Computer Algebra Independent Integration Tests

Summer 2023 edition

5-Inverse-trig-functions/5.1-Inverse-sine/142-5.1.2-d-x-^m-a+b-arcsin-c-x-^n

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Contents

CHAPTER 1

INTRODUCTION

This report gives the result of running the computer algebra independent integration test.The download section in on the main webpage contains links to download the problems in plain text format used for all CAS systems. The number of integrals in this report is [227]. This is test number [142].

1.1 Listing of CAS systems tested

The following are the CAS systems tested:

1. Mathematica 13.3.1 (August 16, 2023) on windows 10.
2. Rubi 4.16.1 (Dec 19, 2018) on Mathematica 13.3 on windows 10
3. Maple 2023.1 (July, 12, 2023) on windows 10.
4. Maxima 5.47 (June 1, 2023) using Lisp SBCL 2.3.0 on Linux via sagemath 10.1 (Aug 20, 2023).
5. FriCAS 1.3.9 (July 8, 2023) based on sbcl 2.3.0 on Linux via sagemath 10.1 (Aug 20, 2023).
6. Giac/Xcas 1.9.0-57 (June 26, 2023) on Linux via sagemath 10.1 (Aug 20, 2023).
7. Sympy 1.12 (May 10, 2023) Using Python 3.11.3 on Linux.
8. Mupad using Matlab 2021a with Symbolic Math Toolbox Version 8.7 on windows 10.

Maxima and Fricas and Giac are called using Sagemath. This was done using Sagemath `integrate` command by changing the name of the algorithm to use the different CAS systems.

Sympy was run directly in Python not via sagemath.

1.2 Results

Important note: A number of problems in this test suite have no antiderivative in closed form. This means the antiderivative of these integrals can not be expressed in terms of elementary, special functions or `Hypergeometric2F1` functions. `RootSum` and `RootOf` are not allowed. If a CAS returns the above integral unevaluated within the time limit, then the result is counted as passed and assigned an A grade.

However, if CAS times out, then it is assigned an F grade even if the integral is not integrable, as this implies CAS could not determine that the integral is not integrable in the time limit.

If a CAS returns an antiderivative to such an integral, it is assigned an A grade automatically and this special result is listed in the introduction section of each individual test report to make it easy to identify as this can be important result to investigate.

The results given in in the table below reflects the above.

System	% solved	% Failed
Rubi	100.00 (227)	0.00 (0)
Mathematica	100.00 (227)	0.00 (0)
Maple	95.59 (217)	4.41 (10)
Giac	71.81 (163)	28.19 (64)
Sympy	44.49 (101)	55.51 (126)
Fricas	37.44 (85)	62.56 (142)
Mupad	33.04 (75)	66.96 (152)
Maxima	33.04 (75)	66.96 (152)

Table 1.1: Percentage solved for each CAS

The table below gives additional break down of the grading of quality of the antiderivatives generated by each CAS. The grading is given using the letters A,B,C and F with A being the best quality. The grading is accomplished by comparing the antiderivative generated with the optimal antiderivatives included in the test suite. The following table describes the meaning of these grades.

grade	description
A	Integral was solved and antiderivative is optimal in quality and leaf size.
B	Integral was solved and antiderivative is optimal in quality but leaf size is larger than twice the optimal antiderivatives leaf size.
C	Integral was solved and antiderivative is non-optimal in quality. This can be due to one or more of the following reasons 1. antiderivative contains a hypergeometric function and the optimal antiderivative does not. 2. antiderivative contains a special function and the optimal antiderivative does not. 3. antiderivative contains the imaginary unit and the optimal antiderivative does not.
F	Integral was not solved. Either the integral was returned unevaluated within the time limit, or it timed out, or CAS hanged or crashed or an exception was raised.

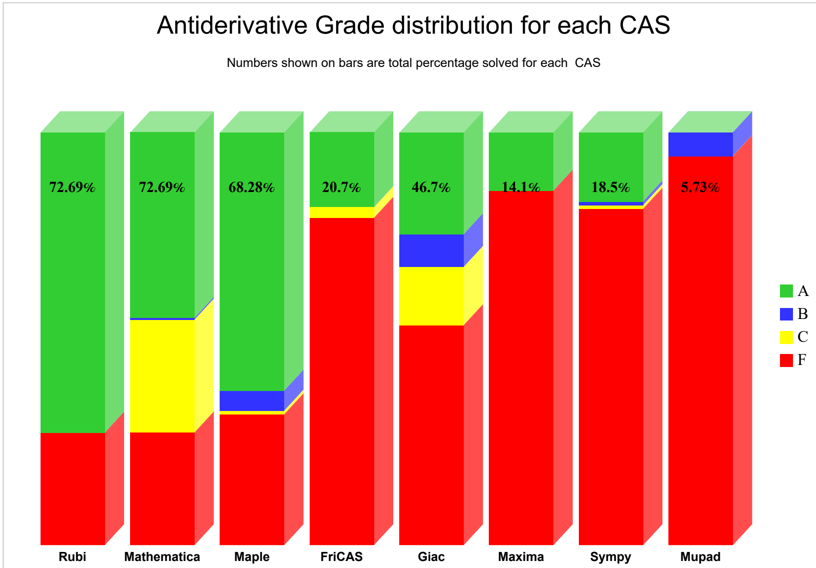
Table 1.2: Description of grading applied to integration result

Grading is implemented for all CAS systems. Based on the above, the following table summarizes the grading for this test suite.

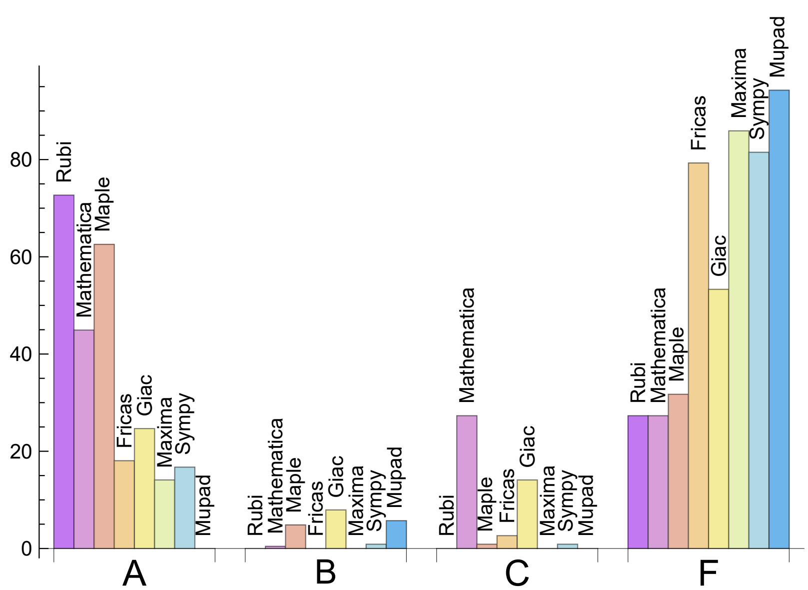
System	% A grade	% B grade	% C grade	% F grade
Rubi	72.687	0.000	0.000	27.313
Maple	62.555	4.846	0.881	31.718
Mathematica	44.934	0.441	27.313	27.313
Giac	24.670	7.930	14.097	53.304
Fricas	18.062	0.000	2.643	79.295
Sympy	16.740	0.881	0.881	81.498
Maxima	14.097	0.000	0.000	85.903
Mupad	0.000	5.727	0.000	94.273

Table 1.3: Antiderivative Grade distribution of each CAS

The following is a Bar chart illustration of the data in the above table.



The figure below compares the grades of the CAS systems.



The following table shows the distribution of the different types of failures for each CAS. There are 3 types failures. The first is when CAS returns the input within the time limit, which means it could not solve it. This is the typical failure and given as **F**.

The second failure is due to time out. CAS could not solve the integral within the 3 minutes time limit which is assigned. This is assigned **F(-1)**.

The third is due to an exception generated, indicated as **F(-2)**. This most likely indicates an interface problem between sagemath and the CAS (applicable only to FriCAS, Maxima and Giac) or it could be an indication of an internal error in the CAS itself. This type of error requires more investigation to determine the cause.

System	Number failed	Percentage normal failure	Percentage timeout failure	Percentage exception failure
Rubi	0	0.00	0.00	0.00
Mathematica	0	0.00	0.00	0.00
Maple	10	100.00	0.00	0.00
Giac	64	79.69	0.00	20.31
Fricas	142	44.37	0.00	55.63
Sympy	126	92.06	0.79	7.14
Maxima	152	60.53	0.00	39.47
Mupad	152	0.00	100.00	0.00

Table 1.4: Failure statistics for each CAS

1.3 Time and leaf size Performance

The table below summarizes the performance of each CAS system in terms of time used and leaf size of results.

Mean size is the average leaf size produced by the CAS (before any normalization). The Normalized mean is relative to the mean size of the optimal anti-derivative given in the input files.

For example, if CAS has **Normalized mean** of 3, then the mean size of its leaf size is 3 times as large as the mean size of the optimal leaf size.

Median size is value of leaf size where half the values are larger than this and half are smaller (before any normalization). i.e. The Middle value.

Similarly the **Normalized median** is relative to the median leaf size of the optimal.

For example, if a CAS has Normalized median of 1.2, then its median is 1.2 as large as the median leaf size of the optimal.

System	Mean time (sec)
Maple	0.08
Mupad	0.09
Rubi	0.10
Fricas	0.24
Giac	0.46
Maxima	0.91
Mathematica	2.72
Sympy	6.63

Table 1.5: Time performance for each CAS

System	Mean size	Normalized mean	Median size	Normalized median
Mupad	22.76	1.08	16.00	1.00
Fricas	51.61	1.24	47.00	1.11
Sympy	53.03	1.06	17.00	1.00
Rubi	85.52	1.00	75.00	1.00
Mathematica	90.52	1.09	69.00	1.07
Maple	102.24	1.11	67.00	0.96
Maxima	108.39	5.49	69.00	1.00
Giac	171.40	1.70	68.00	1.20

Table 1.6: Leaf size performance for each CAS

1.4 Performance based on number of rules Rubi used

This section shows how each CAS performed based on the number of rules Rubi needed to solve the same integral. One diagram is given for each CAS.

On the y axis is the percentage solved which Rubi itself needed the number of rules given the x axis. These plots show that as more rules are needed then most CAS system percentage of solving decreases which indicates the integral is becoming more complicated to solve.

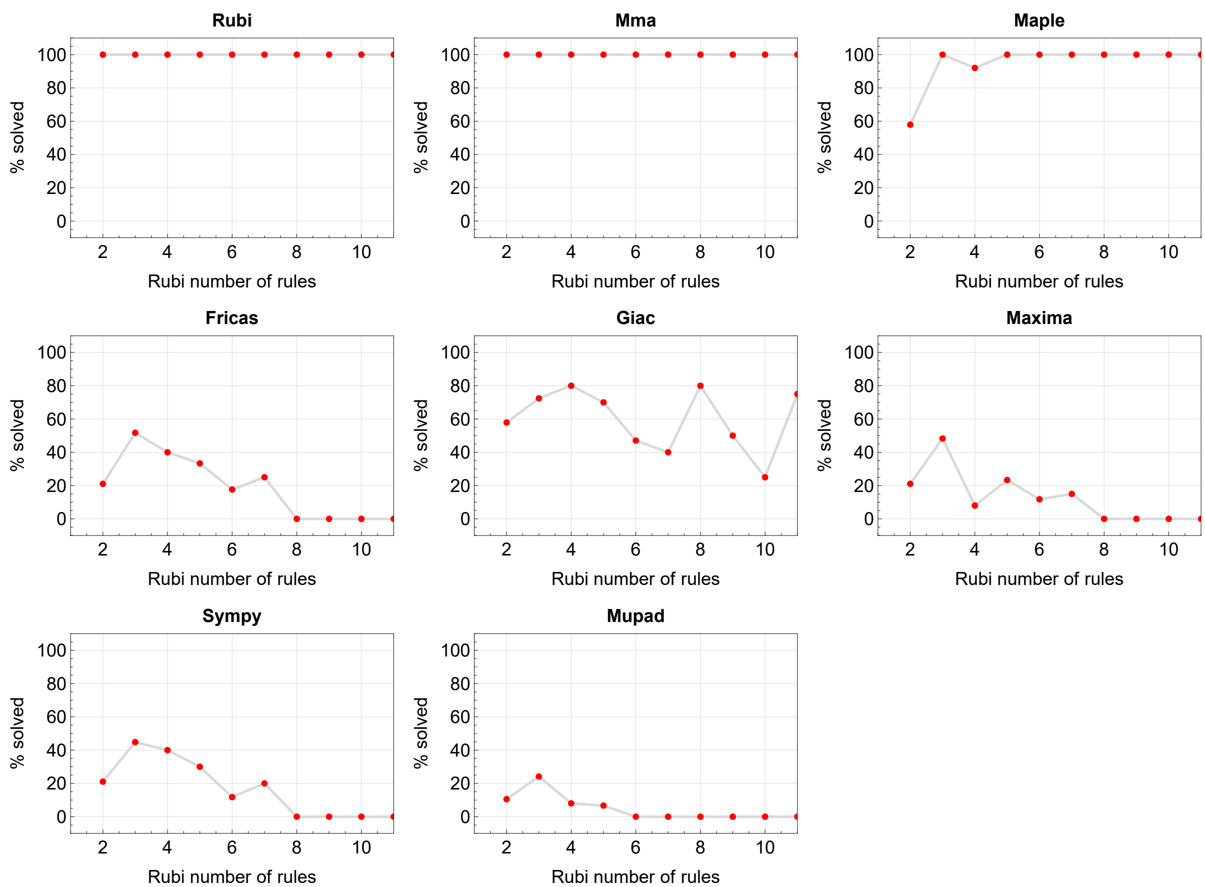


Figure 1.1: Solving statistics per number of Rubi rules used

1.5 Performance based on number of steps Rubi used

This section shows how each CAS performed based on the number of steps Rubi needed to solve the same integral. Note that the number of steps Rubi needed can be much higher than the number of rules, as the same rule could be used more than once.

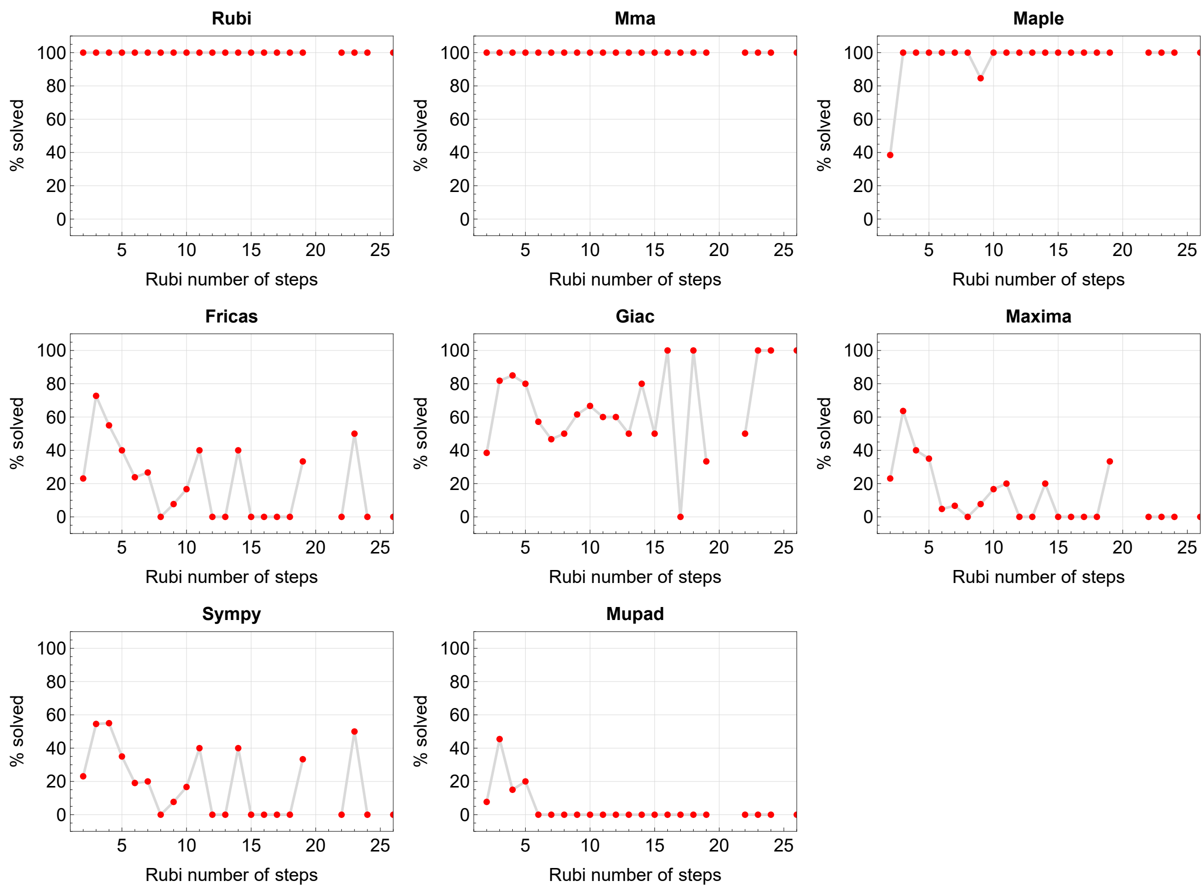


Figure 1.2: Solving statistics per number of Rubi steps used

The above diagram show that the precentage of solved intergals decreases for most CAS systems as the number of steps increases. As expected, for integrals that required less steps by Rubi, CAS systems had more success which indicates the integral was not as hard to solve. As Rubi needed more steps to solve the integral, the solved percentage decreased for most CAS systems which indicates the integral is becoming harder to solve.

1.6 Solved integrals histogram based on leaf size of result

The following shows the distribution of solved integrals for each CAS system based on leaf size of the antiderivatives produced by each CAS. It shows that most integrals solved produced leaf size less than about 100 to 150. The bin size used is 40.

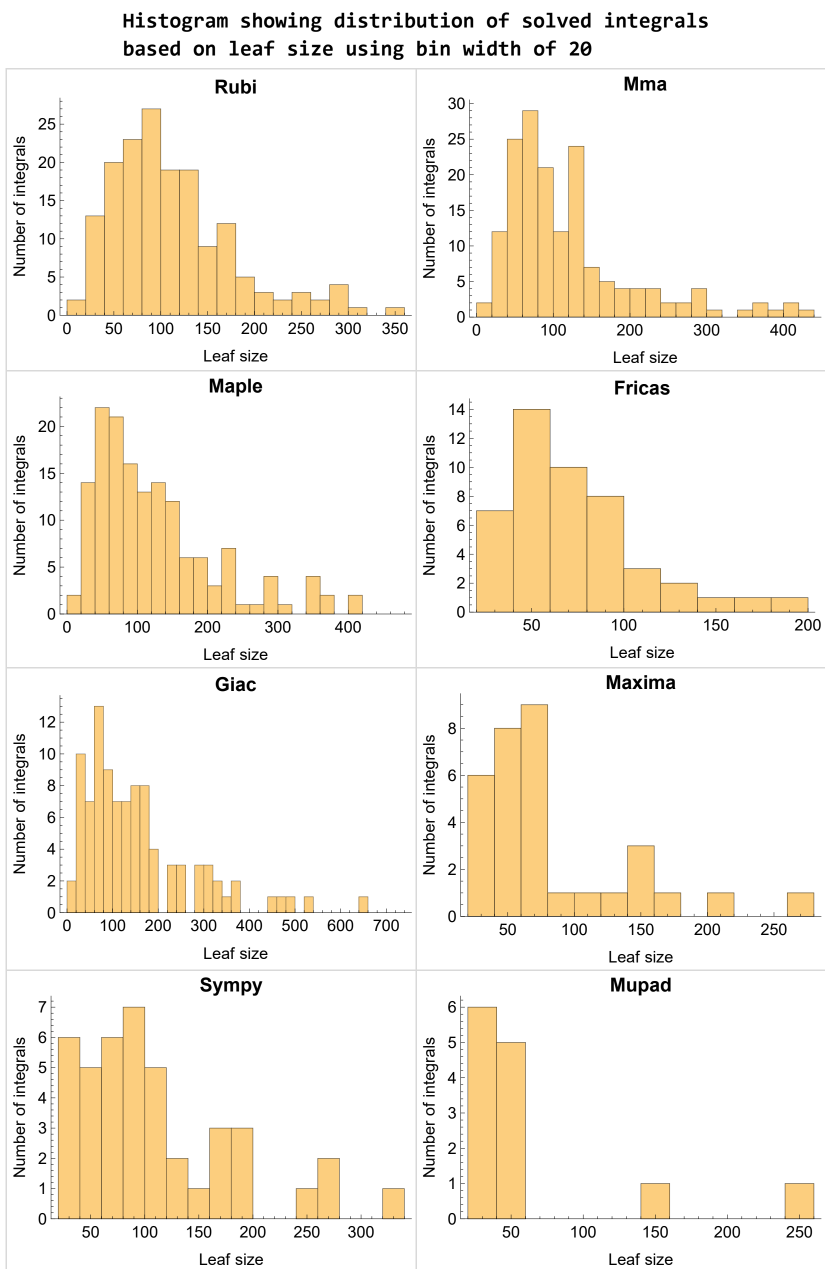


Figure 1.3: Solved integrals based on leaf size distribution

1.7 Solved integrals histogram based on CPU time used

The following shows the distribution of solved integrals for each CAS system based on CPU time used in seconds. The bin size used is 0.1 second.

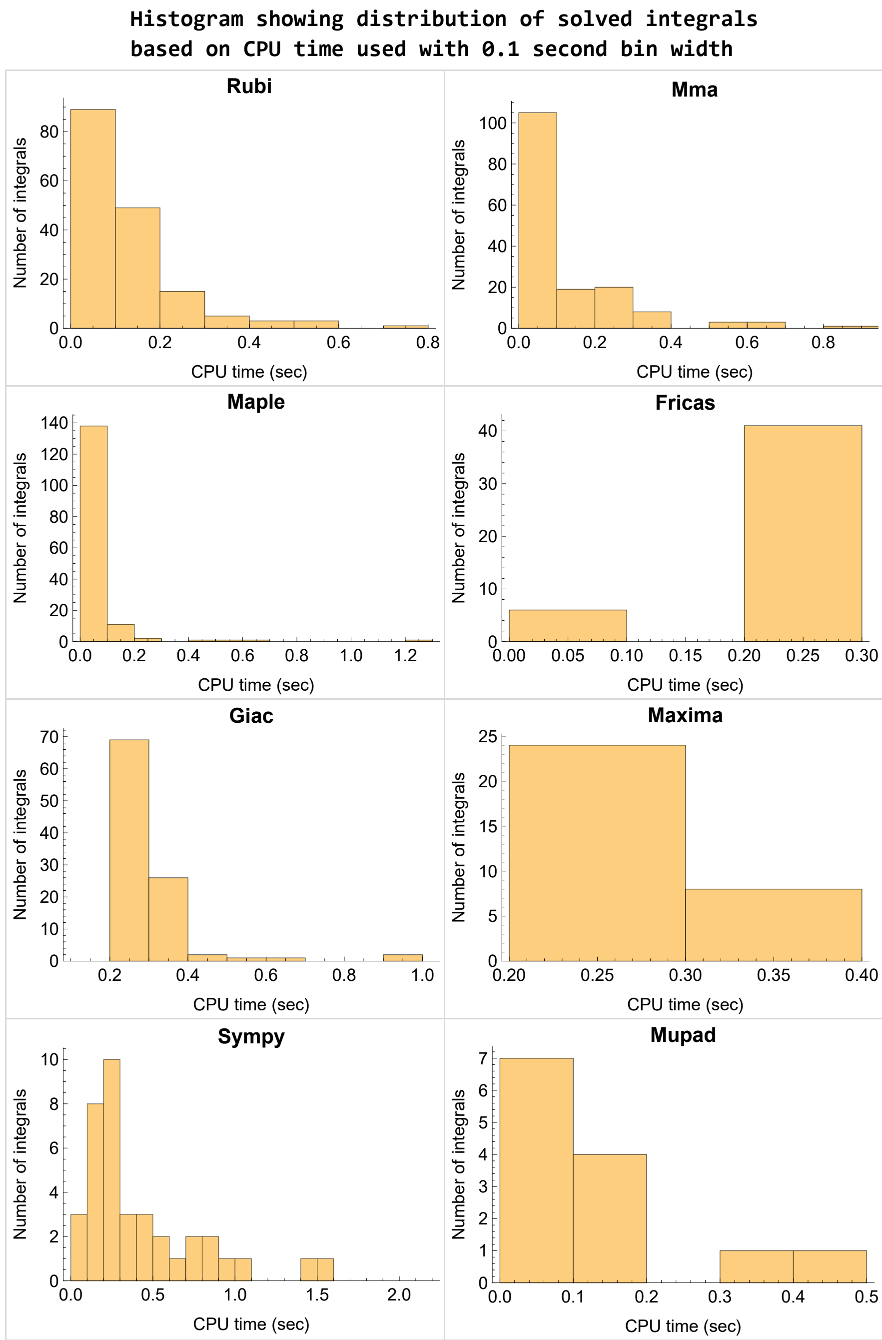


Figure 1.4: Solved integrals histogram based on CPU time used

1.8 Leaf size vs. CPU time used

The following shows the relation between the CPU time used to solve an integral and the leaf size of the antiderivative.

The result for Fricas, Maxima and Giac is shifted more to the right than the other CAS system due to the use of sagemath to call them, which causes an initial slight delay in the timing to start the integration due to overhead of starting a new process each time. This should also be taken into account when looking at the timing of these three CAS systems. Direct calls not using sagemath would result in faster timings, but current implementation uses sagemath as this makes testing much easier to do.

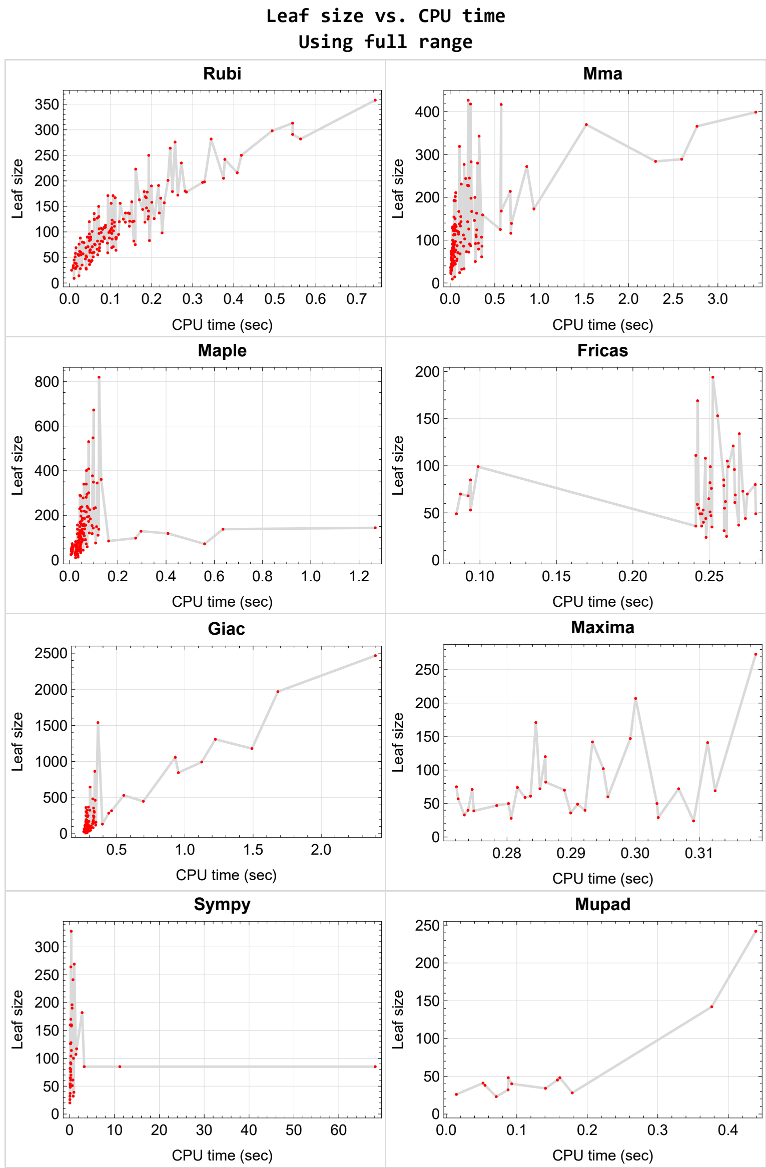


Figure 1.5: Leaf size vs. CPU time. Full range

1.9 list of integrals with no known antiderivative

{49, 50, 58, 59, 65, 66, 72, 73, 79, 85, 91, 97, 98, 106, 112, 118, 119, 120, 123, 124, 125, 126, 127, 128, 129, 134, 135, 136, 137, 138, 139, 161, 162, 166, 167, 171, 172, 176, 177, 181, 182, 186, 187, 191, 192, 196, 197, 201, 202, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227}

1.10 List of integrals solved by CAS but has no known antiderivative

Rubi {}

Mathematica {}

Maple {}

Maxima {}

Fricas {}

Sympy {}

Giac {}

Mupad {}

1.11 list of integrals solved by CAS but failed verification

The following are integrals solved by CAS but the verification phase failed to verify the anti-derivative produced is correct. This does not necessarily mean that the anti-derivative is wrong as additional methods of verification might be needed, or more time is needed (3 minutes time limit was used). These integrals are listed here to make it possible to do further investigation to determine why the result could not be verified.

Rubi {}

Mathematica {}

Maple {}

Maxima Verification phase not currently implemented.

Fricas Verification phase not currently implemented.

Sympy Verification phase not currently implemented.

Giac Verification phase not currently implemented.

Mupad Verification phase not currently implemented.

1.12 Timing

The command `AbsoluteTiming[]` was used in Mathematica to obtain the elapsed time for each integrate call. In Maple, the command `Usage` was used as in the following example

```
cpu_time := Usage(assign ('result_of_int',int(expr,x)),output='realtime'
```

For all other CAS systems, the elapsed time to complete each integral was found by taking the difference between the time after the call completed from the time before the call was made. This was done using Python's `time.time()` call.

All elapsed times shown are in seconds. A time limit of 3 CPU minutes was used for each integral. If the integrate command did not complete within this time limit, the integral was aborted and considered to have failed and assigned an F grade. The time used by failed integrals due to time out was not counted in the final statistics.

1.13 Verification

A verification phase was applied on the result of integration for `Rubi` and `Mathematica`.

Future version of this report will implement verification for the other CAS systems. For the integrals whose result was not run through a verification phase, it is assumed that the antiderivative was correct.

Verification phase also had 3 minutes time out. An integral whose result was not verified could still be correct, but further investigation is needed on those integrals. These integrals were marked in the summary table below and also in each integral separate section so they are easy to identify and locate.

1.14 Important notes about some of the results

Important note about Maxima results

Since tests were run in a batch mode, and using an automated script, then any integral where Maxima needed an interactive response from the user to answer a question during the evaluation of the integral will fail.

The exception raised is `ValueError`. Therefore Maxima results is lower than what would result if Maxima was run directly and each question was answered correctly.

The percentage of such failures were not counted for each test file, but for an example, for the `Timofeev` test file, there were about 14 such integrals out of total 705, or about 2 percent. This percentage can be higher or lower depending on the specific input test file.

Such integrals can be identified by looking at the output of the integration in each section for Maxima. The exception message will indicate the cause of error.

Maxima integrate was run using SageMath with the following settings set by default

```
'besselexpand : true'
'display2d : false'
'domain : complex'
'keepfloat : true'
'load(to_poly_solve)'
'load(simplify_sum)'
'load(abs_integrate)' 'load(diag)'
```

SageMath automatic loading of Maxima `abs_integrate` was found to cause some problems. So the following code was added to disable this effect.

```
from sage.interfaces.maxima_lib import maxima_lib
maxima_lib.set('extra_definite_integration_methods', '[]')
maxima_lib.set('extra_integration_methods', '[]')
```

See `https://ask.sagemath.org/question/43088/integrate-results-that-are-different-from-using-maxima/` for reference.

Important note about FriCAS result

There were few integrals which failed due to SageMath interface and not because FriCAS system could not do the integration.

These will fail With error `Exception raised: NotImplementedError`.

The number of such cases seems to be very small. About 1 or 2 percent of all integrals. These can be identified by looking at the exception message given in the result.

Important note about finding leaf size of antiderivative

For Mathematica, Rubi, and Maple, the builtin system function `LeafSize` was used to find the leaf size of each antiderivative.

The other CAS systems (SageMath and Sympy) do not have special builtin function for this purpose at this time. Therefore the leaf size for Fricas and Sympy antiderivative was determined using the following function, thanks to user `slelievre` at `https://ask.sagemath.org/question/57123/could-we-have-a-leaf_count-function-in-base-sagemath/`

```
def tree_size(expr):
    r"""
    Return the tree size of this expression.
    """
    if expr not in SR:
        # deal with lists, tuples, vectors
        return 1 + sum(tree_size(a) for a in expr)
    expr = SR(expr)
```

```
    x, aa = expr.operator(), expr.operands()
    if x is None:
        return 1
    else:
        return 1 + sum(tree_size(a) for a in aa)
```

For Sympy, which was called directly from Python, the following code was used to obtain the leafsize of its result

```
try:
  # 1.7 is a fudge factor since it is low side from actual leaf count
  leafCount = round(1.7*count_ops(anti))

  except Exception as ee:
        leafCount =1
```

Important note about Mupad results

Matlab's symbolic toolbox does not have a leaf count function to measure the size of the antiderivative. Maple was used to determine the leaf size of Mupad output by post processing Mupad result.

Currently no grading of the antiderivative for Mupad is implemented. If it can integrate the problem, it was assigned a B grade automatically as a placeholder. In the future, when grading function is implemented for Mupad, the tests will be rerun again.

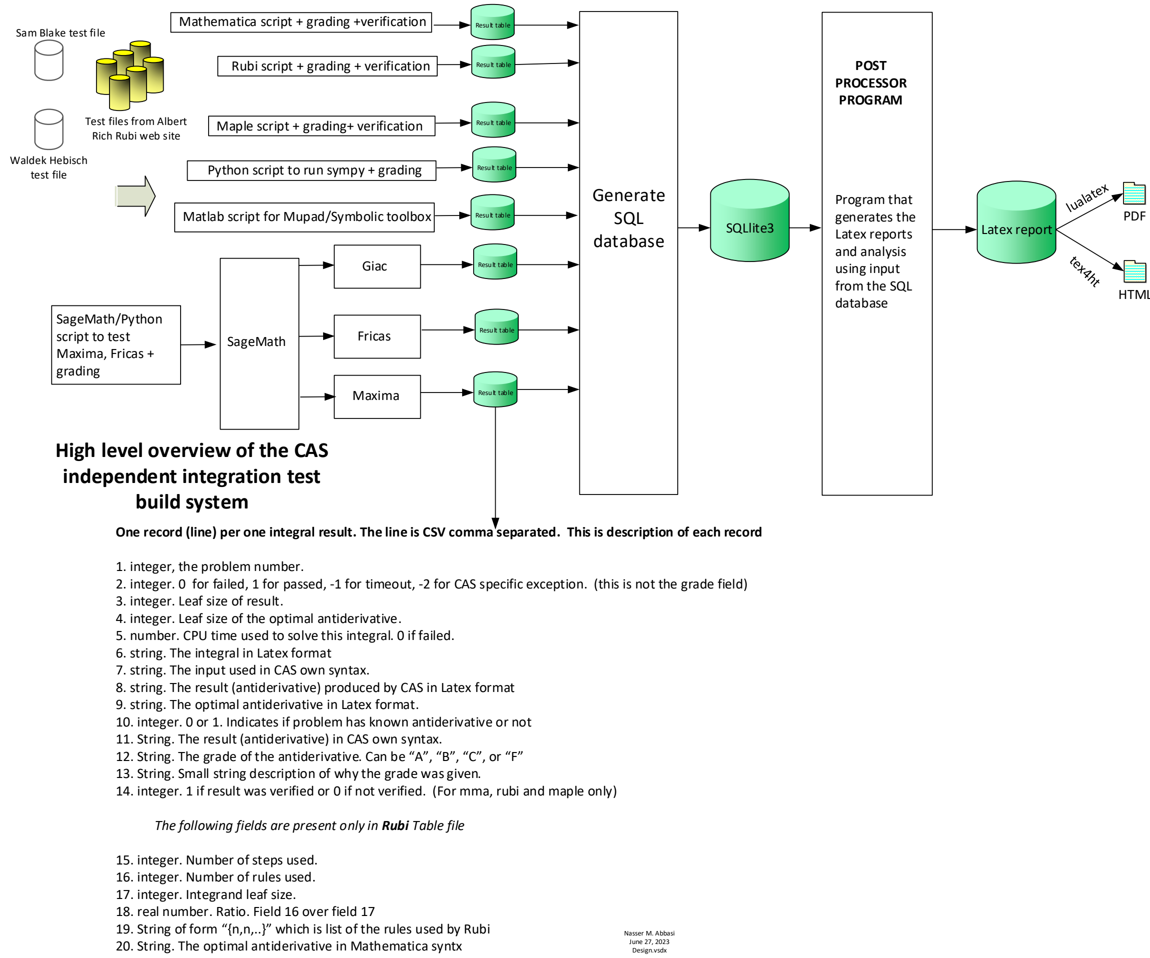
The following is an example of using Matlab's symbolic toolbox (Mupad) to solve an integral

```
integrand = evalin(symengine,'cos(x)*sin(x)')
the_variable = evalin(symengine,'x')
anti = int(integrand,the_variable)
```

Which gives `sin(x)^2/2`

1.15 Design of the test system

The following diagram gives a high level view of the current test build system.



CHAPTER 2

DETAILED SUMMARY TABLES OF RESULTS

2.1 List of integrals sorted by grade for each CAS

Rubi

A grade { 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 51, 52, 53, 54, 55, 56, 57, 60, 61, 62, 63, 64, 67, 68, 69, 70, 71, 74, 75, 76, 77, 78, 80, 81, 82, 83, 84, 86, 87, 88, 89, 90, 92, 93, 94, 95, 96, 99, 100, 101, 102, 103, 104, 105, 107, 108, 109, 110, 111, 113, 114, 115, 116, 117, 121, 122, 130, 131, 132, 133, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 163, 164, 165, 168, 169, 170, 173, 174, 175, 178, 179, 180, 183, 184, 185, 188, 189, 190, 193, 194, 195, 198, 199, 200, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214 }

B grade { }

C grade { }

F normal fail { }

F(-1) timedout fail { }

F(-2) exception fail { }

Mma

A grade { 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 51, 52, 53, 54, 55, 56, 57, 60, 61, 62, 63, 64, 67, 68, 69, 70, 71, 121, 122, 130, 131, 132, 133, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 158, 159, 160, 163, 164, 165, 168, 169, 170, 209, 210, 211, 212, 213, 214 }

B grade { 157 }

C grade { 11, 74, 75, 76, 77, 78, 80, 81, 82, 83, 84, 86, 87, 88, 89, 90, 92, 93, 94, 95, 96, 99, 100, 101, 102, 103, 104, 105, 107, 108, 109, 110, 111, 113, 114, 115, 116, 117, 173, 174, 175, 178, 179, 180, 183, 184, 185, 188, 189, 190, 193, 194, 195, 198, 199, 200, 203, 204, 205, 206, 207, 208 }

F normal fail { }

F(-1) timedout fail { }

F(-2) exception fail { }

Maple

A grade { 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 51, 52, 53, 54, 55, 56, 57, 60, 61, 62, 63, 64, 67, 68, 69, 70, 71, 74, 75, 76, 77, 78, 80, 81, 82, 83, 84, 86, 87, 88, 89, 90, 92, 93, 94, 95, 96, 99, 100, 101, 102, 103, 104, 105, 107, 108, 109, 110, 111, 113, 114, 115, 116, 117, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 152, 153, 154, 155, 157, 158, 159, 160, 163, 164, 165, 168, 169, 170, 173, 174, 175, 188, 189, 190, 193, 194, 195, 203, 204, 205, 206, 207, 208 }

B grade { 151, 156, 178, 179, 180, 183, 184, 185, 198, 199, 200 }

C grade { 132, 133 }

F normal fail { 121, 122, 130, 131, 209, 210, 211, 212, 213, 214 }

F(-1) timedout fail { }

F(-2) exception fail { }

Fricas

A grade { 1, 2, 3, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 19, 21, 22, 23, 24, 25, 26, 32, 33, 34, 35, 36, 37, 140, 141, 142, 143, 145, 146, 147, 148, 149, 150, 153, 154, 155 }

B grade { }

C grade { 203, 204, 205, 206, 207, 208 }

F normal fail { 6, 17, 18, 20, 27, 28, 29, 30, 31, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 51, 52, 53, 54, 55, 56, 57, 60, 61, 62, 63, 64, 67, 68, 69, 70, 71, 121, 122, 130, 131, 132, 133, 144, 151, 152, 156, 157, 158, 159, 160, 163, 164, 165, 168, 169, 170, 209, 210, 211, 212, 213, 214 }

F(-1) timedout fail { }

F(-2) exception fail { 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 125, 126, 127, 128, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202 }

Maxima

A grade { 1, 2, 3, 4, 5, 7, 8, 9, 10, 11, 12, 14, 16, 19, 21, 22, 24, 26, 33, 35, 37, 140, 141, 142, 143, 145, 146, 147, 148, 150, 153, 155 }

B grade { }

C grade { }

F normal fail { 6, 13, 15, 17, 18, 20, 23, 25, 27, 28, 29, 30, 31, 32, 34, 36, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 51, 52, 53, 54, 55, 56, 57, 60, 61, 62, 63, 64, 67, 68, 69, 70, 71, 121, 122, 144, 149, 151, 152, 154, 156, 157, 158, 159, 160, 163, 164, 165, 168, 169, 170, 173, 174, 175, 178, 179, 180, 183, 184, 185, 188, 189, 190, 193, 194, 195, 198, 199, 200, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214 }

F(-1) timedout fail { }

F(-2) exception fail { 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139 }

Giac

A grade { 1, 2, 3, 4, 5, 7, 9, 11, 12, 13, 14, 15, 16, 22, 23, 24, 25, 26, 32, 33, 34, 35, 36, 37, 42, 43, 44, 45, 46, 47, 48, 52, 53, 54, 55, 56, 57, 60, 61, 62, 63, 64, 67, 68, 69, 70, 71, 140, 141, 142, 143, 150, 155, 158, 159, 160 }

B grade { 8, 10, 19, 21, 51, 145, 146, 147, 148, 149, 153, 154, 163, 164, 165, 168, 169, 170 }

C grade { 74, 75, 76, 77, 78, 80, 81, 82, 83, 84, 86, 87, 88, 89, 90, 92, 93, 94, 95, 96, 173, 174, 175, 178, 179, 180, 183, 184, 185, 188, 189, 190 }

F normal fail { 6, 17, 18, 20, 27, 28, 29, 30, 38, 39, 40, 41, 99, 101, 103, 104, 105, 107, 109, 110, 111, 113, 115, 116, 117, 121, 122, 130, 131, 132, 133, 144, 151, 152, 156, 157, 193, 194, 195, 198, 199, 200, 203, 204, 205, 206, 207, 208, 212, 213, 214 }

F(-1) timedout fail { }

F(-2) exception fail { 31, 100, 102, 108, 114, 161, 196, 201, 209, 210, 211, 215, 216 }

Mupad

A grade { }

B grade { 4, 5, 6, 7, 16, 26, 37, 142, 143, 144, 145, 150, 155 }

C grade { }

F normal fail { }

F(-1) timedout fail { 1, 2, 3, 8, 9, 10, 11, 12, 13, 14, 15, 17, 18, 19, 20, 21, 22, 23, 24, 25, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 51, 52, 53, 54, 55, 56, 57, 60, 61, 62, 63, 64, 67, 68, 69, 70, 71, 74, 75, 76, 77, 78, 80, 81, 82, 83, 84, 86, 87, 88, 89, 90, 92, 93, 94, 95, 96, 99, 100, 101, 102, 103, 104, 105, 107, 108, 109, 110, 111, 113, 114, 115, 116, 117, 121, 122, 130, 131, 132, 133, 140, 141, 146, 147, 148, 149, 151, 152, 153, 154, 156, 157, 158, 159, 160, 163, 164, 165, 168, 169, 170, 173, 174, 175, 178, 179, 180, 183, 184, 185, 188, 189, 190, 193, 194, 195, 198, 199, 200, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214 }

F(-2) exception fail { }

Sympy

A grade { 1, 2, 3, 4, 5, 9, 10, 11, 12, 13, 14, 15, 16, 22, 23, 24, 25, 26, 32, 33, 34, 35, 36, 37, 140, 141, 142, 143, 145, 146, 147, 148, 149, 150, 153, 203, 204, 205 }

B grade { 154, 155 }

C grade { 7, 8 }

F normal fail { 6, 17, 18, 19, 20, 21, 27, 28, 29, 30, 31, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 51, 52, 53, 54, 55, 56, 57, 60, 61, 62, 63, 64, 67, 68, 69, 70, 71, 74, 75, 76, 77, 78, 80, 81, 82, 83, 84, 86, 87, 88, 89, 90, 92, 93, 94, 95, 96, 99, 100, 101, 102, 103, 104, 105, 107, 108, 109, 110, 111, 113, 114, 115, 116, 117, 121, 122, 130, 131, 132, 133, 144, 151, 152, 156, 157, 158, 159, 160, 163, 164, 165, 168, 169, 170, 173, 174, 175, 178, 179, 180, 183, 184, 185, 188, 189, 190, 193, 194, 195, 198, 199, 200, 210, 211 }

F(-1) timedout fail { 209 }

F(-2) exception fail { 206, 207, 208, 212, 213, 214, 217, 218, 219 }

2.2 Detailed conclusion table per each integral for all CAS systems

Detailed conclusion table per each integral is given by the table below. The elapsed time is in seconds. For failed result it is given as **F(-1)** if the failure was due to timeout. It is given as **F(-2)** if the failure was due to an exception being raised, which could indicate a bug in the system. If the failure was due to integral not being evaluated within the time limit, then it is given as **F**.

In this table, the column `N.S.` means **normalized size** and is defined as $\frac{\text{antiderivative leaf size}}{\text{optimal antiderivative leaf size}}$. To make the table fit the page, the name `Mathematica` was abbreviated to `MMA`.

Problem 1	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	75	75	51	72	71	49	70	113	0
N.S.	1	1.00	0.68	0.96	0.95	0.65	0.93	1.51	0.00
time (sec)	N/A	0.160	0.043	0.560	0.275	0.245	0.298	0.267	0.000

Problem 2	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	69	69	50	60	61	47	61	84	0
N.S.	1	1.00	0.72	0.87	0.88	0.68	0.88	1.22	0.00
time (sec)	N/A	0.103	0.029	0.010	0.284	0.251	0.241	0.272	0.000

Problem 3	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	54	54	41	52	50	40	48	64	0
N.S.	1	1.00	0.76	0.96	0.93	0.74	0.89	1.19	0.00
time (sec)	N/A	0.023	0.035	0.008	0.303	0.246	0.166	0.278	0.000

Problem 4	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	45	45	40	40	40	36	37	46	38
N.S.	1	1.00	0.89	0.89	0.89	0.80	0.82	1.02	0.84
time (sec)	N/A	0.011	0.018	0.007	0.292	0.245	0.141	0.269	0.055

Problem 5	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	25	25	25	24	24	24	20	24	23
N.S.	1	1.00	1.00	0.96	0.96	0.96	0.80	0.96	0.92
time (sec)	N/A	0.005	0.008	0.006	0.309	0.248	0.063	0.261	0.071

Problem 6	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	F	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	51	51	46	111	0	0	0	0	41
N.S.	1	1.00	0.90	2.18	0.00	0.00	0.00	0.00	0.80
time (sec)	N/A	0.042	0.054	0.118	0.000	0.000	0.000	0.000	0.052

Problem 7	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	C	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	28	28	28	27	39	49	32	48	26
N.S.	1	1.00	1.00	0.96	1.39	1.75	1.14	1.71	0.93
time (sec)	N/A	0.014	0.009	0.007	0.275	0.280	0.823	0.269	0.014

Problem 8	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	C	B	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	34	34	29	29	28	25	51	68	0
N.S.	1	1.00	0.85	0.85	0.82	0.74	1.50	2.00	0.00
time (sec)	N/A	0.009	0.010	0.009	0.281	0.261	0.625	0.277	0.000

Problem 9	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	56	56	53	50	60	73	107	77	0
N.S.	1	1.00	0.95	0.89	1.07	1.30	1.91	1.38	0.00
time (sec)	N/A	0.021	0.018	0.007	0.296	0.272	1.413	0.269	0.000

Problem 10	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	B	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	58	58	41	52	50	37	100	130	0
N.S.	1	1.00	0.71	0.90	0.86	0.64	1.72	2.24	0.00
time (sec)	N/A	0.014	0.024	0.010	0.280	0.269	0.858	0.279	0.000

Problem 11	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	A	A	A	A	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	80	80	51	73	82	85	182	101	0
N.S.	1	1.00	0.64	0.91	1.02	1.06	2.28	1.26	0.00
time (sec)	N/A	0.031	0.022	0.011	0.286	0.259	2.792	0.278	0.000

Problem 12	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	120	120	82	76	102	76	114	169	0
N.S.	1	1.00	0.68	0.63	0.85	0.63	0.95	1.41	0.00
time (sec)	N/A	0.121	0.041	0.108	0.295	0.251	0.405	0.274	0.000

Problem 13	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	A	A	A	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	98	98	74	91	0	70	90	133	0
N.S.	1	1.00	0.76	0.93	0.00	0.71	0.92	1.36	0.00
time (sec)	N/A	0.102	0.056	0.066	0.000	0.275	0.296	0.281	0.000

Problem 14	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	82	82	64	59	72	59	76	97	0
N.S.	1	1.00	0.78	0.72	0.88	0.72	0.93	1.18	0.00
time (sec)	N/A	0.077	0.039	0.073	0.307	0.242	0.225	0.279	0.000

Problem 15	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	A	A	A	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	60	60	55	65	0	51	51	73	0
N.S.	1	1.00	0.92	1.08	0.00	0.85	0.85	1.22	0.00
time (sec)	N/A	0.060	0.031	0.025	0.000	0.250	0.186	0.269	0.000

Problem 16	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	35	35	35	37	33	36	32	33	32
N.S.	1	1.00	1.00	1.06	0.94	1.03	0.91	0.94	0.91
time (sec)	N/A	0.031	0.017	0.030	0.273	0.241	0.081	0.272	0.088

Problem 17	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	F	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	71	71	71	169	0	0	0	0	0
N.S.	1	1.00	1.00	2.38	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.106	0.087	0.043	0.000	0.000	0.000	0.000	0.000

Problem 18	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	F	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	66	66	87	120	0	0	0	0	0
N.S.	1	1.00	1.32	1.82	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.067	0.231	0.037	0.000	0.000	0.000	0.000	0.000

Problem 19	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	F	B	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	44	44	44	48	40	44	0	82	0
N.S.	1	1.00	1.00	1.09	0.91	1.00	0.00	1.86	0.00
time (sec)	N/A	0.047	0.025	0.034	0.274	0.274	0.000	0.286	0.000

Problem 20	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	F	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	116	116	139	149	0	0	0	0	0
N.S.	1	1.00	1.20	1.28	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.103	0.687	0.112	0.000	0.000	0.000	0.000	0.000

Problem 21	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	F	B	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	87	87	69	82	74	62	0	185	0
N.S.	1	1.00	0.79	0.94	0.85	0.71	0.00	2.13	0.00
time (sec)	N/A	0.085	0.033	0.033	0.282	0.261	0.000	0.329	0.000

Problem 22	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	201	201	122	159	171	105	196	249	0
N.S.	1	1.00	0.61	0.79	0.85	0.52	0.98	1.24	0.00
time (sec)	N/A	0.240	0.067	0.048	0.285	0.262	0.544	0.275	0.000

Problem 23	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	A	A	A	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	167	167	112	154	0	96	160	185	0
N.S.	1	1.00	0.67	0.92	0.00	0.57	0.96	1.11	0.00
time (sec)	N/A	0.187	0.039	0.093	0.000	0.266	0.420	0.282	0.000

Problem 24	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	136	136	95	106	120	79	128	142	0
N.S.	1	1.00	0.70	0.78	0.88	0.58	0.94	1.04	0.00
time (sec)	N/A	0.146	0.038	0.043	0.286	0.259	0.307	0.281	0.000

Problem 25	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	A	A	A	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	99	99	82	96	0	69	92	101	0
N.S.	1	1.00	0.83	0.97	0.00	0.70	0.93	1.02	0.00
time (sec)	N/A	0.096	0.025	0.049	0.000	0.267	0.232	0.289	0.000

Problem 26	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	60	60	60	57	57	44	54	56	40
N.S.	1	1.00	1.00	0.95	0.95	0.73	0.90	0.93	0.67
time (sec)	N/A	0.049	0.012	0.026	0.272	0.248	0.111	0.267	0.093

Problem 27	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	F	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	97	97	97	229	0	0	0	0	0
N.S.	1	1.00	1.00	2.36	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.072	0.058	0.042	0.000	0.000	0.000	0.000	0.000

Problem 28	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	F	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	108	108	133	178	0	0	0	0	0
N.S.	1	1.00	1.23	1.65	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.103	0.115	0.052	0.000	0.000	0.000	0.000	0.000

Problem 29	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	F	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	102	102	92	161	0	0	0	0	0
N.S.	1	1.00	0.90	1.58	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.107	0.284	0.060	0.000	0.000	0.000	0.000	0.000

Problem 30	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	F	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	179	179	284	234	0	0	0	0	0
N.S.	1	1.00	1.59	1.31	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.182	2.302	0.107	0.000	0.000	0.000	0.000	0.000

Problem 31	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	F(-2)	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	169	169	116	231	0	0	0	0	0
N.S.	1	1.00	0.69	1.37	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.185	0.680	0.101	0.000	0.000	0.000	0.000	0.000

Problem 32	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	A	A	A	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	282	282	167	345	0	153	269	362	0
N.S.	1	1.00	0.59	1.22	0.00	0.54	0.95	1.28	0.00
time (sec)	N/A	0.563	0.097	0.114	0.000	0.255	1.035	0.275	0.000

Problem 33	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	250	250	150	197	207	134	241	305	0
N.S.	1	1.00	0.60	0.79	0.83	0.54	0.96	1.22	0.00
time (sec)	N/A	0.419	0.055	0.047	0.300	0.270	0.761	0.276	0.000

Problem 34	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	A	A	A	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	198	198	135	215	0	121	190	234	0
N.S.	1	1.00	0.68	1.09	0.00	0.61	0.96	1.18	0.00
time (sec)	N/A	0.329	0.051	0.069	0.000	0.266	0.567	0.286	0.000

Problem 35	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	166	166	114	130	147	99	158	176	0
N.S.	1	1.00	0.69	0.78	0.89	0.60	0.95	1.06	0.00
time (sec)	N/A	0.222	0.048	0.042	0.299	0.262	0.414	0.280	0.000

Problem 36	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	A	A	A	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	111	111	96	117	0	82	104	127	0
N.S.	1	1.00	0.86	1.05	0.00	0.74	0.94	1.14	0.00
time (sec)	N/A	0.146	0.034	0.055	0.000	0.250	0.303	0.274	0.000

Problem 37	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	69	69	69	67	75	55	65	65	48
N.S.	1	1.00	1.00	0.97	1.09	0.80	0.94	0.94	0.70
time (sec)	N/A	0.073	0.024	0.030	0.272	0.243	0.152	0.277	0.088

Problem 38	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	F	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	113	113	113	287	0	0	0	0	0
N.S.	1	1.00	1.00	2.54	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.087	0.055	0.046	0.000	0.000	0.000	0.000	0.000

Problem 39	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	F	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	156	156	198	238	0	0	0	0	0
N.S.	1	1.00	1.27	1.53	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.123	0.233	0.051	0.000	0.000	0.000	0.000	0.000

Problem 40	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	F	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	119	119	124	219	0	0	0	0	0
N.S.	1	1.00	1.04	1.84	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.136	0.298	0.061	0.000	0.000	0.000	0.000	0.000

Problem 41	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	F	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	276	276	399	377	0	0	0	0	0
N.S.	1	1.00	1.45	1.37	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.257	3.425	0.095	0.000	0.000	0.000	0.000	0.000

Problem 42	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	A	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	55	55	40	40	0	0	0	47	0
N.S.	1	1.00	0.73	0.73	0.00	0.00	0.00	0.85	0.00
time (sec)	N/A	0.069	0.028	0.046	0.000	0.000	0.000	0.287	0.000

Problem 43	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	A	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	43	43	33	33	0	0	0	37	0
N.S.	1	1.00	0.77	0.77	0.00	0.00	0.00	0.86	0.00
time (sec)	N/A	0.052	0.156	0.046	0.000	0.000	0.000	0.289	0.000

Problem 44	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	A	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	41	41	31	31	0	0	0	35	0
N.S.	1	1.00	0.76	0.76	0.00	0.00	0.00	0.85	0.00
time (sec)	N/A	0.052	0.014	0.030	0.000	0.000	0.000	0.279	0.000

Problem 45	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	A	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	29	29	24	24	0	0	0	25	0
N.S.	1	1.00	0.83	0.83	0.00	0.00	0.00	0.86	0.00
time (sec)	N/A	0.040	0.106	0.026	0.000	0.000	0.000	0.279	0.000

Problem 46	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	A	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	27	27	22	22	0	0	0	23	0
N.S.	1	1.00	0.81	0.81	0.00	0.00	0.00	0.85	0.00
time (sec)	N/A	0.041	0.009	0.024	0.000	0.000	0.000	0.277	0.000

Problem 47	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	A	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	14	14	14	13	0	0	0	12	0
N.S.	1	1.00	1.00	0.93	0.00	0.00	0.00	0.86	0.00
time (sec)	N/A	0.023	0.051	0.035	0.000	0.000	0.000	0.283	0.000

Problem 48	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	A	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	9	9	9	10	0	0	0	9	0
N.S.	1	1.00	1.00	1.11	0.00	0.00	0.00	1.00	0.00
time (sec)	N/A	0.011	0.024	0.025	0.000	0.000	0.000	0.274	0.000

Problem 49	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	10	10	12	10	12	12	8	12	12
N.S.	1	1.00	1.20	1.00	1.20	1.20	0.80	1.20	1.20
time (sec)	N/A	0.008	0.208	0.030	0.372	0.229	0.263	0.304	0.035

Problem 50	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	10	10	12	10	12	12	10	12	12
N.S.	1	1.00	1.20	1.00	1.20	1.20	1.00	1.20	1.20
time (sec)	N/A	0.009	1.594	0.095	0.374	0.241	0.282	0.313	0.035

Problem 51	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	B	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	83	83	86	105	0	0	0	161	0
N.S.	1	1.00	1.04	1.27	0.00	0.00	0.00	1.94	0.00
time (sec)	N/A	0.048	0.357	0.046	0.000	0.000	0.000	0.286	0.000

Problem 52	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	A	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	71	71	78	78	0	0	0	120	0
N.S.	1	1.00	1.10	1.10	0.00	0.00	0.00	1.69	0.00
time (sec)	N/A	0.045	0.040	0.044	0.000	0.000	0.000	0.289	0.000

Problem 53	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	A	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	69	69	61	81	0	0	0	115	0
N.S.	1	1.00	0.88	1.17	0.00	0.00	0.00	1.67	0.00
time (sec)	N/A	0.040	0.353	0.030	0.000	0.000	0.000	0.280	0.000

Problem 54	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	A	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	57	57	56	54	0	0	0	72	0
N.S.	1	1.00	0.98	0.95	0.00	0.00	0.00	1.26	0.00
time (sec)	N/A	0.033	0.023	0.032	0.000	0.000	0.000	0.293	0.000

Problem 55	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	A	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	55	55	50	57	0	0	0	68	0
N.S.	1	1.00	0.91	1.04	0.00	0.00	0.00	1.24	0.00
time (sec)	N/A	0.028	0.282	0.029	0.000	0.000	0.000	0.289	0.000

Problem 56	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	A	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	38	38	29	28	0	0	0	36	0
N.S.	1	1.00	0.76	0.74	0.00	0.00	0.00	0.95	0.00
time (sec)	N/A	0.016	0.015	0.033	0.000	0.000	0.000	0.285	0.000

Problem 57	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	A	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	36	36	32	33	0	0	0	34	0
N.S.	1	1.00	0.89	0.92	0.00	0.00	0.00	0.94	0.00
time (sec)	N/A	0.049	0.130	0.023	0.000	0.000	0.000	0.277	0.000

Problem 58	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	10	10	12	10	126	12	10	12	12
N.S.	1	1.00	1.20	1.00	12.60	1.20	1.00	1.20	1.20
time (sec)	N/A	0.009	1.328	0.030	0.571	0.263	0.320	0.310	0.034

Problem 59	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	10	10	12	10	137	12	12	12	12
N.S.	1	1.00	1.20	1.00	13.70	1.20	1.20	1.20	1.20
time (sec)	N/A	0.009	10.918	0.060	0.678	0.250	0.366	0.371	0.040

Problem 60	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	A	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	98	98	103	121	0	0	0	170	0
N.S.	1	1.00	1.05	1.23	0.00	0.00	0.00	1.73	0.00
time (sec)	N/A	0.225	0.163	0.045	0.000	0.000	0.000	0.297	0.000

Problem 61	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	A	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	83	83	73	82	0	0	0	125	0
N.S.	1	1.00	0.88	0.99	0.00	0.00	0.00	1.51	0.00
time (sec)	N/A	0.195	0.183	0.039	0.000	0.000	0.000	0.293	0.000

Problem 62	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	A	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	82	82	68	82	0	0	0	102	0
N.S.	1	1.00	0.83	1.00	0.00	0.00	0.00	1.24	0.00
time (sec)	N/A	0.157	0.111	0.025	0.000	0.000	0.000	0.300	0.000

Problem 63	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	A	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	64	64	61	45	0	0	0	67	0
N.S.	1	1.00	0.95	0.70	0.00	0.00	0.00	1.05	0.00
time (sec)	N/A	0.113	0.049	0.038	0.000	0.000	0.000	0.288	0.000

Problem 64	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	A	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	51	51	48	43	0	0	0	43	0
N.S.	1	1.00	0.94	0.84	0.00	0.00	0.00	0.84	0.00
time (sec)	N/A	0.057	0.025	0.027	0.000	0.000	0.000	0.263	0.000

Problem 65	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	10	10	12	10	125	12	10	12	12
N.S.	1	1.00	1.20	1.00	12.50	1.20	1.00	1.20	1.20
time (sec)	N/A	0.009	0.544	0.029	1.395	0.260	0.398	0.321	0.035

Problem 66	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	10	10	12	10	142	12	12	12	12
N.S.	1	1.00	1.20	1.00	14.20	1.20	1.20	1.20	1.20
time (sec)	N/A	0.009	6.637	0.049	1.549	0.244	0.478	0.376	0.036

Problem 67	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	A	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	158	158	159	171	0	0	0	250	0
N.S.	1	1.00	1.01	1.08	0.00	0.00	0.00	1.58	0.00
time (sec)	N/A	0.200	0.364	0.045	0.000	0.000	0.000	0.290	0.000

Problem 68	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	A	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	144	144	107	114	0	0	0	174	0
N.S.	1	1.00	0.74	0.79	0.00	0.00	0.00	1.21	0.00
time (sec)	N/A	0.178	0.351	0.037	0.000	0.000	0.000	0.282	0.000

Problem 69	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	A	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	141	141	112	117	0	0	0	148	0
N.S.	1	1.00	0.79	0.83	0.00	0.00	0.00	1.05	0.00
time (sec)	N/A	0.192	0.290	0.032	0.000	0.000	0.000	0.277	0.000

Problem 70	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	A	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	97	97	86	60	0	0	0	92	0
N.S.	1	1.00	0.89	0.62	0.00	0.00	0.00	0.95	0.00
time (sec)	N/A	0.103	0.151	0.031	0.000	0.000	0.000	0.269	0.000

Problem 71	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	A	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	78	78	70	63	0	0	0	66	0
N.S.	1	1.00	0.90	0.81	0.00	0.00	0.00	0.85	0.00
time (sec)	N/A	0.092	0.088	0.030	0.000	0.000	0.000	0.262	0.000

Problem 72	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	10	10	12	10	201	12	10	12	12
N.S.	1	1.00	1.20	1.00	20.10	1.20	1.00	1.20	1.20
time (sec)	N/A	0.008	3.264	0.028	3.976	0.249	0.514	0.316	0.037

Problem 73	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	10	10	12	10	230	12	12	12	12
N.S.	1	1.00	1.20	1.00	23.00	1.20	1.20	1.20	1.20
time (sec)	N/A	0.008	13.773	0.049	4.899	0.240	0.662	0.402	0.039

Problem 74	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F(-2)	F(-2)	F	C	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	121	121	192	143	0	0	0	247	0
N.S.	1	1.00	1.59	1.18	0.00	0.00	0.00	2.04	0.00
time (sec)	N/A	0.157	0.048	0.098	0.000	0.000	0.000	0.330	0.000

Problem 75	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F(-2)	F(-2)	F	C	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	95	95	131	90	0	0	0	153	0
N.S.	1	1.00	1.38	0.95	0.00	0.00	0.00	1.61	0.00
time (sec)	N/A	0.119	0.028	0.059	0.000	0.000	0.000	0.328	0.000

Problem 76	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F(-2)	F(-2)	F	C	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	86	86	126	96	0	0	0	165	0
N.S.	1	1.00	1.47	1.12	0.00	0.00	0.00	1.92	0.00
time (sec)	N/A	0.113	0.034	0.044	0.000	0.000	0.000	0.326	0.000

Problem 77	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F(-2)	F(-2)	F	C	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	59	59	74	43	0	0	0	71	0
N.S.	1	1.00	1.25	0.73	0.00	0.00	0.00	1.20	0.00
time (sec)	N/A	0.093	0.014	0.038	0.000	0.000	0.000	0.308	0.000

Problem 78	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F(-2)	F(-2)	F	C	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	44	44	66	49	0	0	0	83	0
N.S.	1	1.00	1.50	1.11	0.00	0.00	0.00	1.89	0.00
time (sec)	N/A	0.055	0.026	0.036	0.000	0.000	0.000	0.295	0.000

Problem 79	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	F(-2)	F(-2)	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	12	12	14	10	0	0	10	12	12
N.S.	1	1.00	1.17	0.83	0.00	0.00	0.83	1.00	1.00
time (sec)	N/A	0.008	0.195	0.052	0.000	0.000	0.329	0.443	0.036

Problem 80	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F(-2)	F(-2)	F	C	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	214	282	202	193	0	0	0	355	0
N.S.	1	1.32	0.94	0.90	0.00	0.00	0.00	1.66	0.00
time (sec)	N/A	0.345	0.057	0.074	0.000	0.000	0.000	0.331	0.000

Problem 81	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F(-2)	F(-2)	F	C	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	157	157	130	121	0	0	0	225	0
N.S.	1	1.00	0.83	0.77	0.00	0.00	0.00	1.43	0.00
time (sec)	N/A	0.231	0.028	0.059	0.000	0.000	0.000	0.332	0.000

Problem 82	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F(-2)	F(-2)	F	C	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	147	147	136	131	0	0	0	237	0
N.S.	1	1.00	0.93	0.89	0.00	0.00	0.00	1.61	0.00
time (sec)	N/A	0.188	0.058	0.051	0.000	0.000	0.000	0.334	0.000

Problem 83	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F(-2)	F(-2)	F	C	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	89	89	71	64	0	0	0	107	0
N.S.	1	1.00	0.80	0.72	0.00	0.00	0.00	1.20	0.00
time (sec)	N/A	0.113	0.016	0.045	0.000	0.000	0.000	0.314	0.000

Problem 84	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F(-2)	F(-2)	F	C	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	75	75	76	72	0	0	0	119	0
N.S.	1	1.00	1.01	0.96	0.00	0.00	0.00	1.59	0.00
time (sec)	N/A	0.062	0.041	0.042	0.000	0.000	0.000	0.347	0.000

Problem 85	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	F(-2)	F(-2)	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	12	12	14	10	0	0	10	12	12
N.S.	1	1.00	1.17	0.83	0.00	0.00	0.83	1.00	1.00
time (sec)	N/A	0.010	0.151	0.052	0.000	0.000	1.340	0.530	0.036

Problem 86	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F(-2)	F(-2)	F	C	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	263	298	192	233	0	0	0	463	0
N.S.	1	1.13	0.73	0.89	0.00	0.00	0.00	1.76	0.00
time (sec)	N/A	0.494	0.057	0.076	0.000	0.000	0.000	0.343	0.000

Problem 87	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F(-2)	F(-2)	F	C	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	205	205	131	154	0	0	0	297	0
N.S.	1	1.00	0.64	0.75	0.00	0.00	0.00	1.45	0.00
time (sec)	N/A	0.375	0.040	0.062	0.000	0.000	0.000	0.336	0.000

Problem 88	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F(-2)	F(-2)	F	C	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	178	178	125	156	0	0	0	309	0
N.S.	1	1.00	0.70	0.88	0.00	0.00	0.00	1.74	0.00
time (sec)	N/A	0.285	0.040	0.051	0.000	0.000	0.000	0.335	0.000

Problem 89	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F(-2)	F(-2)	F	C	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	119	119	74	79	0	0	0	143	0
N.S.	1	1.00	0.62	0.66	0.00	0.00	0.00	1.20	0.00
time (sec)	N/A	0.184	0.015	0.042	0.000	0.000	0.000	0.327	0.000

Problem 90	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F(-2)	F(-2)	F	C	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	88	88	68	88	0	0	0	155	0
N.S.	1	1.00	0.77	1.00	0.00	0.00	0.00	1.76	0.00
time (sec)	N/A	0.097	0.032	0.039	0.000	0.000	0.000	0.343	0.000

Problem 91	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	F(-2)	F(-2)	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	12	12	14	10	0	0	10	12	12
N.S.	1	1.00	1.17	0.83	0.00	0.00	0.83	1.00	1.00
time (sec)	N/A	0.008	0.172	0.060	0.000	0.000	17.626	0.548	0.036

Problem 92	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F(-2)	F(-2)	F	C	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	106	106	193	72	0	0	0	139	0
N.S.	1	1.00	1.82	0.68	0.00	0.00	0.00	1.31	0.00
time (sec)	N/A	0.072	0.043	0.069	0.000	0.000	0.000	0.324	0.000

Problem 93	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F(-2)	F(-2)	F	C	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	65	65	128	44	0	0	0	81	0
N.S.	1	1.00	1.97	0.68	0.00	0.00	0.00	1.25	0.00
time (sec)	N/A	0.051	0.026	0.056	0.000	0.000	0.000	0.327	0.000

Problem 94	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F(-2)	F(-2)	F	C	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	71	71	128	51	0	0	0	93	0
N.S.	1	1.00	1.80	0.72	0.00	0.00	0.00	1.31	0.00
time (sec)	N/A	0.055	0.038	0.046	0.000	0.000	0.000	0.309	0.000

Problem 95	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F(-2)	F(-2)	F	C	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	28	28	71	21	0	0	0	35	0
N.S.	1	1.00	2.54	0.75	0.00	0.00	0.00	1.25	0.00
time (sec)	N/A	0.026	0.015	0.034	0.000	0.000	0.000	0.297	0.000

Problem 96	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F(-2)	F(-2)	F	C	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	30	30	69	25	0	0	0	47	0
N.S.	1	1.00	2.30	0.83	0.00	0.00	0.00	1.57	0.00
time (sec)	N/A	0.016	0.024	0.028	0.000	0.000	0.000	0.309	0.000

Problem 97	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	F(-2)	F(-2)	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	12	12	14	10	0	0	12	12	12
N.S.	1	1.00	1.17	0.83	0.00	0.00	1.00	1.00	1.00
time (sec)	N/A	0.009	0.178	0.055	0.000	0.000	0.361	0.382	0.039

Problem 98	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	F(-2)	F(-2)	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	12	12	14	10	0	0	14	12	12
N.S.	1	1.00	1.17	0.83	0.00	0.00	1.17	1.00	1.00
time (sec)	N/A	0.009	2.289	0.069	0.000	0.000	0.495	0.395	0.038

Problem 99	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F(-2)	F(-2)	F	F	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	171	171	427	184	0	0	0	0	0
N.S.	1	1.00	2.50	1.08	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.093	0.202	0.086	0.000	0.000	0.000	0.000	0.000

Problem 100	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F(-2)	F(-2)	F	F(-2)	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	127	127	231	121	0	0	0	0	0
N.S.	1	1.00	1.82	0.95	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.068	0.125	0.082	0.000	0.000	0.000	0.000	0.000

Problem 101	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F(-2)	F(-2)	F	F	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	136	136	319	138	0	0	0	0	0
N.S.	1	1.00	2.35	1.01	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.060	0.104	0.053	0.000	0.000	0.000	0.000	0.000

Problem 102	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F(-2)	F(-2)	F	F(-2)	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	90	90	154	83	0	0	0	0	0
N.S.	1	1.00	1.71	0.92	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.043	0.043	0.051	0.000	0.000	0.000	0.000	0.000

Problem 103	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F(-2)	F(-2)	F	F	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	96	96	211	95	0	0	0	0	0
N.S.	1	1.00	2.20	0.99	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.048	0.063	0.049	0.000	0.000	0.000	0.000	0.000

Problem 104	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F(-2)	F(-2)	F	F	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	55	55	91	43	0	0	0	0	0
N.S.	1	1.00	1.65	0.78	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.024	0.025	0.043	0.000	0.000	0.000	0.000	0.000

Problem 105	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F(-2)	F(-2)	F	F	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	59	59	87	65	0	0	0	0	0
N.S.	1	1.00	1.47	1.10	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.055	0.078	0.042	0.000	0.000	0.000	0.000	0.000

Problem 106	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	F(-2)	F(-2)	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	12	12	14	10	0	0	12	12	12
N.S.	1	1.00	1.17	0.83	0.00	0.00	1.00	1.00	1.00
time (sec)	N/A	0.009	0.186	0.060	0.000	0.000	0.855	0.383	0.036

Problem 107	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F(-2)	F(-2)	F	F	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	171	235	418	173	0	0	0	0	0
N.S.	1	1.37	2.44	1.01	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.272	0.228	0.079	0.000	0.000	0.000	0.000	0.000

Problem 108	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F(-2)	F(-2)	F	F(-2)	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	126	126	200	109	0	0	0	0	0
N.S.	1	1.00	1.59	0.87	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.206	0.278	0.061	0.000	0.000	0.000	0.000	0.000

Problem 109	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F(-2)	F(-2)	F	F	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	125	125	277	117	0	0	0	0	0
N.S.	1	1.00	2.22	0.94	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.191	0.157	0.055	0.000	0.000	0.000	0.000	0.000

Problem 110	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F(-2)	F(-2)	F	F	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	89	89	112	56	0	0	0	0	0
N.S.	1	1.00	1.26	0.63	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.114	0.148	0.044	0.000	0.000	0.000	0.000	0.000

Problem 111	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F(-2)	F(-2)	F	F	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	76	76	138	83	0	0	0	0	0
N.S.	1	1.00	1.82	1.09	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.061	0.105	0.039	0.000	0.000	0.000	0.000	0.000

Problem 112	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	F(-2)	F(-2)	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	12	12	14	10	0	0	12	12	12
N.S.	1	1.00	1.17	0.83	0.00	0.00	1.00	1.00	1.00
time (sec)	N/A	0.008	0.194	0.059	0.000	0.000	6.304	0.411	0.039

Problem 113	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F(-2)	F(-2)	F	F	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	264	264	417	225	0	0	0	0	0
N.S.	1	1.00	1.58	0.85	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.245	0.572	0.084	0.000	0.000	0.000	0.000	0.000

Problem 114	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F(-2)	F(-2)	F	F(-2)	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	190	190	272	139	0	0	0	0	0
N.S.	1	1.00	1.43	0.73	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.199	0.859	0.063	0.000	0.000	0.000	0.000	0.000

Problem 115	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F(-2)	F(-2)	F	F	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	191	191	280	154	0	0	0	0	0
N.S.	1	1.00	1.47	0.81	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.217	0.307	0.056	0.000	0.000	0.000	0.000	0.000

Problem 116	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F(-2)	F(-2)	F	F	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	119	119	146	73	0	0	0	0	0
N.S.	1	1.00	1.23	0.61	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.109	0.272	0.047	0.000	0.000	0.000	0.000	0.000

Problem 117	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F(-2)	F(-2)	F	F	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	105	105	143	110	0	0	0	0	0
N.S.	1	1.00	1.36	1.05	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.101	0.196	0.040	0.000	0.000	0.000	0.000	0.000

Problem 118	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	F(-2)	F(-2)	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	12	12	14	10	0	0	12	12	12
N.S.	1	1.00	1.17	0.83	0.00	0.00	1.00	1.00	1.00
time (sec)	N/A	0.008	0.173	0.055	0.000	0.000	60.723	0.423	0.037

Problem 119	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	12	12	14	12	115	14	12	14	14
N.S.	1	1.00	1.17	1.00	9.58	1.17	1.00	1.17	1.17
time (sec)	N/A	0.080	0.643	0.606	0.684	0.251	5.242	0.589	0.040

Problem 120	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	12	12	14	12	115	14	12	14	14
N.S.	1	1.00	1.17	1.00	9.58	1.17	1.00	1.17	1.17
time (sec)	N/A	0.072	0.551	0.460	0.696	0.263	2.712	0.565	0.048

Problem 121	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F	F	F	F	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	150	150	122	0	0	0	0	0	0
N.S.	1	1.00	0.81	0.00	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.071	0.038	0.000	0.000	0.000	0.000	0.000	0.000

Problem 122	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F	F	F	F	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	69	69	56	0	0	0	0	0	0
N.S.	1	1.00	0.81	0.00	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.016	0.018	0.000	0.000	0.000	0.000	0.000	0.000

Problem 123	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	12	12	14	12	14	14	10	14	14
N.S.	1	1.00	1.17	1.00	1.17	1.17	0.83	1.17	1.17
time (sec)	N/A	0.009	0.299	0.319	0.347	0.241	0.404	0.434	0.043

Problem 124	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	12	12	14	12	157	14	12	14	14
N.S.	1	1.00	1.17	1.00	13.08	1.17	1.00	1.17	1.17
time (sec)	N/A	0.009	0.324	0.348	0.956	0.247	0.705	0.435	0.038

Problem 125	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	F(-2)	F(-2)	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	14	14	16	12	0	0	14	14	14
N.S.	1	1.00	1.14	0.86	0.00	0.00	1.00	1.00	1.00
time (sec)	N/A	0.009	0.557	0.049	0.000	0.000	57.059	1.874	0.038

Problem 126	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	F(-2)	F(-2)	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	14	14	16	12	0	0	14	14	14
N.S.	1	1.00	1.14	0.86	0.00	0.00	1.00	1.00	1.00
time (sec)	N/A	0.009	0.792	0.049	0.000	0.000	1.100	1.209	0.044

Problem 127	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	F(-2)	F(-2)	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	14	14	16	12	0	0	14	14	14
N.S.	1	1.00	1.14	0.86	0.00	0.00	1.00	1.00	1.00
time (sec)	N/A	0.009	0.700	0.048	0.000	0.000	0.521	1.060	0.039

Problem 128	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	F(-2)	F(-2)	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	14	14	16	12	0	0	14	14	14
N.S.	1	1.00	1.14	0.86	0.00	0.00	1.00	1.00	1.00
time (sec)	N/A	0.009	0.631	0.052	0.000	0.000	3.786	0.967	0.044

Problem 129	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	F(-2)	N/A	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	12	12	14	12	0	14	12	14	14
N.S.	1	1.00	1.17	1.00	0.00	1.17	1.00	1.17	1.17
time (sec)	N/A	0.010	0.439	0.607	0.000	0.259	3.488	0.824	0.037

Problem 130	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F(-2)	F	F	F	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	167	167	132	0	0	0	0	0	0
N.S.	1	1.00	0.79	0.00	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.111	0.067	0.000	0.000	0.000	0.000	0.000	0.000

Problem 131	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F(-2)	F	F	F	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	171	171	137	0	0	0	0	0	0
N.S.	1	1.00	0.80	0.00	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.106	0.053	0.000	0.000	0.000	0.000	0.000	0.000

Problem 132	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	C	F(-2)	F	F	F	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	85	85	75	138	0	0	0	0	0
N.S.	1	1.00	0.88	1.62	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.051	0.016	0.121	0.000	0.000	0.000	0.000	0.000

Problem 133	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	C	F(-2)	F	F	F	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	79	79	73	240	0	0	0	0	0
N.S.	1	1.00	0.92	3.04	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.035	0.038	0.073	0.000	0.000	0.000	0.000	0.000

Problem 134	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	F(-2)	N/A	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	10	10	12	10	0	12	8	12	12
N.S.	1	1.00	1.20	1.00	0.00	1.20	0.80	1.20	1.20
time (sec)	N/A	0.009	0.251	0.069	0.000	0.263	0.372	0.320	0.086

Problem 135	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	F(-2)	N/A	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	10	10	12	10	0	12	10	12	12
N.S.	1	1.00	1.20	1.00	0.00	1.20	1.00	1.20	1.20
time (sec)	N/A	0.009	0.550	0.046	0.000	0.250	0.537	0.318	0.084

Problem 136	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	F(-2)	N/A	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	14	14	16	12	0	16	14	14	14
N.S.	1	1.00	1.14	0.86	0.00	1.14	1.00	1.00	1.00
time (sec)	N/A	0.012	1.964	0.076	0.000	0.253	151.119	0.558	0.092

Problem 137	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	F(-2)	N/A	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	14	14	16	12	0	14	14	14	14
N.S.	1	1.00	1.14	0.86	0.00	1.00	1.00	1.00	1.00
time (sec)	N/A	0.010	3.007	0.058	0.000	0.246	3.534	0.572	0.088

Problem 138	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	F(-2)	N/A	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	14	14	16	12	0	20	14	14	14
N.S.	1	1.00	1.14	0.86	0.00	1.43	1.00	1.00	1.00
time (sec)	N/A	0.011	1.263	0.055	0.000	0.278	1.520	0.449	0.090

Problem 139	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	F(-2)	N/A	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	14	14	16	12	0	20	14	14	14
N.S.	1	1.00	1.14	0.86	0.00	1.43	1.00	1.00	1.00
time (sec)	N/A	0.013	1.143	0.059	0.000	0.265	12.301	0.479	0.087

Problem 140	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	76	76	81	68	70	61	80	95	0
N.S.	1	1.00	1.07	0.89	0.92	0.80	1.05	1.25	0.00
time (sec)	N/A	0.023	0.025	0.022	0.289	0.267	0.265	0.279	0.000

Problem 141	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	60	60	49	60	59	53	65	74	0
N.S.	1	1.00	0.82	1.00	0.98	0.88	1.08	1.23	0.00
time (sec)	N/A	0.027	0.028	0.014	0.283	0.246	0.205	0.277	0.000

Problem 142	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	51	51	56	48	49	49	54	64	45
N.S.	1	1.00	1.10	0.94	0.96	0.96	1.06	1.25	0.88
time (sec)	N/A	0.013	0.015	0.013	0.291	0.244	0.161	0.265	0.158

Problem 143	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	30	30	30	30	29	31	26	29	28
N.S.	1	1.00	1.00	1.00	0.97	1.03	0.87	0.97	0.93
time (sec)	N/A	0.009	0.010	0.010	0.304	0.260	0.069	0.259	0.179

Problem 144	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	F	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	63	63	52	118	0	0	0	0	48
N.S.	1	1.00	0.83	1.87	0.00	0.00	0.00	0.00	0.76
time (sec)	N/A	0.049	0.072	0.094	0.000	0.000	0.000	0.000	0.161

Problem 145	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	B	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	33	33	36	39	47	55	39	325	34
N.S.	1	1.00	1.09	1.18	1.42	1.67	1.18	9.85	1.03
time (sec)	N/A	0.018	0.005	0.012	0.278	0.260	0.959	0.303	0.141

Problem 146	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	B	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	39	39	44	46	36	35	61	163	0
N.S.	1	1.00	1.13	1.18	0.92	0.90	1.56	4.18	0.00
time (sec)	N/A	0.013	0.012	0.011	0.290	0.252	0.743	0.279	0.000

Problem 147	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	B	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	62	62	67	61	69	80	117	284	0
N.S.	1	1.00	1.08	0.98	1.11	1.29	1.89	4.58	0.00
time (sec)	N/A	0.025	0.014	0.013	0.312	0.280	1.562	0.442	0.000

Problem 148	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	B	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	102	102	95	125	142	111	170	194	0
N.S.	1	1.00	0.93	1.23	1.39	1.09	1.67	1.90	0.00
time (sec)	N/A	0.098	0.118	0.053	0.293	0.241	0.276	0.276	0.000

Problem 149	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	A	A	B	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	76	76	73	119	0	99	126	155	0
N.S.	1	1.00	0.96	1.57	0.00	1.30	1.66	2.04	0.00
time (sec)	N/A	0.073	0.050	0.045	0.000	0.251	0.208	0.275	0.000

Problem 150	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	47	47	47	72	72	65	82	75	142
N.S.	1	1.00	1.00	1.53	1.53	1.38	1.74	1.60	3.02
time (sec)	N/A	0.038	0.027	0.042	0.285	0.250	0.105	0.287	0.377

Problem 151	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	B	F	F	F	F	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	90	90	143	294	0	0	0	0	0
N.S.	1	1.00	1.59	3.27	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.084	0.122	0.072	0.000	0.000	0.000	0.000	0.000

Problem 152	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	F	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	81	81	126	165	0	0	0	0	0
N.S.	1	1.00	1.56	2.04	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.081	0.209	0.045	0.000	0.000	0.000	0.000	0.000

Problem 153	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	B	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	178	178	163	235	273	194	328	368	0
N.S.	1	1.00	0.92	1.32	1.53	1.09	1.84	2.07	0.00
time (sec)	N/A	0.189	0.297	0.046	0.319	0.252	0.373	0.293	0.000

Problem 154	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	A	B	B	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	125	125	114	219	0	169	264	285	0
N.S.	1	1.00	0.91	1.75	0.00	1.35	2.11	2.28	0.00
time (sec)	N/A	0.131	0.094	0.049	0.000	0.242	0.285	0.283	0.000

Problem 155	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	B	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	82	82	77	132	141	108	160	150	242
N.S.	1	1.00	0.94	1.61	1.72	1.32	1.95	1.83	2.95
time (sec)	N/A	0.068	0.063	0.043	0.311	0.247	0.142	0.275	0.439

Problem 156	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	B	F	F	F	F	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	123	123	244	530	0	0	0	0	0
N.S.	1	1.00	1.98	4.31	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.104	0.174	0.079	0.000	0.000	0.000	0.000	0.000

Problem 157	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	B	A	F	F	F	F	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	137	137	283	349	0	0	0	0	0
N.S.	1	1.00	2.07	2.55	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.136	0.235	0.099	0.000	0.000	0.000	0.000	0.000

Problem 158	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	A	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	121	121	91	102	0	0	0	173	0
N.S.	1	1.00	0.75	0.84	0.00	0.00	0.00	1.43	0.00
time (sec)	N/A	0.147	0.217	0.037	0.000	0.000	0.000	0.274	0.000

Problem 159	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	A	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	63	63	56	58	0	0	0	86	0
N.S.	1	1.00	0.89	0.92	0.00	0.00	0.00	1.37	0.00
time (sec)	N/A	0.073	0.077	0.033	0.000	0.000	0.000	0.273	0.000

Problem 160	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	A	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	53	53	44	48	0	0	0	49	0
N.S.	1	1.00	0.83	0.91	0.00	0.00	0.00	0.92	0.00
time (sec)	N/A	0.040	0.057	0.033	0.000	0.000	0.000	0.287	0.000

Problem 161	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	N/A	N/A	N/A	F(-2)	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	14	14	16	14	16	15	12	0	16
N.S.	1	1.00	1.14	1.00	1.14	1.07	0.86	0.00	1.14
time (sec)	N/A	0.015	0.206	0.074	0.352	0.243	0.655	0.000	0.106

Problem 162	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	14	14	16	14	16	19	14	16	16
N.S.	1	1.00	1.14	1.00	1.14	1.36	1.00	1.14	1.14
time (sec)	N/A	0.016	1.919	0.095	0.356	0.231	0.591	0.546	0.108

Problem 163	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	B	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	156	156	125	149	0	0	0	646	0
N.S.	1	1.00	0.80	0.96	0.00	0.00	0.00	4.14	0.00
time (sec)	N/A	0.101	0.562	0.042	0.000	0.000	0.000	0.305	0.000

Problem 164	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	B	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	90	90	79	77	0	0	0	326	0
N.S.	1	1.00	0.88	0.86	0.00	0.00	0.00	3.62	0.00
time (sec)	N/A	0.052	0.319	0.030	0.000	0.000	0.000	0.284	0.000

Problem 165	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	B	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	86	86	72	76	0	0	0	192	0
N.S.	1	1.00	0.84	0.88	0.00	0.00	0.00	2.23	0.00
time (sec)	N/A	0.104	0.210	0.036	0.000	0.000	0.000	0.280	0.000

Problem 166	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	14	14	16	14	165	30	14	16	16
N.S.	1	1.00	1.14	1.00	11.79	2.14	1.00	1.14	1.14
time (sec)	N/A	0.014	5.007	0.067	0.613	0.236	1.068	0.527	0.118

Problem 167	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	14	14	16	14	182	36	15	16	16
N.S.	1	1.00	1.14	1.00	13.00	2.57	1.07	1.14	1.14
time (sec)	N/A	0.018	34.229	0.091	0.766	0.236	0.970	0.842	0.116

Problem 168	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	B	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	197	197	168	290	0	0	0	1539	0
N.S.	1	1.00	0.85	1.47	0.00	0.00	0.00	7.81	0.00
time (sec)	N/A	0.324	0.572	0.043	0.000	0.000	0.000	0.363	0.000

Problem 169	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	B	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	130	130	108	157	0	0	0	864	0
N.S.	1	1.00	0.83	1.21	0.00	0.00	0.00	6.65	0.00
time (sec)	N/A	0.192	0.292	0.033	0.000	0.000	0.000	0.340	0.000

Problem 170	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	F	F	F	B	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	111	111	93	138	0	0	0	482	0
N.S.	1	1.00	0.84	1.24	0.00	0.00	0.00	4.34	0.00
time (sec)	N/A	0.109	0.316	0.033	0.000	0.000	0.000	0.325	0.000

Problem 171	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	14	14	16	14	254	45	14	16	16
N.S.	1	1.00	1.14	1.00	18.14	3.21	1.00	1.14	1.14
time (sec)	N/A	0.015	1.713	0.069	2.279	0.246	1.657	0.824	0.119

Problem 172	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	14	14	16	14	283	53	15	16	16
N.S.	1	1.00	1.14	1.00	20.21	3.79	1.07	1.14	1.14
time (sec)	N/A	0.015	15.533	0.092	2.669	0.246	1.550	1.392	0.123

Problem 173	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F	F(-2)	F	C	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	242	242	227	361	0	0	0	1057	0
N.S.	1	1.00	0.94	1.49	0.00	0.00	0.00	4.37	0.00
time (sec)	N/A	0.378	0.206	0.131	0.000	0.000	0.000	0.930	0.000

Problem 174	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F	F(-2)	F	C	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	137	137	127	186	0	0	0	448	0
N.S.	1	1.00	0.93	1.36	0.00	0.00	0.00	3.27	0.00
time (sec)	N/A	0.218	0.049	0.062	0.000	0.000	0.000	0.696	0.000

Problem 175	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F	F(-2)	F	C	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	120	120	119	187	0	0	0	531	0
N.S.	1	1.00	0.99	1.56	0.00	0.00	0.00	4.42	0.00
time (sec)	N/A	0.153	0.095	0.053	0.000	0.000	0.000	0.552	0.000

Problem 176	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	N/A	F(-2)	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	16	16	18	14	16	0	14	16	16
N.S.	1	1.00	1.12	0.88	1.00	0.00	0.88	1.00	1.00
time (sec)	N/A	0.024	1.848	0.084	0.612	0.000	0.395	0.887	0.096

Problem 177	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	N/A	F(-2)	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	16	16	18	14	16	0	15	16	16
N.S.	1	1.00	1.12	0.88	1.00	0.00	0.94	1.00	1.00
time (sec)	N/A	0.021	5.648	0.103	0.613	0.000	0.361	0.959	0.093

Problem 178	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	B	F	F(-2)	F	C	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	313	313	245	547	0	0	0	1967	0
N.S.	1	1.00	0.78	1.75	0.00	0.00	0.00	6.28	0.00
time (sec)	N/A	0.543	0.215	0.097	0.000	0.000	0.000	1.682	0.000

Problem 179	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	B	F	F(-2)	F	C	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	172	172	126	281	0	0	0	845	0
N.S.	1	1.00	0.73	1.63	0.00	0.00	0.00	4.91	0.00
time (sec)	N/A	0.264	0.052	0.069	0.000	0.000	0.000	0.953	0.000

Problem 180	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	B	F	F(-2)	F	C	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	159	159	289	278	0	0	0	993	0
N.S.	1	1.00	1.82	1.75	0.00	0.00	0.00	6.25	0.00
time (sec)	N/A	0.152	2.594	0.056	0.000	0.000	0.000	1.124	0.000

Problem 181	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	N/A	F(-2)	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	16	16	18	14	16	0	14	16	16
N.S.	1	1.00	1.12	0.88	1.00	0.00	0.88	1.00	1.00
time (sec)	N/A	0.025	0.479	0.082	0.768	0.000	13.988	1.006	0.094

Problem 182	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	N/A	F(-2)	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	16	16	18	14	16	0	15	16	16
N.S.	1	1.00	1.12	0.88	1.00	0.00	0.94	1.00	1.00
time (sec)	N/A	0.024	4.112	0.105	0.722	0.000	2.701	1.097	0.090

Problem 183	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	B	F	F(-2)	F	C	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	358	358	228	819	0	0	0	2466	0
N.S.	1	1.00	0.64	2.29	0.00	0.00	0.00	6.89	0.00
time (sec)	N/A	0.745	0.203	0.122	0.000	0.000	0.000	2.397	0.000

Problem 184	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	B	F	F(-2)	F	C	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	216	216	129	408	0	0	0	1307	0
N.S.	1	1.00	0.60	1.89	0.00	0.00	0.00	6.05	0.00
time (sec)	N/A	0.409	0.051	0.079	0.000	0.000	0.000	1.224	0.000

Problem 185	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	B	F	F(-2)	F	C	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	179	179	366	401	0	0	0	1179	0
N.S.	1	1.00	2.04	2.24	0.00	0.00	0.00	6.59	0.00
time (sec)	N/A	0.251	2.766	0.070	0.000	0.000	0.000	1.492	0.000

Problem 186	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	N/A	F(-2)	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	16	16	18	14	16	0	14	16	16
N.S.	1	1.00	1.12	0.88	1.00	0.00	0.88	1.00	1.00
time (sec)	N/A	0.026	0.561	0.088	0.821	0.000	31.593	1.058	0.092

Problem 187	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	N/A	F(-2)	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	16	16	18	14	16	0	15	16	16
N.S.	1	1.00	1.12	0.88	1.00	0.00	0.94	1.00	1.00
time (sec)	N/A	0.024	4.267	0.105	0.820	0.000	22.368	1.129	0.093

Problem 188	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F	F(-2)	F	C	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	223	223	228	196	0	0	0	317	0
N.S.	1	1.00	1.02	0.88	0.00	0.00	0.00	1.42	0.00
time (sec)	N/A	0.161	0.195	0.080	0.000	0.000	0.000	0.463	0.000

Problem 189	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F	F(-2)	F	C	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	99	99	123	91	0	0	0	132	0
N.S.	1	1.00	1.24	0.92	0.00	0.00	0.00	1.33	0.00
time (sec)	N/A	0.077	0.050	0.054	0.000	0.000	0.000	0.396	0.000

Problem 190	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F	F(-2)	F	C	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	101	101	121	90	0	0	0	159	0
N.S.	1	1.00	1.20	0.89	0.00	0.00	0.00	1.57	0.00
time (sec)	N/A	0.055	0.081	0.040	0.000	0.000	0.000	0.348	0.000

Problem 191	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	N/A	F(-2)	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	16	16	18	14	16	0	15	16	16
N.S.	1	1.00	1.12	0.88	1.00	0.00	0.94	1.00	1.00
time (sec)	N/A	0.024	1.044	0.078	0.631	0.000	0.424	0.592	0.093

Problem 192	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	N/A	F(-2)	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	16	16	18	14	16	0	17	16	16
N.S.	1	1.00	1.12	0.88	1.00	0.00	1.06	1.00	1.00
time (sec)	N/A	0.023	4.547	0.099	0.625	0.000	0.526	0.648	0.093

Problem 193	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F	F(-2)	F	F	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	250	250	343	301	0	0	0	0	0
N.S.	1	1.00	1.37	1.20	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.193	0.324	0.079	0.000	0.000	0.000	0.000	0.000

Problem 194	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F	F(-2)	F	F	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	130	130	155	156	0	0	0	0	0
N.S.	1	1.00	1.19	1.20	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.071	0.119	0.067	0.000	0.000	0.000	0.000	0.000

Problem 195	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F	F(-2)	F	F	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	137	137	167	158	0	0	0	0	0
N.S.	1	1.00	1.22	1.15	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.143	0.241	0.055	0.000	0.000	0.000	0.000	0.000

Problem 196	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	N/A	F(-2)	N/A	F(-2)	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	16	16	18	14	16	0	15	0	16
N.S.	1	1.00	1.12	0.88	1.00	0.00	0.94	0.00	1.00
time (sec)	N/A	0.027	0.870	0.075	0.593	0.000	1.648	0.000	0.098

Problem 197	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	N/A	F(-2)	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	16	16	18	14	16	0	17	16	16
N.S.	1	1.00	1.12	0.88	1.00	0.00	1.06	1.00	1.00
time (sec)	N/A	0.029	4.529	0.102	0.628	0.000	2.316	1.149	0.095

Problem 198	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	B	F	F(-2)	F	F	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	291	291	370	672	0	0	0	0	0
N.S.	1	1.00	1.27	2.31	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.543	1.526	0.100	0.000	0.000	0.000	0.000	0.000

Problem 199	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	B	F	F(-2)	F	F	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	180	180	173	340	0	0	0	0	0
N.S.	1	1.00	0.96	1.89	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.281	0.939	0.069	0.000	0.000	0.000	0.000	0.000

Problem 200	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	B	F	F(-2)	F	F	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	163	163	214	340	0	0	0	0	0
N.S.	1	1.00	1.31	2.09	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.170	0.674	0.059	0.000	0.000	0.000	0.000	0.000

Problem 201	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	N/A	F(-2)	N/A	F(-2)	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	16	16	18	14	16	0	15	0	16
N.S.	1	1.00	1.12	0.88	1.00	0.00	0.94	0.00	1.00
time (sec)	N/A	0.029	0.891	0.073	0.717	0.000	8.407	0.000	0.096

Problem 202	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	N/A	F(-2)	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	16	16	18	14	16	0	17	16	16
N.S.	1	1.00	1.12	0.88	1.00	0.00	1.06	1.00	1.00
time (sec)	N/A	0.026	4.786	0.102	0.703	0.000	16.239	1.566	0.095

Problem 203	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F	C	A	F	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	120	120	100	144	0	99	85	0	0
N.S.	1	1.00	0.83	1.20	0.00	0.82	0.71	0.00	0.00
time (sec)	N/A	0.048	0.028	1.267	0.000	0.099	68.116	0.000	0.000

Problem 204	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F	C	A	F	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	124	124	66	138	0	85	85	0	0
N.S.	1	1.00	0.53	1.11	0.00	0.69	0.69	0.00	0.00
time (sec)	N/A	0.060	0.023	0.636	0.000	0.094	11.194	0.000	0.000

Problem 205	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F	C	A	F	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	88	88	66	119	0	68	85	0	0
N.S.	1	1.00	0.75	1.35	0.00	0.77	0.97	0.00	0.00
time (sec)	N/A	0.026	0.017	0.408	0.000	0.092	3.264	0.000	0.000

Problem 206	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F	C	F(-2)	F	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	89	89	45	98	0	53	0	0	0
N.S.	1	1.00	0.51	1.10	0.00	0.60	0.00	0.00	0.00
time (sec)	N/A	0.047	0.016	0.274	0.000	0.094	0.000	0.000	0.000

Problem 207	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F	C	F(-2)	F	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	55	55	40	85	0	49	0	0	0
N.S.	1	1.00	0.73	1.55	0.00	0.89	0.00	0.00	0.00
time (sec)	N/A	0.021	0.014	0.162	0.000	0.085	0.000	0.000	0.000

Problem 208	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F	C	F(-2)	F	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	125	125	42	129	0	70	0	0	0
N.S.	1	1.00	0.34	1.03	0.00	0.56	0.00	0.00	0.00
time (sec)	N/A	0.060	0.017	0.296	0.000	0.087	0.000	0.000	0.000

Problem 209	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F	F	F(-1)	F(-2)	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	109	109	90	0	0	0	0	0	0
N.S.	1	1.00	0.83	0.00	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.085	0.049	0.000	0.000	0.000	0.000	0.000	0.000

Problem 210	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F	F	F	F(-2)	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	109	109	90	0	0	0	0	0	0
N.S.	1	1.00	0.83	0.00	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.087	0.043	0.000	0.000	0.000	0.000	0.000	0.000

Problem 211	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F	F	F	F(-2)	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	109	109	90	0	0	0	0	0	0
N.S.	1	1.00	0.83	0.00	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.085	0.046	0.000	0.000	0.000	0.000	0.000	0.000

Problem 212	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F	F	F(-2)	F	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	107	107	90	0	0	0	0	0	0
N.S.	1	1.00	0.84	0.00	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.078	0.039	0.000	0.000	0.000	0.000	0.000	0.000

Problem 213	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F	F	F(-2)	F	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	105	105	87	0	0	0	0	0	0
N.S.	1	1.00	0.83	0.00	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.081	0.037	0.000	0.000	0.000	0.000	0.000	0.000

Problem 214	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F	F	F(-2)	F	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	109	109	87	0	0	0	0	0	0
N.S.	1	1.00	0.80	0.00	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.086	0.042	0.000	0.000	0.000	0.000	0.000	0.000

Problem 215	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	N/A	N/A	N/A	F(-2)	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	18	18	20	16	421	53	17	0	18
N.S.	1	1.00	1.11	0.89	23.39	2.94	0.94	0.00	1.00
time (sec)	N/A	0.098	58.945	0.098	3.550	0.260	78.696	0.000	0.129

Problem 216	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	N/A	N/A	N/A	F(-2)	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	18	18	20	16	398	44	17	0	18
N.S.	1	1.00	1.11	0.89	22.11	2.44	0.94	0.00	1.00
time (sec)	N/A	0.095	142.451	0.068	3.593	0.254	8.465	0.000	0.142

Problem 217	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	N/A	N/A	F(-2)	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	18	18	20	16	438	50	0	18	18
N.S.	1	1.00	1.11	0.89	24.33	2.78	0.00	1.00	1.00
time (sec)	N/A	0.087	71.710	0.021	3.579	0.243	0.000	0.571	0.140

Problem 218	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	N/A	N/A	F(-2)	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	18	18	20	16	469	50	0	18	18
N.S.	1	1.00	1.11	0.89	26.06	2.78	0.00	1.00	1.00
time (sec)	N/A	0.091	59.244	0.110	3.519	0.251	0.000	0.602	0.130

Problem 219	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	N/A	N/A	F(-2)	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	18	18	20	16	471	50	0	18	18
N.S.	1	1.00	1.11	0.89	26.17	2.78	0.00	1.00	1.00
time (sec)	N/A	0.100	41.968	0.131	3.587	0.255	0.000	0.631	0.133

Problem 220	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	18	18	20	16	18	20	15	18	18
N.S.	1	1.00	1.11	0.89	1.00	1.11	0.83	1.00	1.00
time (sec)	N/A	0.018	1.852	0.079	0.422	0.242	4.158	0.306	0.092

Problem 221	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	18	18	20	16	18	18	15	18	18
N.S.	1	1.00	1.11	0.89	1.00	1.00	0.83	1.00	1.00
time (sec)	N/A	0.016	1.604	0.077	0.445	0.229	0.486	0.305	0.093

Problem 222	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	18	18	20	16	18	23	17	18	18
N.S.	1	1.00	1.11	0.89	1.00	1.28	0.94	1.00	1.00
time (sec)	N/A	0.016	0.960	0.080	0.469	0.238	1.425	0.290	0.094

Problem 223	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	18	18	20	16	18	31	17	18	18
N.S.	1	1.00	1.11	0.89	1.00	1.72	0.94	1.00	1.00
time (sec)	N/A	0.019	0.794	0.085	0.506	0.234	3.485	0.289	0.093

Problem 224	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	18	18	20	16	182	34	17	18	18
N.S.	1	1.00	1.11	0.89	10.11	1.89	0.94	1.00	1.00
time (sec)	N/A	0.019	8.687	0.081	1.910	0.240	10.744	0.310	0.114

Problem 225	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	18	18	20	16	180	32	17	18	18
N.S.	1	1.00	1.11	0.89	10.00	1.78	0.94	1.00	1.00
time (sec)	N/A	0.015	8.426	0.083	1.901	0.229	1.992	0.311	0.119

Problem 226	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	18	18	20	16	195	39	19	18	18
N.S.	1	1.00	1.11	0.89	10.83	2.17	1.06	1.00	1.00
time (sec)	N/A	0.015	24.106	0.096	1.690	0.246	4.072	0.318	0.121

Problem 227	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
verified	N/A	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD
size	18	18	20	16	219	51	19	18	18
N.S.	1	1.00	1.11	0.89	12.17	2.83	1.06	1.00	1.00
time (sec)	N/A	0.018	16.641	0.089	1.971	0.231	11.473	0.295	0.114

2.3 Detailed conclusion table specific for Rubi results

The following table is specific to Rubi only. It gives additional statistics for each integral. the column **steps** is the number of steps used by Rubi to obtain the antiderivative. The **rules** column is the number of unique rules used. The **integrand size** column is the leaf size of the integrand. Finally the ratio $\frac{\text{number of rules}}{\text{integrand size}}$ is also given. The larger this ratio is, the harder the integral is to solve. In this test file, problem number [30] had the largest ratio of [1]

Table 2.1: Rubi specific breakdown of results for each integral

#	grade	number of steps used	number of unique rules	normalized antiderivative leaf size	integrand leaf size	$\frac{\text{number of rules}}{\text{integrand leaf size}}$
1	A	4	3	1.00	8	0.375
2	A	4	3	1.00	8	0.375
3	A	4	3	1.00	8	0.375
4	A	3	3	1.00	6	0.500
5	A	2	2	1.00	4	0.500
6	A	5	5	1.00	8	0.625
7	A	4	4	1.00	8	0.500
8	A	2	2	1.00	8	0.250
9	A	5	5	1.00	8	0.625
10	A	3	3	1.00	8	0.375
11	A	6	5	1.00	8	0.625
12	A	7	5	1.00	10	0.500
13	A	6	4	1.00	10	0.400
14	A	5	5	1.00	10	0.500
15	A	4	4	1.00	8	0.500
16	A	3	3	1.00	6	0.500
17	A	6	6	1.00	10	0.600
18	A	7	5	1.00	10	0.500
19	A	3	3	1.00	10	0.300
20	A	9	7	1.00	10	0.700
21	A	5	5	1.00	10	0.500
22	A	14	7	1.00	10	0.700
23	A	11	5	1.00	10	0.500
24	A	9	7	1.00	10	0.700

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#	grade	number of steps used	number of unique rules	normalized antiderivative leaf size	integrand leaf size	$\frac{\text{number of rules}}{\text{integrand leaf size}}$
25	A	6	5	1.00	8	0.625
26	A	4	3	1.00	6	0.500
27	A	7	7	1.00	10	0.700
28	A	9	6	1.00	10	0.600
29	A	7	7	1.00	10	0.700
30	A	14	10	1.00	10	1.000
31	A	10	9	1.00	10	0.900
32	A	23	4	1.00	10	0.400
33	A	19	6	1.00	10	0.600
34	A	14	4	1.00	10	0.400
35	A	11	6	1.00	10	0.600
36	A	7	4	1.00	8	0.500
37	A	5	3	1.00	6	0.500
38	A	8	7	1.00	10	0.700
39	A	11	7	1.00	10	0.700
40	A	8	8	1.00	10	0.800
41	A	19	10	1.00	10	1.000
42	A	7	3	1.00	10	0.300
43	A	6	3	1.00	10	0.300
44	A	6	3	1.00	10	0.300
45	A	5	3	1.00	10	0.300
46	A	5	3	1.00	10	0.300
47	A	4	4	1.00	8	0.500
48	A	2	2	1.00	6	0.333
49	N/A	0	0	1.00	10	0.000
50	N/A	0	0	1.00	10	0.000
51	A	6	2	1.00	10	0.200
52	A	5	2	1.00	10	0.200
53	A	5	2	1.00	10	0.200
54	A	4	2	1.00	10	0.200
55	A	4	2	1.00	10	0.200
56	A	2	2	1.00	8	0.250
57	A	3	3	1.00	6	0.500
58	N/A	0	0	1.00	10	0.000

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Table 2.1 – continued from previous page

#	grade	number of steps used	number of unique rules	normalized antiderivative leaf size	integrand leaf size	$\frac{\text{number of rules}}{\text{integrand leaf size}}$
59	N/A	0	0	1.00	10	0.000
60	A	14	5	1.00	10	0.500
61	A	12	6	1.00	10	0.600
62	A	10	6	1.00	10	0.600
63	A	7	7	1.00	8	0.875
64	A	4	4	1.00	6	0.667
65	N/A	0	0	1.00	10	0.000
66	N/A	0	0	1.00	10	0.000
67	A	12	4	1.00	10	0.400
68	A	9	4	1.00	10	0.400
69	A	10	6	1.00	10	0.600
70	A	5	5	1.00	8	0.625
71	A	5	4	1.00	6	0.667
72	N/A	0	0	1.00	10	0.000
73	N/A	0	0	1.00	10	0.000
74	A	10	5	1.00	12	0.417
75	A	8	5	1.00	12	0.417
76	A	8	5	1.00	12	0.417
77	A	6	5	1.00	10	0.500
78	A	4	4	1.00	8	0.500
79	N/A	0	0	1.00	12	0.000
80	A	23	8	1.32	12	0.667
81	A	16	8	1.00	12	0.667
82	A	13	8	1.00	12	0.667
83	A	8	8	1.00	10	0.800
84	A	5	5	1.00	8	0.625
85	N/A	0	0	1.00	12	0.000
86	A	26	8	1.13	12	0.667
87	A	18	7	1.00	12	0.583
88	A	15	8	1.00	12	0.667
89	A	9	7	1.00	10	0.700
90	A	6	5	1.00	8	0.625
91	N/A	0	0	1.00	12	0.000
92	A	9	4	1.00	12	0.333

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Table 2.1 – continued from previous page

#	grade	number of steps used	number of unique rules	normalized antiderivative leaf size	integrand leaf size	$\frac{\text{number of rules}}{\text{integrand leaf size}}$
93	A	7	4	1.00	12	0.333
94	A	7	4	1.00	12	0.333
95	A	5	5	1.00	10	0.500
96	A	3	3	1.00	8	0.375
97	N/A	0	0	1.00	12	0.000
98	N/A	0	0	1.00	12	0.000
99	A	10	3	1.00	12	0.250
100	A	8	3	1.00	12	0.250
101	A	8	3	1.00	12	0.250
102	A	6	3	1.00	12	0.250
103	A	6	3	1.00	12	0.250
104	A	3	3	1.00	10	0.300
105	A	4	4	1.00	8	0.500
106	N/A	0	0	1.00	12	0.000
107	A	19	6	1.37	12	0.500
108	A	15	7	1.00	12	0.583
109	A	13	7	1.00	12	0.583
110	A	8	8	1.00	10	0.800
111	A	5	5	1.00	8	0.625
112	N/A	0	0	1.00	12	0.000
113	A	17	5	1.00	12	0.417
114	A	12	5	1.00	12	0.417
115	A	13	7	1.00	12	0.583
116	A	6	6	1.00	10	0.600
117	A	6	5	1.00	8	0.625
118	N/A	0	0	1.00	12	0.000
119	N/A	0	0	1.00	12	0.000
120	N/A	0	0	1.00	12	0.000
121	A	2	2	1.00	12	0.167
122	A	2	2	1.00	10	0.200
123	N/A	0	0	1.00	12	0.000
124	N/A	0	0	1.00	12	0.000
125	N/A	0	0	1.00	14	0.000

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Table 2.1 – continued from previous page

#	grade	number of steps used	number of unique rules	normalized antiderivative leaf size	integrand leaf size	$\frac{\text{number of rules}}{\text{integrand leaf size}}$
126	N/A	0	0	1.00	14	0.000
127	N/A	0	0	1.00	14	0.000
128	N/A	0	0	1.00	14	0.000
129	N/A	0	0	1.00	12	0.000
130	A	9	4	1.00	10	0.400
131	A	9	4	1.00	10	0.400
132	A	6	5	1.00	8	0.625
133	A	4	3	1.00	6	0.500
134	N/A	0	0	1.00	10	0.000
135	N/A	0	0	1.00	10	0.000
136	N/A	0	0	1.00	14	0.000
137	N/A	0	0	1.00	14	0.000
138	N/A	0	0	1.00	14	0.000
139	N/A	0	0	1.00	14	0.000
140	A	4	3	1.00	12	0.250
141	A	4	3	1.00	12	0.250
142	A	3	3	1.00	10	0.300
143	A	3	2	1.00	8	0.250
144	A	5	5	1.00	12	0.417
145	A	4	4	1.00	12	0.333
146	A	2	2	1.00	12	0.167
147	A	5	5	1.00	12	0.417
148	A	5	5	1.00	14	0.357
149	A	4	4	1.00	12	0.333
150	A	3	3	1.00	10	0.300
151	A	6	6	1.00	14	0.429
152	A	7	5	1.00	14	0.357
153	A	10	7	1.00	14	0.500
154	A	6	5	1.00	12	0.417
155	A	5	3	1.00	10	0.300
156	A	7	7	1.00	14	0.500
157	A	9	6	1.00	14	0.429
158	A	9	5	1.00	14	0.357
159	A	6	6	1.00	12	0.500

Continued on next page

Table 2.1 – continued from previous page

#	grade	number of steps used	number of unique rules	normalized antiderivative leaf size	integrand leaf size	$\frac{\text{number of rules}}{\text{integrand leaf size}}$
160	A	4	4	1.00	10	0.400
161	N/A	0	0	1.00	14	0.000
162	N/A	0	0	1.00	14	0.000
163	A	8	4	1.00	14	0.286
164	A	4	4	1.00	12	0.333
165	A	5	5	1.00	10	0.500
166	N/A	0	0	1.00	14	0.000
167	N/A	0	0	1.00	14	0.000
168	A	16	8	1.00	14	0.571
169	A	9	9	1.00	12	0.750
170	A	6	6	1.00	10	0.600
171	N/A	0	0	1.00	14	0.000
172	N/A	0	0	1.00	14	0.000
173	A	14	8	1.00	16	0.500
174	A	9	8	1.00	14	0.571
175	A	7	7	1.00	12	0.583
176	N/A	0	0	1.00	16	0.000
177	N/A	0	0	1.00	16	0.000
178	A	22	11	1.00	16	0.688
179	A	11	11	1.00	14	0.786
180	A	8	8	1.00	12	0.667
181	N/A	0	0	1.00	16	0.000
182	N/A	0	0	1.00	16	0.000
183	A	24	11	1.00	16	0.688
184	A	12	10	1.00	14	0.714
185	A	9	8	1.00	12	0.667
186	N/A	0	0	1.00	16	0.000
187	N/A	0	0	1.00	16	0.000
188	A	13	7	1.00	16	0.438
189	A	8	8	1.00	14	0.571
190	A	6	6	1.00	12	0.500
191	N/A	0	0	1.00	16	0.000
192	N/A	0	0	1.00	16	0.000

Continued on next page

Table 2.1 – continued from previous page

#	grade	number of steps used	number of unique rules	normalized antiderivative leaf size	integrand leaf size	$\frac{\text{number of rules}}{\text{integrand leaf size}}$
193	A	12	6	1.00	16	0.375
194	A	6	6	1.00	14	0.429
195	A	7	7	1.00	12	0.583
196	N/A	0	0	1.00	16	0.000
197	N/A	0	0	1.00	16	0.000
198	A	22	10	1.00	16	0.625
199	A	11	11	1.00	14	0.786
200	A	8	8	1.00	12	0.667
201	N/A	0	0	1.00	16	0.000
202	N/A	0	0	1.00	16	0.000
203	A	5	4	1.00	16	0.250
204	A	7	7	1.00	16	0.438
205	A	4	4	1.00	16	0.250
206	A	6	6	1.00	16	0.375
207	A	3	3	1.00	16	0.188
208	A	7	7	1.00	16	0.438
209	A	2	2	1.00	18	0.111
210	A	2	2	1.00	18	0.111
211	A	2	2	1.00	18	0.111
212	A	2	2	1.00	18	0.111
213	A	2	2	1.00	18	0.111
214	A	2	2	1.00	18	0.111
215	N/A	0	0	1.00	18	0.000
216	N/A	0	0	1.00	18	0.000
217	N/A	0	0	1.00	18	0.000
218	N/A	0	0	1.00	18	0.000
219	N/A	0	0	1.00	18	0.000
220	N/A	0	0	1.00	18	0.000
221	N/A	0	0	1.00	18	0.000
222	N/A	0	0	1.00	18	0.000
223	N/A	0	0	1.00	18	0.000
224	N/A	0	0	1.00	18	0.000
225	N/A	0	0	1.00	18	0.000

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Table 2.1 – continued from previous page

#	grade	number of steps used	number of unique rules	normalized antiderivative leaf size	integrand leaf size	$\frac{\text{number of rules}}{\text{integrand leaf size}}$
226	N/A	0	0	1.00	18	0.000
227	N/A	0	0	1.00	18	0.000

CHAPTER 3

LISTING OF INTEGRALS

3.1 $\int x^4 \arcsin(ax)\,dx$

Optimal result

Integrand size = 8, antiderivative size = 75

$$\int x^4 \arcsin(ax)\,dx = \frac{\sqrt{1-a^2x^2}}{5a^5} - \frac{2(1-a^2x^2)^{3/2}}{15a^5} + \frac{(1-a^2x^2)^{5/2}}{25a^5} + \frac{1}{5}x^5 \arcsin(ax)$$

```
[Out] -2/15*(-a^2*x^2+1)^(3/2)/a^5+1/25*(-a^2*x^2+1)^(5/2)/a^5+1/5*x^5*arcsin(a*x
)+1/5*(-a^2*x^2+1)^(1/2)/a^5
```

Rubi [A] (verified)

Time = 0.16 (sec) , antiderivative size = 75, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}} = 0.375$, Rules used = {4723, 272, 45}

$$\int x^4 \arcsin(ax)\,dx = \frac{(1-a^2x^2)^{5/2}}{25a^5} - \frac{2(1-a^2x^2)^{3/2}}{15a^5} + \frac{\sqrt{1-a^2x^2}}{5a^5} + \frac{1}{5}x^5 \arcsin(ax)$$

```
[In] Int[x^4*ArcSin[a*x],x]
```

```
[Out] Sqrt[1 - a^2*x^2]/(5*a^5) - (2*(1 - a^2*x^2)^(3/2))/(15*a^5) + (1 - a^2*x^2
)^(5/2)/(25*a^5) + (x^5*ArcSin[a*x])/5
```

Rule 45

```
Int[((a_.) + (b_.)*(x_))^(m_.)*((c_.) + (d_.)*(x_))^(n_.), x_Symbol] :> Int
[ExpandIntegrand[(a + b*x)^m*(c + d*x)^n, x], x] /; FreeQ[{a, b, c, d, n},
x] && NeQ[b*c - a*d, 0] && IGtQ[m, 0] && ( !IntegerQ[n] || (EqQ[c, 0] && Le
Q[7*m + 4*n + 4, 0]) || LtQ[9*m + 5*(n + 1), 0] || GtQ[m + n + 2, 0])
```

Rule 272

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[1/n, Subst[
Int[x^(Simplify[(m + 1)/n] - 1)*(a + b*x)^p, x], x, x^n], x] /; FreeQ[{a, b
, m, n, p}, x] && IntegerQ[Simplify[(m + 1)/n]]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= \frac{1}{5}x^5\arcsin(ax) - \frac{1}{5}a\int \frac{x^5}{\sqrt{1-a^2x^2}}\,dx \\
&= \frac{1}{5}x^5\arcsin(ax) - \frac{1}{10}a\text{Subst}\left(\int \frac{x^2}{\sqrt{1-a^2x}}\,dx, x, x^2\right) \\
&= \frac{1}{5}x^5\arcsin(ax) - \frac{1}{10}a\text{Subst}\left(\int \left(\frac{1}{a^4\sqrt{1-a^2x}} - \frac{2\sqrt{1-a^2x}}{a^4} + \frac{(1-a^2x)^{3/2}}{a^4}\right)\,dx, x, x^2\right) \\
&= \frac{\sqrt{1-a^2x^2}}{5a^5} - \frac{2(1-a^2x^2)^{3/2}}{15a^5} + \frac{(1-a^2x^2)^{5/2}}{25a^5} + \frac{1}{5}x^5\arcsin(ax)
\end{aligned}$$

Mathematica [A] (verified)

Time = 0.04 (sec) , antiderivative size = 51, normalized size of antiderivative = 0.68

$$\int x^4\arcsin(ax)\,dx = \frac{\sqrt{1-a^2x^2}(8+4a^2x^2+3a^4x^4)}{75a^5} + \frac{1}{5}x^5\arcsin(ax)$$

```
[In] Integrate[x^4*ArcSin[a*x],x]
[Out] (Sqrt[1 - a^2*x^2]*(8 + 4*a^2*x^2 + 3*a^4*x^4))/(75*a^5) + (x^5*ArcSin[a*x]
)/5
```

Maple [A] (verified)

Time = 0.56 (sec) , antiderivative size = 72, normalized size of antiderivative = 0.96

method	result	size
derivativedivides	$\frac{\frac{a^{5} x^{5} \arcsin \left(a x \right)}{5}+\frac{a^{4} x^{4} \sqrt{-a^{2} x^{2}+1}}{25}+\frac{4 a^{2} x^{2} \sqrt{-a^{2} x^{2}+1}}{75}+\frac{8 \sqrt{-a^{2} x^{2}+1}}{75}}{a^{5}}$	72
default	$\frac{\frac{a^{5} x^{5} \arcsin \left(a x \right)}{5}+\frac{a^{4} x^{4} \sqrt{-a^{2} x^{2}+1}}{25}+\frac{4 a^{2} x^{2} \sqrt{-a^{2} x^{2}+1}}{75}+\frac{8 \sqrt{-a^{2} x^{2}+1}}{75}}{a^{5}}$	72
parts	$\frac{x^{5} \arcsin \left(a x \right)}{5}-\frac{a \left(-\frac{x^{4} \sqrt{-a^{2} x^{2}+1}}{5 a^{2}}+\frac{-\frac{4 x^{2} \sqrt{-a^{2} x^{2}+1}}{15 a^{2}}-\frac{8 \sqrt{-a^{2} x^{2}+1}}{15 a^{4}}}{a^{2}}\right)}{5}$	78

```
[In] int(x^4*arcsin(a*x),x,method=_RETURNVERBOSE)
```

```
[Out] 1/a^5*(1/5*a^5*x^5*arcsin(a*x)+1/25*a^4*x^4*(-a^2*x^2+1)^(1/2)+4/75*a^2*x^2
*(-a^2*x^2+1)^(1/2)+8/75*(-a^2*x^2+1)^(1/2))
```

Fricas [A] (verification not implemented)

none

Time = 0.25 (sec) , antiderivative size = 49, normalized size of antiderivative = 0.65

$$\int x^4 \arcsin(ax)\,dx = \frac{15\,a^5x^5 \arcsin\left(ax\right) + (3\,a^4x^4 + 4\,a^2x^2 + 8)\sqrt{-a^2x^2+1}}{75\,a^5}$$

```
[In] integrate(x^4*arcsin(a*x),x, algorithm="fricas")
```

```
[Out] 1/75*(15*a^5*x^5*arcsin(a*x) + (3*a^4*x^4 + 4*a^2*x^2 + 8)*sqrt(-a^2*x^2 +
1))/a^5
```

Sympy [A] (verification not implemented)

Time = 0.30 (sec) , antiderivative size = 70, normalized size of antiderivative = 0.93

$$\int x^4 \arcsin(ax)\,dx = \begin{cases} \frac{x^5 \operatorname{asin}\left(ax\right)}{5} + \frac{x^4\sqrt{-a^2x^2+1}}{25a} + \frac{4x^2\sqrt{-a^2x^2+1}}{75a^3} + \frac{8\sqrt{-a^2x^2+1}}{75a^5} & \text{for}\ a \neq 0 \\ 0 & \text{otherwise} \end{cases}$$

```
[In] integrate(x**4*asin(a*x),x)
```

```
[Out] Piecewise((x**5*asin(a*x)/5 + x**4*sqrt(-a**2*x**2 + 1)/(25*a) + 4*x**2*sqr
t(-a**2*x**2 + 1)/(75*a**3) + 8*sqrt(-a**2*x**2 + 1)/(75*a**5), Ne(a, 0)),
(0, True))
```

Maxima [A] (verification not implemented)

none

Time = 0.27 (sec) , antiderivative size = 71, normalized size of antiderivative = 0.95

$$\int x^4 \arcsin(ax)\,dx = \frac{1}{5}\,x^5 \arcsin\left(ax\right) + \frac{1}{75}\left(\frac{3\,\sqrt{-a^2x^2+1}x^4}{a^2} + \frac{4\,\sqrt{-a^2x^2+1}x^2}{a^4} + \frac{8\,\sqrt{-a^2x^2+1}}{a^6}\right)a$$

```
[In] integrate(x^4*arcsin(a*x),x, algorithm="maxima")
```

```
[Out] 1/5*x^5*arcsin(a*x) + 1/75*(3*sqrt(-a^2*x^2 + 1)*x^4/a^2 + 4*sqrt(-a^2*x^2
+ 1)*x^2/a^4 + 8*sqrt(-a^2*x^2 + 1)/a^6)*a
```

Giac [A] (verification not implemented)

none

Time = 0.27 (sec) , antiderivative size = 113, normalized size of antiderivative = 1.51

$$\int x^4 \arcsin(ax)\,dx = \frac{\left(a^2x^2-1\right)^2 x \arcsin\left(ax\right)}{5\,a^4} + \frac{2\,\left(a^2x^2-1\right)x \arcsin\left(ax\right)}{5\,a^4} + \frac{x \arcsin\left(ax\right)}{5\,a^4} + \frac{\left(a^2x^2-1\right)^2\sqrt{-a^2x^2+1}}{25\,a^5} - \frac{2\,\left(-a^2x^2+1\right)^{\frac{3}{2}}}{15\,a^5} + \frac{\sqrt{-a^2x^2+1}}{5\,a^5}$$

```
[In] integrate(x^4*arcsin(a*x),x, algorithm="giac")
```

```
[Out] 1/5*(a^2*x^2 - 1)^2*x*arcsin(a*x)/a^4 + 2/5*(a^2*x^2 - 1)*x*arcsin(a*x)/a^4
 + 1/5*x*arcsin(a*x)/a^4 + 1/25*(a^2*x^2 - 1)^2*sqrt(-a^2*x^2 + 1)/a^5 - 2/
15*(-a^2*x^2 + 1)^(3/2)/a^5 + 1/5*sqrt(-a^2*x^2 + 1)/a^5
```

Mupad [F(-1)]

Timed out.

$$\int x^4 \arcsin(ax)\,dx = \int x^4\,\mathrm{asin}(a\,x)\,dx$$

```
[In] int(x^4*asin(a*x),x)
```

```
[Out] int(x^4*asin(a*x), x)
```

3.2 $\int x^3 \arcsin(ax)\,dx$

Optimal result

Integrand size = 8, antiderivative size = 69

$$\int x^3 \arcsin(ax)\,dx = \frac{3x\sqrt{1-a^2x^2}}{32a^3} + \frac{x^3\sqrt{1-a^2x^2}}{16a} - \frac{3\arcsin(ax)}{32a^4} + \frac{1}{4}x^4\arcsin(ax)$$

```
[Out] -3/32*arcsin(a*x)/a^4+1/4*x^4*arcsin(a*x)+3/32*x*(-a^2*x^2+1)^(1/2)/a^3+1/1
6*x^3*(-a^2*x^2+1)^(1/2)/a
```

Rubi [A] (verified)

Time = 0.10 (sec) , antiderivative size = 69, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {4723, 327, 222}

$$\int x^3 \arcsin(ax)\,dx = -\frac{3\arcsin(ax)}{32a^4} + \frac{x^3\sqrt{1-a^2x^2}}{16a} + \frac{3x\sqrt{1-a^2x^2}}{32a^3} + \frac{1}{4}x^4\arcsin(ax)$$

```
[In] Int[x^3*ArcSin[a*x],x]
```

```
[Out] (3*x*Sqrt[1 - a^2*x^2])/(32*a^3) + (x^3*Sqrt[1 - a^2*x^2])/(16*a) - (3*ArcS
in[a*x])/(32*a^4) + (x^4*ArcSin[a*x])/4
```

Rule 222

```
Int[1/Sqrt[(a_) + (b_.)*(x_)^2], x_Symbol] :> Simp[ArcSin[Rt[-b, 2]*(x/Sqrt
[a])]/Rt[-b, 2], x] /; FreeQ[{a, b}, x] && GtQ[a, 0] && NegQ[b]
```

Rule 327

```
Int[((c_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[c^(n
 - 1)*(c*x)^(m - n + 1)*((a + b*x^n)^(p + 1)/(b*(m + n*p + 1))), x] - Dist[
```

```
a*c^n*((m - n + 1)/(b*(m + n*p + 1))), Int[(c*x)^(m - n)*(a + b*x^n)^p, x],
 x] /; FreeQ[{a, b, c, p}, x] && IGtQ[n, 0] && GtQ[m, n - 1] && NeQ[m + n*p
 + 1, 0] && IntBinomialQ[a, b, c, n, m, p, x]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= \frac{1}{4}x^4\arcsin(ax) - \frac{1}{4}a\int \frac{x^4}{\sqrt{1-a^2x^2}}\,dx \\
&= \frac{x^3\sqrt{1-a^2x^2}}{16a} + \frac{1}{4}x^4\arcsin(ax) - \frac{3\int \frac{x^2}{\sqrt{1-a^2x^2}}\,dx}{16a} \\
&= \frac{3x\sqrt{1-a^2x^2}}{32a^3} + \frac{x^3\sqrt{1-a^2x^2}}{16a} + \frac{1}{4}x^4\arcsin(ax) - \frac{3\int \frac{1}{\sqrt{1-a^2x^2}}\,dx}{32a^3} \\
&= \frac{3x\sqrt{1-a^2x^2}}{32a^3} + \frac{x^3\sqrt{1-a^2x^2}}{16a} - \frac{3\arcsin(ax)}{32a^4} + \frac{1}{4}x^4\arcsin(ax)
\end{aligned}$$

Mathematica [A] (verified)

Time = 0.03 (sec) , antiderivative size = 50, normalized size of antiderivative = 0.72

$$\int x^3\arcsin(ax)\,dx = \frac{ax\sqrt{1-a^2x^2}(3+2a^2x^2) + (-3+8a^4x^4)\arcsin(ax)}{32a^4}$$

```
[In] Integrate[x^3*ArcSin[a*x],x]
[Out] (a*x*Sqrt[1 - a^2*x^2]*(3 + 2*a^2*x^2) + (-3 + 8*a^4*x^4)*ArcSin[a*x])/(32*
a^4)
```

Maple [A] (verified)

Time = 0.01 (sec) , antiderivative size = 60, normalized size of antiderivative = 0.87

method	result	size
derivativedivides	$\frac{\frac{a^{4} x^{4} \arcsin(ax)}{4}+\frac{a^{3} x^{3} \sqrt{-a^{2} x^{2}+1}}{16}+\frac{3 a x \sqrt{-a^{2} x^{2}+1}}{32}-\frac{3 \arcsin(ax)}{32}}{a^{4}}$	60
default	$\frac{\frac{a^{4} x^{4} \arcsin(ax)}{4}+\frac{a^{3} x^{3} \sqrt{-a^{2} x^{2}+1}}{16}+\frac{3 a x \sqrt{-a^{2} x^{2}+1}}{32}-\frac{3 \arcsin(ax)}{32}}{a^{4}}$	60
parts	$\frac{x^{4} \arcsin(ax)}{4}-\frac{a\left(-\frac{x^{3} \sqrt{-a^{2} x^{2}+1}}{4 a^{2}}+\frac{-\frac{3 x \sqrt{-a^{2} x^{2}+1}}{8 a^{2}}+\frac{3 \arctan\left(\frac{\sqrt{a^{2}}\, x}{\sqrt{-a^{2} x^{2}+1}}\right)}{8 a^{2} \sqrt{a^{2}}}}{a^{2}}\right)}{4}$	89

[In] int(x^3*arcsin(a*x),x,method=_RETURNVERBOSE)

[Out] 1/a^4*(1/4*a^4*x^4*arcsin(a*x)+1/16*a^3*x^3*(-a^2*x^2+1)^(1/2)+3/32*a*x*(-a^2*x^2+1)^(1/2)-3/32*arcsin(a*x))

Fricas [A] (verification not implemented)

none

Time = 0.25 (sec) , antiderivative size = 47, normalized size of antiderivative = 0.68

$$\int x^3 \arcsin(ax)\, dx = \frac{(8\, a^4x^4 - 3) \arcsin{(ax)} + (2\, a^3x^3 + 3\, ax)\sqrt{-a^2x^2 + 1}}{32\, a^4}$$

[In] integrate(x^3*arcsin(a*x),x, algorithm="fricas")

[Out] 1/32*((8*a^4*x^4 - 3)*arcsin(a*x) + (2*a^3*x^3 + 3*a*x)*sqrt(-a^2*x^2 + 1))/a^4

Sympy [A] (verification not implemented)

Time = 0.24 (sec) , antiderivative size = 61, normalized size of antiderivative = 0.88

$$\int x^3 \arcsin(ax)\, dx = \begin{cases} \frac{x^4 \operatorname{asin}{(ax)}}{4} + \frac{x^3\sqrt{-a^2x^2+1}}{16a} + \frac{3x\sqrt{-a^2x^2+1}}{32a^3} - \frac{3 \operatorname{asin}{(ax)}}{32a^4} & \text{for}\: a \neq 0 \\ 0 & \text{otherwise} \end{cases}$$

[In] integrate(x**3*asin(a*x),x)

[Out] Piecewise((x**4*asin(a*x)/4 + x**3*sqrt(-a**2*x**2 + 1)/(16*a) + 3*x*sqrt(-a**2*x**2 + 1)/(32*a**3) - 3*asin(a*x)/(32*a**4), Ne(a, 0)), (0, True))

Maxima [A] (verification not implemented)

none

Time = 0.28 (sec) , antiderivative size = 61, normalized size of antiderivative = 0.88

$$\int x^3 \arcsin(ax)\,dx = \frac{1}{4}\,x^4 \arcsin\left(ax\right) + \frac{1}{32}\left(\frac{2\sqrt{-a^2x^2+1}x^3}{a^2} + \frac{3\sqrt{-a^2x^2+1}x}{a^4} - \frac{3\arcsin\left(ax\right)}{a^5}\right)a$$

```
[In] integrate(x^3*arcsin(a*x),x, algorithm="maxima")
```

```
[Out] 1/4*x^4*arcsin(a*x) + 1/32*(2*sqrt(-a^2*x^2 + 1)*x^3/a^2 + 3*sqrt(-a^2*x^2
+ 1)*x/a^4 - 3*arcsin(a*x)/a^5)*a
```

Giac [A] (verification not implemented)

none

Time = 0.27 (sec) , antiderivative size = 84, normalized size of antiderivative = 1.22

$$\int x^3 \arcsin(ax)\,dx = -\frac{\left(-a^2x^2+1\right)^{\frac{3}{2}}x}{16\,a^3} + \frac{\left(a^2x^2-1\right)^2 \arcsin\left(ax\right)}{4\,a^4} + \frac{5\sqrt{-a^2x^2+1}x}{32\,a^3} + \frac{\left(a^2x^2-1\right)\arcsin\left(ax\right)}{2\,a^4} + \frac{5\arcsin\left(ax\right)}{32\,a^4}$$

```
[In] integrate(x^3*arcsin(a*x),x, algorithm="giac")
```

```
[Out] -1/16*(-a^2*x^2 + 1)^(3/2)*x/a^3 + 1/4*(a^2*x^2 - 1)^2*arcsin(a*x)/a^4 + 5/
32*sqrt(-a^2*x^2 + 1)*x/a^3 + 1/2*(a^2*x^2 - 1)*arcsin(a*x)/a^4 + 5/32*arcs
in(a*x)/a^4
```

Mupad [F(-1)]

Timed out.

$$\int x^3 \arcsin(ax)\,dx = \int x^3 \,\mathrm{asin}(a\,x)\;dx$$

```
[In] int(x^3*asin(a*x),x)
```

```
[Out] int(x^3*asin(a*x), x)
```

3.3 $\int x^2 \arcsin(ax)\,dx$

Optimal result

Integrand size = 8, antiderivative size = 54

$$\int x^2 \arcsin(ax)\,dx = \frac{\sqrt{1-a^2x^2}}{3a^3} - \frac{(1-a^2x^2)^{3/2}}{9a^3} + \frac{1}{3}x^3\arcsin(ax)$$

```
[Out] -1/9*(-a^2*x^2+1)^(3/2)/a^3+1/3*x^3*arcsin(a*x)+1/3*(-a^2*x^2+1)^(1/2)/a^3
```

Rubi [A] (verified)

Time = 0.02 (sec) , antiderivative size = 54, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {4723, 272, 45}

$$\int x^2 \arcsin(ax)\,dx = -\frac{(1-a^2x^2)^{3/2}}{9a^3} + \frac{\sqrt{1-a^2x^2}}{3a^3} + \frac{1}{3}x^3\arcsin(ax)$$

```
[In] Int[x^2*ArcSin[a*x],x]
```

```
[Out] Sqrt[1 - a^2*x^2]/(3*a^3) - (1 - a^2*x^2)^(3/2)/(9*a^3) + (x^3*ArcSin[a*x])
/3
```

Rule 45

```
Int[((a_.) + (b_.)*(x_))^(m_.)*((c_.) + (d_.)*(x_))^(n_.), x_Symbol] :> Int
[ExpandIntegrand[(a + b*x)^m*(c + d*x)^n, x], x] /; FreeQ[{a, b, c, d, n},
x] && NeQ[b*c - a*d, 0] && IGtQ[m, 0] && ( !IntegerQ[n] || (EqQ[c, 0] && Le
Q[7*m + 4*n + 4, 0]) || LtQ[9*m + 5*(n + 1), 0] || GtQ[m + n + 2, 0])
```

Rule 272

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[1/n, Subst[
Int[x^(Simplify[(m + 1)/n] - 1)*(a + b*x)^p, x], x, x^n], x] /; FreeQ[{a, b
, m, n, p}, x] && IntegerQ[Simplify[(m + 1)/n]]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}\text{integral} &= \frac{1}{3}x^3\arcsin(ax) - \frac{1}{3}a\int\frac{x^3}{\sqrt{1-a^2x^2}}\,dx\\ &= \frac{1}{3}x^3\arcsin(ax) - \frac{1}{6}a\text{Subst}\left(\int\frac{x}{\sqrt{1-a^2x}}\,dx, x, x^2\right)\\ &= \frac{1}{3}x^3\arcsin(ax) - \frac{1}{6}a\text{Subst}\left(\int\left(\frac{1}{a^2\sqrt{1-a^2x}} - \frac{\sqrt{1-a^2x}}{a^2}\right)\,dx, x, x^2\right)\\ &= \frac{\sqrt{1-a^2x^2}}{3a^3} - \frac{(1-a^2x^2)^{3/2}}{9a^3} + \frac{1}{3}x^3\arcsin(ax)\end{aligned}$$

Mathematica [A] (verified)

Time = 0.03 (sec) , antiderivative size = 41, normalized size of antiderivative = 0.76

$$\int x^2\arcsin(ax)\,dx = \frac{1}{9}\left(\frac{\sqrt{1-a^2x^2}(2+a^2x^2)}{a^3} + 3x^3\arcsin(ax)\right)$$

```
[In] Integrate[x^2*ArcSin[a*x],x]
[Out] ((Sqrt[1 - a^2*x^2]*(2 + a^2*x^2))/a^3 + 3*x^3*ArcSin[a*x])/9
```

Maple [A] (verified)

Time = 0.01 (sec) , antiderivative size = 52, normalized size of antiderivative = 0.96

method	result	size
derivativedivides	$\frac{\frac{a^3x^3\arcsin(ax)}{3}+\frac{a^2x^2\sqrt{-a^2x^2+1}}{9}+\frac{2\sqrt{-a^2x^2+1}}{9}}{a^3}$	52
default	$\frac{\frac{a^3x^3\arcsin(ax)}{3}+\frac{a^2x^2\sqrt{-a^2x^2+1}}{9}+\frac{2\sqrt{-a^2x^2+1}}{9}}{a^3}$	52
parts	$\frac{x^3\arcsin(ax)}{3}-\frac{a\left(-\frac{x^2\sqrt{-a^2x^2+1}}{3a^2}-\frac{2\sqrt{-a^2x^2+1}}{3a^4}\right)}{3}$	52

```
[In] int(x^2*arcsin(a*x),x,method=_RETURNVERBOSE)
[Out] 1/a^3*(1/3*a^3*x^3*arcsin(a*x)+1/9*a^2*x^2*(-a^2*x^2+1)^(1/2)+2/9*(-a^2*x^2
+1)^(1/2))
```

Fricas [A] (verification not implemented)

none

Time = 0.25 (sec) , antiderivative size = 40, normalized size of antiderivative = 0.74

$$\int x^2\arcsin(ax)\,dx=\frac{3\,a^3x^3\arcsin{(ax)}+(a^2x^2+2)\sqrt{-a^2x^2+1}}{9\,a^3}$$

```
[In] integrate(x^2*arcsin(a*x),x, algorithm="fricas")
[Out] 1/9*(3*a^3*x^3*arcsin(a*x) + (a^2*x^2 + 2)*sqrt(-a^2*x^2 + 1))/a^3
```

Sympy [A] (verification not implemented)

Time = 0.17 (sec) , antiderivative size = 48, normalized size of antiderivative = 0.89

$$\int x^2\arcsin(ax)\,dx=\begin{cases}\frac{x^3\,\mathrm{asin}\,(ax)}{3}+\frac{x^2\sqrt{-a^2x^2+1}}{9a}+\frac{2\sqrt{-a^2x^2+1}}{9a^3} & \text{for } a\neq 0\\ 0 & \text{otherwise}\end{cases}$$

```
[In] integrate(x**2*asin(a*x),x)
[Out] Piecewise((x**3*asin(a*x)/3 + x**2*sqrt(-a**2*x**2 + 1)/(9*a) + 2*sqrt(-a**
2*x**2 + 1)/(9*a**3), Ne(a, 0)), (0, True))
```

Maxima [A] (verification not implemented)

none

Time = 0.30 (sec) , antiderivative size = 50, normalized size of antiderivative = 0.93

$$\int x^2 \arcsin(ax)\,dx = \frac{1}{3}\,x^3 \arcsin\left(ax\right) + \frac{1}{9}\,a\left(\frac{\sqrt{-a^2x^2+1}x^2}{a^2} + \frac{2\,\sqrt{-a^2x^2+1}}{a^4}\right)$$

```
[In] integrate(x^2*arcsin(a*x),x, algorithm="maxima")
[Out] 1/3*x^3*arcsin(a*x) + 1/9*a*(sqrt(-a^2*x^2 + 1)*x^2/a^2 + 2*sqrt(-a^2*x^2 +
 1)/a^4)
```

Giac [A] (verification not implemented)

none

Time = 0.28 (sec) , antiderivative size = 64, normalized size of antiderivative = 1.19

$$\int x^2 \arcsin(ax)\,dx = \frac{(a^2x^2-1)x\arcsin\left(ax\right)}{3\,a^2} + \frac{x\arcsin\left(ax\right)}{3\,a^2} - \frac{(-a^2x^2+1)^{\frac{3}{2}}}{9\,a^3} + \frac{\sqrt{-a^2x^2+1}}{3\,a^3}$$

```
[In] integrate(x^2*arcsin(a*x),x, algorithm="giac")
[Out] 1/3*(a^2*x^2 - 1)*x*arcsin(a*x)/a^2 + 1/3*x*arcsin(a*x)/a^2 - 1/9*(-a^2*x^2
 + 1)^(3/2)/a^3 + 1/3*sqrt(-a^2*x^2 + 1)/a^3
```

Mupad [F(-1)]

Timed out.

$$\int x^2 \arcsin(ax)\,dx = \begin{cases} \frac{\sqrt{\frac{1}{a^2}-x^2}\,\left(\frac{2}{a^2}+x^2\right)}{9} + \frac{x^3\,\mathrm{asin}(a\,x)}{3} & \text{if } 0<a \\ \int x^2\,\mathrm{asin}(a\,x)\,dx & \text{if } \neg 0<a \end{cases}$$

```
[In] int(x^2*asin(a*x),x)
[Out] piecewise(0 < a, ((1/a^2 - x^2)^(1/2)*(2/a^2 + x^2))/9 + (x^3*asin(a*x))/3,
 ~0 < a, int(x^2*asin(a*x), x))
```

3.4 $\int x \arcsin(ax) \, dx$

Optimal result

Integrand size = 6, antiderivative size = 45

$$\int x \arcsin(ax) \, dx = \frac{x\sqrt{1-a^2x^2}}{4a} - \frac{\arcsin(ax)}{4a^2} + \frac{1}{2}x^2 \arcsin(ax)$$

```
[Out] -1/4*arcsin(a*x)/a^2+1/2*x^2*arcsin(a*x)+1/4*x*(-a^2*x^2+1)^(1/2)/a
```

Rubi [A] (verified)

Time = 0.01 (sec) , antiderivative size = 45, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {4723, 327, 222}

$$\int x \arcsin(ax) \, dx = -\frac{\arcsin(ax)}{4a^2} + \frac{x\sqrt{1-a^2x^2}}{4a} + \frac{1}{2}x^2 \arcsin(ax)$$

```
[In] Int[x*ArcSin[a*x],x]
```

```
[Out] (x*Sqrt[1 - a^2*x^2])/(4*a) - ArcSin[a*x]/(4*a^2) + (x^2*ArcSin[a*x])/2
```

Rule 222

```
Int[1/Sqrt[(a_) + (b_.)*(x_)^2], x_Symbol] :> Simp[ArcSin[Rt[-b, 2]*(x/Sqrt
[a])]/Rt[-b, 2], x] /; FreeQ[{a, b}, x] && GtQ[a, 0] && NegQ[b]
```

Rule 327

```
Int[((c_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[c^(n
 - 1)*(c*x)^(m - n + 1)*((a + b*x^n)^(p + 1)/(b*(m + n*p + 1))), x] - Dist[
a*c^n*((m - n + 1)/(b*(m + n*p + 1))), Int[(c*x)^(m - n)*(a + b*x^n)^p, x],
 x] /; FreeQ[{a, b, c, p}, x] && IGtQ[n, 0] && GtQ[m, n - 1] && NeQ[m + n*p
```

```
 + 1, 0] && IntBinomialQ[a, b, c, n, m, p, x]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= \frac{1}{2}x^2\arcsin(ax) - \frac{1}{2}a\int \frac{x^2}{\sqrt{1-a^2x^2}}\,dx \\
&= \frac{x\sqrt{1-a^2x^2}}{4a} + \frac{1}{2}x^2\arcsin(ax) - \frac{\int \frac{1}{\sqrt{1-a^2x^2}}\,dx}{4a} \\
&= \frac{x\sqrt{1-a^2x^2}}{4a} - \frac{\arcsin(ax)}{4a^2} + \frac{1}{2}x^2\arcsin(ax)
\end{aligned}$$

Mathematica [A] (verified)

Time = 0.02 (sec) , antiderivative size = 40, normalized size of antiderivative = 0.89

$$\int x\arcsin(ax)\,dx = \frac{ax\sqrt{1-a^2x^2} + (-1+2a^2x^2)\arcsin(ax)}{4a^2}$$

```
[In] Integrate[x*ArcSin[a*x],x]
[Out] (a*x*Sqrt[1 - a^2*x^2] + (-1 + 2*a^2*x^2)*ArcSin[a*x])/(4*a^2)
```

Maple [A] (verified)

Time = 0.01 (sec) , antiderivative size = 40, normalized size of antiderivative = 0.89

method	result	size
derivativedivides	$\frac{\frac{a^2x^2\arcsin(ax)}{2}+\frac{ax\sqrt{-a^2x^2+1}}{4}-\frac{\arcsin(ax)}{4}}{a^2}$	40
default	$\frac{\frac{a^2x^2\arcsin(ax)}{2}+\frac{ax\sqrt{-a^2x^2+1}}{4}-\frac{\arcsin(ax)}{4}}{a^2}$	40
parts	$\frac{x^2\arcsin(ax)}{2}-\frac{a\left(-\frac{x\sqrt{-a^2x^2+1}}{2a^2}+\frac{\arctan\left(\frac{\sqrt{a^2}\,x}{\sqrt{-a^2x^2+1}}\right)}{2a^2\sqrt{a^2}}\right)}{2}$	63

```
[In] int(x*arcsin(a*x),x,method=_RETURNVERBOSE)
```

[Out] 1/a^2*(1/2*a^2*x^2*arcsin(a*x)+1/4*a*x*(-a^2*x^2+1)^(1/2)-1/4*arcsin(a*x))

Fricas [A] (verification not implemented)

none

Time = 0.24 (sec) , antiderivative size = 36, normalized size of antiderivative = 0.80

$$\int x \arcsin(ax)\, dx = \frac{\sqrt{-a^2x^2+1}ax + (2\,a^2x^2-1)\arcsin{(ax)}}{4\,a^2}$$

[In] integrate(x*arcsin(a*x),x, algorithm="fricas")

[Out] 1/4*(sqrt(-a^2*x^2 + 1)*a*x + (2*a^2*x^2 - 1)*arcsin(a*x))/a^2

Sympy [A] (verification not implemented)

Time = 0.14 (sec) , antiderivative size = 37, normalized size of antiderivative = 0.82

$$\int x \arcsin(ax)\, dx = \begin{cases} \frac{x^2 \operatorname{asin}{(ax)}}{2} + \frac{x\sqrt{-a^2x^2+1}}{4a} - \frac{\operatorname{asin}{(ax)}}{4a^2} & \text{for}\ a \neq 0 \\ 0 & \text{otherwise} \end{cases}$$

[In] integrate(x*asin(a*x),x)

[Out] Piecewise((x**2*asin(a*x)/2 + x*sqrt(-a**2*x**2 + 1)/(4*a) - asin(a*x)/(4*a**2), Ne(a, 0)), (0, True))

Maxima [A] (verification not implemented)

none

Time = 0.29 (sec) , antiderivative size = 40, normalized size of antiderivative = 0.89

$$\int x \arcsin(ax)\, dx = \frac{1}{2}\,x^2\arcsin{(ax)} + \frac{1}{4}\,a\left(\frac{\sqrt{-a^2x^2+1}x}{a^2} - \frac{\arcsin{(ax)}}{a^3}\right)$$

[In] integrate(x*arcsin(a*x),x, algorithm="maxima")

[Out] 1/2*x^2*arcsin(a*x) + 1/4*a*(sqrt(-a^2*x^2 + 1)*x/a^2 - arcsin(a*x)/a^3)

Giac [A] (verification not implemented)

none

Time = 0.27 (sec) , antiderivative size = 46, normalized size of antiderivative = 1.02

$$\int x \arcsin(ax)\, dx = \frac{\sqrt{-a^2x^2 + 1}x}{4\,a} + \frac{(a^2x^2 - 1)\arcsin{(ax)}}{2\,a^2} + \frac{\arcsin{(ax)}}{4\,a^2}$$

```
[In] integrate(x*arcsin(a*x),x, algorithm="giac")
```

```
[Out] 1/4*sqrt(-a^2*x^2 + 1)*x/a + 1/2*(a^2*x^2 - 1)*arcsin(a*x)/a^2 + 1/4*arcsin
(a*x)/a^2
```

Mupad [B] (verification not implemented)

Time = 0.05 (sec) , antiderivative size = 38, normalized size of antiderivative = 0.84

$$\int x \arcsin(ax)\, dx = \frac{\mathrm{asin}(a\,x)\ \left(2\,a^2\,x^2 - 1\right)}{4\,a^2} + \frac{x\,\sqrt{1 - a^2\,x^2}}{4\,a}$$

```
[In] int(x*asin(a*x),x)
```

```
[Out] (asin(a*x)*(2*a^2*x^2 - 1))/(4*a^2) + (x*(1 - a^2*x^2)^(1/2))/(4*a)
```

3.5 $\int \arcsin(ax)\,dx$

Optimal result

Integrand size = 4, antiderivative size = 25

$$\int \arcsin(ax)\,dx = \frac{\sqrt{1-a^2x^2}}{a} + x\arcsin(ax)$$

```
[Out] x*arcsin(a*x)+(-a^2*x^2+1)^(1/2)/a
```

Rubi [A] (verified)

Time = 0.01 (sec) , antiderivative size = 25, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {4715, 267}

$$\int \arcsin(ax)\,dx = \frac{\sqrt{1-a^2x^2}}{a} + x\arcsin(ax)$$

```
[In] Int[ArcSin[a*x],x]
```

```
[Out] Sqrt[1 - a^2*x^2]/a + x*ArcSin[a*x]
```

Rule 267

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[(a + b*x^n)
^(p + 1)/(b*n*(p + 1)), x] /; FreeQ[{a, b, m, n, p}, x] && EqQ[m, n - 1] &&
 NeQ[p, -1]
```

Rule 4715

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.), x_Symbol] :> Simp[x*(a + b*Ar
cSin[c*x])^n, x] - Dist[b*c*n, Int[x*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 -
c^2*x^2]), x], x] /; FreeQ[{a, b, c}, x] && GtQ[n, 0]
```

Rubi steps

$$\text{integral} = x\arcsin(ax) - a\int \frac{x}{\sqrt{1-a^2x^2}}\,dx$$
$$= \frac{\sqrt{1-a^2x^2}}{a} + x\arcsin(ax)$$

Mathematica [A] (verified)

Time = 0.01 (sec) , antiderivative size = 25, normalized size of antiderivative = 1.00

$$\int \arcsin(ax)\,dx = \frac{\sqrt{1-a^2x^2}}{a} + x\arcsin(ax)$$

```
[In] Integrate[ArcSin[a*x],x]
[Out] Sqrt[1 - a^2*x^2]/a + x*ArcSin[a*x]
```

Maple [A] (verified)

Time = 0.01 (sec) , antiderivative size = 24, normalized size of antiderivative = 0.96

method	result	size
parts	$x\arcsin\left(ax\right)+\frac{\sqrt{-a^{2}x^{2}+1}}{a}$	24
derivativedivides	$\frac{ax\arcsin(ax)+\sqrt{-a^{2}x^{2}+1}}{a}$	25
default	$\frac{ax\arcsin(ax)+\sqrt{-a^{2}x^{2}+1}}{a}$	25

```
[In] int(arcsin(a*x),x,method=_RETURNVERBOSE)
[Out] x*arcsin(a*x)+(-a^2*x^2+1)^(1/2)/a
```

Fricas [A] (verification not implemented)

none

Time = 0.25 (sec) , antiderivative size = 24, normalized size of antiderivative = 0.96

$$\int \arcsin(ax)\,dx = \frac{ax\arcsin\left(ax\right) + \sqrt{-a^2x^2+1}}{a}$$

```
[In] integrate(arcsin(a*x),x, algorithm="fricas")
[Out] (a*x*arcsin(a*x) + sqrt(-a^2*x^2 + 1))/a
```

Sympy [A] (verification not implemented)

Time = 0.06 (sec) , antiderivative size = 20, normalized size of antiderivative = 0.80

$$\int \arcsin(ax)\,dx = \begin{cases} x\,\mathrm{asin}\,(ax) + \frac{\sqrt{-a^2x^2+1}}{a} & \text{for } a \neq 0 \\ 0 & \text{otherwise} \end{cases}$$

```
[In] integrate(asin(a*x),x)
[Out] Piecewise((x*asin(a*x) + sqrt(-a**2*x**2 + 1)/a, Ne(a, 0)), (0, True))
```

Maxima [A] (verification not implemented)

none

Time = 0.31 (sec) , antiderivative size = 24, normalized size of antiderivative = 0.96

$$\int \arcsin(ax)\,dx = \frac{ax\arcsin(ax) + \sqrt{-a^2x^2+1}}{a}$$

```
[In] integrate(arcsin(a*x),x, algorithm="maxima")
[Out] (a*x*arcsin(a*x) + sqrt(-a^2*x^2 + 1))/a
```

Giac [A] (verification not implemented)

none

Time = 0.26 (sec) , antiderivative size = 24, normalized size of antiderivative = 0.96

$$\int \arcsin(ax)\,dx = \frac{ax\arcsin(ax) + \sqrt{-a^2x^2+1}}{a}$$

```
[In] integrate(arcsin(a*x),x, algorithm="giac")
[Out] (a*x*arcsin(a*x) + sqrt(-a^2*x^2 + 1))/a
```

Mupad [B] (verification not implemented)

Time = 0.07 (sec) , antiderivative size = 23, normalized size of antiderivative = 0.92

$$\int \arcsin(ax)\,dx = x\,\mathrm{asin}(a\,x) + \frac{\sqrt{1-a^2\,x^2}}{a}$$

```
[In] int(asin(a*x),x)
[Out] x*asin(a*x) + (1 - a^2*x^2)^(1/2)/a
```

3.6 $\int \frac{\arcsin(ax)}{x}\,dx$

Optimal result

Integrand size = 8, antiderivative size = 51

$$\int \frac{\arcsin(ax)}{x}\,dx = -\frac{1}{2}i\arcsin(ax)^2 + \arcsin(ax)\log\left(1 - e^{2i\arcsin(ax)}\right) - \frac{1}{2}i\,\text{PolyLog}\left(2, e^{2i\arcsin(ax)}\right)$$

```
[Out] -1/2*I*arcsin(a*x)^2+arcsin(a*x)*ln(1-(I*a*x+(-a^2*x^2+1)^(1/2))^2)-1/2*I*p
olylog(2,(I*a*x+(-a^2*x^2+1)^(1/2))^2)
```

Rubi [A] (verified)

Time = 0.04 (sec) , antiderivative size = 51, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.625, Rules used = {4721, 3798, 2221, 2317, 2438}

$$\int \frac{\arcsin(ax)}{x}\,dx = -\frac{1}{2}i\,\text{PolyLog}\left(2, e^{2i\arcsin(ax)}\right) - \frac{1}{2}i\arcsin(ax)^2 + \arcsin(ax)\log\left(1 - e^{2i\arcsin(ax)}\right)$$

```
[In] Int[ArcSin[a*x]/x,x]
```

```
[Out] (-1/2*I)*ArcSin[a*x]^2 + ArcSin[a*x]*Log[1 - E^((2*I)*ArcSin[a*x])] - (I/2)
*PolyLog[2, E^((2*I)*ArcSin[a*x])]
```

Rule 2221

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m/(b*f*g*n*Log[F]))*Log[1 + b*((F^(g*(e + f*x)))^n/a)], x] - Di
```

```
st[d*(m/(b*f*g*n*Log[F])), Int[(c + d*x)^(m - 1)*Log[1 + b*((F^(g*(e + f*x)
))^n/a)], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2317

```
Int[Log[(a_) + (b_.)*((F_)^((e_.)*((c_.) + (d_.)*(x_))))^(n_.)], x_Symbol]
:> Dist[1/(d*e*n*Log[F]), Subst[Int[Log[a + b*x]/x, x], x, (F^(e*(c + d*x))
)^n], x] /; FreeQ[{F, a, b, c, d, e, n}, x] && GtQ[a, 0]
```

Rule 2438

```
Int[Log[(c_.)*((d_) + (e_.)*(x_)^(n_.))]/(x_), x_Symbol] :> Simp[-PolyLog[2
, (-c)*e*x^n]/n, x] /; FreeQ[{c, d, e, n}, x] && EqQ[c*d, 1]
```

Rule 3798

```
Int[((c_.) + (d_.)*(x_))^(m_.)*tan[(e_.) + Pi*(k_.) + (f_.)*(x_)], x_Symbol
] :> Simp[I*((c + d*x)^(m + 1)/(d*(m + 1))), x] - Dist[2*I, Int[(c + d*x)^m
*E^(2*I*k*Pi)*(E^(2*I*(e + f*x))/(1 + E^(2*I*k*Pi)*E^(2*I*(e + f*x)))), x],
 x] /; FreeQ[{c, d, e, f}, x] && IntegerQ[4*k] && IGtQ[m, 0]
```

Rule 4721

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)/(x_), x_Symbol] :> Subst[Int[(
a + b*x)^n*Cot[x], x], x, ArcSin[c*x]] /; FreeQ[{a, b, c}, x] && IGtQ[n, 0]
```

Rubi steps

$$
\begin{aligned}
\text{integral} &= \text{Subst}(\int x\cot(x)\,dx, x, \arcsin(ax)) \\
&= -\frac{1}{2}i\arcsin(ax)^2 - 2i\text{Subst}\left(\int \frac{e^{2ix}x}{1-e^{2ix}}\,dx, x, \arcsin(ax)\right) \\
&= -\frac{1}{2}i\arcsin(ax)^2 + \arcsin(ax)\log\left(1-e^{2i\arcsin(ax)}\right) \\
&\quad - \text{Subst}\left(\int \log\left(1-e^{2ix}\right)\,dx, x, \arcsin(ax)\right) \\
&= -\frac{1}{2}i\arcsin(ax)^2 + \arcsin(ax)\log\left(1-e^{2i\arcsin(ax)}\right) \\
&\quad + \frac{1}{2}i\text{Subst}\left(\int \frac{\log(1-x)}{x}\,dx, x, e^{2i\arcsin(ax)}\right) \\
&= -\frac{1}{2}i\arcsin(ax)^2 + \arcsin(ax)\log\left(1-e^{2i\arcsin(ax)}\right) - \frac{1}{2}i\,\text{PolyLog}\left(2, e^{2i\arcsin(ax)}\right)
\end{aligned}
$$

Mathematica [A] (verified)

Time = 0.05 (sec) , antiderivative size = 46, normalized size of antiderivative = 0.90

$$\int \frac{\arcsin(ax)}{x}\,dx = \arcsin(ax)\log\left(1-e^{2i\arcsin(ax)}\right)-\frac{1}{2}i\left(\arcsin(ax)^2+\text{PolyLog}\left(2,e^{2i\arcsin(ax)}\right)\right)$$

```
[In] Integrate[ArcSin[a*x]/x,x]
[Out] ArcSin[a*x]*Log[1 - E^((2*I)*ArcSin[a*x])] - (I/2)*(ArcSin[a*x]^2 + PolyLog
[2, E^((2*I)*ArcSin[a*x])])
```

Maple [A] (verified)

Time = 0.12 (sec) , antiderivative size = 111, normalized size of antiderivative = 2.18

method	result
derivativedivides	$-\frac{i\arcsin(ax)^2}{2}+\arcsin(ax)\ln\left(1-iax-\sqrt{-a^2x^2+1}\right)-i\,\text{polylog}\left(2,iax+\sqrt{-a^2x^2+\right.$
default	$-\frac{i\arcsin(ax)^2}{2}+\arcsin(ax)\ln\left(1-iax-\sqrt{-a^2x^2+1}\right)-i\,\text{polylog}\left(2,iax+\sqrt{-a^2x^2+\right.$

```
[In] int(arcsin(a*x)/x,x,method=_RETURNVERBOSE)
[Out] -1/2*I*arcsin(a*x)^2+arcsin(a*x)*ln(1-I*a*x-(-a^2*x^2+1)^(1/2))-I*polylog(2
,I*a*x+(-a^2*x^2+1)^(1/2))+arcsin(a*x)*ln(1+I*a*x+(-a^2*x^2+1)^(1/2))-I*pol
ylog(2,-I*a*x-(-a^2*x^2+1)^(1/2))
```

Fricas [F]

$$\int \frac{\arcsin(ax)}{x}\,dx = \int \frac{\arcsin(ax)}{x}\,dx$$

```
[In] integrate(arcsin(a*x)/x,x, algorithm="fricas")
[Out] integral(arcsin(a*x)/x, x)
```

Sympy [F]

$$\int \frac{\arcsin(ax)}{x} dx = \int \frac{\operatorname{asin}(ax)}{x} dx$$

```
[In] integrate(asin(a*x)/x,x)
[Out] Integral(asin(a*x)/x, x)
```

Maxima [F]

$$\int \frac{\arcsin(ax)}{x} dx = \int \frac{\arcsin(ax)}{x} dx$$

```
[In] integrate(arcsin(a*x)/x,x, algorithm="maxima")
[Out] integrate(arcsin(a*x)/x, x)
```

Giac [F]

$$\int \frac{\arcsin(ax)}{x} dx = \int \frac{\arcsin(ax)}{x} dx$$

```
[In] integrate(arcsin(a*x)/x,x, algorithm="giac")
[Out] integrate(arcsin(a*x)/x, x)
```

Mupad [B] (verification not implemented)

Time = 0.05 (sec) , antiderivative size = 41, normalized size of antiderivative = 0.80

$$\int \frac{\arcsin(ax)}{x} dx = \ln\left(1 - e^{\operatorname{asin}(a\,x)\,2\mathrm{i}}\right)\,\operatorname{asin}(a\,x) - \frac{\operatorname{polylog}\left(2, e^{\operatorname{asin}(a\,x)\,2\mathrm{i}}\right)\,1\mathrm{i}}{2} - \frac{\operatorname{asin}(a\,x)^2\,1\mathrm{i}}{2}$$

```
[In] int(asin(a*x)/x,x)
[Out] log(1 - exp(asin(a*x)*2i))*asin(a*x) - (polylog(2, exp(asin(a*x)*2i))*1i)/2
 - (asin(a*x)^2*1i)/2
```

3.7 $\int \frac{\arcsin(ax)}{x^2} dx$

Optimal result

Integrand size = 8, antiderivative size = 28

$$\int \frac{\arcsin(ax)}{x^2} dx = -\frac{\arcsin(ax)}{x} - a\text{arctanh}\left(\sqrt{1-a^2x^2}\right)$$

```
[Out] -arcsin(a*x)/x-a*arctanh((-a^2*x^2+1)^(1/2))
```

Rubi [A] (verified)

Time = 0.01 (sec) , antiderivative size = 28, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {4723, 272, 65, 214}

$$\int \frac{\arcsin(ax)}{x^2} dx = -a\text{arctanh}\left(\sqrt{1-a^2x^2}\right) - \frac{\arcsin(ax)}{x}$$

```
[In] Int[ArcSin[a*x]/x^2,x]
```

```
[Out] -(ArcSin[a*x]/x) - a*ArcTanh[Sqrt[1 - a^2*x^2]]
```

Rule 65

```
Int[((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_), x_Symbol] :> With[
{p = Denominator[m]}, Dist[p/b, Subst[Int[x^(p*(m + 1) - 1)*(c - a*(d/b) +
d*(x^p/b))^n, x], x, (a + b*x)^(1/p)], x]] /; FreeQ[{a, b, c, d}, x] && NeQ
[b*c - a*d, 0] && LtQ[-1, m, 0] && LeQ[-1, n, 0] && LeQ[Denominator[n], Den
ominator[m]] && IntLinearQ[a, b, c, d, m, n, x]
```

Rule 214

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(Rt[-a/b, 2]/a)*ArcTanh[x
/Rt[-a/b, 2]], x] /; FreeQ[{a, b}, x] && NegQ[a/b]
```

Rule 272

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[1/n, Subst[
Int[x^(Simplify[(m + 1)/n] - 1)*(a + b*x)^p, x], x, x^n], x] /; FreeQ[{a, b
, m, n, p}, x] && IntegerQ[Simplify[(m + 1)/n]]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= -\frac{\arcsin(ax)}{x} + a\int \frac{1}{x\sqrt{1-a^2x^2}}\,dx \\
&= -\frac{\arcsin(ax)}{x} + \frac{1}{2}a\text{Subst}\left(\int \frac{1}{x\sqrt{1-a^2x}}\,dx, x, x^2\right) \\
&= -\frac{\arcsin(ax)}{x} - \frac{\text{Subst}\left(\int \frac{1}{\frac{1}{a^2}-\frac{x^2}{a^2}}\,dx, x, \sqrt{1-a^2x^2}\right)}{a} \\
&= -\frac{\arcsin(ax)}{x} - a\text{arctanh}\left(\sqrt{1-a^2x^2}\right)
\end{aligned}$$

Mathematica [A] (verified)

Time = 0.01 (sec) , antiderivative size = 28, normalized size of antiderivative = 1.00

$$\int \frac{\arcsin(ax)}{x^2}\,dx = -\frac{\arcsin(ax)}{x} - a\text{arctanh}\left(\sqrt{1-a^2x^2}\right)$$

```
[In] Integrate[ArcSin[a*x]/x^2,x]
[Out] -(ArcSin[a*x]/x) - a*ArcTanh[Sqrt[1 - a^2*x^2]]
```

Maple [A] (verified)

Time = 0.01 (sec) , antiderivative size = 27, normalized size of antiderivative = 0.96

method	result	size
parts	$-\frac{\arcsin(ax)}{x}-a\,\operatorname{arctanh}\left(\frac{1}{\sqrt{-a^2x^2+1}}\right)$	27
derivativedivides	$a\left(-\frac{\arcsin(ax)}{ax}-\operatorname{arctanh}\left(\frac{1}{\sqrt{-a^2x^2+1}}\right)\right)$	31
default	$a\left(-\frac{\arcsin(ax)}{ax}-\operatorname{arctanh}\left(\frac{1}{\sqrt{-a^2x^2+1}}\right)\right)$	31

```
[In] int(arcsin(a*x)/x^2,x,method=_RETURNVERBOSE)
```

```
[Out] -arcsin(a*x)/x-a*arctanh(1/(-a^2*x^2+1)^(1/2))
```

Fricas [A] (verification not implemented)

none

Time = 0.28 (sec) , antiderivative size = 49, normalized size of antiderivative = 1.75

$$\int \frac{\arcsin(ax)}{x^2}\,dx=-\frac{ax\log\left(\sqrt{-a^2x^2+1}+1\right)-ax\log\left(\sqrt{-a^2x^2+1}-1\right)+2\arcsin\left(ax\right)}{2\,x}$$

```
[In] integrate(arcsin(a*x)/x^2,x, algorithm="fricas")
```

```
[Out] -1/2*(a*x*log(sqrt(-a^2*x^2 + 1) + 1) - a*x*log(sqrt(-a^2*x^2 + 1) - 1) + 2
*arcsin(a*x))/x
```

Sympy [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 0.82 (sec) , antiderivative size = 32, normalized size of antiderivative = 1.14

$$\int \frac{\arcsin(ax)}{x^2}\,dx=a\left(\begin{cases}-\operatorname{acosh}\left(\frac{1}{ax}\right) & \text{for}\ \frac{1}{|a^2x^2|}>1\\ i\operatorname{asin}\left(\frac{1}{ax}\right) & \text{otherwise}\end{cases}\right)-\frac{\operatorname{asin}\left(ax\right)}{x}$$

```
[In] integrate(asin(a*x)/x**2,x)
```

```
[Out] a*Piecewise((-acosh(1/(a*x)), 1/Abs(a**2*x**2) > 1), (I*asin(1/(a*x)), True
)) - asin(a*x)/x
```

Maxima [A] (verification not implemented)

none

Time = 0.27 (sec) , antiderivative size = 39, normalized size of antiderivative = 1.39

$$\int \frac{\arcsin(ax)}{x^2}\,dx = -a\log\left(\frac{2\sqrt{-a^2x^2+1}}{|x|} + \frac{2}{|x|}\right) - \frac{\arcsin(ax)}{x}$$

```
[In] integrate(arcsin(a*x)/x^2,x, algorithm="maxima")
[Out] -a*log(2*sqrt(-a^2*x^2 + 1)/abs(x) + 2/abs(x)) - arcsin(a*x)/x
```

Giac [A] (verification not implemented)

none

Time = 0.27 (sec) , antiderivative size = 48, normalized size of antiderivative = 1.71

$$\int \frac{\arcsin(ax)}{x^2}\,dx = -\frac{1}{2}a\left(\log\left(\sqrt{-a^2x^2+1}+1\right) - \log\left(-\sqrt{-a^2x^2+1}+1\right)\right) - \frac{\arcsin(ax)}{x}$$

```
[In] integrate(arcsin(a*x)/x^2,x, algorithm="giac")
[Out] -1/2*a*(log(sqrt(-a^2*x^2 + 1) + 1) - log(-sqrt(-a^2*x^2 + 1) + 1)) - arcsi
n(a*x)/x
```

Mupad [B] (verification not implemented)

Time = 0.01 (sec) , antiderivative size = 26, normalized size of antiderivative = 0.93

$$\int \frac{\arcsin(ax)}{x^2}\,dx = -\frac{\mathrm{asin}(a\,x)}{x} - a\,\mathrm{atanh}\left(\frac{1}{\sqrt{1-a^2\,x^2}}\right)$$

```
[In] int(asin(a*x)/x^2,x)
[Out] - asin(a*x)/x - a*atanh(1/(1 - a^2*x^2)^(1/2))
```

3.8 $\int \frac{\arcsin(ax)}{x^3} dx$

Optimal result

Integrand size = 8, antiderivative size = 34

$$\int \frac{\arcsin(ax)}{x^3} dx = -\frac{a\sqrt{1-a^2x^2}}{2x} - \frac{\arcsin(ax)}{2x^2}$$

```
[Out] -1/2*arcsin(a*x)/x^2-1/2*a*(-a^2*x^2+1)^(1/2)/x
```

Rubi [A] (verified)

Time = 0.01 (sec) , antiderivative size = 34, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.250, Rules used = {4723, 270}

$$\int \frac{\arcsin(ax)}{x^3} dx = -\frac{a\sqrt{1-a^2x^2}}{2x} - \frac{\arcsin(ax)}{2x^2}$$

```
[In] Int[ArcSin[a*x]/x^3,x]
```

```
[Out] -1/2*(a*Sqrt[1 - a^2*x^2])/x - ArcSin[a*x]/(2*x^2)
```

Rule 270

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[(c*
x)^(m + 1)*((a + b*x^n)^(p + 1)/(a*c*(m + 1))), x] /; FreeQ[{a, b, c, m, n,
 p}, x] && EqQ[(m + 1)/n + p + 1, 0] && NeQ[m, -1]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
```

```
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned} \text{integral} &= -\frac{\arcsin(ax)}{2x^2} + \frac{1}{2}a \int \frac{1}{x^2\sqrt{1-a^2x^2}}\,dx \\ &= -\frac{a\sqrt{1-a^2x^2}}{2x} - \frac{\arcsin(ax)}{2x^2} \end{aligned}$$

Mathematica [A] (verified)

Time = 0.01 (sec) , antiderivative size = 29, normalized size of antiderivative = 0.85

$$\int \frac{\arcsin(ax)}{x^3}\,dx = -\frac{ax\sqrt{1-a^2x^2}+\arcsin(ax)}{2x^2}$$

```
[In] Integrate[ArcSin[a*x]/x^3,x]
[Out] -1/2*(a*x*Sqrt[1 - a^2*x^2] + ArcSin[a*x])/x^2
```

Maple [A] (verified)

Time = 0.01 (sec) , antiderivative size = 29, normalized size of antiderivative = 0.85

method	result	size
parts	$-\frac{\arcsin(ax)}{2x^2} - \frac{a\sqrt{-a^2x^2+1}}{2x}$	29
derivativedivides	$a^2\left(-\frac{\arcsin(ax)}{2a^2x^2} - \frac{\sqrt{-a^2x^2+1}}{2ax}\right)$	38
default	$a^2\left(-\frac{\arcsin(ax)}{2a^2x^2} - \frac{\sqrt{-a^2x^2+1}}{2ax}\right)$	38

```
[In] int(arcsin(a*x)/x^3,x,method=_RETURNVERBOSE)
[Out] -1/2*arcsin(a*x)/x^2-1/2*a*(-a^2*x^2+1)^(1/2)/x
```

Fricas [A] (verification not implemented)

none

Time = 0.26 (sec) , antiderivative size = 25, normalized size of antiderivative = 0.74

$$\int \frac{\arcsin(ax)}{x^3}\,dx = -\frac{\sqrt{-a^2x^2+1}ax + \arcsin{(ax)}}{2\,x^2}$$

```
[In] integrate(arcsin(a*x)/x^3,x, algorithm="fricas")
[Out] -1/2*(sqrt(-a^2*x^2 + 1)*a*x + arcsin(a*x))/x^2
```

Sympy [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 0.63 (sec) , antiderivative size = 51, normalized size of antiderivative = 1.50

$$\int \frac{\arcsin(ax)}{x^3}\,dx = \frac{a\left(\begin{cases} -\frac{i\sqrt{a^2x^2-1}}{x} & \text{for}\ |a^2x^2| > 1 \\ -\frac{\sqrt{-a^2x^2+1}}{x} & \text{otherwise} \end{cases}\right)}{2} - \frac{\operatorname{asin}{(ax)}}{2x^2}$$

```
[In] integrate(asin(a*x)/x**3,x)
[Out] a*Piecewise((-I*sqrt(a**2*x**2 - 1)/x, Abs(a**2*x**2) > 1), (-sqrt(-a**2*x*
*2 + 1)/x, True))/2 - asin(a*x)/(2*x**2)
```

Maxima [A] (verification not implemented)

none

Time = 0.28 (sec) , antiderivative size = 28, normalized size of antiderivative = 0.82

$$\int \frac{\arcsin(ax)}{x^3}\,dx = -\frac{\sqrt{-a^2x^2+1}a}{2\,x} - \frac{\arcsin{(ax)}}{2\,x^2}$$

```
[In] integrate(arcsin(a*x)/x^3,x, algorithm="maxima")
[Out] -1/2*sqrt(-a^2*x^2 + 1)*a/x - 1/2*arcsin(a*x)/x^2
```

Giac [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 68 vs. $2(28) = 56$.

Time = 0.28 (sec) , antiderivative size = 68, normalized size of antiderivative = 2.00

$$\int \frac{\arcsin(ax)}{x^3} dx = \frac{1}{4} \left(\frac{a^4 x}{\left(\sqrt{-a^2x^2+1}|a|+a\right)|a|} - \frac{\sqrt{-a^2x^2+1}|a|+a}{x|a|} \right) a - \frac{\arcsin(ax)}{2x^2}$$

```
[In] integrate(arcsin(a*x)/x^3,x, algorithm="giac")
```

```
[Out] 1/4*(a^4*x/((sqrt(-a^2*x^2 + 1)*abs(a) + a)*abs(a)) - (sqrt(-a^2*x^2 + 1)*a
bs(a) + a)/(x*abs(a)))*a - 1/2*arcsin(a*x)/x^2
```

Mupad [F(-1)]

Timed out.

$$\int \frac{\arcsin(ax)}{x^3} dx = \int \frac{\mathrm{asin}(a\,x)}{x^3} dx$$

```
[In] int(asin(a*x)/x^3,x)
```

```
[Out] int(asin(a*x)/x^3, x)
```

3.9 $\int \frac{\arcsin(ax)}{x^4}\,dx$

Optimal result

Integrand size = 8, antiderivative size = 56

$$\int \frac{\arcsin(ax)}{x^4}\,dx = -\frac{a\sqrt{1-a^2x^2}}{6x^2} - \frac{\arcsin(ax)}{3x^3} - \frac{1}{6}a^3\operatorname{arctanh}\left(\sqrt{1-a^2x^2}\right)$$

```
[Out] -1/3*arcsin(a*x)/x^3-1/6*a^3*arctanh((-a^2*x^2+1)^(1/2))-1/6*a*(-a^2*x^2+1)
^(1/2)/x^2
```

Rubi [A] (verified)

Time = 0.02 (sec) , antiderivative size = 56, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.625, Rules used = {4723, 272, 44, 65, 214}

$$\int \frac{\arcsin(ax)}{x^4}\,dx = -\frac{a\sqrt{1-a^2x^2}}{6x^2} - \frac{1}{6}a^3\operatorname{arctanh}\left(\sqrt{1-a^2x^2}\right) - \frac{\arcsin(ax)}{3x^3}$$

```
[In] Int[ArcSin[a*x]/x^4,x]
```

```
[Out] -1/6*(a*Sqrt[1 - a^2*x^2])/x^2 - ArcSin[a*x]/(3*x^3) - (a^3*ArcTanh[Sqrt[1
- a^2*x^2]])/6
```

Rule 44

```
Int[((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_), x_Symbol] :> Simp[
(a + b*x)^(m + 1)*((c + d*x)^(n + 1)/((b*c - a*d)*(m + 1))), x] - Dist[d*((
m + n + 2)/((b*c - a*d)*(m + 1))), Int[(a + b*x)^(m + 1)*(c + d*x)^n, x], x
] /; FreeQ[{a, b, c, d, n}, x] && NeQ[b*c - a*d, 0] && ILtQ[m, -1] && !Int
egerQ[n] && LtQ[n, 0]
```

Rule 65

```
Int[((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_), x_Symbol] :> With[
{p = Denominator[m]}, Dist[p/b, Subst[Int[x^(p*(m + 1) - 1)*(c - a*(d/b) +
d*(x^p/b))^n, x], x, (a + b*x)^(1/p)], x]] /; FreeQ[{a, b, c, d}, x] && NeQ
[b*c - a*d, 0] && LtQ[-1, m, 0] && LeQ[-1, n, 0] && LeQ[Denominator[n], Den
ominator[m]] && IntLinearQ[a, b, c, d, m, n, x]
```

Rule 214

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(Rt[-a/b, 2]/a)*ArcTanh[x
/Rt[-a/b, 2]], x] /; FreeQ[{a, b}, x] && NegQ[a/b]
```

Rule 272

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[1/n, Subst[
Int[x^(Simplify[(m + 1)/n] - 1)*(a + b*x)^p, x], x, x^n], x] /; FreeQ[{a, b
, m, n, p}, x] && IntegerQ[Simplify[(m + 1)/n]]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= -\frac{\arcsin(ax)}{3x^3} + \frac{1}{3}a\int \frac{1}{x^3\sqrt{1-a^2x^2}}\,dx \\
&= -\frac{\arcsin(ax)}{3x^3} + \frac{1}{6}a\text{Subst}\left(\int \frac{1}{x^2\sqrt{1-a^2x}}\,dx, x, x^2\right) \\
&= -\frac{a\sqrt{1-a^2x^2}}{6x^2} - \frac{\arcsin(ax)}{3x^3} + \frac{1}{12}a^3\text{Subst}\left(\int \frac{1}{x\sqrt{1-a^2x}}\,dx, x, x^2\right) \\
&= -\frac{a\sqrt{1-a^2x^2}}{6x^2} - \frac{\arcsin(ax)}{3x^3} - \frac{1}{6}a\text{Subst}\left(\int \frac{1}{\frac{1}{a^2}-\frac{x^2}{a^2}}\,dx, x, \sqrt{1-a^2x^2}\right) \\
&= -\frac{a\sqrt{1-a^2x^2}}{6x^2} - \frac{\arcsin(ax)}{3x^3} - \frac{1}{6}a^3\text{arctanh}\left(\sqrt{1-a^2x^2}\right)
\end{aligned}$$

Mathematica [A] (verified)

Time = 0.02 (sec) , antiderivative size = 53, normalized size of antiderivative = 0.95

$$\int \frac{\arcsin(ax)}{x^4} \, dx = -\frac{ax\sqrt{1-a^2x^2} + 2\arcsin(ax) + a^3x^3\text{arctanh}\left(\sqrt{1-a^2x^2}\right)}{6x^3}$$

```
[In] Integrate[ArcSin[a*x]/x^4,x]
[Out] -1/6*(a*x*Sqrt[1 - a^2*x^2] + 2*ArcSin[a*x] + a^3*x^3*ArcTanh[Sqrt[1 - a^2*
x^2]])/x^3
```

Maple [A] (verified)

Time = 0.01 (sec) , antiderivative size = 50, normalized size of antiderivative = 0.89

method	result	size
parts	$-\frac{\arcsin(ax)}{3x^3}+\frac{a\left(-\frac{\sqrt{-a^2x^2+1}}{2x^2}-\frac{a^2\,\text{arctanh}\left(\frac{1}{\sqrt{-a^2x^2+1}}\right)}{2}\right)}{3}$	50
derivativedivides	$a^3\left(-\frac{\arcsin(ax)}{3a^3x^3}-\frac{\sqrt{-a^2x^2+1}}{6a^2x^2}-\frac{\text{arctanh}\left(\frac{1}{\sqrt{-a^2x^2+1}}\right)}{6}\right)$	53
default	$a^3\left(-\frac{\arcsin(ax)}{3a^3x^3}-\frac{\sqrt{-a^2x^2+1}}{6a^2x^2}-\frac{\text{arctanh}\left(\frac{1}{\sqrt{-a^2x^2+1}}\right)}{6}\right)$	53

```
[In] int(arcsin(a*x)/x^4,x,method=_RETURNVERBOSE)
[Out] -1/3*arcsin(a*x)/x^3+1/3*a*(-1/2/x^2*(-a^2*x^2+1)^(1/2)-1/2*a^2*arctanh(1/(
-a^2*x^2+1)^(1/2)))
```

Fricas [A] (verification not implemented)

none

Time = 0.27 (sec) , antiderivative size = 73, normalized size of antiderivative = 1.30

$$\int \frac{\arcsin(ax)}{x^4} \, dx = -\frac{a^3x^3\log\left(\sqrt{-a^2x^2+1}+1\right) - a^3x^3\log\left(\sqrt{-a^2x^2+1}-1\right) + 2\sqrt{-a^2x^2+1}ax + 4\arcsin(ax)}{12x^3}$$

```
[In] integrate(arcsin(a*x)/x^4,x, algorithm="fricas")
[Out] -1/12*(a^3*x^3*log(sqrt(-a^2*x^2 + 1) + 1) - a^3*x^3*log(sqrt(-a^2*x^2 + 1)
 - 1) + 2*sqrt(-a^2*x^2 + 1)*a*x + 4*arcsin(a*x))/x^3
```

Sympy [A] (verification not implemented)

Time = 1.41 (sec) , antiderivative size = 107, normalized size of antiderivative = 1.91

$$\int \frac{\arcsin(ax)}{x^4}\,dx = \frac{a\left(\begin{cases} -\frac{a^2\operatorname{acosh}\left(\frac{1}{ax}\right)}{2} + \frac{a}{2x\sqrt{-1+\frac{1}{a^2x^2}}} - \frac{1}{2ax^3\sqrt{-1+\frac{1}{a^2x^2}}} & \text{for } \frac{1}{|a^2x^2|} > 1 \\ \frac{ia^2\operatorname{asin}\left(\frac{1}{ax}\right)}{2} - \frac{ia\sqrt{1-\frac{1}{a^2x^2}}}{2x} & \text{otherwise} \end{cases}\right)}{3} - \frac{\operatorname{asin}(ax)}{3x^3}$$

```
[In] integrate(asin(a*x)/x**4,x)
```

```
[Out] a*Piecewise((-a**2*acosh(1/(a*x))/2 + a/(2*x*sqrt(-1 + 1/(a**2*x**2))) - 1/
(2*a*x**3*sqrt(-1 + 1/(a**2*x**2))), 1/Abs(a**2*x**2) > 1), (I*a**2*asin(1/
(a*x))/2 - I*a*sqrt(1 - 1/(a**2*x**2))/(2*x), True))/3 - asin(a*x)/(3*x**3)
```

Maxima [A] (verification not implemented)

none

Time = 0.30 (sec) , antiderivative size = 60, normalized size of antiderivative = 1.07

$$\int \frac{\arcsin(ax)}{x^4}\,dx = -\frac{1}{6}\left(a^2\log\left(\frac{2\sqrt{-a^2x^2+1}}{|x|} + \frac{2}{|x|}\right) + \frac{\sqrt{-a^2x^2+1}}{x^2}\right)a - \frac{\arcsin(ax)}{3\,x^3}$$

```
[In] integrate(arcsin(a*x)/x^4,x, algorithm="maxima")
```

```
[Out] -1/6*(a^2*log(2*sqrt(-a^2*x^2 + 1)/abs(x) + 2/abs(x)) + sqrt(-a^2*x^2 + 1)/
x^2)*a - 1/3*arcsin(a*x)/x^3
```

Giac [A] (verification not implemented)

none

Time = 0.27 (sec) , antiderivative size = 77, normalized size of antiderivative = 1.38

$$\int \frac{\arcsin(ax)}{x^4}\,dx = -\frac{a^4\log\left(\sqrt{-a^2x^2+1}+1\right) - a^4\log\left(-\sqrt{-a^2x^2+1}+1\right) + \frac{2\sqrt{-a^2x^2+1}a^2}{x^2}}{12\,a} - \frac{\arcsin(ax)}{3\,x^3}$$

```
[In] integrate(arcsin(a*x)/x^4,x, algorithm="giac")
```

```
[Out] -1/12*(a^4*log(sqrt(-a^2*x^2 + 1) + 1) - a^4*log(-sqrt(-a^2*x^2 + 1) + 1) +
 2*sqrt(-a^2*x^2 + 1)*a^2/x^2)/a - 1/3*arcsin(a*x)/x^3
```

Mupad [F(-1)]

Timed out.

$$\int \frac{\arcsin(ax)}{x^4}\,dx = \int \frac{\operatorname{asin}(a\,x)}{x^4}\,dx$$

```
[In] int(asin(a*x)/x^4,x)
```

```
[Out] int(asin(a*x)/x^4, x)
```

3.10 $\int \frac{\arcsin(ax)}{x^5} dx$

Optimal result

Integrand size = 8, antiderivative size = 58

$$\int \frac{\arcsin(ax)}{x^5} dx = -\frac{a\sqrt{1-a^2x^2}}{12x^3} - \frac{a^3\sqrt{1-a^2x^2}}{6x} - \frac{\arcsin(ax)}{4x^4}$$

```
[Out] -1/4*arcsin(a*x)/x^4-1/12*a*(-a^2*x^2+1)^(1/2)/x^3-1/6*a^3*(-a^2*x^2+1)^(1/
2)/x
```

Rubi [A] (verified)

Time = 0.01 (sec) , antiderivative size = 58, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {4723, 277, 270}

$$\int \frac{\arcsin(ax)}{x^5} dx = -\frac{a\sqrt{1-a^2x^2}}{12x^3} - \frac{a^3\sqrt{1-a^2x^2}}{6x} - \frac{\arcsin(ax)}{4x^4}$$

```
[In] Int[ArcSin[a*x]/x^5,x]
```

```
[Out] -1/12*(a*Sqrt[1 - a^2*x^2])/x^3 - (a^3*Sqrt[1 - a^2*x^2])/(6*x) - ArcSin[a*
x]/(4*x^4)
```

Rule 270

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[(c*
x)^(m + 1)*((a + b*x^n)^(p + 1)/(a*c*(m + 1))), x] /; FreeQ[{a, b, c, m, n,
 p}, x] && EqQ[(m + 1)/n + p + 1, 0] && NeQ[m, -1]
```

Rule 277

```
Int[(x_)^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[x^(m + 1)*((
a + b*x^n)^(p + 1)/(a*(m + 1))), x] - Dist[b*((m + n*(p + 1) + 1)/(a*(m + 1
))), Int[x^(m + n)*(a + b*x^n)^p, x], x] /; FreeQ[{a, b, m, n, p}, x] && IL
tQ[Simplify[(m + 1)/n + p + 1], 0] && NeQ[m, -1]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}\text{integral} &= -\frac{\arcsin(ax)}{4x^4}+\frac{1}{4}a\int\frac{1}{x^4\sqrt{1-a^2x^2}}\,dx\\ &= -\frac{a\sqrt{1-a^2x^2}}{12x^3}-\frac{\arcsin(ax)}{4x^4}+\frac{1}{6}a^3\int\frac{1}{x^2\sqrt{1-a^2x^2}}\,dx\\ &= -\frac{a\sqrt{1-a^2x^2}}{12x^3}-\frac{a^3\sqrt{1-a^2x^2}}{6x}-\frac{\arcsin(ax)}{4x^4}\end{aligned}$$

Mathematica [A] (verified)

Time = 0.02 (sec) , antiderivative size = 41, normalized size of antiderivative = 0.71

$$\int\frac{\arcsin(ax)}{x^5}\,dx=-\frac{ax\sqrt{1-a^2x^2}(1+2a^2x^2)+3\arcsin(ax)}{12x^4}$$

```
[In] Integrate[ArcSin[a*x]/x^5,x]
[Out] -1/12*(a*x*Sqrt[1 - a^2*x^2]*(1 + 2*a^2*x^2) + 3*ArcSin[a*x])/x^4
```

Maple [A] (verified)

Time = 0.01 (sec) , antiderivative size = 52, normalized size of antiderivative = 0.90

method	result	size
parts	$-\frac{\arcsin(ax)}{4x^4}+\frac{a\left(-\frac{\sqrt{-a^2x^2+1}}{3x^3}-\frac{2a^2\sqrt{-a^2x^2+1}}{3x}\right)}{4}$	52
derivativedivides	$a^4\left(-\frac{\arcsin(ax)}{4a^4x^4}-\frac{\sqrt{-a^2x^2+1}}{12a^3x^3}-\frac{\sqrt{-a^2x^2+1}}{6ax}\right)$	58
default	$a^4\left(-\frac{\arcsin(ax)}{4a^4x^4}-\frac{\sqrt{-a^2x^2+1}}{12a^3x^3}-\frac{\sqrt{-a^2x^2+1}}{6ax}\right)$	58

```
[In] int(arcsin(a*x)/x^5,x,method=_RETURNVERBOSE)
[Out] -1/4*arcsin(a*x)/x^4+1/4*a*(-1/3/x^3*(-a^2*x^2+1)^(1/2)-2/3*a^2/x*(-a^2*x^2
+1)^(1/2))
```

Fricas [A] (verification not implemented)

none

Time = 0.27 (sec) , antiderivative size = 37, normalized size of antiderivative = 0.64

$$\int \frac{\arcsin(ax)}{x^5}\,dx=-\frac{(2\,a^3x^3+ax)\sqrt{-a^2x^2+1}+3\,\arcsin{(ax)}}{12\,x^4}$$

```
[In] integrate(arcsin(a*x)/x^5,x, algorithm="fricas")
[Out] -1/12*((2*a^3*x^3 + a*x)*sqrt(-a^2*x^2 + 1) + 3*arcsin(a*x))/x^4
```

Sympy [A] (verification not implemented)

Time = 0.86 (sec) , antiderivative size = 100, normalized size of antiderivative = 1.72

$$\int \frac{\arcsin(ax)}{x^5}\,dx=\frac{a\left(\begin{cases}-\frac{2ia^2\sqrt{a^2x^2-1}}{3x}-\frac{i\sqrt{a^2x^2-1}}{3x^3} & \text{for } |a^2x^2|>1\\ -\frac{2a^2\sqrt{-a^2x^2+1}}{3x}-\frac{\sqrt{-a^2x^2+1}}{3x^3} & \text{otherwise}\end{cases}\right)}{4}-\frac{\operatorname{asin}{(ax)}}{4x^4}$$

```
[In] integrate(asin(a*x)/x**5,x)
[Out] a*Piecewise((-2*I*a**2*sqrt(a**2*x**2 - 1)/(3*x) - I*sqrt(a**2*x**2 - 1)/(3
*x**3), Abs(a**2*x**2) > 1), (-2*a**2*sqrt(-a**2*x**2 + 1)/(3*x) - sqrt(-a*
*2*x**2 + 1)/(3*x**3), True))/4 - asin(a*x)/(4*x**4)
```

Maxima [A] (verification not implemented)

none

Time = 0.28 (sec) , antiderivative size = 50, normalized size of antiderivative = 0.86

$$\int \frac{\arcsin(ax)}{x^5}\,dx = -\frac{1}{12}\left(\frac{2\sqrt{-a^2x^2+1}a^2}{x}+\frac{\sqrt{-a^2x^2+1}}{x^3}\right)a-\frac{\arcsin(ax)}{4\,x^4}$$

```
[In] integrate(arcsin(a*x)/x^5,x, algorithm="maxima")
[Out] -1/12*(2*sqrt(-a^2*x^2 + 1)*a^2/x + sqrt(-a^2*x^2 + 1)/x^3)*a - 1/4*arcsin(
a*x)/x^4
```

Giac [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 130 vs. 2(48) = 96.

Time = 0.28 (sec) , antiderivative size = 130, normalized size of antiderivative = 2.24

$$\int \frac{\arcsin(ax)}{x^5}\,dx = \frac{1}{96}\left(\frac{\left(a^4+\frac{9\left(\sqrt{-a^2x^2+1}|a|+a\right)^2}{x^2}\right)a^6x^3}{\left(\sqrt{-a^2x^2+1}|a|+a\right)^3|a|}-\frac{\frac{9\left(\sqrt{-a^2x^2+1}|a|+a\right)a^4}{x}+\frac{\left(\sqrt{-a^2x^2+1}|a|+a\right)^3}{x^3}}{a^2|a|}\right)a-\frac{\arcsin(ax)}{4\,x^4}$$

```
[In] integrate(arcsin(a*x)/x^5,x, algorithm="giac")
[Out] 1/96*((a^4 + 9*(sqrt(-a^2*x^2 + 1)*abs(a) + a)^2/x^2)*a^6*x^3/((sqrt(-a^2*x
^2 + 1)*abs(a) + a)^3*abs(a)) - (9*(sqrt(-a^2*x^2 + 1)*abs(a) + a)*a^4/x +
(sqrt(-a^2*x^2 + 1)*abs(a) + a)^3/x^3)/(a^2*abs(a)))*a - 1/4*arcsin(a*x)/x^
4
```

Mupad [F(-1)]

Timed out.

$$\int \frac{\arcsin(ax)}{x^5}\,dx = \int \frac{\mathrm{asin}(a\,x)}{x^5}\,dx$$

```
[In] int(asin(a*x)/x^5,x)
[Out] int(asin(a*x)/x^5, x)
```

3.11 $\int \frac{\arcsin(ax)}{x^6} \, dx$

Optimal result

Integrand size = 8, antiderivative size = 80

$$\int \frac{\arcsin(ax)}{x^6} \, dx = -\frac{a\sqrt{1-a^2x^2}}{20x^4} - \frac{3a^3\sqrt{1-a^2x^2}}{40x^2} - \frac{\arcsin(ax)}{5x^5} - \frac{3}{40}a^5 \operatorname{arctanh}\left(\sqrt{1-a^2x^2}\right)$$

```
[Out] -1/5*arcsin(a*x)/x^5-3/40*a^5*arctanh((-a^2*x^2+1)^(1/2))-1/20*a*(-a^2*x^2+
1)^(1/2)/x^4-3/40*a^3*(-a^2*x^2+1)^(1/2)/x^2
```

Rubi [A] (verified)

Time = 0.03 (sec) , antiderivative size = 80, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 5, $\frac{\text{number of rules}}{\text{integrand size}} = 0.625$, Rules used = {4723, 272, 44, 65, 214}

$$\int \frac{\arcsin(ax)}{x^6} \, dx = -\frac{a\sqrt{1-a^2x^2}}{20x^4} - \frac{3}{40}a^5 \operatorname{arctanh}\left(\sqrt{1-a^2x^2}\right) - \frac{3a^3\sqrt{1-a^2x^2}}{40x^2} - \frac{\arcsin(ax)}{5x^5}$$

```
[In] Int[ArcSin[a*x]/x^6,x]
```

```
[Out] -1/20*(a*Sqrt[1 - a^2*x^2])/x^4 - (3*a^3*Sqrt[1 - a^2*x^2])/(40*x^2) - ArcS
in[a*x]/(5*x^5) - (3*a^5*ArcTanh[Sqrt[1 - a^2*x^2]])/40
```

Rule 44

```
Int[((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_), x_Symbol] :> Simp[
(a + b*x)^(m + 1)*((c + d*x)^(n + 1)/((b*c - a*d)*(m + 1))), x] - Dist[d*((
m + n + 2)/((b*c - a*d)*(m + 1))), Int[(a + b*x)^(m + 1)*(c + d*x)^n, x], x
] /; FreeQ[{a, b, c, d, n}, x] && NeQ[b*c - a*d, 0] && ILtQ[m, -1] &&  !Int
egerQ[n] && LtQ[n, 0]
```

Rule 65

```
Int[((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_), x_Symbol] :> With[
{p = Denominator[m]}, Dist[p/b, Subst[Int[x^(p*(m + 1) - 1)*(c - a*(d/b) +
d*(x^p/b))^n, x], x, (a + b*x)^(1/p)], x]] /; FreeQ[{a, b, c, d}, x] && NeQ
[b*c - a*d, 0] && LtQ[-1, m, 0] && LeQ[-1, n, 0] && LeQ[Denominator[n], Den
ominator[m]] && IntLinearQ[a, b, c, d, m, n, x]
```

Rule 214

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(Rt[-a/b, 2]/a)*ArcTanh[x
/Rt[-a/b, 2]], x] /; FreeQ[{a, b}, x] && NegQ[a/b]
```

Rule 272

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[1/n, Subst[
Int[x^(Simplify[(m + 1)/n] - 1)*(a + b*x)^p, x], x, x^n], x] /; FreeQ[{a, b
, m, n, p}, x] && IntegerQ[Simplify[(m + 1)/n]]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= -\frac{\arcsin(ax)}{5x^5} + \frac{1}{5}a\int \frac{1}{x^5\sqrt{1-a^2x^2}}\,dx \\
&= -\frac{\arcsin(ax)}{5x^5} + \frac{1}{10}a\text{Subst}\left(\int \frac{1}{x^3\sqrt{1-a^2x}}\,dx, x, x^2\right) \\
&= -\frac{a\sqrt{1-a^2x^2}}{20x^4} - \frac{\arcsin(ax)}{5x^5} + \frac{1}{40}\left(3a^3\right)\text{Subst}\left(\int \frac{1}{x^2\sqrt{1-a^2x}}\,dx, x, x^2\right) \\
&= -\frac{a\sqrt{1-a^2x^2}}{20x^4} - \frac{3a^3\sqrt{1-a^2x^2}}{40x^2} - \frac{\arcsin(ax)}{5x^5} + \frac{1}{80}\left(3a^5\right)\text{Subst}\left(\int \frac{1}{x\sqrt{1-a^2x}}\,dx, x, x^2\right) \\
&= -\frac{a\sqrt{1-a^2x^2}}{20x^4} - \frac{3a^3\sqrt{1-a^2x^2}}{40x^2} - \frac{\arcsin(ax)}{5x^5} - \frac{1}{40}\left(3a^3\right)\text{Subst}\left(\int \frac{1}{\frac{1}{a^2}-\frac{x^2}{a^2}}\,dx, x, \sqrt{1-a^2x^2}\right) \\
&= -\frac{a\sqrt{1-a^2x^2}}{20x^4} - \frac{3a^3\sqrt{1-a^2x^2}}{40x^2} - \frac{\arcsin(ax)}{5x^5} - \frac{3}{40}a^5\text{arctanh}\left(\sqrt{1-a^2x^2}\right)
\end{aligned}$$

Mathematica [C] (verified)

Result contains higher order function than in optimal. Order 5 vs. order 3 in optimal.

Time = 0.02 (sec) , antiderivative size = 51, normalized size of antiderivative = 0.64

$$\int \frac{\arcsin(ax)}{x^6} dx = -\frac{\arcsin(ax)}{5x^5} - \frac{1}{5}a^5\sqrt{1-a^2x^2}\,\text{Hypergeometric2F1}\left(\frac{1}{2},3,\frac{3}{2},1-a^2x^2\right)$$

```
[In] Integrate[ArcSin[a*x]/x^6,x]
```

```
[Out] -1/5*ArcSin[a*x]/x^5 - (a^5*Sqrt[1 - a^2*x^2]*Hypergeometric2F1[1/2, 3, 3/2
, 1 - a^2*x^2])/5
```

Maple [A] (verified)

Time = 0.01 (sec) , antiderivative size = 73, normalized size of antiderivative = 0.91

method	result	size
derivativedivides	$a^{5} \left(-\frac{\arcsin \left(a x \right)}{5 a^{5} x^{5}}-\frac{\sqrt{-a^{2} x^{2}+1}}{20 a^{4} x^{4}}-\frac{3 \sqrt{-a^{2} x^{2}+1}}{40 a^{2} x^{2}}-\frac{3\,\operatorname{arctanh}\left(\frac{1}{\sqrt{-a^{2} x^{2}+1}}\right)}{40}\right)$	73
default	$a^{5} \left(-\frac{\arcsin \left(a x \right)}{5 a^{5} x^{5}}-\frac{\sqrt{-a^{2} x^{2}+1}}{20 a^{4} x^{4}}-\frac{3 \sqrt{-a^{2} x^{2}+1}}{40 a^{2} x^{2}}-\frac{3\,\operatorname{arctanh}\left(\frac{1}{\sqrt{-a^{2} x^{2}+1}}\right)}{40}\right)$	73
parts	$-\frac{\arcsin \left(a x \right)}{5 x^{5}}+\frac{a \left(-\frac{\sqrt{-a^{2} x^{2}+1}}{4 x^{4}}+\frac{3 a^{2} \left(-\frac{\sqrt{-a^{2} x^{2}+1}}{2 x^{2}}-\frac{a^{2} \operatorname{arctanh}\left(\frac{1}{\sqrt{-a^{2} x^{2}+1}}\right)}{2}\right)}{4}\right)}{5}$	73

```
[In] int(arcsin(a*x)/x^6,x,method=_RETURNVERBOSE)
```

```
[Out] a^5*(-1/5*arcsin(a*x)/a^5/x^5-1/20/a^4/x^4*(-a^2*x^2+1)^(1/2)-3/40/a^2/x^2*
(-a^2*x^2+1)^(1/2)-3/40*arctanh(1/(-a^2*x^2+1)^(1/2)))
```

Fricas [A] (verification not implemented)

none

Time = 0.26 (sec) , antiderivative size = 85, normalized size of antiderivative = 1.06

$$\int \frac{\arcsin(ax)}{x^6}\,dx = -\frac{3\,a^5x^5\log\left(\sqrt{-a^2x^2+1}+1\right)-3\,a^5x^5\log\left(\sqrt{-a^2x^2+1}-1\right)+2\left(3\,a^3x^3+2\,ax\right)\sqrt{-a^2x^2+1}+16\arcsin(ax)}{80\,x^5}$$

```
[In] integrate(arcsin(a*x)/x^6,x, algorithm="fricas")
```

```
[Out] -1/80*(3*a^5*x^5*log(sqrt(-a^2*x^2 + 1) + 1) - 3*a^5*x^5*log(sqrt(-a^2*x^2
+ 1) - 1) + 2*(3*a^3*x^3 + 2*a*x)*sqrt(-a^2*x^2 + 1) + 16*arcsin(a*x))/x^5
```

Sympy [A] (verification not implemented)

Time = 2.79 (sec) , antiderivative size = 182, normalized size of antiderivative = 2.28

$$\int \frac{\arcsin(ax)}{x^6}\,dx = \frac{a\left(\begin{cases} -\frac{3a^4\operatorname{acosh}\left(\frac{1}{ax}\right)}{8}+\frac{3a^3}{8x\sqrt{-1+\frac{1}{a^2x^2}}}-\frac{a}{8x^3\sqrt{-1+\frac{1}{a^2x^2}}}-\frac{1}{4ax^5\sqrt{-1+\frac{1}{a^2x^2}}} & \text{for}\ \frac{1}{|a^2x^2|}>1 \\ \frac{3ia^4\operatorname{asin}\left(\frac{1}{ax}\right)}{8}-\frac{3ia^3}{8x\sqrt{1-\frac{1}{a^2x^2}}}+\frac{ia}{8x^3\sqrt{1-\frac{1}{a^2x^2}}}+\frac{i}{4ax^5\sqrt{1-\frac{1}{a^2x^2}}} & \text{otherwise} \end{cases}\right)}{5} - \frac{\operatorname{asin}(ax)}{5x^5}$$

```
[In] integrate(asin(a*x)/x**6,x)
```

```
[Out] a*Piecewise((-3*a**4*acosh(1/(a*x))/8 + 3*a**3/(8*x*sqrt(-1 + 1/(a**2*x**2)
)) - a/(8*x**3*sqrt(-1 + 1/(a**2*x**2))) - 1/(4*a*x**5*sqrt(-1 + 1/(a**2*x*
*2))), 1/Abs(a**2*x**2) > 1), (3*I*a**4*asin(1/(a*x))/8 - 3*I*a**3/(8*x*sqr
t(1 - 1/(a**2*x**2))) + I*a/(8*x**3*sqrt(1 - 1/(a**2*x**2))) + I/(4*a*x**5*
sqrt(1 - 1/(a**2*x**2))), True))/5 - asin(a*x)/(5*x**5)
```

Maxima [A] (verification not implemented)

none

Time = 0.29 (sec) , antiderivative size = 82, normalized size of antiderivative = 1.02

$$\int \frac{\arcsin(ax)}{x^6}\,dx = -\frac{1}{40}\left(3\,a^4\log\left(\frac{2\sqrt{-a^2x^2+1}}{|x|}+\frac{2}{|x|}\right)+\frac{3\sqrt{-a^2x^2+1}a^2}{x^2}+\frac{2\sqrt{-a^2x^2+1}}{x^4}\right)a - \frac{\arcsin\left(ax\right)}{5\,x^5}$$

```
[In] integrate(arcsin(a*x)/x^6,x, algorithm="maxima")
```

```
[Out] -1/40*(3*a^4*log(2*sqrt(-a^2*x^2 + 1)/abs(x) + 2/abs(x)) + 3*sqrt(-a^2*x^2
+ 1)*a^2/x^2 + 2*sqrt(-a^2*x^2 + 1)/x^4)*a - 1/5*arcsin(a*x)/x^5
```

Giac [A] (verification not implemented)

none

Time = 0.28 (sec) , antiderivative size = 101, normalized size of antiderivative = 1.26

$$\int \frac{\arcsin(ax)}{x^6}\,dx = -\frac{3\,a^6\log\left(\sqrt{-a^2x^2+1}+1\right)-3\,a^6\log\left(-\sqrt{-a^2x^2+1}+1\right)-\frac{2\left(3\left(-a^2x^2+1\right)^{\frac{3}{2}}a^6-5\sqrt{-a^2x^2+1}a^6\right)}{a^4x^4}}{80\,a} - \frac{\arcsin\left(ax\right)}{5\,x^5}$$

```
[In] integrate(arcsin(a*x)/x^6,x, algorithm="giac")
```

```
[Out] -1/80*(3*a^6*log(sqrt(-a^2*x^2 + 1) + 1) - 3*a^6*log(-sqrt(-a^2*x^2 + 1) +
1) - 2*(3*(-a^2*x^2 + 1)^(3/2)*a^6 - 5*sqrt(-a^2*x^2 + 1)*a^6)/(a^4*x^4))/a
 - 1/5*arcsin(a*x)/x^5
```

Mupad [F(-1)]

Timed out.

$$\int \frac{\arcsin(ax)}{x^6} \, dx = \int \frac{\operatorname{asin}(a\,x)}{x^6} \, dx$$

```
[In] int(asin(a*x)/x^6,x)
[Out] int(asin(a*x)/x^6, x)
```

3.12 $\int x^4 \arcsin(ax)^2 \, dx$

Optimal result

Integrand size = 10, antiderivative size = 120

$$\int x^4 \arcsin(ax)^2 \, dx = -\frac{16x}{75a^4} - \frac{8x^3}{225a^2} - \frac{2x^5}{125} + \frac{16\sqrt{1-a^2x^2}\arcsin(ax)}{75a^5} + \frac{8x^2\sqrt{1-a^2x^2}\arcsin(ax)}{75a^3} + \frac{2x^4\sqrt{1-a^2x^2}\arcsin(ax)}{25a} + \frac{1}{5}x^5\arcsin(ax)^2$$

```
[Out] -16/75*x/a^4-8/225*x^3/a^2-2/125*x^5+1/5*x^5*arcsin(a*x)^2+16/75*arcsin(a*x
)*(-a^2*x^2+1)^(1/2)/a^5+8/75*x^2*arcsin(a*x)*(-a^2*x^2+1)^(1/2)/a^3+2/25*x
^4*arcsin(a*x)*(-a^2*x^2+1)^(1/2)/a
```

Rubi [A] (verified)

Time = 0.12 (sec) , antiderivative size = 120, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 5, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {4723, 4795, 4767, 8, 30}

$$\int x^4 \arcsin(ax)^2 \, dx = -\frac{16x}{75a^4} + \frac{2x^4\sqrt{1-a^2x^2}\arcsin(ax)}{25a} - \frac{8x^3}{225a^2} + \frac{16\sqrt{1-a^2x^2}\arcsin(ax)}{75a^5} + \frac{8x^2\sqrt{1-a^2x^2}\arcsin(ax)}{75a^3} + \frac{1}{5}x^5\arcsin(ax)^2 - \frac{2x^5}{125}$$

```
[In] Int[x^4*ArcSin[a*x]^2,x]
```

```
[Out] (-16*x)/(75*a^4) - (8*x^3)/(225*a^2) - (2*x^5)/125 + (16*Sqrt[1 - a^2*x^2]*
ArcSin[a*x])/(75*a^5) + (8*x^2*Sqrt[1 - a^2*x^2]*ArcSin[a*x])/(75*a^3) + (2
*x^4*Sqrt[1 - a^2*x^2]*ArcSin[a*x])/(25*a) + (x^5*ArcSin[a*x]^2)/5
```

Rule 8

```
Int[a_, x_Symbol] :> Simp[a*x, x] /; FreeQ[a, x]
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rule 4767

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)*((d_) + (e_.)*(x_)^2)^(p_
.), x_Symbol] :> Simp[(d + e*x^2)^(p + 1)*((a + b*ArcSin[c*x])^n/(2*e*(p +
1))), x] + Dist[b*(n/(2*c*(p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], In
t[(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x] /; FreeQ[{a,
b, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && NeQ[p, -1]
```

Rule 4795

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_)*((d_) + (e_.
)*(x_)^2)^(p_), x_Symbol] :> Simp[f*(f*x)^(m - 1)*(d + e*x^2)^(p + 1)*((a +
 b*ArcSin[c*x])^n/(e*(m + 2*p + 1))), x] + (Dist[f^2*((m - 1)/(c^2*(m + 2*p
 + 1))), Int[(f*x)^(m - 2)*(d + e*x^2)^p*(a + b*ArcSin[c*x])^n, x], x] + Di
st[b*f*(n/(c*(m + 2*p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], Int[(f*x)
^(m - 1)*(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x]) /; Fr
eeQ[{a, b, c, d, e, f, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && IGtQ[m,
1] && NeQ[m + 2*p + 1, 0]
```

Rubi steps

$$
\begin{aligned}
\text{integral} &= \frac{1}{5}x^5\arcsin(ax)^2 - \frac{1}{5}(2a)\int \frac{x^5\arcsin(ax)}{\sqrt{1-a^2x^2}}\,dx \\
&= \frac{2x^4\sqrt{1-a^2x^2}\arcsin(ax)}{25a} + \frac{1}{5}x^5\arcsin(ax)^2 - \frac{2\int x^4\,dx}{25} - \frac{8\int \frac{x^3\arcsin(ax)}{\sqrt{1-a^2x^2}}\,dx}{25a} \\
&= -\frac{2x^5}{125} + \frac{8x^2\sqrt{1-a^2x^2}\arcsin(ax)}{75a^3} + \frac{2x^4\sqrt{1-a^2x^2}\arcsin(ax)}{25a} \\
&\quad + \frac{1}{5}x^5\arcsin(ax)^2 - \frac{16\int \frac{x\arcsin(ax)}{\sqrt{1-a^2x^2}}\,dx}{75a^3} - \frac{8\int x^2\,dx}{75a^2}
\end{aligned}
$$

$$= -\frac{8x^3}{225a^2} - \frac{2x^5}{125} + \frac{16\sqrt{1-a^2x^2}\arcsin(ax)}{75a^5} + \frac{8x^2\sqrt{1-a^2x^2}\arcsin(ax)}{75a^3} + \frac{2x^4\sqrt{1-a^2x^2}\arcsin(ax)}{25a} + \frac{1}{5}x^5\arcsin(ax)^2 - \frac{16\int 1\,dx}{75a^4}$$

$$= -\frac{16x}{75a^4} - \frac{8x^3}{225a^2} - \frac{2x^5}{125} + \frac{16\sqrt{1-a^2x^2}\arcsin(ax)}{75a^5} + \frac{8x^2\sqrt{1-a^2x^2}\arcsin(ax)}{75a^3} + \frac{2x^4\sqrt{1-a^2x^2}\arcsin(ax)}{25a} + \frac{1}{5}x^5\arcsin(ax)^2$$

Mathematica [A] (verified)

Time = 0.04 (sec) , antiderivative size = 82, normalized size of antiderivative = 0.68

$$\int x^4\arcsin(ax)^2\,dx = \frac{-2ax(120+20a^2x^2+9a^4x^4)+30\sqrt{1-a^2x^2}(8+4a^2x^2+3a^4x^4)\arcsin(ax)+225a^5x^5\arcsin(ax)^2}{1125a^5}$$

```
[In] Integrate[x^4*ArcSin[a*x]^2,x]
```

```
[Out] (-2*a*x*(120 + 20*a^2*x^2 + 9*a^4*x^4) + 30*Sqrt[1 - a^2*x^2]*(8 + 4*a^2*x^
2 + 3*a^4*x^4)*ArcSin[a*x] + 225*a^5*x^5*ArcSin[a*x]^2)/(1125*a^5)
```

Maple [A] (verified)

Time = 0.11 (sec) , antiderivative size = 76, normalized size of antiderivative = 0.63

method	result	size
derivativedivides	$\frac{\frac{a^5x^5\arcsin(ax)^2}{5}+\frac{2\arcsin(ax)\left(3a^4x^4+4a^2x^2+8\right)\sqrt{-a^2x^2+1}}{75}-\frac{2a^5x^5}{125}-\frac{8a^3x^3}{225}-\frac{16ax}{75}}{a^5}$	76
default	$\frac{\frac{a^5x^5\arcsin(ax)^2}{5}+\frac{2\arcsin(ax)\left(3a^4x^4+4a^2x^2+8\right)\sqrt{-a^2x^2+1}}{75}-\frac{2a^5x^5}{125}-\frac{8a^3x^3}{225}-\frac{16ax}{75}}{a^5}$	76

```
[In] int(x^4*arcsin(a*x)^2,x,method=_RETURNVERBOSE)
```

```
[Out] 1/a^5*(1/5*a^5*x^5*arcsin(a*x)^2+2/75*arcsin(a*x)*(3*a^4*x^4+4*a^2*x^2+8)*(
-a^2*x^2+1)^(1/2)-2/125*a^5*x^5-8/225*a^3*x^3-16/75*a*x)
```

Fricas [A] (verification not implemented)

none

Time = 0.25 (sec) , antiderivative size = 76, normalized size of antiderivative = 0.63

$$\int x^4 \arcsin(ax)^2 \, dx = \frac{225 \, a^5x^5 \arcsin(ax)^2 - 18 \, a^5x^5 - 40 \, a^3x^3 + 30 \, (3 \, a^4x^4 + 4 \, a^2x^2 + 8)\sqrt{-a^2x^2 + 1} \arcsin(ax) - 240 \, ax}{1125 \, a^5}$$

```
[In] integrate(x^4*arcsin(a*x)^2,x, algorithm="fricas")
[Out] 1/1125*(225*a^5*x^5*arcsin(a*x)^2 - 18*a^5*x^5 - 40*a^3*x^3 + 30*(3*a^4*x^4
 + 4*a^2*x^2 + 8)*sqrt(-a^2*x^2 + 1)*arcsin(a*x) - 240*a*x)/a^5
```

Sympy [A] (verification not implemented)

Time = 0.41 (sec) , antiderivative size = 114, normalized size of antiderivative = 0.95

$$\int x^4 \arcsin(ax)^2 \, dx = \begin{cases} \frac{x^5 \operatorname{asin}^2(ax)}{5} - \frac{2x^5}{125} + \frac{2x^4\sqrt{-a^2x^2+1} \operatorname{asin}(ax)}{25a} - \frac{8x^3}{225a^2} + \frac{8x^2\sqrt{-a^2x^2+1} \operatorname{asin}(ax)}{75a^3} - \frac{16x}{75a^4} + \frac{16\sqrt{-a^2x^2+1} \operatorname{asin}(ax)}{75a^5} & \text{for } a \neq \\ 0 & \text{otherwi} \end{cases}$$

```
[In] integrate(x**4*asin(a*x)**2,x)
[Out] Piecewise((x**5*asin(a*x)**2/5 - 2*x**5/125 + 2*x**4*sqrt(-a**2*x**2 + 1)*a
sin(a*x)/(25*a) - 8*x**3/(225*a**2) + 8*x**2*sqrt(-a**2*x**2 + 1)*asin(a*x)
/(75*a**3) - 16*x/(75*a**4) + 16*sqrt(-a**2*x**2 + 1)*asin(a*x)/(75*a**5),
Ne(a, 0)), (0, True))
```

Maxima [A] (verification not implemented)

none

Time = 0.30 (sec) , antiderivative size = 102, normalized size of antiderivative = 0.85

$$\begin{aligned}\int x^4 \arcsin(ax)^2 \, dx &= \frac{1}{5} \, x^5 \arcsin(ax)^2 \\ &+ \frac{2}{75} \left(\frac{3\sqrt{-a^2x^2 + 1}x^4}{a^2} + \frac{4\sqrt{-a^2x^2 + 1}x^2}{a^4} + \frac{8\sqrt{-a^2x^2 + 1}}{a^6} \right) a \arcsin(ax) \\ &- \frac{2 \, (9 \, a^4x^5 + 20 \, a^2x^3 + 120 \, x)}{1125 \, a^4}\end{aligned}$$

```
[In] integrate(x^4*arcsin(a*x)^2,x, algorithm="maxima")
```

```
[Out] 1/5*x^5*arcsin(a*x)^2 + 2/75*(3*sqrt(-a^2*x^2 + 1)*x^4/a^2 + 4*sqrt(-a^2*x^
2 + 1)*x^2/a^4 + 8*sqrt(-a^2*x^2 + 1)/a^6)*a*arcsin(a*x) - 2/1125*(9*a^4*x^
5 + 20*a^2*x^3 + 120*x)/a^4
```

Giac [A] (verification not implemented)

none

Time = 0.27 (sec) , antiderivative size = 169, normalized size of antiderivative = 1.41

$$\int x^4 \arcsin(ax)^2 \, dx = \frac{(a^2x^2-1)^2 x \arcsin(ax)^2}{5a^4} + \frac{2(a^2x^2-1)x \arcsin(ax)^2}{5a^4} - \frac{2(a^2x^2-1)^2 x}{125a^4} + \frac{x \arcsin(ax)^2}{5a^4} + \frac{2(a^2x^2-1)^2\sqrt{-a^2x^2+1}\arcsin(ax)}{25a^5} - \frac{76(a^2x^2-1)x}{1125a^4} - \frac{4(-a^2x^2+1)^{\frac{3}{2}}\arcsin(ax)}{15a^5} - \frac{298x}{1125a^4} + \frac{2\sqrt{-a^2x^2+1}\arcsin(ax)}{5a^5}$$

```
[In] integrate(x^4*arcsin(a*x)^2,x, algorithm="giac")
```

```
[Out] 1/5*(a^2*x^2 - 1)^2*x*arcsin(a*x)^2/a^4 + 2/5*(a^2*x^2 - 1)*x*arcsin(a*x)^2
/a^4 - 2/125*(a^2*x^2 - 1)^2*x/a^4 + 1/5*x*arcsin(a*x)^2/a^4 + 2/25*(a^2*x^
2 - 1)^2*sqrt(-a^2*x^2 + 1)*arcsin(a*x)/a^5 - 76/1125*(a^2*x^2 - 1)*x/a^4 -
 4/15*(-a^2*x^2 + 1)^(3/2)*arcsin(a*x)/a^5 - 298/1125*x/a^4 + 2/5*sqrt(-a^2
*x^2 + 1)*arcsin(a*x)/a^5
```

Mupad [F(-1)]

Timed out.

$$\int x^4 \arcsin(ax)^2 \, dx = \int x^4 \operatorname{asin}(a\,x)^2 \, dx$$

```
[In] int(x^4*asin(a*x)^2,x)
```

```
[Out] int(x^4*asin(a*x)^2, x)
```

3.13 $\int x^3 \arcsin(ax)^2 \, dx$

Optimal result

Integrand size = 10, antiderivative size = 98

$$\int x^3 \arcsin(ax)^2 \, dx = -\frac{3x^2}{32a^2} - \frac{x^4}{32} + \frac{3x\sqrt{1-a^2x^2}\arcsin(ax)}{16a^3} + \frac{x^3\sqrt{1-a^2x^2}\arcsin(ax)}{8a} - \frac{3\arcsin(ax)^2}{32a^4} + \frac{1}{4}x^4\arcsin(ax)^2$$

```
[Out] -3/32*x^2/a^2-1/32*x^4-3/32*arcsin(a*x)^2/a^4+1/4*x^4*arcsin(a*x)^2+3/16*x*
arcsin(a*x)*(-a^2*x^2+1)^(1/2)/a^3+1/8*x^3*arcsin(a*x)*(-a^2*x^2+1)^(1/2)/a
```

Rubi [A] (verified)

Time = 0.10 (sec) , antiderivative size = 98, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 4, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.400, Rules used = {4723, 4795, 4737, 30}

$$\int x^3 \arcsin(ax)^2 \, dx = -\frac{3\arcsin(ax)^2}{32a^4} + \frac{x^3\sqrt{1-a^2x^2}\arcsin(ax)}{8a} - \frac{3x^2}{32a^2} + \frac{3x\sqrt{1-a^2x^2}\arcsin(ax)}{16a^3} + \frac{1}{4}x^4\arcsin(ax)^2 - \frac{x^4}{32}$$

```
[In] Int[x^3*ArcSin[a*x]^2,x]
```

```
[Out] (-3*x^2)/(32*a^2) - x^4/32 + (3*x*Sqrt[1 - a^2*x^2]*ArcSin[a*x])/(16*a^3) +
 (x^3*Sqrt[1 - a^2*x^2]*ArcSin[a*x])/(8*a) - (3*ArcSin[a*x]^2)/(32*a^4) + (
x^4*ArcSin[a*x]^2)/4
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rule 4737

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)/Sqrt[(d_) + (e_.)*(x_)^2], x_S
ymbol] :> Simp[(1/(b*c*(n + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]]*(a
 + b*ArcSin[c*x])^(n + 1), x] /; FreeQ[{a, b, c, d, e, n}, x] && EqQ[c^2*d
+ e, 0] && NeQ[n, -1]
```

Rule 4795

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_)*((d_) + (e_.
)*(x_)^2)^(p_), x_Symbol] :> Simp[f*(f*x)^(m - 1)*(d + e*x^2)^(p + 1)*((a +
 b*ArcSin[c*x])^n/(e*(m + 2*p + 1))), x] + (Dist[f^2*((m - 1)/(c^2*(m + 2*p
 + 1))), Int[(f*x)^(m - 2)*(d + e*x^2)^p*(a + b*ArcSin[c*x])^n, x], x] + Di
st[b*f*(n/(c*(m + 2*p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], Int[(f*x)
^(m - 1)*(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x]) /; Fr
eeQ[{a, b, c, d, e, f, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && IGtQ[m,
1] && NeQ[m + 2*p + 1, 0]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= \frac{1}{4}x^4\arcsin(ax)^2 - \frac{1}{2}a\int \frac{x^4\arcsin(ax)}{\sqrt{1-a^2x^2}}\,dx \\
&= \frac{x^3\sqrt{1-a^2x^2}\arcsin(ax)}{8a} + \frac{1}{4}x^4\arcsin(ax)^2 - \frac{\int x^3\,dx}{8} - \frac{3\int \frac{x^2\arcsin(ax)}{\sqrt{1-a^2x^2}}\,dx}{8a} \\
&= -\frac{x^4}{32} + \frac{3x\sqrt{1-a^2x^2}\arcsin(ax)}{16a^3} + \frac{x^3\sqrt{1-a^2x^2}\arcsin(ax)}{8a} \\
&\quad + \frac{1}{4}x^4\arcsin(ax)^2 - \frac{3\int \frac{\arcsin(ax)}{\sqrt{1-a^2x^2}}\,dx}{16a^3} - \frac{3\int x\,dx}{16a^2} \\
&= -\frac{3x^2}{32a^2} - \frac{x^4}{32} + \frac{3x\sqrt{1-a^2x^2}\arcsin(ax)}{16a^3} \\
&\quad + \frac{x^3\sqrt{1-a^2x^2}\arcsin(ax)}{8a} - \frac{3\arcsin(ax)^2}{32a^4} + \frac{1}{4}x^4\arcsin(ax)^2
\end{aligned}$$

Mathematica [A] (verified)

Time = 0.06 (sec) , antiderivative size = 74, normalized size of antiderivative = 0.76

$$\int x^3 \arcsin(ax)^2 \, dx = \frac{-a^2x^2(3+a^2x^2)+2ax\sqrt{1-a^2x^2}(3+2a^2x^2)\arcsin(ax)+(-3+8a^4x^4)\arcsin(ax)^2}{32a^4}$$

```
[In] Integrate[x^3*ArcSin[a*x]^2,x]
```

```
[Out] (-(a^2*x^2*(3 + a^2*x^2)) + 2*a*x*Sqrt[1 - a^2*x^2]*(3 + 2*a^2*x^2)*ArcSin[
a*x] + (-3 + 8*a^4*x^4)*ArcSin[a*x]^2)/(32*a^4)
```

Maple [A] (verified)

Time = 0.07 (sec) , antiderivative size = 91, normalized size of antiderivative = 0.93

method	result	size
derivativedivides	$\frac{\frac{a^4x^4\arcsin(ax)^2}{4}-\frac{\arcsin(ax)\left(-2a^3x^3\sqrt{-a^2x^2+1}-3ax\sqrt{-a^2x^2+1}+3\arcsin(ax)\right)}{16}+\frac{3\arcsin(ax)^2}{32}-\frac{\left(2a^2x^2+3\right)^2}{128}}{a^4}$	91
default	$\frac{\frac{a^4x^4\arcsin(ax)^2}{4}-\frac{\arcsin(ax)\left(-2a^3x^3\sqrt{-a^2x^2+1}-3ax\sqrt{-a^2x^2+1}+3\arcsin(ax)\right)}{16}+\frac{3\arcsin(ax)^2}{32}-\frac{\left(2a^2x^2+3\right)^2}{128}}{a^4}$	91

```
[In] int(x^3*arcsin(a*x)^2,x,method=_RETURNVERBOSE)
```

```
[Out] 1/a^4*(1/4*a^4*x^4*arcsin(a*x)^2-1/16*arcsin(a*x)*(-2*a^3*x^3*(-a^2*x^2+1)^
(1/2)-3*a*x*(-a^2*x^2+1)^(1/2)+3*arcsin(a*x))+3/32*arcsin(a*x)^2-1/128*(2*a
^2*x^2+3)^2)
```

Fricas [A] (verification not implemented)

none

Time = 0.27 (sec) , antiderivative size = 70, normalized size of antiderivative = 0.71

$$\int x^3 \arcsin(ax)^2 \, dx = -\frac{a^4x^4+3\,a^2x^2-(8\,a^4x^4-3)\arcsin(ax)^2-2\,(2\,a^3x^3+3\,ax)\sqrt{-a^2x^2+1}\arcsin(ax)}{32\,a^4}$$

```
[In] integrate(x^3*arcsin(a*x)^2,x, algorithm="fricas")
```

```
[Out] -1/32*(a^4*x^4 + 3*a^2*x^2 - (8*a^4*x^4 - 3)*arcsin(a*x)^2 - 2*(2*a^3*x^3 +
 3*a*x)*sqrt(-a^2*x^2 + 1)*arcsin(a*x))/a^4
```

Sympy [A] (verification not implemented)

Time = 0.30 (sec) , antiderivative size = 90, normalized size of antiderivative = 0.92

$$\int x^3 \arcsin(ax)^2 \, dx$$
$$= \begin{cases} \frac{x^4 \operatorname{asin}^2(ax)}{4} - \frac{x^4}{32} + \frac{x^3\sqrt{-a^2x^2+1}\operatorname{asin}(ax)}{8a} - \frac{3x^2}{32a^2} + \frac{3x\sqrt{-a^2x^2+1}\operatorname{asin}(ax)}{16a^3} - \frac{3\operatorname{asin}^2(ax)}{32a^4} & \text{for } a \neq 0 \\ 0 & \text{otherwise} \end{cases}$$

```
[In] integrate(x**3*asin(a*x)**2,x)
```

```
[Out] Piecewise((x**4*asin(a*x)**2/4 - x**4/32 + x**3*sqrt(-a**2*x**2 + 1)*asin(a
*x)/(8*a) - 3*x**2/(32*a**2) + 3*x*sqrt(-a**2*x**2 + 1)*asin(a*x)/(16*a**3)
 - 3*asin(a*x)**2/(32*a**4), Ne(a, 0)), (0, True))
```

Maxima [F]

$$\int x^3 \arcsin(ax)^2 \, dx = \int x^3 \arcsin(ax)^2 \, dx$$

```
[In] integrate(x^3*arcsin(a*x)^2,x, algorithm="maxima")
```

```
[Out] 1/4*x^4*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^2 + a*integrate(1/2*sqrt
(a*x + 1)*sqrt(-a*x + 1)*x^4*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))/(a^
2*x^2 - 1), x)
```

Giac [A] (verification not implemented)

none

Time = 0.28 (sec) , antiderivative size = 133, normalized size of antiderivative = 1.36

$$\int x^3 \arcsin(ax)^2 \, dx = -\frac{(-a^2x^2+1)^{\frac{3}{2}} x \arcsin(ax)}{8\,a^3} + \frac{(a^2x^2-1)^2 \arcsin(ax)^2}{4\,a^4} + \frac{5\sqrt{-a^2x^2+1}x \arcsin(ax)}{16\,a^3} + \frac{(a^2x^2-1)\arcsin(ax)^2}{2\,a^4} - \frac{(a^2x^2-1)^2}{32\,a^4} + \frac{5\arcsin(ax)^2}{32\,a^4} - \frac{5(a^2x^2-1)}{32\,a^4} - \frac{17}{256\,a^4}$$

```
[In] integrate(x^3*arcsin(a*x)^2,x, algorithm="giac")
```

```
[Out] -1/8*(-a^2*x^2 + 1)^(3/2)*x*arcsin(a*x)/a^3 + 1/4*(a^2*x^2 - 1)^2*arcsin(a*
x)^2/a^4 + 5/16*sqrt(-a^2*x^2 + 1)*x*arcsin(a*x)/a^3 + 1/2*(a^2*x^2 - 1)*ar
csin(a*x)^2/a^4 - 1/32*(a^2*x^2 - 1)^2/a^4 + 5/32*arcsin(a*x)^2/a^4 - 5/32*
(a^2*x^2 - 1)/a^4 - 17/256/a^4
```

Mupad [F(-1)]

Timed out.

$$\int x^3 \arcsin(ax)^2 \, dx = \int x^3 \operatorname{asin}(a\,x)^2 \, dx$$

```
[In] int(x^3*asin(a*x)^2,x)
```

```
[Out] int(x^3*asin(a*x)^2, x)
```

3.14 $\int x^2 \arcsin(ax)^2 \, dx$

Optimal result

Integrand size = 10, antiderivative size = 82

$$\int x^2 \arcsin(ax)^2 \, dx = -\frac{4x}{9a^2} - \frac{2x^3}{27} + \frac{4\sqrt{1-a^2x^2}\arcsin(ax)}{9a^3} + \frac{2x^2\sqrt{1-a^2x^2}\arcsin(ax)}{9a} + \frac{1}{3}x^3\arcsin(ax)^2$$

```
[Out] -4/9*x/a^2-2/27*x^3+1/3*x^3*arcsin(a*x)^2+4/9*arcsin(a*x)*(-a^2*x^2+1)^(1/2
)/a^3+2/9*x^2*arcsin(a*x)*(-a^2*x^2+1)^(1/2)/a
```

Rubi [A] (verified)

Time = 0.08 (sec) , antiderivative size = 82, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {4723, 4795, 4767, 8, 30}

$$\int x^2 \arcsin(ax)^2 \, dx = \frac{2x^2\sqrt{1-a^2x^2}\arcsin(ax)}{9a} - \frac{4x}{9a^2} + \frac{4\sqrt{1-a^2x^2}\arcsin(ax)}{9a^3} + \frac{1}{3}x^3\arcsin(ax)^2 - \frac{2x^3}{27}$$

```
[In] Int[x^2*ArcSin[a*x]^2,x]
```

```
[Out] (-4*x)/(9*a^2) - (2*x^3)/27 + (4*Sqrt[1 - a^2*x^2]*ArcSin[a*x])/(9*a^3) + (
2*x^2*Sqrt[1 - a^2*x^2]*ArcSin[a*x])/(9*a) + (x^3*ArcSin[a*x]^2)/3
```

Rule 8

```
Int[a_, x_Symbol] :> Simp[a*x, x] /; FreeQ[a, x]
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rule 4767

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)*((d_) + (e_.)*(x_)^2)^(p_
.), x_Symbol] :> Simp[(d + e*x^2)^(p + 1)*((a + b*ArcSin[c*x])^n/(2*e*(p +
1))), x] + Dist[b*(n/(2*c*(p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], In
t[(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x] /; FreeQ[{a,
b, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && NeQ[p, -1]
```

Rule 4795

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_)*((d_) + (e_.
)*(x_)^2)^(p_), x_Symbol] :> Simp[f*(f*x)^(m - 1)*(d + e*x^2)^(p + 1)*((a +
 b*ArcSin[c*x])^n/(e*(m + 2*p + 1))), x] + (Dist[f^2*((m - 1)/(c^2*(m + 2*p
 + 1))), Int[(f*x)^(m - 2)*(d + e*x^2)^p*(a + b*ArcSin[c*x])^n, x], x] + Di
st[b*f*(n/(c*(m + 2*p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], Int[(f*x)
^(m - 1)*(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x]) /; Fr
eeQ[{a, b, c, d, e, f, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && IGtQ[m,
1] && NeQ[m + 2*p + 1, 0]
```

Rubi steps

$$
\begin{aligned}
\text{integral} &= \frac{1}{3}x^3\arcsin(ax)^2 - \frac{1}{3}(2a)\int \frac{x^3\arcsin(ax)}{\sqrt{1-a^2x^2}}\,dx \\
&= \frac{2x^2\sqrt{1-a^2x^2}\arcsin(ax)}{9a} + \frac{1}{3}x^3\arcsin(ax)^2 - \frac{2\int x^2\,dx}{9} - \frac{4\int \frac{x\arcsin(ax)}{\sqrt{1-a^2x^2}}\,dx}{9a} \\
&= -\frac{2x^3}{27} + \frac{4\sqrt{1-a^2x^2}\arcsin(ax)}{9a^3} + \frac{2x^2\sqrt{1-a^2x^2}\arcsin(ax)}{9a} + \frac{1}{3}x^3\arcsin(ax)^2 - \frac{4\int 1\,dx}{9a^2} \\
&= -\frac{4x}{9a^2} - \frac{2x^3}{27} + \frac{4\sqrt{1-a^2x^2}\arcsin(ax)}{9a^3} + \frac{2x^2\sqrt{1-a^2x^2}\arcsin(ax)}{9a} + \frac{1}{3}x^3\arcsin(ax)^2
\end{aligned}
$$

Mathematica [A] (verified)

Time = 0.04 (sec) , antiderivative size = 64, normalized size of antiderivative = 0.78

$$\int x^2 \arcsin(ax)^2\,dx = \frac{-2ax(6+a^2x^2)+6\sqrt{1-a^2x^2}(2+a^2x^2)\arcsin(ax)+9a^3x^3\arcsin(ax)^2}{27a^3}$$

```
[In] Integrate[x^2*ArcSin[a*x]^2,x]
```

```
[Out] (-2*a*x*(6 + a^2*x^2) + 6*Sqrt[1 - a^2*x^2]*(2 + a^2*x^2)*ArcSin[a*x] + 9*a
^3*x^3*ArcSin[a*x]^2)/(27*a^3)
```

Maple [A] (verified)

Time = 0.07 (sec) , antiderivative size = 59, normalized size of antiderivative = 0.72

method	result	size
derivativedivides	$\frac{\frac{a^3x^3\arcsin(ax)^2}{3}+\frac{2\arcsin(ax)\left(a^2x^2+2\right)\sqrt{-a^2x^2+1}}{9}-\frac{2a^3x^3}{27}-\frac{4ax}{9}}{a^3}$	59
default	$\frac{\frac{a^3x^3\arcsin(ax)^2}{3}+\frac{2\arcsin(ax)\left(a^2x^2+2\right)\sqrt{-a^2x^2+1}}{9}-\frac{2a^3x^3}{27}-\frac{4ax}{9}}{a^3}$	59

```
[In] int(x^2*arcsin(a*x)^2,x,method=_RETURNVERBOSE)
```

```
[Out] 1/a^3*(1/3*a^3*x^3*arcsin(a*x)^2+2/9*arcsin(a*x)*(a^2*x^2+2)*(-a^2*x^2+1)^(
1/2)-2/27*a^3*x^3-4/9*a*x)
```

Fricas [A] (verification not implemented)

none

Time = 0.24 (sec) , antiderivative size = 59, normalized size of antiderivative = 0.72

$$\int x^2 \arcsin(ax)^2\,dx = \frac{9\,a^3x^3\arcsin\left(ax\right)^2-2\,a^3x^3+6\left(a^2x^2+2\right)\sqrt{-a^2x^2+1}\arcsin\left(ax\right)-12\,ax}{27\,a^3}$$

```
[In] integrate(x^2*arcsin(a*x)^2,x, algorithm="fricas")
```

```
[Out] 1/27*(9*a^3*x^3*arcsin(a*x)^2 - 2*a^3*x^3 + 6*(a^2*x^2 + 2)*sqrt(-a^2*x^2 +
 1)*arcsin(a*x) - 12*a*x)/a^3
```

Sympy [A] (verification not implemented)

Time = 0.22 (sec) , antiderivative size = 76, normalized size of antiderivative = 0.93

$$\int x^2 \arcsin(ax)^2\,dx = \begin{cases} \frac{x^3 \operatorname{asin}^2(ax)}{3} - \frac{2x^3}{27} + \frac{2x^2\sqrt{-a^2x^2+1}\operatorname{asin}(ax)}{9a} - \frac{4x}{9a^2} + \frac{4\sqrt{-a^2x^2+1}\operatorname{asin}(ax)}{9a^3} & \text{for } a \neq 0 \\ 0 & \text{otherwise} \end{cases}$$

```
[In] integrate(x**2*asin(a*x)**2,x)
```

```
[Out] Piecewise((x**3*asin(a*x)**2/3 - 2*x**3/27 + 2*x**2*sqrt(-a**2*x**2 + 1)*as
in(a*x)/(9*a) - 4*x/(9*a**2) + 4*sqrt(-a**2*x**2 + 1)*asin(a*x)/(9*a**3), N
e(a, 0)), (0, True))
```

Maxima [A] (verification not implemented)

none

Time = 0.31 (sec) , antiderivative size = 72, normalized size of antiderivative = 0.88

$$\int x^2 \arcsin(ax)^2\,dx = \frac{1}{3}x^3 \arcsin(ax)^2 + \frac{2}{9}a\left(\frac{\sqrt{-a^2x^2+1}x^2}{a^2} + \frac{2\sqrt{-a^2x^2+1}}{a^4}\right)\arcsin(ax) - \frac{2(a^2x^3+6x)}{27a^2}$$

```
[In] integrate(x^2*arcsin(a*x)^2,x, algorithm="maxima")
```

```
[Out] 1/3*x^3*arcsin(a*x)^2 + 2/9*a*(sqrt(-a^2*x^2 + 1)*x^2/a^2 + 2*sqrt(-a^2*x^2
 + 1)/a^4)*arcsin(a*x) - 2/27*(a^2*x^3 + 6*x)/a^2
```

Giac [A] (verification not implemented)

none

Time = 0.28 (sec) , antiderivative size = 97, normalized size of antiderivative = 1.18

$$\int x^2 \arcsin(ax)^2\,dx = \frac{(a^2x^2-1)x\arcsin(ax)^2}{3a^2} + \frac{x\arcsin(ax)^2}{3a^2} - \frac{2(a^2x^2-1)x}{27a^2} - \frac{2(-a^2x^2+1)^{\frac{3}{2}}\arcsin(ax)}{9a^3} - \frac{14x}{27a^2} + \frac{2\sqrt{-a^2x^2+1}\arcsin(ax)}{3a^3}$$

```
[In] integrate(x^2*arcsin(a*x)^2,x, algorithm="giac")
```

```
[Out] 1/3*(a^2*x^2 - 1)*x*arcsin(a*x)^2/a^2 + 1/3*x*arcsin(a*x)^2/a^2 - 2/27*(a^2
*x^2 - 1)*x/a^2 - 2/9*(-a^2*x^2 + 1)^(3/2)*arcsin(a*x)/a^3 - 14/27*x/a^2 +
2/3*sqrt(-a^2*x^2 + 1)*arcsin(a*x)/a^3
```

Mupad [F(-1)]

Timed out.

$$\int x^2 \arcsin(ax)^2 \, dx = \int x^2 \operatorname{asin}(a\,x)^2 \, dx$$

```
[In] int(x^2*asin(a*x)^2,x)
[Out] int(x^2*asin(a*x)^2, x)
```

3.15 $\int x \arcsin(ax)^2 \, dx$

Optimal result

Integrand size = 8, antiderivative size = 60

$$\int x \arcsin(ax)^2 \, dx = -\frac{x^2}{4} + \frac{x\sqrt{1-a^2x^2}\arcsin(ax)}{2a} - \frac{\arcsin(ax)^2}{4a^2} + \frac{1}{2}x^2\arcsin(ax)^2$$

```
[Out] -1/4*x^2-1/4*arcsin(a*x)^2/a^2+1/2*x^2*arcsin(a*x)^2+1/2*x*arcsin(a*x)*(-a^
2*x^2+1)^(1/2)/a
```

Rubi [A] (verified)

Time = 0.06 (sec) , antiderivative size = 60, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {4723, 4795, 4737, 30}

$$\int x \arcsin(ax)^2 \, dx = \frac{x\sqrt{1-a^2x^2}\arcsin(ax)}{2a} - \frac{\arcsin(ax)^2}{4a^2} + \frac{1}{2}x^2\arcsin(ax)^2 - \frac{x^2}{4}$$

```
[In] Int[x*ArcSin[a*x]^2,x]
```

```
[Out] -1/4*x^2 + (x*Sqrt[1 - a^2*x^2]*ArcSin[a*x])/(2*a) - ArcSin[a*x]^2/(4*a^2)
+ (x^2*ArcSin[a*x]^2)/2
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
```

```
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rule 4737

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)/Sqrt[(d_) + (e_.)*(x_)^2], x_S
ymbol] :> Simp[(1/(b*c*(n + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]]*(a
 + b*ArcSin[c*x])^(n + 1), x] /; FreeQ[{a, b, c, d, e, n}, x] && EqQ[c^2*d
+ e, 0] && NeQ[n, -1]
```

Rule 4795

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_)*((d_) + (e_.
)*(x_)^2)^(p_), x_Symbol] :> Simp[f*(f*x)^(m - 1)*(d + e*x^2)^(p + 1)*((a +
 b*ArcSin[c*x])^n/(e*(m + 2*p + 1))), x] + (Dist[f^2*((m - 1)/(c^2*(m + 2*p
 + 1))), Int[(f*x)^(m - 2)*(d + e*x^2)^p*(a + b*ArcSin[c*x])^n, x], x] + Di
st[b*f*(n/(c*(m + 2*p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], Int[(f*x)
^(m - 1)*(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x]) /; Fr
eeQ[{a, b, c, d, e, f, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && IGtQ[m,
1] && NeQ[m + 2*p + 1, 0]
```

Rubi steps

$$
\begin{aligned}
\text{integral} &= \frac{1}{2}x^2\arcsin(ax)^2 - a\int \frac{x^2\arcsin(ax)}{\sqrt{1-a^2x^2}}\,dx \\
&= \frac{x\sqrt{1-a^2x^2}\arcsin(ax)}{2a} + \frac{1}{2}x^2\arcsin(ax)^2 - \frac{\int x\,dx}{2} - \frac{\int \frac{\arcsin(ax)}{\sqrt{1-a^2x^2}}\,dx}{2a} \\
&= -\frac{x^2}{4} + \frac{x\sqrt{1-a^2x^2}\arcsin(ax)}{2a} - \frac{\arcsin(ax)^2}{4a^2} + \frac{1}{2}x^2\arcsin(ax)^2
\end{aligned}
$$

Mathematica [A] (verified)

Time = 0.03 (sec) , antiderivative size = 55, normalized size of antiderivative = 0.92

$$
\int x\arcsin(ax)^2\,dx = \frac{-a^2x^2 + 2ax\sqrt{1-a^2x^2}\arcsin(ax) + (-1+2a^2x^2)\arcsin(ax)^2}{4a^2}
$$

```
[In] Integrate[x*ArcSin[a*x]^2,x]
[Out] (-(a^2*x^2) + 2*a*x*Sqrt[1 - a^2*x^2]*ArcSin[a*x] + (-1 + 2*a^2*x^2)*ArcSin
[a*x]^2)/(4*a^2)
```

Maple [A] (verified)

Time = 0.02 (sec) , antiderivative size = 65, normalized size of antiderivative = 1.08

method	result	size
derivativedivides	$\frac{\frac{\arcsin(ax)^2\left(a^2x^2-1\right)}{2}+\frac{\arcsin(ax)\left(ax\sqrt{-a^2x^2+1}+\arcsin(ax)\right)}{2}-\frac{\arcsin(ax)^2}{4}-\frac{a^2x^2}{4}}{a^2}$	65
default	$\frac{\frac{\arcsin(ax)^2\left(a^2x^2-1\right)}{2}+\frac{\arcsin(ax)\left(ax\sqrt{-a^2x^2+1}+\arcsin(ax)\right)}{2}-\frac{\arcsin(ax)^2}{4}-\frac{a^2x^2}{4}}{a^2}$	65

```
[In] int(x*arcsin(a*x)^2,x,method=_RETURNVERBOSE)
[Out] 1/a^2*(1/2*arcsin(a*x)^2*(a^2*x^2-1)+1/2*arcsin(a*x)*(a*x*(-a^2*x^2+1)^(1/2
)+arcsin(a*x))-1/4*arcsin(a*x)^2-1/4*a^2*x^2)
```

Fricas [A] (verification not implemented)

none

Time = 0.25 (sec) , antiderivative size = 51, normalized size of antiderivative = 0.85

$$\int x\arcsin(ax)^2\,dx=-\frac{a^2x^2-2\sqrt{-a^2x^2+1}ax\arcsin(ax)-(2a^2x^2-1)\arcsin(ax)^2}{4a^2}$$

```
[In] integrate(x*arcsin(a*x)^2,x, algorithm="fricas")
[Out] -1/4*(a^2*x^2 - 2*sqrt(-a^2*x^2 + 1)*a*x*arcsin(a*x) - (2*a^2*x^2 - 1)*arcs
in(a*x)^2)/a^2
```

Sympy [A] (verification not implemented)

Time = 0.19 (sec) , antiderivative size = 51, normalized size of antiderivative = 0.85

$$\int x\arcsin(ax)^2\,dx=\begin{cases}\frac{x^2\operatorname{asin}^2(ax)}{2}-\frac{x^2}{4}+\frac{x\sqrt{-a^2x^2+1}\operatorname{asin}(ax)}{2a}-\frac{\operatorname{asin}^2(ax)}{4a^2} & \text{for } a\neq 0\\ 0 & \text{otherwise}\end{cases}$$

```
[In] integrate(x*asin(a*x)**2,x)
[Out] Piecewise((x**2*asin(a*x)**2/2 - x**2/4 + x*sqrt(-a**2*x**2 + 1)*asin(a*x)/
(2*a) - asin(a*x)**2/(4*a**2), Ne(a, 0)), (0, True))
```

Maxima [F]

$$\int x \arcsin(ax)^2 \, dx = \int x \arcsin(ax)^2 \, dx$$

```
[In] integrate(x*arcsin(a*x)^2,x, algorithm="maxima")
```

```
[Out] 1/2*x^2*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^2 + a*integrate(sqrt(a*x
 + 1)*sqrt(-a*x + 1)*x^2*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))/(a^2*x^
2 - 1), x)
```

Giac [A] (verification not implemented)

none

Time = 0.27 (sec) , antiderivative size = 73, normalized size of antiderivative = 1.22

$$\int x \arcsin(ax)^2 \, dx = \frac{\sqrt{-a^2x^2+1}x \arcsin(ax)}{2a} + \frac{(a^2x^2-1)\arcsin(ax)^2}{2a^2} + \frac{\arcsin(ax)^2}{4a^2} - \frac{a^2x^2-1}{4a^2} - \frac{1}{8a^2}$$

```
[In] integrate(x*arcsin(a*x)^2,x, algorithm="giac")
```

```
[Out] 1/2*sqrt(-a^2*x^2 + 1)*x*arcsin(a*x)/a + 1/2*(a^2*x^2 - 1)*arcsin(a*x)^2/a^
2 + 1/4*arcsin(a*x)^2/a^2 - 1/4*(a^2*x^2 - 1)/a^2 - 1/8/a^2
```

Mupad [F(-1)]

Timed out.

$$\int x \arcsin(ax)^2 \, dx = \int x \operatorname{asin}(a\,x)^2 \, dx$$

```
[In] int(x*asin(a*x)^2,x)
```

```
[Out] int(x*asin(a*x)^2, x)
```

3.16 $\int \arcsin(ax)^2\,dx$

Optimal result

Integrand size = 6, antiderivative size = 35

$$\int \arcsin(ax)^2\,dx = -2x + \frac{2\sqrt{1-a^2x^2}\arcsin(ax)}{a} + x\arcsin(ax)^2$$

```
[Out] -2*x+x*arcsin(a*x)^2+2*arcsin(a*x)*(-a^2*x^2+1)^(1/2)/a
```

Rubi [A] (verified)

Time = 0.03 (sec) , antiderivative size = 35, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}} = 0.500$, Rules used = {4715, 4767, 8}

$$\int \arcsin(ax)^2\,dx = \frac{2\sqrt{1-a^2x^2}\arcsin(ax)}{a} + x\arcsin(ax)^2 - 2x$$

```
[In] Int[ArcSin[a*x]^2,x]
```

```
[Out] -2*x + (2*Sqrt[1 - a^2*x^2]*ArcSin[a*x])/a + x*ArcSin[a*x]^2
```

<u>Rule 8</u>

```
Int[a_, x_Symbol] :> Simp[a*x, x] /; FreeQ[a, x]
```

<u>Rule 4715</u>

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.), x_Symbol] :> Simp[x*(a + b*Ar
cSin[c*x])^n, x] - Dist[b*c*n, Int[x*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 -
c^2*x^2]), x], x] /; FreeQ[{a, b, c}, x] && GtQ[n, 0]
```

<u>Rule 4767</u>

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)*((d_) + (e_.)*(x_)^2)^(p_
.), x_Symbol] :> Simp[(d + e*x^2)^(p + 1)*((a + b*ArcSin[c*x])^n/(2*e*(p +
1))), x] + Dist[b*(n/(2*c*(p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], In
t[(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x] /; FreeQ[{a,
b, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && NeQ[p, -1]
```

Rubi steps

$$\begin{aligned}\text{integral} &= x\arcsin(ax)^2-(2a)\int\frac{x\arcsin(ax)}{\sqrt{1-a^2x^2}}\,dx\\ &= \frac{2\sqrt{1-a^2x^2}\arcsin(ax)}{a}+x\arcsin(ax)^2-2\int 1\,dx\\ &= -2x+\frac{2\sqrt{1-a^2x^2}\arcsin(ax)}{a}+x\arcsin(ax)^2\end{aligned}$$

Mathematica [A] (verified)

Time = 0.02 (sec) , antiderivative size = 35, normalized size of antiderivative = 1.00

$$\int\arcsin(ax)^2\,dx=-2x+\frac{2\sqrt{1-a^2x^2}\arcsin(ax)}{a}+x\arcsin(ax)^2$$

```
[In] Integrate[ArcSin[a*x]^2,x]
[Out] -2*x + (2*Sqrt[1 - a^2*x^2]*ArcSin[a*x])/a + x*ArcSin[a*x]^2
```

Maple [A] (verified)

Time = 0.03 (sec) , antiderivative size = 37, normalized size of antiderivative = 1.06

method	result	size
derivativedivides	$\frac{ax\arcsin(ax)^2-2ax+2\arcsin(ax)\sqrt{-a^2x^2+1}}{a}$	37
default	$\frac{ax\arcsin(ax)^2-2ax+2\arcsin(ax)\sqrt{-a^2x^2+1}}{a}$	37

```
[In] int(arcsin(a*x)^2,x,method=_RETURNVERBOSE)
[Out] 1/a*(a*x*arcsin(a*x)^2-2*a*x+2*arcsin(a*x)*(-a^2*x^2+1)^(1/2))
```

Fricas [A] (verification not implemented)

none

Time = 0.24 (sec) , antiderivative size = 36, normalized size of antiderivative = 1.03

$$\int \arcsin(ax)^2\,dx = \frac{ax\arcsin\left(ax\right)^2 - 2\,ax + 2\,\sqrt{-a^2x^2+1}\arcsin\left(ax\right)}{a}$$

```
[In] integrate(arcsin(a*x)^2,x, algorithm="fricas")
[Out] (a*x*arcsin(a*x)^2 - 2*a*x + 2*sqrt(-a^2*x^2 + 1)*arcsin(a*x))/a
```

Sympy [A] (verification not implemented)

Time = 0.08 (sec) , antiderivative size = 32, normalized size of antiderivative = 0.91

$$\int \arcsin(ax)^2\,dx = \begin{cases} x\,\mathrm{asin}^2\left(ax\right) - 2x + \frac{2\sqrt{-a^2x^2+1}\,\mathrm{asin}\left(ax\right)}{a} & \text{for } a \neq 0 \\ 0 & \text{otherwise} \end{cases}$$

```
[In] integrate(asin(a*x)**2,x)
[Out] Piecewise((x*asin(a*x)**2 - 2*x + 2*sqrt(-a**2*x**2 + 1)*asin(a*x)/a, Ne(a,
 0)), (0, True))
```

Maxima [A] (verification not implemented)

none

Time = 0.27 (sec) , antiderivative size = 33, normalized size of antiderivative = 0.94

$$\int \arcsin(ax)^2\,dx = x\arcsin\left(ax\right)^2 - 2\,x + \frac{2\,\sqrt{-a^2x^2+1}\arcsin\left(ax\right)}{a}$$

```
[In] integrate(arcsin(a*x)^2,x, algorithm="maxima")
[Out] x*arcsin(a*x)^2 - 2*x + 2*sqrt(-a^2*x^2 + 1)*arcsin(a*x)/a
```

Giac [A] (verification not implemented)

none

Time = 0.27 (sec) , antiderivative size = 33, normalized size of antiderivative = 0.94

$$\int \arcsin(ax)^2 \, dx = x \arcsin{(ax)}^2 - 2\,x + \frac{2\,\sqrt{-a^2x^2+1}\arcsin{(ax)}}{a}$$

```
[In] integrate(arcsin(a*x)^2,x, algorithm="giac")
[Out] x*arcsin(a*x)^2 - 2*x + 2*sqrt(-a^2*x^2 + 1)*arcsin(a*x)/a
```

Mupad [B] (verification not implemented)

Time = 0.09 (sec) , antiderivative size = 32, normalized size of antiderivative = 0.91

$$\int \arcsin(ax)^2 \, dx = x\,\left(\mathrm{asin}(a\,x)^2-2\right) + \frac{2\,\mathrm{asin}(a\,x)\,\sqrt{1-a^2\,x^2}}{a}$$

```
[In] int(asin(a*x)^2,x)
[Out] x*(asin(a*x)^2 - 2) + (2*asin(a*x)*(1 - a^2*x^2)^(1/2))/a
```

3.17 $\int \frac{\arcsin(ax)^2}{x}\,dx$

Optimal result

Integrand size = 10, antiderivative size = 71

$$\int \frac{\arcsin(ax)^2}{x}\,dx = -\frac{1}{3}i\arcsin(ax)^3 + \arcsin(ax)^2\log\left(1-e^{2i\arcsin(ax)}\right) - i\arcsin(ax)\operatorname{PolyLog}\left(2,e^{2i\arcsin(ax)}\right) + \frac{1}{2}\operatorname{PolyLog}\left(3,e^{2i\arcsin(ax)}\right)$$

```
[Out] -1/3*I*arcsin(a*x)^3+arcsin(a*x)^2*ln(1-(I*a*x+(-a^2*x^2+1)^(1/2))^2)-I*arc
sin(a*x)*polylog(2,(I*a*x+(-a^2*x^2+1)^(1/2))^2)+1/2*polylog(3,(I*a*x+(-a^2
*x^2+1)^(1/2))^2)
```

Rubi [A] (verified)

Time = 0.11 (sec) , antiderivative size = 71, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 6, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.600, Rules used = {4721, 3798, 2221, 2611, 2320, 6724}

$$\int \frac{\arcsin(ax)^2}{x}\,dx = -i\arcsin(ax)\operatorname{PolyLog}\left(2,e^{2i\arcsin(ax)}\right) + \frac{1}{2}\operatorname{PolyLog}\left(3,e^{2i\arcsin(ax)}\right) - \frac{1}{3}i\arcsin(ax)^3 + \arcsin(ax)^2\log\left(1-e^{2i\arcsin(ax)}\right)$$

```
[In] Int[ArcSin[a*x]^2/x,x]
```

```
[Out] (-1/3*I)*ArcSin[a*x]^3 + ArcSin[a*x]^2*Log[1 - E^((2*I)*ArcSin[a*x])] - I*A
rcSin[a*x]*PolyLog[2, E^((2*I)*ArcSin[a*x])] + PolyLog[3, E^((2*I)*ArcSin[a
*x])]/2
```

Rule 2221

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m/(b*f*g*n*Log[F]))*Log[1 + b*((F^(g*(e + f*x)))^n/a)], x] - Di
st[d*(m/(b*f*g*n*Log[F])), Int[(c + d*x)^(m - 1)*Log[1 + b*((F^(g*(e + f*x)
))^n/a)], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2320

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2611

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> Simp[(-(f + g*x)^m)*(PolyLog[2, (-e)*(F^(c*(a +
b*x)))^n]/(b*c*n*Log[F])), x] + Dist[g*(m/(b*c*n*Log[F])), Int[(f + g*x)^(m
 - 1)*PolyLog[2, (-e)*(F^(c*(a + b*x)))^n], x], x] /; FreeQ[{F, a, b, c, e,
 f, g, n}, x] && GtQ[m, 0]
```

Rule 3798

```
Int[((c_.) + (d_.)*(x_))^(m_.)*tan[(e_.) + Pi*(k_.) + (f_.)*(x_)], x_Symbol
] :> Simp[I*((c + d*x)^(m + 1)/(d*(m + 1))), x] - Dist[2*I, Int[(c + d*x)^m
*E^(2*I*k*Pi)*(E^(2*I*(e + f*x))/(1 + E^(2*I*k*Pi)*E^(2*I*(e + f*x)))), x],
 x] /; FreeQ[{c, d, e, f}, x] && IntegerQ[4*k] && IGtQ[m, 0]
```

Rule 4721

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)/(x_), x_Symbol] :> Subst[Int[(
a + b*x)^n*Cot[x], x], x, ArcSin[c*x]] /; FreeQ[{a, b, c}, x] && IGtQ[n, 0]
```

Rule 6724

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rubi steps

$$\text{integral} = \text{Subst}\left(\int x^2 \cot(x)\,dx, x, \arcsin(ax)\right)$$
$$= -\frac{1}{3} i \arcsin(ax)^3 - 2i\text{Subst}\left(\int \frac{e^{2ix} x^2}{1 - e^{2ix}}\,dx, x, \arcsin(ax)\right)$$

$$= -\frac{1}{3}i\arcsin(ax)^3 + \arcsin(ax)^2\log\left(1-e^{2i\arcsin(ax)}\right) - 2\text{Subst}\left(\int x\log\left(1-e^{2ix}\right)\,dx, x, \arcsin(ax)\right)$$

$$= -\frac{1}{3}i\arcsin(ax)^3 + \arcsin(ax)^2\log\left(1-e^{2i\arcsin(ax)}\right) - i\arcsin(ax)\,\text{PolyLog}\left(2, e^{2i\arcsin(ax)}\right) + i\text{Subst}\left(\int \text{PolyLog}\left(2, e^{2ix}\right)\,dx, x, \arcsin(ax)\right)$$

$$= -\frac{1}{3}i\arcsin(ax)^3 + \arcsin(ax)^2\log\left(1-e^{2i\arcsin(ax)}\right) - i\arcsin(ax)\,\text{PolyLog}\left(2, e^{2i\arcsin(ax)}\right) + \frac{1}{2}\text{Subst}\left(\int \frac{\text{PolyLog}(2,x)}{x}\,dx, x, e^{2i\arcsin(ax)}\right)$$

$$= -\frac{1}{3}i\arcsin(ax)^3 + \arcsin(ax)^2\log\left(1-e^{2i\arcsin(ax)}\right) - i\arcsin(ax)\,\text{PolyLog}\left(2, e^{2i\arcsin(ax)}\right) + \frac{1}{2}\,\text{PolyLog}\left(3, e^{2i\arcsin(ax)}\right)$$

Mathematica [A] (verified)

Time = 0.09 (sec) , antiderivative size = 71, normalized size of antiderivative = 1.00

$$\int \frac{\arcsin(ax)^2}{x}\,dx = \frac{1}{3}i\arcsin(ax)^3 + \arcsin(ax)^2\log\left(1-e^{-2i\arcsin(ax)}\right) + i\arcsin(ax)\,\text{PolyLog}\left(2, e^{-2i\arcsin(ax)}\right) + \frac{1}{2}\,\text{PolyLog}\left(3, e^{-2i\arcsin(ax)}\right)$$

```
[In] Integrate[ArcSin[a*x]^2/x,x]
[Out] (I/3)*ArcSin[a*x]^3 + ArcSin[a*x]^2*Log[1 - E^((-2*I)*ArcSin[a*x])] + I*Arc
Sin[a*x]*PolyLog[2, E^((-2*I)*ArcSin[a*x])] + PolyLog[3, E^((-2*I)*ArcSin[a
*x])]/2
```

Maple [A] (verified)

Time = 0.04 (sec) , antiderivative size = 169, normalized size of antiderivative = 2.38

method	result
derivativedivides	$-\frac{i\arcsin(ax)^3}{3} + \arcsin(ax)^2\ln\left(1-iax-\sqrt{-a^2x^2+1}\right) - 2i\arcsin(ax)\,\text{polylog}\left(2, iax\right.$
default	$-\frac{i\arcsin(ax)^3}{3} + \arcsin(ax)^2\ln\left(1-iax-\sqrt{-a^2x^2+1}\right) - 2i\arcsin(ax)\,\text{polylog}\left(2, iax\right.$

```
[In] int(arcsin(a*x)^2/x,x,method=_RETURNVERBOSE)
[Out] -1/3*I*arcsin(a*x)^3+arcsin(a*x)^2*ln(1-I*a*x-(-a^2*x^2+1)^(1/2))-2*I*arcsi
n(a*x)*polylog(2,I*a*x+(-a^2*x^2+1)^(1/2))+2*polylog(3,I*a*x+(-a^2*x^2+1)^(
1/2))+arcsin(a*x)^2*ln(1+I*a*x+(-a^2*x^2+1)^(1/2))-2*I*arcsin(a*x)*polylog(
2,-I*a*x-(-a^2*x^2+1)^(1/2))+2*polylog(3,-I*a*x-(-a^2*x^2+1)^(1/2))
```

Fricas [F]

$$\int \frac{\arcsin(ax)^2}{x}\,dx = \int \frac{\arcsin(ax)^2}{x}\,dx$$

```
[In] integrate(arcsin(a*x)^2/x,x, algorithm="fricas")
[Out] integral(arcsin(a*x)^2/x, x)
```

Sympy [F]

$$\int \frac{\arcsin(ax)^2}{x}\,dx = \int \frac{\operatorname{asin}^2(ax)}{x}\,dx$$

```
[In] integrate(asin(a*x)**2/x,x)
[Out] Integral(asin(a*x)**2/x, x)
```

Maxima [F]

$$\int \frac{\arcsin(ax)^2}{x}\,dx = \int \frac{\arcsin(ax)^2}{x}\,dx$$

```
[In] integrate(arcsin(a*x)^2/x,x, algorithm="maxima")
[Out] integrate(arcsin(a*x)^2/x, x)
```

Giac [F]

$$\int \frac{\arcsin(ax)^2}{x}\,dx = \int \frac{\arcsin\left(ax\right)^2}{x}\,dx$$

```
[In] integrate(arcsin(a*x)^2/x,x, algorithm="giac")
[Out] integrate(arcsin(a*x)^2/x, x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{\arcsin(ax)^2}{x}\,dx = \int \frac{\mathrm{asin}(a\,x)^2}{x}\,dx$$

```
[In] int(asin(a*x)^2/x,x)
[Out] int(asin(a*x)^2/x, x)
```

3.18 $\int \frac{\arcsin(ax)^2}{x^2}\,dx$

Optimal result

Integrand size = 10, antiderivative size = 66

$$\int \frac{\arcsin(ax)^2}{x^2}\,dx = -\frac{\arcsin(ax)^2}{x} - 4a\arcsin(ax)\operatorname{arctanh}\left(e^{i\arcsin(ax)}\right) + 2ia\operatorname{PolyLog}\left(2,-e^{i\arcsin(ax)}\right) - 2ia\operatorname{PolyLog}\left(2,e^{i\arcsin(ax)}\right)$$

```
[Out] -arcsin(a*x)^2/x-4*a*arcsin(a*x)*arctanh(I*a*x+(-a^2*x^2+1)^(1/2))+2*I*a*po
lylog(2,-I*a*x-(-a^2*x^2+1)^(1/2))-2*I*a*polylog(2,I*a*x+(-a^2*x^2+1)^(1/2)
)
```

Rubi [A] (verified)

Time = 0.07 (sec) , antiderivative size = 66, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 5, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {4723, 4803, 4268, 2317, 2438}

$$\int \frac{\arcsin(ax)^2}{x^2}\,dx = -4a\arcsin(ax)\operatorname{arctanh}\left(e^{i\arcsin(ax)}\right) + 2ia\operatorname{PolyLog}\left(2,-e^{i\arcsin(ax)}\right) - 2ia\operatorname{PolyLog}\left(2,e^{i\arcsin(ax)}\right) - \frac{\arcsin(ax)^2}{x}$$

```
[In] Int[ArcSin[a*x]^2/x^2,x]
```

```
[Out] -(ArcSin[a*x]^2/x) - 4*a*ArcSin[a*x]*ArcTanh[E^(I*ArcSin[a*x])] + (2*I)*a*P
olyLog[2, -E^(I*ArcSin[a*x])] - (2*I)*a*PolyLog[2, E^(I*ArcSin[a*x])]
```

Rule 2317

```
Int[Log[(a_) + (b_.)*((F_)^((e_.)*((c_.) + (d_.)*(x_))))^(n_.)], x_Symbol]
:> Dist[1/(d*e*n*Log[F]), Subst[Int[Log[a + b*x]/x, x], x, (F^(e*(c + d*x))
```

```
)^n], x] /; FreeQ[{F, a, b, c, d, e, n}, x] && GtQ[a, 0]
```

Rule 2438

```
Int[Log[(c_.)*((d_) + (e_.)*(x_)^(n_.))]/(x_), x_Symbol] :> Simp[-PolyLog[2
, (-c)*e*x^n]/n, x] /; FreeQ[{c, d, e, n}, x] && EqQ[c*d, 1]
```

Rule 4268

```
Int[csc[(e_.) + (f_.)*(x_)]*((c_.) + (d_.)*(x_))^(m_.), x_Symbol] :> Simp[-
2*(c + d*x)^m*(ArcTanh[E^(I*(e + f*x))]/f), x] + (-Dist[d*(m/f), Int[(c + d
*x)^(m - 1)*Log[1 - E^(I*(e + f*x))], x], x] + Dist[d*(m/f), Int[(c + d*x)^
(m - 1)*Log[1 + E^(I*(e + f*x))], x], x]) /; FreeQ[{c, d, e, f}, x] && IGtQ
[m, 0]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rule 4803

```
Int[(((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_))/Sqrt[(d_) + (e_.)*
(x_)^2], x_Symbol] :> Dist[(1/c^(m + 1))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*
x^2]], Subst[Int[(a + b*x)^n*Sin[x]^m, x], x, ArcSin[c*x]], x] /; FreeQ[{a,
 b, c, d, e}, x] && EqQ[c^2*d + e, 0] && IGtQ[n, 0] && IntegerQ[m]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= -\frac{\arcsin(ax)^2}{x} + (2a)\int \frac{\arcsin(ax)}{x\sqrt{1-a^2x^2}}\,dx \\
&= -\frac{\arcsin(ax)^2}{x} + (2a)\text{Subst}\left(\int x\csc(x)\,dx, x, \arcsin(ax)\right) \\
&= -\frac{\arcsin(ax)^2}{x} - 4a\arcsin(ax)\text{arctanh}\left(e^{i\arcsin(ax)}\right) \\
&\quad - (2a)\text{Subst}\left(\int \log\left(1-e^{ix}\right)\,dx, x, \arcsin(ax)\right) \\
&\quad + (2a)\text{Subst}\left(\int \log\left(1+e^{ix}\right)\,dx, x, \arcsin(ax)\right)
\end{aligned}$$

$$= -\frac{\arcsin(ax)^2}{x} - 4a\arcsin(ax)\text{arctanh}\left(e^{i\arcsin(ax)}\right) + (2ia)\text{Subst}\left(\int\frac{\log(1-x)}{x}\,dx, x, e^{i\arcsin(ax)}\right) - (2ia)\text{Subst}\left(\int\frac{\log(1+x)}{x}\,dx, x, e^{i\arcsin(ax)}\right)$$

$$= -\frac{\arcsin(ax)^2}{x} - 4a\arcsin(ax)\text{arctanh}\left(e^{i\arcsin(ax)}\right) + 2ia\,\text{PolyLog}\left(2, -e^{i\arcsin(ax)}\right) - 2ia\,\text{PolyLog}\left(2, e^{i\arcsin(ax)}\right)$$

Mathematica [A] (verified)

Time = 0.23 (sec) , antiderivative size = 87, normalized size of antiderivative = 1.32

$$\int\frac{\arcsin(ax)^2}{x^2}\,dx = a\left(-\arcsin(ax)\left(\frac{\arcsin(ax)}{ax} - 2\log\left(1-e^{i\arcsin(ax)}\right) + 2\log\left(1+e^{i\arcsin(ax)}\right)\right) + 2i\,\text{PolyLog}\left(2,-e^{i\arcsin(ax)}\right) - 2i\,\text{PolyLog}\left(2,e^{i\arcsin(ax)}\right)\right)$$

```
[In] Integrate[ArcSin[a*x]^2/x^2,x]
```

```
[Out] a*(-(ArcSin[a*x]*(ArcSin[a*x]/(a*x) - 2*Log[1 - E^(I*ArcSin[a*x])] + 2*Log[
1 + E^(I*ArcSin[a*x])])) + (2*I)*PolyLog[2, -E^(I*ArcSin[a*x])] - (2*I)*Pol
yLog[2, E^(I*ArcSin[a*x])])
```

Maple [A] (verified)

Time = 0.04 (sec) , antiderivative size = 120, normalized size of antiderivative = 1.82

method	result
derivativedivides	$a\left(-\frac{\arcsin(ax)^2}{ax} + 2\arcsin(ax)\ln\left(1-iax-\sqrt{-a^2x^2+1}\right) - 2\arcsin(ax)\ln\left(1+iax+\sqrt{\right.\right.$
default	$a\left(-\frac{\arcsin(ax)^2}{ax} + 2\arcsin(ax)\ln\left(1-iax-\sqrt{-a^2x^2+1}\right) - 2\arcsin(ax)\ln\left(1+iax+\sqrt{\right.\right.$

```
[In] int(arcsin(a*x)^2/x^2,x,method=_RETURNVERBOSE)
```

```
[Out] a*(-arcsin(a*x)^2/a/x+2*arcsin(a*x)*ln(1-I*a*x-(-a^2*x^2+1)^(1/2))-2*arcsin
(a*x)*ln(1+I*a*x+(-a^2*x^2+1)^(1/2))+2*I*dilog(1+I*a*x+(-a^2*x^2+1)^(1/2))-
2*I*dilog(1-I*a*x-(-a^2*x^2+1)^(1/2)))
```

Fricas [F]

$$\int \frac{\arcsin(ax)^2}{x^2}\,dx = \int \frac{\arcsin\left(ax\right)^2}{x^2}\,dx$$

```
[In] integrate(arcsin(a*x)^2/x^2,x, algorithm="fricas")
[Out] integral(arcsin(a*x)^2/x^2, x)
```

Sympy [F]

$$\int \frac{\arcsin(ax)^2}{x^2}\,dx = \int \frac{\operatorname{asin}^2\left(ax\right)}{x^2}\,dx$$

```
[In] integrate(asin(a*x)**2/x**2,x)
[Out] Integral(asin(a*x)**2/x**2, x)
```

Maxima [F]

$$\int \frac{\arcsin(ax)^2}{x^2}\,dx = \int \frac{\arcsin\left(ax\right)^2}{x^2}\,dx$$

```
[In] integrate(arcsin(a*x)^2/x^2,x, algorithm="maxima")
[Out] -(2*a*x*integrate(sqrt(a*x + 1)*sqrt(-a*x + 1)*arctan2(a*x, sqrt(a*x + 1)*s
qrt(-a*x + 1))/(a^2*x^3 - x), x) + arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1
))^2)/x
```

Giac [F]

$$\int \frac{\arcsin(ax)^2}{x^2}\,dx = \int \frac{\arcsin\left(ax\right)^2}{x^2}\,dx$$

```
[In] integrate(arcsin(a*x)^2/x^2,x, algorithm="giac")
[Out] integrate(arcsin(a*x)^2/x^2, x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{\arcsin(ax)^2}{x^2}\,dx = \int \frac{\operatorname{asin}(a\,x)^2}{x^2}\,dx$$

```
[In] int(asin(a*x)^2/x^2,x)
```

```
[Out] int(asin(a*x)^2/x^2, x)
```

3.19 $\int \frac{\arcsin(ax)^2}{x^3} dx$

Optimal result

Integrand size = 10, antiderivative size = 44

$$\int \frac{\arcsin(ax)^2}{x^3} dx = -\frac{a\sqrt{1-a^2x^2}\arcsin(ax)}{x} - \frac{\arcsin(ax)^2}{2x^2} + a^2\log(x)$$

```
[Out] -1/2*arcsin(a*x)^2/x^2+a^2*ln(x)-a*arcsin(a*x)*(-a^2*x^2+1)^(1/2)/x
```

Rubi [A] (verified)

Time = 0.05 (sec) , antiderivative size = 44, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}} = 0.300$, Rules used = {4723, 4771, 29}

$$\int \frac{\arcsin(ax)^2}{x^3} dx = -\frac{a\sqrt{1-a^2x^2}\arcsin(ax)}{x} + a^2\log(x) - \frac{\arcsin(ax)^2}{2x^2}$$

```
[In] Int[ArcSin[a*x]^2/x^3,x]
```

```
[Out] -((a*Sqrt[1 - a^2*x^2]*ArcSin[a*x])/x) - ArcSin[a*x]^2/(2*x^2) + a^2*Log[x]
```

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rule 4771

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_)*((d_) + (e_.
)*(x_)^2)^(p_), x_Symbol] :> Simp[(f*x)^(m + 1)*(d + e*x^2)^(p + 1)*((a + b
*ArcSin[c*x])^n/(d*f*(m + 1))), x] - Dist[b*c*(n/(f*(m + 1)))*Simp[(d + e*x
^2)^p/(1 - c^2*x^2)^p], Int[(f*x)^(m + 1)*(1 - c^2*x^2)^(p + 1/2)*(a + b*Ar
cSin[c*x])^(n - 1), x], x] /; FreeQ[{a, b, c, d, e, f, m, p}, x] && EqQ[c^2
*d + e, 0] && GtQ[n, 0] && EqQ[m + 2*p + 3, 0] && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}\text{integral} &= -\frac{\arcsin(ax)^2}{2x^2} + a\int \frac{\arcsin(ax)}{x^2\sqrt{1-a^2x^2}}\,dx \\ &= -\frac{a\sqrt{1-a^2x^2}\arcsin(ax)}{x} - \frac{\arcsin(ax)^2}{2x^2} + a^2\int \frac{1}{x}\,dx \\ &= -\frac{a\sqrt{1-a^2x^2}\arcsin(ax)}{x} - \frac{\arcsin(ax)^2}{2x^2} + a^2\log(x)\end{aligned}$$

Mathematica [A] (verified)

Time = 0.02 (sec) , antiderivative size = 44, normalized size of antiderivative = 1.00

$$\int \frac{\arcsin(ax)^2}{x^3}\,dx = -\frac{a\sqrt{1-a^2x^2}\arcsin(ax)}{x} - \frac{\arcsin(ax)^2}{2x^2} + a^2\log(x)$$

```
[In] Integrate[ArcSin[a*x]^2/x^3,x]
[Out] -((a*Sqrt[1 - a^2*x^2]*ArcSin[a*x])/x) - ArcSin[a*x]^2/(2*x^2) + a^2*Log[x]
```

Maple [A] (verified)

Time = 0.03 (sec) , antiderivative size = 48, normalized size of antiderivative = 1.09

method	result	size
derivativedivides	$a^2\left(-\frac{\arcsin(ax)^2}{2a^2x^2} - \frac{\arcsin(ax)\sqrt{-a^2x^2+1}}{ax} + \ln(ax)\right)$	48
default	$a^2\left(-\frac{\arcsin(ax)^2}{2a^2x^2} - \frac{\arcsin(ax)\sqrt{-a^2x^2+1}}{ax} + \ln(ax)\right)$	48

```
[In] int(arcsin(a*x)^2/x^3,x,method=_RETURNVERBOSE)
[Out] a^2*(-1/2*arcsin(a*x)^2/a^2/x^2-arcsin(a*x)/a/x*(-a^2*x^2+1)^(1/2)+ln(a*x))
```

Fricas [A] (verification not implemented)

none

Time = 0.27 (sec) , antiderivative size = 44, normalized size of antiderivative = 1.00

$$\int \frac{\arcsin(ax)^2}{x^3}\,dx = \frac{2\,a^2x^2\log\left(x\right) - 2\,\sqrt{-a^2x^2+1}ax\arcsin\left(ax\right) - \arcsin\left(ax\right)^2}{2\,x^2}$$

```
[In] integrate(arcsin(a*x)^2/x^3,x, algorithm="fricas")
[Out] 1/2*(2*a^2*x^2*log(x) - 2*sqrt(-a^2*x^2 + 1)*a*x*arcsin(a*x) - arcsin(a*x)^
2)/x^2
```

Sympy [F]

$$\int \frac{\arcsin(ax)^2}{x^3}\,dx = \int \frac{\operatorname{asin}^2\left(ax\right)}{x^3}\,dx$$

```
[In] integrate(asin(a*x)**2/x**3,x)
[Out] Integral(asin(a*x)**2/x**3, x)
```

Maxima [A] (verification not implemented)

none

Time = 0.27 (sec) , antiderivative size = 40, normalized size of antiderivative = 0.91

$$\int \frac{\arcsin(ax)^2}{x^3}\,dx = a^2\log\left(x\right) - \frac{\sqrt{-a^2x^2+1}a\arcsin\left(ax\right)}{x} - \frac{\arcsin\left(ax\right)^2}{2\,x^2}$$

```
[In] integrate(arcsin(a*x)^2/x^3,x, algorithm="maxima")
[Out] a^2*log(x) - sqrt(-a^2*x^2 + 1)*a*arcsin(a*x)/x - 1/2*arcsin(a*x)^2/x^2
```

Giac [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 82 vs. $2(40) = 80$.

Time = 0.29 (sec) , antiderivative size = 82, normalized size of antiderivative = 1.86

$$\int \frac{\arcsin(ax)^2}{x^3}\,dx = \frac{1}{2}\left(\left(\frac{a^4x}{\left(\sqrt{-a^2x^2+1}|a|+a\right)|a|} - \frac{\sqrt{-a^2x^2+1}|a|+a}{x|a|}\right)\arcsin\left(ax\right) + 2\,a\log\left(|x|\right)\right)a - \frac{\arcsin\left(ax\right)^2}{2\,x^2}$$

```
[In] integrate(arcsin(a*x)^2/x^3,x, algorithm="giac")
```

```
[Out] 1/2*((a^4*x/((sqrt(-a^2*x^2 + 1)*abs(a) + a)*abs(a)) - (sqrt(-a^2*x^2 + 1)*
abs(a) + a)/(x*abs(a)))*arcsin(a*x) + 2*a*log(abs(x)))*a - 1/2*arcsin(a*x)^
2/x^2
```

Mupad [F(-1)]

Timed out.

$$\int \frac{\arcsin(ax)^2}{x^3}\,dx = \int \frac{\operatorname{asin}(a\,x)^2}{x^3}\,dx$$

```
[In] int(asin(a*x)^2/x^3,x)
```

```
[Out] int(asin(a*x)^2/x^3, x)
```

3.20 $\int \frac{\arcsin(ax)^2}{x^4}\,dx$

Optimal result

Integrand size = 10, antiderivative size = 116

$$\int \frac{\arcsin(ax)^2}{x^4}\,dx = -\frac{a^2}{3x} - \frac{a\sqrt{1-a^2x^2}\arcsin(ax)}{3x^2} - \frac{\arcsin(ax)^2}{3x^3} - \frac{2}{3}a^3\arcsin(ax)\operatorname{arctanh}\left(e^{i\arcsin(ax)}\right) + \frac{1}{3}ia^3\operatorname{PolyLog}\left(2,-e^{i\arcsin(ax)}\right) - \frac{1}{3}ia^3\operatorname{PolyLog}\left(2,e^{i\arcsin(ax)}\right)$$

```
[Out] -1/3*a^2/x-1/3*arcsin(a*x)^2/x^3-2/3*a^3*arcsin(a*x)*arctanh(I*a*x+(-a^2*x^
2+1)^(1/2))+1/3*I*a^3*polylog(2,-I*a*x-(-a^2*x^2+1)^(1/2))-1/3*I*a^3*polylo
g(2,I*a*x+(-a^2*x^2+1)^(1/2))-1/3*a*arcsin(a*x)*(-a^2*x^2+1)^(1/2)/x^2
```

Rubi [A] (verified)

Time = 0.10 (sec) , antiderivative size = 116, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 7, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.700, Rules used = {4723, 4789, 4803, 4268, 2317, 2438, 30}

$$\int \frac{\arcsin(ax)^2}{x^4}\,dx = -\frac{2}{3}a^3\arcsin(ax)\operatorname{arctanh}\left(e^{i\arcsin(ax)}\right) + \frac{1}{3}ia^3\operatorname{PolyLog}\left(2,-e^{i\arcsin(ax)}\right) - \frac{1}{3}ia^3\operatorname{PolyLog}\left(2,e^{i\arcsin(ax)}\right) - \frac{a\sqrt{1-a^2x^2}\arcsin(ax)}{3x^2} - \frac{a^2}{3x} - \frac{\arcsin(ax)^2}{3x^3}$$

```
[In] Int[ArcSin[a*x]^2/x^4,x]
```

```
[Out] -1/3*a^2/x - (a*Sqrt[1 - a^2*x^2]*ArcSin[a*x])/(3*x^2) - ArcSin[a*x]^2/(3*x
^3) - (2*a^3*ArcSin[a*x]*ArcTanh[E^(I*ArcSin[a*x])])/3 + (I/3)*a^3*PolyLog[
2, -E^(I*ArcSin[a*x])] - (I/3)*a^3*PolyLog[2, E^(I*ArcSin[a*x])]
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2317

```
Int[Log[(a_) + (b_.)*((F_)^((e_.)*((c_.) + (d_.)*(x_))))^(n_.)], x_Symbol]
:> Dist[1/(d*e*n*Log[F]), Subst[Int[Log[a + b*x]/x, x], x, (F^(e*(c + d*x))
)^n], x] /; FreeQ[{F, a, b, c, d, e, n}, x] && GtQ[a, 0]
```

Rule 2438

```
Int[Log[(c_.)*((d_) + (e_.)*(x_)^(n_.))]/(x_), x_Symbol] :> Simp[-PolyLog[2
, (-c)*e*x^n]/n, x] /; FreeQ[{c, d, e, n}, x] && EqQ[c*d, 1]
```

Rule 4268

```
Int[csc[(e_.) + (f_.)*(x_)]*((c_.) + (d_.)*(x_))^(m_.), x_Symbol] :> Simp[-
2*(c + d*x)^m*(ArcTanh[E^(I*(e + f*x))]/f), x] + (-Dist[d*(m/f), Int[(c + d
*x)^(m - 1)*Log[1 - E^(I*(e + f*x))], x], x] + Dist[d*(m/f), Int[(c + d*x)^
(m - 1)*Log[1 + E^(I*(e + f*x))], x], x]) /; FreeQ[{c, d, e, f}, x] && IGtQ
[m, 0]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rule 4789

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_)*((d_) + (e_.
)*(x_)^2)^(p_), x_Symbol] :> Simp[(f*x)^(m + 1)*(d + e*x^2)^(p + 1)*((a + b
*ArcSin[c*x])^n/(d*f*(m + 1))), x] + (Dist[c^2*((m + 2*p + 3)/(f^2*(m + 1))
), Int[(f*x)^(m + 2)*(d + e*x^2)^p*(a + b*ArcSin[c*x])^n, x], x] - Dist[b*c
*(n/(f*(m + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], Int[(f*x)^(m + 1)*(1
- c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x]) /; FreeQ[{a, b, c
, d, e, f, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && ILtQ[m, -1]
```

Rule 4803

```
Int[(((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_))/Sqrt[(d_) + (e_.)*
(x_)^2], x_Symbol] :> Dist[(1/c^(m + 1))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*
x^2]], Subst[Int[(a + b*x)^n*Sin[x]^m, x], x, ArcSin[c*x]], x] /; FreeQ[{a,
```

```
b, c, d, e}, x] && EqQ[c^2*d + e, 0] && IGtQ[n, 0] && IntegerQ[m]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= -\frac{\arcsin(ax)^2}{3x^3}+\frac{1}{3}(2a)\int\frac{\arcsin(ax)}{x^3\sqrt{1-a^2x^2}}\,dx\\
&= -\frac{a\sqrt{1-a^2x^2}\arcsin(ax)}{3x^2}-\frac{\arcsin(ax)^2}{3x^3}+\frac{1}{3}a^2\int\frac{1}{x^2}\,dx+\frac{1}{3}a^3\int\frac{\arcsin(ax)}{x\sqrt{1-a^2x^2}}\,dx\\
&= -\frac{a^2}{3x}-\frac{a\sqrt{1-a^2x^2}\arcsin(ax)}{3x^2}-\frac{\arcsin(ax)^2}{3x^3}+\frac{1}{3}a^3\text{Subst}\left(\int x\csc(x)\,dx,x,\arcsin(ax)\right)\\
&= -\frac{a^2}{3x}-\frac{a\sqrt{1-a^2x^2}\arcsin(ax)}{3x^2}-\frac{\arcsin(ax)^2}{3x^3}-\frac{2}{3}a^3\arcsin(ax)\text{arctanh}\left(e^{i\arcsin(ax)}\right)\\
&\quad-\frac{1}{3}a^3\text{Subst}\left(\int\log\left(1-e^{ix}\right)\,dx,x,\arcsin(ax)\right)\\
&\quad+\frac{1}{3}a^3\text{Subst}\left(\int\log\left(1+e^{ix}\right)\,dx,x,\arcsin(ax)\right)\\
&= -\frac{a^2}{3x}-\frac{a\sqrt{1-a^2x^2}\arcsin(ax)}{3x^2}-\frac{\arcsin(ax)^2}{3x^3}-\frac{2}{3}a^3\arcsin(ax)\text{arctanh}\left(e^{i\arcsin(ax)}\right)\\
&\quad+\frac{1}{3}\left(ia^3\right)\text{Subst}\left(\int\frac{\log(1-x)}{x}\,dx,x,e^{i\arcsin(ax)}\right)\\
&\quad-\frac{1}{3}\left(ia^3\right)\text{Subst}\left(\int\frac{\log(1+x)}{x}\,dx,x,e^{i\arcsin(ax)}\right)\\
&= -\frac{a^2}{3x}-\frac{a\sqrt{1-a^2x^2}\arcsin(ax)}{3x^2}-\frac{\arcsin(ax)^2}{3x^3}-\frac{2}{3}a^3\arcsin(ax)\text{arctanh}\left(e^{i\arcsin(ax)}\right)\\
&\quad+\frac{1}{3}ia^3\text{PolyLog}\left(2,-e^{i\arcsin(ax)}\right)-\frac{1}{3}ia^3\text{PolyLog}\left(2,e^{i\arcsin(ax)}\right)
\end{aligned}$$

Mathematica [A] (verified)

Time = 0.69 (sec) , antiderivative size = 139, normalized size of antiderivative = 1.20

$$\int\frac{\arcsin(ax)^2}{x^4}\,dx=-\frac{a^2x^2+ax\sqrt{1-a^2x^2}\arcsin(ax)+\arcsin(ax)^2-a^3x^3\arcsin(ax)\log\left(1-e^{i\arcsin(ax)}\right)+a^3x^3\arcsin(ax)}{3x^3}$$

```
[In] Integrate[ArcSin[a*x]^2/x^4,x]
[Out] -1/3*(a^2*x^2 + a*x*Sqrt[1 - a^2*x^2]*ArcSin[a*x] + ArcSin[a*x]^2 - a^3*x^3
*ArcSin[a*x]*Log[1 - E^(I*ArcSin[a*x])] + a^3*x^3*ArcSin[a*x]*Log[1 + E^(I*
ArcSin[a*x])] - I*a^3*x^3*PolyLog[2, -E^(I*ArcSin[a*x])] + I*a^3*x^3*PolyLo
g[2, E^(I*ArcSin[a*x])])/x^3
```

Maple [A] (verified)

Time = 0.11 (sec) , antiderivative size = 149, normalized size of antiderivative = 1.28

method	result
derivativedivides	$a^3\left(-\frac{\arcsin(ax)\sqrt{-a^2x^2+1}\,ax+\arcsin(ax)^2+a^2x^2}{3a^3x^3}+\frac{\arcsin(ax)\ln\left(1-iax-\sqrt{-a^2x^2+1}\right)}{3}-\frac{i\,\mathrm{polylog}\left(2,iax+\sqrt{-a^2\right.}}{3}\right.$
default	$a^3\left(-\frac{\arcsin(ax)\sqrt{-a^2x^2+1}\,ax+\arcsin(ax)^2+a^2x^2}{3a^3x^3}+\frac{\arcsin(ax)\ln\left(1-iax-\sqrt{-a^2x^2+1}\right)}{3}-\frac{i\,\mathrm{polylog}\left(2,iax+\sqrt{-a^2\right.}}{3}\right.$

[In] int(arcsin(a*x)^2/x^4,x,method=_RETURNVERBOSE)

[Out] a^3*(-1/3*(arcsin(a*x)*(-a^2*x^2+1)^(1/2)*a*x+arcsin(a*x)^2+a^2*x^2)/a^3/x^3+1/3*arcsin(a*x)*ln(1-I*a*x-(-a^2*x^2+1)^(1/2))-1/3*I*polylog(2,I*a*x+(-a^2*x^2+1)^(1/2))-1/3*arcsin(a*x)*ln(1+I*a*x+(-a^2*x^2+1)^(1/2))+1/3*I*polylog(2,-I*a*x-(-a^2*x^2+1)^(1/2)))

Fricas [F]

$$\int \frac{\arcsin(ax)^2}{x^4}\,dx = \int \frac{\arcsin{(ax)}^2}{x^4}\,dx$$

[In] integrate(arcsin(a*x)^2/x^4,x, algorithm="fricas")

[Out] integral(arcsin(a*x)^2/x^4, x)

Sympy [F]

$$\int \frac{\arcsin(ax)^2}{x^4}\,dx = \int \frac{\operatorname{asin}^2{(ax)}}{x^4}\,dx$$

[In] integrate(asin(a*x)**2/x**4,x)

[Out] Integral(asin(a*x)**2/x**4, x)

Maxima [F]

$$\int \frac{\arcsin(ax)^2}{x^4}\,dx = \int \frac{\arcsin{(ax)}^2}{x^4}\,dx$$

```
[In] integrate(arcsin(a*x)^2/x^4,x, algorithm="maxima")
```

```
[Out] -1/3*(6*a*x^3*integrate(1/3*sqrt(a*x + 1)*sqrt(-a*x + 1)*arctan2(a*x, sqrt(
a*x + 1)*sqrt(-a*x + 1))/(a^2*x^5 - x^3), x) + arctan2(a*x, sqrt(a*x + 1)*s
qrt(-a*x + 1))^2)/x^3
```

Giac [F]

$$\int \frac{\arcsin(ax)^2}{x^4}\,dx = \int \frac{\arcsin{(ax)}^2}{x^4}\,dx$$

```
[In] integrate(arcsin(a*x)^2/x^4,x, algorithm="giac")
```

```
[Out] integrate(arcsin(a*x)^2/x^4, x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{\arcsin(ax)^2}{x^4}\,dx = \int \frac{\mathrm{asin}(a\,x)^2}{x^4}\,dx$$

```
[In] int(asin(a*x)^2/x^4,x)
```

```
[Out] int(asin(a*x)^2/x^4, x)
```

3.21 $\int \frac{\arcsin(ax)^2}{x^5} dx$

Optimal result

Integrand size = 10, antiderivative size = 87

$$\int \frac{\arcsin(ax)^2}{x^5} dx = -\frac{a^2}{12x^2} - \frac{a\sqrt{1-a^2x^2}\arcsin(ax)}{6x^3} - \frac{a^3\sqrt{1-a^2x^2}\arcsin(ax)}{3x} - \frac{\arcsin(ax)^2}{4x^4} + \frac{1}{3}a^4\log(x)$$

```
[Out] -1/12*a^2/x^2-1/4*arcsin(a*x)^2/x^4+1/3*a^4*ln(x)-1/6*a*arcsin(a*x)*(-a^2*x
^2+1)^(1/2)/x^3-1/3*a^3*arcsin(a*x)*(-a^2*x^2+1)^(1/2)/x
```

Rubi [A] (verified)

Time = 0.09 (sec) , antiderivative size = 87, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {4723, 4789, 4771, 29, 30}

$$\int \frac{\arcsin(ax)^2}{x^5} dx = \frac{1}{3}a^4\log(x) - \frac{a\sqrt{1-a^2x^2}\arcsin(ax)}{6x^3} - \frac{a^2}{12x^2} - \frac{a^3\sqrt{1-a^2x^2}\arcsin(ax)}{3x} - \frac{\arcsin(ax)^2}{4x^4}$$

```
[In] Int[ArcSin[a*x]^2/x^5,x]
```

```
[Out] -1/12*a^2/x^2 - (a*Sqrt[1 - a^2*x^2]*ArcSin[a*x])/(6*x^3) - (a^3*Sqrt[1 - a
^2*x^2]*ArcSin[a*x])/(3*x) - ArcSin[a*x]^2/(4*x^4) + (a^4*Log[x])/3
```

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rule 4771

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_)*((d_) + (e_.
)*(x_)^2)^(p_), x_Symbol] :> Simp[(f*x)^(m + 1)*(d + e*x^2)^(p + 1)*((a + b
*ArcSin[c*x])^n/(d*f*(m + 1))), x] - Dist[b*c*(n/(f*(m + 1)))*Simp[(d + e*x
^2)^p/(1 - c^2*x^2)^p], Int[(f*x)^(m + 1)*(1 - c^2*x^2)^(p + 1/2)*(a + b*Ar
cSin[c*x])^(n - 1), x], x] /; FreeQ[{a, b, c, d, e, f, m, p}, x] && EqQ[c^2
*d + e, 0] && GtQ[n, 0] && EqQ[m + 2*p + 3, 0] && NeQ[m, -1]
```

Rule 4789

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_)*((d_) + (e_.
)*(x_)^2)^(p_), x_Symbol] :> Simp[(f*x)^(m + 1)*(d + e*x^2)^(p + 1)*((a + b
*ArcSin[c*x])^n/(d*f*(m + 1))), x] + (Dist[c^2*((m + 2*p + 3)/(f^2*(m + 1))
), Int[(f*x)^(m + 2)*(d + e*x^2)^p*(a + b*ArcSin[c*x])^n, x], x] - Dist[b*c
*(n/(f*(m + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], Int[(f*x)^(m + 1)*(1
- c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x]) /; FreeQ[{a, b, c
, d, e, f, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && ILtQ[m, -1]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= -\frac{\arcsin(ax)^2}{4x^4}+\frac{1}{2}a\int\frac{\arcsin(ax)}{x^4\sqrt{1-a^2x^2}}\,dx\\
&= -\frac{a\sqrt{1-a^2x^2}\arcsin(ax)}{6x^3}-\frac{\arcsin(ax)^2}{4x^4}+\frac{1}{6}a^2\int\frac{1}{x^3}\,dx+\frac{1}{3}a^3\int\frac{\arcsin(ax)}{x^2\sqrt{1-a^2x^2}}\,dx\\
&= -\frac{a^2}{12x^2}-\frac{a\sqrt{1-a^2x^2}\arcsin(ax)}{6x^3}-\frac{a^3\sqrt{1-a^2x^2}\arcsin(ax)}{3x}-\frac{\arcsin(ax)^2}{4x^4}+\frac{1}{3}a^4\int\frac{1}{x}\,dx\\
&= -\frac{a^2}{12x^2}-\frac{a\sqrt{1-a^2x^2}\arcsin(ax)}{6x^3}-\frac{a^3\sqrt{1-a^2x^2}\arcsin(ax)}{3x}-\frac{\arcsin(ax)^2}{4x^4}+\frac{1}{3}a^4\log(x)
\end{aligned}$$

Mathematica [A] (verified)

Time = 0.03 (sec) , antiderivative size = 69, normalized size of antiderivative = 0.79

$$\int \frac{\arcsin(ax)^2}{x^5}\,dx = -\frac{a^2}{12x^2} - \frac{a\sqrt{1-a^2x^2}(1+2a^2x^2)\arcsin(ax)}{6x^3} - \frac{\arcsin(ax)^2}{4x^4} + \frac{1}{3}a^4\log(x)$$

```
[In] Integrate[ArcSin[a*x]^2/x^5,x]
[Out] -1/12*a^2/x^2 - (a*Sqrt[1 - a^2*x^2]*(1 + 2*a^2*x^2)*ArcSin[a*x])/(6*x^3) -
 ArcSin[a*x]^2/(4*x^4) + (a^4*Log[x])/3
```

Maple [A] (verified)

Time = 0.03 (sec) , antiderivative size = 82, normalized size of antiderivative = 0.94

method	result	size
derivativedivides	$a^4\left(-\frac{\arcsin(ax)^2}{4a^4x^4} - \frac{\arcsin(ax)\sqrt{-a^2x^2+1}}{6a^3x^3} - \frac{1}{12a^2x^2} - \frac{\arcsin(ax)\sqrt{-a^2x^2+1}}{3ax} + \frac{\ln(ax)}{3}\right)$	82
default	$a^4\left(-\frac{\arcsin(ax)^2}{4a^4x^4} - \frac{\arcsin(ax)\sqrt{-a^2x^2+1}}{6a^3x^3} - \frac{1}{12a^2x^2} - \frac{\arcsin(ax)\sqrt{-a^2x^2+1}}{3ax} + \frac{\ln(ax)}{3}\right)$	82

```
[In] int(arcsin(a*x)^2/x^5,x,method=_RETURNVERBOSE)
[Out] a^4*(-1/4*arcsin(a*x)^2/a^4/x^4-1/6*arcsin(a*x)*(-a^2*x^2+1)^(1/2)/a^3/x^3-
1/12/a^2/x^2-1/3*arcsin(a*x)/a/x*(-a^2*x^2+1)^(1/2)+1/3*ln(a*x))
```

Fricas [A] (verification not implemented)

none

Time = 0.26 (sec) , antiderivative size = 62, normalized size of antiderivative = 0.71

$$\int \frac{\arcsin(ax)^2}{x^5}\,dx = \frac{4\,a^4x^4\log(x) - a^2x^2 - 2\,(2\,a^3x^3 + ax)\sqrt{-a^2x^2+1}\arcsin(ax) - 3\,\arcsin(ax)^2}{12\,x^4}$$

```
[In] integrate(arcsin(a*x)^2/x^5,x, algorithm="fricas")
[Out] 1/12*(4*a^4*x^4*log(x) - a^2*x^2 - 2*(2*a^3*x^3 + a*x)*sqrt(-a^2*x^2 + 1)*a
rcsin(a*x) - 3*arcsin(a*x)^2)/x^4
```

Sympy [F]

$$\int \frac{\arcsin(ax)^2}{x^5}\,dx = \int \frac{\operatorname{asin}^2(ax)}{x^5}\,dx$$

```
[In] integrate(asin(a*x)**2/x**5,x)
[Out] Integral(asin(a*x)**2/x**5, x)
```

Maxima [A] (verification not implemented)

none

Time = 0.28 (sec) , antiderivative size = 74, normalized size of antiderivative = 0.85

$$\int \frac{\arcsin(ax)^2}{x^5}\,dx = \frac{1}{12}\left(4\,a^2\log(x) - \frac{1}{x^2}\right)a^2 - \frac{1}{6}\left(\frac{2\sqrt{-a^2x^2+1}a^2}{x} + \frac{\sqrt{-a^2x^2+1}}{x^3}\right)a\arcsin(ax) - \frac{\arcsin(ax)^2}{4\,x^4}$$

```
[In] integrate(arcsin(a*x)^2/x^5,x, algorithm="maxima")
[Out] 1/12*(4*a^2*log(x) - 1/x^2)*a^2 - 1/6*(2*sqrt(-a^2*x^2 + 1)*a^2/x + sqrt(-a
^2*x^2 + 1)/x^3)*a*arcsin(a*x) - 1/4*arcsin(a*x)^2/x^4
```

Giac [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 185 vs. 2(73) = 146.

Time = 0.33 (sec) , antiderivative size = 185, normalized size of antiderivative = 2.13

$$\int \frac{\arcsin(ax)^2}{x^5}\,dx = \frac{1}{48}\left(\left(\left(\frac{\left(a^4 + \frac{9\left(\sqrt{-a^2x^2+1}|a|+a\right)^2}{x^2}\right)a^6x^3}{\left(\sqrt{-a^2x^2+1}|a|+a\right)^3|a|} - \frac{\frac{9\left(\sqrt{-a^2x^2+1}|a|+a\right)a^4}{x} + \frac{\left(\sqrt{-a^2x^2+1}|a|+a\right)^3}{x^3}}{a^2|a|}\right)\arcsin(ax) + \frac{4\left(2\,a^4\log\right.}{} \right.\right. - \frac{\arcsin(ax)^2}{4\,x^4}$$

```
[In] integrate(arcsin(a*x)^2/x^5,x, algorithm="giac")
[Out] 1/48*(((a^4 + 9*(sqrt(-a^2*x^2 + 1)*abs(a) + a)^2/x^2)*a^6*x^3/((sqrt(-a^2*
x^2 + 1)*abs(a) + a)^3*abs(a)) - (9*(sqrt(-a^2*x^2 + 1)*abs(a) + a)*a^4/x +
 (sqrt(-a^2*x^2 + 1)*abs(a) + a)^3/x^3)/(a^2*abs(a)))*arcsin(a*x) + 4*(2*a^
4*log(a^2*x^2) - (2*(a^2*x^2 - 1)*a^4 + 3*a^4)/(a^2*x^2))/a)*a - 1/4*arcsin
(a*x)^2/x^4
```

Mupad [F(-1)]

Timed out.

$$\int \frac{\arcsin(ax)^2}{x^5} \, dx = \int \frac{\mathrm{asin}(a\,x)^2}{x^5} \, dx$$

```
[In] int(asin(a*x)^2/x^5,x)
```

```
[Out] int(asin(a*x)^2/x^5, x)
```

3.22 $\int x^4 \arcsin(ax)^3 \, dx$

Optimal result

Integrand size = 10, antiderivative size = 201

$$\int x^4 \arcsin(ax)^3 \, dx = -\frac{298\sqrt{1-a^2x^2}}{375a^5} + \frac{76(1-a^2x^2)^{3/2}}{1125a^5} - \frac{6(1-a^2x^2)^{5/2}}{625a^5} - \frac{16x\arcsin(ax)}{25a^4} - \frac{8x^3\arcsin(ax)}{75a^2} - \frac{6}{125}x^5\arcsin(ax) + \frac{8\sqrt{1-a^2x^2}\arcsin(ax)^2}{25a^5} + \frac{4x^2\sqrt{1-a^2x^2}\arcsin(ax)^2}{25a^3} + \frac{3x^4\sqrt{1-a^2x^2}\arcsin(ax)^2}{25a} + \frac{1}{5}x^5\arcsin(ax)^3$$

```
[Out] 76/1125*(-a^2*x^2+1)^(3/2)/a^5-6/625*(-a^2*x^2+1)^(5/2)/a^5-16/25*x*arcsin(
a*x)/a^4-8/75*x^3*arcsin(a*x)/a^2-6/125*x^5*arcsin(a*x)+1/5*x^5*arcsin(a*x)
^3-298/375*(-a^2*x^2+1)^(1/2)/a^5+8/25*arcsin(a*x)^2*(-a^2*x^2+1)^(1/2)/a^5
+4/25*x^2*arcsin(a*x)^2*(-a^2*x^2+1)^(1/2)/a^3+3/25*x^4*arcsin(a*x)^2*(-a^2
*x^2+1)^(1/2)/a
```

Rubi [A] (verified)

Time = 0.24 (sec) , antiderivative size = 201, normalized size of antiderivative = 1.00, number of steps used = 14, number of rules used = 7, $\frac{\text{number of rules}}{\text{integrand size}} = 0.700$, Rules used

$= \{4723, 4795, 4767, 4715, 267, 272, 45\}$

$$\int x^4 \arcsin(ax)^3 \, dx = -\frac{16x \arcsin(ax)}{25a^4} - \frac{8x^3 \arcsin(ax)}{75a^2} + \frac{3x^4\sqrt{1-a^2x^2} \arcsin(ax)^2}{25a} + \frac{8\sqrt{1-a^2x^2} \arcsin(ax)^2}{25a^5} - \frac{6(1-a^2x^2)^{5/2}}{625a^5} + \frac{76(1-a^2x^2)^{3/2}}{1125a^5} - \frac{298\sqrt{1-a^2x^2}}{375a^5} + \frac{4x^2\sqrt{1-a^2x^2} \arcsin(ax)^2}{25a^3} + \frac{1}{5}x^5 \arcsin(ax)^3 - \frac{6}{125}x^5 \arcsin(ax)$$

```
[In] Int[x^4*ArcSin[a*x]^3,x]
```

```
[Out] (-298*Sqrt[1 - a^2*x^2])/(375*a^5) + (76*(1 - a^2*x^2)^(3/2))/(1125*a^5) -
(6*(1 - a^2*x^2)^(5/2))/(625*a^5) - (16*x*ArcSin[a*x])/(25*a^4) - (8*x^3*Ar
cSin[a*x])/(75*a^2) - (6*x^5*ArcSin[a*x])/125 + (8*Sqrt[1 - a^2*x^2]*ArcSin
[a*x]^2)/(25*a^5) + (4*x^2*Sqrt[1 - a^2*x^2]*ArcSin[a*x]^2)/(25*a^3) + (3*x
^4*Sqrt[1 - a^2*x^2]*ArcSin[a*x]^2)/(25*a) + (x^5*ArcSin[a*x]^3)/5
```

Rule 45

```
Int[((a_.) + (b_.)*(x_))^(m_.)*((c_.) + (d_.)*(x_))^(n_.), x_Symbol] :> Int
[ExpandIntegrand[(a + b*x)^m*(c + d*x)^n, x], x] /; FreeQ[{a, b, c, d, n},
x] && NeQ[b*c - a*d, 0] && IGtQ[m, 0] && ( !IntegerQ[n] || (EqQ[c, 0] && Le
Q[7*m + 4*n + 4, 0]) || LtQ[9*m + 5*(n + 1), 0] || GtQ[m + n + 2, 0])
```

Rule 267

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[(a + b*x^n)
^(p + 1)/(b*n*(p + 1)), x] /; FreeQ[{a, b, m, n, p}, x] && EqQ[m, n - 1] &&
 NeQ[p, -1]
```

Rule 272

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[1/n, Subst[
Int[x^(Simplify[(m + 1)/n] - 1)*(a + b*x)^p, x], x, x^n], x] /; FreeQ[{a, b
, m, n, p}, x] && IntegerQ[Simplify[(m + 1)/n]]
```

Rule 4715

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.), x_Symbol] :> Simp[x*(a + b*Ar
cSin[c*x])^n, x] - Dist[b*c*n, Int[x*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 -
c^2*x^2]), x], x] /; FreeQ[{a, b, c}, x] && GtQ[n, 0]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
```

```
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rule 4767

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)*((d_) + (e_.)*(x_)^2)^(p_
.), x_Symbol] :> Simp[(d + e*x^2)^(p + 1)*((a + b*ArcSin[c*x])^n/(2*e*(p +
1))), x] + Dist[b*(n/(2*c*(p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], In
t[(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x] /; FreeQ[{a,
b, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && NeQ[p, -1]
```

Rule 4795

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_)*((d_) + (e_.
)*(x_)^2)^(p_), x_Symbol] :> Simp[f*(f*x)^(m - 1)*(d + e*x^2)^(p + 1)*((a +
 b*ArcSin[c*x])^n/(e*(m + 2*p + 1))), x] + (Dist[f^2*((m - 1)/(c^2*(m + 2*p
 + 1))), Int[(f*x)^(m - 2)*(d + e*x^2)^p*(a + b*ArcSin[c*x])^n, x], x] + Di
st[b*f*(n/(c*(m + 2*p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], Int[(f*x)
^(m - 1)*(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x]) /; Fr
eeQ[{a, b, c, d, e, f, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && IGtQ[m,
1] && NeQ[m + 2*p + 1, 0]
```

Rubi steps

$$
\begin{aligned}
\text{integral} &= \frac{1}{5}x^5\arcsin(ax)^3-\frac{1}{5}(3a)\int\frac{x^5\arcsin(ax)^2}{\sqrt{1-a^2x^2}}\,dx\\
&= \frac{3x^4\sqrt{1-a^2x^2}\arcsin(ax)^2}{25a}+\frac{1}{5}x^5\arcsin(ax)^3-\frac{6}{25}\int x^4\arcsin(ax)\,dx-\frac{12\int\frac{x^3\arcsin(ax)^2}{\sqrt{1-a^2x^2}}\,dx}{25a}\\
&= -\frac{6}{125}x^5\arcsin(ax)+\frac{4x^2\sqrt{1-a^2x^2}\arcsin(ax)^2}{25a^3}+\frac{3x^4\sqrt{1-a^2x^2}\arcsin(ax)^2}{25a}\\
&\quad+\frac{1}{5}x^5\arcsin(ax)^3-\frac{8\int\frac{x\arcsin(ax)^2}{\sqrt{1-a^2x^2}}\,dx}{25a^3}-\frac{8\int x^2\arcsin(ax)\,dx}{25a^2}\\
&\quad+\frac{1}{125}(6a)\int\frac{x^5}{\sqrt{1-a^2x^2}}\,dx\\
&= -\frac{8x^3\arcsin(ax)}{75a^2}-\frac{6}{125}x^5\arcsin(ax)+\frac{8\sqrt{1-a^2x^2}\arcsin(ax)^2}{25a^5}\\
&\quad+\frac{4x^2\sqrt{1-a^2x^2}\arcsin(ax)^2}{25a^3}+\frac{3x^4\sqrt{1-a^2x^2}\arcsin(ax)^2}{25a}+\frac{1}{5}x^5\arcsin(ax)^3\\
&\quad-\frac{16\int\arcsin(ax)\,dx}{25a^4}+\frac{8\int\frac{x^3}{\sqrt{1-a^2x^2}}\,dx}{75a}+\frac{1}{125}(3a)\text{Subst}\left(\int\frac{x^2}{\sqrt{1-a^2x}}\,dx,x,x^2\right)
\end{aligned}
$$

$$
\begin{aligned}
&= -\frac{16x\arcsin(ax)}{25a^4} - \frac{8x^3\arcsin(ax)}{75a^2} - \frac{6}{125}x^5\arcsin(ax) + \frac{8\sqrt{1-a^2x^2}\arcsin(ax)^2}{25a^5} \\
&\quad + \frac{4x^2\sqrt{1-a^2x^2}\arcsin(ax)^2}{25a^3} + \frac{3x^4\sqrt{1-a^2x^2}\arcsin(ax)^2}{25a} \\
&\quad + \frac{1}{5}x^5\arcsin(ax)^3 + \frac{16\int\frac{x}{\sqrt{1-a^2x^2}}\,dx}{25a^3} + \frac{4\mathrm{Subst}\left(\int\frac{x}{\sqrt{1-a^2x}}\,dx,x,x^2\right)}{75a} \\
&\quad + \frac{1}{125}(3a)\mathrm{Subst}\left(\int\left(\frac{1}{a^4\sqrt{1-a^2x}} - \frac{2\sqrt{1-a^2x}}{a^4} + \frac{(1-a^2x)^{3/2}}{a^4}\right)dx,x,x^2\right) \\
&= -\frac{86\sqrt{1-a^2x^2}}{125a^5} + \frac{4(1-a^2x^2)^{3/2}}{125a^5} - \frac{6(1-a^2x^2)^{5/2}}{625a^5} - \frac{16x\arcsin(ax)}{25a^4} \\
&\quad - \frac{8x^3\arcsin(ax)}{75a^2} - \frac{6}{125}x^5\arcsin(ax) + \frac{8\sqrt{1-a^2x^2}\arcsin(ax)^2}{25a^5} \\
&\quad + \frac{4x^2\sqrt{1-a^2x^2}\arcsin(ax)^2}{25a^3} + \frac{3x^4\sqrt{1-a^2x^2}\arcsin(ax)^2}{25a} \\
&\quad + \frac{1}{5}x^5\arcsin(ax)^3 + \frac{4\mathrm{Subst}\left(\int\left(\frac{1}{a^2\sqrt{1-a^2x}} - \frac{\sqrt{1-a^2x}}{a^2}\right)dx,x,x^2\right)}{75a} \\
&= -\frac{298\sqrt{1-a^2x^2}}{375a^5} + \frac{76(1-a^2x^2)^{3/2}}{1125a^5} - \frac{6(1-a^2x^2)^{5/2}}{625a^5} - \frac{16x\arcsin(ax)}{25a^4} \\
&\quad - \frac{8x^3\arcsin(ax)}{75a^2} - \frac{6}{125}x^5\arcsin(ax) + \frac{8\sqrt{1-a^2x^2}\arcsin(ax)^2}{25a^5} \\
&\quad + \frac{4x^2\sqrt{1-a^2x^2}\arcsin(ax)^2}{25a^3} + \frac{3x^4\sqrt{1-a^2x^2}\arcsin(ax)^2}{25a} + \frac{1}{5}x^5\arcsin(ax)^3
\end{aligned}
$$

Mathematica [A] (verified)

Time = 0.07 (sec) , antiderivative size = 122, normalized size of antiderivative = 0.61

$$
\int x^4\arcsin(ax)^3\,dx
$$
$$
= \frac{-2\sqrt{1-a^2x^2}(2072+136a^2x^2+27a^4x^4) - 30ax(120+20a^2x^2+9a^4x^4)\arcsin(ax) + 225\sqrt{1-a^2x^2}(8+4}{5625a^5}
$$

```
[In] Integrate[x^4*ArcSin[a*x]^3,x]
```

```
[Out] (-2*Sqrt[1 - a^2*x^2]*(2072 + 136*a^2*x^2 + 27*a^4*x^4) - 30*a*x*(120 + 20*
a^2*x^2 + 9*a^4*x^4)*ArcSin[a*x] + 225*Sqrt[1 - a^2*x^2]*(8 + 4*a^2*x^2 + 3
*a^4*x^4)*ArcSin[a*x]^2 + 1125*a^5*x^5*ArcSin[a*x]^3)/(5625*a^5)
```

Maple [A] (verified)

Time = 0.05 (sec) , antiderivative size = 159, normalized size of antiderivative = 0.79

method	result
derivativedivides	$\frac{\frac{a^5x^5\arcsin(ax)^3}{5}+\frac{\arcsin(ax)^2\left(3a^4x^4+4a^2x^2+8\right)\sqrt{-a^2x^2+1}}{25}-\frac{6a^5x^5\arcsin(ax)}{125}-\frac{2\left(3a^4x^4+4a^2x^2+8\right)\sqrt{-a^2x^2+1}}{625}-\frac{8a^3x^3\arcsin}{75}}{a^5}$
default	$\frac{\frac{a^5x^5\arcsin(ax)^3}{5}+\frac{\arcsin(ax)^2\left(3a^4x^4+4a^2x^2+8\right)\sqrt{-a^2x^2+1}}{25}-\frac{6a^5x^5\arcsin(ax)}{125}-\frac{2\left(3a^4x^4+4a^2x^2+8\right)\sqrt{-a^2x^2+1}}{625}-\frac{8a^3x^3\arcsin}{75}}{a^5}$

```
[In] int(x^4*arcsin(a*x)^3,x,method=_RETURNVERBOSE)
```

```
[Out] 1/a^5*(1/5*a^5*x^5*arcsin(a*x)^3+1/25*arcsin(a*x)^2*(3*a^4*x^4+4*a^2*x^2+8)
*(-a^2*x^2+1)^(1/2)-6/125*a^5*x^5*arcsin(a*x)-2/625*(3*a^4*x^4+4*a^2*x^2+8)
*(-a^2*x^2+1)^(1/2)-8/75*a^3*x^3*arcsin(a*x)-8/225*(a^2*x^2+2)*(-a^2*x^2+1)
^(1/2)-16/25*(-a^2*x^2+1)^(1/2)-16/25*a*x*arcsin(a*x))
```

Fricas [A] (verification not implemented)

none

Time = 0.26 (sec) , antiderivative size = 105, normalized size of antiderivative = 0.52

$$\int x^4 \arcsin(ax)^3\,dx$$
$$=\frac{1125\,a^5x^5\arcsin\left(ax\right)^3-30\left(9\,a^5x^5+20\,a^3x^3+120\,ax\right)\arcsin\left(ax\right)-\left(54\,a^4x^4+272\,a^2x^2-225\left(3\,a^4x^4+\right.\right.}{5625\,a^5}$$

```
[In] integrate(x^4*arcsin(a*x)^3,x, algorithm="fricas")
```

```
[Out] 1/5625*(1125*a^5*x^5*arcsin(a*x)^3 - 30*(9*a^5*x^5 + 20*a^3*x^3 + 120*a*x)*
arcsin(a*x) - (54*a^4*x^4 + 272*a^2*x^2 - 225*(3*a^4*x^4 + 4*a^2*x^2 + 8)*a
rcsin(a*x)^2 + 4144)*sqrt(-a^2*x^2 + 1))/a^5
```

Sympy [A] (verification not implemented)

Time = 0.54 (sec) , antiderivative size = 196, normalized size of antiderivative = 0.98

$$\int x^4 \arcsin(ax)^3\,dx$$
$$=\begin{cases}\frac{x^5\operatorname{asin}^3(ax)}{5}-\frac{6x^5\operatorname{asin}(ax)}{125}+\frac{3x^4\sqrt{-a^2x^2+1}\operatorname{asin}^2(ax)}{25a}-\frac{6x^4\sqrt{-a^2x^2+1}}{625a}-\frac{8x^3\operatorname{asin}(ax)}{75a^2}+\frac{4x^2\sqrt{-a^2x^2+1}\operatorname{asin}^2(ax)}{25a^3}-\frac{272x^2\sqrt{}}{56}\\0\end{cases}$$

```
[In] integrate(x**4*asin(a*x)**3,x)
```

```
[Out] Piecewise((x**5*asin(a*x)**3/5 - 6*x**5*asin(a*x)/125 + 3*x**4*sqrt(-a**2*x
**2 + 1)*asin(a*x)**2/(25*a) - 6*x**4*sqrt(-a**2*x**2 + 1)/(625*a) - 8*x**3
*asin(a*x)/(75*a**2) + 4*x**2*sqrt(-a**2*x**2 + 1)*asin(a*x)**2/(25*a**3) -
 272*x**2*sqrt(-a**2*x**2 + 1)/(5625*a**3) - 16*x*asin(a*x)/(25*a**4) + 8*s
qrt(-a**2*x**2 + 1)*asin(a*x)**2/(25*a**5) - 4144*sqrt(-a**2*x**2 + 1)/(562
5*a**5), Ne(a, 0)), (0, True))
```

Maxima [A] (verification not implemented)

none

Time = 0.28 (sec) , antiderivative size = 171, normalized size of antiderivative = 0.85

$$\int x^4 \arcsin(ax)^3\,dx = \frac{1}{5}\,x^5 \arcsin\left(ax\right)^3 + \frac{1}{25}\left(\frac{3\,\sqrt{-a^2x^2+1}x^4}{a^2} + \frac{4\,\sqrt{-a^2x^2+1}x^2}{a^4} + \frac{8\,\sqrt{-a^2x^2+1}}{a^6}\right)a \arcsin\left(ax\right)^2 - \frac{2}{5625}\,a\left(\frac{27\,\sqrt{-a^2x^2+1}a^2x^4 + 136\,\sqrt{-a^2x^2+1}x^2 + \frac{2072\,\sqrt{-a^2x^2+1}}{a^2}}{a^4} + \frac{15\,(9\,a^4x^5 + 20\,a^2x^3 + 120\,x) \arcsin}{a^5}\right.$$

```
[In] integrate(x^4*arcsin(a*x)^3,x, algorithm="maxima")
```

```
[Out] 1/5*x^5*arcsin(a*x)^3 + 1/25*(3*sqrt(-a^2*x^2 + 1)*x^4/a^2 + 4*sqrt(-a^2*x^
2 + 1)*x^2/a^4 + 8*sqrt(-a^2*x^2 + 1)/a^6)*a*arcsin(a*x)^2 - 2/5625*a*((27*
sqrt(-a^2*x^2 + 1)*a^2*x^4 + 136*sqrt(-a^2*x^2 + 1)*x^2 + 2072*sqrt(-a^2*x^
2 + 1)/a^2)/a^4 + 15*(9*a^4*x^5 + 20*a^2*x^3 + 120*x)*arcsin(a*x)/a^5)
```

Giac [A] (verification not implemented)

none

Time = 0.27 (sec) , antiderivative size = 249, normalized size of antiderivative = 1.24

$$\begin{aligned}\int x^4 \arcsin(ax)^3\,dx = {} & \frac{(a^2x^2-1)^2 x \arcsin\left(ax\right)^3}{5\,a^4} + \frac{2\,(a^2x^2-1)x \arcsin\left(ax\right)^3}{5\,a^4} \\ & - \frac{6\,(a^2x^2-1)^2 x \arcsin\left(ax\right)}{125\,a^4} + \frac{x \arcsin\left(ax\right)^3}{5\,a^4} \\ & + \frac{3\,(a^2x^2-1)^2\sqrt{-a^2x^2+1} \arcsin\left(ax\right)^2}{25\,a^5} \\ & - \frac{76\,(a^2x^2-1)x \arcsin\left(ax\right)}{375\,a^4} - \frac{2\,(-a^2x^2+1)^{\frac{3}{2}} \arcsin\left(ax\right)^2}{5\,a^5} \\ & - \frac{298\,x \arcsin\left(ax\right)}{375\,a^4} - \frac{6\,(a^2x^2-1)^2\sqrt{-a^2x^2+1}}{625\,a^5} \\ & + \frac{3\,\sqrt{-a^2x^2+1} \arcsin\left(ax\right)^2}{5\,a^5} + \frac{76\,(-a^2x^2+1)^{\frac{3}{2}}}{1125\,a^5} - \frac{298\,\sqrt{-a^2x^2+1}}{375\,a^5}\end{aligned}$$

```
[In] integrate(x^4*arcsin(a*x)^3,x, algorithm="giac")
```

```
[Out] 1/5*(a^2*x^2 - 1)^2*x*arcsin(a*x)^3/a^4 + 2/5*(a^2*x^2 - 1)*x*arcsin(a*x)^3
/a^4 - 6/125*(a^2*x^2 - 1)^2*x*arcsin(a*x)/a^4 + 1/5*x*arcsin(a*x)^3/a^4 +
3/25*(a^2*x^2 - 1)^2*sqrt(-a^2*x^2 + 1)*arcsin(a*x)^2/a^5 - 76/375*(a^2*x^2
 - 1)*x*arcsin(a*x)/a^4 - 2/5*(-a^2*x^2 + 1)^(3/2)*arcsin(a*x)^2/a^5 - 298/
375*x*arcsin(a*x)/a^4 - 6/625*(a^2*x^2 - 1)^2*sqrt(-a^2*x^2 + 1)/a^5 + 3/5*
sqrt(-a^2*x^2 + 1)*arcsin(a*x)^2/a^5 + 76/1125*(-a^2*x^2 + 1)^(3/2)/a^5 - 2
98/375*sqrt(-a^2*x^2 + 1)/a^5
```

Mupad [F(-1)]

Timed out.

$$\int x^4 \arcsin(ax)^3 \, dx = \int x^4 \operatorname{asin}(a\, x)^3 \, dx$$

```
[In] int(x^4*asin(a*x)^3,x)
```

```
[Out] int(x^4*asin(a*x)^3, x)
```

3.23 $\int x^3 \arcsin(ax)^3 \, dx$

Optimal result

Integrand size = 10, antiderivative size = 167

$$\int x^3 \arcsin(ax)^3 \, dx = -\frac{45x\sqrt{1-a^2x^2}}{256a^3} - \frac{3x^3\sqrt{1-a^2x^2}}{128a} + \frac{45\arcsin(ax)}{256a^4} - \frac{9x^2\arcsin(ax)}{32a^2} - \frac{3}{32}x^4\arcsin(ax) + \frac{9x\sqrt{1-a^2x^2}\arcsin(ax)^2}{32a^3} + \frac{3x^3\sqrt{1-a^2x^2}\arcsin(ax)^2}{16a} - \frac{3\arcsin(ax)^3}{32a^4} + \frac{1}{4}x^4\arcsin(ax)^3$$

```
[Out] 45/256*arcsin(a*x)/a^4-9/32*x^2*arcsin(a*x)/a^2-3/32*x^4*arcsin(a*x)-3/32*a
rcsin(a*x)^3/a^4+1/4*x^4*arcsin(a*x)^3-45/256*x*(-a^2*x^2+1)^(1/2)/a^3-3/12
8*x^3*(-a^2*x^2+1)^(1/2)/a+9/32*x*arcsin(a*x)^2*(-a^2*x^2+1)^(1/2)/a^3+3/16
*x^3*arcsin(a*x)^2*(-a^2*x^2+1)^(1/2)/a
```

Rubi [A] (verified)

Time = 0.19 (sec) , antiderivative size = 167, normalized size of antiderivative = 1.00, number of steps used = 11, number of rules used = 5, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {4723, 4795, 4737, 327, 222}

$$\int x^3 \arcsin(ax)^3 \, dx = -\frac{3\arcsin(ax)^3}{32a^4} + \frac{45\arcsin(ax)}{256a^4} - \frac{9x^2\arcsin(ax)}{32a^2} + \frac{3x^3\sqrt{1-a^2x^2}\arcsin(ax)^2}{16a} - \frac{3x^3\sqrt{1-a^2x^2}}{128a} + \frac{9x\sqrt{1-a^2x^2}\arcsin(ax)^2}{32a^3} - \frac{45x\sqrt{1-a^2x^2}}{256a^3} + \frac{1}{4}x^4\arcsin(ax)^3 - \frac{3}{32}x^4\arcsin(ax)$$

```
[In] Int[x^3*ArcSin[a*x]^3,x]
```

```
[Out] (-45*x*Sqrt[1 - a^2*x^2])/(256*a^3) - (3*x^3*Sqrt[1 - a^2*x^2])/(128*a) + (
45*ArcSin[a*x])/(256*a^4) - (9*x^2*ArcSin[a*x])/(32*a^2) - (3*x^4*ArcSin[a*
x])/32 + (9*x*Sqrt[1 - a^2*x^2]*ArcSin[a*x]^2)/(32*a^3) + (3*x^3*Sqrt[1 - a
^2*x^2]*ArcSin[a*x]^2)/(16*a) - (3*ArcSin[a*x]^3)/(32*a^4) + (x^4*ArcSin[a*
x]^3)/4
```

Rule 222

```
Int[1/Sqrt[(a_) + (b_.)*(x_)^2], x_Symbol] :> Simp[ArcSin[Rt[-b, 2]*(x/Sqrt
[a])]/Rt[-b, 2], x] /; FreeQ[{a, b}, x] && GtQ[a, 0] && NegQ[b]
```

Rule 327

```
Int[((c_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[c^(n
 - 1)*(c*x)^(m - n + 1)*((a + b*x^n)^(p + 1)/(b*(m + n*p + 1))), x] - Dist[
a*c^n*((m - n + 1)/(b*(m + n*p + 1))), Int[(c*x)^(m - n)*(a + b*x^n)^p, x],
 x] /; FreeQ[{a, b, c, p}, x] && IGtQ[n, 0] && GtQ[m, n - 1] && NeQ[m + n*p
 + 1, 0] && IntBinomialQ[a, b, c, n, m, p, x]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rule 4737

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)/Sqrt[(d_) + (e_.)*(x_)^2], x_S
ymbol] :> Simp[(1/(b*c*(n + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]]*(a
 + b*ArcSin[c*x])^(n + 1), x] /; FreeQ[{a, b, c, d, e, n}, x] && EqQ[c^2*d
+ e, 0] && NeQ[n, -1]
```

Rule 4795

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_)*((d_) + (e_.
)*(x_)^2)^(p_), x_Symbol] :> Simp[f*(f*x)^(m - 1)*(d + e*x^2)^(p + 1)*((a +
 b*ArcSin[c*x])^n/(e*(m + 2*p + 1))), x] + (Dist[f^2*((m - 1)/(c^2*(m + 2*p
 + 1))), Int[(f*x)^(m - 2)*(d + e*x^2)^p*(a + b*ArcSin[c*x])^n, x], x] + Di
st[b*f*(n/(c*(m + 2*p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], Int[(f*x)
^(m - 1)*(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x]) /; Fr
eeQ[{a, b, c, d, e, f, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && IGtQ[m,
1] && NeQ[m + 2*p + 1, 0]
```

Rubi steps

$$\text{integral} = \frac{1}{4}x^4\arcsin(ax)^3 - \frac{1}{4}(3a)\int \frac{x^4\arcsin(ax)^2}{\sqrt{1-a^2x^2}}\,dx$$

$$= \frac{3x^3\sqrt{1-a^2x^2}\arcsin(ax)^2}{16a} + \frac{1}{4}x^4\arcsin(ax)^3 - \frac{3}{8}\int x^3\arcsin(ax)\,dx - \frac{9\int \frac{x^2\arcsin(ax)^2}{\sqrt{1-a^2x^2}}\,dx}{16a}$$

$$= -\frac{3}{32}x^4\arcsin(ax) + \frac{9x\sqrt{1-a^2x^2}\arcsin(ax)^2}{32a^3} + \frac{3x^3\sqrt{1-a^2x^2}\arcsin(ax)^2}{16a} + \frac{1}{4}x^4\arcsin(ax)^3 - \frac{9\int \frac{\arcsin(ax)^2}{\sqrt{1-a^2x^2}}\,dx}{32a^3} - \frac{9\int x\arcsin(ax)\,dx}{16a^2} + \frac{1}{32}(3a)\int \frac{x^4}{\sqrt{1-a^2x^2}}\,dx$$

$$= -\frac{3x^3\sqrt{1-a^2x^2}}{128a} - \frac{9x^2\arcsin(ax)}{32a^2} - \frac{3}{32}x^4\arcsin(ax) + \frac{9x\sqrt{1-a^2x^2}\arcsin(ax)^2}{32a^3} + \frac{3x^3\sqrt{1-a^2x^2}\arcsin(ax)^2}{16a} - \frac{3\arcsin(ax)^3}{32a^4} + \frac{1}{4}x^4\arcsin(ax)^3 + \frac{9\int \frac{x^2}{\sqrt{1-a^2x^2}}\,dx}{128a} + \frac{9\int \frac{x^2}{\sqrt{1-a^2x^2}}\,dx}{32a}$$

$$= -\frac{45x\sqrt{1-a^2x^2}}{256a^3} - \frac{3x^3\sqrt{1-a^2x^2}}{128a} - \frac{9x^2\arcsin(ax)}{32a^2} - \frac{3}{32}x^4\arcsin(ax) + \frac{9x\sqrt{1-a^2x^2}\arcsin(ax)^2}{32a^3} + \frac{3x^3\sqrt{1-a^2x^2}\arcsin(ax)^2}{16a} - \frac{3\arcsin(ax)^3}{32a^4} + \frac{1}{4}x^4\arcsin(ax)^3 + \frac{9\int \frac{1}{\sqrt{1-a^2x^2}}\,dx}{256a^3} + \frac{9\int \frac{1}{\sqrt{1-a^2x^2}}\,dx}{64a^3}$$

$$= -\frac{45x\sqrt{1-a^2x^2}}{256a^3} - \frac{3x^3\sqrt{1-a^2x^2}}{128a} + \frac{45\arcsin(ax)}{256a^4} - \frac{9x^2\arcsin(ax)}{32a^2} - \frac{3}{32}x^4\arcsin(ax) + \frac{9x\sqrt{1-a^2x^2}\arcsin(ax)^2}{32a^3} + \frac{3x^3\sqrt{1-a^2x^2}\arcsin(ax)^2}{16a} - \frac{3\arcsin(ax)^3}{32a^4} + \frac{1}{4}x^4\arcsin(ax)^3$$

Mathematica [A] (verified)

Time = 0.04 (sec) , antiderivative size = 112, normalized size of antiderivative = 0.67

$$\int x^3\arcsin(ax)^3\,dx = \frac{-3ax\sqrt{1-a^2x^2}(15+2a^2x^2) - 3(-15+24a^2x^2+8a^4x^4)\arcsin(ax) + 24ax\sqrt{1-a^2x^2}(3+2a^2x^2)\arcsin(a}{256a^4}$$

```
[In] Integrate[x^3*ArcSin[a*x]^3,x]
```

```
[Out] (-3*a*x*Sqrt[1 - a^2*x^2]*(15 + 2*a^2*x^2) - 3*(-15 + 24*a^2*x^2 + 8*a^4*x^
4)*ArcSin[a*x] + 24*a*x*Sqrt[1 - a^2*x^2]*(3 + 2*a^2*x^2)*ArcSin[a*x]^2 + 8
*(-3 + 8*a^4*x^4)*ArcSin[a*x]^3)/(256*a^4)
```

Maple [A] (verified)

Time = 0.09 (sec) , antiderivative size = 154, normalized size of antiderivative = 0.92

method	result
derivativedivides	$\frac{\frac{a^4x^4\arcsin(ax)^3}{4}-\frac{3\arcsin(ax)^2\left(-2a^3x^3\sqrt{-a^2x^2+1}-3ax\sqrt{-a^2x^2+1}+3\arcsin(ax)\right)}{32}-\frac{3a^4x^4\arcsin(ax)}{32}-\frac{3ax\left(2a^2x^2+3\right)\sqrt{-a^2x^2}}{256}}{a^4}$
default	$\frac{\frac{a^4x^4\arcsin(ax)^3}{4}-\frac{3\arcsin(ax)^2\left(-2a^3x^3\sqrt{-a^2x^2+1}-3ax\sqrt{-a^2x^2+1}+3\arcsin(ax)\right)}{32}-\frac{3a^4x^4\arcsin(ax)}{32}-\frac{3ax\left(2a^2x^2+3\right)\sqrt{-a^2x^2}}{256}}{a^4}$

```
[In] int(x^3*arcsin(a*x)^3,x,method=_RETURNVERBOSE)
[Out] 1/a^4*(1/4*a^4*x^4*arcsin(a*x)^3-3/32*arcsin(a*x)^2*(-2*a^3*x^3*(-a^2*x^2+1
)^(1/2)-3*a*x*(-a^2*x^2+1)^(1/2)+3*arcsin(a*x))-3/32*a^4*x^4*arcsin(a*x)-3/
256*a*x*(2*a^2*x^2+3)*(-a^2*x^2+1)^(1/2)-27/256*arcsin(a*x)-9/32*(a^2*x^2-1
)*arcsin(a*x)-9/64*a*x*(-a^2*x^2+1)^(1/2)+3/16*arcsin(a*x)^3)
```

Fricas [A] (verification not implemented)

none

Time = 0.27 (sec) , antiderivative size = 96, normalized size of antiderivative = 0.57

$$\int x^3\arcsin(ax)^3\,dx$$
$$=\frac{8\left(8\,a^4x^4-3\right)\arcsin\left(ax\right)^3-3\left(8\,a^4x^4+24\,a^2x^2-15\right)\arcsin\left(ax\right)-3\left(2\,a^3x^3-8\left(2\,a^3x^3+3\,ax\right)\arcsin\left(a\right.\right.}{256\,a^4}$$

```
[In] integrate(x^3*arcsin(a*x)^3,x, algorithm="fricas")
[Out] 1/256*(8*(8*a^4*x^4 - 3)*arcsin(a*x)^3 - 3*(8*a^4*x^4 + 24*a^2*x^2 - 15)*ar
csin(a*x) - 3*(2*a^3*x^3 - 8*(2*a^3*x^3 + 3*a*x)*arcsin(a*x)^2 + 15*a*x)*sq
rt(-a^2*x^2 + 1))/a^4
```

Sympy [A] (verification not implemented)

Time = 0.42 (sec) , antiderivative size = 160, normalized size of antiderivative = 0.96

$$\int x^3\arcsin(ax)^3\,dx$$
$$=\begin{cases}\frac{x^4\operatorname{asin}^3(ax)}{4}-\frac{3x^4\operatorname{asin}(ax)}{32}+\frac{3x^3\sqrt{-a^2x^2+1}\operatorname{asin}^2(ax)}{16a}-\frac{3x^3\sqrt{-a^2x^2+1}}{128a}-\frac{9x^2\operatorname{asin}(ax)}{32a^2}+\frac{9x\sqrt{-a^2x^2+1}\operatorname{asin}^2(ax)}{32a^3}-\frac{45x\sqrt{-a^2}}{256a} \\ 0\end{cases}$$

```
[In] integrate(x**3*asin(a*x)**3,x)
```

```
[Out] Piecewise((x**4*asin(a*x)**3/4 - 3*x**4*asin(a*x)/32 + 3*x**3*sqrt(-a**2*x**2 + 1)*asin(a*x)**2/(16*a) - 3*x**3*sqrt(-a**2*x**2 + 1)/(128*a) - 9*x**2*asin(a*x)/(32*a**2) + 9*x*sqrt(-a**2*x**2 + 1)*asin(a*x)**2/(32*a**3) - 45*x*sqrt(-a**2*x**2 + 1)/(256*a**3) - 3*asin(a*x)**3/(32*a**4) + 45*asin(a*x)/(256*a**4), Ne(a, 0)), (0, True))
```

Maxima [F]

$$\int x^3 \arcsin(ax)^3\,dx = \int x^3 \arcsin(ax)^3\,dx$$

```
[In] integrate(x^3*arcsin(a*x)^3,x, algorithm="maxima")
```

```
[Out] 1/4*x^4*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^3 + 3*a*integrate(1/4*sqrt(a*x + 1)*sqrt(-a*x + 1)*x^4*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^2/(a^2*x^2 - 1), x)
```

Giac [A] (verification not implemented)

none

Time = 0.28 (sec) , antiderivative size = 185, normalized size of antiderivative = 1.11

$$\begin{aligned}\int x^3 \arcsin(ax)^3\,dx = &-\frac{3\left(-a^2x^2+1\right)^{\frac{3}{2}}x\arcsin(ax)^2}{16\,a^3}+\frac{\left(a^2x^2-1\right)^2\arcsin(ax)^3}{4\,a^4}\\&+\frac{15\sqrt{-a^2x^2+1}x\arcsin(ax)^2}{32\,a^3}+\frac{\left(a^2x^2-1\right)\arcsin(ax)^3}{2\,a^4}\\&+\frac{3\left(-a^2x^2+1\right)^{\frac{3}{2}}x}{128\,a^3}-\frac{3\left(a^2x^2-1\right)^2\arcsin(ax)}{32\,a^4}+\frac{5\arcsin(ax)^3}{32\,a^4}\\&-\frac{51\sqrt{-a^2x^2+1}x}{256\,a^3}-\frac{15\left(a^2x^2-1\right)\arcsin(ax)}{32\,a^4}-\frac{51\arcsin(ax)}{256\,a^4}\end{aligned}$$

```
[In] integrate(x^3*arcsin(a*x)^3,x, algorithm="giac")
```

```
[Out] -3/16*(-a^2*x^2 + 1)^(3/2)*x*arcsin(a*x)^2/a^3 + 1/4*(a^2*x^2 - 1)^2*arcsin(a*x)^3/a^4 + 15/32*sqrt(-a^2*x^2 + 1)*x*arcsin(a*x)^2/a^3 + 1/2*(a^2*x^2 - 1)*arcsin(a*x)^3/a^4 + 3/128*(-a^2*x^2 + 1)^(3/2)*x/a^3 - 3/32*(a^2*x^2 - 1)^2*arcsin(a*x)/a^4 + 5/32*arcsin(a*x)^3/a^4 - 51/256*sqrt(-a^2*x^2 + 1)*x/a^3 - 15/32*(a^2*x^2 - 1)*arcsin(a*x)/a^4 - 51/256*arcsin(a*x)/a^4
```

Mupad [F(-1)]

Timed out.

$$\int x^3 \arcsin(ax)^3 \, dx = \int x^3 \operatorname{asin}(a\,x)^3 \, dx$$

```
[In] int(x^3*asin(a*x)^3,x)
```

```
[Out] int(x^3*asin(a*x)^3, x)
```

3.24 $\int x^2 \arcsin(ax)^3 \, dx$

Optimal result

Integrand size = 10, antiderivative size = 136

$$\int x^2 \arcsin(ax)^3 \, dx = -\frac{14\sqrt{1-a^2x^2}}{9a^3} + \frac{2(1-a^2x^2)^{3/2}}{27a^3} - \frac{4x \arcsin(ax)}{3a^2} - \frac{2}{9}x^3 \arcsin(ax) + \frac{2\sqrt{1-a^2x^2} \arcsin(ax)^2}{3a^3} + \frac{x^2\sqrt{1-a^2x^2} \arcsin(ax)^2}{3a} + \frac{1}{3}x^3 \arcsin(ax)^3$$

```
[Out] 2/27*(-a^2*x^2+1)^(3/2)/a^3-4/3*x*arcsin(a*x)/a^2-2/9*x^3*arcsin(a*x)+1/3*x
^3*arcsin(a*x)^3-14/9*(-a^2*x^2+1)^(1/2)/a^3+2/3*arcsin(a*x)^2*(-a^2*x^2+1)
^(1/2)/a^3+1/3*x^2*arcsin(a*x)^2*(-a^2*x^2+1)^(1/2)/a
```

Rubi [A] (verified)

Time = 0.15 (sec) , antiderivative size = 136, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 7, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.700, Rules used = {4723, 4795, 4767, 4715, 267, 272, 45}

$$\int x^2 \arcsin(ax)^3 \, dx = \frac{x^2\sqrt{1-a^2x^2} \arcsin(ax)^2}{3a} - \frac{4x \arcsin(ax)}{3a^2} + \frac{2\sqrt{1-a^2x^2} \arcsin(ax)^2}{3a^3} + \frac{2(1-a^2x^2)^{3/2}}{27a^3} - \frac{14\sqrt{1-a^2x^2}}{9a^3} + \frac{1}{3}x^3 \arcsin(ax)^3 - \frac{2}{9}x^3 \arcsin(ax)$$

```
[In] Int[x^2*ArcSin[a*x]^3,x]
```

```
[Out] (-14*Sqrt[1 - a^2*x^2])/(9*a^3) + (2*(1 - a^2*x^2)^(3/2))/(27*a^3) - (4*x*A
rcSin[a*x])/(3*a^2) - (2*x^3*ArcSin[a*x])/9 + (2*Sqrt[1 - a^2*x^2]*ArcSin[a
```

```
*x]^2)/(3*a^3) + (x^2*Sqrt[1 - a^2*x^2]*ArcSin[a*x]^2)/(3*a) + (x^3*ArcSin[
a*x]^3)/3
```

Rule 45

```
Int[((a_.) + (b_.)*(x_))^(m_.)*((c_.) + (d_.)*(x_))^(n_.), x_Symbol] :> Int
[ExpandIntegrand[(a + b*x)^m*(c + d*x)^n, x], x] /; FreeQ[{a, b, c, d, n},
x] && NeQ[b*c - a*d, 0] && IGtQ[m, 0] && ( !IntegerQ[n] || (EqQ[c, 0] && Le
Q[7*m + 4*n + 4, 0]) || LtQ[9*m + 5*(n + 1), 0] || GtQ[m + n + 2, 0])
```

Rule 267

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[(a + b*x^n)
^(p + 1)/(b*n*(p + 1)), x] /; FreeQ[{a, b, m, n, p}, x] && EqQ[m, n - 1] &&
 NeQ[p, -1]
```

Rule 272

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[1/n, Subst[
Int[x^(Simplify[(m + 1)/n] - 1)*(a + b*x)^p, x], x, x^n], x] /; FreeQ[{a, b
, m, n, p}, x] && IntegerQ[Simplify[(m + 1)/n]]
```

Rule 4715

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.), x_Symbol] :> Simp[x*(a + b*Ar
cSin[c*x])^n, x] - Dist[b*c*n, Int[x*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 -
c^2*x^2]), x], x] /; FreeQ[{a, b, c}, x] && GtQ[n, 0]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rule 4767

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)*((d_) + (e_.)*(x_)^2)^(p_
.), x_Symbol] :> Simp[(d + e*x^2)^(p + 1)*((a + b*ArcSin[c*x])^n/(2*e*(p +
1))), x] + Dist[b*(n/(2*c*(p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], In
t[(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x] /; FreeQ[{a,
b, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && NeQ[p, -1]
```

Rule 4795

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_)*((d_) + (e_.
)*(x_)^2)^(p_), x_Symbol] :> Simp[f*(f*x)^(m - 1)*(d + e*x^2)^(p + 1)*((a +
```

```
b*ArcSin[c*x])^n/(e*(m + 2*p + 1))), x] + (Dist[f^2*((m - 1)/(c^2*(m + 2*p
 + 1))), Int[(f*x)^(m - 2)*(d + e*x^2)^p*(a + b*ArcSin[c*x])^n, x], x] + Di
st[b*f*(n/(c*(m + 2*p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], Int[(f*x)
^(m - 1)*(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x]) /; Fr
eeQ[{a, b, c, d, e, f, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && IGtQ[m,
1] && NeQ[m + 2*p + 1, 0]
```

Rubi steps

$$
\begin{aligned}
\text{integral} &= \frac{1}{3}x^3\arcsin(ax)^3 - a\int \frac{x^3\arcsin(ax)^2}{\sqrt{1-a^2x^2}}\,dx \\
&= \frac{x^2\sqrt{1-a^2x^2}\arcsin(ax)^2}{3a} + \frac{1}{3}x^3\arcsin(ax)^3 - \frac{2}{3}\int x^2\arcsin(ax)\,dx - \frac{2\int \frac{x\arcsin(ax)^2}{\sqrt{1-a^2x^2}}\,dx}{3a} \\
&= -\frac{2}{9}x^3\arcsin(ax) + \frac{2\sqrt{1-a^2x^2}\arcsin(ax)^2}{3a^3} + \frac{x^2\sqrt{1-a^2x^2}\arcsin(ax)^2}{3a} \\
&\quad + \frac{1}{3}x^3\arcsin(ax)^3 - \frac{4\int \arcsin(ax)\,dx}{3a^2} + \frac{1}{9}(2a)\int \frac{x^3}{\sqrt{1-a^2x^2}}\,dx \\
&= -\frac{4x\arcsin(ax)}{3a^2} - \frac{2}{9}x^3\arcsin(ax) + \frac{2\sqrt{1-a^2x^2}\arcsin(ax)^2}{3a^3} \\
&\quad + \frac{x^2\sqrt{1-a^2x^2}\arcsin(ax)^2}{3a} + \frac{1}{3}x^3\arcsin(ax)^3 \\
&\quad + \frac{4\int \frac{x}{\sqrt{1-a^2x^2}}\,dx}{3a} + \frac{1}{9}a\text{Subst}\left(\int \frac{x}{\sqrt{1-a^2x}}\,dx, x, x^2\right) \\
&= -\frac{4\sqrt{1-a^2x^2}}{3a^3} - \frac{4x\arcsin(ax)}{3a^2} - \frac{2}{9}x^3\arcsin(ax) \\
&\quad + \frac{2\sqrt{1-a^2x^2}\arcsin(ax)^2}{3a^3} + \frac{x^2\sqrt{1-a^2x^2}\arcsin(ax)^2}{3a} \\
&\quad + \frac{1}{3}x^3\arcsin(ax)^3 + \frac{1}{9}a\text{Subst}\left(\int \left(\frac{1}{a^2\sqrt{1-a^2x}} - \frac{\sqrt{1-a^2x}}{a^2}\right)\,dx, x, x^2\right) \\
&= -\frac{14\sqrt{1-a^2x^2}}{9a^3} + \frac{2(1-a^2x^2)^{3/2}}{27a^3} - \frac{4x\arcsin(ax)}{3a^2} - \frac{2}{9}x^3\arcsin(ax) \\
&\qquad + \frac{2\sqrt{1-a^2x^2}\arcsin(ax)^2}{3a^3} + \frac{x^2\sqrt{1-a^2x^2}\arcsin(ax)^2}{3a} + \frac{1}{3}x^3\arcsin(ax)^3
\end{aligned}
$$

Mathematica [A] (verified)

Time = 0.04 (sec) , antiderivative size = 95, normalized size of antiderivative = 0.70

$$\int x^2 \arcsin(ax)^3 \, dx$$
$$= \frac{-2\sqrt{1-a^2x^2}(20+a^2x^2) - 6ax(6+a^2x^2)\arcsin(ax) + 9\sqrt{1-a^2x^2}(2+a^2x^2)\arcsin(ax)^2 + 9a^3x^3 \arcsin}{27a^3}$$

```
[In] Integrate[x^2*ArcSin[a*x]^3,x]
```

```
[Out] (-2*Sqrt[1 - a^2*x^2]*(20 + a^2*x^2) - 6*a*x*(6 + a^2*x^2)*ArcSin[a*x] + 9*
Sqrt[1 - a^2*x^2]*(2 + a^2*x^2)*ArcSin[a*x]^2 + 9*a^3*x^3*ArcSin[a*x]^3)/(2
7*a^3)
```

Maple [A] (verified)

Time = 0.04 (sec) , antiderivative size = 106, normalized size of antiderivative = 0.78

method	result
derivativedivides	$\frac{\frac{a^3x^3\arcsin(ax)^3}{3}+\frac{\arcsin(ax)^2\left(a^2x^2+2\right)\sqrt{-a^2x^2+1}}{3}-\frac{4\sqrt{-a^2x^2+1}}{3}-\frac{4ax\arcsin(ax)}{3}-\frac{2a^3x^3\arcsin(ax)}{9}-\frac{2\left(a^2x^2+2\right)\sqrt{-a^2x^2+1}}{27}}{a^3}$
default	$\frac{\frac{a^3x^3\arcsin(ax)^3}{3}+\frac{\arcsin(ax)^2\left(a^2x^2+2\right)\sqrt{-a^2x^2+1}}{3}-\frac{4\sqrt{-a^2x^2+1}}{3}-\frac{4ax\arcsin(ax)}{3}-\frac{2a^3x^3\arcsin(ax)}{9}-\frac{2\left(a^2x^2+2\right)\sqrt{-a^2x^2+1}}{27}}{a^3}$

```
[In] int(x^2*arcsin(a*x)^3,x,method=_RETURNVERBOSE)
```

```
[Out] 1/a^3*(1/3*a^3*x^3*arcsin(a*x)^3+1/3*arcsin(a*x)^2*(a^2*x^2+2)*(-a^2*x^2+1)
^(1/2)-4/3*(-a^2*x^2+1)^(1/2)-4/3*a*x*arcsin(a*x)-2/9*a^3*x^3*arcsin(a*x)-2
/27*(a^2*x^2+2)*(-a^2*x^2+1)^(1/2))
```

Fricas [A] (verification not implemented)

none

Time = 0.26 (sec) , antiderivative size = 79, normalized size of antiderivative = 0.58

$$\int x^2 \arcsin(ax)^3 \, dx$$
$$= \frac{9\,a^3x^3\arcsin\left(ax\right)^3 - 6\left(a^3x^3 + 6\,ax\right)\arcsin\left(ax\right) - \left(2\,a^2x^2 - 9\left(a^2x^2+2\right)\arcsin\left(ax\right)^2 + 40\right)\sqrt{-a^2x^2+1}}{27\,a^3}$$

```
[In] integrate(x^2*arcsin(a*x)^3,x, algorithm="fricas")
```

```
[Out] 1/27*(9*a^3*x^3*arcsin(a*x)^3 - 6*(a^3*x^3 + 6*a*x)*arcsin(a*x) - (2*a^2*x^
2 - 9*(a^2*x^2 + 2)*arcsin(a*x)^2 + 40)*sqrt(-a^2*x^2 + 1))/a^3
```

Sympy [A] (verification not implemented)

Time = 0.31 (sec) , antiderivative size = 128, normalized size of antiderivative = 0.94

$$\int x^2 \arcsin(ax)^3\,dx$$
$$= \begin{cases} \frac{x^3 \operatorname{asin}^3(ax)}{3} - \frac{2x^3 \operatorname{asin}(ax)}{9} + \frac{x^2\sqrt{-a^2x^2+1}\operatorname{asin}^2(ax)}{3a} - \frac{2x^2\sqrt{-a^2x^2+1}}{27a} - \frac{4x\operatorname{asin}(ax)}{3a^2} + \frac{2\sqrt{-a^2x^2+1}\operatorname{asin}^2(ax)}{3a^3} - \frac{40\sqrt{-a^2x^2+1}}{27a^3} \\ 0 \end{cases}$$

```
[In] integrate(x**2*asin(a*x)**3,x)
```

```
[Out] Piecewise((x**3*asin(a*x)**3/3 - 2*x**3*asin(a*x)/9 + x**2*sqrt(-a**2*x**2
+ 1)*asin(a*x)**2/(3*a) - 2*x**2*sqrt(-a**2*x**2 + 1)/(27*a) - 4*x*asin(a*x
)/(3*a**2) + 2*sqrt(-a**2*x**2 + 1)*asin(a*x)**2/(3*a**3) - 40*sqrt(-a**2*x
**2 + 1)/(27*a**3), Ne(a, 0)), (0, True))
```

Maxima [A] (verification not implemented)

none

Time = 0.29 (sec) , antiderivative size = 120, normalized size of antiderivative = 0.88

$$\int x^2 \arcsin(ax)^3\,dx = \frac{1}{3}x^3 \arcsin(ax)^3 + \frac{1}{3}a\left(\frac{\sqrt{-a^2x^2+1}x^2}{a^2} + \frac{2\sqrt{-a^2x^2+1}}{a^4}\right)\arcsin(ax)^2 - \frac{2}{27}a\left(\frac{\sqrt{-a^2x^2+1}x^2 + \frac{20\sqrt{-a^2x^2+1}}{a^2}}{a^2} + \frac{3(a^2x^3+6x)\arcsin(ax)}{a^3}\right)$$

```
[In] integrate(x^2*arcsin(a*x)^3,x, algorithm="maxima")
```

```
[Out] 1/3*x^3*arcsin(a*x)^3 + 1/3*a*(sqrt(-a^2*x^2 + 1)*x^2/a^2 + 2*sqrt(-a^2*x^2
 + 1)/a^4)*arcsin(a*x)^2 - 2/27*a*((sqrt(-a^2*x^2 + 1)*x^2 + 20*sqrt(-a^2*x
^2 + 1)/a^2)/a^2 + 3*(a^2*x^3 + 6*x)*arcsin(a*x)/a^3)
```

Giac [A] (verification not implemented)

none

Time = 0.28 (sec) , antiderivative size = 142, normalized size of antiderivative = 1.04

$$\int x^2 \arcsin(ax)^3\,dx = \frac{(a^2x^2-1)x\arcsin(ax)^3}{3a^2} + \frac{x\arcsin(ax)^3}{3a^2} - \frac{2(a^2x^2-1)x\arcsin(ax)}{9a^2} - \frac{(-a^2x^2+1)^{\frac{3}{2}}\arcsin(ax)^2}{3a^3} - \frac{14x\arcsin(ax)}{9a^2} + \frac{\sqrt{-a^2x^2+1}\arcsin(ax)^2}{a^3} + \frac{2(-a^2x^2+1)^{\frac{3}{2}}}{27a^3} - \frac{14\sqrt{-a^2x^2+1}}{9a^3}$$

```
[In] integrate(x^2*arcsin(a*x)^3,x, algorithm="giac")
```

```
[Out] 1/3*(a^2*x^2 - 1)*x*arcsin(a*x)^3/a^2 + 1/3*x*arcsin(a*x)^3/a^2 - 2/9*(a^2*
x^2 - 1)*x*arcsin(a*x)/a^2 - 1/3*(-a^2*x^2 + 1)^(3/2)*arcsin(a*x)^2/a^3 - 1
4/9*x*arcsin(a*x)/a^2 + sqrt(-a^2*x^2 + 1)*arcsin(a*x)^2/a^3 + 2/27*(-a^2*x
^2 + 1)^(3/2)/a^3 - 14/9*sqrt(-a^2*x^2 + 1)/a^3
```

Mupad [F(-1)]

Timed out.

$$\int x^2 \arcsin(ax)^3 \, dx = \int x^2 \operatorname{asin}(a\,x)^3 \, dx$$

```
[In] int(x^2*asin(a*x)^3,x)
```

```
[Out] int(x^2*asin(a*x)^3, x)
```

3.25 $\int x \arcsin(ax)^3 \, dx$

Optimal result

Integrand size = 8, antiderivative size = 99

$$\int x \arcsin(ax)^3 \, dx = -\frac{3x\sqrt{1-a^2x^2}}{8a} + \frac{3\arcsin(ax)}{8a^2} - \frac{3}{4}x^2 \arcsin(ax) + \frac{3x\sqrt{1-a^2x^2}\arcsin(ax)^2}{4a} - \frac{\arcsin(ax)^3}{4a^2} + \frac{1}{2}x^2 \arcsin(ax)^3$$

```
[Out] 3/8*arcsin(a*x)/a^2-3/4*x^2*arcsin(a*x)-1/4*arcsin(a*x)^3/a^2+1/2*x^2*arcsi
n(a*x)^3-3/8*x*(-a^2*x^2+1)^(1/2)/a+3/4*x*arcsin(a*x)^2*(-a^2*x^2+1)^(1/2)/
a
```

Rubi [A] (verified)

Time = 0.10 (sec) , antiderivative size = 99, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 5, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.625, Rules used = {4723, 4795, 4737, 327, 222}

$$\int x \arcsin(ax)^3 \, dx = \frac{3x\sqrt{1-a^2x^2}\arcsin(ax)^2}{4a} - \frac{\arcsin(ax)^3}{4a^2} + \frac{3\arcsin(ax)}{8a^2} - \frac{3x\sqrt{1-a^2x^2}}{8a} + \frac{1}{2}x^2 \arcsin(ax)^3 - \frac{3}{4}x^2 \arcsin(ax)$$

```
[In] Int[x*ArcSin[a*x]^3,x]
```

```
[Out] (-3*x*Sqrt[1 - a^2*x^2])/(8*a) + (3*ArcSin[a*x])/(8*a^2) - (3*x^2*ArcSin[a*
x])/4 + (3*x*Sqrt[1 - a^2*x^2]*ArcSin[a*x]^2)/(4*a) - ArcSin[a*x]^3/(4*a^2)
 + (x^2*ArcSin[a*x]^3)/2
```

Rule 222

```
Int[1/Sqrt[(a_) + (b_.)*(x_)^2], x_Symbol] :> Simp[ArcSin[Rt[-b, 2]*(x/Sqrt
[a])]/Rt[-b, 2], x] /; FreeQ[{a, b}, x] && GtQ[a, 0] && NegQ[b]
```

Rule 327

```
Int[((c_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[c^(n
 - 1)*(c*x)^(m - n + 1)*((a + b*x^n)^(p + 1)/(b*(m + n*p + 1))), x] - Dist[
a*c^n*((m - n + 1)/(b*(m + n*p + 1))), Int[(c*x)^(m - n)*(a + b*x^n)^p, x],
 x] /; FreeQ[{a, b, c, p}, x] && IGtQ[n, 0] && GtQ[m, n - 1] && NeQ[m + n*p
 + 1, 0] && IntBinomialQ[a, b, c, n, m, p, x]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rule 4737

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)/Sqrt[(d_) + (e_.)*(x_)^2], x_S
ymbol] :> Simp[(1/(b*c*(n + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]]*(a
 + b*ArcSin[c*x])^(n + 1), x] /; FreeQ[{a, b, c, d, e, n}, x] && EqQ[c^2*d
+ e, 0] && NeQ[n, -1]
```

Rule 4795

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_)*((d_) + (e_.
)*(x_)^2)^(p_), x_Symbol] :> Simp[f*(f*x)^(m - 1)*(d + e*x^2)^(p + 1)*((a +
 b*ArcSin[c*x])^n/(e*(m + 2*p + 1))), x] + (Dist[f^2*((m - 1)/(c^2*(m + 2*p
 + 1))), Int[(f*x)^(m - 2)*(d + e*x^2)^p*(a + b*ArcSin[c*x])^n, x], x] + Di
st[b*f*(n/(c*(m + 2*p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], Int[(f*x)
^(m - 1)*(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x]) /; Fr
eeQ[{a, b, c, d, e, f, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && IGtQ[m,
1] && NeQ[m + 2*p + 1, 0]
```

Rubi steps

$$\text{integral} = \frac{1}{2}x^2\arcsin(ax)^3 - \frac{1}{2}(3a)\int \frac{x^2\arcsin(ax)^2}{\sqrt{1-a^2x^2}}\,dx$$

$$= \frac{3x\sqrt{1-a^2x^2}\arcsin(ax)^2}{4a} + \frac{1}{2}x^2\arcsin(ax)^3 - \frac{3}{2}\int x\arcsin(ax)\,dx - \frac{3\int \frac{\arcsin(ax)^2}{\sqrt{1-a^2x^2}}\,dx}{4a}$$

$$
\begin{aligned}
&= -\frac{3}{4}x^2\arcsin(ax) + \frac{3x\sqrt{1-a^2x^2}\arcsin(ax)^2}{4a} \\
&\quad - \frac{\arcsin(ax)^3}{4a^2} + \frac{1}{2}x^2\arcsin(ax)^3 + \frac{1}{4}(3a)\int \frac{x^2}{\sqrt{1-a^2x^2}}\,dx \\
&= -\frac{3x\sqrt{1-a^2x^2}}{8a} - \frac{3}{4}x^2\arcsin(ax) + \frac{3x\sqrt{1-a^2x^2}\arcsin(ax)^2}{4a} \\
&\quad - \frac{\arcsin(ax)^3}{4a^2} + \frac{1}{2}x^2\arcsin(ax)^3 + \frac{3\int \frac{1}{\sqrt{1-a^2x^2}}\,dx}{8a} \\
&= -\frac{3x\sqrt{1-a^2x^2}}{8a} + \frac{3\arcsin(ax)}{8a^2} - \frac{3}{4}x^2\arcsin(ax) \\
&\quad + \frac{3x\sqrt{1-a^2x^2}\arcsin(ax)^2}{4a} - \frac{\arcsin(ax)^3}{4a^2} + \frac{1}{2}x^2\arcsin(ax)^3
\end{aligned}
$$

Mathematica [A] (verified)

Time = 0.02 (sec) , antiderivative size = 82, normalized size of antiderivative = 0.83

$$
\int x\arcsin(ax)^3\,dx = \frac{-3ax\sqrt{1-a^2x^2} + (3-6a^2x^2)\arcsin(ax) + 6ax\sqrt{1-a^2x^2}\arcsin(ax)^2 + (-2+4a^2x^2)\arcsin(ax)^3}{8a^2}
$$

```
[In] Integrate[x*ArcSin[a*x]^3,x]
```

```
[Out] (-3*a*x*Sqrt[1 - a^2*x^2] + (3 - 6*a^2*x^2)*ArcSin[a*x] + 6*a*x*Sqrt[1 - a^
2*x^2]*ArcSin[a*x]^2 + (-2 + 4*a^2*x^2)*ArcSin[a*x]^3)/(8*a^2)
```

Maple [A] (verified)

Time = 0.05 (sec) , antiderivative size = 96, normalized size of antiderivative = 0.97

method	result
derivativedivides	$\frac{\frac{\arcsin(ax)^3(a^2x^2-1)}{2} + \frac{3\arcsin(ax)^2(ax\sqrt{-a^2x^2+1}+\arcsin(ax))}{4} - \frac{3(a^2x^2-1)\arcsin(ax)}{4} - \frac{3ax\sqrt{-a^2x^2+1}}{8} - \frac{3\arcsin(ax)}{8} - \frac{\arcsin(}{2}}{a^2}$
default	$\frac{\frac{\arcsin(ax)^3(a^2x^2-1)}{2} + \frac{3\arcsin(ax)^2(ax\sqrt{-a^2x^2+1}+\arcsin(ax))}{4} - \frac{3(a^2x^2-1)\arcsin(ax)}{4} - \frac{3ax\sqrt{-a^2x^2+1}}{8} - \frac{3\arcsin(ax)}{8} - \frac{\arcsin(}{2}}{a^2}$

```
[In] int(x*arcsin(a*x)^3,x,method=_RETURNVERBOSE)
```

```
[Out] 1/a^2*(1/2*arcsin(a*x)^3*(a^2*x^2-1)+3/4*arcsin(a*x)^2*(a*x*(-a^2*x^2+1)^(1
/2)+arcsin(a*x))-3/4*(a^2*x^2-1)*arcsin(a*x)-3/8*a*x*(-a^2*x^2+1)^(1/2)-3/8
*arcsin(a*x)-1/2*arcsin(a*x)^3)
```

Fricas [A] (verification not implemented)

none

Time = 0.27 (sec) , antiderivative size = 69, normalized size of antiderivative = 0.70

$$\int x \arcsin(ax)^3 \, dx$$
$$= \frac{2\,(2\,a^2x^2 - 1)\arcsin\left(ax\right)^3 - 3\,(2\,a^2x^2 - 1)\arcsin\left(ax\right) + 3\,\sqrt{-a^2x^2 + 1}\left(2\,ax\arcsin\left(ax\right)^2 - ax\right)}{8\,a^2}$$

```
[In] integrate(x*arcsin(a*x)^3,x, algorithm="fricas")
[Out] 1/8*(2*(2*a^2*x^2 - 1)*arcsin(a*x)^3 - 3*(2*a^2*x^2 - 1)*arcsin(a*x) + 3*sq
rt(-a^2*x^2 + 1)*(2*a*x*arcsin(a*x)^2 - a*x))/a^2
```

Sympy [A] (verification not implemented)

Time = 0.23 (sec) , antiderivative size = 92, normalized size of antiderivative = 0.93

$$\int x \arcsin(ax)^3 \, dx$$
$$= \begin{cases} \frac{x^2 \operatorname{asin}^3(ax)}{2} - \frac{3x^2 \operatorname{asin}(ax)}{4} + \frac{3x\sqrt{-a^2x^2+1}\operatorname{asin}^2(ax)}{4a} - \frac{3x\sqrt{-a^2x^2+1}}{8a} - \frac{\operatorname{asin}^3(ax)}{4a^2} + \frac{3\operatorname{asin}(ax)}{8a^2} & \text{for } a \neq 0 \\ 0 & \text{otherwise} \end{cases}$$

```
[In] integrate(x*asin(a*x)**3,x)
[Out] Piecewise((x**2*asin(a*x)**3/2 - 3*x**2*asin(a*x)/4 + 3*x*sqrt(-a**2*x**2 +
 1)*asin(a*x)**2/(4*a) - 3*x*sqrt(-a**2*x**2 + 1)/(8*a) - asin(a*x)**3/(4*a
**2) + 3*asin(a*x)/(8*a**2), Ne(a, 0)), (0, True))
```

Maxima [F]

$$\int x \arcsin(ax)^3 \, dx = \int x \arcsin\left(ax\right)^3 \, dx$$

```
[In] integrate(x*arcsin(a*x)^3,x, algorithm="maxima")
[Out] 1/2*x^2*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^3 + 3*a*integrate(1/2*sq
rt(a*x + 1)*sqrt(-a*x + 1)*x^2*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^2
/(a^2*x^2 - 1), x)
```

Giac [A] (verification not implemented)

none

Time = 0.29 (sec) , antiderivative size = 101, normalized size of antiderivative = 1.02

$$\int x \arcsin(ax)^3 \, dx = \frac{3 \sqrt{-a^2x^2+1}x \arcsin{(ax)}^2}{4\,a} + \frac{(a^2x^2-1)\arcsin{(ax)}^3}{2\,a^2} + \frac{\arcsin{(ax)}^3}{4\,a^2} - \frac{3\sqrt{-a^2x^2+1}x}{8\,a} - \frac{3\,(a^2x^2-1)\arcsin{(ax)}}{4\,a^2} - \frac{3\arcsin{(ax)}}{8\,a^2}$$

```
[In] integrate(x*arcsin(a*x)^3,x, algorithm="giac")
```

```
[Out] 3/4*sqrt(-a^2*x^2 + 1)*x*arcsin(a*x)^2/a + 1/2*(a^2*x^2 - 1)*arcsin(a*x)^3/
a^2 + 1/4*arcsin(a*x)^3/a^2 - 3/8*sqrt(-a^2*x^2 + 1)*x/a - 3/4*(a^2*x^2 - 1
)*arcsin(a*x)/a^2 - 3/8*arcsin(a*x)/a^2
```

Mupad [F(-1)]

Timed out.

$$\int x \arcsin(ax)^3 \, dx = \int x \,\mathrm{asin}(a\,x)^3 \, dx$$

```
[In] int(x*asin(a*x)^3,x)
```

```
[Out] int(x*asin(a*x)^3, x)
```

3.26 $\int \arcsin(ax)^3\,dx$

Optimal result

Integrand size = 6, antiderivative size = 60

$$\int \arcsin(ax)^3\,dx = -\frac{6\sqrt{1-a^2x^2}}{a} - 6x\arcsin(ax) + \frac{3\sqrt{1-a^2x^2}\arcsin(ax)^2}{a} + x\arcsin(ax)^3$$

```
[Out] -6*x*arcsin(a*x)+x*arcsin(a*x)^3-6*(-a^2*x^2+1)^(1/2)/a+3*arcsin(a*x)^2*(-a
^2*x^2+1)^(1/2)/a
```

Rubi [A] (verified)

Time = 0.05 (sec) , antiderivative size = 60, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {4715, 4767, 267}

$$\int \arcsin(ax)^3\,dx = \frac{3\sqrt{1-a^2x^2}\arcsin(ax)^2}{a} - \frac{6\sqrt{1-a^2x^2}}{a} + x\arcsin(ax)^3 - 6x\arcsin(ax)$$

```
[In] Int[ArcSin[a*x]^3,x]
```

```
[Out] (-6*Sqrt[1 - a^2*x^2])/a - 6*x*ArcSin[a*x] + (3*Sqrt[1 - a^2*x^2]*ArcSin[a*
x]^2)/a + x*ArcSin[a*x]^3
```

Rule 267

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[(a + b*x^n)
^(p + 1)/(b*n*(p + 1)), x] /; FreeQ[{a, b, m, n, p}, x] && EqQ[m, n - 1] &&
 NeQ[p, -1]
```

Rule 4715

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.), x_Symbol] :> Simp[x*(a + b*Ar
cSin[c*x])^n, x] - Dist[b*c*n, Int[x*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 -
c^2*x^2]), x], x] /; FreeQ[{a, b, c}, x] && GtQ[n, 0]
```

Rule 4767

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)*((d_) + (e_.)*(x_)^2)^(p_
.), x_Symbol] :> Simp[(d + e*x^2)^(p + 1)*((a + b*ArcSin[c*x])^n/(2*e*(p +
1))), x] + Dist[b*(n/(2*c*(p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], In
t[(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x] /; FreeQ[{a,
b, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && NeQ[p, -1]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= x\arcsin(ax)^3-(3a)\int \frac{x\arcsin(ax)^2}{\sqrt{1-a^2x^2}}\,dx\\
&= \frac{3\sqrt{1-a^2x^2}\arcsin(ax)^2}{a}+x\arcsin(ax)^3-6\int \arcsin(ax)\,dx\\
&= -6x\arcsin(ax)+\frac{3\sqrt{1-a^2x^2}\arcsin(ax)^2}{a}+x\arcsin(ax)^3+(6a)\int \frac{x}{\sqrt{1-a^2x^2}}\,dx\\
&= -\frac{6\sqrt{1-a^2x^2}}{a}-6x\arcsin(ax)+\frac{3\sqrt{1-a^2x^2}\arcsin(ax)^2}{a}+x\arcsin(ax)^3
\end{aligned}$$

Mathematica [A] (verified)

Time = 0.01 (sec) , antiderivative size = 60, normalized size of antiderivative = 1.00

$$\int \arcsin(ax)^3\,dx=-\frac{6\sqrt{1-a^2x^2}}{a}-6x\arcsin(ax)+\frac{3\sqrt{1-a^2x^2}\arcsin(ax)^2}{a}+x\arcsin(ax)^3$$

```
[In] Integrate[ArcSin[a*x]^3,x]
[Out] (-6*Sqrt[1 - a^2*x^2])/a - 6*x*ArcSin[a*x] + (3*Sqrt[1 - a^2*x^2]*ArcSin[a*
x]^2)/a + x*ArcSin[a*x]^3
```

Maple [A] (verified)

Time = 0.03 (sec) , antiderivative size = 57, normalized size of antiderivative = 0.95

method	result	size
derivativedivides	$\frac{ax\arcsin(ax)^{3}+3\arcsin(ax)^{2}\sqrt{-a^{2}x^{2}+1}-6\sqrt{-a^{2}x^{2}+1}-6ax\arcsin(ax)}{a}$	57
default	$\frac{ax\arcsin(ax)^{3}+3\arcsin(ax)^{2}\sqrt{-a^{2}x^{2}+1}-6\sqrt{-a^{2}x^{2}+1}-6ax\arcsin(ax)}{a}$	57

```
[In] int(arcsin(a*x)^3,x,method=_RETURNVERBOSE)
```

```
[Out] 1/a*(a*x*arcsin(a*x)^3+3*arcsin(a*x)^2*(-a^2*x^2+1)^(1/2)-6*(-a^2*x^2+1)^(1
/2)-6*a*x*arcsin(a*x))
```

Fricas [A] (verification not implemented)

none

Time = 0.25 (sec) , antiderivative size = 44, normalized size of antiderivative = 0.73

$$\int \arcsin(ax)^3\,dx = \frac{ax\arcsin(ax)^3 - 6\,ax\arcsin(ax) + 3\sqrt{-a^2x^2+1}\left(\arcsin(ax)^2 - 2\right)}{a}$$

```
[In] integrate(arcsin(a*x)^3,x, algorithm="fricas")
```

```
[Out] (a*x*arcsin(a*x)^3 - 6*a*x*arcsin(a*x) + 3*sqrt(-a^2*x^2 + 1)*(arcsin(a*x)^
2 - 2))/a
```

Sympy [A] (verification not implemented)

Time = 0.11 (sec) , antiderivative size = 54, normalized size of antiderivative = 0.90

$$\int \arcsin(ax)^3\,dx = \begin{cases} x\operatorname{asin}^3(ax) - 6x\operatorname{asin}(ax) + \frac{3\sqrt{-a^2x^2+1}\operatorname{asin}^2(ax)}{a} - \frac{6\sqrt{-a^2x^2+1}}{a} & \text{for } a \neq 0 \\ 0 & \text{otherwise} \end{cases}$$

```
[In] integrate(asin(a*x)**3,x)
```

```
[Out] Piecewise((x*asin(a*x)**3 - 6*x*asin(a*x) + 3*sqrt(-a**2*x**2 + 1)*asin(a*x
)**2/a - 6*sqrt(-a**2*x**2 + 1)/a, Ne(a, 0)), (0, True))
```

Maxima [A] (verification not implemented)

none

Time = 0.27 (sec) , antiderivative size = 57, normalized size of antiderivative = 0.95

$$\int \arcsin(ax)^3\,dx = x\arcsin{(ax)}^3 + \frac{3\sqrt{-a^2x^2+1}\arcsin{(ax)}^2}{a} - \frac{6\left(ax\arcsin{(ax)}+\sqrt{-a^2x^2+1}\right)}{a}$$

```
[In] integrate(arcsin(a*x)^3,x, algorithm="maxima")
```

```
[Out] x*arcsin(a*x)^3 + 3*sqrt(-a^2*x^2 + 1)*arcsin(a*x)^2/a - 6*(a*x*arcsin(a*x)
 + sqrt(-a^2*x^2 + 1))/a
```

Giac [A] (verification not implemented)

none

Time = 0.27 (sec) , antiderivative size = 56, normalized size of antiderivative = 0.93

$$\int \arcsin(ax)^3\,dx = x\arcsin{(ax)}^3 - 6\,x\arcsin{(ax)} + \frac{3\sqrt{-a^2x^2+1}\arcsin{(ax)}^2}{a} - \frac{6\sqrt{-a^2x^2+1}}{a}$$

```
[In] integrate(arcsin(a*x)^3,x, algorithm="giac")
```

```
[Out] x*arcsin(a*x)^3 - 6*x*arcsin(a*x) + 3*sqrt(-a^2*x^2 + 1)*arcsin(a*x)^2/a -
6*sqrt(-a^2*x^2 + 1)/a
```

Mupad [B] (verification not implemented)

Time = 0.09 (sec) , antiderivative size = 40, normalized size of antiderivative = 0.67

$$\int \arcsin(ax)^3\,dx = \frac{3\sqrt{1-a^2\,x^2}\,\left(\mathrm{asin}(a\,x)^2-2\right)}{a} + x\,\mathrm{asin}(a\,x)\,\left(\mathrm{asin}(a\,x)^2-6\right)$$

```
[In] int(asin(a*x)^3,x)
```

```
[Out] (3*(1 - a^2*x^2)^(1/2)*(asin(a*x)^2 - 2))/a + x*asin(a*x)*(asin(a*x)^2 - 6)
```

3.27 $\int \frac{\arcsin(ax)^3}{x} dx$

Optimal result

Integrand size = 10, antiderivative size = 97

$$\int \frac{\arcsin(ax)^3}{x} dx = -\frac{1}{4}i\arcsin(ax)^4 + \arcsin(ax)^3\log\left(1-e^{2i\arcsin(ax)}\right) - \frac{3}{2}i\arcsin(ax)^2\operatorname{PolyLog}\left(2,e^{2i\arcsin(ax)}\right) + \frac{3}{2}\arcsin(ax)\operatorname{PolyLog}\left(3,e^{2i\arcsin(ax)}\right) + \frac{3}{4}i\operatorname{PolyLog}\left(4,e^{2i\arcsin(ax)}\right)$$

```
[Out] -1/4*I*arcsin(a*x)^4+arcsin(a*x)^3*ln(1-(I*a*x+(-a^2*x^2+1)^(1/2))^2)-3/2*I
*arcsin(a*x)^2*polylog(2,(I*a*x+(-a^2*x^2+1)^(1/2))^2)+3/2*arcsin(a*x)*poly
log(3,(I*a*x+(-a^2*x^2+1)^(1/2))^2)+3/4*I*polylog(4,(I*a*x+(-a^2*x^2+1)^(1/
2))^2)
```

Rubi [A] (verified)

Time = 0.07 (sec) , antiderivative size = 97, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 7, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.700, Rules used = {4721, 3798, 2221, 2611, 6744, 2320, 6724}

$$\int \frac{\arcsin(ax)^3}{x} dx = -\frac{3}{2}i\arcsin(ax)^2\operatorname{PolyLog}\left(2,e^{2i\arcsin(ax)}\right) + \frac{3}{2}\arcsin(ax)\operatorname{PolyLog}\left(3,e^{2i\arcsin(ax)}\right) + \frac{3}{4}i\operatorname{PolyLog}\left(4,e^{2i\arcsin(ax)}\right) - \frac{1}{4}i\arcsin(ax)^4 + \arcsin(ax)^3\log\left(1-e^{2i\arcsin(ax)}\right)$$

```
[In] Int[ArcSin[a*x]^3/x,x]
```

```
[Out] (-1/4*I)*ArcSin[a*x]^4 + ArcSin[a*x]^3*Log[1 - E^((2*I)*ArcSin[a*x])] - ((3
*I)/2)*ArcSin[a*x]^2*PolyLog[2, E^((2*I)*ArcSin[a*x])] + (3*ArcSin[a*x]*Pol
yLog[3, E^((2*I)*ArcSin[a*x])])/2 + ((3*I)/4)*PolyLog[4, E^((2*I)*ArcSin[a*
x])]
```

Rule 2221

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m/(b*f*g*n*Log[F]))*Log[1 + b*((F^(g*(e + f*x)))^n/a)], x] - Di
st[d*(m/(b*f*g*n*Log[F])), Int[(c + d*x)^(m - 1)*Log[1 + b*((F^(g*(e + f*x)
))^n/a)], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2320

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2611

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> Simp[(-(f + g*x)^m)*(PolyLog[2, (-e)*(F^(c*(a +
b*x)))^n]/(b*c*n*Log[F])), x] + Dist[g*(m/(b*c*n*Log[F])), Int[(f + g*x)^(m
 - 1)*PolyLog[2, (-e)*(F^(c*(a + b*x)))^n], x], x] /; FreeQ[{F, a, b, c, e,
 f, g, n}, x] && GtQ[m, 0]
```

Rule 3798

```
Int[((c_.) + (d_.)*(x_))^(m_.)*tan[(e_.) + Pi*(k_.) + (f_.)*(x_)], x_Symbol
] :> Simp[I*((c + d*x)^(m + 1)/(d*(m + 1))), x] - Dist[2*I, Int[(c + d*x)^m
*E^(2*I*k*Pi)*(E^(2*I*(e + f*x))/(1 + E^(2*I*k*Pi)*E^(2*I*(e + f*x)))), x],
 x] /; FreeQ[{c, d, e, f}, x] && IntegerQ[4*k] && IGtQ[m, 0]
```

Rule 4721

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)/(x_), x_Symbol] :> Subst[Int[(
a + b*x)^n*Cot[x], x], x, ArcSin[c*x]] /; FreeQ[{a, b, c}, x] && IGtQ[n, 0]
```

Rule 6724

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rule 6744

```
Int[((e_.) + (f_.)*(x_))^(m_.)*PolyLog[n_, (d_.)*((F_)^((c_.)*((a_.) + (b_.
)*(x_))))^(p_.)], x_Symbol] :> Simp[(e + f*x)^m*(PolyLog[n + 1, d*(F^(c*(a
+ b*x)))^p]/(b*c*p*Log[F])), x] - Dist[f*(m/(b*c*p*Log[F])), Int[(e + f*x)^
(m - 1)*PolyLog[n + 1, d*(F^(c*(a + b*x)))^p], x], x] /; FreeQ[{F, a, b, c,
 d, e, f, n, p}, x] && GtQ[m, 0]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= \text{Subst}\left(\int x^3\cot(x)\,dx, x, \arcsin(ax)\right)\\
&= -\frac{1}{4}i\arcsin(ax)^4 - 2i\text{Subst}\left(\int \frac{e^{2ix}x^3}{1-e^{2ix}}\,dx, x, \arcsin(ax)\right)\\
&= -\frac{1}{4}i\arcsin(ax)^4 + \arcsin(ax)^3\log\left(1-e^{2i\arcsin(ax)}\right)\\
&\quad - 3\text{Subst}\left(\int x^2\log\left(1-e^{2ix}\right)\,dx, x, \arcsin(ax)\right)\\
&= -\frac{1}{4}i\arcsin(ax)^4 + \arcsin(ax)^3\log\left(1-e^{2i\arcsin(ax)}\right)\\
&\quad - \frac{3}{2}i\arcsin(ax)^2\,\text{PolyLog}\left(2, e^{2i\arcsin(ax)}\right)\\
&\quad + 3i\text{Subst}\left(\int x\,\text{PolyLog}\left(2, e^{2ix}\right)\,dx, x, \arcsin(ax)\right)\\
&= -\frac{1}{4}i\arcsin(ax)^4 + \arcsin(ax)^3\log\left(1-e^{2i\arcsin(ax)}\right) - \frac{3}{2}i\arcsin(ax)^2\,\text{PolyLog}\left(2, e^{2i\arcsin(ax)}\right)\\
&\quad + \frac{3}{2}\arcsin(ax)\,\text{PolyLog}\left(3, e^{2i\arcsin(ax)}\right) - \frac{3}{2}\text{Subst}\left(\int \text{PolyLog}\left(3, e^{2ix}\right)\,dx, x, \arcsin(ax)\right)\\
&= -\frac{1}{4}i\arcsin(ax)^4 + \arcsin(ax)^3\log\left(1-e^{2i\arcsin(ax)}\right) - \frac{3}{2}i\arcsin(ax)^2\,\text{PolyLog}\left(2, e^{2i\arcsin(ax)}\right)\\
&\quad + \frac{3}{2}\arcsin(ax)\,\text{PolyLog}\left(3, e^{2i\arcsin(ax)}\right) + \frac{3}{4}i\text{Subst}\left(\int \frac{\text{PolyLog}(3,x)}{x}\,dx, x, e^{2i\arcsin(ax)}\right)\\
&= -\frac{1}{4}i\arcsin(ax)^4 + \arcsin(ax)^3\log\left(1-e^{2i\arcsin(ax)}\right)\\
&\quad - \frac{3}{2}i\arcsin(ax)^2\,\text{PolyLog}\left(2, e^{2i\arcsin(ax)}\right)\\
&\quad + \frac{3}{2}\arcsin(ax)\,\text{PolyLog}\left(3, e^{2i\arcsin(ax)}\right) + \frac{3}{4}i\,\text{PolyLog}\left(4, e^{2i\arcsin(ax)}\right)
\end{aligned}$$

Mathematica [A] (verified)

Time = 0.06 (sec) , antiderivative size = 97, normalized size of antiderivative = 1.00

$$\int \frac{\arcsin(ax)^3}{x} dx = -\frac{1}{64}i\left(\pi^4 - 16\arcsin(ax)^4 + 64i\arcsin(ax)^3\log\left(1 - e^{-2i\arcsin(ax)}\right) - 96\arcsin(ax)^2\operatorname{PolyLog}\left(2, e^{-2i\arcsin(ax)}\right) + 96i\arcsin(ax)\operatorname{PolyLog}\left(3, e^{-2i\arcsin(ax)}\right) + 48\operatorname{PolyLog}\left(4, e^{-2i\arcsin(ax)}\right)\right)$$

```
[In] Integrate[ArcSin[a*x]^3/x,x]
```

```
[Out] (-1/64*I)*(Pi^4 - 16*ArcSin[a*x]^4 + (64*I)*ArcSin[a*x]^3*Log[1 - E^((-2*I)
*ArcSin[a*x])] - 96*ArcSin[a*x]^2*PolyLog[2, E^((-2*I)*ArcSin[a*x])] + (96*
I)*ArcSin[a*x]*PolyLog[3, E^((-2*I)*ArcSin[a*x])] + 48*PolyLog[4, E^((-2*I)
*ArcSin[a*x])])
```

Maple [A] (verified)

Time = 0.04 (sec) , antiderivative size = 229, normalized size of antiderivative = 2.36

method	result
derivativedivides	$-\frac{i\arcsin(ax)^4}{4} + \arcsin(ax)^3\ln\left(1 - iax - \sqrt{-a^2x^2+1}\right) - 3i\arcsin(ax)^2\operatorname{polylog}\left(2, iax +\right.$
default	$-\frac{i\arcsin(ax)^4}{4} + \arcsin(ax)^3\ln\left(1 - iax - \sqrt{-a^2x^2+1}\right) - 3i\arcsin(ax)^2\operatorname{polylog}\left(2, iax +\right.$

```
[In] int(arcsin(a*x)^3/x,x,method=_RETURNVERBOSE)
```

```
[Out] -1/4*I*arcsin(a*x)^4+arcsin(a*x)^3*ln(1-I*a*x-(-a^2*x^2+1)^(1/2))-3*I*arcsi
n(a*x)^2*polylog(2,I*a*x+(-a^2*x^2+1)^(1/2))+6*arcsin(a*x)*polylog(3,I*a*x+
(-a^2*x^2+1)^(1/2))+6*I*polylog(4,I*a*x+(-a^2*x^2+1)^(1/2))+arcsin(a*x)^3*l
n(1+I*a*x+(-a^2*x^2+1)^(1/2))-3*I*arcsin(a*x)^2*polylog(2,-I*a*x-(-a^2*x^2+
1)^(1/2))+6*arcsin(a*x)*polylog(3,-I*a*x-(-a^2*x^2+1)^(1/2))+6*I*polylog(4,
-I*a*x-(-a^2*x^2+1)^(1/2))
```

Fricas [F]

$$\int \frac{\arcsin(ax)^3}{x}\,dx = \int \frac{\arcsin\left(ax\right)^3}{x}\,dx$$

```
[In] integrate(arcsin(a*x)^3/x,x, algorithm="fricas")
[Out] integral(arcsin(a*x)^3/x, x)
```

Sympy [F]

$$\int \frac{\arcsin(ax)^3}{x}\,dx = \int \frac{\operatorname{asin}^3\left(ax\right)}{x}\,dx$$

```
[In] integrate(asin(a*x)**3/x,x)
[Out] Integral(asin(a*x)**3/x, x)
```

Maxima [F]

$$\int \frac{\arcsin(ax)^3}{x}\,dx = \int \frac{\arcsin\left(ax\right)^3}{x}\,dx$$

```
[In] integrate(arcsin(a*x)^3/x,x, algorithm="maxima")
[Out] integrate(arcsin(a*x)^3/x, x)
```

Giac [F]

$$\int \frac{\arcsin(ax)^3}{x}\,dx = \int \frac{\arcsin\left(ax\right)^3}{x}\,dx$$

```
[In] integrate(arcsin(a*x)^3/x,x, algorithm="giac")
[Out] integrate(arcsin(a*x)^3/x, x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{\arcsin(ax)^3}{x}\,dx = \int \frac{\mathrm{asin}(a\,x)^3}{x}\,dx$$

```
[In] int(asin(a*x)^3/x,x)
```

```
[Out] int(asin(a*x)^3/x, x)
```

3.28 $\int \frac{\arcsin(ax)^3}{x^2}\,dx$

Optimal result

Integrand size = 10, antiderivative size = 108

$$\begin{aligned}\int \frac{\arcsin(ax)^3}{x^2}\,dx =& -\frac{\arcsin(ax)^3}{x} - 6a\arcsin(ax)^2\operatorname{arctanh}\left(e^{i\arcsin(ax)}\right)\\ &+ 6ia\arcsin(ax)\operatorname{PolyLog}\left(2,-e^{i\arcsin(ax)}\right)\\ &- 6ia\arcsin(ax)\operatorname{PolyLog}\left(2,e^{i\arcsin(ax)}\right)\\ &- 6a\operatorname{PolyLog}\left(3,-e^{i\arcsin(ax)}\right) + 6a\operatorname{PolyLog}\left(3,e^{i\arcsin(ax)}\right)\end{aligned}$$

```
[Out] -arcsin(a*x)^3/x-6*a*arcsin(a*x)^2*arctanh(I*a*x+(-a^2*x^2+1)^(1/2))+6*I*a*
arcsin(a*x)*polylog(2,-I*a*x-(-a^2*x^2+1)^(1/2))-6*I*a*arcsin(a*x)*polylog(
2,I*a*x+(-a^2*x^2+1)^(1/2))-6*a*polylog(3,-I*a*x-(-a^2*x^2+1)^(1/2))+6*a*po
lylog(3,I*a*x+(-a^2*x^2+1)^(1/2))
```

Rubi [A] (verified)

Time = 0.10 (sec) , antiderivative size = 108, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 6, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.600, Rules used = {4723, 4803, 4268, 2611, 2320, 6724}

$$\begin{aligned}\int \frac{\arcsin(ax)^3}{x^2}\,dx =& -6a\arcsin(ax)^2\operatorname{arctanh}\left(e^{i\arcsin(ax)}\right)\\ &+ 6ia\arcsin(ax)\operatorname{PolyLog}\left(2,-e^{i\arcsin(ax)}\right)\\ &- 6ia\arcsin(ax)\operatorname{PolyLog}\left(2,e^{i\arcsin(ax)}\right) - 6a\operatorname{PolyLog}\left(3,-e^{i\arcsin(ax)}\right)\\ &+ 6a\operatorname{PolyLog}\left(3,e^{i\arcsin(ax)}\right) - \frac{\arcsin(ax)^3}{x}\end{aligned}$$

```
[In] Int[ArcSin[a*x]^3/x^2,x]
```

```
[Out] -(ArcSin[a*x]^3/x) - 6*a*ArcSin[a*x]^2*ArcTanh[E^(I*ArcSin[a*x])] + (6*I)*a
*ArcSin[a*x]*PolyLog[2, -E^(I*ArcSin[a*x])] - (6*I)*a*ArcSin[a*x]*PolyLog[2
, E^(I*ArcSin[a*x])] - 6*a*PolyLog[3, -E^(I*ArcSin[a*x])] + 6*a*PolyLog[3,
E^(I*ArcSin[a*x])]
```

Rule 2320

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2611

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> Simp[(-(f + g*x)^m)*(PolyLog[2, (-e)*(F^(c*(a +
b*x)))^n]/(b*c*n*Log[F])), x] + Dist[g*(m/(b*c*n*Log[F])), Int[(f + g*x)^(m
 - 1)*PolyLog[2, (-e)*(F^(c*(a + b*x)))^n], x], x] /; FreeQ[{F, a, b, c, e,
 f, g, n}, x] && GtQ[m, 0]
```

Rule 4268

```
Int[csc[(e_.) + (f_.)*(x_)]*((c_.) + (d_.)*(x_))^(m_.), x_Symbol] :> Simp[-
2*(c + d*x)^m*(ArcTanh[E^(I*(e + f*x))]/f), x] + (-Dist[d*(m/f), Int[(c + d
*x)^(m - 1)*Log[1 - E^(I*(e + f*x))], x], x] + Dist[d*(m/f), Int[(c + d*x)^
(m - 1)*Log[1 + E^(I*(e + f*x))], x], x]) /; FreeQ[{c, d, e, f}, x] && IGtQ
[m, 0]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rule 4803

```
Int[(((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_))/Sqrt[(d_) + (e_.)*
(x_)^2], x_Symbol] :> Dist[(1/c^(m + 1))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*
x^2]], Subst[Int[(a + b*x)^n*Sin[x]^m, x], x, ArcSin[c*x]], x] /; FreeQ[{a,
 b, c, d, e}, x] && EqQ[c^2*d + e, 0] && IGtQ[n, 0] && IntegerQ[m]
```

Rule 6724

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
```

```
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= -\frac{\arcsin(ax)^3}{x}+(3a)\int \frac{\arcsin(ax)^2}{x\sqrt{1-a^2x^2}}\,dx\\
&= -\frac{\arcsin(ax)^3}{x}+(3a)\text{Subst}\left(\int x^2\csc(x)\,dx,x,\arcsin(ax)\right)\\
&= -\frac{\arcsin(ax)^3}{x}-6a\arcsin(ax)^2\text{arctanh}\left(e^{i\arcsin(ax)}\right)\\
&\quad -(6a)\text{Subst}\left(\int x\log\left(1-e^{ix}\right)\,dx,x,\arcsin(ax)\right)\\
&\quad +(6a)\text{Subst}\left(\int x\log\left(1+e^{ix}\right)\,dx,x,\arcsin(ax)\right)\\
&= -\frac{\arcsin(ax)^3}{x}-6a\arcsin(ax)^2\text{arctanh}\left(e^{i\arcsin(ax)}\right)\\
&\quad +6ia\arcsin(ax)\text{PolyLog}\left(2,-e^{i\arcsin(ax)}\right)-6ia\arcsin(ax)\text{PolyLog}\left(2,e^{i\arcsin(ax)}\right)\\
&\quad -(6ia)\text{Subst}\left(\int \text{PolyLog}\left(2,-e^{ix}\right)\,dx,x,\arcsin(ax)\right)\\
&\quad +(6ia)\text{Subst}\left(\int \text{PolyLog}\left(2,e^{ix}\right)\,dx,x,\arcsin(ax)\right)\\
&= -\frac{\arcsin(ax)^3}{x}-6a\arcsin(ax)^2\text{arctanh}\left(e^{i\arcsin(ax)}\right)\\
&\quad +6ia\arcsin(ax)\text{PolyLog}\left(2,-e^{i\arcsin(ax)}\right)-6ia\arcsin(ax)\text{PolyLog}\left(2,e^{i\arcsin(ax)}\right)\\
&\quad -(6a)\text{Subst}\left(\int \frac{\text{PolyLog}(2,-x)}{x}\,dx,x,e^{i\arcsin(ax)}\right)\\
&\quad +(6a)\text{Subst}\left(\int \frac{\text{PolyLog}(2,x)}{x}\,dx,x,e^{i\arcsin(ax)}\right)\\
&= -\frac{\arcsin(ax)^3}{x}-6a\arcsin(ax)^2\text{arctanh}\left(e^{i\arcsin(ax)}\right)\\
&\quad +6ia\arcsin(ax)\text{PolyLog}\left(2,-e^{i\arcsin(ax)}\right)-6ia\arcsin(ax)\text{PolyLog}\left(2,e^{i\arcsin(ax)}\right)\\
&\quad -6a\,\text{PolyLog}\left(3,-e^{i\arcsin(ax)}\right)+6a\,\text{PolyLog}\left(3,e^{i\arcsin(ax)}\right)
\end{aligned}$$

Mathematica [A] (verified)

Time = 0.12 (sec) , antiderivative size = 133, normalized size of antiderivative = 1.23

$$\int \frac{\arcsin(ax)^3}{x^2}\,dx = a\left(-\frac{\arcsin(ax)^3}{ax} + 3\arcsin(ax)^2\log\left(1-e^{i\arcsin(ax)}\right) - 3\arcsin(ax)^2\log\left(1+e^{i\arcsin(ax)}\right) + 6i\arcsin(ax)\,\text{PolyLog}\left(2,-e^{i\arcsin(ax)}\right) - 6i\arcsin(ax)\,\text{PolyLog}\left(2,e^{i\arcsin(ax)}\right) - 6\,\text{PolyLog}\left(3,-e^{i\arcsin(ax)}\right) + 6\,\text{PolyLog}\left(3,e^{i\arcsin(ax)}\right)\right)$$

```
[In] Integrate[ArcSin[a*x]^3/x^2,x]
```

```
[Out] a*(-(ArcSin[a*x]^3/(a*x)) + 3*ArcSin[a*x]^2*Log[1 - E^(I*ArcSin[a*x])] - 3*
ArcSin[a*x]^2*Log[1 + E^(I*ArcSin[a*x])] + (6*I)*ArcSin[a*x]*PolyLog[2, -E^
(I*ArcSin[a*x])] - (6*I)*ArcSin[a*x]*PolyLog[2, E^(I*ArcSin[a*x])] - 6*Poly
Log[3, -E^(I*ArcSin[a*x])] + 6*PolyLog[3, E^(I*ArcSin[a*x])])
```

Maple [A] (verified)

Time = 0.05 (sec) , antiderivative size = 178, normalized size of antiderivative = 1.65

method	result
derivativedivides	$a\left(-\frac{\arcsin(ax)^3}{ax} + 3\arcsin(ax)^2\ln\left(1-iax-\sqrt{-a^2x^2+1}\right) - 6i\arcsin(ax)\,\text{polylog}\left(2, iax\right.\right.$
default	$a\left(-\frac{\arcsin(ax)^3}{ax} + 3\arcsin(ax)^2\ln\left(1-iax-\sqrt{-a^2x^2+1}\right) - 6i\arcsin(ax)\,\text{polylog}\left(2, iax\right.\right.$

```
[In] int(arcsin(a*x)^3/x^2,x,method=_RETURNVERBOSE)
```

```
[Out] a*(-arcsin(a*x)^3/a/x+3*arcsin(a*x)^2*ln(1-I*a*x-(-a^2*x^2+1)^(1/2))-6*I*ar
csin(a*x)*polylog(2,I*a*x+(-a^2*x^2+1)^(1/2))+6*polylog(3,I*a*x+(-a^2*x^2+1
)^(1/2))-3*arcsin(a*x)^2*ln(1+I*a*x+(-a^2*x^2+1)^(1/2))+6*I*arcsin(a*x)*pol
ylog(2,-I*a*x-(-a^2*x^2+1)^(1/2))-6*polylog(3,-I*a*x-(-a^2*x^2+1)^(1/2)))
```

Fricas [F]

$$\int \frac{\arcsin(ax)^3}{x^2} \, dx = \int \frac{\arcsin\left(ax\right)^3}{x^2} \, dx$$

```
[In] integrate(arcsin(a*x)^3/x^2,x, algorithm="fricas")
[Out] integral(arcsin(a*x)^3/x^2, x)
```

Sympy [F]

$$\int \frac{\arcsin(ax)^3}{x^2} \, dx = \int \frac{\operatorname{asin}^3\left(ax\right)}{x^2} \, dx$$

```
[In] integrate(asin(a*x)**3/x**2,x)
[Out] Integral(asin(a*x)**3/x**2, x)
```

Maxima [F]

$$\int \frac{\arcsin(ax)^3}{x^2} \, dx = \int \frac{\arcsin\left(ax\right)^3}{x^2} \, dx$$

```
[In] integrate(arcsin(a*x)^3/x^2,x, algorithm="maxima")
[Out] -(arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^3 + 3*a*x*integrate(sqrt(a*x +
 1)*sqrt(-a*x + 1)*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^2/(a^2*x^3 -
x), x))/x
```

Giac [F]

$$\int \frac{\arcsin(ax)^3}{x^2} \, dx = \int \frac{\arcsin\left(ax\right)^3}{x^2} \, dx$$

```
[In] integrate(arcsin(a*x)^3/x^2,x, algorithm="giac")
[Out] integrate(arcsin(a*x)^3/x^2, x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{\arcsin(ax)^3}{x^2} \, dx = \int \frac{\operatorname{asin}(a\,x)^3}{x^2} \, dx$$

```
[In] int(asin(a*x)^3/x^2,x)
[Out] int(asin(a*x)^3/x^2, x)
```

3.29 $\int \frac{\arcsin(ax)^3}{x^3} dx$

Optimal result

Integrand size = 10, antiderivative size = 102

$$\int \frac{\arcsin(ax)^3}{x^3} dx = -\frac{3}{2}ia^2\arcsin(ax)^2 - \frac{3a\sqrt{1-a^2x^2}\arcsin(ax)^2}{2x} - \frac{\arcsin(ax)^3}{2x^2} + 3a^2\arcsin(ax)\log\left(1-e^{2i\arcsin(ax)}\right) - \frac{3}{2}ia^2\operatorname{PolyLog}\left(2,e^{2i\arcsin(ax)}\right)$$

```
[Out] -3/2*I*a^2*arcsin(a*x)^2-1/2*arcsin(a*x)^3/x^2+3*a^2*arcsin(a*x)*ln(1-(I*a*
x+(-a^2*x^2+1)^(1/2))^2)-3/2*I*a^2*polylog(2,(I*a*x+(-a^2*x^2+1)^(1/2))^2)-
3/2*a*arcsin(a*x)^2*(-a^2*x^2+1)^(1/2)/x
```

Rubi [A] (verified)

Time = 0.11 (sec) , antiderivative size = 102, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 7, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.700, Rules used = {4723, 4771, 4721, 3798, 2221, 2317, 2438}

$$\int \frac{\arcsin(ax)^3}{x^3} dx = -\frac{3}{2}ia^2\operatorname{PolyLog}\left(2,e^{2i\arcsin(ax)}\right) - \frac{3a\sqrt{1-a^2x^2}\arcsin(ax)^2}{2x} - \frac{3}{2}ia^2\arcsin(ax)^2 + 3a^2\arcsin(ax)\log\left(1-e^{2i\arcsin(ax)}\right) - \frac{\arcsin(ax)^3}{2x^2}$$

```
[In] Int[ArcSin[a*x]^3/x^3,x]
```

```
[Out] ((-3*I)/2)*a^2*ArcSin[a*x]^2 - (3*a*Sqrt[1 - a^2*x^2]*ArcSin[a*x]^2)/(2*x)
- ArcSin[a*x]^3/(2*x^2) + 3*a^2*ArcSin[a*x]*Log[1 - E^((2*I)*ArcSin[a*x])]
- ((3*I)/2)*a^2*PolyLog[2, E^((2*I)*ArcSin[a*x])]
```

Rule 2221

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m/(b*f*g*n*Log[F]))*Log[1 + b*((F^(g*(e + f*x)))^n/a)], x] - Di
st[d*(m/(b*f*g*n*Log[F])), Int[(c + d*x)^(m - 1)*Log[1 + b*((F^(g*(e + f*x)
))^n/a)], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2317

```
Int[Log[(a_) + (b_.)*((F_)^((e_.)*((c_.) + (d_.)*(x_))))^(n_.)], x_Symbol]
:> Dist[1/(d*e*n*Log[F]), Subst[Int[Log[a + b*x]/x, x], x, (F^(e*(c + d*x))
)^n], x] /; FreeQ[{F, a, b, c, d, e, n}, x] && GtQ[a, 0]
```

Rule 2438

```
Int[Log[(c_.)*((d_) + (e_.)*(x_)^(n_.))]/(x_), x_Symbol] :> Simp[-PolyLog[2
, (-c)*e*x^n]/n, x] /; FreeQ[{c, d, e, n}, x] && EqQ[c*d, 1]
```

Rule 3798

```
Int[((c_.) + (d_.)*(x_))^(m_.)*tan[(e_.) + Pi*(k_.) + (f_.)*(x_)], x_Symbol
] :> Simp[I*((c + d*x)^(m + 1)/(d*(m + 1))), x] - Dist[2*I, Int[(c + d*x)^m
*E^(2*I*k*Pi)*(E^(2*I*(e + f*x))/(1 + E^(2*I*k*Pi)*E^(2*I*(e + f*x)))), x],
 x] /; FreeQ[{c, d, e, f}, x] && IntegerQ[4*k] && IGtQ[m, 0]
```

Rule 4721

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)/(x_), x_Symbol] :> Subst[Int[(
a + b*x)^n*Cot[x], x], x, ArcSin[c*x]] /; FreeQ[{a, b, c}, x] && IGtQ[n, 0]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rule 4771

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_)*((d_) + (e_.
)*(x_)^2)^(p_), x_Symbol] :> Simp[(f*x)^(m + 1)*(d + e*x^2)^(p + 1)*((a + b
*ArcSin[c*x])^n/(d*f*(m + 1))), x] - Dist[b*c*(n/(f*(m + 1)))*Simp[(d + e*x
^2)^p/(1 - c^2*x^2)^p], Int[(f*x)^(m + 1)*(1 - c^2*x^2)^(p + 1/2)*(a + b*Ar
cSin[c*x])^(n - 1), x], x] /; FreeQ[{a, b, c, d, e, f, m, p}, x] && EqQ[c^2
*d + e, 0] && GtQ[n, 0] && EqQ[m + 2*p + 3, 0] && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= -\frac{\arcsin(ax)^3}{2x^2}+\frac{1}{2}(3a)\int\frac{\arcsin(ax)^2}{x^2\sqrt{1-a^2x^2}}\,dx\\
&= -\frac{3a\sqrt{1-a^2x^2}\arcsin(ax)^2}{2x}-\frac{\arcsin(ax)^3}{2x^2}+\left(3a^2\right)\int\frac{\arcsin(ax)}{x}\,dx\\
&= -\frac{3a\sqrt{1-a^2x^2}\arcsin(ax)^2}{2x}-\frac{\arcsin(ax)^3}{2x^2}+\left(3a^2\right)\text{Subst}\left(\int x\cot(x)\,dx,x,\arcsin(ax)\right)\\
&= -\frac{3}{2}ia^2\arcsin(ax)^2-\frac{3a\sqrt{1-a^2x^2}\arcsin(ax)^2}{2x}-\frac{\arcsin(ax)^3}{2x^2}\\
&\quad-\left(6ia^2\right)\text{Subst}\left(\int\frac{e^{2ix}x}{1-e^{2ix}}\,dx,x,\arcsin(ax)\right)\\
&= -\frac{3}{2}ia^2\arcsin(ax)^2-\frac{3a\sqrt{1-a^2x^2}\arcsin(ax)^2}{2x}\\
&\quad-\frac{\arcsin(ax)^3}{2x^2}+3a^2\arcsin(ax)\log\left(1-e^{2i\arcsin(ax)}\right)\\
&\quad-\left(3a^2\right)\text{Subst}\left(\int\log\left(1-e^{2ix}\right)\,dx,x,\arcsin(ax)\right)\\
&= -\frac{3}{2}ia^2\arcsin(ax)^2-\frac{3a\sqrt{1-a^2x^2}\arcsin(ax)^2}{2x}\\
&\quad-\frac{\arcsin(ax)^3}{2x^2}+3a^2\arcsin(ax)\log\left(1-e^{2i\arcsin(ax)}\right)\\
&\quad+\frac{1}{2}\left(3ia^2\right)\text{Subst}\left(\int\frac{\log(1-x)}{x}\,dx,x,e^{2i\arcsin(ax)}\right)\\
&= -\frac{3}{2}ia^2\arcsin(ax)^2-\frac{3a\sqrt{1-a^2x^2}\arcsin(ax)^2}{2x}-\frac{\arcsin(ax)^3}{2x^2}\\
&\quad+3a^2\arcsin(ax)\log\left(1-e^{2i\arcsin(ax)}\right)-\frac{3}{2}ia^2\,\text{PolyLog}\left(2,e^{2i\arcsin(ax)}\right)
\end{aligned}$$

Mathematica [A] (verified)

Time = 0.28 (sec) , antiderivative size = 92, normalized size of antiderivative = 0.90

$$\int\frac{\arcsin(ax)^3}{x^3}\,dx = -\frac{\arcsin(ax)\left(3ax\left(iax+\sqrt{1-a^2x^2}\right)\arcsin(ax)+\arcsin(ax)^2-6a^2x^2\log\left(1-e^{2i\arcsin(ax)}\right)\right)}{2x^2}-\frac{3}{2}ia^2\,\text{PolyLog}\left(2,e^{2i\arcsin(ax)}\right)$$

```
[In] Integrate[ArcSin[a*x]^3/x^3,x]
```

```
[Out] -1/2*(ArcSin[a*x]*(3*a*x*(I*a*x + Sqrt[1 - a^2*x^2])*ArcSin[a*x] + ArcSin[a
*x]^2 - 6*a^2*x^2*Log[1 - E^((2*I)*ArcSin[a*x])]))/x^2 - ((3*I)/2)*a^2*Poly
Log[2, E^((2*I)*ArcSin[a*x])]
```

Maple [A] (verified)

Time = 0.06 (sec) , antiderivative size = 161, normalized size of antiderivative = 1.58

method	result
derivativedivides	$a^2\left(-\frac{\arcsin(ax)^2\left(-3ia^2x^2+3ax\sqrt{-a^2x^2+1}+\arcsin(ax)\right)}{2a^2x^2}+3\arcsin\left(ax\right)\ln\left(1-iax-\sqrt{-a^2x^2+1}\right)\right.$
default	$a^2\left(-\frac{\arcsin(ax)^2\left(-3ia^2x^2+3ax\sqrt{-a^2x^2+1}+\arcsin(ax)\right)}{2a^2x^2}+3\arcsin\left(ax\right)\ln\left(1-iax-\sqrt{-a^2x^2+1}\right)\right.$

```
[In] int(arcsin(a*x)^3/x^3,x,method=_RETURNVERBOSE)
```

```
[Out] a^2*(-1/2*arcsin(a*x)^2*(-3*I*a^2*x^2+3*a*x*(-a^2*x^2+1)^(1/2)+arcsin(a*x))
/a^2/x^2+3*arcsin(a*x)*ln(1-I*a*x-(-a^2*x^2+1)^(1/2))+3*arcsin(a*x)*ln(1+I*
a*x+(-a^2*x^2+1)^(1/2))-3*I*arcsin(a*x)^2-3*I*polylog(2,I*a*x+(-a^2*x^2+1)^
(1/2))-3*I*polylog(2,-I*a*x-(-a^2*x^2+1)^(1/2)))
```

Fricas [F]

$$\int \frac{\arcsin(ax)^3}{x^3}\,dx = \int \frac{\arcsin\left(ax\right)^3}{x^3}\,dx$$

```
[In] integrate(arcsin(a*x)^3/x^3,x, algorithm="fricas")
```

```
[Out] integral(arcsin(a*x)^3/x^3, x)
```

Sympy [F]

$$\int \frac{\arcsin(ax)^3}{x^3}\,dx = \int \frac{\operatorname{asin}^3\left(ax\right)}{x^3}\,dx$$

```
[In] integrate(asin(a*x)**3/x**3,x)
```

```
[Out] Integral(asin(a*x)**3/x**3, x)
```

Maxima [F]

$$\int \frac{\arcsin(ax)^3}{x^3} \, dx = \int \frac{\arcsin\left(ax\right)^3}{x^3} \, dx$$

```
[In] integrate(arcsin(a*x)^3/x^3,x, algorithm="maxima")
```

```
[Out] -1/2*(6*a*x^2*integrate(1/2*sqrt(a*x + 1)*sqrt(-a*x + 1)*arctan2(a*x, sqrt(
a*x + 1)*sqrt(-a*x + 1))^2/(a^2*x^4 - x^2), x) + arctan2(a*x, sqrt(a*x + 1)
*sqrt(-a*x + 1))^3)/x^2
```

Giac [F]

$$\int \frac{\arcsin(ax)^3}{x^3} \, dx = \int \frac{\arcsin\left(ax\right)^3}{x^3} \, dx$$

```
[In] integrate(arcsin(a*x)^3/x^3,x, algorithm="giac")
```

```
[Out] integrate(arcsin(a*x)^3/x^3, x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{\arcsin(ax)^3}{x^3} \, dx = \int \frac{\mathrm{asin}(a\,x)^3}{x^3} \, dx$$

```
[In] int(asin(a*x)^3/x^3,x)
```

```
[Out] int(asin(a*x)^3/x^3, x)
```

3.30 $\int \frac{\arcsin(ax)^3}{x^4} dx$

Optimal result

Integrand size = 10, antiderivative size = 179

$$
\begin{aligned}
\int \frac{\arcsin(ax)^3}{x^4} dx = & -\frac{a^2 \arcsin(ax)}{x} - \frac{a\sqrt{1-a^2x^2} \arcsin(ax)^2}{2x^2} - \frac{\arcsin(ax)^3}{3x^3} \\
& - a^3 \arcsin(ax)^2 \operatorname{arctanh}\left(e^{i \arcsin(ax)}\right) - a^3 \operatorname{arctanh}\left(\sqrt{1-a^2x^2}\right) \\
& + ia^3 \arcsin(ax) \operatorname{PolyLog}\left(2, -e^{i \arcsin(ax)}\right) \\
& - ia^3 \arcsin(ax) \operatorname{PolyLog}\left(2, e^{i \arcsin(ax)}\right) \\
& - a^3 \operatorname{PolyLog}\left(3, -e^{i \arcsin(ax)}\right) + a^3 \operatorname{PolyLog}\left(3, e^{i \arcsin(ax)}\right)
\end{aligned}
$$

```
[Out] -a^2*arcsin(a*x)/x-1/3*arcsin(a*x)^3/x^3-a^3*arcsin(a*x)^2*arctanh(I*a*x+(-
a^2*x^2+1)^(1/2))-a^3*arctanh((-a^2*x^2+1)^(1/2))+I*a^3*arcsin(a*x)*polylog
(2,-I*a*x-(-a^2*x^2+1)^(1/2))-I*a^3*arcsin(a*x)*polylog(2,I*a*x+(-a^2*x^2+1
)^(1/2))-a^3*polylog(3,-I*a*x-(-a^2*x^2+1)^(1/2))+a^3*polylog(3,I*a*x+(-a^2
*x^2+1)^(1/2))-1/2*a*arcsin(a*x)^2*(-a^2*x^2+1)^(1/2)/x^2
```

Rubi [A] (verified)

Time = 0.18 (sec) , antiderivative size = 179, normalized size of antiderivative = 1.00, number of steps used = 14, number of rules used = 10, $\frac{\text{number of rules}}{\text{integrand size}} = 1.000$, Rules

used = {4723, 4789, 4803, 4268, 2611, 2320, 6724, 272, 65, 214}

$$\int \frac{\arcsin(ax)^3}{x^4}\,dx = a^3\left(-\arcsin(ax)^2\right)\operatorname{arctanh}\left(e^{i\arcsin(ax)}\right) + ia^3\arcsin(ax)\operatorname{PolyLog}\left(2,-e^{i\arcsin(ax)}\right) - ia^3\arcsin(ax)\operatorname{PolyLog}\left(2,e^{i\arcsin(ax)}\right) - a^3\operatorname{PolyLog}\left(3,-e^{i\arcsin(ax)}\right) + a^3\operatorname{PolyLog}\left(3,e^{i\arcsin(ax)}\right) - \frac{a\sqrt{1-a^2x^2}\arcsin(ax)^2}{2x^2} - \frac{a^2\arcsin(ax)}{x} - a^3\operatorname{arctanh}\left(\sqrt{1-a^2x^2}\right) - \frac{\arcsin(ax)^3}{3x^3}$$

```
[In] Int[ArcSin[a*x]^3/x^4,x]
```

```
[Out] -((a^2*ArcSin[a*x])/x) - (a*Sqrt[1 - a^2*x^2]*ArcSin[a*x]^2)/(2*x^2) - ArcS
in[a*x]^3/(3*x^3) - a^3*ArcSin[a*x]^2*ArcTanh[E^(I*ArcSin[a*x])] - a^3*ArcT
anh[Sqrt[1 - a^2*x^2]] + I*a^3*ArcSin[a*x]*PolyLog[2, -E^(I*ArcSin[a*x])] -
 I*a^3*ArcSin[a*x]*PolyLog[2, E^(I*ArcSin[a*x])] - a^3*PolyLog[3, -E^(I*Arc
Sin[a*x])] + a^3*PolyLog[3, E^(I*ArcSin[a*x])]
```

Rule 65

```
Int[((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_), x_Symbol] :> With[
{p = Denominator[m]}, Dist[p/b, Subst[Int[x^(p*(m + 1) - 1)*(c - a*(d/b) +
d*(x^p/b))^n, x], x, (a + b*x)^(1/p)], x]] /; FreeQ[{a, b, c, d}, x] && NeQ
[b*c - a*d, 0] && LtQ[-1, m, 0] && LeQ[-1, n, 0] && LeQ[Denominator[n], Den
ominator[m]] && IntLinearQ[a, b, c, d, m, n, x]
```

Rule 214

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(Rt[-a/b, 2]/a)*ArcTanh[x
/Rt[-a/b, 2]], x] /; FreeQ[{a, b}, x] && NegQ[a/b]
```

Rule 272

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[1/n, Subst[
Int[x^(Simplify[(m + 1)/n] - 1)*(a + b*x)^p, x], x, x^n], x] /; FreeQ[{a, b
, m, n, p}, x] && IntegerQ[Simplify[(m + 1)/n]]
```

Rule 2320

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2611

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> Simp[(-(f + g*x)^m)*(PolyLog[2, (-e)*(F^(c*(a +
b*x)))^n]/(b*c*n*Log[F])), x] + Dist[g*(m/(b*c*n*Log[F])), Int[(f + g*x)^(m
 - 1)*PolyLog[2, (-e)*(F^(c*(a + b*x)))^n], x], x] /; FreeQ[{F, a, b, c, e,
 f, g, n}, x] && GtQ[m, 0]
```

Rule 4268

```
Int[csc[(e_.) + (f_.)*(x_)]*((c_.) + (d_.)*(x_))^(m_.), x_Symbol] :> Simp[-
2*(c + d*x)^m*(ArcTanh[E^(I*(e + f*x))]/f), x] + (-Dist[d*(m/f), Int[(c + d
*x)^(m - 1)*Log[1 - E^(I*(e + f*x))], x], x] + Dist[d*(m/f), Int[(c + d*x)^
(m - 1)*Log[1 + E^(I*(e + f*x))], x], x]) /; FreeQ[{c, d, e, f}, x] && IGtQ
[m, 0]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rule 4789

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_)*((d_) + (e_.
)*(x_)^2)^(p_), x_Symbol] :> Simp[(f*x)^(m + 1)*(d + e*x^2)^(p + 1)*((a + b
*ArcSin[c*x])^n/(d*f*(m + 1))), x] + (Dist[c^2*((m + 2*p + 3)/(f^2*(m + 1))
), Int[(f*x)^(m + 2)*(d + e*x^2)^p*(a + b*ArcSin[c*x])^n, x], x] - Dist[b*c
*(n/(f*(m + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], Int[(f*x)^(m + 1)*(1
- c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x]) /; FreeQ[{a, b, c
, d, e, f, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && ILtQ[m, -1]
```

Rule 4803

```
Int[(((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_))/Sqrt[(d_) + (e_.)*
(x_)^2], x_Symbol] :> Dist[(1/c^(m + 1))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*
x^2]], Subst[Int[(a + b*x)^n*Sin[x]^m, x], x, ArcSin[c*x]], x] /; FreeQ[{a,
 b, c, d, e}, x] && EqQ[c^2*d + e, 0] && IGtQ[n, 0] && IntegerQ[m]
```

Rule 6724

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= -\frac{\arcsin(ax)^3}{3x^3} + a\int \frac{\arcsin(ax)^2}{x^3\sqrt{1-a^2x^2}}\,dx \\
&= -\frac{a\sqrt{1-a^2x^2}\arcsin(ax)^2}{2x^2} - \frac{\arcsin(ax)^3}{3x^3} + a^2\int \frac{\arcsin(ax)}{x^2}\,dx + \frac{1}{2}a^3\int \frac{\arcsin(ax)^2}{x\sqrt{1-a^2x^2}}\,dx \\
&= -\frac{a^2\arcsin(ax)}{x} - \frac{a\sqrt{1-a^2x^2}\arcsin(ax)^2}{2x^2} - \frac{\arcsin(ax)^3}{3x^3} \\
&\quad + \frac{1}{2}a^3\text{Subst}\left(\int x^2\csc(x)\,dx, x, \arcsin(ax)\right) + a^3\int \frac{1}{x\sqrt{1-a^2x^2}}\,dx \\
&= -\frac{a^2\arcsin(ax)}{x} - \frac{a\sqrt{1-a^2x^2}\arcsin(ax)^2}{2x^2} - \frac{\arcsin(ax)^3}{3x^3} \\
&\quad - a^3\arcsin(ax)^2\text{arctanh}\left(e^{i\arcsin(ax)}\right) + \frac{1}{2}a^3\text{Subst}\left(\int \frac{1}{x\sqrt{1-a^2x}}\,dx, x, x^2\right) \\
&\quad - a^3\text{Subst}\left(\int x\log\left(1-e^{ix}\right)\,dx, x, \arcsin(ax)\right) \\
&\quad + a^3\text{Subst}\left(\int x\log\left(1+e^{ix}\right)\,dx, x, \arcsin(ax)\right) \\
&= -\frac{a^2\arcsin(ax)}{x} - \frac{a\sqrt{1-a^2x^2}\arcsin(ax)^2}{2x^2} - \frac{\arcsin(ax)^3}{3x^3} \\
&\quad - a^3\arcsin(ax)^2\text{arctanh}\left(e^{i\arcsin(ax)}\right) + ia^3\arcsin(ax)\,\text{PolyLog}\left(2, -e^{i\arcsin(ax)}\right) \\
&\quad - ia^3\arcsin(ax)\,\text{PolyLog}\left(2, e^{i\arcsin(ax)}\right) - a\text{Subst}\left(\int \frac{1}{\frac{1}{a^2}-\frac{x^2}{a^2}}\,dx, x, \sqrt{1-a^2x^2}\right) \\
&\quad - \left(ia^3\right)\text{Subst}\left(\int \text{PolyLog}\left(2, -e^{ix}\right)\,dx, x, \arcsin(ax)\right) \\
&\quad + \left(ia^3\right)\text{Subst}\left(\int \text{PolyLog}\left(2, e^{ix}\right)\,dx, x, \arcsin(ax)\right) \\
&= -\frac{a^2\arcsin(ax)}{x} - \frac{a\sqrt{1-a^2x^2}\arcsin(ax)^2}{2x^2} - \frac{\arcsin(ax)^3}{3x^3} \\
&\quad - a^3\arcsin(ax)^2\text{arctanh}\left(e^{i\arcsin(ax)}\right) - a^3\text{arctanh}\left(\sqrt{1-a^2x^2}\right) \\
&\quad + ia^3\arcsin(ax)\,\text{PolyLog}\left(2, -e^{i\arcsin(ax)}\right) - ia^3\arcsin(ax)\,\text{PolyLog}\left(2, e^{i\arcsin(ax)}\right) \\
&\quad - a^3\text{Subst}\left(\int \frac{\text{PolyLog}(2,-x)}{x}\,dx, x, e^{i\arcsin(ax)}\right) \\
&\quad + a^3\text{Subst}\left(\int \frac{\text{PolyLog}(2,x)}{x}\,dx, x, e^{i\arcsin(ax)}\right)
\end{aligned}$$

$$
\begin{aligned}
&= -\frac{a^2 \arcsin(ax)}{x} - \frac{a\sqrt{1-a^2x^2}\arcsin(ax)^2}{2x^2} - \frac{\arcsin(ax)^3}{3x^3} \\
&\quad - a^3 \arcsin(ax)^2 \operatorname{arctanh}\left(e^{i\arcsin(ax)}\right) - a^3 \operatorname{arctanh}\left(\sqrt{1-a^2x^2}\right) \\
&\quad + ia^3 \arcsin(ax)\,\text{PolyLog}\left(2, -e^{i\arcsin(ax)}\right) - ia^3 \arcsin(ax)\,\text{PolyLog}\left(2, e^{i\arcsin(ax)}\right) \\
&\quad - a^3\,\text{PolyLog}\left(3, -e^{i\arcsin(ax)}\right) + a^3\,\text{PolyLog}\left(3, e^{i\arcsin(ax)}\right)
\end{aligned}
$$

Mathematica [A] (verified)

Time = 2.30 (sec) , antiderivative size = 284, normalized size of antiderivative = 1.59

$$
\begin{aligned}
\int \frac{\arcsin(ax)^3}{x^4}\,dx &= \frac{1}{48}a^3\left(-24\arcsin(ax)\cot\left(\frac{1}{2}\arcsin(ax)\right)\right. \\
&\quad - 4\arcsin(ax)^3\cot\left(\frac{1}{2}\arcsin(ax)\right) - 6\arcsin(ax)^2\csc^2\left(\frac{1}{2}\arcsin(ax)\right) \\
&\quad - ax\arcsin(ax)^3\csc^4\left(\frac{1}{2}\arcsin(ax)\right) \\
&\quad + 24\arcsin(ax)^2\log\left(1-e^{i\arcsin(ax)}\right) \\
&\quad - 24\arcsin(ax)^2\log\left(1+e^{i\arcsin(ax)}\right) + 48\log\left(\tan\left(\frac{1}{2}\arcsin(ax)\right)\right) \\
&\quad + 48i\arcsin(ax)\,\text{PolyLog}\left(2,-e^{i\arcsin(ax)}\right) \\
&\quad - 48i\arcsin(ax)\,\text{PolyLog}\left(2,e^{i\arcsin(ax)}\right) - 48\,\text{PolyLog}\left(3,-e^{i\arcsin(ax)}\right) \\
&\quad + 48\,\text{PolyLog}\left(3,e^{i\arcsin(ax)}\right) + 6\arcsin(ax)^2\sec^2\left(\frac{1}{2}\arcsin(ax)\right) \\
&\quad - \frac{16\arcsin(ax)^3\sin^4\left(\frac{1}{2}\arcsin(ax)\right)}{a^3x^3} - 24\arcsin(ax)\tan\left(\frac{1}{2}\arcsin(ax)\right) \\
&\quad \left. - 4\arcsin(ax)^3\tan\left(\frac{1}{2}\arcsin(ax)\right)\right)
\end{aligned}
$$

```
[In] Integrate[ArcSin[a*x]^3/x^4,x]
```

```
[Out] (a^3*(-24*ArcSin[a*x]*Cot[ArcSin[a*x]/2] - 4*ArcSin[a*x]^3*Cot[ArcSin[a*x]/
2] - 6*ArcSin[a*x]^2*Csc[ArcSin[a*x]/2]^2 - a*x*ArcSin[a*x]^3*Csc[ArcSin[a*
x]/2]^4 + 24*ArcSin[a*x]^2*Log[1 - E^(I*ArcSin[a*x])] - 24*ArcSin[a*x]^2*Lo
g[1 + E^(I*ArcSin[a*x])] + 48*Log[Tan[ArcSin[a*x]/2]] + (48*I)*ArcSin[a*x]*
PolyLog[2, -E^(I*ArcSin[a*x])] - (48*I)*ArcSin[a*x]*PolyLog[2, E^(I*ArcSin[
a*x])] - 48*PolyLog[3, -E^(I*ArcSin[a*x])] + 48*PolyLog[3, E^(I*ArcSin[a*x]
)] + 6*ArcSin[a*x]^2*Sec[ArcSin[a*x]/2]^2 - (16*ArcSin[a*x]^3*Sin[ArcSin[a*
x]/2]^4)/(a^3*x^3) - 24*ArcSin[a*x]*Tan[ArcSin[a*x]/2] - 4*ArcSin[a*x]^3*Ta
n[ArcSin[a*x]/2]))/48
```

Maple [A] (verified)

Time = 0.11 (sec) , antiderivative size = 234, normalized size of antiderivative = 1.31

method	result
derivativedivides	$a^{3}\left(-\frac{\arcsin(ax)\left(3\arcsin(ax)\sqrt{-a^{2}x^{2}+1}\,ax+2\arcsin(ax)^{2}+6a^{2}x^{2}\right)}{6a^{3}x^{3}}+\frac{\arcsin(ax)^{2}\ln\left(1-iax-\sqrt{-a^{2}x^{2}+1}\right)}{2}-i\,a$
default	$a^{3}\left(-\frac{\arcsin(ax)\left(3\arcsin(ax)\sqrt{-a^{2}x^{2}+1}\,ax+2\arcsin(ax)^{2}+6a^{2}x^{2}\right)}{6a^{3}x^{3}}+\frac{\arcsin(ax)^{2}\ln\left(1-iax-\sqrt{-a^{2}x^{2}+1}\right)}{2}-i\,a$

```
[In] int(arcsin(a*x)^3/x^4,x,method=_RETURNVERBOSE)
[Out] a^3*(-1/6/a^3/x^3*arcsin(a*x)*(3*arcsin(a*x)*(-a^2*x^2+1)^(1/2)*a*x+2*arcsi
n(a*x)^2+6*a^2*x^2)+1/2*arcsin(a*x)^2*ln(1-I*a*x-(-a^2*x^2+1)^(1/2))-I*arcs
in(a*x)*polylog(2,I*a*x+(-a^2*x^2+1)^(1/2))+polylog(3,I*a*x+(-a^2*x^2+1)^(1
/2))-1/2*arcsin(a*x)^2*ln(1+I*a*x+(-a^2*x^2+1)^(1/2))+I*arcsin(a*x)*polylog
(2,-I*a*x-(-a^2*x^2+1)^(1/2))-polylog(3,-I*a*x-(-a^2*x^2+1)^(1/2))-2*arctan
h(I*a*x+(-a^2*x^2+1)^(1/2)))
```

Fricas [F]

$$\int \frac{\arcsin(ax)^3}{x^4}\,dx = \int \frac{\arcsin\left(ax\right)^{3}}{x^{4}}\,dx$$

```
[In] integrate(arcsin(a*x)^3/x^4,x, algorithm="fricas")
[Out] integral(arcsin(a*x)^3/x^4, x)
```

Sympy [F]

$$\int \frac{\arcsin(ax)^3}{x^4}\,dx = \int \frac{\operatorname{asin}^{3}\left(ax\right)}{x^{4}}\,dx$$

```
[In] integrate(asin(a*x)**3/x**4,x)
[Out] Integral(asin(a*x)**3/x**4, x)
```

Maxima [F]

$$\int \frac{\arcsin(ax)^3}{x^4}\,dx = \int \frac{\arcsin\left(ax\right)^3}{x^4}\,dx$$

[In] integrate(arcsin(a*x)^3/x^4,x, algorithm="maxima")

[Out] -1/3*(3*a*x^3*integrate(sqrt(a*x + 1)*sqrt(-a*x + 1)*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^2/(a^2*x^5 - x^3), x) + arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^3)/x^3

Giac [F]

$$\int \frac{\arcsin(ax)^3}{x^4}\,dx = \int \frac{\arcsin\left(ax\right)^3}{x^4}\,dx$$

[In] integrate(arcsin(a*x)^3/x^4,x, algorithm="giac")

[Out] integrate(arcsin(a*x)^3/x^4, x)

Mupad [F(-1)]

Timed out.

$$\int \frac{\arcsin(ax)^3}{x^4}\,dx = \int \frac{\mathrm{asin}(a\,x)^3}{x^4}\,dx$$

[In] int(asin(a*x)^3/x^4,x)

[Out] int(asin(a*x)^3/x^4, x)

3.31 $\int \frac{\arcsin(ax)^3}{x^5}\,dx$

Optimal result

Integrand size = 10, antiderivative size = 169

$$\int \frac{\arcsin(ax)^3}{x^5}\,dx = -\frac{a^3\sqrt{1-a^2x^2}}{4x} - \frac{a^2\arcsin(ax)}{4x^2} - \frac{1}{2}ia^4\arcsin(ax)^2 - \frac{a\sqrt{1-a^2x^2}\arcsin(ax)^2}{4x^3} - \frac{a^3\sqrt{1-a^2x^2}\arcsin(ax)^2}{2x} - \frac{\arcsin(ax)^3}{4x^4} + a^4\arcsin(ax)\log\left(1-e^{2i\arcsin(ax)}\right) - \frac{1}{2}ia^4\operatorname{PolyLog}\left(2,e^{2i\arcsin(ax)}\right)$$

```
[Out] -1/4*a^2*arcsin(a*x)/x^2-1/2*I*a^4*arcsin(a*x)^2-1/4*arcsin(a*x)^3/x^4+a^4*
arcsin(a*x)*ln(1-(I*a*x+(-a^2*x^2+1)^(1/2))^2)-1/2*I*a^4*polylog(2,(I*a*x+(
-a^2*x^2+1)^(1/2))^2)-1/4*a^3*(-a^2*x^2+1)^(1/2)/x-1/4*a*arcsin(a*x)^2*(-a^
2*x^2+1)^(1/2)/x^3-1/2*a^3*arcsin(a*x)^2*(-a^2*x^2+1)^(1/2)/x
```

Rubi [A] (verified)

Time = 0.18 (sec) , antiderivative size = 169, normalized size of antiderivative = 1.00, number of steps used = 10, number of rules used = 9, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.900, Rules used = {4723, 4789, 4771, 4721, 3798, 2221, 2317, 2438, 270}

$$\int \frac{\arcsin(ax)^3}{x^5}\,dx = -\frac{1}{2}ia^4\operatorname{PolyLog}\left(2,e^{2i\arcsin(ax)}\right) - \frac{1}{2}ia^4\arcsin(ax)^2 + a^4\arcsin(ax)\log\left(1-e^{2i\arcsin(ax)}\right) - \frac{a^2\arcsin(ax)}{4x^2} - \frac{a\sqrt{1-a^2x^2}\arcsin(ax)^2}{4x^3} - \frac{a^3\sqrt{1-a^2x^2}\arcsin(ax)^2}{2x} - \frac{a^3\sqrt{1-a^2x^2}}{4x} - \frac{\arcsin(ax)^3}{4x^4}$$

```
[In] Int[ArcSin[a*x]^3/x^5,x]
```

```
[Out] -1/4*(a^3*Sqrt[1 - a^2*x^2])/x - (a^2*ArcSin[a*x])/(4*x^2) - (I/2)*a^4*ArcS
in[a*x]^2 - (a*Sqrt[1 - a^2*x^2]*ArcSin[a*x]^2)/(4*x^3) - (a^3*Sqrt[1 - a^2
*x^2]*ArcSin[a*x]^2)/(2*x) - ArcSin[a*x]^3/(4*x^4) + a^4*ArcSin[a*x]*Log[1
- E^((2*I)*ArcSin[a*x])] - (I/2)*a^4*PolyLog[2, E^((2*I)*ArcSin[a*x])]
```

Rule 270

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[(c*
x)^(m + 1)*((a + b*x^n)^(p + 1)/(a*c*(m + 1))), x] /; FreeQ[{a, b, c, m, n,
 p}, x] && EqQ[(m + 1)/n + p + 1, 0] && NeQ[m, -1]
```

Rule 2221

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m/(b*f*g*n*Log[F]))*Log[1 + b*((F^(g*(e + f*x)))^n/a)], x] - Di
st[d*(m/(b*f*g*n*Log[F])), Int[(c + d*x)^(m - 1)*Log[1 + b*((F^(g*(e + f*x)
))^n/a)], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2317

```
Int[Log[(a_) + (b_.)*((F_)^((e_.)*((c_.) + (d_.)*(x_))))^(n_.)], x_Symbol]
:> Dist[1/(d*e*n*Log[F]), Subst[Int[Log[a + b*x]/x, x], x, (F^(e*(c + d*x))
)^n], x] /; FreeQ[{F, a, b, c, d, e, n}, x] && GtQ[a, 0]
```

Rule 2438

```
Int[Log[(c_.)*((d_) + (e_.)*(x_)^(n_.))]/(x_), x_Symbol] :> Simp[-PolyLog[2
, (-c)*e*x^n]/n, x] /; FreeQ[{c, d, e, n}, x] && EqQ[c*d, 1]
```

Rule 3798

```
Int[((c_.) + (d_.)*(x_))^(m_.)*tan[(e_.) + Pi*(k_.) + (f_.)*(x_)], x_Symbol
] :> Simp[I*((c + d*x)^(m + 1)/(d*(m + 1))), x] - Dist[2*I, Int[(c + d*x)^m
*E^(2*I*k*Pi)*(E^(2*I*(e + f*x))/(1 + E^(2*I*k*Pi)*E^(2*I*(e + f*x)))), x],
 x] /; FreeQ[{c, d, e, f}, x] && IntegerQ[4*k] && IGtQ[m, 0]
```

Rule 4721

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)/(x_), x_Symbol] :> Subst[Int[(
a + b*x)^n*Cot[x], x], x, ArcSin[c*x]] /; FreeQ[{a, b, c}, x] && IGtQ[n, 0]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
```

```
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rule 4771

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_)*((d_) + (e_.
)*(x_)^2)^(p_), x_Symbol] :> Simp[(f*x)^(m + 1)*(d + e*x^2)^(p + 1)*((a + b
*ArcSin[c*x])^n/(d*f*(m + 1))), x] - Dist[b*c*(n/(f*(m + 1)))*Simp[(d + e*x
^2)^p/(1 - c^2*x^2)^p], Int[(f*x)^(m + 1)*(1 - c^2*x^2)^(p + 1/2)*(a + b*Ar
cSin[c*x])^(n - 1), x], x] /; FreeQ[{a, b, c, d, e, f, m, p}, x] && EqQ[c^2
*d + e, 0] && GtQ[n, 0] && EqQ[m + 2*p + 3, 0] && NeQ[m, -1]
```

Rule 4789

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_)*((d_) + (e_.
)*(x_)^2)^(p_), x_Symbol] :> Simp[(f*x)^(m + 1)*(d + e*x^2)^(p + 1)*((a + b
*ArcSin[c*x])^n/(d*f*(m + 1))), x] + (Dist[c^2*((m + 2*p + 3)/(f^2*(m + 1))
), Int[(f*x)^(m + 2)*(d + e*x^2)^p*(a + b*ArcSin[c*x])^n, x], x] - Dist[b*c
*(n/(f*(m + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], Int[(f*x)^(m + 1)*(1
- c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x]) /; FreeQ[{a, b, c
, d, e, f, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && ILtQ[m, -1]
```

Rubi steps

$$
\begin{aligned}
\text{integral} &= -\frac{\arcsin(ax)^3}{4x^4}+\frac{1}{4}(3a)\int\frac{\arcsin(ax)^2}{x^4\sqrt{1-a^2x^2}}\,dx\\
&= -\frac{a\sqrt{1-a^2x^2}\arcsin(ax)^2}{4x^3}-\frac{\arcsin(ax)^3}{4x^4}+\frac{1}{2}a^2\int\frac{\arcsin(ax)}{x^3}\,dx+\frac{1}{2}a^3\int\frac{\arcsin(ax)^2}{x^2\sqrt{1-a^2x^2}}\,dx\\
&= -\frac{a^2\arcsin(ax)}{4x^2}-\frac{a\sqrt{1-a^2x^2}\arcsin(ax)^2}{4x^3}-\frac{a^3\sqrt{1-a^2x^2}\arcsin(ax)^2}{2x}\\
&\quad-\frac{\arcsin(ax)^3}{4x^4}+\frac{1}{4}a^3\int\frac{1}{x^2\sqrt{1-a^2x^2}}\,dx+a^4\int\frac{\arcsin(ax)}{x}\,dx\\
&= -\frac{a^3\sqrt{1-a^2x^2}}{4x}-\frac{a^2\arcsin(ax)}{4x^2}-\frac{a\sqrt{1-a^2x^2}\arcsin(ax)^2}{4x^3}\\
&\quad-\frac{a^3\sqrt{1-a^2x^2}\arcsin(ax)^2}{2x}-\frac{\arcsin(ax)^3}{4x^4}+a^4\text{Subst}\left(\int x\cot(x)\,dx,x,\arcsin(ax)\right)\\
&= -\frac{a^3\sqrt{1-a^2x^2}}{4x}-\frac{a^2\arcsin(ax)}{4x^2}-\frac{1}{2}ia^4\arcsin(ax)^2-\frac{a\sqrt{1-a^2x^2}\arcsin(ax)^2}{4x^3}\\
&\quad-\frac{a^3\sqrt{1-a^2x^2}\arcsin(ax)^2}{2x}-\frac{\arcsin(ax)^3}{4x^4}-\left(2ia^4\right)\text{Subst}\left(\int\frac{e^{2ix}x}{1-e^{2ix}}\,dx,x,\arcsin(ax)\right)
\end{aligned}
$$

$$
\begin{aligned}
&= -\frac{a^3\sqrt{1-a^2x^2}}{4x} - \frac{a^2\arcsin(ax)}{4x^2} - \frac{1}{2}ia^4\arcsin(ax)^2 - \frac{a\sqrt{1-a^2x^2}\arcsin(ax)^2}{4x^3} \\
&\quad - \frac{a^3\sqrt{1-a^2x^2}\arcsin(ax)^2}{2x} - \frac{\arcsin(ax)^3}{4x^4} + a^4\arcsin(ax)\log\left(1-e^{2i\arcsin(ax)}\right) \\
&\quad - a^4\text{Subst}\left(\int \log\left(1-e^{2ix}\right)\,dx, x, \arcsin(ax)\right) \\
&= -\frac{a^3\sqrt{1-a^2x^2}}{4x} - \frac{a^2\arcsin(ax)}{4x^2} - \frac{1}{2}ia^4\arcsin(ax)^2 - \frac{a\sqrt{1-a^2x^2}\arcsin(ax)^2}{4x^3} \\
&\quad - \frac{a^3\sqrt{1-a^2x^2}\arcsin(ax)^2}{2x} - \frac{\arcsin(ax)^3}{4x^4} + a^4\arcsin(ax)\log\left(1-e^{2i\arcsin(ax)}\right) \\
&\quad + \frac{1}{2}(ia^4)\,\text{Subst}\left(\int \frac{\log(1-x)}{x}\,dx, x, e^{2i\arcsin(ax)}\right) \\
&= -\frac{a^3\sqrt{1-a^2x^2}}{4x} - \frac{a^2\arcsin(ax)}{4x^2} - \frac{1}{2}ia^4\arcsin(ax)^2 \\
&\quad - \frac{a\sqrt{1-a^2x^2}\arcsin(ax)^2}{4x^3} - \frac{a^3\sqrt{1-a^2x^2}\arcsin(ax)^2}{2x} - \frac{\arcsin(ax)^3}{4x^4} \\
&\quad + a^4\arcsin(ax)\log\left(1-e^{2i\arcsin(ax)}\right) - \frac{1}{2}ia^4\,\text{PolyLog}\left(2, e^{2i\arcsin(ax)}\right)
\end{aligned}
$$

Mathematica [A] (verified)

Time = 0.68 (sec) , antiderivative size = 116, normalized size of antiderivative = 0.69

$$
\begin{aligned}
\int \frac{\arcsin(ax)^3}{x^5}\,dx &= \frac{1}{4}\Bigg(-\frac{\arcsin(ax)^3}{x^4} + a^4\Bigg(-\frac{\sqrt{1-a^2x^2}\left(1+\left(2+\frac{1}{a^2x^2}\right)\arcsin(ax)^2\right)}{ax} \\
&\quad - \arcsin(ax)\left(\frac{1}{a^2x^2} + 2i\arcsin(ax) - 4\log\left(1-e^{2i\arcsin(ax)}\right)\right) \\
&\quad - 2i\,\text{PolyLog}\left(2, e^{2i\arcsin(ax)}\right)\Bigg)\Bigg)
\end{aligned}
$$

```
[In] Integrate[ArcSin[a*x]^3/x^5,x]
```

```
[Out] (-(ArcSin[a*x]^3/x^4) + a^4*(-((Sqrt[1 - a^2*x^2]*(1 + (2 + 1/(a^2*x^2))*Ar
cSin[a*x]^2))/(a*x)) - ArcSin[a*x]*(1/(a^2*x^2) + (2*I)*ArcSin[a*x] - 4*Log
[1 - E^((2*I)*ArcSin[a*x])]) - (2*I)*PolyLog[2, E^((2*I)*ArcSin[a*x])]))/4
```

Maple [A] (verified)

Time = 0.10 (sec) , antiderivative size = 231, normalized size of antiderivative = 1.37

method	result
derivativedivides	$a^4\left(-\frac{-2i\arcsin(ax)^2a^4x^4+2\arcsin(ax)^2\sqrt{-a^2x^2+1}\,a^3x^3-ia^4x^4+\arcsin(ax)^2\sqrt{-a^2x^2+1}\,ax+a^3x^3\sqrt{-a^2x^2+1}+\mathrm{arc}}{4a^4x^4}\right.$
default	$a^4\left(-\frac{-2i\arcsin(ax)^2a^4x^4+2\arcsin(ax)^2\sqrt{-a^2x^2+1}\,a^3x^3-ia^4x^4+\arcsin(ax)^2\sqrt{-a^2x^2+1}\,ax+a^3x^3\sqrt{-a^2x^2+1}+\mathrm{arc}}{4a^4x^4}\right.$

```
[In] int(arcsin(a*x)^3/x^5,x,method=_RETURNVERBOSE)
```

```
[Out] a^4*(-1/4*(-2*I*arcsin(a*x)^2*a^4*x^4+2*arcsin(a*x)^2*(-a^2*x^2+1)^(1/2)*a^
3*x^3-I*a^4*x^4+arcsin(a*x)^2*(-a^2*x^2+1)^(1/2)*a*x+a^3*x^3*(-a^2*x^2+1)^(
1/2)+arcsin(a*x)^3+a^2*x^2*arcsin(a*x))/a^4/x^4+arcsin(a*x)*ln(1-I*a*x-(-a^
2*x^2+1)^(1/2))+arcsin(a*x)*ln(1+I*a*x+(-a^2*x^2+1)^(1/2))-I*arcsin(a*x)^2-
I*polylog(2,I*a*x+(-a^2*x^2+1)^(1/2))-I*polylog(2,-I*a*x-(-a^2*x^2+1)^(1/2)
))
```

Fricas [F]

$$\int \frac{\arcsin(ax)^3}{x^5}\,dx = \int \frac{\arcsin\left(ax\right)^3}{x^5}\,dx$$

```
[In] integrate(arcsin(a*x)^3/x^5,x, algorithm="fricas")
```

```
[Out] integral(arcsin(a*x)^3/x^5, x)
```

Sympy [F]

$$\int \frac{\arcsin(ax)^3}{x^5}\,dx = \int \frac{\operatorname{asin}^3\left(ax\right)}{x^5}\,dx$$

```
[In] integrate(asin(a*x)**3/x**5,x)
```

```
[Out] Integral(asin(a*x)**3/x**5, x)
```

Maxima [F]

$$\int \frac{\arcsin(ax)^3}{x^5}\,dx = \int \frac{\arcsin\left(ax\right)^3}{x^5}\,dx$$

```
[In] integrate(arcsin(a*x)^3/x^5,x, algorithm="maxima")
```

```
[Out] -1/4*(12*a*x^4*integrate(1/4*sqrt(a*x + 1)*sqrt(-a*x + 1)*arctan2(a*x, sqrt
(a*x + 1)*sqrt(-a*x + 1))^2/(a^2*x^6 - x^4), x) + arctan2(a*x, sqrt(a*x + 1
)*sqrt(-a*x + 1))^3)/x^4
```

Giac [F(-2)]

Exception generated.

$$\int \frac{\arcsin(ax)^3}{x^5}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate(arcsin(a*x)^3/x^5,x, algorithm="giac")
```

```
[Out] Exception raised: TypeError >> an error occurred running a Giac command:INP
UT:sage2:=int(sage0,sageVARx):;OUTPUT:sym2poly/r2sym(const gen & e,const in
dex_m & i,const vecteur & l) Error: Bad Argument Value
```

Mupad [F(-1)]

Timed out.

$$\int \frac{\arcsin(ax)^3}{x^5}\,dx = \int \frac{\mathrm{asin}(a\,x)^3}{x^5}\,dx$$

```
[In] int(asin(a*x)^3/x^5,x)
```

```
[Out] int(asin(a*x)^3/x^5, x)
```

3.32 $\int x^5 \arcsin(ax)^4 \, dx$

Optimal result

Integrand size = 10, antiderivative size = 282

$$\begin{aligned}\int x^5 \arcsin(ax)^4 \, dx = {} & \frac{245x^2}{1152a^4} + \frac{65x^4}{3456a^2} + \frac{x^6}{324} - \frac{245x\sqrt{1-a^2x^2}\arcsin(ax)}{576a^5} \\ & - \frac{65x^3\sqrt{1-a^2x^2}\arcsin(ax)}{864a^3} - \frac{x^5\sqrt{1-a^2x^2}\arcsin(ax)}{54a} \\ & + \frac{245\arcsin(ax)^2}{1152a^6} - \frac{5x^2\arcsin(ax)^2}{16a^4} - \frac{5x^4\arcsin(ax)^2}{48a^2} \\ & - \frac{1}{18}x^6\arcsin(ax)^2 + \frac{5x\sqrt{1-a^2x^2}\arcsin(ax)^3}{24a^5} \\ & + \frac{5x^3\sqrt{1-a^2x^2}\arcsin(ax)^3}{36a^3} + \frac{x^5\sqrt{1-a^2x^2}\arcsin(ax)^3}{9a} \\ & - \frac{5\arcsin(ax)^4}{96a^6} + \frac{1}{6}x^6\arcsin(ax)^4\end{aligned}$$

```
[Out] 245/1152*x^2/a^4+65/3456*x^4/a^2+1/324*x^6+245/1152*arcsin(a*x)^2/a^6-5/16*
x^2*arcsin(a*x)^2/a^4-5/48*x^4*arcsin(a*x)^2/a^2-1/18*x^6*arcsin(a*x)^2-5/9
6*arcsin(a*x)^4/a^6+1/6*x^6*arcsin(a*x)^4-245/576*x*arcsin(a*x)*(-a^2*x^2+1
)^(1/2)/a^5-65/864*x^3*arcsin(a*x)*(-a^2*x^2+1)^(1/2)/a^3-1/54*x^5*arcsin(a
*x)*(-a^2*x^2+1)^(1/2)/a+5/24*x*arcsin(a*x)^3*(-a^2*x^2+1)^(1/2)/a^5+5/36*x
^3*arcsin(a*x)^3*(-a^2*x^2+1)^(1/2)/a^3+1/9*x^5*arcsin(a*x)^3*(-a^2*x^2+1)^
(1/2)/a
```

Rubi [A] (verified)

Time = 0.56 (sec) , antiderivative size = 282, normalized size of antiderivative = 1.00, number of steps used = 23, number of rules used = 4, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.400, Rules used = {4723, 4795, 4737, 30}

$$\int x^5 \arcsin(ax)^4 \, dx = -\frac{5\arcsin(ax)^4}{96a^6} + \frac{245\arcsin(ax)^2}{1152a^6} - \frac{5x^2\arcsin(ax)^2}{16a^4} + \frac{245x^2}{1152a^4} - \frac{5x^4\arcsin(ax)^2}{48a^2} + \frac{x^5\sqrt{1-a^2x^2}\arcsin(ax)^3}{9a} - \frac{x^5\sqrt{1-a^2x^2}\arcsin(ax)}{54a} + \frac{65x^4}{3456a^2} + \frac{5x\sqrt{1-a^2x^2}\arcsin(ax)^3}{24a^5} - \frac{245x\sqrt{1-a^2x^2}\arcsin(ax)}{576a^5} + \frac{5x^3\sqrt{1-a^2x^2}\arcsin(ax)^3}{36a^3} - \frac{65x^3\sqrt{1-a^2x^2}\arcsin(ax)}{864a^3} + \frac{1}{6}x^6\arcsin(ax)^4 - \frac{1}{18}x^6\arcsin(ax)^2 + \frac{x^6}{324}$$

```
[In] Int[x^5*ArcSin[a*x]^4,x]
```

```
[Out] (245*x^2)/(1152*a^4) + (65*x^4)/(3456*a^2) + x^6/324 - (245*x*Sqrt[1 - a^2*
x^2]*ArcSin[a*x])/(576*a^5) - (65*x^3*Sqrt[1 - a^2*x^2]*ArcSin[a*x])/(864*a
^3) - (x^5*Sqrt[1 - a^2*x^2]*ArcSin[a*x])/(54*a) + (245*ArcSin[a*x]^2)/(115
2*a^6) - (5*x^2*ArcSin[a*x]^2)/(16*a^4) - (5*x^4*ArcSin[a*x]^2)/(48*a^2) -
(x^6*ArcSin[a*x]^2)/18 + (5*x*Sqrt[1 - a^2*x^2]*ArcSin[a*x]^3)/(24*a^5) + (
5*x^3*Sqrt[1 - a^2*x^2]*ArcSin[a*x]^3)/(36*a^3) + (x^5*Sqrt[1 - a^2*x^2]*Ar
cSin[a*x]^3)/(9*a) - (5*ArcSin[a*x]^4)/(96*a^6) + (x^6*ArcSin[a*x]^4)/6
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rule 4737

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)/Sqrt[(d_) + (e_.)*(x_)^2], x_S
ymbol] :> Simp[(1/(b*c*(n + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]]*(a
 + b*ArcSin[c*x])^(n + 1), x] /; FreeQ[{a, b, c, d, e, n}, x] && EqQ[c^2*d
```

```
+ e, 0] && NeQ[n, -1]
```

Rule 4795

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_)*((d_) + (e_.
)*(x_)^2)^(p_), x_Symbol] :> Simp[f*(f*x)^(m - 1)*(d + e*x^2)^(p + 1)*((a +
 b*ArcSin[c*x])^n/(e*(m + 2*p + 1))), x] + (Dist[f^2*((m - 1)/(c^2*(m + 2*p
 + 1))), Int[(f*x)^(m - 2)*(d + e*x^2)^p*(a + b*ArcSin[c*x])^n, x], x] + Di
st[b*f*(n/(c*(m + 2*p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], Int[(f*x)
^(m - 1)*(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x]) /; Fr
eeQ[{a, b, c, d, e, f, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && IGtQ[m,
1] && NeQ[m + 2*p + 1, 0]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= \frac{1}{6}x^6\arcsin(ax)^4-\frac{1}{3}(2a)\int\frac{x^6\arcsin(ax)^3}{\sqrt{1-a^2x^2}}\,dx\\
&= \frac{x^5\sqrt{1-a^2x^2}\arcsin(ax)^3}{9a}+\frac{1}{6}x^6\arcsin(ax)^4-\frac{1}{3}\int x^5\arcsin(ax)^2\,dx-\frac{5\int\frac{x^4\arcsin(ax)^3}{\sqrt{1-a^2x^2}}\,dx}{9a}\\
&= -\frac{1}{18}x^6\arcsin(ax)^2+\frac{5x^3\sqrt{1-a^2x^2}\arcsin(ax)^3}{36a^3}+\frac{x^5\sqrt{1-a^2x^2}\arcsin(ax)^3}{9a}\\
&\quad+\frac{1}{6}x^6\arcsin(ax)^4-\frac{5\int\frac{x^2\arcsin(ax)^3}{\sqrt{1-a^2x^2}}\,dx}{12a^3}-\frac{5\int x^3\arcsin(ax)^2\,dx}{12a^2}\\
&\quad+\frac{1}{9}a\int\frac{x^6\arcsin(ax)}{\sqrt{1-a^2x^2}}\,dx\\
&= -\frac{x^5\sqrt{1-a^2x^2}\arcsin(ax)}{54a}-\frac{5x^4\arcsin(ax)^2}{48a^2}-\frac{1}{18}x^6\arcsin(ax)^2+\frac{5x\sqrt{1-a^2x^2}\arcsin(ax)^3}{24a^5}\\
&\quad+\frac{5x^3\sqrt{1-a^2x^2}\arcsin(ax)^3}{36a^3}+\frac{x^5\sqrt{1-a^2x^2}\arcsin(ax)^3}{9a}+\frac{1}{6}x^6\arcsin(ax)^4+\frac{\int x^5\,dx}{54}\\
&\quad-\frac{5\int\frac{\arcsin(ax)^3}{\sqrt{1-a^2x^2}}\,dx}{24a^5}-\frac{5\int x\arcsin(ax)^2\,dx}{8a^4}+\frac{5\int\frac{x^4\arcsin(ax)}{\sqrt{1-a^2x^2}}\,dx}{54a}+\frac{5\int\frac{x^4\arcsin(ax)}{\sqrt{1-a^2x^2}}\,dx}{24a}\\
&= \frac{x^6}{324}-\frac{65x^3\sqrt{1-a^2x^2}\arcsin(ax)}{864a^3}-\frac{x^5\sqrt{1-a^2x^2}\arcsin(ax)}{54a}\\
&\quad-\frac{5x^2\arcsin(ax)^2}{16a^4}-\frac{5x^4\arcsin(ax)^2}{48a^2}-\frac{1}{18}x^6\arcsin(ax)^2\\
&\quad+\frac{5x\sqrt{1-a^2x^2}\arcsin(ax)^3}{24a^5}+\frac{5x^3\sqrt{1-a^2x^2}\arcsin(ax)^3}{36a^3}\\
&\quad+\frac{x^5\sqrt{1-a^2x^2}\arcsin(ax)^3}{9a}-\frac{5\arcsin(ax)^4}{96a^6}+\frac{1}{6}x^6\arcsin(ax)^4+\frac{5\int\frac{x^2\arcsin(ax)}{\sqrt{1-a^2x^2}}\,dx}{72a^3}\\
&\quad+\frac{5\int\frac{x^2\arcsin(ax)}{\sqrt{1-a^2x^2}}\,dx}{32a^3}+\frac{5\int\frac{x^2\arcsin(ax)}{\sqrt{1-a^2x^2}}\,dx}{8a^3}+\frac{5\int x^3\,dx}{216a^2}+\frac{5\int x^3\,dx}{96a^2}
\end{aligned}$$

$$= \frac{65x^4}{3456a^2} + \frac{x^6}{324} - \frac{245x\sqrt{1-a^2x^2}\arcsin(ax)}{576a^5} - \frac{65x^3\sqrt{1-a^2x^2}\arcsin(ax)}{864a^3} - \frac{x^5\sqrt{1-a^2x^2}\arcsin(ax)}{54a} - \frac{5x^2\arcsin(ax)^2}{16a^4} - \frac{5x^4\arcsin(ax)^2}{48a^2} - \frac{1}{18}x^6\arcsin(ax)^2 + \frac{5x\sqrt{1-a^2x^2}\arcsin(ax)^3}{24a^5} + \frac{5x^3\sqrt{1-a^2x^2}\arcsin(ax)^3}{36a^3} + \frac{x^5\sqrt{1-a^2x^2}\arcsin(ax)^3}{9a} - \frac{5\arcsin(ax)^4}{96a^6} + \frac{1}{6}x^6\arcsin(ax)^4 + \frac{5\int\frac{\arcsin(ax)}{\sqrt{1-a^2x^2}}dx}{144a^5} + \frac{5\int\frac{\arcsin(ax)}{\sqrt{1-a^2x^2}}dx}{64a^5} + \frac{5\int\frac{\arcsin(ax)}{\sqrt{1-a^2x^2}}dx}{16a^5} + \frac{5\int x\,dx}{144a^4} + \frac{5\int x\,dx}{64a^4} + \frac{5\int x\,dx}{16a^4}$$

$$= \frac{245x^2}{1152a^4} + \frac{65x^4}{3456a^2} + \frac{x^6}{324} - \frac{245x\sqrt{1-a^2x^2}\arcsin(ax)}{576a^5} - \frac{65x^3\sqrt{1-a^2x^2}\arcsin(ax)}{864a^3} - \frac{x^5\sqrt{1-a^2x^2}\arcsin(ax)}{54a} + \frac{245\arcsin(ax)^2}{1152a^6} - \frac{5x^2\arcsin(ax)^2}{16a^4} - \frac{5x^4\arcsin(ax)^2}{48a^2} - \frac{1}{18}x^6\arcsin(ax)^2 + \frac{5x\sqrt{1-a^2x^2}\arcsin(ax)^3}{24a^5} + \frac{5x^3\sqrt{1-a^2x^2}\arcsin(ax)^3}{36a^3} + \frac{x^5\sqrt{1-a^2x^2}\arcsin(ax)^3}{9a} - \frac{5\arcsin(ax)^4}{96a^6} + \frac{1}{6}x^6\arcsin(ax)^4$$

Mathematica [A] (verified)

Time = 0.10 (sec) , antiderivative size = 167, normalized size of antiderivative = 0.59

$$\int x^5\arcsin(ax)^4\,dx$$
$$= \frac{a^2x^2(2205+195a^2x^2+32a^4x^4) - 6ax\sqrt{1-a^2x^2}(735+130a^2x^2+32a^4x^4)\arcsin(ax) - 9(-245+360a^2x}{}$$

```
[In] Integrate[x^5*ArcSin[a*x]^4,x]
```

```
[Out] (a^2*x^2*(2205 + 195*a^2*x^2 + 32*a^4*x^4) - 6*a*x*Sqrt[1 - a^2*x^2]*(735 +
 130*a^2*x^2 + 32*a^4*x^4)*ArcSin[a*x] - 9*(-245 + 360*a^2*x^2 + 120*a^4*x^
4 + 64*a^6*x^6)*ArcSin[a*x]^2 + 144*a*x*Sqrt[1 - a^2*x^2]*(15 + 10*a^2*x^2
+ 8*a^4*x^4)*ArcSin[a*x]^3 + 108*(-5 + 16*a^6*x^6)*ArcSin[a*x]^4)/(10368*a^
6)
```

Maple [A] (verified)

Time = 0.11 (sec) , antiderivative size = 345, normalized size of antiderivative = 1.22

method	result
derivativedivides	$\frac{a^6 x^6 \arcsin(ax)^4}{6} - \frac{\arcsin(ax)^3 \left(-8\sqrt{-a^2x^2+1}\, a^5x^5 - 10a^3x^3\sqrt{-a^2x^2+1} - 15ax\sqrt{-a^2x^2+1} + 15\arcsin(ax)\right)}{72} - \frac{\arcsin(ax)^2 a^6 x^6}{18} + \frac{\mathrm{ar}}{}$
default	$\frac{a^6 x^6 \arcsin(ax)^4}{6} - \frac{\arcsin(ax)^3 \left(-8\sqrt{-a^2x^2+1}\, a^5x^5 - 10a^3x^3\sqrt{-a^2x^2+1} - 15ax\sqrt{-a^2x^2+1} + 15\arcsin(ax)\right)}{72} - \frac{\arcsin(ax)^2 a^6 x^6}{18} + \frac{\mathrm{ar}}{}$

```
[In] int(x^5*arcsin(a*x)^4,x,method=_RETURNVERBOSE)
```

```
[Out] 1/a^6*(1/6*a^6*x^6*arcsin(a*x)^4-1/72*arcsin(a*x)^3*(-8*(-a^2*x^2+1)^(1/2)*
a^5*x^5-10*a^3*x^3*(-a^2*x^2+1)^(1/2)-15*a*x*(-a^2*x^2+1)^(1/2)+15*arcsin(a
*x))-1/18*arcsin(a*x)^2*a^6*x^6+1/432*arcsin(a*x)*(-8*(-a^2*x^2+1)^(1/2)*a^
5*x^5-10*a^3*x^3*(-a^2*x^2+1)^(1/2)-15*a*x*(-a^2*x^2+1)^(1/2)+15*arcsin(a*x
))+115/1152*arcsin(a*x)^2+1/324*(a^2*x^2-1)^3+13/864*(a^2*x^2-1)^2+7/36*a^2
*x^2-11/288-5/48*a^4*x^4*arcsin(a*x)^2+5/192*arcsin(a*x)*(-2*a^3*x^3*(-a^2*
x^2+1)^(1/2)-3*a*x*(-a^2*x^2+1)^(1/2)+3*arcsin(a*x))+5/1536*(2*a^2*x^2+3)^2
-5/16*arcsin(a*x)^2*(a^2*x^2-1)-5/16*arcsin(a*x)*(a*x*(-a^2*x^2+1)^(1/2)+ar
csin(a*x))+5/32*arcsin(a*x)^4)
```

Fricas [A] (verification not implemented)

none

Time = 0.26 (sec) , antiderivative size = 153, normalized size of antiderivative = 0.54

$$\int x^5 \arcsin(ax)^4 \, dx$$

$$= \frac{32\, a^6x^6 + 195\, a^4x^4 + 108\,(16\, a^6x^6 - 5)\arcsin{(ax)}^4 + 2205\, a^2x^2 - 9\,(64\, a^6x^6 + 120\, a^4x^4 + 360\, a^2x^2 - 245}{}$$

```
[In] integrate(x^5*arcsin(a*x)^4,x, algorithm="fricas")
```

```
[Out] 1/10368*(32*a^6*x^6 + 195*a^4*x^4 + 108*(16*a^6*x^6 - 5)*arcsin(a*x)^4 + 22
05*a^2*x^2 - 9*(64*a^6*x^6 + 120*a^4*x^4 + 360*a^2*x^2 - 245)*arcsin(a*x)^2
 + 6*sqrt(-a^2*x^2 + 1)*(24*(8*a^5*x^5 + 10*a^3*x^3 + 15*a*x)*arcsin(a*x)^3
 - (32*a^5*x^5 + 130*a^3*x^3 + 735*a*x)*arcsin(a*x)))/a^6
```

Sympy [A] (verification not implemented)

Time = 1.04 (sec) , antiderivative size = 269, normalized size of antiderivative = 0.95

$$\int x^5 \arcsin(ax)^4 \, dx$$
$$= \begin{cases} \frac{x^6 \operatorname{asin}^4(ax)}{6} - \frac{x^6 \operatorname{asin}^2(ax)}{18} + \frac{x^6}{324} + \frac{x^5\sqrt{-a^2x^2+1} \operatorname{asin}^3(ax)}{9a} - \frac{x^5\sqrt{-a^2x^2+1} \operatorname{asin}(ax)}{54a} - \frac{5x^4 \operatorname{asin}^2(ax)}{48a^2} + \frac{65x^4}{3456a^2} + \frac{5x^3\sqrt{-a^2x^2}}{36} \\ 0 \end{cases}$$

```
[In] integrate(x**5*asin(a*x)**4,x)
```

```
[Out] Piecewise((x**6*asin(a*x)**4/6 - x**6*asin(a*x)**2/18 + x**6/324 + x**5*sqr
t(-a**2*x**2 + 1)*asin(a*x)**3/(9*a) - x**5*sqrt(-a**2*x**2 + 1)*asin(a*x)/
(54*a) - 5*x**4*asin(a*x)**2/(48*a**2) + 65*x**4/(3456*a**2) + 5*x**3*sqrt(
-a**2*x**2 + 1)*asin(a*x)**3/(36*a**3) - 65*x**3*sqrt(-a**2*x**2 + 1)*asin(
a*x)/(864*a**3) - 5*x**2*asin(a*x)**2/(16*a**4) + 245*x**2/(1152*a**4) + 5*
x*sqrt(-a**2*x**2 + 1)*asin(a*x)**3/(24*a**5) - 245*x*sqrt(-a**2*x**2 + 1)*
asin(a*x)/(576*a**5) - 5*asin(a*x)**4/(96*a**6) + 245*asin(a*x)**2/(1152*a*
*6), Ne(a, 0)), (0, True))
```

Maxima [F]

$$\int x^5 \arcsin(ax)^4 \, dx = \int x^5 \arcsin(ax)^4 \, dx$$

```
[In] integrate(x^5*arcsin(a*x)^4,x, algorithm="maxima")
```

```
[Out] 1/6*x^6*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^4 + 2*a*integrate(1/3*sq
rt(a*x + 1)*sqrt(-a*x + 1)*x^6*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^3
/(a^2*x^2 - 1), x)
```

Giac [A] (verification not implemented)

none

Time = 0.27 (sec) , antiderivative size = 362, normalized size of antiderivative = 1.28

$$\int x^5 \arcsin(ax)^4 \, dx = \frac{(a^2x^2-1)^2\sqrt{-a^2x^2+1}x \arcsin(ax)^3}{9a^5} + \frac{(a^2x^2-1)^3 \arcsin(ax)^4}{6a^6} - \frac{13(-a^2x^2+1)^{\frac{3}{2}}x \arcsin(ax)^3}{36a^5} + \frac{(a^2x^2-1)^2 \arcsin(ax)^4}{2a^6} - \frac{(a^2x^2-1)^2\sqrt{-a^2x^2+1}x \arcsin(ax)}{54a^5} + \frac{11\sqrt{-a^2x^2+1}x \arcsin(ax)^3}{24a^5} - \frac{(a^2x^2-1)^3 \arcsin(ax)^2}{18a^6} + \frac{(a^2x^2-1) \arcsin(ax)^4}{2a^6} + \frac{97(-a^2x^2+1)^{\frac{3}{2}}x \arcsin(ax)}{864a^5} - \frac{13(a^2x^2-1)^2 \arcsin(ax)^2}{48a^6} + \frac{11 \arcsin(ax)^4}{96a^6} - \frac{299\sqrt{-a^2x^2+1}x \arcsin(ax)}{576a^5} + \frac{(a^2x^2-1)^3}{324a^6} - \frac{11(a^2x^2-1) \arcsin(ax)^2}{16a^6} + \frac{97(a^2x^2-1)^2}{3456a^6} - \frac{299 \arcsin(ax)^2}{1152a^6} + \frac{299(a^2x^2-1)}{1152a^6} + \frac{9971}{82944a^6}$$

```
[In] integrate(x^5*arcsin(a*x)^4,x, algorithm="giac")
```

```
[Out] 1/9*(a^2*x^2 - 1)^2*sqrt(-a^2*x^2 + 1)*x*arcsin(a*x)^3/a^5 + 1/6*(a^2*x^2 -
 1)^3*arcsin(a*x)^4/a^6 - 13/36*(-a^2*x^2 + 1)^(3/2)*x*arcsin(a*x)^3/a^5 +
1/2*(a^2*x^2 - 1)^2*arcsin(a*x)^4/a^6 - 1/54*(a^2*x^2 - 1)^2*sqrt(-a^2*x^2
+ 1)*x*arcsin(a*x)/a^5 + 11/24*sqrt(-a^2*x^2 + 1)*x*arcsin(a*x)^3/a^5 - 1/1
8*(a^2*x^2 - 1)^3*arcsin(a*x)^2/a^6 + 1/2*(a^2*x^2 - 1)*arcsin(a*x)^4/a^6 +
 97/864*(-a^2*x^2 + 1)^(3/2)*x*arcsin(a*x)/a^5 - 13/48*(a^2*x^2 - 1)^2*arcs
in(a*x)^2/a^6 + 11/96*arcsin(a*x)^4/a^6 - 299/576*sqrt(-a^2*x^2 + 1)*x*arcs
in(a*x)/a^5 + 1/324*(a^2*x^2 - 1)^3/a^6 - 11/16*(a^2*x^2 - 1)*arcsin(a*x)^2
/a^6 + 97/3456*(a^2*x^2 - 1)^2/a^6 - 299/1152*arcsin(a*x)^2/a^6 + 299/1152*
(a^2*x^2 - 1)/a^6 + 9971/82944/a^6
```

Mupad [F(-1)]

Timed out.

$$\int x^5 \arcsin(ax)^4 \, dx = \int x^5 \operatorname{asin}(a\,x)^4 \, dx$$

```
[In] int(x^5*asin(a*x)^4,x)
```

```
[Out] int(x^5*asin(a*x)^4, x)
```

3.33 $\int x^4 \arcsin(ax)^4 \, dx$

Optimal result

Integrand size = 10, antiderivative size = 250

$$
\begin{aligned}
\int x^4 \arcsin(ax)^4 \, dx = {} & \frac{16576x}{5625a^4} + \frac{1088x^3}{16875a^2} + \frac{24x^5}{3125} - \frac{16576\sqrt{1-a^2x^2}\arcsin(ax)}{5625a^5} \\
& - \frac{1088x^2\sqrt{1-a^2x^2}\arcsin(ax)}{5625a^3} - \frac{24x^4\sqrt{1-a^2x^2}\arcsin(ax)}{625a} \\
& - \frac{32x\arcsin(ax)^2}{25a^4} - \frac{16x^3\arcsin(ax)^2}{75a^2} - \frac{12}{125}x^5\arcsin(ax)^2 \\
& + \frac{32\sqrt{1-a^2x^2}\arcsin(ax)^3}{75a^5} + \frac{16x^2\sqrt{1-a^2x^2}\arcsin(ax)^3}{75a^3} \\
& + \frac{4x^4\sqrt{1-a^2x^2}\arcsin(ax)^3}{25a} + \frac{1}{5}x^5\arcsin(ax)^4
\end{aligned}
$$

```
[Out] 16576/5625*x/a^4+1088/16875*x^3/a^2+24/3125*x^5-32/25*x*arcsin(a*x)^2/a^4-1
6/75*x^3*arcsin(a*x)^2/a^2-12/125*x^5*arcsin(a*x)^2+1/5*x^5*arcsin(a*x)^4-1
6576/5625*arcsin(a*x)*(-a^2*x^2+1)^(1/2)/a^5-1088/5625*x^2*arcsin(a*x)*(-a^
2*x^2+1)^(1/2)/a^3-24/625*x^4*arcsin(a*x)*(-a^2*x^2+1)^(1/2)/a+32/75*arcsin
(a*x)^3*(-a^2*x^2+1)^(1/2)/a^5+16/75*x^2*arcsin(a*x)^3*(-a^2*x^2+1)^(1/2)/a
^3+4/25*x^4*arcsin(a*x)^3*(-a^2*x^2+1)^(1/2)/a
```

Rubi [A] (verified)

Time = 0.42 (sec) , antiderivative size = 250, normalized size of antiderivative = 1.00, number of steps used = 19, number of rules used = 6, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.600, Rules used = {4723, 4795, 4767, 4715, 8, 30}

$$\begin{aligned}\int x^4 \arcsin(ax)^4\,dx = &-\frac{32x\arcsin(ax)^2}{25a^4}+\frac{16576x}{5625a^4}-\frac{16x^3\arcsin(ax)^2}{75a^2}\\&+\frac{4x^4\sqrt{1-a^2x^2}\arcsin(ax)^3}{25a}-\frac{24x^4\sqrt{1-a^2x^2}\arcsin(ax)}{625a}\\&+\frac{1088x^3}{16875a^2}+\frac{32\sqrt{1-a^2x^2}\arcsin(ax)^3}{75a^5}-\frac{16576\sqrt{1-a^2x^2}\arcsin(ax)}{5625a^5}\\&+\frac{16x^2\sqrt{1-a^2x^2}\arcsin(ax)^3}{75a^3}-\frac{1088x^2\sqrt{1-a^2x^2}\arcsin(ax)}{5625a^3}\\&+\frac{1}{5}x^5\arcsin(ax)^4-\frac{12}{125}x^5\arcsin(ax)^2+\frac{24x^5}{3125}\end{aligned}$$

```
[In] Int[x^4*ArcSin[a*x]^4,x]
```

```
[Out] (16576*x)/(5625*a^4) + (1088*x^3)/(16875*a^2) + (24*x^5)/3125 - (16576*Sqrt
[1 - a^2*x^2]*ArcSin[a*x])/(5625*a^5) - (1088*x^2*Sqrt[1 - a^2*x^2]*ArcSin[
a*x])/(5625*a^3) - (24*x^4*Sqrt[1 - a^2*x^2]*ArcSin[a*x])/(625*a) - (32*x*A
rcSin[a*x]^2)/(25*a^4) - (16*x^3*ArcSin[a*x]^2)/(75*a^2) - (12*x^5*ArcSin[a
*x]^2)/125 + (32*Sqrt[1 - a^2*x^2]*ArcSin[a*x]^3)/(75*a^5) + (16*x^2*Sqrt[1
 - a^2*x^2]*ArcSin[a*x]^3)/(75*a^3) + (4*x^4*Sqrt[1 - a^2*x^2]*ArcSin[a*x]^
3)/(25*a) + (x^5*ArcSin[a*x]^4)/5
```

Rule 8

```
Int[a_, x_Symbol] :> Simp[a*x, x] /; FreeQ[a, x]
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 4715

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.), x_Symbol] :> Simp[x*(a + b*Ar
cSin[c*x])^n, x] - Dist[b*c*n, Int[x*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 -
c^2*x^2]), x], x] /; FreeQ[{a, b, c}, x] && GtQ[n, 0]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
```

```
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rule 4767

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)*((d_) + (e_.)*(x_)^2)^(p_
.), x_Symbol] :> Simp[(d + e*x^2)^(p + 1)*((a + b*ArcSin[c*x])^n/(2*e*(p +
1))), x] + Dist[b*(n/(2*c*(p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], In
t[(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x] /; FreeQ[{a,
b, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && NeQ[p, -1]
```

Rule 4795

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_)*((d_) + (e_.
)*(x_)^2)^(p_), x_Symbol] :> Simp[f*(f*x)^(m - 1)*(d + e*x^2)^(p + 1)*((a +
 b*ArcSin[c*x])^n/(e*(m + 2*p + 1))), x] + (Dist[f^2*((m - 1)/(c^2*(m + 2*p
 + 1))), Int[(f*x)^(m - 2)*(d + e*x^2)^p*(a + b*ArcSin[c*x])^n, x], x] + Di
st[b*f*(n/(c*(m + 2*p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], Int[(f*x)
^(m - 1)*(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x]) /; Fr
eeQ[{a, b, c, d, e, f, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && IGtQ[m,
1] && NeQ[m + 2*p + 1, 0]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= \frac{1}{5}x^5\arcsin(ax)^4 - \frac{1}{5}(4a)\int \frac{x^5\arcsin(ax)^3}{\sqrt{1-a^2x^2}}\,dx \\
&= \frac{4x^4\sqrt{1-a^2x^2}\arcsin(ax)^3}{25a} + \frac{1}{5}x^5\arcsin(ax)^4 - \frac{12}{25}\int x^4\arcsin(ax)^2\,dx - \frac{16\int \frac{x^3\arcsin(ax)^3}{\sqrt{1-a^2x^2}}\,dx}{25a} \\
&= -\frac{12}{125}x^5\arcsin(ax)^2 + \frac{16x^2\sqrt{1-a^2x^2}\arcsin(ax)^3}{75a^3} \\
&\quad + \frac{4x^4\sqrt{1-a^2x^2}\arcsin(ax)^3}{25a} + \frac{1}{5}x^5\arcsin(ax)^4 - \frac{32\int \frac{x\arcsin(ax)^3}{\sqrt{1-a^2x^2}}\,dx}{75a^3} \\
&\quad - \frac{16\int x^2\arcsin(ax)^2\,dx}{25a^2} + \frac{1}{125}(24a)\int \frac{x^5\arcsin(ax)}{\sqrt{1-a^2x^2}}\,dx \\
&= -\frac{24x^4\sqrt{1-a^2x^2}\arcsin(ax)}{625a} - \frac{16x^3\arcsin(ax)^2}{75a^2} - \frac{12}{125}x^5\arcsin(ax)^2 \\
&\quad + \frac{32\sqrt{1-a^2x^2}\arcsin(ax)^3}{75a^5} + \frac{16x^2\sqrt{1-a^2x^2}\arcsin(ax)^3}{75a^3} \\
&\quad + \frac{4x^4\sqrt{1-a^2x^2}\arcsin(ax)^3}{25a} + \frac{1}{5}x^5\arcsin(ax)^4 + \frac{24\int x^4\,dx}{625} \\
&\quad - \frac{32\int \arcsin(ax)^2\,dx}{25a^4} + \frac{96\int \frac{x^3\arcsin(ax)}{\sqrt{1-a^2x^2}}\,dx}{625a} + \frac{32\int \frac{x^3\arcsin(ax)}{\sqrt{1-a^2x^2}}\,dx}{75a}
\end{aligned}$$

$$= \frac{24x^5}{3125} - \frac{1088x^2\sqrt{1-a^2x^2}\arcsin(ax)}{5625a^3} - \frac{24x^4\sqrt{1-a^2x^2}\arcsin(ax)}{625a} - \frac{32x\arcsin(ax)^2}{25a^4} - \frac{16x^3\arcsin(ax)^2}{75a^2} - \frac{12}{125}x^5\arcsin(ax)^2 + \frac{32\sqrt{1-a^2x^2}\arcsin(ax)^3}{75a^5} + \frac{16x^2\sqrt{1-a^2x^2}\arcsin(ax)^3}{75a^3} + \frac{4x^4\sqrt{1-a^2x^2}\arcsin(ax)^3}{25a} + \frac{1}{5}x^5\arcsin(ax)^4 + \frac{64\int \frac{x\arcsin(ax)}{\sqrt{1-a^2x^2}}\,dx}{625a^3} + \frac{64\int \frac{x\arcsin(ax)}{\sqrt{1-a^2x^2}}\,dx}{225a^3} + \frac{64\int \frac{x\arcsin(ax)}{\sqrt{1-a^2x^2}}\,dx}{25a^3} + \frac{32\int x^2\,dx}{625a^2} + \frac{32\int x^2\,dx}{225a^2}$$

$$= \frac{1088x^3}{16875a^2} + \frac{24x^5}{3125} - \frac{16576\sqrt{1-a^2x^2}\arcsin(ax)}{5625a^5} - \frac{1088x^2\sqrt{1-a^2x^2}\arcsin(ax)}{5625a^3} - \frac{24x^4\sqrt{1-a^2x^2}\arcsin(ax)}{625a} - \frac{32x\arcsin(ax)^2}{25a^4} - \frac{16x^3\arcsin(ax)^2}{75a^2} - \frac{12}{125}x^5\arcsin(ax)^2 + \frac{32\sqrt{1-a^2x^2}\arcsin(ax)^3}{75a^5} + \frac{16x^2\sqrt{1-a^2x^2}\arcsin(ax)^3}{75a^3} + \frac{4x^4\sqrt{1-a^2x^2}\arcsin(ax)^3}{25a} + \frac{1}{5}x^5\arcsin(ax)^4 + \frac{64\int 1\,dx}{625a^4} + \frac{64\int 1\,dx}{225a^4} + \frac{64\int 1\,dx}{25a^4}$$

$$= \frac{16576x}{5625a^4} + \frac{1088x^3}{16875a^2} + \frac{24x^5}{3125} - \frac{16576\sqrt{1-a^2x^2}\arcsin(ax)}{5625a^5} - \frac{1088x^2\sqrt{1-a^2x^2}\arcsin(ax)}{5625a^3} - \frac{24x^4\sqrt{1-a^2x^2}\arcsin(ax)}{625a} - \frac{32x\arcsin(ax)^2}{25a^4} - \frac{16x^3\arcsin(ax)^2}{75a^2} - \frac{12}{125}x^5\arcsin(ax)^2 + \frac{32\sqrt{1-a^2x^2}\arcsin(ax)^3}{75a^5} + \frac{16x^2\sqrt{1-a^2x^2}\arcsin(ax)^3}{75a^3} + \frac{4x^4\sqrt{1-a^2x^2}\arcsin(ax)^3}{25a} + \frac{1}{5}x^5\arcsin(ax)^4$$

Mathematica [A] (verified)

Time = 0.06 (sec) , antiderivative size = 150, normalized size of antiderivative = 0.60

$$\int x^4\arcsin(ax)^4\,dx$$

$$= \frac{8ax(31080+680a^2x^2+81a^4x^4) - 120\sqrt{1-a^2x^2}(2072+136a^2x^2+27a^4x^4)\arcsin(ax) - 900ax(120+2}{84375}$$

```
[In] Integrate[x^4*ArcSin[a*x]^4,x]
```

```
[Out] (8*a*x*(31080 + 680*a^2*x^2 + 81*a^4*x^4) - 120*Sqrt[1 - a^2*x^2]*(2072 + 1
36*a^2*x^2 + 27*a^4*x^4)*ArcSin[a*x] - 900*a*x*(120 + 20*a^2*x^2 + 9*a^4*x^
4)*ArcSin[a*x]^2 + 4500*Sqrt[1 - a^2*x^2]*(8 + 4*a^2*x^2 + 3*a^4*x^4)*ArcSi
n[a*x]^3 + 16875*a^5*x^5*ArcSin[a*x]^4)/(84375*a^5)
```

Maple [A] (verified)

Time = 0.05 (sec) , antiderivative size = 197, normalized size of antiderivative = 0.79

method	result
derivativedivides	$\frac{a^5x^5\arcsin(ax)^4}{5}+\frac{4\arcsin(ax)^3\left(3a^4x^4+4a^2x^2+8\right)\sqrt{-a^2x^2+1}}{75}-\frac{12a^5x^5\arcsin(ax)^2}{125}-\frac{8\arcsin(ax)\left(3a^4x^4+4a^2x^2+8\right)\sqrt{-a^2x^2+1}}{625}+$
default	$\frac{a^5x^5\arcsin(ax)^4}{5}+\frac{4\arcsin(ax)^3\left(3a^4x^4+4a^2x^2+8\right)\sqrt{-a^2x^2+1}}{75}-\frac{12a^5x^5\arcsin(ax)^2}{125}-\frac{8\arcsin(ax)\left(3a^4x^4+4a^2x^2+8\right)\sqrt{-a^2x^2+1}}{625}+$

```
[In] int(x^4*arcsin(a*x)^4,x,method=_RETURNVERBOSE)
[Out] 1/a^5*(1/5*a^5*x^5*arcsin(a*x)^4+4/75*arcsin(a*x)^3*(3*a^4*x^4+4*a^2*x^2+8)
*(-a^2*x^2+1)^(1/2)-12/125*a^5*x^5*arcsin(a*x)^2-8/625*arcsin(a*x)*(3*a^4*x
^4+4*a^2*x^2+8)*(-a^2*x^2+1)^(1/2)+24/3125*a^5*x^5+1088/16875*a^3*x^3+16576
/5625*a*x-16/75*a^3*x^3*arcsin(a*x)^2-32/225*arcsin(a*x)*(a^2*x^2+2)*(-a^2*
x^2+1)^(1/2)-32/25*a*x*arcsin(a*x)^2-64/25*arcsin(a*x)*(-a^2*x^2+1)^(1/2))
```

Fricas [A] (verification not implemented)

none

Time = 0.27 (sec) , antiderivative size = 134, normalized size of antiderivative = 0.54

$$\int x^4\arcsin(ax)^4\,dx$$
$$=\frac{16875\,a^5x^5\arcsin\left(ax\right)^4+648\,a^5x^5+5440\,a^3x^3-900\left(9\,a^5x^5+20\,a^3x^3+120\,ax\right)\arcsin\left(ax\right)^2+248640\,ax}{84375\,a}$$

```
[In] integrate(x^4*arcsin(a*x)^4,x, algorithm="fricas")
[Out] 1/84375*(16875*a^5*x^5*arcsin(a*x)^4 + 648*a^5*x^5 + 5440*a^3*x^3 - 900*(9*
a^5*x^5 + 20*a^3*x^3 + 120*a*x)*arcsin(a*x)^2 + 248640*a*x + 60*sqrt(-a^2*x
^2 + 1)*(75*(3*a^4*x^4 + 4*a^2*x^2 + 8)*arcsin(a*x)^3 - 2*(27*a^4*x^4 + 136
*a^2*x^2 + 2072)*arcsin(a*x)))/a^5
```

Sympy [A] (verification not implemented)

Time = 0.76 (sec) , antiderivative size = 241, normalized size of antiderivative = 0.96

$$\int x^4\arcsin(ax)^4\,dx$$
$$=\begin{cases}\frac{x^5\operatorname{asin}^4(ax)}{5}-\frac{12x^5\operatorname{asin}^2(ax)}{125}+\frac{24x^5}{3125}+\frac{4x^4\sqrt{-a^2x^2+1}\operatorname{asin}^3(ax)}{25a}-\frac{24x^4\sqrt{-a^2x^2+1}\operatorname{asin}(ax)}{625a}-\frac{16x^3\operatorname{asin}^2(ax)}{75a^2}+\frac{1088x^3}{16875a^2}+\frac{16x}{}\\0\end{cases}$$

```
[In] integrate(x**4*asin(a*x)**4,x)
```

```
[Out] Piecewise((x**5*asin(a*x)**4/5 - 12*x**5*asin(a*x)**2/125 + 24*x**5/3125 +
4*x**4*sqrt(-a**2*x**2 + 1)*asin(a*x)**3/(25*a) - 24*x**4*sqrt(-a**2*x**2 +
 1)*asin(a*x)/(625*a) - 16*x**3*asin(a*x)**2/(75*a**2) + 1088*x**3/(16875*a
**2) + 16*x**2*sqrt(-a**2*x**2 + 1)*asin(a*x)**3/(75*a**3) - 1088*x**2*sqrt
(-a**2*x**2 + 1)*asin(a*x)/(5625*a**3) - 32*x*asin(a*x)**2/(25*a**4) + 1657
6*x/(5625*a**4) + 32*sqrt(-a**2*x**2 + 1)*asin(a*x)**3/(75*a**5) - 16576*sq
rt(-a**2*x**2 + 1)*asin(a*x)/(5625*a**5), Ne(a, 0)), (0, True))
```

Maxima [A] (verification not implemented)

none

Time = 0.30 (sec) , antiderivative size = 207, normalized size of antiderivative = 0.83

$$\int x^4 \arcsin(ax)^4\,dx = \frac{1}{5}\,x^5 \arcsin{(ax)}^4 + \frac{4}{75}\left(\frac{3\sqrt{-a^2x^2+1}x^4}{a^2} + \frac{4\sqrt{-a^2x^2+1}x^2}{a^4} + \frac{8\sqrt{-a^2x^2+1}}{a^6}\right)a \arcsin{(ax)}^3 - \frac{4}{84375}\left(2\,a\left(\frac{15\left(27\sqrt{-a^2x^2+1}a^2x^4 + 136\sqrt{-a^2x^2+1}x^2 + \frac{2072\sqrt{-a^2x^2+1}}{a^2}\right)\arcsin{(ax)}}{a^5} - \frac{81\,a^4x^5 + 68\right.\right.$$

```
[In] integrate(x^4*arcsin(a*x)^4,x, algorithm="maxima")
```

```
[Out] 1/5*x^5*arcsin(a*x)^4 + 4/75*(3*sqrt(-a^2*x^2 + 1)*x^4/a^2 + 4*sqrt(-a^2*x^
2 + 1)*x^2/a^4 + 8*sqrt(-a^2*x^2 + 1)/a^6)*a*arcsin(a*x)^3 - 4/84375*(2*a*(
15*(27*sqrt(-a^2*x^2 + 1)*a^2*x^4 + 136*sqrt(-a^2*x^2 + 1)*x^2 + 2072*sqrt(
-a^2*x^2 + 1)/a^2)*arcsin(a*x)/a^5 - (81*a^4*x^5 + 680*a^2*x^3 + 31080*x)/a
^6) + 225*(9*a^4*x^5 + 20*a^2*x^3 + 120*x)*arcsin(a*x)^2/a^5)*a
```

Giac [A] (verification not implemented)

none

Time = 0.28 (sec) , antiderivative size = 305, normalized size of antiderivative = 1.22

$$\int x^4 \arcsin(ax)^4 \, dx = \frac{(a^2x^2-1)^2 x \arcsin{(ax)}^4}{5\,a^4} + \frac{2\,(a^2x^2-1)x \arcsin{(ax)}^4}{5\,a^4} - \frac{12\,(a^2x^2-1)^2 x \arcsin{(ax)}^2}{125\,a^4} + \frac{x \arcsin{(ax)}^4}{5\,a^4} + \frac{4\,(a^2x^2-1)^2\sqrt{-a^2x^2+1}\arcsin{(ax)}^3}{25\,a^5} - \frac{152\,(a^2x^2-1)x \arcsin{(ax)}^2}{375\,a^4} - \frac{8\,(-a^2x^2+1)^{\frac{3}{2}}\arcsin{(ax)}^3}{15\,a^5} + \frac{24\,(a^2x^2-1)^2 x}{3125\,a^4} - \frac{596\,x \arcsin{(ax)}^2}{375\,a^4} - \frac{24\,(a^2x^2-1)^2\sqrt{-a^2x^2+1}\arcsin{(ax)}}{625\,a^5} + \frac{4\,\sqrt{-a^2x^2+1}\arcsin{(ax)}^3}{5\,a^5} + \frac{6736\,(a^2x^2-1)x}{84375\,a^4} + \frac{304\,(-a^2x^2+1)^{\frac{3}{2}}\arcsin{(ax)}}{1125\,a^5} + \frac{254728\,x}{84375\,a^4} - \frac{1192\,\sqrt{-a^2x^2+1}\arcsin{(ax)}}{375\,a^5}$$

```
[In] integrate(x^4*arcsin(a*x)^4,x, algorithm="giac")
```

```
[Out] 1/5*(a^2*x^2 - 1)^2*x*arcsin(a*x)^4/a^4 + 2/5*(a^2*x^2 - 1)*x*arcsin(a*x)^4
/a^4 - 12/125*(a^2*x^2 - 1)^2*x*arcsin(a*x)^2/a^4 + 1/5*x*arcsin(a*x)^4/a^4
 + 4/25*(a^2*x^2 - 1)^2*sqrt(-a^2*x^2 + 1)*arcsin(a*x)^3/a^5 - 152/375*(a^2
*x^2 - 1)*x*arcsin(a*x)^2/a^4 - 8/15*(-a^2*x^2 + 1)^(3/2)*arcsin(a*x)^3/a^5
 + 24/3125*(a^2*x^2 - 1)^2*x/a^4 - 596/375*x*arcsin(a*x)^2/a^4 - 24/625*(a^
2*x^2 - 1)^2*sqrt(-a^2*x^2 + 1)*arcsin(a*x)/a^5 + 4/5*sqrt(-a^2*x^2 + 1)*ar
csin(a*x)^3/a^5 + 6736/84375*(a^2*x^2 - 1)*x/a^4 + 304/1125*(-a^2*x^2 + 1)^
(3/2)*arcsin(a*x)/a^5 + 254728/84375*x/a^4 - 1192/375*sqrt(-a^2*x^2 + 1)*ar
csin(a*x)/a^5
```

Mupad [F(-1)]

Timed out.

$$\int x^4 \arcsin(ax)^4 \, dx = \int x^4 \operatorname{asin}(a\,x)^4 \, dx$$

```
[In] int(x^4*asin(a*x)^4,x)
```

```
[Out] int(x^4*asin(a*x)^4, x)
```

3.34 $\int x^3 \arcsin(ax)^4 \, dx$

Optimal result

Integrand size = 10, antiderivative size = 198

$$\begin{aligned}\int x^3 \arcsin(ax)^4 \, dx &= \frac{45x^2}{128a^2} + \frac{3x^4}{128} - \frac{45x\sqrt{1-a^2x^2}\arcsin(ax)}{64a^3} \\ &\quad - \frac{3x^3\sqrt{1-a^2x^2}\arcsin(ax)}{32a} + \frac{45\arcsin(ax)^2}{128a^4} - \frac{9x^2\arcsin(ax)^2}{16a^2} \\ &\quad - \frac{3}{16}x^4\arcsin(ax)^2 + \frac{3x\sqrt{1-a^2x^2}\arcsin(ax)^3}{8a^3} \\ &\quad + \frac{x^3\sqrt{1-a^2x^2}\arcsin(ax)^3}{4a} - \frac{3\arcsin(ax)^4}{32a^4} + \frac{1}{4}x^4\arcsin(ax)^4\end{aligned}$$

```
[Out] 45/128*x^2/a^2+3/128*x^4+45/128*arcsin(a*x)^2/a^4-9/16*x^2*arcsin(a*x)^2/a^
2-3/16*x^4*arcsin(a*x)^2-3/32*arcsin(a*x)^4/a^4+1/4*x^4*arcsin(a*x)^4-45/64
*x*arcsin(a*x)*(-a^2*x^2+1)^(1/2)/a^3-3/32*x^3*arcsin(a*x)*(-a^2*x^2+1)^(1/
2)/a+3/8*x*arcsin(a*x)^3*(-a^2*x^2+1)^(1/2)/a^3+1/4*x^3*arcsin(a*x)^3*(-a^2
*x^2+1)^(1/2)/a
```

Rubi [A] (verified)

Time = 0.33 (sec) , antiderivative size = 198, normalized size of antiderivative = 1.00, number of steps used = 14, number of rules used = 4, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.400, Rules used

$= \{4723, 4795, 4737, 30\}$

$$\int x^3 \arcsin(ax)^4 \, dx = -\frac{3 \arcsin(ax)^4}{32a^4} + \frac{45 \arcsin(ax)^2}{128a^4} - \frac{9x^2 \arcsin(ax)^2}{16a^2} + \frac{x^3\sqrt{1-a^2x^2} \arcsin(ax)^3}{4a} - \frac{3x^3\sqrt{1-a^2x^2} \arcsin(ax)}{32a} + \frac{45x^2}{128a^2} + \frac{3x\sqrt{1-a^2x^2} \arcsin(ax)^3}{8a^3} - \frac{45x\sqrt{1-a^2x^2} \arcsin(ax)}{64a^3} + \frac{1}{4}x^4 \arcsin(ax)^4 - \frac{3}{16}x^4 \arcsin(ax)^2 + \frac{3x^4}{128}$$

```
[In] Int[x^3*ArcSin[a*x]^4,x]
```

```
[Out] (45*x^2)/(128*a^2) + (3*x^4)/128 - (45*x*Sqrt[1 - a^2*x^2]*ArcSin[a*x])/(64
*a^3) - (3*x^3*Sqrt[1 - a^2*x^2]*ArcSin[a*x])/(32*a) + (45*ArcSin[a*x]^2)/(
128*a^4) - (9*x^2*ArcSin[a*x]^2)/(16*a^2) - (3*x^4*ArcSin[a*x]^2)/16 + (3*x
*Sqrt[1 - a^2*x^2]*ArcSin[a*x]^3)/(8*a^3) + (x^3*Sqrt[1 - a^2*x^2]*ArcSin[a
*x]^3)/(4*a) - (3*ArcSin[a*x]^4)/(32*a^4) + (x^4*ArcSin[a*x]^4)/4
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rule 4737

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)/Sqrt[(d_) + (e_.)*(x_)^2], x_S
ymbol] :> Simp[(1/(b*c*(n + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]]*(a
 + b*ArcSin[c*x])^(n + 1), x] /; FreeQ[{a, b, c, d, e, n}, x] && EqQ[c^2*d
+ e, 0] && NeQ[n, -1]
```

Rule 4795

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_)*((d_) + (e_.
)*(x_)^2)^(p_), x_Symbol] :> Simp[f*(f*x)^(m - 1)*(d + e*x^2)^(p + 1)*((a +
 b*ArcSin[c*x])^n/(e*(m + 2*p + 1))), x] + (Dist[f^2*((m - 1)/(c^2*(m + 2*p
 + 1))), Int[(f*x)^(m - 2)*(d + e*x^2)^p*(a + b*ArcSin[c*x])^n, x], x] + Di
st[b*f*(n/(c*(m + 2*p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], Int[(f*x)
^(m - 1)*(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x]) /; Fr
eeQ[{a, b, c, d, e, f, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && IGtQ[m,
```

```
1] && NeQ[m + 2*p + 1, 0]
```

Rubi steps

$$\text{integral} = \frac{1}{4}x^4\arcsin(ax)^4 - a\int\frac{x^4\arcsin(ax)^3}{\sqrt{1-a^2x^2}}\,dx$$

$$= \frac{x^3\sqrt{1-a^2x^2}\arcsin(ax)^3}{4a} + \frac{1}{4}x^4\arcsin(ax)^4 - \frac{3}{4}\int x^3\arcsin(ax)^2\,dx - \frac{3\int\frac{x^2\arcsin(ax)^3}{\sqrt{1-a^2x^2}}\,dx}{4a}$$

$$= -\frac{3}{16}x^4\arcsin(ax)^2 + \frac{3x\sqrt{1-a^2x^2}\arcsin(ax)^3}{8a^3} + \frac{x^3\sqrt{1-a^2x^2}\arcsin(ax)^3}{4a} + \frac{1}{4}x^4\arcsin(ax)^4 - \frac{3\int\frac{\arcsin(ax)^3}{\sqrt{1-a^2x^2}}\,dx}{8a^3} - \frac{9\int x\arcsin(ax)^2\,dx}{8a^2} + \frac{1}{8}(3a)\int\frac{x^4\arcsin(ax)}{\sqrt{1-a^2x^2}}\,dx$$

$$= -\frac{3x^3\sqrt{1-a^2x^2}\arcsin(ax)}{32a} - \frac{9x^2\arcsin(ax)^2}{16a^2} - \frac{3}{16}x^4\arcsin(ax)^2 + \frac{3x\sqrt{1-a^2x^2}\arcsin(ax)^3}{8a^3} + \frac{x^3\sqrt{1-a^2x^2}\arcsin(ax)^3}{4a} - \frac{3\arcsin(ax)^4}{32a^4} + \frac{1}{4}x^4\arcsin(ax)^4 + \frac{3\int x^3\,dx}{32} + \frac{9\int\frac{x^2\arcsin(ax)}{\sqrt{1-a^2x^2}}\,dx}{32a} + \frac{9\int\frac{x^2\arcsin(ax)}{\sqrt{1-a^2x^2}}\,dx}{8a}$$

$$= \frac{3x^4}{128} - \frac{45x\sqrt{1-a^2x^2}\arcsin(ax)}{64a^3} - \frac{3x^3\sqrt{1-a^2x^2}\arcsin(ax)}{32a} - \frac{9x^2\arcsin(ax)^2}{16a^2} - \frac{3}{16}x^4\arcsin(ax)^2 + \frac{3x\sqrt{1-a^2x^2}\arcsin(ax)^3}{8a^3} + \frac{x^3\sqrt{1-a^2x^2}\arcsin(ax)^3}{4a} - \frac{3\arcsin(ax)^4}{32a^4} + \frac{1}{4}x^4\arcsin(ax)^4 + \frac{9\int\frac{\arcsin(ax)}{\sqrt{1-a^2x^2}}\,dx}{64a^3} + \frac{9\int\frac{\arcsin(ax)}{\sqrt{1-a^2x^2}}\,dx}{16a^3} + \frac{9\int x\,dx}{64a^2} + \frac{9\int x\,dx}{16a^2}$$

$$= \frac{45x^2}{128a^2} + \frac{3x^4}{128} - \frac{45x\sqrt{1-a^2x^2}\arcsin(ax)}{64a^3} - \frac{3x^3\sqrt{1-a^2x^2}\arcsin(ax)}{32a} + \frac{45\arcsin(ax)^2}{128a^4} - \frac{9x^2\arcsin(ax)^2}{16a^2} - \frac{3}{16}x^4\arcsin(ax)^2 + \frac{3x\sqrt{1-a^2x^2}\arcsin(ax)^3}{8a^3} + \frac{x^3\sqrt{1-a^2x^2}\arcsin(ax)^3}{4a} - \frac{3\arcsin(ax)^4}{32a^4} + \frac{1}{4}x^4\arcsin(ax)^4$$

Mathematica [A] (verified)

Time = 0.05 (sec) , antiderivative size = 135, normalized size of antiderivative = 0.68

$$\int x^3 \arcsin(ax)^4 \, dx$$
$$= \frac{3a^2x^2(15 + a^2x^2) - 6ax\sqrt{1 - a^2x^2}(15 + 2a^2x^2) \arcsin(ax) - 3(-15 + 24a^2x^2 + 8a^4x^4) \arcsin(ax)^2 + 16ax}{128a^4}$$

```
[In] Integrate[x^3*ArcSin[a*x]^4,x]
```

```
[Out] (3*a^2*x^2*(15 + a^2*x^2) - 6*a*x*Sqrt[1 - a^2*x^2]*(15 + 2*a^2*x^2)*ArcSin
[a*x] - 3*(-15 + 24*a^2*x^2 + 8*a^4*x^4)*ArcSin[a*x]^2 + 16*a*x*Sqrt[1 - a^
2*x^2]*(3 + 2*a^2*x^2)*ArcSin[a*x]^3 + 4*(-3 + 8*a^4*x^4)*ArcSin[a*x]^4)/(1
28*a^4)
```

Maple [A] (verified)

Time = 0.07 (sec) , antiderivative size = 215, normalized size of antiderivative = 1.09

method	result
derivativedivides	$\frac{\frac{a^4x^4 \arcsin(ax)^4}{4} - \frac{\arcsin(ax)^3\left(-2a^3x^3\sqrt{-a^2x^2+1} - 3ax\sqrt{-a^2x^2+1} + 3\arcsin(ax)\right)}{8} - \frac{3a^4x^4 \arcsin(ax)^2}{16} + \frac{3\arcsin(ax)\left(-2a^3x^3\sqrt{-a}\right.}{}}{}$
default	$\frac{\frac{a^4x^4 \arcsin(ax)^4}{4} - \frac{\arcsin(ax)^3\left(-2a^3x^3\sqrt{-a^2x^2+1} - 3ax\sqrt{-a^2x^2+1} + 3\arcsin(ax)\right)}{8} - \frac{3a^4x^4 \arcsin(ax)^2}{16} + \frac{3\arcsin(ax)\left(-2a^3x^3\sqrt{-a}\right.}{}}{}$

```
[In] int(x^3*arcsin(a*x)^4,x,method=_RETURNVERBOSE)
```

```
[Out] 1/a^4*(1/4*a^4*x^4*arcsin(a*x)^4-1/8*arcsin(a*x)^3*(-2*a^3*x^3*(-a^2*x^2+1)
^(1/2)-3*a*x*(-a^2*x^2+1)^(1/2)+3*arcsin(a*x))-3/16*a^4*x^4*arcsin(a*x)^2+3
/64*arcsin(a*x)*(-2*a^3*x^3*(-a^2*x^2+1)^(1/2)-3*a*x*(-a^2*x^2+1)^(1/2)+3*a
rcsin(a*x))+27/128*arcsin(a*x)^2+3/512*(2*a^2*x^2+3)^2-9/16*arcsin(a*x)^2*(
a^2*x^2-1)-9/16*arcsin(a*x)*(a*x*(-a^2*x^2+1)^(1/2)+arcsin(a*x))+9/32*a^2*x
^2+9/32*arcsin(a*x)^4)
```

Fricas [A] (verification not implemented)

none

Time = 0.27 (sec) , antiderivative size = 121, normalized size of antiderivative = 0.61

$$\int x^3 \arcsin(ax)^4 \, dx = \frac{3 a^4x^4 + 4 \left(8 a^4x^4 - 3\right) \arcsin(ax)^4 + 45 a^2x^2 - 3 \left(8 a^4x^4 + 24 a^2x^2 - 15\right) \arcsin(ax)^2 + 2 \sqrt{-a^2x^2 + 1} (8}{128 a^4}$$

```
[In] integrate(x^3*arcsin(a*x)^4,x, algorithm="fricas")
```

```
[Out] 1/128*(3*a^4*x^4 + 4*(8*a^4*x^4 - 3)*arcsin(a*x)^4 + 45*a^2*x^2 - 3*(8*a^4*
x^4 + 24*a^2*x^2 - 15)*arcsin(a*x)^2 + 2*sqrt(-a^2*x^2 + 1)*(8*(2*a^3*x^3 +
 3*a*x)*arcsin(a*x)^3 - 3*(2*a^3*x^3 + 15*a*x)*arcsin(a*x)))/a^4
```

Sympy [A] (verification not implemented)

Time = 0.57 (sec) , antiderivative size = 190, normalized size of antiderivative = 0.96

$$\int x^3 \arcsin(ax)^4 \, dx = \begin{cases} \frac{x^4 \operatorname{asin}^4(ax)}{4} - \frac{3x^4 \operatorname{asin}^2(ax)}{16} + \frac{3x^4}{128} + \frac{x^3\sqrt{-a^2x^2+1} \operatorname{asin}^3(ax)}{4a} - \frac{3x^3\sqrt{-a^2x^2+1} \operatorname{asin}(ax)}{32a} - \frac{9x^2 \operatorname{asin}^2(ax)}{16a^2} + \frac{45x^2}{128a^2} + \frac{3x\sqrt{-a^2}}{} \\ 0 \end{cases}$$

```
[In] integrate(x**3*asin(a*x)**4,x)
```

```
[Out] Piecewise((x**4*asin(a*x)**4/4 - 3*x**4*asin(a*x)**2/16 + 3*x**4/128 + x**3
*sqrt(-a**2*x**2 + 1)*asin(a*x)**3/(4*a) - 3*x**3*sqrt(-a**2*x**2 + 1)*asin
(a*x)/(32*a) - 9*x**2*asin(a*x)**2/(16*a**2) + 45*x**2/(128*a**2) + 3*x*sqr
t(-a**2*x**2 + 1)*asin(a*x)**3/(8*a**3) - 45*x*sqrt(-a**2*x**2 + 1)*asin(a*
x)/(64*a**3) - 3*asin(a*x)**4/(32*a**4) + 45*asin(a*x)**2/(128*a**4), Ne(a,
 0)), (0, True))
```

Maxima [F]

$$\int x^3 \arcsin(ax)^4 \, dx = \int x^3 \arcsin(ax)^4 \, dx$$

```
[In] integrate(x^3*arcsin(a*x)^4,x, algorithm="maxima")
```

```
[Out] 1/4*x^4*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^4 + a*integrate(sqrt(a*x
 + 1)*sqrt(-a*x + 1)*x^4*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^3/(a^2*
x^2 - 1), x)
```

Giac [A] (verification not implemented)

none

Time = 0.29 (sec) , antiderivative size = 234, normalized size of antiderivative = 1.18

$$\int x^3 \arcsin(ax)^4\,dx = -\frac{(-a^2x^2+1)^{\frac{3}{2}}x\arcsin(ax)^3}{4a^3} + \frac{(a^2x^2-1)^2\arcsin(ax)^4}{4a^4} + \frac{5\sqrt{-a^2x^2+1}x\arcsin(ax)^3}{8a^3} + \frac{(a^2x^2-1)\arcsin(ax)^4}{2a^4} + \frac{3(-a^2x^2+1)^{\frac{3}{2}}x\arcsin(ax)}{32a^3} - \frac{3(a^2x^2-1)^2\arcsin(ax)^2}{16a^4} + \frac{5\arcsin(ax)^4}{32a^4} - \frac{51\sqrt{-a^2x^2+1}x\arcsin(ax)}{64a^3} - \frac{15(a^2x^2-1)\arcsin(ax)^2}{16a^4} + \frac{3(a^2x^2-1)^2}{128a^4} - \frac{51\arcsin(ax)^2}{128a^4} + \frac{51(a^2x^2-1)}{128a^4} + \frac{195}{1024a^4}$$

```
[In] integrate(x^3*arcsin(a*x)^4,x, algorithm="giac")
```

```
[Out] -1/4*(-a^2*x^2 + 1)^(3/2)*x*arcsin(a*x)^3/a^3 + 1/4*(a^2*x^2 - 1)^2*arcsin(
a*x)^4/a^4 + 5/8*sqrt(-a^2*x^2 + 1)*x*arcsin(a*x)^3/a^3 + 1/2*(a^2*x^2 - 1)
*arcsin(a*x)^4/a^4 + 3/32*(-a^2*x^2 + 1)^(3/2)*x*arcsin(a*x)/a^3 - 3/16*(a^
2*x^2 - 1)^2*arcsin(a*x)^2/a^4 + 5/32*arcsin(a*x)^4/a^4 - 51/64*sqrt(-a^2*x
^2 + 1)*x*arcsin(a*x)/a^3 - 15/16*(a^2*x^2 - 1)*arcsin(a*x)^2/a^4 + 3/128*(
a^2*x^2 - 1)^2/a^4 - 51/128*arcsin(a*x)^2/a^4 + 51/128*(a^2*x^2 - 1)/a^4 +
195/1024/a^4
```

Mupad [F(-1)]

Timed out.

$$\int x^3 \arcsin(ax)^4\,dx = \int x^3 \operatorname{asin}(a\,x)^4\,dx$$

```
[In] int(x^3*asin(a*x)^4,x)
```

```
[Out] int(x^3*asin(a*x)^4, x)
```

3.35 $\int x^2 \arcsin(ax)^4\,dx$

Optimal result

Integrand size = 10, antiderivative size = 166

$$\int x^2 \arcsin(ax)^4\,dx = \frac{160x}{27a^2}+\frac{8x^3}{81}-\frac{160\sqrt{1-a^2x^2}\arcsin(ax)}{27a^3}-\frac{8x^2\sqrt{1-a^2x^2}\arcsin(ax)}{27a}-\frac{8x\arcsin(ax)^2}{3a^2}-\frac{4}{9}x^3\arcsin(ax)^2+\frac{8\sqrt{1-a^2x^2}\arcsin(ax)^3}{9a^3}+\frac{4x^2\sqrt{1-a^2x^2}\arcsin(ax)^3}{9a}+\frac{1}{3}x^3\arcsin(ax)^4$$

```
[Out] 160/27*x/a^2+8/81*x^3-8/3*x*arcsin(a*x)^2/a^2-4/9*x^3*arcsin(a*x)^2+1/3*x^3
*arcsin(a*x)^4-160/27*arcsin(a*x)*(-a^2*x^2+1)^(1/2)/a^3-8/27*x^2*arcsin(a*
x)*(-a^2*x^2+1)^(1/2)/a+8/9*arcsin(a*x)^3*(-a^2*x^2+1)^(1/2)/a^3+4/9*x^2*ar
csin(a*x)^3*(-a^2*x^2+1)^(1/2)/a
```

Rubi [A] (verified)

Time = 0.22 (sec) , antiderivative size = 166, normalized size of antiderivative = 1.00, number of steps used = 11, number of rules used = 6, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.600, Rules used = {4723, 4795, 4767, 4715, 8, 30}

$$\int x^2 \arcsin(ax)^4\,dx = \frac{4x^2\sqrt{1-a^2x^2}\arcsin(ax)^3}{9a}-\frac{8x^2\sqrt{1-a^2x^2}\arcsin(ax)}{27a}-\frac{8x\arcsin(ax)^2}{3a^2}+\frac{160x}{27a^2}+\frac{8\sqrt{1-a^2x^2}\arcsin(ax)^3}{9a^3}-\frac{160\sqrt{1-a^2x^2}\arcsin(ax)}{27a^3}+\frac{1}{3}x^3\arcsin(ax)^4-\frac{4}{9}x^3\arcsin(ax)^2+\frac{8x^3}{81}$$

```
[In] Int[x^2*ArcSin[a*x]^4,x]
```

```
[Out] (160*x)/(27*a^2) + (8*x^3)/81 - (160*Sqrt[1 - a^2*x^2]*ArcSin[a*x])/(27*a^3
) - (8*x^2*Sqrt[1 - a^2*x^2]*ArcSin[a*x])/(27*a) - (8*x*ArcSin[a*x]^2)/(3*a
^2) - (4*x^3*ArcSin[a*x]^2)/9 + (8*Sqrt[1 - a^2*x^2]*ArcSin[a*x]^3)/(9*a^3)
 + (4*x^2*Sqrt[1 - a^2*x^2]*ArcSin[a*x]^3)/(9*a) + (x^3*ArcSin[a*x]^4)/3
```

Rule 8

```
Int[a_, x_Symbol] :> Simp[a*x, x] /; FreeQ[a, x]
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 4715

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.), x_Symbol] :> Simp[x*(a + b*Ar
cSin[c*x])^n, x] - Dist[b*c*n, Int[x*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 -
c^2*x^2]), x], x] /; FreeQ[{a, b, c}, x] && GtQ[n, 0]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rule 4767

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)*((d_) + (e_.)*(x_)^2)^(p_
.), x_Symbol] :> Simp[(d + e*x^2)^(p + 1)*((a + b*ArcSin[c*x])^n/(2*e*(p +
1))), x] + Dist[b*(n/(2*c*(p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], In
t[(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x] /; FreeQ[{a,
b, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && NeQ[p, -1]
```

Rule 4795

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_)*((d_) + (e_.
)*(x_)^2)^(p_), x_Symbol] :> Simp[f*(f*x)^(m - 1)*(d + e*x^2)^(p + 1)*((a +
 b*ArcSin[c*x])^n/(e*(m + 2*p + 1))), x] + (Dist[f^2*((m - 1)/(c^2*(m + 2*p
 + 1))), Int[(f*x)^(m - 2)*(d + e*x^2)^p*(a + b*ArcSin[c*x])^n, x], x] + Di
st[b*f*(n/(c*(m + 2*p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], Int[(f*x)
^(m - 1)*(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x]) /; Fr
eeQ[{a, b, c, d, e, f, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && IGtQ[m,
1] && NeQ[m + 2*p + 1, 0]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= \frac{1}{3}x^3\arcsin(ax)^4 - \frac{1}{3}(4a)\int \frac{x^3\arcsin(ax)^3}{\sqrt{1-a^2x^2}}\,dx \\
&= \frac{4x^2\sqrt{1-a^2x^2}\arcsin(ax)^3}{9a} + \frac{1}{3}x^3\arcsin(ax)^4 - \frac{4}{3}\int x^2\arcsin(ax)^2\,dx - \frac{8\int \frac{x\arcsin(ax)^3}{\sqrt{1-a^2x^2}}\,dx}{9a} \\
&= -\frac{4}{9}x^3\arcsin(ax)^2 + \frac{8\sqrt{1-a^2x^2}\arcsin(ax)^3}{9a^3} + \frac{4x^2\sqrt{1-a^2x^2}\arcsin(ax)^3}{9a} \\
&\quad + \frac{1}{3}x^3\arcsin(ax)^4 - \frac{8\int \arcsin(ax)^2\,dx}{3a^2} + \frac{1}{9}(8a)\int \frac{x^3\arcsin(ax)}{\sqrt{1-a^2x^2}}\,dx \\
&= -\frac{8x^2\sqrt{1-a^2x^2}\arcsin(ax)}{27a} - \frac{8x\arcsin(ax)^2}{3a^2} - \frac{4}{9}x^3\arcsin(ax)^2 \\
&\quad + \frac{8\sqrt{1-a^2x^2}\arcsin(ax)^3}{9a^3} + \frac{4x^2\sqrt{1-a^2x^2}\arcsin(ax)^3}{9a} \\
&\quad + \frac{1}{3}x^3\arcsin(ax)^4 + \frac{8\int x^2\,dx}{27} + \frac{16\int \frac{x\arcsin(ax)}{\sqrt{1-a^2x^2}}\,dx}{27a} + \frac{16\int \frac{x\arcsin(ax)}{\sqrt{1-a^2x^2}}\,dx}{3a} \\
&= \frac{8x^3}{81} - \frac{160\sqrt{1-a^2x^2}\arcsin(ax)}{27a^3} - \frac{8x^2\sqrt{1-a^2x^2}\arcsin(ax)}{27a} \\
&\quad - \frac{8x\arcsin(ax)^2}{3a^2} - \frac{4}{9}x^3\arcsin(ax)^2 + \frac{8\sqrt{1-a^2x^2}\arcsin(ax)^3}{9a^3} \\
&\quad + \frac{4x^2\sqrt{1-a^2x^2}\arcsin(ax)^3}{9a} + \frac{1}{3}x^3\arcsin(ax)^4 + \frac{16\int 1\,dx}{27a^2} + \frac{16\int 1\,dx}{3a^2} \\
&= \frac{160x}{27a^2} + \frac{8x^3}{81} - \frac{160\sqrt{1-a^2x^2}\arcsin(ax)}{27a^3} - \frac{8x^2\sqrt{1-a^2x^2}\arcsin(ax)}{27a} - \frac{8x\arcsin(ax)^2}{3a^2} \\
&\quad - \frac{4}{9}x^3\arcsin(ax)^2 + \frac{8\sqrt{1-a^2x^2}\arcsin(ax)^3}{9a^3} + \frac{4x^2\sqrt{1-a^2x^2}\arcsin(ax)^3}{9a} + \frac{1}{3}x^3\arcsin(ax)^4
\end{aligned}$$

Mathematica [A] (verified)

Time = 0.05 (sec) , antiderivative size = 114, normalized size of antiderivative = 0.69

$$\int x^2\arcsin(ax)^4\,dx$$
$$= \frac{8ax(60+a^2x^2) - 24\sqrt{1-a^2x^2}(20+a^2x^2)\arcsin(ax) - 36ax(6+a^2x^2)\arcsin(ax)^2 + 36\sqrt{1-a^2x^2}(2+\cdots}{81a^3}$$

```
[In] Integrate[x^2*ArcSin[a*x]^4,x]
```

```
[Out] (8*a*x*(60 + a^2*x^2) - 24*Sqrt[1 - a^2*x^2]*(20 + a^2*x^2)*ArcSin[a*x] - 3
6*a*x*(6 + a^2*x^2)*ArcSin[a*x]^2 + 36*Sqrt[1 - a^2*x^2]*(2 + a^2*x^2)*ArcS
in[a*x]^3 + 27*a^3*x^3*ArcSin[a*x]^4)/(81*a^3)
```

Maple [A] (verified)

Time = 0.04 (sec) , antiderivative size = 130, normalized size of antiderivative = 0.78

method	result
derivativedivides	$\frac{\frac{a^3x^3\arcsin(ax)^4}{3}+\frac{4\arcsin(ax)^3\left(a^2x^2+2\right)\sqrt{-a^2x^2+1}}{9}-\frac{8ax\arcsin(ax)^2}{3}+\frac{160ax}{27}-\frac{16\arcsin(ax)\sqrt{-a^2x^2+1}}{3}-\frac{4a^3x^3\arcsin(ax)^2}{9}-\cdots}{a^3}$
default	$\frac{\frac{a^3x^3\arcsin(ax)^4}{3}+\frac{4\arcsin(ax)^3\left(a^2x^2+2\right)\sqrt{-a^2x^2+1}}{9}-\frac{8ax\arcsin(ax)^2}{3}+\frac{160ax}{27}-\frac{16\arcsin(ax)\sqrt{-a^2x^2+1}}{3}-\frac{4a^3x^3\arcsin(ax)^2}{9}-\cdots}{a^3}$

```
[In] int(x^2*arcsin(a*x)^4,x,method=_RETURNVERBOSE)
```

```
[Out] 1/a^3*(1/3*a^3*x^3*arcsin(a*x)^4+4/9*arcsin(a*x)^3*(a^2*x^2+2)*(-a^2*x^2+1)
^(1/2)-8/3*a*x*arcsin(a*x)^2+160/27*a*x-16/3*arcsin(a*x)*(-a^2*x^2+1)^(1/2)
-4/9*a^3*x^3*arcsin(a*x)^2-8/27*arcsin(a*x)*(a^2*x^2+2)*(-a^2*x^2+1)^(1/2)+
8/81*a^3*x^3)
```

Fricas [A] (verification not implemented)

none

Time = 0.26 (sec) , antiderivative size = 99, normalized size of antiderivative = 0.60

$$\int x^2\arcsin(ax)^4\,dx$$
$$=\frac{27\,a^3x^3\arcsin\left(ax\right)^4+8\,a^3x^3-36\left(a^3x^3+6\,ax\right)\arcsin\left(ax\right)^2+480\,ax+12\sqrt{-a^2x^2+1}\big(3\left(a^2x^2+2\right)\arcsin\cdots}{81\,a^3}$$

```
[In] integrate(x^2*arcsin(a*x)^4,x, algorithm="fricas")
```

```
[Out] 1/81*(27*a^3*x^3*arcsin(a*x)^4 + 8*a^3*x^3 - 36*(a^3*x^3 + 6*a*x)*arcsin(a*
x)^2 + 480*a*x + 12*sqrt(-a^2*x^2 + 1)*(3*(a^2*x^2 + 2)*arcsin(a*x)^3 - 2*(
a^2*x^2 + 20)*arcsin(a*x)))/a^3
```

Sympy [A] (verification not implemented)

Time = 0.41 (sec) , antiderivative size = 158, normalized size of antiderivative = 0.95

$$\int x^2\arcsin(ax)^4\,dx$$
$$=\begin{cases}\frac{x^3\operatorname{asin}^4(ax)}{3}-\frac{4x^3\operatorname{asin}^2(ax)}{9}+\frac{8x^3}{81}+\frac{4x^2\sqrt{-a^2x^2+1}\operatorname{asin}^3(ax)}{9a}-\frac{8x^2\sqrt{-a^2x^2+1}\operatorname{asin}(ax)}{27a}-\frac{8x\operatorname{asin}^2(ax)}{3a^2}+\frac{160x}{27a^2}+\frac{8\sqrt{-a^2x^2+\cdots}}{9a\cdots} \\ 0\end{cases}$$

```
[In] integrate(x**2*asin(a*x)**4,x)
```

```
[Out] Piecewise((x**3*asin(a*x)**4/3 - 4*x**3*asin(a*x)**2/9 + 8*x**3/81 + 4*x**2
*sqrt(-a**2*x**2 + 1)*asin(a*x)**3/(9*a) - 8*x**2*sqrt(-a**2*x**2 + 1)*asin
(a*x)/(27*a) - 8*x*asin(a*x)**2/(3*a**2) + 160*x/(27*a**2) + 8*sqrt(-a**2*x
**2 + 1)*asin(a*x)**3/(9*a**3) - 160*sqrt(-a**2*x**2 + 1)*asin(a*x)/(27*a**
3), Ne(a, 0)), (0, True))
```

Maxima [A] (verification not implemented)

none

Time = 0.30 (sec) , antiderivative size = 147, normalized size of antiderivative = 0.89

$$\int x^2 \arcsin(ax)^4\,dx = \frac{1}{3}\,x^3 \arcsin\left(ax\right)^4 + \frac{4}{9}\,a\left(\frac{\sqrt{-a^2x^2+1}x^2}{a^2} + \frac{2\,\sqrt{-a^2x^2+1}}{a^4}\right)\arcsin\left(ax\right)^3 - \frac{4}{81}\left(2\,a\left(\frac{3\left(\sqrt{-a^2x^2+1}x^2 + \frac{20\,\sqrt{-a^2x^2+1}}{a^2}\right)\arcsin\left(ax\right)}{a^3} - \frac{a^2x^3+60\,x}{a^4}\right) + \frac{9\left(a^2x^3+6\,x\right)\arcsin\left(ax\right)^2}{a^3}\right)$$

```
[In] integrate(x^2*arcsin(a*x)^4,x, algorithm="maxima")
```

```
[Out] 1/3*x^3*arcsin(a*x)^4 + 4/9*a*(sqrt(-a^2*x^2 + 1)*x^2/a^2 + 2*sqrt(-a^2*x^2
 + 1)/a^4)*arcsin(a*x)^3 - 4/81*(2*a*(3*(sqrt(-a^2*x^2 + 1)*x^2 + 20*sqrt(-
a^2*x^2 + 1)/a^2)*arcsin(a*x)/a^3 - (a^2*x^3 + 60*x)/a^4) + 9*(a^2*x^3 + 6*
x)*arcsin(a*x)^2/a^3)*a
```

Giac [A] (verification not implemented)

none

Time = 0.28 (sec) , antiderivative size = 176, normalized size of antiderivative = 1.06

$$\int x^2 \arcsin(ax)^4\,dx = \frac{(a^2x^2-1)x\arcsin\left(ax\right)^4}{3\,a^2} + \frac{x\arcsin\left(ax\right)^4}{3\,a^2} - \frac{4\left(a^2x^2-1\right)x\arcsin\left(ax\right)^2}{9\,a^2} - \frac{4\left(-a^2x^2+1\right)^{\frac{3}{2}}\arcsin\left(ax\right)^3}{9\,a^3} - \frac{28\,x\arcsin\left(ax\right)^2}{9\,a^2} + \frac{4\,\sqrt{-a^2x^2+1}\arcsin\left(ax\right)^3}{3\,a^3} + \frac{8\left(a^2x^2-1\right)x}{81\,a^2} + \frac{8\left(-a^2x^2+1\right)^{\frac{3}{2}}\arcsin\left(ax\right)}{27\,a^3} + \frac{488\,x}{81\,a^2} - \frac{56\,\sqrt{-a^2x^2+1}\arcsin\left(ax\right)}{9\,a^3}$$

```
[In] integrate(x^2*arcsin(a*x)^4,x, algorithm="giac")
```

```
[Out] 1/3*(a^2*x^2 - 1)*x*arcsin(a*x)^4/a^2 + 1/3*x*arcsin(a*x)^4/a^2 - 4/9*(a^2*
x^2 - 1)*x*arcsin(a*x)^2/a^2 - 4/9*(-a^2*x^2 + 1)^(3/2)*arcsin(a*x)^3/a^3 -
 28/9*x*arcsin(a*x)^2/a^2 + 4/3*sqrt(-a^2*x^2 + 1)*arcsin(a*x)^3/a^3 + 8/81
*(a^2*x^2 - 1)*x/a^2 + 8/27*(-a^2*x^2 + 1)^(3/2)*arcsin(a*x)/a^3 + 488/81*x
/a^2 - 56/9*sqrt(-a^2*x^2 + 1)*arcsin(a*x)/a^3
```

Mupad [F(-1)]

Timed out.

$$\int x^2 \arcsin(ax)^4 \, dx = \int x^2 \, \mathrm{asin}(a\,x)^4 \, dx$$

```
[In] int(x^2*asin(a*x)^4,x)
[Out] int(x^2*asin(a*x)^4, x)
```

3.36 $\int x \arcsin(ax)^4 \, dx$

Optimal result

Integrand size = 8, antiderivative size = 111

$$\int x \arcsin(ax)^4 \, dx = \frac{3x^2}{4} - \frac{3x\sqrt{1-a^2x^2}\arcsin(ax)}{2a} + \frac{3\arcsin(ax)^2}{4a^2} - \frac{3}{2}x^2\arcsin(ax)^2 + \frac{x\sqrt{1-a^2x^2}\arcsin(ax)^3}{a} - \frac{\arcsin(ax)^4}{4a^2} + \frac{1}{2}x^2\arcsin(ax)^4$$

```
[Out] 3/4*x^2+3/4*arcsin(a*x)^2/a^2-3/2*x^2*arcsin(a*x)^2-1/4*arcsin(a*x)^4/a^2+1
/2*x^2*arcsin(a*x)^4-3/2*x*arcsin(a*x)*(-a^2*x^2+1)^(1/2)/a+x*arcsin(a*x)^3
*(-a^2*x^2+1)^(1/2)/a
```

Rubi [A] (verified)

Time = 0.15 (sec) , antiderivative size = 111, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 4, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {4723, 4795, 4737, 30}

$$\int x \arcsin(ax)^4 \, dx = \frac{x\sqrt{1-a^2x^2}\arcsin(ax)^3}{a} - \frac{3x\sqrt{1-a^2x^2}\arcsin(ax)}{2a} - \frac{\arcsin(ax)^4}{4a^2} + \frac{3\arcsin(ax)^2}{4a^2} + \frac{1}{2}x^2\arcsin(ax)^4 - \frac{3}{2}x^2\arcsin(ax)^2 + \frac{3x^2}{4}$$

```
[In] Int[x*ArcSin[a*x]^4,x]
```

```
[Out] (3*x^2)/4 - (3*x*Sqrt[1 - a^2*x^2]*ArcSin[a*x])/(2*a) + (3*ArcSin[a*x]^2)/(
4*a^2) - (3*x^2*ArcSin[a*x]^2)/2 + (x*Sqrt[1 - a^2*x^2]*ArcSin[a*x]^3)/a -
ArcSin[a*x]^4/(4*a^2) + (x^2*ArcSin[a*x]^4)/2
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rule 4737

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)/Sqrt[(d_) + (e_.)*(x_)^2], x_S
ymbol] :> Simp[(1/(b*c*(n + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]]*(a
 + b*ArcSin[c*x])^(n + 1), x] /; FreeQ[{a, b, c, d, e, n}, x] && EqQ[c^2*d
+ e, 0] && NeQ[n, -1]
```

Rule 4795

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_)*((d_) + (e_.
)*(x_)^2)^(p_), x_Symbol] :> Simp[f*(f*x)^(m - 1)*(d + e*x^2)^(p + 1)*((a +
 b*ArcSin[c*x])^n/(e*(m + 2*p + 1))), x] + (Dist[f^2*((m - 1)/(c^2*(m + 2*p
 + 1))), Int[(f*x)^(m - 2)*(d + e*x^2)^p*(a + b*ArcSin[c*x])^n, x], x] + Di
st[b*f*(n/(c*(m + 2*p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], Int[(f*x)
^(m - 1)*(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x]) /; Fr
eeQ[{a, b, c, d, e, f, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && IGtQ[m,
1] && NeQ[m + 2*p + 1, 0]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= \frac{1}{2}x^2\arcsin(ax)^4 - (2a)\int\frac{x^2\arcsin(ax)^3}{\sqrt{1-a^2x^2}}\,dx \\
&= \frac{x\sqrt{1-a^2x^2}\arcsin(ax)^3}{a} + \frac{1}{2}x^2\arcsin(ax)^4 - 3\int x\arcsin(ax)^2\,dx - \frac{\int\frac{\arcsin(ax)^3}{\sqrt{1-a^2x^2}}\,dx}{a} \\
&= -\frac{3}{2}x^2\arcsin(ax)^2 + \frac{x\sqrt{1-a^2x^2}\arcsin(ax)^3}{a} - \frac{\arcsin(ax)^4}{4a^2} \\
&\quad + \frac{1}{2}x^2\arcsin(ax)^4 + (3a)\int\frac{x^2\arcsin(ax)}{\sqrt{1-a^2x^2}}\,dx \\
&= -\frac{3x\sqrt{1-a^2x^2}\arcsin(ax)}{2a} - \frac{3}{2}x^2\arcsin(ax)^2 + \frac{x\sqrt{1-a^2x^2}\arcsin(ax)^3}{a} \\
&\quad - \frac{\arcsin(ax)^4}{4a^2} + \frac{1}{2}x^2\arcsin(ax)^4 + \frac{3\int x\,dx}{2} + \frac{3\int\frac{\arcsin(ax)}{\sqrt{1-a^2x^2}}\,dx}{2a}
\end{aligned}$$

$$= \frac{3x^2}{4} - \frac{3x\sqrt{1-a^2x^2}\arcsin(ax)}{2a} + \frac{3\arcsin(ax)^2}{4a^2} - \frac{3}{2}x^2\arcsin(ax)^2 + \frac{x\sqrt{1-a^2x^2}\arcsin(ax)^3}{a} - \frac{\arcsin(ax)^4}{4a^2} + \frac{1}{2}x^2\arcsin(ax)^4$$

Mathematica [A] (verified)

Time = 0.03 (sec) , antiderivative size = 96, normalized size of antiderivative = 0.86

$$\int x\arcsin(ax)^4\,dx$$
$$= \frac{3a^2x^2 - 6ax\sqrt{1-a^2x^2}\arcsin(ax) + (3-6a^2x^2)\arcsin(ax)^2 + 4ax\sqrt{1-a^2x^2}\arcsin(ax)^3 + (-1+2a^2x^2}{4a^2}$$

```
[In] Integrate[x*ArcSin[a*x]^4,x]
```

```
[Out] (3*a^2*x^2 - 6*a*x*Sqrt[1 - a^2*x^2]*ArcSin[a*x] + (3 - 6*a^2*x^2)*ArcSin[a
*x]^2 + 4*a*x*Sqrt[1 - a^2*x^2]*ArcSin[a*x]^3 + (-1 + 2*a^2*x^2)*ArcSin[a*x
]^4)/(4*a^2)
```

Maple [A] (verified)

Time = 0.06 (sec) , antiderivative size = 117, normalized size of antiderivative = 1.05

method	result
derivativedivides	$\frac{\frac{\arcsin(ax)^4(a^2x^2-1)}{2}+\arcsin(ax)^3\left(ax\sqrt{-a^2x^2+1}+\arcsin(ax)\right)-\frac{3\arcsin(ax)^2(a^2x^2-1)}{2}-\frac{3\arcsin(ax)\left(ax\sqrt{-a^2x^2+1}+\arcsin\right.}{2}}{a^2}$
default	$\frac{\frac{\arcsin(ax)^4(a^2x^2-1)}{2}+\arcsin(ax)^3\left(ax\sqrt{-a^2x^2+1}+\arcsin(ax)\right)-\frac{3\arcsin(ax)^2(a^2x^2-1)}{2}-\frac{3\arcsin(ax)\left(ax\sqrt{-a^2x^2+1}+\arcsin\right.}{2}}{a^2}$

```
[In] int(x*arcsin(a*x)^4,x,method=_RETURNVERBOSE)
```

```
[Out] 1/a^2*(1/2*arcsin(a*x)^4*(a^2*x^2-1)+arcsin(a*x)^3*(a*x*(-a^2*x^2+1)^(1/2)+
arcsin(a*x))-3/2*arcsin(a*x)^2*(a^2*x^2-1)-3/2*arcsin(a*x)*(a*x*(-a^2*x^2+1
)^(1/2)+arcsin(a*x))+3/4*arcsin(a*x)^2+3/4*a^2*x^2-3/4*arcsin(a*x)^4)
```

Fricas [A] (verification not implemented)

none

Time = 0.25 (sec) , antiderivative size = 82, normalized size of antiderivative = 0.74

$$\int x \arcsin(ax)^4 \, dx$$
$$= \frac{(2\,a^2x^2-1)\arcsin{(ax)}^4+3\,a^2x^2-3\,(2\,a^2x^2-1)\arcsin{(ax)}^2+2\,(2\,ax\arcsin{(ax)}^3-3\,ax\arcsin{(ax)})\sqrt{-}}{4\,a^2}$$

```
[In] integrate(x*arcsin(a*x)^4,x, algorithm="fricas")
[Out] 1/4*((2*a^2*x^2 - 1)*arcsin(a*x)^4 + 3*a^2*x^2 - 3*(2*a^2*x^2 - 1)*arcsin(a
*x)^2 + 2*(2*a*x*arcsin(a*x)^3 - 3*a*x*arcsin(a*x))*sqrt(-a^2*x^2 + 1))/a^2
```

Sympy [A] (verification not implemented)

Time = 0.30 (sec) , antiderivative size = 104, normalized size of antiderivative = 0.94

$$\int x \arcsin(ax)^4 \, dx$$
$$= \begin{cases} \frac{x^2\operatorname{asin}^4(ax)}{2} - \frac{3x^2\operatorname{asin}^2(ax)}{2} + \frac{3x^2}{4} + \frac{x\sqrt{-a^2x^2+1}\operatorname{asin}^3(ax)}{a} - \frac{3x\sqrt{-a^2x^2+1}\operatorname{asin}(ax)}{2a} - \frac{\operatorname{asin}^4(ax)}{4a^2} + \frac{3\operatorname{asin}^2(ax)}{4a^2} & \text{for } a \neq 0 \\ 0 & \text{otherwise} \end{cases}$$

```
[In] integrate(x*asin(a*x)**4,x)
[Out] Piecewise((x**2*asin(a*x)**4/2 - 3*x**2*asin(a*x)**2/2 + 3*x**2/4 + x*sqrt(
-a**2*x**2 + 1)*asin(a*x)**3/a - 3*x*sqrt(-a**2*x**2 + 1)*asin(a*x)/(2*a) -
 asin(a*x)**4/(4*a**2) + 3*asin(a*x)**2/(4*a**2), Ne(a, 0)), (0, True))
```

Maxima [F]

$$\int x \arcsin(ax)^4 \, dx = \int x \arcsin{(ax)}^4 \, dx$$

```
[In] integrate(x*arcsin(a*x)^4,x, algorithm="maxima")
[Out] 1/2*x^2*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^4 + 2*a*integrate(sqrt(a
*x + 1)*sqrt(-a*x + 1)*x^2*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^3/(a^
2*x^2 - 1), x)
```

Giac [A] (verification not implemented)

none

Time = 0.27 (sec) , antiderivative size = 127, normalized size of antiderivative = 1.14

$$\int x \arcsin(ax)^4 \, dx = \frac{\sqrt{-a^2x^2+1}x \arcsin(ax)^3}{a} + \frac{(a^2x^2-1)\arcsin(ax)^4}{2a^2} + \frac{\arcsin(ax)^4}{4a^2} - \frac{3\sqrt{-a^2x^2+1}x \arcsin(ax)}{2a} - \frac{3(a^2x^2-1)\arcsin(ax)^2}{2a^2} - \frac{3\arcsin(ax)^2}{4a^2} + \frac{3(a^2x^2-1)}{4a^2} + \frac{3}{8a^2}$$

```
[In] integrate(x*arcsin(a*x)^4,x, algorithm="giac")
[Out] sqrt(-a^2*x^2 + 1)*x*arcsin(a*x)^3/a + 1/2*(a^2*x^2 - 1)*arcsin(a*x)^4/a^2
+ 1/4*arcsin(a*x)^4/a^2 - 3/2*sqrt(-a^2*x^2 + 1)*x*arcsin(a*x)/a - 3/2*(a^2
*x^2 - 1)*arcsin(a*x)^2/a^2 - 3/4*arcsin(a*x)^2/a^2 + 3/4*(a^2*x^2 - 1)/a^2
 + 3/8/a^2
```

Mupad [F(-1)]

Timed out.

$$\int x \arcsin(ax)^4 \, dx = \int x \operatorname{asin}(a\,x)^4 \, dx$$

```
[In] int(x*asin(a*x)^4,x)
[Out] int(x*asin(a*x)^4, x)
```

3.37 $\int \arcsin(ax)^4\,dx$

Optimal result

Integrand size = 6, antiderivative size = 69

$$\int \arcsin(ax)^4\,dx = 24x - \frac{24\sqrt{1-a^2x^2}\arcsin(ax)}{a} - 12x\arcsin(ax)^2 + \frac{4\sqrt{1-a^2x^2}\arcsin(ax)^3}{a} + x\arcsin(ax)^4$$

```
[Out] 24*x-12*x*arcsin(a*x)^2+x*arcsin(a*x)^4-24*arcsin(a*x)*(-a^2*x^2+1)^(1/2)/a
+4*arcsin(a*x)^3*(-a^2*x^2+1)^(1/2)/a
```

Rubi [A] (verified)

Time = 0.07 (sec) , antiderivative size = 69, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {4715, 4767, 8}

$$\int \arcsin(ax)^4\,dx = \frac{4\sqrt{1-a^2x^2}\arcsin(ax)^3}{a} - \frac{24\sqrt{1-a^2x^2}\arcsin(ax)}{a} + x\arcsin(ax)^4 - 12x\arcsin(ax)^2 + 24x$$

```
[In] Int[ArcSin[a*x]^4,x]
```

```
[Out] 24*x - (24*Sqrt[1 - a^2*x^2]*ArcSin[a*x])/a - 12*x*ArcSin[a*x]^2 + (4*Sqrt[
1 - a^2*x^2]*ArcSin[a*x]^3)/a + x*ArcSin[a*x]^4
```

Rule 8

```
Int[a_, x_Symbol] :> Simp[a*x, x] /; FreeQ[a, x]
```

Rule 4715

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.), x_Symbol] :> Simp[x*(a + b*Ar
cSin[c*x])^n, x] - Dist[b*c*n, Int[x*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 -
c^2*x^2]), x], x] /; FreeQ[{a, b, c}, x] && GtQ[n, 0]
```

Rule 4767

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)*((d_) + (e_.)*(x_)^2)^(p_
.), x_Symbol] :> Simp[(d + e*x^2)^(p + 1)*((a + b*ArcSin[c*x])^n/(2*e*(p +
1))), x] + Dist[b*(n/(2*c*(p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], In
t[(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x] /; FreeQ[{a,
b, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && NeQ[p, -1]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= x\arcsin(ax)^4-(4a)\int\frac{x\arcsin(ax)^3}{\sqrt{1-a^2x^2}}\,dx\\
&=\frac{4\sqrt{1-a^2x^2}\arcsin(ax)^3}{a}+x\arcsin(ax)^4-12\int\arcsin(ax)^2\,dx\\
&=-12x\arcsin(ax)^2+\frac{4\sqrt{1-a^2x^2}\arcsin(ax)^3}{a}+x\arcsin(ax)^4+(24a)\int\frac{x\arcsin(ax)}{\sqrt{1-a^2x^2}}\,dx\\
&=-\frac{24\sqrt{1-a^2x^2}\arcsin(ax)}{a}-12x\arcsin(ax)^2\\
&\quad+\frac{4\sqrt{1-a^2x^2}\arcsin(ax)^3}{a}+x\arcsin(ax)^4+24\int 1\,dx\\
&=24x-\frac{24\sqrt{1-a^2x^2}\arcsin(ax)}{a}-12x\arcsin(ax)^2+\frac{4\sqrt{1-a^2x^2}\arcsin(ax)^3}{a}+x\arcsin(ax)^4
\end{aligned}$$

Mathematica [A] (verified)

Time = 0.02 (sec) , antiderivative size = 69, normalized size of antiderivative = 1.00

$$\int\arcsin(ax)^4\,dx=24x-\frac{24\sqrt{1-a^2x^2}\arcsin(ax)}{a}-12x\arcsin(ax)^2+\frac{4\sqrt{1-a^2x^2}\arcsin(ax)^3}{a}+x\arcsin(ax)^4$$

```
[In] Integrate[ArcSin[a*x]^4,x]
[Out] 24*x - (24*Sqrt[1 - a^2*x^2]*ArcSin[a*x])/a - 12*x*ArcSin[a*x]^2 + (4*Sqrt[
1 - a^2*x^2]*ArcSin[a*x]^3)/a + x*ArcSin[a*x]^4
```

Maple [A] (verified)

Time = 0.03 (sec) , antiderivative size = 67, normalized size of antiderivative = 0.97

method	result	size
derivativedivides	$\frac{ax\arcsin(ax)^4+4\arcsin(ax)^3\sqrt{-a^2x^2+1}-12ax\arcsin(ax)^2+24ax-24\arcsin(ax)\sqrt{-a^2x^2+1}}{a}$	67
default	$\frac{ax\arcsin(ax)^4+4\arcsin(ax)^3\sqrt{-a^2x^2+1}-12ax\arcsin(ax)^2+24ax-24\arcsin(ax)\sqrt{-a^2x^2+1}}{a}$	67

```
[In] int(arcsin(a*x)^4,x,method=_RETURNVERBOSE)
[Out] 1/a*(a*x*arcsin(a*x)^4+4*arcsin(a*x)^3*(-a^2*x^2+1)^(1/2)-12*a*x*arcsin(a*x
)^2+24*a*x-24*arcsin(a*x)*(-a^2*x^2+1)^(1/2))
```

Fricas [A] (verification not implemented)

none

Time = 0.24 (sec) , antiderivative size = 55, normalized size of antiderivative = 0.80

$$\int \arcsin(ax)^4\,dx = \frac{ax\arcsin(ax)^4 - 12\,ax\arcsin(ax)^2 + 24\,ax + 4\,\sqrt{-a^2x^2+1}\left(\arcsin(ax)^3 - 6\,\arcsin(ax)\right)}{a}$$

```
[In] integrate(arcsin(a*x)^4,x, algorithm="fricas")
[Out] (a*x*arcsin(a*x)^4 - 12*a*x*arcsin(a*x)^2 + 24*a*x + 4*sqrt(-a^2*x^2 + 1)*(
arcsin(a*x)^3 - 6*arcsin(a*x)))/a
```

Sympy [A] (verification not implemented)

Time = 0.15 (sec) , antiderivative size = 65, normalized size of antiderivative = 0.94

$$\int \arcsin(ax)^4\,dx = \begin{cases} x\operatorname{asin}^4(ax) - 12x\operatorname{asin}^2(ax) + 24x + \frac{4\sqrt{-a^2x^2+1}\operatorname{asin}^3(ax)}{a} - \frac{24\sqrt{-a^2x^2+1}\operatorname{asin}(ax)}{a} & \text{for } a \neq 0 \\ 0 & \text{otherwise} \end{cases}$$

```
[In] integrate(asin(a*x)**4,x)
[Out] Piecewise((x*asin(a*x)**4 - 12*x*asin(a*x)**2 + 24*x + 4*sqrt(-a**2*x**2 +
1)*asin(a*x)**3/a - 24*sqrt(-a**2*x**2 + 1)*asin(a*x)/a, Ne(a, 0)), (0, Tru
e))
```

Maxima [A] (verification not implemented)

none

Time = 0.27 (sec) , antiderivative size = 75, normalized size of antiderivative = 1.09

$$\int \arcsin(ax)^4\,dx = x\arcsin(ax)^4 + \frac{4\sqrt{-a^2x^2+1}\arcsin(ax)^3}{a} - 12\left(\frac{x\arcsin(ax)^2}{a} - \frac{2\left(x - \frac{\sqrt{-a^2x^2+1}\arcsin(ax)}{a}\right)}{a}\right)a$$

```
[In] integrate(arcsin(a*x)^4,x, algorithm="maxima")
```

```
[Out] x*arcsin(a*x)^4 + 4*sqrt(-a^2*x^2 + 1)*arcsin(a*x)^3/a - 12*(x*arcsin(a*x)^
2/a - 2*(x - sqrt(-a^2*x^2 + 1)*arcsin(a*x)/a)/a)*a
```

Giac [A] (verification not implemented)

none

Time = 0.28 (sec) , antiderivative size = 65, normalized size of antiderivative = 0.94

$$\int \arcsin(ax)^4\,dx = x\arcsin(ax)^4 - 12\,x\arcsin(ax)^2 + \frac{4\sqrt{-a^2x^2+1}\arcsin(ax)^3}{a} + 24\,x - \frac{24\sqrt{-a^2x^2+1}\arcsin(ax)}{a}$$

```
[In] integrate(arcsin(a*x)^4,x, algorithm="giac")
```

```
[Out] x*arcsin(a*x)^4 - 12*x*arcsin(a*x)^2 + 4*sqrt(-a^2*x^2 + 1)*arcsin(a*x)^3/a
 + 24*x - 24*sqrt(-a^2*x^2 + 1)*arcsin(a*x)/a
```

Mupad [B] (verification not implemented)

Time = 0.09 (sec) , antiderivative size = 48, normalized size of antiderivative = 0.70

$$\int \arcsin(ax)^4\,dx = x\left(\mathrm{asin}(a\,x)^4 - 12\,\mathrm{asin}(a\,x)^2 + 24\right) + \frac{4\,\mathrm{asin}(a\,x)\,\sqrt{1-a^2\,x^2}\,\left(\mathrm{asin}(a\,x)^2 - 6\right)}{a}$$

```
[In] int(asin(a*x)^4,x)
```

```
[Out] x*(asin(a*x)^4 - 12*asin(a*x)^2 + 24) + (4*asin(a*x)*(1 - a^2*x^2)^(1/2)*(a
sin(a*x)^2 - 6))/a
```

3.38 $\int \frac{\arcsin(ax)^4}{x} \, dx$

Optimal result

Integrand size = 10, antiderivative size = 113

$$\int \frac{\arcsin(ax)^4}{x} \, dx = -\frac{1}{5} i \arcsin(ax)^5 + \arcsin(ax)^4 \log\left(1 - e^{2i \arcsin(ax)}\right) - 2i \arcsin(ax)^3 \operatorname{PolyLog}\left(2, e^{2i \arcsin(ax)}\right) + 3 \arcsin(ax)^2 \operatorname{PolyLog}\left(3, e^{2i \arcsin(ax)}\right) + 3i \arcsin(ax) \operatorname{PolyLog}\left(4, e^{2i \arcsin(ax)}\right) - \frac{3}{2} \operatorname{PolyLog}\left(5, e^{2i \arcsin(ax)}\right)$$

```
[Out] -1/5*I*arcsin(a*x)^5+arcsin(a*x)^4*ln(1-(I*a*x+(-a^2*x^2+1)^(1/2))^2)-2*I*a
rcsin(a*x)^3*polylog(2,(I*a*x+(-a^2*x^2+1)^(1/2))^2)+3*arcsin(a*x)^2*polylo
g(3,(I*a*x+(-a^2*x^2+1)^(1/2))^2)+3*I*arcsin(a*x)*polylog(4,(I*a*x+(-a^2*x^
2+1)^(1/2))^2)-3/2*polylog(5,(I*a*x+(-a^2*x^2+1)^(1/2))^2)
```

Rubi [A] (verified)

Time = 0.09 (sec) , antiderivative size = 113, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 7, $\frac{\text{number of rules}}{\text{integrand size}} = 0.700$, Rules used = {4721, 3798, 2221, 2611, 6744, 2320, 6724}

$$\int \frac{\arcsin(ax)^4}{x} \, dx = -2i \arcsin(ax)^3 \operatorname{PolyLog}\left(2, e^{2i \arcsin(ax)}\right) + 3 \arcsin(ax)^2 \operatorname{PolyLog}\left(3, e^{2i \arcsin(ax)}\right) + 3i \arcsin(ax) \operatorname{PolyLog}\left(4, e^{2i \arcsin(ax)}\right) - \frac{3}{2} \operatorname{PolyLog}\left(5, e^{2i \arcsin(ax)}\right) - \frac{1}{5} i \arcsin(ax)^5 + \arcsin(ax)^4 \log\left(1 - e^{2i \arcsin(ax)}\right)$$

```
[In] Int[ArcSin[a*x]^4/x,x]
```

```
[Out] (-1/5*I)*ArcSin[a*x]^5 + ArcSin[a*x]^4*Log[1 - E^((2*I)*ArcSin[a*x])] - (2*
I)*ArcSin[a*x]^3*PolyLog[2, E^((2*I)*ArcSin[a*x])] + 3*ArcSin[a*x]^2*PolyLo
g[3, E^((2*I)*ArcSin[a*x])] + (3*I)*ArcSin[a*x]*PolyLog[4, E^((2*I)*ArcSin[
a*x])] - (3*PolyLog[5, E^((2*I)*ArcSin[a*x])])/2
```

Rule 2221

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m/(b*f*g*n*Log[F]))*Log[1 + b*((F^(g*(e + f*x)))^n/a)], x] - Di
st[d*(m/(b*f*g*n*Log[F])), Int[(c + d*x)^(m - 1)*Log[1 + b*((F^(g*(e + f*x)
))^n/a)], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2320

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2611

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> Simp[(-(f + g*x)^m)*(PolyLog[2, (-e)*(F^(c*(a +
b*x)))^n]/(b*c*n*Log[F])), x] + Dist[g*(m/(b*c*n*Log[F])), Int[(f + g*x)^(m
 - 1)*PolyLog[2, (-e)*(F^(c*(a + b*x)))^n], x], x] /; FreeQ[{F, a, b, c, e,
 f, g, n}, x] && GtQ[m, 0]
```

Rule 3798

```
Int[((c_.) + (d_.)*(x_))^(m_.)*tan[(e_.) + Pi*(k_.) + (f_.)*(x_)], x_Symbol
] :> Simp[I*((c + d*x)^(m + 1)/(d*(m + 1))), x] - Dist[2*I, Int[(c + d*x)^m
*E^(2*I*k*Pi)*(E^(2*I*(e + f*x))/(1 + E^(2*I*k*Pi)*E^(2*I*(e + f*x)))), x],
 x] /; FreeQ[{c, d, e, f}, x] && IntegerQ[4*k] && IGtQ[m, 0]
```

Rule 4721

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)/(x_), x_Symbol] :> Subst[Int[(
a + b*x)^n*Cot[x], x], x, ArcSin[c*x]] /; FreeQ[{a, b, c}, x] && IGtQ[n, 0]
```

Rule 6724

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rule 6744

```
Int[((e_.) + (f_.)*(x_))^(m_.)*PolyLog[n_, (d_.)*((F_)^((c_.)*((a_.) + (b_.
)*(x_))))^(p_.)], x_Symbol] :> Simp[(e + f*x)^m*(PolyLog[n + 1, d*(F^(c*(a
+ b*x)))^p]/(b*c*p*Log[F])), x] - Dist[f*(m/(b*c*p*Log[F])), Int[(e + f*x)^
(m - 1)*PolyLog[n + 1, d*(F^(c*(a + b*x)))^p], x], x] /; FreeQ[{F, a, b, c,
 d, e, f, n, p}, x] && GtQ[m, 0]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= \text{Subst}\left(\int x^4 \cot(x)\,dx, x, \arcsin(ax)\right)\\
&= -\frac{1}{5} i \arcsin(ax)^5 - 2i\text{Subst}\left(\int \frac{e^{2ix}x^4}{1-e^{2ix}}\,dx, x, \arcsin(ax)\right)\\
&= -\frac{1}{5} i \arcsin(ax)^5 + \arcsin(ax)^4 \log\left(1-e^{2i\arcsin(ax)}\right)\\
&\quad - 4\text{Subst}\left(\int x^3 \log\left(1-e^{2ix}\right)\,dx, x, \arcsin(ax)\right)\\
&= -\frac{1}{5} i \arcsin(ax)^5 + \arcsin(ax)^4 \log\left(1-e^{2i\arcsin(ax)}\right)\\
&\quad - 2i\arcsin(ax)^3 \text{PolyLog}\left(2, e^{2i\arcsin(ax)}\right)\\
&\quad + 6i\text{Subst}\left(\int x^2 \text{PolyLog}\left(2, e^{2ix}\right)\,dx, x, \arcsin(ax)\right)\\
&= -\frac{1}{5} i \arcsin(ax)^5 + \arcsin(ax)^4 \log\left(1-e^{2i\arcsin(ax)}\right) - 2i\arcsin(ax)^3 \text{PolyLog}\left(2, e^{2i\arcsin(ax)}\right)\\
&\quad + 3\arcsin(ax)^2 \text{PolyLog}\left(3, e^{2i\arcsin(ax)}\right) - 6\text{Subst}\left(\int x\,\text{PolyLog}\left(3, e^{2ix}\right)\,dx, x, \arcsin(ax)\right)\\
&= -\frac{1}{5} i \arcsin(ax)^5 + \arcsin(ax)^4 \log\left(1-e^{2i\arcsin(ax)}\right)\\
&\quad - 2i\arcsin(ax)^3 \text{PolyLog}\left(2, e^{2i\arcsin(ax)}\right)\\
&\quad + 3\arcsin(ax)^2 \text{PolyLog}\left(3, e^{2i\arcsin(ax)}\right) + 3i\arcsin(ax)\,\text{PolyLog}\left(4, e^{2i\arcsin(ax)}\right)\\
&\quad - 3i\text{Subst}\left(\int \text{PolyLog}\left(4, e^{2ix}\right)\,dx, x, \arcsin(ax)\right)\\
&= -\frac{1}{5} i \arcsin(ax)^5 + \arcsin(ax)^4 \log\left(1-e^{2i\arcsin(ax)}\right)\\
&\quad - 2i\arcsin(ax)^3 \text{PolyLog}\left(2, e^{2i\arcsin(ax)}\right)\\
&\quad + 3\arcsin(ax)^2 \text{PolyLog}\left(3, e^{2i\arcsin(ax)}\right) + 3i\arcsin(ax)\,\text{PolyLog}\left(4, e^{2i\arcsin(ax)}\right)\\
&\quad - \frac{3}{2}\text{Subst}\left(\int \frac{\text{PolyLog}(4,x)}{x}\,dx, x, e^{2i\arcsin(ax)}\right)
\end{aligned}$$

$$= -\frac{1}{5}i\arcsin(ax)^5 + \arcsin(ax)^4\log\left(1-e^{2i\arcsin(ax)}\right) - 2i\arcsin(ax)^3\operatorname{PolyLog}\left(2,e^{2i\arcsin(ax)}\right) + 3\arcsin(ax)^2\operatorname{PolyLog}\left(3,e^{2i\arcsin(ax)}\right) + 3i\arcsin(ax)\operatorname{PolyLog}\left(4,e^{2i\arcsin(ax)}\right) - \frac{3}{2}\operatorname{PolyLog}\left(5,e^{2i\arcsin(ax)}\right)$$

Mathematica [A] (verified)

Time = 0.05 (sec) , antiderivative size = 113, normalized size of antiderivative = 1.00

$$\int \frac{\arcsin(ax)^4}{x}\,dx = \frac{1}{5}i\arcsin(ax)^5 + \arcsin(ax)^4\log\left(1-e^{-2i\arcsin(ax)}\right) + 2i\arcsin(ax)^3\operatorname{PolyLog}\left(2,e^{-2i\arcsin(ax)}\right) + 3\arcsin(ax)^2\operatorname{PolyLog}\left(3,e^{-2i\arcsin(ax)}\right) - 3i\arcsin(ax)\operatorname{PolyLog}\left(4,e^{-2i\arcsin(ax)}\right) - \frac{3}{2}\operatorname{PolyLog}\left(5,e^{-2i\arcsin(ax)}\right)$$

```
[In] Integrate[ArcSin[a*x]^4/x,x]
```

```
[Out] (I/5)*ArcSin[a*x]^5 + ArcSin[a*x]^4*Log[1 - E^((-2*I)*ArcSin[a*x])] + (2*I)
*ArcSin[a*x]^3*PolyLog[2, E^((-2*I)*ArcSin[a*x])] + 3*ArcSin[a*x]^2*PolyLog
[3, E^((-2*I)*ArcSin[a*x])] - (3*I)*ArcSin[a*x]*PolyLog[4, E^((-2*I)*ArcSin
[a*x])] - (3*PolyLog[5, E^((-2*I)*ArcSin[a*x])])/2
```

Maple [A] (verified)

Time = 0.05 (sec) , antiderivative size = 287, normalized size of antiderivative = 2.54

method	result
derivativedivides	$-\frac{i\arcsin(ax)^5}{5} + \arcsin(ax)^4\ln\left(1-iax-\sqrt{-a^2x^2+1}\right) - 4i\arcsin(ax)^3\operatorname{polylog}\left(2, iax\right.$
default	$-\frac{i\arcsin(ax)^5}{5} + \arcsin(ax)^4\ln\left(1-iax-\sqrt{-a^2x^2+1}\right) - 4i\arcsin(ax)^3\operatorname{polylog}\left(2, iax\right.$

```
[In] int(arcsin(a*x)^4/x,x,method=_RETURNVERBOSE)
```

```
[Out] -1/5*I*arcsin(a*x)^5+arcsin(a*x)^4*ln(1-I*a*x-(-a^2*x^2+1)^(1/2))-4*I*arcsi
n(a*x)^3*polylog(2,I*a*x+(-a^2*x^2+1)^(1/2))+12*arcsin(a*x)^2*polylog(3,I*a
*x+(-a^2*x^2+1)^(1/2))+24*I*arcsin(a*x)*polylog(4,I*a*x+(-a^2*x^2+1)^(1/2))
-24*polylog(5,I*a*x+(-a^2*x^2+1)^(1/2))+arcsin(a*x)^4*ln(1+I*a*x+(-a^2*x^2+
1)^(1/2))-4*I*arcsin(a*x)^3*polylog(2,-I*a*x-(-a^2*x^2+1)^(1/2))+12*arcsin(
a*x)^2*polylog(3,-I*a*x-(-a^2*x^2+1)^(1/2))+24*I*arcsin(a*x)*polylog(4,-I*a
*x-(-a^2*x^2+1)^(1/2))-24*polylog(5,-I*a*x-(-a^2*x^2+1)^(1/2))
```

Fricas [F]

$$\int \frac{\arcsin(ax)^4}{x}\,dx = \int \frac{\arcsin\left(ax\right)^4}{x}\,dx$$

```
[In] integrate(arcsin(a*x)^4/x,x, algorithm="fricas")
[Out] integral(arcsin(a*x)^4/x, x)
```

Sympy [F]

$$\int \frac{\arcsin(ax)^4}{x}\,dx = \int \frac{\operatorname{asin}^4\left(ax\right)}{x}\,dx$$

```
[In] integrate(asin(a*x)**4/x,x)
[Out] Integral(asin(a*x)**4/x, x)
```

Maxima [F]

$$\int \frac{\arcsin(ax)^4}{x}\,dx = \int \frac{\arcsin\left(ax\right)^4}{x}\,dx$$

```
[In] integrate(arcsin(a*x)^4/x,x, algorithm="maxima")
[Out] integrate(arcsin(a*x)^4/x, x)
```

Giac [F]

$$\int \frac{\arcsin(ax)^4}{x}\,dx = \int \frac{\arcsin\left(ax\right)^4}{x}\,dx$$

```
[In] integrate(arcsin(a*x)^4/x,x, algorithm="giac")
[Out] integrate(arcsin(a*x)^4/x, x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{\arcsin(ax)^4}{x}\,dx = \int \frac{\mathrm{asin}(a\,x)^4}{x}\,dx$$

```
[In] int(asin(a*x)^4/x,x)
[Out] int(asin(a*x)^4/x, x)
```

3.39 $\int \frac{\arcsin(ax)^4}{x^2} \, dx$

Optimal result

Integrand size = 10, antiderivative size = 156

$$\begin{aligned}\int \frac{\arcsin(ax)^4}{x^2}\,dx = {} & -\frac{\arcsin(ax)^4}{x} - 8a\arcsin(ax)^3\operatorname{arctanh}\left(e^{i\arcsin(ax)}\right) \\ & + 12ia\arcsin(ax)^2\operatorname{PolyLog}\left(2,-e^{i\arcsin(ax)}\right) \\ & - 12ia\arcsin(ax)^2\operatorname{PolyLog}\left(2,e^{i\arcsin(ax)}\right) \\ & - 24a\arcsin(ax)\operatorname{PolyLog}\left(3,-e^{i\arcsin(ax)}\right) \\ & + 24a\arcsin(ax)\operatorname{PolyLog}\left(3,e^{i\arcsin(ax)}\right) \\ & - 24ia\operatorname{PolyLog}\left(4,-e^{i\arcsin(ax)}\right) + 24ia\operatorname{PolyLog}\left(4,e^{i\arcsin(ax)}\right)\end{aligned}$$

```
[Out] -arcsin(a*x)^4/x-8*a*arcsin(a*x)^3*arctanh(I*a*x+(-a^2*x^2+1)^(1/2))+12*I*a
*arcsin(a*x)^2*polylog(2,-I*a*x-(-a^2*x^2+1)^(1/2))-12*I*a*arcsin(a*x)^2*po
lylog(2,I*a*x+(-a^2*x^2+1)^(1/2))-24*a*arcsin(a*x)*polylog(3,-I*a*x-(-a^2*x
^2+1)^(1/2))+24*a*arcsin(a*x)*polylog(3,I*a*x+(-a^2*x^2+1)^(1/2))-24*I*a*po
lylog(4,-I*a*x-(-a^2*x^2+1)^(1/2))+24*I*a*polylog(4,I*a*x+(-a^2*x^2+1)^(1/2
))
```

Rubi [A] (verified)

Time = 0.12 (sec) , antiderivative size = 156, normalized size of antiderivative = 1.00, number of steps used = 11, number of rules used = 7, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.700, Rules used

$= \{4723, 4803, 4268, 2611, 6744, 2320, 6724\}$

$$\int \frac{\arcsin(ax)^4}{x^2}\,dx = -8a\arcsin(ax)^3\operatorname{arctanh}\left(e^{i\arcsin(ax)}\right) + 12ia\arcsin(ax)^2\operatorname{PolyLog}\left(2,-e^{i\arcsin(ax)}\right) - 12ia\arcsin(ax)^2\operatorname{PolyLog}\left(2,e^{i\arcsin(ax)}\right) - 24a\arcsin(ax)\operatorname{PolyLog}\left(3,-e^{i\arcsin(ax)}\right) + 24a\arcsin(ax)\operatorname{PolyLog}\left(3,e^{i\arcsin(ax)}\right) - 24ia\operatorname{PolyLog}\left(4,-e^{i\arcsin(ax)}\right) + 24ia\operatorname{PolyLog}\left(4,e^{i\arcsin(ax)}\right) - \frac{\arcsin(ax)^4}{x}$$

```
[In] Int[ArcSin[a*x]^4/x^2,x]
```

```
[Out] -(ArcSin[a*x]^4/x) - 8*a*ArcSin[a*x]^3*ArcTanh[E^(I*ArcSin[a*x])] + (12*I)*
a*ArcSin[a*x]^2*PolyLog[2, -E^(I*ArcSin[a*x])] - (12*I)*a*ArcSin[a*x]^2*Pol
yLog[2, E^(I*ArcSin[a*x])] - 24*a*ArcSin[a*x]*PolyLog[3, -E^(I*ArcSin[a*x])
] + 24*a*ArcSin[a*x]*PolyLog[3, E^(I*ArcSin[a*x])] - (24*I)*a*PolyLog[4, -E
^(I*ArcSin[a*x])] + (24*I)*a*PolyLog[4, E^(I*ArcSin[a*x])]
```

Rule 2320

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2611

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> Simp[(-(f + g*x)^m)*(PolyLog[2, (-e)*(F^(c*(a +
b*x)))^n]/(b*c*n*Log[F])), x] + Dist[g*(m/(b*c*n*Log[F])), Int[(f + g*x)^(m
 - 1)*PolyLog[2, (-e)*(F^(c*(a + b*x)))^n], x], x] /; FreeQ[{F, a, b, c, e,
 f, g, n}, x] && GtQ[m, 0]
```

Rule 4268

```
Int[csc[(e_.) + (f_.)*(x_)]*((c_.) + (d_.)*(x_))^(m_.), x_Symbol] :> Simp[-
2*(c + d*x)^m*(ArcTanh[E^(I*(e + f*x))]/f), x] + (-Dist[d*(m/f), Int[(c + d
*x)^(m - 1)*Log[1 - E^(I*(e + f*x))], x], x] + Dist[d*(m/f), Int[(c + d*x)^
(m - 1)*Log[1 + E^(I*(e + f*x))], x], x]) /; FreeQ[{c, d, e, f}, x] && IGtQ
[m, 0]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
```

```
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rule 4803

```
Int[(((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_))/Sqrt[(d_) + (e_.)*
(x_)^2], x_Symbol] :> Dist[(1/c^(m + 1))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*
x^2]], Subst[Int[(a + b*x)^n*Sin[x]^m, x], x, ArcSin[c*x]], x] /; FreeQ[{a,
 b, c, d, e}, x] && EqQ[c^2*d + e, 0] && IGtQ[n, 0] && IntegerQ[m]
```

Rule 6724

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rule 6744

```
Int[((e_.) + (f_.)*(x_))^(m_.)*PolyLog[n_, (d_.)*((F_)^((c_.)*((a_.) + (b_.
)*(x_))))^(p_.)], x_Symbol] :> Simp[(e + f*x)^m*(PolyLog[n + 1, d*(F^(c*(a
+ b*x)))^p]/(b*c*p*Log[F])), x] - Dist[f*(m/(b*c*p*Log[F])), Int[(e + f*x)^
(m - 1)*PolyLog[n + 1, d*(F^(c*(a + b*x)))^p], x], x] /; FreeQ[{F, a, b, c,
 d, e, f, n, p}, x] && GtQ[m, 0]
```

Rubi steps

$$
\begin{aligned}
\text{integral} &= -\frac{\arcsin(ax)^4}{x} + (4a)\int \frac{\arcsin(ax)^3}{x\sqrt{1-a^2x^2}}\,dx \\
&= -\frac{\arcsin(ax)^4}{x} + (4a)\text{Subst}\left(\int x^3\csc(x)\,dx, x, \arcsin(ax)\right) \\
&= -\frac{\arcsin(ax)^4}{x} - 8a\arcsin(ax)^3\text{arctanh}\left(e^{i\arcsin(ax)}\right) \\
&\quad - (12a)\text{Subst}\left(\int x^2\log\left(1-e^{ix}\right)\,dx, x, \arcsin(ax)\right) \\
&\quad + (12a)\text{Subst}\left(\int x^2\log\left(1+e^{ix}\right)\,dx, x, \arcsin(ax)\right) \\
&= -\frac{\arcsin(ax)^4}{x} - 8a\arcsin(ax)^3\text{arctanh}\left(e^{i\arcsin(ax)}\right) \\
&\quad + 12ia\arcsin(ax)^2\,\text{PolyLog}\left(2, -e^{i\arcsin(ax)}\right) \\
&\quad - 12ia\arcsin(ax)^2\,\text{PolyLog}\left(2, e^{i\arcsin(ax)}\right) \\
&\quad - (24ia)\text{Subst}\left(\int x\,\text{PolyLog}\left(2, -e^{ix}\right)\,dx, x, \arcsin(ax)\right) \\
&\quad + (24ia)\text{Subst}\left(\int x\,\text{PolyLog}\left(2, e^{ix}\right)\,dx, x, \arcsin(ax)\right)
\end{aligned}
$$

$$
\begin{aligned}
&= -\frac{\arcsin(ax)^4}{x} - 8a\arcsin(ax)^3\operatorname{arctanh}\left(e^{i\arcsin(ax)}\right) \\
&\quad + 12ia\arcsin(ax)^2\operatorname{PolyLog}\left(2, -e^{i\arcsin(ax)}\right) \\
&\quad - 12ia\arcsin(ax)^2\operatorname{PolyLog}\left(2, e^{i\arcsin(ax)}\right) \\
&\quad - 24a\arcsin(ax)\operatorname{PolyLog}\left(3, -e^{i\arcsin(ax)}\right) + 24a\arcsin(ax)\operatorname{PolyLog}\left(3, e^{i\arcsin(ax)}\right) \\
&\quad + (24a)\operatorname{Subst}\left(\int \operatorname{PolyLog}\left(3, -e^{ix}\right)\,dx, x, \arcsin(ax)\right) \\
&\quad - (24a)\operatorname{Subst}\left(\int \operatorname{PolyLog}\left(3, e^{ix}\right)\,dx, x, \arcsin(ax)\right)
\end{aligned}
$$

$$
\begin{aligned}
&= -\frac{\arcsin(ax)^4}{x} - 8a\arcsin(ax)^3\operatorname{arctanh}\left(e^{i\arcsin(ax)}\right) \\
&\quad + 12ia\arcsin(ax)^2\operatorname{PolyLog}\left(2, -e^{i\arcsin(ax)}\right) \\
&\quad - 12ia\arcsin(ax)^2\operatorname{PolyLog}\left(2, e^{i\arcsin(ax)}\right) \\
&\quad - 24a\arcsin(ax)\operatorname{PolyLog}\left(3, -e^{i\arcsin(ax)}\right) + 24a\arcsin(ax)\operatorname{PolyLog}\left(3, e^{i\arcsin(ax)}\right) \\
&\quad - (24ia)\operatorname{Subst}\left(\int \frac{\operatorname{PolyLog}(3, -x)}{x}\,dx, x, e^{i\arcsin(ax)}\right) \\
&\quad + (24ia)\operatorname{Subst}\left(\int \frac{\operatorname{PolyLog}(3, x)}{x}\,dx, x, e^{i\arcsin(ax)}\right)
\end{aligned}
$$

$$
\begin{aligned}
&= -\frac{\arcsin(ax)^4}{x} - 8a\arcsin(ax)^3\operatorname{arctanh}\left(e^{i\arcsin(ax)}\right) \\
&\quad + 12ia\arcsin(ax)^2\operatorname{PolyLog}\left(2, -e^{i\arcsin(ax)}\right) \\
&\quad - 12ia\arcsin(ax)^2\operatorname{PolyLog}\left(2, e^{i\arcsin(ax)}\right) \\
&\quad - 24a\arcsin(ax)\operatorname{PolyLog}\left(3, -e^{i\arcsin(ax)}\right) + 24a\arcsin(ax)\operatorname{PolyLog}\left(3, e^{i\arcsin(ax)}\right) \\
&\quad - 24ia\operatorname{PolyLog}\left(4, -e^{i\arcsin(ax)}\right) + 24ia\operatorname{PolyLog}\left(4, e^{i\arcsin(ax)}\right)
\end{aligned}
$$

Mathematica [A] (verified)

Time = 0.23 (sec) , antiderivative size = 198, normalized size of antiderivative = 1.27

$$
\begin{aligned}
\int \frac{\arcsin(ax)^4}{x^2}\,dx = a\Bigg(&-\frac{i\pi^4}{2} + i\arcsin(ax)^4 - \frac{\arcsin(ax)^4}{ax} \\
&+ 4\arcsin(ax)^3\log\left(1 - e^{-i\arcsin(ax)}\right) - 4\arcsin(ax)^3\log\left(1 + e^{i\arcsin(ax)}\right) \\
&+ 12i\arcsin(ax)^2\operatorname{PolyLog}\left(2, e^{-i\arcsin(ax)}\right) \\
&+ 12i\arcsin(ax)^2\operatorname{PolyLog}\left(2, -e^{i\arcsin(ax)}\right) \\
&+ 24\arcsin(ax)\operatorname{PolyLog}\left(3, e^{-i\arcsin(ax)}\right) \\
&- 24\arcsin(ax)\operatorname{PolyLog}\left(3, -e^{i\arcsin(ax)}\right) \\
&- 24i\operatorname{PolyLog}\left(4, e^{-i\arcsin(ax)}\right) - 24i\operatorname{PolyLog}\left(4, -e^{i\arcsin(ax)}\right)\Bigg)
\end{aligned}
$$

```
[In] Integrate[ArcSin[a*x]^4/x^2,x]
```

```
[Out] a*((-1/2*I)*Pi^4 + I*ArcSin[a*x]^4 - ArcSin[a*x]^4/(a*x) + 4*ArcSin[a*x]^3*
Log[1 - E^((-I)*ArcSin[a*x])] - 4*ArcSin[a*x]^3*Log[1 + E^(I*ArcSin[a*x])]
+ (12*I)*ArcSin[a*x]^2*PolyLog[2, E^((-I)*ArcSin[a*x])] + (12*I)*ArcSin[a*x
]^2*PolyLog[2, -E^(I*ArcSin[a*x])] + 24*ArcSin[a*x]*PolyLog[3, E^((-I)*ArcS
in[a*x])] - 24*ArcSin[a*x]*PolyLog[3, -E^(I*ArcSin[a*x])] - (24*I)*PolyLog[
4, E^((-I)*ArcSin[a*x])] - (24*I)*PolyLog[4, -E^(I*ArcSin[a*x])])
```

Maple [A] (verified)

Time = 0.05 (sec) , antiderivative size = 238, normalized size of antiderivative = 1.53

method	result
derivativedivides	$a\left(-\frac{\arcsin(ax)^4}{ax}+4\arcsin\left(ax\right)^3\ln\left(1-iax-\sqrt{-a^2x^2+1}\right)-4\arcsin\left(ax\right)^3\ln\left(1+iax+\right.\right.$
default	$a\left(-\frac{\arcsin(ax)^4}{ax}+4\arcsin\left(ax\right)^3\ln\left(1-iax-\sqrt{-a^2x^2+1}\right)-4\arcsin\left(ax\right)^3\ln\left(1+iax+\right.\right.$

```
[In] int(arcsin(a*x)^4/x^2,x,method=_RETURNVERBOSE)
```

```
[Out] a*(-arcsin(a*x)^4/a/x+4*arcsin(a*x)^3*ln(1-I*a*x-(-a^2*x^2+1)^(1/2))-4*arcs
in(a*x)^3*ln(1+I*a*x+(-a^2*x^2+1)^(1/2))+24*arcsin(a*x)*polylog(3,I*a*x+(-a
^2*x^2+1)^(1/2))-24*arcsin(a*x)*polylog(3,-I*a*x-(-a^2*x^2+1)^(1/2))-12*I*a
rcsin(a*x)^2*polylog(2,I*a*x+(-a^2*x^2+1)^(1/2))+12*I*arcsin(a*x)^2*polylog
(2,-I*a*x-(-a^2*x^2+1)^(1/2))+24*I*polylog(4,I*a*x+(-a^2*x^2+1)^(1/2))-24*I
*polylog(4,-I*a*x-(-a^2*x^2+1)^(1/2)))
```

Fricas [F]

$$\int \frac{\arcsin(ax)^4}{x^2}\,dx=\int \frac{\arcsin\left(ax\right)^4}{x^2}\,dx$$

```
[In] integrate(arcsin(a*x)^4/x^2,x, algorithm="fricas")
```

```
[Out] integral(arcsin(a*x)^4/x^2, x)
```

Sympy [F]

$$\int \frac{\arcsin(ax)^4}{x^2} dx = \int \frac{\operatorname{asin}^4(ax)}{x^2} dx$$

[In] integrate(asin(a*x)**4/x**2,x)

[Out] Integral(asin(a*x)**4/x**2, x)

Maxima [F]

$$\int \frac{\arcsin(ax)^4}{x^2} dx = \int \frac{\arcsin(ax)^4}{x^2} dx$$

[In] integrate(arcsin(a*x)^4/x^2,x, algorithm="maxima")

[Out] -(arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^4 + 4*a*x*integrate(sqrt(a*x + 1)*sqrt(-a*x + 1)*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^3/(a^2*x^3 - x), x))/x

Giac [F]

$$\int \frac{\arcsin(ax)^4}{x^2} dx = \int \frac{\arcsin(ax)^4}{x^2} dx$$

[In] integrate(arcsin(a*x)^4/x^2,x, algorithm="giac")

[Out] integrate(arcsin(a*x)^4/x^2, x)

Mupad [F(-1)]

Timed out.

$$\int \frac{\arcsin(ax)^4}{x^2} dx = \int \frac{\operatorname{asin}(a\,x)^4}{x^2} dx$$

[In] int(asin(a*x)^4/x^2,x)

[Out] int(asin(a*x)^4/x^2, x)

3.40 $\int \frac{\arcsin(ax)^4}{x^3}\,dx$

Optimal result

Integrand size = 10, antiderivative size = 119

$$\int \frac{\arcsin(ax)^4}{x^3}\,dx = -2ia^2\arcsin(ax)^3 - \frac{2a\sqrt{1-a^2x^2}\arcsin(ax)^3}{x} - \frac{\arcsin(ax)^4}{2x^2} + 6a^2\arcsin(ax)^2\log\left(1-e^{2i\arcsin(ax)}\right) - 6ia^2\arcsin(ax)\operatorname{PolyLog}\left(2,e^{2i\arcsin(ax)}\right) + 3a^2\operatorname{PolyLog}\left(3,e^{2i\arcsin(ax)}\right)$$

```
[Out] -2*I*a^2*arcsin(a*x)^3-1/2*arcsin(a*x)^4/x^2+6*a^2*arcsin(a*x)^2*ln(1-(I*a*
x+(-a^2*x^2+1)^(1/2))^2)-6*I*a^2*arcsin(a*x)*polylog(2,(I*a*x+(-a^2*x^2+1)^
(1/2))^2)+3*a^2*polylog(3,(I*a*x+(-a^2*x^2+1)^(1/2))^2)-2*a*arcsin(a*x)^3*(
-a^2*x^2+1)^(1/2)/x
```

Rubi [A] (verified)

Time = 0.14 (sec) , antiderivative size = 119, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.800, Rules used = {4723, 4771, 4721, 3798, 2221, 2611, 2320, 6724}

$$\int \frac{\arcsin(ax)^4}{x^3}\,dx = -6ia^2\arcsin(ax)\operatorname{PolyLog}\left(2,e^{2i\arcsin(ax)}\right) + 3a^2\operatorname{PolyLog}\left(3,e^{2i\arcsin(ax)}\right) - \frac{2a\sqrt{1-a^2x^2}\arcsin(ax)^3}{x} - 2ia^2\arcsin(ax)^3 + 6a^2\arcsin(ax)^2\log\left(1-e^{2i\arcsin(ax)}\right) - \frac{\arcsin(ax)^4}{2x^2}$$

```
[In] Int[ArcSin[a*x]^4/x^3,x]
```

```
[Out] (-2*I)*a^2*ArcSin[a*x]^3 - (2*a*Sqrt[1 - a^2*x^2]*ArcSin[a*x]^3)/x - ArcSin
[a*x]^4/(2*x^2) + 6*a^2*ArcSin[a*x]^2*Log[1 - E^((2*I)*ArcSin[a*x])] - (6*I
)*a^2*ArcSin[a*x]*PolyLog[2, E^((2*I)*ArcSin[a*x])] + 3*a^2*PolyLog[3, E^((
2*I)*ArcSin[a*x])]
```

Rule 2221

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m/(b*f*g*n*Log[F]))*Log[1 + b*((F^(g*(e + f*x)))^n/a)], x] - Di
st[d*(m/(b*f*g*n*Log[F])), Int[(c + d*x)^(m - 1)*Log[1 + b*((F^(g*(e + f*x)
))^n/a)], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2320

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2611

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> Simp[(-(f + g*x)^m)*(PolyLog[2, (-e)*(F^(c*(a +
b*x)))^n]/(b*c*n*Log[F])), x] + Dist[g*(m/(b*c*n*Log[F])), Int[(f + g*x)^(m
 - 1)*PolyLog[2, (-e)*(F^(c*(a + b*x)))^n], x], x] /; FreeQ[{F, a, b, c, e,
 f, g, n}, x] && GtQ[m, 0]
```

Rule 3798

```
Int[((c_.) + (d_.)*(x_))^(m_.)*tan[(e_.) + Pi*(k_.) + (f_.)*(x_)], x_Symbol
] :> Simp[I*((c + d*x)^(m + 1)/(d*(m + 1))), x] - Dist[2*I, Int[(c + d*x)^m
*E^(2*I*k*Pi)*(E^(2*I*(e + f*x))/(1 + E^(2*I*k*Pi)*E^(2*I*(e + f*x)))), x],
 x] /; FreeQ[{c, d, e, f}, x] && IntegerQ[4*k] && IGtQ[m, 0]
```

Rule 4721

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)/(x_), x_Symbol] :> Subst[Int[(
a + b*x)^n*Cot[x], x], x, ArcSin[c*x]] /; FreeQ[{a, b, c}, x] && IGtQ[n, 0]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rule 4771

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_)*((d_) + (e_.
)*(x_)^2)^(p_), x_Symbol] :> Simp[(f*x)^(m + 1)*(d + e*x^2)^(p + 1)*((a + b
*ArcSin[c*x])^n/(d*f*(m + 1))), x] - Dist[b*c*(n/(f*(m + 1)))*Simp[(d + e*x
^2)^p/(1 - c^2*x^2)^p], Int[(f*x)^(m + 1)*(1 - c^2*x^2)^(p + 1/2)*(a + b*Ar
cSin[c*x])^(n - 1), x], x] /; FreeQ[{a, b, c, d, e, f, m, p}, x] && EqQ[c^2
*d + e, 0] && GtQ[n, 0] && EqQ[m + 2*p + 3, 0] && NeQ[m, -1]
```

Rule 6724

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rubi steps

$$
\begin{aligned}
\text{integral} &= -\frac{\arcsin(ax)^4}{2x^2} + (2a)\int \frac{\arcsin(ax)^3}{x^2\sqrt{1-a^2x^2}}\,dx \\
&= -\frac{2a\sqrt{1-a^2x^2}\arcsin(ax)^3}{x} - \frac{\arcsin(ax)^4}{2x^2} + \left(6a^2\right)\int \frac{\arcsin(ax)^2}{x}\,dx \\
&= -\frac{2a\sqrt{1-a^2x^2}\arcsin(ax)^3}{x} - \frac{\arcsin(ax)^4}{2x^2} + \left(6a^2\right)\text{Subst}\left(\int x^2\cot(x)\,dx, x, \arcsin(ax)\right) \\
&= -2ia^2\arcsin(ax)^3 - \frac{2a\sqrt{1-a^2x^2}\arcsin(ax)^3}{x} - \frac{\arcsin(ax)^4}{2x^2} \\
&\quad - \left(12ia^2\right)\text{Subst}\left(\int \frac{e^{2ix}x^2}{1-e^{2ix}}\,dx, x, \arcsin(ax)\right) \\
&= -2ia^2\arcsin(ax)^3 - \frac{2a\sqrt{1-a^2x^2}\arcsin(ax)^3}{x} \\
&\quad - \frac{\arcsin(ax)^4}{2x^2} + 6a^2\arcsin(ax)^2\log\left(1-e^{2i\arcsin(ax)}\right) \\
&\quad - \left(12a^2\right)\text{Subst}\left(\int x\log\left(1-e^{2ix}\right)\,dx, x, \arcsin(ax)\right) \\
&= -2ia^2\arcsin(ax)^3 - \frac{2a\sqrt{1-a^2x^2}\arcsin(ax)^3}{x} - \frac{\arcsin(ax)^4}{2x^2} \\
&\quad + 6a^2\arcsin(ax)^2\log\left(1-e^{2i\arcsin(ax)}\right) - 6ia^2\arcsin(ax)\,\text{PolyLog}\left(2, e^{2i\arcsin(ax)}\right) \\
&\quad + \left(6ia^2\right)\text{Subst}\left(\int \text{PolyLog}\left(2, e^{2ix}\right)\,dx, x, \arcsin(ax)\right)
\end{aligned}
$$

$$= -2ia^2 \arcsin(ax)^3 - \frac{2a\sqrt{1-a^2x^2}\arcsin(ax)^3}{x} - \frac{\arcsin(ax)^4}{2x^2} + 6a^2 \arcsin(ax)^2 \log\left(1-e^{2i\arcsin(ax)}\right) - 6ia^2 \arcsin(ax)\,\text{PolyLog}\left(2, e^{2i\arcsin(ax)}\right) + \left(3a^2\right)\text{Subst}\left(\int \frac{\text{PolyLog}(2,x)}{x}\,dx, x, e^{2i\arcsin(ax)}\right)$$

$$= -2ia^2 \arcsin(ax)^3 - \frac{2a\sqrt{1-a^2x^2}\arcsin(ax)^3}{x} - \frac{\arcsin(ax)^4}{2x^2} + 6a^2 \arcsin(ax)^2 \log\left(1-e^{2i\arcsin(ax)}\right) - 6ia^2 \arcsin(ax)\,\text{PolyLog}\left(2, e^{2i\arcsin(ax)}\right) + 3a^2\,\text{PolyLog}\left(3, e^{2i\arcsin(ax)}\right)$$

Mathematica [A] (verified)

Time = 0.30 (sec) , antiderivative size = 124, normalized size of antiderivative = 1.04

$$\int \frac{\arcsin(ax)^4}{x^3}\,dx = -\frac{\arcsin(ax)^4}{2x^2} + \frac{1}{4}a^2\left(-i\pi^3 + 8i\arcsin(ax)^3 - \frac{8\sqrt{1-a^2x^2}\arcsin(ax)^3}{ax} + 24\arcsin(ax)^2\log\left(1-e^{-2i\arcsin(ax)}\right) + 24i\arcsin(ax)\,\text{PolyLog}\left(2, e^{-2i\arcsin(ax)}\right) + 12\,\text{PolyLog}\left(3, e^{-2i\arcsin(ax)}\right)\right)$$

```
[In] Integrate[ArcSin[a*x]^4/x^3,x]
```

```
[Out] -1/2*ArcSin[a*x]^4/x^2 + (a^2*((-I)*Pi^3 + (8*I)*ArcSin[a*x]^3 - (8*Sqrt[1
- a^2*x^2]*ArcSin[a*x]^3)/(a*x) + 24*ArcSin[a*x]^2*Log[1 - E^((-2*I)*ArcSin
[a*x])] + (24*I)*ArcSin[a*x]*PolyLog[2, E^((-2*I)*ArcSin[a*x])] + 12*PolyLo
g[3, E^((-2*I)*ArcSin[a*x])]))/4
```

Maple [A] (verified)

Time = 0.06 (sec) , antiderivative size = 219, normalized size of antiderivative = 1.84

method	result
derivativedivides	$a^2\left(-\frac{\arcsin(ax)^3\left(-4ia^2x^2+4ax\sqrt{-a^2x^2+1}+\arcsin(ax)\right)}{2a^2x^2} - 4i\arcsin(ax)^3 + 6\arcsin(ax)^2\ln\left(1-i\right.\right.$
default	$a^2\left(-\frac{\arcsin(ax)^3\left(-4ia^2x^2+4ax\sqrt{-a^2x^2+1}+\arcsin(ax)\right)}{2a^2x^2} - 4i\arcsin(ax)^3 + 6\arcsin(ax)^2\ln\left(1-i\right.\right.$

```
[In] int(arcsin(a*x)^4/x^3,x,method=_RETURNVERBOSE)
```

[Out] a^2*(-1/2*arcsin(a*x)^3*(-4*I*a^2*x^2+4*a*x*(-a^2*x^2+1)^(1/2)+arcsin(a*x))/a^2/x^2-4*I*arcsin(a*x)^3+6*arcsin(a*x)^2*ln(1-I*a*x-(-a^2*x^2+1)^(1/2))-12*I*arcsin(a*x)*polylog(2,I*a*x+(-a^2*x^2+1)^(1/2))+12*polylog(3,I*a*x+(-a^2*x^2+1)^(1/2))+6*arcsin(a*x)^2*ln(1+I*a*x+(-a^2*x^2+1)^(1/2))-12*I*arcsin(a*x)*polylog(2,-I*a*x-(-a^2*x^2+1)^(1/2))+12*polylog(3,-I*a*x-(-a^2*x^2+1)^(1/2)))

Fricas [F]

$$\int \frac{\arcsin(ax)^4}{x^3}\,dx = \int \frac{\arcsin(ax)^4}{x^3}\,dx$$

[In] integrate(arcsin(a*x)^4/x^3,x, algorithm="fricas")

[Out] integral(arcsin(a*x)^4/x^3, x)

Sympy [F]

$$\int \frac{\arcsin(ax)^4}{x^3}\,dx = \int \frac{\operatorname{asin}^4(ax)}{x^3}\,dx$$

[In] integrate(asin(a*x)**4/x**3,x)

[Out] Integral(asin(a*x)**4/x**3, x)

Maxima [F]

$$\int \frac{\arcsin(ax)^4}{x^3}\,dx = \int \frac{\arcsin(ax)^4}{x^3}\,dx$$

[In] integrate(arcsin(a*x)^4/x^3,x, algorithm="maxima")

[Out] -1/2*(arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^4 + 4*a*x^2*integrate(sqrt(a*x + 1)*sqrt(-a*x + 1)*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^3/(a^2*x^4 - x^2), x))/x^2

Giac [F]

$$\int \frac{\arcsin(ax)^4}{x^3}\,dx = \int \frac{\arcsin\left(ax\right)^4}{x^3}\,dx$$

```
[In] integrate(arcsin(a*x)^4/x^3,x, algorithm="giac")
[Out] integrate(arcsin(a*x)^4/x^3, x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{\arcsin(ax)^4}{x^3}\,dx = \int \frac{\mathrm{asin}(a\,x)^4}{x^3}\,dx$$

```
[In] int(asin(a*x)^4/x^3,x)
[Out] int(asin(a*x)^4/x^3, x)
```

3.41 $\int \frac{\arcsin(ax)^4}{x^4} dx$

Optimal result

Integrand size = 10, antiderivative size = 276

$$\begin{aligned}\int \frac{\arcsin(ax)^4}{x^4} dx = & -\frac{2a^2 \arcsin(ax)^2}{x} - \frac{2a\sqrt{1-a^2x^2} \arcsin(ax)^3}{3x^2} \\ & - \frac{\arcsin(ax)^4}{3x^3} - 8a^3 \arcsin(ax) \text{arctanh}\left(e^{i\arcsin(ax)}\right) \\ & - \frac{4}{3}a^3 \arcsin(ax)^3 \text{arctanh}\left(e^{i\arcsin(ax)}\right) + 4ia^3 \operatorname{PolyLog}\left(2, -e^{i\arcsin(ax)}\right) \\ & + 2ia^3 \arcsin(ax)^2 \operatorname{PolyLog}\left(2, -e^{i\arcsin(ax)}\right) \\ & - 4ia^3 \operatorname{PolyLog}\left(2, e^{i\arcsin(ax)}\right) - 2ia^3 \arcsin(ax)^2 \operatorname{PolyLog}\left(2, e^{i\arcsin(ax)}\right) \\ & - 4a^3 \arcsin(ax) \operatorname{PolyLog}\left(3, -e^{i\arcsin(ax)}\right) \\ & + 4a^3 \arcsin(ax) \operatorname{PolyLog}\left(3, e^{i\arcsin(ax)}\right) \\ & - 4ia^3 \operatorname{PolyLog}\left(4, -e^{i\arcsin(ax)}\right) + 4ia^3 \operatorname{PolyLog}\left(4, e^{i\arcsin(ax)}\right)\end{aligned}$$

```
[Out] -2*a^2*arcsin(a*x)^2/x-1/3*arcsin(a*x)^4/x^3-8*a^3*arcsin(a*x)*arctanh(I*a*
x+(-a^2*x^2+1)^(1/2))-4/3*a^3*arcsin(a*x)^3*arctanh(I*a*x+(-a^2*x^2+1)^(1/2
))+4*I*a^3*polylog(2,-I*a*x-(-a^2*x^2+1)^(1/2))+2*I*a^3*arcsin(a*x)^2*polyl
og(2,-I*a*x-(-a^2*x^2+1)^(1/2))-4*I*a^3*polylog(2,I*a*x+(-a^2*x^2+1)^(1/2))
-2*I*a^3*arcsin(a*x)^2*polylog(2,I*a*x+(-a^2*x^2+1)^(1/2))-4*a^3*arcsin(a*x
)*polylog(3,-I*a*x-(-a^2*x^2+1)^(1/2))+4*a^3*arcsin(a*x)*polylog(3,I*a*x+(-
a^2*x^2+1)^(1/2))-4*I*a^3*polylog(4,-I*a*x-(-a^2*x^2+1)^(1/2))+4*I*a^3*poly
log(4,I*a*x+(-a^2*x^2+1)^(1/2))-2/3*a*arcsin(a*x)^3*(-a^2*x^2+1)^(1/2)/x^2
```

Rubi [A] (verified)

Time = 0.26 (sec) , antiderivative size = 276, normalized size of antiderivative = 1.00, number of steps used = 19, number of rules used = 10, $\frac{\text{number of rules}}{\text{integrand size}} = 1.000$, Rules used = {4723, 4789, 4803, 4268, 2611, 6744, 2320, 6724, 2317, 2438}

$$\begin{aligned}\int \frac{\arcsin(ax)^4}{x^4}\,dx = &-\frac{4}{3}a^3\arcsin(ax)^3\operatorname{arctanh}\left(e^{i\arcsin(ax)}\right) \\ &- 8a^3\arcsin(ax)\operatorname{arctanh}\left(e^{i\arcsin(ax)}\right) \\ &+ 2ia^3\arcsin(ax)^2\operatorname{PolyLog}\left(2,-e^{i\arcsin(ax)}\right) \\ &- 2ia^3\arcsin(ax)^2\operatorname{PolyLog}\left(2,e^{i\arcsin(ax)}\right) \\ &- 4a^3\arcsin(ax)\operatorname{PolyLog}\left(3,-e^{i\arcsin(ax)}\right) \\ &+ 4a^3\arcsin(ax)\operatorname{PolyLog}\left(3,e^{i\arcsin(ax)}\right) \\ &+ 4ia^3\operatorname{PolyLog}\left(2,-e^{i\arcsin(ax)}\right) - 4ia^3\operatorname{PolyLog}\left(2,e^{i\arcsin(ax)}\right) \\ &- 4ia^3\operatorname{PolyLog}\left(4,-e^{i\arcsin(ax)}\right) + 4ia^3\operatorname{PolyLog}\left(4,e^{i\arcsin(ax)}\right) \\ &- \frac{2a\sqrt{1-a^2x^2}\arcsin(ax)^3}{3x^2} - \frac{2a^2\arcsin(ax)^2}{x} - \frac{\arcsin(ax)^4}{3x^3}\end{aligned}$$

```
[In] Int[ArcSin[a*x]^4/x^4,x]
```

```
[Out] (-2*a^2*ArcSin[a*x]^2)/x - (2*a*Sqrt[1 - a^2*x^2]*ArcSin[a*x]^3)/(3*x^2) -
ArcSin[a*x]^4/(3*x^3) - 8*a^3*ArcSin[a*x]*ArcTanh[E^(I*ArcSin[a*x])] - (4*a
^3*ArcSin[a*x]^3*ArcTanh[E^(I*ArcSin[a*x])])/3 + (4*I)*a^3*PolyLog[2, -E^(I
*ArcSin[a*x])] + (2*I)*a^3*ArcSin[a*x]^2*PolyLog[2, -E^(I*ArcSin[a*x])] - (
4*I)*a^3*PolyLog[2, E^(I*ArcSin[a*x])] - (2*I)*a^3*ArcSin[a*x]^2*PolyLog[2,
 E^(I*ArcSin[a*x])] - 4*a^3*ArcSin[a*x]*PolyLog[3, -E^(I*ArcSin[a*x])] + 4*
a^3*ArcSin[a*x]*PolyLog[3, E^(I*ArcSin[a*x])] - (4*I)*a^3*PolyLog[4, -E^(I*
ArcSin[a*x])] + (4*I)*a^3*PolyLog[4, E^(I*ArcSin[a*x])]
```

Rule 2317

```
Int[Log[(a_) + (b_.)*((F_)^((e_.)*((c_.) + (d_.)*(x_))))^(n_.)], x_Symbol]
:> Dist[1/(d*e*n*Log[F]), Subst[Int[Log[a + b*x]/x, x], x, (F^(e*(c + d*x))
)^n], x] /; FreeQ[{F, a, b, c, d, e, n}, x] && GtQ[a, 0]
```

Rule 2320

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2438

```
Int[Log[(c_.)*((d_) + (e_.)*(x_)^(n_.))]/(x_), x_Symbol] :> Simp[-PolyLog[2
, (-c)*e*x^n]/n, x] /; FreeQ[{c, d, e, n}, x] && EqQ[c*d, 1]
```

Rule 2611

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> Simp[(-(f + g*x)^m)*(PolyLog[2, (-e)*(F^(c*(a +
b*x)))^n]/(b*c*n*Log[F])), x] + Dist[g*(m/(b*c*n*Log[F])), Int[(f + g*x)^(m
 - 1)*PolyLog[2, (-e)*(F^(c*(a + b*x)))^n], x], x] /; FreeQ[{F, a, b, c, e,
 f, g, n}, x] && GtQ[m, 0]
```

Rule 4268

```
Int[csc[(e_.) + (f_.)*(x_)]*((c_.) + (d_.)*(x_))^(m_.), x_Symbol] :> Simp[-
2*(c + d*x)^m*(ArcTanh[E^(I*(e + f*x))]/f), x] + (-Dist[d*(m/f), Int[(c + d
*x)^(m - 1)*Log[1 - E^(I*(e + f*x))], x], x] + Dist[d*(m/f), Int[(c + d*x)^
(m - 1)*Log[1 + E^(I*(e + f*x))], x], x]) /; FreeQ[{c, d, e, f}, x] && IGtQ
[m, 0]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rule 4789

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_)*((d_) + (e_.
)*(x_)^2)^(p_), x_Symbol] :> Simp[(f*x)^(m + 1)*(d + e*x^2)^(p + 1)*((a + b
*ArcSin[c*x])^n/(d*f*(m + 1))), x] + (Dist[c^2*((m + 2*p + 3)/(f^2*(m + 1))
), Int[(f*x)^(m + 2)*(d + e*x^2)^p*(a + b*ArcSin[c*x])^n, x], x] - Dist[b*c
*(n/(f*(m + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], Int[(f*x)^(m + 1)*(1
- c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x]) /; FreeQ[{a, b, c
, d, e, f, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && ILtQ[m, -1]
```

Rule 4803

```
Int[(((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_))/Sqrt[(d_) + (e_.)*
(x_)^2], x_Symbol] :> Dist[(1/c^(m + 1))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*
x^2]], Subst[Int[(a + b*x)^n*Sin[x]^m, x], x, ArcSin[c*x]], x] /; FreeQ[{a,
 b, c, d, e}, x] && EqQ[c^2*d + e, 0] && IGtQ[n, 0] && IntegerQ[m]
```

Rule 6724

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
```

```
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rule 6744

```
Int[((e_.) + (f_.)*(x_))^(m_.)*PolyLog[n_, (d_.)*((F_)^((c_.)*((a_.) + (b_.
)*(x_))))^(p_.)], x_Symbol] :> Simp[(e + f*x)^m*(PolyLog[n + 1, d*(F^(c*(a
+ b*x)))^p]/(b*c*p*Log[F])), x] - Dist[f*(m/(b*c*p*Log[F])), Int[(e + f*x)^
(m - 1)*PolyLog[n + 1, d*(F^(c*(a + b*x)))^p], x], x] /; FreeQ[{F, a, b, c,
 d, e, f, n, p}, x] && GtQ[m, 0]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= -\frac{\arcsin(ax)^4}{3x^3}+\frac{1}{3}(4a)\int \frac{\arcsin(ax)^3}{x^3\sqrt{1-a^2x^2}}\,dx\\
&= -\frac{2a\sqrt{1-a^2x^2}\arcsin(ax)^3}{3x^2}-\frac{\arcsin(ax)^4}{3x^3}\\
&\quad+\left(2a^2\right)\int \frac{\arcsin(ax)^2}{x^2}\,dx+\frac{1}{3}\left(2a^3\right)\int \frac{\arcsin(ax)^3}{x\sqrt{1-a^2x^2}}\,dx\\
&= -\frac{2a^2\arcsin(ax)^2}{x}-\frac{2a\sqrt{1-a^2x^2}\arcsin(ax)^3}{3x^2}-\frac{\arcsin(ax)^4}{3x^3}\\
&\quad+\frac{1}{3}\left(2a^3\right)\text{Subst}\left(\int x^3\csc(x)\,dx,x,\arcsin(ax)\right)+\left(4a^3\right)\int \frac{\arcsin(ax)}{x\sqrt{1-a^2x^2}}\,dx\\
&= -\frac{2a^2\arcsin(ax)^2}{x}-\frac{2a\sqrt{1-a^2x^2}\arcsin(ax)^3}{3x^2}\\
&\quad-\frac{\arcsin(ax)^4}{3x^3}-\frac{4}{3}a^3\arcsin(ax)^3\operatorname{arctanh}\left(e^{i\arcsin(ax)}\right)\\
&\quad-\left(2a^3\right)\text{Subst}\left(\int x^2\log\left(1-e^{ix}\right)\,dx,x,\arcsin(ax)\right)\\
&\quad+\left(2a^3\right)\text{Subst}\left(\int x^2\log\left(1+e^{ix}\right)\,dx,x,\arcsin(ax)\right)\\
&\quad+\left(4a^3\right)\text{Subst}(\int x\csc(x)\,dx,x,\arcsin(ax))
\end{aligned}$$

$$
\begin{aligned}
&= -\frac{2a^2\arcsin(ax)^2}{x} - \frac{2a\sqrt{1-a^2x^2}\arcsin(ax)^3}{3x^2} - \frac{\arcsin(ax)^4}{3x^3} \\
&\quad - 8a^3\arcsin(ax)\text{arctanh}\left(e^{i\arcsin(ax)}\right) - \frac{4}{3}a^3\arcsin(ax)^3\text{arctanh}\left(e^{i\arcsin(ax)}\right) \\
&\quad + 2ia^3\arcsin(ax)^2\,\text{PolyLog}\left(2,-e^{i\arcsin(ax)}\right) \\
&\quad - 2ia^3\arcsin(ax)^2\,\text{PolyLog}\left(2,e^{i\arcsin(ax)}\right) \\
&\quad - (4ia^3)\,\text{Subst}\left(\int x\,\text{PolyLog}\left(2,-e^{ix}\right)\,dx, x, \arcsin(ax)\right) \\
&\quad + (4ia^3)\,\text{Subst}\left(\int x\,\text{PolyLog}\left(2,e^{ix}\right)\,dx, x, \arcsin(ax)\right) \\
&\quad - (4a^3)\,\text{Subst}\left(\int \log\left(1-e^{ix}\right)\,dx, x, \arcsin(ax)\right) \\
&\quad + (4a^3)\,\text{Subst}\left(\int \log\left(1+e^{ix}\right)\,dx, x, \arcsin(ax)\right) \\
&= -\frac{2a^2\arcsin(ax)^2}{x} - \frac{2a\sqrt{1-a^2x^2}\arcsin(ax)^3}{3x^2} - \frac{\arcsin(ax)^4}{3x^3} \\
&\quad - 8a^3\arcsin(ax)\text{arctanh}\left(e^{i\arcsin(ax)}\right) - \frac{4}{3}a^3\arcsin(ax)^3\text{arctanh}\left(e^{i\arcsin(ax)}\right) \\
&\quad + 2ia^3\arcsin(ax)^2\,\text{PolyLog}\left(2,-e^{i\arcsin(ax)}\right) \\
&\quad - 2ia^3\arcsin(ax)^2\,\text{PolyLog}\left(2,e^{i\arcsin(ax)}\right) \\
&\quad - 4a^3\arcsin(ax)\,\text{PolyLog}\left(3,-e^{i\arcsin(ax)}\right) + 4a^3\arcsin(ax)\,\text{PolyLog}\left(3,e^{i\arcsin(ax)}\right) \\
&\quad + (4ia^3)\,\text{Subst}\left(\int \frac{\log(1-x)}{x}\,dx, x, e^{i\arcsin(ax)}\right) \\
&\quad - (4ia^3)\,\text{Subst}\left(\int \frac{\log(1+x)}{x}\,dx, x, e^{i\arcsin(ax)}\right) \\
&\quad + (4a^3)\,\text{Subst}\left(\int \text{PolyLog}\left(3,-e^{ix}\right)\,dx, x, \arcsin(ax)\right) \\
&\quad - (4a^3)\,\text{Subst}\left(\int \text{PolyLog}\left(3,e^{ix}\right)\,dx, x, \arcsin(ax)\right) \\
&= -\frac{2a^2\arcsin(ax)^2}{x} - \frac{2a\sqrt{1-a^2x^2}\arcsin(ax)^3}{3x^2} - \frac{\arcsin(ax)^4}{3x^3} \\
&\quad - 8a^3\arcsin(ax)\text{arctanh}\left(e^{i\arcsin(ax)}\right) - \frac{4}{3}a^3\arcsin(ax)^3\text{arctanh}\left(e^{i\arcsin(ax)}\right) \\
&\quad + 4ia^3\,\text{PolyLog}\left(2,-e^{i\arcsin(ax)}\right) + 2ia^3\arcsin(ax)^2\,\text{PolyLog}\left(2,-e^{i\arcsin(ax)}\right) \\
&\quad - 4ia^3\,\text{PolyLog}\left(2,e^{i\arcsin(ax)}\right) - 2ia^3\arcsin(ax)^2\,\text{PolyLog}\left(2,e^{i\arcsin(ax)}\right) \\
&\quad - 4a^3\arcsin(ax)\,\text{PolyLog}\left(3,-e^{i\arcsin(ax)}\right) + 4a^3\arcsin(ax)\,\text{PolyLog}\left(3,e^{i\arcsin(ax)}\right) \\
&\quad - (4ia^3)\,\text{Subst}\left(\int \frac{\text{PolyLog}(3,-x)}{x}\,dx, x, e^{i\arcsin(ax)}\right) \\
&\quad + (4ia^3)\,\text{Subst}\left(\int \frac{\text{PolyLog}(3,x)}{x}\,dx, x, e^{i\arcsin(ax)}\right)
\end{aligned}
$$

$$
\begin{aligned}
&= -\frac{2a^2\arcsin(ax)^2}{x} - \frac{2a\sqrt{1-a^2x^2}\arcsin(ax)^3}{3x^2} - \frac{\arcsin(ax)^4}{3x^3} \\
&\quad - 8a^3\arcsin(ax)\text{arctanh}\left(e^{i\arcsin(ax)}\right) - \frac{4}{3}a^3\arcsin(ax)^3\text{arctanh}\left(e^{i\arcsin(ax)}\right) \\
&\quad + 4ia^3\,\text{PolyLog}\left(2,-e^{i\arcsin(ax)}\right) + 2ia^3\arcsin(ax)^2\,\text{PolyLog}\left(2,-e^{i\arcsin(ax)}\right) \\
&\quad - 4ia^3\,\text{PolyLog}\left(2,e^{i\arcsin(ax)}\right) - 2ia^3\arcsin(ax)^2\,\text{PolyLog}\left(2,e^{i\arcsin(ax)}\right) \\
&\quad - 4a^3\arcsin(ax)\,\text{PolyLog}\left(3,-e^{i\arcsin(ax)}\right) + 4a^3\arcsin(ax)\,\text{PolyLog}\left(3,e^{i\arcsin(ax)}\right) \\
&\quad - 4ia^3\,\text{PolyLog}\left(4,-e^{i\arcsin(ax)}\right) + 4ia^3\,\text{PolyLog}\left(4,e^{i\arcsin(ax)}\right)
\end{aligned}
$$

Mathematica [A] (verified)

Time = 3.42 (sec) , antiderivative size = 399, normalized size of antiderivative = 1.45

$$
\begin{aligned}
\int \frac{\arcsin(ax)^4}{x^4}\,dx &= \frac{1}{24}a^3\left(-2i\pi^4 + 4i\arcsin(ax)^4 - 24\arcsin(ax)^2\cot\left(\frac{1}{2}\arcsin(ax)\right)\right. \\
&\quad - 2\arcsin(ax)^4\cot\left(\frac{1}{2}\arcsin(ax)\right) - 4\arcsin(ax)^3\csc^2\left(\frac{1}{2}\arcsin(ax)\right) \\
&\quad - \frac{1}{2}ax\arcsin(ax)^4\csc^4\left(\frac{1}{2}\arcsin(ax)\right) \\
&\quad + 16\arcsin(ax)^3\log\left(1-e^{-i\arcsin(ax)}\right) + 96\arcsin(ax)\log\left(1-e^{i\arcsin(ax)}\right) \\
&\quad - 96\arcsin(ax)\log\left(1+e^{i\arcsin(ax)}\right) - 16\arcsin(ax)^3\log\left(1+e^{i\arcsin(ax)}\right) \\
&\quad + 48i\arcsin(ax)^2\,\text{PolyLog}\left(2,e^{-i\arcsin(ax)}\right) \\
&\quad + 48i\left(2+\arcsin(ax)^2\right)\text{PolyLog}\left(2,-e^{i\arcsin(ax)}\right) \\
&\quad - 96i\,\text{PolyLog}\left(2,e^{i\arcsin(ax)}\right) + 96\arcsin(ax)\,\text{PolyLog}\left(3,e^{-i\arcsin(ax)}\right) \\
&\quad - 96\arcsin(ax)\,\text{PolyLog}\left(3,-e^{i\arcsin(ax)}\right) - 96i\,\text{PolyLog}\left(4,e^{-i\arcsin(ax)}\right) \\
&\quad - 96i\,\text{PolyLog}\left(4,-e^{i\arcsin(ax)}\right) + 4\arcsin(ax)^3\sec^2\left(\frac{1}{2}\arcsin(ax)\right) \\
&\quad - \frac{8\arcsin(ax)^4\sin^4\left(\frac{1}{2}\arcsin(ax)\right)}{a^3x^3} - 24\arcsin(ax)^2\tan\left(\frac{1}{2}\arcsin(ax)\right) \\
&\quad \left. - 2\arcsin(ax)^4\tan\left(\frac{1}{2}\arcsin(ax)\right)\right)
\end{aligned}
$$

```
[In] Integrate[ArcSin[a*x]^4/x^4,x]
```

```
[Out] (a^3*((-2*I)*Pi^4 + (4*I)*ArcSin[a*x]^4 - 24*ArcSin[a*x]^2*Cot[ArcSin[a*x]/
2] - 2*ArcSin[a*x]^4*Cot[ArcSin[a*x]/2] - 4*ArcSin[a*x]^3*Csc[ArcSin[a*x]/2
]^2 - (a*x*ArcSin[a*x]^4*Csc[ArcSin[a*x]/2]^4)/2 + 16*ArcSin[a*x]^3*Log[1 -
 E^((-I)*ArcSin[a*x])] + 96*ArcSin[a*x]*Log[1 - E^(I*ArcSin[a*x])] - 96*Arc
Sin[a*x]*Log[1 + E^(I*ArcSin[a*x])] - 16*ArcSin[a*x]^3*Log[1 + E^(I*ArcSin[
a*x])] + (48*I)*ArcSin[a*x]^2*PolyLog[2, E^((-I)*ArcSin[a*x])] + (48*I)*(2
+ ArcSin[a*x]^2)*PolyLog[2, -E^(I*ArcSin[a*x])] - (96*I)*PolyLog[2, E^(I*Ar
```

```
cSin[a*x])] + 96*ArcSin[a*x]*PolyLog[3, E^((-I)*ArcSin[a*x])] - 96*ArcSin[a
*x]*PolyLog[3, -E^(I*ArcSin[a*x])] - (96*I)*PolyLog[4, E^((-I)*ArcSin[a*x])
] - (96*I)*PolyLog[4, -E^(I*ArcSin[a*x])] + 4*ArcSin[a*x]^3*Sec[ArcSin[a*x]
/2]^2 - (8*ArcSin[a*x]^4*Sin[ArcSin[a*x]/2]^4)/(a^3*x^3) - 24*ArcSin[a*x]^2
*Tan[ArcSin[a*x]/2] - 2*ArcSin[a*x]^4*Tan[ArcSin[a*x]/2]))/24
```

Maple [A] (verified)

Time = 0.10 (sec) , antiderivative size = 377, normalized size of antiderivative = 1.37

method	result
derivativedivides	$a^{3}\left(-\frac{\arcsin(ax)^{2}\left(2\arcsin(ax)\sqrt{-a^{2}x^{2}+1}\,ax+\arcsin(ax)^{2}+6a^{2}x^{2}\right)}{3a^{3}x^{3}}+\frac{2\arcsin(ax)^{3}\ln\left(1-iax-\sqrt{-a^{2}x^{2}+1}\right)}{3}-2i\right.$
default	$a^{3}\left(-\frac{\arcsin(ax)^{2}\left(2\arcsin(ax)\sqrt{-a^{2}x^{2}+1}\,ax+\arcsin(ax)^{2}+6a^{2}x^{2}\right)}{3a^{3}x^{3}}+\frac{2\arcsin(ax)^{3}\ln\left(1-iax-\sqrt{-a^{2}x^{2}+1}\right)}{3}-2i\right.$

```
[In] int(arcsin(a*x)^4/x^4,x,method=_RETURNVERBOSE)
```

```
[Out] a^3*(-1/3/a^3/x^3*arcsin(a*x)^2*(2*arcsin(a*x)*(-a^2*x^2+1)^(1/2)*a*x+arcsi
n(a*x)^2+6*a^2*x^2)+2/3*arcsin(a*x)^3*ln(1-I*a*x-(-a^2*x^2+1)^(1/2))-2*I*ar
csin(a*x)^2*polylog(2,I*a*x+(-a^2*x^2+1)^(1/2))+4*arcsin(a*x)*polylog(3,I*a
*x+(-a^2*x^2+1)^(1/2))+4*I*polylog(4,I*a*x+(-a^2*x^2+1)^(1/2))-2/3*arcsin(a
*x)^3*ln(1+I*a*x+(-a^2*x^2+1)^(1/2))+2*I*arcsin(a*x)^2*polylog(2,-I*a*x-(-a
^2*x^2+1)^(1/2))-4*arcsin(a*x)*polylog(3,-I*a*x-(-a^2*x^2+1)^(1/2))-4*I*pol
ylog(4,-I*a*x-(-a^2*x^2+1)^(1/2))+4*arcsin(a*x)*ln(1-I*a*x-(-a^2*x^2+1)^(1/
2))-4*I*polylog(2,I*a*x+(-a^2*x^2+1)^(1/2))-4*arcsin(a*x)*ln(1+I*a*x+(-a^2*
x^2+1)^(1/2))+4*I*polylog(2,-I*a*x-(-a^2*x^2+1)^(1/2)))
```

Fricas [F]

$$\int \frac{\arcsin(ax)^4}{x^4}\,dx=\int \frac{\arcsin\left(ax\right)^4}{x^4}\,dx$$

```
[In] integrate(arcsin(a*x)^4/x^4,x, algorithm="fricas")
```

```
[Out] integral(arcsin(a*x)^4/x^4, x)
```

Sympy [F]

$$\int \frac{\arcsin(ax)^4}{x^4}\,dx = \int \frac{\operatorname{asin}^4(ax)}{x^4}\,dx$$

```
[In] integrate(asin(a*x)**4/x**4,x)
```

```
[Out] Integral(asin(a*x)**4/x**4, x)
```

Maxima [F]

$$\int \frac{\arcsin(ax)^4}{x^4}\,dx = \int \frac{\arcsin(ax)^4}{x^4}\,dx$$

```
[In] integrate(arcsin(a*x)^4/x^4,x, algorithm="maxima")
```

```
[Out] -1/3*(12*a*x^3*integrate(1/3*sqrt(a*x + 1)*sqrt(-a*x + 1)*arctan2(a*x, sqrt
(a*x + 1)*sqrt(-a*x + 1))^3/(a^2*x^5 - x^3), x) + arctan2(a*x, sqrt(a*x + 1
)*sqrt(-a*x + 1))^4)/x^3
```

Giac [F]

$$\int \frac{\arcsin(ax)^4}{x^4}\,dx = \int \frac{\arcsin(ax)^4}{x^4}\,dx$$

```
[In] integrate(arcsin(a*x)^4/x^4,x, algorithm="giac")
```

```
[Out] integrate(arcsin(a*x)^4/x^4, x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{\arcsin(ax)^4}{x^4}\,dx = \int \frac{\operatorname{asin}(a\,x)^4}{x^4}\,dx$$

```
[In] int(asin(a*x)^4/x^4,x)
```

```
[Out] int(asin(a*x)^4/x^4, x)
```

3.42 $\int \frac{x^6}{\arcsin(ax)}\,dx$

Optimal result

Integrand size = 10, antiderivative size = 55

$$\int \frac{x^6}{\arcsin(ax)}\,dx = \frac{5\,\text{CosIntegral}(\arcsin(ax))}{64a^7} - \frac{9\,\text{CosIntegral}(3\arcsin(ax))}{64a^7} + \frac{5\,\text{CosIntegral}(5\arcsin(ax))}{64a^7} - \frac{\text{CosIntegral}(7\arcsin(ax))}{64a^7}$$

```
[Out] 5/64*Ci(arcsin(a*x))/a^7-9/64*Ci(3*arcsin(a*x))/a^7+5/64*Ci(5*arcsin(a*x))/
a^7-1/64*Ci(7*arcsin(a*x))/a^7
```

Rubi [A] (verified)

Time = 0.07 (sec) , antiderivative size = 55, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.300, Rules used = {4731, 4491, 3383}

$$\int \frac{x^6}{\arcsin(ax)}\,dx = \frac{5\,\text{CosIntegral}(\arcsin(ax))}{64a^7} - \frac{9\,\text{CosIntegral}(3\arcsin(ax))}{64a^7} + \frac{5\,\text{CosIntegral}(5\arcsin(ax))}{64a^7} - \frac{\text{CosIntegral}(7\arcsin(ax))}{64a^7}$$

```
[In] Int[x^6/ArcSin[a*x],x]
```

```
[Out] (5*CosIntegral[ArcSin[a*x]])/(64*a^7) - (9*CosIntegral[3*ArcSin[a*x]])/(64*
a^7) + (5*CosIntegral[5*ArcSin[a*x]])/(64*a^7) - CosIntegral[7*ArcSin[a*x]]
/(64*a^7)
```

Rule 3383

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Simp[CosInte
gral[e - Pi/2 + f*x]/d, x] /; FreeQ[{c, d, e, f}, x] && EqQ[d*(e - Pi/2) -
```

```
c*f, 0]
```

Rule 4491

```
Int[Cos[(a_.) + (b_.)*(x_)]^(p_.)*((c_.) + (d_.)*(x_))^(m_.)*Sin[(a_.) + (b
_.)*(x_)]^(n_.), x_Symbol] :> Int[ExpandTrigReduce[(c + d*x)^m, Sin[a + b*x
]^n*Cos[a + b*x]^p, x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && IG
tQ[p, 0]
```

Rule 4731

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Dist[1
/(b*c^(m + 1)), Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b], x], x, a +
 b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, n}, x] && IGtQ[m, 0]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= \frac{\text{Subst}\left(\int \frac{\cos(x)\sin^6(x)}{x}\,dx, x, \arcsin(ax)\right)}{a^7} \\
&= \frac{\text{Subst}\left(\int \left(\frac{5\cos(x)}{64x} - \frac{9\cos(3x)}{64x} + \frac{5\cos(5x)}{64x} - \frac{\cos(7x)}{64x}\right)\,dx, x, \arcsin(ax)\right)}{a^7} \\
&= -\frac{\text{Subst}\left(\int \frac{\cos(7x)}{x}\,dx, x, \arcsin(ax)\right)}{64a^7} + \frac{5\text{Subst}\left(\int \frac{\cos(x)}{x}\,dx, x, \arcsin(ax)\right)}{64a^7} \\
&\quad + \frac{5\text{Subst}\left(\int \frac{\cos(5x)}{x}\,dx, x, \arcsin(ax)\right)}{64a^7} - \frac{9\text{Subst}\left(\int \frac{\cos(3x)}{x}\,dx, x, \arcsin(ax)\right)}{64a^7} \\
&= \frac{5\,\text{CosIntegral}(\arcsin(ax))}{64a^7} - \frac{9\,\text{CosIntegral}(3\arcsin(ax))}{64a^7} \\
&\quad + \frac{5\,\text{CosIntegral}(5\arcsin(ax))}{64a^7} - \frac{\text{CosIntegral}(7\arcsin(ax))}{64a^7}
\end{aligned}$$

Mathematica [A] (verified)

Time = 0.03 (sec) , antiderivative size = 40, normalized size of antiderivative = 0.73

$$\int \frac{x^6}{\arcsin(ax)}\,dx = -\frac{-5\,\text{CosIntegral}(\arcsin(ax)) + 9\,\text{CosIntegral}(3\arcsin(ax)) - 5\,\text{CosIntegral}(5\arcsin(ax)) + \text{CosIntegral}}{64a^7}$$

```
[In] Integrate[x^6/ArcSin[a*x],x]
```

```
[Out] -1/64*(-5*CosIntegral[ArcSin[a*x]] + 9*CosIntegral[3*ArcSin[a*x]] - 5*CosIn
tegral[5*ArcSin[a*x]] + CosIntegral[7*ArcSin[a*x]])/a^7
```

Maple [A] (verified)

Time = 0.05 (sec) , antiderivative size = 40, normalized size of antiderivative = 0.73

method	result	size
derivativedivides	$\frac{\frac{5\,\mathrm{Ci}(\arcsin(ax))}{64}-\frac{9\,\mathrm{Ci}(3\arcsin(ax))}{64}+\frac{5\,\mathrm{Ci}(5\arcsin(ax))}{64}-\frac{\mathrm{Ci}(7\arcsin(ax))}{64}}{a^7}$	40
default	$\frac{\frac{5\,\mathrm{Ci}(\arcsin(ax))}{64}-\frac{9\,\mathrm{Ci}(3\arcsin(ax))}{64}+\frac{5\,\mathrm{Ci}(5\arcsin(ax))}{64}-\frac{\mathrm{Ci}(7\arcsin(ax))}{64}}{a^7}$	40

```
[In] int(x^6/arcsin(a*x),x,method=_RETURNVERBOSE)
[Out] 1/a^7*(5/64*Ci(arcsin(a*x))-9/64*Ci(3*arcsin(a*x))+5/64*Ci(5*arcsin(a*x))-1
/64*Ci(7*arcsin(a*x)))
```

Fricas [F]

$$\int \frac{x^6}{\arcsin(ax)}\,dx = \int \frac{x^6}{\arcsin(ax)}\,dx$$

```
[In] integrate(x^6/arcsin(a*x),x, algorithm="fricas")
[Out] integral(x^6/arcsin(a*x), x)
```

Sympy [F]

$$\int \frac{x^6}{\arcsin(ax)}\,dx = \int \frac{x^6}{\operatorname{asin}(ax)}\,dx$$

```
[In] integrate(x**6/asin(a*x),x)
[Out] Integral(x**6/asin(a*x), x)
```

Maxima [F]

$$\int \frac{x^6}{\arcsin(ax)}\,dx = \int \frac{x^6}{\arcsin(ax)}\,dx$$

```
[In] integrate(x^6/arcsin(a*x),x, algorithm="maxima")
[Out] integrate(x^6/arcsin(a*x), x)
```

Giac [A] (verification not implemented)

none

Time = 0.29 (sec) , antiderivative size = 47, normalized size of antiderivative = 0.85

$$\int \frac{x^6}{\arcsin(ax)}\,dx = -\frac{\operatorname{Ci}\left(7\arcsin\left(ax\right)\right)}{64\,a^7} + \frac{5\operatorname{Ci}\left(5\arcsin\left(ax\right)\right)}{64\,a^7} - \frac{9\operatorname{Ci}\left(3\arcsin\left(ax\right)\right)}{64\,a^7} + \frac{5\operatorname{Ci}\left(\arcsin\left(ax\right)\right)}{64\,a^7}$$

```
[In] integrate(x^6/arcsin(a*x),x, algorithm="giac")
```

```
[Out] -1/64*cos_integral(7*arcsin(a*x))/a^7 + 5/64*cos_integral(5*arcsin(a*x))/a^
7 - 9/64*cos_integral(3*arcsin(a*x))/a^7 + 5/64*cos_integral(arcsin(a*x))/a
^7
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x^6}{\arcsin(ax)}\,dx = \int \frac{x^6}{\mathrm{asin}\left(a\,x\right)}\,dx$$

```
[In] int(x^6/asin(a*x),x)
```

```
[Out] int(x^6/asin(a*x), x)
```

3.43 $\int \frac{x^5}{\arcsin(ax)} dx$

Optimal result

Integrand size = 10, antiderivative size = 43

$$\int \frac{x^5}{\arcsin(ax)} dx = \frac{5\text{Si}(2\arcsin(ax))}{32a^6} - \frac{\text{Si}(4\arcsin(ax))}{8a^6} + \frac{\text{Si}(6\arcsin(ax))}{32a^6}$$

```
[Out] 5/32*Si(2*arcsin(a*x))/a^6-1/8*Si(4*arcsin(a*x))/a^6+1/32*Si(6*arcsin(a*x))
/a^6
```

Rubi [A] (verified)

Time = 0.05 (sec) , antiderivative size = 43, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.300, Rules used = {4731, 4491, 3380}

$$\int \frac{x^5}{\arcsin(ax)} dx = \frac{5\text{Si}(2\arcsin(ax))}{32a^6} - \frac{\text{Si}(4\arcsin(ax))}{8a^6} + \frac{\text{Si}(6\arcsin(ax))}{32a^6}$$

```
[In] Int[x^5/ArcSin[a*x],x]
```

```
[Out] (5*SinIntegral[2*ArcSin[a*x]])/(32*a^6) - SinIntegral[4*ArcSin[a*x]]/(8*a^6
) + SinIntegral[6*ArcSin[a*x]]/(32*a^6)
```

Rule 3380

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Simp[SinInte
gral[e + f*x]/d, x] /; FreeQ[{c, d, e, f}, x] && EqQ[d*e - c*f, 0]
```

Rule 4491

```
Int[Cos[(a_.) + (b_.)*(x_)]^(p_.)*((c_.) + (d_.)*(x_))^(m_.)*Sin[(a_.) + (b
_.)*(x_)]^(n_.), x_Symbol] :> Int[ExpandTrigReduce[(c + d*x)^m, Sin[a + b*x
```

```
]^n*Cos[a + b*x]^p, x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && IG
tQ[p, 0]
```

Rule 4731

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Dist[1
/(b*c^(m + 1)), Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b], x], x, a +
 b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, n}, x] && IGtQ[m, 0]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= \frac{\text{Subst}\left(\int \frac{\cos(x)\sin^5(x)}{x}\,dx, x, \arcsin(ax)\right)}{a^6} \\
&= \frac{\text{Subst}\left(\int \left(\frac{5\sin(2x)}{32x} - \frac{\sin(4x)}{8x} + \frac{\sin(6x)}{32x}\right)\,dx, x, \arcsin(ax)\right)}{a^6} \\
&= \frac{\text{Subst}\left(\int \frac{\sin(6x)}{x}\,dx, x, \arcsin(ax)\right)}{32a^6} - \frac{\text{Subst}\left(\int \frac{\sin(4x)}{x}\,dx, x, \arcsin(ax)\right)}{8a^6} \\
&\quad + \frac{5\text{Subst}\left(\int \frac{\sin(2x)}{x}\,dx, x, \arcsin(ax)\right)}{32a^6} \\
&= \frac{5\text{Si}(2\arcsin(ax))}{32a^6} - \frac{\text{Si}(4\arcsin(ax))}{8a^6} + \frac{\text{Si}(6\arcsin(ax))}{32a^6}
\end{aligned}$$

Mathematica [A] (verified)

Time = 0.16 (sec) , antiderivative size = 33, normalized size of antiderivative = 0.77

$$\int \frac{x^5}{\arcsin(ax)}\,dx = \frac{5\text{Si}(2\arcsin(ax)) - 4\text{Si}(4\arcsin(ax)) + \text{Si}(6\arcsin(ax))}{32a^6}$$

```
[In] Integrate[x^5/ArcSin[a*x],x]
[Out] (5*SinIntegral[2*ArcSin[a*x]] - 4*SinIntegral[4*ArcSin[a*x]] + SinIntegral[
6*ArcSin[a*x]])/(32*a^6)
```

Maple [A] (verified)

Time = 0.05 (sec) , antiderivative size = 33, normalized size of antiderivative = 0.77

method	result	size
derivativedivides	$\frac{\frac{5\,\mathrm{Si}(2\arcsin(ax))}{32}-\frac{\mathrm{Si}(4\arcsin(ax))}{8}+\frac{\mathrm{Si}(6\arcsin(ax))}{32}}{a^{6}}$	33
default	$\frac{\frac{5\,\mathrm{Si}(2\arcsin(ax))}{32}-\frac{\mathrm{Si}(4\arcsin(ax))}{8}+\frac{\mathrm{Si}(6\arcsin(ax))}{32}}{a^{6}}$	33

```
[In] int(x^5/arcsin(a*x),x,method=_RETURNVERBOSE)
[Out] 1/a^6*(5/32*Si(2*arcsin(a*x))-1/8*Si(4*arcsin(a*x))+1/32*Si(6*arcsin(a*x)))
```

Fricas [F]

$$\int \frac{x^5}{\arcsin(ax)}\,dx=\int \frac{x^5}{\arcsin{(ax)}}\,dx$$

```
[In] integrate(x^5/arcsin(a*x),x, algorithm="fricas")
[Out] integral(x^5/arcsin(a*x), x)
```

Sympy [F]

$$\int \frac{x^5}{\arcsin(ax)}\,dx=\int \frac{x^5}{\operatorname{asin}{(ax)}}\,dx$$

```
[In] integrate(x**5/asin(a*x),x)
[Out] Integral(x**5/asin(a*x), x)
```

Maxima [F]

$$\int \frac{x^5}{\arcsin(ax)}\,dx=\int \frac{x^5}{\arcsin{(ax)}}\,dx$$

```
[In] integrate(x^5/arcsin(a*x),x, algorithm="maxima")
[Out] integrate(x^5/arcsin(a*x), x)
```

Giac [A] (verification not implemented)

none

Time = 0.29 (sec) , antiderivative size = 37, normalized size of antiderivative = 0.86

$$\int \frac{x^5}{\arcsin(ax)}\,dx = \frac{\mathrm{Si}\left(6\arcsin\left(ax\right)\right)}{32\,a^6} - \frac{\mathrm{Si}\left(4\arcsin\left(ax\right)\right)}{8\,a^6} + \frac{5\,\mathrm{Si}\left(2\arcsin\left(ax\right)\right)}{32\,a^6}$$

```
[In] integrate(x^5/arcsin(a*x),x, algorithm="giac")
[Out] 1/32*sin_integral(6*arcsin(a*x))/a^6 - 1/8*sin_integral(4*arcsin(a*x))/a^6
+ 5/32*sin_integral(2*arcsin(a*x))/a^6
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x^5}{\arcsin(ax)}\,dx = \int \frac{x^5}{\mathrm{asin}\left(a\,x\right)}\,dx$$

```
[In] int(x^5/asin(a*x),x)
[Out] int(x^5/asin(a*x), x)
```

3.44 $\int \frac{x^4}{\arcsin(ax)} dx$

Optimal result

Integrand size = 10, antiderivative size = 41

$$\int \frac{x^4}{\arcsin(ax)} dx = \frac{\text{CosIntegral}(\arcsin(ax))}{8a^5} - \frac{3\,\text{CosIntegral}(3\arcsin(ax))}{16a^5} + \frac{\text{CosIntegral}(5\arcsin(ax))}{16a^5}$$

```
[Out] 1/8*Ci(arcsin(a*x))/a^5-3/16*Ci(3*arcsin(a*x))/a^5+1/16*Ci(5*arcsin(a*x))/a
^5
```

Rubi [A] (verified)

Time = 0.05 (sec) , antiderivative size = 41, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.300, Rules used = {4731, 4491, 3383}

$$\int \frac{x^4}{\arcsin(ax)} dx = \frac{\text{CosIntegral}(\arcsin(ax))}{8a^5} - \frac{3\,\text{CosIntegral}(3\arcsin(ax))}{16a^5} + \frac{\text{CosIntegral}(5\arcsin(ax))}{16a^5}$$

```
[In] Int[x^4/ArcSin[a*x],x]
```

```
[Out] CosIntegral[ArcSin[a*x]]/(8*a^5) - (3*CosIntegral[3*ArcSin[a*x]])/(16*a^5)
+ CosIntegral[5*ArcSin[a*x]]/(16*a^5)
```

Rule 3383

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Simp[CosInte
gral[e - Pi/2 + f*x]/d, x] /; FreeQ[{c, d, e, f}, x] && EqQ[d*(e - Pi/2) -
```

```
c*f, 0]
```

Rule 4491

```
Int[Cos[(a_.) + (b_.)*(x_)]^(p_.)*((c_.) + (d_.)*(x_))^(m_.)*Sin[(a_.) + (b
_.)*(x_)]^(n_.), x_Symbol] :> Int[ExpandTrigReduce[(c + d*x)^m, Sin[a + b*x
]^n*Cos[a + b*x]^p, x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && IG
tQ[p, 0]
```

Rule 4731

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Dist[1
/(b*c^(m + 1)), Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b], x], x, a +
 b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, n}, x] && IGtQ[m, 0]
```

Rubi steps

$$
\begin{aligned}
\text{integral} &= \frac{\text{Subst}\left(\int \frac{\cos(x)\sin^4(x)}{x}\,dx, x, \arcsin(ax)\right)}{a^5} \\
&= \frac{\text{Subst}\left(\int \left(\frac{\cos(x)}{8x} - \frac{3\cos(3x)}{16x} + \frac{\cos(5x)}{16x}\right)\,dx, x, \arcsin(ax)\right)}{a^5} \\
&= \frac{\text{Subst}\left(\int \frac{\cos(5x)}{x}\,dx, x, \arcsin(ax)\right)}{16a^5} + \frac{\text{Subst}\left(\int \frac{\cos(x)}{x}\,dx, x, \arcsin(ax)\right)}{8a^5} \\
&\quad - \frac{3\text{Subst}\left(\int \frac{\cos(3x)}{x}\,dx, x, \arcsin(ax)\right)}{16a^5} \\
&= \frac{\text{CosIntegral}(\arcsin(ax))}{8a^5} - \frac{3\,\text{CosIntegral}(3\arcsin(ax))}{16a^5} + \frac{\text{CosIntegral}(5\arcsin(ax))}{16a^5}
\end{aligned}
$$

Mathematica [A] (verified)

Time = 0.01 (sec) , antiderivative size = 31, normalized size of antiderivative = 0.76

$$
\int \frac{x^4}{\arcsin(ax)}\,dx = \frac{2\,\text{CosIntegral}(\arcsin(ax)) - 3\,\text{CosIntegral}(3\arcsin(ax)) + \text{CosIntegral}(5\arcsin(ax))}{16a^5}
$$

```
[In] Integrate[x^4/ArcSin[a*x],x]
```

```
[Out] (2*CosIntegral[ArcSin[a*x]] - 3*CosIntegral[3*ArcSin[a*x]] + CosIntegral[5*
ArcSin[a*x]])/(16*a^5)
```

Maple [A] (verified)

Time = 0.03 (sec) , antiderivative size = 31, normalized size of antiderivative = 0.76

method	result	size
derivativedivides	$\frac{\frac{\mathrm{Ci}(\arcsin(ax))}{8}-\frac{3\,\mathrm{Ci}(3\arcsin(ax))}{16}+\frac{\mathrm{Ci}(5\arcsin(ax))}{16}}{a^5}$	31
default	$\frac{\frac{\mathrm{Ci}(\arcsin(ax))}{8}-\frac{3\,\mathrm{Ci}(3\arcsin(ax))}{16}+\frac{\mathrm{Ci}(5\arcsin(ax))}{16}}{a^5}$	31

```
[In] int(x^4/arcsin(a*x),x,method=_RETURNVERBOSE)
[Out] 1/a^5*(1/8*Ci(arcsin(a*x))-3/16*Ci(3*arcsin(a*x))+1/16*Ci(5*arcsin(a*x)))
```

Fricas [F]

$$\int \frac{x^4}{\arcsin(ax)}\,dx = \int \frac{x^4}{\arcsin(ax)}\,dx$$

```
[In] integrate(x^4/arcsin(a*x),x, algorithm="fricas")
[Out] integral(x^4/arcsin(a*x), x)
```

Sympy [F]

$$\int \frac{x^4}{\arcsin(ax)}\,dx = \int \frac{x^4}{\operatorname{asin}(ax)}\,dx$$

```
[In] integrate(x**4/asin(a*x),x)
[Out] Integral(x**4/asin(a*x), x)
```

Maxima [F]

$$\int \frac{x^4}{\arcsin(ax)}\,dx = \int \frac{x^4}{\arcsin(ax)}\,dx$$

```
[In] integrate(x^4/arcsin(a*x),x, algorithm="maxima")
[Out] integrate(x^4/arcsin(a*x), x)
```

Giac [A] (verification not implemented)

none

Time = 0.28 (sec) , antiderivative size = 35, normalized size of antiderivative = 0.85

$$\int \frac{x^4}{\arcsin(ax)}\,dx = \frac{\operatorname{Ci}\left(5\arcsin\left(ax\right)\right)}{16\,a^5} - \frac{3\operatorname{Ci}\left(3\arcsin\left(ax\right)\right)}{16\,a^5} + \frac{\operatorname{Ci}\left(\arcsin\left(ax\right)\right)}{8\,a^5}$$

```
[In] integrate(x^4/arcsin(a*x),x, algorithm="giac")
[Out] 1/16*cos_integral(5*arcsin(a*x))/a^5 - 3/16*cos_integral(3*arcsin(a*x))/a^5
 + 1/8*cos_integral(arcsin(a*x))/a^5
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x^4}{\arcsin(ax)}\,dx = \int \frac{x^4}{\mathrm{asin}\left(a\,x\right)}\,dx$$

```
[In] int(x^4/asin(a*x),x)
[Out] int(x^4/asin(a*x), x)
```

3.45 $\int \frac{x^3}{\arcsin(ax)}\,dx$

Optimal result

Integrand size = 10, antiderivative size = 29

$$\int \frac{x^3}{\arcsin(ax)}\,dx = \frac{\mathrm{Si}(2\arcsin(ax))}{4a^4} - \frac{\mathrm{Si}(4\arcsin(ax))}{8a^4}$$

```
[Out] 1/4*Si(2*arcsin(a*x))/a^4-1/8*Si(4*arcsin(a*x))/a^4
```

Rubi [A] (verified)

Time = 0.04 (sec) , antiderivative size = 29, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.300, Rules used = {4731, 4491, 3380}

$$\int \frac{x^3}{\arcsin(ax)}\,dx = \frac{\mathrm{Si}(2\arcsin(ax))}{4a^4} - \frac{\mathrm{Si}(4\arcsin(ax))}{8a^4}$$

```
[In] Int[x^3/ArcSin[a*x],x]
```

```
[Out] SinIntegral[2*ArcSin[a*x]]/(4*a^4) - SinIntegral[4*ArcSin[a*x]]/(8*a^4)
```

Rule 3380

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Simp[SinInte
gral[e + f*x]/d, x] /; FreeQ[{c, d, e, f}, x] && EqQ[d*e - c*f, 0]
```

Rule 4491

```
Int[Cos[(a_.) + (b_.)*(x_)]^(p_.)*((c_.) + (d_.)*(x_))^(m_.)*Sin[(a_.) + (b
_.)*(x_)]^(n_.), x_Symbol] :> Int[ExpandTrigReduce[(c + d*x)^m, Sin[a + b*x
]^n*Cos[a + b*x]^p, x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && IG
tQ[p, 0]
```

Rule 4731

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Dist[1
/(b*c^(m + 1)), Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b], x], x, a +
 b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, n}, x] && IGtQ[m, 0]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= \frac{\text{Subst}\left(\int \frac{\cos(x)\sin^3(x)}{x}\,dx, x, \arcsin(ax)\right)}{a^4}\\
&= \frac{\text{Subst}\left(\int \left(\frac{\sin(2x)}{4x}-\frac{\sin(4x)}{8x}\right)\,dx, x, \arcsin(ax)\right)}{a^4}\\
&= -\frac{\text{Subst}\left(\int \frac{\sin(4x)}{x}\,dx, x, \arcsin(ax)\right)}{8a^4}+\frac{\text{Subst}\left(\int \frac{\sin(2x)}{x}\,dx, x, \arcsin(ax)\right)}{4a^4}\\
&= \frac{\text{Si}(2\arcsin(ax))}{4a^4}-\frac{\text{Si}(4\arcsin(ax))}{8a^4}
\end{aligned}$$

Mathematica [A] (verified)

Time = 0.11 (sec) , antiderivative size = 24, normalized size of antiderivative = 0.83

$$\int \frac{x^3}{\arcsin(ax)}\,dx = -\frac{-2\text{Si}(2\arcsin(ax))+\text{Si}(4\arcsin(ax))}{8a^4}$$

```
[In] Integrate[x^3/ArcSin[a*x],x]
[Out] -1/8*(-2*SinIntegral[2*ArcSin[a*x]] + SinIntegral[4*ArcSin[a*x]])/a^4
```

Maple [A] (verified)

Time = 0.03 (sec) , antiderivative size = 24, normalized size of antiderivative = 0.83

method	result	size
derivativedivides	$\frac{\frac{\text{Si}(2\arcsin(ax))}{4}-\frac{\text{Si}(4\arcsin(ax))}{8}}{a^4}$	24
default	$\frac{\frac{\text{Si}(2\arcsin(ax))}{4}-\frac{\text{Si}(4\arcsin(ax))}{8}}{a^4}$	24

```
[In] int(x^3/arcsin(a*x),x,method=_RETURNVERBOSE)
[Out] 1/a^4*(1/4*Si(2*arcsin(a*x))-1/8*Si(4*arcsin(a*x)))
```

Fricas [F]

$$\int \frac{x^3}{\arcsin(ax)}\,dx = \int \frac{x^3}{\arcsin\left(ax\right)}\,dx$$

```
[In] integrate(x^3/arcsin(a*x),x, algorithm="fricas")
[Out] integral(x^3/arcsin(a*x), x)
```

Sympy [F]

$$\int \frac{x^3}{\arcsin(ax)}\,dx = \int \frac{x^3}{\operatorname{asin}\left(ax\right)}\,dx$$

```
[In] integrate(x**3/asin(a*x),x)
[Out] Integral(x**3/asin(a*x), x)
```

Maxima [F]

$$\int \frac{x^3}{\arcsin(ax)}\,dx = \int \frac{x^3}{\arcsin\left(ax\right)}\,dx$$

```
[In] integrate(x^3/arcsin(a*x),x, algorithm="maxima")
[Out] integrate(x^3/arcsin(a*x), x)
```

Giac [A] (verification not implemented)

none

Time = 0.28 (sec) , antiderivative size = 25, normalized size of antiderivative = 0.86

$$\int \frac{x^3}{\arcsin(ax)}\,dx = -\frac{\operatorname{Si}\left(4\arcsin\left(ax\right)\right)}{8\,a^4} + \frac{\operatorname{Si}\left(2\arcsin\left(ax\right)\right)}{4\,a^4}$$

```
[In] integrate(x^3/arcsin(a*x),x, algorithm="giac")
[Out] -1/8*sin_integral(4*arcsin(a*x))/a^4 + 1/4*sin_integral(2*arcsin(a*x))/a^4
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x^3}{\arcsin(ax)}\,dx = \int \frac{x^3}{\mathrm{asin}\,(a\,x)}\,dx$$

```
[In] int(x^3/asin(a*x),x)
```

```
[Out] int(x^3/asin(a*x), x)
```

3.46 $\int \frac{x^2}{\arcsin(ax)}\,dx$

Optimal result

Integrand size = 10, antiderivative size = 27

$$\int \frac{x^2}{\arcsin(ax)}\,dx=\frac{\text{CosIntegral}(\arcsin(ax))}{4a^3}-\frac{\text{CosIntegral}(3\arcsin(ax))}{4a^3}$$

```
[Out] 1/4*Ci(arcsin(a*x))/a^3-1/4*Ci(3*arcsin(a*x))/a^3
```

Rubi [A] (verified)

Time = 0.04 (sec) , antiderivative size = 27, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.300, Rules used = {4731, 4491, 3383}

$$\int \frac{x^2}{\arcsin(ax)}\,dx=\frac{\text{CosIntegral}(\arcsin(ax))}{4a^3}-\frac{\text{CosIntegral}(3\arcsin(ax))}{4a^3}$$

```
[In] Int[x^2/ArcSin[a*x],x]
```

```
[Out] CosIntegral[ArcSin[a*x]]/(4*a^3) - CosIntegral[3*ArcSin[a*x]]/(4*a^3)
```

Rule 3383

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Simp[CosInte
gral[e - Pi/2 + f*x]/d, x] /; FreeQ[{c, d, e, f}, x] && EqQ[d*(e - Pi/2) -
c*f, 0]
```

Rule 4491

```
Int[Cos[(a_.) + (b_.)*(x_)]^(p_.)*((c_.) + (d_.)*(x_))^(m_.)*Sin[(a_.) + (b
_.)*(x_)]^(n_.), x_Symbol] :> Int[ExpandTrigReduce[(c + d*x)^m, Sin[a + b*x
```

```
]^n*Cos[a + b*x]^p, x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && IG
tQ[p, 0]
```

Rule 4731

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Dist[1
/(b*c^(m + 1)), Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b], x], x, a +
 b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, n}, x] && IGtQ[m, 0]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= \frac{\text{Subst}\left(\int \frac{\cos(x)\sin^2(x)}{x}\,dx, x, \arcsin(ax)\right)}{a^3} \\
&= \frac{\text{Subst}\left(\int \left(\frac{\cos(x)}{4x} - \frac{\cos(3x)}{4x}\right)\,dx, x, \arcsin(ax)\right)}{a^3} \\
&= \frac{\text{Subst}\left(\int \frac{\cos(x)}{x}\,dx, x, \arcsin(ax)\right)}{4a^3} - \frac{\text{Subst}\left(\int \frac{\cos(3x)}{x}\,dx, x, \arcsin(ax)\right)}{4a^3} \\
&= \frac{\text{CosIntegral}(\arcsin(ax))}{4a^3} - \frac{\text{CosIntegral}(3\arcsin(ax))}{4a^3}
\end{aligned}$$

Mathematica [A] (verified)

Time = 0.01 (sec) , antiderivative size = 22, normalized size of antiderivative = 0.81

$$\int \frac{x^2}{\arcsin(ax)}\,dx = \frac{\text{CosIntegral}(\arcsin(ax)) - \text{CosIntegral}(3\arcsin(ax))}{4a^3}$$

```
[In] Integrate[x^2/ArcSin[a*x],x]
[Out] (CosIntegral[ArcSin[a*x]] - CosIntegral[3*ArcSin[a*x]])/(4*a^3)
```

Maple [A] (verified)

Time = 0.02 (sec) , antiderivative size = 22, normalized size of antiderivative = 0.81

method	result	size
derivativedivides	$\frac{\frac{\text{Ci}(\arcsin(ax))}{4} - \frac{\text{Ci}(3\arcsin(ax))}{4}}{a^3}$	22
default	$\frac{\frac{\text{Ci}(\arcsin(ax))}{4} - \frac{\text{Ci}(3\arcsin(ax))}{4}}{a^3}$	22

```
[In] int(x^2/arcsin(a*x),x,method=_RETURNVERBOSE)
[Out] 1/a^3*(1/4*Ci(arcsin(a*x))-1/4*Ci(3*arcsin(a*x)))
```

Fricas [F]

$$\int \frac{x^2}{\arcsin(ax)}\,dx = \int \frac{x^2}{\arcsin(ax)}\,dx$$

```
[In] integrate(x^2/arcsin(a*x),x, algorithm="fricas")
[Out] integral(x^2/arcsin(a*x), x)
```

Sympy [F]

$$\int \frac{x^2}{\arcsin(ax)}\,dx = \int \frac{x^2}{\operatorname{asin}(ax)}\,dx$$

```
[In] integrate(x**2/asin(a*x),x)
[Out] Integral(x**2/asin(a*x), x)
```

Maxima [F]

$$\int \frac{x^2}{\arcsin(ax)}\,dx = \int \frac{x^2}{\arcsin(ax)}\,dx$$

```
[In] integrate(x^2/arcsin(a*x),x, algorithm="maxima")
[Out] integrate(x^2/arcsin(a*x), x)
```

Giac [A] (verification not implemented)

none

Time = 0.28 (sec) , antiderivative size = 23, normalized size of antiderivative = 0.85

$$\int \frac{x^2}{\arcsin(ax)}\,dx = -\frac{\operatorname{Ci}(3\arcsin(ax))}{4a^3} + \frac{\operatorname{Ci}(\arcsin(ax))}{4a^3}$$

```
[In] integrate(x^2/arcsin(a*x),x, algorithm="giac")
[Out] -1/4*cos_integral(3*arcsin(a*x))/a^3 + 1/4*cos_integral(arcsin(a*x))/a^3
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x^2}{\arcsin(ax)}\,dx = \int \frac{x^2}{\mathrm{asin}\,(a\,x)}\,dx$$

```
[In] int(x^2/asin(a*x),x)
```

```
[Out] int(x^2/asin(a*x), x)
```

3.47 $\int \frac{x}{\arcsin(ax)}\,dx$

Optimal result

Integrand size = 8, antiderivative size = 14

$$\int \frac{x}{\arcsin(ax)}\,dx = \frac{\text{Si}(2\arcsin(ax))}{2a^2}$$

```
[Out] 1/2*Si(2*arcsin(a*x))/a^2
```

Rubi [A] (verified)

Time = 0.02 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, $\frac{\text{number of rules}}{\text{integrand size}} = 0.500$, Rules used = {4731, 4491, 12, 3380}

$$\int \frac{x}{\arcsin(ax)}\,dx = \frac{\text{Si}(2\arcsin(ax))}{2a^2}$$

```
[In] Int[x/ArcSin[a*x],x]
```

```
[Out] SinIntegral[2*ArcSin[a*x]]/(2*a^2)
```

Rule 12

```
Int[(a_)*(u_), x_Symbol] :> Dist[a, Int[u, x], x] /; FreeQ[a, x] &&  !Match
Q[u, (b_)*(v_) /; FreeQ[b, x]]
```

Rule 3380

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Simp[SinInte
gral[e + f*x]/d, x] /; FreeQ[{c, d, e, f}, x] && EqQ[d*e - c*f, 0]
```

Rule 4491

```
Int[Cos[(a_.) + (b_.)*(x_)]^(p_.)*((c_.) + (d_.)*(x_))^(m_.)*Sin[(a_.) + (b
_.)*(x_)]^(n_.), x_Symbol] :> Int[ExpandTrigReduce[(c + d*x)^m, Sin[a + b*x
]^n*Cos[a + b*x]^p, x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && IG
tQ[p, 0]
```

Rule 4731

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Dist[1
/(b*c^(m + 1)), Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b], x], x, a +
 b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, n}, x] && IGtQ[m, 0]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= \frac{\text{Subst}\left(\int \frac{\cos(x)\sin(x)}{x}\,dx, x, \arcsin(ax)\right)}{a^2}\\
&= \frac{\text{Subst}\left(\int \frac{\sin(2x)}{2x}\,dx, x, \arcsin(ax)\right)}{a^2}\\
&= \frac{\text{Subst}\left(\int \frac{\sin(2x)}{x}\,dx, x, \arcsin(ax)\right)}{2a^2}\\
&= \frac{\text{Si}(2\arcsin(ax))}{2a^2}
\end{aligned}$$

Mathematica [A] (verified)

Time = 0.05 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00

$$\int \frac{x}{\arcsin(ax)}\,dx = \frac{\text{Si}(2\arcsin(ax))}{2a^2}$$

```
[In] Integrate[x/ArcSin[a*x],x]
[Out] SinIntegral[2*ArcSin[a*x]]/(2*a^2)
```

Maple [A] (verified)

Time = 0.04 (sec) , antiderivative size = 13, normalized size of antiderivative = 0.93

method	result	size
derivativedivides	$\frac{\text{Si}(2\arcsin(ax))}{2a^2}$	13
default	$\frac{\text{Si}(2\arcsin(ax))}{2a^2}$	13

```
[In] int(x/arcsin(a*x),x,method=_RETURNVERBOSE)
[Out] 1/2*Si(2*arcsin(a*x))/a^2
```

Fricas [F]

$$\int \frac{x}{\arcsin(ax)}\,dx = \int \frac{x}{\arcsin(ax)}\,dx$$

```
[In] integrate(x/arcsin(a*x),x, algorithm="fricas")
[Out] integral(x/arcsin(a*x), x)
```

Sympy [F]

$$\int \frac{x}{\arcsin(ax)}\,dx = \int \frac{x}{\operatorname{asin}(ax)}\,dx$$

```
[In] integrate(x/asin(a*x),x)
[Out] Integral(x/asin(a*x), x)
```

Maxima [F]

$$\int \frac{x}{\arcsin(ax)}\,dx = \int \frac{x}{\arcsin(ax)}\,dx$$

```
[In] integrate(x/arcsin(a*x),x, algorithm="maxima")
[Out] integrate(x/arcsin(a*x), x)
```

Giac [A] (verification not implemented)

none

Time = 0.28 (sec) , antiderivative size = 12, normalized size of antiderivative = 0.86

$$\int \frac{x}{\arcsin(ax)}\,dx = \frac{\operatorname{Si}(2\arcsin(ax))}{2\,a^2}$$

```
[In] integrate(x/arcsin(a*x),x, algorithm="giac")
[Out] 1/2*sin_integral(2*arcsin(a*x))/a^2
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x}{\arcsin(ax)}\,dx = \int \frac{x}{\mathrm{asin}\,(a\,x)}\,dx$$

```
[In] int(x/asin(a*x),x)
[Out] int(x/asin(a*x), x)
```

3.48 $\int \frac{1}{\arcsin(ax)}\,dx$

Optimal result

Integrand size = 6, antiderivative size = 9

$$\int \frac{1}{\arcsin(ax)}\,dx = \frac{\text{CosIntegral}(\arcsin(ax))}{a}$$

```
[Out] Ci(arcsin(a*x))/a
```

Rubi [A] (verified)

Time = 0.01 (sec) , antiderivative size = 9, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.333, Rules used = {4719, 3383}

$$\int \frac{1}{\arcsin(ax)}\,dx = \frac{\text{CosIntegral}(\arcsin(ax))}{a}$$

```
[In] Int[ArcSin[a*x]^(-1),x]
```

```
[Out] CosIntegral[ArcSin[a*x]]/a
```

Rule 3383

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Simp[CosInte
gral[e - Pi/2 + f*x]/d, x] /; FreeQ[{c, d, e, f}, x] && EqQ[d*(e - Pi/2) -
c*f, 0]
```

Rule 4719

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_), x_Symbol] :> Dist[1/(b*c), Sub
st[Int[x^n*Cos[-a/b + x/b], x], x, a + b*ArcSin[c*x]], x] /; FreeQ[{a, b, c
, n}, x]
```

Rubi steps

$$\begin{aligned}\text{integral} &= \frac{\text{Subst}\left(\int \frac{\cos(x)}{x}\,dx, x, \arcsin(ax)\right)}{a}\\ &= \frac{\text{CosIntegral}(\arcsin(ax))}{a}\end{aligned}$$

Mathematica [A] (verified)

Time = 0.02 (sec) , antiderivative size = 9, normalized size of antiderivative = 1.00

$$\int \frac{1}{\arcsin(ax)}\,dx = \frac{\text{CosIntegral}(\arcsin(ax))}{a}$$

```
[In] Integrate[ArcSin[a*x]^(-1),x]
[Out] CosIntegral[ArcSin[a*x]]/a
```

Maple [A] (verified)

Time = 0.02 (sec) , antiderivative size = 10, normalized size of antiderivative = 1.11

method	result	size
derivativedivides	$\frac{\text{Ci}(\arcsin(ax))}{a}$	10
default	$\frac{\text{Ci}(\arcsin(ax))}{a}$	10

```
[In] int(1/arcsin(a*x),x,method=_RETURNVERBOSE)
[Out] Ci(arcsin(a*x))/a
```

Fricas [F]

$$\int \frac{1}{\arcsin(ax)}\,dx = \int \frac{1}{\arcsin{(ax)}}\,dx$$

```
[In] integrate(1/arcsin(a*x),x, algorithm="fricas")
[Out] integral(1/arcsin(a*x), x)
```

Sympy [F]

$$\int \frac{1}{\arcsin(ax)}\,dx = \int \frac{1}{\operatorname{asin}{(ax)}}\,dx$$

[In] integrate(1/asin(a*x),x)

[Out] Integral(1/asin(a*x), x)

Maxima [F]

$$\int \frac{1}{\arcsin(ax)}\,dx = \int \frac{1}{\arcsin{(ax)}}\,dx$$

[In] integrate(1/arcsin(a*x),x, algorithm="maxima")

[Out] integrate(1/arcsin(a*x), x)

Giac [A] (verification not implemented)

none

Time = 0.27 (sec) , antiderivative size = 9, normalized size of antiderivative = 1.00

$$\int \frac{1}{\arcsin(ax)}\,dx = \frac{\operatorname{Ci}{(\arcsin{(ax)})}}{a}$$

[In] integrate(1/arcsin(a*x),x, algorithm="giac")

[Out] cos_integral(arcsin(a*x))/a

Mupad [F(-1)]

Timed out.

$$\int \frac{1}{\arcsin(ax)}\,dx = \int \frac{1}{\mathrm{asin}\left(a\,x\right)}\,dx$$

[In] int(1/asin(a*x),x)

[Out] int(1/asin(a*x), x)

3.49 $\int \frac{1}{x \arcsin(ax)} dx$

Optimal result

Integrand size = 10, antiderivative size = 10

$$\int \frac{1}{x \arcsin(ax)} dx = \operatorname{Int}\left(\frac{1}{x \arcsin(ax)}, x\right)$$

```
[Out] Unintegrable(1/x/arcsin(a*x),x)
```

Rubi [N/A]

Not integrable

Time = 0.01 (sec) , antiderivative size = 10, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{1}{x \arcsin(ax)} dx = \int \frac{1}{x \arcsin(ax)} dx$$

```
[In] Int[1/(x*ArcSin[a*x]),x]
```

```
[Out] Defer[Int][1/(x*ArcSin[a*x]), x]
```

Rubi steps

$$\text{integral} = \int \frac{1}{x \arcsin(ax)} dx$$

Mathematica [N/A]

Not integrable

Time = 0.21 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.20

$$\int \frac{1}{x \arcsin(ax)} \, dx = \int \frac{1}{x \arcsin(ax)} \, dx$$

```
[In] Integrate[1/(x*ArcSin[a*x]),x]
[Out] Integrate[1/(x*ArcSin[a*x]), x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.03 (sec) , antiderivative size = 10, normalized size of antiderivative = 1.00

$$\int \frac{1}{x \arcsin(ax)} dx$$

```
[In] int(1/x/arcsin(a*x),x)
[Out] int(1/x/arcsin(a*x),x)
```

Fricas [N/A]

Not integrable

Time = 0.23 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.20

$$\int \frac{1}{x \arcsin(ax)} \, dx = \int \frac{1}{x \arcsin(ax)} \, dx$$

```
[In] integrate(1/x/arcsin(a*x),x, algorithm="fricas")
[Out] integral(1/(x*arcsin(a*x)), x)
```

Sympy [N/A]

Not integrable

Time = 0.26 (sec) , antiderivative size = 8, normalized size of antiderivative = 0.80

$$\int \frac{1}{x \arcsin(ax)} \, dx = \int \frac{1}{x \operatorname{asin}(ax)} \, dx$$

```
[In] integrate(1/x/asin(a*x),x)
[Out] Integral(1/(x*asin(a*x)), x)
```

Maxima [N/A]

Not integrable

Time = 0.37 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.20

$$\int \frac{1}{x \arcsin(ax)} \, dx = \int \frac{1}{x \arcsin{(ax)}} \, dx$$

```
[In] integrate(1/x/arcsin(a*x),x, algorithm="maxima")
[Out] integrate(1/(x*arcsin(a*x)), x)
```

Giac [N/A]

Not integrable

Time = 0.30 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.20

$$\int \frac{1}{x \arcsin(ax)} \, dx = \int \frac{1}{x \arcsin{(ax)}} \, dx$$

```
[In] integrate(1/x/arcsin(a*x),x, algorithm="giac")
[Out] integrate(1/(x*arcsin(a*x)), x)
```

Mupad [N/A]

Not integrable

Time = 0.04 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.20

$$\int \frac{1}{x \arcsin(ax)} \, dx = \int \frac{1}{x \,\mathrm{asin}\left(a\,x\right)} \, dx$$

```
[In] int(1/(x*asin(a*x)),x)
[Out] int(1/(x*asin(a*x)), x)
```

3.50 $\int \frac{1}{x^2 \arcsin(ax)} \, dx$

Optimal result

Integrand size = 10, antiderivative size = 10

$$\int \frac{1}{x^2 \arcsin(ax)} \, dx = \text{Int}\left(\frac{1}{x^2 \arcsin(ax)}, x\right)$$

```
[Out] Unintegrable(1/x^2/arcsin(a*x),x)
```

Rubi [N/A]

Not integrable

Time = 0.01 (sec) , antiderivative size = 10, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}} = 0.000$, Rules used = {}

$$\int \frac{1}{x^2 \arcsin(ax)} \, dx = \int \frac{1}{x^2 \arcsin(ax)} \, dx$$

```
[In] Int[1/(x^2*ArcSin[a*x]),x]
```

```
[Out] Defer[Int][1/(x^2*ArcSin[a*x]), x]
```

Rubi steps

$$\text{integral} = \int \frac{1}{x^2 \arcsin(ax)} \, dx$$

Mathematica [N/A]

Not integrable

Time = 1.59 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.20

$$\int \frac{1}{x^2 \arcsin(ax)}\,dx = \int \frac{1}{x^2 \arcsin(ax)}\,dx$$

```
[In] Integrate[1/(x^2*ArcSin[a*x]),x]
[Out] Integrate[1/(x^2*ArcSin[a*x]), x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.10 (sec) , antiderivative size = 10, normalized size of antiderivative = 1.00

$$\int \frac{1}{x^2 \arcsin\left(ax\right)}dx$$

```
[In] int(1/x^2/arcsin(a*x),x)
[Out] int(1/x^2/arcsin(a*x),x)
```

Fricas [N/A]

Not integrable

Time = 0.24 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.20

$$\int \frac{1}{x^2 \arcsin(ax)}\,dx = \int \frac{1}{x^2 \arcsin\left(ax\right)}\,dx$$

```
[In] integrate(1/x^2/arcsin(a*x),x, algorithm="fricas")
[Out] integral(1/(x^2*arcsin(a*x)), x)
```

Sympy [N/A]

Not integrable

Time = 0.28 (sec) , antiderivative size = 10, normalized size of antiderivative = 1.00

$$\int \frac{1}{x^2 \arcsin(ax)}\,dx = \int \frac{1}{x^2 \operatorname{asin}\left(ax\right)}\,dx$$

```
[In] integrate(1/x**2/asin(a*x),x)
[Out] Integral(1/(x**2*asin(a*x)), x)
```

Maxima [N/A]

Not integrable

Time = 0.37 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.20

$$\int \frac{1}{x^2 \arcsin(ax)}\,dx = \int \frac{1}{x^2 \arcsin{(ax)}}\,dx$$

```
[In] integrate(1/x^2/arcsin(a*x),x, algorithm="maxima")
[Out] integrate(1/(x^2*arcsin(a*x)), x)
```

Giac [N/A]

Not integrable

Time = 0.31 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.20

$$\int \frac{1}{x^2 \arcsin(ax)}\,dx = \int \frac{1}{x^2 \arcsin{(ax)}}\,dx$$

```
[In] integrate(1/x^2/arcsin(a*x),x, algorithm="giac")
[Out] integrate(1/(x^2*arcsin(a*x)), x)
```

Mupad [N/A]

Not integrable

Time = 0.03 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.20

$$\int \frac{1}{x^2 \arcsin(ax)}\,dx = \int \frac{1}{x^2\,\mathrm{asin}\left(a\,x\right)}\,dx$$

```
[In] int(1/(x^2*asin(a*x)),x)
[Out] int(1/(x^2*asin(a*x)), x)
```

3.51 $\int \frac{x^6}{\arcsin(ax)^2}\,dx$

Optimal result

Integrand size = 10, antiderivative size = 83

$$\int \frac{x^6}{\arcsin(ax)^2}\,dx = -\frac{x^6\sqrt{1-a^2x^2}}{a\arcsin(ax)}-\frac{5\text{Si}(\arcsin(ax))}{64a^7}+\frac{27\text{Si}(3\arcsin(ax))}{64a^7}-\frac{25\text{Si}(5\arcsin(ax))}{64a^7}+\frac{7\text{Si}(7\arcsin(ax))}{64a^7}$$

```
[Out] -5/64*Si(arcsin(a*x))/a^7+27/64*Si(3*arcsin(a*x))/a^7-25/64*Si(5*arcsin(a*x
))/a^7+7/64*Si(7*arcsin(a*x))/a^7-x^6*(-a^2*x^2+1)^(1/2)/a/arcsin(a*x)
```

Rubi [A] (verified)

Time = 0.05 (sec) , antiderivative size = 83, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 2, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.200, Rules used = {4727, 3380}

$$\int \frac{x^6}{\arcsin(ax)^2}\,dx = -\frac{5\text{Si}(\arcsin(ax))}{64a^7}+\frac{27\text{Si}(3\arcsin(ax))}{64a^7}-\frac{25\text{Si}(5\arcsin(ax))}{64a^7}+\frac{7\text{Si}(7\arcsin(ax))}{64a^7}-\frac{x^6\sqrt{1-a^2x^2}}{a\arcsin(ax)}$$

```
[In] Int[x^6/ArcSin[a*x]^2,x]
```

```
[Out] -((x^6*Sqrt[1 - a^2*x^2])/(a*ArcSin[a*x])) - (5*SinIntegral[ArcSin[a*x]])/(
64*a^7) + (27*SinIntegral[3*ArcSin[a*x]])/(64*a^7) - (25*SinIntegral[5*ArcS
in[a*x]])/(64*a^7) + (7*SinIntegral[7*ArcSin[a*x]])/(64*a^7)
```

Rule 3380

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Simp[SinInte
gral[e + f*x]/d, x] /; FreeQ[{c, d, e, f}, x] && EqQ[d*e - c*f, 0]
```

Rule 4727

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^m*Sqrt[1 - c^2*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] - Dist
[1/(b^2*c^(m + 1)*(n + 1)), Subst[Int[ExpandTrigReduce[x^(n + 1), Sin[-a/b
+ x/b]^(m - 1)*(m - (m + 1)*Sin[-a/b + x/b]^2), x], x], x, a + b*ArcSin[c*x
]], x] /; FreeQ[{a, b, c}, x] && IGtQ[m, 0] && GeQ[n, -2] && LtQ[n, -1]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= -\frac{x^6\sqrt{1-a^2x^2}}{a\arcsin(ax)} + \frac{\text{Subst}\left(\int\left(-\frac{5\sin(x)}{64x}+\frac{27\sin(3x)}{64x}-\frac{25\sin(5x)}{64x}+\frac{7\sin(7x)}{64x}\right)dx, x, \arcsin(ax)\right)}{a^7}\\
&= -\frac{x^6\sqrt{1-a^2x^2}}{a\arcsin(ax)} - \frac{5\text{Subst}\left(\int\frac{\sin(x)}{x}\,dx, x, \arcsin(ax)\right)}{64a^7} + \frac{7\text{Subst}\left(\int\frac{\sin(7x)}{x}\,dx, x, \arcsin(ax)\right)}{64a^7}\\
&\quad - \frac{25\text{Subst}\left(\int\frac{\sin(5x)}{x}\,dx, x, \arcsin(ax)\right)}{64a^7} + \frac{27\text{Subst}\left(\int\frac{\sin(3x)}{x}\,dx, x, \arcsin(ax)\right)}{64a^7}\\
&= -\frac{x^6\sqrt{1-a^2x^2}}{a\arcsin(ax)} - \frac{5\text{Si}(\arcsin(ax))}{64a^7} + \frac{27\text{Si}(3\arcsin(ax))}{64a^7}\\
&\quad - \frac{25\text{Si}(5\arcsin(ax))}{64a^7} + \frac{7\text{Si}(7\arcsin(ax))}{64a^7}
\end{aligned}$$

Mathematica [A] (verified)

Time = 0.36 (sec) , antiderivative size = 86, normalized size of antiderivative = 1.04

$$\int\frac{x^6}{\arcsin(ax)^2}\,dx = -\frac{64a^6x^6\sqrt{1-a^2x^2}+5\arcsin(ax)\text{Si}(\arcsin(ax))-27\arcsin(ax)\text{Si}(3\arcsin(ax))+25\arcsin(ax)\text{Si}(5\arcsi}{64a^7\arcsin(ax)}$$

```
[In] Integrate[x^6/ArcSin[a*x]^2,x]
```

```
[Out] -1/64*(64*a^6*x^6*Sqrt[1 - a^2*x^2] + 5*ArcSin[a*x]*SinIntegral[ArcSin[a*x]
] - 27*ArcSin[a*x]*SinIntegral[3*ArcSin[a*x]] + 25*ArcSin[a*x]*SinIntegral[
5*ArcSin[a*x]] - 7*ArcSin[a*x]*SinIntegral[7*ArcSin[a*x]])/(a^7*ArcSin[a*x]
)
```

Maple [A] (verified)

Time = 0.05 (sec) , antiderivative size = 105, normalized size of antiderivative = 1.27

method	result
derivativedivides	$\frac{-\frac{5\sqrt{-a^2x^2+1}}{64\arcsin(ax)}-\frac{5\ \mathrm{Si}(\arcsin(ax))}{64}+\frac{9\cos(3\arcsin(ax))}{64\arcsin(ax)}+\frac{27\ \mathrm{Si}(3\arcsin(ax))}{64}-\frac{5\cos(5\arcsin(ax))}{64\arcsin(ax)}-\frac{25\ \mathrm{Si}(5\arcsin(ax))}{64}+\frac{\cos(7\arcsin(}{64\arcsin(}}{a^7}$
default	$\frac{-\frac{5\sqrt{-a^2x^2+1}}{64\arcsin(ax)}-\frac{5\ \mathrm{Si}(\arcsin(ax))}{64}+\frac{9\cos(3\arcsin(ax))}{64\arcsin(ax)}+\frac{27\ \mathrm{Si}(3\arcsin(ax))}{64}-\frac{5\cos(5\arcsin(ax))}{64\arcsin(ax)}-\frac{25\ \mathrm{Si}(5\arcsin(ax))}{64}+\frac{\cos(7\arcsin(}{64\arcsin(}}{a^7}$

```
[In] int(x^6/arcsin(a*x)^2,x,method=_RETURNVERBOSE)
[Out] 1/a^7*(-5/64/arcsin(a*x)*(-a^2*x^2+1)^(1/2)-5/64*Si(arcsin(a*x))+9/64/arcsi
n(a*x)*cos(3*arcsin(a*x))+27/64*Si(3*arcsin(a*x))-5/64/arcsin(a*x)*cos(5*ar
csin(a*x))-25/64*Si(5*arcsin(a*x))+1/64/arcsin(a*x)*cos(7*arcsin(a*x))+7/64
*Si(7*arcsin(a*x)))
```

Fricas [F]

$$\int \frac{x^6}{\arcsin(ax)^2}\,dx = \int \frac{x^6}{\arcsin\left(ax\right)^2}\,dx$$

```
[In] integrate(x^6/arcsin(a*x)^2,x, algorithm="fricas")
[Out] integral(x^6/arcsin(a*x)^2, x)
```

Sympy [F]

$$\int \frac{x^6}{\arcsin(ax)^2}\,dx = \int \frac{x^6}{\operatorname{asin}^2\left(ax\right)}\,dx$$

```
[In] integrate(x**6/asin(a*x)**2,x)
[Out] Integral(x**6/asin(a*x)**2, x)
```

Maxima [F]

$$\int \frac{x^6}{\arcsin(ax)^2}\,dx = \int \frac{x^6}{\arcsin{(ax)}^2}\,dx$$

[In] integrate(x^6/arcsin(a*x)^2,x, algorithm="maxima")

[Out] -(sqrt(a*x + 1)*sqrt(-a*x + 1)*x^6 - a*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))*integrate((7*a^2*x^7 - 6*x^5)*sqrt(a*x + 1)*sqrt(-a*x + 1)/((a^3*x^2 - a)*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))), x))/(a*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1)))

Giac [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 161 vs. $2(73) = 146$.

Time = 0.29 (sec) , antiderivative size = 161, normalized size of antiderivative = 1.94

$$\int \frac{x^6}{\arcsin(ax)^2}\,dx = -\frac{(a^2x^2-1)^3\sqrt{-a^2x^2+1}}{a^7\arcsin{(ax)}} - \frac{3\,(a^2x^2-1)^2\sqrt{-a^2x^2+1}}{a^7\arcsin{(ax)}} + \frac{7\,\mathrm{Si}\,(7\arcsin{(ax)})}{64\,a^7} - \frac{25\,\mathrm{Si}\,(5\arcsin{(ax)})}{64\,a^7} + \frac{27\,\mathrm{Si}\,(3\arcsin{(ax)})}{64\,a^7} - \frac{5\,\mathrm{Si}\,(\arcsin{(ax)})}{64\,a^7} + \frac{3\,(-a^2x^2+1)^{\frac{3}{2}}}{a^7\arcsin{(ax)}} - \frac{\sqrt{-a^2x^2+1}}{a^7\arcsin{(ax)}}$$

[In] integrate(x^6/arcsin(a*x)^2,x, algorithm="giac")

[Out] -(a^2*x^2 - 1)^3*sqrt(-a^2*x^2 + 1)/(a^7*arcsin(a*x)) - 3*(a^2*x^2 - 1)^2*sqrt(-a^2*x^2 + 1)/(a^7*arcsin(a*x)) + 7/64*sin_integral(7*arcsin(a*x))/a^7 - 25/64*sin_integral(5*arcsin(a*x))/a^7 + 27/64*sin_integral(3*arcsin(a*x))/a^7 - 5/64*sin_integral(arcsin(a*x))/a^7 + 3*(-a^2*x^2 + 1)^(3/2)/(a^7*arcsin(a*x)) - sqrt(-a^2*x^2 + 1)/(a^7*arcsin(a*x))

Mupad [F(-1)]

Timed out.

$$\int \frac{x^6}{\arcsin(ax)^2}\,dx = \int \frac{x^6}{{\mathrm{asin}\left(a\,x\right)}^2}\,dx$$

[In] int(x^6/asin(a*x)^2,x)

[Out] int(x^6/asin(a*x)^2, x)

3.52 $\int \frac{x^5}{\arcsin(ax)^2} \, dx$

Optimal result

Integrand size = 10, antiderivative size = 71

$$\int \frac{x^5}{\arcsin(ax)^2} \, dx = -\frac{x^5\sqrt{1-a^2x^2}}{a\arcsin(ax)} + \frac{5\,\text{CosIntegral}(2\arcsin(ax))}{16a^6} - \frac{\text{CosIntegral}(4\arcsin(ax))}{2a^6} + \frac{3\,\text{CosIntegral}(6\arcsin(ax))}{16a^6}$$

```
[Out] 5/16*Ci(2*arcsin(a*x))/a^6-1/2*Ci(4*arcsin(a*x))/a^6+3/16*Ci(6*arcsin(a*x))
/a^6-x^5*(-a^2*x^2+1)^(1/2)/a/arcsin(a*x)
```

Rubi [A] (verified)

Time = 0.04 (sec) , antiderivative size = 71, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 2, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.200, Rules used = {4727, 3383}

$$\int \frac{x^5}{\arcsin(ax)^2} \, dx = \frac{5\,\text{CosIntegral}(2\arcsin(ax))}{16a^6} - \frac{\text{CosIntegral}(4\arcsin(ax))}{2a^6} + \frac{3\,\text{CosIntegral}(6\arcsin(ax))}{16a^6} - \frac{x^5\sqrt{1-a^2x^2}}{a\arcsin(ax)}$$

```
[In] Int[x^5/ArcSin[a*x]^2,x]
```

```
[Out] -((x^5*Sqrt[1 - a^2*x^2])/(a*ArcSin[a*x])) + (5*CosIntegral[2*ArcSin[a*x]])
/(16*a^6) - CosIntegral[4*ArcSin[a*x]]/(2*a^6) + (3*CosIntegral[6*ArcSin[a*
x]])/(16*a^6)
```

Rule 3383

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Simp[CosInte
gral[e - Pi/2 + f*x]/d, x] /; FreeQ[{c, d, e, f}, x] && EqQ[d*(e - Pi/2) -
c*f, 0]
```

Rule 4727

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^m*Sqrt[1 - c^2*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] - Dist
[1/(b^2*c^(m + 1)*(n + 1)), Subst[Int[ExpandTrigReduce[x^(n + 1), Sin[-a/b
+ x/b]^(m - 1)*(m - (m + 1)*Sin[-a/b + x/b]^2), x], x], x, a + b*ArcSin[c*x
]], x] /; FreeQ[{a, b, c}, x] && IGtQ[m, 0] && GeQ[n, -2] && LtQ[n, -1]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= -\frac{x^5\sqrt{1-a^2x^2}}{a\arcsin(ax)} + \frac{\text{Subst}\left(\int \left(\frac{5\cos(2x)}{16x} - \frac{\cos(4x)}{2x} + \frac{3\cos(6x)}{16x}\right)dx, x, \arcsin(ax)\right)}{a^6} \\
&= -\frac{x^5\sqrt{1-a^2x^2}}{a\arcsin(ax)} + \frac{3\text{Subst}\left(\int \frac{\cos(6x)}{x}dx, x, \arcsin(ax)\right)}{16a^6} \\
&\quad + \frac{5\text{Subst}\left(\int \frac{\cos(2x)}{x}dx, x, \arcsin(ax)\right)}{16a^6} - \frac{\text{Subst}\left(\int \frac{\cos(4x)}{x}dx, x, \arcsin(ax)\right)}{2a^6} \\
&= -\frac{x^5\sqrt{1-a^2x^2}}{a\arcsin(ax)} + \frac{5\,\text{CosIntegral}(2\arcsin(ax))}{16a^6} \\
&\quad - \frac{\text{CosIntegral}(4\arcsin(ax))}{2a^6} + \frac{3\,\text{CosIntegral}(6\arcsin(ax))}{16a^6}
\end{aligned}$$

Mathematica [A] (verified)

Time = 0.04 (sec) , antiderivative size = 78, normalized size of antiderivative = 1.10

$$\int \frac{x^5}{\arcsin(ax)^2}dx = -\frac{-10\arcsin(ax)\,\text{CosIntegral}(2\arcsin(ax)) + 16\arcsin(ax)\,\text{CosIntegral}(4\arcsin(ax)) - 6\arcsin(ax)\,\text{CosI}}{32a^6\arcsin(ax)}$$

```
[In] Integrate[x^5/ArcSin[a*x]^2,x]
```

```
[Out] -1/32*(-10*ArcSin[a*x]*CosIntegral[2*ArcSin[a*x]] + 16*ArcSin[a*x]*CosInteg
ral[4*ArcSin[a*x]] - 6*ArcSin[a*x]*CosIntegral[6*ArcSin[a*x]] + 5*Sin[2*Arc
Sin[a*x]] - 4*Sin[4*ArcSin[a*x]] + Sin[6*ArcSin[a*x]])/(a^6*ArcSin[a*x])
```

Maple [A] (verified)

Time = 0.04 (sec) , antiderivative size = 78, normalized size of antiderivative = 1.10

method	result	size
derivativedivides	$\frac{-\frac{5\sin(2\arcsin(ax))}{32\arcsin(ax)}+\frac{5\,\mathrm{Ci}(2\arcsin(ax))}{16}+\frac{\sin(4\arcsin(ax))}{8\arcsin(ax)}-\frac{\mathrm{Ci}(4\arcsin(ax))}{2}-\frac{\sin(6\arcsin(ax))}{32\arcsin(ax)}+\frac{3\,\mathrm{Ci}(6\arcsin(ax))}{16}}{a^6}$	78
default	$\frac{-\frac{5\sin(2\arcsin(ax))}{32\arcsin(ax)}+\frac{5\,\mathrm{Ci}(2\arcsin(ax))}{16}+\frac{\sin(4\arcsin(ax))}{8\arcsin(ax)}-\frac{\mathrm{Ci}(4\arcsin(ax))}{2}-\frac{\sin(6\arcsin(ax))}{32\arcsin(ax)}+\frac{3\,\mathrm{Ci}(6\arcsin(ax))}{16}}{a^6}$	78

```
[In] int(x^5/arcsin(a*x)^2,x,method=_RETURNVERBOSE)
[Out] 1/a^6*(-5/32/arcsin(a*x)*sin(2*arcsin(a*x))+5/16*Ci(2*arcsin(a*x))+1/8/arcs
in(a*x)*sin(4*arcsin(a*x))-1/2*Ci(4*arcsin(a*x))-1/32/arcsin(a*x)*sin(6*arc
sin(a*x))+3/16*Ci(6*arcsin(a*x)))
```

Fricas [F]

$$\int \frac{x^5}{\arcsin(ax)^2}\,dx = \int \frac{x^5}{\arcsin\left(ax\right)^2}\,dx$$

```
[In] integrate(x^5/arcsin(a*x)^2,x, algorithm="fricas")
[Out] integral(x^5/arcsin(a*x)^2, x)
```

Sympy [F]

$$\int \frac{x^5}{\arcsin(ax)^2}\,dx = \int \frac{x^5}{\operatorname{asin}^2\left(ax\right)}\,dx$$

```
[In] integrate(x**5/asin(a*x)**2,x)
[Out] Integral(x**5/asin(a*x)**2, x)
```

Maxima [F]

$$\int \frac{x^5}{\arcsin(ax)^2}\,dx = \int \frac{x^5}{\arcsin\left(ax\right)^2}\,dx$$

```
[In] integrate(x^5/arcsin(a*x)^2,x, algorithm="maxima")
[Out] -(sqrt(a*x + 1)*sqrt(-a*x + 1)*x^5 - a*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x
 + 1))*integrate((6*a^2*x^6 - 5*x^4)*sqrt(a*x + 1)*sqrt(-a*x + 1)/((a^3*x^2
 - a)*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))), x))/(a*arctan2(a*x, sqrt
(a*x + 1)*sqrt(-a*x + 1)))
```

Giac [A] (verification not implemented)

none

Time = 0.29 (sec) , antiderivative size = 120, normalized size of antiderivative = 1.69

$$\int \frac{x^5}{\arcsin(ax)^2}\,dx = -\frac{\left(a^2x^2-1\right)^2\sqrt{-a^2x^2+1}x}{a^5\arcsin\left(ax\right)} + \frac{2\left(-a^2x^2+1\right)^{\frac{3}{2}}x}{a^5\arcsin\left(ax\right)} - \frac{\sqrt{-a^2x^2+1}x}{a^5\arcsin\left(ax\right)} + \frac{3\,\mathrm{Ci}\left(6\arcsin\left(ax\right)\right)}{16\,a^6} - \frac{\mathrm{Ci}\left(4\arcsin\left(ax\right)\right)}{2\,a^6} + \frac{5\,\mathrm{Ci}\left(2\arcsin\left(ax\right)\right)}{16\,a^6}$$

```
[In] integrate(x^5/arcsin(a*x)^2,x, algorithm="giac")
```

```
[Out] -(a^2*x^2 - 1)^2*sqrt(-a^2*x^2 + 1)*x/(a^5*arcsin(a*x)) + 2*(-a^2*x^2 + 1)^
(3/2)*x/(a^5*arcsin(a*x)) - sqrt(-a^2*x^2 + 1)*x/(a^5*arcsin(a*x)) + 3/16*c
os_integral(6*arcsin(a*x))/a^6 - 1/2*cos_integral(4*arcsin(a*x))/a^6 + 5/16
*cos_integral(2*arcsin(a*x))/a^6
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x^5}{\arcsin(ax)^2}\,dx = \int \frac{x^5}{\mathrm{asin}\left(a\,x\right)^2}\,dx$$

```
[In] int(x^5/asin(a*x)^2,x)
```

```
[Out] int(x^5/asin(a*x)^2, x)
```

3.53 $\int \frac{x^4}{\arcsin(ax)^2} \, dx$

Optimal result

Integrand size = 10, antiderivative size = 69

$$\int \frac{x^4}{\arcsin(ax)^2} \, dx = -\frac{x^4\sqrt{1-a^2x^2}}{a\arcsin(ax)} - \frac{\text{Si}(\arcsin(ax))}{8a^5} + \frac{9\text{Si}(3\arcsin(ax))}{16a^5} - \frac{5\text{Si}(5\arcsin(ax))}{16a^5}$$

```
[Out] -1/8*Si(arcsin(a*x))/a^5+9/16*Si(3*arcsin(a*x))/a^5-5/16*Si(5*arcsin(a*x))/
a^5-x^4*(-a^2*x^2+1)^(1/2)/a/arcsin(a*x)
```

Rubi [A] (verified)

Time = 0.04 (sec) , antiderivative size = 69, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 2, $\frac{\text{number of rules}}{\text{integrand size}} = 0.200$, Rules used = {4727, 3380}

$$\int \frac{x^4}{\arcsin(ax)^2} \, dx = -\frac{\text{Si}(\arcsin(ax))}{8a^5} + \frac{9\text{Si}(3\arcsin(ax))}{16a^5} - \frac{5\text{Si}(5\arcsin(ax))}{16a^5} - \frac{x^4\sqrt{1-a^2x^2}}{a\arcsin(ax)}$$

```
[In] Int[x^4/ArcSin[a*x]^2,x]
```

```
[Out] -((x^4*Sqrt[1 - a^2*x^2])/(a*ArcSin[a*x])) - SinIntegral[ArcSin[a*x]]/(8*a^
5) + (9*SinIntegral[3*ArcSin[a*x]])/(16*a^5) - (5*SinIntegral[5*ArcSin[a*x]
])/(16*a^5)
```

Rule 3380

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Simp[SinInte
gral[e + f*x]/d, x] /; FreeQ[{c, d, e, f}, x] && EqQ[d*e - c*f, 0]
```

Rule 4727

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^m*Sqrt[1 - c^2*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] - Dist
[1/(b^2*c^(m + 1)*(n + 1)), Subst[Int[ExpandTrigReduce[x^(n + 1), Sin[-a/b
+ x/b]^(m - 1)*(m - (m + 1)*Sin[-a/b + x/b]^2), x], x], x, a + b*ArcSin[c*x
]], x] /; FreeQ[{a, b, c}, x] && IGtQ[m, 0] && GeQ[n, -2] && LtQ[n, -1]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= -\frac{x^4\sqrt{1-a^2x^2}}{a\arcsin(ax)} + \frac{\text{Subst}\left(\int\left(-\frac{\sin(x)}{8x}+\frac{9\sin(3x)}{16x}-\frac{5\sin(5x)}{16x}\right)\,dx, x, \arcsin(ax)\right)}{a^5} \\
&= -\frac{x^4\sqrt{1-a^2x^2}}{a\arcsin(ax)} - \frac{\text{Subst}\left(\int\frac{\sin(x)}{x}\,dx, x, \arcsin(ax)\right)}{8a^5} \\
&\quad - \frac{5\text{Subst}\left(\int\frac{\sin(5x)}{x}\,dx, x, \arcsin(ax)\right)}{16a^5} + \frac{9\text{Subst}\left(\int\frac{\sin(3x)}{x}\,dx, x, \arcsin(ax)\right)}{16a^5} \\
&= -\frac{x^4\sqrt{1-a^2x^2}}{a\arcsin(ax)} - \frac{\text{Si}(\arcsin(ax))}{8a^5} + \frac{9\text{Si}(3\arcsin(ax))}{16a^5} - \frac{5\text{Si}(5\arcsin(ax))}{16a^5}
\end{aligned}$$

Mathematica [A] (verified)

Time = 0.35 (sec) , antiderivative size = 61, normalized size of antiderivative = 0.88

$$\int \frac{x^4}{\arcsin(ax)^2}\,dx = -\frac{\frac{16a^4x^4\sqrt{1-a^2x^2}}{\arcsin(ax)} + 2\text{Si}(\arcsin(ax)) - 9\text{Si}(3\arcsin(ax)) + 5\text{Si}(5\arcsin(ax))}{16a^5}$$

```
[In] Integrate[x^4/ArcSin[a*x]^2,x]
```

```
[Out] -1/16*((16*a^4*x^4*Sqrt[1 - a^2*x^2])/ArcSin[a*x] + 2*SinIntegral[ArcSin[a*
x]] - 9*SinIntegral[3*ArcSin[a*x]] + 5*SinIntegral[5*ArcSin[a*x]])/a^5
```

Maple [A] (verified)

Time = 0.03 (sec) , antiderivative size = 81, normalized size of antiderivative = 1.17

method	result	size
derivativedivides	$\frac{-\frac{\sqrt{-a^2x^2+1}}{8\arcsin(ax)}-\frac{\text{Si}(\arcsin(ax))}{8}+\frac{3\cos(3\arcsin(ax))}{16\arcsin(ax)}+\frac{9\ \text{Si}(3\arcsin(ax))}{16}-\frac{\cos(5\arcsin(ax))}{16\arcsin(ax)}-\frac{5\ \text{Si}(5\arcsin(ax))}{16}}{a^5}$	81
default	$\frac{-\frac{\sqrt{-a^2x^2+1}}{8\arcsin(ax)}-\frac{\text{Si}(\arcsin(ax))}{8}+\frac{3\cos(3\arcsin(ax))}{16\arcsin(ax)}+\frac{9\ \text{Si}(3\arcsin(ax))}{16}-\frac{\cos(5\arcsin(ax))}{16\arcsin(ax)}-\frac{5\ \text{Si}(5\arcsin(ax))}{16}}{a^5}$	81

```
[In] int(x^4/arcsin(a*x)^2,x,method=_RETURNVERBOSE)
```

```
[Out] 1/a^5*(-1/8/arcsin(a*x)*(-a^2*x^2+1)^(1/2)-1/8*Si(arcsin(a*x))+3/16/arcsin(
a*x)*cos(3*arcsin(a*x))+9/16*Si(3*arcsin(a*x))-1/16/arcsin(a*x)*cos(5*arcsi
n(a*x))-5/16*Si(5*arcsin(a*x)))
```

Fricas [F]

$$\int \frac{x^4}{\arcsin(ax)^2}\,dx = \int \frac{x^4}{\arcsin\left(ax\right)^2}\,dx$$

```
[In] integrate(x^4/arcsin(a*x)^2,x, algorithm="fricas")
```

```
[Out] integral(x^4/arcsin(a*x)^2, x)
```

Sympy [F]

$$\int \frac{x^4}{\arcsin(ax)^2}\,dx = \int \frac{x^4}{\operatorname{asin}^2\left(ax\right)}\,dx$$

```
[In] integrate(x**4/asin(a*x)**2,x)
```

```
[Out] Integral(x**4/asin(a*x)**2, x)
```

Maxima [F]

$$\int \frac{x^4}{\arcsin(ax)^2}\,dx = \int \frac{x^4}{\arcsin\left(ax\right)^2}\,dx$$

```
[In] integrate(x^4/arcsin(a*x)^2,x, algorithm="maxima")
```

```
[Out] -(sqrt(a*x + 1)*sqrt(-a*x + 1)*x^4 - a*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x
 + 1))*integrate((5*a^2*x^5 - 4*x^3)*sqrt(a*x + 1)*sqrt(-a*x + 1)/((a^3*x^2
 - a)*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))), x))/(a*arctan2(a*x, sqrt
(a*x + 1)*sqrt(-a*x + 1)))
```

Giac [A] (verification not implemented)

none

Time = 0.28 (sec) , antiderivative size = 115, normalized size of antiderivative = 1.67

$$\int \frac{x^4}{\arcsin(ax)^2}\,dx = -\frac{\left(a^2x^2-1\right)^2\sqrt{-a^2x^2+1}}{a^5\arcsin\left(ax\right)} - \frac{5\,\mathrm{Si}\left(5\,\arcsin\left(ax\right)\right)}{16\,a^5} + \frac{9\,\mathrm{Si}\left(3\,\arcsin\left(ax\right)\right)}{16\,a^5} - \frac{\mathrm{Si}\left(\arcsin\left(ax\right)\right)}{8\,a^5} + \frac{2\left(-a^2x^2+1\right)^{\frac{3}{2}}}{a^5\arcsin\left(ax\right)} - \frac{\sqrt{-a^2x^2+1}}{a^5\arcsin\left(ax\right)}$$

```
[In] integrate(x^4/arcsin(a*x)^2,x, algorithm="giac")
```

```
[Out] -(a^2*x^2 - 1)^2*sqrt(-a^2*x^2 + 1)/(a^5*arcsin(a*x)) - 5/16*sin_integral(5
*arcsin(a*x))/a^5 + 9/16*sin_integral(3*arcsin(a*x))/a^5 - 1/8*sin_integral
(arcsin(a*x))/a^5 + 2*(-a^2*x^2 + 1)^(3/2)/(a^5*arcsin(a*x)) - sqrt(-a^2*x^
2 + 1)/(a^5*arcsin(a*x))
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x^4}{\arcsin(ax)^2}\,dx = \int \frac{x^4}{\mathrm{asin}\left(a\,x\right)^2}\,dx$$

```
[In] int(x^4/asin(a*x)^2,x)
```

```
[Out] int(x^4/asin(a*x)^2, x)
```

3.54 $\int \frac{x^3}{\arcsin(ax)^2}\,dx$

Optimal result

Integrand size = 10, antiderivative size = 57

$$\int \frac{x^3}{\arcsin(ax)^2}\,dx = -\frac{x^3\sqrt{1-a^2x^2}}{a\arcsin(ax)} + \frac{\text{CosIntegral}(2\arcsin(ax))}{2a^4} - \frac{\text{CosIntegral}(4\arcsin(ax))}{2a^4}$$

```
[Out] 1/2*Ci(2*arcsin(a*x))/a^4-1/2*Ci(4*arcsin(a*x))/a^4-x^3*(-a^2*x^2+1)^(1/2)/
a/arcsin(a*x)
```

Rubi [A] (verified)

Time = 0.03 (sec) , antiderivative size = 57, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 2, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.200, Rules used = {4727, 3383}

$$\int \frac{x^3}{\arcsin(ax)^2}\,dx = \frac{\text{CosIntegral}(2\arcsin(ax))}{2a^4} - \frac{\text{CosIntegral}(4\arcsin(ax))}{2a^4} - \frac{x^3\sqrt{1-a^2x^2}}{a\arcsin(ax)}$$

```
[In] Int[x^3/ArcSin[a*x]^2,x]
```

```
[Out] -((x^3*Sqrt[1 - a^2*x^2])/(a*ArcSin[a*x])) + CosIntegral[2*ArcSin[a*x]]/(2*
a^4) - CosIntegral[4*ArcSin[a*x]]/(2*a^4)
```

Rule 3383

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Simp[CosInte
gral[e - Pi/2 + f*x]/d, x] /; FreeQ[{c, d, e, f}, x] && EqQ[d*(e - Pi/2) -
c*f, 0]
```

Rule 4727

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^m*Sqrt[1 - c^2*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] - Dist
[1/(b^2*c^(m + 1)*(n + 1)), Subst[Int[ExpandTrigReduce[x^(n + 1), Sin[-a/b
+ x/b]^(m - 1)*(m - (m + 1)*Sin[-a/b + x/b]^2), x], x], x, a + b*ArcSin[c*x
]], x] /; FreeQ[{a, b, c}, x] && IGtQ[m, 0] && GeQ[n, -2] && LtQ[n, -1]
```

Rubi steps

$$\begin{aligned}\text{integral} &= -\frac{x^3\sqrt{1-a^2x^2}}{a\arcsin(ax)}+\frac{\text{Subst}\left(\int\left(\frac{\cos(2x)}{2x}-\frac{\cos(4x)}{2x}\right)dx,x,\arcsin(ax)\right)}{a^4}\\ &= -\frac{x^3\sqrt{1-a^2x^2}}{a\arcsin(ax)}+\frac{\text{Subst}\left(\int\frac{\cos(2x)}{x}dx,x,\arcsin(ax)\right)}{2a^4}-\frac{\text{Subst}\left(\int\frac{\cos(4x)}{x}dx,x,\arcsin(ax)\right)}{2a^4}\\ &= -\frac{x^3\sqrt{1-a^2x^2}}{a\arcsin(ax)}+\frac{\text{CosIntegral}(2\arcsin(ax))}{2a^4}-\frac{\text{CosIntegral}(4\arcsin(ax))}{2a^4}\end{aligned}$$

Mathematica [A] (verified)

Time = 0.02 (sec) , antiderivative size = 56, normalized size of antiderivative = 0.98

$$\int\frac{x^3}{\arcsin(ax)^2}\,dx = \frac{4\arcsin(ax)\,\text{CosIntegral}(2\arcsin(ax))-4\arcsin(ax)\,\text{CosIntegral}(4\arcsin(ax))-2\sin(2\arcsin(ax))+\sin}{8a^4\arcsin(ax)}$$

```
[In] Integrate[x^3/ArcSin[a*x]^2,x]
```

```
[Out] (4*ArcSin[a*x]*CosIntegral[2*ArcSin[a*x]] - 4*ArcSin[a*x]*CosIntegral[4*Arc
Sin[a*x]] - 2*Sin[2*ArcSin[a*x]] + Sin[4*ArcSin[a*x]])/(8*a^4*ArcSin[a*x])
```

Maple [A] (verified)

Time = 0.03 (sec) , antiderivative size = 54, normalized size of antiderivative = 0.95

method	result	size
derivativedivides	$\frac{-\frac{\sin(2\arcsin(ax))}{4\arcsin(ax)}+\frac{\text{Ci}(2\arcsin(ax))}{2}+\frac{\sin(4\arcsin(ax))}{8\arcsin(ax)}-\frac{\text{Ci}(4\arcsin(ax))}{2}}{a^4}$	54
default	$\frac{-\frac{\sin(2\arcsin(ax))}{4\arcsin(ax)}+\frac{\text{Ci}(2\arcsin(ax))}{2}+\frac{\sin(4\arcsin(ax))}{8\arcsin(ax)}-\frac{\text{Ci}(4\arcsin(ax))}{2}}{a^4}$	54

```
[In] int(x^3/arcsin(a*x)^2,x,method=_RETURNVERBOSE)
```

[Out] 1/a^4*(-1/4/arcsin(a*x)*sin(2*arcsin(a*x))+1/2*Ci(2*arcsin(a*x))+1/8/arcsin
(a*x)*sin(4*arcsin(a*x))-1/2*Ci(4*arcsin(a*x)))

Fricas [F]

$$\int \frac{x^3}{\arcsin(ax)^2}\,dx = \int \frac{x^3}{\arcsin\left(ax\right)^2}\,dx$$

[In] integrate(x^3/arcsin(a*x)^2,x, algorithm="fricas")

[Out] integral(x^3/arcsin(a*x)^2, x)

Sympy [F]

$$\int \frac{x^3}{\arcsin(ax)^2}\,dx = \int \frac{x^3}{\operatorname{asin}^2\left(ax\right)}\,dx$$

[In] integrate(x**3/asin(a*x)**2,x)

[Out] Integral(x**3/asin(a*x)**2, x)

Maxima [F]

$$\int \frac{x^3}{\arcsin(ax)^2}\,dx = \int \frac{x^3}{\arcsin\left(ax\right)^2}\,dx$$

[In] integrate(x^3/arcsin(a*x)^2,x, algorithm="maxima")

[Out] -(sqrt(a*x + 1)*sqrt(-a*x + 1)*x^3 - a*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x
 + 1))*integrate((4*a^2*x^4 - 3*x^2)*sqrt(a*x + 1)*sqrt(-a*x + 1)/((a^3*x^2
 - a)*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))), x))/(a*arctan2(a*x, sqrt
(a*x + 1)*sqrt(-a*x + 1)))

Giac [A] (verification not implemented)

none

Time = 0.29 (sec) , antiderivative size = 72, normalized size of antiderivative = 1.26

$$\int \frac{x^3}{\arcsin(ax)^2} \, dx = \frac{(-a^2x^2+1)^{\frac{3}{2}}x}{a^3 \arcsin(ax)} - \frac{\sqrt{-a^2x^2+1}x}{a^3 \arcsin(ax)} - \frac{\operatorname{Ci}(4 \arcsin(ax))}{2a^4} + \frac{\operatorname{Ci}(2 \arcsin(ax))}{2a^4}$$

```
[In] integrate(x^3/arcsin(a*x)^2,x, algorithm="giac")
```

```
[Out] (-a^2*x^2 + 1)^(3/2)*x/(a^3*arcsin(a*x)) - sqrt(-a^2*x^2 + 1)*x/(a^3*arcsin
(a*x)) - 1/2*cos_integral(4*arcsin(a*x))/a^4 + 1/2*cos_integral(2*arcsin(a*
x))/a^4
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x^3}{\arcsin(ax)^2} \, dx = \int \frac{x^3}{\operatorname{asin}(a\,x)^2} \, dx$$

```
[In] int(x^3/asin(a*x)^2,x)
```

```
[Out] int(x^3/asin(a*x)^2, x)
```

3.55 $\int \frac{x^2}{\arcsin(ax)^2} dx$

Optimal result

Integrand size = 10, antiderivative size = 55

$$\int \frac{x^2}{\arcsin(ax)^2} dx = -\frac{x^2\sqrt{1-a^2x^2}}{a\arcsin(ax)} - \frac{\text{Si}(\arcsin(ax))}{4a^3} + \frac{3\text{Si}(3\arcsin(ax))}{4a^3}$$

```
[Out] -1/4*Si(arcsin(a*x))/a^3+3/4*Si(3*arcsin(a*x))/a^3-x^2*(-a^2*x^2+1)^(1/2)/a
/arcsin(a*x)
```

Rubi [A] (verified)

Time = 0.03 (sec) , antiderivative size = 55, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 2, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.200, Rules used = {4727, 3380}

$$\int \frac{x^2}{\arcsin(ax)^2} dx = -\frac{\text{Si}(\arcsin(ax))}{4a^3} + \frac{3\text{Si}(3\arcsin(ax))}{4a^3} - \frac{x^2\sqrt{1-a^2x^2}}{a\arcsin(ax)}$$

```
[In] Int[x^2/ArcSin[a*x]^2,x]
```

```
[Out] -((x^2*Sqrt[1 - a^2*x^2])/(a*ArcSin[a*x])) - SinIntegral[ArcSin[a*x]]/(4*a^
3) + (3*SinIntegral[3*ArcSin[a*x]])/(4*a^3)
```

Rule 3380

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Simp[SinInte
gral[e + f*x]/d, x] /; FreeQ[{c, d, e, f}, x] && EqQ[d*e - c*f, 0]
```

Rule 4727

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^m*Sqrt[1 - c^2*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] - Dist
```

```
[1/(b^2*c^(m + 1)*(n + 1)), Subst[Int[ExpandTrigReduce[x^(n + 1), Sin[-a/b
+ x/b]^(m - 1)*(m - (m + 1)*Sin[-a/b + x/b]^2), x], x], x, a + b*ArcSin[c*x
]], x] /; FreeQ[{a, b, c}, x] && IGtQ[m, 0] && GeQ[n, -2] && LtQ[n, -1]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= -\frac{x^2\sqrt{1-a^2x^2}}{a\arcsin(ax)} + \frac{\text{Subst}\left(\int\left(-\frac{\sin(x)}{4x}+\frac{3\sin(3x)}{4x}\right)\,dx, x, \arcsin(ax)\right)}{a^3}\\
&= -\frac{x^2\sqrt{1-a^2x^2}}{a\arcsin(ax)} - \frac{\text{Subst}\left(\int\frac{\sin(x)}{x}\,dx, x, \arcsin(ax)\right)}{4a^3} + \frac{3\text{Subst}\left(\int\frac{\sin(3x)}{x}\,dx, x, \arcsin(ax)\right)}{4a^3}\\
&= -\frac{x^2\sqrt{1-a^2x^2}}{a\arcsin(ax)} - \frac{\text{Si}(\arcsin(ax))}{4a^3} + \frac{3\text{Si}(3\arcsin(ax))}{4a^3}
\end{aligned}$$

Mathematica [A] (verified)

Time = 0.28 (sec) , antiderivative size = 50, normalized size of antiderivative = 0.91

$$\int\frac{x^2}{\arcsin(ax)^2}\,dx = -\frac{\frac{4a^2x^2\sqrt{1-a^2x^2}}{\arcsin(ax)} + \text{Si}(\arcsin(ax)) - 3\text{Si}(3\arcsin(ax))}{4a^3}$$

```
[In] Integrate[x^2/ArcSin[a*x]^2,x]
[Out] -1/4*((4*a^2*x^2*Sqrt[1 - a^2*x^2])/ArcSin[a*x] + SinIntegral[ArcSin[a*x]]
- 3*SinIntegral[3*ArcSin[a*x]])/a^3
```

Maple [A] (verified)

Time = 0.03 (sec) , antiderivative size = 57, normalized size of antiderivative = 1.04

method	result	size
derivativedivides	$\frac{-\frac{\sqrt{-a^2x^2+1}}{4\arcsin(ax)}-\frac{\text{Si}(\arcsin(ax))}{4}+\frac{\cos(3\arcsin(ax))}{4\arcsin(ax)}+\frac{3\ \text{Si}(3\arcsin(ax))}{4}}{a^3}$	57
default	$\frac{-\frac{\sqrt{-a^2x^2+1}}{4\arcsin(ax)}-\frac{\text{Si}(\arcsin(ax))}{4}+\frac{\cos(3\arcsin(ax))}{4\arcsin(ax)}+\frac{3\ \text{Si}(3\arcsin(ax))}{4}}{a^3}$	57

```
[In] int(x^2/arcsin(a*x)^2,x,method=_RETURNVERBOSE)
[Out] 1/a^3*(-1/4/arcsin(a*x)*(-a^2*x^2+1)^(1/2)-1/4*Si(arcsin(a*x))+1/4/arcsin(a
*x)*cos(3*arcsin(a*x))+3/4*Si(3*arcsin(a*x)))
```

Fricas [F]

$$\int \frac{x^2}{\arcsin(ax)^2}\,dx = \int \frac{x^2}{\arcsin\left(ax\right)^2}\,dx$$

```
[In] integrate(x^2/arcsin(a*x)^2,x, algorithm="fricas")
[Out] integral(x^2/arcsin(a*x)^2, x)
```

Sympy [F]

$$\int \frac{x^2}{\arcsin(ax)^2}\,dx = \int \frac{x^2}{\operatorname{asin}^2\left(ax\right)}\,dx$$

```
[In] integrate(x**2/asin(a*x)**2,x)
[Out] Integral(x**2/asin(a*x)**2, x)
```

Maxima [F]

$$\int \frac{x^2}{\arcsin(ax)^2}\,dx = \int \frac{x^2}{\arcsin\left(ax\right)^2}\,dx$$

```
[In] integrate(x^2/arcsin(a*x)^2,x, algorithm="maxima")
[Out] -(sqrt(a*x + 1)*sqrt(-a*x + 1)*x^2 - a*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x
 + 1))*integrate((3*a^2*x^3 - 2*x)*sqrt(a*x + 1)*sqrt(-a*x + 1)/((a^3*x^2 -
 a)*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))), x))/(a*arctan2(a*x, sqrt(a
*x + 1)*sqrt(-a*x + 1)))
```

Giac [A] (verification not implemented)

none

Time = 0.29 (sec) , antiderivative size = 68, normalized size of antiderivative = 1.24

$$\int \frac{x^2}{\arcsin(ax)^2}\,dx = \frac{3\,\mathrm{Si}\left(3\arcsin\left(ax\right)\right)}{4\,a^3} - \frac{\mathrm{Si}\left(\arcsin\left(ax\right)\right)}{4\,a^3} + \frac{\left(-a^2x^2+1\right)^{\frac{3}{2}}}{a^3\arcsin\left(ax\right)} - \frac{\sqrt{-a^2x^2+1}}{a^3\arcsin\left(ax\right)}$$

```
[In] integrate(x^2/arcsin(a*x)^2,x, algorithm="giac")
[Out] 3/4*sin_integral(3*arcsin(a*x))/a^3 - 1/4*sin_integral(arcsin(a*x))/a^3 + (
-a^2*x^2 + 1)^(3/2)/(a^3*arcsin(a*x)) - sqrt(-a^2*x^2 + 1)/(a^3*arcsin(a*x)
)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x^2}{\arcsin(ax)^2}\,dx = \int \frac{x^2}{\operatorname{asin}\left(a\,x\right)^2}\,dx$$

```
[In] int(x^2/asin(a*x)^2,x)
[Out] int(x^2/asin(a*x)^2, x)
```

3.56 $\int \frac{x}{\arcsin(ax)^2} \, dx$

Optimal result

Integrand size = 8, antiderivative size = 38

$$\int \frac{x}{\arcsin(ax)^2} \, dx = -\frac{x\sqrt{1-a^2x^2}}{a \arcsin(ax)} + \frac{\text{CosIntegral}(2\arcsin(ax))}{a^2}$$

```
[Out] Ci(2*arcsin(a*x))/a^2-x*(-a^2*x^2+1)^(1/2)/a/arcsin(a*x)
```

Rubi [A] (verified)

Time = 0.02 (sec) , antiderivative size = 38, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.250, Rules used = {4727, 3383}

$$\int \frac{x}{\arcsin(ax)^2} \, dx = \frac{\text{CosIntegral}(2\arcsin(ax))}{a^2} - \frac{x\sqrt{1-a^2x^2}}{a \arcsin(ax)}$$

```
[In] Int[x/ArcSin[a*x]^2,x]
```

```
[Out] -((x*Sqrt[1 - a^2*x^2])/(a*ArcSin[a*x])) + CosIntegral[2*ArcSin[a*x]]/a^2
```

Rule 3383

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Simp[CosInte
gral[e - Pi/2 + f*x]/d, x] /; FreeQ[{c, d, e, f}, x] && EqQ[d*(e - Pi/2) -
c*f, 0]
```

Rule 4727

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^m*Sqrt[1 - c^2*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] - Dist
[1/(b^2*c^(m + 1)*(n + 1)), Subst[Int[ExpandTrigReduce[x^(n + 1), Sin[-a/b
```

```
+ x/b]^(m - 1)*(m - (m + 1)*Sin[-a/b + x/b]^2), x], x], x, a + b*ArcSin[c*x
]], x] /; FreeQ[{a, b, c}, x] && IGtQ[m, 0] && GeQ[n, -2] && LtQ[n, -1]
```

Rubi steps

$$\begin{aligned}\text{integral} &= -\frac{x\sqrt{1-a^2x^2}}{a\arcsin(ax)} + \frac{\text{Subst}\left(\int \frac{\cos(2x)}{x}\,dx, x, \arcsin(ax)\right)}{a^2}\\ &= -\frac{x\sqrt{1-a^2x^2}}{a\arcsin(ax)} + \frac{\text{CosIntegral}(2\arcsin(ax))}{a^2}\end{aligned}$$

Mathematica [A] (verified)

Time = 0.02 (sec) , antiderivative size = 29, normalized size of antiderivative = 0.76

$$\int \frac{x}{\arcsin(ax)^2}\,dx = \frac{\text{CosIntegral}(2\arcsin(ax)) - \frac{\sin(2\arcsin(ax))}{2\arcsin(ax)}}{a^2}$$

```
[In] Integrate[x/ArcSin[a*x]^2,x]
[Out] (CosIntegral[2*ArcSin[a*x]] - Sin[2*ArcSin[a*x]]/(2*ArcSin[a*x]))/a^2
```

Maple [A] (verified)

Time = 0.03 (sec) , antiderivative size = 28, normalized size of antiderivative = 0.74

method	result	size
derivativedivides	$\frac{-\frac{\sin(2\arcsin(ax))}{2\arcsin(ax)}+\text{Ci}(2\arcsin(ax))}{a^2}$	28
default	$\frac{-\frac{\sin(2\arcsin(ax))}{2\arcsin(ax)}+\text{Ci}(2\arcsin(ax))}{a^2}$	28

```
[In] int(x/arcsin(a*x)^2,x,method=_RETURNVERBOSE)
[Out] 1/a^2*(-1/2/arcsin(a*x)*sin(2*arcsin(a*x))+Ci(2*arcsin(a*x)))
```

Fricas [F]

$$\int \frac{x}{\arcsin(ax)^2} \, dx = \int \frac{x}{\arcsin{(ax)}^2} \, dx$$

```
[In] integrate(x/arcsin(a*x)^2,x, algorithm="fricas")
[Out] integral(x/arcsin(a*x)^2, x)
```

Sympy [F]

$$\int \frac{x}{\arcsin(ax)^2} \, dx = \int \frac{x}{\operatorname{asin}^2{(ax)}} \, dx$$

```
[In] integrate(x/asin(a*x)**2,x)
[Out] Integral(x/asin(a*x)**2, x)
```

Maxima [F]

$$\int \frac{x}{\arcsin(ax)^2} \, dx = \int \frac{x}{\arcsin{(ax)}^2} \, dx$$

```
[In] integrate(x/arcsin(a*x)^2,x, algorithm="maxima")
[Out] (a*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))*integrate((2*a^2*x^2 - 1)*sqr
t(a*x + 1)*sqrt(-a*x + 1)/((a^3*x^2 - a)*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a
*x + 1))), x) - sqrt(a*x + 1)*sqrt(-a*x + 1)*x)/(a*arctan2(a*x, sqrt(a*x +
1)*sqrt(-a*x + 1)))
```

Giac [A] (verification not implemented)

none

Time = 0.29 (sec) , antiderivative size = 36, normalized size of antiderivative = 0.95

$$\int \frac{x}{\arcsin(ax)^2} \, dx = -\frac{\sqrt{-a^2x^2 + 1}x}{a \arcsin{(ax)}} + \frac{\operatorname{Ci}{(2 \arcsin{(ax)})}}{a^2}$$

```
[In] integrate(x/arcsin(a*x)^2,x, algorithm="giac")
[Out] -sqrt(-a^2*x^2 + 1)*x/(a*arcsin(a*x)) + cos_integral(2*arcsin(a*x))/a^2
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x}{\arcsin(ax)^2}\,dx = \int \frac{x}{\mathrm{asin}\left(a\,x\right)^2}\,dx$$

```
[In] int(x/asin(a*x)^2,x)
[Out] int(x/asin(a*x)^2, x)
```

3.57 $\int \frac{1}{\arcsin(ax)^2} \, dx$

Optimal result

Integrand size = 6, antiderivative size = 36

$$\int \frac{1}{\arcsin(ax)^2} \, dx = -\frac{\sqrt{1-a^2x^2}}{a \arcsin(ax)} - \frac{\text{Si}(\arcsin(ax))}{a}$$

```
[Out] -Si(arcsin(a*x))/a-(-a^2*x^2+1)^(1/2)/a/arcsin(a*x)
```

Rubi [A] (verified)

Time = 0.05 (sec) , antiderivative size = 36, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {4717, 4809, 3380}

$$\int \frac{1}{\arcsin(ax)^2} \, dx = -\frac{\sqrt{1-a^2x^2}}{a \arcsin(ax)} - \frac{\text{Si}(\arcsin(ax))}{a}$$

```
[In] Int[ArcSin[a*x]^(-2),x]
```

```
[Out] -(Sqrt[1 - a^2*x^2]/(a*ArcSin[a*x])) - SinIntegral[ArcSin[a*x]]/a
```

Rule 3380

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Simp[SinInte
gral[e + f*x]/d, x] /; FreeQ[{c, d, e, f}, x] && EqQ[d*e - c*f, 0]
```

Rule 4717

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_), x_Symbol] :> Simp[Sqrt[1 - c^2
*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] + Dist[c/(b*(n + 1)),
 Int[x*((a + b*ArcSin[c*x])^(n + 1)/Sqrt[1 - c^2*x^2]), x], x] /; FreeQ[{a,
 b, c}, x] && LtQ[n, -1]
```

Rule 4809

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_.)*((d_) + (e_.)*(x_)^
2)^(p_.), x_Symbol] :> Dist[(1/(b*c^(m + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x
^2)^p], Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b]^(2*p + 1), x], x, a
 + b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, d, e, n}, x] && EqQ[c^2*d + e, 0]
&& IGtQ[2*p + 2, 0] && IGtQ[m, 0]
```

Rubi steps

$$\begin{aligned}\text{integral} &= -\frac{\sqrt{1-a^2x^2}}{a\arcsin(ax)} - a\int\frac{x}{\sqrt{1-a^2x^2}\arcsin(ax)}\,dx\\ &= -\frac{\sqrt{1-a^2x^2}}{a\arcsin(ax)} - \frac{\text{Subst}\left(\int\frac{\sin(x)}{x}\,dx, x, \arcsin(ax)\right)}{a}\\ &= -\frac{\sqrt{1-a^2x^2}}{a\arcsin(ax)} - \frac{\text{Si}(\arcsin(ax))}{a}\end{aligned}$$

Mathematica [A] (verified)

Time = 0.13 (sec) , antiderivative size = 32, normalized size of antiderivative = 0.89

$$\int\frac{1}{\arcsin(ax)^2}\,dx = -\frac{\frac{\sqrt{1-a^2x^2}}{\arcsin(ax)} + \text{Si}(\arcsin(ax))}{a}$$

```
[In] Integrate[ArcSin[a*x]^(-2),x]
[Out] -((Sqrt[1 - a^2*x^2]/ArcSin[a*x] + SinIntegral[ArcSin[a*x]])/a)
```

Maple [A] (verified)

Time = 0.02 (sec) , antiderivative size = 33, normalized size of antiderivative = 0.92

method	result	size
derivativedivides	$\frac{-\frac{\sqrt{-a^2x^2+1}}{\arcsin(ax)}-\text{Si}(\arcsin(ax))}{a}$	33
default	$\frac{-\frac{\sqrt{-a^2x^2+1}}{\arcsin(ax)}-\text{Si}(\arcsin(ax))}{a}$	33

```
[In] int(1/arcsin(a*x)^2,x,method=_RETURNVERBOSE)
[Out] 1/a*(-1/arcsin(a*x)*(-a^2*x^2+1)^(1/2)-Si(arcsin(a*x)))
```

Fricas [F]

$$\int \frac{1}{\arcsin(ax)^2}\,dx = \int \frac{1}{\arcsin\left(ax\right)^2}\,dx$$

```
[In] integrate(1/arcsin(a*x)^2,x, algorithm="fricas")
[Out] integral(arcsin(a*x)^(-2), x)
```

Sympy [F]

$$\int \frac{1}{\arcsin(ax)^2}\,dx = \int \frac{1}{\operatorname{asin}^2\left(ax\right)}\,dx$$

```
[In] integrate(1/asin(a*x)**2,x)
[Out] Integral(asin(a*x)**(-2), x)
```

Maxima [F]

$$\int \frac{1}{\arcsin(ax)^2}\,dx = \int \frac{1}{\arcsin\left(ax\right)^2}\,dx$$

```
[In] integrate(1/arcsin(a*x)^2,x, algorithm="maxima")
[Out] (a^2*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))*integrate(sqrt(a*x + 1)*sqr
t(-a*x + 1)*x/((a^2*x^2 - 1)*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))), x
) - sqrt(a*x + 1)*sqrt(-a*x + 1))/(a*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x +
 1)))
```

Giac [A] (verification not implemented)

none

Time = 0.28 (sec) , antiderivative size = 34, normalized size of antiderivative = 0.94

$$\int \frac{1}{\arcsin(ax)^2}\,dx = -\frac{\operatorname{Si}\left(\arcsin\left(ax\right)\right)}{a} - \frac{\sqrt{-a^2x^2+1}}{a\arcsin\left(ax\right)}$$

```
[In] integrate(1/arcsin(a*x)^2,x, algorithm="giac")
[Out] -sin_integral(arcsin(a*x))/a - sqrt(-a^2*x^2 + 1)/(a*arcsin(a*x))
```

Mupad [F(-1)]

Timed out.

$$\int \frac{1}{\arcsin(ax)^2}\,dx = \int \frac{1}{\mathrm{asin}\left(a\,x\right)^2}\,dx$$

```
[In] int(1/asin(a*x)^2,x)
[Out] int(1/asin(a*x)^2, x)
```

3.58 $\int \frac{1}{x \arcsin(ax)^2} \, dx$

Optimal result

Integrand size = 10, antiderivative size = 10

$$\int \frac{1}{x \arcsin(ax)^2} \, dx = \text{Int}\left(\frac{1}{x \arcsin(ax)^2}, x\right)$$

```
[Out] Unintegrable(1/x/arcsin(a*x)^2,x)
```

Rubi [N/A]

Not integrable

Time = 0.01 (sec) , antiderivative size = 10, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}} = 0.000$, Rules used = {}

$$\int \frac{1}{x \arcsin(ax)^2} \, dx = \int \frac{1}{x \arcsin(ax)^2} \, dx$$

```
[In] Int[1/(x*ArcSin[a*x]^2),x]
```

```
[Out] Defer[Int][1/(x*ArcSin[a*x]^2), x]
```

Rubi steps

$$\text{integral} = \int \frac{1}{x \arcsin(ax)^2} \, dx$$

Mathematica [N/A]

Not integrable

Time = 1.33 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.20

$$\int \frac{1}{x \arcsin(ax)^2} dx = \int \frac{1}{x \arcsin(ax)^2} dx$$

```
[In] Integrate[1/(x*ArcSin[a*x]^2),x]
[Out] Integrate[1/(x*ArcSin[a*x]^2), x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.03 (sec) , antiderivative size = 10, normalized size of antiderivative = 1.00

$$\int \frac{1}{x \arcsin\left(ax\right)^{2}}dx$$

```
[In] int(1/x/arcsin(a*x)^2,x)
[Out] int(1/x/arcsin(a*x)^2,x)
```

Fricas [N/A]

Not integrable

Time = 0.26 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.20

$$\int \frac{1}{x \arcsin(ax)^2} dx = \int \frac{1}{x \arcsin\left(ax\right)^{2}} dx$$

```
[In] integrate(1/x/arcsin(a*x)^2,x, algorithm="fricas")
[Out] integral(1/(x*arcsin(a*x)^2), x)
```

Sympy [N/A]

Not integrable

Time = 0.32 (sec) , antiderivative size = 10, normalized size of antiderivative = 1.00

$$\int \frac{1}{x \arcsin(ax)^2} dx = \int \frac{1}{x \operatorname{asin}^{2}\left(ax\right)} dx$$

```
[In] integrate(1/x/asin(a*x)**2,x)
[Out] Integral(1/(x*asin(a*x)**2), x)
```

Maxima [N/A]

Not integrable

Time = 0.57 (sec) , antiderivative size = 126, normalized size of antiderivative = 12.60

$$\int \frac{1}{x \arcsin(ax)^2} \, dx = \int \frac{1}{x \arcsin{(ax)}^2} \, dx$$

```
[In] integrate(1/x/arcsin(a*x)^2,x, algorithm="maxima")
```

```
[Out] (a*x*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))*integrate(sqrt(a*x + 1)*sqr
t(-a*x + 1)/((a^3*x^4 - a*x^2)*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))),
 x) - sqrt(a*x + 1)*sqrt(-a*x + 1))/(a*x*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a
*x + 1)))
```

Giac [N/A]

Not integrable

Time = 0.31 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.20

$$\int \frac{1}{x \arcsin(ax)^2} \, dx = \int \frac{1}{x \arcsin{(ax)}^2} \, dx$$

```
[In] integrate(1/x/arcsin(a*x)^2,x, algorithm="giac")
```

```
[Out] integrate(1/(x*arcsin(a*x)^2), x)
```

Mupad [N/A]

Not integrable

Time = 0.03 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.20

$$\int \frac{1}{x \arcsin(ax)^2} \, dx = \int \frac{1}{x\,{\mathrm{asin}\left(a\,x\right)}^2} \, dx$$

```
[In] int(1/(x*asin(a*x)^2),x)
```

```
[Out] int(1/(x*asin(a*x)^2), x)
```

3.59 $\int \frac{1}{x^2 \arcsin(ax)^2} \, dx$

Optimal result

Integrand size = 10, antiderivative size = 10

$$\int \frac{1}{x^2 \arcsin(ax)^2} \, dx = \operatorname{Int}\left(\frac{1}{x^2 \arcsin(ax)^2}, x\right)$$

```
[Out] Unintegrable(1/x^2/arcsin(a*x)^2,x)
```

Rubi [N/A]

Not integrable

Time = 0.01 (sec) , antiderivative size = 10, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{1}{x^2 \arcsin(ax)^2} \, dx = \int \frac{1}{x^2 \arcsin(ax)^2} \, dx$$

```
[In] Int[1/(x^2*ArcSin[a*x]^2),x]
[Out] Defer[Int][1/(x^2*ArcSin[a*x]^2), x]
```

Rubi steps

$$\text{integral} = \int \frac{1}{x^2 \arcsin(ax)^2} \, dx$$

Mathematica [N/A]

Not integrable

Time = 10.92 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.20

$$\int \frac{1}{x^2 \arcsin(ax)^2} \, dx = \int \frac{1}{x^2 \arcsin(ax)^2} \, dx$$

```
[In] Integrate[1/(x^2*ArcSin[a*x]^2),x]
[Out] Integrate[1/(x^2*ArcSin[a*x]^2), x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.06 (sec) , antiderivative size = 10, normalized size of antiderivative = 1.00

$$\int \frac{1}{x^2 \arcsin\left(ax\right)^2} dx$$

```
[In] int(1/x^2/arcsin(a*x)^2,x)
[Out] int(1/x^2/arcsin(a*x)^2,x)
```

Fricas [N/A]

Not integrable

Time = 0.25 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.20

$$\int \frac{1}{x^2 \arcsin(ax)^2} \, dx = \int \frac{1}{x^2 \arcsin\left(ax\right)^2} \, dx$$

```
[In] integrate(1/x^2/arcsin(a*x)^2,x, algorithm="fricas")
[Out] integral(1/(x^2*arcsin(a*x)^2), x)
```

Sympy [N/A]

Not integrable

Time = 0.37 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.20

$$\int \frac{1}{x^2 \arcsin(ax)^2} \, dx = \int \frac{1}{x^2 \operatorname{asin}^2\left(ax\right)} \, dx$$

```
[In] integrate(1/x**2/asin(a*x)**2,x)
[Out] Integral(1/(x**2*asin(a*x)**2), x)
```

Maxima [N/A]

Not integrable

Time = 0.68 (sec) , antiderivative size = 137, normalized size of antiderivative = 13.70

$$\int \frac{1}{x^2 \arcsin(ax)^2} \, dx = \int \frac{1}{x^2 \arcsin{(ax)}^2} \, dx$$

```
[In] integrate(1/x^2/arcsin(a*x)^2,x, algorithm="maxima")
```

```
[Out] -(a*x^2*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))*integrate((a^2*x^2 - 2)*
sqrt(a*x + 1)*sqrt(-a*x + 1)/((a^3*x^5 - a*x^3)*arctan2(a*x, sqrt(a*x + 1)*
sqrt(-a*x + 1))), x) + sqrt(a*x + 1)*sqrt(-a*x + 1))/(a*x^2*arctan2(a*x, sq
rt(a*x + 1)*sqrt(-a*x + 1)))
```

Giac [N/A]

Not integrable

Time = 0.37 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.20

$$\int \frac{1}{x^2 \arcsin(ax)^2} \, dx = \int \frac{1}{x^2 \arcsin{(ax)}^2} \, dx$$

```
[In] integrate(1/x^2/arcsin(a*x)^2,x, algorithm="giac")
```

```
[Out] integrate(1/(x^2*arcsin(a*x)^2), x)
```

Mupad [N/A]

Not integrable

Time = 0.04 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.20

$$\int \frac{1}{x^2 \arcsin(ax)^2} \, dx = \int \frac{1}{x^2 \,\mathrm{asin}{(a\,x)}^2} \, dx$$

```
[In] int(1/(x^2*asin(a*x)^2),x)
```

```
[Out] int(1/(x^2*asin(a*x)^2), x)
```

3.60 $\int \frac{x^4}{\arcsin(ax)^3}\,dx$

Optimal result

Integrand size = 10, antiderivative size = 98

$$\int \frac{x^4}{\arcsin(ax)^3}\,dx = -\frac{x^4\sqrt{1-a^2x^2}}{2a\arcsin(ax)^2}-\frac{2x^3}{a^2\arcsin(ax)}+\frac{5x^5}{2\arcsin(ax)}-\frac{\text{CosIntegral}(\arcsin(ax))}{16a^5}+\frac{27\,\text{CosIntegral}(3\arcsin(ax))}{32a^5}-\frac{25\,\text{CosIntegral}(5\arcsin(ax))}{32a^5}$$

```
[Out] -2*x^3/a^2/arcsin(a*x)+5/2*x^5/arcsin(a*x)-1/16*Ci(arcsin(a*x))/a^5+27/32*C
i(3*arcsin(a*x))/a^5-25/32*Ci(5*arcsin(a*x))/a^5-1/2*x^4*(-a^2*x^2+1)^(1/2)
/a/arcsin(a*x)^2
```

Rubi [A] (verified)

Time = 0.23 (sec) , antiderivative size = 98, normalized size of antiderivative = 1.00, number of steps used = 14, number of rules used = 5, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {4729, 4807, 4731, 4491, 3383}

$$\int \frac{x^4}{\arcsin(ax)^3}\,dx = -\frac{\text{CosIntegral}(\arcsin(ax))}{16a^5}+\frac{27\,\text{CosIntegral}(3\arcsin(ax))}{32a^5}-\frac{25\,\text{CosIntegral}(5\arcsin(ax))}{32a^5}-\frac{2x^3}{a^2\arcsin(ax)}-\frac{x^4\sqrt{1-a^2x^2}}{2a\arcsin(ax)^2}+\frac{5x^5}{2\arcsin(ax)}$$

```
[In] Int[x^4/ArcSin[a*x]^3,x]
```

```
[Out] -1/2*(x^4*Sqrt[1 - a^2*x^2])/(a*ArcSin[a*x]^2) - (2*x^3)/(a^2*ArcSin[a*x])
+ (5*x^5)/(2*ArcSin[a*x]) - CosIntegral[ArcSin[a*x]]/(16*a^5) + (27*CosInte
gral[3*ArcSin[a*x]])/(32*a^5) - (25*CosIntegral[5*ArcSin[a*x]])/(32*a^5)
```

Rule 3383

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Simp[CosInte
gral[e - Pi/2 + f*x]/d, x] /; FreeQ[{c, d, e, f}, x] && EqQ[d*(e - Pi/2) -
c*f, 0]
```

Rule 4491

```
Int[Cos[(a_.) + (b_.)*(x_)]^(p_.)*((c_.) + (d_.)*(x_))^(m_.)*Sin[(a_.) + (b
_.)*(x_)]^(n_.), x_Symbol] :> Int[ExpandTrigReduce[(c + d*x)^m, Sin[a + b*x
]^n*Cos[a + b*x]^p, x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && IG
tQ[p, 0]
```

Rule 4729

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^m*Sqrt[1 - c^2*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] + (Dis
t[c*((m + 1)/(b*(n + 1))), Int[x^(m + 1)*((a + b*ArcSin[c*x])^(n + 1)/Sqrt[
1 - c^2*x^2]), x], x] - Dist[m/(b*c*(n + 1)), Int[x^(m - 1)*((a + b*ArcSin[
c*x])^(n + 1)/Sqrt[1 - c^2*x^2]), x], x]) /; FreeQ[{a, b, c}, x] && IGtQ[m,
 0] && LtQ[n, -2]
```

Rule 4731

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Dist[1
/(b*c^(m + 1)), Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b], x], x, a +
 b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, n}, x] && IGtQ[m, 0]
```

Rule 4807

```
Int[(((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*((f_.)*(x_))^(m_.))/Sqrt[(d_)
+ (e_.)*(x_)^2], x_Symbol] :> Simp[((f*x)^m/(b*c*(n + 1)))*Simp[Sqrt[1 - c^
2*x^2]/Sqrt[d + e*x^2]]*(a + b*ArcSin[c*x])^(n + 1), x] - Dist[f*(m/(b*c*(n
 + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]], Int[(f*x)^(m - 1)*(a + b*A
rcSin[c*x])^(n + 1), x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && EqQ[c^2*d
 + e, 0] && LtQ[n, -1]
```

Rubi steps

$$\text{integral} = -\frac{x^4\sqrt{1-a^2x^2}}{2a\arcsin(ax)^2} + \frac{2\int \frac{x^3}{\sqrt{1-a^2x^2}\arcsin(ax)^2}\,dx}{a} - \frac{1}{2}(5a)\int \frac{x^5}{\sqrt{1-a^2x^2}\arcsin(ax)^2}\,dx$$

$$= -\frac{x^4\sqrt{1-a^2x^2}}{2a\arcsin(ax)^2} - \frac{2x^3}{a^2\arcsin(ax)} + \frac{5x^5}{2\arcsin(ax)} - \frac{25}{2}\int\frac{x^4}{\arcsin(ax)}\,dx + \frac{6\int\frac{x^2}{\arcsin(ax)}\,dx}{a^2}$$

$$= -\frac{x^4\sqrt{1-a^2x^2}}{2a\arcsin(ax)^2} - \frac{2x^3}{a^2\arcsin(ax)} + \frac{5x^5}{2\arcsin(ax)} + \frac{6\text{Subst}\left(\int\frac{\cos(x)\sin^2(x)}{x}\,dx, x, \arcsin(ax)\right)}{a^5} - \frac{25\text{Subst}\left(\int\frac{\cos(x)\sin^4(x)}{x}\,dx, x, \arcsin(ax)\right)}{2a^5}$$

$$= -\frac{x^4\sqrt{1-a^2x^2}}{2a\arcsin(ax)^2} - \frac{2x^3}{a^2\arcsin(ax)} + \frac{5x^5}{2\arcsin(ax)} + \frac{6\text{Subst}\left(\int\left(\frac{\cos(x)}{4x} - \frac{\cos(3x)}{4x}\right)dx, x, \arcsin(ax)\right)}{a^5} - \frac{25\text{Subst}\left(\int\left(\frac{\cos(x)}{8x} - \frac{3\cos(3x)}{16x} + \frac{\cos(5x)}{16x}\right)dx, x, \arcsin(ax)\right)}{2a^5}$$

$$= -\frac{x^4\sqrt{1-a^2x^2}}{2a\arcsin(ax)^2} - \frac{2x^3}{a^2\arcsin(ax)} + \frac{5x^5}{2\arcsin(ax)} - \frac{25\text{Subst}\left(\int\frac{\cos(5x)}{x}\,dx, x, \arcsin(ax)\right)}{32a^5} + \frac{3\text{Subst}\left(\int\frac{\cos(x)}{x}\,dx, x, \arcsin(ax)\right)}{2a^5} - \frac{3\text{Subst}\left(\int\frac{\cos(3x)}{x}\,dx, x, \arcsin(ax)\right)}{2a^5} - \frac{25\text{Subst}\left(\int\frac{\cos(x)}{x}\,dx, x, \arcsin(ax)\right)}{16a^5} + \frac{75\text{Subst}\left(\int\frac{\cos(3x)}{x}\,dx, x, \arcsin(ax)\right)}{32a^5}$$

$$= -\frac{x^4\sqrt{1-a^2x^2}}{2a\arcsin(ax)^2} - \frac{2x^3}{a^2\arcsin(ax)} + \frac{5x^5}{2\arcsin(ax)} - \frac{\text{CosIntegral}(\arcsin(ax))}{16a^5} + \frac{27\,\text{CosIntegral}(3\arcsin(ax))}{32a^5} - \frac{25\,\text{CosIntegral}(5\arcsin(ax))}{32a^5}$$

Mathematica [A] (verified)

Time = 0.16 (sec) , antiderivative size = 103, normalized size of antiderivative = 1.05

$$\int\frac{x^4}{\arcsin(ax)^3}\,dx = -\frac{16a^4x^4\sqrt{1-a^2x^2} + 64a^3x^3\arcsin(ax) - 80a^5x^5\arcsin(ax) + 2\arcsin(ax)^2\,\text{CosIntegral}(\arcsin(ax)) - 2}{32a^5\arcsin(ax)^2}$$

```
[In] Integrate[x^4/ArcSin[a*x]^3,x]
[Out] -1/32*(16*a^4*x^4*Sqrt[1 - a^2*x^2] + 64*a^3*x^3*ArcSin[a*x] - 80*a^5*x^5*A
rcSin[a*x] + 2*ArcSin[a*x]^2*CosIntegral[ArcSin[a*x]] - 27*ArcSin[a*x]^2*Co
sIntegral[3*ArcSin[a*x]] + 25*ArcSin[a*x]^2*CosIntegral[5*ArcSin[a*x]])/(a^
5*ArcSin[a*x]^2)
```

Maple [A] (verified)

Time = 0.04 (sec) , antiderivative size = 121, normalized size of antiderivative = 1.23

method	result
derivativedivides	$\frac{-\frac{\sqrt{-a^2x^2+1}}{16\arcsin(ax)^2}+\frac{ax}{16\arcsin(ax)}-\frac{\mathrm{Ci}(\arcsin(ax))}{16}+\frac{3\cos(3\arcsin(ax))}{32\arcsin(ax)^2}-\frac{9\sin(3\arcsin(ax))}{32\arcsin(ax)}+\frac{27\ \mathrm{Ci}(3\arcsin(ax))}{32}-\frac{\cos(5\arcsin(ax))}{32\arcsin(ax)^2}+}{a^5}$
default	$\frac{-\frac{\sqrt{-a^2x^2+1}}{16\arcsin(ax)^2}+\frac{ax}{16\arcsin(ax)}-\frac{\mathrm{Ci}(\arcsin(ax))}{16}+\frac{3\cos(3\arcsin(ax))}{32\arcsin(ax)^2}-\frac{9\sin(3\arcsin(ax))}{32\arcsin(ax)}+\frac{27\ \mathrm{Ci}(3\arcsin(ax))}{32}-\frac{\cos(5\arcsin(ax))}{32\arcsin(ax)^2}+}{a^5}$

```
[In] int(x^4/arcsin(a*x)^3,x,method=_RETURNVERBOSE)
[Out] 1/a^5*(-1/16/arcsin(a*x)^2*(-a^2*x^2+1)^(1/2)+1/16*a*x/arcsin(a*x)-1/16*Ci(
arcsin(a*x))+3/32/arcsin(a*x)^2*cos(3*arcsin(a*x))-9/32/arcsin(a*x)*sin(3*a
rcsin(a*x))+27/32*Ci(3*arcsin(a*x))-1/32/arcsin(a*x)^2*cos(5*arcsin(a*x))+5
/32/arcsin(a*x)*sin(5*arcsin(a*x))-25/32*Ci(5*arcsin(a*x)))
```

Fricas [F]

$$\int \frac{x^4}{\arcsin(ax)^3}\,dx=\int \frac{x^4}{\arcsin{(ax)}^3}\,dx$$

```
[In] integrate(x^4/arcsin(a*x)^3,x, algorithm="fricas")
[Out] integral(x^4/arcsin(a*x)^3, x)
```

Sympy [F]

$$\int \frac{x^4}{\arcsin(ax)^3}\,dx=\int \frac{x^4}{\operatorname{asin}^3{(ax)}}\,dx$$

```
[In] integrate(x**4/asin(a*x)**3,x)
[Out] Integral(x**4/asin(a*x)**3, x)
```

Maxima [F]

$$\int \frac{x^4}{\arcsin(ax)^3}\,dx = \int \frac{x^4}{\arcsin{(ax)}^3}\,dx$$

```
[In] integrate(x^4/arcsin(a*x)^3,x, algorithm="maxima")
```

```
[Out] -1/2*(sqrt(a*x + 1)*sqrt(-a*x + 1)*a*x^4 + arctan2(a*x, sqrt(a*x + 1)*sqrt(
-a*x + 1))^2*integrate((25*a^2*x^4 - 12*x^2)/arctan2(a*x, sqrt(a*x + 1)*sqr
t(-a*x + 1)), x) - (5*a^2*x^5 - 4*x^3)*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x
 + 1)))/(a^2*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^2)
```

Giac [A] (verification not implemented)

none

Time = 0.30 (sec) , antiderivative size = 170, normalized size of antiderivative = 1.73

$$\begin{aligned}\int \frac{x^4}{\arcsin(ax)^3}\,dx &= \frac{5\,{\left(a^2x^2-1\right)}^2x}{2\,a^4\arcsin{(ax)}} + \frac{3\,{\left(a^2x^2-1\right)}x}{a^4\arcsin{(ax)}} + \frac{x}{2\,a^4\arcsin{(ax)}} \\ &\quad - \frac{25\,\mathrm{Ci}\left(5\,\arcsin{(ax)}\right)}{32\,a^5} + \frac{27\,\mathrm{Ci}\left(3\,\arcsin{(ax)}\right)}{32\,a^5} - \frac{\mathrm{Ci}\left(\arcsin{(ax)}\right)}{16\,a^5} \\ &\quad - \frac{{\left(a^2x^2-1\right)}^2\sqrt{-a^2x^2+1}}{2\,a^5\arcsin{(ax)}^2} + \frac{{\left(-a^2x^2+1\right)}^{\frac{3}{2}}}{a^5\arcsin{(ax)}^2} - \frac{\sqrt{-a^2x^2+1}}{2\,a^5\arcsin{(ax)}^2}\end{aligned}$$

```
[In] integrate(x^4/arcsin(a*x)^3,x, algorithm="giac")
```

```
[Out] 5/2*(a^2*x^2 - 1)^2*x/(a^4*arcsin(a*x)) + 3*(a^2*x^2 - 1)*x/(a^4*arcsin(a*x
)) + 1/2*x/(a^4*arcsin(a*x)) - 25/32*cos_integral(5*arcsin(a*x))/a^5 + 27/3
2*cos_integral(3*arcsin(a*x))/a^5 - 1/16*cos_integral(arcsin(a*x))/a^5 - 1/
2*(a^2*x^2 - 1)^2*sqrt(-a^2*x^2 + 1)/(a^5*arcsin(a*x)^2) + (-a^2*x^2 + 1)^(
3/2)/(a^5*arcsin(a*x)^2) - 1/2*sqrt(-a^2*x^2 + 1)/(a^5*arcsin(a*x)^2)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x^4}{\arcsin(ax)^3}\,dx = \int \frac{x^4}{{\mathrm{asin}\left(a\,x\right)}^3}\,dx$$

```
[In] int(x^4/asin(a*x)^3,x)
```

```
[Out] int(x^4/asin(a*x)^3, x)
```

3.61 $\int \frac{x^3}{\arcsin(ax)^3} dx$

Optimal result

Integrand size = 10, antiderivative size = 83

$$\int \frac{x^3}{\arcsin(ax)^3} dx = -\frac{x^3\sqrt{1-a^2x^2}}{2a\arcsin(ax)^2} - \frac{3x^2}{2a^2\arcsin(ax)} + \frac{2x^4}{\arcsin(ax)} - \frac{\text{Si}(2\arcsin(ax))}{2a^4} + \frac{\text{Si}(4\arcsin(ax))}{a^4}$$

```
[Out] -3/2*x^2/a^2/arcsin(a*x)+2*x^4/arcsin(a*x)-1/2*Si(2*arcsin(a*x))/a^4+Si(4*a
rcsin(a*x))/a^4-1/2*x^3*(-a^2*x^2+1)^(1/2)/a/arcsin(a*x)^2
```

Rubi [A] (verified)

Time = 0.19 (sec) , antiderivative size = 83, normalized size of antiderivative = 1.00, number of steps used = 12, number of rules used = 6, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.600, Rules used = {4729, 4807, 4731, 4491, 3380, 12}

$$\int \frac{x^3}{\arcsin(ax)^3} dx = -\frac{\text{Si}(2\arcsin(ax))}{2a^4} + \frac{\text{Si}(4\arcsin(ax))}{a^4} - \frac{3x^2}{2a^2\arcsin(ax)} - \frac{x^3\sqrt{1-a^2x^2}}{2a\arcsin(ax)^2} + \frac{2x^4}{\arcsin(ax)}$$

```
[In] Int[x^3/ArcSin[a*x]^3,x]
```

```
[Out] -1/2*(x^3*Sqrt[1 - a^2*x^2])/(a*ArcSin[a*x]^2) - (3*x^2)/(2*a^2*ArcSin[a*x]
) + (2*x^4)/ArcSin[a*x] - SinIntegral[2*ArcSin[a*x]]/(2*a^4) + SinIntegral[
4*ArcSin[a*x]]/a^4
```

Rule 12

```
Int[(a_)*(u_), x_Symbol] :> Dist[a, Int[u, x], x] /; FreeQ[a, x] &&  !Match
Q[u, (b_)*(v_) /; FreeQ[b, x]]
```

Rule 3380

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Simp[SinInte
gral[e + f*x]/d, x] /; FreeQ[{c, d, e, f}, x] && EqQ[d*e - c*f, 0]
```

Rule 4491

```
Int[Cos[(a_.) + (b_.)*(x_)]^(p_.)*((c_.) + (d_.)*(x_))^(m_.)*Sin[(a_.) + (b
_.)*(x_)]^(n_.), x_Symbol] :> Int[ExpandTrigReduce[(c + d*x)^m, Sin[a + b*x
]^n*Cos[a + b*x]^p, x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && IG
tQ[p, 0]
```

Rule 4729

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^m*Sqrt[1 - c^2*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] + (Dis
t[c*((m + 1)/(b*(n + 1))), Int[x^(m + 1)*((a + b*ArcSin[c*x])^(n + 1)/Sqrt[
1 - c^2*x^2]), x], x] - Dist[m/(b*c*(n + 1)), Int[x^(m - 1)*((a + b*ArcSin[
c*x])^(n + 1)/Sqrt[1 - c^2*x^2]), x], x]) /; FreeQ[{a, b, c}, x] && IGtQ[m,
 0] && LtQ[n, -2]
```

Rule 4731

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Dist[1
/(b*c^(m + 1)), Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b], x], x, a +
 b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, n}, x] && IGtQ[m, 0]
```

Rule 4807

```
Int[(((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*((f_.)*(x_))^(m_.))/Sqrt[(d_)
+ (e_.)*(x_)^2], x_Symbol] :> Simp[((f*x)^m/(b*c*(n + 1)))*Simp[Sqrt[1 - c^
2*x^2]/Sqrt[d + e*x^2]]*(a + b*ArcSin[c*x])^(n + 1), x] - Dist[f*(m/(b*c*(n
 + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]], Int[(f*x)^(m - 1)*(a + b*A
rcSin[c*x])^(n + 1), x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && EqQ[c^2*d
 + e, 0] && LtQ[n, -1]
```

Rubi steps

$$\begin{aligned}\text{integral} &= -\frac{x^3\sqrt{1-a^2x^2}}{2a\arcsin(ax)^2}+\frac{3\int\frac{x^2}{\sqrt{1-a^2x^2}\arcsin(ax)^2}\,dx}{2a}-(2a)\int\frac{x^4}{\sqrt{1-a^2x^2}\arcsin(ax)^2}\,dx\\ &= -\frac{x^3\sqrt{1-a^2x^2}}{2a\arcsin(ax)^2}-\frac{3x^2}{2a^2\arcsin(ax)}+\frac{2x^4}{\arcsin(ax)}-8\int\frac{x^3}{\arcsin(ax)}\,dx+\frac{3\int\frac{x}{\arcsin(ax)}\,dx}{a^2}\end{aligned}$$

$$= -\frac{x^3\sqrt{1-a^2x^2}}{2a\arcsin(ax)^2} - \frac{3x^2}{2a^2\arcsin(ax)} + \frac{2x^4}{\arcsin(ax)} + \frac{3\text{Subst}\left(\int \frac{\cos(x)\sin(x)}{x}\,dx, x, \arcsin(ax)\right)}{a^4} - \frac{8\text{Subst}\left(\int \frac{\cos(x)\sin^3(x)}{x}\,dx, x, \arcsin(ax)\right)}{a^4}$$

$$= -\frac{x^3\sqrt{1-a^2x^2}}{2a\arcsin(ax)^2} - \frac{3x^2}{2a^2\arcsin(ax)} + \frac{2x^4}{\arcsin(ax)} + \frac{3\text{Subst}\left(\int \frac{\sin(2x)}{2x}\,dx, x, \arcsin(ax)\right)}{a^4} - \frac{8\text{Subst}\left(\int \left(\frac{\sin(2x)}{4x} - \frac{\sin(4x)}{8x}\right)\,dx, x, \arcsin(ax)\right)}{a^4}$$

$$= -\frac{x^3\sqrt{1-a^2x^2}}{2a\arcsin(ax)^2} - \frac{3x^2}{2a^2\arcsin(ax)} + \frac{2x^4}{\arcsin(ax)} + \frac{\text{Subst}\left(\int \frac{\sin(4x)}{x}\,dx, x, \arcsin(ax)\right)}{a^4} + \frac{3\text{Subst}\left(\int \frac{\sin(2x)}{x}\,dx, x, \arcsin(ax)\right)}{2a^4} - \frac{2\text{Subst}\left(\int \frac{\sin(2x)}{x}\,dx, x, \arcsin(ax)\right)}{a^4}$$

$$= -\frac{x^3\sqrt{1-a^2x^2}}{2a\arcsin(ax)^2} - \frac{3x^2}{2a^2\arcsin(ax)} + \frac{2x^4}{\arcsin(ax)} - \frac{\text{Si}(2\arcsin(ax))}{2a^4} + \frac{\text{Si}(4\arcsin(ax))}{a^4}$$

Mathematica [A] (verified)

Time = 0.18 (sec) , antiderivative size = 73, normalized size of antiderivative = 0.88

$$\int \frac{x^3}{\arcsin(ax)^3}\,dx = \frac{\frac{a^2x^2\left(-ax\sqrt{1-a^2x^2}+(-3+4a^2x^2)\arcsin(ax)\right)}{\arcsin(ax)^2} - \text{Si}(2\arcsin(ax)) + 2\text{Si}(4\arcsin(ax))}{2a^4}$$

```
[In] Integrate[x^3/ArcSin[a*x]^3,x]
[Out] ((a^2*x^2*(-(a*x*Sqrt[1 - a^2*x^2]) + (-3 + 4*a^2*x^2)*ArcSin[a*x]))/ArcSin
[a*x]^2 - SinIntegral[2*ArcSin[a*x]] + 2*SinIntegral[4*ArcSin[a*x]])/(2*a^4
)
```

Maple [A] (verified)

Time = 0.04 (sec) , antiderivative size = 82, normalized size of antiderivative = 0.99

method	result	size
derivativedivides	$\frac{-\frac{\sin(2\arcsin(ax))}{8\arcsin(ax)^2}-\frac{\cos(2\arcsin(ax))}{4\arcsin(ax)}-\frac{\text{Si}(2\arcsin(ax))}{2}+\frac{\sin(4\arcsin(ax))}{16\arcsin(ax)^2}+\frac{\cos(4\arcsin(ax))}{4\arcsin(ax)}+\text{Si}(4\arcsin(ax))}{a^4}$	82
default	$\frac{-\frac{\sin(2\arcsin(ax))}{8\arcsin(ax)^2}-\frac{\cos(2\arcsin(ax))}{4\arcsin(ax)}-\frac{\text{Si}(2\arcsin(ax))}{2}+\frac{\sin(4\arcsin(ax))}{16\arcsin(ax)^2}+\frac{\cos(4\arcsin(ax))}{4\arcsin(ax)}+\text{Si}(4\arcsin(ax))}{a^4}$	82

[In] int(x^3/arcsin(a*x)^3,x,method=_RETURNVERBOSE)

[Out] 1/a^4*(-1/8/arcsin(a*x)^2*sin(2*arcsin(a*x))-1/4/arcsin(a*x)*cos(2*arcsin(a*x))-1/2*Si(2*arcsin(a*x))+1/16/arcsin(a*x)^2*sin(4*arcsin(a*x))+1/4/arcsin(a*x)*cos(4*arcsin(a*x))+Si(4*arcsin(a*x)))

Fricas [F]

$$\int \frac{x^3}{\arcsin(ax)^3}\,dx = \int \frac{x^3}{\arcsin\left(ax\right)^3}\,dx$$

[In] integrate(x^3/arcsin(a*x)^3,x, algorithm="fricas")

[Out] integral(x^3/arcsin(a*x)^3, x)

Sympy [F]

$$\int \frac{x^3}{\arcsin(ax)^3}\,dx = \int \frac{x^3}{\operatorname{asin}^3\left(ax\right)}\,dx$$

[In] integrate(x**3/asin(a*x)**3,x)

[Out] Integral(x**3/asin(a*x)**3, x)

Maxima [F]

$$\int \frac{x^3}{\arcsin(ax)^3}\,dx = \int \frac{x^3}{\arcsin\left(ax\right)^3}\,dx$$

[In] integrate(x^3/arcsin(a*x)^3,x, algorithm="maxima")

[Out] -1/2*(sqrt(a*x + 1)*sqrt(-a*x + 1)*a*x^3 + 2*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^2*integrate((8*a^2*x^3 - 3*x)/arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1)), x) - (4*a^2*x^4 - 3*x^2)*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1)))/(a^2*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^2)

Giac [A] (verification not implemented)

none

Time = 0.29 (sec) , antiderivative size = 125, normalized size of antiderivative = 1.51

$$\int \frac{x^3}{\arcsin(ax)^3}\,dx = \frac{(-a^2x^2+1)^{\frac{3}{2}}x}{2\,a^3\arcsin{(ax)}^2} + \frac{2\,(a^2x^2-1)^2}{a^4\arcsin{(ax)}} + \frac{\mathrm{Si}\,(4\arcsin{(ax)})}{a^4} - \frac{\mathrm{Si}\,(2\arcsin{(ax)})}{2\,a^4} - \frac{\sqrt{-a^2x^2+1}x}{2\,a^3\arcsin{(ax)}^2} + \frac{5\,(a^2x^2-1)}{2\,a^4\arcsin{(ax)}} + \frac{1}{2\,a^4\arcsin{(ax)}}$$

```
[In] integrate(x^3/arcsin(a*x)^3,x, algorithm="giac")
```

```
[Out] 1/2*(-a^2*x^2 + 1)^(3/2)*x/(a^3*arcsin(a*x)^2) + 2*(a^2*x^2 - 1)^2/(a^4*arc
sin(a*x)) + sin_integral(4*arcsin(a*x))/a^4 - 1/2*sin_integral(2*arcsin(a*x
))/a^4 - 1/2*sqrt(-a^2*x^2 + 1)*x/(a^3*arcsin(a*x)^2) + 5/2*(a^2*x^2 - 1)/(
a^4*arcsin(a*x)) + 1/2/(a^4*arcsin(a*x))
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x^3}{\arcsin(ax)^3}\,dx = \int \frac{x^3}{\mathrm{asin}\left(a\,x\right)^3}\,dx$$

```
[In] int(x^3/asin(a*x)^3,x)
```

```
[Out] int(x^3/asin(a*x)^3, x)
```

3.62 $\int \frac{x^2}{\arcsin(ax)^3}\,dx$

Optimal result

Integrand size = 10, antiderivative size = 82

$$\int \frac{x^2}{\arcsin(ax)^3}\,dx = -\frac{x^2\sqrt{1-a^2x^2}}{2a\arcsin(ax)^2}-\frac{x}{a^2\arcsin(ax)}+\frac{3x^3}{2\arcsin(ax)}-\frac{\text{CosIntegral}(\arcsin(ax))}{8a^3}+\frac{9\,\text{CosIntegral}(3\arcsin(ax))}{8a^3}$$

```
[Out] -x/a^2/arcsin(a*x)+3/2*x^3/arcsin(a*x)-1/8*Ci(arcsin(a*x))/a^3+9/8*Ci(3*arc
sin(a*x))/a^3-1/2*x^2*(-a^2*x^2+1)^(1/2)/a/arcsin(a*x)^2
```

Rubi [A] (verified)

Time = 0.16 (sec) , antiderivative size = 82, normalized size of antiderivative = 1.00, number of steps used = 10, number of rules used = 6, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.600, Rules used = {4729, 4807, 4731, 4491, 3383, 4719}

$$\int \frac{x^2}{\arcsin(ax)^3}\,dx = -\frac{\text{CosIntegral}(\arcsin(ax))}{8a^3}+\frac{9\,\text{CosIntegral}(3\arcsin(ax))}{8a^3}-\frac{x^2\sqrt{1-a^2x^2}}{2a\arcsin(ax)^2}-\frac{x}{a^2\arcsin(ax)}+\frac{3x^3}{2\arcsin(ax)}$$

```
[In] Int[x^2/ArcSin[a*x]^3,x]
```

```
[Out] -1/2*(x^2*Sqrt[1 - a^2*x^2])/(a*ArcSin[a*x]^2) - x/(a^2*ArcSin[a*x]) + (3*x
^3)/(2*ArcSin[a*x]) - CosIntegral[ArcSin[a*x]]/(8*a^3) + (9*CosIntegral[3*A
rcSin[a*x]])/(8*a^3)
```

Rule 3383

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Simp[CosInte
gral[e - Pi/2 + f*x]/d, x] /; FreeQ[{c, d, e, f}, x] && EqQ[d*(e - Pi/2) -
c*f, 0]
```

Rule 4491

```
Int[Cos[(a_.) + (b_.)*(x_)]^(p_.)*((c_.) + (d_.)*(x_))^(m_.)*Sin[(a_.) + (b
_.)*(x_)]^(n_.), x_Symbol] :> Int[ExpandTrigReduce[(c + d*x)^m, Sin[a + b*x
]^n*Cos[a + b*x]^p, x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && IG
tQ[p, 0]
```

Rule 4719

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_), x_Symbol] :> Dist[1/(b*c), Sub
st[Int[x^n*Cos[-a/b + x/b], x], x, a + b*ArcSin[c*x]], x] /; FreeQ[{a, b, c
, n}, x]
```

Rule 4729

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^m*Sqrt[1 - c^2*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] + (Dis
t[c*((m + 1)/(b*(n + 1))), Int[x^(m + 1)*((a + b*ArcSin[c*x])^(n + 1)/Sqrt[
1 - c^2*x^2]), x], x] - Dist[m/(b*c*(n + 1)), Int[x^(m - 1)*((a + b*ArcSin[
c*x])^(n + 1)/Sqrt[1 - c^2*x^2]), x], x]) /; FreeQ[{a, b, c}, x] && IGtQ[m,
 0] && LtQ[n, -2]
```

Rule 4731

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Dist[1
/(b*c^(m + 1)), Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b], x], x, a +
 b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, n}, x] && IGtQ[m, 0]
```

Rule 4807

```
Int[(((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*((f_.)*(x_))^(m_.))/Sqrt[(d_)
+ (e_.)*(x_)^2], x_Symbol] :> Simp[((f*x)^m/(b*c*(n + 1)))*Simp[Sqrt[1 - c^
2*x^2]/Sqrt[d + e*x^2]]*(a + b*ArcSin[c*x])^(n + 1), x] - Dist[f*(m/(b*c*(n
 + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]], Int[(f*x)^(m - 1)*(a + b*A
rcSin[c*x])^(n + 1), x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && EqQ[c^2*d
 + e, 0] && LtQ[n, -1]
```

Rubi steps

$$\text{integral} = -\frac{x^2\sqrt{1-a^2x^2}}{2a\arcsin(ax)^2} + \frac{\int \frac{x}{\sqrt{1-a^2x^2}\arcsin(ax)^2}\,dx}{a} - \frac{1}{2}(3a)\int \frac{x^3}{\sqrt{1-a^2x^2}\arcsin(ax)^2}\,dx$$

$$= -\frac{x^2\sqrt{1-a^2x^2}}{2a\arcsin(ax)^2} - \frac{x}{a^2\arcsin(ax)} + \frac{3x^3}{2\arcsin(ax)} - \frac{9}{2}\int\frac{x^2}{\arcsin(ax)}\,dx + \frac{\int\frac{1}{\arcsin(ax)}\,dx}{a^2}$$

$$= -\frac{x^2\sqrt{1-a^2x^2}}{2a\arcsin(ax)^2} - \frac{x}{a^2\arcsin(ax)} + \frac{3x^3}{2\arcsin(ax)} + \frac{\text{Subst}\left(\int\frac{\cos(x)}{x}\,dx, x, \arcsin(ax)\right)}{a^3} - \frac{9\text{Subst}\left(\int\frac{\cos(x)\sin^2(x)}{x}\,dx, x, \arcsin(ax)\right)}{2a^3}$$

$$= -\frac{x^2\sqrt{1-a^2x^2}}{2a\arcsin(ax)^2} - \frac{x}{a^2\arcsin(ax)} + \frac{3x^3}{2\arcsin(ax)} + \frac{\text{CosIntegral}(\arcsin(ax))}{a^3} - \frac{9\text{Subst}\left(\int\left(\frac{\cos(x)}{4x} - \frac{\cos(3x)}{4x}\right)dx, x, \arcsin(ax)\right)}{2a^3}$$

$$= -\frac{x^2\sqrt{1-a^2x^2}}{2a\arcsin(ax)^2} - \frac{x}{a^2\arcsin(ax)} + \frac{3x^3}{2\arcsin(ax)} + \frac{\text{CosIntegral}(\arcsin(ax))}{a^3} - \frac{9\text{Subst}\left(\int\frac{\cos(x)}{x}\,dx, x, \arcsin(ax)\right)}{8a^3} + \frac{9\text{Subst}\left(\int\frac{\cos(3x)}{x}\,dx, x, \arcsin(ax)\right)}{8a^3}$$

$$= -\frac{x^2\sqrt{1-a^2x^2}}{2a\arcsin(ax)^2} - \frac{x}{a^2\arcsin(ax)} + \frac{3x^3}{2\arcsin(ax)} - \frac{\text{CosIntegral}(\arcsin(ax))}{8a^3} + \frac{9\,\text{CosIntegral}(3\arcsin(ax))}{8a^3}$$

Mathematica [A] (verified)

Time = 0.11 (sec) , antiderivative size = 68, normalized size of antiderivative = 0.83

$$\int\frac{x^2}{\arcsin(ax)^3}\,dx = \frac{\frac{4ax\left(-ax\sqrt{1-a^2x^2}+(-2+3a^2x^2)\arcsin(ax)\right)}{\arcsin(ax)^2} - \text{CosIntegral}(\arcsin(ax)) + 9\,\text{CosIntegral}(3\arcsin(ax))}{8a^3}$$

```
[In] Integrate[x^2/ArcSin[a*x]^3,x]
```

```
[Out] ((4*a*x*(-(a*x*Sqrt[1 - a^2*x^2]) + (-2 + 3*a^2*x^2)*ArcSin[a*x]))/ArcSin[a
*x]^2 - CosIntegral[ArcSin[a*x]] + 9*CosIntegral[3*ArcSin[a*x]])/(8*a^3)
```

Maple [A] (verified)

Time = 0.02 (sec) , antiderivative size = 82, normalized size of antiderivative = 1.00

method	result	size
derivativedivides	$\frac{-\frac{\sqrt{-a^2x^2+1}}{8\arcsin(ax)^2}+\frac{ax}{8\arcsin(ax)}-\frac{\operatorname{Ci}(\arcsin(ax))}{8}+\frac{\cos(3\arcsin(ax))}{8\arcsin(ax)^2}-\frac{3\sin(3\arcsin(ax))}{8\arcsin(ax)}+\frac{9\operatorname{Ci}(3\arcsin(ax))}{8}}{a^3}$	82
default	$\frac{-\frac{\sqrt{-a^2x^2+1}}{8\arcsin(ax)^2}+\frac{ax}{8\arcsin(ax)}-\frac{\operatorname{Ci}(\arcsin(ax))}{8}+\frac{\cos(3\arcsin(ax))}{8\arcsin(ax)^2}-\frac{3\sin(3\arcsin(ax))}{8\arcsin(ax)}+\frac{9\operatorname{Ci}(3\arcsin(ax))}{8}}{a^3}$	82

```
[In] int(x^2/arcsin(a*x)^3,x,method=_RETURNVERBOSE)
[Out] 1/a^3*(-1/8/arcsin(a*x)^2*(-a^2*x^2+1)^(1/2)+1/8*a*x/arcsin(a*x)-1/8*Ci(arc
sin(a*x))+1/8/arcsin(a*x)^2*cos(3*arcsin(a*x))-3/8/arcsin(a*x)*sin(3*arcsin
(a*x))+9/8*Ci(3*arcsin(a*x)))
```

Fricas [F]

$$\int \frac{x^2}{\arcsin(ax)^3}\,dx = \int \frac{x^2}{\arcsin{(ax)}^3}\,dx$$

```
[In] integrate(x^2/arcsin(a*x)^3,x, algorithm="fricas")
[Out] integral(x^2/arcsin(a*x)^3, x)
```

Sympy [F]

$$\int \frac{x^2}{\arcsin(ax)^3}\,dx = \int \frac{x^2}{\operatorname{asin}^3{(ax)}}\,dx$$

```
[In] integrate(x**2/asin(a*x)**3,x)
[Out] Integral(x**2/asin(a*x)**3, x)
```

Maxima [F]

$$\int \frac{x^2}{\arcsin(ax)^3}\,dx = \int \frac{x^2}{\arcsin{(ax)}^3}\,dx$$

```
[In] integrate(x^2/arcsin(a*x)^3,x, algorithm="maxima")
[Out] -1/2*(sqrt(a*x + 1)*sqrt(-a*x + 1)*a*x^2 + arctan2(a*x, sqrt(a*x + 1)*sqrt(
-a*x + 1))^2*integrate((9*a^2*x^2 - 2)/arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x
 + 1)), x) - (3*a^2*x^3 - 2*x)*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1)))/
(a^2*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^2)
```

Giac [A] (verification not implemented)

none

Time = 0.30 (sec) , antiderivative size = 102, normalized size of antiderivative = 1.24

$$\int \frac{x^2}{\arcsin(ax)^3}\,dx = \frac{3\,(a^2x^2-1)x}{2\,a^2\arcsin{(ax)}} + \frac{x}{2\,a^2\arcsin{(ax)}} + \frac{9\,\mathrm{Ci}\,(3\,\arcsin{(ax)})}{8\,a^3} - \frac{\mathrm{Ci}\,(\arcsin{(ax)})}{8\,a^3} + \frac{(-a^2x^2+1)^{\frac{3}{2}}}{2\,a^3\arcsin{(ax)}^2} - \frac{\sqrt{-a^2x^2+1}}{2\,a^3\arcsin{(ax)}^2}$$

```
[In] integrate(x^2/arcsin(a*x)^3,x, algorithm="giac")
```

```
[Out] 3/2*(a^2*x^2 - 1)*x/(a^2*arcsin(a*x)) + 1/2*x/(a^2*arcsin(a*x)) + 9/8*cos_i
ntegral(3*arcsin(a*x))/a^3 - 1/8*cos_integral(arcsin(a*x))/a^3 + 1/2*(-a^2*
x^2 + 1)^(3/2)/(a^3*arcsin(a*x)^2) - 1/2*sqrt(-a^2*x^2 + 1)/(a^3*arcsin(a*x
)^2)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x^2}{\arcsin(ax)^3}\,dx = \int \frac{x^2}{\mathrm{asin}\,(a\,x)^3}\,dx$$

```
[In] int(x^2/asin(a*x)^3,x)
```

```
[Out] int(x^2/asin(a*x)^3, x)
```

3.63 $\int \frac{x}{\arcsin(ax)^3} \, dx$

Optimal result

Integrand size = 8, antiderivative size = 64

$$\int \frac{x}{\arcsin(ax)^3} \, dx = -\frac{x\sqrt{1-a^2x^2}}{2a\arcsin(ax)^2} - \frac{1}{2a^2\arcsin(ax)} + \frac{x^2}{\arcsin(ax)} - \frac{\text{Si}(2\arcsin(ax))}{a^2}$$

```
[Out] -1/2/a^2/arcsin(a*x)+x^2/arcsin(a*x)-Si(2*arcsin(a*x))/a^2-1/2*x*(-a^2*x^2+
1)^(1/2)/a/arcsin(a*x)^2
```

Rubi [A] (verified)

Time = 0.11 (sec) , antiderivative size = 64, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 7, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.875, Rules used = {4729, 4807, 4731, 4491, 12, 3380, 4737}

$$\int \frac{x}{\arcsin(ax)^3} \, dx = -\frac{\text{Si}(2\arcsin(ax))}{a^2} - \frac{x\sqrt{1-a^2x^2}}{2a\arcsin(ax)^2} - \frac{1}{2a^2\arcsin(ax)} + \frac{x^2}{\arcsin(ax)}$$

```
[In] Int[x/ArcSin[a*x]^3,x]
```

```
[Out] -1/2*(x*Sqrt[1 - a^2*x^2])/(a*ArcSin[a*x]^2) - 1/(2*a^2*ArcSin[a*x]) + x^2/
ArcSin[a*x] - SinIntegral[2*ArcSin[a*x]]/a^2
```

Rule 12

```
Int[(a_)*(u_), x_Symbol] :> Dist[a, Int[u, x], x] /; FreeQ[a, x] &&  !Match
Q[u, (b_)*(v_) /; FreeQ[b, x]]
```

Rule 3380

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Simp[SinInte
gral[e + f*x]/d, x] /; FreeQ[{c, d, e, f}, x] && EqQ[d*e - c*f, 0]
```

Rule 4491

```
Int[Cos[(a_.) + (b_.)*(x_)]^(p_.)*((c_.) + (d_.)*(x_))^(m_.)*Sin[(a_.) + (b
_.)*(x_)]^(n_.), x_Symbol] :> Int[ExpandTrigReduce[(c + d*x)^m, Sin[a + b*x
]^n*Cos[a + b*x]^p, x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && IG
tQ[p, 0]
```

Rule 4729

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^m*Sqrt[1 - c^2*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] + (Dis
t[c*((m + 1)/(b*(n + 1))), Int[x^(m + 1)*((a + b*ArcSin[c*x])^(n + 1)/Sqrt[
1 - c^2*x^2]), x], x] - Dist[m/(b*c*(n + 1)), Int[x^(m - 1)*((a + b*ArcSin[
c*x])^(n + 1)/Sqrt[1 - c^2*x^2]), x], x]) /; FreeQ[{a, b, c}, x] && IGtQ[m,
 0] && LtQ[n, -2]
```

Rule 4731

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Dist[1
/(b*c^(m + 1)), Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b], x], x, a +
 b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, n}, x] && IGtQ[m, 0]
```

Rule 4737

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)/Sqrt[(d_) + (e_.)*(x_)^2], x_S
ymbol] :> Simp[(1/(b*c*(n + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]]*(a
 + b*ArcSin[c*x])^(n + 1), x] /; FreeQ[{a, b, c, d, e, n}, x] && EqQ[c^2*d
+ e, 0] && NeQ[n, -1]
```

Rule 4807

```
Int[(((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*((f_.)*(x_))^(m_.))/Sqrt[(d_)
+ (e_.)*(x_)^2], x_Symbol] :> Simp[((f*x)^m/(b*c*(n + 1)))*Simp[Sqrt[1 - c^
2*x^2]/Sqrt[d + e*x^2]]*(a + b*ArcSin[c*x])^(n + 1), x] - Dist[f*(m/(b*c*(n
 + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]], Int[(f*x)^(m - 1)*(a + b*A
rcSin[c*x])^(n + 1), x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && EqQ[c^2*d
 + e, 0] && LtQ[n, -1]
```

Rubi steps

$$\text{integral} = -\frac{x\sqrt{1-a^2x^2}}{2a\arcsin(ax)^2} + \frac{\int \frac{1}{\sqrt{1-a^2x^2}\arcsin(ax)^2}\,dx}{2a} - a\int \frac{x^2}{\sqrt{1-a^2x^2}\arcsin(ax)^2}\,dx$$

$$= -\frac{x\sqrt{1-a^2x^2}}{2a\arcsin(ax)^2} - \frac{1}{2a^2\arcsin(ax)} + \frac{x^2}{\arcsin(ax)} - 2\int \frac{x}{\arcsin(ax)}\,dx$$

$$= -\frac{x\sqrt{1-a^2x^2}}{2a\arcsin(ax)^2} - \frac{1}{2a^2\arcsin(ax)} + \frac{x^2}{\arcsin(ax)} - \frac{2\text{Subst}\left(\int \frac{\cos(x)\sin(x)}{x}\,dx, x, \arcsin(ax)\right)}{a^2}$$

$$= -\frac{x\sqrt{1-a^2x^2}}{2a\arcsin(ax)^2} - \frac{1}{2a^2\arcsin(ax)} + \frac{x^2}{\arcsin(ax)} - \frac{2\text{Subst}\left(\int \frac{\sin(2x)}{2x}\,dx, x, \arcsin(ax)\right)}{a^2}$$

$$= -\frac{x\sqrt{1-a^2x^2}}{2a\arcsin(ax)^2} - \frac{1}{2a^2\arcsin(ax)} + \frac{x^2}{\arcsin(ax)} - \frac{\text{Subst}\left(\int \frac{\sin(2x)}{x}\,dx, x, \arcsin(ax)\right)}{a^2}$$

$$= -\frac{x\sqrt{1-a^2x^2}}{2a\arcsin(ax)^2} - \frac{1}{2a^2\arcsin(ax)} + \frac{x^2}{\arcsin(ax)} - \frac{\text{Si}(2\arcsin(ax))}{a^2}$$

Mathematica [A] (verified)

Time = 0.05 (sec) , antiderivative size = 61, normalized size of antiderivative = 0.95

$$\int \frac{x}{\arcsin(ax)^3}\,dx = -\frac{ax\sqrt{1-a^2x^2} + (1-2a^2x^2)\arcsin(ax) + 2\arcsin(ax)^2\text{Si}(2\arcsin(ax))}{2a^2\arcsin(ax)^2}$$

```
[In] Integrate[x/ArcSin[a*x]^3,x]
```

```
[Out] -1/2*(a*x*Sqrt[1 - a^2*x^2] + (1 - 2*a^2*x^2)*ArcSin[a*x] + 2*ArcSin[a*x]^2
*SinIntegral[2*ArcSin[a*x]])/(a^2*ArcSin[a*x]^2)
```

Maple [A] (verified)

Time = 0.04 (sec) , antiderivative size = 45, normalized size of antiderivative = 0.70

method	result	size
derivativedivides	$\frac{-\frac{\sin(2\arcsin(ax))}{4\arcsin(ax)^2}-\frac{\cos(2\arcsin(ax))}{2\arcsin(ax)}-\text{Si}(2\arcsin(ax))}{a^2}$	45
default	$\frac{-\frac{\sin(2\arcsin(ax))}{4\arcsin(ax)^2}-\frac{\cos(2\arcsin(ax))}{2\arcsin(ax)}-\text{Si}(2\arcsin(ax))}{a^2}$	45

```
[In] int(x/arcsin(a*x)^3,x,method=_RETURNVERBOSE)
```

```
[Out] 1/a^2*(-1/4/arcsin(a*x)^2*sin(2*arcsin(a*x))-1/2/arcsin(a*x)*cos(2*arcsin(a
*x))-Si(2*arcsin(a*x)))
```

Fricas [F]

$$\int \frac{x}{\arcsin(ax)^3} \, dx = \int \frac{x}{\arcsin\left(ax\right)^3} \, dx$$

```
[In] integrate(x/arcsin(a*x)^3,x, algorithm="fricas")
[Out] integral(x/arcsin(a*x)^3, x)
```

Sympy [F]

$$\int \frac{x}{\arcsin(ax)^3} \, dx = \int \frac{x}{\operatorname{asin}^3\left(ax\right)} \, dx$$

```
[In] integrate(x/asin(a*x)**3,x)
[Out] Integral(x/asin(a*x)**3, x)
```

Maxima [F]

$$\int \frac{x}{\arcsin(ax)^3} \, dx = \int \frac{x}{\arcsin\left(ax\right)^3} \, dx$$

```
[In] integrate(x/arcsin(a*x)^3,x, algorithm="maxima")
[Out] -1/2*(4*a^2*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^2*integrate(x/arctan
2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1)), x) + sqrt(a*x + 1)*sqrt(-a*x + 1)*a*x
 - (2*a^2*x^2 - 1)*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1)))/(a^2*arctan2
(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^2)
```

Giac [A] (verification not implemented)

none

Time = 0.29 (sec) , antiderivative size = 67, normalized size of antiderivative = 1.05

$$\int \frac{x}{\arcsin(ax)^3} \, dx = -\frac{\operatorname{Si}\left(2\arcsin\left(ax\right)\right)}{a^2} - \frac{\sqrt{-a^2x^2+1}x}{2\,a\arcsin\left(ax\right)^2} + \frac{a^2x^2-1}{a^2\arcsin\left(ax\right)} + \frac{1}{2\,a^2\arcsin\left(ax\right)}$$

```
[In] integrate(x/arcsin(a*x)^3,x, algorithm="giac")
[Out] -sin_integral(2*arcsin(a*x))/a^2 - 1/2*sqrt(-a^2*x^2 + 1)*x/(a*arcsin(a*x)^
2) + (a^2*x^2 - 1)/(a^2*arcsin(a*x)) + 1/2/(a^2*arcsin(a*x))
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x}{\arcsin(ax)^3}\,dx = \int \frac{x}{\mathrm{asin}\left(a\,x\right)^3}\,dx$$

```
[In] int(x/asin(a*x)^3,x)
```

```
[Out] int(x/asin(a*x)^3, x)
```

3.64 $\int \frac{1}{\arcsin(ax)^3}\,dx$

Optimal result

Integrand size = 6, antiderivative size = 51

$$\int \frac{1}{\arcsin(ax)^3}\,dx = -\frac{\sqrt{1-a^2x^2}}{2a\arcsin(ax)^2}+\frac{x}{2\arcsin(ax)}-\frac{\text{CosIntegral}(\arcsin(ax))}{2a}$$

```
[Out] 1/2*x/arcsin(a*x)-1/2*Ci(arcsin(a*x))/a-1/2*(-a^2*x^2+1)^(1/2)/a/arcsin(a*x
)^2
```

Rubi [A] (verified)

Time = 0.06 (sec) , antiderivative size = 51, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.667, Rules used = {4717, 4807, 4719, 3383}

$$\int \frac{1}{\arcsin(ax)^3}\,dx = -\frac{\sqrt{1-a^2x^2}}{2a\arcsin(ax)^2}-\frac{\text{CosIntegral}(\arcsin(ax))}{2a}+\frac{x}{2\arcsin(ax)}$$

```
[In] Int[ArcSin[a*x]^(-3),x]
```

```
[Out] -1/2*Sqrt[1 - a^2*x^2]/(a*ArcSin[a*x]^2) + x/(2*ArcSin[a*x]) - CosIntegral[
ArcSin[a*x]]/(2*a)
```

Rule 3383

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Simp[CosInte
gral[e - Pi/2 + f*x]/d, x] /; FreeQ[{c, d, e, f}, x] && EqQ[d*(e - Pi/2) -
c*f, 0]
```

Rule 4717

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_), x_Symbol] :> Simp[Sqrt[1 - c^2
*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] + Dist[c/(b*(n + 1)),
 Int[x*((a + b*ArcSin[c*x])^(n + 1)/Sqrt[1 - c^2*x^2]), x], x] /; FreeQ[{a,
 b, c}, x] && LtQ[n, -1]
```

Rule 4719

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_), x_Symbol] :> Dist[1/(b*c), Sub
st[Int[x^n*Cos[-a/b + x/b], x], x, a + b*ArcSin[c*x]], x] /; FreeQ[{a, b, c
, n}, x]
```

Rule 4807

```
Int[(((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*((f_.)*(x_))^(m_.))/Sqrt[(d_)
+ (e_.)*(x_)^2], x_Symbol] :> Simp[((f*x)^m/(b*c*(n + 1)))*Simp[Sqrt[1 - c^
2*x^2]/Sqrt[d + e*x^2]]*(a + b*ArcSin[c*x])^(n + 1), x] - Dist[f*(m/(b*c*(n
 + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]], Int[(f*x)^(m - 1)*(a + b*A
rcSin[c*x])^(n + 1), x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && EqQ[c^2*d
 + e, 0] && LtQ[n, -1]
```

Rubi steps

$$
\begin{aligned}
\text{integral} &= -\frac{\sqrt{1-a^2x^2}}{2a\arcsin(ax)^2} - \frac{1}{2}a\int \frac{x}{\sqrt{1-a^2x^2}\arcsin(ax)^2}\,dx \\
&= -\frac{\sqrt{1-a^2x^2}}{2a\arcsin(ax)^2} + \frac{x}{2\arcsin(ax)} - \frac{1}{2}\int \frac{1}{\arcsin(ax)}\,dx \\
&= -\frac{\sqrt{1-a^2x^2}}{2a\arcsin(ax)^2} + \frac{x}{2\arcsin(ax)} - \frac{\text{Subst}\left(\int \frac{\cos(x)}{x}\,dx, x, \arcsin(ax)\right)}{2a} \\
&= -\frac{\sqrt{1-a^2x^2}}{2a\arcsin(ax)^2} + \frac{x}{2\arcsin(ax)} - \frac{\text{CosIntegral}(\arcsin(ax))}{2a}
\end{aligned}
$$

Mathematica [A] (verified)

Time = 0.02 (sec) , antiderivative size = 48, normalized size of antiderivative = 0.94

$$
\int \frac{1}{\arcsin(ax)^3}\,dx = -\frac{\sqrt{1-a^2x^2} - ax\arcsin(ax) + \arcsin(ax)^2\,\text{CosIntegral}(\arcsin(ax))}{2a\arcsin(ax)^2}
$$

```
[In] Integrate[ArcSin[a*x]^(-3),x]
[Out] -1/2*(Sqrt[1 - a^2*x^2] - a*x*ArcSin[a*x] + ArcSin[a*x]^2*CosIntegral[ArcSi
n[a*x]])/(a*ArcSin[a*x]^2)
```

Maple [A] (verified)

Time = 0.03 (sec) , antiderivative size = 43, normalized size of antiderivative = 0.84

method	result	size
derivativedivides	$\frac{-\frac{\sqrt{-a^2x^2+1}}{2\arcsin(ax)^2}+\frac{ax}{2\arcsin(ax)}-\frac{\mathrm{Ci}(\arcsin(ax))}{2}}{a}$	43
default	$\frac{-\frac{\sqrt{-a^2x^2+1}}{2\arcsin(ax)^2}+\frac{ax}{2\arcsin(ax)}-\frac{\mathrm{Ci}(\arcsin(ax))}{2}}{a}$	43

```
[In] int(1/arcsin(a*x)^3,x,method=_RETURNVERBOSE)
[Out] 1/a*(-1/2/arcsin(a*x)^2*(-a^2*x^2+1)^(1/2)+1/2*a*x/arcsin(a*x)-1/2*Ci(arcsi
n(a*x)))
```

Fricas [F]

$$\int \frac{1}{\arcsin(ax)^3}\,dx = \int \frac{1}{\arcsin{(ax)}^3}\,dx$$

```
[In] integrate(1/arcsin(a*x)^3,x, algorithm="fricas")
[Out] integral(arcsin(a*x)^(-3), x)
```

Sympy [F]

$$\int \frac{1}{\arcsin(ax)^3}\,dx = \int \frac{1}{\operatorname{asin}^3{(ax)}}\,dx$$

```
[In] integrate(1/asin(a*x)**3,x)
[Out] Integral(asin(a*x)**(-3), x)
```

Maxima [F]

$$\int \frac{1}{\arcsin(ax)^3}\,dx = \int \frac{1}{\arcsin{(ax)}^3}\,dx$$

```
[In] integrate(1/arcsin(a*x)^3,x, algorithm="maxima")
[Out] -1/2*(a*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^2*integrate(1/arctan2(a*
x, sqrt(a*x + 1)*sqrt(-a*x + 1)), x) - a*x*arctan2(a*x, sqrt(a*x + 1)*sqrt(
-a*x + 1)) + sqrt(a*x + 1)*sqrt(-a*x + 1))/(a*arctan2(a*x, sqrt(a*x + 1)*sq
rt(-a*x + 1))^2)
```

Giac [A] (verification not implemented)

none

Time = 0.26 (sec) , antiderivative size = 43, normalized size of antiderivative = 0.84

$$\int \frac{1}{\arcsin(ax)^3}\,dx = \frac{x}{2\,\arcsin{(ax)}} - \frac{\mathrm{Ci}\,(\arcsin{(ax)})}{2\,a} - \frac{\sqrt{-a^2x^2+1}}{2\,a\arcsin{(ax)}^2}$$

```
[In] integrate(1/arcsin(a*x)^3,x, algorithm="giac")
```

```
[Out] 1/2*x/arcsin(a*x) - 1/2*cos_integral(arcsin(a*x))/a - 1/2*sqrt(-a^2*x^2 + 1
)/(a*arcsin(a*x)^2)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{1}{\arcsin(ax)^3}\,dx = \int \frac{1}{\mathrm{asin}\,(a\,x)^3}\,dx$$

```
[In] int(1/asin(a*x)^3,x)
```

```
[Out] int(1/asin(a*x)^3, x)
```

3.65 $\int \frac{1}{x \arcsin(ax)^3} \, dx$

Optimal result

Integrand size = 10, antiderivative size = 10

$$\int \frac{1}{x \arcsin(ax)^3} \, dx = \operatorname{Int}\left(\frac{1}{x \arcsin(ax)^3}, x\right)$$

```
[Out] Unintegrable(1/x/arcsin(a*x)^3,x)
```

Rubi [N/A]

Not integrable

Time = 0.01 (sec) , antiderivative size = 10, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{1}{x \arcsin(ax)^3} \, dx = \int \frac{1}{x \arcsin(ax)^3} \, dx$$

```
[In] Int[1/(x*ArcSin[a*x]^3),x]
```

```
[Out] Defer[Int][1/(x*ArcSin[a*x]^3), x]
```

Rubi steps

$$\text{integral} = \int \frac{1}{x \arcsin(ax)^3} \, dx$$

Mathematica [N/A]

Not integrable

Time = 0.54 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.20

$$\int \frac{1}{x \arcsin(ax)^3} \, dx = \int \frac{1}{x \arcsin(ax)^3} \, dx$$

```
[In] Integrate[1/(x*ArcSin[a*x]^3),x]
[Out] Integrate[1/(x*ArcSin[a*x]^3), x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.03 (sec) , antiderivative size = 10, normalized size of antiderivative = 1.00

$$\int \frac{1}{x \arcsin \left(a x \right)^{3}}d x$$

```
[In] int(1/x/arcsin(a*x)^3,x)
[Out] int(1/x/arcsin(a*x)^3,x)
```

Fricas [N/A]

Not integrable

Time = 0.26 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.20

$$\int \frac{1}{x \arcsin(ax)^3} \, dx = \int \frac{1}{x \arcsin \left(a x\right)^{3}} \, dx$$

```
[In] integrate(1/x/arcsin(a*x)^3,x, algorithm="fricas")
[Out] integral(1/(x*arcsin(a*x)^3), x)
```

Sympy [N/A]

Not integrable

Time = 0.40 (sec) , antiderivative size = 10, normalized size of antiderivative = 1.00

$$\int \frac{1}{x \arcsin(ax)^3} \, dx = \int \frac{1}{x \operatorname{asin}^{3}{\left(a x \right)}}\, dx$$

```
[In] integrate(1/x/asin(a*x)**3,x)
[Out] Integral(1/(x*asin(a*x)**3), x)
```

Maxima [N/A]

Not integrable

Time = 1.40 (sec) , antiderivative size = 125, normalized size of antiderivative = 12.50

$$\int \frac{1}{x \arcsin(ax)^3} \, dx = \int \frac{1}{x \arcsin{(ax)}^3} \, dx$$

```
[In] integrate(1/x/arcsin(a*x)^3,x, algorithm="maxima")
```

```
[Out] 1/2*(2*x^2*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^2*integrate(1/(x^3*ar
ctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))), x) - sqrt(a*x + 1)*sqrt(-a*x + 1
)*a*x + arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1)))/(a^2*x^2*arctan2(a*x, s
qrt(a*x + 1)*sqrt(-a*x + 1))^2)
```

Giac [N/A]

Not integrable

Time = 0.32 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.20

$$\int \frac{1}{x \arcsin(ax)^3} \, dx = \int \frac{1}{x \arcsin{(ax)}^3} \, dx$$

```
[In] integrate(1/x/arcsin(a*x)^3,x, algorithm="giac")
```

```
[Out] integrate(1/(x*arcsin(a*x)^3), x)
```

Mupad [N/A]

Not integrable

Time = 0.04 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.20

$$\int \frac{1}{x \arcsin(ax)^3} \, dx = \int \frac{1}{x \,\mathrm{asin}{(a\,x)}^3} \, dx$$

```
[In] int(1/(x*asin(a*x)^3),x)
```

```
[Out] int(1/(x*asin(a*x)^3), x)
```

3.66 $\int \frac{1}{x^2 \arcsin(ax)^3} \, dx$

Optimal result

Integrand size = 10, antiderivative size = 10

$$\int \frac{1}{x^2 \arcsin(ax)^3} \, dx = \text{Int}\left(\frac{1}{x^2 \arcsin(ax)^3}, x\right)$$

```
[Out] Unintegrable(1/x^2/arcsin(a*x)^3,x)
```

Rubi [N/A]

Not integrable

Time = 0.01 (sec) , antiderivative size = 10, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}} = 0.000$, Rules used = {}

$$\int \frac{1}{x^2 \arcsin(ax)^3} \, dx = \int \frac{1}{x^2 \arcsin(ax)^3} \, dx$$

```
[In] Int[1/(x^2*ArcSin[a*x]^3),x]
[Out] Defer[Int][1/(x^2*ArcSin[a*x]^3), x]
```

Rubi steps

$$\text{integral} = \int \frac{1}{x^2 \arcsin(ax)^3} \, dx$$

Mathematica [N/A]

Not integrable

Time = 6.64 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.20

$$\int \frac{1}{x^2 \arcsin(ax)^3} \, dx = \int \frac{1}{x^2 \arcsin(ax)^3} \, dx$$

```
[In] Integrate[1/(x^2*ArcSin[a*x]^3),x]
[Out] Integrate[1/(x^2*ArcSin[a*x]^3), x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.05 (sec) , antiderivative size = 10, normalized size of antiderivative = 1.00

$$\int \frac{1}{x^2 \arcsin\left(ax\right)^3} dx$$

```
[In] int(1/x^2/arcsin(a*x)^3,x)
[Out] int(1/x^2/arcsin(a*x)^3,x)
```

Fricas [N/A]

Not integrable

Time = 0.24 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.20

$$\int \frac{1}{x^2 \arcsin(ax)^3} \, dx = \int \frac{1}{x^2 \arcsin\left(ax\right)^3} \, dx$$

```
[In] integrate(1/x^2/arcsin(a*x)^3,x, algorithm="fricas")
[Out] integral(1/(x^2*arcsin(a*x)^3), x)
```

Sympy [N/A]

Not integrable

Time = 0.48 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.20

$$\int \frac{1}{x^2 \arcsin(ax)^3} \, dx = \int \frac{1}{x^2 \operatorname{asin}^3\left(ax\right)} \, dx$$

```
[In] integrate(1/x**2/asin(a*x)**3,x)
[Out] Integral(1/(x**2*asin(a*x)**3), x)
```

Maxima [N/A]

Not integrable

Time = 1.55 (sec) , antiderivative size = 142, normalized size of antiderivative = 14.20

$$\int \frac{1}{x^2 \arcsin(ax)^3} \, dx = \int \frac{1}{x^2 \arcsin{(ax)}^3} \, dx$$

```
[In] integrate(1/x^2/arcsin(a*x)^3,x, algorithm="maxima")
```

```
[Out] -1/2*(x^3*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^2*integrate((a^2*x^2 -
 6)/(x^4*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))), x) + sqrt(a*x + 1)*sq
rt(-a*x + 1)*a*x + (a^2*x^2 - 2)*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))
)/(a^2*x^3*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^2)
```

Giac [N/A]

Not integrable

Time = 0.38 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.20

$$\int \frac{1}{x^2 \arcsin(ax)^3} \, dx = \int \frac{1}{x^2 \arcsin{(ax)}^3} \, dx$$

```
[In] integrate(1/x^2/arcsin(a*x)^3,x, algorithm="giac")
```

```
[Out] integrate(1/(x^2*arcsin(a*x)^3), x)
```

Mupad [N/A]

Not integrable

Time = 0.04 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.20

$$\int \frac{1}{x^2 \arcsin(ax)^3} \, dx = \int \frac{1}{x^2 \,\mathrm{asin}{(a\,x)}^3} \, dx$$

```
[In] int(1/(x^2*asin(a*x)^3),x)
```

```
[Out] int(1/(x^2*asin(a*x)^3), x)
```

3.67 $\int \frac{x^4}{\arcsin(ax)^4}\,dx$

Optimal result

Integrand size = 10, antiderivative size = 158

$$\int \frac{x^4}{\arcsin(ax)^4}\,dx = -\frac{x^4\sqrt{1-a^2x^2}}{3a\arcsin(ax)^3} - \frac{2x^3}{3a^2\arcsin(ax)^2} + \frac{5x^5}{6\arcsin(ax)^2} - \frac{2x^2\sqrt{1-a^2x^2}}{a^3\arcsin(ax)} + \frac{25x^4\sqrt{1-a^2x^2}}{6a\arcsin(ax)} + \frac{\mathrm{Si}(\arcsin(ax))}{48a^5} - \frac{27\mathrm{Si}(3\arcsin(ax))}{32a^5} + \frac{125\mathrm{Si}(5\arcsin(ax))}{96a^5}$$

```
[Out] -2/3*x^3/a^2/arcsin(a*x)^2+5/6*x^5/arcsin(a*x)^2+1/48*Si(arcsin(a*x))/a^5-2
7/32*Si(3*arcsin(a*x))/a^5+125/96*Si(5*arcsin(a*x))/a^5-1/3*x^4*(-a^2*x^2+1
)^(1/2)/a/arcsin(a*x)^3-2*x^2*(-a^2*x^2+1)^(1/2)/a^3/arcsin(a*x)+25/6*x^4*(
-a^2*x^2+1)^(1/2)/a/arcsin(a*x)
```

Rubi [A] (verified)

Time = 0.20 (sec) , antiderivative size = 158, normalized size of antiderivative = 1.00, number of steps used = 12, number of rules used = 4, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.400, Rules used = {4729, 4807, 4727, 3380}

$$\int \frac{x^4}{\arcsin(ax)^4}\,dx = \frac{\mathrm{Si}(\arcsin(ax))}{48a^5} - \frac{27\mathrm{Si}(3\arcsin(ax))}{32a^5} + \frac{125\mathrm{Si}(5\arcsin(ax))}{96a^5} - \frac{2x^3}{3a^2\arcsin(ax)^2} + \frac{25x^4\sqrt{1-a^2x^2}}{6a\arcsin(ax)} - \frac{x^4\sqrt{1-a^2x^2}}{3a\arcsin(ax)^3} - \frac{2x^2\sqrt{1-a^2x^2}}{a^3\arcsin(ax)} + \frac{5x^5}{6\arcsin(ax)^2}$$

```
[In] Int[x^4/ArcSin[a*x]^4,x]
```

```
[Out] -1/3*(x^4*Sqrt[1 - a^2*x^2])/(a*ArcSin[a*x]^3) - (2*x^3)/(3*a^2*ArcSin[a*x]
^2) + (5*x^5)/(6*ArcSin[a*x]^2) - (2*x^2*Sqrt[1 - a^2*x^2])/(a^3*ArcSin[a*x
]) + (25*x^4*Sqrt[1 - a^2*x^2])/(6*a*ArcSin[a*x]) + SinIntegral[ArcSin[a*x]
]/(48*a^5) - (27*SinIntegral[3*ArcSin[a*x]])/(32*a^5) + (125*SinIntegral[5*
ArcSin[a*x]])/(96*a^5)
```

Rule 3380

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Simp[SinInte
gral[e + f*x]/d, x] /; FreeQ[{c, d, e, f}, x] && EqQ[d*e - c*f, 0]
```

Rule 4727

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^m*Sqrt[1 - c^2*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] - Dist
[1/(b^2*c^(m + 1)*(n + 1)), Subst[Int[ExpandTrigReduce[x^(n + 1), Sin[-a/b
+ x/b]^(m - 1)*(m - (m + 1)*Sin[-a/b + x/b]^2), x], x], x, a + b*ArcSin[c*x
]], x] /; FreeQ[{a, b, c}, x] && IGtQ[m, 0] && GeQ[n, -2] && LtQ[n, -1]
```

Rule 4729

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^m*Sqrt[1 - c^2*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] + (Dis
t[c*((m + 1)/(b*(n + 1))), Int[x^(m + 1)*((a + b*ArcSin[c*x])^(n + 1)/Sqrt[
1 - c^2*x^2]), x], x] - Dist[m/(b*c*(n + 1)), Int[x^(m - 1)*((a + b*ArcSin[
c*x])^(n + 1)/Sqrt[1 - c^2*x^2]), x], x]) /; FreeQ[{a, b, c}, x] && IGtQ[m,
 0] && LtQ[n, -2]
```

Rule 4807

```
Int[(((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*((f_.)*(x_))^(m_.))/Sqrt[(d_)
+ (e_.)*(x_)^2], x_Symbol] :> Simp[((f*x)^m/(b*c*(n + 1)))*Simp[Sqrt[1 - c^
2*x^2]/Sqrt[d + e*x^2]]*(a + b*ArcSin[c*x])^(n + 1), x] - Dist[f*(m/(b*c*(n
 + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]], Int[(f*x)^(m - 1)*(a + b*A
rcSin[c*x])^(n + 1), x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && EqQ[c^2*d
 + e, 0] && LtQ[n, -1]
```

Rubi steps

$$\begin{aligned}\text{integral} &= -\frac{x^4\sqrt{1-a^2x^2}}{3a\arcsin(ax)^3}+\frac{4\int\frac{x^3}{\sqrt{1-a^2x^2}\arcsin(ax)^3}\,dx}{3a}-\frac{1}{3}(5a)\int\frac{x^5}{\sqrt{1-a^2x^2}\arcsin(ax)^3}\,dx\\ &= -\frac{x^4\sqrt{1-a^2x^2}}{3a\arcsin(ax)^3}-\frac{2x^3}{3a^2\arcsin(ax)^2}+\frac{5x^5}{6\arcsin(ax)^2}-\frac{25}{6}\int\frac{x^4}{\arcsin(ax)^2}\,dx+\frac{2\int\frac{x^2}{\arcsin(ax)^2}\,dx}{a^2}\end{aligned}$$

$$= -\frac{x^4\sqrt{1-a^2x^2}}{3a\arcsin(ax)^3} - \frac{2x^3}{3a^2\arcsin(ax)^2} + \frac{5x^5}{6\arcsin(ax)^2} - \frac{2x^2\sqrt{1-a^2x^2}}{a^3\arcsin(ax)} + \frac{25x^4\sqrt{1-a^2x^2}}{6a\arcsin(ax)} + \frac{2\text{Subst}\left(\int\left(-\frac{\sin(x)}{4x}+\frac{3\sin(3x)}{4x}\right)dx,x,\arcsin(ax)\right)}{a^5} - \frac{25\text{Subst}\left(\int\left(-\frac{\sin(x)}{8x}+\frac{9\sin(3x)}{16x}-\frac{5\sin(5x)}{16x}\right)dx,x,\arcsin(ax)\right)}{6a^5}$$

$$= -\frac{x^4\sqrt{1-a^2x^2}}{3a\arcsin(ax)^3} - \frac{2x^3}{3a^2\arcsin(ax)^2} + \frac{5x^5}{6\arcsin(ax)^2} - \frac{2x^2\sqrt{1-a^2x^2}}{a^3\arcsin(ax)} + \frac{25x^4\sqrt{1-a^2x^2}}{6a\arcsin(ax)} - \frac{\text{Subst}\left(\int\frac{\sin(x)}{x}dx,x,\arcsin(ax)\right)}{2a^5} + \frac{25\text{Subst}\left(\int\frac{\sin(x)}{x}dx,x,\arcsin(ax)\right)}{48a^5} + \frac{125\text{Subst}\left(\int\frac{\sin(5x)}{x}dx,x,\arcsin(ax)\right)}{96a^5} + \frac{3\text{Subst}\left(\int\frac{\sin(3x)}{x}dx,x,\arcsin(ax)\right)}{2a^5} - \frac{75\text{Subst}\left(\int\frac{\sin(3x)}{x}dx,x,\arcsin(ax)\right)}{32a^5}$$

$$= -\frac{x^4\sqrt{1-a^2x^2}}{3a\arcsin(ax)^3} - \frac{2x^3}{3a^2\arcsin(ax)^2} + \frac{5x^5}{6\arcsin(ax)^2} - \frac{2x^2\sqrt{1-a^2x^2}}{a^3\arcsin(ax)} + \frac{25x^4\sqrt{1-a^2x^2}}{6a\arcsin(ax)} + \frac{\text{Si}(\arcsin(ax))}{48a^5} - \frac{27\text{Si}(3\arcsin(ax))}{32a^5} + \frac{125\text{Si}(5\arcsin(ax))}{96a^5}$$

Mathematica [A] (verified)

Time = 0.36 (sec) , antiderivative size = 159, normalized size of antiderivative = 1.01

$$\int \frac{x^4}{\arcsin(ax)^4}\,dx = \frac{-32a^4x^4\sqrt{1-a^2x^2} - 64a^3x^3\arcsin(ax) + 80a^5x^5\arcsin(ax) - 192a^2x^2\sqrt{1-a^2x^2}\arcsin(ax)^2 + 400a^4x^4}{9}$$

```
[In] Integrate[x^4/ArcSin[a*x]^4,x]
```

```
[Out] (-32*a^4*x^4*Sqrt[1 - a^2*x^2] - 64*a^3*x^3*ArcSin[a*x] + 80*a^5*x^5*ArcSin
[a*x] - 192*a^2*x^2*Sqrt[1 - a^2*x^2]*ArcSin[a*x]^2 + 400*a^4*x^4*Sqrt[1 -
a^2*x^2]*ArcSin[a*x]^2 + 2*ArcSin[a*x]^3*SinIntegral[ArcSin[a*x]] - 81*ArcS
in[a*x]^3*SinIntegral[3*ArcSin[a*x]] + 125*ArcSin[a*x]^3*SinIntegral[5*ArcS
in[a*x]])/(96*a^5*ArcSin[a*x]^3)
```

Maple [A] (verified)

Time = 0.04 (sec) , antiderivative size = 171, normalized size of antiderivative = 1.08

method	result
derivativedivides	$\frac{-\frac{\sqrt{-a^2x^2+1}}{24\arcsin(ax)^3}+\frac{ax}{48\arcsin(ax)^2}+\frac{\sqrt{-a^2x^2+1}}{48\arcsin(ax)}+\frac{\mathrm{Si}(\arcsin(ax))}{48}+\frac{\cos(3\arcsin(ax))}{16\arcsin(ax)^3}-\frac{3\sin(3\arcsin(ax))}{32\arcsin(ax)^2}-\frac{9\cos(3\arcsin(ax))}{32\arcsin(ax)}-\frac{27\ \mathrm{Si}(}{}}{a^5}$
default	$\frac{-\frac{\sqrt{-a^2x^2+1}}{24\arcsin(ax)^3}+\frac{ax}{48\arcsin(ax)^2}+\frac{\sqrt{-a^2x^2+1}}{48\arcsin(ax)}+\frac{\mathrm{Si}(\arcsin(ax))}{48}+\frac{\cos(3\arcsin(ax))}{16\arcsin(ax)^3}-\frac{3\sin(3\arcsin(ax))}{32\arcsin(ax)^2}-\frac{9\cos(3\arcsin(ax))}{32\arcsin(ax)}-\frac{27\ \mathrm{Si}(}{}}{a^5}$

[In] int(x^4/arcsin(a*x)^4,x,method=_RETURNVERBOSE)

[Out] 1/a^5*(-1/24/arcsin(a*x)^3*(-a^2*x^2+1)^(1/2)+1/48*a*x/arcsin(a*x)^2+1/48/arcsin(a*x)*(-a^2*x^2+1)^(1/2)+1/48*Si(arcsin(a*x))+1/16/arcsin(a*x)^3*cos(3*arcsin(a*x))-3/32/arcsin(a*x)^2*sin(3*arcsin(a*x))-9/32/arcsin(a*x)*cos(3*arcsin(a*x))-27/32*Si(3*arcsin(a*x))-1/48/arcsin(a*x)^3*cos(5*arcsin(a*x))+5/96/arcsin(a*x)^2*sin(5*arcsin(a*x))+25/96/arcsin(a*x)*cos(5*arcsin(a*x))+125/96*Si(5*arcsin(a*x)))

Fricas [F]

$$\int \frac{x^4}{\arcsin(ax)^4}\,dx = \int \frac{x^4}{\arcsin\left(ax\right)^4}\,dx$$

[In] integrate(x^4/arcsin(a*x)^4,x, algorithm="fricas")

[Out] integral(x^4/arcsin(a*x)^4, x)

Sympy [F]

$$\int \frac{x^4}{\arcsin(ax)^4}\,dx = \int \frac{x^4}{\operatorname{asin}^4\left(ax\right)}\,dx$$

[In] integrate(x**4/asin(a*x)**4,x)

[Out] Integral(x**4/asin(a*x)**4, x)

Maxima [F]

$$\int \frac{x^4}{\arcsin(ax)^4}\,dx = \int \frac{x^4}{\arcsin\left(ax\right)^4}\,dx$$

```
[In] integrate(x^4/arcsin(a*x)^4,x, algorithm="maxima")
```

```
[Out] -1/6*(6*a^3*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^3*integrate(1/6*(125
*a^4*x^5 - 136*a^2*x^3 + 24*x)*sqrt(a*x + 1)*sqrt(-a*x + 1)/((a^5*x^2 - a^3
)*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))), x) + (2*a^2*x^4 - (25*a^2*x^
4 - 12*x^2)*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^2)*sqrt(a*x + 1)*sqr
t(-a*x + 1) - (5*a^3*x^5 - 4*a*x^3)*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x +
1)))/(a^3*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^3)
```

Giac [A] (verification not implemented)

none

Time = 0.29 (sec) , antiderivative size = 250, normalized size of antiderivative = 1.58

$$\begin{aligned}\int \frac{x^4}{\arcsin(ax)^4}\,dx &= \frac{5\left(a^2x^2-1\right)^2x}{6\,a^4\arcsin\left(ax\right)^2} + \frac{25\left(a^2x^2-1\right)^2\sqrt{-a^2x^2+1}}{6\,a^5\arcsin\left(ax\right)} + \frac{(a^2x^2-1)x}{a^4\arcsin\left(ax\right)^2} \\ &+ \frac{125\ \mathrm{Si}\left(5\arcsin\left(ax\right)\right)}{96\,a^5} - \frac{27\ \mathrm{Si}\left(3\arcsin\left(ax\right)\right)}{32\,a^5} + \frac{\mathrm{Si}\left(\arcsin\left(ax\right)\right)}{48\,a^5} \\ &- \frac{19\left(-a^2x^2+1\right)^{\frac{3}{2}}}{3\,a^5\arcsin\left(ax\right)} + \frac{x}{6\,a^4\arcsin\left(ax\right)^2} - \frac{\left(a^2x^2-1\right)^2\sqrt{-a^2x^2+1}}{3\,a^5\arcsin\left(ax\right)^3} \\ &+ \frac{13\sqrt{-a^2x^2+1}}{6\,a^5\arcsin\left(ax\right)} + \frac{2\left(-a^2x^2+1\right)^{\frac{3}{2}}}{3\,a^5\arcsin\left(ax\right)^3} - \frac{\sqrt{-a^2x^2+1}}{3\,a^5\arcsin\left(ax\right)^3}\end{aligned}$$

```
[In] integrate(x^4/arcsin(a*x)^4,x, algorithm="giac")
```

```
[Out] 5/6*(a^2*x^2 - 1)^2*x/(a^4*arcsin(a*x)^2) + 25/6*(a^2*x^2 - 1)^2*sqrt(-a^2*
x^2 + 1)/(a^5*arcsin(a*x)) + (a^2*x^2 - 1)*x/(a^4*arcsin(a*x)^2) + 125/96*s
in_integral(5*arcsin(a*x))/a^5 - 27/32*sin_integral(3*arcsin(a*x))/a^5 + 1/
48*sin_integral(arcsin(a*x))/a^5 - 19/3*(-a^2*x^2 + 1)^(3/2)/(a^5*arcsin(a*
x)) + 1/6*x/(a^4*arcsin(a*x)^2) - 1/3*(a^2*x^2 - 1)^2*sqrt(-a^2*x^2 + 1)/(a
^5*arcsin(a*x)^3) + 13/6*sqrt(-a^2*x^2 + 1)/(a^5*arcsin(a*x)) + 2/3*(-a^2*x
^2 + 1)^(3/2)/(a^5*arcsin(a*x)^3) - 1/3*sqrt(-a^2*x^2 + 1)/(a^5*arcsin(a*x)
^3)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x^4}{\arcsin(ax)^4}\,dx = \int \frac{x^4}{\mathrm{asin}\left(a\,x\right)^4}\,dx$$

```
[In] int(x^4/asin(a*x)^4,x)
```

```
[Out] int(x^4/asin(a*x)^4, x)
```

3.68 $\int \frac{x^3}{\arcsin(ax)^4}\,dx$

Optimal result

Integrand size = 10, antiderivative size = 144

$$\int \frac{x^3}{\arcsin(ax)^4}\,dx = -\frac{x^3\sqrt{1-a^2x^2}}{3a\arcsin(ax)^3} - \frac{x^2}{2a^2\arcsin(ax)^2} + \frac{2x^4}{3\arcsin(ax)^2} - \frac{x\sqrt{1-a^2x^2}}{a^3\arcsin(ax)} + \frac{8x^3\sqrt{1-a^2x^2}}{3a\arcsin(ax)} - \frac{\operatorname{CosIntegral}(2\arcsin(ax))}{3a^4} + \frac{4\operatorname{CosIntegral}(4\arcsin(ax))}{3a^4}$$

```
[Out] -1/2*x^2/a^2/arcsin(a*x)^2+2/3*x^4/arcsin(a*x)^2-1/3*Ci(2*arcsin(a*x))/a^4+
4/3*Ci(4*arcsin(a*x))/a^4-1/3*x^3*(-a^2*x^2+1)^(1/2)/a/arcsin(a*x)^3-x*(-a^
2*x^2+1)^(1/2)/a^3/arcsin(a*x)+8/3*x^3*(-a^2*x^2+1)^(1/2)/a/arcsin(a*x)
```

Rubi [A] (verified)

Time = 0.18 (sec) , antiderivative size = 144, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 4, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.400, Rules used = {4729, 4807, 4727, 3383}

$$\int \frac{x^3}{\arcsin(ax)^4}\,dx = -\frac{\operatorname{CosIntegral}(2\arcsin(ax))}{3a^4} + \frac{4\operatorname{CosIntegral}(4\arcsin(ax))}{3a^4} - \frac{x^2}{2a^2\arcsin(ax)^2} + \frac{8x^3\sqrt{1-a^2x^2}}{3a\arcsin(ax)} - \frac{x^3\sqrt{1-a^2x^2}}{3a\arcsin(ax)^3} - \frac{x\sqrt{1-a^2x^2}}{a^3\arcsin(ax)} + \frac{2x^4}{3\arcsin(ax)^2}$$

```
[In] Int[x^3/ArcSin[a*x]^4,x]
```

```
[Out] -1/3*(x^3*Sqrt[1 - a^2*x^2])/(a*ArcSin[a*x]^3) - x^2/(2*a^2*ArcSin[a*x]^2)
+ (2*x^4)/(3*ArcSin[a*x]^2) - (x*Sqrt[1 - a^2*x^2])/(a^3*ArcSin[a*x]) + (8*
x^3*Sqrt[1 - a^2*x^2])/(3*a*ArcSin[a*x]) - CosIntegral[2*ArcSin[a*x]]/(3*a^
4) + (4*CosIntegral[4*ArcSin[a*x]])/(3*a^4)
```

Rule 3383

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Simp[CosInte
gral[e - Pi/2 + f*x]/d, x] /; FreeQ[{c, d, e, f}, x] && EqQ[d*(e - Pi/2) -
c*f, 0]
```

Rule 4727

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^m*Sqrt[1 - c^2*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] - Dist
[1/(b^2*c^(m + 1)*(n + 1)), Subst[Int[ExpandTrigReduce[x^(n + 1), Sin[-a/b
+ x/b]^(m - 1)*(m - (m + 1)*Sin[-a/b + x/b]^2), x], x], x, a + b*ArcSin[c*x
]], x] /; FreeQ[{a, b, c}, x] && IGtQ[m, 0] && GeQ[n, -2] && LtQ[n, -1]
```

Rule 4729

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^m*Sqrt[1 - c^2*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] + (Dis
t[c*((m + 1)/(b*(n + 1))), Int[x^(m + 1)*((a + b*ArcSin[c*x])^(n + 1)/Sqrt[
1 - c^2*x^2]), x], x] - Dist[m/(b*c*(n + 1)), Int[x^(m - 1)*((a + b*ArcSin[
c*x])^(n + 1)/Sqrt[1 - c^2*x^2]), x], x]) /; FreeQ[{a, b, c}, x] && IGtQ[m,
 0] && LtQ[n, -2]
```

Rule 4807

```
Int[(((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*((f_.)*(x_))^(m_.))/Sqrt[(d_)
+ (e_.)*(x_)^2], x_Symbol] :> Simp[((f*x)^m/(b*c*(n + 1)))*Simp[Sqrt[1 - c^
2*x^2]/Sqrt[d + e*x^2]]*(a + b*ArcSin[c*x])^(n + 1), x] - Dist[f*(m/(b*c*(n
 + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]], Int[(f*x)^(m - 1)*(a + b*A
rcSin[c*x])^(n + 1), x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && EqQ[c^2*d
 + e, 0] && LtQ[n, -1]
```

Rubi steps

$$\begin{aligned}\text{integral} &= -\frac{x^3\sqrt{1-a^2x^2}}{3a\arcsin(ax)^3}+\frac{\int \frac{x^2}{\sqrt{1-a^2x^2}\arcsin(ax)^3}\,dx}{a}-\frac{1}{3}(4a)\int \frac{x^4}{\sqrt{1-a^2x^2}\arcsin(ax)^3}\,dx\\ &= -\frac{x^3\sqrt{1-a^2x^2}}{3a\arcsin(ax)^3}-\frac{x^2}{2a^2\arcsin(ax)^2}+\frac{2x^4}{3\arcsin(ax)^2}-\frac{8}{3}\int \frac{x^3}{\arcsin(ax)^2}\,dx+\frac{\int \frac{x}{\arcsin(ax)^2}\,dx}{a^2}\end{aligned}$$

$$= -\frac{x^3\sqrt{1-a^2x^2}}{3a\arcsin(ax)^3} - \frac{x^2}{2a^2\arcsin(ax)^2} + \frac{2x^4}{3\arcsin(ax)^2} - \frac{x\sqrt{1-a^2x^2}}{a^3\arcsin(ax)} + \frac{8x^3\sqrt{1-a^2x^2}}{3a\arcsin(ax)} + \frac{\text{Subst}\left(\int \frac{\cos(2x)}{x}\,dx, x, \arcsin(ax)\right)}{a^4} - \frac{8\text{Subst}\left(\int \left(\frac{\cos(2x)}{2x} - \frac{\cos(4x)}{2x}\right)\,dx, x, \arcsin(ax)\right)}{3a^4}$$

$$= -\frac{x^3\sqrt{1-a^2x^2}}{3a\arcsin(ax)^3} - \frac{x^2}{2a^2\arcsin(ax)^2} + \frac{2x^4}{3\arcsin(ax)^2} - \frac{x\sqrt{1-a^2x^2}}{a^3\arcsin(ax)} + \frac{8x^3\sqrt{1-a^2x^2}}{3a\arcsin(ax)} + \frac{\text{CosIntegral}(2\arcsin(ax))}{a^4} - \frac{4\text{Subst}\left(\int \frac{\cos(2x)}{x}\,dx, x, \arcsin(ax)\right)}{3a^4} + \frac{4\text{Subst}\left(\int \frac{\cos(4x)}{x}\,dx, x, \arcsin(ax)\right)}{3a^4}$$

$$= -\frac{x^3\sqrt{1-a^2x^2}}{3a\arcsin(ax)^3} - \frac{x^2}{2a^2\arcsin(ax)^2} + \frac{2x^4}{3\arcsin(ax)^2} - \frac{x\sqrt{1-a^2x^2}}{a^3\arcsin(ax)} + \frac{8x^3\sqrt{1-a^2x^2}}{3a\arcsin(ax)} - \frac{\text{CosIntegral}(2\arcsin(ax))}{3a^4} + \frac{4\,\text{CosIntegral}(4\arcsin(ax))}{3a^4}$$

Mathematica [A] (verified)

Time = 0.35 (sec) , antiderivative size = 107, normalized size of antiderivative = 0.74

$$\int \frac{x^3}{\arcsin(ax)^4}\,dx = \frac{\frac{ax\left(-2a^2x^2\sqrt{1-a^2x^2}+ax(-3+4a^2x^2)\arcsin(ax)+2\sqrt{1-a^2x^2}(-3+8a^2x^2)\arcsin(ax)^2\right)}{\arcsin(ax)^3} - 2\,\text{CosIntegral}(2\arcsin(ax)) + 8\,\text{CosI}}{6a^4}$$

```
[In] Integrate[x^3/ArcSin[a*x]^4,x]
```

```
[Out] ((a*x*(-2*a^2*x^2*Sqrt[1 - a^2*x^2] + a*x*(-3 + 4*a^2*x^2)*ArcSin[a*x] + 2*
Sqrt[1 - a^2*x^2]*(-3 + 8*a^2*x^2)*ArcSin[a*x]^2))/ArcSin[a*x]^3 - 2*CosInt
egral[2*ArcSin[a*x]] + 8*CosIntegral[4*ArcSin[a*x]])/(6*a^4)
```

Maple [A] (verified)

Time = 0.04 (sec) , antiderivative size = 114, normalized size of antiderivative = 0.79

method	result
derivativedivides	$\frac{-\frac{\sin(2\arcsin(ax))}{12\arcsin(ax)^3} - \frac{\cos(2\arcsin(ax))}{12\arcsin(ax)^2} + \frac{\sin(2\arcsin(ax))}{6\arcsin(ax)} - \frac{\text{Ci}(2\arcsin(ax))}{3} + \frac{\sin(4\arcsin(ax))}{24\arcsin(ax)^3} + \frac{\cos(4\arcsin(ax))}{12\arcsin(ax)^2} - \frac{\sin(4\arcsin(ax))}{3\arcsin(ax)}}{a^4}$
default	$\frac{-\frac{\sin(2\arcsin(ax))}{12\arcsin(ax)^3} - \frac{\cos(2\arcsin(ax))}{12\arcsin(ax)^2} + \frac{\sin(2\arcsin(ax))}{6\arcsin(ax)} - \frac{\text{Ci}(2\arcsin(ax))}{3} + \frac{\sin(4\arcsin(ax))}{24\arcsin(ax)^3} + \frac{\cos(4\arcsin(ax))}{12\arcsin(ax)^2} - \frac{\sin(4\arcsin(ax))}{3\arcsin(ax)}}{a^4}$

```
[In] int(x^3/arcsin(a*x)^4,x,method=_RETURNVERBOSE)
```

```
[Out] 1/a^4*(-1/12/arcsin(a*x)^3*sin(2*arcsin(a*x))-1/12/arcsin(a*x)^2*cos(2*arcs
in(a*x))+1/6/arcsin(a*x)*sin(2*arcsin(a*x))-1/3*Ci(2*arcsin(a*x))+1/24/arcs
in(a*x)^3*sin(4*arcsin(a*x))+1/12/arcsin(a*x)^2*cos(4*arcsin(a*x))-1/3/arcs
in(a*x)*sin(4*arcsin(a*x))+4/3*Ci(4*arcsin(a*x)))
```

Fricas [F]

$$\int \frac{x^3}{\arcsin(ax)^4} \, dx = \int \frac{x^3}{\arcsin\left(ax\right)^4} \, dx$$

```
[In] integrate(x^3/arcsin(a*x)^4,x, algorithm="fricas")
```

```
[Out] integral(x^3/arcsin(a*x)^4, x)
```

Sympy [F]

$$\int \frac{x^3}{\arcsin(ax)^4} \, dx = \int \frac{x^3}{\operatorname{asin}^4\left(ax\right)} \, dx$$

```
[In] integrate(x**3/asin(a*x)**4,x)
```

```
[Out] Integral(x**3/asin(a*x)**4, x)
```

Maxima [F]

$$\int \frac{x^3}{\arcsin(ax)^4} \, dx = \int \frac{x^3}{\arcsin\left(ax\right)^4} \, dx$$

```
[In] integrate(x^3/arcsin(a*x)^4,x, algorithm="maxima")
```

```
[Out] -1/6*(6*a^3*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^3*integrate(1/3*(32*
a^4*x^4 - 30*a^2*x^2 + 3)*sqrt(a*x + 1)*sqrt(-a*x + 1)/((a^5*x^2 - a^3)*arc
tan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))), x) + 2*(a^2*x^3 - (8*a^2*x^3 - 3*
x)*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^2)*sqrt(a*x + 1)*sqrt(-a*x +
1) - (4*a^3*x^4 - 3*a*x^2)*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1)))/(a^3
*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^3)
```

Giac [A] (verification not implemented)

none

Time = 0.28 (sec) , antiderivative size = 174, normalized size of antiderivative = 1.21

$$\int \frac{x^3}{\arcsin(ax)^4}\,dx = -\frac{8\,(-a^2x^2+1)^{\frac{3}{2}}x}{3\,a^3\arcsin(ax)} + \frac{5\,\sqrt{-a^2x^2+1}x}{3\,a^3\arcsin(ax)} + \frac{4\,\operatorname{Ci}(4\,\arcsin(ax))}{3\,a^4} - \frac{\operatorname{Ci}(2\,\arcsin(ax))}{3\,a^4} + \frac{(-a^2x^2+1)^{\frac{3}{2}}x}{3\,a^3\arcsin(ax)^3} + \frac{2\,(a^2x^2-1)^2}{3\,a^4\arcsin(ax)^2} - \frac{\sqrt{-a^2x^2+1}x}{3\,a^3\arcsin(ax)^3} + \frac{5\,(a^2x^2-1)}{6\,a^4\arcsin(ax)^2} + \frac{1}{6\,a^4\arcsin(ax)^2}$$

```
[In] integrate(x^3/arcsin(a*x)^4,x, algorithm="giac")
```

```
[Out] -8/3*(-a^2*x^2 + 1)^(3/2)*x/(a^3*arcsin(a*x)) + 5/3*sqrt(-a^2*x^2 + 1)*x/(a
^3*arcsin(a*x)) + 4/3*cos_integral(4*arcsin(a*x))/a^4 - 1/3*cos_integral(2*
arcsin(a*x))/a^4 + 1/3*(-a^2*x^2 + 1)^(3/2)*x/(a^3*arcsin(a*x)^3) + 2/3*(a^
2*x^2 - 1)^2/(a^4*arcsin(a*x)^2) - 1/3*sqrt(-a^2*x^2 + 1)*x/(a^3*arcsin(a*x
)^3) + 5/6*(a^2*x^2 - 1)/(a^4*arcsin(a*x)^2) + 1/6/(a^4*arcsin(a*x)^2)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x^3}{\arcsin(ax)^4}\,dx = \int \frac{x^3}{\operatorname{asin}(a\,x)^4}\,dx$$

```
[In] int(x^3/asin(a*x)^4,x)
```

```
[Out] int(x^3/asin(a*x)^4, x)
```

3.69 $\int \frac{x^2}{\arcsin(ax)^4}\,dx$

Optimal result

Integrand size = 10, antiderivative size = 141

$$\int \frac{x^2}{\arcsin(ax)^4}\,dx = -\frac{x^2\sqrt{1-a^2x^2}}{3a\arcsin(ax)^3} - \frac{x}{3a^2\arcsin(ax)^2} + \frac{x^3}{2\arcsin(ax)^2} - \frac{\sqrt{1-a^2x^2}}{3a^3\arcsin(ax)} + \frac{3x^2\sqrt{1-a^2x^2}}{2a\arcsin(ax)} + \frac{\text{Si}(\arcsin(ax))}{24a^3} - \frac{9\text{Si}(3\arcsin(ax))}{8a^3}$$

```
[Out] -1/3*x/a^2/arcsin(a*x)^2+1/2*x^3/arcsin(a*x)^2+1/24*Si(arcsin(a*x))/a^3-9/8
*Si(3*arcsin(a*x))/a^3-1/3*x^2*(-a^2*x^2+1)^(1/2)/a/arcsin(a*x)^3-1/3*(-a^2
*x^2+1)^(1/2)/a^3/arcsin(a*x)+3/2*x^2*(-a^2*x^2+1)^(1/2)/a/arcsin(a*x)
```

Rubi [A] (verified)

Time = 0.19 (sec) , antiderivative size = 141, normalized size of antiderivative = 1.00, number of steps used = 10, number of rules used = 6, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.600, Rules used = {4729, 4807, 4727, 3380, 4717, 4809}

$$\int \frac{x^2}{\arcsin(ax)^4}\,dx = \frac{\text{Si}(\arcsin(ax))}{24a^3} - \frac{9\text{Si}(3\arcsin(ax))}{8a^3} + \frac{3x^2\sqrt{1-a^2x^2}}{2a\arcsin(ax)} - \frac{x^2\sqrt{1-a^2x^2}}{3a\arcsin(ax)^3} - \frac{x}{3a^2\arcsin(ax)^2} - \frac{\sqrt{1-a^2x^2}}{3a^3\arcsin(ax)} + \frac{x^3}{2\arcsin(ax)^2}$$

```
[In] Int[x^2/ArcSin[a*x]^4,x]
```

```
[Out] -1/3*(x^2*Sqrt[1 - a^2*x^2])/(a*ArcSin[a*x]^3) - x/(3*a^2*ArcSin[a*x]^2) +
x^3/(2*ArcSin[a*x]^2) - Sqrt[1 - a^2*x^2]/(3*a^3*ArcSin[a*x]) + (3*x^2*Sqrt
[1 - a^2*x^2])/(2*a*ArcSin[a*x]) + SinIntegral[ArcSin[a*x]]/(24*a^3) - (9*S
inIntegral[3*ArcSin[a*x]])/(8*a^3)
```

Rule 3380

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Simp[SinInte
gral[e + f*x]/d, x] /; FreeQ[{c, d, e, f}, x] && EqQ[d*e - c*f, 0]
```

Rule 4717

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_), x_Symbol] :> Simp[Sqrt[1 - c^2
*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] + Dist[c/(b*(n + 1)),
 Int[x*((a + b*ArcSin[c*x])^(n + 1)/Sqrt[1 - c^2*x^2]), x], x] /; FreeQ[{a,
 b, c}, x] && LtQ[n, -1]
```

Rule 4727

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^m*Sqrt[1 - c^2*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] - Dist
[1/(b^2*c^(m + 1)*(n + 1)), Subst[Int[ExpandTrigReduce[x^(n + 1), Sin[-a/b
+ x/b]^(m - 1)*(m - (m + 1)*Sin[-a/b + x/b]^2), x], x], x, a + b*ArcSin[c*x
]], x] /; FreeQ[{a, b, c}, x] && IGtQ[m, 0] && GeQ[n, -2] && LtQ[n, -1]
```

Rule 4729

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^m*Sqrt[1 - c^2*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] + (Dis
t[c*((m + 1)/(b*(n + 1))), Int[x^(m + 1)*((a + b*ArcSin[c*x])^(n + 1)/Sqrt[
1 - c^2*x^2]), x], x] - Dist[m/(b*c*(n + 1)), Int[x^(m - 1)*((a + b*ArcSin[
c*x])^(n + 1)/Sqrt[1 - c^2*x^2]), x], x]) /; FreeQ[{a, b, c}, x] && IGtQ[m,
 0] && LtQ[n, -2]
```

Rule 4807

```
Int[(((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*((f_.)*(x_))^(m_.))/Sqrt[(d_)
+ (e_.)*(x_)^2], x_Symbol] :> Simp[((f*x)^m/(b*c*(n + 1)))*Simp[Sqrt[1 - c^
2*x^2]/Sqrt[d + e*x^2]]*(a + b*ArcSin[c*x])^(n + 1), x] - Dist[f*(m/(b*c*(n
 + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]], Int[(f*x)^(m - 1)*(a + b*A
rcSin[c*x])^(n + 1), x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && EqQ[c^2*d
 + e, 0] && LtQ[n, -1]
```

Rule 4809

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_.)*((d_) + (e_.)*(x_)^
2)^(p_.), x_Symbol] :> Dist[(1/(b*c^(m + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x
^2)^p], Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b]^(2*p + 1), x], x, a
 + b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, d, e, n}, x] && EqQ[c^2*d + e, 0]
&& IGtQ[2*p + 2, 0] && IGtQ[m, 0]
```

Rubi steps

$$\text{integral} = -\frac{x^2\sqrt{1-a^2x^2}}{3a\arcsin(ax)^3} + \frac{2\int \frac{x}{\sqrt{1-a^2x^2}\arcsin(ax)^3}\,dx}{3a} - a\int \frac{x^3}{\sqrt{1-a^2x^2}\arcsin(ax)^3}\,dx$$

$$= -\frac{x^2\sqrt{1-a^2x^2}}{3a\arcsin(ax)^3} - \frac{x}{3a^2\arcsin(ax)^2} + \frac{x^3}{2\arcsin(ax)^2} - \frac{3}{2}\int \frac{x^2}{\arcsin(ax)^2}\,dx + \frac{\int \frac{1}{\arcsin(ax)^2}\,dx}{3a^2}$$

$$= -\frac{x^2\sqrt{1-a^2x^2}}{3a\arcsin(ax)^3} - \frac{x}{3a^2\arcsin(ax)^2} + \frac{x^3}{2\arcsin(ax)^2} - \frac{\sqrt{1-a^2x^2}}{3a^3\arcsin(ax)} + \frac{3x^2\sqrt{1-a^2x^2}}{2a\arcsin(ax)} - \frac{3\text{Subst}\left(\int \left(-\frac{\sin(x)}{4x} + \frac{3\sin(3x)}{4x}\right)\,dx, x, \arcsin(ax)\right)}{2a^3} - \frac{\int \frac{x}{\sqrt{1-a^2x^2}\arcsin(ax)}\,dx}{3a}$$

$$= -\frac{x^2\sqrt{1-a^2x^2}}{3a\arcsin(ax)^3} - \frac{x}{3a^2\arcsin(ax)^2} + \frac{x^3}{2\arcsin(ax)^2} - \frac{\sqrt{1-a^2x^2}}{3a^3\arcsin(ax)} + \frac{3x^2\sqrt{1-a^2x^2}}{2a\arcsin(ax)} - \frac{\text{Subst}\left(\int \frac{\sin(x)}{x}\,dx, x, \arcsin(ax)\right)}{3a^3} + \frac{3\text{Subst}\left(\int \frac{\sin(x)}{x}\,dx, x, \arcsin(ax)\right)}{8a^3} - \frac{9\text{Subst}\left(\int \frac{\sin(3x)}{x}\,dx, x, \arcsin(ax)\right)}{8a^3}$$

$$= -\frac{x^2\sqrt{1-a^2x^2}}{3a\arcsin(ax)^3} - \frac{x}{3a^2\arcsin(ax)^2} + \frac{x^3}{2\arcsin(ax)^2} - \frac{\sqrt{1-a^2x^2}}{3a^3\arcsin(ax)} + \frac{3x^2\sqrt{1-a^2x^2}}{2a\arcsin(ax)} + \frac{\text{Si}(\arcsin(ax))}{24a^3} - \frac{9\text{Si}(3\arcsin(ax))}{8a^3}$$

Mathematica [A] (verified)

Time = 0.29 (sec) , antiderivative size = 112, normalized size of antiderivative = 0.79

$$\int \frac{x^2}{\arcsin(ax)^4}\,dx = \frac{-\frac{8a^2x^2\sqrt{1-a^2x^2}}{\arcsin(ax)^3} + \frac{4ax(-2+3a^2x^2)}{\arcsin(ax)^2} + \frac{4\sqrt{1-a^2x^2}(-2+9a^2x^2)}{\arcsin(ax)} - 80\text{Si}(\arcsin(ax)) - 27(-3\text{Si}(\arcsin(ax)) + \text{Si}(3\arcsin}{24a^3}$$

```
[In] Integrate[x^2/ArcSin[a*x]^4,x]
```

```
[Out] ((-8*a^2*x^2*Sqrt[1 - a^2*x^2])/ArcSin[a*x]^3 + (4*a*x*(-2 + 3*a^2*x^2))/Ar
cSin[a*x]^2 + (4*Sqrt[1 - a^2*x^2]*(-2 + 9*a^2*x^2))/ArcSin[a*x] - 80*SinIn
tegral[ArcSin[a*x]] - 27*(-3*SinIntegral[ArcSin[a*x]] + SinIntegral[3*ArcSi
n[a*x]]))/(24*a^3)
```

Maple [A] (verified)

Time = 0.03 (sec) , antiderivative size = 117, normalized size of antiderivative = 0.83

method	result
derivativedivides	$\frac{-\frac{\sqrt{-a^2x^2+1}}{12\arcsin(ax)^3}+\frac{ax}{24\arcsin(ax)^2}+\frac{\sqrt{-a^2x^2+1}}{24\arcsin(ax)}+\frac{\mathrm{Si}(\arcsin(ax))}{24}+\frac{\cos(3\arcsin(ax))}{12\arcsin(ax)^3}-\frac{\sin(3\arcsin(ax))}{8\arcsin(ax)^2}-\frac{3\cos(3\arcsin(ax))}{8\arcsin(ax)}-9\ \mathrm{Si}(}{a^3}$
default	$\frac{-\frac{\sqrt{-a^2x^2+1}}{12\arcsin(ax)^3}+\frac{ax}{24\arcsin(ax)^2}+\frac{\sqrt{-a^2x^2+1}}{24\arcsin(ax)}+\frac{\mathrm{Si}(\arcsin(ax))}{24}+\frac{\cos(3\arcsin(ax))}{12\arcsin(ax)^3}-\frac{\sin(3\arcsin(ax))}{8\arcsin(ax)^2}-\frac{3\cos(3\arcsin(ax))}{8\arcsin(ax)}-9\ \mathrm{Si}(}{a^3}$

```
[In] int(x^2/arcsin(a*x)^4,x,method=_RETURNVERBOSE)
[Out] 1/a^3*(-1/12/arcsin(a*x)^3*(-a^2*x^2+1)^(1/2)+1/24*a*x/arcsin(a*x)^2+1/24/a
rcsin(a*x)*(-a^2*x^2+1)^(1/2)+1/24*Si(arcsin(a*x))+1/12/arcsin(a*x)^3*cos(3
*arcsin(a*x))-1/8/arcsin(a*x)^2*sin(3*arcsin(a*x))-3/8/arcsin(a*x)*cos(3*ar
csin(a*x))-9/8*Si(3*arcsin(a*x)))
```

Fricas [F]

$$\int \frac{x^2}{\arcsin(ax)^4}\,dx = \int \frac{x^2}{\arcsin{(ax)}^4}\,dx$$

```
[In] integrate(x^2/arcsin(a*x)^4,x, algorithm="fricas")
[Out] integral(x^2/arcsin(a*x)^4, x)
```

Sympy [F]

$$\int \frac{x^2}{\arcsin(ax)^4}\,dx = \int \frac{x^2}{\operatorname{asin}^4{(ax)}}\,dx$$

```
[In] integrate(x**2/asin(a*x)**4,x)
[Out] Integral(x**2/asin(a*x)**4, x)
```

Maxima [F]

$$\int \frac{x^2}{\arcsin(ax)^4}\,dx = \int \frac{x^2}{\arcsin(ax)^4}\,dx$$

[In] integrate(x^2/arcsin(a*x)^4,x, algorithm="maxima")

[Out] -1/6*(6*a^3*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^3*integrate(1/6*(27*a^2*x^3 - 20*x)*sqrt(a*x + 1)*sqrt(-a*x + 1)/((a^3*x^2 - a)*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))), x) + (2*a^2*x^2 - (9*a^2*x^2 - 2)*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^2)*sqrt(a*x + 1)*sqrt(-a*x + 1) - (3*a^3*x^3 - 2*a*x)*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1)))/(a^3*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^3)

Giac [A] (verification not implemented)

none

Time = 0.28 (sec) , antiderivative size = 148, normalized size of antiderivative = 1.05

$$\int \frac{x^2}{\arcsin(ax)^4}\,dx = \frac{(a^2x^2-1)x}{2\,a^2\arcsin(ax)^2} - \frac{9\,\mathrm{Si}\left(3\arcsin(ax)\right)}{8\,a^3} + \frac{\mathrm{Si}\left(\arcsin(ax)\right)}{24\,a^3} - \frac{3\,(-a^2x^2+1)^{\frac{3}{2}}}{2\,a^3\arcsin(ax)} + \frac{x}{6\,a^2\arcsin(ax)^2} + \frac{7\sqrt{-a^2x^2+1}}{6\,a^3\arcsin(ax)} + \frac{(-a^2x^2+1)^{\frac{3}{2}}}{3\,a^3\arcsin(ax)^3} - \frac{\sqrt{-a^2x^2+1}}{3\,a^3\arcsin(ax)^3}$$

[In] integrate(x^2/arcsin(a*x)^4,x, algorithm="giac")

[Out] 1/2*(a^2*x^2 - 1)*x/(a^2*arcsin(a*x)^2) - 9/8*sin_integral(3*arcsin(a*x))/a^3 + 1/24*sin_integral(arcsin(a*x))/a^3 - 3/2*(-a^2*x^2 + 1)^(3/2)/(a^3*arcsin(a*x)) + 1/6*x/(a^2*arcsin(a*x)^2) + 7/6*sqrt(-a^2*x^2 + 1)/(a^3*arcsin(a*x)) + 1/3*(-a^2*x^2 + 1)^(3/2)/(a^3*arcsin(a*x)^3) - 1/3*sqrt(-a^2*x^2 + 1)/(a^3*arcsin(a*x)^3)

Mupad [F(-1)]

Timed out.

$$\int \frac{x^2}{\arcsin(ax)^4}\,dx = \int \frac{x^2}{\operatorname{asin}\left(a\,x\right)^4}\,dx$$

```
[In] int(x^2/asin(a*x)^4,x)
[Out] int(x^2/asin(a*x)^4, x)
```

3.70 $\int \frac{x}{\arcsin(ax)^4}\,dx$

Optimal result

Integrand size = 8, antiderivative size = 97

$$\int \frac{x}{\arcsin(ax)^4}\,dx = -\frac{x\sqrt{1-a^2x^2}}{3a\arcsin(ax)^3} - \frac{1}{6a^2\arcsin(ax)^2} + \frac{x^2}{3\arcsin(ax)^2} + \frac{2x\sqrt{1-a^2x^2}}{3a\arcsin(ax)} - \frac{2\,\text{CosIntegral}(2\arcsin(ax))}{3a^2}$$

```
[Out] -1/6/a^2/arcsin(a*x)^2+1/3*x^2/arcsin(a*x)^2-2/3*Ci(2*arcsin(a*x))/a^2-1/3*
x*(-a^2*x^2+1)^(1/2)/a/arcsin(a*x)^3+2/3*x*(-a^2*x^2+1)^(1/2)/a/arcsin(a*x)
```

Rubi [A] (verified)

Time = 0.10 (sec) , antiderivative size = 97, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5, $\frac{\text{number of rules}}{\text{integrand size}} = 0.625$, Rules used = {4729, 4807, 4727, 3383, 4737}

$$\int \frac{x}{\arcsin(ax)^4}\,dx = -\frac{2\,\text{CosIntegral}(2\arcsin(ax))}{3a^2} + \frac{2x\sqrt{1-a^2x^2}}{3a\arcsin(ax)} - \frac{x\sqrt{1-a^2x^2}}{3a\arcsin(ax)^3} - \frac{1}{6a^2\arcsin(ax)^2} + \frac{x^2}{3\arcsin(ax)^2}$$

```
[In] Int[x/ArcSin[a*x]^4,x]
```

```
[Out] -1/3*(x*Sqrt[1 - a^2*x^2])/(a*ArcSin[a*x]^3) - 1/(6*a^2*ArcSin[a*x]^2) + x^
2/(3*ArcSin[a*x]^2) + (2*x*Sqrt[1 - a^2*x^2])/(3*a*ArcSin[a*x]) - (2*CosInt
egral[2*ArcSin[a*x]])/(3*a^2)
```

Rule 3383

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Simp[CosInte
gral[e - Pi/2 + f*x]/d, x] /; FreeQ[{c, d, e, f}, x] && EqQ[d*(e - Pi/2) -
c*f, 0]
```

Rule 4727

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^m*Sqrt[1 - c^2*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] - Dist
[1/(b^2*c^(m + 1)*(n + 1)), Subst[Int[ExpandTrigReduce[x^(n + 1), Sin[-a/b
+ x/b]^(m - 1)*(m - (m + 1)*Sin[-a/b + x/b]^2), x], x], x, a + b*ArcSin[c*x
]], x] /; FreeQ[{a, b, c}, x] && IGtQ[m, 0] && GeQ[n, -2] && LtQ[n, -1]
```

Rule 4729

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^m*Sqrt[1 - c^2*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] + (Dis
t[c*((m + 1)/(b*(n + 1))), Int[x^(m + 1)*((a + b*ArcSin[c*x])^(n + 1)/Sqrt[
1 - c^2*x^2]), x], x] - Dist[m/(b*c*(n + 1)), Int[x^(m - 1)*((a + b*ArcSin[
c*x])^(n + 1)/Sqrt[1 - c^2*x^2]), x], x]) /; FreeQ[{a, b, c}, x] && IGtQ[m,
 0] && LtQ[n, -2]
```

Rule 4737

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)/Sqrt[(d_) + (e_.)*(x_)^2], x_S
ymbol] :> Simp[(1/(b*c*(n + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]]*(a
 + b*ArcSin[c*x])^(n + 1), x] /; FreeQ[{a, b, c, d, e, n}, x] && EqQ[c^2*d
+ e, 0] && NeQ[n, -1]
```

Rule 4807

```
Int[(((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*((f_.)*(x_))^(m_.))/Sqrt[(d_)
+ (e_.)*(x_)^2], x_Symbol] :> Simp[((f*x)^m/(b*c*(n + 1)))*Simp[Sqrt[1 - c^
2*x^2]/Sqrt[d + e*x^2]]*(a + b*ArcSin[c*x])^(n + 1), x] - Dist[f*(m/(b*c*(n
 + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]], Int[(f*x)^(m - 1)*(a + b*A
rcSin[c*x])^(n + 1), x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && EqQ[c^2*d
 + e, 0] && LtQ[n, -1]
```

Rubi steps

$$\text{integral} = -\frac{x\sqrt{1-a^2x^2}}{3a\arcsin(ax)^3} + \frac{\int \frac{1}{\sqrt{1-a^2x^2}\arcsin(ax)^3}\,dx}{3a} - \frac{1}{3}(2a)\int \frac{x^2}{\sqrt{1-a^2x^2}\arcsin(ax)^3}\,dx$$

$$= -\frac{x\sqrt{1-a^2x^2}}{3a\arcsin(ax)^3} - \frac{1}{6a^2\arcsin(ax)^2} + \frac{x^2}{3\arcsin(ax)^2} - \frac{2}{3}\int \frac{x}{\arcsin(ax)^2}\,dx$$

$$= -\frac{x\sqrt{1-a^2x^2}}{3a\arcsin(ax)^3} - \frac{1}{6a^2\arcsin(ax)^2} + \frac{x^2}{3\arcsin(ax)^2} + \frac{2x\sqrt{1-a^2x^2}}{3a\arcsin(ax)} - \frac{2\text{Subst}\left(\int \frac{\cos(2x)}{x}\,dx, x, \arcsin(ax)\right)}{3a^2}$$

$$= -\frac{x\sqrt{1-a^2x^2}}{3a\arcsin(ax)^3} - \frac{1}{6a^2\arcsin(ax)^2} + \frac{x^2}{3\arcsin(ax)^2} + \frac{2x\sqrt{1-a^2x^2}}{3a\arcsin(ax)} - \frac{2\,\text{CosIntegral}(2\arcsin(ax))}{3a^2}$$

Mathematica [A] (verified)

Time = 0.15 (sec) , antiderivative size = 86, normalized size of antiderivative = 0.89

$$\int \frac{x}{\arcsin(ax)^4}\,dx = \frac{-2ax\sqrt{1-a^2x^2} + (-1+2a^2x^2)\arcsin(ax) + 4ax\sqrt{1-a^2x^2}\arcsin(ax)^2 - 4\arcsin(ax)^3\,\text{CosIntegral}(2\,\text{arc}}{6a^2\arcsin(ax)^3}$$

```
[In] Integrate[x/ArcSin[a*x]^4,x]
```

```
[Out] (-2*a*x*Sqrt[1 - a^2*x^2] + (-1 + 2*a^2*x^2)*ArcSin[a*x] + 4*a*x*Sqrt[1 - a
^2*x^2]*ArcSin[a*x]^2 - 4*ArcSin[a*x]^3*CosIntegral[2*ArcSin[a*x]])/(6*a^2*
ArcSin[a*x]^3)
```

Maple [A] (verified)

Time = 0.03 (sec) , antiderivative size = 60, normalized size of antiderivative = 0.62

method	result	size
derivativedivides	$\frac{-\frac{\sin(2\arcsin(ax))}{6\arcsin(ax)^3} - \frac{\cos(2\arcsin(ax))}{6\arcsin(ax)^2} + \frac{\sin(2\arcsin(ax))}{3\arcsin(ax)} - \frac{2\ \text{Ci}(2\arcsin(ax))}{3}}{a^2}$	60
default	$\frac{-\frac{\sin(2\arcsin(ax))}{6\arcsin(ax)^3} - \frac{\cos(2\arcsin(ax))}{6\arcsin(ax)^2} + \frac{\sin(2\arcsin(ax))}{3\arcsin(ax)} - \frac{2\ \text{Ci}(2\arcsin(ax))}{3}}{a^2}$	60

```
[In] int(x/arcsin(a*x)^4,x,method=_RETURNVERBOSE)
```

```
[Out] 1/a^2*(-1/6/arcsin(a*x)^3*sin(2*arcsin(a*x))-1/6/arcsin(a*x)^2*cos(2*arcsin
(a*x))+1/3/arcsin(a*x)*sin(2*arcsin(a*x))-2/3*Ci(2*arcsin(a*x)))
```

Fricas [F]

$$\int \frac{x}{\arcsin(ax)^4}\,dx = \int \frac{x}{\arcsin\left(ax\right)^4}\,dx$$

```
[In] integrate(x/arcsin(a*x)^4,x, algorithm="fricas")
[Out] integral(x/arcsin(a*x)^4, x)
```

Sympy [F]

$$\int \frac{x}{\arcsin(ax)^4}\,dx = \int \frac{x}{\operatorname{asin}^4\left(ax\right)}\,dx$$

```
[In] integrate(x/asin(a*x)**4,x)
[Out] Integral(x/asin(a*x)**4, x)
```

Maxima [F]

$$\int \frac{x}{\arcsin(ax)^4}\,dx = \int \frac{x}{\arcsin\left(ax\right)^4}\,dx$$

```
[In] integrate(x/arcsin(a*x)^4,x, algorithm="maxima")
[Out] -1/6*(6*a^2*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^3*integrate(2/3*(2*a
^2*x^2 - 1)*sqrt(a*x + 1)*sqrt(-a*x + 1)/((a^3*x^2 - a)*arctan2(a*x, sqrt(a
*x + 1)*sqrt(-a*x + 1))), x) - 2*(2*a*x*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*
x + 1))^2 - a*x)*sqrt(a*x + 1)*sqrt(-a*x + 1) - (2*a^2*x^2 - 1)*arctan2(a*x
, sqrt(a*x + 1)*sqrt(-a*x + 1)))/(a^2*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x
+ 1))^3)
```

Giac [A] (verification not implemented)

none

Time = 0.27 (sec) , antiderivative size = 92, normalized size of antiderivative = 0.95

$$\int \frac{x}{\arcsin(ax)^4}\,dx = \frac{2\sqrt{-a^2x^2+1}x}{3\,a\arcsin\left(ax\right)} - \frac{2\operatorname{Ci}\left(2\arcsin\left(ax\right)\right)}{3\,a^2} - \frac{\sqrt{-a^2x^2+1}x}{3\,a\arcsin\left(ax\right)^3} + \frac{a^2x^2-1}{3\,a^2\arcsin\left(ax\right)^2} + \frac{1}{6\,a^2\arcsin\left(ax\right)^2}$$

```
[In] integrate(x/arcsin(a*x)^4,x, algorithm="giac")
```

```
[Out] 2/3*sqrt(-a^2*x^2 + 1)*x/(a*arcsin(a*x)) - 2/3*cos_integral(2*arcsin(a*x))/
a^2 - 1/3*sqrt(-a^2*x^2 + 1)*x/(a*arcsin(a*x)^3) + 1/3*(a^2*x^2 - 1)/(a^2*a
rcsin(a*x)^2) + 1/6/(a^2*arcsin(a*x)^2)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x}{\arcsin(ax)^4}\,dx = \int \frac{x}{\mathrm{asin}\left(a\,x\right)^4}\,dx$$

```
[In] int(x/asin(a*x)^4,x)
```

```
[Out] int(x/asin(a*x)^4, x)
```

3.71 $\int \frac{1}{\arcsin(ax)^4}\,dx$

Optimal result

Integrand size = 6, antiderivative size = 78

$$\int \frac{1}{\arcsin(ax)^4}\,dx = -\frac{\sqrt{1-a^2x^2}}{3a\arcsin(ax)^3}+\frac{x}{6\arcsin(ax)^2}+\frac{\sqrt{1-a^2x^2}}{6a\arcsin(ax)}+\frac{\text{Si}(\arcsin(ax))}{6a}$$

```
[Out] 1/6*x/arcsin(a*x)^2+1/6*Si(arcsin(a*x))/a-1/3*(-a^2*x^2+1)^(1/2)/a/arcsin(a
*x)^3+1/6*(-a^2*x^2+1)^(1/2)/a/arcsin(a*x)
```

Rubi [A] (verified)

Time = 0.09 (sec) , antiderivative size = 78, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 4, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.667, Rules used = {4717, 4807, 4809, 3380}

$$\int \frac{1}{\arcsin(ax)^4}\,dx = \frac{\sqrt{1-a^2x^2}}{6a\arcsin(ax)}-\frac{\sqrt{1-a^2x^2}}{3a\arcsin(ax)^3}+\frac{\text{Si}(\arcsin(ax))}{6a}+\frac{x}{6\arcsin(ax)^2}$$

```
[In] Int[ArcSin[a*x]^(-4),x]
```

```
[Out] -1/3*Sqrt[1 - a^2*x^2]/(a*ArcSin[a*x]^3) + x/(6*ArcSin[a*x]^2) + Sqrt[1 - a
^2*x^2]/(6*a*ArcSin[a*x]) + SinIntegral[ArcSin[a*x]]/(6*a)
```

Rule 3380

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Simp[SinInte
gral[e + f*x]/d, x] /; FreeQ[{c, d, e, f}, x] && EqQ[d*e - c*f, 0]
```

Rule 4717

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_), x_Symbol] :> Simp[Sqrt[1 - c^2
*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] + Dist[c/(b*(n + 1)),
```

```
Int[x*((a + b*ArcSin[c*x])^(n + 1)/Sqrt[1 - c^2*x^2]), x], x] /; FreeQ[{a,
b, c}, x] && LtQ[n, -1]
```

Rule 4807

```
Int[(((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*((f_.)*(x_))^(m_.))/Sqrt[(d_)
+ (e_.)*(x_)^2], x_Symbol] :> Simp[((f*x)^m/(b*c*(n + 1)))*Simp[Sqrt[1 - c^
2*x^2]/Sqrt[d + e*x^2]]*(a + b*ArcSin[c*x])^(n + 1), x] - Dist[f*(m/(b*c*(n
 + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]], Int[(f*x)^(m - 1)*(a + b*A
rcSin[c*x])^(n + 1), x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && EqQ[c^2*d
 + e, 0] && LtQ[n, -1]
```

Rule 4809

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_.)*((d_) + (e_.)*(x_)^
2)^(p_.), x_Symbol] :> Dist[(1/(b*c^(m + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x
^2)^p], Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b]^(2*p + 1), x], x, a
 + b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, d, e, n}, x] && EqQ[c^2*d + e, 0]
&& IGtQ[2*p + 2, 0] && IGtQ[m, 0]
```

Rubi steps

$$
\begin{aligned}
\text{integral} &= -\frac{\sqrt{1-a^2x^2}}{3a\arcsin(ax)^3} - \frac{1}{3}a\int \frac{x}{\sqrt{1-a^2x^2}\arcsin(ax)^3}\,dx \\
&= -\frac{\sqrt{1-a^2x^2}}{3a\arcsin(ax)^3} + \frac{x}{6\arcsin(ax)^2} - \frac{1}{6}\int \frac{1}{\arcsin(ax)^2}\,dx \\
&= -\frac{\sqrt{1-a^2x^2}}{3a\arcsin(ax)^3} + \frac{x}{6\arcsin(ax)^2} + \frac{\sqrt{1-a^2x^2}}{6a\arcsin(ax)} + \frac{1}{6}a\int \frac{x}{\sqrt{1-a^2x^2}\arcsin(ax)}\,dx \\
&= -\frac{\sqrt{1-a^2x^2}}{3a\arcsin(ax)^3} + \frac{x}{6\arcsin(ax)^2} + \frac{\sqrt{1-a^2x^2}}{6a\arcsin(ax)} + \frac{\text{Subst}\left(\int \frac{\sin(x)}{x}\,dx, x, \arcsin(ax)\right)}{6a} \\
&= -\frac{\sqrt{1-a^2x^2}}{3a\arcsin(ax)^3} + \frac{x}{6\arcsin(ax)^2} + \frac{\sqrt{1-a^2x^2}}{6a\arcsin(ax)} + \frac{\text{Si}(\arcsin(ax))}{6a}
\end{aligned}
$$

Mathematica [A] (verified)

Time = 0.09 (sec) , antiderivative size = 70, normalized size of antiderivative = 0.90

$$\int \frac{1}{\arcsin(ax)^4}\,dx = \frac{-2\sqrt{1-a^2x^2}+ax\arcsin(ax)+\sqrt{1-a^2x^2}\arcsin(ax)^2+\arcsin(ax)^3\mathrm{Si}(\arcsin(ax))}{6a\arcsin(ax)^3}$$

[In] Integrate[ArcSin[a*x]^(-4),x]

[Out] (-2*Sqrt[1 - a^2*x^2] + a*x*ArcSin[a*x] + Sqrt[1 - a^2*x^2]*ArcSin[a*x]^2 + ArcSin[a*x]^3*SinIntegral[ArcSin[a*x]])/(6*a*ArcSin[a*x]^3)

Maple [A] (verified)

Time = 0.03 (sec) , antiderivative size = 63, normalized size of antiderivative = 0.81

method	result	size
derivativedivides	$\frac{-\frac{\sqrt{-a^2x^2+1}}{3\arcsin(ax)^3}+\frac{ax}{6\arcsin(ax)^2}+\frac{\sqrt{-a^2x^2+1}}{6\arcsin(ax)}+\frac{\mathrm{Si}(\arcsin(ax))}{6}}{a}$	63
default	$\frac{-\frac{\sqrt{-a^2x^2+1}}{3\arcsin(ax)^3}+\frac{ax}{6\arcsin(ax)^2}+\frac{\sqrt{-a^2x^2+1}}{6\arcsin(ax)}+\frac{\mathrm{Si}(\arcsin(ax))}{6}}{a}$	63

[In] int(1/arcsin(a*x)^4,x,method=_RETURNVERBOSE)

[Out] 1/a*(-1/3/arcsin(a*x)^3*(-a^2*x^2+1)^(1/2)+1/6*a*x/arcsin(a*x)^2+1/6/arcsin(a*x)*(-a^2*x^2+1)^(1/2)+1/6*Si(arcsin(a*x)))

Fricas [F]

$$\int \frac{1}{\arcsin(ax)^4}\,dx = \int \frac{1}{\arcsin(ax)^4}\,dx$$

[In] integrate(1/arcsin(a*x)^4,x, algorithm="fricas")

[Out] integral(arcsin(a*x)^(-4), x)

Sympy [F]

$$\int \frac{1}{\arcsin(ax)^4}\,dx = \int \frac{1}{\operatorname{asin}^4(ax)}\,dx$$

```
[In] integrate(1/asin(a*x)**4,x)
```

```
[Out] Integral(asin(a*x)**(-4), x)
```

Maxima [F]

$$\int \frac{1}{\arcsin(ax)^4}\,dx = \int \frac{1}{\arcsin(ax)^4}\,dx$$

```
[In] integrate(1/arcsin(a*x)^4,x, algorithm="maxima")
```

```
[Out] -1/6*(6*a^2*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^3*integrate(1/6*sqrt
(a*x + 1)*sqrt(-a*x + 1)*x/((a^2*x^2 - 1)*arctan2(a*x, sqrt(a*x + 1)*sqrt(-
a*x + 1))), x) - a*x*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1)) - sqrt(a*x
+ 1)*sqrt(-a*x + 1)*(arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^2 - 2))/(a*
arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^3)
```

Giac [A] (verification not implemented)

none

Time = 0.26 (sec) , antiderivative size = 66, normalized size of antiderivative = 0.85

$$\int \frac{1}{\arcsin(ax)^4}\,dx = \frac{\operatorname{Si}(\arcsin(ax))}{6\,a} + \frac{x}{6\,\arcsin(ax)^2} + \frac{\sqrt{-a^2x^2+1}}{6\,a\arcsin(ax)} - \frac{\sqrt{-a^2x^2+1}}{3\,a\arcsin(ax)^3}$$

```
[In] integrate(1/arcsin(a*x)^4,x, algorithm="giac")
```

```
[Out] 1/6*sin_integral(arcsin(a*x))/a + 1/6*x/arcsin(a*x)^2 + 1/6*sqrt(-a^2*x^2 +
 1)/(a*arcsin(a*x)) - 1/3*sqrt(-a^2*x^2 + 1)/(a*arcsin(a*x)^3)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{1}{\arcsin(ax)^4}\,dx = \int \frac{1}{\operatorname{asin}\left(a\,x\right)^4}\,dx$$

```
[In] int(1/asin(a*x)^4,x)
[Out] int(1/asin(a*x)^4, x)
```

3.72 $\int \frac{1}{x \arcsin(ax)^4} dx$

Optimal result

Integrand size = 10, antiderivative size = 10

$$\int \frac{1}{x \arcsin(ax)^4} dx = \operatorname{Int}\left(\frac{1}{x \arcsin(ax)^4}, x\right)$$

```
[Out] Unintegrable(1/x/arcsin(a*x)^4,x)
```

Rubi [N/A]

Not integrable

Time = 0.01 (sec) , antiderivative size = 10, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{1}{x \arcsin(ax)^4} dx = \int \frac{1}{x \arcsin(ax)^4} dx$$

```
[In] Int[1/(x*ArcSin[a*x]^4),x]
[Out] Defer[Int][1/(x*ArcSin[a*x]^4), x]
```

Rubi steps

$$\text{integral} = \int \frac{1}{x \arcsin(ax)^4} dx$$

Mathematica [N/A]

Not integrable

Time = 3.26 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.20

$$\int \frac{1}{x\arcsin(ax)^4}\,dx = \int \frac{1}{x\arcsin(ax)^4}\,dx$$

```
[In] Integrate[1/(x*ArcSin[a*x]^4),x]
[Out] Integrate[1/(x*ArcSin[a*x]^4), x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.03 (sec) , antiderivative size = 10, normalized size of antiderivative = 1.00

$$\int \frac{1}{x\arcsin\left(ax\right)^{4}}dx$$

```
[In] int(1/x/arcsin(a*x)^4,x)
[Out] int(1/x/arcsin(a*x)^4,x)
```

Fricas [N/A]

Not integrable

Time = 0.25 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.20

$$\int \frac{1}{x\arcsin(ax)^4}\,dx = \int \frac{1}{x\arcsin\left(ax\right)^{4}}\,dx$$

```
[In] integrate(1/x/arcsin(a*x)^4,x, algorithm="fricas")
[Out] integral(1/(x*arcsin(a*x)^4), x)
```

Sympy [N/A]

Not integrable

Time = 0.51 (sec) , antiderivative size = 10, normalized size of antiderivative = 1.00

$$\int \frac{1}{x\arcsin(ax)^4}\,dx = \int \frac{1}{x\operatorname{asin}^{4}\left(ax\right)}\,dx$$

```
[In] integrate(1/x/asin(a*x)**4,x)
[Out] Integral(1/(x*asin(a*x)**4), x)
```

Maxima [N/A]

Not integrable

Time = 3.98 (sec) , antiderivative size = 201, normalized size of antiderivative = 20.10

$$\int \frac{1}{x \arcsin(ax)^4} \, dx = \int \frac{1}{x \arcsin{(ax)}^4} \, dx$$

```
[In] integrate(1/x/arcsin(a*x)^4,x, algorithm="maxima")
```

```
[Out] -1/6*(6*a^3*x^3*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^3*integrate(1/3*
(2*a^2*x^2 - 3)*sqrt(a*x + 1)*sqrt(-a*x + 1)/((a^5*x^6 - a^3*x^4)*arctan2(a
*x, sqrt(a*x + 1)*sqrt(-a*x + 1))), x) - a*x*arctan2(a*x, sqrt(a*x + 1)*sqr
t(-a*x + 1)) + 2*(a^2*x^2 + arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^2)*s
qrt(a*x + 1)*sqrt(-a*x + 1))/(a^3*x^3*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x
+ 1))^3)
```

Giac [N/A]

Not integrable

Time = 0.32 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.20

$$\int \frac{1}{x \arcsin(ax)^4} \, dx = \int \frac{1}{x \arcsin{(ax)}^4} \, dx$$

```
[In] integrate(1/x/arcsin(a*x)^4,x, algorithm="giac")
```

```
[Out] integrate(1/(x*arcsin(a*x)^4), x)
```

Mupad [N/A]

Not integrable

Time = 0.04 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.20

$$\int \frac{1}{x \arcsin(ax)^4} \, dx = \int \frac{1}{x \, \mathrm{asin}{(a\,x)}^4} \, dx$$

```
[In] int(1/(x*asin(a*x)^4),x)
```

```
[Out] int(1/(x*asin(a*x)^4), x)
```

3.73 $\int \frac{1}{x^2 \arcsin(ax)^4} dx$

Optimal result

Integrand size = 10, antiderivative size = 10

$$\int \frac{1}{x^2 \arcsin(ax)^4} dx = \text{Int}\left(\frac{1}{x^2 \arcsin(ax)^4}, x\right)$$

```
[Out] Unintegrable(1/x^2/arcsin(a*x)^4,x)
```

Rubi [N/A]

Not integrable

Time = 0.01 (sec) , antiderivative size = 10, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{1}{x^2 \arcsin(ax)^4} dx = \int \frac{1}{x^2 \arcsin(ax)^4} dx$$

```
[In] Int[1/(x^2*ArcSin[a*x]^4),x]
[Out] Defer[Int][1/(x^2*ArcSin[a*x]^4), x]
```

Rubi steps

$$\text{integral} = \int \frac{1}{x^2 \arcsin(ax)^4} dx$$

Mathematica [N/A]

Not integrable

Time = 13.77 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.20

$$\int \frac{1}{x^2 \arcsin(ax)^4} \, dx = \int \frac{1}{x^2 \arcsin(ax)^4} \, dx$$

```
[In] Integrate[1/(x^2*ArcSin[a*x]^4),x]
[Out] Integrate[1/(x^2*ArcSin[a*x]^4), x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.05 (sec) , antiderivative size = 10, normalized size of antiderivative = 1.00

$$\int \frac{1}{x^2 \arcsin\left(ax\right)^4} dx$$

```
[In] int(1/x^2/arcsin(a*x)^4,x)
[Out] int(1/x^2/arcsin(a*x)^4,x)
```

Fricas [N/A]

Not integrable

Time = 0.24 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.20

$$\int \frac{1}{x^2 \arcsin(ax)^4} \, dx = \int \frac{1}{x^2 \arcsin\left(ax\right)^4} \, dx$$

```
[In] integrate(1/x^2/arcsin(a*x)^4,x, algorithm="fricas")
[Out] integral(1/(x^2*arcsin(a*x)^4), x)
```

Sympy [N/A]

Not integrable

Time = 0.66 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.20

$$\int \frac{1}{x^2 \arcsin(ax)^4} \, dx = \int \frac{1}{x^2 \operatorname{asin}^4\left(ax\right)} \, dx$$

```
[In] integrate(1/x**2/asin(a*x)**4,x)
[Out] Integral(1/(x**2*asin(a*x)**4), x)
```

Maxima [N/A]

Not integrable

Time = 4.90 (sec) , antiderivative size = 230, normalized size of antiderivative = 23.00

$$\int \frac{1}{x^2 \arcsin(ax)^4}\, dx = \int \frac{1}{x^2 \arcsin{(ax)}^4}\, dx$$

```
[In] integrate(1/x^2/arcsin(a*x)^4,x, algorithm="maxima")
```

```
[Out] 1/6*(6*a^3*x^4*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^3*integrate(1/6*(
a^4*x^4 - 20*a^2*x^2 + 24)*sqrt(a*x + 1)*sqrt(-a*x + 1)/((a^5*x^7 - a^3*x^5
)*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))), x) - (2*a^2*x^2 - (a^2*x^2 -
 6)*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^2)*sqrt(a*x + 1)*sqrt(-a*x +
 1) - (a^3*x^3 - 2*a*x)*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1)))/(a^3*x^
4*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^3)
```

Giac [N/A]

Not integrable

Time = 0.40 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.20

$$\int \frac{1}{x^2 \arcsin(ax)^4}\, dx = \int \frac{1}{x^2 \arcsin{(ax)}^4}\, dx$$

```
[In] integrate(1/x^2/arcsin(a*x)^4,x, algorithm="giac")
```

```
[Out] integrate(1/(x^2*arcsin(a*x)^4), x)
```

Mupad [N/A]

Not integrable

Time = 0.04 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.20

$$\int \frac{1}{x^2 \arcsin(ax)^4}\, dx = \int \frac{1}{x^2\, \mathrm{asin}{(a\, x)}^4}\, dx$$

```
[In] int(1/(x^2*asin(a*x)^4),x)
```

```
[Out] int(1/(x^2*asin(a*x)^4), x)
```

3.74 $\int x^4 \sqrt{\arcsin(ax)}\,dx$

Optimal result

Integrand size = 12, antiderivative size = 121

$$\int x^4\sqrt{\arcsin(ax)}\,dx=\frac{1}{5}x^5\sqrt{\arcsin(ax)}-\frac{\sqrt{\frac{\pi}{2}}\operatorname{FresnelS}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{8a^5}+\frac{\sqrt{\frac{\pi}{6}}\operatorname{FresnelS}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{16a^5}-\frac{\sqrt{\frac{\pi}{10}}\operatorname{FresnelS}\left(\sqrt{\frac{10}{\pi}}\sqrt{\arcsin(ax)}\right)}{80a^5}$$

```
[Out] -1/800*FresnelS(10^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*10^(1/2)*Pi^(1/2)/a^5+
1/96*FresnelS(6^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*6^(1/2)*Pi^(1/2)/a^5-1/16
*FresnelS(2^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*2^(1/2)*Pi^(1/2)/a^5+1/5*x^5*
arcsin(a*x)^(1/2)
```

Rubi [A] (verified)

Time = 0.16 (sec) , antiderivative size = 121, normalized size of antiderivative = 1.00, number of steps used = 10, number of rules used = 5, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.417, Rules used = {4725, 4809, 3393, 3386, 3432}

$$\int x^4\sqrt{\arcsin(ax)}\,dx=-\frac{\sqrt{\frac{\pi}{2}}\operatorname{FresnelS}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{8a^5}+\frac{\sqrt{\frac{\pi}{6}}\operatorname{FresnelS}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{16a^5}-\frac{\sqrt{\frac{\pi}{10}}\operatorname{FresnelS}\left(\sqrt{\frac{10}{\pi}}\sqrt{\arcsin(ax)}\right)}{80a^5}+\frac{1}{5}x^5\sqrt{\arcsin(ax)}$$

```
[In] Int[x^4*Sqrt[ArcSin[a*x]],x]
```

```
[Out] (x^5*Sqrt[ArcSin[a*x]])/5 - (Sqrt[Pi/2]*FresnelS[Sqrt[2/Pi]*Sqrt[ArcSin[a*x
]]])/(8*a^5) + (Sqrt[Pi/6]*FresnelS[Sqrt[6/Pi]*Sqrt[ArcSin[a*x]]])/(16*a^5)
 - (Sqrt[Pi/10]*FresnelS[Sqrt[10/Pi]*Sqrt[ArcSin[a*x]]])/(80*a^5)
```

Rule 3386

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[2/d
, Subst[Int[Sin[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d, e, f}
, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3393

```
Int[((c_.) + (d_.)*(x_))^(m_)*sin[(e_.) + (f_.)*(x_)]^(n_), x_Symbol] :> In
t[ExpandTrigReduce[(c + d*x)^m, Sin[e + f*x]^n, x], x] /; FreeQ[{c, d, e, f
, m}, x] && IGtQ[n, 1] && ( !RationalQ[m] || (GeQ[m, -1] && LtQ[m, 1]))
```

Rule 3432

```
Int[Sin[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelS[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4725

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^(m + 1)*((a + b*ArcSin[c*x])^n/(m + 1)), x] - Dist[b*c*(n/(m + 1)), Int[x^
(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*x^2]), x], x] /; FreeQ[{a
, b, c}, x] && IGtQ[m, 0] && GtQ[n, 0]
```

Rule 4809

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_.)*((d_) + (e_.)*(x_)^
2)^(p_.), x_Symbol] :> Dist[(1/(b*c^(m + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x
^2)^p], Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b]^(2*p + 1), x], x, a
 + b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, d, e, n}, x] && EqQ[c^2*d + e, 0]
&& IGtQ[2*p + 2, 0] && IGtQ[m, 0]
```

Rubi steps

$$
\begin{aligned}
\text{integral} &= \frac{1}{5}x^5\sqrt{\arcsin(ax)} - \frac{1}{10}a\int \frac{x^5}{\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}\,dx \\
&= \frac{1}{5}x^5\sqrt{\arcsin(ax)} - \frac{\text{Subst}\left(\int \frac{\sin^5(x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{10a^5} \\
&= \frac{1}{5}x^5\sqrt{\arcsin(ax)} - \frac{\text{Subst}\left(\int \left(\frac{5\sin(x)}{8\sqrt{x}} - \frac{5\sin(3x)}{16\sqrt{x}} + \frac{\sin(5x)}{16\sqrt{x}}\right)\,dx, x, \arcsin(ax)\right)}{10a^5}
\end{aligned}
$$

$$= \frac{1}{5}x^5\sqrt{\arcsin(ax)} - \frac{\text{Subst}\left(\int \frac{\sin(5x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{160a^5} + \frac{\text{Subst}\left(\int \frac{\sin(3x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{32a^5} - \frac{\text{Subst}\left(\int \frac{\sin(x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{16a^5}$$

$$= \frac{1}{5}x^5\sqrt{\arcsin(ax)} - \frac{\text{Subst}\left(\int \sin(5x^2)\,dx, x, \sqrt{\arcsin(ax)}\right)}{80a^5} + \frac{\text{Subst}\left(\int \sin(3x^2)\,dx, x, \sqrt{\arcsin(ax)}\right)}{16a^5} - \frac{\text{Subst}\left(\int \sin(x^2)\,dx, x, \sqrt{\arcsin(ax)}\right)}{8a^5}$$

$$= \frac{1}{5}x^5\sqrt{\arcsin(ax)} - \frac{\sqrt{\frac{\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{8a^5} + \frac{\sqrt{\frac{\pi}{6}}\,\text{FresnelS}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{16a^5} - \frac{\sqrt{\frac{\pi}{10}}\,\text{FresnelS}\left(\sqrt{\frac{10}{\pi}}\sqrt{\arcsin(ax)}\right)}{80a^5}$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.05 (sec) , antiderivative size = 192, normalized size of antiderivative = 1.59

$$\int x^4\sqrt{\arcsin(ax)}\,dx$$

$$= \frac{150\sqrt{-i\arcsin(ax)}\Gamma\left(\frac{3}{2}, -i\arcsin(ax)\right) + 150\sqrt{i\arcsin(ax)}\Gamma\left(\frac{3}{2}, i\arcsin(ax)\right) - 25\sqrt{3}\sqrt{-i\arcsin(ax)}\Gamma\left(\frac{3}{2},\right.}{}$$

```
[In] Integrate[x^4*Sqrt[ArcSin[a*x]],x]
```

```
[Out] (150*Sqrt[(-I)*ArcSin[a*x]]*Gamma[3/2, (-I)*ArcSin[a*x]] + 150*Sqrt[I*ArcSi
n[a*x]]*Gamma[3/2, I*ArcSin[a*x]] - 25*Sqrt[3]*Sqrt[(-I)*ArcSin[a*x]]*Gamma
[3/2, (-3*I)*ArcSin[a*x]] - 25*Sqrt[3]*Sqrt[I*ArcSin[a*x]]*Gamma[3/2, (3*I)
*ArcSin[a*x]] + 3*Sqrt[5]*Sqrt[(-I)*ArcSin[a*x]]*Gamma[3/2, (-5*I)*ArcSin[a
*x]] + 3*Sqrt[5]*Sqrt[I*ArcSin[a*x]]*Gamma[3/2, (5*I)*ArcSin[a*x]])/(2400*a
^5*Sqrt[ArcSin[a*x]])
```

Maple [A] (verified)

Time = 0.10 (sec) , antiderivative size = 143, normalized size of antiderivative = 1.18

method	result
default	$-\frac{-25\,\mathrm{FresnelS}\left(\frac{\sqrt{2}\,\sqrt{3}\,\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)\sqrt{3}\,\sqrt{2}\,\sqrt{\arcsin(ax)}\,\sqrt{\pi}+3\,\mathrm{FresnelS}\left(\frac{\sqrt{2}\,\sqrt{5}\,\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)\sqrt{5}\,\sqrt{2}\,\sqrt{\arcsin(ax)}\,\sqrt{\pi}+150\,\mathrm{FresnelS}}{2400a^5\sqrt{\mathrm{arcs}}}$

```
[In] int(x^4*arcsin(a*x)^(1/2),x,method=_RETURNVERBOSE)
```

```
[Out] -1/2400/a^5/arcsin(a*x)^(1/2)*(-25*FresnelS(2^(1/2)/Pi^(1/2)*3^(1/2)*arcsin
(a*x)^(1/2))*3^(1/2)*2^(1/2)*arcsin(a*x)^(1/2)*Pi^(1/2)+3*FresnelS(2^(1/2)/
Pi^(1/2)*5^(1/2)*arcsin(a*x)^(1/2))*5^(1/2)*2^(1/2)*arcsin(a*x)^(1/2)*Pi^(1
/2)+150*FresnelS(2^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*2^(1/2)*arcsin(a*x)^(1
/2)*Pi^(1/2)-300*a*x*arcsin(a*x)+150*arcsin(a*x)*sin(3*arcsin(a*x))-30*arcs
in(a*x)*sin(5*arcsin(a*x)))
```

Fricas [F(-2)]

Exception generated.

$$\int x^4\sqrt{\arcsin(ax)}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate(x^4*arcsin(a*x)^(1/2),x, algorithm="fricas")
```

```
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int x^4\sqrt{\arcsin(ax)}\,dx = \int x^4\sqrt{\operatorname{asin}(ax)}\,dx$$

```
[In] integrate(x**4*asin(a*x)**(1/2),x)
```

```
[Out] Integral(x**4*sqrt(asin(a*x)), x)
```

Maxima [F(-2)]

Exception generated.

$$\int x^4\sqrt{\arcsin(ax)}\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(x^4*arcsin(a*x)^(1/2),x, algorithm="maxima")
```

```
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 0.33 (sec) , antiderivative size = 247, normalized size of antiderivative = 2.04

$$\begin{aligned}\int x^4\sqrt{\arcsin(ax)}\,dx = & -\frac{(i-1)\sqrt{10}\sqrt{\pi}\,\mathrm{erf}\left(\left(\frac{1}{2}i-\frac{1}{2}\right)\sqrt{10}\sqrt{\arcsin(ax)}\right)}{3200\,a^5} \\ & +\frac{(i+1)\sqrt{10}\sqrt{\pi}\,\mathrm{erf}\left(-\left(\frac{1}{2}i+\frac{1}{2}\right)\sqrt{10}\sqrt{\arcsin(ax)}\right)}{3200\,a^5} \\ & +\frac{(i-1)\sqrt{6}\sqrt{\pi}\,\mathrm{erf}\left(\left(\frac{1}{2}i-\frac{1}{2}\right)\sqrt{6}\sqrt{\arcsin(ax)}\right)}{384\,a^5} \\ & -\frac{(i+1)\sqrt{6}\sqrt{\pi}\,\mathrm{erf}\left(-\left(\frac{1}{2}i+\frac{1}{2}\right)\sqrt{6}\sqrt{\arcsin(ax)}\right)}{384\,a^5} \\ & -\frac{(i-1)\sqrt{2}\sqrt{\pi}\,\mathrm{erf}\left(\left(\frac{1}{2}i-\frac{1}{2}\right)\sqrt{2}\sqrt{\arcsin(ax)}\right)}{64\,a^5} \\ & +\frac{(i+1)\sqrt{2}\sqrt{\pi}\,\mathrm{erf}\left(-\left(\frac{1}{2}i+\frac{1}{2}\right)\sqrt{2}\sqrt{\arcsin(ax)}\right)}{64\,a^5} \\ & -\frac{i\sqrt{\arcsin(ax)}e^{(5i\arcsin(ax))}}{160\,a^5}+\frac{i\sqrt{\arcsin(ax)}e^{(3i\arcsin(ax))}}{32\,a^5} \\ & -\frac{i\sqrt{\arcsin(ax)}e^{(i\arcsin(ax))}}{16\,a^5}+\frac{i\sqrt{\arcsin(ax)}e^{(-i\arcsin(ax))}}{16\,a^5} \\ & -\frac{i\sqrt{\arcsin(ax)}e^{(-3i\arcsin(ax))}}{32\,a^5}+\frac{i\sqrt{\arcsin(ax)}e^{(-5i\arcsin(ax))}}{160\,a^5}\end{aligned}$$

```
[In] integrate(x^4*arcsin(a*x)^(1/2),x, algorithm="giac")
```

```
[Out] -(1/3200*I - 1/3200)*sqrt(10)*sqrt(pi)*erf((1/2*I - 1/2)*sqrt(10)*sqrt(arcs
in(a*x)))/a^5 + (1/3200*I + 1/3200)*sqrt(10)*sqrt(pi)*erf(-(1/2*I + 1/2)*sq
rt(10)*sqrt(arcsin(a*x)))/a^5 + (1/384*I - 1/384)*sqrt(6)*sqrt(pi)*erf((1/2
```

```
*I - 1/2)*sqrt(6)*sqrt(arcsin(a*x)))/a^5 - (1/384*I + 1/384)*sqrt(6)*sqrt(p
i)*erf(-(1/2*I + 1/2)*sqrt(6)*sqrt(arcsin(a*x)))/a^5 - (1/64*I - 1/64)*sqrt
(2)*sqrt(pi)*erf((1/2*I - 1/2)*sqrt(2)*sqrt(arcsin(a*x)))/a^5 + (1/64*I + 1
/64)*sqrt(2)*sqrt(pi)*erf(-(1/2*I + 1/2)*sqrt(2)*sqrt(arcsin(a*x)))/a^5 - 1
/160*I*sqrt(arcsin(a*x))*e^(5*I*arcsin(a*x))/a^5 + 1/32*I*sqrt(arcsin(a*x))
*e^(3*I*arcsin(a*x))/a^5 - 1/16*I*sqrt(arcsin(a*x))*e^(I*arcsin(a*x))/a^5 +
 1/16*I*sqrt(arcsin(a*x))*e^(-I*arcsin(a*x))/a^5 - 1/32*I*sqrt(arcsin(a*x))
*e^(-3*I*arcsin(a*x))/a^5 + 1/160*I*sqrt(arcsin(a*x))*e^(-5*I*arcsin(a*x))/
a^5
```

Mupad [F(-1)]

Timed out.

$$\int x^4\sqrt{\arcsin(ax)}\,dx = \int x^4\,\sqrt{\mathrm{asin}\,(a\,x)}\,dx$$

```
[In] int(x^4*asin(a*x)^(1/2),x)
[Out] int(x^4*asin(a*x)^(1/2), x)
```

3.75 $\int x^3 \sqrt{\arcsin(ax)}\, dx$

Optimal result

Integrand size = 12, antiderivative size = 95

$$\int x^3 \sqrt{\arcsin(ax)}\, dx = -\frac{3\sqrt{\arcsin(ax)}}{32a^4} + \frac{1}{4}x^4\sqrt{\arcsin(ax)} - \frac{\sqrt{\frac{\pi}{2}}\,\text{FresnelC}\left(2\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{64a^4} + \frac{\sqrt{\pi}\,\text{FresnelC}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{16a^4}$$

```
[Out] -1/128*FresnelC(2*2^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*2^(1/2)*Pi^(1/2)/a^4+
1/16*FresnelC(2*arcsin(a*x)^(1/2)/Pi^(1/2))*Pi^(1/2)/a^4-3/32*arcsin(a*x)^(
1/2)/a^4+1/4*x^4*arcsin(a*x)^(1/2)
```

Rubi [A] (verified)

Time = 0.12 (sec) , antiderivative size = 95, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 5, $\frac{\text{number of rules}}{\text{integrand size}} = 0.417$, Rules used = {4725, 4809, 3393, 3385, 3433}

$$\int x^3 \sqrt{\arcsin(ax)}\, dx = -\frac{\sqrt{\frac{\pi}{2}}\,\text{FresnelC}\left(2\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{64a^4} + \frac{\sqrt{\pi}\,\text{FresnelC}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{16a^4} - \frac{3\sqrt{\arcsin(ax)}}{32a^4} + \frac{1}{4}x^4\sqrt{\arcsin(ax)}$$

```
[In] Int[x^3*Sqrt[ArcSin[a*x]],x]
```

```
[Out] (-3*Sqrt[ArcSin[a*x]])/(32*a^4) + (x^4*Sqrt[ArcSin[a*x]])/4 - (Sqrt[Pi/2]*F
resnelC[2*Sqrt[2/Pi]*Sqrt[ArcSin[a*x]]])/(64*a^4) + (Sqrt[Pi]*FresnelC[(2*S
qrt[ArcSin[a*x]])/Sqrt[Pi]])/(16*a^4)
```

Rule 3385

```
Int[sin[Pi/2 + (e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> D
ist[2/d, Subst[Int[Cos[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d
, e, f}, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3393

```
Int[((c_.) + (d_.)*(x_))^(m_)*sin[(e_.) + (f_.)*(x_)]^(n_), x_Symbol] :> In
t[ExpandTrigReduce[(c + d*x)^m, Sin[e + f*x]^n, x], x] /; FreeQ[{c, d, e, f
, m}, x] && IGtQ[n, 1] && ( !RationalQ[m] || (GeQ[m, -1] && LtQ[m, 1]))
```

Rule 3433

```
Int[Cos[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelC[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4725

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^(m + 1)*((a + b*ArcSin[c*x])^n/(m + 1)), x] - Dist[b*c*(n/(m + 1)), Int[x^
(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*x^2]), x], x] /; FreeQ[{a
, b, c}, x] && IGtQ[m, 0] && GtQ[n, 0]
```

Rule 4809

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_.)*((d_) + (e_.)*(x_)^
2)^(p_.), x_Symbol] :> Dist[(1/(b*c^(m + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x
^2)^p], Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b]^(2*p + 1), x], x, a
 + b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, d, e, n}, x] && EqQ[c^2*d + e, 0]
&& IGtQ[2*p + 2, 0] && IGtQ[m, 0]
```

Rubi steps

$$
\begin{aligned}
\text{integral} &= \frac{1}{4}x^4\sqrt{\arcsin(ax)} - \frac{1}{8}a\int \frac{x^4}{\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}\,dx \\
&= \frac{1}{4}x^4\sqrt{\arcsin(ax)} - \frac{\text{Subst}\left(\int \frac{\sin^4(x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{8a^4} \\
&= \frac{1}{4}x^4\sqrt{\arcsin(ax)} - \frac{\text{Subst}\left(\int \left(\frac{3}{8\sqrt{x}} - \frac{\cos(2x)}{2\sqrt{x}} + \frac{\cos(4x)}{8\sqrt{x}}\right)\,dx, x, \arcsin(ax)\right)}{8a^4} \\
&= -\frac{3\sqrt{\arcsin(ax)}}{32a^4} + \frac{1}{4}x^4\sqrt{\arcsin(ax)} - \frac{\text{Subst}\left(\int \frac{\cos(4x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{64a^4} \\
&\quad + \frac{\text{Subst}\left(\int \frac{\cos(2x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{16a^4}
\end{aligned}
$$

$$= -\frac{3\sqrt{\arcsin(ax)}}{32a^4} + \frac{1}{4}x^4\sqrt{\arcsin(ax)} - \frac{\text{Subst}\left(\int \cos\left(4x^2\right)\,dx, x, \sqrt{\arcsin(ax)}\right)}{32a^4} + \frac{\text{Subst}\left(\int \cos\left(2x^2\right)\,dx, x, \sqrt{\arcsin(ax)}\right)}{8a^4}$$

$$= -\frac{3\sqrt{\arcsin(ax)}}{32a^4} + \frac{1}{4}x^4\sqrt{\arcsin(ax)} - \frac{\sqrt{\frac{\pi}{2}}\,\text{FresnelC}\left(2\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{64a^4} + \frac{\sqrt{\pi}\,\text{FresnelC}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{16a^4}$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.03 (sec) , antiderivative size = 131, normalized size of antiderivative = 1.38

$$\int x^3\sqrt{\arcsin(ax)}\,dx = -\frac{i\left(4\sqrt{2}\sqrt{-i\arcsin(ax)}\Gamma\left(\frac{3}{2},-2i\arcsin(ax)\right) - 4\sqrt{2}\sqrt{i\arcsin(ax)}\Gamma\left(\frac{3}{2},2i\arcsin(ax)\right) - \sqrt{-i\arcsin(ax)}\Gamma\right.}{128a^4\sqrt{\arcsin(ax)}}$$

```
[In] Integrate[x^3*Sqrt[ArcSin[a*x]],x]
```

```
[Out] ((-1/128*I)*(4*Sqrt[2]*Sqrt[(-I)*ArcSin[a*x]]*Gamma[3/2, (-2*I)*ArcSin[a*x]
] - 4*Sqrt[2]*Sqrt[I*ArcSin[a*x]]*Gamma[3/2, (2*I)*ArcSin[a*x]] - Sqrt[(-I)
*ArcSin[a*x]]*Gamma[3/2, (-4*I)*ArcSin[a*x]] + Sqrt[I*ArcSin[a*x]]*Gamma[3/
2, (4*I)*ArcSin[a*x]]))/(a^4*Sqrt[ArcSin[a*x]])
```

Maple [A] (verified)

Time = 0.06 (sec) , antiderivative size = 90, normalized size of antiderivative = 0.95

method	result
default	$-\frac{\sqrt{2}\,\sqrt{\arcsin(ax)}\,\sqrt{\pi}\,\text{FresnelC}\left(\frac{2\sqrt{2}\,\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)+16\arcsin(ax)\cos(2\arcsin(ax))-4\arcsin(ax)\cos(4\arcsin(ax))-8\sqrt{\arcsin(ax)}\,\sqrt{}}{128a^4\sqrt{\arcsin(ax)}}$

```
[In] int(x^3*arcsin(a*x)^(1/2),x,method=_RETURNVERBOSE)
```

```
[Out] -1/128/a^4/arcsin(a*x)^(1/2)*(2^(1/2)*arcsin(a*x)^(1/2)*Pi^(1/2)*FresnelC(2
*2^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))+16*arcsin(a*x)*cos(2*arcsin(a*x))-4*ar
csin(a*x)*cos(4*arcsin(a*x))-8*arcsin(a*x)^(1/2)*Pi^(1/2)*FresnelC(2*arcsin
(a*x)^(1/2)/Pi^(1/2)))
```

Fricas [F(-2)]

Exception generated.

$$\int x^3 \sqrt{\arcsin(ax)}\, dx = \text{Exception raised: TypeError}$$

```
[In] integrate(x^3*arcsin(a*x)^(1/2),x, algorithm="fricas")
```

```
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int x^3 \sqrt{\arcsin(ax)}\, dx = \int x^3 \sqrt{\operatorname{asin}(ax)}\, dx$$

```
[In] integrate(x**3*asin(a*x)**(1/2),x)
```

```
[Out] Integral(x**3*sqrt(asin(a*x)), x)
```

Maxima [F(-2)]

Exception generated.

$$\int x^3 \sqrt{\arcsin(ax)}\, dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(x^3*arcsin(a*x)^(1/2),x, algorithm="maxima")
```

```
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 0.33 (sec) , antiderivative size = 153, normalized size of antiderivative = 1.61

$$\int x^3\sqrt{\arcsin(ax)}\,dx = \frac{(i+1)\,\sqrt{2}\sqrt{\pi}\,\mathrm{erf}\left((i-1)\,\sqrt{2}\sqrt{\arcsin{(ax)}}\right)}{512\,a^4} - \frac{(i-1)\,\sqrt{2}\sqrt{\pi}\,\mathrm{erf}\left(-(i+1)\,\sqrt{2}\sqrt{\arcsin{(ax)}}\right)}{512\,a^4} - \frac{(i+1)\,\sqrt{\pi}\,\mathrm{erf}\left((i-1)\,\sqrt{\arcsin{(ax)}}\right)}{64\,a^4} + \frac{(i-1)\,\sqrt{\pi}\,\mathrm{erf}\left(-(i+1)\,\sqrt{\arcsin{(ax)}}\right)}{64\,a^4} + \frac{\sqrt{\arcsin{(ax)}}e^{(4i\arcsin(ax))}}{64\,a^4} - \frac{\sqrt{\arcsin{(ax)}}e^{(2i\arcsin(ax))}}{16\,a^4} - \frac{\sqrt{\arcsin{(ax)}}e^{(-2i\arcsin(ax))}}{16\,a^4} + \frac{\sqrt{\arcsin{(ax)}}e^{(-4i\arcsin(ax))}}{64\,a^4}$$

```
[In] integrate(x^3*arcsin(a*x)^(1/2),x, algorithm="giac")
```

```
[Out] (1/512*I + 1/512)*sqrt(2)*sqrt(pi)*erf((I - 1)*sqrt(2)*sqrt(arcsin(a*x)))/a
^4 - (1/512*I - 1/512)*sqrt(2)*sqrt(pi)*erf(-(I + 1)*sqrt(2)*sqrt(arcsin(a*
x)))/a^4 - (1/64*I + 1/64)*sqrt(pi)*erf((I - 1)*sqrt(arcsin(a*x)))/a^4 + (1
/64*I - 1/64)*sqrt(pi)*erf(-(I + 1)*sqrt(arcsin(a*x)))/a^4 + 1/64*sqrt(arcs
in(a*x))*e^(4*I*arcsin(a*x))/a^4 - 1/16*sqrt(arcsin(a*x))*e^(2*I*arcsin(a*x
))/a^4 - 1/16*sqrt(arcsin(a*x))*e^(-2*I*arcsin(a*x))/a^4 + 1/64*sqrt(arcsin
(a*x))*e^(-4*I*arcsin(a*x))/a^4
```

Mupad [F(-1)]

Timed out.

$$\int x^3\sqrt{\arcsin(ax)}\,dx = \int x^3\,\sqrt{\mathrm{asin}\left(a\,x\right)}\,dx$$

```
[In] int(x^3*asin(a*x)^(1/2),x)
```

```
[Out] int(x^3*asin(a*x)^(1/2), x)
```

3.76 $\int x^2 \sqrt{\arcsin(ax)}\,dx$

Optimal result

Integrand size = 12, antiderivative size = 86

$$\int x^2 \sqrt{\arcsin(ax)}\,dx = \frac{1}{3}x^3\sqrt{\arcsin(ax)} - \frac{\sqrt{\frac{\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{4a^3} + \frac{\sqrt{\frac{\pi}{6}}\,\text{FresnelS}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{12a^3}$$

```
[Out] 1/72*FresnelS(6^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*6^(1/2)*Pi^(1/2)/a^3-1/8*
FresnelS(2^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*2^(1/2)*Pi^(1/2)/a^3+1/3*x^3*a
rcsin(a*x)^(1/2)
```

Rubi [A] (verified)

Time = 0.11 (sec) , antiderivative size = 86, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 5, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.417, Rules used = {4725, 4809, 3393, 3386, 3432}

$$\int x^2 \sqrt{\arcsin(ax)}\,dx = -\frac{\sqrt{\frac{\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{4a^3} + \frac{\sqrt{\frac{\pi}{6}}\,\text{FresnelS}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{12a^3} + \frac{1}{3}x^3\sqrt{\arcsin(ax)}$$

```
[In] Int[x^2*Sqrt[ArcSin[a*x]],x]
```

```
[Out] (x^3*Sqrt[ArcSin[a*x]])/3 - (Sqrt[Pi/2]*FresnelS[Sqrt[2/Pi]*Sqrt[ArcSin[a*x
]]])/(4*a^3) + (Sqrt[Pi/6]*FresnelS[Sqrt[6/Pi]*Sqrt[ArcSin[a*x]]])/(12*a^3)
```

Rule 3386

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[2/d
, Subst[Int[Sin[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d, e, f}
, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3393

```
Int[((c_.) + (d_.)*(x_))^(m_)*sin[(e_.) + (f_.)*(x_)]^(n_), x_Symbol] :> In
t[ExpandTrigReduce[(c + d*x)^m, Sin[e + f*x]^n, x], x] /; FreeQ[{c, d, e, f
, m}, x] && IGtQ[n, 1] && ( !RationalQ[m] || (GeQ[m, -1] && LtQ[m, 1]))
```

Rule 3432

```
Int[Sin[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelS[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4725

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^(m + 1)*((a + b*ArcSin[c*x])^n/(m + 1)), x] - Dist[b*c*(n/(m + 1)), Int[x^
(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*x^2]), x], x] /; FreeQ[{a
, b, c}, x] && IGtQ[m, 0] && GtQ[n, 0]
```

Rule 4809

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_.)*((d_) + (e_.)*(x_)^
2)^(p_.), x_Symbol] :> Dist[(1/(b*c^(m + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x
^2)^p], Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b]^(2*p + 1), x], x, a
 + b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, d, e, n}, x] && EqQ[c^2*d + e, 0]
&& IGtQ[2*p + 2, 0] && IGtQ[m, 0]
```

Rubi steps

$$
\begin{aligned}
\text{integral} &= \frac{1}{3}x^3\sqrt{\arcsin(ax)} - \frac{1}{6}a\int \frac{x^3}{\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}\,dx \\
&= \frac{1}{3}x^3\sqrt{\arcsin(ax)} - \frac{\text{Subst}\left(\int \frac{\sin^3(x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{6a^3} \\
&= \frac{1}{3}x^3\sqrt{\arcsin(ax)} - \frac{\text{Subst}\left(\int \left(\frac{3\sin(x)}{4\sqrt{x}} - \frac{\sin(3x)}{4\sqrt{x}}\right)\,dx, x, \arcsin(ax)\right)}{6a^3} \\
&= \frac{1}{3}x^3\sqrt{\arcsin(ax)} + \frac{\text{Subst}\left(\int \frac{\sin(3x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{24a^3} - \frac{\text{Subst}\left(\int \frac{\sin(x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{8a^3}
\end{aligned}
$$

$$= \frac{1}{3}x^3\sqrt{\arcsin(ax)} + \frac{\text{Subst}\left(\int \sin\left(3x^2\right) \, dx, x, \sqrt{\arcsin(ax)}\right)}{12a^3} - \frac{\text{Subst}\left(\int \sin\left(x^2\right) \, dx, x, \sqrt{\arcsin(ax)}\right)}{4a^3}$$

$$= \frac{1}{3}x^3\sqrt{\arcsin(ax)} - \frac{\sqrt{\frac{\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{4a^3} + \frac{\sqrt{\frac{\pi}{6}}\,\text{FresnelS}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{12a^3}$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.03 (sec) , antiderivative size = 126, normalized size of antiderivative = 1.47

$$\int x^2\sqrt{\arcsin(ax)}\, dx$$
$$= \frac{9\sqrt{-i\arcsin(ax)}\Gamma\left(\frac{3}{2}, -i\arcsin(ax)\right) + 9\sqrt{i\arcsin(ax)}\Gamma\left(\frac{3}{2}, i\arcsin(ax)\right) - \sqrt{3}\left(\sqrt{-i\arcsin(ax)}\Gamma\left(\frac{3}{2}, -3i\right.\right.}{72a^3\sqrt{\arcsin(ax)}}$$

```
[In] Integrate[x^2*Sqrt[ArcSin[a*x]],x]
```

```
[Out] (9*Sqrt[(-I)*ArcSin[a*x]]*Gamma[3/2, (-I)*ArcSin[a*x]] + 9*Sqrt[I*ArcSin[a*
x]]*Gamma[3/2, I*ArcSin[a*x]] - Sqrt[3]*(Sqrt[(-I)*ArcSin[a*x]]*Gamma[3/2,
(-3*I)*ArcSin[a*x]] + Sqrt[I*ArcSin[a*x]]*Gamma[3/2, (3*I)*ArcSin[a*x]]))/(
72*a^3*Sqrt[ArcSin[a*x]])
```

Maple [A] (verified)

Time = 0.04 (sec) , antiderivative size = 96, normalized size of antiderivative = 1.12

method	result
default	$-\frac{-\text{FresnelS}\left(\frac{\sqrt{2}\,\sqrt{3}\,\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)\sqrt{3}\,\sqrt{2}\,\sqrt{\arcsin(ax)}\,\sqrt{\pi}+9\,\text{FresnelS}\left(\frac{\sqrt{2}\,\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)\sqrt{2}\,\sqrt{\arcsin(ax)}\,\sqrt{\pi}-18ax\arcsin(ax)+6\,\text{ar}}{72a^3\sqrt{\arcsin(ax)}}$

```
[In] int(x^2*arcsin(a*x)^(1/2),x,method=_RETURNVERBOSE)
```

```
[Out] -1/72/a^3/arcsin(a*x)^(1/2)*(-FresnelS(2^(1/2)/Pi^(1/2)*3^(1/2)*arcsin(a*x)
^(1/2))*3^(1/2)*2^(1/2)*arcsin(a*x)^(1/2)*Pi^(1/2)+9*FresnelS(2^(1/2)/Pi^(1
/2)*arcsin(a*x)^(1/2))*2^(1/2)*arcsin(a*x)^(1/2)*Pi^(1/2)-18*a*x*arcsin(a*x
)+6*arcsin(a*x)*sin(3*arcsin(a*x)))
```

Fricas [F(-2)]

Exception generated.

$$\int x^2\sqrt{\arcsin(ax)}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate(x^2*arcsin(a*x)^(1/2),x, algorithm="fricas")
```

```
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int x^2\sqrt{\arcsin(ax)}\,dx = \int x^2\sqrt{\operatorname{asin}(ax)}\,dx$$

```
[In] integrate(x**2*asin(a*x)**(1/2),x)
```

```
[Out] Integral(x**2*sqrt(asin(a*x)), x)
```

Maxima [F(-2)]

Exception generated.

$$\int x^2\sqrt{\arcsin(ax)}\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(x^2*arcsin(a*x)^(1/2),x, algorithm="maxima")
```

```
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 0.33 (sec) , antiderivative size = 165, normalized size of antiderivative = 1.92

$$\int x^2\sqrt{\arcsin(ax)}\,dx = \frac{(i-1)\sqrt{6}\sqrt{\pi}\,\mathrm{erf}\left(\left(\frac{1}{2}i-\frac{1}{2}\right)\sqrt{6}\sqrt{\arcsin(ax)}\right)}{288\,a^3} - \frac{(i+1)\sqrt{6}\sqrt{\pi}\,\mathrm{erf}\left(-\left(\frac{1}{2}i+\frac{1}{2}\right)\sqrt{6}\sqrt{\arcsin(ax)}\right)}{288\,a^3} - \frac{(i-1)\sqrt{2}\sqrt{\pi}\,\mathrm{erf}\left(\left(\frac{1}{2}i-\frac{1}{2}\right)\sqrt{2}\sqrt{\arcsin(ax)}\right)}{32\,a^3} + \frac{(i+1)\sqrt{2}\sqrt{\pi}\,\mathrm{erf}\left(-\left(\frac{1}{2}i+\frac{1}{2}\right)\sqrt{2}\sqrt{\arcsin(ax)}\right)}{32\,a^3} + \frac{i\sqrt{\arcsin(ax)}e^{(3i\arcsin(ax))}}{24\,a^3} - \frac{i\sqrt{\arcsin(ax)}e^{(i\arcsin(ax))}}{8\,a^3} + \frac{i\sqrt{\arcsin(ax)}e^{(-i\arcsin(ax))}}{8\,a^3} - \frac{i\sqrt{\arcsin(ax)}e^{(-3i\arcsin(ax))}}{24\,a^3}$$

```
[In] integrate(x^2*arcsin(a*x)^(1/2),x, algorithm="giac")
[Out] (1/288*I - 1/288)*sqrt(6)*sqrt(pi)*erf((1/2*I - 1/2)*sqrt(6)*sqrt(arcsin(a*
x)))/a^3 - (1/288*I + 1/288)*sqrt(6)*sqrt(pi)*erf(-(1/2*I + 1/2)*sqrt(6)*sq
rt(arcsin(a*x)))/a^3 - (1/32*I - 1/32)*sqrt(2)*sqrt(pi)*erf((1/2*I - 1/2)*s
qrt(2)*sqrt(arcsin(a*x)))/a^3 + (1/32*I + 1/32)*sqrt(2)*sqrt(pi)*erf(-(1/2*
I + 1/2)*sqrt(2)*sqrt(arcsin(a*x)))/a^3 + 1/24*I*sqrt(arcsin(a*x))*e^(3*I*a
rcsin(a*x))/a^3 - 1/8*I*sqrt(arcsin(a*x))*e^(I*arcsin(a*x))/a^3 + 1/8*I*sqr
t(arcsin(a*x))*e^(-I*arcsin(a*x))/a^3 - 1/24*I*sqrt(arcsin(a*x))*e^(-3*I*ar
csin(a*x))/a^3
```

Mupad [F(-1)]

Timed out.

$$\int x^2\sqrt{\arcsin(ax)}\,dx = \int x^2\sqrt{\mathrm{asin}\left(a\,x\right)}\,dx$$

```
[In] int(x^2*asin(a*x)^(1/2),x)
[Out] int(x^2*asin(a*x)^(1/2), x)
```

3.77 $\int x\sqrt{\arcsin(ax)}\,dx$

Optimal result

Integrand size = 10, antiderivative size = 59

$$\int x\sqrt{\arcsin(ax)}\,dx=-\frac{\sqrt{\arcsin(ax)}}{4a^2}+\frac{1}{2}x^2\sqrt{\arcsin(ax)}+\frac{\sqrt{\pi}\,\text{FresnelC}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{8a^2}$$

```
[Out] 1/8*FresnelC(2*arcsin(a*x)^(1/2)/Pi^(1/2))*Pi^(1/2)/a^2-1/4*arcsin(a*x)^(1/
2)/a^2+1/2*x^2*arcsin(a*x)^(1/2)
```

Rubi [A] (verified)

Time = 0.09 (sec) , antiderivative size = 59, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 5, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {4725, 4809, 3393, 3385, 3433}

$$\int x\sqrt{\arcsin(ax)}\,dx=\frac{\sqrt{\pi}\,\text{FresnelC}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{8a^2}-\frac{\sqrt{\arcsin(ax)}}{4a^2}+\frac{1}{2}x^2\sqrt{\arcsin(ax)}$$

```
[In] Int[x*Sqrt[ArcSin[a*x]],x]
```

```
[Out] -1/4*Sqrt[ArcSin[a*x]]/a^2 + (x^2*Sqrt[ArcSin[a*x]])/2 + (Sqrt[Pi]*FresnelC
[(2*Sqrt[ArcSin[a*x]])/Sqrt[Pi]])/(8*a^2)
```

Rule 3385

```
Int[sin[Pi/2 + (e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> D
ist[2/d, Subst[Int[Cos[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d
, e, f}, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3393

```
Int[((c_.) + (d_.)*(x_))^(m_)*sin[(e_.) + (f_.)*(x_)]^(n_), x_Symbol] :> In
t[ExpandTrigReduce[(c + d*x)^m, Sin[e + f*x]^n, x], x] /; FreeQ[{c, d, e, f
, m}, x] && IGtQ[n, 1] && ( !RationalQ[m] || (GeQ[m, -1] && LtQ[m, 1]))
```

Rule 3433

```
Int[Cos[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelC[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4725

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^(m + 1)*((a + b*ArcSin[c*x])^n/(m + 1)), x] - Dist[b*c*(n/(m + 1)), Int[x^
(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*x^2]), x], x] /; FreeQ[{a
, b, c}, x] && IGtQ[m, 0] && GtQ[n, 0]
```

Rule 4809

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_.)*((d_) + (e_.)*(x_)^
2)^(p_.), x_Symbol] :> Dist[(1/(b*c^(m + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x
^2)^p], Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b]^(2*p + 1), x], x, a
 + b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, d, e, n}, x] && EqQ[c^2*d + e, 0]
&& IGtQ[2*p + 2, 0] && IGtQ[m, 0]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= \frac{1}{2}x^2\sqrt{\arcsin(ax)} - \frac{1}{4}a\int \frac{x^2}{\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}\,dx \\
&= \frac{1}{2}x^2\sqrt{\arcsin(ax)} - \frac{\text{Subst}\left(\int \frac{\sin^2(x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{4a^2} \\
&= \frac{1}{2}x^2\sqrt{\arcsin(ax)} - \frac{\text{Subst}\left(\int \left(\frac{1}{2\sqrt{x}} - \frac{\cos(2x)}{2\sqrt{x}}\right)\,dx, x, \arcsin(ax)\right)}{4a^2} \\
&= -\frac{\sqrt{\arcsin(ax)}}{4a^2} + \frac{1}{2}x^2\sqrt{\arcsin(ax)} + \frac{\text{Subst}\left(\int \frac{\cos(2x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{8a^2} \\
&= -\frac{\sqrt{\arcsin(ax)}}{4a^2} + \frac{1}{2}x^2\sqrt{\arcsin(ax)} + \frac{\text{Subst}\left(\int \cos\left(2x^2\right)\,dx, x, \sqrt{\arcsin(ax)}\right)}{4a^2} \\
&= -\frac{\sqrt{\arcsin(ax)}}{4a^2} + \frac{1}{2}x^2\sqrt{\arcsin(ax)} + \frac{\sqrt{\pi}\,\text{FresnelC}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{8a^2}
\end{aligned}$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.01 (sec) , antiderivative size = 74, normalized size of antiderivative = 1.25

$$\int x\sqrt{\arcsin(ax)}\,dx = -\frac{i\left(\sqrt{-i\arcsin(ax)}\Gamma\left(\frac{3}{2},-2i\arcsin(ax)\right)-\sqrt{i\arcsin(ax)}\Gamma\left(\frac{3}{2},2i\arcsin(ax)\right)\right)}{8\sqrt{2}a^2\sqrt{\arcsin(ax)}}$$

```
[In] Integrate[x*Sqrt[ArcSin[a*x]],x]
[Out] ((-1/8*I)*(Sqrt[(-I)*ArcSin[a*x]]*Gamma[3/2, (-2*I)*ArcSin[a*x]] - Sqrt[I*A
rcSin[a*x]]*Gamma[3/2, (2*I)*ArcSin[a*x]]))/(Sqrt[2]*a^2*Sqrt[ArcSin[a*x]])
```

Maple [A] (verified)

Time = 0.04 (sec) , antiderivative size = 43, normalized size of antiderivative = 0.73

method	result	size
default	$-\frac{2\sqrt{\arcsin(ax)}\,\sqrt{\pi}\,\cos(2\arcsin(ax))-\pi\,\operatorname{FresnelC}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{8a^2\sqrt{\pi}}$	43

```
[In] int(x*arcsin(a*x)^(1/2),x,method=_RETURNVERBOSE)
[Out] -1/8/a^2*(2*arcsin(a*x)^(1/2)*Pi^(1/2)*cos(2*arcsin(a*x))-Pi*FresnelC(2*arc
sin(a*x)^(1/2)/Pi^(1/2)))/Pi^(1/2)
```

Fricas [F(-2)]

Exception generated.

$$\int x\sqrt{\arcsin(ax)}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate(x*arcsin(a*x)^(1/2),x, algorithm="fricas")
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int x\sqrt{\arcsin(ax)}\,dx = \int x\sqrt{\operatorname{asin}(ax)}\,dx$$

```
[In] integrate(x*asin(a*x)**(1/2),x)
```

```
[Out] Integral(x*sqrt(asin(a*x)), x)
```

Maxima [F(-2)]

Exception generated.

$$\int x\sqrt{\arcsin(ax)}\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(x*arcsin(a*x)^(1/2),x, algorithm="maxima")
```

```
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 0.31 (sec) , antiderivative size = 71, normalized size of antiderivative = 1.20

$$\int x\sqrt{\arcsin(ax)}\,dx = -\frac{(i+1)\sqrt{\pi}\operatorname{erf}\left((i-1)\sqrt{\arcsin(ax)}\right)}{32\,a^2} + \frac{(i-1)\sqrt{\pi}\operatorname{erf}\left(-(i+1)\sqrt{\arcsin(ax)}\right)}{32\,a^2} - \frac{\sqrt{\arcsin(ax)}e^{(2i\arcsin(ax))}}{8\,a^2} - \frac{\sqrt{\arcsin(ax)}e^{(-2i\arcsin(ax))}}{8\,a^2}$$

```
[In] integrate(x*arcsin(a*x)^(1/2),x, algorithm="giac")
```

```
[Out] -(1/32*I + 1/32)*sqrt(pi)*erf((I - 1)*sqrt(arcsin(a*x)))/a^2 + (1/32*I - 1/
32)*sqrt(pi)*erf(-(I + 1)*sqrt(arcsin(a*x)))/a^2 - 1/8*sqrt(arcsin(a*x))*e^
(2*I*arcsin(a*x))/a^2 - 1/8*sqrt(arcsin(a*x))*e^(-2*I*arcsin(a*x))/a^2
```

Mupad [F(-1)]

Timed out.

$$\int x\sqrt{\arcsin(ax)}\,dx = \int x\,\sqrt{\operatorname{asin}\left(a\,x\right)}\,dx$$

```
[In] int(x*asin(a*x)^(1/2),x)
[Out] int(x*asin(a*x)^(1/2), x)
```

3.78 $\int \sqrt{\arcsin(ax)}\,dx$

Optimal result

Integrand size = 8, antiderivative size = 44

$$\int \sqrt{\arcsin(ax)}\,dx = x\sqrt{\arcsin(ax)} - \frac{\sqrt{\frac{\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{a}$$

```
[Out] -1/2*FresnelS(2^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*2^(1/2)*Pi^(1/2)/a+x*arcs
in(a*x)^(1/2)
```

Rubi [A] (verified)

Time = 0.05 (sec) , antiderivative size = 44, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {4715, 4809, 3386, 3432}

$$\int \sqrt{\arcsin(ax)}\,dx = x\sqrt{\arcsin(ax)} - \frac{\sqrt{\frac{\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{a}$$

```
[In] Int[Sqrt[ArcSin[a*x]],x]
```

```
[Out] x*Sqrt[ArcSin[a*x]] - (Sqrt[Pi/2]*FresnelS[Sqrt[2/Pi]*Sqrt[ArcSin[a*x]]])/a
```

Rule 3386

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[2/d
, Subst[Int[Sin[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d, e, f}
, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3432

```
Int[Sin[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelS[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4715

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.), x_Symbol] :> Simp[x*(a + b*Ar
cSin[c*x])^n, x] - Dist[b*c*n, Int[x*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 -
c^2*x^2]), x], x] /; FreeQ[{a, b, c}, x] && GtQ[n, 0]
```

Rule 4809

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_.)*((d_) + (e_.)*(x_)^
2)^(p_.), x_Symbol] :> Dist[(1/(b*c^(m + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x
^2)^p], Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b]^(2*p + 1), x], x, a
 + b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, d, e, n}, x] && EqQ[c^2*d + e, 0]
&& IGtQ[2*p + 2, 0] && IGtQ[m, 0]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= x\sqrt{\arcsin(ax)} - \frac{1}{2}a\int \frac{x}{\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}\,dx \\
&= x\sqrt{\arcsin(ax)} - \frac{\text{Subst}\left(\int \frac{\sin(x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{2a} \\
&= x\sqrt{\arcsin(ax)} - \frac{\text{Subst}\left(\int \sin\left(x^2\right)\,dx, x, \sqrt{\arcsin(ax)}\right)}{a} \\
&= x\sqrt{\arcsin(ax)} - \frac{\sqrt{\frac{\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{a}
\end{aligned}$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.03 (sec) , antiderivative size = 66, normalized size of antiderivative = 1.50

$$\int \sqrt{\arcsin(ax)}\,dx = \frac{\sqrt{-i\arcsin(ax)}\Gamma\left(\frac{3}{2}, -i\arcsin(ax)\right) + \sqrt{i\arcsin(ax)}\Gamma\left(\frac{3}{2}, i\arcsin(ax)\right)}{2a\sqrt{\arcsin(ax)}}$$

```
[In] Integrate[Sqrt[ArcSin[a*x]],x]
```

```
[Out] (Sqrt[(-I)*ArcSin[a*x]]*Gamma[3/2, (-I)*ArcSin[a*x]] + Sqrt[I*ArcSin[a*x]]*
Gamma[3/2, I*ArcSin[a*x]])/(2*a*Sqrt[ArcSin[a*x]])
```

Maple [A] (verified)

Time = 0.04 (sec) , antiderivative size = 49, normalized size of antiderivative = 1.11

method	result	size
default	$\frac{-\operatorname{FresnelS}\left(\frac{\sqrt{2}\,\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)\sqrt{2}\,\sqrt{\arcsin(ax)}\,\sqrt{\pi}+2ax\arcsin(ax)}{2a\sqrt{\arcsin(ax)}}$	49

[In] int(arcsin(a*x)^(1/2),x,method=_RETURNVERBOSE)

[Out] 1/2/a/arcsin(a*x)^(1/2)*(-FresnelS(2^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*2^(1/2)*arcsin(a*x)^(1/2)*Pi^(1/2)+2*a*x*arcsin(a*x))

Fricas [F(-2)]

Exception generated.

$$\int \sqrt{\arcsin(ax)}\,dx = \text{Exception raised: TypeError}$$

[In] integrate(arcsin(a*x)^(1/2),x, algorithm="fricas")

[Out] Exception raised: TypeError >> Error detected within library code: integrate: implementation incomplete (constant residues)

Sympy [F]

$$\int \sqrt{\arcsin(ax)}\,dx = \int \sqrt{\operatorname{asin}(ax)}\,dx$$

[In] integrate(asin(a*x)**(1/2),x)

[Out] Integral(sqrt(asin(a*x)), x)

Maxima [F(-2)]

Exception generated.

$$\int \sqrt{\arcsin(ax)}\,dx = \text{Exception raised: RuntimeError}$$

[In] integrate(arcsin(a*x)^(1/2),x, algorithm="maxima")

[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negative exponent.

Giac [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 0.30 (sec) , antiderivative size = 83, normalized size of antiderivative = 1.89

$$\int \sqrt{\arcsin(ax)}\,dx = -\frac{(i-1)\,\sqrt{2}\sqrt{\pi}\,\mathrm{erf}\left(\left(\frac{1}{2}i-\frac{1}{2}\right)\,\sqrt{2}\sqrt{\arcsin\left(ax\right)}\right)}{8\,a} + \frac{(i+1)\,\sqrt{2}\sqrt{\pi}\,\mathrm{erf}\left(-\left(\frac{1}{2}i+\frac{1}{2}\right)\,\sqrt{2}\sqrt{\arcsin\left(ax\right)}\right)}{8\,a} - \frac{i\,\sqrt{\arcsin\left(ax\right)}e^{\left(i\,\arcsin(ax)\right)}}{2\,a} + \frac{i\,\sqrt{\arcsin\left(ax\right)}e^{\left(-i\,\arcsin(ax)\right)}}{2\,a}$$

```
[In] integrate(arcsin(a*x)^(1/2),x, algorithm="giac")
```

```
[Out] -(1/8*I - 1/8)*sqrt(2)*sqrt(pi)*erf((1/2*I - 1/2)*sqrt(2)*sqrt(arcsin(a*x))
)/a + (1/8*I + 1/8)*sqrt(2)*sqrt(pi)*erf(-(1/2*I + 1/2)*sqrt(2)*sqrt(arcsin
(a*x)))/a - 1/2*I*sqrt(arcsin(a*x))*e^(I*arcsin(a*x))/a + 1/2*I*sqrt(arcsin
(a*x))*e^(-I*arcsin(a*x))/a
```

Mupad [F(-1)]

Timed out.

$$\int \sqrt{\arcsin(ax)}\,dx = \int \sqrt{\mathrm{asin}\left(a\,x\right)}\,dx$$

```
[In] int(asin(a*x)^(1/2),x)
```

```
[Out] int(asin(a*x)^(1/2), x)
```

3.79 $\int \frac{\sqrt{\arcsin(ax)}}{x} dx$

Optimal result

Integrand size = 12, antiderivative size = 12

$$\int \frac{\sqrt{\arcsin(ax)}}{x} dx = \operatorname{Int}\left(\frac{\sqrt{\arcsin(ax)}}{x}, x\right)$$

```
[Out] Unintegrable(arcsin(a*x)^(1/2)/x,x)
```

Rubi [N/A]

Not integrable

Time = 0.01 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}} = 0.000$, Rules used = {}

$$\int \frac{\sqrt{\arcsin(ax)}}{x} dx = \int \frac{\sqrt{\arcsin(ax)}}{x} dx$$

```
[In] Int[Sqrt[ArcSin[a*x]]/x,x]
[Out] Defer[Int][Sqrt[ArcSin[a*x]]/x, x]
```

Rubi steps

$$\text{integral} = \int \frac{\sqrt{\arcsin(ax)}}{x} dx$$

Mathematica [N/A]

Not integrable

Time = 0.20 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.17

$$\int \frac{\sqrt{\arcsin(ax)}}{x} dx = \int \frac{\sqrt{\arcsin(ax)}}{x} dx$$

```
[In] Integrate[Sqrt[ArcSin[a*x]]/x,x]
[Out] Integrate[Sqrt[ArcSin[a*x]]/x, x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.05 (sec) , antiderivative size = 10, normalized size of antiderivative = 0.83

$$\int \frac{\sqrt{\arcsin(ax)}}{x} dx$$

```
[In] int(arcsin(a*x)^(1/2)/x,x)
[Out] int(arcsin(a*x)^(1/2)/x,x)
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{\sqrt{\arcsin(ax)}}{x} dx = \text{Exception raised: TypeError}$$

```
[In] integrate(arcsin(a*x)^(1/2)/x,x, algorithm="fricas")
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [N/A]

Not integrable

Time = 0.33 (sec) , antiderivative size = 10, normalized size of antiderivative = 0.83

$$\int \frac{\sqrt{\arcsin(ax)}}{x} dx = \int \frac{\sqrt{\operatorname{asin}(ax)}}{x} dx$$

```
[In] integrate(asin(a*x)**(1/2)/x,x)
[Out] Integral(sqrt(asin(a*x))/x, x)
```

Maxima [F(-2)]

Exception generated.

$$\int \frac{\sqrt{\arcsin(ax)}}{x}\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(arcsin(a*x)^(1/2)/x,x, algorithm="maxima")
```

```
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [N/A]

Not integrable

Time = 0.44 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.00

$$\int \frac{\sqrt{\arcsin(ax)}}{x}\,dx = \int \frac{\sqrt{\arcsin{(ax)}}}{x}\,dx$$

```
[In] integrate(arcsin(a*x)^(1/2)/x,x, algorithm="giac")
```

```
[Out] integrate(sqrt(arcsin(a*x))/x, x)
```

Mupad [N/A]

Not integrable

Time = 0.04 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.00

$$\int \frac{\sqrt{\arcsin(ax)}}{x}\,dx = \int \frac{\sqrt{\mathrm{asin}\left(a\,x\right)}}{x}\,dx$$

```
[In] int(asin(a*x)^(1/2)/x,x)
```

```
[Out] int(asin(a*x)^(1/2)/x, x)
```

3.80 $\int x^4 \arcsin(ax)^{3/2} dx$

Optimal result

Integrand size = 12, antiderivative size = 214

$$\int x^4 \arcsin(ax)^{3/2} dx = \frac{4\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{25a^5} + \frac{2x^2\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{25a^3} + \frac{3x^4\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{50a} + \frac{1}{5}x^5 \arcsin(ax)^{3/2} - \frac{3\sqrt{\frac{\pi}{2}}\,\text{FresnelC}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{16a^5} + \frac{\sqrt{\frac{\pi}{6}}\,\text{FresnelC}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{32a^5} - \frac{3\sqrt{\frac{\pi}{10}}\,\text{FresnelC}\left(\sqrt{\frac{10}{\pi}}\sqrt{\arcsin(ax)}\right)}{800a^5}$$

```
[Out] 1/5*x^5*arcsin(a*x)^(3/2)-3/8000*FresnelC(10^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/
2))*10^(1/2)*Pi^(1/2)/a^5+1/192*FresnelC(6^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2)
)*6^(1/2)*Pi^(1/2)/a^5-3/32*FresnelC(2^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*2^
(1/2)*Pi^(1/2)/a^5+4/25*(-a^2*x^2+1)^(1/2)*arcsin(a*x)^(1/2)/a^5+2/25*x^2*(
-a^2*x^2+1)^(1/2)*arcsin(a*x)^(1/2)/a^3+3/50*x^4*(-a^2*x^2+1)^(1/2)*arcsin(
a*x)^(1/2)/a
```

Rubi [A] (verified)

Time = 0.34 (sec) , antiderivative size = 282, normalized size of antiderivative = 1.32, number of steps used = 23, number of rules used = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.667, Rules used

= {4725, 4795, 4767, 4719, 3385, 3433, 4731, 4491}

$$\int x^4 \arcsin(ax)^{3/2}\,dx = -\frac{2\sqrt{2\pi}\,\text{FresnelC}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{25a^5} - \frac{11\sqrt{\frac{\pi}{2}}\,\text{FresnelC}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{400a^5} + \frac{3\sqrt{\frac{3\pi}{2}}\,\text{FresnelC}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{800a^5} + \frac{\sqrt{\frac{\pi}{6}}\,\text{FresnelC}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{50a^5} - \frac{3\sqrt{\frac{\pi}{10}}\,\text{FresnelC}\left(\sqrt{\frac{10}{\pi}}\sqrt{\arcsin(ax)}\right)}{800a^5} + \frac{3x^4\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{50a} + \frac{4\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{25a^5} + \frac{2x^2\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{25a^3} + \frac{1}{5}x^5\arcsin(ax)^{3/2}$$

```
[In] Int[x^4*ArcSin[a*x]^(3/2),x]
```

```
[Out] (4*Sqrt[1 - a^2*x^2]*Sqrt[ArcSin[a*x]])/(25*a^5) + (2*x^2*Sqrt[1 - a^2*x^2]
*Sqrt[ArcSin[a*x]])/(25*a^3) + (3*x^4*Sqrt[1 - a^2*x^2]*Sqrt[ArcSin[a*x]])/
(50*a) + (x^5*ArcSin[a*x]^(3/2))/5 - (11*Sqrt[Pi/2]*FresnelC[Sqrt[2/Pi]*Sqr
t[ArcSin[a*x]]])/(400*a^5) - (2*Sqrt[2*Pi]*FresnelC[Sqrt[2/Pi]*Sqrt[ArcSin[
a*x]]])/(25*a^5) + (Sqrt[Pi/6]*FresnelC[Sqrt[6/Pi]*Sqrt[ArcSin[a*x]]])/(50*
a^5) + (3*Sqrt[(3*Pi)/2]*FresnelC[Sqrt[6/Pi]*Sqrt[ArcSin[a*x]]])/(800*a^5)
- (3*Sqrt[Pi/10]*FresnelC[Sqrt[10/Pi]*Sqrt[ArcSin[a*x]]])/(800*a^5)
```

Rule 3385

```
Int[sin[Pi/2 + (e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> D
ist[2/d, Subst[Int[Cos[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d
, e, f}, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3433

```
Int[Cos[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelC[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4491

```
Int[Cos[(a_.) + (b_.)*(x_)]^(p_.)*((c_.) + (d_.)*(x_))^(m_.)*Sin[(a_.) + (b
_.)*(x_)]^(n_.), x_Symbol] :> Int[ExpandTrigReduce[(c + d*x)^m, Sin[a + b*x
]^n*Cos[a + b*x]^p, x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && IG
tQ[p, 0]
```

Rule 4719

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_), x_Symbol] :> Dist[1/(b*c), Sub
st[Int[x^n*Cos[-a/b + x/b], x], x, a + b*ArcSin[c*x]], x] /; FreeQ[{a, b, c
```

```
, n}, x]
```

Rule 4725

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^(m + 1)*((a + b*ArcSin[c*x])^n/(m + 1)), x] - Dist[b*c*(n/(m + 1)), Int[x^
(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*x^2]), x], x] /; FreeQ[{a
, b, c}, x] && IGtQ[m, 0] && GtQ[n, 0]
```

Rule 4731

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Dist[1
/(b*c^(m + 1)), Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b], x], x, a +
 b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, n}, x] && IGtQ[m, 0]
```

Rule 4767

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)*((d_) + (e_.)*(x_)^2)^(p_
.), x_Symbol] :> Simp[(d + e*x^2)^(p + 1)*((a + b*ArcSin[c*x])^n/(2*e*(p +
1))), x] + Dist[b*(n/(2*c*(p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], In
t[(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x] /; FreeQ[{a,
b, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && NeQ[p, -1]
```

Rule 4795

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_)*((d_) + (e_.
)*(x_)^2)^(p_), x_Symbol] :> Simp[f*(f*x)^(m - 1)*(d + e*x^2)^(p + 1)*((a +
 b*ArcSin[c*x])^n/(e*(m + 2*p + 1))), x] + (Dist[f^2*((m - 1)/(c^2*(m + 2*p
 + 1))), Int[(f*x)^(m - 2)*(d + e*x^2)^p*(a + b*ArcSin[c*x])^n, x], x] + Di
st[b*f*(n/(c*(m + 2*p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], Int[(f*x)
^(m - 1)*(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x]) /; Fr
eeQ[{a, b, c, d, e, f, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && IGtQ[m,
1] && NeQ[m + 2*p + 1, 0]
```

Rubi steps

$$
\begin{aligned}
\text{integral} &= \frac{1}{5}x^5\arcsin(ax)^{3/2} - \frac{1}{10}(3a)\int\frac{x^5\sqrt{\arcsin(ax)}}{\sqrt{1-a^2x^2}}\,dx \\
&= \frac{3x^4\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{50a} + \frac{1}{5}x^5\arcsin(ax)^{3/2} \\
&\quad - \frac{3}{100}\int\frac{x^4}{\sqrt{\arcsin(ax)}}\,dx - \frac{6\int\frac{x^3\sqrt{\arcsin(ax)}}{\sqrt{1-a^2x^2}}\,dx}{25a}
\end{aligned}
$$

$$= \frac{2x^2\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{25a^3} + \frac{3x^4\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{50a} + \frac{1}{5}x^5\arcsin(ax)^{3/2} - \frac{3\text{Subst}\left(\int \frac{\cos(x)\sin^4(x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{100a^5} - \frac{4\int \frac{x\sqrt{\arcsin(ax)}}{\sqrt{1-a^2x^2}}\,dx}{25a^3} - \frac{\int \frac{x^2}{\sqrt{\arcsin(ax)}}\,dx}{25a^2}$$

$$= \frac{4\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{25a^5} + \frac{2x^2\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{25a^3} + \frac{3x^4\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{50a} + \frac{1}{5}x^5\arcsin(ax)^{3/2} - \frac{3\text{Subst}\left(\int \left(\frac{\cos(x)}{8\sqrt{x}} - \frac{3\cos(3x)}{16\sqrt{x}} + \frac{\cos(5x)}{16\sqrt{x}}\right)dx, x, \arcsin(ax)\right)}{100a^5} - \frac{\text{Subst}\left(\int \frac{\cos(x)\sin^2(x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{25a^5} - \frac{2\int \frac{1}{\sqrt{\arcsin(ax)}}\,dx}{25a^4}$$

$$= \frac{4\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{25a^5} + \frac{2x^2\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{25a^3} + \frac{3x^4\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{50a} + \frac{1}{5}x^5\arcsin(ax)^{3/2} - \frac{3\text{Subst}\left(\int \frac{\cos(5x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{1600a^5} - \frac{3\text{Subst}\left(\int \frac{\cos(x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{800a^5} + \frac{9\text{Subst}\left(\int \frac{\cos(3x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{1600a^5} - \frac{\text{Subst}\left(\int \left(\frac{\cos(x)}{4\sqrt{x}} - \frac{\cos(3x)}{4\sqrt{x}}\right)dx, x, \arcsin(ax)\right)}{25a^5} - \frac{2\text{Subst}\left(\int \frac{\cos(x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{25a^5}$$

$$= \frac{4\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{25a^5} + \frac{2x^2\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{25a^3} + \frac{3x^4\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{50a} + \frac{1}{5}x^5\arcsin(ax)^{3/2} - \frac{3\text{Subst}\left(\int \cos(5x^2)\,dx, x, \sqrt{\arcsin(ax)}\right)}{800a^5} - \frac{3\text{Subst}\left(\int \cos(x^2)\,dx, x, \sqrt{\arcsin(ax)}\right)}{400a^5} - \frac{\text{Subst}\left(\int \frac{\cos(x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{100a^5} + \frac{\text{Subst}\left(\int \frac{\cos(3x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{100a^5} + \frac{9\text{Subst}\left(\int \cos(3x^2)\,dx, x, \sqrt{\arcsin(ax)}\right)}{800a^5} - \frac{4\text{Subst}\left(\int \cos(x^2)\,dx, x, \sqrt{\arcsin(ax)}\right)}{25a^5}$$

$$
\begin{aligned}
&=\frac{4\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{25a^5}+\frac{2x^2\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{25a^3}\\
&+\frac{3x^4\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{50a}+\frac{1}{5}x^5\arcsin(ax)^{3/2}\\
&-\frac{3\sqrt{\frac{\pi}{2}}\,\text{FresnelC}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{400a^5}-\frac{2\sqrt{2\pi}\,\text{FresnelC}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{25a^5}\\
&+\frac{3\sqrt{\frac{3\pi}{2}}\,\text{FresnelC}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{800a^5}-\frac{3\sqrt{\frac{\pi}{10}}\,\text{FresnelC}\left(\sqrt{\frac{10}{\pi}}\sqrt{\arcsin(ax)}\right)}{800a^5}\\
&-\frac{\text{Subst}\left(\int\cos\left(x^2\right)\,dx,x,\sqrt{\arcsin(ax)}\right)}{50a^5}+\frac{\text{Subst}\left(\int\cos\left(3x^2\right)\,dx,x,\sqrt{\arcsin(ax)}\right)}{50a^5}
\end{aligned}
$$

$$
\begin{aligned}
&=\frac{4\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{25a^5}+\frac{2x^2\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{25a^3}\\
&+\frac{3x^4\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{50a}+\frac{1}{5}x^5\arcsin(ax)^{3/2}\\
&-\frac{11\sqrt{\frac{\pi}{2}}\,\text{FresnelC}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{400a^5}-\frac{2\sqrt{2\pi}\,\text{FresnelC}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{25a^5}\\
&+\frac{\sqrt{\frac{\pi}{6}}\,\text{FresnelC}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{50a^5}+\frac{3\sqrt{\frac{3\pi}{2}}\,\text{FresnelC}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{800a^5}\\
&-\frac{3\sqrt{\frac{\pi}{10}}\,\text{FresnelC}\left(\sqrt{\frac{10}{\pi}}\sqrt{\arcsin(ax)}\right)}{800a^5}
\end{aligned}
$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.06 (sec) , antiderivative size = 202, normalized size of antiderivative = 0.94

$$
\int x^4\arcsin(ax)^{3/2}\,dx=\frac{\sqrt{\arcsin(ax)}\left(2250\sqrt{i\arcsin(ax)}\Gamma\left(\frac{5}{2},-i\arcsin(ax)\right)+2250\sqrt{-i\arcsin(ax)}\Gamma\left(\frac{5}{2},i\,\mathrm{ar}\right.\right.}{}
$$

```
[In] Integrate[x^4*ArcSin[a*x]^(3/2),x]
```

```
[Out] (Sqrt[ArcSin[a*x]]*(2250*Sqrt[I*ArcSin[a*x]]*Gamma[5/2, (-I)*ArcSin[a*x]] +
 2250*Sqrt[(-I)*ArcSin[a*x]]*Gamma[5/2, I*ArcSin[a*x]] - 125*Sqrt[3]*Sqrt[I
*ArcSin[a*x]]*Gamma[5/2, (-3*I)*ArcSin[a*x]] - 125*Sqrt[3]*Sqrt[(-I)*ArcSin
[a*x]]*Gamma[5/2, (3*I)*ArcSin[a*x]] + 9*Sqrt[5]*Sqrt[I*ArcSin[a*x]]*Gamma[
5/2, (-5*I)*ArcSin[a*x]] + 9*Sqrt[5]*Sqrt[(-I)*ArcSin[a*x]]*Gamma[5/2, (5*I
)*ArcSin[a*x]]))/(36000*a^5*Sqrt[ArcSin[a*x]^2])
```

Maple [A] (verified)

Time = 0.07 (sec) , antiderivative size = 193, normalized size of antiderivative = 0.90

method	result
default	$\frac{-9\ \mathrm{FresnelC}\left(\frac{\sqrt{2}\,\sqrt{5}\,\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)\sqrt{5}\,\sqrt{2}\,\sqrt{\arcsin(ax)}\,\sqrt{\pi}+125\ \mathrm{FresnelC}\left(\frac{\sqrt{2}\,\sqrt{3}\,\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)\sqrt{3}\,\sqrt{2}\,\sqrt{\arcsin(ax)}\,\sqrt{\pi}+3000ax\arcsi}{}$

[In] int(x^4*arcsin(a*x)^(3/2),x,method=_RETURNVERBOSE)

[Out] 1/24000/a^5*(-9*FresnelC(2^(1/2)/Pi^(1/2)*5^(1/2)*arcsin(a*x)^(1/2))*5^(1/2)*2^(1/2)*arcsin(a*x)^(1/2)*Pi^(1/2)+125*FresnelC(2^(1/2)/Pi^(1/2)*3^(1/2)*arcsin(a*x)^(1/2))*3^(1/2)*2^(1/2)*arcsin(a*x)^(1/2)*Pi^(1/2)+3000*a*x*arcsin(a*x)^2-2250*FresnelC(2^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*2^(1/2)*arcsin(a*x)^(1/2)*Pi^(1/2)+300*arcsin(a*x)^2*sin(5*arcsin(a*x))-1500*arcsin(a*x)^2*sin(3*arcsin(a*x))+4500*arcsin(a*x)*(-a^2*x^2+1)^(1/2)-750*arcsin(a*x)*cos(3*arcsin(a*x))+90*arcsin(a*x)*cos(5*arcsin(a*x)))/arcsin(a*x)^(1/2)

Fricas [F(-2)]

Exception generated.

$$\int x^4 \arcsin(ax)^{3/2}\,dx = \text{Exception raised: TypeError}$$

[In] integrate(x^4*arcsin(a*x)^(3/2),x, algorithm="fricas")

[Out] Exception raised: TypeError >> Error detected within library code: integrate: implementation incomplete (constant residues)

Sympy [F]

$$\int x^4 \arcsin(ax)^{3/2}\,dx = \int x^4 \operatorname{asin}^{\frac{3}{2}}(ax)\,dx$$

[In] integrate(x**4*asin(a*x)**(3/2),x)

[Out] Integral(x**4*asin(a*x)**(3/2), x)

Maxima [F(-2)]

Exception generated.

$$\int x^4 \arcsin(ax)^{3/2}\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(x^4*arcsin(a*x)^(3/2),x, algorithm="maxima")
```

```
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 0.33 (sec) , antiderivative size = 355, normalized size of antiderivative = 1.66

$$\int x^4 \arcsin(ax)^{3/2}\,dx = -\frac{i \arcsin(ax)^{\frac{3}{2}} e^{(5i \arcsin(ax))}}{160\,a^5} + \frac{i \arcsin(ax)^{\frac{3}{2}} e^{(3i \arcsin(ax))}}{32\,a^5} - \frac{i \arcsin(ax)^{\frac{3}{2}} e^{(i \arcsin(ax))}}{16\,a^5} + \frac{i \arcsin(ax)^{\frac{3}{2}} e^{(-i \arcsin(ax))}}{16\,a^5} - \frac{i \arcsin(ax)^{\frac{3}{2}} e^{(-3i \arcsin(ax))}}{32\,a^5} + \frac{i \arcsin(ax)^{\frac{3}{2}} e^{(-5i \arcsin(ax))}}{160\,a^5} + \frac{(3i+3)\sqrt{10}\sqrt{\pi}\,\mathrm{erf}\left(\left(\frac{1}{2}i-\frac{1}{2}\right)\sqrt{10}\sqrt{\arcsin(ax)}\right)}{32000\,a^5} - \frac{(3i-3)\sqrt{10}\sqrt{\pi}\,\mathrm{erf}\left(-\left(\frac{1}{2}i+\frac{1}{2}\right)\sqrt{10}\sqrt{\arcsin(ax)}\right)}{32000\,a^5} - \frac{(i+1)\sqrt{6}\sqrt{\pi}\,\mathrm{erf}\left(\left(\frac{1}{2}i-\frac{1}{2}\right)\sqrt{6}\sqrt{\arcsin(ax)}\right)}{768\,a^5} + \frac{(i-1)\sqrt{6}\sqrt{\pi}\,\mathrm{erf}\left(-\left(\frac{1}{2}i+\frac{1}{2}\right)\sqrt{6}\sqrt{\arcsin(ax)}\right)}{768\,a^5} + \frac{(3i+3)\sqrt{2}\sqrt{\pi}\,\mathrm{erf}\left(\left(\frac{1}{2}i-\frac{1}{2}\right)\sqrt{2}\sqrt{\arcsin(ax)}\right)}{128\,a^5} - \frac{(3i-3)\sqrt{2}\sqrt{\pi}\,\mathrm{erf}\left(-\left(\frac{1}{2}i+\frac{1}{2}\right)\sqrt{2}\sqrt{\arcsin(ax)}\right)}{128\,a^5} + \frac{3\sqrt{\arcsin(ax)}e^{(5i \arcsin(ax))}}{1600\,a^5} - \frac{\sqrt{\arcsin(ax)}e^{(3i \arcsin(ax))}}{64\,a^5} + \frac{3\sqrt{\arcsin(ax)}e^{(i \arcsin(ax))}}{32\,a^5} + \frac{3\sqrt{\arcsin(ax)}e^{(-i \arcsin(ax))}}{32\,a^5} - \frac{\sqrt{\arcsin(ax)}e^{(-3i \arcsin(ax))}}{64\,a^5} + \frac{3\sqrt{\arcsin(ax)}e^{(-5i \arcsin(ax))}}{1600\,a^5}$$

```
[In] integrate(x^4*arcsin(a*x)^(3/2),x, algorithm="giac")
```

```
[Out] -1/160*I*arcsin(a*x)^(3/2)*e^(5*I*arcsin(a*x))/a^5 + 1/32*I*arcsin(a*x)^(3/
2)*e^(3*I*arcsin(a*x))/a^5 - 1/16*I*arcsin(a*x)^(3/2)*e^(I*arcsin(a*x))/a^5
 + 1/16*I*arcsin(a*x)^(3/2)*e^(-I*arcsin(a*x))/a^5 - 1/32*I*arcsin(a*x)^(3/
2)*e^(-3*I*arcsin(a*x))/a^5 + 1/160*I*arcsin(a*x)^(3/2)*e^(-5*I*arcsin(a*x)
)/a^5 + (3/32000*I + 3/32000)*sqrt(10)*sqrt(pi)*erf((1/2*I - 1/2)*sqrt(10)*
sqrt(arcsin(a*x)))/a^5 - (3/32000*I - 3/32000)*sqrt(10)*sqrt(pi)*erf(-(1/2*
I + 1/2)*sqrt(10)*sqrt(arcsin(a*x)))/a^5 - (1/768*I + 1/768)*sqrt(6)*sqrt(p
i)*erf((1/2*I - 1/2)*sqrt(6)*sqrt(arcsin(a*x)))/a^5 + (1/768*I - 1/768)*sqr
t(6)*sqrt(pi)*erf(-(1/2*I + 1/2)*sqrt(6)*sqrt(arcsin(a*x)))/a^5 + (3/128*I
```

```
+ 3/128)*sqrt(2)*sqrt(pi)*erf((1/2*I - 1/2)*sqrt(2)*sqrt(arcsin(a*x)))/a^5
- (3/128*I - 3/128)*sqrt(2)*sqrt(pi)*erf(-(1/2*I + 1/2)*sqrt(2)*sqrt(arcsin
(a*x)))/a^5 + 3/1600*sqrt(arcsin(a*x))*e^(5*I*arcsin(a*x))/a^5 - 1/64*sqrt(
arcsin(a*x))*e^(3*I*arcsin(a*x))/a^5 + 3/32*sqrt(arcsin(a*x))*e^(I*arcsin(a
*x))/a^5 + 3/32*sqrt(arcsin(a*x))*e^(-I*arcsin(a*x))/a^5 - 1/64*sqrt(arcsin
(a*x))*e^(-3*I*arcsin(a*x))/a^5 + 3/1600*sqrt(arcsin(a*x))*e^(-5*I*arcsin(a
*x))/a^5
```

Mupad [F(-1)]

Timed out.

$$\int x^4 \arcsin(ax)^{3/2}\,dx = \int x^4\,\mathrm{asin}(a\,x)^{3/2}\,dx$$

```
[In] int(x^4*asin(a*x)^(3/2),x)
[Out] int(x^4*asin(a*x)^(3/2), x)
```

3.81 $\int x^3 \arcsin(ax)^{3/2}\,dx$

Optimal result

Integrand size = 12, antiderivative size = 157

$$\int x^3 \arcsin(ax)^{3/2}\,dx = \frac{9x\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{64a^3} + \frac{3x^3\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{32a} - \frac{3\arcsin(ax)^{3/2}}{32a^4} + \frac{1}{4}x^4\arcsin(ax)^{3/2} + \frac{3\sqrt{\frac{\pi}{2}}\,\text{FresnelS}\left(2\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{512a^4} - \frac{3\sqrt{\pi}\,\text{FresnelS}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{64a^4}$$

```
[Out] -3/32*arcsin(a*x)^(3/2)/a^4+1/4*x^4*arcsin(a*x)^(3/2)+3/1024*FresnelS(2*2^(
1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*2^(1/2)*Pi^(1/2)/a^4-3/64*FresnelS(2*arcsi
n(a*x)^(1/2)/Pi^(1/2))*Pi^(1/2)/a^4+9/64*x*(-a^2*x^2+1)^(1/2)*arcsin(a*x)^(
1/2)/a^3+3/32*x^3*(-a^2*x^2+1)^(1/2)*arcsin(a*x)^(1/2)/a
```

Rubi [A] (verified)

Time = 0.23 (sec) , antiderivative size = 157, normalized size of antiderivative = 1.00, number of steps used = 16, number of rules used = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.667, Rules used = {4725, 4795, 4737, 4731, 4491, 12, 3386, 3432}

$$\int x^3 \arcsin(ax)^{3/2}\,dx = \frac{3\sqrt{\frac{\pi}{2}}\,\text{FresnelS}\left(2\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{512a^4} - \frac{3\sqrt{\pi}\,\text{FresnelS}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{64a^4} - \frac{3\arcsin(ax)^{3/2}}{32a^4} + \frac{3x^3\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{32a} + \frac{9x\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{64a^3} + \frac{1}{4}x^4\arcsin(ax)^{3/2}$$

```
[In] Int[x^3*ArcSin[a*x]^(3/2),x]
```

```
[Out] (9*x*Sqrt[1 - a^2*x^2]*Sqrt[ArcSin[a*x]])/(64*a^3) + (3*x^3*Sqrt[1 - a^2*x^
2]*Sqrt[ArcSin[a*x]])/(32*a) - (3*ArcSin[a*x]^(3/2))/(32*a^4) + (x^4*ArcSin
[a*x]^(3/2))/4 + (3*Sqrt[Pi/2]*FresnelS[2*Sqrt[2/Pi]*Sqrt[ArcSin[a*x]]])/(5
12*a^4) - (3*Sqrt[Pi]*FresnelS[(2*Sqrt[ArcSin[a*x]])/Sqrt[Pi]])/(64*a^4)
```

Rule 12

```
Int[(a_)*(u_), x_Symbol] :> Dist[a, Int[u, x], x] /; FreeQ[a, x] &&  !Match
Q[u, (b_)*(v_) /; FreeQ[b, x]]
```

Rule 3386

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[2/d
, Subst[Int[Sin[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d, e, f}
, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3432

```
Int[Sin[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelS[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4491

```
Int[Cos[(a_.) + (b_.)*(x_)]^(p_.)*((c_.) + (d_.)*(x_))^(m_.)*Sin[(a_.) + (b
_.)*(x_)]^(n_.), x_Symbol] :> Int[ExpandTrigReduce[(c + d*x)^m, Sin[a + b*x
]^n*Cos[a + b*x]^p, x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && IG
tQ[p, 0]
```

Rule 4725

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^(m + 1)*((a + b*ArcSin[c*x])^n/(m + 1)), x] - Dist[b*c*(n/(m + 1)), Int[x^
(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*x^2]), x], x] /; FreeQ[{a
, b, c}, x] && IGtQ[m, 0] && GtQ[n, 0]
```

Rule 4731

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Dist[1
/(b*c^(m + 1)), Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b], x], x, a +
 b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, n}, x] && IGtQ[m, 0]
```

Rule 4737

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)/Sqrt[(d_) + (e_.)*(x_)^2], x_S
ymbol] :> Simp[(1/(b*c*(n + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]]*(a
 + b*ArcSin[c*x])^(n + 1), x] /; FreeQ[{a, b, c, d, e, n}, x] && EqQ[c^2*d
```

```
+ e, 0] && NeQ[n, -1]
```

Rule 4795

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_)*((d_) + (e_.
)*(x_)^2)^(p_), x_Symbol] :> Simp[f*(f*x)^(m - 1)*(d + e*x^2)^(p + 1)*((a +
 b*ArcSin[c*x])^n/(e*(m + 2*p + 1))), x] + (Dist[f^2*((m - 1)/(c^2*(m + 2*p
 + 1))), Int[(f*x)^(m - 2)*(d + e*x^2)^p*(a + b*ArcSin[c*x])^n, x], x] + Di
st[b*f*(n/(c*(m + 2*p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], Int[(f*x)
^(m - 1)*(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x]) /; Fr
eeQ[{a, b, c, d, e, f, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && IGtQ[m,
1] && NeQ[m + 2*p + 1, 0]
```

Rubi steps

$$\text{integral} = \frac{1}{4}x^4\arcsin(ax)^{3/2}-\frac{1}{8}(3a)\int\frac{x^4\sqrt{\arcsin(ax)}}{\sqrt{1-a^2x^2}}\,dx$$

$$=\frac{3x^3\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{32a}+\frac{1}{4}x^4\arcsin(ax)^{3/2}-\frac{3}{64}\int\frac{x^3}{\sqrt{\arcsin(ax)}}\,dx-\frac{9\int\frac{x^2\sqrt{\arcsin(ax)}}{\sqrt{1-a^2x^2}}\,dx}{32a}$$

$$=\frac{9x\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{64a^3}+\frac{3x^3\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{32a}+\frac{1}{4}x^4\arcsin(ax)^{3/2}-\frac{3\text{Subst}\left(\int\frac{\cos(x)\sin^3(x)}{\sqrt{x}}\,dx,x,\arcsin(ax)\right)}{64a^4}-\frac{9\int\frac{\sqrt{\arcsin(ax)}}{\sqrt{1-a^2x^2}}\,dx}{64a^3}-\frac{9\int\frac{x}{\sqrt{\arcsin(ax)}}\,dx}{128a^2}$$

$$=\frac{9x\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{64a^3}+\frac{3x^3\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{32a}-\frac{3\arcsin(ax)^{3/2}}{32a^4}+\frac{1}{4}x^4\arcsin(ax)^{3/2}-\frac{3\text{Subst}\left(\int\left(\frac{\sin(2x)}{4\sqrt{x}}-\frac{\sin(4x)}{8\sqrt{x}}\right)dx,x,\arcsin(ax)\right)}{64a^4}-\frac{9\text{Subst}\left(\int\frac{\cos(x)\sin(x)}{\sqrt{x}}\,dx,x,\arcsin(ax)\right)}{128a^4}$$

$$=\frac{9x\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{64a^3}+\frac{3x^3\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{32a}-\frac{3\arcsin(ax)^{3/2}}{32a^4}+\frac{1}{4}x^4\arcsin(ax)^{3/2}+\frac{3\text{Subst}\left(\int\frac{\sin(4x)}{\sqrt{x}}\,dx,x,\arcsin(ax)\right)}{512a^4}-\frac{3\text{Subst}\left(\int\frac{\sin(2x)}{\sqrt{x}}\,dx,x,\arcsin(ax)\right)}{256a^4}-\frac{9\text{Subst}\left(\int\frac{\sin(2x)}{2\sqrt{x}}\,dx,x,\arcsin(ax)\right)}{128a^4}$$

$$= \frac{9x\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{64a^3} + \frac{3x^3\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{32a} - \frac{3\arcsin(ax)^{3/2}}{32a^4} + \frac{1}{4}x^4\arcsin(ax)^{3/2} + \frac{3\text{Subst}\left(\int \sin\left(4x^2\right)\,dx, x, \sqrt{\arcsin(ax)}\right)}{256a^4} - \frac{3\text{Subst}\left(\int \sin\left(2x^2\right)\,dx, x, \sqrt{\arcsin(ax)}\right)}{128a^4} - \frac{9\text{Subst}\left(\int \frac{\sin(2x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{256a^4}$$

$$= \frac{9x\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{64a^3} + \frac{3x^3\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{32a} - \frac{3\arcsin(ax)^{3/2}}{32a^4} + \frac{1}{4}x^4\arcsin(ax)^{3/2} + \frac{3\sqrt{\frac{\pi}{2}}\,\text{FresnelS}\left(2\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{512a^4} - \frac{3\sqrt{\pi}\,\text{FresnelS}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{256a^4} - \frac{9\text{Subst}\left(\int \sin\left(2x^2\right)\,dx, x, \sqrt{\arcsin(ax)}\right)}{128a^4}$$

$$= \frac{9x\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{64a^3} + \frac{3x^3\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{32a} - \frac{3\arcsin(ax)^{3/2}}{32a^4} + \frac{1}{4}x^4\arcsin(ax)^{3/2} + \frac{3\sqrt{\frac{\pi}{2}}\,\text{FresnelS}\left(2\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{512a^4} - \frac{3\sqrt{\pi}\,\text{FresnelS}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{64a^4}$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.03 (sec) , antiderivative size = 130, normalized size of antiderivative = 0.83

$$\int x^3\arcsin(ax)^{3/2}\,dx = \frac{8\sqrt{2}\sqrt{-i\arcsin(ax)}\,\Gamma\left(\frac{5}{2}, -2i\arcsin(ax)\right) + 8\sqrt{2}\sqrt{i\arcsin(ax)}\,\Gamma\left(\frac{5}{2}, 2i\arcsin(ax)\right) -}{512a^4\sqrt{\arcsin(}}$$

```
[In] Integrate[x^3*ArcSin[a*x]^(3/2),x]
```

```
[Out] (8*Sqrt[2]*Sqrt[(-I)*ArcSin[a*x]]*Gamma[5/2, (-2*I)*ArcSin[a*x]] + 8*Sqrt[2
]*Sqrt[I*ArcSin[a*x]]*Gamma[5/2, (2*I)*ArcSin[a*x]] - Sqrt[(-I)*ArcSin[a*x]
]*Gamma[5/2, (-4*I)*ArcSin[a*x]] - Sqrt[I*ArcSin[a*x]]*Gamma[5/2, (4*I)*Arc
Sin[a*x]])/(512*a^4*Sqrt[ArcSin[a*x]])
```

Maple [A] (verified)

Time = 0.06 (sec) , antiderivative size = 121, normalized size of antiderivative = 0.77

method	result
default	$-\frac{-3\sqrt{2}\,\sqrt{\arcsin(ax)}\,\sqrt{\pi}\,\operatorname{FresnelS}\left(\frac{2\sqrt{2}\,\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)+128\arcsin(ax)^{2}\cos(2\arcsin(ax))-32\arcsin(ax)^{2}\cos(4\arcsin(ax))+48\sqrt{\text{arc}}}{1024a^{4}\sqrt{\arcsin(ax)}}$

```
[In] int(x^3*arcsin(a*x)^(3/2),x,method=_RETURNVERBOSE)
```

```
[Out] -1/1024/a^4*(-3*2^(1/2)*arcsin(a*x)^(1/2)*Pi^(1/2)*FresnelS(2*2^(1/2)/Pi^(1
/2)*arcsin(a*x)^(1/2))+128*arcsin(a*x)^2*cos(2*arcsin(a*x))-32*arcsin(a*x)^
2*cos(4*arcsin(a*x))+48*arcsin(a*x)^(1/2)*Pi^(1/2)*FresnelS(2*arcsin(a*x)^(
1/2)/Pi^(1/2))-96*arcsin(a*x)*sin(2*arcsin(a*x))+12*arcsin(a*x)*sin(4*arcsi
n(a*x)))/arcsin(a*x)^(1/2)
```

Fricas [F(-2)]

Exception generated.

$$\int x^3 \arcsin(ax)^{3/2}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate(x^3*arcsin(a*x)^(3/2),x, algorithm="fricas")
```

```
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int x^3 \arcsin(ax)^{3/2}\,dx = \int x^3 \operatorname{asin}^{\frac{3}{2}}(ax)\,dx$$

```
[In] integrate(x**3*asin(a*x)**(3/2),x)
```

```
[Out] Integral(x**3*asin(a*x)**(3/2), x)
```

Maxima [F(-2)]

Exception generated.

$$\int x^3 \arcsin(ax)^{3/2}\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(x^3*arcsin(a*x)^(3/2),x, algorithm="maxima")
```

```
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 0.33 (sec) , antiderivative size = 225, normalized size of antiderivative = 1.43

$$\int x^3 \arcsin(ax)^{3/2}\,dx = \frac{\arcsin(ax)^{\frac{3}{2}}e^{(4i\arcsin(ax))}}{64a^4} - \frac{\arcsin(ax)^{\frac{3}{2}}e^{(2i\arcsin(ax))}}{16a^4} - \frac{\arcsin(ax)^{\frac{3}{2}}e^{(-2i\arcsin(ax))}}{16a^4} + \frac{\arcsin(ax)^{\frac{3}{2}}e^{(-4i\arcsin(ax))}}{64a^4} + \frac{(3i-3)\sqrt{2}\sqrt{\pi}\,\mathrm{erf}\left((i-1)\sqrt{2}\sqrt{\arcsin(ax)}\right)}{4096a^4} - \frac{(3i+3)\sqrt{2}\sqrt{\pi}\,\mathrm{erf}\left(-(i+1)\sqrt{2}\sqrt{\arcsin(ax)}\right)}{4096a^4} - \frac{(3i-3)\sqrt{\pi}\,\mathrm{erf}\left((i-1)\sqrt{\arcsin(ax)}\right)}{256a^4} + \frac{(3i+3)\sqrt{\pi}\,\mathrm{erf}\left(-(i+1)\sqrt{\arcsin(ax)}\right)}{256a^4} + \frac{3i\sqrt{\arcsin(ax)}e^{(4i\arcsin(ax))}}{512a^4} - \frac{3i\sqrt{\arcsin(ax)}e^{(2i\arcsin(ax))}}{64a^4} + \frac{3i\sqrt{\arcsin(ax)}e^{(-2i\arcsin(ax))}}{64a^4} - \frac{3i\sqrt{\arcsin(ax)}e^{(-4i\arcsin(ax))}}{512a^4}$$

```
[In] integrate(x^3*arcsin(a*x)^(3/2),x, algorithm="giac")
```

```
[Out] 1/64*arcsin(a*x)^(3/2)*e^(4*I*arcsin(a*x))/a^4 - 1/16*arcsin(a*x)^(3/2)*e^(
2*I*arcsin(a*x))/a^4 - 1/16*arcsin(a*x)^(3/2)*e^(-2*I*arcsin(a*x))/a^4 + 1/
64*arcsin(a*x)^(3/2)*e^(-4*I*arcsin(a*x))/a^4 + (3/4096*I - 3/4096)*sqrt(2)
*sqrt(pi)*erf((I - 1)*sqrt(2)*sqrt(arcsin(a*x)))/a^4 - (3/4096*I + 3/4096)*
sqrt(2)*sqrt(pi)*erf(-(I + 1)*sqrt(2)*sqrt(arcsin(a*x)))/a^4 - (3/256*I - 3
/256)*sqrt(pi)*erf((I - 1)*sqrt(arcsin(a*x)))/a^4 + (3/256*I + 3/256)*sqrt(
```

```
pi)*erf(-(I + 1)*sqrt(arcsin(a*x)))/a^4 + 3/512*I*sqrt(arcsin(a*x))*e^(4*I*
arcsin(a*x))/a^4 - 3/64*I*sqrt(arcsin(a*x))*e^(2*I*arcsin(a*x))/a^4 + 3/64*
I*sqrt(arcsin(a*x))*e^(-2*I*arcsin(a*x))/a^4 - 3/512*I*sqrt(arcsin(a*x))*e^
(-4*I*arcsin(a*x))/a^4
```

Mupad [F(-1)]

Timed out.

$$\int x^3 \arcsin(ax)^{3/2}\,dx = \int x^3\,\mathrm{asin}(a\,x)^{3/2}\,dx$$

```
[In] int(x^3*asin(a*x)^(3/2),x)
```

```
[Out] int(x^3*asin(a*x)^(3/2), x)
```

3.82 $\int x^2 \arcsin(ax)^{3/2}\, dx$

Optimal result

Integrand size = 12, antiderivative size = 147

$$\int x^2 \arcsin(ax)^{3/2}\, dx = \frac{\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{3a^3} + \frac{x^2\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{6a} + \frac{1}{3}x^3\arcsin(ax)^{3/2} - \frac{3\sqrt{\frac{\pi}{2}}\,\text{FresnelC}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{8a^3} + \frac{\sqrt{\frac{\pi}{6}}\,\text{FresnelC}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{24a^3}$$

```
[Out] 1/3*x^3*arcsin(a*x)^(3/2)+1/144*FresnelC(6^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2)
)*6^(1/2)*Pi^(1/2)/a^3-3/16*FresnelC(2^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*2^
(1/2)*Pi^(1/2)/a^3+1/3*(-a^2*x^2+1)^(1/2)*arcsin(a*x)^(1/2)/a^3+1/6*x^2*(-a
^2*x^2+1)^(1/2)*arcsin(a*x)^(1/2)/a
```

Rubi [A] (verified)

Time = 0.19 (sec) , antiderivative size = 147, normalized size of antiderivative = 1.00, number of steps used = 13, number of rules used = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.667, Rules used = {4725, 4795, 4767, 4719, 3385, 3433, 4731, 4491}

$$\int x^2 \arcsin(ax)^{3/2}\, dx = -\frac{3\sqrt{\frac{\pi}{2}}\,\text{FresnelC}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{8a^3} + \frac{\sqrt{\frac{\pi}{6}}\,\text{FresnelC}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{24a^3} + \frac{x^2\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{6a} + \frac{\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{3a^3} + \frac{1}{3}x^3\arcsin(ax)^{3/2}$$

```
[In] Int[x^2*ArcSin[a*x]^(3/2),x]
```

```
[Out] (Sqrt[1 - a^2*x^2]*Sqrt[ArcSin[a*x]])/(3*a^3) + (x^2*Sqrt[1 - a^2*x^2]*Sqrt
[ArcSin[a*x]])/(6*a) + (x^3*ArcSin[a*x]^(3/2))/3 - (3*Sqrt[Pi/2]*FresnelC[S
qrt[2/Pi]*Sqrt[ArcSin[a*x]]])/(8*a^3) + (Sqrt[Pi/6]*FresnelC[Sqrt[6/Pi]*Sqr
t[ArcSin[a*x]]])/(24*a^3)
```

Rule 3385

```
Int[sin[Pi/2 + (e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> D
ist[2/d, Subst[Int[Cos[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d
, e, f}, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3433

```
Int[Cos[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelC[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4491

```
Int[Cos[(a_.) + (b_.)*(x_)]^(p_.)*((c_.) + (d_.)*(x_))^(m_.)*Sin[(a_.) + (b
_.)*(x_)]^(n_.), x_Symbol] :> Int[ExpandTrigReduce[(c + d*x)^m, Sin[a + b*x
]^n*Cos[a + b*x]^p, x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && IG
tQ[p, 0]
```

Rule 4719

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_), x_Symbol] :> Dist[1/(b*c), Sub
st[Int[x^n*Cos[-a/b + x/b], x], x, a + b*ArcSin[c*x]], x] /; FreeQ[{a, b, c
, n}, x]
```

Rule 4725

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^(m + 1)*((a + b*ArcSin[c*x])^n/(m + 1)), x] - Dist[b*c*(n/(m + 1)), Int[x^
(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*x^2]), x], x] /; FreeQ[{a
, b, c}, x] && IGtQ[m, 0] && GtQ[n, 0]
```

Rule 4731

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Dist[1
/(b*c^(m + 1)), Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b], x], x, a +
 b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, n}, x] && IGtQ[m, 0]
```

Rule 4767

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)*((d_) + (e_.)*(x_)^2)^(p_
.), x_Symbol] :> Simp[(d + e*x^2)^(p + 1)*((a + b*ArcSin[c*x])^n/(2*e*(p +
```

```
1))), x] + Dist[b*(n/(2*c*(p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], In
t[(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x] /; FreeQ[{a,
b, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && NeQ[p, -1]
```

Rule 4795

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_)*((d_) + (e_.
)*(x_)^2)^(p_), x_Symbol] :> Simp[f*(f*x)^(m - 1)*(d + e*x^2)^(p + 1)*((a +
 b*ArcSin[c*x])^n/(e*(m + 2*p + 1))), x] + (Dist[f^2*((m - 1)/(c^2*(m + 2*p
 + 1))), Int[(f*x)^(m - 2)*(d + e*x^2)^p*(a + b*ArcSin[c*x])^n, x], x] + Di
st[b*f*(n/(c*(m + 2*p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], Int[(f*x)
^(m - 1)*(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x]) /; Fr
eeQ[{a, b, c, d, e, f, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && IGtQ[m,
1] && NeQ[m + 2*p + 1, 0]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= \frac{1}{3}x^3\arcsin(ax)^{3/2} - \frac{1}{2}a\int\frac{x^3\sqrt{\arcsin(ax)}}{\sqrt{1-a^2x^2}}\,dx \\
&= \frac{x^2\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{6a} + \frac{1}{3}x^3\arcsin(ax)^{3/2} - \frac{1}{12}\int\frac{x^2}{\sqrt{\arcsin(ax)}}\,dx - \frac{\int\frac{x\sqrt{\arcsin(ax)}}{\sqrt{1-a^2x^2}}\,dx}{3a} \\
&= \frac{\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{3a^3} + \frac{x^2\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{6a} + \frac{1}{3}x^3\arcsin(ax)^{3/2} \\
&\quad - \frac{\text{Subst}\left(\int\frac{\cos(x)\sin^2(x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{12a^3} - \frac{\int\frac{1}{\sqrt{\arcsin(ax)}}\,dx}{6a^2} \\
&= \frac{\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{3a^3} + \frac{x^2\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{6a} + \frac{1}{3}x^3\arcsin(ax)^{3/2} \\
&\quad - \frac{\text{Subst}\left(\int\left(\frac{\cos(x)}{4\sqrt{x}} - \frac{\cos(3x)}{4\sqrt{x}}\right)\,dx, x, \arcsin(ax)\right)}{12a^3} - \frac{\text{Subst}\left(\int\frac{\cos(x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{6a^3} \\
&= \frac{\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{3a^3} + \frac{x^2\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{6a} \\
&\quad + \frac{1}{3}x^3\arcsin(ax)^{3/2} - \frac{\text{Subst}\left(\int\frac{\cos(x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{48a^3} \\
&\quad + \frac{\text{Subst}\left(\int\frac{\cos(3x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{48a^3} - \frac{\text{Subst}\left(\int\cos\left(x^2\right)\,dx, x, \sqrt{\arcsin(ax)}\right)}{3a^3}
\end{aligned}$$

$$= \frac{\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{3a^3} + \frac{x^2\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{6a} + \frac{1}{3}x^3\arcsin(ax)^{3/2} - \frac{\sqrt{\frac{\pi}{2}}\operatorname{FresnelC}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{3a^3} - \frac{\operatorname{Subst}\left(\int \cos\left(x^2\right)\,dx, x, \sqrt{\arcsin(ax)}\right)}{24a^3} + \frac{\operatorname{Subst}\left(\int \cos\left(3x^2\right)\,dx, x, \sqrt{\arcsin(ax)}\right)}{24a^3}$$

$$= \frac{\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{3a^3} + \frac{x^2\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{6a} + \frac{1}{3}x^3\arcsin(ax)^{3/2} - \frac{3\sqrt{\frac{\pi}{2}}\operatorname{FresnelC}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{8a^3} + \frac{\sqrt{\frac{\pi}{6}}\operatorname{FresnelC}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{24a^3}$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.06 (sec) , antiderivative size = 136, normalized size of antiderivative = 0.93

$$\int x^2\arcsin(ax)^{3/2}\,dx = \frac{\sqrt{\arcsin(ax)}\left(27\sqrt{i\arcsin(ax)}\Gamma\left(\frac{5}{2},-i\arcsin(ax)\right)+27\sqrt{-i\arcsin(ax)}\Gamma\left(\frac{5}{2},i\arcsin\right.\right.}{216a^3\sqrt{}}$$

```
[In] Integrate[x^2*ArcSin[a*x]^(3/2),x]
```

```
[Out] (Sqrt[ArcSin[a*x]]*(27*Sqrt[I*ArcSin[a*x]]*Gamma[5/2, (-I)*ArcSin[a*x]] + 2
7*Sqrt[(-I)*ArcSin[a*x]]*Gamma[5/2, I*ArcSin[a*x]] - Sqrt[3]*(Sqrt[I*ArcSin
[a*x]]*Gamma[5/2, (-3*I)*ArcSin[a*x]] + Sqrt[(-I)*ArcSin[a*x]]*Gamma[5/2, (
3*I)*ArcSin[a*x]])))/(216*a^3*Sqrt[ArcSin[a*x]^2])
```

Maple [A] (verified)

Time = 0.05 (sec) , antiderivative size = 131, normalized size of antiderivative = 0.89

method	result
default	$-\frac{-36ax\arcsin(ax)^2-\operatorname{FresnelC}\left(\frac{\sqrt{2}\sqrt{3}\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)\sqrt{3}\sqrt{2}\sqrt{\arcsin(ax)}\sqrt{\pi}+12\arcsin(ax)^2\sin(3\arcsin(ax))+27\operatorname{FresnelC}\left(\frac{\sqrt{2}\sqrt{a}}{}\right.}{144a^3\sqrt{\arcsin(ax)}}$

```
[In] int(x^2*arcsin(a*x)^(3/2),x,method=_RETURNVERBOSE)
```

```
[Out] -1/144/a^3/arcsin(a*x)^(1/2)*(-36*a*x*arcsin(a*x)^2-FresnelC(2^(1/2)/Pi^(1/
2)*3^(1/2)*arcsin(a*x)^(1/2))*3^(1/2)*2^(1/2)*arcsin(a*x)^(1/2)*Pi^(1/2)+12
*arcsin(a*x)^2*sin(3*arcsin(a*x))+27*FresnelC(2^(1/2)/Pi^(1/2)*arcsin(a*x)^
(1/2))*2^(1/2)*arcsin(a*x)^(1/2)*Pi^(1/2)+6*arcsin(a*x)*cos(3*arcsin(a*x))-
54*arcsin(a*x)*(-a^2*x^2+1)^(1/2))
```

Fricas [F(-2)]

Exception generated.

$$\int x^2 \arcsin(ax)^{3/2} \, dx = \text{Exception raised: TypeError}$$

```
[In] integrate(x^2*arcsin(a*x)^(3/2),x, algorithm="fricas")
```

```
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int x^2 \arcsin(ax)^{3/2} \, dx = \int x^2 \operatorname{asin}^{\frac{3}{2}}(ax) \, dx$$

```
[In] integrate(x**2*asin(a*x)**(3/2),x)
```

```
[Out] Integral(x**2*asin(a*x)**(3/2), x)
```

Maxima [F(-2)]

Exception generated.

$$\int x^2 \arcsin(ax)^{3/2} \, dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(x^2*arcsin(a*x)^(3/2),x, algorithm="maxima")
```

```
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 0.33 (sec) , antiderivative size = 237, normalized size of antiderivative = 1.61

$$\int x^2 \arcsin(ax)^{3/2}\,dx = \frac{i\arcsin(ax)^{\frac{3}{2}}e^{(3i\arcsin(ax))}}{24a^3} - \frac{i\arcsin(ax)^{\frac{3}{2}}e^{(i\arcsin(ax))}}{8a^3} + \frac{i\arcsin(ax)^{\frac{3}{2}}e^{(-i\arcsin(ax))}}{8a^3} - \frac{i\arcsin(ax)^{\frac{3}{2}}e^{(-3i\arcsin(ax))}}{24a^3} - \frac{(i+1)\sqrt{6}\sqrt{\pi}\,\mathrm{erf}\left(\left(\frac{1}{2}i-\frac{1}{2}\right)\sqrt{6}\sqrt{\arcsin(ax)}\right)}{576a^3} + \frac{(i-1)\sqrt{6}\sqrt{\pi}\,\mathrm{erf}\left(-\left(\frac{1}{2}i+\frac{1}{2}\right)\sqrt{6}\sqrt{\arcsin(ax)}\right)}{576a^3} + \frac{(3i+3)\sqrt{2}\sqrt{\pi}\,\mathrm{erf}\left(\left(\frac{1}{2}i-\frac{1}{2}\right)\sqrt{2}\sqrt{\arcsin(ax)}\right)}{64a^3} - \frac{(3i-3)\sqrt{2}\sqrt{\pi}\,\mathrm{erf}\left(-\left(\frac{1}{2}i+\frac{1}{2}\right)\sqrt{2}\sqrt{\arcsin(ax)}\right)}{64a^3} - \frac{\sqrt{\arcsin(ax)}e^{(3i\arcsin(ax))}}{48a^3} + \frac{3\sqrt{\arcsin(ax)}e^{(i\arcsin(ax))}}{16a^3} + \frac{3\sqrt{\arcsin(ax)}e^{(-i\arcsin(ax))}}{16a^3} - \frac{\sqrt{\arcsin(ax)}e^{(-3i\arcsin(ax))}}{48a^3}$$

```
[In] integrate(x^2*arcsin(a*x)^(3/2),x, algorithm="giac")
```

```
[Out] 1/24*I*arcsin(a*x)^(3/2)*e^(3*I*arcsin(a*x))/a^3 - 1/8*I*arcsin(a*x)^(3/2)*
e^(I*arcsin(a*x))/a^3 + 1/8*I*arcsin(a*x)^(3/2)*e^(-I*arcsin(a*x))/a^3 - 1/
24*I*arcsin(a*x)^(3/2)*e^(-3*I*arcsin(a*x))/a^3 - (1/576*I + 1/576)*sqrt(6)
*sqrt(pi)*erf((1/2*I - 1/2)*sqrt(6)*sqrt(arcsin(a*x)))/a^3 + (1/576*I - 1/5
76)*sqrt(6)*sqrt(pi)*erf(-(1/2*I + 1/2)*sqrt(6)*sqrt(arcsin(a*x)))/a^3 + (3
/64*I + 3/64)*sqrt(2)*sqrt(pi)*erf((1/2*I - 1/2)*sqrt(2)*sqrt(arcsin(a*x)))
/a^3 - (3/64*I - 3/64)*sqrt(2)*sqrt(pi)*erf(-(1/2*I + 1/2)*sqrt(2)*sqrt(arc
sin(a*x)))/a^3 - 1/48*sqrt(arcsin(a*x))*e^(3*I*arcsin(a*x))/a^3 + 3/16*sqrt
(arcsin(a*x))*e^(I*arcsin(a*x))/a^3 + 3/16*sqrt(arcsin(a*x))*e^(-I*arcsin(a
*x))/a^3 - 1/48*sqrt(arcsin(a*x))*e^(-3*I*arcsin(a*x))/a^3
```

Mupad [F(-1)]

Timed out.

$$\int x^2 \arcsin(ax)^{3/2}\,dx = \int x^2\,\mathrm{asin}(a\,x)^{3/2}\,dx$$

```
[In] int(x^2*asin(a*x)^(3/2),x)
```

```
[Out] int(x^2*asin(a*x)^(3/2), x)
```

3.83 $\int x \arcsin(ax)^{3/2}\,dx$

Optimal result

Integrand size = 10, antiderivative size = 89

$$\int x \arcsin(ax)^{3/2}\,dx = \frac{3x\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{8a} - \frac{\arcsin(ax)^{3/2}}{4a^2} + \frac{1}{2}x^2\arcsin(ax)^{3/2} - \frac{3\sqrt{\pi}\,\text{FresnelS}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{32a^2}$$

```
[Out] -1/4*arcsin(a*x)^(3/2)/a^2+1/2*x^2*arcsin(a*x)^(3/2)-3/32*FresnelS(2*arcsin
(a*x)^(1/2)/Pi^(1/2))*Pi^(1/2)/a^2+3/8*x*(-a^2*x^2+1)^(1/2)*arcsin(a*x)^(1/
2)/a
```

Rubi [A] (verified)

Time = 0.11 (sec) , antiderivative size = 89, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.800, Rules used = {4725, 4795, 4737, 4731, 4491, 12, 3386, 3432}

$$\int x \arcsin(ax)^{3/2}\,dx = -\frac{3\sqrt{\pi}\,\text{FresnelS}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{32a^2} + \frac{3x\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{8a} - \frac{\arcsin(ax)^{3/2}}{4a^2} + \frac{1}{2}x^2\arcsin(ax)^{3/2}$$

```
[In] Int[x*ArcSin[a*x]^(3/2),x]
```

```
[Out] (3*x*Sqrt[1 - a^2*x^2]*Sqrt[ArcSin[a*x]])/(8*a) - ArcSin[a*x]^(3/2)/(4*a^2)
 + (x^2*ArcSin[a*x]^(3/2))/2 - (3*Sqrt[Pi]*FresnelS[(2*Sqrt[ArcSin[a*x]])/S
qrt[Pi]])/(32*a^2)
```

Rule 12

```
Int[(a_)*(u_), x_Symbol] :> Dist[a, Int[u, x], x] /; FreeQ[a, x] &&  !Match
Q[u, (b_)*(v_) /; FreeQ[b, x]]
```

Rule 3386

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[2/d
, Subst[Int[Sin[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d, e, f}
, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3432

```
Int[Sin[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelS[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4491

```
Int[Cos[(a_.) + (b_.)*(x_)]^(p_.)*((c_.) + (d_.)*(x_))^(m_.)*Sin[(a_.) + (b
_.)*(x_)]^(n_.), x_Symbol] :> Int[ExpandTrigReduce[(c + d*x)^m, Sin[a + b*x
]^n*Cos[a + b*x]^p, x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && IG
tQ[p, 0]
```

Rule 4725

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^(m + 1)*((a + b*ArcSin[c*x])^n/(m + 1)), x] - Dist[b*c*(n/(m + 1)), Int[x^
(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*x^2]), x], x] /; FreeQ[{a
, b, c}, x] && IGtQ[m, 0] && GtQ[n, 0]
```

Rule 4731

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Dist[1
/(b*c^(m + 1)), Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b], x], x, a +
 b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, n}, x] && IGtQ[m, 0]
```

Rule 4737

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)/Sqrt[(d_) + (e_.)*(x_)^2], x_S
ymbol] :> Simp[(1/(b*c*(n + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]]*(a
 + b*ArcSin[c*x])^(n + 1), x] /; FreeQ[{a, b, c, d, e, n}, x] && EqQ[c^2*d
+ e, 0] && NeQ[n, -1]
```

Rule 4795

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_)*((d_) + (e_.
)*(x_)^2)^(p_), x_Symbol] :> Simp[f*(f*x)^(m - 1)*(d + e*x^2)^(p + 1)*((a +
 b*ArcSin[c*x])^n/(e*(m + 2*p + 1))), x] + (Dist[f^2*((m - 1)/(c^2*(m + 2*p
```

```
 + 1))), Int[(f*x)^(m - 2)*(d + e*x^2)^p*(a + b*ArcSin[c*x])^n, x], x] + Di
st[b*f*(n/(c*(m + 2*p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], Int[(f*x)
^(m - 1)*(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x]) /; Fr
eeQ[{a, b, c, d, e, f, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && IGtQ[m,
1] && NeQ[m + 2*p + 1, 0]
```

Rubi steps

$$\text{integral} = \frac{1}{2}x^2\arcsin(ax)^{3/2} - \frac{1}{4}(3a)\int \frac{x^2\sqrt{\arcsin(ax)}}{\sqrt{1-a^2x^2}}\,dx$$

$$= \frac{3x\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{8a} + \frac{1}{2}x^2\arcsin(ax)^{3/2} - \frac{3}{16}\int \frac{x}{\sqrt{\arcsin(ax)}}\,dx - \frac{3\int \frac{\sqrt{\arcsin(ax)}}{\sqrt{1-a^2x^2}}\,dx}{8a}$$

$$= \frac{3x\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{8a} - \frac{\arcsin(ax)^{3/2}}{4a^2} + \frac{1}{2}x^2\arcsin(ax)^{3/2} - \frac{3\text{Subst}\left(\int \frac{\cos(x)\sin(x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{16a^2}$$

$$= \frac{3x\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{8a} - \frac{\arcsin(ax)^{3/2}}{4a^2} + \frac{1}{2}x^2\arcsin(ax)^{3/2} - \frac{3\text{Subst}\left(\int \frac{\sin(2x)}{2\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{16a^2}$$

$$= \frac{3x\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{8a} - \frac{\arcsin(ax)^{3/2}}{4a^2} + \frac{1}{2}x^2\arcsin(ax)^{3/2} - \frac{3\text{Subst}\left(\int \frac{\sin(2x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{32a^2}$$

$$= \frac{3x\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{8a} - \frac{\arcsin(ax)^{3/2}}{4a^2} + \frac{1}{2}x^2\arcsin(ax)^{3/2} - \frac{3\text{Subst}\left(\int \sin\left(2x^2\right)\,dx, x, \sqrt{\arcsin(ax)}\right)}{16a^2}$$

$$= \frac{3x\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{8a} - \frac{\arcsin(ax)^{3/2}}{4a^2} + \frac{1}{2}x^2\arcsin(ax)^{3/2} - \frac{3\sqrt{\pi}\,\text{FresnelS}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{32a^2}$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.02 (sec) , antiderivative size = 71, normalized size of antiderivative = 0.80

$$\int x\arcsin(ax)^{3/2}\,dx = \frac{\sqrt{-i\arcsin(ax)}\Gamma\left(\frac{5}{2},-2i\arcsin(ax)\right)+\sqrt{i\arcsin(ax)}\Gamma\left(\frac{5}{2},2i\arcsin(ax)\right)}{16\sqrt{2}a^2\sqrt{\arcsin(ax)}}$$

```
[In] Integrate[x*ArcSin[a*x]^(3/2),x]
[Out] (Sqrt[(-I)*ArcSin[a*x]]*Gamma[5/2, (-2*I)*ArcSin[a*x]] + Sqrt[I*ArcSin[a*x]
]*Gamma[5/2, (2*I)*ArcSin[a*x]])/(16*Sqrt[2]*a^2*Sqrt[ArcSin[a*x]])
```

Maple [A] (verified)

Time = 0.04 (sec) , antiderivative size = 64, normalized size of antiderivative = 0.72

method	result	size
default	$-\frac{8\arcsin(ax)^2\cos(2\arcsin(ax))+3\sqrt{\arcsin(ax)}\,\sqrt{\pi}\,\operatorname{FresnelS}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)-6\arcsin(ax)\sin(2\arcsin(ax))}{32a^2\sqrt{\arcsin(ax)}}$	64

```
[In] int(x*arcsin(a*x)^(3/2),x,method=_RETURNVERBOSE)
[Out] -1/32/a^2*(8*arcsin(a*x)^2*cos(2*arcsin(a*x))+3*arcsin(a*x)^(1/2)*Pi^(1/2)*
FresnelS(2*arcsin(a*x)^(1/2)/Pi^(1/2))-6*arcsin(a*x)*sin(2*arcsin(a*x)))/ar
csin(a*x)^(1/2)
```

Fricas [F(-2)]

Exception generated.

$$\int x\arcsin(ax)^{3/2}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate(x*arcsin(a*x)^(3/2),x, algorithm="fricas")
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int x\arcsin(ax)^{3/2}\,dx=\int x\,\mathrm{asin}^{\frac{3}{2}}\left(ax\right)dx$$

```
[In] integrate(x*asin(a*x)**(3/2),x)
```

```
[Out] Integral(x*asin(a*x)**(3/2), x)
```

Maxima [F(-2)]

Exception generated.

$$\int x\arcsin(ax)^{3/2}\,dx=\text{Exception raised: RuntimeError}$$

```
[In] integrate(x*arcsin(a*x)^(3/2),x, algorithm="maxima")
```

```
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 0.31 (sec) , antiderivative size = 107, normalized size of antiderivative = 1.20

$$\int x\arcsin(ax)^{3/2}\,dx=-\frac{\arcsin\left(ax\right)^{\frac{3}{2}}e^{\left(2i\arcsin\left(ax\right)\right)}}{8\,a^{2}}-\frac{\arcsin\left(ax\right)^{\frac{3}{2}}e^{\left(-2i\arcsin\left(ax\right)\right)}}{8\,a^{2}}-\frac{\left(3i-3\right)\sqrt{\pi}\,\mathrm{erf}\left(\left(i-1\right)\sqrt{\arcsin\left(ax\right)}\right)}{128\,a^{2}}+\frac{\left(3i+3\right)\sqrt{\pi}\,\mathrm{erf}\left(-\left(i+1\right)\sqrt{\arcsin\left(ax\right)}\right)}{128\,a^{2}}-\frac{3i\sqrt{\arcsin\left(ax\right)}e^{\left(2i\arcsin\left(ax\right)\right)}}{32\,a^{2}}+\frac{3i\sqrt{\arcsin\left(ax\right)}e^{\left(-2i\arcsin\left(ax\right)\right)}}{32\,a^{2}}$$

```
[In] integrate(x*arcsin(a*x)^(3/2),x, algorithm="giac")
```

```
[Out] -1/8*arcsin(a*x)^(3/2)*e^(2*I*arcsin(a*x))/a^2 - 1/8*arcsin(a*x)^(3/2)*e^(-
2*I*arcsin(a*x))/a^2 - (3/128*I - 3/128)*sqrt(pi)*erf((I - 1)*sqrt(arcsin(a
*x)))/a^2 + (3/128*I + 3/128)*sqrt(pi)*erf(-(I + 1)*sqrt(arcsin(a*x)))/a^2
- 3/32*I*sqrt(arcsin(a*x))*e^(2*I*arcsin(a*x))/a^2 + 3/32*I*sqrt(arcsin(a*x
))*e^(-2*I*arcsin(a*x))/a^2
```

Mupad [F(-1)]

Timed out.

$$\int x \arcsin(ax)^{3/2} \, dx = \int x \operatorname{asin}(a\,x)^{3/2} \, dx$$

```
[In] int(x*asin(a*x)^(3/2),x)
[Out] int(x*asin(a*x)^(3/2), x)
```

3.84 $\int \arcsin(ax)^{3/2}\,dx$

Optimal result

Integrand size = 8, antiderivative size = 75

$$\int \arcsin(ax)^{3/2}\,dx = \frac{3\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{2a} + x\arcsin(ax)^{3/2} - \frac{3\sqrt{\frac{\pi}{2}}\,\text{FresnelC}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{2a}$$

```
[Out] x*arcsin(a*x)^(3/2)-3/4*FresnelC(2^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*2^(1/2
)*Pi^(1/2)/a+3/2*(-a^2*x^2+1)^(1/2)*arcsin(a*x)^(1/2)/a
```

Rubi [A] (verified)

Time = 0.06 (sec) , antiderivative size = 75, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.625, Rules used = {4715, 4767, 4719, 3385, 3433}

$$\int \arcsin(ax)^{3/2}\,dx = \frac{3\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{2a} - \frac{3\sqrt{\frac{\pi}{2}}\,\text{FresnelC}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{2a} + x\arcsin(ax)^{3/2}$$

```
[In] Int[ArcSin[a*x]^(3/2),x]
```

```
[Out] (3*Sqrt[1 - a^2*x^2]*Sqrt[ArcSin[a*x]])/(2*a) + x*ArcSin[a*x]^(3/2) - (3*Sq
rt[Pi/2]*FresnelC[Sqrt[2/Pi]*Sqrt[ArcSin[a*x]]])/(2*a)
```

Rule 3385

```
Int[sin[Pi/2 + (e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> D
ist[2/d, Subst[Int[Cos[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d
```

```
, e, f}, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3433

```
Int[Cos[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelC[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4715

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.), x_Symbol] :> Simp[x*(a + b*Ar
cSin[c*x])^n, x] - Dist[b*c*n, Int[x*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 -
c^2*x^2]), x], x] /; FreeQ[{a, b, c}, x] && GtQ[n, 0]
```

Rule 4719

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_), x_Symbol] :> Dist[1/(b*c), Sub
st[Int[x^n*Cos[-a/b + x/b], x], x, a + b*ArcSin[c*x]], x] /; FreeQ[{a, b, c
, n}, x]
```

Rule 4767

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)*((d_) + (e_.)*(x_)^2)^(p_
.), x_Symbol] :> Simp[(d + e*x^2)^(p + 1)*((a + b*ArcSin[c*x])^n/(2*e*(p +
1))), x] + Dist[b*(n/(2*c*(p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], In
t[(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x] /; FreeQ[{a,
b, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && NeQ[p, -1]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= x\arcsin(ax)^{3/2}-\frac{1}{2}(3a)\int\frac{x\sqrt{\arcsin(ax)}}{\sqrt{1-a^2x^2}}\,dx\\
&=\frac{3\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{2a}+x\arcsin(ax)^{3/2}-\frac{3}{4}\int\frac{1}{\sqrt{\arcsin(ax)}}\,dx\\
&=\frac{3\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{2a}+x\arcsin(ax)^{3/2}-\frac{3\text{Subst}\left(\int\frac{\cos(x)}{\sqrt{x}}\,dx,x,\arcsin(ax)\right)}{4a}\\
&=\frac{3\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{2a}+x\arcsin(ax)^{3/2}-\frac{3\text{Subst}\left(\int\cos\left(x^2\right)\,dx,x,\sqrt{\arcsin(ax)}\right)}{2a}\\
&=\frac{3\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}{2a}+x\arcsin(ax)^{3/2}-\frac{3\sqrt{\frac{\pi}{2}}\,\text{FresnelC}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{2a}
\end{aligned}$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.04 (sec) , antiderivative size = 76, normalized size of antiderivative = 1.01

$$\int \arcsin(ax)^{3/2}\,dx = \frac{\sqrt{\arcsin(ax)}\left(\sqrt{i\arcsin(ax)}\Gamma\left(\frac{5}{2},-i\arcsin(ax)\right)+\sqrt{-i\arcsin(ax)}\Gamma\left(\frac{5}{2},i\arcsin(ax)\right)\right)}{2a\sqrt{\arcsin(ax)^2}}$$

```
[In] Integrate[ArcSin[a*x]^(3/2),x]
```

```
[Out] (Sqrt[ArcSin[a*x]]*(Sqrt[I*ArcSin[a*x]]*Gamma[5/2, (-I)*ArcSin[a*x]] + Sqrt
[(-I)*ArcSin[a*x]]*Gamma[5/2, I*ArcSin[a*x]]))/(2*a*Sqrt[ArcSin[a*x]^2])
```

Maple [A] (verified)

Time = 0.04 (sec) , antiderivative size = 72, normalized size of antiderivative = 0.96

method	result	size
default	$\frac{\sqrt{2}\left(2\arcsin(ax)^{\frac{3}{2}}\sqrt{2}\,\sqrt{\pi}\,ax+3\sqrt{2}\,\sqrt{\arcsin(ax)}\,\sqrt{\pi}\,\sqrt{-a^2x^2+1}-3\pi\ \mathrm{FresnelC}\left(\frac{\sqrt{2}\,\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)\right)}{4a\sqrt{\pi}}$	72

```
[In] int(arcsin(a*x)^(3/2),x,method=_RETURNVERBOSE)
```

```
[Out] 1/4/a*2^(1/2)*(2*arcsin(a*x)^(3/2)*2^(1/2)*Pi^(1/2)*a*x+3*2^(1/2)*arcsin(a*
x)^(1/2)*Pi^(1/2)*(-a^2*x^2+1)^(1/2)-3*Pi*FresnelC(2^(1/2)/Pi^(1/2)*arcsin(
a*x)^(1/2)))/Pi^(1/2)
```

Fricas [F(-2)]

Exception generated.

$$\int \arcsin(ax)^{3/2}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate(arcsin(a*x)^(3/2),x, algorithm="fricas")
```

```
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int \arcsin(ax)^{3/2}\,dx = \int \operatorname{asin}^{\frac{3}{2}}(ax)\,dx$$

```
[In] integrate(asin(a*x)**(3/2),x)
```

```
[Out] Integral(asin(a*x)**(3/2), x)
```

Maxima [F(-2)]

Exception generated.

$$\int \arcsin(ax)^{3/2}\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(arcsin(a*x)^(3/2),x, algorithm="maxima")
```

```
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 0.35 (sec) , antiderivative size = 119, normalized size of antiderivative = 1.59

$$\begin{aligned}\int \arcsin(ax)^{3/2}\,dx = &-\frac{i\arcsin(ax)^{\frac{3}{2}}e^{(i\arcsin(ax))}}{2a} + \frac{i\arcsin(ax)^{\frac{3}{2}}e^{(-i\arcsin(ax))}}{2a} \\ &+ \frac{(3i+3)\sqrt{2}\sqrt{\pi}\operatorname{erf}\left(\left(\frac{1}{2}i-\frac{1}{2}\right)\sqrt{2}\sqrt{\arcsin(ax)}\right)}{16a} \\ &- \frac{(3i-3)\sqrt{2}\sqrt{\pi}\operatorname{erf}\left(-\left(\frac{1}{2}i+\frac{1}{2}\right)\sqrt{2}\sqrt{\arcsin(ax)}\right)}{16a} \\ &+ \frac{3\sqrt{\arcsin(ax)}e^{(i\arcsin(ax))}}{4a} + \frac{3\sqrt{\arcsin(ax)}e^{(-i\arcsin(ax))}}{4a}\end{aligned}$$

```
[In] integrate(arcsin(a*x)^(3/2),x, algorithm="giac")
```

```
[Out] -1/2*I*arcsin(a*x)^(3/2)*e^(I*arcsin(a*x))/a + 1/2*I*arcsin(a*x)^(3/2)*e^(-
I*arcsin(a*x))/a + (3/16*I + 3/16)*sqrt(2)*sqrt(pi)*erf((1/2*I - 1/2)*sqrt(
2)*sqrt(arcsin(a*x)))/a - (3/16*I - 3/16)*sqrt(2)*sqrt(pi)*erf(-(1/2*I + 1/
2)*sqrt(2)*sqrt(arcsin(a*x)))/a + 3/4*sqrt(arcsin(a*x))*e^(I*arcsin(a*x))/a
 + 3/4*sqrt(arcsin(a*x))*e^(-I*arcsin(a*x))/a
```

Mupad [F(-1)]

Timed out.

$$\int \arcsin(ax)^{3/2}\,dx = \int \mathrm{asin}(a\,x)^{3/2}\,dx$$

```
[In] int(asin(a*x)^(3/2),x)
[Out] int(asin(a*x)^(3/2), x)
```

3.85 $\int \frac{\arcsin(ax)^{3/2}}{x} \, dx$

Optimal result

Integrand size = 12, antiderivative size = 12

$$\int \frac{\arcsin(ax)^{3/2}}{x} \, dx = \text{Int}\left(\frac{\arcsin(ax)^{3/2}}{x}, x\right)$$

```
[Out] Unintegrable(arcsin(a*x)^(3/2)/x,x)
```

Rubi [N/A]

Not integrable

Time = 0.01 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}} = 0.000$, Rules used = {}

$$\int \frac{\arcsin(ax)^{3/2}}{x} \, dx = \int \frac{\arcsin(ax)^{3/2}}{x} \, dx$$

```
[In] Int[ArcSin[a*x]^(3/2)/x,x]
```

```
[Out] Defer[Int][ArcSin[a*x]^(3/2)/x, x]
```

Rubi steps

$$\text{integral} = \int \frac{\arcsin(ax)^{3/2}}{x} \, dx$$

Mathematica [N/A]

Not integrable

Time = 0.15 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.17

$$\int \frac{\arcsin(ax)^{3/2}}{x} dx = \int \frac{\arcsin(ax)^{3/2}}{x} dx$$

```
[In] Integrate[ArcSin[a*x]^(3/2)/x,x]
[Out] Integrate[ArcSin[a*x]^(3/2)/x, x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.05 (sec) , antiderivative size = 10, normalized size of antiderivative = 0.83

$$\int \frac{\arcsin(ax)^{\frac{3}{2}}}{x} dx$$

```
[In] int(arcsin(a*x)^(3/2)/x,x)
[Out] int(arcsin(a*x)^(3/2)/x,x)
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{\arcsin(ax)^{3/2}}{x} dx = \text{Exception raised: TypeError}$$

```
[In] integrate(arcsin(a*x)^(3/2)/x,x, algorithm="fricas")
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [N/A]

Not integrable

Time = 1.34 (sec) , antiderivative size = 10, normalized size of antiderivative = 0.83

$$\int \frac{\arcsin(ax)^{3/2}}{x} dx = \int \frac{\operatorname{asin}^{\frac{3}{2}}(ax)}{x} dx$$

```
[In] integrate(asin(a*x)**(3/2)/x,x)
[Out] Integral(asin(a*x)**(3/2)/x, x)
```

Maxima [F(-2)]

Exception generated.

$$\int \frac{\arcsin(ax)^{3/2}}{x}\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(arcsin(a*x)^(3/2)/x,x, algorithm="maxima")
```

```
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [N/A]

Not integrable

Time = 0.53 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.00

$$\int \frac{\arcsin(ax)^{3/2}}{x}\,dx = \int \frac{\arcsin\left(ax\right)^{\frac{3}{2}}}{x}\,dx$$

```
[In] integrate(arcsin(a*x)^(3/2)/x,x, algorithm="giac")
```

```
[Out] integrate(arcsin(a*x)^(3/2)/x, x)
```

Mupad [N/A]

Not integrable

Time = 0.04 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.00

$$\int \frac{\arcsin(ax)^{3/2}}{x}\,dx = \int \frac{\mathrm{asin}(a\,x)^{3/2}}{x}\,dx$$

```
[In] int(asin(a*x)^(3/2)/x,x)
```

```
[Out] int(asin(a*x)^(3/2)/x, x)
```

3.86 $\int x^4 \arcsin(ax)^{5/2} dx$

Optimal result

Integrand size = 12, antiderivative size = 263

$$\int x^4 \arcsin(ax)^{5/2} dx = -\frac{2x\sqrt{\arcsin(ax)}}{5a^4} - \frac{x^3\sqrt{\arcsin(ax)}}{15a^2} - \frac{3}{100}x^5\sqrt{\arcsin(ax)} + \frac{4\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{15a^5} + \frac{2x^2\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{15a^3} + \frac{x^4\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{10a} + \frac{1}{5}x^5\arcsin(ax)^{5/2} + \frac{15\sqrt{\frac{\pi}{2}}\operatorname{FresnelS}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{32a^5} - \frac{5\sqrt{\frac{\pi}{6}}\operatorname{FresnelS}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{192a^5} + \frac{3\sqrt{\frac{\pi}{10}}\operatorname{Fresne}}{}$$

```
[Out] 1/5*x^5*arcsin(a*x)^(5/2)+3/16000*FresnelS(10^(1/2)/Pi^(1/2)*arcsin(a*x)^(1
/2))*10^(1/2)*Pi^(1/2)/a^5-5/1152*FresnelS(6^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/
2))*6^(1/2)*Pi^(1/2)/a^5+15/64*FresnelS(2^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))
*2^(1/2)*Pi^(1/2)/a^5+4/15*arcsin(a*x)^(3/2)*(-a^2*x^2+1)^(1/2)/a^5+2/15*x^
2*arcsin(a*x)^(3/2)*(-a^2*x^2+1)^(1/2)/a^3+1/10*x^4*arcsin(a*x)^(3/2)*(-a^2
*x^2+1)^(1/2)/a-2/5*x*arcsin(a*x)^(1/2)/a^4-1/15*x^3*arcsin(a*x)^(1/2)/a^2-
3/100*x^5*arcsin(a*x)^(1/2)
```

Rubi [A] (verified)

Time = 0.49 (sec) , antiderivative size = 298, normalized size of antiderivative = 1.13, number of steps used = 26, number of rules used = 8, $\frac{\text{number of rules}}{\text{integrand size}} = 0.667$, Rules used

= {4725, 4795, 4767, 4715, 4809, 3386, 3432, 3393}

$$\int x^4 \arcsin(ax)^{5/2}\,dx = \frac{15\sqrt{\frac{\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{32a^5} - \frac{\sqrt{\frac{3\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{320a^5} - \frac{\sqrt{\frac{\pi}{6}}\,\text{FresnelS}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{60a^5} + \frac{3\sqrt{\frac{\pi}{10}}\,\text{FresnelS}\left(\sqrt{\frac{10}{\pi}}\sqrt{\arcsin(ax)}\right)}{1600a^5} - \frac{2x\sqrt{\arcsin(ax)}}{5a^4} - \frac{x^3\sqrt{\arcsin(ax)}}{15a^2} + \frac{x^4\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{10a} + \frac{4\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{15a^5} + \frac{2x^2\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{15a^3} + \frac{1}{5}x^5\arcsin(ax)^{5/2} - \frac{3}{100}x^5\sqrt{\arcsin(ax)}$$

```
[In] Int[x^4*ArcSin[a*x]^(5/2),x]
```

```
[Out] (-2*x*Sqrt[ArcSin[a*x]])/(5*a^4) - (x^3*Sqrt[ArcSin[a*x]])/(15*a^2) - (3*x^
5*Sqrt[ArcSin[a*x]])/100 + (4*Sqrt[1 - a^2*x^2]*ArcSin[a*x]^(3/2))/(15*a^5)
 + (2*x^2*Sqrt[1 - a^2*x^2]*ArcSin[a*x]^(3/2))/(15*a^3) + (x^4*Sqrt[1 - a^2
*x^2]*ArcSin[a*x]^(3/2))/(10*a) + (x^5*ArcSin[a*x]^(5/2))/5 + (15*Sqrt[Pi/2
]*FresnelS[Sqrt[2/Pi]*Sqrt[ArcSin[a*x]]])/(32*a^5) - (Sqrt[Pi/6]*FresnelS[S
qrt[6/Pi]*Sqrt[ArcSin[a*x]]])/(60*a^5) - (Sqrt[(3*Pi)/2]*FresnelS[Sqrt[6/Pi
]*Sqrt[ArcSin[a*x]]])/(320*a^5) + (3*Sqrt[Pi/10]*FresnelS[Sqrt[10/Pi]*Sqrt[
ArcSin[a*x]]])/(1600*a^5)
```

Rule 3386

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[2/d
, Subst[Int[Sin[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d, e, f}
, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3393

```
Int[((c_.) + (d_.)*(x_))^(m_)*sin[(e_.) + (f_.)*(x_)]^(n_), x_Symbol] :> In
t[ExpandTrigReduce[(c + d*x)^m, Sin[e + f*x]^n, x], x] /; FreeQ[{c, d, e, f
, m}, x] && IGtQ[n, 1] && ( !RationalQ[m] || (GeQ[m, -1] && LtQ[m, 1]))
```

Rule 3432

```
Int[Sin[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelS[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4715

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.), x_Symbol] :> Simp[x*(a + b*Ar
cSin[c*x])^n, x] - Dist[b*c*n, Int[x*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 -
```

```
c^2*x^2]), x], x] /; FreeQ[{a, b, c}, x] && GtQ[n, 0]
```

Rule 4725

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^(m + 1)*((a + b*ArcSin[c*x])^n/(m + 1)), x] - Dist[b*c*(n/(m + 1)), Int[x^
(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*x^2]), x], x] /; FreeQ[{a
, b, c}, x] && IGtQ[m, 0] && GtQ[n, 0]
```

Rule 4767

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)*((d_) + (e_.)*(x_)^2)^(p_
.), x_Symbol] :> Simp[(d + e*x^2)^(p + 1)*((a + b*ArcSin[c*x])^n/(2*e*(p +
1))), x] + Dist[b*(n/(2*c*(p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], In
t[(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x] /; FreeQ[{a,
b, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && NeQ[p, -1]
```

Rule 4795

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_)*((d_) + (e_.
)*(x_)^2)^(p_), x_Symbol] :> Simp[f*(f*x)^(m - 1)*(d + e*x^2)^(p + 1)*((a +
 b*ArcSin[c*x])^n/(e*(m + 2*p + 1))), x] + (Dist[f^2*((m - 1)/(c^2*(m + 2*p
 + 1))), Int[(f*x)^(m - 2)*(d + e*x^2)^p*(a + b*ArcSin[c*x])^n, x], x] + Di
st[b*f*(n/(c*(m + 2*p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], Int[(f*x)
^(m - 1)*(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x]) /; Fr
eeQ[{a, b, c, d, e, f, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && IGtQ[m,
1] && NeQ[m + 2*p + 1, 0]
```

Rule 4809

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_.)*((d_) + (e_.)*(x_)^
2)^(p_.), x_Symbol] :> Dist[(1/(b*c^(m + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x
^2)^p], Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b]^(2*p + 1), x], x, a
 + b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, d, e, n}, x] && EqQ[c^2*d + e, 0]
&& IGtQ[2*p + 2, 0] && IGtQ[m, 0]
```

Rubi steps

$$\text{integral} = \frac{1}{5}x^5\arcsin(ax)^{5/2} - \frac{1}{2}a\int\frac{x^5\arcsin(ax)^{3/2}}{\sqrt{1-a^2x^2}}\,dx$$

$$= \frac{x^4\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{10a} + \frac{1}{5}x^5\arcsin(ax)^{5/2} - \frac{3}{20}\int x^4\sqrt{\arcsin(ax)}\,dx - \frac{2\int\frac{x^3\arcsin(ax)^{3/2}}{\sqrt{1-a^2x^2}}\,dx}{5a}$$

$$= -\frac{3}{100}x^5\sqrt{\arcsin(ax)} + \frac{2x^2\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{15a^3} + \frac{x^4\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{10a} + \frac{1}{5}x^5\arcsin(ax)^{5/2} - \frac{4\int\frac{x\arcsin(ax)^{3/2}}{\sqrt{1-a^2x^2}}\,dx}{15a^3} - \frac{\int x^2\sqrt{\arcsin(ax)}\,dx}{5a^2} + \frac{1}{200}(3a)\int\frac{x^5}{\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}\,dx$$

$$= -\frac{x^3\sqrt{\arcsin(ax)}}{15a^2} - \frac{3}{100}x^5\sqrt{\arcsin(ax)} + \frac{4\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{15a^5} + \frac{2x^2\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{15a^3} + \frac{x^4\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{10a} + \frac{1}{5}x^5\arcsin(ax)^{5/2} + \frac{3\text{Subst}\left(\int\frac{\sin^5(x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{200a^5} - \frac{2\int\sqrt{\arcsin(ax)}\,dx}{5a^4} + \frac{\int\frac{x^3}{\sqrt{1-a^2x^2}\sqrt{\arcsin(}}}{30a}$$

$$= -\frac{2x\sqrt{\arcsin(ax)}}{5a^4} - \frac{x^3\sqrt{\arcsin(ax)}}{15a^2} - \frac{3}{100}x^5\sqrt{\arcsin(ax)} + \frac{4\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{15a^5} + \frac{2x^2\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{15a^3} + \frac{x^4\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{10a} + \frac{1}{5}x^5\arcsin(ax)^{5/2} + \frac{3\text{Subst}\left(\int\left(\frac{5\sin(x)}{8\sqrt{x}} - \frac{5\sin(3x)}{16\sqrt{x}} + \frac{\sin(5x)}{16\sqrt{x}}\right)dx, x, \arcsin(ax)\right)}{200a^5} + \frac{\text{Subst}\left(\int\frac{\sin^3(x)}{\sqrt{x}}\,d\right.}{30}$$

$$= -\frac{2x\sqrt{\arcsin(ax)}}{5a^4} - \frac{x^3\sqrt{\arcsin(ax)}}{15a^2} - \frac{3}{100}x^5\sqrt{\arcsin(ax)} + \frac{4\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{15a^5} + \frac{2x^2\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{15a^3} + \frac{x^4\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{10a} + \frac{1}{5}x^5\arcsin(ax)^{5/2} + \frac{3\text{Subst}\left(\int\frac{\sin(5x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{3200a^5} - \frac{3\text{Subst}\left(\int\frac{\sin(3x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{640a^5} + -\frac{3}{}$$

$$= -\frac{2x\sqrt{\arcsin(ax)}}{5a^4} - \frac{x^3\sqrt{\arcsin(ax)}}{15a^2} - \frac{3}{100}x^5\sqrt{\arcsin(ax)} + \frac{4\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{15a^5} + \frac{2x^2\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{15a^3} + \frac{x^4\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{10a} + \frac{1}{5}x^5\arcsin(ax)^{5/2} + \frac{3\text{Subst}\left(\int\sin\left(5x^2\right)dx, x, \sqrt{\arcsin(ax)}\right)}{1600a^5} - \frac{\text{Subst}\left(\int\frac{\sin(3x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{120a^5}$$

$$= -\frac{2x\sqrt{\arcsin(ax)}}{5a^4} - \frac{x^3\sqrt{\arcsin(ax)}}{15a^2} - \frac{3}{100}x^5\sqrt{\arcsin(ax)} + \frac{4\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{15a^5} + \frac{2x^2\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{15a^3} + \frac{x^4\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{10a} + \frac{1}{5}x^5\arcsin(ax)^{5/2} + \frac{3\sqrt{\frac{\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{160a^5} + \frac{\sqrt{2\pi}\,\text{FresnelS}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{5a^5} - \sqrt{\frac{3\cdots}{2}}$$

$$= -\frac{2x\sqrt{\arcsin(ax)}}{5a^4} - \frac{x^3\sqrt{\arcsin(ax)}}{15a^2} - \frac{3}{100}x^5\sqrt{\arcsin(ax)} + \frac{4\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{15a^5} + \frac{2x^2\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{15a^3} + \frac{x^4\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{10a} + \frac{1}{5}x^5\arcsin(ax)^{5/2} + \frac{11\sqrt{\frac{\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{160a^5} + \frac{\sqrt{2\pi}\,\text{FresnelS}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{5a^5} - \sqrt{\cdots}$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.06 (sec) , antiderivative size = 192, normalized size of antiderivative = 0.73

$$\int x^4\arcsin(ax)^{5/2}\,dx = -\frac{33750\sqrt{-i\arcsin(ax)}\Gamma\left(\frac{7}{2},-i\arcsin(ax)\right) + 33750\sqrt{i\arcsin(ax)}\Gamma\left(\frac{7}{2},i\arcsin(ax)\right) - 625\sqrt{3}\sqrt{-i\arcsin(ax\cdots}}{\cdots}$$

```
[In] Integrate[x^4*ArcSin[a*x]^(5/2),x]
```

```
[Out] -1/540000*(33750*Sqrt[(-I)*ArcSin[a*x]]*Gamma[7/2, (-I)*ArcSin[a*x]] + 3375
0*Sqrt[I*ArcSin[a*x]]*Gamma[7/2, I*ArcSin[a*x]] - 625*Sqrt[3]*Sqrt[(-I)*Arc
Sin[a*x]]*Gamma[7/2, (-3*I)*ArcSin[a*x]] - 625*Sqrt[3]*Sqrt[I*ArcSin[a*x]]*
Gamma[7/2, (3*I)*ArcSin[a*x]] + 27*Sqrt[5]*Sqrt[(-I)*ArcSin[a*x]]*Gamma[7/2
, (-5*I)*ArcSin[a*x]] + 27*Sqrt[5]*Sqrt[I*ArcSin[a*x]]*Gamma[7/2, (5*I)*Arc
Sin[a*x]])/(a^5*Sqrt[ArcSin[a*x]])
```

Maple [A] (verified)

Time = 0.08 (sec) , antiderivative size = 233, normalized size of antiderivative = 0.89

method	result
default	$-\frac{-18000ax\arcsin(ax)^3-27\,\mathrm{FresnelS}\left(\frac{\sqrt{2}\,\sqrt{5}\,\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)\sqrt{5}\,\sqrt{2}\,\sqrt{\arcsin(ax)}\,\sqrt{\pi}+625\,\mathrm{FresnelS}\left(\frac{\sqrt{2}\,\sqrt{3}\,\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)\sqrt{3}\,\sqrt{2}\,\sqrt{\mathrm{arcs}}}{}$

[In] int(x^4*arcsin(a*x)^(5/2),x,method=_RETURNVERBOSE)

[Out] -1/144000/a^5/arcsin(a*x)^(1/2)*(-18000*a*x*arcsin(a*x)^3-27*FresnelS(2^(1/2)/Pi^(1/2)*5^(1/2)*arcsin(a*x)^(1/2))*5^(1/2)*2^(1/2)*arcsin(a*x)^(1/2)*Pi^(1/2)+625*FresnelS(2^(1/2)/Pi^(1/2)*3^(1/2)*arcsin(a*x)^(1/2))*3^(1/2)*2^(1/2)*arcsin(a*x)^(1/2)*Pi^(1/2)+9000*arcsin(a*x)^3*sin(3*arcsin(a*x))-1800*arcsin(a*x)^3*sin(5*arcsin(a*x))-33750*FresnelS(2^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*2^(1/2)*arcsin(a*x)^(1/2)*Pi^(1/2)-45000*arcsin(a*x)^2*(-a^2*x^2+1)^(1/2)+7500*arcsin(a*x)^2*cos(3*arcsin(a*x))-900*arcsin(a*x)^2*cos(5*arcsin(a*x))+67500*a*x*arcsin(a*x)-3750*arcsin(a*x)*sin(3*arcsin(a*x))+270*arcsin(a*x)*sin(5*arcsin(a*x)))

Fricas [F(-2)]

Exception generated.

$$\int x^4 \arcsin(ax)^{5/2}\,dx = \text{Exception raised: TypeError}$$

[In] integrate(x^4*arcsin(a*x)^(5/2),x, algorithm="fricas")

[Out] Exception raised: TypeError >> Error detected within library code: integrate: implementation incomplete (constant residues)

Sympy [F]

$$\int x^4 \arcsin(ax)^{5/2}\,dx = \int x^4 \operatorname{asin}^{\frac{5}{2}}(ax)\,dx$$

[In] integrate(x**4*asin(a*x)**(5/2),x)

[Out] Integral(x**4*asin(a*x)**(5/2), x)

Maxima [F(-2)]

Exception generated.

$$\int x^4 \arcsin(ax)^{5/2} \, dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(x^4*arcsin(a*x)^(5/2),x, algorithm="maxima")
```

```
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 0.34 (sec) , antiderivative size = 463, normalized size of antiderivative = 1.76

$$\int x^4 \arcsin(ax)^{5/2} \, dx = \text{Too large to display}$$

```
[In] integrate(x^4*arcsin(a*x)^(5/2),x, algorithm="giac")
```

```
[Out] -1/160*I*arcsin(a*x)^(5/2)*e^(5*I*arcsin(a*x))/a^5 + 1/32*I*arcsin(a*x)^(5/
2)*e^(3*I*arcsin(a*x))/a^5 - 1/16*I*arcsin(a*x)^(5/2)*e^(I*arcsin(a*x))/a^5
 + 1/16*I*arcsin(a*x)^(5/2)*e^(-I*arcsin(a*x))/a^5 - 1/32*I*arcsin(a*x)^(5/
2)*e^(-3*I*arcsin(a*x))/a^5 + 1/160*I*arcsin(a*x)^(5/2)*e^(-5*I*arcsin(a*x)
)/a^5 + 1/320*arcsin(a*x)^(3/2)*e^(5*I*arcsin(a*x))/a^5 - 5/192*arcsin(a*x)
^(3/2)*e^(3*I*arcsin(a*x))/a^5 + 5/32*arcsin(a*x)^(3/2)*e^(I*arcsin(a*x))/a
^5 + 5/32*arcsin(a*x)^(3/2)*e^(-I*arcsin(a*x))/a^5 - 5/192*arcsin(a*x)^(3/2
)*e^(-3*I*arcsin(a*x))/a^5 + 1/320*arcsin(a*x)^(3/2)*e^(-5*I*arcsin(a*x))/a
^5 + (3/64000*I - 3/64000)*sqrt(10)*sqrt(pi)*erf((1/2*I - 1/2)*sqrt(10)*sqr
t(arcsin(a*x)))/a^5 - (3/64000*I + 3/64000)*sqrt(10)*sqrt(pi)*erf(-(1/2*I +
 1/2)*sqrt(10)*sqrt(arcsin(a*x)))/a^5 - (5/4608*I - 5/4608)*sqrt(6)*sqrt(pi
)*erf((1/2*I - 1/2)*sqrt(6)*sqrt(arcsin(a*x)))/a^5 + (5/4608*I + 5/4608)*sq
rt(6)*sqrt(pi)*erf(-(1/2*I + 1/2)*sqrt(6)*sqrt(arcsin(a*x)))/a^5 + (15/256*
I - 15/256)*sqrt(2)*sqrt(pi)*erf((1/2*I - 1/2)*sqrt(2)*sqrt(arcsin(a*x)))/a
^5 - (15/256*I + 15/256)*sqrt(2)*sqrt(pi)*erf(-(1/2*I + 1/2)*sqrt(2)*sqrt(a
rcsin(a*x)))/a^5 + 3/3200*I*sqrt(arcsin(a*x))*e^(5*I*arcsin(a*x))/a^5 - 5/3
84*I*sqrt(arcsin(a*x))*e^(3*I*arcsin(a*x))/a^5 + 15/64*I*sqrt(arcsin(a*x))*
e^(I*arcsin(a*x))/a^5 - 15/64*I*sqrt(arcsin(a*x))*e^(-I*arcsin(a*x))/a^5 +
5/384*I*sqrt(arcsin(a*x))*e^(-3*I*arcsin(a*x))/a^5 - 3/3200*I*sqrt(arcsin(a
*x))*e^(-5*I*arcsin(a*x))/a^5
```

Mupad [F(-1)]

Timed out.

$$\int x^4 \arcsin(ax)^{5/2}\,dx = \int x^4 \operatorname{asin}(a\,x)^{5/2}\,dx$$

```
[In] int(x^4*asin(a*x)^(5/2),x)
[Out] int(x^4*asin(a*x)^(5/2), x)
```

3.87 $\int x^3 \arcsin(ax)^{5/2}\,dx$

Optimal result

Integrand size = 12, antiderivative size = 205

$$\int x^3 \arcsin(ax)^{5/2}\,dx = \frac{225\sqrt{\arcsin(ax)}}{2048a^4} - \frac{45x^2\sqrt{\arcsin(ax)}}{256a^2} - \frac{15}{256}x^4\sqrt{\arcsin(ax)} + \frac{15x\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{64a^3} + \frac{5x^3\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{32a} - \frac{3\arcsin(ax)^{5/2}}{32a^4} + \frac{1}{4}x^4\arcsin(ax)^{5/2} + \frac{15\sqrt{\frac{\pi}{2}}\,\text{FresnelC}\left(2\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{4096a^4} - \frac{15\sqrt{\pi}\,\text{FresnelC}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{256a^4}$$

```
[Out] -3/32*arcsin(a*x)^(5/2)/a^4+1/4*x^4*arcsin(a*x)^(5/2)+15/8192*FresnelC(2*2^
(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*2^(1/2)*Pi^(1/2)/a^4-15/256*FresnelC(2*ar
csin(a*x)^(1/2)/Pi^(1/2))*Pi^(1/2)/a^4+15/64*x*arcsin(a*x)^(3/2)*(-a^2*x^2+
1)^(1/2)/a^3+5/32*x^3*arcsin(a*x)^(3/2)*(-a^2*x^2+1)^(1/2)/a+225/2048*arcsi
n(a*x)^(1/2)/a^4-45/256*x^2*arcsin(a*x)^(1/2)/a^2-15/256*x^4*arcsin(a*x)^(1
/2)
```

Rubi [A] (verified)

Time = 0.38 (sec) , antiderivative size = 205, normalized size of antiderivative = 1.00, number of steps used = 18, number of rules used = 7, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.583, Rules used = {4725, 4795, 4737, 4809, 3393, 3385, 3433}

$$\int x^3 \arcsin(ax)^{5/2}\,dx = \frac{15\sqrt{\frac{\pi}{2}}\,\text{FresnelC}\left(2\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{4096a^4} - \frac{15\sqrt{\pi}\,\text{FresnelC}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{256a^4} - \frac{3\arcsin(ax)^{5/2}}{32a^4} + \frac{225\sqrt{\arcsin(ax)}}{2048a^4} - \frac{45x^2\sqrt{\arcsin(ax)}}{256a^2} + \frac{5x^3\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{32a} + \frac{15x\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{64a^3} + \frac{1}{4}x^4\arcsin(ax)^{5/2} - \frac{15}{256}x^4\sqrt{\arcsin(ax)}$$

```
[In] Int[x^3*ArcSin[a*x]^(5/2),x]
```

```
[Out] (225*Sqrt[ArcSin[a*x]])/(2048*a^4) - (45*x^2*Sqrt[ArcSin[a*x]])/(256*a^2) -
 (15*x^4*Sqrt[ArcSin[a*x]])/256 + (15*x*Sqrt[1 - a^2*x^2]*ArcSin[a*x]^(3/2)
)/(64*a^3) + (5*x^3*Sqrt[1 - a^2*x^2]*ArcSin[a*x]^(3/2))/(32*a) - (3*ArcSin
[a*x]^(5/2))/(32*a^4) + (x^4*ArcSin[a*x]^(5/2))/4 + (15*Sqrt[Pi/2]*FresnelC
[2*Sqrt[2/Pi]*Sqrt[ArcSin[a*x]]])/(4096*a^4) - (15*Sqrt[Pi]*FresnelC[(2*Sqr
t[ArcSin[a*x]])/Sqrt[Pi]])/(256*a^4)
```

Rule 3385

```
Int[sin[Pi/2 + (e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> D
ist[2/d, Subst[Int[Cos[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d
, e, f}, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3393

```
Int[((c_.) + (d_.)*(x_))^(m_)*sin[(e_.) + (f_.)*(x_)]^(n_), x_Symbol] :> In
t[ExpandTrigReduce[(c + d*x)^m, Sin[e + f*x]^n, x], x] /; FreeQ[{c, d, e, f
, m}, x] && IGtQ[n, 1] && ( !RationalQ[m] || (GeQ[m, -1] && LtQ[m, 1]))
```

Rule 3433

```
Int[Cos[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelC[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4725

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^(m + 1)*((a + b*ArcSin[c*x])^n/(m + 1)), x] - Dist[b*c*(n/(m + 1)), Int[x^
(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*x^2]), x], x] /; FreeQ[{a
```

```
, b, c}, x] && IGtQ[m, 0] && GtQ[n, 0]
```

Rule 4737

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)/Sqrt[(d_) + (e_.)*(x_)^2], x_S
ymbol] :> Simp[(1/(b*c*(n + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]]*(a
 + b*ArcSin[c*x])^(n + 1), x] /; FreeQ[{a, b, c, d, e, n}, x] && EqQ[c^2*d
+ e, 0] && NeQ[n, -1]
```

Rule 4795

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_)*((d_) + (e_.
)*(x_)^2)^(p_), x_Symbol] :> Simp[f*(f*x)^(m - 1)*(d + e*x^2)^(p + 1)*((a +
 b*ArcSin[c*x])^n/(e*(m + 2*p + 1))), x] + (Dist[f^2*((m - 1)/(c^2*(m + 2*p
 + 1))), Int[(f*x)^(m - 2)*(d + e*x^2)^p*(a + b*ArcSin[c*x])^n, x], x] + Di
st[b*f*(n/(c*(m + 2*p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], Int[(f*x)
^(m - 1)*(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x]) /; Fr
eeQ[{a, b, c, d, e, f, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && IGtQ[m,
1] && NeQ[m + 2*p + 1, 0]
```

Rule 4809

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_.)*((d_) + (e_.)*(x_)^
2)^(p_.), x_Symbol] :> Dist[(1/(b*c^(m + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x
^2)^p], Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b]^(2*p + 1), x], x, a
 + b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, d, e, n}, x] && EqQ[c^2*d + e, 0]
&& IGtQ[2*p + 2, 0] && IGtQ[m, 0]
```

Rubi steps

$$
\begin{aligned}
\text{integral} &= \frac{1}{4}x^4\arcsin(ax)^{5/2} - \frac{1}{8}(5a)\int \frac{x^4\arcsin(ax)^{3/2}}{\sqrt{1-a^2x^2}}\,dx \\
&= \frac{5x^3\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{32a} \\
&\quad + \frac{1}{4}x^4\arcsin(ax)^{5/2} - \frac{15}{64}\int x^3\sqrt{\arcsin(ax)}\,dx - \frac{15\int \frac{x^2\arcsin(ax)^{3/2}}{\sqrt{1-a^2x^2}}\,dx}{32a} \\
&= -\frac{15}{256}x^4\sqrt{\arcsin(ax)} + \frac{15x\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{64a^3} \\
&\quad + \frac{5x^3\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{32a} + \frac{1}{4}x^4\arcsin(ax)^{5/2} - \frac{15\int \frac{\arcsin(ax)^{3/2}}{\sqrt{1-a^2x^2}}\,dx}{64a^3} \\
&\quad - \frac{45\int x\sqrt{\arcsin(ax)}\,dx}{128a^2} + \frac{1}{512}(15a)\int \frac{x^4}{\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}\,dx
\end{aligned}
$$

$$= -\frac{45x^2\sqrt{\arcsin(ax)}}{256a^2} - \frac{15}{256}x^4\sqrt{\arcsin(ax)} + \frac{15x\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{64a^3} + \frac{5x^3\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{32a} - \frac{3\arcsin(ax)^{5/2}}{32a^4} + \frac{1}{4}x^4\arcsin(ax)^{5/2} + \frac{15\text{Subst}\left(\int \frac{\sin^4(x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{512a^4} + \frac{45\int \frac{x^2}{\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}\,dx}{512a}$$

$$= -\frac{45x^2\sqrt{\arcsin(ax)}}{256a^2} - \frac{15}{256}x^4\sqrt{\arcsin(ax)} + \frac{15x\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{64a^3} + \frac{5x^3\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{32a} - \frac{3\arcsin(ax)^{5/2}}{32a^4} + \frac{1}{4}x^4\arcsin(ax)^{5/2} + \frac{15\text{Subst}\left(\int \left(\frac{3}{8\sqrt{x}} - \frac{\cos(2x)}{2\sqrt{x}} + \frac{\cos(4x)}{8\sqrt{x}}\right)\,dx, x, \arcsin(ax)\right)}{512a^4} + \frac{45\text{Subst}\left(\int \frac{\sin^2(x)}{\sqrt{x}}\right.}{512}$$

$$= \frac{45\sqrt{\arcsin(ax)}}{2048a^4} - \frac{45x^2\sqrt{\arcsin(ax)}}{256a^2} - \frac{15}{256}x^4\sqrt{\arcsin(ax)} + \frac{15x\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{64a^3} + \frac{5x^3\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{32a} - \frac{3\arcsin(ax)^{5/2}}{32a^4} + \frac{1}{4}x^4\arcsin(ax)^{5/2} + \frac{15\text{Subst}\left(\int \frac{\cos(4x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{4096a^4} - \frac{15\text{Subst}\left(\int \frac{\cos(2x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{1024a^4} -$$

$$= \frac{225\sqrt{\arcsin(ax)}}{2048a^4} - \frac{45x^2\sqrt{\arcsin(ax)}}{256a^2} - \frac{15}{256}x^4\sqrt{\arcsin(ax)} + \frac{15x\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{64a^3} + \frac{5x^3\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{32a} - \frac{3\arcsin(ax)^{5/2}}{32a^4} + \frac{1}{4}x^4\arcsin(ax)^{5/2} + \frac{15\text{Subst}\left(\int \cos(4x^2)\,dx, x, \sqrt{\arcsin(ax)}\right)}{2048a^4} - \frac{15\text{Subst}\left(\int \cos(2x^2)\,dx, x, \sqrt{a}\right.}{512a^4}$$

$$= \frac{225\sqrt{\arcsin(ax)}}{2048a^4} - \frac{45x^2\sqrt{\arcsin(ax)}}{256a^2} - \frac{15}{256}x^4\sqrt{\arcsin(ax)} + \frac{15x\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{64a^3} + \frac{5x^3\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{32a} - \frac{3\arcsin(ax)^{5/2}}{32a^4} + \frac{1}{4}x^4\arcsin(ax)^{5/2} + \frac{15\sqrt{\frac{\pi}{2}}\,\text{FresnelC}\left(2\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{4096a^4} - \frac{15\sqrt{\pi}\,\text{FresnelC}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{1024a^4} - \frac{45\text{Su}}{}$$

$$= \frac{225\sqrt{\arcsin(ax)}}{2048a^4} - \frac{45x^2\sqrt{\arcsin(ax)}}{256a^2} - \frac{15}{256}x^4\sqrt{\arcsin(ax)} + \frac{15x\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{64a^3} + \frac{5x^3\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{32a} - \frac{3\arcsin(ax)^{5/2}}{32a^4} + \frac{1}{4}x^4\arcsin(ax)^{5/2} + \frac{15\sqrt{\frac{\pi}{2}}\,\text{FresnelC}\left(2\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{4096a^4} - \frac{15\sqrt{\pi}\,\text{FresnelC}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{256a^4}$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.04 (sec) , antiderivative size = 131, normalized size of antiderivative = 0.64

$$\int x^3 \arcsin(ax)^{5/2}\,dx = \frac{i\left(16\sqrt{2}\sqrt{-i\arcsin(ax)}\Gamma\left(\frac{7}{2},-2i\arcsin(ax)\right)-16\sqrt{2}\sqrt{i\arcsin(ax)}\Gamma\left(\frac{7}{2},2i\arcsin(ax\right.\right.}{2048a^4\sqrt{\mathrm{arcs}}}$$

[In] Integrate[x^3*ArcSin[a*x]^(5/2),x]

[Out] ((I/2048)*(16*Sqrt[2]*Sqrt[(-I)*ArcSin[a*x]]*Gamma[7/2, (-2*I)*ArcSin[a*x]] - 16*Sqrt[2]*Sqrt[I*ArcSin[a*x]]*Gamma[7/2, (2*I)*ArcSin[a*x]] - Sqrt[(-I)*ArcSin[a*x]]*Gamma[7/2, (-4*I)*ArcSin[a*x]] + Sqrt[I*ArcSin[a*x]]*Gamma[7/2, (4*I)*ArcSin[a*x]]))/(a^4*Sqrt[ArcSin[a*x]])

Maple [A] (verified)

Time = 0.06 (sec) , antiderivative size = 154, normalized size of antiderivative = 0.75

method	result
default	$\frac{-1024\arcsin(ax)^{\frac{5}{2}}\sqrt{\pi}\cos(2\arcsin(ax))+256\arcsin(ax)^{\frac{5}{2}}\sqrt{\pi}\cos(4\arcsin(ax))+1280\arcsin(ax)^{\frac{3}{2}}\sqrt{\pi}\sin(2\arcsin(ax))-160\arcsin(a}{}$

[In] int(x^3*arcsin(a*x)^(5/2),x,method=_RETURNVERBOSE)

[Out] 1/8192/a^4*(-1024*arcsin(a*x)^(5/2)*Pi^(1/2)*cos(2*arcsin(a*x))+256*arcsin(a*x)^(5/2)*Pi^(1/2)*cos(4*arcsin(a*x))+1280*arcsin(a*x)^(3/2)*Pi^(1/2)*sin(2*arcsin(a*x))-160*arcsin(a*x)^(3/2)*Pi^(1/2)*sin(4*arcsin(a*x))+15*Pi*2^(1/2)*FresnelC(2*2^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))+960*arcsin(a*x)^(1/2)*Pi^(1/2)*cos(2*arcsin(a*x))-60*arcsin(a*x)^(1/2)*Pi^(1/2)*cos(4*arcsin(a*x))-480*Pi*FresnelC(2*arcsin(a*x)^(1/2)/Pi^(1/2)))/Pi^(1/2)

Fricas [F(-2)]

Exception generated.

$$\int x^3 \arcsin(ax)^{5/2}\,dx = \text{Exception raised: TypeError}$$

[In] integrate(x^3*arcsin(a*x)^(5/2),x, algorithm="fricas")

[Out] Exception raised: TypeError >> Error detected within library code: integrate: implementation incomplete (constant residues)

Sympy [F]

$$\int x^3 \arcsin(ax)^{5/2}\, dx = \int x^3 \operatorname{asin}^{\frac{5}{2}}(ax)\, dx$$

```
[In] integrate(x**3*asin(a*x)**(5/2),x)
[Out] Integral(x**3*asin(a*x)**(5/2), x)
```

Maxima [F(-2)]

Exception generated.

$$\int x^3 \arcsin(ax)^{5/2}\, dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(x^3*arcsin(a*x)^(5/2),x, algorithm="maxima")
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 0.34 (sec) , antiderivative size = 297, normalized size of antiderivative = 1.45

$$\int x^3 \arcsin(ax)^{5/2}\,dx = \frac{\arcsin(ax)^{\frac{5}{2}} e^{(4i \arcsin(ax))}}{64\,a^4} - \frac{\arcsin(ax)^{\frac{5}{2}} e^{(2i \arcsin(ax))}}{16\,a^4} - \frac{\arcsin(ax)^{\frac{5}{2}} e^{(-2i \arcsin(ax))}}{16\,a^4} + \frac{\arcsin(ax)^{\frac{5}{2}} e^{(-4i \arcsin(ax))}}{64\,a^4} + \frac{5i \arcsin(ax)^{\frac{3}{2}} e^{(4i \arcsin(ax))}}{512\,a^4} - \frac{5i \arcsin(ax)^{\frac{3}{2}} e^{(2i \arcsin(ax))}}{64\,a^4} + \frac{5i \arcsin(ax)^{\frac{3}{2}} e^{(-2i \arcsin(ax))}}{64\,a^4} - \frac{5i \arcsin(ax)^{\frac{3}{2}} e^{(-4i \arcsin(ax))}}{512\,a^4} - \frac{(15i+15)\,\sqrt{2}\sqrt{\pi}\,\mathrm{erf}\left((i-1)\,\sqrt{2}\sqrt{\arcsin(ax)}\right)}{32768\,a^4} + \frac{(15i-15)\,\sqrt{2}\sqrt{\pi}\,\mathrm{erf}\left(-(i+1)\,\sqrt{2}\sqrt{\arcsin(ax)}\right)}{32768\,a^4} + \frac{(15i+15)\,\sqrt{\pi}\,\mathrm{erf}\left((i-1)\,\sqrt{\arcsin(ax)}\right)}{1024\,a^4} - \frac{(15i-15)\,\sqrt{\pi}\,\mathrm{erf}\left(-(i+1)\,\sqrt{\arcsin(ax)}\right)}{1024\,a^4} - \frac{15\,\sqrt{\arcsin(ax)}e^{(4i \arcsin(ax))}}{4096\,a^4} + \frac{15\,\sqrt{\arcsin(ax)}e^{(2i \arcsin(ax))}}{256\,a^4} + \frac{15\,\sqrt{\arcsin(ax)}e^{(-2i \arcsin(ax))}}{256\,a^4} - \frac{15\,\sqrt{\arcsin(ax)}e^{(-4i \arcsin(ax))}}{4096\,a^4}$$

```
[In] integrate(x^3*arcsin(a*x)^(5/2),x, algorithm="giac")
```

```
[Out] 1/64*arcsin(a*x)^(5/2)*e^(4*I*arcsin(a*x))/a^4 - 1/16*arcsin(a*x)^(5/2)*e^(
2*I*arcsin(a*x))/a^4 - 1/16*arcsin(a*x)^(5/2)*e^(-2*I*arcsin(a*x))/a^4 + 1/
64*arcsin(a*x)^(5/2)*e^(-4*I*arcsin(a*x))/a^4 + 5/512*I*arcsin(a*x)^(3/2)*e
^(4*I*arcsin(a*x))/a^4 - 5/64*I*arcsin(a*x)^(3/2)*e^(2*I*arcsin(a*x))/a^4 +
 5/64*I*arcsin(a*x)^(3/2)*e^(-2*I*arcsin(a*x))/a^4 - 5/512*I*arcsin(a*x)^(3
/2)*e^(-4*I*arcsin(a*x))/a^4 - (15/32768*I + 15/32768)*sqrt(2)*sqrt(pi)*erf
((I - 1)*sqrt(2)*sqrt(arcsin(a*x)))/a^4 + (15/32768*I - 15/32768)*sqrt(2)*s
qrt(pi)*erf(-(I + 1)*sqrt(2)*sqrt(arcsin(a*x)))/a^4 + (15/1024*I + 15/1024)
*sqrt(pi)*erf((I - 1)*sqrt(arcsin(a*x)))/a^4 - (15/1024*I - 15/1024)*sqrt(p
i)*erf(-(I + 1)*sqrt(arcsin(a*x)))/a^4 - 15/4096*sqrt(arcsin(a*x))*e^(4*I*a
rcsin(a*x))/a^4 + 15/256*sqrt(arcsin(a*x))*e^(2*I*arcsin(a*x))/a^4 + 15/256
*sqrt(arcsin(a*x))*e^(-2*I*arcsin(a*x))/a^4 - 15/4096*sqrt(arcsin(a*x))*e^(
-4*I*arcsin(a*x))/a^4
```

Mupad [F(-1)]

Timed out.

$$\int x^3 \arcsin(ax)^{5/2}\,dx = \int x^3\,\mathrm{asin}(a\,x)^{5/2}\,dx$$

```
[In] int(x^3*asin(a*x)^(5/2),x)
[Out] int(x^3*asin(a*x)^(5/2), x)
```

3.88 $\int x^2 \arcsin(ax)^{5/2} \, dx$

Optimal result

Integrand size = 12, antiderivative size = 178

$$\int x^2 \arcsin(ax)^{5/2} \, dx = -\frac{5x\sqrt{\arcsin(ax)}}{6a^2} - \frac{5}{36}x^3\sqrt{\arcsin(ax)} + \frac{5\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{9a^3} + \frac{5x^2\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{18a} + \frac{1}{3}x^3\arcsin(ax)^{5/2} + \frac{15\sqrt{\frac{\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{16a^3} - \frac{5\sqrt{\frac{\pi}{6}}\,\text{FresnelS}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{144a^3}$$

```
[Out] 1/3*x^3*arcsin(a*x)^(5/2)-5/864*FresnelS(6^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2)
)*6^(1/2)*Pi^(1/2)/a^3+15/32*FresnelS(2^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*2
^(1/2)*Pi^(1/2)/a^3+5/9*arcsin(a*x)^(3/2)*(-a^2*x^2+1)^(1/2)/a^3+5/18*x^2*a
rcsin(a*x)^(3/2)*(-a^2*x^2+1)^(1/2)/a-5/6*x*arcsin(a*x)^(1/2)/a^2-5/36*x^3*
arcsin(a*x)^(1/2)
```

Rubi [A] (verified)

Time = 0.28 (sec) , antiderivative size = 178, normalized size of antiderivative = 1.00, number of steps used = 15, number of rules used = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.667, Rules used = {4725, 4795, 4767, 4715, 4809, 3386, 3432, 3393}

$$\int x^2 \arcsin(ax)^{5/2} \, dx = \frac{15\sqrt{\frac{\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{16a^3} - \frac{5\sqrt{\frac{\pi}{6}}\,\text{FresnelS}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{144a^3} + \frac{5x^2\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{18a} - \frac{5x\sqrt{\arcsin(ax)}}{6a^2} + \frac{5\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{9a^3} + \frac{1}{3}x^3\arcsin(ax)^{5/2} - \frac{5}{36}x^3\sqrt{\arcsin(ax)}$$

```
[In] Int[x^2*ArcSin[a*x]^(5/2),x]
```

```
[Out] (-5*x*Sqrt[ArcSin[a*x]])/(6*a^2) - (5*x^3*Sqrt[ArcSin[a*x]])/36 + (5*Sqrt[1
 - a^2*x^2]*ArcSin[a*x]^(3/2))/(9*a^3) + (5*x^2*Sqrt[1 - a^2*x^2]*ArcSin[a*
x]^(3/2))/(18*a) + (x^3*ArcSin[a*x]^(5/2))/3 + (15*Sqrt[Pi/2]*FresnelS[Sqrt
[2/Pi]*Sqrt[ArcSin[a*x]]])/(16*a^3) - (5*Sqrt[Pi/6]*FresnelS[Sqrt[6/Pi]*Sqr
t[ArcSin[a*x]]])/(144*a^3)
```

Rule 3386

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[2/d
, Subst[Int[Sin[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d, e, f}
, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3393

```
Int[((c_.) + (d_.)*(x_))^(m_)*sin[(e_.) + (f_.)*(x_)]^(n_), x_Symbol] :> In
t[ExpandTrigReduce[(c + d*x)^m, Sin[e + f*x]^n, x], x] /; FreeQ[{c, d, e, f
, m}, x] && IGtQ[n, 1] && ( !RationalQ[m] || (GeQ[m, -1] && LtQ[m, 1]))
```

Rule 3432

```
Int[Sin[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelS[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4715

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.), x_Symbol] :> Simp[x*(a + b*Ar
cSin[c*x])^n, x] - Dist[b*c*n, Int[x*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 -
c^2*x^2]), x], x] /; FreeQ[{a, b, c}, x] && GtQ[n, 0]
```

Rule 4725

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^(m + 1)*((a + b*ArcSin[c*x])^n/(m + 1)), x] - Dist[b*c*(n/(m + 1)), Int[x^
(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*x^2]), x], x] /; FreeQ[{a
, b, c}, x] && IGtQ[m, 0] && GtQ[n, 0]
```

Rule 4767

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)*((d_) + (e_.)*(x_)^2)^(p_
.), x_Symbol] :> Simp[(d + e*x^2)^(p + 1)*((a + b*ArcSin[c*x])^n/(2*e*(p +
1))), x] + Dist[b*(n/(2*c*(p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], In
t[(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x] /; FreeQ[{a,
b, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && NeQ[p, -1]
```

Rule 4795

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_)*((d_) + (e_.
)*(x_)^2)^(p_), x_Symbol] :> Simp[f*(f*x)^(m - 1)*(d + e*x^2)^(p + 1)*((a +
 b*ArcSin[c*x])^n/(e*(m + 2*p + 1))), x] + (Dist[f^2*((m - 1)/(c^2*(m + 2*p
 + 1))), Int[(f*x)^(m - 2)*(d + e*x^2)^p*(a + b*ArcSin[c*x])^n, x], x] + Di
st[b*f*(n/(c*(m + 2*p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], Int[(f*x)
^(m - 1)*(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x]) /; Fr
eeQ[{a, b, c, d, e, f, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && IGtQ[m,
1] && NeQ[m + 2*p + 1, 0]
```

Rule 4809

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_.)*((d_) + (e_.)*(x_)^
2)^(p_.), x_Symbol] :> Dist[(1/(b*c^(m + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x
^2)^p], Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b]^(2*p + 1), x], x, a
 + b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, d, e, n}, x] && EqQ[c^2*d + e, 0]
&& IGtQ[2*p + 2, 0] && IGtQ[m, 0]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= \frac{1}{3}x^3\arcsin(ax)^{5/2} - \frac{1}{6}(5a)\int \frac{x^3\arcsin(ax)^{3/2}}{\sqrt{1-a^2x^2}}\,dx \\
&= \frac{5x^2\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{18a} \\
&\quad + \frac{1}{3}x^3\arcsin(ax)^{5/2} - \frac{5}{12}\int x^2\sqrt{\arcsin(ax)}\,dx - \frac{5\int \frac{x\arcsin(ax)^{3/2}}{\sqrt{1-a^2x^2}}\,dx}{9a} \\
&= -\frac{5}{36}x^3\sqrt{\arcsin(ax)} + \frac{5\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{9a^3} + \frac{5x^2\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{18a} \\
&\quad + \frac{1}{3}x^3\arcsin(ax)^{5/2} - \frac{5\int \sqrt{\arcsin(ax)}\,dx}{6a^2} + \frac{1}{72}(5a)\int \frac{x^3}{\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}\,dx \\
&= -\frac{5x\sqrt{\arcsin(ax)}}{6a^2} - \frac{5}{36}x^3\sqrt{\arcsin(ax)} \\
&\quad + \frac{5\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{9a^3} + \frac{5x^2\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{18a} \\
&\quad + \frac{1}{3}x^3\arcsin(ax)^{5/2} + \frac{5\text{Subst}\left(\int \frac{\sin^3(x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{72a^3} + \frac{5\int \frac{x}{\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}\,dx}{12a}
\end{aligned}$$

$$= -\frac{5x\sqrt{\arcsin(ax)}}{6a^2} - \frac{5}{36}x^3\sqrt{\arcsin(ax)} + \frac{5\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{9a^3} + \frac{5x^2\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{18a} + \frac{1}{3}x^3\arcsin(ax)^{5/2} + \frac{5\text{Subst}\left(\int\left(\frac{3\sin(x)}{4\sqrt{x}} - \frac{\sin(3x)}{4\sqrt{x}}\right)dx, x, \arcsin(ax)\right)}{72a^3} + \frac{5\text{Subst}\left(\int\frac{\sin(x)}{\sqrt{x}}dx, x, \arcsin(ax)\right)}{12a^3}$$

$$= -\frac{5x\sqrt{\arcsin(ax)}}{6a^2} - \frac{5}{36}x^3\sqrt{\arcsin(ax)} + \frac{5\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{9a^3} + \frac{5x^2\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{18a} + \frac{1}{3}x^3\arcsin(ax)^{5/2} - \frac{5\text{Subst}\left(\int\frac{\sin(3x)}{\sqrt{x}}dx, x, \arcsin(ax)\right)}{288a^3} + \frac{5\text{Subst}\left(\int\frac{\sin(x)}{\sqrt{x}}dx, x, \arcsin(ax)\right)}{96a^3} + \frac{5\text{Subst}\left(\int\sin(x^2)\,dx, x, \sqrt{\arcsin(ax)}\right)}{6a^3}$$

$$= -\frac{5x\sqrt{\arcsin(ax)}}{6a^2} - \frac{5}{36}x^3\sqrt{\arcsin(ax)} + \frac{5\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{9a^3} + \frac{5x^2\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{18a} + \frac{1}{3}x^3\arcsin(ax)^{5/2} + \frac{5\sqrt{\frac{\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{6a^3} - \frac{5\text{Subst}\left(\int\sin(3x^2)\,dx, x, \sqrt{\arcsin(ax)}\right)}{144a^3} + \frac{5\text{Subst}\left(\int\sin(x^2)\,dx, x, \sqrt{\arcsin(ax)}\right)}{48a^3}$$

$$= -\frac{5x\sqrt{\arcsin(ax)}}{6a^2} - \frac{5}{36}x^3\sqrt{\arcsin(ax)} + \frac{5\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{9a^3} + \frac{5x^2\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{18a} + \frac{1}{3}x^3\arcsin(ax)^{5/2} + \frac{15\sqrt{\frac{\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{16a^3} - \frac{5\sqrt{\frac{\pi}{6}}\,\text{FresnelS}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{144a^3}$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.04 (sec) , antiderivative size = 125, normalized size of antiderivative = 0.70

$$\int x^2 \arcsin(ax)^{5/2}\,dx = \frac{-81\sqrt{-i\arcsin(ax)}\Gamma\left(\frac{7}{2},-i\arcsin(ax)\right)-81\sqrt{i\arcsin(ax)}\Gamma\left(\frac{7}{2},i\arcsin(ax)\right)+\sqrt{3}\left(\right.}{648a^3\sqrt{\arcsin}}$$

[In] Integrate[x^2*ArcSin[a*x]^(5/2),x]

[Out] (-81*Sqrt[(-I)*ArcSin[a*x]]*Gamma[7/2, (-I)*ArcSin[a*x]] - 81*Sqrt[I*ArcSin[a*x]]*Gamma[7/2, I*ArcSin[a*x]] + Sqrt[3]*(Sqrt[(-I)*ArcSin[a*x]]*Gamma[7/2, (-3*I)*ArcSin[a*x]] + Sqrt[I*ArcSin[a*x]]*Gamma[7/2, (3*I)*ArcSin[a*x]]))/(648*a^3*Sqrt[ArcSin[a*x]])

Maple [A] (verified)

Time = 0.05 (sec) , antiderivative size = 156, normalized size of antiderivative = 0.88

method	result
default	$-\frac{-216ax\arcsin(ax)^3+72\arcsin(ax)^3\sin(3\arcsin(ax))+5\ \mathrm{FresnelS}\left(\frac{\sqrt{2}\sqrt{3}\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)\sqrt{3}\sqrt{2}\sqrt{\arcsin(ax)}\sqrt{\pi}+60\arcsin(ax)^2\cos(}{86}$

[In] int(x^2*arcsin(a*x)^(5/2),x,method=_RETURNVERBOSE)

[Out] -1/864/a^3/arcsin(a*x)^(1/2)*(-216*a*x*arcsin(a*x)^3+72*arcsin(a*x)^3*sin(3*arcsin(a*x))+5*FresnelS(2^(1/2)/Pi^(1/2)*3^(1/2)*arcsin(a*x)^(1/2))*3^(1/2)*2^(1/2)*arcsin(a*x)^(1/2)*Pi^(1/2)+60*arcsin(a*x)^2*cos(3*arcsin(a*x))-540*arcsin(a*x)^2*(-a^2*x^2+1)^(1/2)-405*FresnelS(2^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*2^(1/2)*arcsin(a*x)^(1/2)*Pi^(1/2)+810*a*x*arcsin(a*x)-30*arcsin(a*x)*sin(3*arcsin(a*x)))

Fricas [F(-2)]

Exception generated.

$$\int x^2 \arcsin(ax)^{5/2}\,dx = \text{Exception raised: TypeError}$$

[In] integrate(x^2*arcsin(a*x)^(5/2),x, algorithm="fricas")

[Out] Exception raised: TypeError >> Error detected within library code: integrate: implementation incomplete (constant residues)

Sympy [F]

$$\int x^2 \arcsin(ax)^{5/2}\,dx = \int x^2 \operatorname{asin}^{\frac{5}{2}}(ax)\,dx$$

```
[In] integrate(x**2*asin(a*x)**(5/2),x)
```

```
[Out] Integral(x**2*asin(a*x)**(5/2), x)
```

Maxima [F(-2)]

Exception generated.

$$\int x^2 \arcsin(ax)^{5/2}\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(x^2*arcsin(a*x)^(5/2),x, algorithm="maxima")
```

```
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 0.34 (sec) , antiderivative size = 309, normalized size of antiderivative = 1.74

$$\int x^2 \arcsin(ax)^{5/2} \, dx = \frac{i \arcsin(ax)^{\frac{5}{2}} e^{(3i \arcsin(ax))}}{24 a^3} - \frac{i \arcsin(ax)^{\frac{5}{2}} e^{(i \arcsin(ax))}}{8 a^3} + \frac{i \arcsin(ax)^{\frac{5}{2}} e^{(-i \arcsin(ax))}}{8 a^3} - \frac{i \arcsin(ax)^{\frac{5}{2}} e^{(-3i \arcsin(ax))}}{24 a^3} - \frac{5 \arcsin(ax)^{\frac{3}{2}} e^{(3i \arcsin(ax))}}{144 a^3} + \frac{5 \arcsin(ax)^{\frac{3}{2}} e^{(i \arcsin(ax))}}{16 a^3} + \frac{5 \arcsin(ax)^{\frac{3}{2}} e^{(-i \arcsin(ax))}}{16 a^3} - \frac{5 \arcsin(ax)^{\frac{3}{2}} e^{(-3i \arcsin(ax))}}{144 a^3} - \frac{(5i-5)\sqrt{6}\sqrt{\pi}\,\mathrm{erf}\left(\left(\frac{1}{2}i - \frac{1}{2}\right)\sqrt{6}\sqrt{\arcsin(ax)}\right)}{3456 a^3} + \frac{(5i+5)\sqrt{6}\sqrt{\pi}\,\mathrm{erf}\left(-\left(\frac{1}{2}i + \frac{1}{2}\right)\sqrt{6}\sqrt{\arcsin(ax)}\right)}{3456 a^3} + \frac{(15i-15)\sqrt{2}\sqrt{\pi}\,\mathrm{erf}\left(\left(\frac{1}{2}i - \frac{1}{2}\right)\sqrt{2}\sqrt{\arcsin(ax)}\right)}{128 a^3} - \frac{(15i+15)\sqrt{2}\sqrt{\pi}\,\mathrm{erf}\left(-\left(\frac{1}{2}i + \frac{1}{2}\right)\sqrt{2}\sqrt{\arcsin(ax)}\right)}{128 a^3} - \frac{5i\sqrt{\arcsin(ax)}e^{(3i \arcsin(ax))}}{288 a^3} + \frac{15i\sqrt{\arcsin(ax)}e^{(i \arcsin(ax))}}{32 a^3} - \frac{15i\sqrt{\arcsin(ax)}e^{(-i \arcsin(ax))}}{32 a^3} + \frac{5i\sqrt{\arcsin(ax)}e^{(-3i \arcsin(ax))}}{288 a^3}$$

```
[In] integrate(x^2*arcsin(a*x)^(5/2),x, algorithm="giac")
```

```
[Out] 1/24*I*arcsin(a*x)^(5/2)*e^(3*I*arcsin(a*x))/a^3 - 1/8*I*arcsin(a*x)^(5/2)*
e^(I*arcsin(a*x))/a^3 + 1/8*I*arcsin(a*x)^(5/2)*e^(-I*arcsin(a*x))/a^3 - 1/
24*I*arcsin(a*x)^(5/2)*e^(-3*I*arcsin(a*x))/a^3 - 5/144*arcsin(a*x)^(3/2)*e
^(3*I*arcsin(a*x))/a^3 + 5/16*arcsin(a*x)^(3/2)*e^(I*arcsin(a*x))/a^3 + 5/1
6*arcsin(a*x)^(3/2)*e^(-I*arcsin(a*x))/a^3 - 5/144*arcsin(a*x)^(3/2)*e^(-3*
I*arcsin(a*x))/a^3 - (5/3456*I - 5/3456)*sqrt(6)*sqrt(pi)*erf((1/2*I - 1/2)
*sqrt(6)*sqrt(arcsin(a*x)))/a^3 + (5/3456*I + 5/3456)*sqrt(6)*sqrt(pi)*erf(
-(1/2*I + 1/2)*sqrt(6)*sqrt(arcsin(a*x)))/a^3 + (15/128*I - 15/128)*sqrt(2)
*sqrt(pi)*erf((1/2*I - 1/2)*sqrt(2)*sqrt(arcsin(a*x)))/a^3 - (15/128*I + 15
/128)*sqrt(2)*sqrt(pi)*erf(-(1/2*I + 1/2)*sqrt(2)*sqrt(arcsin(a*x)))/a^3 -
5/288*I*sqrt(arcsin(a*x))*e^(3*I*arcsin(a*x))/a^3 + 15/32*I*sqrt(arcsin(a*x
))*e^(I*arcsin(a*x))/a^3 - 15/32*I*sqrt(arcsin(a*x))*e^(-I*arcsin(a*x))/a^3
 + 5/288*I*sqrt(arcsin(a*x))*e^(-3*I*arcsin(a*x))/a^3
```

Mupad [F(-1)]

Timed out.

$$\int x^2 \arcsin(ax)^{5/2}\,dx = \int x^2\,\mathrm{asin}(a\,x)^{5/2}\,dx$$

```
[In] int(x^2*asin(a*x)^(5/2),x)
[Out] int(x^2*asin(a*x)^(5/2), x)
```

3.89 $\int x \arcsin(ax)^{5/2} \, dx$

Optimal result

Integrand size = 10, antiderivative size = 119

$$\int x \arcsin(ax)^{5/2} \, dx = \frac{15\sqrt{\arcsin(ax)}}{64a^2} - \frac{15}{32}x^2\sqrt{\arcsin(ax)} + \frac{5x\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{8a} - \frac{\arcsin(ax)^{5/2}}{4a^2} + \frac{1}{2}x^2\arcsin(ax)^{5/2} - \frac{15\sqrt{\pi}\,\text{FresnelC}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{128a^2}$$

```
[Out] -1/4*arcsin(a*x)^(5/2)/a^2+1/2*x^2*arcsin(a*x)^(5/2)-15/128*FresnelC(2*arcs
in(a*x)^(1/2)/Pi^(1/2))*Pi^(1/2)/a^2+5/8*x*arcsin(a*x)^(3/2)*(-a^2*x^2+1)^(
1/2)/a+15/64*arcsin(a*x)^(1/2)/a^2-15/32*x^2*arcsin(a*x)^(1/2)
```

Rubi [A] (verified)

Time = 0.18 (sec) , antiderivative size = 119, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 7, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.700, Rules used = {4725, 4795, 4737, 4809, 3393, 3385, 3433}

$$\int x \arcsin(ax)^{5/2} \, dx = -\frac{15\sqrt{\pi}\,\text{FresnelC}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{128a^2} + \frac{5x\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{8a} - \frac{\arcsin(ax)^{5/2}}{4a^2} + \frac{15\sqrt{\arcsin(ax)}}{64a^2} + \frac{1}{2}x^2\arcsin(ax)^{5/2} - \frac{15}{32}x^2\sqrt{\arcsin(ax)}$$

```
[In] Int[x*ArcSin[a*x]^(5/2),x]
```

```
[Out] (15*Sqrt[ArcSin[a*x]])/(64*a^2) - (15*x^2*Sqrt[ArcSin[a*x]])/32 + (5*x*Sqrt
[1 - a^2*x^2]*ArcSin[a*x]^(3/2))/(8*a) - ArcSin[a*x]^(5/2)/(4*a^2) + (x^2*A
```

```
rcSin[a*x]^(5/2))/2 - (15*Sqrt[Pi]*FresnelC[(2*Sqrt[ArcSin[a*x]])/Sqrt[Pi]]
)/(128*a^2)
```

Rule 3385

```
Int[sin[Pi/2 + (e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> D
ist[2/d, Subst[Int[Cos[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d
, e, f}, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3393

```
Int[((c_.) + (d_.)*(x_))^(m_)*sin[(e_.) + (f_.)*(x_)]^(n_), x_Symbol] :> In
t[ExpandTrigReduce[(c + d*x)^m, Sin[e + f*x]^n, x], x] /; FreeQ[{c, d, e, f
, m}, x] && IGtQ[n, 1] && ( !RationalQ[m] || (GeQ[m, -1] && LtQ[m, 1]))
```

Rule 3433

```
Int[Cos[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelC[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4725

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^(m + 1)*((a + b*ArcSin[c*x])^n/(m + 1)), x] - Dist[b*c*(n/(m + 1)), Int[x^
(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*x^2]), x], x] /; FreeQ[{a
, b, c}, x] && IGtQ[m, 0] && GtQ[n, 0]
```

Rule 4737

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)/Sqrt[(d_) + (e_.)*(x_)^2], x_S
ymbol] :> Simp[(1/(b*c*(n + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]]*(a
 + b*ArcSin[c*x])^(n + 1), x] /; FreeQ[{a, b, c, d, e, n}, x] && EqQ[c^2*d
+ e, 0] && NeQ[n, -1]
```

Rule 4795

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_)*((d_) + (e_.
)*(x_)^2)^(p_), x_Symbol] :> Simp[f*(f*x)^(m - 1)*(d + e*x^2)^(p + 1)*((a +
 b*ArcSin[c*x])^n/(e*(m + 2*p + 1))), x] + (Dist[f^2*((m - 1)/(c^2*(m + 2*p
 + 1))), Int[(f*x)^(m - 2)*(d + e*x^2)^p*(a + b*ArcSin[c*x])^n, x], x] + Di
st[b*f*(n/(c*(m + 2*p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], Int[(f*x)
^(m - 1)*(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x]) /; Fr
eeQ[{a, b, c, d, e, f, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && IGtQ[m,
1] && NeQ[m + 2*p + 1, 0]
```

Rule 4809

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_.)*((d_) + (e_.)*(x_)^
2)^(p_.), x_Symbol] :> Dist[(1/(b*c^(m + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x
^2)^p], Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b]^(2*p + 1), x], x, a
 + b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, d, e, n}, x] && EqQ[c^2*d + e, 0]
&& IGtQ[2*p + 2, 0] && IGtQ[m, 0]
```

Rubi steps

$$\text{integral} = \frac{1}{2}x^2\arcsin(ax)^{5/2} - \frac{1}{4}(5a)\int \frac{x^2\arcsin(ax)^{3/2}}{\sqrt{1-a^2x^2}}\,dx$$

$$= \frac{5x\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{8a} + \frac{1}{2}x^2\arcsin(ax)^{5/2} - \frac{15}{16}\int x\sqrt{\arcsin(ax)}\,dx - \frac{5\int \frac{\arcsin(ax)^{3/2}}{\sqrt{1-a^2x^2}}\,dx}{8a}$$

$$= -\frac{15}{32}x^2\sqrt{\arcsin(ax)} + \frac{5x\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{8a} - \frac{\arcsin(ax)^{5/2}}{4a^2} + \frac{1}{2}x^2\arcsin(ax)^{5/2} + \frac{1}{64}(15a)\int \frac{x^2}{\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}\,dx$$

$$= -\frac{15}{32}x^2\sqrt{\arcsin(ax)} + \frac{5x\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{8a} - \frac{\arcsin(ax)^{5/2}}{4a^2} + \frac{1}{2}x^2\arcsin(ax)^{5/2} + \frac{15\text{Subst}\left(\int \frac{\sin^2(x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{64a^2}$$

$$= -\frac{15}{32}x^2\sqrt{\arcsin(ax)} + \frac{5x\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{8a} - \frac{\arcsin(ax)^{5/2}}{4a^2} + \frac{1}{2}x^2\arcsin(ax)^{5/2} + \frac{15\text{Subst}\left(\int \left(\frac{1}{2\sqrt{x}} - \frac{\cos(2x)}{2\sqrt{x}}\right)dx, x, \arcsin(ax)\right)}{64a^2}$$

$$= \frac{15\sqrt{\arcsin(ax)}}{64a^2} - \frac{15}{32}x^2\sqrt{\arcsin(ax)} + \frac{5x\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{8a} - \frac{\arcsin(ax)^{5/2}}{4a^2} + \frac{1}{2}x^2\arcsin(ax)^{5/2} - \frac{15\text{Subst}\left(\int \frac{\cos(2x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{128a^2}$$

$$= \frac{15\sqrt{\arcsin(ax)}}{64a^2} - \frac{15}{32}x^2\sqrt{\arcsin(ax)} + \frac{5x\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{8a} - \frac{\arcsin(ax)^{5/2}}{4a^2} + \frac{1}{2}x^2\arcsin(ax)^{5/2} - \frac{15\text{Subst}\left(\int \cos(2x^2)\,dx, x, \sqrt{\arcsin(ax)}\right)}{64a^2}$$

$$= \frac{15\sqrt{\arcsin(ax)}}{64a^2} - \frac{15}{32}x^2\sqrt{\arcsin(ax)} + \frac{5x\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{8a} - \frac{\arcsin(ax)^{5/2}}{4a^2} + \frac{1}{2}x^2\arcsin(ax)^{5/2} - \frac{15\sqrt{\pi}\,\text{FresnelC}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{128a^2}$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.02 (sec) , antiderivative size = 74, normalized size of antiderivative = 0.62

$$\int x\arcsin(ax)^{5/2}\,dx=\frac{i\left(\sqrt{-i\arcsin(ax)}\Gamma\left(\frac{7}{2},-2i\arcsin(ax)\right)-\sqrt{i\arcsin(ax)}\Gamma\left(\frac{7}{2},2i\arcsin(ax)\right)\right)}{32\sqrt{2}a^2\sqrt{\arcsin(ax)}}$$

```
[In] Integrate[x*ArcSin[a*x]^(5/2),x]
```

```
[Out] ((I/32)*(Sqrt[(-I)*ArcSin[a*x]]*Gamma[7/2, (-2*I)*ArcSin[a*x]] - Sqrt[I*Arc
Sin[a*x]]*Gamma[7/2, (2*I)*ArcSin[a*x]]))/(Sqrt[2]*a^2*Sqrt[ArcSin[a*x]])
```

Maple [A] (verified)

Time = 0.04 (sec) , antiderivative size = 79, normalized size of antiderivative = 0.66

method	result
default	$-\frac{32\arcsin(ax)^{\frac{5}{2}}\sqrt{\pi}\,\cos(2\arcsin(ax))-40\arcsin(ax)^{\frac{3}{2}}\sqrt{\pi}\,\sin(2\arcsin(ax))-30\sqrt{\arcsin(ax)}\,\sqrt{\pi}\,\cos(2\arcsin(ax))+15\pi\,\operatorname{FresnelC}\left(\right.}{128a^2\sqrt{\pi}}$

```
[In] int(x*arcsin(a*x)^(5/2),x,method=_RETURNVERBOSE)
```

```
[Out] -1/128/a^2/Pi^(1/2)*(32*arcsin(a*x)^(5/2)*Pi^(1/2)*cos(2*arcsin(a*x))-40*ar
csin(a*x)^(3/2)*Pi^(1/2)*sin(2*arcsin(a*x))-30*arcsin(a*x)^(1/2)*Pi^(1/2)*c
os(2*arcsin(a*x))+15*Pi*FresnelC(2*arcsin(a*x)^(1/2)/Pi^(1/2)))
```

Fricas [F(-2)]

Exception generated.

$$\int x\arcsin(ax)^{5/2}\,dx=\text{Exception raised: TypeError}$$

```
[In] integrate(x*arcsin(a*x)^(5/2),x, algorithm="fricas")
```

```
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int x \arcsin(ax)^{5/2}\,dx = \int x \operatorname{asin}^{\frac{5}{2}}(ax)\,dx$$

```
[In] integrate(x*asin(a*x)**(5/2),x)
[Out] Integral(x*asin(a*x)**(5/2), x)
```

Maxima [F(-2)]

Exception generated.

$$\int x \arcsin(ax)^{5/2}\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(x*arcsin(a*x)^(5/2),x, algorithm="maxima")
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 0.33 (sec) , antiderivative size = 143, normalized size of antiderivative = 1.20

$$\begin{aligned}\int x \arcsin(ax)^{5/2}\,dx = &-\frac{\arcsin(ax)^{\frac{5}{2}}e^{(2i\arcsin(ax))}}{8a^2} \\ &-\frac{\arcsin(ax)^{\frac{5}{2}}e^{(-2i\arcsin(ax))}}{8a^2}-\frac{5i\arcsin(ax)^{\frac{3}{2}}e^{(2i\arcsin(ax))}}{32a^2} \\ &+\frac{5i\arcsin(ax)^{\frac{3}{2}}e^{(-2i\arcsin(ax))}}{32a^2}+\frac{(15i+15)\sqrt{\pi}\operatorname{erf}\left((i-1)\sqrt{\arcsin(ax)}\right)}{512a^2} \\ &-\frac{(15i-15)\sqrt{\pi}\operatorname{erf}\left(-(i+1)\sqrt{\arcsin(ax)}\right)}{512a^2} \\ &+\frac{15\sqrt{\arcsin(ax)}e^{(2i\arcsin(ax))}}{128a^2}+\frac{15\sqrt{\arcsin(ax)}e^{(-2i\arcsin(ax))}}{128a^2}\end{aligned}$$

```
[In] integrate(x*arcsin(a*x)^(5/2),x, algorithm="giac")
[Out] -1/8*arcsin(a*x)^(5/2)*e^(2*I*arcsin(a*x))/a^2 - 1/8*arcsin(a*x)^(5/2)*e^(-
2*I*arcsin(a*x))/a^2 - 5/32*I*arcsin(a*x)^(3/2)*e^(2*I*arcsin(a*x))/a^2 + 5
/32*I*arcsin(a*x)^(3/2)*e^(-2*I*arcsin(a*x))/a^2 + (15/512*I + 15/512)*sqrt
(pi)*erf((I - 1)*sqrt(arcsin(a*x)))/a^2 - (15/512*I - 15/512)*sqrt(pi)*erf(
-(I + 1)*sqrt(arcsin(a*x)))/a^2 + 15/128*sqrt(arcsin(a*x))*e^(2*I*arcsin(a*
x))/a^2 + 15/128*sqrt(arcsin(a*x))*e^(-2*I*arcsin(a*x))/a^2
```

Mupad [F(-1)]

Timed out.

$$\int x \arcsin(ax)^{5/2} \, dx = \int x \operatorname{asin}(a\,x)^{5/2} \, dx$$

```
[In] int(x*asin(a*x)^(5/2),x)
[Out] int(x*asin(a*x)^(5/2), x)
```

3.90 $\int \arcsin(ax)^{5/2}\,dx$

Optimal result

Integrand size = 8, antiderivative size = 88

$$\int \arcsin(ax)^{5/2}\,dx = -\frac{15}{4}x\sqrt{\arcsin(ax)} + \frac{5\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{2a} + x\arcsin(ax)^{5/2} + \frac{15\sqrt{\frac{\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{4a}$$

```
[Out] x*arcsin(a*x)^(5/2)+15/8*FresnelS(2^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*2^(1/
2)*Pi^(1/2)/a+5/2*arcsin(a*x)^(3/2)*(-a^2*x^2+1)^(1/2)/a-15/4*x*arcsin(a*x)
^(1/2)
```

Rubi [A] (verified)

Time = 0.10 (sec) , antiderivative size = 88, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 5, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.625, Rules used = {4715, 4767, 4809, 3386, 3432}

$$\int \arcsin(ax)^{5/2}\,dx = \frac{5\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{2a} + \frac{15\sqrt{\frac{\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{4a} + x\arcsin(ax)^{5/2} - \frac{15}{4}x\sqrt{\arcsin(ax)}$$

```
[In] Int[ArcSin[a*x]^(5/2),x]
```

```
[Out] (-15*x*Sqrt[ArcSin[a*x]])/4 + (5*Sqrt[1 - a^2*x^2]*ArcSin[a*x]^(3/2))/(2*a)
 + x*ArcSin[a*x]^(5/2) + (15*Sqrt[Pi/2]*FresnelS[Sqrt[2/Pi]*Sqrt[ArcSin[a*x
]]])/(4*a)
```

Rule 3386

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[2/d
, Subst[Int[Sin[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d, e, f}
, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3432

```
Int[Sin[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelS[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4715

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.), x_Symbol] :> Simp[x*(a + b*Ar
cSin[c*x])^n, x] - Dist[b*c*n, Int[x*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 -
c^2*x^2]), x], x] /; FreeQ[{a, b, c}, x] && GtQ[n, 0]
```

Rule 4767

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)*((d_) + (e_.)*(x_)^2)^(p_
.), x_Symbol] :> Simp[(d + e*x^2)^(p + 1)*((a + b*ArcSin[c*x])^n/(2*e*(p +
1))), x] + Dist[b*(n/(2*c*(p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], In
t[(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x] /; FreeQ[{a,
b, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && NeQ[p, -1]
```

Rule 4809

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_.)*((d_) + (e_.)*(x_)^
2)^(p_.), x_Symbol] :> Dist[(1/(b*c^(m + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x
^2)^p], Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b]^(2*p + 1), x], x, a
 + b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, d, e, n}, x] && EqQ[c^2*d + e, 0]
&& IGtQ[2*p + 2, 0] && IGtQ[m, 0]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= x\arcsin(ax)^{5/2} - \frac{1}{2}(5a)\int \frac{x\arcsin(ax)^{3/2}}{\sqrt{1-a^2x^2}}\,dx \\
&= \frac{5\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{2a} + x\arcsin(ax)^{5/2} - \frac{15}{4}\int \sqrt{\arcsin(ax)}\,dx \\
&= -\frac{15}{4}x\sqrt{\arcsin(ax)} + \frac{5\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{2a} \\
&\quad + x\arcsin(ax)^{5/2} + \frac{1}{8}(15a)\int \frac{x}{\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}\,dx
\end{aligned}$$

$$= -\frac{15}{4}x\sqrt{\arcsin(ax)} + \frac{5\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{2a} + x\arcsin(ax)^{5/2} + \frac{15\text{Subst}\left(\int \frac{\sin(x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{8a}$$

$$= -\frac{15}{4}x\sqrt{\arcsin(ax)} + \frac{5\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{2a} + x\arcsin(ax)^{5/2} + \frac{15\text{Subst}\left(\int \sin\left(x^2\right)\,dx, x, \sqrt{\arcsin(ax)}\right)}{4a}$$

$$= -\frac{15}{4}x\sqrt{\arcsin(ax)} + \frac{5\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}{2a} + x\arcsin(ax)^{5/2} + \frac{15\sqrt{\frac{\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{4a}$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.03 (sec) , antiderivative size = 68, normalized size of antiderivative = 0.77

$$\int \arcsin(ax)^{5/2}\,dx = \frac{-\sqrt{-i\arcsin(ax)}\,\Gamma\left(\frac{7}{2}, -i\arcsin(ax)\right) - \sqrt{i\arcsin(ax)}\,\Gamma\left(\frac{7}{2}, i\arcsin(ax)\right)}{2a\sqrt{\arcsin(ax)}}$$

```
[In] Integrate[ArcSin[a*x]^(5/2),x]
```

```
[Out] (-(Sqrt[(-I)*ArcSin[a*x]]*Gamma[7/2, (-I)*ArcSin[a*x]]) - Sqrt[I*ArcSin[a*x
]]*Gamma[7/2, I*ArcSin[a*x]])/(2*a*Sqrt[ArcSin[a*x]])
```

Maple [A] (verified)

Time = 0.04 (sec) , antiderivative size = 88, normalized size of antiderivative = 1.00

method	result	siz
default	$\frac{\sqrt{2}\left(4\arcsin(ax)^{\frac{5}{2}}\sqrt{2}\,\sqrt{\pi}\,ax+10\arcsin(ax)^{\frac{3}{2}}\sqrt{2}\,\sqrt{\pi}\,\sqrt{-a^2x^2+1}-15\sqrt{2}\,\sqrt{\arcsin(ax)}\,\sqrt{\pi}\,ax+15\pi\ \text{FresnelS}\left(\frac{\sqrt{2}\,\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)\right)}{8a\sqrt{\pi}}$	88

```
[In] int(arcsin(a*x)^(5/2),x,method=_RETURNVERBOSE)
```

```
[Out] 1/8/a*2^(1/2)/Pi^(1/2)*(4*arcsin(a*x)^(5/2)*2^(1/2)*Pi^(1/2)*a*x+10*arcsin(
a*x)^(3/2)*2^(1/2)*Pi^(1/2)*(-a^2*x^2+1)^(1/2)-15*2^(1/2)*arcsin(a*x)^(1/2)
*Pi^(1/2)*a*x+15*Pi*FresnelS(2^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2)))
```

Fricas [F(-2)]

Exception generated.

$$\int \arcsin(ax)^{5/2}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate(arcsin(a*x)^(5/2),x, algorithm="fricas")
```

```
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int \arcsin(ax)^{5/2}\,dx = \int \operatorname{asin}^{\frac{5}{2}}(ax)\,dx$$

```
[In] integrate(asin(a*x)**(5/2),x)
```

```
[Out] Integral(asin(a*x)**(5/2), x)
```

Maxima [F(-2)]

Exception generated.

$$\int \arcsin(ax)^{5/2}\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(arcsin(a*x)^(5/2),x, algorithm="maxima")
```

```
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 0.34 (sec) , antiderivative size = 155, normalized size of antiderivative = 1.76

$$\int \arcsin(ax)^{5/2}\,dx = -\frac{i\arcsin(ax)^{\frac{5}{2}}e^{(i\arcsin(ax))}}{2a} + \frac{i\arcsin(ax)^{\frac{5}{2}}e^{(-i\arcsin(ax))}}{2a} + \frac{5\arcsin(ax)^{\frac{3}{2}}e^{(i\arcsin(ax))}}{4a} + \frac{5\arcsin(ax)^{\frac{3}{2}}e^{(-i\arcsin(ax))}}{4a} + \frac{(15i-15)\sqrt{2}\sqrt{\pi}\operatorname{erf}\left(\left(\frac{1}{2}i-\frac{1}{2}\right)\sqrt{2}\sqrt{\arcsin(ax)}\right)}{32a} - \frac{(15i+15)\sqrt{2}\sqrt{\pi}\operatorname{erf}\left(-\left(\frac{1}{2}i+\frac{1}{2}\right)\sqrt{2}\sqrt{\arcsin(ax)}\right)}{32a} + \frac{15i\sqrt{\arcsin(ax)}e^{(i\arcsin(ax))}}{8a} - \frac{15i\sqrt{\arcsin(ax)}e^{(-i\arcsin(ax))}}{8a}$$

```
[In] integrate(arcsin(a*x)^(5/2),x, algorithm="giac")
```

```
[Out] -1/2*I*arcsin(a*x)^(5/2)*e^(I*arcsin(a*x))/a + 1/2*I*arcsin(a*x)^(5/2)*e^(-
I*arcsin(a*x))/a + 5/4*arcsin(a*x)^(3/2)*e^(I*arcsin(a*x))/a + 5/4*arcsin(a
*x)^(3/2)*e^(-I*arcsin(a*x))/a + (15/32*I - 15/32)*sqrt(2)*sqrt(pi)*erf((1/
2*I - 1/2)*sqrt(2)*sqrt(arcsin(a*x)))/a - (15/32*I + 15/32)*sqrt(2)*sqrt(pi
)*erf(-(1/2*I + 1/2)*sqrt(2)*sqrt(arcsin(a*x)))/a + 15/8*I*sqrt(arcsin(a*x)
)*e^(I*arcsin(a*x))/a - 15/8*I*sqrt(arcsin(a*x))*e^(-I*arcsin(a*x))/a
```

Mupad [F(-1)]

Timed out.

$$\int \arcsin(ax)^{5/2}\,dx = \int \operatorname{asin}(a\,x)^{5/2}\,dx$$

```
[In] int(asin(a*x)^(5/2),x)
```

```
[Out] int(asin(a*x)^(5/2), x)
```

3.91 $\int \frac{\arcsin(ax)^{5/2}}{x}\,dx$

Optimal result

Integrand size = 12, antiderivative size = 12

$$\int \frac{\arcsin(ax)^{5/2}}{x}\,dx = \text{Int}\left(\frac{\arcsin(ax)^{5/2}}{x},x\right)$$

```
[Out] Unintegrable(arcsin(a*x)^(5/2)/x,x)
```

Rubi [N/A]

Not integrable

Time = 0.01 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\arcsin(ax)^{5/2}}{x}\,dx = \int \frac{\arcsin(ax)^{5/2}}{x}\,dx$$

```
[In] Int[ArcSin[a*x]^(5/2)/x,x]
[Out] Defer[Int][ArcSin[a*x]^(5/2)/x, x]
```

Rubi steps

$$\text{integral} = \int \frac{\arcsin(ax)^{5/2}}{x}\,dx$$

Mathematica [N/A]

Not integrable

Time = 0.17 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.17

$$\int \frac{\arcsin(ax)^{5/2}}{x}\,dx = \int \frac{\arcsin(ax)^{5/2}}{x}\,dx$$

```
[In] Integrate[ArcSin[a*x]^(5/2)/x,x]
[Out] Integrate[ArcSin[a*x]^(5/2)/x, x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.06 (sec) , antiderivative size = 10, normalized size of antiderivative = 0.83

$$\int \frac{\arcsin\left(ax\right)^{\frac{5}{2}}}{x}dx$$

```
[In] int(arcsin(a*x)^(5/2)/x,x)
[Out] int(arcsin(a*x)^(5/2)/x,x)
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{\arcsin(ax)^{5/2}}{x}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate(arcsin(a*x)^(5/2)/x,x, algorithm="fricas")
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [N/A]

Not integrable

Time = 17.63 (sec) , antiderivative size = 10, normalized size of antiderivative = 0.83

$$\int \frac{\arcsin(ax)^{5/2}}{x}\,dx = \int \frac{\operatorname{asin}^{\frac{5}{2}}\left(ax\right)}{x}\,dx$$

```
[In] integrate(asin(a*x)**(5/2)/x,x)
[Out] Integral(asin(a*x)**(5/2)/x, x)
```

Maxima [F(-2)]

Exception generated.

$$\int \frac{\arcsin(ax)^{5/2}}{x}\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(arcsin(a*x)^(5/2)/x,x, algorithm="maxima")
```

```
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [N/A]

Not integrable

Time = 0.55 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.00

$$\int \frac{\arcsin(ax)^{5/2}}{x}\,dx = \int \frac{\arcsin\left(ax\right)^{\frac{5}{2}}}{x}\,dx$$

```
[In] integrate(arcsin(a*x)^(5/2)/x,x, algorithm="giac")
```

```
[Out] integrate(arcsin(a*x)^(5/2)/x, x)
```

Mupad [N/A]

Not integrable

Time = 0.04 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.00

$$\int \frac{\arcsin(ax)^{5/2}}{x}\,dx = \int \frac{\mathrm{asin}(a\,x)^{5/2}}{x}\,dx$$

```
[In] int(asin(a*x)^(5/2)/x,x)
```

```
[Out] int(asin(a*x)^(5/2)/x, x)
```

3.92 $\int \frac{x^4}{\sqrt{\arcsin(ax)}}\,dx$

Optimal result

Integrand size = 12, antiderivative size = 106

$$\int \frac{x^4}{\sqrt{\arcsin(ax)}}\,dx=\frac{\sqrt{\frac{\pi}{2}}\,\text{FresnelC}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{4a^5}-\frac{\sqrt{\frac{3\pi}{2}}\,\text{FresnelC}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{8a^5}+\frac{\sqrt{\frac{\pi}{10}}\,\text{FresnelC}\left(\sqrt{\frac{10}{\pi}}\sqrt{\arcsin(ax)}\right)}{8a^5}$$

```
[Out] 1/80*FresnelC(10^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*10^(1/2)*Pi^(1/2)/a^5+1/
8*FresnelC(2^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*2^(1/2)*Pi^(1/2)/a^5-1/16*Fr
esnelC(6^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*6^(1/2)*Pi^(1/2)/a^5
```

Rubi [A] (verified)

Time = 0.07 (sec) , antiderivative size = 106, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 4, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.333, Rules used = {4731, 4491, 3385, 3433}

$$\int \frac{x^4}{\sqrt{\arcsin(ax)}}\,dx=\frac{\sqrt{\frac{\pi}{2}}\,\text{FresnelC}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{4a^5}-\frac{\sqrt{\frac{3\pi}{2}}\,\text{FresnelC}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{8a^5}+\frac{\sqrt{\frac{\pi}{10}}\,\text{FresnelC}\left(\sqrt{\frac{10}{\pi}}\sqrt{\arcsin(ax)}\right)}{8a^5}$$

```
[In] Int[x^4/Sqrt[ArcSin[a*x]],x]
```

```
[Out] (Sqrt[Pi/2]*FresnelC[Sqrt[2/Pi]*Sqrt[ArcSin[a*x]]])/(4*a^5) - (Sqrt[(3*Pi)/
2]*FresnelC[Sqrt[6/Pi]*Sqrt[ArcSin[a*x]]])/(8*a^5) + (Sqrt[Pi/10]*FresnelC[
Sqrt[10/Pi]*Sqrt[ArcSin[a*x]]])/(8*a^5)
```

Rule 3385

```
Int[sin[Pi/2 + (e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> D
ist[2/d, Subst[Int[Cos[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d
, e, f}, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3433

```
Int[Cos[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelC[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4491

```
Int[Cos[(a_.) + (b_.)*(x_)]^(p_.)*((c_.) + (d_.)*(x_))^(m_.)*Sin[(a_.) + (b
_.)*(x_)]^(n_.), x_Symbol] :> Int[ExpandTrigReduce[(c + d*x)^m, Sin[a + b*x
]^n*Cos[a + b*x]^p, x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && IG
tQ[p, 0]
```

Rule 4731

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Dist[1
/(b*c^(m + 1)), Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b], x], x, a +
 b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, n}, x] && IGtQ[m, 0]
```

Rubi steps

$$
\begin{aligned}
\text{integral} &= \frac{\text{Subst}\left(\int \frac{\cos(x)\sin^4(x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{a^5} \\
&= \frac{\text{Subst}\left(\int \left(\frac{\cos(x)}{8\sqrt{x}} - \frac{3\cos(3x)}{16\sqrt{x}} + \frac{\cos(5x)}{16\sqrt{x}}\right)\,dx, x, \arcsin(ax)\right)}{a^5} \\
&= \frac{\text{Subst}\left(\int \frac{\cos(5x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{16a^5} + \frac{\text{Subst}\left(\int \frac{\cos(x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{8a^5} \\
&\quad - \frac{3\text{Subst}\left(\int \frac{\cos(3x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{16a^5} \\
&= \frac{\text{Subst}\left(\int \cos\left(5x^2\right)\,dx, x, \sqrt{\arcsin(ax)}\right)}{8a^5} + \frac{\text{Subst}\left(\int \cos\left(x^2\right)\,dx, x, \sqrt{\arcsin(ax)}\right)}{4a^5} \\
&\quad - \frac{3\text{Subst}\left(\int \cos\left(3x^2\right)\,dx, x, \sqrt{\arcsin(ax)}\right)}{8a^5}
\end{aligned}
$$

$$= \frac{\sqrt{\frac{\pi}{2}}\,\text{FresnelC}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{4a^5} - \frac{\sqrt{\frac{3\pi}{2}}\,\text{FresnelC}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{8a^5} + \frac{\sqrt{\frac{\pi}{10}}\,\text{FresnelC}\left(\sqrt{\frac{10}{\pi}}\sqrt{\arcsin(ax)}\right)}{8a^5}$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.04 (sec) , antiderivative size = 193, normalized size of antiderivative = 1.82

$$\int \frac{x^4}{\sqrt{\arcsin(ax)}}\,dx = -\frac{i\left(10\sqrt{-i\arcsin(ax)}\Gamma\left(\frac{1}{2},-i\arcsin(ax)\right) - 10\sqrt{i\arcsin(ax)}\Gamma\left(\frac{1}{2},i\arcsin(ax)\right) - 5\sqrt{3}\sqrt{-i\arcsin(ax)}\Gamma\left(\frac{1}{2}\right.\right.}{}$$

```
[In] Integrate[x^4/Sqrt[ArcSin[a*x]],x]
```

```
[Out] ((-1/160*I)*(10*Sqrt[(-I)*ArcSin[a*x]]*Gamma[1/2, (-I)*ArcSin[a*x]] - 10*Sq
rt[I*ArcSin[a*x]]*Gamma[1/2, I*ArcSin[a*x]] - 5*Sqrt[3]*Sqrt[(-I)*ArcSin[a*
x]]*Gamma[1/2, (-3*I)*ArcSin[a*x]] + 5*Sqrt[3]*Sqrt[I*ArcSin[a*x]]*Gamma[1/
2, (3*I)*ArcSin[a*x]] + Sqrt[5]*Sqrt[(-I)*ArcSin[a*x]]*Gamma[1/2, (-5*I)*Ar
cSin[a*x]] - Sqrt[5]*Sqrt[I*ArcSin[a*x]]*Gamma[1/2, (5*I)*ArcSin[a*x]]))/(a
^5*Sqrt[ArcSin[a*x]])
```

Maple [A] (verified)

Time = 0.07 (sec) , antiderivative size = 72, normalized size of antiderivative = 0.68

method	result	size
default	$\frac{\sqrt{2}\sqrt{\pi}\left(\sqrt{5}\,\text{FresnelC}\left(\frac{\sqrt{2}\sqrt{5}\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)-5\sqrt{3}\,\text{FresnelC}\left(\frac{\sqrt{2}\sqrt{3}\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)+10\,\text{FresnelC}\left(\frac{\sqrt{2}\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)\right)}{80a^5}$	72

```
[In] int(x^4/arcsin(a*x)^(1/2),x,method=_RETURNVERBOSE)
```

```
[Out] 1/80/a^5*2^(1/2)*Pi^(1/2)*(5^(1/2)*FresnelC(2^(1/2)/Pi^(1/2)*5^(1/2)*arcsin
(a*x)^(1/2))-5*3^(1/2)*FresnelC(2^(1/2)/Pi^(1/2)*3^(1/2)*arcsin(a*x)^(1/2))
+10*FresnelC(2^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2)))
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{x^4}{\sqrt{\arcsin(ax)}}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate(x^4/arcsin(a*x)^(1/2),x, algorithm="fricas")
```

```
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int \frac{x^4}{\sqrt{\arcsin(ax)}}\,dx = \int \frac{x^4}{\sqrt{\operatorname{asin}(ax)}}\,dx$$

```
[In] integrate(x**4/asin(a*x)**(1/2),x)
```

```
[Out] Integral(x**4/sqrt(asin(a*x)), x)
```

Maxima [F(-2)]

Exception generated.

$$\int \frac{x^4}{\sqrt{\arcsin(ax)}}\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(x^4/arcsin(a*x)^(1/2),x, algorithm="maxima")
```

```
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 0.32 (sec) , antiderivative size = 139, normalized size of antiderivative = 1.31

$$\int \frac{x^4}{\sqrt{\arcsin(ax)}}\,dx = -\frac{(i+1)\,\sqrt{10}\sqrt{\pi}\,\text{erf}\left(\left(\frac{1}{2}i-\frac{1}{2}\right)\,\sqrt{10}\sqrt{\arcsin(ax)}\right)}{320\,a^5} + \frac{(i-1)\,\sqrt{10}\sqrt{\pi}\,\text{erf}\left(-\left(\frac{1}{2}i+\frac{1}{2}\right)\,\sqrt{10}\sqrt{\arcsin(ax)}\right)}{320\,a^5} + \frac{(i+1)\,\sqrt{6}\sqrt{\pi}\,\text{erf}\left(\left(\frac{1}{2}i-\frac{1}{2}\right)\,\sqrt{6}\sqrt{\arcsin(ax)}\right)}{64\,a^5} - \frac{(i-1)\,\sqrt{6}\sqrt{\pi}\,\text{erf}\left(-\left(\frac{1}{2}i+\frac{1}{2}\right)\,\sqrt{6}\sqrt{\arcsin(ax)}\right)}{64\,a^5} - \frac{(i+1)\,\sqrt{2}\sqrt{\pi}\,\text{erf}\left(\left(\frac{1}{2}i-\frac{1}{2}\right)\,\sqrt{2}\sqrt{\arcsin(ax)}\right)}{32\,a^5} + \frac{(i-1)\,\sqrt{2}\sqrt{\pi}\,\text{erf}\left(-\left(\frac{1}{2}i+\frac{1}{2}\right)\,\sqrt{2}\sqrt{\arcsin(ax)}\right)}{32\,a^5}$$

```
[In] integrate(x^4/arcsin(a*x)^(1/2),x, algorithm="giac")
```

```
[Out] -(1/320*I + 1/320)*sqrt(10)*sqrt(pi)*erf((1/2*I - 1/2)*sqrt(10)*sqrt(arcsin
(a*x)))/a^5 + (1/320*I - 1/320)*sqrt(10)*sqrt(pi)*erf(-(1/2*I + 1/2)*sqrt(1
0)*sqrt(arcsin(a*x)))/a^5 + (1/64*I + 1/64)*sqrt(6)*sqrt(pi)*erf((1/2*I - 1
/2)*sqrt(6)*sqrt(arcsin(a*x)))/a^5 - (1/64*I - 1/64)*sqrt(6)*sqrt(pi)*erf(-
(1/2*I + 1/2)*sqrt(6)*sqrt(arcsin(a*x)))/a^5 - (1/32*I + 1/32)*sqrt(2)*sqrt
(pi)*erf((1/2*I - 1/2)*sqrt(2)*sqrt(arcsin(a*x)))/a^5 + (1/32*I - 1/32)*sqr
t(2)*sqrt(pi)*erf(-(1/2*I + 1/2)*sqrt(2)*sqrt(arcsin(a*x)))/a^5
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x^4}{\sqrt{\arcsin(ax)}}\,dx = \int \frac{x^4}{\sqrt{\operatorname{asin}(a\,x)}}\,dx$$

```
[In] int(x^4/asin(a*x)^(1/2),x)
```

```
[Out] int(x^4/asin(a*x)^(1/2), x)
```

3.93 $\int \frac{x^3}{\sqrt{\arcsin(ax)}} \, dx$

Optimal result

Integrand size = 12, antiderivative size = 65

$$\int \frac{x^3}{\sqrt{\arcsin(ax)}} \, dx = -\frac{\sqrt{\frac{\pi}{2}} \operatorname{FresnelS}\left(2\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{8a^4} + \frac{\sqrt{\pi} \operatorname{FresnelS}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{4a^4}$$

```
[Out] -1/16*FresnelS(2*2^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*2^(1/2)*Pi^(1/2)/a^4+1
/4*FresnelS(2*arcsin(a*x)^(1/2)/Pi^(1/2))*Pi^(1/2)/a^4
```

Rubi [A] (verified)

Time = 0.05 (sec) , antiderivative size = 65, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 4, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.333, Rules used = {4731, 4491, 3386, 3432}

$$\int \frac{x^3}{\sqrt{\arcsin(ax)}} \, dx = \frac{\sqrt{\pi} \operatorname{FresnelS}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{4a^4} - \frac{\sqrt{\frac{\pi}{2}} \operatorname{FresnelS}\left(2\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{8a^4}$$

```
[In] Int[x^3/Sqrt[ArcSin[a*x]],x]
```

```
[Out] -1/8*(Sqrt[Pi/2]*FresnelS[2*Sqrt[2/Pi]*Sqrt[ArcSin[a*x]]])/a^4 + (Sqrt[Pi]*
FresnelS[(2*Sqrt[ArcSin[a*x]])/Sqrt[Pi]])/(4*a^4)
```

Rule 3386

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[2/d
, Subst[Int[Sin[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d, e, f}
, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3432

```
Int[Sin[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelS[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4491

```
Int[Cos[(a_.) + (b_.)*(x_)]^(p_.)*((c_.) + (d_.)*(x_))^(m_.)*Sin[(a_.) + (b
_.)*(x_)]^(n_.), x_Symbol] :> Int[ExpandTrigReduce[(c + d*x)^m, Sin[a + b*x
]^n*Cos[a + b*x]^p, x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && IG
tQ[p, 0]
```

Rule 4731

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Dist[1
/(b*c^(m + 1)), Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b], x], x, a +
 b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, n}, x] && IGtQ[m, 0]
```

Rubi steps

$$
\begin{aligned}
\text{integral} &= \frac{\text{Subst}\left(\int \frac{\cos(x)\sin^3(x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{a^4}\\
&= \frac{\text{Subst}\left(\int \left(\frac{\sin(2x)}{4\sqrt{x}} - \frac{\sin(4x)}{8\sqrt{x}}\right)\,dx, x, \arcsin(ax)\right)}{a^4}\\
&= -\frac{\text{Subst}\left(\int \frac{\sin(4x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{8a^4} + \frac{\text{Subst}\left(\int \frac{\sin(2x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{4a^4}\\
&= -\frac{\text{Subst}\left(\int \sin\left(4x^2\right)\,dx, x, \sqrt{\arcsin(ax)}\right)}{4a^4} + \frac{\text{Subst}\left(\int \sin\left(2x^2\right)\,dx, x, \sqrt{\arcsin(ax)}\right)}{2a^4}\\
&= -\frac{\sqrt{\frac{\pi}{2}}\,\text{FresnelS}\left(2\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{8a^4} + \frac{\sqrt{\pi}\,\text{FresnelS}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{4a^4}
\end{aligned}
$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.03 (sec) , antiderivative size = 128, normalized size of antiderivative = 1.97

$$
\int \frac{x^3}{\sqrt{\arcsin(ax)}}\,dx
= \frac{-2\sqrt{2}\sqrt{-i\arcsin(ax)}\Gamma\left(\frac{1}{2}, -2i\arcsin(ax)\right) - 2\sqrt{2}\sqrt{i\arcsin(ax)}\Gamma\left(\frac{1}{2}, 2i\arcsin(ax)\right) + \sqrt{-i\arcsin(ax)}\Gamma\left(\frac{1}{2}, \ldots\right.}{32a^4\sqrt{\arcsin(ax)}}
$$

[In] Integrate[x^3/Sqrt[ArcSin[a*x]],x]

[Out] (-2*Sqrt[2]*Sqrt[(-I)*ArcSin[a*x]]*Gamma[1/2, (-2*I)*ArcSin[a*x]] - 2*Sqrt[2]*Sqrt[I*ArcSin[a*x]]*Gamma[1/2, (2*I)*ArcSin[a*x]] + Sqrt[(-I)*ArcSin[a*x]]*Gamma[1/2, (-4*I)*ArcSin[a*x]] + Sqrt[I*ArcSin[a*x]]*Gamma[1/2, (4*I)*ArcSin[a*x]])/(32*a^4*Sqrt[ArcSin[a*x]])

Maple [A] (verified)

Time = 0.06 (sec) , antiderivative size = 44, normalized size of antiderivative = 0.68

method	result	size
default	$\frac{\sqrt{\pi}\left(-\sqrt{2}\,\operatorname{FresnelS}\left(\frac{2\sqrt{2}\,\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)+4\,\operatorname{FresnelS}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)\right)}{16a^4}$	44

[In] int(x^3/arcsin(a*x)^(1/2),x,method=_RETURNVERBOSE)

[Out] 1/16/a^4*Pi^(1/2)*(-2^(1/2)*FresnelS(2*2^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))+4*FresnelS(2*arcsin(a*x)^(1/2)/Pi^(1/2)))

Fricas [F(-2)]

Exception generated.

$$\int \frac{x^3}{\sqrt{\arcsin(ax)}}\,dx = \text{Exception raised: TypeError}$$

[In] integrate(x^3/arcsin(a*x)^(1/2),x, algorithm="fricas")

[Out] Exception raised: TypeError >> Error detected within library code: integrate: implementation incomplete (constant residues)

Sympy [F]

$$\int \frac{x^3}{\sqrt{\arcsin(ax)}}\,dx = \int \frac{x^3}{\sqrt{\operatorname{asin}(ax)}}\,dx$$

[In] integrate(x**3/asin(a*x)**(1/2),x)

[Out] Integral(x**3/sqrt(asin(a*x)), x)

Maxima [F(-2)]

Exception generated.

$$\int \frac{x^3}{\sqrt{\arcsin(ax)}}\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(x^3/arcsin(a*x)^(1/2),x, algorithm="maxima")
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 0.33 (sec) , antiderivative size = 81, normalized size of antiderivative = 1.25

$$\begin{aligned}\int \frac{x^3}{\sqrt{\arcsin(ax)}}\,dx = &-\frac{(i-1)\,\sqrt{2}\sqrt{\pi}\,\mathrm{erf}\left((i-1)\,\sqrt{2}\sqrt{\arcsin(ax)}\right)}{64\,a^4}\\ &+\frac{(i+1)\,\sqrt{2}\sqrt{\pi}\,\mathrm{erf}\left(-(i+1)\,\sqrt{2}\sqrt{\arcsin(ax)}\right)}{64\,a^4}\\ &+\frac{(i-1)\,\sqrt{\pi}\,\mathrm{erf}\left((i-1)\,\sqrt{\arcsin(ax)}\right)}{16\,a^4}\\ &-\frac{(i+1)\,\sqrt{\pi}\,\mathrm{erf}\left(-(i+1)\,\sqrt{\arcsin(ax)}\right)}{16\,a^4}\end{aligned}$$

```
[In] integrate(x^3/arcsin(a*x)^(1/2),x, algorithm="giac")
[Out] -(1/64*I - 1/64)*sqrt(2)*sqrt(pi)*erf((I - 1)*sqrt(2)*sqrt(arcsin(a*x)))/a^
4 + (1/64*I + 1/64)*sqrt(2)*sqrt(pi)*erf(-(I + 1)*sqrt(2)*sqrt(arcsin(a*x))
)/a^4 + (1/16*I - 1/16)*sqrt(pi)*erf((I - 1)*sqrt(arcsin(a*x)))/a^4 - (1/16
*I + 1/16)*sqrt(pi)*erf(-(I + 1)*sqrt(arcsin(a*x)))/a^4
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x^3}{\sqrt{\arcsin(ax)}}\,dx = \int \frac{x^3}{\sqrt{\mathrm{asin}\left(a\,x\right)}}\,dx$$

```
[In] int(x^3/asin(a*x)^(1/2),x)
[Out] int(x^3/asin(a*x)^(1/2), x)
```

3.94 $\int \frac{x^2}{\sqrt{\arcsin(ax)}}\,dx$

Optimal result

Integrand size = 12, antiderivative size = 71

$$\int \frac{x^2}{\sqrt{\arcsin(ax)}}\,dx = \frac{\sqrt{\frac{\pi}{2}}\,\text{FresnelC}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{2a^3} - \frac{\sqrt{\frac{\pi}{6}}\,\text{FresnelC}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{2a^3}$$

```
[Out] -1/12*FresnelC(6^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*6^(1/2)*Pi^(1/2)/a^3+1/4
*FresnelC(2^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*2^(1/2)*Pi^(1/2)/a^3
```

Rubi [A] (verified)

Time = 0.06 (sec) , antiderivative size = 71, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 4, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.333, Rules used = {4731, 4491, 3385, 3433}

$$\int \frac{x^2}{\sqrt{\arcsin(ax)}}\,dx = \frac{\sqrt{\frac{\pi}{2}}\,\text{FresnelC}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{2a^3} - \frac{\sqrt{\frac{\pi}{6}}\,\text{FresnelC}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{2a^3}$$

```
[In] Int[x^2/Sqrt[ArcSin[a*x]],x]
```

```
[Out] (Sqrt[Pi/2]*FresnelC[Sqrt[2/Pi]*Sqrt[ArcSin[a*x]]])/(2*a^3) - (Sqrt[Pi/6]*F
resnelC[Sqrt[6/Pi]*Sqrt[ArcSin[a*x]]])/(2*a^3)
```

Rule 3385

```
Int[sin[Pi/2 + (e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> D
ist[2/d, Subst[Int[Cos[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d
, e, f}, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3433

```
Int[Cos[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelC[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4491

```
Int[Cos[(a_.) + (b_.)*(x_)]^(p_.)*((c_.) + (d_.)*(x_))^(m_.)*Sin[(a_.) + (b
_.)*(x_)]^(n_.), x_Symbol] :> Int[ExpandTrigReduce[(c + d*x)^m, Sin[a + b*x
]^n*Cos[a + b*x]^p, x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && IG
tQ[p, 0]
```

Rule 4731

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Dist[1
/(b*c^(m + 1)), Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b], x], x, a +
 b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, n}, x] && IGtQ[m, 0]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= \frac{\text{Subst}\left(\int \frac{\cos(x)\sin^2(x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{a^3}\\
&= \frac{\text{Subst}\left(\int \left(\frac{\cos(x)}{4\sqrt{x}} - \frac{\cos(3x)}{4\sqrt{x}}\right)\,dx, x, \arcsin(ax)\right)}{a^3}\\
&= \frac{\text{Subst}\left(\int \frac{\cos(x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{4a^3} - \frac{\text{Subst}\left(\int \frac{\cos(3x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{4a^3}\\
&= \frac{\text{Subst}\left(\int \cos\left(x^2\right)\,dx, x, \sqrt{\arcsin(ax)}\right)}{2a^3} - \frac{\text{Subst}\left(\int \cos\left(3x^2\right)\,dx, x, \sqrt{\arcsin(ax)}\right)}{2a^3}\\
&= \frac{\sqrt{\frac{\pi}{2}}\,\text{FresnelC}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{2a^3} - \frac{\sqrt{\frac{\pi}{6}}\,\text{FresnelC}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{2a^3}
\end{aligned}$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.04 (sec) , antiderivative size = 128, normalized size of antiderivative = 1.80

$$\int \frac{x^2}{\sqrt{\arcsin(ax)}}\,dx = -\frac{i\left(3\sqrt{-i\arcsin(ax)}\,\Gamma\left(\frac{1}{2}, -i\arcsin(ax)\right) - 3\sqrt{i\arcsin(ax)}\,\Gamma\left(\frac{1}{2}, i\arcsin(ax)\right) + \sqrt{3}\left(-\sqrt{-i\arcsin(ax)}\,\Gamma\left(\frac{1}{2}\right.\right.\right.}{24a^3\sqrt{\arcsin(ax)}}$$

```
[In] Integrate[x^2/Sqrt[ArcSin[a*x]],x]
```

```
[Out] ((-1/24*I)*(3*Sqrt[(-I)*ArcSin[a*x]]*Gamma[1/2, (-I)*ArcSin[a*x]] - 3*Sqrt[
I*ArcSin[a*x]]*Gamma[1/2, I*ArcSin[a*x]] + Sqrt[3]*(-(Sqrt[(-I)*ArcSin[a*x]
]*Gamma[1/2, (-3*I)*ArcSin[a*x]]) + Sqrt[I*ArcSin[a*x]]*Gamma[1/2, (3*I)*Ar
cSin[a*x]])))/(a^3*Sqrt[ArcSin[a*x]])
```

Maple [A] (verified)

Time = 0.05 (sec) , antiderivative size = 51, normalized size of antiderivative = 0.72

method	result	size
default	$\frac{\sqrt{2}\,\sqrt{\pi}\,\left(-\sqrt{3}\,\operatorname{FresnelC}\left(\frac{\sqrt{2}\,\sqrt{3}\,\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)+3\,\operatorname{FresnelC}\left(\frac{\sqrt{2}\,\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)\right)}{12a^{3}}$	51

```
[In] int(x^2/arcsin(a*x)^(1/2),x,method=_RETURNVERBOSE)
```

```
[Out] 1/12/a^3*2^(1/2)*Pi^(1/2)*(-3^(1/2)*FresnelC(2^(1/2)/Pi^(1/2)*3^(1/2)*arcsi
n(a*x)^(1/2))+3*FresnelC(2^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2)))
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{x^2}{\sqrt{\arcsin(ax)}}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate(x^2/arcsin(a*x)^(1/2),x, algorithm="fricas")
```

```
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int \frac{x^2}{\sqrt{\arcsin(ax)}}\,dx = \int \frac{x^2}{\sqrt{\operatorname{asin}(ax)}}\,dx$$

```
[In] integrate(x**2/asin(a*x)**(1/2),x)
```

```
[Out] Integral(x**2/sqrt(asin(a*x)), x)
```

Maxima [F(-2)]

Exception generated.

$$\int \frac{x^2}{\sqrt{\arcsin(ax)}}\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(x^2/arcsin(a*x)^(1/2),x, algorithm="maxima")
```

```
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 0.31 (sec) , antiderivative size = 93, normalized size of antiderivative = 1.31

$$\int \frac{x^2}{\sqrt{\arcsin(ax)}}\,dx = \frac{(i+1)\sqrt{6}\sqrt{\pi}\,\mathrm{erf}\left(\left(\frac{1}{2}i-\frac{1}{2}\right)\sqrt{6}\sqrt{\arcsin(ax)}\right)}{48\,a^3} - \frac{(i-1)\sqrt{6}\sqrt{\pi}\,\mathrm{erf}\left(-\left(\frac{1}{2}i+\frac{1}{2}\right)\sqrt{6}\sqrt{\arcsin(ax)}\right)}{48\,a^3} - \frac{(i+1)\sqrt{2}\sqrt{\pi}\,\mathrm{erf}\left(\left(\frac{1}{2}i-\frac{1}{2}\right)\sqrt{2}\sqrt{\arcsin(ax)}\right)}{16\,a^3} + \frac{(i-1)\sqrt{2}\sqrt{\pi}\,\mathrm{erf}\left(-\left(\frac{1}{2}i+\frac{1}{2}\right)\sqrt{2}\sqrt{\arcsin(ax)}\right)}{16\,a^3}$$

```
[In] integrate(x^2/arcsin(a*x)^(1/2),x, algorithm="giac")
```

```
[Out] (1/48*I + 1/48)*sqrt(6)*sqrt(pi)*erf((1/2*I - 1/2)*sqrt(6)*sqrt(arcsin(a*x)
))/a^3 - (1/48*I - 1/48)*sqrt(6)*sqrt(pi)*erf(-(1/2*I + 1/2)*sqrt(6)*sqrt(a
rcsin(a*x)))/a^3 - (1/16*I + 1/16)*sqrt(2)*sqrt(pi)*erf((1/2*I - 1/2)*sqrt(
2)*sqrt(arcsin(a*x)))/a^3 + (1/16*I - 1/16)*sqrt(2)*sqrt(pi)*erf(-(1/2*I +
1/2)*sqrt(2)*sqrt(arcsin(a*x)))/a^3
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x^2}{\sqrt{\arcsin(ax)}}\,dx = \int \frac{x^2}{\sqrt{\operatorname{asin}\left(a\,x\right)}}\,dx$$

```
[In] int(x^2/asin(a*x)^(1/2),x)
[Out] int(x^2/asin(a*x)^(1/2), x)
```

3.95 $\int \frac{x}{\sqrt{\arcsin(ax)}}\,dx$

Optimal result

Integrand size = 10, antiderivative size = 28

$$\int \frac{x}{\sqrt{\arcsin(ax)}}\,dx=\frac{\sqrt{\pi}\,\text{FresnelS}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{2a^2}$$

```
[Out] 1/2*FresnelS(2*arcsin(a*x)^(1/2)/Pi^(1/2))*Pi^(1/2)/a^2
```

Rubi [A] (verified)

Time = 0.03 (sec) , antiderivative size = 28, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {4731, 4491, 12, 3386, 3432}

$$\int \frac{x}{\sqrt{\arcsin(ax)}}\,dx=\frac{\sqrt{\pi}\,\text{FresnelS}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{2a^2}$$

```
[In] Int[x/Sqrt[ArcSin[a*x]],x]
```

```
[Out] (Sqrt[Pi]*FresnelS[(2*Sqrt[ArcSin[a*x]])/Sqrt[Pi]])/(2*a^2)
```

Rule 12

```
Int[(a_)*(u_), x_Symbol] :> Dist[a, Int[u, x], x] /; FreeQ[a, x] && !Match
Q[u, (b_)*(v_) /; FreeQ[b, x]]
```

Rule 3386

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[2/d
, Subst[Int[Sin[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d, e, f}
```

```
, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3432

```
Int[Sin[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelS[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4491

```
Int[Cos[(a_.) + (b_.)*(x_)]^(p_.)*((c_.) + (d_.)*(x_))^(m_.)*Sin[(a_.) + (b
_.)*(x_)]^(n_.), x_Symbol] :> Int[ExpandTrigReduce[(c + d*x)^m, Sin[a + b*x
]^n*Cos[a + b*x]^p, x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && IG
tQ[p, 0]
```

Rule 4731

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Dist[1
/(b*c^(m + 1)), Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b], x], x, a +
 b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, n}, x] && IGtQ[m, 0]
```

Rubi steps

$$
\begin{aligned}
\text{integral} &= \frac{\text{Subst}\left(\int \frac{\cos(x)\sin(x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{a^2}\\
&= \frac{\text{Subst}\left(\int \frac{\sin(2x)}{2\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{a^2}\\
&= \frac{\text{Subst}\left(\int \frac{\sin(2x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{2a^2}\\
&= \frac{\text{Subst}\left(\int \sin\left(2x^2\right)\,dx, x, \sqrt{\arcsin(ax)}\right)}{a^2}\\
&= \frac{\sqrt{\pi}\,\text{FresnelS}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{2a^2}
\end{aligned}
$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.01 (sec) , antiderivative size = 71, normalized size of antiderivative = 2.54

$$\int \frac{x}{\sqrt{\arcsin(ax)}}\,dx$$
$$= -\frac{\sqrt{-i\arcsin(ax)}\Gamma\left(\frac{1}{2},-2i\arcsin(ax)\right)+\sqrt{i\arcsin(ax)}\Gamma\left(\frac{1}{2},2i\arcsin(ax)\right)}{4\sqrt{2}a^2\sqrt{\arcsin(ax)}}$$

```
[In] Integrate[x/Sqrt[ArcSin[a*x]],x]
[Out] -1/4*(Sqrt[(-I)*ArcSin[a*x]]*Gamma[1/2, (-2*I)*ArcSin[a*x]] + Sqrt[I*ArcSin
[a*x]]*Gamma[1/2, (2*I)*ArcSin[a*x]])/(Sqrt[2]*a^2*Sqrt[ArcSin[a*x]])
```

Maple [A] (verified)

Time = 0.03 (sec) , antiderivative size = 21, normalized size of antiderivative = 0.75

method	result	size
default	$\frac{\operatorname{FresnelS}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)\sqrt{\pi}}{2a^2}$	21

```
[In] int(x/arcsin(a*x)^(1/2),x,method=_RETURNVERBOSE)
[Out] 1/2*FresnelS(2*arcsin(a*x)^(1/2)/Pi^(1/2))*Pi^(1/2)/a^2
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{x}{\sqrt{\arcsin(ax)}}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate(x/arcsin(a*x)^(1/2),x, algorithm="fricas")
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int \frac{x}{\sqrt{\arcsin(ax)}}\,dx = \int \frac{x}{\sqrt{\operatorname{asin}(ax)}}\,dx$$

```
[In] integrate(x/asin(a*x)**(1/2),x)
```

```
[Out] Integral(x/sqrt(asin(a*x)), x)
```

Maxima [F(-2)]

Exception generated.

$$\int \frac{x}{\sqrt{\arcsin(ax)}}\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(x/arcsin(a*x)^(1/2),x, algorithm="maxima")
```

```
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 0.30 (sec) , antiderivative size = 35, normalized size of antiderivative = 1.25

$$\int \frac{x}{\sqrt{\arcsin(ax)}}\,dx = \frac{(i-1)\,\sqrt{\pi}\operatorname{erf}\left((i-1)\,\sqrt{\arcsin(ax)}\right)}{8\,a^2} - \frac{(i+1)\,\sqrt{\pi}\operatorname{erf}\left(-(i+1)\,\sqrt{\arcsin(ax)}\right)}{8\,a^2}$$

```
[In] integrate(x/arcsin(a*x)^(1/2),x, algorithm="giac")
```

```
[Out] (1/8*I - 1/8)*sqrt(pi)*erf((I - 1)*sqrt(arcsin(a*x)))/a^2 - (1/8*I + 1/8)*s
qrt(pi)*erf(-(I + 1)*sqrt(arcsin(a*x)))/a^2
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x}{\sqrt{\arcsin(ax)}}\,dx = \int \frac{x}{\sqrt{\mathrm{asin}\,(a\,x)}}\,dx$$

```
[In] int(x/asin(a*x)^(1/2),x)
[Out] int(x/asin(a*x)^(1/2), x)
```

3.96 $\int \frac{1}{\sqrt{\arcsin(ax)}}\,dx$

Optimal result

Integrand size = 8, antiderivative size = 30

$$\int \frac{1}{\sqrt{\arcsin(ax)}}\,dx = \frac{\sqrt{2\pi}\,\text{FresnelC}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{a}$$

```
[Out] FresnelC(2^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*2^(1/2)*Pi^(1/2)/a
```

Rubi [A] (verified)

Time = 0.02 (sec) , antiderivative size = 30, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {4719, 3385, 3433}

$$\int \frac{1}{\sqrt{\arcsin(ax)}}\,dx = \frac{\sqrt{2\pi}\,\text{FresnelC}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{a}$$

```
[In] Int[1/Sqrt[ArcSin[a*x]],x]
```

```
[Out] (Sqrt[2*Pi]*FresnelC[Sqrt[2/Pi]*Sqrt[ArcSin[a*x]]])/a
```

Rule 3385

```
Int[sin[Pi/2 + (e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> D
ist[2/d, Subst[Int[Cos[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d
, e, f}, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3433

```
Int[Cos[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelC[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4719

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_), x_Symbol] :> Dist[1/(b*c), Sub
st[Int[x^n*Cos[-a/b + x/b], x], x, a + b*ArcSin[c*x]], x] /; FreeQ[{a, b, c
, n}, x]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= \frac{\text{Subst}\left(\int \frac{\cos(x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{a} \\
&= \frac{2\text{Subst}\left(\int \cos\left(x^2\right)\,dx, x, \sqrt{\arcsin(ax)}\right)}{a} \\
&= \frac{\sqrt{2\pi}\,\text{FresnelC}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{a}
\end{aligned}$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.02 (sec) , antiderivative size = 69, normalized size of antiderivative = 2.30

$$\int \frac{1}{\sqrt{\arcsin(ax)}}\,dx = -\frac{i\left(\sqrt{-i\arcsin(ax)}\,\Gamma\left(\frac{1}{2}, -i\arcsin(ax)\right) - \sqrt{i\arcsin(ax)}\,\Gamma\left(\frac{1}{2}, i\arcsin(ax)\right)\right)}{2a\sqrt{\arcsin(ax)}}$$

```
[In] Integrate[1/Sqrt[ArcSin[a*x]],x]
[Out] ((-1/2*I)*(Sqrt[(-I)*ArcSin[a*x]]*Gamma[1/2, (-I)*ArcSin[a*x]] - Sqrt[I*Arc
Sin[a*x]]*Gamma[1/2, I*ArcSin[a*x]]))/(a*Sqrt[ArcSin[a*x]])
```

Maple [A] (verified)

Time = 0.03 (sec) , antiderivative size = 25, normalized size of antiderivative = 0.83

method	result	size
default	$\frac{\text{FresnelC}\left(\frac{\sqrt{2}\,\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)\sqrt{2}\,\sqrt{\pi}}{a}$	25

```
[In] int(1/arcsin(a*x)^(1/2),x,method=_RETURNVERBOSE)
[Out] FresnelC(2^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*2^(1/2)*Pi^(1/2)/a
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{1}{\sqrt{\arcsin(ax)}}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate(1/arcsin(a*x)^(1/2),x, algorithm="fricas")
```

```
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int \frac{1}{\sqrt{\arcsin(ax)}}\,dx = \int \frac{1}{\sqrt{\operatorname{asin}(ax)}}\,dx$$

```
[In] integrate(1/asin(a*x)**(1/2),x)
```

```
[Out] Integral(1/sqrt(asin(a*x)), x)
```

Maxima [F(-2)]

Exception generated.

$$\int \frac{1}{\sqrt{\arcsin(ax)}}\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(1/arcsin(a*x)^(1/2),x, algorithm="maxima")
```

```
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 0.31 (sec) , antiderivative size = 47, normalized size of antiderivative = 1.57

$$\int \frac{1}{\sqrt{\arcsin(ax)}}\,dx = -\frac{(i+1)\,\sqrt{2}\sqrt{\pi}\operatorname{erf}\left(\left(\frac{1}{2}i-\frac{1}{2}\right)\,\sqrt{2}\sqrt{\arcsin\left(ax\right)}\right)}{4\,a} + \frac{(i-1)\,\sqrt{2}\sqrt{\pi}\operatorname{erf}\left(-\left(\frac{1}{2}i+\frac{1}{2}\right)\,\sqrt{2}\sqrt{\arcsin\left(ax\right)}\right)}{4\,a}$$

```
[In] integrate(1/arcsin(a*x)^(1/2),x, algorithm="giac")
```

```
[Out] -(1/4*I + 1/4)*sqrt(2)*sqrt(pi)*erf((1/2*I - 1/2)*sqrt(2)*sqrt(arcsin(a*x))
)/a + (1/4*I - 1/4)*sqrt(2)*sqrt(pi)*erf(-(1/2*I + 1/2)*sqrt(2)*sqrt(arcsin
(a*x)))/a
```

Mupad [F(-1)]

Timed out.

$$\int \frac{1}{\sqrt{\arcsin(ax)}}\,dx = \int \frac{1}{\sqrt{\mathrm{asin}\left(a\,x\right)}}\,dx$$

```
[In] int(1/asin(a*x)^(1/2),x)
```

```
[Out] int(1/asin(a*x)^(1/2), x)
```

3.97 $\int \frac{1}{x\sqrt{\arcsin(ax)}}\,dx$

Optimal result

Integrand size = 12, antiderivative size = 12

$$\int \frac{1}{x\sqrt{\arcsin(ax)}}\,dx = \text{Int}\left(\frac{1}{x\sqrt{\arcsin(ax)}},x\right)$$

```
[Out] Unintegrable(1/x/arcsin(a*x)^(1/2),x)
```

Rubi [N/A]

Not integrable

Time = 0.01 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}} = 0.000$, Rules used = {}

$$\int \frac{1}{x\sqrt{\arcsin(ax)}}\,dx = \int \frac{1}{x\sqrt{\arcsin(ax)}}\,dx$$

```
[In] Int[1/(x*Sqrt[ArcSin[a*x]]),x]
[Out] Defer[Int][1/(x*Sqrt[ArcSin[a*x]]), x]
```

Rubi steps

$$\text{integral} = \int \frac{1}{x\sqrt{\arcsin(ax)}}\,dx$$

Mathematica [N/A]

Not integrable

Time = 0.18 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.17

$$\int \frac{1}{x\sqrt{\arcsin(ax)}}\,dx = \int \frac{1}{x\sqrt{\arcsin(ax)}}\,dx$$

```
[In] Integrate[1/(x*Sqrt[ArcSin[a*x]]),x]
[Out] Integrate[1/(x*Sqrt[ArcSin[a*x]]), x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.06 (sec) , antiderivative size = 10, normalized size of antiderivative = 0.83

$$\int \frac{1}{x\sqrt{\arcsin\left(ax\right)}}dx$$

```
[In] int(1/x/arcsin(a*x)^(1/2),x)
[Out] int(1/x/arcsin(a*x)^(1/2),x)
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{1}{x\sqrt{\arcsin(ax)}}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate(1/x/arcsin(a*x)^(1/2),x, algorithm="fricas")
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [N/A]

Not integrable

Time = 0.36 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.00

$$\int \frac{1}{x\sqrt{\arcsin(ax)}}\,dx = \int \frac{1}{x\sqrt{\operatorname{asin}\left(ax\right)}}\,dx$$

```
[In] integrate(1/x/asin(a*x)**(1/2),x)
[Out] Integral(1/(x*sqrt(asin(a*x))), x)
```

Maxima [F(-2)]

Exception generated.

$$\int \frac{1}{x\sqrt{\arcsin(ax)}}\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(1/x/arcsin(a*x)^(1/2),x, algorithm="maxima")
```

```
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [N/A]

Not integrable

Time = 0.38 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.00

$$\int \frac{1}{x\sqrt{\arcsin(ax)}}\,dx = \int \frac{1}{x\sqrt{\arcsin{(ax)}}}\,dx$$

```
[In] integrate(1/x/arcsin(a*x)^(1/2),x, algorithm="giac")
```

```
[Out] integrate(1/(x*sqrt(arcsin(a*x))), x)
```

Mupad [N/A]

Not integrable

Time = 0.04 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.00

$$\int \frac{1}{x\sqrt{\arcsin(ax)}}\,dx = \int \frac{1}{x\,\sqrt{\mathrm{asin}\left(a\,x\right)}}\,dx$$

```
[In] int(1/(x*asin(a*x)^(1/2)),x)
```

```
[Out] int(1/(x*asin(a*x)^(1/2)), x)
```

3.98 $\int \frac{1}{x^2\sqrt{\arcsin(ax)}}\,dx$

Optimal result

Integrand size = 12, antiderivative size = 12

$$\int \frac{1}{x^2\sqrt{\arcsin(ax)}}\,dx = \text{Int}\left(\frac{1}{x^2\sqrt{\arcsin(ax)}},x\right)$$

```
[Out] Unintegrable(1/x^2/arcsin(a*x)^(1/2),x)
```

Rubi [N/A]

Not integrable

Time = 0.01 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{1}{x^2\sqrt{\arcsin(ax)}}\,dx = \int \frac{1}{x^2\sqrt{\arcsin(ax)}}\,dx$$

```
[In] Int[1/(x^2*Sqrt[ArcSin[a*x]]),x]
```

```
[Out] Defer[Int][1/(x^2*Sqrt[ArcSin[a*x]]), x]
```

Rubi steps

$$\text{integral} = \int \frac{1}{x^2\sqrt{\arcsin(ax)}}\,dx$$

Mathematica [N/A]

Not integrable

Time = 2.29 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.17

$$\int \frac{1}{x^2\sqrt{\arcsin(ax)}}\,dx = \int \frac{1}{x^2\sqrt{\arcsin(ax)}}\,dx$$

```
[In] Integrate[1/(x^2*Sqrt[ArcSin[a*x]]),x]
[Out] Integrate[1/(x^2*Sqrt[ArcSin[a*x]]), x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.07 (sec) , antiderivative size = 10, normalized size of antiderivative = 0.83

$$\int \frac{1}{x^2\sqrt{\arcsin(ax)}}dx$$

```
[In] int(1/x^2/arcsin(a*x)^(1/2),x)
[Out] int(1/x^2/arcsin(a*x)^(1/2),x)
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{1}{x^2\sqrt{\arcsin(ax)}}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate(1/x^2/arcsin(a*x)^(1/2),x, algorithm="fricas")
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [N/A]

Not integrable

Time = 0.49 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.17

$$\int \frac{1}{x^2\sqrt{\arcsin(ax)}}\,dx = \int \frac{1}{x^2\sqrt{\operatorname{asin}(ax)}}\,dx$$

```
[In] integrate(1/x**2/asin(a*x)**(1/2),x)
[Out] Integral(1/(x**2*sqrt(asin(a*x))), x)
```

Maxima [F(-2)]

Exception generated.

$$\int \frac{1}{x^2\sqrt{\arcsin(ax)}}\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(1/x^2/arcsin(a*x)^(1/2),x, algorithm="maxima")
```

```
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [N/A]

Not integrable

Time = 0.40 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.00

$$\int \frac{1}{x^2\sqrt{\arcsin(ax)}}\,dx = \int \frac{1}{x^2\sqrt{\arcsin{(ax)}}}\,dx$$

```
[In] integrate(1/x^2/arcsin(a*x)^(1/2),x, algorithm="giac")
```

```
[Out] integrate(1/(x^2*sqrt(arcsin(a*x))), x)
```

Mupad [N/A]

Not integrable

Time = 0.04 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.00

$$\int \frac{1}{x^2\sqrt{\arcsin(ax)}}\,dx = \int \frac{1}{x^2\,\sqrt{\mathrm{asin}\left(a\,x\right)}}\,dx$$

```
[In] int(1/(x^2*asin(a*x)^(1/2)),x)
```

```
[Out] int(1/(x^2*asin(a*x)^(1/2)), x)
```

3.99 $\int \frac{x^6}{\arcsin(ax)^{3/2}}\,dx$

Optimal result

Integrand size = 12, antiderivative size = 171

$$\int \frac{x^6}{\arcsin(ax)^{3/2}}\,dx = -\frac{2x^6\sqrt{1-a^2x^2}}{a\sqrt{\arcsin(ax)}} - \frac{5\sqrt{\frac{\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{16a^7} + \frac{9\sqrt{\frac{3\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{16a^7} - \frac{5\sqrt{\frac{5\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{10}{\pi}}\sqrt{\arcsin(ax)}\right)}{16a^7} + \frac{\sqrt{\frac{7\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{14}{\pi}}\sqrt{\arcsin(ax)}\right)}{16a^7}$$

```
[Out] -5/32*FresnelS(2^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*2^(1/2)*Pi^(1/2)/a^7+9/3
2*FresnelS(6^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*6^(1/2)*Pi^(1/2)/a^7-5/32*Fr
esnelS(10^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*10^(1/2)*Pi^(1/2)/a^7+1/32*Fres
nelS(14^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*14^(1/2)*Pi^(1/2)/a^7-2*x^6*(-a^2
*x^2+1)^(1/2)/a/arcsin(a*x)^(1/2)
```

Rubi [A] (verified)

Time = 0.09 (sec) , antiderivative size = 171, normalized size of antiderivative = 1.00, number of steps used = 10, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.250, Rules used

$= \{4727, 3386, 3432\}$

$$\int \frac{x^6}{\arcsin(ax)^{3/2}}\,dx = -\frac{5\sqrt{\frac{\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{16a^7} + \frac{9\sqrt{\frac{3\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{16a^7} - \frac{5\sqrt{\frac{5\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{10}{\pi}}\sqrt{\arcsin(ax)}\right)}{16a^7} + \frac{\sqrt{\frac{7\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{14}{\pi}}\sqrt{\arcsin(ax)}\right)}{16a^7} - \frac{2x^6\sqrt{1-a^2x^2}}{a\sqrt{\arcsin(ax)}}$$

```
[In] Int[x^6/ArcSin[a*x]^(3/2),x]
```

```
[Out] (-2*x^6*Sqrt[1 - a^2*x^2])/(a*Sqrt[ArcSin[a*x]]) - (5*Sqrt[Pi/2]*FresnelS[S
qrt[2/Pi]*Sqrt[ArcSin[a*x]]])/(16*a^7) + (9*Sqrt[(3*Pi)/2]*FresnelS[Sqrt[6/
Pi]*Sqrt[ArcSin[a*x]]])/(16*a^7) - (5*Sqrt[(5*Pi)/2]*FresnelS[Sqrt[10/Pi]*S
qrt[ArcSin[a*x]]])/(16*a^7) + (Sqrt[(7*Pi)/2]*FresnelS[Sqrt[14/Pi]*Sqrt[Arc
Sin[a*x]]])/(16*a^7)
```

Rule 3386

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[2/d
, Subst[Int[Sin[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d, e, f}
, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3432

```
Int[Sin[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelS[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4727

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^m*Sqrt[1 - c^2*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] - Dist
[1/(b^2*c^(m + 1)*(n + 1)), Subst[Int[ExpandTrigReduce[x^(n + 1), Sin[-a/b
+ x/b]^(m - 1)*(m - (m + 1)*Sin[-a/b + x/b]^2), x], x], x, a + b*ArcSin[c*x
]], x] /; FreeQ[{a, b, c}, x] && IGtQ[m, 0] && GeQ[n, -2] && LtQ[n, -1]
```

Rubi steps

$$\text{integral} = -\frac{2x^6\sqrt{1-a^2x^2}}{a\sqrt{\arcsin(ax)}} + \frac{2\text{Subst}\left(\int\left(-\frac{5\sin(x)}{64\sqrt{x}} + \frac{27\sin(3x)}{64\sqrt{x}} - \frac{25\sin(5x)}{64\sqrt{x}} + \frac{7\sin(7x)}{64\sqrt{x}}\right)dx, x, \arcsin(ax)\right)}{a^7}$$

$$= -\frac{2x^6\sqrt{1-a^2x^2}}{a\sqrt{\arcsin(ax)}} - \frac{5\text{Subst}\left(\int \frac{\sin(x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{32a^7} + \frac{7\text{Subst}\left(\int \frac{\sin(7x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{32a^7} - \frac{25\text{Subst}\left(\int \frac{\sin(5x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{32a^7} + \frac{27\text{Subst}\left(\int \frac{\sin(3x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{32a^7}$$

$$= -\frac{2x^6\sqrt{1-a^2x^2}}{a\sqrt{\arcsin(ax)}} - \frac{5\text{Subst}\left(\int \sin\left(x^2\right)\,dx, x, \sqrt{\arcsin(ax)}\right)}{16a^7} + \frac{7\text{Subst}\left(\int \sin\left(7x^2\right)\,dx, x, \sqrt{\arcsin(ax)}\right)}{16a^7} - \frac{25\text{Subst}\left(\int \sin\left(5x^2\right)\,dx, x, \sqrt{\arcsin(ax)}\right)}{16a^7} + \frac{27\text{Subst}\left(\int \sin\left(3x^2\right)\,dx, x, \sqrt{\arcsin(ax)}\right)}{16a^7}$$

$$= -\frac{2x^6\sqrt{1-a^2x^2}}{a\sqrt{\arcsin(ax)}} - \frac{5\sqrt{\frac{\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{16a^7} + \frac{9\sqrt{\frac{3\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{16a^7} - \frac{5\sqrt{\frac{5\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{10}{\pi}}\sqrt{\arcsin(ax)}\right)}{16a^7} + \frac{\sqrt{\frac{7\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{14}{\pi}}\sqrt{\arcsin(ax)}\right)}{16a^7}$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.20 (sec) , antiderivative size = 427, normalized size of antiderivative = 2.50

$$\int \frac{x^6}{\arcsin(ax)^{3/2}}\,dx = \frac{-\frac{5\left(e^{i\arcsin(ax)}-\sqrt{-i\arcsin(ax)}\,\Gamma\left(\frac{1}{2},-i\arcsin(ax)\right)\right)}{64\sqrt{\arcsin(ax)}} - \frac{5\left(e^{-i\arcsin(ax)}-\sqrt{i\arcsin(ax)}\,\Gamma\left(\frac{1}{2},i\arcsin(ax)\right)\right)}{64\sqrt{\arcsin(ax)}} + \frac{9(}{}$$

```
[In] Integrate[x^6/ArcSin[a*x]^(3/2),x]
```

```
[Out] ((-5*(E^(I*ArcSin[a*x]) - Sqrt[(-I)*ArcSin[a*x]]*Gamma[1/2, (-I)*ArcSin[a*x
]]))/(64*Sqrt[ArcSin[a*x]]) - (5*(E^((-I)*ArcSin[a*x]) - Sqrt[I*ArcSin[a*x]
]*Gamma[1/2, I*ArcSin[a*x]]))/(64*Sqrt[ArcSin[a*x]]) + (9*(E^((3*I)*ArcSin[
a*x]) - Sqrt[3]*Sqrt[(-I)*ArcSin[a*x]]*Gamma[1/2, (-3*I)*ArcSin[a*x]]))/(64
*Sqrt[ArcSin[a*x]]) + (9*(E^((-3*I)*ArcSin[a*x]) - Sqrt[3]*Sqrt[I*ArcSin[a*
x]]*Gamma[1/2, (3*I)*ArcSin[a*x]]))/(64*Sqrt[ArcSin[a*x]]) - (5*(E^((5*I)*A
rcSin[a*x]) - Sqrt[5]*Sqrt[(-I)*ArcSin[a*x]]*Gamma[1/2, (-5*I)*ArcSin[a*x]]
))/(64*Sqrt[ArcSin[a*x]]) - (5*(E^((-5*I)*ArcSin[a*x]) - Sqrt[5]*Sqrt[I*Arc
Sin[a*x]]*Gamma[1/2, (5*I)*ArcSin[a*x]]))/(64*Sqrt[ArcSin[a*x]]) + (E^((7*I
)*ArcSin[a*x]) - Sqrt[7]*Sqrt[(-I)*ArcSin[a*x]]*Gamma[1/2, (-7*I)*ArcSin[a*
x]])/(64*Sqrt[ArcSin[a*x]]) + (E^((-7*I)*ArcSin[a*x]) - Sqrt[7]*Sqrt[I*ArcS
in[a*x]]*Gamma[1/2, (7*I)*ArcSin[a*x]])/(64*Sqrt[ArcSin[a*x]]))/a^7
```

Maple [A] (verified)

Time = 0.09 (sec) , antiderivative size = 184, normalized size of antiderivative = 1.08

method	result
default	$-\frac{-9\,\mathrm{FresnelS}\left(\frac{\sqrt{2}\,\sqrt{3}\,\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)\sqrt{3}\,\sqrt{2}\,\sqrt{\arcsin(ax)}\,\sqrt{\pi}+5\,\mathrm{FresnelS}\left(\frac{\sqrt{2}\,\sqrt{5}\,\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)\sqrt{5}\,\sqrt{2}\,\sqrt{\arcsin(ax)}\,\sqrt{\pi}-\sqrt{2}\,\sqrt{\pi}\,\sqrt{7}\,\mathrm{Fres}}{}$

```
[In] int(x^6/arcsin(a*x)^(3/2),x,method=_RETURNVERBOSE)
```

```
[Out] -1/32/a^7*(-9*FresnelS(2^(1/2)/Pi^(1/2)*3^(1/2)*arcsin(a*x)^(1/2))*3^(1/2)*
2^(1/2)*arcsin(a*x)^(1/2)*Pi^(1/2)+5*FresnelS(2^(1/2)/Pi^(1/2)*5^(1/2)*arcs
in(a*x)^(1/2))*5^(1/2)*2^(1/2)*arcsin(a*x)^(1/2)*Pi^(1/2)-2^(1/2)*Pi^(1/2)*
7^(1/2)*FresnelS(2^(1/2)/Pi^(1/2)*7^(1/2)*arcsin(a*x)^(1/2))*arcsin(a*x)^(1
/2)+5*FresnelS(2^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*2^(1/2)*arcsin(a*x)^(1/2
)*Pi^(1/2)+5*(-a^2*x^2+1)^(1/2)-9*cos(3*arcsin(a*x))+5*cos(5*arcsin(a*x))-c
os(7*arcsin(a*x)))/arcsin(a*x)^(1/2)
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{x^6}{\arcsin(ax)^{3/2}}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate(x^6/arcsin(a*x)^(3/2),x, algorithm="fricas")
```

```
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int \frac{x^6}{\arcsin(ax)^{3/2}}\,dx = \int \frac{x^6}{\operatorname{asin}^{\frac{3}{2}}(ax)}\,dx$$

```
[In] integrate(x**6/asin(a*x)**(3/2),x)
```

```
[Out] Integral(x**6/asin(a*x)**(3/2), x)
```

Maxima [F(-2)]

Exception generated.

$$\int \frac{x^6}{\arcsin(ax)^{3/2}}\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(x^6/arcsin(a*x)^(3/2),x, algorithm="maxima")
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [F]

$$\int \frac{x^6}{\arcsin(ax)^{3/2}}\,dx = \int \frac{x^6}{\arcsin\left(ax\right)^{\frac{3}{2}}}\,dx$$

```
[In] integrate(x^6/arcsin(a*x)^(3/2),x, algorithm="giac")
[Out] integrate(x^6/arcsin(a*x)^(3/2), x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x^6}{\arcsin(ax)^{3/2}}\,dx = \int \frac{x^6}{\mathrm{asin}\left(a\,x\right)^{3/2}}\,dx$$

```
[In] int(x^6/asin(a*x)^(3/2),x)
[Out] int(x^6/asin(a*x)^(3/2), x)
```

3.100 $\int \frac{x^5}{\arcsin(ax)^{3/2}}\,dx$

Optimal result

Integrand size = 12, antiderivative size = 127

$$\int \frac{x^5}{\arcsin(ax)^{3/2}}\,dx = -\frac{2x^5\sqrt{1-a^2x^2}}{a\sqrt{\arcsin(ax)}} - \frac{\sqrt{\frac{\pi}{2}}\,\text{FresnelC}\left(2\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{a^6} + \frac{\sqrt{3\pi}\,\text{FresnelC}\left(2\sqrt{\frac{3}{\pi}}\sqrt{\arcsin(ax)}\right)}{8a^6} + \frac{5\sqrt{\pi}\,\text{FresnelC}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{8a^6}$$

```
[Out] -1/2*FresnelC(2*2^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*2^(1/2)*Pi^(1/2)/a^6+5/
8*FresnelC(2*arcsin(a*x)^(1/2)/Pi^(1/2))*Pi^(1/2)/a^6+1/8*FresnelC(2*3^(1/2
)/Pi^(1/2)*arcsin(a*x)^(1/2))*3^(1/2)*Pi^(1/2)/a^6-2*x^5*(-a^2*x^2+1)^(1/2)
/a/arcsin(a*x)^(1/2)
```

Rubi [A] (verified)

Time = 0.07 (sec) , antiderivative size = 127, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.250, Rules used = {4727, 3385, 3433}

$$\int \frac{x^5}{\arcsin(ax)^{3/2}}\,dx = -\frac{\sqrt{\frac{\pi}{2}}\,\text{FresnelC}\left(2\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{a^6} + \frac{\sqrt{3\pi}\,\text{FresnelC}\left(2\sqrt{\frac{3}{\pi}}\sqrt{\arcsin(ax)}\right)}{8a^6} + \frac{5\sqrt{\pi}\,\text{FresnelC}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{8a^6} - \frac{2x^5\sqrt{1-a^2x^2}}{a\sqrt{\arcsin(ax)}}$$

```
[In] Int[x^5/ArcSin[a*x]^(3/2),x]
```

```
[Out] (-2*x^5*Sqrt[1 - a^2*x^2])/(a*Sqrt[ArcSin[a*x]]) - (Sqrt[Pi/2]*FresnelC[2*S
qrt[2/Pi]*Sqrt[ArcSin[a*x]]])/a^6 + (Sqrt[3*Pi]*FresnelC[2*Sqrt[3/Pi]*Sqrt[
ArcSin[a*x]]])/(8*a^6) + (5*Sqrt[Pi]*FresnelC[(2*Sqrt[ArcSin[a*x]])/Sqrt[Pi
]])/(8*a^6)
```

Rule 3385

```
Int[sin[Pi/2 + (e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> D
ist[2/d, Subst[Int[Cos[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d
, e, f}, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3433

```
Int[Cos[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelC[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4727

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^m*Sqrt[1 - c^2*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] - Dist
[1/(b^2*c^(m + 1)*(n + 1)), Subst[Int[ExpandTrigReduce[x^(n + 1), Sin[-a/b
+ x/b]^(m - 1)*(m - (m + 1)*Sin[-a/b + x/b]^2), x], x], x, a + b*ArcSin[c*x
]], x] /; FreeQ[{a, b, c}, x] && IGtQ[m, 0] && GeQ[n, -2] && LtQ[n, -1]
```

Rubi steps

$$
\begin{aligned}
\text{integral} &= -\frac{2x^5\sqrt{1-a^2x^2}}{a\sqrt{\arcsin(ax)}}+\frac{2\text{Subst}\left(\int \left(\frac{5\cos(2x)}{16\sqrt{x}}-\frac{\cos(4x)}{2\sqrt{x}}+\frac{3\cos(6x)}{16\sqrt{x}}\right)\,dx,x,\arcsin(ax)\right)}{a^6}\\
&= -\frac{2x^5\sqrt{1-a^2x^2}}{a\sqrt{\arcsin(ax)}}+\frac{3\text{Subst}\left(\int \frac{\cos(6x)}{\sqrt{x}}\,dx,x,\arcsin(ax)\right)}{8a^6}\\
&\quad+\frac{5\text{Subst}\left(\int \frac{\cos(2x)}{\sqrt{x}}\,dx,x,\arcsin(ax)\right)}{8a^6}-\frac{\text{Subst}\left(\int \frac{\cos(4x)}{\sqrt{x}}\,dx,x,\arcsin(ax)\right)}{a^6}\\
&= -\frac{2x^5\sqrt{1-a^2x^2}}{a\sqrt{\arcsin(ax)}}+\frac{3\text{Subst}\left(\int \cos\left(6x^2\right)\,dx,x,\sqrt{\arcsin(ax)}\right)}{4a^6}\\
&\quad+\frac{5\text{Subst}\left(\int \cos\left(2x^2\right)\,dx,x,\sqrt{\arcsin(ax)}\right)}{4a^6}\\
&\quad-\frac{2\text{Subst}\left(\int \cos\left(4x^2\right)\,dx,x,\sqrt{\arcsin(ax)}\right)}{a^6}
\end{aligned}
$$

$$= -\frac{2x^5\sqrt{1-a^2x^2}}{a\sqrt{\arcsin(ax)}} - \frac{\sqrt{\frac{\pi}{2}}\,\text{FresnelC}\left(2\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{a^6} + \frac{\sqrt{3\pi}\,\text{FresnelC}\left(2\sqrt{\frac{3}{\pi}}\sqrt{\arcsin(ax)}\right)}{8a^6} + \frac{5\sqrt{\pi}\,\text{FresnelC}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{8a^6}$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.12 (sec) , antiderivative size = 231, normalized size of antiderivative = 1.82

$$\int \frac{x^5}{\arcsin(ax)^{3/2}}\,dx = -\frac{5i\sqrt{2}\sqrt{-i\arcsin(ax)}\Gamma\left(\frac{1}{2},-2i\arcsin(ax)\right) - 5i\sqrt{2}\sqrt{i\arcsin(ax)}\Gamma\left(\frac{1}{2},2i\arcsin(ax)\right) - 8i\sqrt{-i\arcsin(ax)}\Gamma(}{}$$

```
[In] Integrate[x^5/ArcSin[a*x]^(3/2),x]
```

```
[Out] -1/32*((5*I)*Sqrt[2]*Sqrt[(-I)*ArcSin[a*x]]*Gamma[1/2, (-2*I)*ArcSin[a*x]]
- (5*I)*Sqrt[2]*Sqrt[I*ArcSin[a*x]]*Gamma[1/2, (2*I)*ArcSin[a*x]] - (8*I)*S
qrt[(-I)*ArcSin[a*x]]*Gamma[1/2, (-4*I)*ArcSin[a*x]] + (8*I)*Sqrt[I*ArcSin[
a*x]]*Gamma[1/2, (4*I)*ArcSin[a*x]] + I*Sqrt[6]*Sqrt[(-I)*ArcSin[a*x]]*Gamm
a[1/2, (-6*I)*ArcSin[a*x]] - I*Sqrt[6]*Sqrt[I*ArcSin[a*x]]*Gamma[1/2, (6*I)
*ArcSin[a*x]] + 10*Sin[2*ArcSin[a*x]] - 8*Sin[4*ArcSin[a*x]] + 2*Sin[6*ArcS
in[a*x]])/(a^6*Sqrt[ArcSin[a*x]])
```

Maple [A] (verified)

Time = 0.08 (sec) , antiderivative size = 121, normalized size of antiderivative = 0.95

method	result
default	$-\frac{8\sqrt{2}\,\sqrt{\arcsin(ax)}\,\sqrt{\pi}\,\text{FresnelC}\left(\frac{2\sqrt{2}\,\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)-2\sqrt{\pi}\,\sqrt{3}\,\text{FresnelC}\left(\frac{\sqrt{2}\,\sqrt{6}\,\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)\sqrt{\arcsin(ax)}-10\sqrt{\arcsin(ax)}\,\sqrt{\pi}\,\text{Fresne}}{16a^6\sqrt{\arcsin(ax)}}$

```
[In] int(x^5/arcsin(a*x)^(3/2),x,method=_RETURNVERBOSE)
```

```
[Out] -1/16/a^6/arcsin(a*x)^(1/2)*(8*2^(1/2)*arcsin(a*x)^(1/2)*Pi^(1/2)*FresnelC(
2*2^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))-2*Pi^(1/2)*3^(1/2)*FresnelC(2^(1/2)/P
i^(1/2)*6^(1/2)*arcsin(a*x)^(1/2))*arcsin(a*x)^(1/2)-10*arcsin(a*x)^(1/2)*P
i^(1/2)*FresnelC(2*arcsin(a*x)^(1/2)/Pi^(1/2))+5*sin(2*arcsin(a*x))-4*sin(4
*arcsin(a*x))+sin(6*arcsin(a*x)))
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{x^5}{\arcsin(ax)^{3/2}} dx = \text{Exception raised: TypeError}$$

```
[In] integrate(x^5/arcsin(a*x)^(3/2),x, algorithm="fricas")
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int \frac{x^5}{\arcsin(ax)^{3/2}} dx = \int \frac{x^5}{\operatorname{asin}^{\frac{3}{2}}(ax)} dx$$

```
[In] integrate(x**5/asin(a*x)**(3/2),x)
[Out] Integral(x**5/asin(a*x)**(3/2), x)
```

Maxima [F(-2)]

Exception generated.

$$\int \frac{x^5}{\arcsin(ax)^{3/2}} dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(x^5/arcsin(a*x)^(3/2),x, algorithm="maxima")
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [F(-2)]

Exception generated.

$$\int \frac{x^5}{\arcsin(ax)^{3/2}} dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(x^5/arcsin(a*x)^(3/2),x, algorithm="giac")
[Out] Exception raised: RuntimeError >> an error occurred running a Giac command:
INPUT:sage2OUTPUT:sym2poly/r2sym(const gen & e,const index_m & i,const vect
eur & l) Error: Bad Argument Value
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x^5}{\arcsin(ax)^{3/2}}\,dx = \int \frac{x^5}{\mathrm{asin}\left(a\,x\right)^{3/2}}\,dx$$

```
[In] int(x^5/asin(a*x)^(3/2),x)
[Out] int(x^5/asin(a*x)^(3/2), x)
```

3.101 $\int \frac{x^4}{\arcsin(ax)^{3/2}}\,dx$

Optimal result

Integrand size = 12, antiderivative size = 136

$$\int \frac{x^4}{\arcsin(ax)^{3/2}}\,dx = -\frac{2x^4\sqrt{1-a^2x^2}}{a\sqrt{\arcsin(ax)}} - \frac{\sqrt{\frac{\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{2a^5} + \frac{3\sqrt{\frac{3\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{4a^5} - \frac{\sqrt{\frac{5\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{10}{\pi}}\sqrt{\arcsin(ax)}\right)}{4a^5}$$

```
[Out] -1/4*FresnelS(2^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*2^(1/2)*Pi^(1/2)/a^5+3/8*
FresnelS(6^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*6^(1/2)*Pi^(1/2)/a^5-1/8*Fresn
elS(10^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*10^(1/2)*Pi^(1/2)/a^5-2*x^4*(-a^2*
x^2+1)^(1/2)/a/arcsin(a*x)^(1/2)
```

Rubi [A] (verified)

Time = 0.06 (sec) , antiderivative size = 136, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.250, Rules used = {4727, 3386, 3432}

$$\int \frac{x^4}{\arcsin(ax)^{3/2}}\,dx = -\frac{\sqrt{\frac{\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{2a^5} + \frac{3\sqrt{\frac{3\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{4a^5} - \frac{\sqrt{\frac{5\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{10}{\pi}}\sqrt{\arcsin(ax)}\right)}{4a^5} - \frac{2x^4\sqrt{1-a^2x^2}}{a\sqrt{\arcsin(ax)}}$$

```
[In] Int[x^4/ArcSin[a*x]^(3/2),x]
```

```
[Out] (-2*x^4*Sqrt[1 - a^2*x^2])/(a*Sqrt[ArcSin[a*x]]) - (Sqrt[Pi/2]*FresnelS[Sqr
t[2/Pi]*Sqrt[ArcSin[a*x]]])/(2*a^5) + (3*Sqrt[(3*Pi)/2]*FresnelS[Sqrt[6/Pi]
*Sqrt[ArcSin[a*x]]])/(4*a^5) - (Sqrt[(5*Pi)/2]*FresnelS[Sqrt[10/Pi]*Sqrt[Ar
cSin[a*x]]])/(4*a^5)
```

Rule 3386

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[2/d
, Subst[Int[Sin[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d, e, f}
, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3432

```
Int[Sin[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelS[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4727

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^m*Sqrt[1 - c^2*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] - Dist
[1/(b^2*c^(m + 1)*(n + 1)), Subst[Int[ExpandTrigReduce[x^(n + 1), Sin[-a/b
+ x/b]^(m - 1)*(m - (m + 1)*Sin[-a/b + x/b]^2), x], x], x, a + b*ArcSin[c*x
]], x] /; FreeQ[{a, b, c}, x] && IGtQ[m, 0] && GeQ[n, -2] && LtQ[n, -1]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= -\frac{2x^4\sqrt{1-a^2x^2}}{a\sqrt{\arcsin(ax)}}+\frac{2\text{Subst}\left(\int\left(-\frac{\sin(x)}{8\sqrt{x}}+\frac{9\sin(3x)}{16\sqrt{x}}-\frac{5\sin(5x)}{16\sqrt{x}}\right)\,dx,x,\arcsin(ax)\right)}{a^5}\\
&= -\frac{2x^4\sqrt{1-a^2x^2}}{a\sqrt{\arcsin(ax)}}-\frac{\text{Subst}\left(\int\frac{\sin(x)}{\sqrt{x}}\,dx,x,\arcsin(ax)\right)}{4a^5}\\
&\quad-\frac{5\text{Subst}\left(\int\frac{\sin(5x)}{\sqrt{x}}\,dx,x,\arcsin(ax)\right)}{8a^5}+\frac{9\text{Subst}\left(\int\frac{\sin(3x)}{\sqrt{x}}\,dx,x,\arcsin(ax)\right)}{8a^5}\\
&= -\frac{2x^4\sqrt{1-a^2x^2}}{a\sqrt{\arcsin(ax)}}-\frac{\text{Subst}\left(\int\sin\left(x^2\right)\,dx,x,\sqrt{\arcsin(ax)}\right)}{2a^5}\\
&\quad-\frac{5\text{Subst}\left(\int\sin\left(5x^2\right)\,dx,x,\sqrt{\arcsin(ax)}\right)}{4a^5}\\
&\quad+\frac{9\text{Subst}\left(\int\sin\left(3x^2\right)\,dx,x,\sqrt{\arcsin(ax)}\right)}{4a^5}
\end{aligned}$$

$$= -\frac{2x^4\sqrt{1-a^2x^2}}{a\sqrt{\arcsin(ax)}} - \frac{\sqrt{\frac{\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{2a^5} + \frac{3\sqrt{\frac{3\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{4a^5} - \frac{\sqrt{\frac{5\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{10}{\pi}}\sqrt{\arcsin(ax)}\right)}{4a^5}$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.10 (sec) , antiderivative size = 319, normalized size of antiderivative = 2.35

$$\int \frac{x^4}{\arcsin(ax)^{3/2}}\,dx = \frac{-\frac{e^{i\arcsin(ax)}-\sqrt{-i\arcsin(ax)}\Gamma\left(\frac{1}{2},-i\arcsin(ax)\right)}{8\sqrt{\arcsin(ax)}} - \frac{e^{-i\arcsin(ax)}-\sqrt{i\arcsin(ax)}\Gamma\left(\frac{1}{2},i\arcsin(ax)\right)}{8\sqrt{\arcsin(ax)}} + \frac{3\left(e^{3i\arcsin\dots}\right.}{}}{}$$

```
[In] Integrate[x^4/ArcSin[a*x]^(3/2),x]
```

```
[Out] (-1/8*(E^(I*ArcSin[a*x]) - Sqrt[(-I)*ArcSin[a*x]]*Gamma[1/2, (-I)*ArcSin[a*
x]])/Sqrt[ArcSin[a*x]] - (E^((-I)*ArcSin[a*x]) - Sqrt[I*ArcSin[a*x]]*Gamma[
1/2, I*ArcSin[a*x]])/(8*Sqrt[ArcSin[a*x]]) + (3*(E^((3*I)*ArcSin[a*x]) - Sq
rt[3]*Sqrt[(-I)*ArcSin[a*x]]*Gamma[1/2, (-3*I)*ArcSin[a*x]]))/(16*Sqrt[ArcS
in[a*x]]) + (3*(E^((-3*I)*ArcSin[a*x]) - Sqrt[3]*Sqrt[I*ArcSin[a*x]]*Gamma[
1/2, (3*I)*ArcSin[a*x]]))/(16*Sqrt[ArcSin[a*x]]) - (E^((5*I)*ArcSin[a*x]) -
 Sqrt[5]*Sqrt[(-I)*ArcSin[a*x]]*Gamma[1/2, (-5*I)*ArcSin[a*x]])/(16*Sqrt[Ar
cSin[a*x]]) - (E^((-5*I)*ArcSin[a*x]) - Sqrt[5]*Sqrt[I*ArcSin[a*x]]*Gamma[1
/2, (5*I)*ArcSin[a*x]])/(16*Sqrt[ArcSin[a*x]]))/a^5
```

Maple [A] (verified)

Time = 0.05 (sec) , antiderivative size = 138, normalized size of antiderivative = 1.01

method	result
default	$-\frac{\text{FresnelS}\left(\frac{\sqrt{2}\,\sqrt{5}\,\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)\sqrt{5}\,\sqrt{2}\,\sqrt{\arcsin(ax)}\,\sqrt{\pi}-3\,\text{FresnelS}\left(\frac{\sqrt{2}\,\sqrt{3}\,\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)\sqrt{3}\,\sqrt{2}\,\sqrt{\arcsin(ax)}\,\sqrt{\pi}+2\,\text{FresnelS}\left(\frac{\sqrt{2}\,\dots}{}\right.}{8a^5\sqrt{\arcsin(ax)}}$

```
[In] int(x^4/arcsin(a*x)^(3/2),x,method=_RETURNVERBOSE)
```

```
[Out] -1/8/a^5*(FresnelS(2^(1/2)/Pi^(1/2)*5^(1/2)*arcsin(a*x)^(1/2))*5^(1/2)*2^(1
/2)*arcsin(a*x)^(1/2)*Pi^(1/2)-3*FresnelS(2^(1/2)/Pi^(1/2)*3^(1/2)*arcsin(a
*x)^(1/2))*3^(1/2)*2^(1/2)*arcsin(a*x)^(1/2)*Pi^(1/2)+2*FresnelS(2^(1/2)/Pi
^(1/2)*arcsin(a*x)^(1/2))*2^(1/2)*arcsin(a*x)^(1/2)*Pi^(1/2)+2*(-a^2*x^2+1)
^(1/2)-3*cos(3*arcsin(a*x))+cos(5*arcsin(a*x)))/arcsin(a*x)^(1/2)
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{x^4}{\arcsin(ax)^{3/2}}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate(x^4/arcsin(a*x)^(3/2),x, algorithm="fricas")
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int \frac{x^4}{\arcsin(ax)^{3/2}}\,dx = \int \frac{x^4}{\operatorname{asin}^{\frac{3}{2}}(ax)}\,dx$$

```
[In] integrate(x**4/asin(a*x)**(3/2),x)
[Out] Integral(x**4/asin(a*x)**(3/2), x)
```

Maxima [F(-2)]

Exception generated.

$$\int \frac{x^4}{\arcsin(ax)^{3/2}}\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(x^4/arcsin(a*x)^(3/2),x, algorithm="maxima")
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [F]

$$\int \frac{x^4}{\arcsin(ax)^{3/2}}\,dx = \int \frac{x^4}{\arcsin(ax)^{\frac{3}{2}}}\,dx$$

```
[In] integrate(x^4/arcsin(a*x)^(3/2),x, algorithm="giac")
[Out] integrate(x^4/arcsin(a*x)^(3/2), x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x^4}{\arcsin(ax)^{3/2}}\,dx = \int \frac{x^4}{\mathrm{asin}\left(a\,x\right)^{3/2}}\,dx$$

```
[In] int(x^4/asin(a*x)^(3/2),x)
[Out] int(x^4/asin(a*x)^(3/2), x)
```

3.102 $\int \frac{x^3}{\arcsin(ax)^{3/2}}\,dx$

Optimal result

Integrand size = 12, antiderivative size = 90

$$\int \frac{x^3}{\arcsin(ax)^{3/2}}\,dx = -\frac{2x^3\sqrt{1-a^2x^2}}{a\sqrt{\arcsin(ax)}} - \frac{\sqrt{\frac{\pi}{2}}\,\text{FresnelC}\left(2\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{a^4} + \frac{\sqrt{\pi}\,\text{FresnelC}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{a^4}$$

```
[Out] -1/2*FresnelC(2*2^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*2^(1/2)*Pi^(1/2)/a^4+Fr
esnelC(2*arcsin(a*x)^(1/2)/Pi^(1/2))*Pi^(1/2)/a^4-2*x^3*(-a^2*x^2+1)^(1/2)/
a/arcsin(a*x)^(1/2)
```

Rubi [A] (verified)

Time = 0.04 (sec) , antiderivative size = 90, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.250, Rules used = {4727, 3385, 3433}

$$\int \frac{x^3}{\arcsin(ax)^{3/2}}\,dx = -\frac{\sqrt{\frac{\pi}{2}}\,\text{FresnelC}\left(2\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{a^4} + \frac{\sqrt{\pi}\,\text{FresnelC}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{a^4} - \frac{2x^3\sqrt{1-a^2x^2}}{a\sqrt{\arcsin(ax)}}$$

```
[In] Int[x^3/ArcSin[a*x]^(3/2),x]
```

```
[Out] (-2*x^3*Sqrt[1 - a^2*x^2])/(a*Sqrt[ArcSin[a*x]]) - (Sqrt[Pi/2]*FresnelC[2*S
qrt[2/Pi]*Sqrt[ArcSin[a*x]]])/a^4 + (Sqrt[Pi]*FresnelC[(2*Sqrt[ArcSin[a*x]]
)/Sqrt[Pi]])/a^4
```

Rule 3385

```
Int[sin[Pi/2 + (e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> D
ist[2/d, Subst[Int[Cos[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d
, e, f}, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3433

```
Int[Cos[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelC[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4727

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^m*Sqrt[1 - c^2*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] - Dist
[1/(b^2*c^(m + 1)*(n + 1)), Subst[Int[ExpandTrigReduce[x^(n + 1), Sin[-a/b
+ x/b]^(m - 1)*(m - (m + 1)*Sin[-a/b + x/b]^2), x], x], x, a + b*ArcSin[c*x
]], x] /; FreeQ[{a, b, c}, x] && IGtQ[m, 0] && GeQ[n, -2] && LtQ[n, -1]
```

Rubi steps

$$\text{integral} = -\frac{2x^3\sqrt{1-a^2x^2}}{a\sqrt{\arcsin(ax)}} + \frac{2\text{Subst}\left(\int \left(\frac{\cos(2x)}{2\sqrt{x}} - \frac{\cos(4x)}{2\sqrt{x}}\right) dx, x, \arcsin(ax)\right)}{a^4}$$

$$= -\frac{2x^3\sqrt{1-a^2x^2}}{a\sqrt{\arcsin(ax)}} + \frac{\text{Subst}\left(\int \frac{\cos(2x)}{\sqrt{x}} dx, x, \arcsin(ax)\right)}{a^4} - \frac{\text{Subst}\left(\int \frac{\cos(4x)}{\sqrt{x}} dx, x, \arcsin(ax)\right)}{a^4}$$

$$= -\frac{2x^3\sqrt{1-a^2x^2}}{a\sqrt{\arcsin(ax)}} + \frac{2\text{Subst}\left(\int \cos(2x^2)\, dx, x, \sqrt{\arcsin(ax)}\right)}{a^4} - \frac{2\text{Subst}\left(\int \cos(4x^2)\, dx, x, \sqrt{\arcsin(ax)}\right)}{a^4}$$

$$= -\frac{2x^3\sqrt{1-a^2x^2}}{a\sqrt{\arcsin(ax)}} - \frac{\sqrt{\frac{\pi}{2}}\,\text{FresnelC}\left(2\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{a^4} + \frac{\sqrt{\pi}\,\text{FresnelC}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{a^4}$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.04 (sec) , antiderivative size = 154, normalized size of antiderivative = 1.71

$$\int \frac{x^3}{\arcsin(ax)^{3/2}}\,dx = \frac{-i\sqrt{2}\sqrt{-i\arcsin(ax)}\Gamma\left(\frac{1}{2},-2i\arcsin(ax)\right)+i\sqrt{2}\sqrt{i\arcsin(ax)}\Gamma\left(\frac{1}{2},2i\arcsin(ax)\right)+i$$

```
[In] Integrate[x^3/ArcSin[a*x]^(3/2),x]
```

```
[Out] ((-I)*Sqrt[2]*Sqrt[(-I)*ArcSin[a*x]]*Gamma[1/2, (-2*I)*ArcSin[a*x]] + I*Sqr
t[2]*Sqrt[I*ArcSin[a*x]]*Gamma[1/2, (2*I)*ArcSin[a*x]] + I*Sqrt[(-I)*ArcSin
[a*x]]*Gamma[1/2, (-4*I)*ArcSin[a*x]] - I*Sqrt[I*ArcSin[a*x]]*Gamma[1/2, (4
*I)*ArcSin[a*x]] - 2*Sin[2*ArcSin[a*x]] + Sin[4*ArcSin[a*x]])/(4*a^4*Sqrt[A
rcSin[a*x]])
```

Maple [A] (verified)

Time = 0.05 (sec) , antiderivative size = 83, normalized size of antiderivative = 0.92

method	result
default	$-\frac{2\sqrt{2}\,\sqrt{\arcsin(ax)}\,\sqrt{\pi}\,\mathrm{FresnelC}\left(\frac{2\sqrt{2}\,\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)-4\sqrt{\arcsin(ax)}\,\sqrt{\pi}\,\mathrm{FresnelC}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)+2\sin(2\arcsin(ax))-\sin(4\arcsin(a}{4a^4\sqrt{\arcsin(ax)}}$

```
[In] int(x^3/arcsin(a*x)^(3/2),x,method=_RETURNVERBOSE)
```

```
[Out] -1/4/a^4*(2*2^(1/2)*arcsin(a*x)^(1/2)*Pi^(1/2)*FresnelC(2*2^(1/2)/Pi^(1/2)*
arcsin(a*x)^(1/2))-4*arcsin(a*x)^(1/2)*Pi^(1/2)*FresnelC(2*arcsin(a*x)^(1/2
)/Pi^(1/2))+2*sin(2*arcsin(a*x))-sin(4*arcsin(a*x)))/arcsin(a*x)^(1/2)
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{x^3}{\arcsin(ax)^{3/2}}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate(x^3/arcsin(a*x)^(3/2),x, algorithm="fricas")
```

```
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int \frac{x^3}{\arcsin(ax)^{3/2}}\,dx = \int \frac{x^3}{\operatorname{asin}^{\frac{3}{2}}(ax)}\,dx$$

```
[In] integrate(x**3/asin(a*x)**(3/2),x)
[Out] Integral(x**3/asin(a*x)**(3/2), x)
```

Maxima [F(-2)]

Exception generated.

$$\int \frac{x^3}{\arcsin(ax)^{3/2}}\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(x^3/arcsin(a*x)^(3/2),x, algorithm="maxima")
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [F(-2)]

Exception generated.

$$\int \frac{x^3}{\arcsin(ax)^{3/2}}\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(x^3/arcsin(a*x)^(3/2),x, algorithm="giac")
[Out] Exception raised: RuntimeError >> an error occurred running a Giac command:
INPUT:sage2OUTPUT:sym2poly/r2sym(const gen & e,const index_m & i,const vect
eur & l) Error: Bad Argument Value
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x^3}{\arcsin(ax)^{3/2}}\,dx = \int \frac{x^3}{\operatorname{asin}(a\,x)^{3/2}}\,dx$$

```
[In] int(x^3/asin(a*x)^(3/2),x)
[Out] int(x^3/asin(a*x)^(3/2), x)
```

3.103 $\int \frac{x^2}{\arcsin(ax)^{3/2}}\,dx$

Optimal result

Integrand size = 12, antiderivative size = 96

$$\int \frac{x^2}{\arcsin(ax)^{3/2}}\,dx = -\frac{2x^2\sqrt{1-a^2x^2}}{a\sqrt{\arcsin(ax)}} - \frac{\sqrt{\frac{\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{a^3} + \frac{\sqrt{\frac{3\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{a^3}$$

```
[Out] -1/2*FresnelS(2^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*2^(1/2)*Pi^(1/2)/a^3+1/2*
FresnelS(6^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*6^(1/2)*Pi^(1/2)/a^3-2*x^2*(-a
^2*x^2+1)^(1/2)/a/arcsin(a*x)^(1/2)
```

Rubi [A] (verified)

Time = 0.05 (sec) , antiderivative size = 96, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.250, Rules used = {4727, 3386, 3432}

$$\int \frac{x^2}{\arcsin(ax)^{3/2}}\,dx = -\frac{\sqrt{\frac{\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{a^3} + \frac{\sqrt{\frac{3\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{a^3} - \frac{2x^2\sqrt{1-a^2x^2}}{a\sqrt{\arcsin(ax)}}$$

```
[In] Int[x^2/ArcSin[a*x]^(3/2),x]
```

```
[Out] (-2*x^2*Sqrt[1 - a^2*x^2])/(a*Sqrt[ArcSin[a*x]]) - (Sqrt[Pi/2]*FresnelS[Sqr
t[2/Pi]*Sqrt[ArcSin[a*x]]])/a^3 + (Sqrt[(3*Pi)/2]*FresnelS[Sqrt[6/Pi]*Sqrt[
ArcSin[a*x]]])/a^3
```

Rule 3386

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[2/d
, Subst[Int[Sin[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d, e, f}
, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3432

```
Int[Sin[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelS[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4727

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^m*Sqrt[1 - c^2*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] - Dist
[1/(b^2*c^(m + 1)*(n + 1)), Subst[Int[ExpandTrigReduce[x^(n + 1), Sin[-a/b
+ x/b]^(m - 1)*(m - (m + 1)*Sin[-a/b + x/b]^2), x], x], x, a + b*ArcSin[c*x
]], x] /; FreeQ[{a, b, c}, x] && IGtQ[m, 0] && GeQ[n, -2] && LtQ[n, -1]
```

Rubi steps

$$
\begin{aligned}
\text{integral} &= -\frac{2x^2\sqrt{1-a^2x^2}}{a\sqrt{\arcsin(ax)}} + \frac{2\text{Subst}\left(\int \left(-\frac{\sin(x)}{4\sqrt{x}} + \frac{3\sin(3x)}{4\sqrt{x}}\right)\,dx, x, \arcsin(ax)\right)}{a^3} \\
&= -\frac{2x^2\sqrt{1-a^2x^2}}{a\sqrt{\arcsin(ax)}} - \frac{\text{Subst}\left(\int \frac{\sin(x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{2a^3} + \frac{3\text{Subst}\left(\int \frac{\sin(3x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{2a^3} \\
&= -\frac{2x^2\sqrt{1-a^2x^2}}{a\sqrt{\arcsin(ax)}} - \frac{\text{Subst}\left(\int \sin\left(x^2\right)\,dx, x, \sqrt{\arcsin(ax)}\right)}{a^3} \\
&\quad + \frac{3\text{Subst}\left(\int \sin\left(3x^2\right)\,dx, x, \sqrt{\arcsin(ax)}\right)}{a^3} \\
&= -\frac{2x^2\sqrt{1-a^2x^2}}{a\sqrt{\arcsin(ax)}} - \frac{\sqrt{\frac{\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{a^3} + \frac{\sqrt{\frac{3\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{a^3}
\end{aligned}
$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.06 (sec) , antiderivative size = 211, normalized size of antiderivative = 2.20

$$\int \frac{x^2}{\arcsin(ax)^{3/2}}\,dx = \frac{-\frac{e^{i\arcsin(ax)}-\sqrt{-i\arcsin(ax)}\,\Gamma\left(\frac{1}{2},-i\arcsin(ax)\right)}{4\sqrt{\arcsin(ax)}}-\frac{e^{-i\arcsin(ax)}-\sqrt{i\arcsin(ax)}\,\Gamma\left(\frac{1}{2},i\arcsin(ax)\right)}{4\sqrt{\arcsin(ax)}}+\frac{e^{3i\arcsin(ax)}}{}}{a^3}$$

```
[In] Integrate[x^2/ArcSin[a*x]^(3/2),x]
```

```
[Out] (-1/4*(E^(I*ArcSin[a*x]) - Sqrt[(-I)*ArcSin[a*x]]*Gamma[1/2, (-I)*ArcSin[a*
x]])/Sqrt[ArcSin[a*x]] - (E^((-I)*ArcSin[a*x]) - Sqrt[I*ArcSin[a*x]]*Gamma[
1/2, I*ArcSin[a*x]])/(4*Sqrt[ArcSin[a*x]]) + (E^((3*I)*ArcSin[a*x]) - Sqrt[
3]*Sqrt[(-I)*ArcSin[a*x]]*Gamma[1/2, (-3*I)*ArcSin[a*x]])/(4*Sqrt[ArcSin[a*
x]]) + (E^((-3*I)*ArcSin[a*x]) - Sqrt[3]*Sqrt[I*ArcSin[a*x]]*Gamma[1/2, (3*
I)*ArcSin[a*x]])/(4*Sqrt[ArcSin[a*x]]))/a^3
```

Maple [A] (verified)

Time = 0.05 (sec) , antiderivative size = 95, normalized size of antiderivative = 0.99

method	result
default	$-\frac{-\operatorname{FresnelS}\left(\frac{\sqrt{2}\,\sqrt{3}\,\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)\sqrt{3}\,\sqrt{2}\,\sqrt{\arcsin(ax)}\,\sqrt{\pi}+\operatorname{FresnelS}\left(\frac{\sqrt{2}\,\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)\sqrt{2}\,\sqrt{\arcsin(ax)}\,\sqrt{\pi}+\sqrt{-a^2x^2+1}-\cos(3\arcsin}{2a^3\sqrt{\arcsin(ax)}}$

```
[In] int(x^2/arcsin(a*x)^(3/2),x,method=_RETURNVERBOSE)
```

```
[Out] -1/2/a^3*(-FresnelS(2^(1/2)/Pi^(1/2)*3^(1/2)*arcsin(a*x)^(1/2))*3^(1/2)*2^(
1/2)*arcsin(a*x)^(1/2)*Pi^(1/2)+FresnelS(2^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2)
)*2^(1/2)*arcsin(a*x)^(1/2)*Pi^(1/2)+(-a^2*x^2+1)^(1/2)-cos(3*arcsin(a*x)))
/arcsin(a*x)^(1/2)
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{x^2}{\arcsin(ax)^{3/2}}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate(x^2/arcsin(a*x)^(3/2),x, algorithm="fricas")
```

```
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int \frac{x^2}{\arcsin(ax)^{3/2}}\,dx = \int \frac{x^2}{\operatorname{asin}^{\frac{3}{2}}(ax)}\,dx$$

```
[In] integrate(x**2/asin(a*x)**(3/2),x)
[Out] Integral(x**2/asin(a*x)**(3/2), x)
```

Maxima [F(-2)]

Exception generated.

$$\int \frac{x^2}{\arcsin(ax)^{3/2}}\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(x^2/arcsin(a*x)^(3/2),x, algorithm="maxima")
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [F]

$$\int \frac{x^2}{\arcsin(ax)^{3/2}}\,dx = \int \frac{x^2}{\arcsin(ax)^{\frac{3}{2}}}\,dx$$

```
[In] integrate(x^2/arcsin(a*x)^(3/2),x, algorithm="giac")
[Out] integrate(x^2/arcsin(a*x)^(3/2), x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x^2}{\arcsin(ax)^{3/2}}\,dx = \int \frac{x^2}{\operatorname{asin}(a\,x)^{3/2}}\,dx$$

```
[In] int(x^2/asin(a*x)^(3/2),x)
[Out] int(x^2/asin(a*x)^(3/2), x)
```

3.104 $\int \frac{x}{\arcsin(ax)^{3/2}}\,dx$

Optimal result

Integrand size = 10, antiderivative size = 55

$$\int \frac{x}{\arcsin(ax)^{3/2}}\,dx=-\frac{2x\sqrt{1-a^2x^2}}{a\sqrt{\arcsin(ax)}}+\frac{2\sqrt{\pi}\,\text{FresnelC}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{a^2}$$

```
[Out] 2*FresnelC(2*arcsin(a*x)^(1/2)/Pi^(1/2))*Pi^(1/2)/a^2-2*x*(-a^2*x^2+1)^(1/2
)/a/arcsin(a*x)^(1/2)
```

Rubi [A] (verified)

Time = 0.02 (sec) , antiderivative size = 55, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.300, Rules used = {4727, 3385, 3433}

$$\int \frac{x}{\arcsin(ax)^{3/2}}\,dx=\frac{2\sqrt{\pi}\,\text{FresnelC}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{a^2}-\frac{2x\sqrt{1-a^2x^2}}{a\sqrt{\arcsin(ax)}}$$

```
[In] Int[x/ArcSin[a*x]^(3/2),x]
```

```
[Out] (-2*x*Sqrt[1 - a^2*x^2])/(a*Sqrt[ArcSin[a*x]]) + (2*Sqrt[Pi]*FresnelC[(2*Sq
rt[ArcSin[a*x]])/Sqrt[Pi]])/a^2
```

Rule 3385

```
Int[sin[Pi/2 + (e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> D
ist[2/d, Subst[Int[Cos[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d
, e, f}, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3433

```
Int[Cos[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelC[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4727

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^m*Sqrt[1 - c^2*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] - Dist
[1/(b^2*c^(m + 1)*(n + 1)), Subst[Int[ExpandTrigReduce[x^(n + 1), Sin[-a/b
+ x/b]^(m - 1)*(m - (m + 1)*Sin[-a/b + x/b]^2), x], x], x, a + b*ArcSin[c*x
]], x] /; FreeQ[{a, b, c}, x] && IGtQ[m, 0] && GeQ[n, -2] && LtQ[n, -1]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= -\frac{2x\sqrt{1-a^2x^2}}{a\sqrt{\arcsin(ax)}}+\frac{2\text{Subst}\left(\int \frac{\cos(2x)}{\sqrt{x}}\,dx,x,\arcsin(ax)\right)}{a^2}\\
&= -\frac{2x\sqrt{1-a^2x^2}}{a\sqrt{\arcsin(ax)}}+\frac{4\text{Subst}\left(\int \cos\left(2x^2\right)\,dx,x,\sqrt{\arcsin(ax)}\right)}{a^2}\\
&= -\frac{2x\sqrt{1-a^2x^2}}{a\sqrt{\arcsin(ax)}}+\frac{2\sqrt{\pi}\,\text{FresnelC}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{a^2}
\end{aligned}$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.02 (sec) , antiderivative size = 91, normalized size of antiderivative = 1.65

$$\int \frac{x}{\arcsin(ax)^{3/2}}\,dx = -\frac{i\sqrt{2}\sqrt{-i\arcsin(ax)}\Gamma\left(\frac{1}{2},-2i\arcsin(ax)\right)-i\sqrt{2}\sqrt{i\arcsin(ax)}\Gamma\left(\frac{1}{2},2i\arcsin(ax)\right)+2\sin(2\arcsin(ax))}{2a^2\sqrt{\arcsin(ax)}}$$

```
[In] Integrate[x/ArcSin[a*x]^(3/2),x]
```

```
[Out] -1/2*(I*Sqrt[2]*Sqrt[(-I)*ArcSin[a*x]]*Gamma[1/2, (-2*I)*ArcSin[a*x]] - I*S
qrt[2]*Sqrt[I*ArcSin[a*x]]*Gamma[1/2, (2*I)*ArcSin[a*x]] + 2*Sin[2*ArcSin[a
*x]])/(a^2*Sqrt[ArcSin[a*x]])
```

Maple [A] (verified)

Time = 0.04 (sec) , antiderivative size = 43, normalized size of antiderivative = 0.78

method	result	size
default	$-\frac{-2\sqrt{\arcsin(ax)}\,\sqrt{\pi}\,\operatorname{FresnelC}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)+\sin(2\arcsin(ax))}{a^{2}\sqrt{\arcsin(ax)}}$	43

```
[In] int(x/arcsin(a*x)^(3/2),x,method=_RETURNVERBOSE)
[Out] -1/a^2/arcsin(a*x)^(1/2)*(-2*arcsin(a*x)^(1/2)*Pi^(1/2)*FresnelC(2*arcsin(a
*x)^(1/2)/Pi^(1/2))+sin(2*arcsin(a*x)))
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{x}{\arcsin(ax)^{3/2}}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate(x/arcsin(a*x)^(3/2),x, algorithm="fricas")
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int \frac{x}{\arcsin(ax)^{3/2}}\,dx = \int \frac{x}{\operatorname{asin}^{\frac{3}{2}}(ax)}\,dx$$

```
[In] integrate(x/asin(a*x)**(3/2),x)
[Out] Integral(x/asin(a*x)**(3/2), x)
```

Maxima [F(-2)]

Exception generated.

$$\int \frac{x}{\arcsin(ax)^{3/2}}\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(x/arcsin(a*x)^(3/2),x, algorithm="maxima")
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [F]

$$\int \frac{x}{\arcsin(ax)^{3/2}}\,dx = \int \frac{x}{\arcsin\left(ax\right)^{\frac{3}{2}}}\,dx$$

```
[In] integrate(x/arcsin(a*x)^(3/2),x, algorithm="giac")
[Out] integrate(x/arcsin(a*x)^(3/2), x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x}{\arcsin(ax)^{3/2}}\,dx = \int \frac{x}{\mathrm{asin}\left(a\,x\right)^{3/2}}\,dx$$

```
[In] int(x/asin(a*x)^(3/2),x)
[Out] int(x/asin(a*x)^(3/2), x)
```

3.105 $\int \frac{1}{\arcsin(ax)^{3/2}}\,dx$

Optimal result

Integrand size = 8, antiderivative size = 59

$$\int \frac{1}{\arcsin(ax)^{3/2}}\,dx = -\frac{2\sqrt{1-a^2x^2}}{a\sqrt{\arcsin(ax)}} - \frac{2\sqrt{2\pi}\,\text{FresnelS}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{a}$$

```
[Out] -2*FresnelS(2^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*2^(1/2)*Pi^(1/2)/a-2*(-a^2*
x^2+1)^(1/2)/a/arcsin(a*x)^(1/2)
```

Rubi [A] (verified)

Time = 0.06 (sec) , antiderivative size = 59, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {4717, 4809, 3386, 3432}

$$\int \frac{1}{\arcsin(ax)^{3/2}}\,dx = -\frac{2\sqrt{1-a^2x^2}}{a\sqrt{\arcsin(ax)}} - \frac{2\sqrt{2\pi}\,\text{FresnelS}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{a}$$

```
[In] Int[ArcSin[a*x]^(-3/2),x]
```

```
[Out] (-2*Sqrt[1 - a^2*x^2])/(a*Sqrt[ArcSin[a*x]]) - (2*Sqrt[2*Pi]*FresnelS[Sqrt[
2/Pi]*Sqrt[ArcSin[a*x]]])/a
```

Rule 3386

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[2/d
, Subst[Int[Sin[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d, e, f}
, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3432

```
Int[Sin[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelS[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4717

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_), x_Symbol] :> Simp[Sqrt[1 - c^2
*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] + Dist[c/(b*(n + 1)),
 Int[x*((a + b*ArcSin[c*x])^(n + 1)/Sqrt[1 - c^2*x^2]), x], x] /; FreeQ[{a,
 b, c}, x] && LtQ[n, -1]
```

Rule 4809

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_.)*((d_) + (e_.)*(x_)^
2)^(p_.), x_Symbol] :> Dist[(1/(b*c^(m + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x
^2)^p], Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b]^(2*p + 1), x], x, a
 + b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, d, e, n}, x] && EqQ[c^2*d + e, 0]
&& IGtQ[2*p + 2, 0] && IGtQ[m, 0]
```

Rubi steps

$$
\begin{aligned}
\text{integral} &= -\frac{2\sqrt{1-a^2x^2}}{a\sqrt{\arcsin(ax)}} - (2a)\int \frac{x}{\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}\,dx \\
&= -\frac{2\sqrt{1-a^2x^2}}{a\sqrt{\arcsin(ax)}} - \frac{2\text{Subst}\left(\int \frac{\sin(x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{a} \\
&= -\frac{2\sqrt{1-a^2x^2}}{a\sqrt{\arcsin(ax)}} - \frac{4\text{Subst}\left(\int \sin\left(x^2\right)\,dx, x, \sqrt{\arcsin(ax)}\right)}{a} \\
&= -\frac{2\sqrt{1-a^2x^2}}{a\sqrt{\arcsin(ax)}} - \frac{2\sqrt{2\pi}\,\text{FresnelS}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{a}
\end{aligned}
$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.08 (sec) , antiderivative size = 87, normalized size of antiderivative = 1.47

$$\int \frac{1}{\arcsin(ax)^{3/2}}\,dx = \frac{-e^{-i\arcsin(ax)}\left(1+e^{2i\arcsin(ax)}\right)+\sqrt{-i\arcsin(ax)}\Gamma\left(\frac{1}{2},-i\arcsin(ax)\right)+\sqrt{i\arcsin(ax)}}{a\sqrt{\arcsin(ax)}}$$

```
[In] Integrate[ArcSin[a*x]^(-3/2),x]
```

```
[Out] (-((1 + E^((2*I)*ArcSin[a*x]))/E^(I*ArcSin[a*x])) + Sqrt[(-I)*ArcSin[a*x]]*
Gamma[1/2, (-I)*ArcSin[a*x]] + Sqrt[I*ArcSin[a*x]]*Gamma[1/2, I*ArcSin[a*x]
])/(a*Sqrt[ArcSin[a*x]])
```

Maple [A] (verified)

Time = 0.04 (sec) , antiderivative size = 65, normalized size of antiderivative = 1.10

method	result	size
default	$-\frac{\sqrt{2}\left(2\arcsin(ax)\pi\ \mathrm{FresnelS}\left(\frac{\sqrt{2}\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)+\sqrt{2}\sqrt{\arcsin(ax)}\sqrt{\pi}\sqrt{-a^2x^2+1}\right)}{a\sqrt{\pi}\arcsin(ax)}$	65

```
[In] int(1/arcsin(a*x)^(3/2),x,method=_RETURNVERBOSE)
```

```
[Out] -1/a*2^(1/2)/Pi^(1/2)*(2*arcsin(a*x)*Pi*FresnelS(2^(1/2)/Pi^(1/2)*arcsin(a*
x)^(1/2))+2^(1/2)*arcsin(a*x)^(1/2)*Pi^(1/2)*(-a^2*x^2+1)^(1/2))/arcsin(a*x
)
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{1}{\arcsin(ax)^{3/2}}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate(1/arcsin(a*x)^(3/2),x, algorithm="fricas")
```

```
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int \frac{1}{\arcsin(ax)^{3/2}}\,dx = \int \frac{1}{\operatorname{asin}^{\frac{3}{2}}(ax)}\,dx$$

```
[In] integrate(1/asin(a*x)**(3/2),x)
```

```
[Out] Integral(asin(a*x)**(-3/2), x)
```

Maxima [F(-2)]

Exception generated.

$$\int \frac{1}{\arcsin(ax)^{3/2}}\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(1/arcsin(a*x)^(3/2),x, algorithm="maxima")
```

```
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [F]

$$\int \frac{1}{\arcsin(ax)^{3/2}}\,dx = \int \frac{1}{\arcsin(ax)^{\frac{3}{2}}}\,dx$$

```
[In] integrate(1/arcsin(a*x)^(3/2),x, algorithm="giac")
```

```
[Out] integrate(arcsin(a*x)^(-3/2), x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{1}{\arcsin(ax)^{3/2}}\,dx = \int \frac{1}{\operatorname{asin}(a\,x)^{3/2}}\,dx$$

```
[In] int(1/asin(a*x)^(3/2),x)
```

```
[Out] int(1/asin(a*x)^(3/2), x)
```

3.106 $\int \frac{1}{x \arcsin(ax)^{3/2}} dx$

Optimal result

Integrand size = 12, antiderivative size = 12

$$\int \frac{1}{x \arcsin(ax)^{3/2}} dx = \text{Int}\left(\frac{1}{x \arcsin(ax)^{3/2}}, x\right)$$

```
[Out] Unintegrable(1/x/arcsin(a*x)^(3/2),x)
```

Rubi [N/A]

Not integrable

Time = 0.01 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{1}{x \arcsin(ax)^{3/2}} dx = \int \frac{1}{x \arcsin(ax)^{3/2}} dx$$

```
[In] Int[1/(x*ArcSin[a*x]^(3/2)),x]
[Out] Defer[Int][1/(x*ArcSin[a*x]^(3/2)), x]
```

Rubi steps

$$\text{integral} = \int \frac{1}{x \arcsin(ax)^{3/2}} dx$$

Mathematica [N/A]

Not integrable

Time = 0.19 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.17

$$\int \frac{1}{x \arcsin(ax)^{3/2}} \, dx = \int \frac{1}{x \arcsin(ax)^{3/2}} \, dx$$

```
[In] Integrate[1/(x*ArcSin[a*x]^(3/2)),x]
[Out] Integrate[1/(x*ArcSin[a*x]^(3/2)), x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.06 (sec) , antiderivative size = 10, normalized size of antiderivative = 0.83

$$\int \frac{1}{x \arcsin \left(ax\right)^{\frac{3}{2}}}dx$$

```
[In] int(1/x/arcsin(a*x)^(3/2),x)
[Out] int(1/x/arcsin(a*x)^(3/2),x)
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{1}{x \arcsin(ax)^{3/2}} \, dx = \text{Exception raised: TypeError}$$

```
[In] integrate(1/x/arcsin(a*x)^(3/2),x, algorithm="fricas")
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [N/A]

Not integrable

Time = 0.85 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.00

$$\int \frac{1}{x \arcsin(ax)^{3/2}} \, dx = \int \frac{1}{x \operatorname{asin}^{\frac{3}{2}} (ax)} \, dx$$

```
[In] integrate(1/x/asin(a*x)**(3/2),x)
[Out] Integral(1/(x*asin(a*x)**(3/2)), x)
```

Maxima [F(-2)]

Exception generated.

$$\int \frac{1}{x \arcsin(ax)^{3/2}} \, dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(1/x/arcsin(a*x)^(3/2),x, algorithm="maxima")
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [N/A]

Not integrable

Time = 0.38 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.00

$$\int \frac{1}{x \arcsin(ax)^{3/2}} \, dx = \int \frac{1}{x \arcsin{(ax)}^{\frac{3}{2}}} \, dx$$

```
[In] integrate(1/x/arcsin(a*x)^(3/2),x, algorithm="giac")
[Out] integrate(1/(x*arcsin(a*x)^(3/2)), x)
```

Mupad [N/A]

Not integrable

Time = 0.04 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.00

$$\int \frac{1}{x \arcsin(ax)^{3/2}} \, dx = \int \frac{1}{x \, \mathrm{asin}\left(a\,x\right)^{3/2}} \, dx$$

```
[In] int(1/(x*asin(a*x)^(3/2)),x)
[Out] int(1/(x*asin(a*x)^(3/2)), x)
```

3.107 $\int \frac{x^4}{\arcsin(ax)^{5/2}}\,dx$

Optimal result

Integrand size = 12, antiderivative size = 171

$$\int \frac{x^4}{\arcsin(ax)^{5/2}}\,dx = -\frac{2x^4\sqrt{1-a^2x^2}}{3a\arcsin(ax)^{3/2}} - \frac{16x^3}{3a^2\sqrt{\arcsin(ax)}} + \frac{20x^5}{3\sqrt{\arcsin(ax)}} - \frac{\sqrt{\frac{\pi}{2}}\,\text{FresnelC}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{3a^5} + \frac{3\sqrt{\frac{3\pi}{2}}\,\text{FresnelC}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{2a^5} - \frac{5\sqrt{\frac{5\pi}{2}}\,\text{FresnelC}\left(\sqrt{\frac{10}{\pi}}\sqrt{\arcsin(ax)}\right)}{6a^5}$$

```
[Out] -1/6*FresnelC(2^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*2^(1/2)*Pi^(1/2)/a^5+3/4*
FresnelC(6^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*6^(1/2)*Pi^(1/2)/a^5-5/12*Fres
nelC(10^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*10^(1/2)*Pi^(1/2)/a^5-2/3*x^4*(-a
^2*x^2+1)^(1/2)/a/arcsin(a*x)^(3/2)-16/3*x^3/a^2/arcsin(a*x)^(1/2)+20/3*x^5
/arcsin(a*x)^(1/2)
```

Rubi [A] (verified)

Time = 0.27 (sec) , antiderivative size = 235, normalized size of antiderivative = 1.37, number of steps used = 19, number of rules used = 6, $\frac{\text{number of rules}}{\text{integrand size}} = 0.500$, Rules used

= {4729, 4807, 4731, 4491, 3385, 3433}

$$\int \frac{x^4}{\arcsin(ax)^{5/2}}\,dx = \frac{4\sqrt{2\pi}\,\text{FresnelC}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{a^5} - \frac{25\sqrt{\frac{\pi}{2}}\,\text{FresnelC}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{3a^5} - \frac{4\sqrt{\frac{2\pi}{3}}\,\text{FresnelC}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{a^5} + \frac{25\sqrt{\frac{\pi}{6}}\,\text{FresnelC}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{2a^5} - \frac{5\sqrt{\frac{5\pi}{2}}\,\text{FresnelC}\left(\sqrt{\frac{10}{\pi}}\sqrt{\arcsin(ax)}\right)}{6a^5} - \frac{16x^3}{3a^2\sqrt{\arcsin(ax)}} - \frac{2x^4\sqrt{1-a^2x^2}}{3a\arcsin(ax)^{3/2}} + \frac{20x^5}{3\sqrt{\arcsin(ax)}}$$

```
[In] Int[x^4/ArcSin[a*x]^(5/2),x]
```

```
[Out] (-2*x^4*Sqrt[1 - a^2*x^2])/(3*a*ArcSin[a*x]^(3/2)) - (16*x^3)/(3*a^2*Sqrt[A
rcSin[a*x]]) + (20*x^5)/(3*Sqrt[ArcSin[a*x]]) - (25*Sqrt[Pi/2]*FresnelC[Sqr
t[2/Pi]*Sqrt[ArcSin[a*x]]])/(3*a^5) + (4*Sqrt[2*Pi]*FresnelC[Sqrt[2/Pi]*Sqr
t[ArcSin[a*x]]])/a^5 + (25*Sqrt[Pi/6]*FresnelC[Sqrt[6/Pi]*Sqrt[ArcSin[a*x]]
])/(2*a^5) - (4*Sqrt[(2*Pi)/3]*FresnelC[Sqrt[6/Pi]*Sqrt[ArcSin[a*x]]])/a^5
- (5*Sqrt[(5*Pi)/2]*FresnelC[Sqrt[10/Pi]*Sqrt[ArcSin[a*x]]])/(6*a^5)
```

Rule 3385

```
Int[sin[Pi/2 + (e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> D
ist[2/d, Subst[Int[Cos[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d
, e, f}, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3433

```
Int[Cos[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelC[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4491

```
Int[Cos[(a_.) + (b_.)*(x_)]^(p_.)*((c_.) + (d_.)*(x_))^(m_.)*Sin[(a_.) + (b
_.)*(x_)]^(n_.), x_Symbol] :> Int[ExpandTrigReduce[(c + d*x)^m, Sin[a + b*x
]^n*Cos[a + b*x]^p, x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && IG
tQ[p, 0]
```

Rule 4729

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^m*Sqrt[1 - c^2*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] + (Dis
t[c*((m + 1)/(b*(n + 1))), Int[x^(m + 1)*((a + b*ArcSin[c*x])^(n + 1)/Sqrt[
1 - c^2*x^2]), x], x] - Dist[m/(b*c*(n + 1)), Int[x^(m - 1)*((a + b*ArcSin[
c*x])^(n + 1)/Sqrt[1 - c^2*x^2]), x], x]) /; FreeQ[{a, b, c}, x] && IGtQ[m,
```

```
0] && LtQ[n, -2]
```

Rule 4731

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Dist[1
/(b*c^(m + 1)), Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b], x], x, a +
 b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, n}, x] && IGtQ[m, 0]
```

Rule 4807

```
Int[(((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*((f_.)*(x_))^(m_.))/Sqrt[(d_)
+ (e_.)*(x_)^2], x_Symbol] :> Simp[((f*x)^m/(b*c*(n + 1)))*Simp[Sqrt[1 - c^
2*x^2]/Sqrt[d + e*x^2]]*(a + b*ArcSin[c*x])^(n + 1), x] - Dist[f*(m/(b*c*(n
 + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]], Int[(f*x)^(m - 1)*(a + b*A
rcSin[c*x])^(n + 1), x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && EqQ[c^2*d
 + e, 0] && LtQ[n, -1]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= -\frac{2x^4\sqrt{1-a^2x^2}}{3a\arcsin(ax)^{3/2}}+\frac{8\int\frac{x^3}{\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}\,dx}{3a} \\
&\quad -\frac{1}{3}(10a)\int\frac{x^5}{\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}\,dx \\
&= -\frac{2x^4\sqrt{1-a^2x^2}}{3a\arcsin(ax)^{3/2}}-\frac{16x^3}{3a^2\sqrt{\arcsin(ax)}}+\frac{20x^5}{3\sqrt{\arcsin(ax)}} \\
&\quad -\frac{100}{3}\int\frac{x^4}{\sqrt{\arcsin(ax)}}\,dx+\frac{16\int\frac{x^2}{\sqrt{\arcsin(ax)}}\,dx}{a^2} \\
&= -\frac{2x^4\sqrt{1-a^2x^2}}{3a\arcsin(ax)^{3/2}}-\frac{16x^3}{3a^2\sqrt{\arcsin(ax)}}+\frac{20x^5}{3\sqrt{\arcsin(ax)}} \\
&\quad +\frac{16\text{Subst}\left(\int\frac{\cos(x)\sin^2(x)}{\sqrt{x}}\,dx,x,\arcsin(ax)\right)}{a^5} \\
&\quad -\frac{100\text{Subst}\left(\int\frac{\cos(x)\sin^4(x)}{\sqrt{x}}\,dx,x,\arcsin(ax)\right)}{3a^5} \\
&= -\frac{2x^4\sqrt{1-a^2x^2}}{3a\arcsin(ax)^{3/2}}-\frac{16x^3}{3a^2\sqrt{\arcsin(ax)}}+\frac{20x^5}{3\sqrt{\arcsin(ax)}} \\
&\quad +\frac{16\text{Subst}\left(\int\left(\frac{\cos(x)}{4\sqrt{x}}-\frac{\cos(3x)}{4\sqrt{x}}\right)\,dx,x,\arcsin(ax)\right)}{a^5} \\
&\quad -\frac{100\text{Subst}\left(\int\left(\frac{\cos(x)}{8\sqrt{x}}-\frac{3\cos(3x)}{16\sqrt{x}}+\frac{\cos(5x)}{16\sqrt{x}}\right)\,dx,x,\arcsin(ax)\right)}{3a^5}
\end{aligned}$$

$$= -\frac{2x^4\sqrt{1-a^2x^2}}{3a\arcsin(ax)^{3/2}} - \frac{16x^3}{3a^2\sqrt{\arcsin(ax)}} + \frac{20x^5}{3\sqrt{\arcsin(ax)}} - \frac{25\text{Subst}\left(\int \frac{\cos(5x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{12a^5} + \frac{4\text{Subst}\left(\int \frac{\cos(x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{a^5} - \frac{4\text{Subst}\left(\int \frac{\cos(3x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{a^5} - \frac{25\text{Subst}\left(\int \frac{\cos(x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{6a^5} + \frac{25\text{Subst}\left(\int \frac{\cos(3x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{4a^5}$$

$$= -\frac{2x^4\sqrt{1-a^2x^2}}{3a\arcsin(ax)^{3/2}} - \frac{16x^3}{3a^2\sqrt{\arcsin(ax)}} + \frac{20x^5}{3\sqrt{\arcsin(ax)}} - \frac{25\text{Subst}\left(\int \cos(5x^2)\,dx, x, \sqrt{\arcsin(ax)}\right)}{6a^5} + \frac{8\text{Subst}\left(\int \cos(x^2)\,dx, x, \sqrt{\arcsin(ax)}\right)}{a^5} - \frac{8\text{Subst}\left(\int \cos(3x^2)\,dx, x, \sqrt{\arcsin(ax)}\right)}{a^5} - \frac{25\text{Subst}\left(\int \cos(x^2)\,dx, x, \sqrt{\arcsin(ax)}\right)}{3a^5} + \frac{25\text{Subst}\left(\int \cos(3x^2)\,dx, x, \sqrt{\arcsin(ax)}\right)}{2a^5}$$

$$= -\frac{2x^4\sqrt{1-a^2x^2}}{3a\arcsin(ax)^{3/2}} - \frac{16x^3}{3a^2\sqrt{\arcsin(ax)}} + \frac{20x^5}{3\sqrt{\arcsin(ax)}} - \frac{25\sqrt{\frac{\pi}{2}}\,\text{FresnelC}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{3a^5} + \frac{4\sqrt{2\pi}\,\text{FresnelC}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{a^5} + \frac{25\sqrt{\frac{\pi}{6}}\,\text{FresnelC}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{2a^5} - \frac{4\sqrt{\frac{2\pi}{3}}\,\text{FresnelC}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{a^5} - \frac{5\sqrt{\frac{5\pi}{2}}\,\text{FresnelC}\left(\sqrt{\frac{10}{\pi}}\sqrt{\arcsin(ax)}\right)}{6a^5}$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.23 (sec) , antiderivative size = 418, normalized size of antiderivative = 2.44

$$\int \frac{x^4}{\arcsin(ax)^{5/2}}\,dx = \frac{\frac{ie^{i\arcsin(ax)}(i-2\arcsin(ax))-2(-i\arcsin(ax))^{3/2}\Gamma\left(\frac{1}{2},-i\arcsin(ax)\right)}{24\arcsin(ax)^{3/2}} - \frac{e^{-i\arcsin(ax)}\left(1-2i\arcsin(ax)+2e^{i\arcsin(a}\right.}{24\arcsin(a}}{}$$

[In] Integrate[x^4/ArcSin[a*x]^(5/2),x]

[Out] ((I*E^(I*ArcSin[a*x])*(I - 2*ArcSin[a*x]) - 2*((-I)*ArcSin[a*x])^(3/2)*Gamma[1/2, (-I)*ArcSin[a*x]])/(24*ArcSin[a*x]^(3/2)) - (1 - (2*I)*ArcSin[a*x] + 2*E^(I*ArcSin[a*x])*(I*ArcSin[a*x])^(3/2)*Gamma[1/2, I*ArcSin[a*x]])/(24*E^(I*ArcSin[a*x])*ArcSin[a*x]^(3/2)) - (I*E^((3*I)*ArcSin[a*x])*(I - 6*ArcSin[a*x]) - 6*Sqrt[3]*((-I)*ArcSin[a*x])^(3/2)*Gamma[1/2, (-3*I)*ArcSin[a*x]])/(16*ArcSin[a*x]^(3/2)) + (1 - (6*I)*ArcSin[a*x] + 6*Sqrt[3]*E^((3*I)*ArcSin[a*x])*(I*ArcSin[a*x])^(3/2)*Gamma[1/2, (3*I)*ArcSin[a*x]])/(16*E^((3*I)*ArcSin[a*x])*ArcSin[a*x]^(3/2)) + (I*E^((5*I)*ArcSin[a*x])*(I - 10*ArcSin[a*x]) - 10*Sqrt[5]*((-I)*ArcSin[a*x])^(3/2)*Gamma[1/2, (-5*I)*ArcSin[a*x]])/(48*ArcSin[a*x]^(3/2)) - (1 - (10*I)*ArcSin[a*x] + 10*Sqrt[5]*E^((5*I)*ArcSin[a*x])*(I*ArcSin[a*x])^(3/2)*Gamma[1/2, (5*I)*ArcSin[a*x]])/(48*E^((5*I)*ArcSin[a*x])*ArcSin[a*x]^(3/2)))/a^5

Maple [A] (verified)

Time = 0.08 (sec) , antiderivative size = 173, normalized size of antiderivative = 1.01

method	result
default	$-\frac{10\sqrt{2}\,\sqrt{\pi}\,\sqrt{5}\ \mathrm{FresnelC}\left(\frac{\sqrt{2}\,\sqrt{5}\,\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)\arcsin(ax)^{\frac{3}{2}}-18\sqrt{2}\,\sqrt{\pi}\,\sqrt{3}\ \mathrm{FresnelC}\left(\frac{\sqrt{2}\,\sqrt{3}\,\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)\arcsin(ax)^{\frac{3}{2}}+4\sqrt{2}\,\sqrt{\pi}\ \mathrm{Fres}}{}$

[In] int(x^4/arcsin(a*x)^(5/2),x,method=_RETURNVERBOSE)

[Out] -1/24/a^5*(10*2^(1/2)*Pi^(1/2)*5^(1/2)*FresnelC(2^(1/2)/Pi^(1/2)*5^(1/2)*arcsin(a*x)^(1/2))*arcsin(a*x)^(3/2)-18*2^(1/2)*Pi^(1/2)*3^(1/2)*FresnelC(2^(1/2)/Pi^(1/2)*3^(1/2)*arcsin(a*x)^(1/2))*arcsin(a*x)^(3/2)+4*2^(1/2)*Pi^(1/2)*FresnelC(2^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*arcsin(a*x)^(3/2)-4*a*x*arcsin(a*x)+18*arcsin(a*x)*sin(3*arcsin(a*x))-10*arcsin(a*x)*sin(5*arcsin(a*x))+2*(-a^2*x^2+1)^(1/2)-3*cos(3*arcsin(a*x))+cos(5*arcsin(a*x)))/arcsin(a*x)^(3/2)

Fricas [F(-2)]

Exception generated.

$$\int \frac{x^4}{\arcsin(ax)^{5/2}}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate(x^4/arcsin(a*x)^(5/2),x, algorithm="fricas")
```

```
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int \frac{x^4}{\arcsin(ax)^{5/2}}\,dx = \int \frac{x^4}{\operatorname{asin}^{\frac{5}{2}}(ax)}\,dx$$

```
[In] integrate(x**4/asin(a*x)**(5/2),x)
```

```
[Out] Integral(x**4/asin(a*x)**(5/2), x)
```

Maxima [F(-2)]

Exception generated.

$$\int \frac{x^4}{\arcsin(ax)^{5/2}}\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(x^4/arcsin(a*x)^(5/2),x, algorithm="maxima")
```

```
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [F]

$$\int \frac{x^4}{\arcsin(ax)^{5/2}}\,dx = \int \frac{x^4}{\arcsin(ax)^{\frac{5}{2}}}\,dx$$

```
[In] integrate(x^4/arcsin(a*x)^(5/2),x, algorithm="giac")
```

```
[Out] integrate(x^4/arcsin(a*x)^(5/2), x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x^4}{\arcsin(ax)^{5/2}}\,dx = \int \frac{x^4}{\mathrm{asin}\left(a\,x\right)^{5/2}}\,dx$$

```
[In] int(x^4/asin(a*x)^(5/2),x)
[Out] int(x^4/asin(a*x)^(5/2), x)
```

3.108 $\int \frac{x^3}{\arcsin(ax)^{5/2}} dx$

Optimal result

Integrand size = 12, antiderivative size = 126

$$\int \frac{x^3}{\arcsin(ax)^{5/2}} dx = -\frac{2x^3\sqrt{1-a^2x^2}}{3a\arcsin(ax)^{3/2}} - \frac{4x^2}{a^2\sqrt{\arcsin(ax)}} + \frac{16x^4}{3\sqrt{\arcsin(ax)}} + \frac{4\sqrt{2\pi}\,\text{FresnelS}\left(2\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{3a^4} - \frac{4\sqrt{\pi}\,\text{FresnelS}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{3a^4}$$

```
[Out] -4/3*FresnelS(2*arcsin(a*x)^(1/2)/Pi^(1/2))*Pi^(1/2)/a^4+4/3*FresnelS(2*2^(
1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*2^(1/2)*Pi^(1/2)/a^4-2/3*x^3*(-a^2*x^2+1)^
(1/2)/a/arcsin(a*x)^(3/2)-4*x^2/a^2/arcsin(a*x)^(1/2)+16/3*x^4/arcsin(a*x)^
(1/2)
```

Rubi [A] (verified)

Time = 0.21 (sec) , antiderivative size = 126, normalized size of antiderivative = 1.00, number of steps used = 15, number of rules used = 7, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.583, Rules used = {4729, 4807, 4731, 4491, 3386, 3432, 12}

$$\int \frac{x^3}{\arcsin(ax)^{5/2}} dx = \frac{4\sqrt{2\pi}\,\text{FresnelS}\left(2\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{3a^4} - \frac{4\sqrt{\pi}\,\text{FresnelS}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{3a^4} - \frac{4x^2}{a^2\sqrt{\arcsin(ax)}} - \frac{2x^3\sqrt{1-a^2x^2}}{3a\arcsin(ax)^{3/2}} + \frac{16x^4}{3\sqrt{\arcsin(ax)}}$$

```
[In] Int[x^3/ArcSin[a*x]^(5/2),x]
```

```
[Out] (-2*x^3*Sqrt[1 - a^2*x^2])/(3*a*ArcSin[a*x]^(3/2)) - (4*x^2)/(a^2*Sqrt[ArcS
in[a*x]]) + (16*x^4)/(3*Sqrt[ArcSin[a*x]]) + (4*Sqrt[2*Pi]*FresnelS[2*Sqrt[
```

```
2/Pi]*Sqrt[ArcSin[a*x]]])/(3*a^4) - (4*Sqrt[Pi]*FresnelS[(2*Sqrt[ArcSin[a*x
]])/Sqrt[Pi]])/(3*a^4)
```

Rule 12

```
Int[(a_)*(u_), x_Symbol] :> Dist[a, Int[u, x], x] /; FreeQ[a, x] &&  !Match
Q[u, (b_)*(v_) /; FreeQ[b, x]]
```

Rule 3386

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[2/d
, Subst[Int[Sin[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d, e, f}
, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3432

```
Int[Sin[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelS[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4491

```
Int[Cos[(a_.) + (b_.)*(x_)]^(p_.)*((c_.) + (d_.)*(x_))^(m_.)*Sin[(a_.) + (b
_.)*(x_)]^(n_.), x_Symbol] :> Int[ExpandTrigReduce[(c + d*x)^m, Sin[a + b*x
]^n*Cos[a + b*x]^p, x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && IG
tQ[p, 0]
```

Rule 4729

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^m*Sqrt[1 - c^2*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] + (Dis
t[c*((m + 1)/(b*(n + 1))), Int[x^(m + 1)*((a + b*ArcSin[c*x])^(n + 1)/Sqrt[
1 - c^2*x^2]), x], x] - Dist[m/(b*c*(n + 1)), Int[x^(m - 1)*((a + b*ArcSin[
c*x])^(n + 1)/Sqrt[1 - c^2*x^2]), x], x]) /; FreeQ[{a, b, c}, x] && IGtQ[m,
 0] && LtQ[n, -2]
```

Rule 4731

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Dist[1
/(b*c^(m + 1)), Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b], x], x, a +
 b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, n}, x] && IGtQ[m, 0]
```

Rule 4807

```
Int[(((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*((f_.)*(x_))^(m_.))/Sqrt[(d_)
+ (e_.)*(x_)^2], x_Symbol] :> Simp[((f*x)^m/(b*c*(n + 1)))*Simp[Sqrt[1 - c^
2*x^2]/Sqrt[d + e*x^2]]*(a + b*ArcSin[c*x])^(n + 1), x] - Dist[f*(m/(b*c*(n
 + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]], Int[(f*x)^(m - 1)*(a + b*A
```

```
rcSin[c*x])^(n + 1), x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && EqQ[c^2*d
 + e, 0] && LtQ[n, -1]
```

Rubi steps

integral

$$= -\frac{2x^3\sqrt{1-a^2x^2}}{3a\arcsin(ax)^{3/2}} + \frac{2\int \frac{x^2}{\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}\,dx}{a} - \frac{1}{3}(8a)\int \frac{x^4}{\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}\,dx$$

$$= -\frac{2x^3\sqrt{1-a^2x^2}}{3a\arcsin(ax)^{3/2}} - \frac{4x^2}{a^2\sqrt{\arcsin(ax)}} + \frac{16x^4}{3\sqrt{\arcsin(ax)}} - \frac{64}{3}\int \frac{x^3}{\sqrt{\arcsin(ax)}}\,dx + \frac{8\int \frac{x}{\sqrt{\arcsin(ax)}}\,dx}{a^2}$$

$$= -\frac{2x^3\sqrt{1-a^2x^2}}{3a\arcsin(ax)^{3/2}} - \frac{4x^2}{a^2\sqrt{\arcsin(ax)}} + \frac{16x^4}{3\sqrt{\arcsin(ax)}} + \frac{8\mathrm{Subst}\left(\int \frac{\cos(x)\sin(x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{a^4} - \frac{64\mathrm{Subst}\left(\int \frac{\cos(x)\sin^3(x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{3a^4}$$

$$= -\frac{2x^3\sqrt{1-a^2x^2}}{3a\arcsin(ax)^{3/2}} - \frac{4x^2}{a^2\sqrt{\arcsin(ax)}} + \frac{16x^4}{3\sqrt{\arcsin(ax)}} + \frac{8\mathrm{Subst}\left(\int \frac{\sin(2x)}{2\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{a^4} - \frac{64\mathrm{Subst}\left(\int \left(\frac{\sin(2x)}{4\sqrt{x}} - \frac{\sin(4x)}{8\sqrt{x}}\right)\,dx, x, \arcsin(ax)\right)}{3a^4}$$

$$= -\frac{2x^3\sqrt{1-a^2x^2}}{3a\arcsin(ax)^{3/2}} - \frac{4x^2}{a^2\sqrt{\arcsin(ax)}} + \frac{16x^4}{3\sqrt{\arcsin(ax)}} + \frac{8\mathrm{Subst}\left(\int \frac{\sin(4x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{3a^4} + \frac{4\mathrm{Subst}\left(\int \frac{\sin(2x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{a^4} - \frac{16\mathrm{Subst}\left(\int \frac{\sin(2x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{3a^4}$$

$$= -\frac{2x^3\sqrt{1-a^2x^2}}{3a\arcsin(ax)^{3/2}} - \frac{4x^2}{a^2\sqrt{\arcsin(ax)}} + \frac{16x^4}{3\sqrt{\arcsin(ax)}} + \frac{16\mathrm{Subst}\left(\int \sin(4x^2)\,dx, x, \sqrt{\arcsin(ax)}\right)}{3a^4} + \frac{8\mathrm{Subst}\left(\int \sin(2x^2)\,dx, x, \sqrt{\arcsin(ax)}\right)}{a^4} - \frac{32\mathrm{Subst}\left(\int \sin(2x^2)\,dx, x, \sqrt{\arcsin(ax)}\right)}{3a^4}$$

$$= -\frac{2x^3\sqrt{1-a^2x^2}}{3a\arcsin(ax)^{3/2}} - \frac{4x^2}{a^2\sqrt{\arcsin(ax)}} + \frac{16x^4}{3\sqrt{\arcsin(ax)}} + \frac{4\sqrt{2\pi}\,\mathrm{FresnelS}\left(2\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{3a^4} - \frac{4\sqrt{\pi}\,\mathrm{FresnelS}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{3a^4}$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.28 (sec) , antiderivative size = 200, normalized size of antiderivative = 1.59

$$\int \frac{x^3}{\arcsin(ax)^{5/2}}\,dx = \frac{-4\arcsin(ax)\left(e^{-2i\arcsin(ax)} + e^{2i\arcsin(ax)} - \sqrt{2}\sqrt{-i\arcsin(ax)}\,\Gamma\left(\frac{1}{2}, -2i\arcsin(ax)\right) - \cdots\right.}{\cdots}$$

```
[In] Integrate[x^3/ArcSin[a*x]^(5/2),x]
```

```
[Out] (-4*ArcSin[a*x]*(E^((-2*I)*ArcSin[a*x]) + E^((2*I)*ArcSin[a*x]) - Sqrt[2]*S
qrt[(-I)*ArcSin[a*x]]*Gamma[1/2, (-2*I)*ArcSin[a*x]] - Sqrt[2]*Sqrt[I*ArcSi
n[a*x]]*Gamma[1/2, (2*I)*ArcSin[a*x]]) + 4*ArcSin[a*x]*(E^((-4*I)*ArcSin[a*
x]) + E^((4*I)*ArcSin[a*x]) - 2*Sqrt[(-I)*ArcSin[a*x]]*Gamma[1/2, (-4*I)*Ar
cSin[a*x]] - 2*Sqrt[I*ArcSin[a*x]]*Gamma[1/2, (4*I)*ArcSin[a*x]]) - 2*Sin[2
*ArcSin[a*x]] + Sin[4*ArcSin[a*x]])/(12*a^4*ArcSin[a*x]^(3/2))
```

Maple [A] (verified)

Time = 0.06 (sec) , antiderivative size = 109, normalized size of antiderivative = 0.87

method	result
default	$-\frac{-16\sqrt{2}\,\sqrt{\pi}\,\mathrm{FresnelS}\left(\frac{2\sqrt{2}\,\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)\arcsin(ax)^{\frac{3}{2}}+16\sqrt{\pi}\,\mathrm{FresnelS}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)\arcsin(ax)^{\frac{3}{2}}+8\arcsin(ax)\cos(2\arcsin(ax)) \cdots}{12a^4\arcsin(ax)^{\frac{3}{2}}}$

```
[In] int(x^3/arcsin(a*x)^(5/2),x,method=_RETURNVERBOSE)
```

```
[Out] -1/12/a^4*(-16*2^(1/2)*Pi^(1/2)*FresnelS(2*2^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/
2))*arcsin(a*x)^(3/2)+16*Pi^(1/2)*FresnelS(2*arcsin(a*x)^(1/2)/Pi^(1/2))*ar
csin(a*x)^(3/2)+8*arcsin(a*x)*cos(2*arcsin(a*x))-8*arcsin(a*x)*cos(4*arcsin
(a*x))+2*sin(2*arcsin(a*x))-sin(4*arcsin(a*x)))/arcsin(a*x)^(3/2)
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{x^3}{\arcsin(ax)^{5/2}}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate(x^3/arcsin(a*x)^(5/2),x, algorithm="fricas")
```

```
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int \frac{x^3}{\arcsin(ax)^{5/2}}\,dx = \int \frac{x^3}{\operatorname{asin}^{\frac{5}{2}}(ax)}\,dx$$

```
[In] integrate(x**3/asin(a*x)**(5/2),x)
```

```
[Out] Integral(x**3/asin(a*x)**(5/2), x)
```

Maxima [F(-2)]

Exception generated.

$$\int \frac{x^3}{\arcsin(ax)^{5/2}}\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(x^3/arcsin(a*x)^(5/2),x, algorithm="maxima")
```

```
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [F(-2)]

Exception generated.

$$\int \frac{x^3}{\arcsin(ax)^{5/2}}\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(x^3/arcsin(a*x)^(5/2),x, algorithm="giac")
```

```
[Out] Exception raised: RuntimeError >> an error occurred running a Giac command:
INPUT:sage2OUTPUT:sym2poly/r2sym(const gen & e,const index_m & i,const vect
eur & l) Error: Bad Argument Value
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x^3}{\arcsin(ax)^{5/2}}\,dx = \int \frac{x^3}{\operatorname{asin}(a\,x)^{5/2}}\,dx$$

```
[In] int(x^3/asin(a*x)^(5/2),x)
```

```
[Out] int(x^3/asin(a*x)^(5/2), x)
```

3.109 $\int \frac{x^2}{\arcsin(ax)^{5/2}}\,dx$

Optimal result

Integrand size = 12, antiderivative size = 125

$$\int \frac{x^2}{\arcsin(ax)^{5/2}}\,dx = -\frac{2x^2\sqrt{1-a^2x^2}}{3a\arcsin(ax)^{3/2}} - \frac{8x}{3a^2\sqrt{\arcsin(ax)}} + \frac{4x^3}{\sqrt{\arcsin(ax)}} - \frac{\sqrt{2\pi}\,\text{FresnelC}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{3a^3} + \frac{\sqrt{6\pi}\,\text{FresnelC}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{a^3}$$

```
[Out] -1/3*FresnelC(2^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*2^(1/2)*Pi^(1/2)/a^3+Fres
nelC(6^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*6^(1/2)*Pi^(1/2)/a^3-2/3*x^2*(-a^2
*x^2+1)^(1/2)/a/arcsin(a*x)^(3/2)-8/3*x/a^2/arcsin(a*x)^(1/2)+4*x^3/arcsin(
a*x)^(1/2)
```

Rubi [A] (verified)

Time = 0.19 (sec) , antiderivative size = 125, normalized size of antiderivative = 1.00, number of steps used = 13, number of rules used = 7, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.583, Rules used = {4729, 4807, 4731, 4491, 3385, 3433, 4719}

$$\int \frac{x^2}{\arcsin(ax)^{5/2}}\,dx = -\frac{\sqrt{2\pi}\,\text{FresnelC}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{3a^3} + \frac{\sqrt{6\pi}\,\text{FresnelC}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{a^3} - \frac{2x^2\sqrt{1-a^2x^2}}{3a\arcsin(ax)^{3/2}} - \frac{8x}{3a^2\sqrt{\arcsin(ax)}} + \frac{4x^3}{\sqrt{\arcsin(ax)}}$$

```
[In] Int[x^2/ArcSin[a*x]^(5/2),x]
```

```
[Out] (-2*x^2*Sqrt[1 - a^2*x^2])/(3*a*ArcSin[a*x]^(3/2)) - (8*x)/(3*a^2*Sqrt[ArcS
in[a*x]]) + (4*x^3)/Sqrt[ArcSin[a*x]] - (Sqrt[2*Pi]*FresnelC[Sqrt[2/Pi]*Sqr
```

```
t[ArcSin[a*x]]])/(3*a^3) + (Sqrt[6*Pi]*FresnelC[Sqrt[6/Pi]*Sqrt[ArcSin[a*x]
]])/a^3
```

Rule 3385

```
Int[sin[Pi/2 + (e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> D
ist[2/d, Subst[Int[Cos[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d
, e, f}, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3433

```
Int[Cos[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelC[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4491

```
Int[Cos[(a_.) + (b_.)*(x_)]^(p_.)*((c_.) + (d_.)*(x_))^(m_.)*Sin[(a_.) + (b
_.)*(x_)]^(n_.), x_Symbol] :> Int[ExpandTrigReduce[(c + d*x)^m, Sin[a + b*x
]^n*Cos[a + b*x]^p, x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && IG
tQ[p, 0]
```

Rule 4719

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_), x_Symbol] :> Dist[1/(b*c), Sub
st[Int[x^n*Cos[-a/b + x/b], x], x, a + b*ArcSin[c*x]], x] /; FreeQ[{a, b, c
, n}, x]
```

Rule 4729

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^m*Sqrt[1 - c^2*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] + (Dis
t[c*((m + 1)/(b*(n + 1))), Int[x^(m + 1)*((a + b*ArcSin[c*x])^(n + 1)/Sqrt[
1 - c^2*x^2]), x], x] - Dist[m/(b*c*(n + 1)), Int[x^(m - 1)*((a + b*ArcSin[
c*x])^(n + 1)/Sqrt[1 - c^2*x^2]), x], x]) /; FreeQ[{a, b, c}, x] && IGtQ[m,
 0] && LtQ[n, -2]
```

Rule 4731

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Dist[1
/(b*c^(m + 1)), Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b], x], x, a +
 b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, n}, x] && IGtQ[m, 0]
```

Rule 4807

```
Int[(((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*((f_.)*(x_))^(m_.))/Sqrt[(d_)
+ (e_.)*(x_)^2], x_Symbol] :> Simp[((f*x)^m/(b*c*(n + 1)))*Simp[Sqrt[1 - c^
2*x^2]/Sqrt[d + e*x^2]]*(a + b*ArcSin[c*x])^(n + 1), x] - Dist[f*(m/(b*c*(n
```

```
 + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]], Int[(f*x)^(m - 1)*(a + b*A
rcSin[c*x])^(n + 1), x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && EqQ[c^2*d
 + e, 0] && LtQ[n, -1]
```

Rubi steps

$$\text{integral} = -\frac{2x^2\sqrt{1-a^2x^2}}{3a\arcsin(ax)^{3/2}} + \frac{4\int \frac{x}{\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}\,dx}{3a} - (2a)\int \frac{x^3}{\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}\,dx$$

$$= -\frac{2x^2\sqrt{1-a^2x^2}}{3a\arcsin(ax)^{3/2}} - \frac{8x}{3a^2\sqrt{\arcsin(ax)}} + \frac{4x^3}{\sqrt{\arcsin(ax)}} - 12\int \frac{x^2}{\sqrt{\arcsin(ax)}}\,dx + \frac{8\int \frac{1}{\sqrt{\arcsin(ax)}}\,dx}{3a^2}$$

$$= -\frac{2x^2\sqrt{1-a^2x^2}}{3a\arcsin(ax)^{3/2}} - \frac{8x}{3a^2\sqrt{\arcsin(ax)}} + \frac{4x^3}{\sqrt{\arcsin(ax)}} + \frac{8\text{Subst}\left(\int \frac{\cos(x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{3a^3} - \frac{12\text{Subst}\left(\int \frac{\cos(x)\sin^2(x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{a^3}$$

$$= -\frac{2x^2\sqrt{1-a^2x^2}}{3a\arcsin(ax)^{3/2}} - \frac{8x}{3a^2\sqrt{\arcsin(ax)}} + \frac{4x^3}{\sqrt{\arcsin(ax)}} + \frac{16\text{Subst}\left(\int \cos\left(x^2\right)\,dx, x, \sqrt{\arcsin(ax)}\right)}{3a^3} - \frac{12\text{Subst}\left(\int \left(\frac{\cos(x)}{4\sqrt{x}} - \frac{\cos(3x)}{4\sqrt{x}}\right)\,dx, x, \arcsin(ax)\right)}{a^3}$$

$$= -\frac{2x^2\sqrt{1-a^2x^2}}{3a\arcsin(ax)^{3/2}} - \frac{8x}{3a^2\sqrt{\arcsin(ax)}} + \frac{4x^3}{\sqrt{\arcsin(ax)}} + \frac{8\sqrt{2\pi}\,\text{FresnelC}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{3a^3} - \frac{3\text{Subst}\left(\int \frac{\cos(x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{a^3} + \frac{3\text{Subst}\left(\int \frac{\cos(3x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{a^3}$$

$$= -\frac{2x^2\sqrt{1-a^2x^2}}{3a\arcsin(ax)^{3/2}} - \frac{8x}{3a^2\sqrt{\arcsin(ax)}} + \frac{4x^3}{\sqrt{\arcsin(ax)}} + \frac{8\sqrt{2\pi}\,\text{FresnelC}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{3a^3} - \frac{6\text{Subst}\left(\int \cos\left(x^2\right)\,dx, x, \sqrt{\arcsin(ax)}\right)}{a^3} + \frac{6\text{Subst}\left(\int \cos\left(3x^2\right)\,dx, x, \sqrt{\arcsin(ax)}\right)}{a^3}$$

$$= -\frac{2x^2\sqrt{1-a^2x^2}}{3a\arcsin(ax)^{3/2}} - \frac{8x}{3a^2\sqrt{\arcsin(ax)}} + \frac{4x^3}{\sqrt{\arcsin(ax)}} - \frac{\sqrt{2\pi}\,\text{FresnelC}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{3a^3} + \frac{\sqrt{6\pi}\,\text{FresnelC}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{a^3}$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.16 (sec) , antiderivative size = 277, normalized size of antiderivative = 2.22

$$\int \frac{x^2}{\arcsin(ax)^{5/2}}\,dx = \frac{\frac{ie^{i\arcsin(ax)}(i-2\arcsin(ax))-2(-i\arcsin(ax))^{3/2}\Gamma\left(\frac{1}{2},-i\arcsin(ax)\right)}{12\arcsin(ax)^{3/2}} - \frac{e^{-i\arcsin(ax)}\left(1-2i\arcsin(ax)+2e^{i\arcsin(ax)}\right.}{12\arcsin(ax)}}{}$$

```
[In] Integrate[x^2/ArcSin[a*x]^(5/2),x]
```

```
[Out] ((I*E^(I*ArcSin[a*x])*(I - 2*ArcSin[a*x]) - 2*((-I)*ArcSin[a*x])^(3/2)*Gamm
a[1/2, (-I)*ArcSin[a*x]])/(12*ArcSin[a*x]^(3/2)) - (1 - (2*I)*ArcSin[a*x] +
 2*E^(I*ArcSin[a*x])*(I*ArcSin[a*x])^(3/2)*Gamma[1/2, I*ArcSin[a*x]])/(12*E
^(I*ArcSin[a*x])*ArcSin[a*x]^(3/2)) - (I*E^((3*I)*ArcSin[a*x])*(I - 6*ArcSi
n[a*x]) - 6*Sqrt[3]*((-I)*ArcSin[a*x])^(3/2)*Gamma[1/2, (-3*I)*ArcSin[a*x]]
)/(12*ArcSin[a*x]^(3/2)) + (1 - (6*I)*ArcSin[a*x] + 6*Sqrt[3]*E^((3*I)*ArcS
in[a*x])*(I*ArcSin[a*x])^(3/2)*Gamma[1/2, (3*I)*ArcSin[a*x]])/(12*E^((3*I)*
ArcSin[a*x])*ArcSin[a*x]^(3/2)))/a^3
```

Maple [A] (verified)

Time = 0.06 (sec) , antiderivative size = 117, normalized size of antiderivative = 0.94

method	result
default	$-\frac{-6\sqrt{2}\,\sqrt{\pi}\,\sqrt{3}\,\text{FresnelC}\left(\frac{\sqrt{2}\,\sqrt{3}\,\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)\arcsin(ax)^{\frac{3}{2}}+2\sqrt{2}\,\sqrt{\pi}\,\text{FresnelC}\left(\frac{\sqrt{2}\,\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)\arcsin(ax)^{\frac{3}{2}}-2ax\arcsin(ax)+6\,\text{arcs}}{6a^3\arcsin(ax)^{\frac{3}{2}}}$

```
[In] int(x^2/arcsin(a*x)^(5/2),x,method=_RETURNVERBOSE)
```

```
[Out] -1/6/a^3*(-6*2^(1/2)*Pi^(1/2)*3^(1/2)*FresnelC(2^(1/2)/Pi^(1/2)*3^(1/2)*arc
sin(a*x)^(1/2))*arcsin(a*x)^(3/2)+2*2^(1/2)*Pi^(1/2)*FresnelC(2^(1/2)/Pi^(1
/2)*arcsin(a*x)^(1/2))*arcsin(a*x)^(3/2)-2*a*x*arcsin(a*x)+6*arcsin(a*x)*si
n(3*arcsin(a*x))+(-a^2*x^2+1)^(1/2)-cos(3*arcsin(a*x)))/arcsin(a*x)^(3/2)
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{x^2}{\arcsin(ax)^{5/2}}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate(x^2/arcsin(a*x)^(5/2),x, algorithm="fricas")
```

```
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int \frac{x^2}{\arcsin(ax)^{5/2}}\,dx = \int \frac{x^2}{\operatorname{asin}^{\frac{5}{2}}(ax)}\,dx$$

```
[In] integrate(x**2/asin(a*x)**(5/2),x)
```

```
[Out] Integral(x**2/asin(a*x)**(5/2), x)
```

Maxima [F(-2)]

Exception generated.

$$\int \frac{x^2}{\arcsin(ax)^{5/2}}\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(x^2/arcsin(a*x)^(5/2),x, algorithm="maxima")
```

```
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [F]

$$\int \frac{x^2}{\arcsin(ax)^{5/2}}\,dx = \int \frac{x^2}{\arcsin(ax)^{\frac{5}{2}}}\,dx$$

```
[In] integrate(x^2/arcsin(a*x)^(5/2),x, algorithm="giac")
```

```
[Out] integrate(x^2/arcsin(a*x)^(5/2), x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x^2}{\arcsin(ax)^{5/2}}\,dx = \int \frac{x^2}{\operatorname{asin}(a\,x)^{5/2}}\,dx$$

```
[In] int(x^2/asin(a*x)^(5/2),x)
[Out] int(x^2/asin(a*x)^(5/2), x)
```

3.110 $\int \frac{x}{\arcsin(ax)^{5/2}}\,dx$

Optimal result

Integrand size = 10, antiderivative size = 89

$$\int \frac{x}{\arcsin(ax)^{5/2}}\,dx = -\frac{2x\sqrt{1-a^2x^2}}{3a\arcsin(ax)^{3/2}} - \frac{4}{3a^2\sqrt{\arcsin(ax)}} + \frac{8x^2}{3\sqrt{\arcsin(ax)}} - \frac{8\sqrt{\pi}\,\text{FresnelS}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{3a^2}$$

```
[Out] -8/3*FresnelS(2*arcsin(a*x)^(1/2)/Pi^(1/2))*Pi^(1/2)/a^2-2/3*x*(-a^2*x^2+1)
^(1/2)/a/arcsin(a*x)^(3/2)-4/3/a^2/arcsin(a*x)^(1/2)+8/3*x^2/arcsin(a*x)^(1
/2)
```

Rubi [A] (verified)

Time = 0.11 (sec) , antiderivative size = 89, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.800, Rules used = {4729, 4807, 4731, 4491, 12, 3386, 3432, 4737}

$$\int \frac{x}{\arcsin(ax)^{5/2}}\,dx = -\frac{8\sqrt{\pi}\,\text{FresnelS}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{3a^2} - \frac{2x\sqrt{1-a^2x^2}}{3a\arcsin(ax)^{3/2}} - \frac{4}{3a^2\sqrt{\arcsin(ax)}} + \frac{8x^2}{3\sqrt{\arcsin(ax)}}$$

```
[In] Int[x/ArcSin[a*x]^(5/2),x]
```

```
[Out] (-2*x*Sqrt[1 - a^2*x^2])/(3*a*ArcSin[a*x]^(3/2)) - 4/(3*a^2*Sqrt[ArcSin[a*x
]]) + (8*x^2)/(3*Sqrt[ArcSin[a*x]]) - (8*Sqrt[Pi]*FresnelS[(2*Sqrt[ArcSin[a
*x]])/Sqrt[Pi]])/(3*a^2)
```

Rule 12

```
Int[(a_)*(u_), x_Symbol] :> Dist[a, Int[u, x], x] /; FreeQ[a, x] &&  !Match
Q[u, (b_)*(v_) /; FreeQ[b, x]]
```

Rule 3386

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[2/d
, Subst[Int[Sin[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d, e, f}
, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3432

```
Int[Sin[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelS[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4491

```
Int[Cos[(a_.) + (b_.)*(x_)]^(p_.)*((c_.) + (d_.)*(x_))^(m_.)*Sin[(a_.) + (b
_.)*(x_)]^(n_.), x_Symbol] :> Int[ExpandTrigReduce[(c + d*x)^m, Sin[a + b*x
]^n*Cos[a + b*x]^p, x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && IG
tQ[p, 0]
```

Rule 4729

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^m*Sqrt[1 - c^2*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] + (Dis
t[c*((m + 1)/(b*(n + 1))), Int[x^(m + 1)*((a + b*ArcSin[c*x])^(n + 1)/Sqrt[
1 - c^2*x^2]), x], x] - Dist[m/(b*c*(n + 1)), Int[x^(m - 1)*((a + b*ArcSin[
c*x])^(n + 1)/Sqrt[1 - c^2*x^2]), x], x]) /; FreeQ[{a, b, c}, x] && IGtQ[m,
 0] && LtQ[n, -2]
```

Rule 4731

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Dist[1
/(b*c^(m + 1)), Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b], x], x, a +
 b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, n}, x] && IGtQ[m, 0]
```

Rule 4737

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)/Sqrt[(d_) + (e_.)*(x_)^2], x_S
ymbol] :> Simp[(1/(b*c*(n + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]]*(a
 + b*ArcSin[c*x])^(n + 1), x] /; FreeQ[{a, b, c, d, e, n}, x] && EqQ[c^2*d
+ e, 0] && NeQ[n, -1]
```

Rule 4807

```
Int[(((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*((f_.)*(x_))^(m_.))/Sqrt[(d_)
+ (e_.)*(x_)^2], x_Symbol] :> Simp[((f*x)^m/(b*c*(n + 1)))*Simp[Sqrt[1 - c^
2*x^2]/Sqrt[d + e*x^2]]*(a + b*ArcSin[c*x])^(n + 1), x] - Dist[f*(m/(b*c*(n
 + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]], Int[(f*x)^(m - 1)*(a + b*A
rcSin[c*x])^(n + 1), x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && EqQ[c^2*d
 + e, 0] && LtQ[n, -1]
```

Rubi steps

integral

$$= -\frac{2x\sqrt{1-a^2x^2}}{3a\arcsin(ax)^{3/2}} + \frac{2\int \frac{1}{\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}\,dx}{3a} - \frac{1}{3}(4a)\int \frac{x^2}{\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}\,dx$$

$$= -\frac{2x\sqrt{1-a^2x^2}}{3a\arcsin(ax)^{3/2}} - \frac{4}{3a^2\sqrt{\arcsin(ax)}} + \frac{8x^2}{3\sqrt{\arcsin(ax)}} - \frac{16}{3}\int \frac{x}{\sqrt{\arcsin(ax)}}\,dx$$

$$= -\frac{2x\sqrt{1-a^2x^2}}{3a\arcsin(ax)^{3/2}} - \frac{4}{3a^2\sqrt{\arcsin(ax)}} + \frac{8x^2}{3\sqrt{\arcsin(ax)}} - \frac{16\text{Subst}\left(\int \frac{\cos(x)\sin(x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{3a^2}$$

$$= -\frac{2x\sqrt{1-a^2x^2}}{3a\arcsin(ax)^{3/2}} - \frac{4}{3a^2\sqrt{\arcsin(ax)}} + \frac{8x^2}{3\sqrt{\arcsin(ax)}} - \frac{16\text{Subst}\left(\int \frac{\sin(2x)}{2\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{3a^2}$$

$$= -\frac{2x\sqrt{1-a^2x^2}}{3a\arcsin(ax)^{3/2}} - \frac{4}{3a^2\sqrt{\arcsin(ax)}} + \frac{8x^2}{3\sqrt{\arcsin(ax)}} - \frac{8\text{Subst}\left(\int \frac{\sin(2x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{3a^2}$$

$$= -\frac{2x\sqrt{1-a^2x^2}}{3a\arcsin(ax)^{3/2}} - \frac{4}{3a^2\sqrt{\arcsin(ax)}} + \frac{8x^2}{3\sqrt{\arcsin(ax)}} - \frac{16\text{Subst}\left(\int \sin\left(2x^2\right)\,dx, x, \sqrt{\arcsin(ax)}\right)}{3a^2}$$

$$= -\frac{2x\sqrt{1-a^2x^2}}{3a\arcsin(ax)^{3/2}} - \frac{4}{3a^2\sqrt{\arcsin(ax)}} + \frac{8x^2}{3\sqrt{\arcsin(ax)}} - \frac{8\sqrt{\pi}\,\text{FresnelS}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{3a^2}$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.15 (sec) , antiderivative size = 112, normalized size of antiderivative = 1.26

$$\int \frac{x}{\arcsin(ax)^{5/2}}\,dx =$$
$$-\frac{2\arcsin(ax)\left(e^{-2i\arcsin(ax)} + e^{2i\arcsin(ax)} - \sqrt{2}\sqrt{-i\arcsin(ax)}\Gamma\left(\frac{1}{2}, -2i\arcsin(ax)\right) - \sqrt{2}\sqrt{i\arcsin(ax)}\Gamma\left(\frac{1}{2},\right.\right.}{3a^2\arcsin(ax)^{3/2}}$$

```
[In] Integrate[x/ArcSin[a*x]^(5/2),x]
```

```
[Out] -1/3*(2*ArcSin[a*x]*(E^((-2*I)*ArcSin[a*x]) + E^((2*I)*ArcSin[a*x]) - Sqrt[
2]*Sqrt[(-I)*ArcSin[a*x]]*Gamma[1/2, (-2*I)*ArcSin[a*x]] - Sqrt[2]*Sqrt[I*A
rcSin[a*x]]*Gamma[1/2, (2*I)*ArcSin[a*x]]) + Sin[2*ArcSin[a*x]])/(a^2*ArcSi
n[a*x]^(3/2))
```

Maple [A] (verified)

Time = 0.04 (sec) , antiderivative size = 56, normalized size of antiderivative = 0.63

method	result	size
default	$-\frac{8\sqrt{\pi}\,\operatorname{FresnelS}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)\arcsin(ax)^{\frac{3}{2}}+4\arcsin(ax)\cos(2\arcsin(ax))+\sin(2\arcsin(ax))}{3a^2\arcsin(ax)^{\frac{3}{2}}}$	56

```
[In] int(x/arcsin(a*x)^(5/2),x,method=_RETURNVERBOSE)
```

```
[Out] -1/3/a^2*(8*Pi^(1/2)*FresnelS(2*arcsin(a*x)^(1/2)/Pi^(1/2))*arcsin(a*x)^(3/
2)+4*arcsin(a*x)*cos(2*arcsin(a*x))+sin(2*arcsin(a*x)))/arcsin(a*x)^(3/2)
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{x}{\arcsin(ax)^{5/2}}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate(x/arcsin(a*x)^(5/2),x, algorithm="fricas")
```

```
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int \frac{x}{\arcsin(ax)^{5/2}}\,dx = \int \frac{x}{\operatorname{asin}^{\frac{5}{2}}(ax)}\,dx$$

```
[In] integrate(x/asin(a*x)**(5/2),x)
[Out] Integral(x/asin(a*x)**(5/2), x)
```

Maxima [F(-2)]

Exception generated.

$$\int \frac{x}{\arcsin(ax)^{5/2}}\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(x/arcsin(a*x)^(5/2),x, algorithm="maxima")
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [F]

$$\int \frac{x}{\arcsin(ax)^{5/2}}\,dx = \int \frac{x}{\arcsin(ax)^{\frac{5}{2}}}\,dx$$

```
[In] integrate(x/arcsin(a*x)^(5/2),x, algorithm="giac")
[Out] integrate(x/arcsin(a*x)^(5/2), x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x}{\arcsin(ax)^{5/2}}\,dx = \int \frac{x}{\operatorname{asin}(a\,x)^{5/2}}\,dx$$

```
[In] int(x/asin(a*x)^(5/2),x)
[Out] int(x/asin(a*x)^(5/2), x)
```

3.111 $\int \frac{1}{\arcsin(ax)^{5/2}}\,dx$

Optimal result

Integrand size = 8, antiderivative size = 76

$$\int \frac{1}{\arcsin(ax)^{5/2}}\,dx=-\frac{2\sqrt{1-a^2x^2}}{3a\arcsin(ax)^{3/2}}+\frac{4x}{3\sqrt{\arcsin(ax)}}-\frac{4\sqrt{2\pi}\,\mathrm{FresnelC}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{3a}$$

```
[Out] -4/3*FresnelC(2^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*2^(1/2)*Pi^(1/2)/a-2/3*(-
a^2*x^2+1)^(1/2)/a/arcsin(a*x)^(3/2)+4/3*x/arcsin(a*x)^(1/2)
```

Rubi [A] (verified)

Time = 0.06 (sec) , antiderivative size = 76, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.625, Rules used = {4717, 4807, 4719, 3385, 3433}

$$\int \frac{1}{\arcsin(ax)^{5/2}}\,dx=-\frac{2\sqrt{1-a^2x^2}}{3a\arcsin(ax)^{3/2}}-\frac{4\sqrt{2\pi}\,\mathrm{FresnelC}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{3a}+\frac{4x}{3\sqrt{\arcsin(ax)}}$$

```
[In] Int[ArcSin[a*x]^(-5/2),x]
```

```
[Out] (-2*Sqrt[1 - a^2*x^2])/(3*a*ArcSin[a*x]^(3/2)) + (4*x)/(3*Sqrt[ArcSin[a*x]]
) - (4*Sqrt[2*Pi]*FresnelC[Sqrt[2/Pi]*Sqrt[ArcSin[a*x]]])/(3*a)
```

Rule 3385

```
Int[sin[Pi/2 + (e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> D
ist[2/d, Subst[Int[Cos[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d
, e, f}, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3433

```
Int[Cos[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelC[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4717

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_), x_Symbol] :> Simp[Sqrt[1 - c^2
*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] + Dist[c/(b*(n + 1)),
 Int[x*((a + b*ArcSin[c*x])^(n + 1)/Sqrt[1 - c^2*x^2]), x], x] /; FreeQ[{a,
 b, c}, x] && LtQ[n, -1]
```

Rule 4719

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_), x_Symbol] :> Dist[1/(b*c), Sub
st[Int[x^n*Cos[-a/b + x/b], x], x, a + b*ArcSin[c*x]], x] /; FreeQ[{a, b, c
, n}, x]
```

Rule 4807

```
Int[(((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*((f_.)*(x_))^(m_.))/Sqrt[(d_)
+ (e_.)*(x_)^2], x_Symbol] :> Simp[((f*x)^m/(b*c*(n + 1)))*Simp[Sqrt[1 - c^
2*x^2]/Sqrt[d + e*x^2]]*(a + b*ArcSin[c*x])^(n + 1), x] - Dist[f*(m/(b*c*(n
 + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]], Int[(f*x)^(m - 1)*(a + b*A
rcSin[c*x])^(n + 1), x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && EqQ[c^2*d
 + e, 0] && LtQ[n, -1]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= -\frac{2\sqrt{1-a^2x^2}}{3a\arcsin(ax)^{3/2}}-\frac{1}{3}(2a)\int\frac{x}{\sqrt{1-a^2x^2}\arcsin(ax)^{3/2}}\,dx\\
&= -\frac{2\sqrt{1-a^2x^2}}{3a\arcsin(ax)^{3/2}}+\frac{4x}{3\sqrt{\arcsin(ax)}}-\frac{4}{3}\int\frac{1}{\sqrt{\arcsin(ax)}}\,dx\\
&= -\frac{2\sqrt{1-a^2x^2}}{3a\arcsin(ax)^{3/2}}+\frac{4x}{3\sqrt{\arcsin(ax)}}-\frac{4\text{Subst}\left(\int\frac{\cos(x)}{\sqrt{x}}\,dx,x,\arcsin(ax)\right)}{3a}\\
&= -\frac{2\sqrt{1-a^2x^2}}{3a\arcsin(ax)^{3/2}}+\frac{4x}{3\sqrt{\arcsin(ax)}}-\frac{8\text{Subst}\left(\int\cos\left(x^2\right)\,dx,x,\sqrt{\arcsin(ax)}\right)}{3a}\\
&= -\frac{2\sqrt{1-a^2x^2}}{3a\arcsin(ax)^{3/2}}+\frac{4x}{3\sqrt{\arcsin(ax)}}-\frac{4\sqrt{2\pi}\,\text{FresnelC}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{3a}
\end{aligned}$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.10 (sec) , antiderivative size = 138, normalized size of antiderivative = 1.82

$$\int \frac{1}{\arcsin(ax)^{5/2}}\,dx = \frac{-2ie^{i\arcsin(ax)}(-i+2\arcsin(ax)) - 4(-i\arcsin(ax))^{3/2}\Gamma\left(\frac{1}{2}, -i\arcsin(ax)\right)}{6a\arcsin(ax)^{3/2}} + \frac{e^{-i\arcsin(ax)}\left(-2+4i\arcsin(ax) - 4e^{i\arcsin(ax)}(i\arcsin(ax))^{3/2}\Gamma\left(\frac{1}{2}, i\arcsin(ax)\right)\right)}{6a\arcsin(ax)^{3/2}}$$

```
[In] Integrate[ArcSin[a*x]^(-5/2),x]
```

```
[Out] ((-2*I)*E^(I*ArcSin[a*x])*(-I + 2*ArcSin[a*x]) - 4*((-I)*ArcSin[a*x])^(3/2)
*Gamma[1/2, (-I)*ArcSin[a*x]])/(6*a*ArcSin[a*x]^(3/2)) + (-2 + (4*I)*ArcSin
[a*x] - 4*E^(I*ArcSin[a*x])*(I*ArcSin[a*x])^(3/2)*Gamma[1/2, I*ArcSin[a*x]]
)/(6*a*E^(I*ArcSin[a*x])*ArcSin[a*x]^(3/2))
```

Maple [A] (verified)

Time = 0.04 (sec) , antiderivative size = 83, normalized size of antiderivative = 1.09

method	result	size
default	$-\frac{\sqrt{2}\left(4\arcsin(ax)^{2}\pi\ \mathrm{FresnelC}\left(\frac{\sqrt{2}\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)-2\arcsin(ax)^{\frac{3}{2}}\sqrt{2}\sqrt{\pi}\,ax+\sqrt{2}\sqrt{\arcsin(ax)}\sqrt{\pi}\sqrt{-a^{2}x^{2}+1}\right)}{3a\sqrt{\pi}\arcsin(ax)^{2}}$	83

```
[In] int(1/arcsin(a*x)^(5/2),x,method=_RETURNVERBOSE)
```

```
[Out] -1/3/a*2^(1/2)/Pi^(1/2)*(4*arcsin(a*x)^2*Pi*FresnelC(2^(1/2)/Pi^(1/2)*arcsi
n(a*x)^(1/2))-2*arcsin(a*x)^(3/2)*2^(1/2)*Pi^(1/2)*a*x+2^(1/2)*arcsin(a*x)^
(1/2)*Pi^(1/2)*(-a^2*x^2+1)^(1/2))/arcsin(a*x)^2
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{1}{\arcsin(ax)^{5/2}}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate(1/arcsin(a*x)^(5/2),x, algorithm="fricas")
```

```
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int \frac{1}{\arcsin(ax)^{5/2}}\,dx = \int \frac{1}{\operatorname{asin}^{\frac{5}{2}}(ax)}\,dx$$

```
[In] integrate(1/asin(a*x)**(5/2),x)
[Out] Integral(asin(a*x)**(-5/2), x)
```

Maxima [F(-2)]

Exception generated.

$$\int \frac{1}{\arcsin(ax)^{5/2}}\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(1/arcsin(a*x)^(5/2),x, algorithm="maxima")
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [F]

$$\int \frac{1}{\arcsin(ax)^{5/2}}\,dx = \int \frac{1}{\arcsin(ax)^{\frac{5}{2}}}\,dx$$

```
[In] integrate(1/arcsin(a*x)^(5/2),x, algorithm="giac")
[Out] integrate(arcsin(a*x)^(-5/2), x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{1}{\arcsin(ax)^{5/2}}\,dx = \int \frac{1}{\operatorname{asin}(a\,x)^{5/2}}\,dx$$

```
[In] int(1/asin(a*x)^(5/2),x)
[Out] int(1/asin(a*x)^(5/2), x)
```

3.112 $\int \frac{1}{x \arcsin(ax)^{5/2}} \, dx$

Optimal result

Integrand size = 12, antiderivative size = 12

$$\int \frac{1}{x \arcsin(ax)^{5/2}} \, dx = \text{Int}\left(\frac{1}{x \arcsin(ax)^{5/2}}, x\right)$$

```
[Out] Unintegrable(1/x/arcsin(a*x)^(5/2),x)
```

Rubi [N/A]

Not integrable

Time = 0.01 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{1}{x \arcsin(ax)^{5/2}} \, dx = \int \frac{1}{x \arcsin(ax)^{5/2}} \, dx$$

```
[In] Int[1/(x*ArcSin[a*x]^(5/2)),x]
[Out] Defer[Int][1/(x*ArcSin[a*x]^(5/2)), x]
```

Rubi steps

$$\text{integral} = \int \frac{1}{x \arcsin(ax)^{5/2}} \, dx$$

Mathematica [N/A]

Not integrable

Time = 0.19 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.17

$$\int \frac{1}{x \arcsin(ax)^{5/2}} \, dx = \int \frac{1}{x \arcsin(ax)^{5/2}} \, dx$$

```
[In] Integrate[1/(x*ArcSin[a*x]^(5/2)),x]
[Out] Integrate[1/(x*ArcSin[a*x]^(5/2)), x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.06 (sec) , antiderivative size = 10, normalized size of antiderivative = 0.83

$$\int \frac{1}{x \arcsin(ax)^{\frac{5}{2}}}dx$$

```
[In] int(1/x/arcsin(a*x)^(5/2),x)
[Out] int(1/x/arcsin(a*x)^(5/2),x)
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{1}{x \arcsin(ax)^{5/2}} \, dx = \text{Exception raised: TypeError}$$

```
[In] integrate(1/x/arcsin(a*x)^(5/2),x, algorithm="fricas")
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [N/A]

Not integrable

Time = 6.30 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.00

$$\int \frac{1}{x \arcsin(ax)^{5/2}} \, dx = \int \frac{1}{x \operatorname{asin}^{\frac{5}{2}}(ax)} \, dx$$

```
[In] integrate(1/x/asin(a*x)**(5/2),x)
[Out] Integral(1/(x*asin(a*x)**(5/2)), x)
```

Maxima [F(-2)]

Exception generated.

$$\int \frac{1}{x \arcsin(ax)^{5/2}}\, dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(1/x/arcsin(a*x)^(5/2),x, algorithm="maxima")
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [N/A]

Not integrable

Time = 0.41 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.00

$$\int \frac{1}{x \arcsin(ax)^{5/2}}\, dx = \int \frac{1}{x \arcsin\left(ax\right)^{\frac{5}{2}}}\, dx$$

```
[In] integrate(1/x/arcsin(a*x)^(5/2),x, algorithm="giac")
[Out] integrate(1/(x*arcsin(a*x)^(5/2)), x)
```

Mupad [N/A]

Not integrable

Time = 0.04 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.00

$$\int \frac{1}{x \arcsin(ax)^{5/2}}\, dx = \int \frac{1}{x\, \mathrm{asin}\left(a\, x\right)^{5/2}}\, dx$$

```
[In] int(1/(x*asin(a*x)^(5/2)),x)
[Out] int(1/(x*asin(a*x)^(5/2)), x)
```

3.113 $\int \frac{x^4}{\arcsin(ax)^{7/2}}\,dx$

Optimal result

Integrand size = 12, antiderivative size = 264

$$\begin{aligned}\int \frac{x^4}{\arcsin(ax)^{7/2}}\,dx =& -\frac{2x^4\sqrt{1-a^2x^2}}{5a\arcsin(ax)^{5/2}}-\frac{16x^3}{15a^2\arcsin(ax)^{3/2}}\\&+\frac{4x^5}{3\arcsin(ax)^{3/2}}-\frac{32x^2\sqrt{1-a^2x^2}}{5a^3\sqrt{\arcsin(ax)}}+\frac{40x^4\sqrt{1-a^2x^2}}{3a\sqrt{\arcsin(ax)}}\\&+\frac{\sqrt{2\pi}\,\text{FresnelS}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{15a^5}-\frac{5\sqrt{\frac{3\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{a^5}\\&+\frac{8\sqrt{6\pi}\,\text{FresnelS}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{5a^5}+\frac{5\sqrt{\frac{5\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{10}{\pi}}\sqrt{\arcsin(ax)}\right)}{3a^5}\end{aligned}$$

```
[Out] -16/15*x^3/a^2/arcsin(a*x)^(3/2)+4/3*x^5/arcsin(a*x)^(3/2)-9/10*FresnelS(6^
(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*6^(1/2)*Pi^(1/2)/a^5+1/15*FresnelS(2^(1/2
)/Pi^(1/2)*arcsin(a*x)^(1/2))*2^(1/2)*Pi^(1/2)/a^5+5/6*FresnelS(10^(1/2)/Pi
^(1/2)*arcsin(a*x)^(1/2))*10^(1/2)*Pi^(1/2)/a^5-2/5*x^4*(-a^2*x^2+1)^(1/2)/
a/arcsin(a*x)^(5/2)-32/5*x^2*(-a^2*x^2+1)^(1/2)/a^3/arcsin(a*x)^(1/2)+40/3*
x^4*(-a^2*x^2+1)^(1/2)/a/arcsin(a*x)^(1/2)
```

Rubi [A] (verified)

Time = 0.25 (sec) , antiderivative size = 264, normalized size of antiderivative = 1.00, number of steps used = 17, number of rules used = 5, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.417, Rules used = {4729, 4807, 4727, 3386, 3432}

$$\int \frac{x^4}{\arcsin(ax)^{7/2}}\,dx = \frac{\sqrt{2\pi}\,\text{FresnelS}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{15a^5} + \frac{8\sqrt{6\pi}\,\text{FresnelS}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{5a^5} - \frac{5\sqrt{\frac{3\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{a^5} + \frac{5\sqrt{\frac{5\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{10}{\pi}}\sqrt{\arcsin(ax)}\right)}{3a^5} - \frac{16x^3}{15a^2\arcsin(ax)^{3/2}} + \frac{40x^4\sqrt{1-a^2x^2}}{3a\sqrt{\arcsin(ax)}} - \frac{2x^4\sqrt{1-a^2x^2}}{5a\arcsin(ax)^{5/2}} - \frac{32x^2\sqrt{1-a^2x^2}}{5a^3\sqrt{\arcsin(ax)}} + \frac{4x^5}{3\arcsin(ax)^{3/2}}$$

```
[In] Int[x^4/ArcSin[a*x]^(7/2),x]
```

```
[Out] (-2*x^4*Sqrt[1 - a^2*x^2])/(5*a*ArcSin[a*x]^(5/2)) - (16*x^3)/(15*a^2*ArcSi
n[a*x]^(3/2)) + (4*x^5)/(3*ArcSin[a*x]^(3/2)) - (32*x^2*Sqrt[1 - a^2*x^2])/
(5*a^3*Sqrt[ArcSin[a*x]]) + (40*x^4*Sqrt[1 - a^2*x^2])/(3*a*Sqrt[ArcSin[a*x
]]) + (Sqrt[2*Pi]*FresnelS[Sqrt[2/Pi]*Sqrt[ArcSin[a*x]]])/(15*a^5) - (5*Sqr
t[(3*Pi)/2]*FresnelS[Sqrt[6/Pi]*Sqrt[ArcSin[a*x]]])/a^5 + (8*Sqrt[6*Pi]*Fre
snelS[Sqrt[6/Pi]*Sqrt[ArcSin[a*x]]])/(5*a^5) + (5*Sqrt[(5*Pi)/2]*FresnelS[S
qrt[10/Pi]*Sqrt[ArcSin[a*x]]])/(3*a^5)
```

Rule 3386

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[2/d
, Subst[Int[Sin[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d, e, f}
, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3432

```
Int[Sin[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelS[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4727

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^m*Sqrt[1 - c^2*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] - Dist
[1/(b^2*c^(m + 1)*(n + 1)), Subst[Int[ExpandTrigReduce[x^(n + 1), Sin[-a/b
+ x/b]^(m - 1)*(m - (m + 1)*Sin[-a/b + x/b]^2), x], x], x, a + b*ArcSin[c*x
]], x] /; FreeQ[{a, b, c}, x] && IGtQ[m, 0] && GeQ[n, -2] && LtQ[n, -1]
```

Rule 4729

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^m*Sqrt[1 - c^2*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] + (Dis
t[c*((m + 1)/(b*(n + 1))), Int[x^(m + 1)*((a + b*ArcSin[c*x])^(n + 1)/Sqrt[
1 - c^2*x^2]), x], x] - Dist[m/(b*c*(n + 1)), Int[x^(m - 1)*((a + b*ArcSin[
c*x])^(n + 1)/Sqrt[1 - c^2*x^2]), x], x]) /; FreeQ[{a, b, c}, x] && IGtQ[m,
 0] && LtQ[n, -2]
```

Rule 4807

```
Int[(((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*((f_.)*(x_))^(m_.))/Sqrt[(d_)
+ (e_.)*(x_)^2], x_Symbol] :> Simp[((f*x)^m/(b*c*(n + 1)))*Simp[Sqrt[1 - c^
2*x^2]/Sqrt[d + e*x^2]]*(a + b*ArcSin[c*x])^(n + 1), x] - Dist[f*(m/(b*c*(n
 + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]], Int[(f*x)^(m - 1)*(a + b*A
rcSin[c*x])^(n + 1), x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && EqQ[c^2*d
 + e, 0] && LtQ[n, -1]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= -\frac{2x^4\sqrt{1-a^2x^2}}{5a\arcsin(ax)^{5/2}}+\frac{8\int\frac{x^3}{\sqrt{1-a^2x^2}\arcsin(ax)^{5/2}}\,dx}{5a}-(2a)\int\frac{x^5}{\sqrt{1-a^2x^2}\arcsin(ax)^{5/2}}\,dx\\
&= -\frac{2x^4\sqrt{1-a^2x^2}}{5a\arcsin(ax)^{5/2}}-\frac{16x^3}{15a^2\arcsin(ax)^{3/2}}+\frac{4x^5}{3\arcsin(ax)^{3/2}}\\
&\quad -\frac{20}{3}\int\frac{x^4}{\arcsin(ax)^{3/2}}\,dx+\frac{16\int\frac{x^2}{\arcsin(ax)^{3/2}}\,dx}{5a^2}\\
&= -\frac{2x^4\sqrt{1-a^2x^2}}{5a\arcsin(ax)^{5/2}}-\frac{16x^3}{15a^2\arcsin(ax)^{3/2}}+\frac{4x^5}{3\arcsin(ax)^{3/2}}-\frac{32x^2\sqrt{1-a^2x^2}}{5a^3\sqrt{\arcsin(ax)}}\\
&\quad +\frac{40x^4\sqrt{1-a^2x^2}}{3a\sqrt{\arcsin(ax)}}+\frac{32\text{Subst}\left(\int\left(-\frac{\sin(x)}{4\sqrt{x}}+\frac{3\sin(3x)}{4\sqrt{x}}\right)dx,x,\arcsin(ax)\right)}{5a^5}\\
&\quad -\frac{40\text{Subst}\left(\int\left(-\frac{\sin(x)}{8\sqrt{x}}+\frac{9\sin(3x)}{16\sqrt{x}}-\frac{5\sin(5x)}{16\sqrt{x}}\right)dx,x,\arcsin(ax)\right)}{3a^5}
\end{aligned}$$

$$= -\frac{2x^4\sqrt{1-a^2x^2}}{5a\arcsin(ax)^{5/2}} - \frac{16x^3}{15a^2\arcsin(ax)^{3/2}} + \frac{4x^5}{3\arcsin(ax)^{3/2}} - \frac{32x^2\sqrt{1-a^2x^2}}{5a^3\sqrt{\arcsin(ax)}} + \frac{40x^4\sqrt{1-a^2x^2}}{3a\sqrt{\arcsin(ax)}} - \frac{8\text{Subst}\left(\int\frac{\sin(x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{5a^5} + \frac{5\text{Subst}\left(\int\frac{\sin(x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{3a^5} + \frac{25\text{Subst}\left(\int\frac{\sin(5x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{6a^5} + \frac{24\text{Subst}\left(\int\frac{\sin(3x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{5a^5} - \frac{15\text{Subst}\left(\int\frac{\sin(3x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{2a^5}$$

$$= -\frac{2x^4\sqrt{1-a^2x^2}}{5a\arcsin(ax)^{5/2}} - \frac{16x^3}{15a^2\arcsin(ax)^{3/2}} + \frac{4x^5}{3\arcsin(ax)^{3/2}} - \frac{32x^2\sqrt{1-a^2x^2}}{5a^3\sqrt{\arcsin(ax)}} + \frac{40x^4\sqrt{1-a^2x^2}}{3a\sqrt{\arcsin(ax)}} - \frac{16\text{Subst}\left(\int\sin\left(x^2\right)\,dx, x, \sqrt{\arcsin(ax)}\right)}{5a^5} + \frac{10\text{Subst}\left(\int\sin\left(x^2\right)\,dx, x, \sqrt{\arcsin(ax)}\right)}{3a^5} + \frac{25\text{Subst}\left(\int\sin\left(5x^2\right)\,dx, x, \sqrt{\arcsin(ax)}\right)}{3a^5} + \frac{48\text{Subst}\left(\int\sin\left(3x^2\right)\,dx, x, \sqrt{\arcsin(ax)}\right)}{5a^5} - \frac{15\text{Subst}\left(\int\sin\left(3x^2\right)\,dx, x, \sqrt{\arcsin(ax)}\right)}{a^5}$$

$$= -\frac{2x^4\sqrt{1-a^2x^2}}{5a\arcsin(ax)^{5/2}} - \frac{16x^3}{15a^2\arcsin(ax)^{3/2}} + \frac{4x^5}{3\arcsin(ax)^{3/2}} - \frac{32x^2\sqrt{1-a^2x^2}}{5a^3\sqrt{\arcsin(ax)}} + \frac{40x^4\sqrt{1-a^2x^2}}{3a\sqrt{\arcsin(ax)}} + \frac{\sqrt{2\pi}\,\text{FresnelS}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{15a^5} - \frac{5\sqrt{\frac{3\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{a^5} + \frac{8\sqrt{6\pi}\,\text{FresnelS}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{5a^5} + \frac{5\sqrt{\frac{5\pi}{2}}\,\text{FresnelS}\left(\sqrt{\frac{10}{\pi}}\sqrt{\arcsin(ax)}\right)}{3a^5}$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.57 (sec) , antiderivative size = 417, normalized size of antiderivative = 1.58

$$\int \frac{x^4}{\arcsin(ax)^{7/2}}\,dx = \frac{9e^{3i\arcsin(ax)}(1+2i\arcsin(ax)-12\arcsin(ax)^2)+2e^{i\arcsin(ax)}(-3-2i\arcsin(ax)+4$$

[In] Integrate[x^4/ArcSin[a*x]^(7/2),x]

[Out] (9*E^((3*I)*ArcSin[a*x])*(1 + (2*I)*ArcSin[a*x] - 12*ArcSin[a*x]^2) + 2*E^(I*ArcSin[a*x])*(-3 - (2*I)*ArcSin[a*x] + 4*ArcSin[a*x]^2) + E^((5*I)*ArcSin[a*x])*(-3 - (10*I)*ArcSin[a*x] + 100*ArcSin[a*x]^2) - 8*Sqrt[(-I)*ArcSin[a*x]]*ArcSin[a*x]^2*Gamma[1/2, (-I)*ArcSin[a*x]] + (-6 + (4*I)*ArcSin[a*x] + 8*ArcSin[a*x]^2 + 8*E^(I*ArcSin[a*x])*(I*ArcSin[a*x])^(5/2)*Gamma[1/2, I*ArcSin[a*x]])/E^(I*ArcSin[a*x]) + 108*Sqrt[3]*Sqrt[(-I)*ArcSin[a*x]]*ArcSin[a*x]^2*Gamma[1/2, (-3*I)*ArcSin[a*x]] - (9*(-1 + (2*I)*ArcSin[a*x] + 12*ArcSin[a*x]^2 + 12*Sqrt[3]*E^((3*I)*ArcSin[a*x])*(I*ArcSin[a*x])^(5/2)*Gamma[1/2, (3*I)*ArcSin[a*x]]))/E^((3*I)*ArcSin[a*x]) - 100*Sqrt[5]*Sqrt[(-I)*ArcSin[a*x]]*ArcSin[a*x]^2*Gamma[1/2, (-5*I)*ArcSin[a*x]] + (-3 + (10*I)*ArcSin[a*x] + 100*ArcSin[a*x]^2 + 100*Sqrt[5]*E^((5*I)*ArcSin[a*x])*(I*ArcSin[a*x])^(5/2)*Gamma[1/2, (5*I)*ArcSin[a*x]])/E^((5*I)*ArcSin[a*x]))/(240*a^5*ArcSin[a*x]^(5/2))

Maple [A] (verified)

Time = 0.08 (sec) , antiderivative size = 225, normalized size of antiderivative = 0.85

method	result
default	$-\frac{-100\sqrt{2}\,\sqrt{\pi}\,\sqrt{5}\ \mathrm{FresnelS}\left(\frac{\sqrt{2}\,\sqrt{5}\,\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)\arcsin(ax)^{\frac{5}{2}}+108\sqrt{2}\,\sqrt{\pi}\,\sqrt{3}\ \mathrm{FresnelS}\left(\frac{\sqrt{2}\,\sqrt{3}\,\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)\arcsin(ax)^{\frac{5}{2}}-8\sqrt{2}\,\sqrt{\pi}\ \mathrm{I}}{}$

[In] int(x^4/arcsin(a*x)^(7/2),x,method=_RETURNVERBOSE)

[Out] -1/120/a^5*(-100*2^(1/2)*Pi^(1/2)*5^(1/2)*FresnelS(2^(1/2)/Pi^(1/2)*5^(1/2)*arcsin(a*x)^(1/2))*arcsin(a*x)^(5/2)+108*2^(1/2)*Pi^(1/2)*3^(1/2)*FresnelS(2^(1/2)/Pi^(1/2)*3^(1/2)*arcsin(a*x)^(1/2))*arcsin(a*x)^(5/2)-8*2^(1/2)*Pi^(1/2)*FresnelS(2^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*arcsin(a*x)^(5/2)-8*arcsin(a*x)^2*(-a^2*x^2+1)^(1/2)+108*arcsin(a*x)^2*cos(3*arcsin(a*x))-100*arcsin(a*x)^2*cos(5*arcsin(a*x))-4*a*x*arcsin(a*x)+18*arcsin(a*x)*sin(3*arcsin(a*x))-10*arcsin(a*x)*sin(5*arcsin(a*x))+6*(-a^2*x^2+1)^(1/2)-9*cos(3*arcsin(a*x))+3*cos(5*arcsin(a*x)))/arcsin(a*x)^(5/2)

Fricas [F(-2)]

Exception generated.

$$\int \frac{x^4}{\arcsin(ax)^{7/2}}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate(x^4/arcsin(a*x)^(7/2),x, algorithm="fricas")
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int \frac{x^4}{\arcsin(ax)^{7/2}}\,dx = \int \frac{x^4}{\operatorname{asin}^{\frac{7}{2}}(ax)}\,dx$$

```
[In] integrate(x**4/asin(a*x)**(7/2),x)
[Out] Integral(x**4/asin(a*x)**(7/2), x)
```

Maxima [F(-2)]

Exception generated.

$$\int \frac{x^4}{\arcsin(ax)^{7/2}}\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(x^4/arcsin(a*x)^(7/2),x, algorithm="maxima")
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [F]

$$\int \frac{x^4}{\arcsin(ax)^{7/2}}\,dx = \int \frac{x^4}{\arcsin(ax)^{\frac{7}{2}}}\,dx$$

```
[In] integrate(x^4/arcsin(a*x)^(7/2),x, algorithm="giac")
[Out] integrate(x^4/arcsin(a*x)^(7/2), x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x^4}{\arcsin(ax)^{7/2}}\,dx = \int \frac{x^4}{\mathrm{asin}\left(a\,x\right)^{7/2}}\,dx$$

```
[In] int(x^4/asin(a*x)^(7/2),x)
[Out] int(x^4/asin(a*x)^(7/2), x)
```

3.114 $\int \frac{x^3}{\arcsin(ax)^{7/2}}\,dx$

Optimal result

Integrand size = 12, antiderivative size = 190

$$\int \frac{x^3}{\arcsin(ax)^{7/2}}\,dx = -\frac{2x^3\sqrt{1-a^2x^2}}{5a\arcsin(ax)^{5/2}} - \frac{4x^2}{5a^2\arcsin(ax)^{3/2}} + \frac{16x^4}{15\arcsin(ax)^{3/2}} - \frac{16x\sqrt{1-a^2x^2}}{5a^3\sqrt{\arcsin(ax)}} + \frac{128x^3\sqrt{1-a^2x^2}}{15a\sqrt{\arcsin(ax)}} + \frac{32\sqrt{2\pi}\,\text{FresnelC}\left(2\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{15a^4} - \frac{16\sqrt{\pi}\,\text{FresnelC}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{15a^4}$$

```
[Out] -4/5*x^2/a^2/arcsin(a*x)^(3/2)+16/15*x^4/arcsin(a*x)^(3/2)-16/15*FresnelC(2
*arcsin(a*x)^(1/2)/Pi^(1/2))*Pi^(1/2)/a^4+32/15*FresnelC(2*2^(1/2)/Pi^(1/2)
*arcsin(a*x)^(1/2))*2^(1/2)*Pi^(1/2)/a^4-2/5*x^3*(-a^2*x^2+1)^(1/2)/a/arcsi
n(a*x)^(5/2)-16/5*x*(-a^2*x^2+1)^(1/2)/a^3/arcsin(a*x)^(1/2)+128/15*x^3*(-a
^2*x^2+1)^(1/2)/a/arcsin(a*x)^(1/2)
```

Rubi [A] (verified)

Time = 0.20 (sec) , antiderivative size = 190, normalized size of antiderivative = 1.00, number of steps used = 12, number of rules used = 5, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.417, Rules used = {4729, 4807, 4727, 3385, 3433}

$$\int \frac{x^3}{\arcsin(ax)^{7/2}}\,dx = \frac{32\sqrt{2\pi}\,\text{FresnelC}\left(2\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{15a^4} - \frac{16\sqrt{\pi}\,\text{FresnelC}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{15a^4} - \frac{4x^2}{5a^2\arcsin(ax)^{3/2}} + \frac{128x^3\sqrt{1-a^2x^2}}{15a\sqrt{\arcsin(ax)}} - \frac{2x^3\sqrt{1-a^2x^2}}{5a\arcsin(ax)^{5/2}} - \frac{16x\sqrt{1-a^2x^2}}{5a^3\sqrt{\arcsin(ax)}} + \frac{16x^4}{15\arcsin(ax)^{3/2}}$$

```
[In] Int[x^3/ArcSin[a*x]^(7/2),x]
```

```
[Out] (-2*x^3*Sqrt[1 - a^2*x^2])/(5*a*ArcSin[a*x]^(5/2)) - (4*x^2)/(5*a^2*ArcSin[
a*x]^(3/2)) + (16*x^4)/(15*ArcSin[a*x]^(3/2)) - (16*x*Sqrt[1 - a^2*x^2])/(5
*a^3*Sqrt[ArcSin[a*x]]) + (128*x^3*Sqrt[1 - a^2*x^2])/(15*a*Sqrt[ArcSin[a*x
]]) + (32*Sqrt[2*Pi]*FresnelC[2*Sqrt[2/Pi]*Sqrt[ArcSin[a*x]]])/(15*a^4) - (
16*Sqrt[Pi]*FresnelC[(2*Sqrt[ArcSin[a*x]])/Sqrt[Pi]])/(15*a^4)
```

Rule 3385

```
Int[sin[Pi/2 + (e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> D
ist[2/d, Subst[Int[Cos[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d
, e, f}, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3433

```
Int[Cos[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelC[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4727

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^m*Sqrt[1 - c^2*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] - Dist
[1/(b^2*c^(m + 1)*(n + 1)), Subst[Int[ExpandTrigReduce[x^(n + 1), Sin[-a/b
+ x/b]^(m - 1)*(m - (m + 1)*Sin[-a/b + x/b]^2), x], x], x, a + b*ArcSin[c*x
]], x] /; FreeQ[{a, b, c}, x] && IGtQ[m, 0] && GeQ[n, -2] && LtQ[n, -1]
```

Rule 4729

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^m*Sqrt[1 - c^2*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] + (Dis
t[c*((m + 1)/(b*(n + 1))), Int[x^(m + 1)*((a + b*ArcSin[c*x])^(n + 1)/Sqrt[
1 - c^2*x^2]), x], x] - Dist[m/(b*c*(n + 1)), Int[x^(m - 1)*((a + b*ArcSin[
c*x])^(n + 1)/Sqrt[1 - c^2*x^2]), x], x]) /; FreeQ[{a, b, c}, x] && IGtQ[m,
 0] && LtQ[n, -2]
```

Rule 4807

```
Int[(((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*((f_.)*(x_))^(m_.))/Sqrt[(d_)
+ (e_.)*(x_)^2], x_Symbol] :> Simp[((f*x)^m/(b*c*(n + 1)))*Simp[Sqrt[1 - c^
2*x^2]/Sqrt[d + e*x^2]]*(a + b*ArcSin[c*x])^(n + 1), x] - Dist[f*(m/(b*c*(n
 + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]], Int[(f*x)^(m - 1)*(a + b*A
rcSin[c*x])^(n + 1), x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && EqQ[c^2*d
 + e, 0] && LtQ[n, -1]
```

Rubi steps

integral

$$= -\frac{2x^3\sqrt{1-a^2x^2}}{5a\arcsin(ax)^{5/2}} + \frac{6\int\frac{x^2}{\sqrt{1-a^2x^2}\arcsin(ax)^{5/2}}\,dx}{5a} - \frac{1}{5}(8a)\int\frac{x^4}{\sqrt{1-a^2x^2}\arcsin(ax)^{5/2}}\,dx$$

$$= -\frac{2x^3\sqrt{1-a^2x^2}}{5a\arcsin(ax)^{5/2}} - \frac{4x^2}{5a^2\arcsin(ax)^{3/2}} + \frac{16x^4}{15\arcsin(ax)^{3/2}} - \frac{64}{15}\int\frac{x^3}{\arcsin(ax)^{3/2}}\,dx + \frac{8\int\frac{x}{\arcsin(ax)^{3/2}}\,dx}{5a^2}$$

$$= -\frac{2x^3\sqrt{1-a^2x^2}}{5a\arcsin(ax)^{5/2}} - \frac{4x^2}{5a^2\arcsin(ax)^{3/2}} + \frac{16x^4}{15\arcsin(ax)^{3/2}} - \frac{16x\sqrt{1-a^2x^2}}{5a^3\sqrt{\arcsin(ax)}} + \frac{128x^3\sqrt{1-a^2x^2}}{15a\sqrt{\arcsin(ax)}} + \frac{16\mathrm{Subst}\left(\int\frac{\cos(2x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{5a^4} - \frac{128\mathrm{Subst}\left(\int\left(\frac{\cos(2x)}{2\sqrt{x}} - \frac{\cos(4x)}{2\sqrt{x}}\right)\,dx, x, \arcsin(ax)\right)}{15a^4}$$

$$= -\frac{2x^3\sqrt{1-a^2x^2}}{5a\arcsin(ax)^{5/2}} - \frac{4x^2}{5a^2\arcsin(ax)^{3/2}} + \frac{16x^4}{15\arcsin(ax)^{3/2}} - \frac{16x\sqrt{1-a^2x^2}}{5a^3\sqrt{\arcsin(ax)}} + \frac{128x^3\sqrt{1-a^2x^2}}{15a\sqrt{\arcsin(ax)}} - \frac{64\mathrm{Subst}\left(\int\frac{\cos(2x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{15a^4} + \frac{64\mathrm{Subst}\left(\int\frac{\cos(4x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{15a^4} + \frac{32\mathrm{Subst}\left(\int\cos\left(2x^2\right)\,dx, x, \sqrt{\arcsin(ax)}\right)}{5a^4}$$

$$= -\frac{2x^3\sqrt{1-a^2x^2}}{5a\arcsin(ax)^{5/2}} - \frac{4x^2}{5a^2\arcsin(ax)^{3/2}} + \frac{16x^4}{15\arcsin(ax)^{3/2}} - \frac{16x\sqrt{1-a^2x^2}}{5a^3\sqrt{\arcsin(ax)}} + \frac{128x^3\sqrt{1-a^2x^2}}{15a\sqrt{\arcsin(ax)}} + \frac{16\sqrt{\pi}\,\mathrm{FresnelC}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{5a^4} - \frac{128\mathrm{Subst}\left(\int\cos\left(2x^2\right)\,dx, x, \sqrt{\arcsin(ax)}\right)}{15a^4} + \frac{128\mathrm{Subst}\left(\int\cos\left(4x^2\right)\,dx, x, \sqrt{\arcsin(ax)}\right)}{15a^4}$$

$$= -\frac{2x^3\sqrt{1-a^2x^2}}{5a\arcsin(ax)^{5/2}} - \frac{4x^2}{5a^2\arcsin(ax)^{3/2}} + \frac{16x^4}{15\arcsin(ax)^{3/2}} - \frac{16x\sqrt{1-a^2x^2}}{5a^3\sqrt{\arcsin(ax)}} + \frac{128x^3\sqrt{1-a^2x^2}}{15a\sqrt{\arcsin(ax)}} + \frac{32\sqrt{2\pi}\,\mathrm{FresnelC}\left(2\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{15a^4} - \frac{16\sqrt{\pi}\,\mathrm{FresnelC}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{15a^4}$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.86 (sec) , antiderivative size = 272, normalized size of antiderivative = 1.43

$$\int \frac{x^3}{\arcsin(ax)^{7/2}}\,dx = \frac{4\arcsin(ax)\left(ie^{2i\arcsin(ax)}(i-4\arcsin(ax))-4\sqrt{2}(-i\arcsin(ax))^{3/2}\Gamma\left(\frac{1}{2},-2i\arcsin(a\right.\right.}{}$$

```
[In] Integrate[x^3/ArcSin[a*x]^(7/2),x]
```

```
[Out] (4*ArcSin[a*x]*(I*E^((2*I)*ArcSin[a*x])*(I - 4*ArcSin[a*x]) - 4*Sqrt[2]*((-
I)*ArcSin[a*x])^(3/2)*Gamma[1/2, (-2*I)*ArcSin[a*x]] + (-1 + (4*I)*ArcSin[a
*x] - 4*Sqrt[2]*E^((2*I)*ArcSin[a*x])*(I*ArcSin[a*x])^(3/2)*Gamma[1/2, (2*I
)*ArcSin[a*x]])/E^((2*I)*ArcSin[a*x])) - 4*ArcSin[a*x]*(I*E^((4*I)*ArcSin[a
*x])*(I - 8*ArcSin[a*x]) - 16*((-I)*ArcSin[a*x])^(3/2)*Gamma[1/2, (-4*I)*Ar
cSin[a*x]] + (-1 + (8*I)*ArcSin[a*x] - 16*E^((4*I)*ArcSin[a*x])*(I*ArcSin[a
*x])^(3/2)*Gamma[1/2, (4*I)*ArcSin[a*x]])/E^((4*I)*ArcSin[a*x])) - 6*Sin[2*
ArcSin[a*x]] + 3*Sin[4*ArcSin[a*x]])/(60*a^4*ArcSin[a*x]^(5/2))
```

Maple [A] (verified)

Time = 0.06 (sec) , antiderivative size = 139, normalized size of antiderivative = 0.73

method	result
default	$\frac{128\sqrt{2}\,\sqrt{\pi}\ \mathrm{FresnelC}\left(\frac{2\sqrt{2}\,\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)\arcsin(ax)^{\frac{5}{2}}-64\sqrt{\pi}\ \mathrm{FresnelC}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)\arcsin(ax)^{\frac{5}{2}}+32\sin(2\arcsin(ax))\arcsin(ax)^{2}}{60a^{4}\,\mathrm{ar}}$

```
[In] int(x^3/arcsin(a*x)^(7/2),x,method=_RETURNVERBOSE)
```

```
[Out] 1/60/a^4*(128*2^(1/2)*Pi^(1/2)*FresnelC(2*2^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2
))*arcsin(a*x)^(5/2)-64*Pi^(1/2)*FresnelC(2*arcsin(a*x)^(1/2)/Pi^(1/2))*arc
sin(a*x)^(5/2)+32*sin(2*arcsin(a*x))*arcsin(a*x)^2-64*sin(4*arcsin(a*x))*ar
csin(a*x)^2-8*arcsin(a*x)*cos(2*arcsin(a*x))+8*arcsin(a*x)*cos(4*arcsin(a*x
))-6*sin(2*arcsin(a*x))+3*sin(4*arcsin(a*x)))/arcsin(a*x)^(5/2)
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{x^3}{\arcsin(ax)^{7/2}}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate(x^3/arcsin(a*x)^(7/2),x, algorithm="fricas")
```

```
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int \frac{x^3}{\arcsin(ax)^{7/2}}\,dx = \int \frac{x^3}{\operatorname{asin}^{\frac{7}{2}}(ax)}\,dx$$

```
[In] integrate(x**3/asin(a*x)**(7/2),x)
```

```
[Out] Integral(x**3/asin(a*x)**(7/2), x)
```

Maxima [F(-2)]

Exception generated.

$$\int \frac{x^3}{\arcsin(ax)^{7/2}}\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(x^3/arcsin(a*x)^(7/2),x, algorithm="maxima")
```

```
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [F(-2)]

Exception generated.

$$\int \frac{x^3}{\arcsin(ax)^{7/2}}\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(x^3/arcsin(a*x)^(7/2),x, algorithm="giac")
```

```
[Out] Exception raised: RuntimeError >> an error occurred running a Giac command:
INPUT:sage2OUTPUT:sym2poly/r2sym(const gen & e,const index_m & i,const vect
eur & l) Error: Bad Argument Value
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x^3}{\arcsin(ax)^{7/2}}\,dx = \int \frac{x^3}{\mathrm{asin}\left(a\,x\right)^{7/2}}\,dx$$

```
[In] int(x^3/asin(a*x)^(7/2),x)
[Out] int(x^3/asin(a*x)^(7/2), x)
```

3.115 $\int \frac{x^2}{\arcsin(ax)^{7/2}}\,dx$

Optimal result

Integrand size = 12, antiderivative size = 191

$$\int \frac{x^2}{\arcsin(ax)^{7/2}}\,dx = -\frac{2x^2\sqrt{1-a^2x^2}}{5a\arcsin(ax)^{5/2}} - \frac{8x}{15a^2\arcsin(ax)^{3/2}} + \frac{4x^3}{5\arcsin(ax)^{3/2}} - \frac{16\sqrt{1-a^2x^2}}{15a^3\sqrt{\arcsin(ax)}} + \frac{24x^2\sqrt{1-a^2x^2}}{5a\sqrt{\arcsin(ax)}} + \frac{2\sqrt{2\pi}\,\text{FresnelS}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{15a^3} - \frac{6\sqrt{6\pi}\,\text{FresnelS}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{5a^3}$$

```
[Out] -8/15*x/a^2/arcsin(a*x)^(3/2)+4/5*x^3/arcsin(a*x)^(3/2)+2/15*FresnelS(2^(1/
2)/Pi^(1/2)*arcsin(a*x)^(1/2))*2^(1/2)*Pi^(1/2)/a^3-6/5*FresnelS(6^(1/2)/Pi
^(1/2)*arcsin(a*x)^(1/2))*6^(1/2)*Pi^(1/2)/a^3-2/5*x^2*(-a^2*x^2+1)^(1/2)/a
/arcsin(a*x)^(5/2)-16/15*(-a^2*x^2+1)^(1/2)/a^3/arcsin(a*x)^(1/2)+24/5*x^2*
(-a^2*x^2+1)^(1/2)/a/arcsin(a*x)^(1/2)
```

Rubi [A] (verified)

Time = 0.22 (sec) , antiderivative size = 191, normalized size of antiderivative = 1.00, number of steps used = 13, number of rules used = 7, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.583, Rules used = {4729, 4807, 4727, 3386, 3432, 4717, 4809}

$$\int \frac{x^2}{\arcsin(ax)^{7/2}}\,dx = \frac{2\sqrt{2\pi}\,\text{FresnelS}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{15a^3} - \frac{6\sqrt{6\pi}\,\text{FresnelS}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{5a^3} + \frac{24x^2\sqrt{1-a^2x^2}}{5a\sqrt{\arcsin(ax)}} - \frac{2x^2\sqrt{1-a^2x^2}}{5a\arcsin(ax)^{5/2}} - \frac{8x}{15a^2\arcsin(ax)^{3/2}} - \frac{16\sqrt{1-a^2x^2}}{15a^3\sqrt{\arcsin(ax)}} + \frac{4x^3}{5\arcsin(ax)^{3/2}}$$

```
[In] Int[x^2/ArcSin[a*x]^(7/2),x]
```

```
[Out] (-2*x^2*Sqrt[1 - a^2*x^2])/(5*a*ArcSin[a*x]^(5/2)) - (8*x)/(15*a^2*ArcSin[a
*x]^(3/2)) + (4*x^3)/(5*ArcSin[a*x]^(3/2)) - (16*Sqrt[1 - a^2*x^2])/(15*a^3
*Sqrt[ArcSin[a*x]]) + (24*x^2*Sqrt[1 - a^2*x^2])/(5*a*Sqrt[ArcSin[a*x]]) +
(2*Sqrt[2*Pi]*FresnelS[Sqrt[2/Pi]*Sqrt[ArcSin[a*x]]])/(15*a^3) - (6*Sqrt[6*
Pi]*FresnelS[Sqrt[6/Pi]*Sqrt[ArcSin[a*x]]])/(5*a^3)
```

Rule 3386

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[2/d
, Subst[Int[Sin[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d, e, f}
, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3432

```
Int[Sin[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelS[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4717

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_), x_Symbol] :> Simp[Sqrt[1 - c^2
*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] + Dist[c/(b*(n + 1)),
 Int[x*((a + b*ArcSin[c*x])^(n + 1)/Sqrt[1 - c^2*x^2]), x], x] /; FreeQ[{a,
 b, c}, x] && LtQ[n, -1]
```

Rule 4727

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^m*Sqrt[1 - c^2*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] - Dist
[1/(b^2*c^(m + 1)*(n + 1)), Subst[Int[ExpandTrigReduce[x^(n + 1), Sin[-a/b
+ x/b]^(m - 1)*(m - (m + 1)*Sin[-a/b + x/b]^2), x], x], x, a + b*ArcSin[c*x
]], x] /; FreeQ[{a, b, c}, x] && IGtQ[m, 0] && GeQ[n, -2] && LtQ[n, -1]
```

Rule 4729

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^m*Sqrt[1 - c^2*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] + (Dis
t[c*((m + 1)/(b*(n + 1))), Int[x^(m + 1)*((a + b*ArcSin[c*x])^(n + 1)/Sqrt[
1 - c^2*x^2]), x], x] - Dist[m/(b*c*(n + 1)), Int[x^(m - 1)*((a + b*ArcSin[
c*x])^(n + 1)/Sqrt[1 - c^2*x^2]), x], x]) /; FreeQ[{a, b, c}, x] && IGtQ[m,
 0] && LtQ[n, -2]
```

Rule 4807

```
Int[(((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*((f_.)*(x_))^(m_.))/Sqrt[(d_)
+ (e_.)*(x_)^2], x_Symbol] :> Simp[((f*x)^m/(b*c*(n + 1)))*Simp[Sqrt[1 - c^
2*x^2]/Sqrt[d + e*x^2]]*(a + b*ArcSin[c*x])^(n + 1), x] - Dist[f*(m/(b*c*(n
```

```
 + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]], Int[(f*x)^(m - 1)*(a + b*A
rcSin[c*x])^(n + 1), x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && EqQ[c^2*d
 + e, 0] && LtQ[n, -1]
```

Rule 4809

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_.)*((d_) + (e_.)*(x_)^
2)^(p_.), x_Symbol] :> Dist[(1/(b*c^(m + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x
^2)^p], Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b]^(2*p + 1), x], x, a
 + b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, d, e, n}, x] && EqQ[c^2*d + e, 0]
&& IGtQ[2*p + 2, 0] && IGtQ[m, 0]
```

Rubi steps

$$
\begin{aligned}
\text{integral} &= -\frac{2x^2\sqrt{1-a^2x^2}}{5a\arcsin(ax)^{5/2}}+\frac{4\int\frac{x}{\sqrt{1-a^2x^2}\arcsin(ax)^{5/2}}\,dx}{5a}-\frac{1}{5}(6a)\int\frac{x^3}{\sqrt{1-a^2x^2}\arcsin(ax)^{5/2}}\,dx\\
&= -\frac{2x^2\sqrt{1-a^2x^2}}{5a\arcsin(ax)^{5/2}}-\frac{8x}{15a^2\arcsin(ax)^{3/2}}+\frac{4x^3}{5\arcsin(ax)^{3/2}}\\
&\quad -\frac{12}{5}\int\frac{x^2}{\arcsin(ax)^{3/2}}\,dx+\frac{8\int\frac{1}{\arcsin(ax)^{3/2}}\,dx}{15a^2}\\
&= -\frac{2x^2\sqrt{1-a^2x^2}}{5a\arcsin(ax)^{5/2}}-\frac{8x}{15a^2\arcsin(ax)^{3/2}}\\
&\quad +\frac{4x^3}{5\arcsin(ax)^{3/2}}-\frac{16\sqrt{1-a^2x^2}}{15a^3\sqrt{\arcsin(ax)}}+\frac{24x^2\sqrt{1-a^2x^2}}{5a\sqrt{\arcsin(ax)}}\\
&\quad -\frac{24\text{Subst}\left(\int\left(-\frac{\sin(x)}{4\sqrt{x}}+\frac{3\sin(3x)}{4\sqrt{x}}\right)\,dx,x,\arcsin(ax)\right)}{5a^3}-\frac{16\int\frac{x}{\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}\,dx}{15a}\\
&= -\frac{2x^2\sqrt{1-a^2x^2}}{5a\arcsin(ax)^{5/2}}-\frac{8x}{15a^2\arcsin(ax)^{3/2}}+\frac{4x^3}{5\arcsin(ax)^{3/2}}\\
&\quad -\frac{16\sqrt{1-a^2x^2}}{15a^3\sqrt{\arcsin(ax)}}+\frac{24x^2\sqrt{1-a^2x^2}}{5a\sqrt{\arcsin(ax)}}-\frac{16\text{Subst}\left(\int\frac{\sin(x)}{\sqrt{x}}\,dx,x,\arcsin(ax)\right)}{15a^3}\\
&\quad +\frac{6\text{Subst}\left(\int\frac{\sin(x)}{\sqrt{x}}\,dx,x,\arcsin(ax)\right)}{5a^3}-\frac{18\text{Subst}\left(\int\frac{\sin(3x)}{\sqrt{x}}\,dx,x,\arcsin(ax)\right)}{5a^3}
\end{aligned}
$$

$$= -\frac{2x^2\sqrt{1-a^2x^2}}{5a\arcsin(ax)^{5/2}} - \frac{8x}{15a^2\arcsin(ax)^{3/2}} + \frac{4x^3}{5\arcsin(ax)^{3/2}} - \frac{16\sqrt{1-a^2x^2}}{15a^3\sqrt{\arcsin(ax)}} + \frac{24x^2\sqrt{1-a^2x^2}}{5a\sqrt{\arcsin(ax)}} - \frac{32\text{Subst}\left(\int\sin(x^2)\,dx, x, \sqrt{\arcsin(ax)}\right)}{15a^3} + \frac{12\text{Subst}\left(\int\sin(x^2)\,dx, x, \sqrt{\arcsin(ax)}\right)}{5a^3} - \frac{36\text{Subst}\left(\int\sin(3x^2)\,dx, x, \sqrt{\arcsin(ax)}\right)}{5a^3}$$

$$= -\frac{2x^2\sqrt{1-a^2x^2}}{5a\arcsin(ax)^{5/2}} - \frac{8x}{15a^2\arcsin(ax)^{3/2}} + \frac{4x^3}{5\arcsin(ax)^{3/2}} - \frac{16\sqrt{1-a^2x^2}}{15a^3\sqrt{\arcsin(ax)}} + \frac{24x^2\sqrt{1-a^2x^2}}{5a\sqrt{\arcsin(ax)}} + \frac{2\sqrt{2\pi}\,\text{FresnelS}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{15a^3} - \frac{6\sqrt{6\pi}\,\text{FresnelS}\left(\sqrt{\frac{6}{\pi}}\sqrt{\arcsin(ax)}\right)}{5a^3}$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.31 (sec) , antiderivative size = 280, normalized size of antiderivative = 1.47

$$\int \frac{x^2}{\arcsin(ax)^{7/2}}\,dx = \frac{3e^{3i\arcsin(ax)}(1+2i\arcsin(ax)-12\arcsin(ax)^2)+e^{i\arcsin(ax)}(-3-2i\arcsin(ax)+4\,a$$

```
[In] Integrate[x^2/ArcSin[a*x]^(7/2),x]
```

```
[Out] (3*E^((3*I)*ArcSin[a*x])*(1 + (2*I)*ArcSin[a*x] - 12*ArcSin[a*x]^2) + E^(I*
ArcSin[a*x])*(-3 - (2*I)*ArcSin[a*x] + 4*ArcSin[a*x]^2) - 4*Sqrt[(-I)*ArcSi
n[a*x]]*ArcSin[a*x]^2*Gamma[1/2, (-I)*ArcSin[a*x]] + (-3 + (2*I)*ArcSin[a*x
] + 4*ArcSin[a*x]^2 + 4*E^(I*ArcSin[a*x])*(I*ArcSin[a*x])^(5/2)*Gamma[1/2,
I*ArcSin[a*x]])/E^(I*ArcSin[a*x]) + 36*Sqrt[3]*Sqrt[(-I)*ArcSin[a*x]]*ArcSi
n[a*x]^2*Gamma[1/2, (-3*I)*ArcSin[a*x]] - (3*(-1 + (2*I)*ArcSin[a*x] + 12*A
rcSin[a*x]^2 + 12*Sqrt[3]*E^((3*I)*ArcSin[a*x])*(I*ArcSin[a*x])^(5/2)*Gamma
[1/2, (3*I)*ArcSin[a*x]]))/E^((3*I)*ArcSin[a*x]))/(60*a^3*ArcSin[a*x]^(5/2)
)
```

Maple [A] (verified)

Time = 0.06 (sec) , antiderivative size = 154, normalized size of antiderivative = 0.81

method	result
default	$-\frac{36\sqrt{2}\,\sqrt{\pi}\,\sqrt{3}\ \mathrm{FresnelS}\left(\frac{\sqrt{2}\,\sqrt{3}\,\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)\arcsin(ax)^{\frac{5}{2}}-4\sqrt{2}\,\sqrt{\pi}\ \mathrm{FresnelS}\left(\frac{\sqrt{2}\,\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)\arcsin(ax)^{\frac{5}{2}}+36\arcsin(ax)^{2}\cos(3\,\mathrm{arc}}{30a^{3}\arcsin(ax)}$

```
[In] int(x^2/arcsin(a*x)^(7/2),x,method=_RETURNVERBOSE)
```

```
[Out] -1/30/a^3*(36*2^(1/2)*Pi^(1/2)*3^(1/2)*FresnelS(2^(1/2)/Pi^(1/2)*3^(1/2)*ar
csin(a*x)^(1/2))*arcsin(a*x)^(5/2)-4*2^(1/2)*Pi^(1/2)*FresnelS(2^(1/2)/Pi^(
1/2)*arcsin(a*x)^(1/2))*arcsin(a*x)^(5/2)+36*arcsin(a*x)^2*cos(3*arcsin(a*x
))-4*arcsin(a*x)^2*(-a^2*x^2+1)^(1/2)-2*a*x*arcsin(a*x)+6*arcsin(a*x)*sin(3
*arcsin(a*x))-3*cos(3*arcsin(a*x))+3*(-a^2*x^2+1)^(1/2))/arcsin(a*x)^(5/2)
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{x^2}{\arcsin(ax)^{7/2}}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate(x^2/arcsin(a*x)^(7/2),x, algorithm="fricas")
```

```
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int \frac{x^2}{\arcsin(ax)^{7/2}}\,dx = \int \frac{x^2}{\operatorname{asin}^{\frac{7}{2}}(ax)}\,dx$$

```
[In] integrate(x**2/asin(a*x)**(7/2),x)
```

```
[Out] Integral(x**2/asin(a*x)**(7/2), x)
```

Maxima [F(-2)]

Exception generated.

$$\int \frac{x^2}{\arcsin(ax)^{7/2}}\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(x^2/arcsin(a*x)^(7/2),x, algorithm="maxima")
```

```
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [F]

$$\int \frac{x^2}{\arcsin(ax)^{7/2}}\,dx = \int \frac{x^2}{\arcsin(ax)^{\frac{7}{2}}}\,dx$$

```
[In] integrate(x^2/arcsin(a*x)^(7/2),x, algorithm="giac")
```

```
[Out] integrate(x^2/arcsin(a*x)^(7/2), x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x^2}{\arcsin(ax)^{7/2}}\,dx = \int \frac{x^2}{\mathrm{asin}\left(a\,x\right)^{7/2}}\,dx$$

```
[In] int(x^2/asin(a*x)^(7/2),x)
```

```
[Out] int(x^2/asin(a*x)^(7/2), x)
```

3.116 $\int \frac{x}{\arcsin(ax)^{7/2}}\,dx$

Optimal result

Integrand size = 10, antiderivative size = 119

$$\int \frac{x}{\arcsin(ax)^{7/2}}\,dx = -\frac{2x\sqrt{1-a^2x^2}}{5a\arcsin(ax)^{5/2}} - \frac{4}{15a^2\arcsin(ax)^{3/2}} + \frac{8x^2}{15\arcsin(ax)^{3/2}} + \frac{32x\sqrt{1-a^2x^2}}{15a\sqrt{\arcsin(ax)}} - \frac{32\sqrt{\pi}\,\text{FresnelC}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{15a^2}$$

```
[Out] -4/15/a^2/arcsin(a*x)^(3/2)+8/15*x^2/arcsin(a*x)^(3/2)-32/15*FresnelC(2*arc
sin(a*x)^(1/2)/Pi^(1/2))*Pi^(1/2)/a^2-2/5*x*(-a^2*x^2+1)^(1/2)/a/arcsin(a*x
)^(5/2)+32/15*x*(-a^2*x^2+1)^(1/2)/a/arcsin(a*x)^(1/2)
```

Rubi [A] (verified)

Time = 0.11 (sec) , antiderivative size = 119, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 6, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.600, Rules used = {4729, 4807, 4727, 3385, 3433, 4737}

$$\int \frac{x}{\arcsin(ax)^{7/2}}\,dx = -\frac{32\sqrt{\pi}\,\text{FresnelC}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{15a^2} + \frac{32x\sqrt{1-a^2x^2}}{15a\sqrt{\arcsin(ax)}} - \frac{2x\sqrt{1-a^2x^2}}{5a\arcsin(ax)^{5/2}} - \frac{4}{15a^2\arcsin(ax)^{3/2}} + \frac{8x^2}{15\arcsin(ax)^{3/2}}$$

```
[In] Int[x/ArcSin[a*x]^(7/2),x]
```

```
[Out] (-2*x*Sqrt[1 - a^2*x^2])/(5*a*ArcSin[a*x]^(5/2)) - 4/(15*a^2*ArcSin[a*x]^(3
/2)) + (8*x^2)/(15*ArcSin[a*x]^(3/2)) + (32*x*Sqrt[1 - a^2*x^2])/(15*a*Sqrt
```

```
[ArcSin[a*x]]) - (32*Sqrt[Pi]*FresnelC[(2*Sqrt[ArcSin[a*x]])/Sqrt[Pi]])/(15
*a^2)
```

Rule 3385

```
Int[sin[Pi/2 + (e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> D
ist[2/d, Subst[Int[Cos[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d
, e, f}, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3433

```
Int[Cos[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelC[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4727

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^m*Sqrt[1 - c^2*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] - Dist
[1/(b^2*c^(m + 1)*(n + 1)), Subst[Int[ExpandTrigReduce[x^(n + 1), Sin[-a/b
+ x/b]^(m - 1)*(m - (m + 1)*Sin[-a/b + x/b]^2), x], x], x, a + b*ArcSin[c*x
]], x] /; FreeQ[{a, b, c}, x] && IGtQ[m, 0] && GeQ[n, -2] && LtQ[n, -1]
```

Rule 4729

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^m*Sqrt[1 - c^2*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] + (Dis
t[c*((m + 1)/(b*(n + 1))), Int[x^(m + 1)*((a + b*ArcSin[c*x])^(n + 1)/Sqrt[
1 - c^2*x^2]), x], x] - Dist[m/(b*c*(n + 1)), Int[x^(m - 1)*((a + b*ArcSin[
c*x])^(n + 1)/Sqrt[1 - c^2*x^2]), x], x]) /; FreeQ[{a, b, c}, x] && IGtQ[m,
 0] && LtQ[n, -2]
```

Rule 4737

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)/Sqrt[(d_) + (e_.)*(x_)^2], x_S
ymbol] :> Simp[(1/(b*c*(n + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]]*(a
 + b*ArcSin[c*x])^(n + 1), x] /; FreeQ[{a, b, c, d, e, n}, x] && EqQ[c^2*d
+ e, 0] && NeQ[n, -1]
```

Rule 4807

```
Int[(((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*((f_.)*(x_))^(m_.))/Sqrt[(d_)
+ (e_.)*(x_)^2], x_Symbol] :> Simp[((f*x)^m/(b*c*(n + 1)))*Simp[Sqrt[1 - c^
2*x^2]/Sqrt[d + e*x^2]]*(a + b*ArcSin[c*x])^(n + 1), x] - Dist[f*(m/(b*c*(n
 + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]], Int[(f*x)^(m - 1)*(a + b*A
rcSin[c*x])^(n + 1), x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && EqQ[c^2*d
 + e, 0] && LtQ[n, -1]
```

Rubi steps

$$
\begin{aligned}
\text{integral} &= -\frac{2x\sqrt{1-a^2x^2}}{5a\arcsin(ax)^{5/2}}+\frac{2\int\frac{1}{\sqrt{1-a^2x^2}\arcsin(ax)^{5/2}}\,dx}{5a}-\frac{1}{5}(4a)\int\frac{x^2}{\sqrt{1-a^2x^2}\arcsin(ax)^{5/2}}\,dx\\
&= -\frac{2x\sqrt{1-a^2x^2}}{5a\arcsin(ax)^{5/2}}-\frac{4}{15a^2\arcsin(ax)^{3/2}}+\frac{8x^2}{15\arcsin(ax)^{3/2}}-\frac{16}{15}\int\frac{x}{\arcsin(ax)^{3/2}}\,dx\\
&= -\frac{2x\sqrt{1-a^2x^2}}{5a\arcsin(ax)^{5/2}}-\frac{4}{15a^2\arcsin(ax)^{3/2}}+\frac{8x^2}{15\arcsin(ax)^{3/2}}\\
&\quad+\frac{32x\sqrt{1-a^2x^2}}{15a\sqrt{\arcsin(ax)}}-\frac{32\text{Subst}\left(\int\frac{\cos(2x)}{\sqrt{x}}\,dx,x,\arcsin(ax)\right)}{15a^2}\\
&= -\frac{2x\sqrt{1-a^2x^2}}{5a\arcsin(ax)^{5/2}}-\frac{4}{15a^2\arcsin(ax)^{3/2}}+\frac{8x^2}{15\arcsin(ax)^{3/2}}\\
&\quad+\frac{32x\sqrt{1-a^2x^2}}{15a\sqrt{\arcsin(ax)}}-\frac{64\text{Subst}\left(\int\cos\left(2x^2\right)\,dx,x,\sqrt{\arcsin(ax)}\right)}{15a^2}\\
&= -\frac{2x\sqrt{1-a^2x^2}}{5a\arcsin(ax)^{5/2}}-\frac{4}{15a^2\arcsin(ax)^{3/2}}+\frac{8x^2}{15\arcsin(ax)^{3/2}}\\
&\quad+\frac{32x\sqrt{1-a^2x^2}}{15a\sqrt{\arcsin(ax)}}-\frac{32\sqrt{\pi}\,\text{FresnelC}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)}{15a^2}
\end{aligned}
$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.27 (sec) , antiderivative size = 146, normalized size of antiderivative = 1.23

$$
\int\frac{x}{\arcsin(ax)^{7/2}}\,dx = -\frac{\arcsin(ax)\left(2e^{2i\arcsin(ax)}(1+4i\arcsin(ax))+8\sqrt{2}(-i\arcsin(ax))^{3/2}\Gamma\left(\frac{1}{2},-2i\arcsin(ax)\right)+e^{-2i\arcsin(ax)}\left(2-\right.\right.}{15a^2\arcsin(ax)^{5/}}
$$

```
[In] Integrate[x/ArcSin[a*x]^(7/2),x]
```

```
[Out] -1/15*(ArcSin[a*x]*(2*E^((2*I)*ArcSin[a*x])*(1 + (4*I)*ArcSin[a*x]) + 8*Sqr
t[2]*((-I)*ArcSin[a*x])^(3/2)*Gamma[1/2, (-2*I)*ArcSin[a*x]] + (2 - (8*I)*A
rcSin[a*x] + 8*Sqrt[2]*E^((2*I)*ArcSin[a*x])*(I*ArcSin[a*x])^(3/2)*Gamma[1/
2, (2*I)*ArcSin[a*x]])/E^((2*I)*ArcSin[a*x])) + 3*Sin[2*ArcSin[a*x]])/(a^2*
ArcSin[a*x]^(5/2))
```

Maple [A] (verified)

Time = 0.05 (sec) , antiderivative size = 73, normalized size of antiderivative = 0.61

method	result
default	$\frac{-32\sqrt{\pi}\,\mathrm{FresnelC}\left(\frac{2\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)\arcsin(ax)^{\frac{5}{2}}+16\sin(2\arcsin(ax))\arcsin(ax)^{2}-4\arcsin(ax)\cos(2\arcsin(ax))-3\sin(2\arcsin(ax))}{15a^{2}\arcsin(ax)^{\frac{5}{2}}}$

```
[In] int(x/arcsin(a*x)^(7/2),x,method=_RETURNVERBOSE)
[Out] 1/15/a^2*(-32*Pi^(1/2)*FresnelC(2*arcsin(a*x)^(1/2)/Pi^(1/2))*arcsin(a*x)^(
5/2)+16*sin(2*arcsin(a*x))*arcsin(a*x)^2-4*arcsin(a*x)*cos(2*arcsin(a*x))-3
*sin(2*arcsin(a*x)))/arcsin(a*x)^(5/2)
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{x}{\arcsin(ax)^{7/2}}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate(x/arcsin(a*x)^(7/2),x, algorithm="fricas")
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int \frac{x}{\arcsin(ax)^{7/2}}\,dx = \int \frac{x}{\operatorname{asin}^{\frac{7}{2}}(ax)}\,dx$$

```
[In] integrate(x/asin(a*x)**(7/2),x)
[Out] Integral(x/asin(a*x)**(7/2), x)
```

Maxima [F(-2)]

Exception generated.

$$\int \frac{x}{\arcsin(ax)^{7/2}}\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(x/arcsin(a*x)^(7/2),x, algorithm="maxima")
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [F]

$$\int \frac{x}{\arcsin(ax)^{7/2}}\,dx = \int \frac{x}{\arcsin(ax)^{\frac{7}{2}}}\,dx$$

```
[In] integrate(x/arcsin(a*x)^(7/2),x, algorithm="giac")
[Out] integrate(x/arcsin(a*x)^(7/2), x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x}{\arcsin(ax)^{7/2}}\,dx = \int \frac{x}{\operatorname{asin}(a\,x)^{7/2}}\,dx$$

```
[In] int(x/asin(a*x)^(7/2),x)
[Out] int(x/asin(a*x)^(7/2), x)
```

3.117 $\int \frac{1}{\arcsin(ax)^{7/2}}\,dx$

Optimal result

Integrand size = 8, antiderivative size = 105

$$\int \frac{1}{\arcsin(ax)^{7/2}}\,dx = -\frac{2\sqrt{1-a^2x^2}}{5a\arcsin(ax)^{5/2}}+\frac{4x}{15\arcsin(ax)^{3/2}}+\frac{8\sqrt{1-a^2x^2}}{15a\sqrt{\arcsin(ax)}}+\frac{8\sqrt{2\pi}\,\mathrm{FresnelS}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{15a}$$

```
[Out] 4/15*x/arcsin(a*x)^(3/2)+8/15*FresnelS(2^(1/2)/Pi^(1/2)*arcsin(a*x)^(1/2))*
2^(1/2)*Pi^(1/2)/a-2/5*(-a^2*x^2+1)^(1/2)/a/arcsin(a*x)^(5/2)+8/15*(-a^2*x^
2+1)^(1/2)/a/arcsin(a*x)^(1/2)
```

Rubi [A] (verified)

Time = 0.10 (sec) , antiderivative size = 105, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 5, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.625, Rules used = {4717, 4807, 4809, 3386, 3432}

$$\int \frac{1}{\arcsin(ax)^{7/2}}\,dx = \frac{8\sqrt{1-a^2x^2}}{15a\sqrt{\arcsin(ax)}}-\frac{2\sqrt{1-a^2x^2}}{5a\arcsin(ax)^{5/2}}+\frac{8\sqrt{2\pi}\,\mathrm{FresnelS}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{15a}+\frac{4x}{15\arcsin(ax)^{3/2}}$$

```
[In] Int[ArcSin[a*x]^(-7/2),x]
```

```
[Out] (-2*Sqrt[1 - a^2*x^2])/(5*a*ArcSin[a*x]^(5/2)) + (4*x)/(15*ArcSin[a*x]^(3/2
)) + (8*Sqrt[1 - a^2*x^2])/(15*a*Sqrt[ArcSin[a*x]]) + (8*Sqrt[2*Pi]*Fresnel
S[Sqrt[2/Pi]*Sqrt[ArcSin[a*x]]])/(15*a)
```

Rule 3386

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[2/d
, Subst[Int[Sin[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d, e, f}
, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3432

```
Int[Sin[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelS[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4717

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_), x_Symbol] :> Simp[Sqrt[1 - c^2
*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] + Dist[c/(b*(n + 1)),
 Int[x*((a + b*ArcSin[c*x])^(n + 1)/Sqrt[1 - c^2*x^2]), x], x] /; FreeQ[{a,
 b, c}, x] && LtQ[n, -1]
```

Rule 4807

```
Int[(((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*((f_.)*(x_))^(m_.))/Sqrt[(d_)
+ (e_.)*(x_)^2], x_Symbol] :> Simp[((f*x)^m/(b*c*(n + 1)))*Simp[Sqrt[1 - c^
2*x^2]/Sqrt[d + e*x^2]]*(a + b*ArcSin[c*x])^(n + 1), x] - Dist[f*(m/(b*c*(n
 + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]], Int[(f*x)^(m - 1)*(a + b*A
rcSin[c*x])^(n + 1), x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && EqQ[c^2*d
 + e, 0] && LtQ[n, -1]
```

Rule 4809

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_.)*((d_) + (e_.)*(x_)^
2)^(p_.), x_Symbol] :> Dist[(1/(b*c^(m + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x
^2)^p], Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b]^(2*p + 1), x], x, a
 + b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, d, e, n}, x] && EqQ[c^2*d + e, 0]
&& IGtQ[2*p + 2, 0] && IGtQ[m, 0]
```

Rubi steps

$$
\begin{aligned}
\text{integral} &= -\frac{2\sqrt{1-a^2x^2}}{5a\arcsin(ax)^{5/2}} - \frac{1}{5}(2a)\int \frac{x}{\sqrt{1-a^2x^2}\arcsin(ax)^{5/2}}\,dx \\
&= -\frac{2\sqrt{1-a^2x^2}}{5a\arcsin(ax)^{5/2}} + \frac{4x}{15\arcsin(ax)^{3/2}} - \frac{4}{15}\int \frac{1}{\arcsin(ax)^{3/2}}\,dx \\
&= -\frac{2\sqrt{1-a^2x^2}}{5a\arcsin(ax)^{5/2}} + \frac{4x}{15\arcsin(ax)^{3/2}} + \frac{8\sqrt{1-a^2x^2}}{15a\sqrt{\arcsin(ax)}} \\
&\quad + \frac{1}{15}(8a)\int \frac{x}{\sqrt{1-a^2x^2}\sqrt{\arcsin(ax)}}\,dx
\end{aligned}
$$

$$= -\frac{2\sqrt{1-a^2x^2}}{5a\arcsin(ax)^{5/2}} + \frac{4x}{15\arcsin(ax)^{3/2}} + \frac{8\sqrt{1-a^2x^2}}{15a\sqrt{\arcsin(ax)}} + \frac{8\text{Subst}\left(\int \frac{\sin(x)}{\sqrt{x}}\,dx, x, \arcsin(ax)\right)}{15a}$$

$$= -\frac{2\sqrt{1-a^2x^2}}{5a\arcsin(ax)^{5/2}} + \frac{4x}{15\arcsin(ax)^{3/2}} + \frac{8\sqrt{1-a^2x^2}}{15a\sqrt{\arcsin(ax)}} + \frac{16\text{Subst}\left(\int \sin\left(x^2\right)\,dx, x, \sqrt{\arcsin(ax)}\right)}{15a}$$

$$= -\frac{2\sqrt{1-a^2x^2}}{5a\arcsin(ax)^{5/2}} + \frac{4x}{15\arcsin(ax)^{3/2}} + \frac{8\sqrt{1-a^2x^2}}{15a\sqrt{\arcsin(ax)}} + \frac{8\sqrt{2\pi}\,\text{FresnelS}\left(\sqrt{\frac{2}{\pi}}\sqrt{\arcsin(ax)}\right)}{15a}$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.20 (sec) , antiderivative size = 143, normalized size of antiderivative = 1.36

$$\int \frac{1}{\arcsin(ax)^{7/2}}\,dx = \frac{2e^{i\arcsin(ax)}\left(-3-2i\arcsin(ax)+4\arcsin(ax)^2\right)-8\sqrt{-i\arcsin(ax)}\arcsin(ax)^2\Gamma\left(\frac{1}{2},-\right.}{}$$

```
[In] Integrate[ArcSin[a*x]^(-7/2),x]
```

```
[Out] (2*E^(I*ArcSin[a*x])*(-3 - (2*I)*ArcSin[a*x] + 4*ArcSin[a*x]^2) - 8*Sqrt[(-
I)*ArcSin[a*x]]*ArcSin[a*x]^2*Gamma[1/2, (-I)*ArcSin[a*x]] + (-6 + (4*I)*Ar
cSin[a*x] + 8*ArcSin[a*x]^2 + 8*E^(I*ArcSin[a*x])*(I*ArcSin[a*x])^(5/2)*Gam
ma[1/2, I*ArcSin[a*x]])/E^(I*ArcSin[a*x]))/(30*a*ArcSin[a*x]^(5/2))
```

Maple [A] (verified)

Time = 0.04 (sec) , antiderivative size = 110, normalized size of antiderivative = 1.05

method	result
default	$\frac{\sqrt{2}\left(8\arcsin(ax)^3\pi\,\text{FresnelS}\left(\frac{\sqrt{2}\sqrt{\arcsin(ax)}}{\sqrt{\pi}}\right)+4\arcsin(ax)^{\frac{5}{2}}\sqrt{2}\sqrt{\pi}\sqrt{-a^2x^2+1}+2\arcsin(ax)^{\frac{3}{2}}\sqrt{2}\sqrt{\pi}\,ax-3\sqrt{2}\sqrt{\arcsin(ax)}\sqrt{\pi}\sqrt{\right.}{15a\sqrt{\pi}\arcsin(ax)^3}$

```
[In] int(1/arcsin(a*x)^(7/2),x,method=_RETURNVERBOSE)
```

```
[Out] 1/15/a*2^(1/2)/Pi^(1/2)/arcsin(a*x)^3*(8*arcsin(a*x)^3*Pi*FresnelS(2^(1/2)/
Pi^(1/2)*arcsin(a*x)^(1/2))+4*arcsin(a*x)^(5/2)*2^(1/2)*Pi^(1/2)*(-a^2*x^2+
1)^(1/2)+2*arcsin(a*x)^(3/2)*2^(1/2)*Pi^(1/2)*a*x-3*2^(1/2)*arcsin(a*x)^(1/
2)*Pi^(1/2)*(-a^2*x^2+1)^(1/2))
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{1}{\arcsin(ax)^{7/2}} \, dx = \text{Exception raised: TypeError}$$

```
[In] integrate(1/arcsin(a*x)^(7/2),x, algorithm="fricas")
```

```
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int \frac{1}{\arcsin(ax)^{7/2}} \, dx = \int \frac{1}{\operatorname{asin}^{\frac{7}{2}}(ax)} \, dx$$

```
[In] integrate(1/asin(a*x)**(7/2),x)
```

```
[Out] Integral(asin(a*x)**(-7/2), x)
```

Maxima [F(-2)]

Exception generated.

$$\int \frac{1}{\arcsin(ax)^{7/2}} \, dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(1/arcsin(a*x)^(7/2),x, algorithm="maxima")
```

```
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [F]

$$\int \frac{1}{\arcsin(ax)^{7/2}} \, dx = \int \frac{1}{\arcsin(ax)^{\frac{7}{2}}} \, dx$$

```
[In] integrate(1/arcsin(a*x)^(7/2),x, algorithm="giac")
```

```
[Out] integrate(arcsin(a*x)^(-7/2), x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{1}{\arcsin(ax)^{7/2}}\,dx = \int \frac{1}{\operatorname{asin}\left(a\,x\right)^{7/2}}\,dx$$

```
[In] int(1/asin(a*x)^(7/2),x)
[Out] int(1/asin(a*x)^(7/2), x)
```

3.118 $\int \frac{1}{x \arcsin(ax)^{7/2}} \, dx$

Optimal result

Integrand size = 12, antiderivative size = 12

$$\int \frac{1}{x \arcsin(ax)^{7/2}} \, dx = \text{Int}\left(\frac{1}{x \arcsin(ax)^{7/2}}, x\right)$$

```
[Out] Unintegrable(1/x/arcsin(a*x)^(7/2),x)
```

Rubi [N/A]

Not integrable

Time = 0.01 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{1}{x \arcsin(ax)^{7/2}} \, dx = \int \frac{1}{x \arcsin(ax)^{7/2}} \, dx$$

```
[In] Int[1/(x*ArcSin[a*x]^(7/2)),x]
[Out] Defer[Int][1/(x*ArcSin[a*x]^(7/2)), x]
```

Rubi steps

$$\text{integral} = \int \frac{1}{x \arcsin(ax)^{7/2}} \, dx$$

Mathematica [N/A]

Not integrable

Time = 0.17 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.17

$$\int \frac{1}{x \arcsin(ax)^{7/2}} \, dx = \int \frac{1}{x \arcsin(ax)^{7/2}} \, dx$$

```
[In] Integrate[1/(x*ArcSin[a*x]^(7/2)),x]
[Out] Integrate[1/(x*ArcSin[a*x]^(7/2)), x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.06 (sec) , antiderivative size = 10, normalized size of antiderivative = 0.83

$$\int \frac{1}{x \arcsin{(ax)}^{\frac{7}{2}}}dx$$

```
[In] int(1/x/arcsin(a*x)^(7/2),x)
[Out] int(1/x/arcsin(a*x)^(7/2),x)
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{1}{x \arcsin(ax)^{7/2}} \, dx = \text{Exception raised: TypeError}$$

```
[In] integrate(1/x/arcsin(a*x)^(7/2),x, algorithm="fricas")
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [N/A]

Not integrable

Time = 60.72 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.00

$$\int \frac{1}{x \arcsin(ax)^{7/2}} \, dx = \int \frac{1}{x \operatorname{asin}^{\frac{7}{2}}{(ax)}} \, dx$$

```
[In] integrate(1/x/asin(a*x)**(7/2),x)
[Out] Integral(1/(x*asin(a*x)**(7/2)), x)
```

Maxima [F(-2)]

Exception generated.

$$\int \frac{1}{x \arcsin(ax)^{7/2}} dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(1/x/arcsin(a*x)^(7/2),x, algorithm="maxima")
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [N/A]

Not integrable

Time = 0.42 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.00

$$\int \frac{1}{x \arcsin(ax)^{7/2}} dx = \int \frac{1}{x \arcsin{(ax)}^{\frac{7}{2}}} dx$$

```
[In] integrate(1/x/arcsin(a*x)^(7/2),x, algorithm="giac")
[Out] integrate(1/(x*arcsin(a*x)^(7/2)), x)
```

Mupad [N/A]

Not integrable

Time = 0.04 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.00

$$\int \frac{1}{x \arcsin(ax)^{7/2}} dx = \int \frac{1}{x \operatorname{asin}{(a\,x)}^{7/2}} dx$$

```
[In] int(1/(x*asin(a*x)^(7/2)),x)
[Out] int(1/(x*asin(a*x)^(7/2)), x)
```

3.119 $\int (bx)^m \arcsin(ax)^4 \, dx$

Optimal result

Integrand size = 12, antiderivative size = 12

$$\int (bx)^m \arcsin(ax)^4 \, dx = \frac{(bx)^{1+m} \arcsin(ax)^4}{b(1+m)} - \frac{4a\text{Int}\left(\frac{(bx)^{1+m} \arcsin(ax)^3}{\sqrt{1-a^2x^2}}, x\right)}{b(1+m)}$$

```
[Out] (b*x)^(1+m)*arcsin(a*x)^4/b/(1+m)-4*a*Unintegrable((b*x)^(1+m)*arcsin(a*x)^
3/(-a^2*x^2+1)^(1/2),x)/b/(1+m)
```

Rubi [N/A]

Not integrable

Time = 0.08 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}} = 0.000$, Rules used = {}

$$\int (bx)^m \arcsin(ax)^4 \, dx = \int (bx)^m \arcsin(ax)^4 \, dx$$

```
[In] Int[(b*x)^m*ArcSin[a*x]^4,x]
```

```
[Out] ((b*x)^(1 + m)*ArcSin[a*x]^4)/(b*(1 + m)) - (4*a*Defer[Int][((b*x)^(1 + m)*
ArcSin[a*x]^3)/Sqrt[1 - a^2*x^2], x])/(b*(1 + m))
```

Rubi steps

$$\text{integral} = \frac{(bx)^{1+m} \arcsin(ax)^4}{b(1+m)} - \frac{(4a) \int \frac{(bx)^{1+m} \arcsin(ax)^3}{\sqrt{1-a^2x^2}} \, dx}{b(1+m)}$$

Mathematica [N/A]

Not integrable

Time = 0.64 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.17

$$\int (bx)^m \arcsin(ax)^4 \, dx = \int (bx)^m \arcsin(ax)^4 \, dx$$

```
[In] Integrate[(b*x)^m*ArcSin[a*x]^4,x]
[Out] Integrate[(b*x)^m*ArcSin[a*x]^4, x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.61 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.00

$$\int (bx)^m \arcsin(ax)^4 \, dx$$

```
[In] int((b*x)^m*arcsin(a*x)^4,x)
[Out] int((b*x)^m*arcsin(a*x)^4,x)
```

Fricas [N/A]

Not integrable

Time = 0.25 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.17

$$\int (bx)^m \arcsin(ax)^4 \, dx = \int (bx)^m \arcsin(ax)^4 \, dx$$

```
[In] integrate((b*x)^m*arcsin(a*x)^4,x, algorithm="fricas")
[Out] integral((b*x)^m*arcsin(a*x)^4, x)
```

Sympy [N/A]

Not integrable

Time = 5.24 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.00

$$\int (bx)^m \arcsin(ax)^4 \, dx = \int (bx)^m \operatorname{asin}^4(ax) \, dx$$

```
[In] integrate((b*x)**m*asin(a*x)**4,x)
[Out] Integral((b*x)**m*asin(a*x)**4, x)
```

Maxima [N/A]

Not integrable

Time = 0.68 (sec) , antiderivative size = 115, normalized size of antiderivative = 9.58

$$\int (bx)^m \arcsin(ax)^4 \, dx = \int (bx)^m \arcsin{(ax)}^4 \, dx$$

```
[In] integrate((b*x)^m*arcsin(a*x)^4,x, algorithm="maxima")
```

```
[Out] (b^m*x*x^m*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^4 + 4*(a*b^m*m + a*b^
m)*integrate(sqrt(a*x + 1)*sqrt(-a*x + 1)*x*x^m*arctan2(a*x, sqrt(a*x + 1)*
sqrt(-a*x + 1))^3/((a^2*m + a^2)*x^2 - m - 1), x))/(m + 1)
```

Giac [N/A]

Not integrable

Time = 0.59 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.17

$$\int (bx)^m \arcsin(ax)^4 \, dx = \int (bx)^m \arcsin{(ax)}^4 \, dx$$

```
[In] integrate((b*x)^m*arcsin(a*x)^4,x, algorithm="giac")
```

```
[Out] integrate((b*x)^m*arcsin(a*x)^4, x)
```

Mupad [N/A]

Not integrable

Time = 0.04 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.17

$$\int (bx)^m \arcsin(ax)^4 \, dx = \int \mathrm{asin}(a\,x)^4\,{(b\,x)}^m \, dx$$

```
[In] int(asin(a*x)^4*(b*x)^m,x)
```

```
[Out] int(asin(a*x)^4*(b*x)^m, x)
```

3.120 $\int (bx)^m \arcsin(ax)^3 \, dx$

Optimal result

Integrand size = 12, antiderivative size = 12

$$\int (bx)^m \arcsin(ax)^3 \, dx = \frac{(bx)^{1+m} \arcsin(ax)^3}{b(1+m)} - \frac{3a\text{Int}\left(\frac{(bx)^{1+m} \arcsin(ax)^2}{\sqrt{1-a^2x^2}}, x\right)}{b(1+m)}$$

```
[Out] (b*x)^(1+m)*arcsin(a*x)^3/b/(1+m)-3*a*Unintegrable((b*x)^(1+m)*arcsin(a*x)^
2/(-a^2*x^2+1)^(1/2),x)/b/(1+m)
```

Rubi [N/A]

Not integrable

Time = 0.07 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int (bx)^m \arcsin(ax)^3 \, dx = \int (bx)^m \arcsin(ax)^3 \, dx$$

```
[In] Int[(b*x)^m*ArcSin[a*x]^3,x]
```

```
[Out] ((b*x)^(1 + m)*ArcSin[a*x]^3)/(b*(1 + m)) - (3*a*Defer[Int][((b*x)^(1 + m)*
ArcSin[a*x]^2)/Sqrt[1 - a^2*x^2], x])/(b*(1 + m))
```

Rubi steps

$$\text{integral} = \frac{(bx)^{1+m} \arcsin(ax)^3}{b(1+m)} - \frac{(3a) \int \frac{(bx)^{1+m} \arcsin(ax)^2}{\sqrt{1-a^2x^2}} \, dx}{b(1+m)}$$

Mathematica [N/A]

Not integrable

Time = 0.55 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.17

$$\int (bx)^m \arcsin(ax)^3 \, dx = \int (bx)^m \arcsin(ax)^3 \, dx$$

```
[In] Integrate[(b*x)^m*ArcSin[a*x]^3,x]
[Out] Integrate[(b*x)^m*ArcSin[a*x]^3, x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.46 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.00

$$\int (bx)^m \arcsin(ax)^3 \, dx$$

```
[In] int((b*x)^m*arcsin(a*x)^3,x)
[Out] int((b*x)^m*arcsin(a*x)^3,x)
```

Fricas [N/A]

Not integrable

Time = 0.26 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.17

$$\int (bx)^m \arcsin(ax)^3 \, dx = \int (bx)^m \arcsin(ax)^3 \, dx$$

```
[In] integrate((b*x)^m*arcsin(a*x)^3,x, algorithm="fricas")
[Out] integral((b*x)^m*arcsin(a*x)^3, x)
```

Sympy [N/A]

Not integrable

Time = 2.71 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.00

$$\int (bx)^m \arcsin(ax)^3 \, dx = \int (bx)^m \operatorname{asin}^3(ax) \, dx$$

```
[In] integrate((b*x)**m*asin(a*x)**3,x)
[Out] Integral((b*x)**m*asin(a*x)**3, x)
```

Maxima [N/A]

Not integrable

Time = 0.70 (sec) , antiderivative size = 115, normalized size of antiderivative = 9.58

$$\int (bx)^m \arcsin(ax)^3 \, dx = \int (bx)^m \arcsin{(ax)}^3 \, dx$$

```
[In] integrate((b*x)^m*arcsin(a*x)^3,x, algorithm="maxima")
```

```
[Out] (b^m*x*x^m*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^3 + 3*(a*b^m*m + a*b^
m)*integrate(sqrt(a*x + 1)*sqrt(-a*x + 1)*x*x^m*arctan2(a*x, sqrt(a*x + 1)*
sqrt(-a*x + 1))^2/((a^2*m + a^2)*x^2 - m - 1), x))/(m + 1)
```

Giac [N/A]

Not integrable

Time = 0.56 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.17

$$\int (bx)^m \arcsin(ax)^3 \, dx = \int (bx)^m \arcsin{(ax)}^3 \, dx$$

```
[In] integrate((b*x)^m*arcsin(a*x)^3,x, algorithm="giac")
```

```
[Out] integrate((b*x)^m*arcsin(a*x)^3, x)
```

Mupad [N/A]

Not integrable

Time = 0.05 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.17

$$\int (bx)^m \arcsin(ax)^3 \, dx = \int \mathrm{asin}(a\,x)^3\,{(b\,x)}^m \, dx$$

```
[In] int(asin(a*x)^3*(b*x)^m,x)
```

```
[Out] int(asin(a*x)^3*(b*x)^m, x)
```

3.121 $\int (bx)^m \arcsin(ax)^2 \, dx$

Optimal result

Integrand size = 12, antiderivative size = 150

$$\int (bx)^m \arcsin(ax)^2 \, dx = \frac{(bx)^{1+m} \arcsin(ax)^2}{b(1+m)} - \frac{2a(bx)^{2+m} \arcsin(ax) \text{Hypergeometric2F1}\left(\frac{1}{2}, \frac{2+m}{2}, \frac{4+m}{2}, a^2x^2\right)}{b^2(1+m)(2+m)} + \frac{2a^2(bx)^{3+m} {}_3F_2\left(1, \frac{3}{2}+\frac{m}{2}, \frac{3}{2}+\frac{m}{2}; 2+\frac{m}{2}, \frac{5}{2}+\frac{m}{2}; a^2x^2\right)}{b^3(1+m)(2+m)(3+m)}$$

```
[Out] (b*x)^(1+m)*arcsin(a*x)^2/b/(1+m)-2*a*(b*x)^(2+m)*arcsin(a*x)*hypergeom([1/
2, 1+1/2*m],[2+1/2*m],a^2*x^2)/b^2/(1+m)/(2+m)+2*a^2*(b*x)^(3+m)*hypergeom(
[1, 3/2+1/2*m, 3/2+1/2*m],[2+1/2*m, 5/2+1/2*m],a^2*x^2)/b^3/(3+m)/(m^2+3*m+
2)
```

Rubi [A] (verified)

Time = 0.07 (sec) , antiderivative size = 150, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.167, Rules used = {4723, 4805}

$$\int (bx)^m \arcsin(ax)^2 \, dx = \frac{2a^2(bx)^{m+3} {}_3F_2\left(1, \frac{m}{2}+\frac{3}{2}, \frac{m}{2}+\frac{3}{2}; \frac{m}{2}+2, \frac{m}{2}+\frac{5}{2}; a^2x^2\right)}{b^3(m+1)(m+2)(m+3)} - \frac{2a \arcsin(ax)(bx)^{m+2} \text{Hypergeometric2F1}\left(\frac{1}{2}, \frac{m+2}{2}, \frac{m+4}{2}, a^2x^2\right)}{b^2(m+1)(m+2)} + \frac{\arcsin(ax)^2(bx)^{m+1}}{b(m+1)}$$

```
[In] Int[(b*x)^m*ArcSin[a*x]^2,x]
```

```
[Out] ((b*x)^(1 + m)*ArcSin[a*x]^2)/(b*(1 + m)) - (2*a*(b*x)^(2 + m)*ArcSin[a*x]*
Hypergeometric2F1[1/2, (2 + m)/2, (4 + m)/2, a^2*x^2])/(b^2*(1 + m)*(2 + m)
) + (2*a^2*(b*x)^(3 + m)*HypergeometricPFQ[{1, 3/2 + m/2, 3/2 + m/2}, {2 +
m/2, 5/2 + m/2}, a^2*x^2])/(b^3*(1 + m)*(2 + m)*(3 + m))
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rule 4805

```
Int[(((a_.) + ArcSin[(c_.)*(x_)]*(b_.))*((f_.)*(x_))^(m_))/Sqrt[(d_) + (e_.
)*(x_)^2], x_Symbol] :> Simp[((f*x)^(m + 1)/(f*(m + 1)))*Simp[Sqrt[1 - c^2*
x^2]/Sqrt[d + e*x^2]]*(a + b*ArcSin[c*x])*Hypergeometric2F1[1/2, (1 + m)/2,
 (3 + m)/2, c^2*x^2], x] - Simp[b*c*((f*x)^(m + 2)/(f^2*(m + 1)*(m + 2)))*S
imp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]]*HypergeometricPFQ[{1, 1 + m/2, 1 + m
/2}, {3/2 + m/2, 2 + m/2}, c^2*x^2], x] /; FreeQ[{a, b, c, d, e, f, m}, x]
&& EqQ[c^2*d + e, 0] &&  !IntegerQ[m]
```

Rubi steps

$$\text{integral} = \frac{(bx)^{1+m}\arcsin(ax)^2}{b(1+m)} - \frac{(2a)\int \frac{(bx)^{1+m}\arcsin(ax)}{\sqrt{1-a^2x^2}}\,dx}{b(1+m)}$$

$$= \frac{(bx)^{1+m}\arcsin(ax)^2}{b(1+m)} - \frac{2a(bx)^{2+m}\arcsin(ax)\,\text{Hypergeometric2F1}\left(\frac{1}{2},\frac{2+m}{2},\frac{4+m}{2},a^2x^2\right)}{b^2(1+m)(2+m)} + \frac{2a^2(bx)^{3+m}\,{}_3F_2\left(1,\frac{3}{2}+\frac{m}{2},\frac{3}{2}+\frac{m}{2};2+\frac{m}{2},\frac{5}{2}+\frac{m}{2};a^2x^2\right)}{b^3(1+m)(2+m)(3+m)}$$

Mathematica [A] (verified)

Time = 0.04 (sec) , antiderivative size = 122, normalized size of antiderivative = 0.81

$$\int (bx)^m \arcsin(ax)^2\,dx = \frac{x(bx)^m\left((3+m)\arcsin(ax)\left((2+m)\arcsin(ax)-2ax\,\text{Hypergeometric2F1}\left(\frac{1}{2},\frac{2+m}{2},\frac{4+m}{2},a^2x^2\right)\right)+2a^2x^2\,{}_3\right.}{(1+m)(2+m)(3+m)}$$

```
[In] Integrate[(b*x)^m*ArcSin[a*x]^2,x]
```

```
[Out] (x*(b*x)^m*((3 + m)*ArcSin[a*x]*((2 + m)*ArcSin[a*x] - 2*a*x*Hypergeometric
2F1[1/2, (2 + m)/2, (4 + m)/2, a^2*x^2]) + 2*a^2*x^2*HypergeometricPFQ[{1,
3/2 + m/2, 3/2 + m/2}, {2 + m/2, 5/2 + m/2}, a^2*x^2]))/((1 + m)*(2 + m)*(3
 + m))
```

Maple [F]

$$\int (bx)^m \arcsin(ax)^2\,dx$$

```
[In] int((b*x)^m*arcsin(a*x)^2,x)
```

```
[Out] int((b*x)^m*arcsin(a*x)^2,x)
```

Fricas [F]

$$\int (bx)^m \arcsin(ax)^2\,dx = \int (bx)^m \arcsin(ax)^2\,dx$$

```
[In] integrate((b*x)^m*arcsin(a*x)^2,x, algorithm="fricas")
```

```
[Out] integral((b*x)^m*arcsin(a*x)^2, x)
```

Sympy [F]

$$\int (bx)^m \arcsin(ax)^2\,dx = \int (bx)^m \operatorname{asin}^2(ax)\,dx$$

```
[In] integrate((b*x)**m*asin(a*x)**2,x)
```

```
[Out] Integral((b*x)**m*asin(a*x)**2, x)
```

Maxima [F]

$$\int (bx)^m \arcsin(ax)^2\,dx = \int (bx)^m \arcsin(ax)^2\,dx$$

```
[In] integrate((b*x)^m*arcsin(a*x)^2,x, algorithm="maxima")
```

```
[Out] (b^m*x*x^m*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1))^2 + 2*(a*b^m*m + a*b^
m)*integrate(sqrt(a*x + 1)*sqrt(-a*x + 1)*x*x^m*arctan2(a*x, sqrt(a*x + 1)*
sqrt(-a*x + 1))/((a^2*m + a^2)*x^2 - m - 1), x))/(m + 1)
```

Giac [F]

$$\int (bx)^m \arcsin(ax)^2 \, dx = \int (bx)^m \arcsin(ax)^2 \, dx$$

```
[In] integrate((b*x)^m*arcsin(a*x)^2,x, algorithm="giac")
[Out] integrate((b*x)^m*arcsin(a*x)^2, x)
```

Mupad [F(-1)]

Timed out.

$$\int (bx)^m \arcsin(ax)^2 \, dx = \int \operatorname{asin}(a\,x)^2 \, (b\,x)^m \, dx$$

```
[In] int(asin(a*x)^2*(b*x)^m,x)
[Out] int(asin(a*x)^2*(b*x)^m, x)
```

3.122 $\int (bx)^m \arcsin(ax)\,dx$

Optimal result

Integrand size = 10, antiderivative size = 69

$$\int (bx)^m \arcsin(ax)\,dx = \frac{(bx)^{1+m}\arcsin(ax)}{b(1+m)} - \frac{a(bx)^{2+m}\,\text{Hypergeometric2F1}\left(\frac{1}{2},\frac{2+m}{2},\frac{4+m}{2},a^2x^2\right)}{b^2(1+m)(2+m)}$$

```
[Out] (b*x)^(1+m)*arcsin(a*x)/b/(1+m)-a*(b*x)^(2+m)*hypergeom([1/2, 1+1/2*m],[2+1
/2*m],a^2*x^2)/b^2/(1+m)/(2+m)
```

Rubi [A] (verified)

Time = 0.02 (sec) , antiderivative size = 69, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.200, Rules used = {4723, 371}

$$\int (bx)^m \arcsin(ax)\,dx = \frac{\arcsin(ax)(bx)^{m+1}}{b(m+1)} - \frac{a(bx)^{m+2}\,\text{Hypergeometric2F1}\left(\frac{1}{2},\frac{m+2}{2},\frac{m+4}{2},a^2x^2\right)}{b^2(m+1)(m+2)}$$

```
[In] Int[(b*x)^m*ArcSin[a*x],x]
```

```
[Out] ((b*x)^(1 + m)*ArcSin[a*x])/(b*(1 + m)) - (a*(b*x)^(2 + m)*Hypergeometric2F
1[1/2, (2 + m)/2, (4 + m)/2, a^2*x^2])/(b^2*(1 + m)*(2 + m))
```

Rule 371

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[a^p
*((c*x)^(m + 1)/(c*(m + 1)))*Hypergeometric2F1[-p, (m + 1)/n, (m + 1)/n + 1
```

```
, (-b)*(x^n/a)], x] /; FreeQ[{a, b, c, m, n, p}, x] &&  !IGtQ[p, 0] && (ILt
Q[p, 0] || GtQ[a, 0])
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}\text{integral} &= \frac{(bx)^{1+m}\arcsin(ax)}{b(1+m)} - \frac{a\int\frac{(bx)^{1+m}}{\sqrt{1-a^2x^2}}\,dx}{b(1+m)}\\ &= \frac{(bx)^{1+m}\arcsin(ax)}{b(1+m)} - \frac{a(bx)^{2+m}\,\text{Hypergeometric2F1}\left(\frac{1}{2},\frac{2+m}{2},\frac{4+m}{2},a^2x^2\right)}{b^2(1+m)(2+m)}\end{aligned}$$

Mathematica [A] (verified)

Time = 0.02 (sec) , antiderivative size = 56, normalized size of antiderivative = 0.81

$$\int (bx)^m \arcsin(ax)\,dx = -\frac{x(bx)^m\left(-((2+m)\arcsin(ax)) + ax\,\text{Hypergeometric2F1}\left(\frac{1}{2},\frac{2+m}{2},\frac{4+m}{2},a^2x^2\right)\right)}{(1+m)(2+m)}$$

```
[In] Integrate[(b*x)^m*ArcSin[a*x],x]
[Out] -((x*(b*x)^m*(-((2 + m)*ArcSin[a*x]) + a*x*Hypergeometric2F1[1/2, (2 + m)/2
, (4 + m)/2, a^2*x^2]))/((1 + m)*(2 + m)))
```

Maple [F]

$$\int (bx)^m \arcsin(ax)\,dx$$

```
[In] int((b*x)^m*arcsin(a*x),x)
[Out] int((b*x)^m*arcsin(a*x),x)
```

Fricas [F]

$$\int (bx)^m \arcsin(ax)\,dx = \int (bx)^m \arcsin(ax)\ dx$$

```
[In] integrate((b*x)^m*arcsin(a*x),x, algorithm="fricas")
[Out] integral((b*x)^m*arcsin(a*x), x)
```

Sympy [F]

$$\int (bx)^m \arcsin(ax)\,dx = \int (bx)^m \operatorname{asin}(ax)\,dx$$

```
[In] integrate((b*x)**m*asin(a*x),x)
[Out] Integral((b*x)**m*asin(a*x), x)
```

Maxima [F]

$$\int (bx)^m \arcsin(ax)\,dx = \int (bx)^m \arcsin(ax)\ dx$$

```
[In] integrate((b*x)^m*arcsin(a*x),x, algorithm="maxima")
[Out] (b^m*x*x^m*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1)) + (a*b^m*m + a*b^m)*i
ntegrate(sqrt(a*x + 1)*sqrt(-a*x + 1)*x*x^m/((a^2*m + a^2)*x^2 - m - 1), x)
)/(m + 1)
```

Giac [F]

$$\int (bx)^m \arcsin(ax)\,dx = \int (bx)^m \arcsin(ax)\ dx$$

```
[In] integrate((b*x)^m*arcsin(a*x),x, algorithm="giac")
[Out] integrate((b*x)^m*arcsin(a*x), x)
```

Mupad [F(-1)]

Timed out.

$$\int (bx)^m \arcsin(ax)\, dx = \int \mathrm{asin}(a\, x)\ (b\, x)^m\, dx$$

```
[In] int(asin(a*x)*(b*x)^m,x)
[Out] int(asin(a*x)*(b*x)^m, x)
```

3.123 $\int \frac{(bx)^m}{\arcsin(ax)} dx$

Optimal result

Integrand size = 12, antiderivative size = 12

$$\int \frac{(bx)^m}{\arcsin(ax)} dx = \text{Int}\left(\frac{(bx)^m}{\arcsin(ax)}, x\right)$$

```
[Out] Unintegrable((b*x)^m/arcsin(a*x),x)
```

Rubi [N/A]

Not integrable

Time = 0.01 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}} = 0.000$, Rules used = {}

$$\int \frac{(bx)^m}{\arcsin(ax)} dx = \int \frac{(bx)^m}{\arcsin(ax)} dx$$

```
[In] Int[(b*x)^m/ArcSin[a*x],x]
[Out] Defer[Int][(b*x)^m/ArcSin[a*x], x]
```

Rubi steps

$$\text{integral} = \int \frac{(bx)^m}{\arcsin(ax)} dx$$

Mathematica [N/A]

Not integrable

Time = 0.30 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.17

$$\int \frac{(bx)^m}{\arcsin(ax)}\,dx=\int \frac{(bx)^m}{\arcsin(ax)}\,dx$$

```
[In] Integrate[(b*x)^m/ArcSin[a*x],x]
[Out] Integrate[(b*x)^m/ArcSin[a*x], x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.32 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.00

$$\int \frac{(bx)^m}{\arcsin\left(ax\right)}dx$$

```
[In] int((b*x)^m/arcsin(a*x),x)
[Out] int((b*x)^m/arcsin(a*x),x)
```

Fricas [N/A]

Not integrable

Time = 0.24 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.17

$$\int \frac{(bx)^m}{\arcsin(ax)}\,dx=\int \frac{(bx)^m}{\arcsin\left(ax\right)}\,dx$$

```
[In] integrate((b*x)^m/arcsin(a*x),x, algorithm="fricas")
[Out] integral((b*x)^m/arcsin(a*x), x)
```

Sympy [N/A]

Not integrable

Time = 0.40 (sec) , antiderivative size = 10, normalized size of antiderivative = 0.83

$$\int \frac{(bx)^m}{\arcsin(ax)}\,dx=\int \frac{(bx)^m}{\operatorname{asin}\left(ax\right)}\,dx$$

```
[In] integrate((b*x)**m/asin(a*x),x)
[Out] Integral((b*x)**m/asin(a*x), x)
```

Maxima [N/A]

Not integrable

Time = 0.35 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.17

$$\int \frac{(bx)^m}{\arcsin(ax)} dx = \int \frac{(bx)^m}{\arcsin(ax)} dx$$

```
[In] integrate((b*x)^m/arcsin(a*x),x, algorithm="maxima")
[Out] integrate((b*x)^m/arcsin(a*x), x)
```

Giac [N/A]

Not integrable

Time = 0.43 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.17

$$\int \frac{(bx)^m}{\arcsin(ax)} dx = \int \frac{(bx)^m}{\arcsin(ax)} dx$$

```
[In] integrate((b*x)^m/arcsin(a*x),x, algorithm="giac")
[Out] integrate((b*x)^m/arcsin(a*x), x)
```

Mupad [N/A]

Not integrable

Time = 0.04 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.17

$$\int \frac{(bx)^m}{\arcsin(ax)} dx = \int \frac{(b\,x)^m}{\mathrm{asin}\,(a\,x)} dx$$

```
[In] int((b*x)^m/asin(a*x),x)
[Out] int((b*x)^m/asin(a*x), x)
```

3.124 $\int \frac{(bx)^m}{\arcsin(ax)^2} \, dx$

Optimal result

Integrand size = 12, antiderivative size = 12

$$\int \frac{(bx)^m}{\arcsin(ax)^2} \, dx = \text{Int}\left(\frac{(bx)^m}{\arcsin(ax)^2}, x\right)$$

```
[Out] Unintegrable((b*x)^m/arcsin(a*x)^2,x)
```

Rubi [N/A]

Not integrable

Time = 0.01 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}} = 0.000$, Rules used = {}

$$\int \frac{(bx)^m}{\arcsin(ax)^2} \, dx = \int \frac{(bx)^m}{\arcsin(ax)^2} \, dx$$

```
[In] Int[(b*x)^m/ArcSin[a*x]^2,x]
[Out] Defer[Int][(b*x)^m/ArcSin[a*x]^2, x]
```

Rubi steps

$$\text{integral} = \int \frac{(bx)^m}{\arcsin(ax)^2} \, dx$$

Mathematica [N/A]

Not integrable

Time = 0.32 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.17

$$\int \frac{(bx)^m}{\arcsin(ax)^2}\,dx = \int \frac{(bx)^m}{\arcsin(ax)^2}\,dx$$

```
[In] Integrate[(b*x)^m/ArcSin[a*x]^2,x]
[Out] Integrate[(b*x)^m/ArcSin[a*x]^2, x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.35 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.00

$$\int \frac{(bx)^m}{\arcsin\left(ax\right)^2}dx$$

```
[In] int((b*x)^m/arcsin(a*x)^2,x)
[Out] int((b*x)^m/arcsin(a*x)^2,x)
```

Fricas [N/A]

Not integrable

Time = 0.25 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.17

$$\int \frac{(bx)^m}{\arcsin(ax)^2}\,dx = \int \frac{(bx)^m}{\arcsin\left(ax\right)^2}\,dx$$

```
[In] integrate((b*x)^m/arcsin(a*x)^2,x, algorithm="fricas")
[Out] integral((b*x)^m/arcsin(a*x)^2, x)
```

Sympy [N/A]

Not integrable

Time = 0.70 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.00

$$\int \frac{(bx)^m}{\arcsin(ax)^2}\,dx = \int \frac{(bx)^m}{\operatorname{asin}^2\left(ax\right)}\,dx$$

```
[In] integrate((b*x)**m/asin(a*x)**2,x)
[Out] Integral((b*x)**m/asin(a*x)**2, x)
```

Maxima [N/A]

Not integrable

Time = 0.96 (sec) , antiderivative size = 157, normalized size of antiderivative = 13.08

$$\int \frac{(bx)^m}{\arcsin(ax)^2} \, dx = \int \frac{(bx)^m}{\arcsin{(ax)}^2} \, dx$$

```
[In] integrate((b*x)^m/arcsin(a*x)^2,x, algorithm="maxima")
```

```
[Out] -(sqrt(a*x + 1)*sqrt(-a*x + 1)*b^m*x^m - a*arctan2(a*x, sqrt(a*x + 1)*sqrt(
-a*x + 1))*integrate(((a^2*b^m*m + a^2*b^m)*x^2 - b^m*m)*sqrt(a*x + 1)*sqrt
(-a*x + 1)*x^m/((a^3*x^3 - a*x)*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1)))
, x))/(a*arctan2(a*x, sqrt(a*x + 1)*sqrt(-a*x + 1)))
```

Giac [N/A]

Not integrable

Time = 0.44 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.17

$$\int \frac{(bx)^m}{\arcsin(ax)^2} \, dx = \int \frac{(bx)^m}{\arcsin{(ax)}^2} \, dx$$

```
[In] integrate((b*x)^m/arcsin(a*x)^2,x, algorithm="giac")
```

```
[Out] integrate((b*x)^m/arcsin(a*x)^2, x)
```

Mupad [N/A]

Not integrable

Time = 0.04 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.17

$$\int \frac{(bx)^m}{\arcsin(ax)^2} \, dx = \int \frac{{(b\,x)}^m}{{\mathrm{asin}\left(a\,x\right)}^2} \,d x$$

```
[In] int((b*x)^m/asin(a*x)^2,x)
```

```
[Out] int((b*x)^m/asin(a*x)^2, x)
```

3.125 $\int (bx)^m \arcsin(ax)^{3/2}\,dx$

Optimal result

Integrand size = 14, antiderivative size = 14

$$\int (bx)^m \arcsin(ax)^{3/2}\,dx = \text{Int}\left((bx)^m \arcsin(ax)^{3/2}, x\right)$$

```
[Out] Unintegrable((b*x)^m*arcsin(a*x)^(3/2),x)
```

Rubi [N/A]

Not integrable

Time = 0.01 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int (bx)^m \arcsin(ax)^{3/2}\,dx = \int (bx)^m \arcsin(ax)^{3/2}\,dx$$

```
[In] Int[(b*x)^m*ArcSin[a*x]^(3/2),x]
[Out] Defer[Int][(b*x)^m*ArcSin[a*x]^(3/2), x]
```

Rubi steps

$$\text{integral} = \int (bx)^m \arcsin(ax)^{3/2}\,dx$$

Mathematica [N/A]

Not integrable

Time = 0.56 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.14

$$\int (bx)^m \arcsin(ax)^{3/2}\,dx=\int (bx)^m \arcsin(ax)^{3/2}\,dx$$

```
[In] Integrate[(b*x)^m*ArcSin[a*x]^(3/2),x]
[Out] Integrate[(b*x)^m*ArcSin[a*x]^(3/2), x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.05 (sec) , antiderivative size = 12, normalized size of antiderivative = 0.86

$$\int (bx)^m \arcsin(ax)^{\frac{3}{2}}\,dx$$

```
[In] int((b*x)^m*arcsin(a*x)^(3/2),x)
[Out] int((b*x)^m*arcsin(a*x)^(3/2),x)
```

Fricas [F(-2)]

Exception generated.

$$\int (bx)^m \arcsin(ax)^{3/2}\,dx=\text{Exception raised: TypeError}$$

```
[In] integrate((b*x)^m*arcsin(a*x)^(3/2),x, algorithm="fricas")
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [N/A]

Not integrable

Time = 57.06 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00

$$\int (bx)^m \arcsin(ax)^{3/2}\,dx=\int (bx)^m \operatorname{asin}^{\frac{3}{2}}(ax)\,dx$$

```
[In] integrate((b*x)**m*asin(a*x)**(3/2),x)
[Out] Integral((b*x)**m*asin(a*x)**(3/2), x)
```

Maxima [F(-2)]

Exception generated.

$$\int (bx)^m \arcsin(ax)^{3/2}\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate((b*x)^m*arcsin(a*x)^(3/2),x, algorithm="maxima")
```

```
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [N/A]

Not integrable

Time = 1.87 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00

$$\int (bx)^m \arcsin(ax)^{3/2}\,dx = \int (bx)^m \arcsin\left(ax\right)^{\frac{3}{2}}\,dx$$

```
[In] integrate((b*x)^m*arcsin(a*x)^(3/2),x, algorithm="giac")
```

```
[Out] integrate((b*x)^m*arcsin(a*x)^(3/2), x)
```

Mupad [N/A]

Not integrable

Time = 0.04 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00

$$\int (bx)^m \arcsin(ax)^{3/2}\,dx = \int \mathrm{asin}(a\,x)^{3/2}\,(b\,x)^m\,dx$$

```
[In] int(asin(a*x)^(3/2)*(b*x)^m,x)
```

```
[Out] int(asin(a*x)^(3/2)*(b*x)^m, x)
```

3.126 $\int (bx)^m \sqrt{\arcsin(ax)}\, dx$

Optimal result

Integrand size = 14, antiderivative size = 14

$$\int (bx)^m \sqrt{\arcsin(ax)}\, dx = \text{Int}\left((bx)^m \sqrt{\arcsin(ax)}, x\right)$$

```
[Out] Unintegrable((b*x)^m*arcsin(a*x)^(1/2),x)
```

Rubi [N/A]

Not integrable

Time = 0.01 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}} = 0.000$, Rules used = {}

$$\int (bx)^m \sqrt{\arcsin(ax)}\, dx = \int (bx)^m \sqrt{\arcsin(ax)}\, dx$$

```
[In] Int[(b*x)^m*Sqrt[ArcSin[a*x]],x]
```

```
[Out] Defer[Int][(b*x)^m*Sqrt[ArcSin[a*x]], x]
```

Rubi steps

$$\text{integral} = \int (bx)^m \sqrt{\arcsin(ax)}\, dx$$

Mathematica [N/A]

Not integrable

Time = 0.79 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.14

$$\int (bx)^m \sqrt{\arcsin(ax)}\, dx = \int (bx)^m \sqrt{\arcsin(ax)}\, dx$$

```
[In] Integrate[(b*x)^m*Sqrt[ArcSin[a*x]],x]
[Out] Integrate[(b*x)^m*Sqrt[ArcSin[a*x]], x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.05 (sec) , antiderivative size = 12, normalized size of antiderivative = 0.86

$$\int (bx)^m \sqrt{\arcsin (ax)}dx$$

```
[In] int((b*x)^m*arcsin(a*x)^(1/2),x)
[Out] int((b*x)^m*arcsin(a*x)^(1/2),x)
```

Fricas [F(-2)]

Exception generated.

$$\int (bx)^m \sqrt{\arcsin(ax)}\, dx = \text{Exception raised: TypeError}$$

```
[In] integrate((b*x)^m*arcsin(a*x)^(1/2),x, algorithm="fricas")
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [N/A]

Not integrable

Time = 1.10 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00

$$\int (bx)^m \sqrt{\arcsin(ax)}\, dx = \int (bx)^m \sqrt{\operatorname{asin}(ax)}\, dx$$

```
[In] integrate((b*x)**m*asin(a*x)**(1/2),x)
[Out] Integral((b*x)**m*sqrt(asin(a*x)), x)
```

Maxima [F(-2)]

Exception generated.

$$\int (bx)^m \sqrt{\arcsin(ax)}\, dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate((b*x)^m*arcsin(a*x)^(1/2),x, algorithm="maxima")
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [N/A]

Not integrable

Time = 1.21 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00

$$\int (bx)^m \sqrt{\arcsin(ax)}\, dx = \int (bx)^m \sqrt{\arcsin(ax)}\, dx$$

```
[In] integrate((b*x)^m*arcsin(a*x)^(1/2),x, algorithm="giac")
[Out] integrate((b*x)^m*sqrt(arcsin(a*x)), x)
```

Mupad [N/A]

Not integrable

Time = 0.04 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00

$$\int (bx)^m \sqrt{\arcsin(ax)}\, dx = \int \sqrt{\mathrm{asin}(a\,x)}\, (b\,x)^m\, dx$$

```
[In] int(asin(a*x)^(1/2)*(b*x)^m,x)
[Out] int(asin(a*x)^(1/2)*(b*x)^m, x)
```

3.127 $\int \frac{(bx)^m}{\sqrt{\arcsin(ax)}}\,dx$

Optimal result

Integrand size = 14, antiderivative size = 14

$$\int \frac{(bx)^m}{\sqrt{\arcsin(ax)}}\,dx = \operatorname{Int}\left(\frac{(bx)^m}{\sqrt{\arcsin(ax)}},x\right)$$

```
[Out] Unintegrable((b*x)^m/arcsin(a*x)^(1/2),x)
```

Rubi [N/A]

Not integrable

Time = 0.01 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{(bx)^m}{\sqrt{\arcsin(ax)}}\,dx = \int \frac{(bx)^m}{\sqrt{\arcsin(ax)}}\,dx$$

```
[In] Int[(b*x)^m/Sqrt[ArcSin[a*x]],x]
```

```
[Out] Defer[Int][(b*x)^m/Sqrt[ArcSin[a*x]], x]
```

Rubi steps

$$\text{integral} = \int \frac{(bx)^m}{\sqrt{\arcsin(ax)}}\,dx$$

Mathematica [N/A]

Not integrable

Time = 0.70 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.14

$$\int \frac{(bx)^m}{\sqrt{\arcsin(ax)}}\,dx = \int \frac{(bx)^m}{\sqrt{\arcsin(ax)}}\,dx$$

```
[In] Integrate[(b*x)^m/Sqrt[ArcSin[a*x]],x]
[Out] Integrate[(b*x)^m/Sqrt[ArcSin[a*x]], x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.05 (sec) , antiderivative size = 12, normalized size of antiderivative = 0.86

$$\int \frac{(bx)^m}{\sqrt{\arcsin\left(ax\right)}}dx$$

```
[In] int((b*x)^m/arcsin(a*x)^(1/2),x)
[Out] int((b*x)^m/arcsin(a*x)^(1/2),x)
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{(bx)^m}{\sqrt{\arcsin(ax)}}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate((b*x)^m/arcsin(a*x)^(1/2),x, algorithm="fricas")
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [N/A]

Not integrable

Time = 0.52 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00

$$\int \frac{(bx)^m}{\sqrt{\arcsin(ax)}}\,dx = \int \frac{(bx)^m}{\sqrt{\operatorname{asin}\left(ax\right)}}\,dx$$

```
[In] integrate((b*x)**m/asin(a*x)**(1/2),x)
[Out] Integral((b*x)**m/sqrt(asin(a*x)), x)
```

Maxima [F(-2)]

Exception generated.

$$\int \frac{(bx)^m}{\sqrt{\arcsin(ax)}}\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate((b*x)^m/arcsin(a*x)^(1/2),x, algorithm="maxima")
```

```
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [N/A]

Not integrable

Time = 1.06 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00

$$\int \frac{(bx)^m}{\sqrt{\arcsin(ax)}}\,dx = \int \frac{(bx)^m}{\sqrt{\arcsin(ax)}}\,dx$$

```
[In] integrate((b*x)^m/arcsin(a*x)^(1/2),x, algorithm="giac")
```

```
[Out] integrate((b*x)^m/sqrt(arcsin(a*x)), x)
```

Mupad [N/A]

Not integrable

Time = 0.04 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00

$$\int \frac{(bx)^m}{\sqrt{\arcsin(ax)}}\,dx = \int \frac{(b\,x)^m}{\sqrt{\mathrm{asin}\,(a\,x)}}\,dx$$

```
[In] int((b*x)^m/asin(a*x)^(1/2),x)
```

```
[Out] int((b*x)^m/asin(a*x)^(1/2), x)
```

3.128 $\int \frac{(bx)^m}{\arcsin(ax)^{3/2}}\,dx$

Optimal result

Integrand size = 14, antiderivative size = 14

$$\int \frac{(bx)^m}{\arcsin(ax)^{3/2}}\,dx = \text{Int}\left(\frac{(bx)^m}{\arcsin(ax)^{3/2}},x\right)$$

```
[Out] Unintegrable((b*x)^m/arcsin(a*x)^(3/2),x)
```

Rubi [N/A]

Not integrable

Time = 0.01 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{(bx)^m}{\arcsin(ax)^{3/2}}\,dx = \int \frac{(bx)^m}{\arcsin(ax)^{3/2}}\,dx$$

```
[In] Int[(b*x)^m/ArcSin[a*x]^(3/2),x]
```

```
[Out] Defer[Int][(b*x)^m/ArcSin[a*x]^(3/2), x]
```

Rubi steps

$$\text{integral} = \int \frac{(bx)^m}{\arcsin(ax)^{3/2}}\,dx$$

Mathematica [N/A]

Not integrable

Time = 0.63 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.14

$$\int \frac{(bx)^m}{\arcsin(ax)^{3/2}}\,dx = \int \frac{(bx)^m}{\arcsin(ax)^{3/2}}\,dx$$

```
[In] Integrate[(b*x)^m/ArcSin[a*x]^(3/2),x]
[Out] Integrate[(b*x)^m/ArcSin[a*x]^(3/2), x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.05 (sec) , antiderivative size = 12, normalized size of antiderivative = 0.86

$$\int \frac{(bx)^m}{\arcsin\left(ax\right)^{\frac{3}{2}}}dx$$

```
[In] int((b*x)^m/arcsin(a*x)^(3/2),x)
[Out] int((b*x)^m/arcsin(a*x)^(3/2),x)
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{(bx)^m}{\arcsin(ax)^{3/2}}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate((b*x)^m/arcsin(a*x)^(3/2),x, algorithm="fricas")
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [N/A]

Not integrable

Time = 3.79 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00

$$\int \frac{(bx)^m}{\arcsin(ax)^{3/2}}\,dx = \int \frac{(bx)^m}{\operatorname{asin}^{\frac{3}{2}}(ax)}\,dx$$

```
[In] integrate((b*x)**m/asin(a*x)**(3/2),x)
[Out] Integral((b*x)**m/asin(a*x)**(3/2), x)
```

Maxima [F(-2)]

Exception generated.

$$\int \frac{(bx)^m}{\arcsin(ax)^{3/2}}\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate((b*x)^m/arcsin(a*x)^(3/2),x, algorithm="maxima")
```

```
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [N/A]

Not integrable

Time = 0.97 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00

$$\int \frac{(bx)^m}{\arcsin(ax)^{3/2}}\,dx = \int \frac{(bx)^m}{\arcsin\left(ax\right)^{\frac{3}{2}}}\,dx$$

```
[In] integrate((b*x)^m/arcsin(a*x)^(3/2),x, algorithm="giac")
```

```
[Out] integrate((b*x)^m/arcsin(a*x)^(3/2), x)
```

Mupad [N/A]

Not integrable

Time = 0.04 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00

$$\int \frac{(bx)^m}{\arcsin(ax)^{3/2}}\,dx = \int \frac{(b\,x)^m}{\mathrm{asin}\left(a\,x\right)^{3/2}}\,dx$$

```
[In] int((b*x)^m/asin(a*x)^(3/2),x)
```

```
[Out] int((b*x)^m/asin(a*x)^(3/2), x)
```

3.129 $\int (bx)^m \arcsin(ax)^n \, dx$

Optimal result

Integrand size = 12, antiderivative size = 12

$$\int (bx)^m \arcsin(ax)^n \, dx = \text{Int}((bx)^m \arcsin(ax)^n, x)$$

```
[Out] Unintegrable((b*x)^m*arcsin(a*x)^n,x)
```

Rubi [N/A]

Not integrable

Time = 0.01 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}} = 0.000$, Rules used = {}

$$\int (bx)^m \arcsin(ax)^n \, dx = \int (bx)^m \arcsin(ax)^n \, dx$$

```
[In] Int[(b*x)^m*ArcSin[a*x]^n,x]
[Out] Defer[Int][(b*x)^m*ArcSin[a*x]^n, x]
```

Rubi steps

$$\text{integral} = \int (bx)^m \arcsin(ax)^n \, dx$$

Mathematica [N/A]

Not integrable

Time = 0.44 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.17

$$\int (bx)^m \arcsin(ax)^n \, dx = \int (bx)^m \arcsin(ax)^n \, dx$$

```
[In] Integrate[(b*x)^m*ArcSin[a*x]^n,x]
[Out] Integrate[(b*x)^m*ArcSin[a*x]^n, x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.61 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.00

$$\int (bx)^m \arcsin (ax)^n \, dx$$

```
[In] int((b*x)^m*arcsin(a*x)^n,x)
[Out] int((b*x)^m*arcsin(a*x)^n,x)
```

Fricas [N/A]

Not integrable

Time = 0.26 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.17

$$\int (bx)^m \arcsin(ax)^n \, dx = \int (bx)^m \arcsin (ax)^n \, dx$$

```
[In] integrate((b*x)^m*arcsin(a*x)^n,x, algorithm="fricas")
[Out] integral((b*x)^m*arcsin(a*x)^n, x)
```

Sympy [N/A]

Not integrable

Time = 3.49 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.00

$$\int (bx)^m \arcsin(ax)^n \, dx = \int (bx)^m \operatorname{asin}^n (ax) \, dx$$

```
[In] integrate((b*x)**m*asin(a*x)**n,x)
[Out] Integral((b*x)**m*asin(a*x)**n, x)
```

Maxima [F(-2)]

Exception generated.

$$\int (bx)^m \arcsin(ax)^n \, dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate((b*x)^m*arcsin(a*x)^n,x, algorithm="maxima")
```

```
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [N/A]

Not integrable

Time = 0.82 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.17

$$\int (bx)^m \arcsin(ax)^n \, dx = \int (bx)^m \arcsin(ax)^n \, dx$$

```
[In] integrate((b*x)^m*arcsin(a*x)^n,x, algorithm="giac")
```

```
[Out] integrate((b*x)^m*arcsin(a*x)^n, x)
```

Mupad [N/A]

Not integrable

Time = 0.04 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.17

$$\int (bx)^m \arcsin(ax)^n \, dx = \int \mathrm{asin}(a\,x)^n\,(b\,x)^m \, dx$$

```
[In] int(asin(a*x)^n*(b*x)^m,x)
```

```
[Out] int(asin(a*x)^n*(b*x)^m, x)
```

3.130 $\int x^3 \arcsin(ax)^n \, dx$

Optimal result

Integrand size = 10, antiderivative size = 167

$$\begin{aligned}\int x^3 \arcsin(ax)^n \, dx = &-\frac{2^{-4-n}(-i\arcsin(ax))^{-n}\arcsin(ax)^n\Gamma(1+n,-2i\arcsin(ax))}{a^4} \\ &-\frac{2^{-4-n}(i\arcsin(ax))^{-n}\arcsin(ax)^n\Gamma(1+n,2i\arcsin(ax))}{a^4} \\ &+\frac{2^{-2(3+n)}(-i\arcsin(ax))^{-n}\arcsin(ax)^n\Gamma(1+n,-4i\arcsin(ax))}{a^4} \\ &+\frac{2^{-2(3+n)}(i\arcsin(ax))^{-n}\arcsin(ax)^n\Gamma(1+n,4i\arcsin(ax))}{a^4}\end{aligned}$$

```
[Out] -2^(-4-n)*arcsin(a*x)^n*GAMMA(1+n,-2*I*arcsin(a*x))/a^4/((-I*arcsin(a*x))^n
)-2^(-4-n)*arcsin(a*x)^n*GAMMA(1+n,2*I*arcsin(a*x))/a^4/((I*arcsin(a*x))^n)
+arcsin(a*x)^n*GAMMA(1+n,-4*I*arcsin(a*x))/(2^(6+2*n))/a^4/((-I*arcsin(a*x)
)^n)+arcsin(a*x)^n*GAMMA(1+n,4*I*arcsin(a*x))/(2^(6+2*n))/a^4/((I*arcsin(a*
x))^n)
```

Rubi [A] (verified)

Time = 0.11 (sec) , antiderivative size = 167, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 4, $\frac{\text{number of rules}}{\text{integrand size}} = 0.400$, Rules used

$= \{4731, 4491, 3389, 2212\}$

$$\int x^3 \arcsin(ax)^n \, dx = -\frac{2^{-n-4} \arcsin(ax)^n (-i \arcsin(ax))^{-n} \Gamma(n+1, -2i \arcsin(ax))}{a^4} + \frac{2^{-2(n+3)} \arcsin(ax)^n (-i \arcsin(ax))^{-n} \Gamma(n+1, -4i \arcsin(ax))}{a^4} - \frac{2^{-n-4} (i \arcsin(ax))^{-n} \arcsin(ax)^n \Gamma(n+1, 2i \arcsin(ax))}{a^4} + \frac{2^{-2(n+3)} (i \arcsin(ax))^{-n} \arcsin(ax)^n \Gamma(n+1, 4i \arcsin(ax))}{a^4}$$

```
[In] Int[x^3*ArcSin[a*x]^n,x]
```

```
[Out] -((2^(-4 - n)*ArcSin[a*x]^n*Gamma[1 + n, (-2*I)*ArcSin[a*x]])/(a^4*((-I)*Ar
cSin[a*x])^n)) - (2^(-4 - n)*ArcSin[a*x]^n*Gamma[1 + n, (2*I)*ArcSin[a*x]])
/(a^4*(I*ArcSin[a*x])^n) + (ArcSin[a*x]^n*Gamma[1 + n, (-4*I)*ArcSin[a*x]])
/(2^(2*(3 + n))*a^4*((-I)*ArcSin[a*x])^n) + (ArcSin[a*x]^n*Gamma[1 + n, (4*
I)*ArcSin[a*x]])/(2^(2*(3 + n))*a^4*(I*ArcSin[a*x])^n)
```

Rule 2212

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))*((c_.) + (d_.)*(x_))^(m_), x_Symbol]
:> Simp[(-F^(g*(e - c*(f/d))))*((c + d*x)^FracPart[m]/(d*((-f)*g*(Log[F]/d)
)^(IntPart[m] + 1)*((-f)*g*Log[F]*((c + d*x)/d))^FracPart[m]))*Gamma[m + 1,
 ((-f)*g*(Log[F]/d))*(c + d*x)], x] /; FreeQ[{F, c, d, e, f, g, m}, x] &&
!IntegerQ[m]
```

Rule 3389

```
Int[((c_.) + (d_.)*(x_))^(m_.)*sin[(e_.) + (f_.)*(x_)], x_Symbol] :> Dist[I
/2, Int[(c + d*x)^m/E^(I*(e + f*x)), x], x] - Dist[I/2, Int[(c + d*x)^m*E^(
I*(e + f*x)), x], x] /; FreeQ[{c, d, e, f, m}, x]
```

Rule 4491

```
Int[Cos[(a_.) + (b_.)*(x_)]^(p_.)*((c_.) + (d_.)*(x_))^(m_.)*Sin[(a_.) + (b
_.)*(x_)]^(n_.), x_Symbol] :> Int[ExpandTrigReduce[(c + d*x)^m, Sin[a + b*x
]^n*Cos[a + b*x]^p, x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && IG
tQ[p, 0]
```

Rule 4731

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Dist[1
/(b*c^(m + 1)), Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b], x], x, a +
 b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, n}, x] && IGtQ[m, 0]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= \frac{\text{Subst}\left(\int x^n \cos(x)\sin^3(x)\,dx, x, \arcsin(ax)\right)}{a^4}\\
&= \frac{\text{Subst}\left(\int \left(\frac{1}{4}x^n \sin(2x) - \frac{1}{8}x^n \sin(4x)\right)\,dx, x, \arcsin(ax)\right)}{a^4}\\
&= -\frac{\text{Subst}\left(\int x^n \sin(4x)\,dx, x, \arcsin(ax)\right)}{8a^4} + \frac{\text{Subst}\left(\int x^n \sin(2x)\,dx, x, \arcsin(ax)\right)}{4a^4}\\
&= -\frac{i\text{Subst}\left(\int e^{-4ix}x^n\,dx, x, \arcsin(ax)\right)}{16a^4} + \frac{i\text{Subst}\left(\int e^{4ix}x^n\,dx, x, \arcsin(ax)\right)}{16a^4}\\
&\quad + \frac{i\text{Subst}\left(\int e^{-2ix}x^n\,dx, x, \arcsin(ax)\right)}{8a^4} - \frac{i\text{Subst}\left(\int e^{2ix}x^n\,dx, x, \arcsin(ax)\right)}{8a^4}\\
&= -\frac{2^{-4-n}(-i\arcsin(ax))^{-n}\arcsin(ax)^n\Gamma(1+n,-2i\arcsin(ax))}{a^4}\\
&\quad - \frac{2^{-4-n}(i\arcsin(ax))^{-n}\arcsin(ax)^n\Gamma(1+n,2i\arcsin(ax))}{a^4}\\
&\quad + \frac{4^{-3-n}(-i\arcsin(ax))^{-n}\arcsin(ax)^n\Gamma(1+n,-4i\arcsin(ax))}{a^4}\\
&\quad + \frac{4^{-3-n}(i\arcsin(ax))^{-n}\arcsin(ax)^n\Gamma(1+n,4i\arcsin(ax))}{a^4}
\end{aligned}$$

Mathematica [A] (verified)

Time = 0.07 (sec) , antiderivative size = 132, normalized size of antiderivative = 0.79

$$\int x^3 \arcsin(ax)^n\,dx$$
$$= \frac{4^{-3-n}\arcsin(ax)^n\left(\arcsin(ax)^2\right)^{-n}\left(-2^{2+n}(i\arcsin(ax))^n\Gamma(1+n,-2i\arcsin(ax)) - 2^{2+n}(-i\arcsin(ax))^n\Gamma\right.}{a}$$

```
[In] Integrate[x^3*ArcSin[a*x]^n,x]
```

```
[Out] (4^(-3 - n)*ArcSin[a*x]^n*(-(2^(2 + n)*(I*ArcSin[a*x])^n*Gamma[1 + n, (-2*I
)*ArcSin[a*x]]) - 2^(2 + n)*((-I)*ArcSin[a*x])^n*Gamma[1 + n, (2*I)*ArcSin[
a*x]] + (I*ArcSin[a*x])^n*Gamma[1 + n, (-4*I)*ArcSin[a*x]] + ((-I)*ArcSin[a
*x])^n*Gamma[1 + n, (4*I)*ArcSin[a*x]]))/(a^4*(ArcSin[a*x]^2)^n)
```

Maple [F]

$$\int x^3 \arcsin{(ax)}^n \, dx$$

```
[In] int(x^3*arcsin(a*x)^n,x)
[Out] int(x^3*arcsin(a*x)^n,x)
```

Fricas [F]

$$\int x^3 \arcsin(ax)^n \, dx = \int x^3 \arcsin{(ax)}^n \, dx$$

```
[In] integrate(x^3*arcsin(a*x)^n,x, algorithm="fricas")
[Out] integral(x^3*arcsin(a*x)^n, x)
```

Sympy [F]

$$\int x^3 \arcsin(ax)^n \, dx = \int x^3 \operatorname{asin}^n{(ax)} \, dx$$

```
[In] integrate(x**3*asin(a*x)**n,x)
[Out] Integral(x**3*asin(a*x)**n, x)
```

Maxima [F(-2)]

Exception generated.

$$\int x^3 \arcsin(ax)^n \, dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(x^3*arcsin(a*x)^n,x, algorithm="maxima")
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [F]

$$\int x^3 \arcsin(ax)^n \, dx = \int x^3 \arcsin{(ax)}^n \, dx$$

```
[In] integrate(x^3*arcsin(a*x)^n,x, algorithm="giac")
[Out] integrate(x^3*arcsin(a*x)^n, x)
```

Mupad [F(-1)]

Timed out.

$$\int x^3 \arcsin(ax)^n \, dx = \int x^3 \operatorname{asin}(a\,x)^n \, dx$$

```
[In] int(x^3*asin(a*x)^n,x)
[Out] int(x^3*asin(a*x)^n, x)
```

3.131 $\int x^2 \arcsin(ax)^n\,dx$

Optimal result

Integrand size = 10, antiderivative size = 171

$$\int x^2 \arcsin(ax)^n\,dx = -\frac{i(-i\arcsin(ax))^{-n}\arcsin(ax)^n\Gamma(1+n,-i\arcsin(ax))}{8a^3} + \frac{i(i\arcsin(ax))^{-n}\arcsin(ax)^n\Gamma(1+n,i\arcsin(ax))}{8a^3} + \frac{i3^{-1-n}(-i\arcsin(ax))^{-n}\arcsin(ax)^n\Gamma(1+n,-3i\arcsin(ax))}{8a^3} - \frac{i3^{-1-n}(i\arcsin(ax))^{-n}\arcsin(ax)^n\Gamma(1+n,3i\arcsin(ax))}{8a^3}$$

```
[Out] -1/8*I*arcsin(a*x)^n*GAMMA(1+n,-I*arcsin(a*x))/a^3/((-I*arcsin(a*x))^n)+1/8
*I*arcsin(a*x)^n*GAMMA(1+n,I*arcsin(a*x))/a^3/((I*arcsin(a*x))^n)+1/8*I*3^(
-1-n)*arcsin(a*x)^n*GAMMA(1+n,-3*I*arcsin(a*x))/a^3/((-I*arcsin(a*x))^n)-1/
8*I*3^(-1-n)*arcsin(a*x)^n*GAMMA(1+n,3*I*arcsin(a*x))/a^3/((I*arcsin(a*x))^
n)
```

Rubi [A] (verified)

Time = 0.11 (sec) , antiderivative size = 171, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 4, $\frac{\text{number of rules}}{\text{integrand size}} = 0.400$, Rules used = {4731, 4491, 3388, 2212}

$$\int x^2 \arcsin(ax)^n\,dx = -\frac{i\arcsin(ax)^n(-i\arcsin(ax))^{-n}\Gamma(n+1,-i\arcsin(ax))}{8a^3} + \frac{i3^{-n-1}\arcsin(ax)^n(-i\arcsin(ax))^{-n}\Gamma(n+1,-3i\arcsin(ax))}{8a^3} + \frac{i(i\arcsin(ax))^{-n}\arcsin(ax)^n\Gamma(n+1,i\arcsin(ax))}{8a^3} - \frac{i3^{-n-1}(i\arcsin(ax))^{-n}\arcsin(ax)^n\Gamma(n+1,3i\arcsin(ax))}{8a^3}$$

```
[In] Int[x^2*ArcSin[a*x]^n,x]
```

```
[Out] ((-1/8*I)*ArcSin[a*x]^n*Gamma[1 + n, (-I)*ArcSin[a*x]])/(a^3*((-I)*ArcSin[a
*x])^n) + ((I/8)*ArcSin[a*x]^n*Gamma[1 + n, I*ArcSin[a*x]])/(a^3*(I*ArcSin[
a*x])^n) + ((I/8)*3^(-1 - n)*ArcSin[a*x]^n*Gamma[1 + n, (-3*I)*ArcSin[a*x]]
)/(a^3*((-I)*ArcSin[a*x])^n) - ((I/8)*3^(-1 - n)*ArcSin[a*x]^n*Gamma[1 + n,
 (3*I)*ArcSin[a*x]])/(a^3*(I*ArcSin[a*x])^n)
```

Rule 2212

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))*((c_.) + (d_.)*(x_))^(m_), x_Symbol]
:> Simp[(-F^(g*(e - c*(f/d))))*((c + d*x)^FracPart[m]/(d*((-f)*g*(Log[F]/d)
)^(IntPart[m] + 1)*((-f)*g*Log[F]*((c + d*x)/d))^FracPart[m]))*Gamma[m + 1,
 ((-f)*g*(Log[F]/d))*(c + d*x)], x] /; FreeQ[{F, c, d, e, f, g, m}, x] &&
!IntegerQ[m]
```

Rule 3388

```
Int[((c_.) + (d_.)*(x_))^(m_.)*sin[(e_.) + Pi*(k_.) + (f_.)*(x_)], x_Symbol
] :> Dist[I/2, Int[(c + d*x)^m/(E^(I*k*Pi)*E^(I*(e + f*x))), x], x] - Dist[
I/2, Int[(c + d*x)^m*E^(I*k*Pi)*E^(I*(e + f*x)), x], x] /; FreeQ[{c, d, e,
f, m}, x] && IntegerQ[2*k]
```

Rule 4491

```
Int[Cos[(a_.) + (b_.)*(x_)]^(p_.)*((c_.) + (d_.)*(x_))^(m_.)*Sin[(a_.) + (b
_.)*(x_)]^(n_.), x_Symbol] :> Int[ExpandTrigReduce[(c + d*x)^m, Sin[a + b*x
]^n*Cos[a + b*x]^p, x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && IG
tQ[p, 0]
```

Rule 4731

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Dist[1
/(b*c^(m + 1)), Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b], x], x, a +
 b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, n}, x] && IGtQ[m, 0]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= \frac{\text{Subst}\left(\int x^n \cos(x)\sin^2(x)\,dx, x, \arcsin(ax)\right)}{a^3}\\
&= \frac{\text{Subst}\left(\int \left(\frac{1}{4}x^n\cos(x)-\frac{1}{4}x^n\cos(3x)\right)\,dx, x, \arcsin(ax)\right)}{a^3}\\
&= \frac{\text{Subst}\left(\int x^n \cos(x)\,dx, x, \arcsin(ax)\right)}{4a^3}-\frac{\text{Subst}\left(\int x^n \cos(3x)\,dx, x, \arcsin(ax)\right)}{4a^3}
\end{aligned}$$

$$= \frac{\text{Subst}\left(\int e^{-ix}x^n\,dx, x, \arcsin(ax)\right)}{8a^3} + \frac{\text{Subst}\left(\int e^{ix}x^n\,dx, x, \arcsin(ax)\right)}{8a^3} - \frac{\text{Subst}\left(\int e^{-3ix}x^n\,dx, x, \arcsin(ax)\right)}{8a^3} - \frac{\text{Subst}\left(\int e^{3ix}x^n\,dx, x, \arcsin(ax)\right)}{8a^3}$$

$$= -\frac{i(-i\arcsin(ax))^{-n}\arcsin(ax)^n\Gamma(1+n,-i\arcsin(ax))}{8a^3} + \frac{i(i\arcsin(ax))^{-n}\arcsin(ax)^n\Gamma(1+n,i\arcsin(ax))}{8a^3} + \frac{i3^{-1-n}(-i\arcsin(ax))^{-n}\arcsin(ax)^n\Gamma(1+n,-3i\arcsin(ax))}{8a^3} - \frac{i3^{-1-n}(i\arcsin(ax))^{-n}\arcsin(ax)^n\Gamma(1+n,3i\arcsin(ax))}{8a^3}$$

Mathematica [A] (verified)

Time = 0.05 (sec) , antiderivative size = 137, normalized size of antiderivative = 0.80

$$\int x^2\arcsin(ax)^n\,dx$$

$$= \frac{i3^{-1-n}\arcsin(ax)^n\left(\arcsin(ax)^2\right)^{-n}\left(-3^{1+n}(i\arcsin(ax))^n\Gamma(1+n,-i\arcsin(ax)) + 3^{1+n}(-i\arcsin(ax))^n\Gamma\right.}{8}$$

```
[In] Integrate[x^2*ArcSin[a*x]^n,x]
```

```
[Out] ((I/8)*3^(-1 - n)*ArcSin[a*x]^n*(-(3^(1 + n)*(I*ArcSin[a*x])^n*Gamma[1 + n,
 (-I)*ArcSin[a*x]]) + 3^(1 + n)*((-I)*ArcSin[a*x])^n*Gamma[1 + n, I*ArcSin[
a*x]] + (I*ArcSin[a*x])^n*Gamma[1 + n, (-3*I)*ArcSin[a*x]] - ((-I)*ArcSin[a
*x])^n*Gamma[1 + n, (3*I)*ArcSin[a*x]]))/(a^3*(ArcSin[a*x]^2)^n)
```

Maple [F]

$$\int x^2\arcsin(ax)^n\,dx$$

```
[In] int(x^2*arcsin(a*x)^n,x)
```

```
[Out] int(x^2*arcsin(a*x)^n,x)
```

Fricas [F]

$$\int x^2 \arcsin(ax)^n \, dx = \int x^2 \arcsin\left(ax\right)^n \, dx$$

```
[In] integrate(x^2*arcsin(a*x)^n,x, algorithm="fricas")
[Out] integral(x^2*arcsin(a*x)^n, x)
```

Sympy [F]

$$\int x^2 \arcsin(ax)^n \, dx = \int x^2 \operatorname{asin}^n\left(ax\right) dx$$

```
[In] integrate(x**2*asin(a*x)**n,x)
[Out] Integral(x**2*asin(a*x)**n, x)
```

Maxima [F(-2)]

Exception generated.

$$\int x^2 \arcsin(ax)^n \, dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(x^2*arcsin(a*x)^n,x, algorithm="maxima")
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [F]

$$\int x^2 \arcsin(ax)^n \, dx = \int x^2 \arcsin\left(ax\right)^n \, dx$$

```
[In] integrate(x^2*arcsin(a*x)^n,x, algorithm="giac")
[Out] integrate(x^2*arcsin(a*x)^n, x)
```

Mupad [F(-1)]

Timed out.

$$\int x^2 \arcsin(ax)^n \, dx = \int x^2 \operatorname{asin}(a\,x)^n \, dx$$

```
[In] int(x^2*asin(a*x)^n,x)
[Out] int(x^2*asin(a*x)^n, x)
```

3.132 $\int x \arcsin(ax)^n \, dx$

Optimal result

Integrand size = 8, antiderivative size = 85

$$\int x \arcsin(ax)^n \, dx = -\frac{2^{-3-n}(-i\arcsin(ax))^{-n}\arcsin(ax)^n\Gamma(1+n,-2i\arcsin(ax))}{a^2} - \frac{2^{-3-n}(i\arcsin(ax))^{-n}\arcsin(ax)^n\Gamma(1+n,2i\arcsin(ax))}{a^2}$$

```
[Out] -2^(-3-n)*arcsin(a*x)^n*GAMMA(1+n,-2*I*arcsin(a*x))/a^2/((-I*arcsin(a*x))^n
)-2^(-3-n)*arcsin(a*x)^n*GAMMA(1+n,2*I*arcsin(a*x))/a^2/((I*arcsin(a*x))^n)
```

Rubi [A] (verified)

Time = 0.05 (sec) , antiderivative size = 85, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 5, $\frac{\text{number of rules}}{\text{integrand size}} = 0.625$, Rules used = {4731, 4491, 12, 3389, 2212}

$$\int x \arcsin(ax)^n \, dx = -\frac{2^{-n-3}\arcsin(ax)^n(-i\arcsin(ax))^{-n}\Gamma(n+1,-2i\arcsin(ax))}{a^2} - \frac{2^{-n-3}(i\arcsin(ax))^{-n}\arcsin(ax)^n\Gamma(n+1,2i\arcsin(ax))}{a^2}$$

```
[In] Int[x*ArcSin[a*x]^n,x]
```

```
[Out] -((2^(-3 - n)*ArcSin[a*x]^n*Gamma[1 + n, (-2*I)*ArcSin[a*x]])/(a^2*((-I)*Ar
cSin[a*x])^n)) - (2^(-3 - n)*ArcSin[a*x]^n*Gamma[1 + n, (2*I)*ArcSin[a*x]])
/(a^2*(I*ArcSin[a*x])^n)
```

Rule 12

```
Int[(a_)*(u_), x_Symbol] :> Dist[a, Int[u, x], x] /; FreeQ[a, x] && !Match
Q[u, (b_)*(v_) /; FreeQ[b, x]]
```

Rule 2212

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))*((c_.) + (d_.)*(x_))^(m_), x_Symbol]
:> Simp[(-F^(g*(e - c*(f/d))))*((c + d*x)^FracPart[m]/(d*((-f)*g*(Log[F]/d)
)^(IntPart[m] + 1)*((-f)*g*Log[F]*((c + d*x)/d))^FracPart[m]))*Gamma[m + 1,
 ((-f)*g*(Log[F]/d))*(c + d*x)], x] /; FreeQ[{F, c, d, e, f, g, m}, x] &&
!IntegerQ[m]
```

Rule 3389

```
Int[((c_.) + (d_.)*(x_))^(m_.)*sin[(e_.) + (f_.)*(x_)], x_Symbol] :> Dist[I
/2, Int[(c + d*x)^m/E^(I*(e + f*x)), x], x] - Dist[I/2, Int[(c + d*x)^m*E^(
I*(e + f*x)), x], x] /; FreeQ[{c, d, e, f, m}, x]
```

Rule 4491

```
Int[Cos[(a_.) + (b_.)*(x_)]^(p_.)*((c_.) + (d_.)*(x_))^(m_.)*Sin[(a_.) + (b
_.)*(x_)]^(n_.), x_Symbol] :> Int[ExpandTrigReduce[(c + d*x)^m, Sin[a + b*x
]^n*Cos[a + b*x]^p, x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && IG
tQ[p, 0]
```

Rule 4731

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Dist[1
/(b*c^(m + 1)), Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b], x], x, a +
 b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, n}, x] && IGtQ[m, 0]
```

Rubi steps

$$
\begin{aligned}
\text{integral} &= \frac{\text{Subst}\left(\int x^n \cos(x)\sin(x)\,dx, x, \arcsin(ax)\right)}{a^2}\\
&= \frac{\text{Subst}\left(\int \frac{1}{2}x^n \sin(2x)\,dx, x, \arcsin(ax)\right)}{a^2}\\
&= \frac{\text{Subst}\left(\int x^n \sin(2x)\,dx, x, \arcsin(ax)\right)}{2a^2}\\
&= \frac{i\text{Subst}\left(\int e^{-2ix}x^n\,dx, x, \arcsin(ax)\right)}{4a^2} - \frac{i\text{Subst}\left(\int e^{2ix}x^n\,dx, x, \arcsin(ax)\right)}{4a^2}\\
&= -\frac{2^{-3-n}(-i\arcsin(ax))^{-n}\arcsin(ax)^n\Gamma(1+n,-2i\arcsin(ax))}{a^2}\\
&\quad - \frac{2^{-3-n}(i\arcsin(ax))^{-n}\arcsin(ax)^n\Gamma(1+n,2i\arcsin(ax))}{a^2}
\end{aligned}
$$

Mathematica [A] (verified)

Time = 0.02 (sec) , antiderivative size = 75, normalized size of antiderivative = 0.88

$$\int x \arcsin(ax)^n \, dx =$$
$$-\frac{2^{-3-n} \arcsin(ax)^n \left(\arcsin(ax)^2\right)^{-n} \left((i \arcsin(ax))^n \Gamma(1+n, -2i \arcsin(ax)) + (-i \arcsin(ax))^n \Gamma(1+n, 2\right.}{a^2}$$

```
[In] Integrate[x*ArcSin[a*x]^n,x]
[Out] -((2^(-3 - n)*ArcSin[a*x]^n*((I*ArcSin[a*x])^n*Gamma[1 + n, (-2*I)*ArcSin[a
*x]] + ((-I)*ArcSin[a*x])^n*Gamma[1 + n, (2*I)*ArcSin[a*x]]))/(a^2*(ArcSin[
a*x]^2)^n))
```

Maple [C] (verified)

Result contains higher order function than in optimal. Order 9 vs. order 4.

Time = 0.12 (sec) , antiderivative size = 138, normalized size of antiderivative = 1.62

method	result
default	$\frac{\sqrt{\pi}\left(\frac{2 \arcsin(ax)^{1+n} \sin(2 \arcsin(ax))}{\sqrt{\pi}\,(2+n)} - \frac{2^{\frac{1}{2}-n} \sqrt{\arcsin(ax)}\ \mathrm{LommelS1}\left(n+\frac{3}{2}, \frac{3}{2}, 2 \arcsin(ax)\right) \sin(2 \arcsin(ax))}{\sqrt{\pi}\,(2+n)} - \frac{3\, 2^{-\frac{3}{2}-n} \left(\frac{4}{3}+\frac{2n}{3}\right)(2 \arcsin(ax) \cos}{}\right.}{4a^2}$

```
[In] int(x*arcsin(a*x)^n,x,method=_RETURNVERBOSE)
[Out] 1/4*Pi^(1/2)/a^2*(2/Pi^(1/2)/(2+n)*arcsin(a*x)^(1+n)*sin(2*arcsin(a*x))-2^(
1/2-n)/Pi^(1/2)/(2+n)*arcsin(a*x)^(1/2)*LommelS1(n+3/2,3/2,2*arcsin(a*x))*s
in(2*arcsin(a*x))-3*2^(-3/2-n)/Pi^(1/2)/(2+n)/arcsin(a*x)^(1/2)*(4/3+2/3*n)
*(2*arcsin(a*x)*cos(2*arcsin(a*x))-sin(2*arcsin(a*x)))*LommelS1(n+1/2,1/2,2
*arcsin(a*x)))
```

Fricas [F]

$$\int x \arcsin(ax)^n \, dx = \int x \arcsin(ax)^n \, dx$$

```
[In] integrate(x*arcsin(a*x)^n,x, algorithm="fricas")
[Out] integral(x*arcsin(a*x)^n, x)
```

Sympy [F]

$$\int x \arcsin(ax)^n \, dx = \int x \operatorname{asin}^n (ax) \, dx$$

```
[In] integrate(x*asin(a*x)**n,x)
[Out] Integral(x*asin(a*x)**n, x)
```

Maxima [F(-2)]

Exception generated.

$$\int x \arcsin(ax)^n \, dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(x*arcsin(a*x)^n,x, algorithm="maxima")
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [F]

$$\int x \arcsin(ax)^n \, dx = \int x \arcsin(ax)^n \, dx$$

```
[In] integrate(x*arcsin(a*x)^n,x, algorithm="giac")
[Out] integrate(x*arcsin(a*x)^n, x)
```

Mupad [F(-1)]

Timed out.

$$\int x \arcsin(ax)^n \, dx = \int x \operatorname{asin}(a\,x)^n \, dx$$

```
[In] int(x*asin(a*x)^n,x)
[Out] int(x*asin(a*x)^n, x)
```

3.133 $\int \arcsin(ax)^n\,dx$

Optimal result

Integrand size = 6, antiderivative size = 79

$$\int \arcsin(ax)^n\,dx = -\frac{i(-i\arcsin(ax))^{-n}\arcsin(ax)^n\Gamma(1+n,-i\arcsin(ax))}{2a} + \frac{i(i\arcsin(ax))^{-n}\arcsin(ax)^n\Gamma(1+n,i\arcsin(ax))}{2a}$$

```
[Out] -1/2*I*arcsin(a*x)^n*GAMMA(1+n,-I*arcsin(a*x))/a/((-I*arcsin(a*x))^n)+1/2*I
*arcsin(a*x)^n*GAMMA(1+n,I*arcsin(a*x))/a/((I*arcsin(a*x))^n)
```

Rubi [A] (verified)

Time = 0.04 (sec) , antiderivative size = 79, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {4719, 3388, 2212}

$$\int \arcsin(ax)^n\,dx = \frac{i(i\arcsin(ax))^{-n}\arcsin(ax)^n\Gamma(n+1,i\arcsin(ax))}{2a} - \frac{i(-i\arcsin(ax))^{-n}\arcsin(ax)^n\Gamma(n+1,-i\arcsin(ax))}{2a}$$

```
[In] Int[ArcSin[a*x]^n,x]
```

```
[Out] ((-1/2*I)*ArcSin[a*x]^n*Gamma[1 + n, (-I)*ArcSin[a*x]])/(a*((-I)*ArcSin[a*x
])^n) + ((I/2)*ArcSin[a*x]^n*Gamma[1 + n, I*ArcSin[a*x]])/(a*(I*ArcSin[a*x]
)^n)
```

<u>Rule 2212</u>

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))*((c_.) + (d_.)*(x_))^(m_), x_Symbol]
:> Simp[(-F^(g*(e - c*(f/d))))*((c + d*x)^FracPart[m]/(d*((-f)*g*(Log[F]/d)
```

```
)^(IntPart[m] + 1)*((-f)*g*Log[F]*((c + d*x)/d))^FracPart[m]))*Gamma[m + 1,
 ((-f)*g*(Log[F]/d))*(c + d*x)], x] /; FreeQ[{F, c, d, e, f, g, m}, x] &&
!IntegerQ[m]
```

Rule 3388

```
Int[((c_.) + (d_.)*(x_))^(m_.)*sin[(e_.) + Pi*(k_.) + (f_.)*(x_)], x_Symbol
] :> Dist[I/2, Int[(c + d*x)^m/(E^(I*k*Pi)*E^(I*(e + f*x))), x], x] - Dist[
I/2, Int[(c + d*x)^m*E^(I*k*Pi)*E^(I*(e + f*x)), x], x] /; FreeQ[{c, d, e,
f, m}, x] && IntegerQ[2*k]
```

Rule 4719

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_), x_Symbol] :> Dist[1/(b*c), Sub
st[Int[x^n*Cos[-a/b + x/b], x], x, a + b*ArcSin[c*x]], x] /; FreeQ[{a, b, c
, n}, x]
```

Rubi steps

$$
\begin{aligned}
\text{integral} &= \frac{\operatorname{Subst}\left(\int x^n \cos(x)\,dx, x, \arcsin(ax)\right)}{a} \\
&= \frac{\operatorname{Subst}\left(\int e^{-ix} x^n\,dx, x, \arcsin(ax)\right)}{2a} + \frac{\operatorname{Subst}\left(\int e^{ix} x^n\,dx, x, \arcsin(ax)\right)}{2a} \\
&= -\frac{i(-i\arcsin(ax))^{-n}\arcsin(ax)^n\Gamma(1+n, -i\arcsin(ax))}{2a} \\
&\quad + \frac{i(i\arcsin(ax))^{-n}\arcsin(ax)^n\Gamma(1+n, i\arcsin(ax))}{2a}
\end{aligned}
$$

Mathematica [A] (verified)

Time = 0.04 (sec) , antiderivative size = 73, normalized size of antiderivative = 0.92

$$
\int \arcsin(ax)^n\,dx
= \frac{i\arcsin(ax)^n\left(\arcsin(ax)^2\right)^{-n}\left(-(i\arcsin(ax))^n\Gamma(1+n, -i\arcsin(ax)) + (-i\arcsin(ax))^n\Gamma(1+n, i\arcsi\right.}{2a}
$$

```
[In] Integrate[ArcSin[a*x]^n,x]
```

```
[Out] ((I/2)*ArcSin[a*x]^n*(-((I*ArcSin[a*x])^n*Gamma[1 + n, (-I)*ArcSin[a*x]]) +
 ((-I)*ArcSin[a*x])^n*Gamma[1 + n, I*ArcSin[a*x]]))/(a*(ArcSin[a*x]^2)^n)
```

Maple [C] (verified)

Result contains higher order function than in optimal. Order 9 vs. order 4.

Time = 0.07 (sec) , antiderivative size = 240, normalized size of antiderivative = 3.04

method	result
default	$\frac{2^{n}\sqrt{\pi}\left(\frac{2^{-1-n}\arcsin(ax)^{n}(6+2n)ax}{\sqrt{\pi}\,(1+n)(3+n)}+\frac{\arcsin(ax)^{n}2^{-n}\sqrt{-a^{2}x^{2}+1}\,\left(a^{2}x^{2}\arcsin(ax)-\arcsin(ax)+ax\sqrt{-a^{2}x^{2}+1}\right)}{\sqrt{\pi}\,(1+n)\left(a^{2}x^{2}-1\right)}+\frac{2^{-n}\sqrt{\arcsin(ax)}\,n\,\mathrm{LommelS1}(\cdots}{\sqrt{\pi}\,(1+n\cdots}\right.}{a}$

```
[In] int(arcsin(a*x)^n,x,method=_RETURNVERBOSE)
```

```
[Out] 2^n*Pi^(1/2)/a*(2^(-1-n)/Pi^(1/2)/(1+n)*arcsin(a*x)^n*(6+2*n)/(3+n)*a*x+1/P
i^(1/2)/(1+n)*arcsin(a*x)^n*2^(-n)*(-a^2*x^2+1)^(1/2)/(a^2*x^2-1)*(a^2*x^2*
arcsin(a*x)-arcsin(a*x)+a*x*(-a^2*x^2+1)^(1/2))+2^(-n)/Pi^(1/2)/(1+n)*arcsi
n(a*x)^(1/2)*n*LommelS1(n+1/2,3/2,arcsin(a*x))*a*x-2^(-n)/Pi^(1/2)/(1+n)/ar
csin(a*x)^(1/2)*(-a^2*x^2+1)^(1/2)/(a^2*x^2-1)*(a^2*x^2*arcsin(a*x)-arcsin(
a*x)+a*x*(-a^2*x^2+1)^(1/2))*LommelS1(n+3/2,1/2,arcsin(a*x)))
```

Fricas [F]

$$\int \arcsin(ax)^n\,dx = \int \arcsin\left(ax\right)^{n}\,dx$$

```
[In] integrate(arcsin(a*x)^n,x, algorithm="fricas")
```

```
[Out] integral(arcsin(a*x)^n, x)
```

Sympy [F]

$$\int \arcsin(ax)^n\,dx = \int \operatorname{asin}^{n}\left(ax\right)dx$$

```
[In] integrate(asin(a*x)**n,x)
```

```
[Out] Integral(asin(a*x)**n, x)
```

Maxima [F(-2)]

Exception generated.

$$\int \arcsin(ax)^n\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(arcsin(a*x)^n,x, algorithm="maxima")
```

```
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [F]

$$\int \arcsin(ax)^n\,dx = \int \arcsin\left(ax\right)^n\,dx$$

```
[In] integrate(arcsin(a*x)^n,x, algorithm="giac")
```

```
[Out] integrate(arcsin(a*x)^n, x)
```

Mupad [F(-1)]

Timed out.

$$\int \arcsin(ax)^n\,dx = \int \mathrm{asin}(a\,x)^n\,dx$$

```
[In] int(asin(a*x)^n,x)
```

```
[Out] int(asin(a*x)^n, x)
```

3.134 $\int \frac{\arcsin(ax)^n}{x} \, dx$

Optimal result

Integrand size = 10, antiderivative size = 10

$$\int \frac{\arcsin(ax)^n}{x} \, dx = \text{Int}\left(\frac{\arcsin(ax)^n}{x}, x\right)$$

```
[Out] Unintegrable(arcsin(a*x)^n/x,x)
```

Rubi [N/A]

Not integrable

Time = 0.01 (sec) , antiderivative size = 10, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\arcsin(ax)^n}{x} \, dx = \int \frac{\arcsin(ax)^n}{x} \, dx$$

```
[In] Int[ArcSin[a*x]^n/x,x]
```

```
[Out] Defer[Int][ArcSin[a*x]^n/x, x]
```

Rubi steps

$$\text{integral} = \int \frac{\arcsin(ax)^n}{x} \, dx$$

Mathematica [N/A]

Not integrable

Time = 0.25 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.20

$$\int \frac{\arcsin(ax)^n}{x} \, dx = \int \frac{\arcsin(ax)^n}{x} \, dx$$

```
[In] Integrate[ArcSin[a*x]^n/x,x]
[Out] Integrate[ArcSin[a*x]^n/x, x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.07 (sec) , antiderivative size = 10, normalized size of antiderivative = 1.00

$$\int \frac{\arcsin{(ax)}^n}{x}dx$$

```
[In] int(arcsin(a*x)^n/x,x)
[Out] int(arcsin(a*x)^n/x,x)
```

Fricas [N/A]

Not integrable

Time = 0.26 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.20

$$\int \frac{\arcsin(ax)^n}{x} \, dx = \int \frac{\arcsin{(ax)}^n}{x} \, dx$$

```
[In] integrate(arcsin(a*x)^n/x,x, algorithm="fricas")
[Out] integral(arcsin(a*x)^n/x, x)
```

Sympy [N/A]

Not integrable

Time = 0.37 (sec) , antiderivative size = 8, normalized size of antiderivative = 0.80

$$\int \frac{\arcsin(ax)^n}{x} \, dx = \int \frac{\operatorname{asin}^n{(ax)}}{x} \, dx$$

```
[In] integrate(asin(a*x)**n/x,x)
[Out] Integral(asin(a*x)**n/x, x)
```

Maxima [F(-2)]

Exception generated.

$$\int \frac{\arcsin(ax)^n}{x} \, dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(arcsin(a*x)^n/x,x, algorithm="maxima")
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [N/A]

Not integrable

Time = 0.32 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.20

$$\int \frac{\arcsin(ax)^n}{x} \, dx = \int \frac{\arcsin(ax)^n}{x} \, dx$$

```
[In] integrate(arcsin(a*x)^n/x,x, algorithm="giac")
[Out] integrate(arcsin(a*x)^n/x, x)
```

Mupad [N/A]

Not integrable

Time = 0.09 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.20

$$\int \frac{\arcsin(ax)^n}{x} \, dx = \int \frac{\mathrm{asin}(a\,x)^n}{x} \, dx$$

```
[In] int(asin(a*x)^n/x,x)
[Out] int(asin(a*x)^n/x, x)
```

3.135 $\int \frac{\arcsin(ax)^n}{x^2} dx$

Optimal result

Integrand size = 10, antiderivative size = 10

$$\int \frac{\arcsin(ax)^n}{x^2} dx = \text{Int}\left(\frac{\arcsin(ax)^n}{x^2}, x\right)$$

```
[Out] Unintegrable(arcsin(a*x)^n/x^2,x)
```

Rubi [N/A]

Not integrable

Time = 0.01 (sec) , antiderivative size = 10, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}} = 0.000$, Rules used = {}

$$\int \frac{\arcsin(ax)^n}{x^2} dx = \int \frac{\arcsin(ax)^n}{x^2} dx$$

```
[In] Int[ArcSin[a*x]^n/x^2,x]
```

```
[Out] Defer[Int][ArcSin[a*x]^n/x^2, x]
```

Rubi steps

$$\text{integral} = \int \frac{\arcsin(ax)^n}{x^2} dx$$

Mathematica [N/A]

Not integrable

Time = 0.55 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.20

$$\int \frac{\arcsin(ax)^n}{x^2}\,dx = \int \frac{\arcsin(ax)^n}{x^2}\,dx$$

```
[In] Integrate[ArcSin[a*x]^n/x^2,x]
[Out] Integrate[ArcSin[a*x]^n/x^2, x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.05 (sec) , antiderivative size = 10, normalized size of antiderivative = 1.00

$$\int \frac{\arcsin\left(a x\right)^{n}}{x^{2}}d x$$

```
[In] int(arcsin(a*x)^n/x^2,x)
[Out] int(arcsin(a*x)^n/x^2,x)
```

Fricas [N/A]

Not integrable

Time = 0.25 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.20

$$\int \frac{\arcsin(ax)^n}{x^2}\,dx = \int \frac{\arcsin\left(ax\right)^{n}}{x^{2}}\,dx$$

```
[In] integrate(arcsin(a*x)^n/x^2,x, algorithm="fricas")
[Out] integral(arcsin(a*x)^n/x^2, x)
```

Sympy [N/A]

Not integrable

Time = 0.54 (sec) , antiderivative size = 10, normalized size of antiderivative = 1.00

$$\int \frac{\arcsin(ax)^n}{x^2}\,dx = \int \frac{\operatorname{asin}^{n}\left(ax\right)}{x^{2}}\,dx$$

```
[In] integrate(asin(a*x)**n/x**2,x)
[Out] Integral(asin(a*x)**n/x**2, x)
```

Maxima [F(-2)]

Exception generated.

$$\int \frac{\arcsin(ax)^n}{x^2}\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(arcsin(a*x)^n/x^2,x, algorithm="maxima")
```

```
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [N/A]

Not integrable

Time = 0.32 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.20

$$\int \frac{\arcsin(ax)^n}{x^2}\,dx = \int \frac{\arcsin{(ax)}^n}{x^2}\,dx$$

```
[In] integrate(arcsin(a*x)^n/x^2,x, algorithm="giac")
```

```
[Out] integrate(arcsin(a*x)^n/x^2, x)
```

Mupad [N/A]

Not integrable

Time = 0.08 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.20

$$\int \frac{\arcsin(ax)^n}{x^2}\,dx = \int \frac{\mathrm{asin}(a\,x)^n}{x^2}\,dx$$

```
[In] int(asin(a*x)^n/x^2,x)
```

```
[Out] int(asin(a*x)^n/x^2, x)
```

3.136 $\int (bx)^{3/2} \arcsin(ax)^n \, dx$

Optimal result

Integrand size = 14, antiderivative size = 14

$$\int (bx)^{3/2} \arcsin(ax)^n \, dx = \operatorname{Int}\left((bx)^{3/2} \arcsin(ax)^n, x\right)$$

```
[Out] Unintegrable((b*x)^(3/2)*arcsin(a*x)^n,x)
```

Rubi [N/A]

Not integrable

Time = 0.01 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}} = 0.000$, Rules used = {}

$$\int (bx)^{3/2} \arcsin(ax)^n \, dx = \int (bx)^{3/2} \arcsin(ax)^n \, dx$$

```
[In] Int[(b*x)^(3/2)*ArcSin[a*x]^n,x]
```

```
[Out] Defer[Int][(b*x)^(3/2)*ArcSin[a*x]^n, x]
```

Rubi steps

$$\text{integral} = \int (bx)^{3/2} \arcsin(ax)^n \, dx$$

Mathematica [N/A]

Not integrable

Time = 1.96 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.14

$$\int (bx)^{3/2} \arcsin(ax)^n \, dx = \int (bx)^{3/2} \arcsin(ax)^n \, dx$$

```
[In] Integrate[(b*x)^(3/2)*ArcSin[a*x]^n,x]
[Out] Integrate[(b*x)^(3/2)*ArcSin[a*x]^n, x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.08 (sec) , antiderivative size = 12, normalized size of antiderivative = 0.86

$$\int (bx)^{\frac{3}{2}} \arcsin (ax)^n \, dx$$

```
[In] int((b*x)^(3/2)*arcsin(a*x)^n,x)
[Out] int((b*x)^(3/2)*arcsin(a*x)^n,x)
```

Fricas [N/A]

Not integrable

Time = 0.25 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.14

$$\int (bx)^{3/2} \arcsin(ax)^n \, dx = \int (bx)^{\frac{3}{2}} \arcsin (ax)^n \, dx$$

```
[In] integrate((b*x)^(3/2)*arcsin(a*x)^n,x, algorithm="fricas")
[Out] integral(sqrt(b*x)*b*x*arcsin(a*x)^n, x)
```

Sympy [N/A]

Not integrable

Time = 151.12 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00

$$\int (bx)^{3/2} \arcsin(ax)^n \, dx = \int (bx)^{\frac{3}{2}} \operatorname{asin}^n (ax) \, dx$$

```
[In] integrate((b*x)**(3/2)*asin(a*x)**n,x)
[Out] Integral((b*x)**(3/2)*asin(a*x)**n, x)
```

Maxima [F(-2)]

Exception generated.

$$\int (bx)^{3/2} \arcsin(ax)^n \, dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate((b*x)^(3/2)*arcsin(a*x)^n,x, algorithm="maxima")
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [N/A]

Not integrable

Time = 0.56 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00

$$\int (bx)^{3/2} \arcsin(ax)^n \, dx = \int (bx)^{\frac{3}{2}} \arcsin(ax)^n \, dx$$

```
[In] integrate((b*x)^(3/2)*arcsin(a*x)^n,x, algorithm="giac")
[Out] integrate((b*x)^(3/2)*arcsin(a*x)^n, x)
```

Mupad [N/A]

Not integrable

Time = 0.09 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00

$$\int (bx)^{3/2} \arcsin(ax)^n \, dx = \int \mathrm{asin}(a\,x)^n\,(b\,x)^{3/2} \, dx$$

```
[In] int(asin(a*x)^n*(b*x)^(3/2),x)
[Out] int(asin(a*x)^n*(b*x)^(3/2), x)
```

3.137 $\int \sqrt{bx} \arcsin(ax)^n \, dx$

Optimal result

Integrand size = 14, antiderivative size = 14

$$\int \sqrt{bx} \arcsin(ax)^n \, dx = \text{Int}\left(\sqrt{bx} \arcsin(ax)^n, x\right)$$

```
[Out] Unintegrable((b*x)^(1/2)*arcsin(a*x)^n,x)
```

Rubi [N/A]

Not integrable

Time = 0.01 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}} = 0.000$, Rules used = {}

$$\int \sqrt{bx} \arcsin(ax)^n \, dx = \int \sqrt{bx} \arcsin(ax)^n \, dx$$

```
[In] Int[Sqrt[b*x]*ArcSin[a*x]^n,x]
[Out] Defer[Int][Sqrt[b*x]*ArcSin[a*x]^n, x]
```

Rubi steps

$$\text{integral} = \int \sqrt{bx} \arcsin(ax)^n \, dx$$

Mathematica [N/A]

Not integrable

Time = 3.01 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.14

$$\int \sqrt{bx} \arcsin(ax)^n \, dx = \int \sqrt{bx} \arcsin(ax)^n \, dx$$

```
[In] Integrate[Sqrt[b*x]*ArcSin[a*x]^n,x]
[Out] Integrate[Sqrt[b*x]*ArcSin[a*x]^n, x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.06 (sec) , antiderivative size = 12, normalized size of antiderivative = 0.86

$$\int \sqrt{bx} \arcsin(ax)^n \, dx$$

```
[In] int((b*x)^(1/2)*arcsin(a*x)^n,x)
[Out] int((b*x)^(1/2)*arcsin(a*x)^n,x)
```

Fricas [N/A]

Not integrable

Time = 0.25 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00

$$\int \sqrt{bx} \arcsin(ax)^n \, dx = \int \sqrt{bx} \arcsin(ax)^n \, dx$$

```
[In] integrate((b*x)^(1/2)*arcsin(a*x)^n,x, algorithm="fricas")
[Out] integral(sqrt(b*x)*arcsin(a*x)^n, x)
```

Sympy [N/A]

Not integrable

Time = 3.53 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00

$$\int \sqrt{bx} \arcsin(ax)^n \, dx = \int \sqrt{bx} \operatorname{asin}^n(ax) \, dx$$

```
[In] integrate((b*x)**(1/2)*asin(a*x)**n,x)
[Out] Integral(sqrt(b*x)*asin(a*x)**n, x)
```

Maxima [F(-2)]

Exception generated.

$$\int \sqrt{bx} \arcsin(ax)^n \, dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate((b*x)^(1/2)*arcsin(a*x)^n,x, algorithm="maxima")
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [N/A]

Not integrable

Time = 0.57 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00

$$\int \sqrt{bx} \arcsin(ax)^n \, dx = \int \sqrt{bx} \arcsin(ax)^n \, dx$$

```
[In] integrate((b*x)^(1/2)*arcsin(a*x)^n,x, algorithm="giac")
[Out] integrate(sqrt(b*x)*arcsin(a*x)^n, x)
```

Mupad [N/A]

Not integrable

Time = 0.09 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00

$$\int \sqrt{bx} \arcsin(ax)^n \, dx = \int \operatorname{asin}(a\,x)^n\,\sqrt{b\,x} \, dx$$

```
[In] int(asin(a*x)^n*(b*x)^(1/2),x)
[Out] int(asin(a*x)^n*(b*x)^(1/2), x)
```

3.138 $\int \frac{\arcsin(ax)^n}{\sqrt{bx}}\,dx$

Optimal result

Integrand size = 14, antiderivative size = 14

$$\int \frac{\arcsin(ax)^n}{\sqrt{bx}}\,dx = \text{Int}\left(\frac{\arcsin(ax)^n}{\sqrt{bx}},x\right)$$

```
[Out] Unintegrable(arcsin(a*x)^n/(b*x)^(1/2),x)
```

Rubi [N/A]

Not integrable

Time = 0.01 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\arcsin(ax)^n}{\sqrt{bx}}\,dx = \int \frac{\arcsin(ax)^n}{\sqrt{bx}}\,dx$$

```
[In] Int[ArcSin[a*x]^n/Sqrt[b*x],x]
[Out] Defer[Int][ArcSin[a*x]^n/Sqrt[b*x], x]
```

Rubi steps

$$\text{integral} = \int \frac{\arcsin(ax)^n}{\sqrt{bx}}\,dx$$

Mathematica [N/A]

Not integrable

Time = 1.26 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.14

$$\int \frac{\arcsin(ax)^n}{\sqrt{bx}}\,dx = \int \frac{\arcsin(ax)^n}{\sqrt{bx}}\,dx$$

```
[In] Integrate[ArcSin[a*x]^n/Sqrt[b*x],x]
[Out] Integrate[ArcSin[a*x]^n/Sqrt[b*x], x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.06 (sec) , antiderivative size = 12, normalized size of antiderivative = 0.86

$$\int \frac{\arcsin\left(ax\right)^n}{\sqrt{bx}}dx$$

```
[In] int(arcsin(a*x)^n/(b*x)^(1/2),x)
[Out] int(arcsin(a*x)^n/(b*x)^(1/2),x)
```

Fricas [N/A]

Not integrable

Time = 0.28 (sec) , antiderivative size = 20, normalized size of antiderivative = 1.43

$$\int \frac{\arcsin(ax)^n}{\sqrt{bx}}\,dx = \int \frac{\arcsin\left(ax\right)^n}{\sqrt{bx}}\,dx$$

```
[In] integrate(arcsin(a*x)^n/(b*x)^(1/2),x, algorithm="fricas")
[Out] integral(sqrt(b*x)*arcsin(a*x)^n/(b*x), x)
```

Sympy [N/A]

Not integrable

Time = 1.52 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00

$$\int \frac{\arcsin(ax)^n}{\sqrt{bx}}\,dx = \int \frac{\operatorname{asin}^n\left(ax\right)}{\sqrt{bx}}\,dx$$

```
[In] integrate(asin(a*x)**n/(b*x)**(1/2),x)
[Out] Integral(asin(a*x)**n/sqrt(b*x), x)
```

Maxima [F(-2)]

Exception generated.

$$\int \frac{\arcsin(ax)^n}{\sqrt{bx}}\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(arcsin(a*x)^n/(b*x)^(1/2),x, algorithm="maxima")
```

```
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [N/A]

Not integrable

Time = 0.45 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00

$$\int \frac{\arcsin(ax)^n}{\sqrt{bx}}\,dx = \int \frac{\arcsin(ax)^n}{\sqrt{bx}}\,dx$$

```
[In] integrate(arcsin(a*x)^n/(b*x)^(1/2),x, algorithm="giac")
```

```
[Out] integrate(arcsin(a*x)^n/sqrt(b*x), x)
```

Mupad [N/A]

Not integrable

Time = 0.09 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00

$$\int \frac{\arcsin(ax)^n}{\sqrt{bx}}\,dx = \int \frac{\mathrm{asin}(a\,x)^n}{\sqrt{b\,x}}\,dx$$

```
[In] int(asin(a*x)^n/(b*x)^(1/2),x)
```

```
[Out] int(asin(a*x)^n/(b*x)^(1/2), x)
```

3.139 $\int \frac{\arcsin(ax)^n}{(bx)^{3/2}} dx$

Optimal result

Integrand size = 14, antiderivative size = 14

$$\int \frac{\arcsin(ax)^n}{(bx)^{3/2}} dx = \text{Int}\left(\frac{\arcsin(ax)^n}{(bx)^{3/2}}, x\right)$$

```
[Out] Unintegrable(arcsin(a*x)^n/(b*x)^(3/2),x)
```

Rubi [N/A]

Not integrable

Time = 0.01 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\arcsin(ax)^n}{(bx)^{3/2}} dx = \int \frac{\arcsin(ax)^n}{(bx)^{3/2}} dx$$

```
[In] Int[ArcSin[a*x]^n/(b*x)^(3/2),x]
[Out] Defer[Int][ArcSin[a*x]^n/(b*x)^(3/2), x]
```

Rubi steps

$$\text{integral} = \int \frac{\arcsin(ax)^n}{(bx)^{3/2}} dx$$

Mathematica [N/A]

Not integrable

Time = 1.14 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.14

$$\int \frac{\arcsin(ax)^n}{(bx)^{3/2}}\,dx = \int \frac{\arcsin(ax)^n}{(bx)^{3/2}}\,dx$$

```
[In] Integrate[ArcSin[a*x]^n/(b*x)^(3/2),x]
[Out] Integrate[ArcSin[a*x]^n/(b*x)^(3/2), x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.06 (sec) , antiderivative size = 12, normalized size of antiderivative = 0.86

$$\int \frac{\arcsin(ax)^n}{(bx)^{\frac{3}{2}}}dx$$

```
[In] int(arcsin(a*x)^n/(b*x)^(3/2),x)
[Out] int(arcsin(a*x)^n/(b*x)^(3/2),x)
```

Fricas [N/A]

Not integrable

Time = 0.26 (sec) , antiderivative size = 20, normalized size of antiderivative = 1.43

$$\int \frac{\arcsin(ax)^n}{(bx)^{3/2}}\,dx = \int \frac{\arcsin(ax)^n}{(bx)^{\frac{3}{2}}}\,dx$$

```
[In] integrate(arcsin(a*x)^n/(b*x)^(3/2),x, algorithm="fricas")
[Out] integral(sqrt(b*x)*arcsin(a*x)^n/(b^2*x^2), x)
```

Sympy [N/A]

Not integrable

Time = 12.30 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00

$$\int \frac{\arcsin(ax)^n}{(bx)^{3/2}}\,dx = \int \frac{\operatorname{asin}^n(ax)}{(bx)^{\frac{3}{2}}}\,dx$$

```
[In] integrate(asin(a*x)**n/(b*x)**(3/2),x)
[Out] Integral(asin(a*x)**n/(b*x)**(3/2), x)
```

Maxima [F(-2)]

Exception generated.

$$\int \frac{\arcsin(ax)^n}{(bx)^{3/2}} dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(arcsin(a*x)^n/(b*x)^(3/2),x, algorithm="maxima")
```

```
[Out] Exception raised: RuntimeError >> ECL says: expt: undefined: 0 to a negativ
e exponent.
```

Giac [N/A]

Not integrable

Time = 0.48 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00

$$\int \frac{\arcsin(ax)^n}{(bx)^{3/2}} dx = \int \frac{\arcsin(ax)^n}{(bx)^{\frac{3}{2}}} dx$$

```
[In] integrate(arcsin(a*x)^n/(b*x)^(3/2),x, algorithm="giac")
```

```
[Out] integrate(arcsin(a*x)^n/(b*x)^(3/2), x)
```

Mupad [N/A]

Not integrable

Time = 0.09 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00

$$\int \frac{\arcsin(ax)^n}{(bx)^{3/2}} dx = \int \frac{\mathrm{asin}(a\,x)^n}{(b\,x)^{3/2}} dx$$

```
[In] int(asin(a*x)^n/(b*x)^(3/2),x)
```

```
[Out] int(asin(a*x)^n/(b*x)^(3/2), x)
```

3.140 $\int x^3(a+b\arcsin(cx))\,dx$

Optimal result

Integrand size = 12, antiderivative size = 76

$$\int x^3(a+b\arcsin(cx))\,dx = \frac{3bx\sqrt{1-c^2x^2}}{32c^3}+\frac{bx^3\sqrt{1-c^2x^2}}{16c}-\frac{3b\arcsin(cx)}{32c^4}+\frac{1}{4}x^4(a+b\arcsin(cx))$$

```
[Out] -3/32*b*arcsin(c*x)/c^4+1/4*x^4*(a+b*arcsin(c*x))+3/32*b*x*(-c^2*x^2+1)^(1/
2)/c^3+1/16*b*x^3*(-c^2*x^2+1)^(1/2)/c
```

Rubi [A] (verified)

Time = 0.02 (sec) , antiderivative size = 76, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.250, Rules used = {4723, 327, 222}

$$\int x^3(a+b\arcsin(cx))\,dx = \frac{1}{4}x^4(a+b\arcsin(cx))-\frac{3b\arcsin(cx)}{32c^4}+\frac{bx^3\sqrt{1-c^2x^2}}{16c}+\frac{3bx\sqrt{1-c^2x^2}}{32c^3}$$

```
[In] Int[x^3*(a + b*ArcSin[c*x]),x]
```

```
[Out] (3*b*x*Sqrt[1 - c^2*x^2])/(32*c^3) + (b*x^3*Sqrt[1 - c^2*x^2])/(16*c) - (3*
b*ArcSin[c*x])/(32*c^4) + (x^4*(a + b*ArcSin[c*x]))/4
```

Rule 222

```
Int[1/Sqrt[(a_) + (b_.)*(x_)^2], x_Symbol] :> Simp[ArcSin[Rt[-b, 2]*(x/Sqrt
[a])]/Rt[-b, 2], x] /; FreeQ[{a, b}, x] && GtQ[a, 0] && NegQ[b]
```

Rule 327

```
Int[((c_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[c^(n
 - 1)*(c*x)^(m - n + 1)*((a + b*x^n)^(p + 1)/(b*(m + n*p + 1))), x] - Dist[
a*c^n*((m - n + 1)/(b*(m + n*p + 1))), Int[(c*x)^(m - n)*(a + b*x^n)^p, x],
 x] /; FreeQ[{a, b, c, p}, x] && IGtQ[n, 0] && GtQ[m, n - 1] && NeQ[m + n*p
 + 1, 0] && IntBinomialQ[a, b, c, n, m, p, x]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rubi steps

$$
\begin{aligned}
\text{integral} &= \frac{1}{4}x^4(a+b\arcsin(cx)) - \frac{1}{4}(bc)\int \frac{x^4}{\sqrt{1-c^2x^2}}\,dx \\
&= \frac{bx^3\sqrt{1-c^2x^2}}{16c} + \frac{1}{4}x^4(a+b\arcsin(cx)) - \frac{(3b)\int \frac{x^2}{\sqrt{1-c^2x^2}}\,dx}{16c} \\
&= \frac{3bx\sqrt{1-c^2x^2}}{32c^3} + \frac{bx^3\sqrt{1-c^2x^2}}{16c} + \frac{1}{4}x^4(a+b\arcsin(cx)) - \frac{(3b)\int \frac{1}{\sqrt{1-c^2x^2}}\,dx}{32c^3} \\
&= \frac{3bx\sqrt{1-c^2x^2}}{32c^3} + \frac{bx^3\sqrt{1-c^2x^2}}{16c} - \frac{3b\arcsin(cx)}{32c^4} + \frac{1}{4}x^4(a+b\arcsin(cx))
\end{aligned}
$$

Mathematica [A] (verified)

Time = 0.02 (sec) , antiderivative size = 81, normalized size of antiderivative = 1.07

$$
\int x^3(a+b\arcsin(cx))\,dx = \frac{ax^4}{4} + \frac{3bx\sqrt{1-c^2x^2}}{32c^3} + \frac{bx^3\sqrt{1-c^2x^2}}{16c} - \frac{3b\arcsin(cx)}{32c^4} + \frac{1}{4}bx^4\arcsin(cx)
$$

```
[In] Integrate[x^3*(a + b*ArcSin[c*x]),x]
[Out] (a*x^4)/4 + (3*b*x*Sqrt[1 - c^2*x^2])/(32*c^3) + (b*x^3*Sqrt[1 - c^2*x^2])/
(16*c) - (3*b*ArcSin[c*x])/(32*c^4) + (b*x^4*ArcSin[c*x])/4
```

Maple [A] (verified)

Time = 0.02 (sec) , antiderivative size = 68, normalized size of antiderivative = 0.89

method	result	size
parts	$\frac{a\,x^{4}}{4}+\frac{b\left(\frac{c^{4} x^{4} \arcsin \left(c x \right)}{4}+\frac{c^{3} x^{3} \sqrt{-c^{2} x^{2}+1}}{16}+\frac{3 c x \sqrt{-c^{2} x^{2}+1}}{32}-\frac{3 \arcsin \left(c x \right)}{32}\right)}{c^{4}}$	68
derivativedivides	$\frac{\frac{a\,c^{4} x^{4}}{4}+b\left(\frac{c^{4} x^{4} \arcsin \left(c x \right)}{4}+\frac{c^{3} x^{3} \sqrt{-c^{2} x^{2}+1}}{16}+\frac{3 c x \sqrt{-c^{2} x^{2}+1}}{32}-\frac{3 \arcsin \left(c x \right)}{32}\right)}{c^{4}}$	72
default	$\frac{\frac{a\,c^{4} x^{4}}{4}+b\left(\frac{c^{4} x^{4} \arcsin \left(c x \right)}{4}+\frac{c^{3} x^{3} \sqrt{-c^{2} x^{2}+1}}{16}+\frac{3 c x \sqrt{-c^{2} x^{2}+1}}{32}-\frac{3 \arcsin \left(c x \right)}{32}\right)}{c^{4}}$	72

```
[In] int(x^3*(a+b*arcsin(c*x)),x,method=_RETURNVERBOSE)
[Out] 1/4*a*x^4+b/c^4*(1/4*c^4*x^4*arcsin(c*x)+1/16*c^3*x^3*(-c^2*x^2+1)^(1/2)+3/
32*c*x*(-c^2*x^2+1)^(1/2)-3/32*arcsin(c*x))
```

Fricas [A] (verification not implemented)

none

Time = 0.27 (sec) , antiderivative size = 61, normalized size of antiderivative = 0.80

$$\int x^3(a+b\arcsin(cx))\,dx = \frac{8\,ac^4x^4 + (8\,bc^4x^4 - 3\,b)\arcsin{(cx)} + (2\,bc^3x^3 + 3\,bcx)\sqrt{-c^2x^2+1}}{32\,c^4}$$

```
[In] integrate(x^3*(a+b*arcsin(c*x)),x, algorithm="fricas")
[Out] 1/32*(8*a*c^4*x^4 + (8*b*c^4*x^4 - 3*b)*arcsin(c*x) + (2*b*c^3*x^3 + 3*b*c*
x)*sqrt(-c^2*x^2 + 1))/c^4
```

Sympy [A] (verification not implemented)

Time = 0.26 (sec) , antiderivative size = 80, normalized size of antiderivative = 1.05

$$\int x^3(a+b\arcsin(cx))\,dx = \begin{cases} \frac{ax^4}{4} + \frac{bx^4\operatorname{asin}{(cx)}}{4} + \frac{bx^3\sqrt{-c^2x^2+1}}{16c} + \frac{3bx\sqrt{-c^2x^2+1}}{32c^3} - \frac{3b\operatorname{asin}{(cx)}}{32c^4} & \text{for}\: c \neq 0 \\ \frac{ax^4}{4} & \text{otherwise} \end{cases}$$

```
[In] integrate(x**3*(a+b*asin(c*x)),x)
[Out] Piecewise((a*x**4/4 + b*x**4*asin(c*x)/4 + b*x**3*sqrt(-c**2*x**2 + 1)/(16*
c) + 3*b*x*sqrt(-c**2*x**2 + 1)/(32*c**3) - 3*b*asin(c*x)/(32*c**4), Ne(c,
0)), (a*x**4/4, True))
```

Maxima [A] (verification not implemented)

none

Time = 0.29 (sec) , antiderivative size = 70, normalized size of antiderivative = 0.92

$$\int x^3(a+b\arcsin(cx))\,dx = \frac{1}{4}\,ax^4 + \frac{1}{32}\left(8\,x^4\arcsin(cx) + \left(\frac{2\sqrt{-c^2x^2+1}x^3}{c^2} + \frac{3\sqrt{-c^2x^2+1}x}{c^4} - \frac{3\arcsin(cx)}{c^5}\right)c\right)b$$

```
[In] integrate(x^3*(a+b*arcsin(c*x)),x, algorithm="maxima")
```

```
[Out] 1/4*a*x^4 + 1/32*(8*x^4*arcsin(c*x) + (2*sqrt(-c^2*x^2 + 1)*x^3/c^2 + 3*sqr
t(-c^2*x^2 + 1)*x/c^4 - 3*arcsin(c*x)/c^5)*c)*b
```

Giac [A] (verification not implemented)

none

Time = 0.28 (sec) , antiderivative size = 95, normalized size of antiderivative = 1.25

$$\int x^3(a+b\arcsin(cx))\,dx = \frac{1}{4}\,ax^4 - \frac{(-c^2x^2+1)^{\frac{3}{2}}bx}{16\,c^3} + \frac{(c^2x^2-1)^2 b\arcsin(cx)}{4\,c^4} + \frac{5\sqrt{-c^2x^2+1}bx}{32\,c^3} + \frac{(c^2x^2-1)b\arcsin(cx)}{2\,c^4} + \frac{5\,b\arcsin(cx)}{32\,c^4}$$

```
[In] integrate(x^3*(a+b*arcsin(c*x)),x, algorithm="giac")
```

```
[Out] 1/4*a*x^4 - 1/16*(-c^2*x^2 + 1)^(3/2)*b*x/c^3 + 1/4*(c^2*x^2 - 1)^2*b*arcsi
n(c*x)/c^4 + 5/32*sqrt(-c^2*x^2 + 1)*b*x/c^3 + 1/2*(c^2*x^2 - 1)*b*arcsin(c
*x)/c^4 + 5/32*b*arcsin(c*x)/c^4
```

Mupad [F(-1)]

Timed out.

$$\int x^3(a+b\arcsin(cx))\,dx = \int x^3\,(a+b\,\mathrm{asin}(c\,x))\,dx$$

```
[In] int(x^3*(a + b*asin(c*x)),x)
```

```
[Out] int(x^3*(a + b*asin(c*x)), x)
```

3.141 $\int x^2(a+b\arcsin(cx))\,dx$

Optimal result

Integrand size = 12, antiderivative size = 60

$$\int x^2(a+b\arcsin(cx))\,dx=\frac{b\sqrt{1-c^2x^2}}{3c^3}-\frac{b(1-c^2x^2)^{3/2}}{9c^3}+\frac{1}{3}x^3(a+b\arcsin(cx))$$

```
[Out] -1/9*b*(-c^2*x^2+1)^(3/2)/c^3+1/3*x^3*(a+b*arcsin(c*x))+1/3*b*(-c^2*x^2+1)^
(1/2)/c^3
```

Rubi [A] (verified)

Time = 0.03 (sec) , antiderivative size = 60, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.250, Rules used = {4723, 272, 45}

$$\int x^2(a+b\arcsin(cx))\,dx=\frac{1}{3}x^3(a+b\arcsin(cx))-\frac{b(1-c^2x^2)^{3/2}}{9c^3}+\frac{b\sqrt{1-c^2x^2}}{3c^3}$$

```
[In] Int[x^2*(a + b*ArcSin[c*x]),x]
```

```
[Out] (b*Sqrt[1 - c^2*x^2])/(3*c^3) - (b*(1 - c^2*x^2)^(3/2))/(9*c^3) + (x^3*(a +
 b*ArcSin[c*x]))/3
```

Rule 45

```
Int[((a_.) + (b_.)*(x_))^(m_.)*((c_.) + (d_.)*(x_))^(n_.), x_Symbol] :> Int
[ExpandIntegrand[(a + b*x)^m*(c + d*x)^n, x], x] /; FreeQ[{a, b, c, d, n},
x] && NeQ[b*c - a*d, 0] && IGtQ[m, 0] && ( !IntegerQ[n] || (EqQ[c, 0] && Le
Q[7*m + 4*n + 4, 0]) || LtQ[9*m + 5*(n + 1), 0] || GtQ[m + n + 2, 0])
```

Rule 272

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[1/n, Subst[
Int[x^(Simplify[(m + 1)/n] - 1)*(a + b*x)^p, x], x, x^n], x] /; FreeQ[{a, b
, m, n, p}, x] && IntegerQ[Simplify[(m + 1)/n]]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= \frac{1}{3}x^3(a+b\arcsin(cx)) - \frac{1}{3}(bc)\int \frac{x^3}{\sqrt{1-c^2x^2}}\,dx \\
&= \frac{1}{3}x^3(a+b\arcsin(cx)) - \frac{1}{6}(bc)\text{Subst}\left(\int \frac{x}{\sqrt{1-c^2x}}\,dx, x, x^2\right) \\
&= \frac{1}{3}x^3(a+b\arcsin(cx)) - \frac{1}{6}(bc)\text{Subst}\left(\int \left(\frac{1}{c^2\sqrt{1-c^2x}} - \frac{\sqrt{1-c^2x}}{c^2}\right)\,dx, x, x^2\right) \\
&= \frac{b\sqrt{1-c^2x^2}}{3c^3} - \frac{b(1-c^2x^2)^{3/2}}{9c^3} + \frac{1}{3}x^3(a+b\arcsin(cx))
\end{aligned}$$

Mathematica [A] (verified)

Time = 0.03 (sec) , antiderivative size = 49, normalized size of antiderivative = 0.82

$$\int x^2(a+b\arcsin(cx))\,dx = \frac{1}{9}\left(3ax^3 + \frac{b\sqrt{1-c^2x^2}(2+c^2x^2)}{c^3} + 3bx^3\arcsin(cx)\right)$$

```
[In] Integrate[x^2*(a + b*ArcSin[c*x]),x]
[Out] (3*a*x^3 + (b*Sqrt[1 - c^2*x^2]*(2 + c^2*x^2))/c^3 + 3*b*x^3*ArcSin[c*x])/9
```

Maple [A] (verified)

Time = 0.01 (sec) , antiderivative size = 60, normalized size of antiderivative = 1.00

method	result	size
parts	$\frac{x^{3} a}{3}+\frac{b\left(\frac{c^{3} x^{3} \arcsin\left(c x\right)}{3}+\frac{c^{2} x^{2} \sqrt{-c^{2} x^{2}+1}}{9}+\frac{2 \sqrt{-c^{2} x^{2}+1}}{9}\right)}{c^{3}}$	60
derivativedivides	$\frac{\frac{c^{3} x^{3} a}{3}+b\left(\frac{c^{3} x^{3} \arcsin\left(c x\right)}{3}+\frac{c^{2} x^{2} \sqrt{-c^{2} x^{2}+1}}{9}+\frac{2 \sqrt{-c^{2} x^{2}+1}}{9}\right)}{c^{3}}$	64
default	$\frac{\frac{c^{3} x^{3} a}{3}+b\left(\frac{c^{3} x^{3} \arcsin\left(c x\right)}{3}+\frac{c^{2} x^{2} \sqrt{-c^{2} x^{2}+1}}{9}+\frac{2 \sqrt{-c^{2} x^{2}+1}}{9}\right)}{c^{3}}$	64

```
[In] int(x^2*(a+b*arcsin(c*x)),x,method=_RETURNVERBOSE)
[Out] 1/3*x^3*a+b/c^3*(1/3*c^3*x^3*arcsin(c*x)+1/9*c^2*x^2*(-c^2*x^2+1)^(1/2)+2/9
*(-c^2*x^2+1)^(1/2))
```

Fricas [A] (verification not implemented)

none

Time = 0.25 (sec) , antiderivative size = 53, normalized size of antiderivative = 0.88

$$\int x^2(a+b\arcsin(cx))\,dx=\frac{3\,bc^3x^3\arcsin\left(cx\right)+3\,ac^3x^3+(bc^2x^2+2\,b)\sqrt{-c^2x^2+1}}{9\,c^3}$$

```
[In] integrate(x^2*(a+b*arcsin(c*x)),x, algorithm="fricas")
[Out] 1/9*(3*b*c^3*x^3*arcsin(c*x) + 3*a*c^3*x^3 + (b*c^2*x^2 + 2*b)*sqrt(-c^2*x^
2 + 1))/c^3
```

Sympy [A] (verification not implemented)

Time = 0.20 (sec) , antiderivative size = 65, normalized size of antiderivative = 1.08

$$\int x^2(a+b\arcsin(cx))\,dx=\begin{cases}\frac{ax^3}{3}+\frac{bx^3\operatorname{asin}\left(cx\right)}{3}+\frac{bx^2\sqrt{-c^2x^2+1}}{9c}+\frac{2b\sqrt{-c^2x^2+1}}{9c^3} & \text{for}\ c\neq 0\\ \frac{ax^3}{3} & \text{otherwise}\end{cases}$$

```
[In] integrate(x**2*(a+b*asin(c*x)),x)
[Out] Piecewise((a*x**3/3 + b*x**3*asin(c*x)/3 + b*x**2*sqrt(-c**2*x**2 + 1)/(9*c
) + 2*b*sqrt(-c**2*x**2 + 1)/(9*c**3), Ne(c, 0)), (a*x**3/3, True))
```

Maxima [A] (verification not implemented)

none

Time = 0.28 (sec) , antiderivative size = 59, normalized size of antiderivative = 0.98

$$\int x^2(a+b\arcsin(cx))\,dx = \frac{1}{3}\,ax^3 + \frac{1}{9}\left(3\,x^3\arcsin\left(cx\right) + c\left(\frac{\sqrt{-c^2x^2+1}x^2}{c^2} + \frac{2\,\sqrt{-c^2x^2+1}}{c^4}\right)\right)b$$

```
[In] integrate(x^2*(a+b*arcsin(c*x)),x, algorithm="maxima")
```

```
[Out] 1/3*a*x^3 + 1/9*(3*x^3*arcsin(c*x) + c*(sqrt(-c^2*x^2 + 1)*x^2/c^2 + 2*sqrt
(-c^2*x^2 + 1)/c^4))*b
```

Giac [A] (verification not implemented)

none

Time = 0.28 (sec) , antiderivative size = 74, normalized size of antiderivative = 1.23

$$\int x^2(a+b\arcsin(cx))\,dx = \frac{1}{3}\,ax^3 + \frac{(c^2x^2-1)bx\arcsin\left(cx\right)}{3\,c^2} + \frac{bx\arcsin\left(cx\right)}{3\,c^2} - \frac{(-c^2x^2+1)^{\frac{3}{2}}b}{9\,c^3} + \frac{\sqrt{-c^2x^2+1}b}{3\,c^3}$$

```
[In] integrate(x^2*(a+b*arcsin(c*x)),x, algorithm="giac")
```

```
[Out] 1/3*a*x^3 + 1/3*(c^2*x^2 - 1)*b*x*arcsin(c*x)/c^2 + 1/3*b*x*arcsin(c*x)/c^2
 - 1/9*(-c^2*x^2 + 1)^(3/2)*b/c^3 + 1/3*sqrt(-c^2*x^2 + 1)*b/c^3
```

Mupad [F(-1)]

Timed out.

$$\int x^2(a+b\arcsin(cx))\,dx = \begin{cases} b\left(\frac{\sqrt{\frac{1}{c^2}-x^2}\left(\frac{2}{c^2}+x^2\right)}{9} + \frac{x^3\,\mathrm{asin}(c\,x)}{3}\right) + \frac{a\,x^3}{3} & \text{if } 0<c \\ \int x^2\left(a+b\,\mathrm{asin}(c\,x)\right)\,dx & \text{if } \neg 0<c \end{cases}$$

```
[In] int(x^2*(a + b*asin(c*x)),x)
```

```
[Out] piecewise(0 < c, b*(((1/c^2 - x^2)^(1/2)*(2/c^2 + x^2))/9 + (x^3*asin(c*x))
/3) + (a*x^3)/3, ~0 < c, int(x^2*(a + b*asin(c*x)), x))
```

3.142 $\int x(a+b\arcsin(cx))\,dx$

Optimal result

Integrand size = 10, antiderivative size = 51

$$\int x(a+b\arcsin(cx))\,dx=\frac{bx\sqrt{1-c^2x^2}}{4c}-\frac{b\arcsin(cx)}{4c^2}+\frac{1}{2}x^2(a+b\arcsin(cx))$$

```
[Out] -1/4*b*arcsin(c*x)/c^2+1/2*x^2*(a+b*arcsin(c*x))+1/4*b*x*(-c^2*x^2+1)^(1/2)
/c
```

Rubi [A] (verified)

Time = 0.01 (sec) , antiderivative size = 51, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.300, Rules used = {4723, 327, 222}

$$\int x(a+b\arcsin(cx))\,dx=\frac{1}{2}x^2(a+b\arcsin(cx))-\frac{b\arcsin(cx)}{4c^2}+\frac{bx\sqrt{1-c^2x^2}}{4c}$$

```
[In] Int[x*(a + b*ArcSin[c*x]),x]
```

```
[Out] (b*x*Sqrt[1 - c^2*x^2])/(4*c) - (b*ArcSin[c*x])/(4*c^2) + (x^2*(a + b*ArcSi
n[c*x]))/2
```

Rule 222

```
Int[1/Sqrt[(a_) + (b_.)*(x_)^2], x_Symbol] :> Simp[ArcSin[Rt[-b, 2]*(x/Sqrt
[a])]/Rt[-b, 2], x] /; FreeQ[{a, b}, x] && GtQ[a, 0] && NegQ[b]
```

Rule 327

```
Int[((c_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[c^(n
 - 1)*(c*x)^(m - n + 1)*((a + b*x^n)^(p + 1)/(b*(m + n*p + 1))), x] - Dist[
```

```
a*c^n*((m - n + 1)/(b*(m + n*p + 1))), Int[(c*x)^(m - n)*(a + b*x^n)^p, x],
 x] /; FreeQ[{a, b, c, p}, x] && IGtQ[n, 0] && GtQ[m, n - 1] && NeQ[m + n*p
 + 1, 0] && IntBinomialQ[a, b, c, n, m, p, x]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= \frac{1}{2}x^2(a+b\arcsin(cx)) - \frac{1}{2}(bc)\int \frac{x^2}{\sqrt{1-c^2x^2}}\,dx \\
&= \frac{bx\sqrt{1-c^2x^2}}{4c} + \frac{1}{2}x^2(a+b\arcsin(cx)) - \frac{b\int \frac{1}{\sqrt{1-c^2x^2}}\,dx}{4c} \\
&= \frac{bx\sqrt{1-c^2x^2}}{4c} - \frac{b\arcsin(cx)}{4c^2} + \frac{1}{2}x^2(a+b\arcsin(cx))
\end{aligned}$$

Mathematica [A] (verified)

Time = 0.02 (sec) , antiderivative size = 56, normalized size of antiderivative = 1.10

$$\int x(a+b\arcsin(cx))\,dx = \frac{ax^2}{2} + \frac{bx\sqrt{1-c^2x^2}}{4c} - \frac{b\arcsin(cx)}{4c^2} + \frac{1}{2}bx^2\arcsin(cx)$$

```
[In] Integrate[x*(a + b*ArcSin[c*x]),x]
[Out] (a*x^2)/2 + (b*x*Sqrt[1 - c^2*x^2])/(4*c) - (b*ArcSin[c*x])/(4*c^2) + (b*x^
2*ArcSin[c*x])/2
```

Maple [A] (verified)

Time = 0.01 (sec) , antiderivative size = 48, normalized size of antiderivative = 0.94

method	result	size
parts	$\frac{a\,x^{2}}{2}+\frac{b\left(\frac{c^{2}x^{2}\arcsin(cx)}{2}+\frac{cx\sqrt{-c^{2}x^{2}+1}}{4}-\frac{\arcsin(cx)}{4}\right)}{c^{2}}$	48
derivativedivides	$\frac{\frac{c^{2}x^{2}a}{2}+b\left(\frac{c^{2}x^{2}\arcsin(cx)}{2}+\frac{cx\sqrt{-c^{2}x^{2}+1}}{4}-\frac{\arcsin(cx)}{4}\right)}{c^{2}}$	52
default	$\frac{\frac{c^{2}x^{2}a}{2}+b\left(\frac{c^{2}x^{2}\arcsin(cx)}{2}+\frac{cx\sqrt{-c^{2}x^{2}+1}}{4}-\frac{\arcsin(cx)}{4}\right)}{c^{2}}$	52

```
[In] int(x*(a+b*arcsin(c*x)),x,method=_RETURNVERBOSE)
[Out] 1/2*a*x^2+b/c^2*(1/2*c^2*x^2*arcsin(c*x)+1/4*c*x*(-c^2*x^2+1)^(1/2)-1/4*arc
sin(c*x))
```

Fricas [A] (verification not implemented)

none

Time = 0.24 (sec) , antiderivative size = 49, normalized size of antiderivative = 0.96

$$\int x(a+b\arcsin(cx))\,dx=\frac{2\,ac^{2}x^{2}+\sqrt{-c^{2}x^{2}+1}bcx+(2\,bc^{2}x^{2}-b)\arcsin\left(cx\right)}{4\,c^{2}}$$

```
[In] integrate(x*(a+b*arcsin(c*x)),x, algorithm="fricas")
[Out] 1/4*(2*a*c^2*x^2 + sqrt(-c^2*x^2 + 1)*b*c*x + (2*b*c^2*x^2 - b)*arcsin(c*x)
)/c^2
```

Sympy [A] (verification not implemented)

Time = 0.16 (sec) , antiderivative size = 54, normalized size of antiderivative = 1.06

$$\int x(a+b\arcsin(cx))\,dx=\begin{cases}\frac{ax^{2}}{2}+\frac{bx^{2}\operatorname{asin}\left(cx\right)}{2}+\frac{bx\sqrt{-c^{2}x^{2}+1}}{4c}-\frac{b\operatorname{asin}\left(cx\right)}{4c^{2}} & \text{for}\ c\neq 0\\ \frac{ax^{2}}{2} & \text{otherwise}\end{cases}$$

```
[In] integrate(x*(a+b*asin(c*x)),x)
[Out] Piecewise((a*x**2/2 + b*x**2*asin(c*x)/2 + b*x*sqrt(-c**2*x**2 + 1)/(4*c) -
 b*asin(c*x)/(4*c**2), Ne(c, 0)), (a*x**2/2, True))
```

Maxima [A] (verification not implemented)

none

Time = 0.29 (sec) , antiderivative size = 49, normalized size of antiderivative = 0.96

$$\int x(a+b\arcsin(cx))\,dx = \frac{1}{2}\,ax^2+\frac{1}{4}\left(2\,x^2\arcsin\left(cx\right)+c\left(\frac{\sqrt{-c^2x^2+1}x}{c^2}-\frac{\arcsin\left(cx\right)}{c^3}\right)\right)b$$

```
[In] integrate(x*(a+b*arcsin(c*x)),x, algorithm="maxima")
```

```
[Out] 1/2*a*x^2 + 1/4*(2*x^2*arcsin(c*x) + c*(sqrt(-c^2*x^2 + 1)*x/c^2 - arcsin(c
*x)/c^3))*b
```

Giac [A] (verification not implemented)

none

Time = 0.27 (sec) , antiderivative size = 64, normalized size of antiderivative = 1.25

$$\int x(a+b\arcsin(cx))\,dx = \frac{\sqrt{-c^2x^2+1}bx}{4\,c}+\frac{(c^2x^2-1)b\arcsin\left(cx\right)}{2\,c^2}+\frac{(c^2x^2-1)a}{2\,c^2}+\frac{b\arcsin\left(cx\right)}{4\,c^2}$$

```
[In] integrate(x*(a+b*arcsin(c*x)),x, algorithm="giac")
```

```
[Out] 1/4*sqrt(-c^2*x^2 + 1)*b*x/c + 1/2*(c^2*x^2 - 1)*b*arcsin(c*x)/c^2 + 1/2*(c
^2*x^2 - 1)*a/c^2 + 1/4*b*arcsin(c*x)/c^2
```

Mupad [B] (verification not implemented)

Time = 0.16 (sec) , antiderivative size = 45, normalized size of antiderivative = 0.88

$$\int x(a+b\arcsin(cx))\,dx = \frac{a\,x^2}{2}+\frac{b\,\left(\frac{\mathrm{asin}(c\,x)\,\left(2\,c^2\,x^2-1\right)}{4}+\frac{c\,x\,\sqrt{1-c^2\,x^2}}{4}\right)}{c^2}$$

```
[In] int(x*(a + b*asin(c*x)),x)
```

```
[Out] (a*x^2)/2 + (b*((asin(c*x)*(2*c^2*x^2 - 1))/4 + (c*x*(1 - c^2*x^2)^(1/2))/4
))/c^2
```

3.143 $\int (a + b \arcsin(cx)) \, dx$

Optimal result

Integrand size = 8, antiderivative size = 30

$$\int (a + b \arcsin(cx)) \, dx = ax + \frac{b\sqrt{1 - c^2x^2}}{c} + bx \arcsin(cx)$$

```
[Out] a*x+b*x*arcsin(c*x)+b*(-c^2*x^2+1)^(1/2)/c
```

Rubi [A] (verified)

Time = 0.01 (sec) , antiderivative size = 30, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2, $\frac{\text{number of rules}}{\text{integrand size}} = 0.250$, Rules used = {4715, 267}

$$\int (a + b \arcsin(cx)) \, dx = ax + bx \arcsin(cx) + \frac{b\sqrt{1 - c^2x^2}}{c}$$

```
[In] Int[a + b*ArcSin[c*x],x]
```

```
[Out] a*x + (b*Sqrt[1 - c^2*x^2])/c + b*x*ArcSin[c*x]
```

Rule 267

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[(a + b*x^n)
^(p + 1)/(b*n*(p + 1)), x] /; FreeQ[{a, b, m, n, p}, x] && EqQ[m, n - 1] &&
 NeQ[p, -1]
```

Rule 4715

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.), x_Symbol] :> Simp[x*(a + b*Ar
cSin[c*x])^n, x] - Dist[b*c*n, Int[x*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 -
c^2*x^2]), x], x] /; FreeQ[{a, b, c}, x] && GtQ[n, 0]
```

Rubi steps

$$\begin{aligned}\text{integral} &= ax + b\int \arcsin(cx)\,dx\\ &= ax + bx\arcsin(cx) - (bc)\int \frac{x}{\sqrt{1-c^2x^2}}\,dx\\ &= ax + \frac{b\sqrt{1-c^2x^2}}{c} + bx\arcsin(cx)\end{aligned}$$

Mathematica [A] (verified)

Time = 0.01 (sec) , antiderivative size = 30, normalized size of antiderivative = 1.00

$$\int (a + b\arcsin(cx))\,dx = ax + \frac{b\sqrt{1-c^2x^2}}{c} + bx\arcsin(cx)$$

```
[In] Integrate[a + b*ArcSin[c*x],x]
[Out] a*x + (b*Sqrt[1 - c^2*x^2])/c + b*x*ArcSin[c*x]
```

Maple [A] (verified)

Time = 0.01 (sec) , antiderivative size = 30, normalized size of antiderivative = 1.00

method	result	size
default	$ax + \frac{b\left(cx\arcsin(cx)+\sqrt{-c^2x^2+1}\right)}{c}$	30
parts	$ax + \frac{b\left(cx\arcsin(cx)+\sqrt{-c^2x^2+1}\right)}{c}$	30
derivativedivides	$\frac{cxa+b\left(cx\arcsin(cx)+\sqrt{-c^2x^2+1}\right)}{c}$	32

```
[In] int(a+b*arcsin(c*x),x,method=_RETURNVERBOSE)
[Out] a*x+b/c*(c*x*arcsin(c*x)+(-c^2*x^2+1)^(1/2))
```

Fricas [A] (verification not implemented)

none

Time = 0.26 (sec) , antiderivative size = 31, normalized size of antiderivative = 1.03

$$\int (a+b\arcsin(cx))\,dx=\frac{bcx\arcsin{(cx)}+acx+\sqrt{-c^2x^2+1}b}{c}$$

```
[In] integrate(a+b*arcsin(c*x),x, algorithm="fricas")
[Out] (b*c*x*arcsin(c*x) + a*c*x + sqrt(-c^2*x^2 + 1)*b)/c
```

Sympy [A] (verification not implemented)

Time = 0.07 (sec) , antiderivative size = 26, normalized size of antiderivative = 0.87

$$\int (a+b\arcsin(cx))\,dx=ax+b\left(\begin{cases}x\operatorname{asin}{(cx)}+\frac{\sqrt{-c^2x^2+1}}{c} & \text{for}\ c\neq 0\\ 0 & \text{otherwise}\end{cases}\right)$$

```
[In] integrate(a+b*asin(c*x),x)
[Out] a*x + b*Piecewise((x*asin(c*x) + sqrt(-c**2*x**2 + 1)/c, Ne(c, 0)), (0, Tru
e))
```

Maxima [A] (verification not implemented)

none

Time = 0.30 (sec) , antiderivative size = 29, normalized size of antiderivative = 0.97

$$\int (a+b\arcsin(cx))\,dx=ax+\frac{\left(cx\arcsin{(cx)}+\sqrt{-c^2x^2+1}\right)b}{c}$$

```
[In] integrate(a+b*arcsin(c*x),x, algorithm="maxima")
[Out] a*x + (c*x*arcsin(c*x) + sqrt(-c^2*x^2 + 1))*b/c
```

Giac [A] (verification not implemented)

none

Time = 0.26 (sec) , antiderivative size = 29, normalized size of antiderivative = 0.97

$$\int (a + b \arcsin(cx)) \, dx = ax + \frac{\left(cx \arcsin\left(cx\right) + \sqrt{-c^2x^2 + 1}\right)b}{c}$$

```
[In] integrate(a+b*arcsin(c*x),x, algorithm="giac")
[Out] a*x + (c*x*arcsin(c*x) + sqrt(-c^2*x^2 + 1))*b/c
```

Mupad [B] (verification not implemented)

Time = 0.18 (sec) , antiderivative size = 28, normalized size of antiderivative = 0.93

$$\int (a + b \arcsin(cx)) \, dx = a\,x + \frac{b\,\sqrt{1 - c^2\,x^2}}{c} + b\,x\,\mathrm{asin}(c\,x)$$

```
[In] int(a + b*asin(c*x),x)
[Out] a*x + (b*(1 - c^2*x^2)^(1/2))/c + b*x*asin(c*x)
```

3.144 $\int \frac{a+b\arcsin(cx)}{x}\,dx$

Optimal result

Integrand size = 12, antiderivative size = 63

$$\int \frac{a+b\arcsin(cx)}{x}\,dx = -\frac{i(a+b\arcsin(cx))^2}{2b} + (a+b\arcsin(cx))\log\left(1-e^{2i\arcsin(cx)}\right) - \frac{1}{2}ib\,\text{PolyLog}\left(2,e^{2i\arcsin(cx)}\right)$$

```
[Out] -1/2*I*(a+b*arcsin(c*x))^2/b+(a+b*arcsin(c*x))*ln(1-(I*c*x+(-c^2*x^2+1)^(1/
2))^2)-1/2*I*b*polylog(2,(I*c*x+(-c^2*x^2+1)^(1/2))^2)
```

Rubi [A] (verified)

Time = 0.05 (sec) , antiderivative size = 63, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5, $\frac{\text{number of rules}}{\text{integrand size}} = 0.417$, Rules used = {4721, 3798, 2221, 2317, 2438}

$$\int \frac{a+b\arcsin(cx)}{x}\,dx = -\frac{i(a+b\arcsin(cx))^2}{2b} + \log\left(1-e^{2i\arcsin(cx)}\right)(a+b\arcsin(cx)) - \frac{1}{2}ib\,\text{PolyLog}\left(2,e^{2i\arcsin(cx)}\right)$$

```
[In] Int[(a + b*ArcSin[c*x])/x,x]
```

```
[Out] ((-1/2*I)*(a + b*ArcSin[c*x])^2)/b + (a + b*ArcSin[c*x])*Log[1 - E^((2*I)*A
rcSin[c*x])] - (I/2)*b*PolyLog[2, E^((2*I)*ArcSin[c*x])]
```

Rule 2221

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m/(b*f*g*n*Log[F]))*Log[1 + b*((F^(g*(e + f*x)))^n/a)], x] - Di
```

```
st[d*(m/(b*f*g*n*Log[F])), Int[(c + d*x)^(m - 1)*Log[1 + b*((F^(g*(e + f*x)
))^n/a)], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2317

```
Int[Log[(a_) + (b_.)*((F_)^((e_.)*((c_.) + (d_.)*(x_))))^(n_.)], x_Symbol]
:> Dist[1/(d*e*n*Log[F]), Subst[Int[Log[a + b*x]/x, x], x, (F^(e*(c + d*x))
)^n], x] /; FreeQ[{F, a, b, c, d, e, n}, x] && GtQ[a, 0]
```

Rule 2438

```
Int[Log[(c_.)*((d_) + (e_.)*(x_)^(n_.))]/(x_), x_Symbol] :> Simp[-PolyLog[2
, (-c)*e*x^n]/n, x] /; FreeQ[{c, d, e, n}, x] && EqQ[c*d, 1]
```

Rule 3798

```
Int[((c_.) + (d_.)*(x_))^(m_.)*tan[(e_.) + Pi*(k_.) + (f_.)*(x_)], x_Symbol
] :> Simp[I*((c + d*x)^(m + 1)/(d*(m + 1))), x] - Dist[2*I, Int[(c + d*x)^m
*E^(2*I*k*Pi)*(E^(2*I*(e + f*x))/(1 + E^(2*I*k*Pi)*E^(2*I*(e + f*x)))), x],
 x] /; FreeQ[{c, d, e, f}, x] && IntegerQ[4*k] && IGtQ[m, 0]
```

Rule 4721

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)/(x_), x_Symbol] :> Subst[Int[(
a + b*x)^n*Cot[x], x], x, ArcSin[c*x]] /; FreeQ[{a, b, c}, x] && IGtQ[n, 0]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= \text{Subst}\left(\int (a+bx)\cot(x)\,dx, x, \arcsin(cx)\right)\\
&= -\frac{i(a+b\arcsin(cx))^2}{2b} - 2i\text{Subst}\left(\int \frac{e^{2ix}(a+bx)}{1-e^{2ix}}\,dx, x, \arcsin(cx)\right)\\
&= -\frac{i(a+b\arcsin(cx))^2}{2b} + (a+b\arcsin(cx))\log\left(1-e^{2i\arcsin(cx)}\right)\\
&\quad - b\text{Subst}\left(\int \log\left(1-e^{2ix}\right)\,dx, x, \arcsin(cx)\right)\\
&= -\frac{i(a+b\arcsin(cx))^2}{2b} + (a+b\arcsin(cx))\log\left(1-e^{2i\arcsin(cx)}\right)\\
&\quad + \frac{1}{2}(ib)\text{Subst}\left(\int \frac{\log(1-x)}{x}\,dx, x, e^{2i\arcsin(cx)}\right)\\
&= -\frac{i(a+b\arcsin(cx))^2}{2b} + (a+b\arcsin(cx))\log\left(1-e^{2i\arcsin(cx)}\right) - \frac{1}{2}ib\,\text{PolyLog}\left(2, e^{2i\arcsin(cx)}\right)
\end{aligned}$$

Mathematica [A] (verified)

Time = 0.07 (sec) , antiderivative size = 52, normalized size of antiderivative = 0.83

$$\int \frac{a+b\arcsin(cx)}{x}\,dx = b\arcsin(cx)\log\left(1-e^{2i\arcsin(cx)}\right)+a\log(x) -\frac{1}{2}ib\left(\arcsin(cx)^2+\text{PolyLog}\left(2,e^{2i\arcsin(cx)}\right)\right)$$

```
[In] Integrate[(a + b*ArcSin[c*x])/x,x]
[Out] b*ArcSin[c*x]*Log[1 - E^((2*I)*ArcSin[c*x])] + a*Log[x] - (I/2)*b*(ArcSin[c
*x]^2 + PolyLog[2, E^((2*I)*ArcSin[c*x])])
```

Maple [A] (verified)

Time = 0.09 (sec) , antiderivative size = 118, normalized size of antiderivative = 1.87

method	result
parts	$a\ln(x)+b\left(-\frac{i\arcsin(cx)^2}{2}+\arcsin(cx)\ln\left(1+icx+\sqrt{-c^2x^2+1}\right)-i\,\text{polylog}\left(2,-icx-\right.\right.$
derivativedivides	$a\ln(cx)+b\left(-\frac{i\arcsin(cx)^2}{2}+\arcsin(cx)\ln\left(1+icx+\sqrt{-c^2x^2+1}\right)-i\,\text{polylog}\left(2,-icx-\right.\right.$
default	$a\ln(cx)+b\left(-\frac{i\arcsin(cx)^2}{2}+\arcsin(cx)\ln\left(1+icx+\sqrt{-c^2x^2+1}\right)-i\,\text{polylog}\left(2,-icx-\right.\right.$

```
[In] int((a+b*arcsin(c*x))/x,x,method=_RETURNVERBOSE)
[Out] a*ln(x)+b*(-1/2*I*arcsin(c*x)^2+arcsin(c*x)*ln(1+I*c*x+(-c^2*x^2+1)^(1/2))-
I*polylog(2,-I*c*x-(-c^2*x^2+1)^(1/2))+arcsin(c*x)*ln(1-I*c*x-(-c^2*x^2+1)^
(1/2))-I*polylog(2,I*c*x+(-c^2*x^2+1)^(1/2)))
```

Fricas [F]

$$\int \frac{a+b\arcsin(cx)}{x}\,dx = \int \frac{b\arcsin(cx)+a}{x}\,dx$$

```
[In] integrate((a+b*arcsin(c*x))/x,x, algorithm="fricas")
[Out] integral((b*arcsin(c*x) + a)/x, x)
```

Sympy [F]

$$\int \frac{a+b\arcsin(cx)}{x}\,dx=\int \frac{a+b\operatorname{asin}(cx)}{x}\,dx$$

```
[In] integrate((a+b*asin(c*x))/x,x)
[Out] Integral((a + b*asin(c*x))/x, x)
```

Maxima [F]

$$\int \frac{a+b\arcsin(cx)}{x}\,dx=\int \frac{b\arcsin(cx)+a}{x}\,dx$$

```
[In] integrate((a+b*arcsin(c*x))/x,x, algorithm="maxima")
[Out] b*integrate(arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1))/x, x) + a*log(x)
```

Giac [F]

$$\int \frac{a+b\arcsin(cx)}{x}\,dx=\int \frac{b\arcsin(cx)+a}{x}\,dx$$

```
[In] integrate((a+b*arcsin(c*x))/x,x, algorithm="giac")
[Out] integrate((b*arcsin(c*x) + a)/x, x)
```

Mupad [B] (verification not implemented)

Time = 0.16 (sec) , antiderivative size = 48, normalized size of antiderivative = 0.76

$$\int \frac{a+b\arcsin(cx)}{x}\,dx=a\,\ln(x)-\frac{b\,\mathrm{polylog}\left(2,\mathrm{e}^{\mathrm{asin}(c\,x)\,2\mathrm{i}}\right)\,1\mathrm{i}}{2}-\frac{b\,\mathrm{asin}(c\,x)^2\,1\mathrm{i}}{2}+b\,\ln\left(1-\mathrm{e}^{\mathrm{asin}(c\,x)\,2\mathrm{i}}\right)\,\mathrm{asin}(c\,x)$$

```
[In] int((a + b*asin(c*x))/x,x)
[Out] a*log(x) - (b*polylog(2, exp(asin(c*x)*2i))*1i)/2 - (b*asin(c*x)^2*1i)/2 +
b*log(1 - exp(asin(c*x)*2i))*asin(c*x)
```

3.145 $\int \frac{a+b \arcsin(cx)}{x^2} dx$

Optimal result

Integrand size = 12, antiderivative size = 33

$$\int \frac{a+b \arcsin(cx)}{x^2} dx = -\frac{a+b \arcsin(cx)}{x} - b c \operatorname{arctanh}\left(\sqrt{1-c^2x^2}\right)$$

```
[Out] (-a-b*arcsin(c*x))/x-b*c*arctanh((-c^2*x^2+1)^(1/2))
```

Rubi [A] (verified)

Time = 0.02 (sec) , antiderivative size = 33, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.333, Rules used = {4723, 272, 65, 214}

$$\int \frac{a+b \arcsin(cx)}{x^2} dx = -\frac{a+b \arcsin(cx)}{x} - b c \operatorname{arctanh}\left(\sqrt{1-c^2x^2}\right)$$

```
[In] Int[(a + b*ArcSin[c*x])/x^2,x]
```

```
[Out] -((a + b*ArcSin[c*x])/x) - b*c*ArcTanh[Sqrt[1 - c^2*x^2]]
```

Rule 65

```
Int[((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_), x_Symbol] :> With[
{p = Denominator[m]}, Dist[p/b, Subst[Int[x^(p*(m + 1) - 1)*(c - a*(d/b) +
d*(x^p/b))^n, x], x, (a + b*x)^(1/p)], x]] /; FreeQ[{a, b, c, d}, x] && NeQ
[b*c - a*d, 0] && LtQ[-1, m, 0] && LeQ[-1, n, 0] && LeQ[Denominator[n], Den
ominator[m]] && IntLinearQ[a, b, c, d, m, n, x]
```

Rule 214

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(Rt[-a/b, 2]/a)*ArcTanh[x
/Rt[-a/b, 2]], x] /; FreeQ[{a, b}, x] && NegQ[a/b]
```

Rule 272

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[1/n, Subst[
Int[x^(Simplify[(m + 1)/n] - 1)*(a + b*x)^p, x], x, x^n], x] /; FreeQ[{a, b
, m, n, p}, x] && IntegerQ[Simplify[(m + 1)/n]]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= -\frac{a+b\arcsin(cx)}{x}+(bc)\int\frac{1}{x\sqrt{1-c^2x^2}}\,dx\\
&= -\frac{a+b\arcsin(cx)}{x}+\frac{1}{2}(bc)\text{Subst}\left(\int\frac{1}{x\sqrt{1-c^2x}}\,dx,x,x^2\right)\\
&= -\frac{a+b\arcsin(cx)}{x}-\frac{b\text{Subst}\left(\int\frac{1}{\frac{1}{c^2}-\frac{x^2}{c^2}}\,dx,x,\sqrt{1-c^2x^2}\right)}{c}\\
&= -\frac{a+b\arcsin(cx)}{x}-b\text{carctanh}\left(\sqrt{1-c^2x^2}\right)
\end{aligned}$$

Mathematica [A] (verified)

Time = 0.00 (sec) , antiderivative size = 36, normalized size of antiderivative = 1.09

$$\int\frac{a+b\arcsin(cx)}{x^2}\,dx=-\frac{a}{x}-\frac{b\arcsin(cx)}{x}-b\text{carctanh}\left(\sqrt{1-c^2x^2}\right)$$

```
[In] Integrate[(a + b*ArcSin[c*x])/x^2,x]
[Out] -(a/x) - (b*ArcSin[c*x])/x - b*c*ArcTanh[Sqrt[1 - c^2*x^2]]
```

Maple [A] (verified)

Time = 0.01 (sec) , antiderivative size = 39, normalized size of antiderivative = 1.18

method	result	size
parts	$-\frac{a}{x}+bc\left(-\frac{\arcsin(cx)}{cx}-\operatorname{arctanh}\left(\frac{1}{\sqrt{-c^2x^2+1}}\right)\right)$	39
derivativedivides	$c\left(-\frac{a}{cx}+b\left(-\frac{\arcsin(cx)}{cx}-\operatorname{arctanh}\left(\frac{1}{\sqrt{-c^2x^2+1}}\right)\right)\right)$	43
default	$c\left(-\frac{a}{cx}+b\left(-\frac{\arcsin(cx)}{cx}-\operatorname{arctanh}\left(\frac{1}{\sqrt{-c^2x^2+1}}\right)\right)\right)$	43

```
[In] int((a+b*arcsin(c*x))/x^2,x,method=_RETURNVERBOSE)
[Out] -a/x+b*c*(-1/c/x*arcsin(c*x)-arctanh(1/(-c^2*x^2+1)^(1/2)))
```

Fricas [A] (verification not implemented)

none

Time = 0.26 (sec) , antiderivative size = 55, normalized size of antiderivative = 1.67

$$\int \frac{a+b\arcsin(cx)}{x^2}\,dx = -\frac{bcx\log\left(\sqrt{-c^2x^2+1}+1\right)-bcx\log\left(\sqrt{-c^2x^2+1}-1\right)+2\,b\arcsin\left(cx\right)+2\,a}{2\,x}$$

```
[In] integrate((a+b*arcsin(c*x))/x^2,x, algorithm="fricas")
[Out] -1/2*(b*c*x*log(sqrt(-c^2*x^2 + 1) + 1) - b*c*x*log(sqrt(-c^2*x^2 + 1) - 1)
 + 2*b*arcsin(c*x) + 2*a)/x
```

Sympy [A] (verification not implemented)

Time = 0.96 (sec) , antiderivative size = 39, normalized size of antiderivative = 1.18

$$\int \frac{a+b\arcsin(cx)}{x^2}\,dx = -\frac{a}{x}+bc\left(\begin{cases}-\operatorname{acosh}\left(\frac{1}{cx}\right) & \text{for } \frac{1}{|c^2x^2|}>1\\ i\operatorname{asin}\left(\frac{1}{cx}\right) & \text{otherwise}\end{cases}\right)-\frac{b\operatorname{asin}\left(cx\right)}{x}$$

```
[In] integrate((a+b*asin(c*x))/x**2,x)
[Out] -a/x + b*c*Piecewise((-acosh(1/(c*x)), 1/Abs(c**2*x**2) > 1), (I*asin(1/(c*
x)), True)) - b*asin(c*x)/x
```

Maxima [A] (verification not implemented)

none

Time = 0.28 (sec) , antiderivative size = 47, normalized size of antiderivative = 1.42

$$\int \frac{a + b \arcsin(cx)}{x^2} \, dx = -\left(c \log\left(\frac{2\sqrt{-c^2x^2+1}}{|x|} + \frac{2}{|x|}\right) + \frac{\arcsin(cx)}{x}\right)b - \frac{a}{x}$$

```
[In] integrate((a+b*arcsin(c*x))/x^2,x, algorithm="maxima")
[Out] -(c*log(2*sqrt(-c^2*x^2 + 1)/abs(x) + 2/abs(x)) + arcsin(c*x)/x)*b - a/x
```

Giac [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 325 vs. 2(31) = 62.

Time = 0.30 (sec) , antiderivative size = 325, normalized size of antiderivative = 9.85

$$\begin{aligned}\int \frac{a + b \arcsin(cx)}{x^2} \, dx = &-\frac{\sqrt{-c^2x^2+1}bc^2x \arcsin(cx)}{2\left(\sqrt{-c^2x^2+1}+1\right)^2} - \frac{bc^2x \arcsin(cx)}{2\left(\sqrt{-c^2x^2+1}+1\right)^2} \\ &- \frac{\sqrt{-c^2x^2+1}ac^2x}{2\left(\sqrt{-c^2x^2+1}+1\right)^2} + \frac{\sqrt{-c^2x^2+1}bc \log(|c||x|)}{\sqrt{-c^2x^2+1}+1} \\ &- \frac{\sqrt{-c^2x^2+1}bc \log\left(\sqrt{-c^2x^2+1}+1\right)}{\sqrt{-c^2x^2+1}+1} - \frac{ac^2x}{2\left(\sqrt{-c^2x^2+1}+1\right)^2} \\ &+ \frac{bc \log(|c||x|)}{\sqrt{-c^2x^2+1}+1} - \frac{bc \log\left(\sqrt{-c^2x^2+1}+1\right)}{\sqrt{-c^2x^2+1}+1} \\ &- \frac{\sqrt{-c^2x^2+1}b \arcsin(cx)}{2x} - \frac{b \arcsin(cx)}{2x} - \frac{\sqrt{-c^2x^2+1}a}{2x} - \frac{a}{2x}\end{aligned}$$

```
[In] integrate((a+b*arcsin(c*x))/x^2,x, algorithm="giac")
[Out] -1/2*sqrt(-c^2*x^2 + 1)*b*c^2*x*arcsin(c*x)/(sqrt(-c^2*x^2 + 1) + 1)^2 - 1/
2*b*c^2*x*arcsin(c*x)/(sqrt(-c^2*x^2 + 1) + 1)^2 - 1/2*sqrt(-c^2*x^2 + 1)*a
*c^2*x/(sqrt(-c^2*x^2 + 1) + 1)^2 + sqrt(-c^2*x^2 + 1)*b*c*log(abs(c)*abs(x
))/(sqrt(-c^2*x^2 + 1) + 1) - sqrt(-c^2*x^2 + 1)*b*c*log(sqrt(-c^2*x^2 + 1)
 + 1)/(sqrt(-c^2*x^2 + 1) + 1) - 1/2*a*c^2*x/(sqrt(-c^2*x^2 + 1) + 1)^2 + b
*c*log(abs(c)*abs(x))/(sqrt(-c^2*x^2 + 1) + 1) - b*c*log(sqrt(-c^2*x^2 + 1)
 + 1)/(sqrt(-c^2*x^2 + 1) + 1) - 1/2*sqrt(-c^2*x^2 + 1)*b*arcsin(c*x)/x - 1
/2*b*arcsin(c*x)/x - 1/2*sqrt(-c^2*x^2 + 1)*a/x - 1/2*a/x
```

Mupad [B] (verification not implemented)

Time = 0.14 (sec) , antiderivative size = 34, normalized size of antiderivative = 1.03

$$\int \frac{a+b\arcsin(cx)}{x^2}\,dx=-\frac{a}{x}-\frac{b\,\mathrm{asin}(c\,x)}{x}-b\,c\,\mathrm{atanh}\left(\frac{1}{\sqrt{1-c^2\,x^2}}\right)$$

```
[In] int((a + b*asin(c*x))/x^2,x)
[Out] - a/x - (b*asin(c*x))/x - b*c*atanh(1/(1 - c^2*x^2)^(1/2))
```

3.146 $\int \frac{a+b\arcsin(cx)}{x^3}\,dx$

Optimal result

Integrand size = 12, antiderivative size = 39

$$\int \frac{a+b\arcsin(cx)}{x^3}\,dx=-\frac{bc\sqrt{1-c^2x^2}}{2x}-\frac{a+b\arcsin(cx)}{2x^2}$$

```
[Out] 1/2*(-a-b*arcsin(c*x))/x^2-1/2*b*c*(-c^2*x^2+1)^(1/2)/x
```

Rubi [A] (verified)

Time = 0.01 (sec) , antiderivative size = 39, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.167, Rules used = {4723, 270}

$$\int \frac{a+b\arcsin(cx)}{x^3}\,dx=-\frac{a+b\arcsin(cx)}{2x^2}-\frac{bc\sqrt{1-c^2x^2}}{2x}$$

```
[In] Int[(a + b*ArcSin[c*x])/x^3,x]
```

```
[Out] -1/2*(b*c*Sqrt[1 - c^2*x^2])/x - (a + b*ArcSin[c*x])/(2*x^2)
```

Rule 270

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[(c*
x)^(m + 1)*((a + b*x^n)^(p + 1)/(a*c*(m + 1))), x] /; FreeQ[{a, b, c, m, n,
 p}, x] && EqQ[(m + 1)/n + p + 1, 0] && NeQ[m, -1]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
```

```
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rubi steps

$$\text{integral} = -\frac{a+b\arcsin(cx)}{2x^2} + \frac{1}{2}(bc)\int \frac{1}{x^2\sqrt{1-c^2x^2}}\,dx$$
$$= -\frac{bc\sqrt{1-c^2x^2}}{2x} - \frac{a+b\arcsin(cx)}{2x^2}$$

Mathematica [A] (verified)

Time = 0.01 (sec) , antiderivative size = 44, normalized size of antiderivative = 1.13

$$\int \frac{a+b\arcsin(cx)}{x^3}\,dx = -\frac{a}{2x^2} - \frac{bc\sqrt{1-c^2x^2}}{2x} - \frac{b\arcsin(cx)}{2x^2}$$

```
[In] Integrate[(a + b*ArcSin[c*x])/x^3,x]
[Out] -1/2*a/x^2 - (b*c*Sqrt[1 - c^2*x^2])/(2*x) - (b*ArcSin[c*x])/(2*x^2)
```

Maple [A] (verified)

Time = 0.01 (sec) , antiderivative size = 46, normalized size of antiderivative = 1.18

method	result	size
parts	$-\frac{a}{2x^2} + b\,c^2\left(-\frac{\arcsin(cx)}{2c^2x^2} - \frac{\sqrt{-c^2x^2+1}}{2cx}\right)$	46
derivativedivides	$c^2\left(-\frac{a}{2c^2x^2} + b\left(-\frac{\arcsin(cx)}{2c^2x^2} - \frac{\sqrt{-c^2x^2+1}}{2cx}\right)\right)$	50
default	$c^2\left(-\frac{a}{2c^2x^2} + b\left(-\frac{\arcsin(cx)}{2c^2x^2} - \frac{\sqrt{-c^2x^2+1}}{2cx}\right)\right)$	50

```
[In] int((a+b*arcsin(c*x))/x^3,x,method=_RETURNVERBOSE)
[Out] -1/2*a/x^2+b*c^2*(-1/2/c^2/x^2*arcsin(c*x)-1/2/c/x*(-c^2*x^2+1)^(1/2))
```

Fricas [A] (verification not implemented)

none

Time = 0.25 (sec) , antiderivative size = 35, normalized size of antiderivative = 0.90

$$\int \frac{a+b\arcsin(cx)}{x^3}\,dx = -\frac{\sqrt{-c^2x^2+1}bcx - ax^2 + b\arcsin(cx) + a}{2\,x^2}$$

```
[In] integrate((a+b*arcsin(c*x))/x^3,x, algorithm="fricas")
```

```
[Out] -1/2*(sqrt(-c^2*x^2 + 1)*b*c*x - a*x^2 + b*arcsin(c*x) + a)/x^2
```

Sympy [A] (verification not implemented)

Time = 0.74 (sec) , antiderivative size = 61, normalized size of antiderivative = 1.56

$$\int \frac{a+b\arcsin(cx)}{x^3}\,dx = -\frac{a}{2x^2} + \frac{bc\left(\begin{cases} -\frac{i\sqrt{c^2x^2-1}}{x} & \text{for } |c^2x^2| > 1 \\ -\frac{\sqrt{-c^2x^2+1}}{x} & \text{otherwise} \end{cases}\right)}{2} - \frac{b\,\mathrm{asin}\,(cx)}{2x^2}$$

```
[In] integrate((a+b*asin(c*x))/x**3,x)
```

```
[Out] -a/(2*x**2) + b*c*Piecewise((-I*sqrt(c**2*x**2 - 1)/x, Abs(c**2*x**2) > 1),
 (-sqrt(-c**2*x**2 + 1)/x, True))/2 - b*asin(c*x)/(2*x**2)
```

Maxima [A] (verification not implemented)

none

Time = 0.29 (sec) , antiderivative size = 36, normalized size of antiderivative = 0.92

$$\int \frac{a+b\arcsin(cx)}{x^3}\,dx = -\frac{1}{2}\,b\left(\frac{\sqrt{-c^2x^2+1}c}{x} + \frac{\arcsin(cx)}{x^2}\right) - \frac{a}{2\,x^2}$$

```
[In] integrate((a+b*arcsin(c*x))/x^3,x, algorithm="maxima")
```

```
[Out] -1/2*b*(sqrt(-c^2*x^2 + 1)*c/x + arcsin(c*x)/x^2) - 1/2*a/x^2
```

Giac [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 163 vs. $2(33) = 66$.

Time = 0.28 (sec) , antiderivative size = 163, normalized size of antiderivative = 4.18

$$\int \frac{a + b\arcsin(cx)}{x^3} \, dx = -\frac{bc^4x^2 \arcsin(cx)}{8\left(\sqrt{-c^2x^2+1}+1\right)^2} - \frac{ac^4x^2}{8\left(\sqrt{-c^2x^2+1}+1\right)^2} + \frac{bc^3x}{4\left(\sqrt{-c^2x^2+1}+1\right)} - \frac{1}{4}bc^2\arcsin(cx) - \frac{1}{4}ac^2 - \frac{bc\left(\sqrt{-c^2x^2+1}+1\right)}{4x} - \frac{b\left(\sqrt{-c^2x^2+1}+1\right)^2\arcsin(cx)}{8x^2} - \frac{a\left(\sqrt{-c^2x^2+1}+1\right)^2}{8x^2}$$

```
[In] integrate((a+b*arcsin(c*x))/x^3,x, algorithm="giac")
```

```
[Out] -1/8*b*c^4*x^2*arcsin(c*x)/(sqrt(-c^2*x^2 + 1) + 1)^2 - 1/8*a*c^4*x^2/(sqrt
(-c^2*x^2 + 1) + 1)^2 + 1/4*b*c^3*x/(sqrt(-c^2*x^2 + 1) + 1) - 1/4*b*c^2*ar
csin(c*x) - 1/4*a*c^2 - 1/4*b*c*(sqrt(-c^2*x^2 + 1) + 1)/x - 1/8*b*(sqrt(-c
^2*x^2 + 1) + 1)^2*arcsin(c*x)/x^2 - 1/8*a*(sqrt(-c^2*x^2 + 1) + 1)^2/x^2
```

Mupad [F(-1)]

Timed out.

$$\int \frac{a + b\arcsin(cx)}{x^3} \, dx = \int \frac{a + b\,\mathrm{asin}(c\,x)}{x^3} \, dx$$

```
[In] int((a + b*asin(c*x))/x^3,x)
```

```
[Out] int((a + b*asin(c*x))/x^3, x)
```

3.147 $\int \frac{a+b\arcsin(cx)}{x^4}\,dx$

Optimal result

Integrand size = 12, antiderivative size = 62

$$\int \frac{a+b\arcsin(cx)}{x^4}\,dx=-\frac{bc\sqrt{1-c^2x^2}}{6x^2}-\frac{a+b\arcsin(cx)}{3x^3}-\frac{1}{6}bc^3\text{arctanh}\left(\sqrt{1-c^2x^2}\right)$$

```
[Out] 1/3*(-a-b*arcsin(c*x))/x^3-1/6*b*c^3*arctanh((-c^2*x^2+1)^(1/2))-1/6*b*c*(-
c^2*x^2+1)^(1/2)/x^2
```

Rubi [A] (verified)

Time = 0.02 (sec) , antiderivative size = 62, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.417, Rules used = {4723, 272, 44, 65, 214}

$$\int \frac{a+b\arcsin(cx)}{x^4}\,dx=-\frac{a+b\arcsin(cx)}{3x^3}-\frac{1}{6}bc^3\text{arctanh}\left(\sqrt{1-c^2x^2}\right)-\frac{bc\sqrt{1-c^2x^2}}{6x^2}$$

```
[In] Int[(a + b*ArcSin[c*x])/x^4,x]
```

```
[Out] -1/6*(b*c*Sqrt[1 - c^2*x^2])/x^2 - (a + b*ArcSin[c*x])/(3*x^3) - (b*c^3*Arc
Tanh[Sqrt[1 - c^2*x^2]])/6
```

Rule 44

```
Int[((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_), x_Symbol] :> Simp[
(a + b*x)^(m + 1)*((c + d*x)^(n + 1)/((b*c - a*d)*(m + 1))), x] - Dist[d*((
m + n + 2)/((b*c - a*d)*(m + 1))), Int[(a + b*x)^(m + 1)*(c + d*x)^n, x], x
] /; FreeQ[{a, b, c, d, n}, x] && NeQ[b*c - a*d, 0] && ILtQ[m, -1] &&  !Int
egerQ[n] && LtQ[n, 0]
```

Rule 65

```
Int[((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_), x_Symbol] :> With[
{p = Denominator[m]}, Dist[p/b, Subst[Int[x^(p*(m + 1) - 1)*(c - a*(d/b) +
d*(x^p/b))^n, x], x, (a + b*x)^(1/p)], x]] /; FreeQ[{a, b, c, d}, x] && NeQ
[b*c - a*d, 0] && LtQ[-1, m, 0] && LeQ[-1, n, 0] && LeQ[Denominator[n], Den
ominator[m]] && IntLinearQ[a, b, c, d, m, n, x]
```

Rule 214

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(Rt[-a/b, 2]/a)*ArcTanh[x
/Rt[-a/b, 2]], x] /; FreeQ[{a, b}, x] && NegQ[a/b]
```

Rule 272

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[1/n, Subst[
Int[x^(Simplify[(m + 1)/n] - 1)*(a + b*x)^p, x], x, x^n], x] /; FreeQ[{a, b
, m, n, p}, x] && IntegerQ[Simplify[(m + 1)/n]]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= -\frac{a+b\arcsin(cx)}{3x^3}+\frac{1}{3}(bc)\int\frac{1}{x^3\sqrt{1-c^2x^2}}\,dx\\
&= -\frac{a+b\arcsin(cx)}{3x^3}+\frac{1}{6}(bc)\text{Subst}\left(\int\frac{1}{x^2\sqrt{1-c^2x}}\,dx,x,x^2\right)\\
&= -\frac{bc\sqrt{1-c^2x^2}}{6x^2}-\frac{a+b\arcsin(cx)}{3x^3}+\frac{1}{12}\left(bc^3\right)\text{Subst}\left(\int\frac{1}{x\sqrt{1-c^2x}}\,dx,x,x^2\right)\\
&= -\frac{bc\sqrt{1-c^2x^2}}{6x^2}-\frac{a+b\arcsin(cx)}{3x^3}-\frac{1}{6}(bc)\text{Subst}\left(\int\frac{1}{\frac{1}{c^2}-\frac{x^2}{c^2}}\,dx,x,\sqrt{1-c^2x^2}\right)\\
&= -\frac{bc\sqrt{1-c^2x^2}}{6x^2}-\frac{a+b\arcsin(cx)}{3x^3}-\frac{1}{6}bc^3\text{arctanh}\left(\sqrt{1-c^2x^2}\right)
\end{aligned}$$

Mathematica [A] (verified)

Time = 0.01 (sec) , antiderivative size = 67, normalized size of antiderivative = 1.08

$$\int \frac{a+b\arcsin(cx)}{x^4}\,dx = -\frac{a}{3x^3}-\frac{bc\sqrt{1-c^2x^2}}{6x^2}-\frac{b\arcsin(cx)}{3x^3}-\frac{1}{6}bc^3\text{arctanh}\left(\sqrt{1-c^2x^2}\right)$$

```
[In] Integrate[(a + b*ArcSin[c*x])/x^4,x]
```

```
[Out] -1/3*a/x^3 - (b*c*Sqrt[1 - c^2*x^2])/(6*x^2) - (b*ArcSin[c*x])/(3*x^3) - (b
*c^3*ArcTanh[Sqrt[1 - c^2*x^2]])/6
```

Maple [A] (verified)

Time = 0.01 (sec) , antiderivative size = 61, normalized size of antiderivative = 0.98

method	result	size
parts	$-\frac{a}{3x^3}+b\,c^3\left(-\frac{\arcsin(cx)}{3c^3x^3}-\frac{\sqrt{-c^2x^2+1}}{6c^2x^2}-\frac{\text{arctanh}\left(\frac{1}{\sqrt{-c^2x^2+1}}\right)}{6}\right)$	61
derivativedivides	$c^3\left(-\frac{a}{3c^3x^3}+b\left(-\frac{\arcsin(cx)}{3c^3x^3}-\frac{\sqrt{-c^2x^2+1}}{6c^2x^2}-\frac{\text{arctanh}\left(\frac{1}{\sqrt{-c^2x^2+1}}\right)}{6}\right)\right)$	65
default	$c^3\left(-\frac{a}{3c^3x^3}+b\left(-\frac{\arcsin(cx)}{3c^3x^3}-\frac{\sqrt{-c^2x^2+1}}{6c^2x^2}-\frac{\text{arctanh}\left(\frac{1}{\sqrt{-c^2x^2+1}}\right)}{6}\right)\right)$	65

```
[In] int((a+b*arcsin(c*x))/x^4,x,method=_RETURNVERBOSE)
```

```
[Out] -1/3*a/x^3+b*c^3*(-1/3/c^3/x^3*arcsin(c*x)-1/6/c^2/x^2*(-c^2*x^2+1)^(1/2)-1
/6*arctanh(1/(-c^2*x^2+1)^(1/2)))
```

Fricas [A] (verification not implemented)

none

Time = 0.28 (sec) , antiderivative size = 80, normalized size of antiderivative = 1.29

$$\int \frac{a+b\arcsin(cx)}{x^4}\,dx = -\frac{bc^3x^3\log\left(\sqrt{-c^2x^2+1}+1\right)-bc^3x^3\log\left(\sqrt{-c^2x^2+1}-1\right)+2\sqrt{-c^2x^2+1}bcx+4\,b\arcsin(cx)+4\,a}{12\,x^3}$$

```
[In] integrate((a+b*arcsin(c*x))/x^4,x, algorithm="fricas")
```

```
[Out] -1/12*(b*c^3*x^3*log(sqrt(-c^2*x^2 + 1) + 1) - b*c^3*x^3*log(sqrt(-c^2*x^2
+ 1) - 1) + 2*sqrt(-c^2*x^2 + 1)*b*c*x + 4*b*arcsin(c*x) + 4*a)/x^3
```

Sympy [A] (verification not implemented)

Time = 1.56 (sec) , antiderivative size = 117, normalized size of antiderivative = 1.89

$$\int \frac{a+b\arcsin(cx)}{x^4}\,dx = -\frac{a}{3x^3} + \frac{bc\left(\begin{cases} -\frac{c^2\operatorname{acosh}\left(\frac{1}{cx}\right)}{2} + \frac{c}{2x\sqrt{-1+\frac{1}{c^2x^2}}} - \frac{1}{2cx^3\sqrt{-1+\frac{1}{c^2x^2}}} & \text{for } \frac{1}{|c^2x^2|} > 1 \\ \frac{ic^2\operatorname{asin}\left(\frac{1}{cx}\right)}{2} - \frac{ic\sqrt{1-\frac{1}{c^2x^2}}}{2x} & \text{otherwise} \end{cases}\right)}{3} - \frac{b\operatorname{asin}(cx)}{3x^3}$$

```
[In] integrate((a+b*asin(c*x))/x**4,x)
```

```
[Out] -a/(3*x**3) + b*c*Piecewise((-c**2*acosh(1/(c*x))/2 + c/(2*x*sqrt(-1 + 1/(c
**2*x**2))) - 1/(2*c*x**3*sqrt(-1 + 1/(c**2*x**2))), 1/Abs(c**2*x**2) > 1),
 (I*c**2*asin(1/(c*x))/2 - I*c*sqrt(1 - 1/(c**2*x**2))/(2*x), True))/3 - b*
asin(c*x)/(3*x**3)
```

Maxima [A] (verification not implemented)

none

Time = 0.31 (sec) , antiderivative size = 69, normalized size of antiderivative = 1.11

$$\int \frac{a+b\arcsin(cx)}{x^4}\,dx = -\frac{1}{6}\left(\left(c^2\log\left(\frac{2\sqrt{-c^2x^2+1}}{|x|}+\frac{2}{|x|}\right)+\frac{\sqrt{-c^2x^2+1}}{x^2}\right)c+\frac{2\arcsin(cx)}{x^3}\right)b-\frac{a}{3x^3}$$

```
[In] integrate((a+b*arcsin(c*x))/x^4,x, algorithm="maxima")
```

```
[Out] -1/6*((c^2*log(2*sqrt(-c^2*x^2 + 1)/abs(x) + 2/abs(x)) + sqrt(-c^2*x^2 + 1)
/x^2)*c + 2*arcsin(c*x)/x^3)*b - 1/3*a/x^3
```

Giac [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 284 vs. $2(52) = 104$.

Time = 0.44 (sec) , antiderivative size = 284, normalized size of antiderivative = 4.58

$$\int \frac{a+b\arcsin(cx)}{x^4}\,dx = -\frac{bc^6x^3\arcsin(cx)}{24\left(\sqrt{-c^2x^2+1}+1\right)^3} - \frac{ac^6x^3}{24\left(\sqrt{-c^2x^2+1}+1\right)^3} + \frac{bc^5x^2}{24\left(\sqrt{-c^2x^2+1}+1\right)^2} - \frac{bc^4x\arcsin(cx)}{8\left(\sqrt{-c^2x^2+1}+1\right)} - \frac{ac^4x}{8\left(\sqrt{-c^2x^2+1}+1\right)} + \frac{1}{6}bc^3\log(|c||x|) - \frac{1}{6}bc^3\log\left(\sqrt{-c^2x^2+1}+1\right) - \frac{bc^2\left(\sqrt{-c^2x^2+1}+1\right)\arcsin(cx)}{8\,x} - \frac{ac^2\left(\sqrt{-c^2x^2+1}+1\right)}{8\,x} - \frac{bc\left(\sqrt{-c^2x^2+1}+1\right)^2}{24\,x^2} - \frac{b\left(\sqrt{-c^2x^2+1}+1\right)^3\arcsin(cx)}{24\,x^3} - \frac{a\left(\sqrt{-c^2x^2+1}+1\right)^3}{24\,x^3}$$

```
[In] integrate((a+b*arcsin(c*x))/x^4,x, algorithm="giac")
```

```
[Out] -1/24*b*c^6*x^3*arcsin(c*x)/(sqrt(-c^2*x^2 + 1) + 1)^3 - 1/24*a*c^6*x^3/(sq
rt(-c^2*x^2 + 1) + 1)^3 + 1/24*b*c^5*x^2/(sqrt(-c^2*x^2 + 1) + 1)^2 - 1/8*b
*c^4*x*arcsin(c*x)/(sqrt(-c^2*x^2 + 1) + 1) - 1/8*a*c^4*x/(sqrt(-c^2*x^2 +
1) + 1) + 1/6*b*c^3*log(abs(c)*abs(x)) - 1/6*b*c^3*log(sqrt(-c^2*x^2 + 1) +
 1) - 1/8*b*c^2*(sqrt(-c^2*x^2 + 1) + 1)*arcsin(c*x)/x - 1/8*a*c^2*(sqrt(-c
^2*x^2 + 1) + 1)/x - 1/24*b*c*(sqrt(-c^2*x^2 + 1) + 1)^2/x^2 - 1/24*b*(sqrt
(-c^2*x^2 + 1) + 1)^3*arcsin(c*x)/x^3 - 1/24*a*(sqrt(-c^2*x^2 + 1) + 1)^3/x
^3
```

Mupad [F(-1)]

Timed out.

$$\int \frac{a+b\arcsin(cx)}{x^4}\,dx = \int \frac{a+b\,\mathrm{asin}(c\,x)}{x^4}\,dx$$

```
[In] int((a + b*asin(c*x))/x^4,x)
```

```
[Out] int((a + b*asin(c*x))/x^4, x)
```

3.148 $\int x^2(a+b\arcsin(cx))^2\,dx$

Optimal result

Integrand size = 14, antiderivative size = 102

$$\int x^2(a+b\arcsin(cx))^2\,dx=-\frac{4b^2x}{9c^2}-\frac{2b^2x^3}{27}+\frac{4b\sqrt{1-c^2x^2}(a+b\arcsin(cx))}{9c^3}+\frac{2bx^2\sqrt{1-c^2x^2}(a+b\arcsin(cx))}{9c}+\frac{1}{3}x^3(a+b\arcsin(cx))^2$$

```
[Out] -4/9*b^2*x/c^2-2/27*b^2*x^3+1/3*x^3*(a+b*arcsin(c*x))^2+4/9*b*(a+b*arcsin(c
*x))*(-c^2*x^2+1)^(1/2)/c^3+2/9*b*x^2*(a+b*arcsin(c*x))*(-c^2*x^2+1)^(1/2)/
c
```

Rubi [A] (verified)

Time = 0.10 (sec) , antiderivative size = 102, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.357, Rules used = {4723, 4795, 4767, 8, 30}

$$\int x^2(a+b\arcsin(cx))^2\,dx=\frac{2bx^2\sqrt{1-c^2x^2}(a+b\arcsin(cx))}{9c}+\frac{4b\sqrt{1-c^2x^2}(a+b\arcsin(cx))}{9c^3}+\frac{1}{3}x^3(a+b\arcsin(cx))^2-\frac{4b^2x}{9c^2}-\frac{2}{27}b^2x^3$$

```
[In] Int[x^2*(a + b*ArcSin[c*x])^2,x]
```

```
[Out] (-4*b^2*x)/(9*c^2) - (2*b^2*x^3)/27 + (4*b*Sqrt[1 - c^2*x^2]*(a + b*ArcSin[
c*x]))/(9*c^3) + (2*b*x^2*Sqrt[1 - c^2*x^2]*(a + b*ArcSin[c*x]))/(9*c) + (x
^3*(a + b*ArcSin[c*x])^2)/3
```

Rule 8

```
Int[a_, x_Symbol] :> Simp[a*x, x] /; FreeQ[a, x]
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rule 4767

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)*((d_) + (e_.)*(x_)^2)^(p_
.), x_Symbol] :> Simp[(d + e*x^2)^(p + 1)*((a + b*ArcSin[c*x])^n/(2*e*(p +
1))), x] + Dist[b*(n/(2*c*(p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], In
t[(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x] /; FreeQ[{a,
b, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && NeQ[p, -1]
```

Rule 4795

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_)*((d_) + (e_.
)*(x_)^2)^(p_), x_Symbol] :> Simp[f*(f*x)^(m - 1)*(d + e*x^2)^(p + 1)*((a +
 b*ArcSin[c*x])^n/(e*(m + 2*p + 1))), x] + (Dist[f^2*((m - 1)/(c^2*(m + 2*p
 + 1))), Int[(f*x)^(m - 2)*(d + e*x^2)^p*(a + b*ArcSin[c*x])^n, x], x] + Di
st[b*f*(n/(c*(m + 2*p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], Int[(f*x)
^(m - 1)*(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x]) /; Fr
eeQ[{a, b, c, d, e, f, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && IGtQ[m,
1] && NeQ[m + 2*p + 1, 0]
```

Rubi steps

$$\begin{aligned}\text{integral} &= \frac{1}{3}x^3(a+b\arcsin(cx))^2-\frac{1}{3}(2bc)\int\frac{x^3(a+b\arcsin(cx))}{\sqrt{1-c^2x^2}}\,dx\\ &= \frac{2bx^2\sqrt{1-c^2x^2}(a+b\arcsin(cx))}{9c}+\frac{1}{3}x^3(a+b\arcsin(cx))^2\\ &\quad-\frac{1}{9}\left(2b^2\right)\int x^2\,dx-\frac{(4b)\int\frac{x(a+b\arcsin(cx))}{\sqrt{1-c^2x^2}}\,dx}{9c}\end{aligned}$$

$$
\begin{aligned}
&= -\frac{2}{27}b^2x^3 + \frac{4b\sqrt{1-c^2x^2}(a+b\arcsin(cx))}{9c^3} \\
&\quad + \frac{2bx^2\sqrt{1-c^2x^2}(a+b\arcsin(cx))}{9c} + \frac{1}{3}x^3(a+b\arcsin(cx))^2 - \frac{(4b^2)\int 1\,dx}{9c^2} \\
&= -\frac{4b^2x}{9c^2} - \frac{2b^2x^3}{27} + \frac{4b\sqrt{1-c^2x^2}(a+b\arcsin(cx))}{9c^3} \\
&\quad + \frac{2bx^2\sqrt{1-c^2x^2}(a+b\arcsin(cx))}{9c} + \frac{1}{3}x^3(a+b\arcsin(cx))^2
\end{aligned}
$$

Mathematica [A] (verified)

Time = 0.12 (sec) , antiderivative size = 95, normalized size of antiderivative = 0.93

$$
\int x^2(a+b\arcsin(cx))^2\,dx = \frac{1}{3}\left(x^3(a+b\arcsin(cx))^2 - \frac{2b\left(6bcx+bc^3x^3-6\sqrt{1-c^2x^2}(a+b\arcsin(cx))-3c^2x^2\sqrt{1-c^2x^2}(a+b\arcsin(cx))\right)}{9c^3}\right)
$$

```
[In] Integrate[x^2*(a + b*ArcSin[c*x])^2,x]
```

```
[Out] (x^3*(a + b*ArcSin[c*x])^2 - (2*b*(6*b*c*x + b*c^3*x^3 - 6*Sqrt[1 - c^2*x^2
]*(a + b*ArcSin[c*x]) - 3*c^2*x^2*Sqrt[1 - c^2*x^2]*(a + b*ArcSin[c*x])))/(
9*c^3))/3
```

Maple [A] (verified)

Time = 0.05 (sec) , antiderivative size = 125, normalized size of antiderivative = 1.23

method	result
parts	$\frac{a^2x^3}{3} + \frac{b^2\left(\frac{c^3x^3\arcsin(cx)^2}{3}+\frac{2\arcsin(cx)\left(c^2x^2+2\right)\sqrt{-c^2x^2+1}}{9}-\frac{2c^3x^3}{27}-\frac{4cx}{9}\right)}{c^3} + \frac{2ab\bigg(\frac{c^3x^3\arcsin(cx)}{3}+\frac{c^2x^2\sqrt{-c^2x^2+1}}{9}+}{c^3}$
derivativedivides	$\frac{\frac{a^2c^3x^3}{3}+b^2\left(\frac{c^3x^3\arcsin(cx)^2}{3}+\frac{2\arcsin(cx)\left(c^2x^2+2\right)\sqrt{-c^2x^2+1}}{9}-\frac{2c^3x^3}{27}-\frac{4cx}{9}\right)+2ab\bigg(\frac{c^3x^3\arcsin(cx)}{3}+\frac{c^2x^2\sqrt{-c^2x^2+1}}{9}+\frac{2\sqrt{-}}{}}{c^3}$
default	$\frac{\frac{a^2c^3x^3}{3}+b^2\left(\frac{c^3x^3\arcsin(cx)^2}{3}+\frac{2\arcsin(cx)\left(c^2x^2+2\right)\sqrt{-c^2x^2+1}}{9}-\frac{2c^3x^3}{27}-\frac{4cx}{9}\right)+2ab\bigg(\frac{c^3x^3\arcsin(cx)}{3}+\frac{c^2x^2\sqrt{-c^2x^2+1}}{9}+\frac{2\sqrt{-}}{}}{c^3}$

```
[In] int(x^2*(a+b*arcsin(c*x))^2,x,method=_RETURNVERBOSE)
```

```
[Out] 1/3*a^2*x^3+b^2/c^3*(1/3*c^3*x^3*arcsin(c*x)^2+2/9*arcsin(c*x)*(c^2*x^2+2)*
(-c^2*x^2+1)^(1/2)-2/27*c^3*x^3-4/9*c*x)+2*a*b/c^3*(1/3*c^3*x^3*arcsin(c*x)
+1/9*c^2*x^2*(-c^2*x^2+1)^(1/2)+2/9*(-c^2*x^2+1)^(1/2))
```

Fricas [A] (verification not implemented)

none

Time = 0.24 (sec) , antiderivative size = 111, normalized size of antiderivative = 1.09

$$\int x^2(a+b\arcsin(cx))^2\,dx$$
$$=\frac{9\,b^2c^3x^3\arcsin\left(cx\right)^2+18\,abc^3x^3\arcsin\left(cx\right)+(9\,a^2-2\,b^2)c^3x^3-12\,b^2cx+6\,(abc^2x^2+2\,ab+(b^2c^2x^2+2}{27\,c^3}$$

```
[In] integrate(x^2*(a+b*arcsin(c*x))^2,x, algorithm="fricas")
```

```
[Out] 1/27*(9*b^2*c^3*x^3*arcsin(c*x)^2 + 18*a*b*c^3*x^3*arcsin(c*x) + (9*a^2 - 2
*b^2)*c^3*x^3 - 12*b^2*c*x + 6*(a*b*c^2*x^2 + 2*a*b + (b^2*c^2*x^2 + 2*b^2)
*arcsin(c*x))*sqrt(-c^2*x^2 + 1))/c^3
```

Sympy [A] (verification not implemented)

Time = 0.28 (sec) , antiderivative size = 170, normalized size of antiderivative = 1.67

$$\int x^2(a+b\arcsin(cx))^2\,dx$$
$$=\begin{cases}\frac{a^2x^3}{3}+\frac{2abx^3\operatorname{asin}\left(cx\right)}{3}+\frac{2abx^2\sqrt{-c^2x^2+1}}{9c}+\frac{4ab\sqrt{-c^2x^2+1}}{9c^3}+\frac{b^2x^3\operatorname{asin}^2\left(cx\right)}{3}-\frac{2b^2x^3}{27}+\frac{2b^2x^2\sqrt{-c^2x^2+1}\operatorname{asin}\left(cx\right)}{9c}-\frac{4b^2x}{9c^2}+ \\ \frac{a^2x^3}{3}\end{cases}$$

```
[In] integrate(x**2*(a+b*asin(c*x))**2,x)
```

```
[Out] Piecewise((a**2*x**3/3 + 2*a*b*x**3*asin(c*x)/3 + 2*a*b*x**2*sqrt(-c**2*x**
2 + 1)/(9*c) + 4*a*b*sqrt(-c**2*x**2 + 1)/(9*c**3) + b**2*x**3*asin(c*x)**2
/3 - 2*b**2*x**3/27 + 2*b**2*x**2*sqrt(-c**2*x**2 + 1)*asin(c*x)/(9*c) - 4*
b**2*x/(9*c**2) + 4*b**2*sqrt(-c**2*x**2 + 1)*asin(c*x)/(9*c**3), Ne(c, 0))
, (a**2*x**3/3, True))
```

Maxima [A] (verification not implemented)

none

Time = 0.29 (sec) , antiderivative size = 142, normalized size of antiderivative = 1.39

$$\int x^2(a+b\arcsin(cx))^2\,dx = \frac{1}{3}\,b^2x^3\arcsin\left(cx\right)^2 + \frac{1}{3}\,a^2x^3 + \frac{2}{9}\left(3\,x^3\arcsin\left(cx\right) + c\left(\frac{\sqrt{-c^2x^2+1}x^2}{c^2} + \frac{2\,\sqrt{-c^2x^2+1}}{c^4}\right)\right)ab + \frac{2}{27}\left(3\,c\left(\frac{\sqrt{-c^2x^2+1}x^2}{c^2} + \frac{2\,\sqrt{-c^2x^2+1}}{c^4}\right)\arcsin\left(cx\right) - \frac{c^2x^3+6\,x}{c^2}\right)b^2$$

```
[In] integrate(x^2*(a+b*arcsin(c*x))^2,x, algorithm="maxima")
```

```
[Out] 1/3*b^2*x^3*arcsin(c*x)^2 + 1/3*a^2*x^3 + 2/9*(3*x^3*arcsin(c*x) + c*(sqrt(
-c^2*x^2 + 1)*x^2/c^2 + 2*sqrt(-c^2*x^2 + 1)/c^4))*a*b + 2/27*(3*c*(sqrt(-c
^2*x^2 + 1)*x^2/c^2 + 2*sqrt(-c^2*x^2 + 1)/c^4)*arcsin(c*x) - (c^2*x^3 + 6*
x)/c^2)*b^2
```

Giac [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 194 vs. $2(88) = 176$.

Time = 0.28 (sec) , antiderivative size = 194, normalized size of antiderivative = 1.90

$$\int x^2(a+b\arcsin(cx))^2\,dx = \frac{1}{3}\,a^2x^3 + \frac{(c^2x^2-1)b^2x\arcsin\left(cx\right)^2}{3\,c^2} + \frac{2\,(c^2x^2-1)abx\arcsin\left(cx\right)}{3\,c^2} + \frac{b^2x\arcsin\left(cx\right)^2}{3\,c^2} - \frac{2\,(c^2x^2-1)b^2x}{27\,c^2} + \frac{2\,abx\arcsin\left(cx\right)}{3\,c^2} - \frac{2\,(-c^2x^2+1)^{\frac{3}{2}}b^2\arcsin\left(cx\right)}{9\,c^3} - \frac{14\,b^2x}{27\,c^2} - \frac{2\,(-c^2x^2+1)^{\frac{3}{2}}ab}{9\,c^3} + \frac{2\,\sqrt{-c^2x^2+1}b^2\arcsin\left(cx\right)}{3\,c^3} + \frac{2\,\sqrt{-c^2x^2+1}ab}{3\,c^3}$$

```
[In] integrate(x^2*(a+b*arcsin(c*x))^2,x, algorithm="giac")
```

```
[Out] 1/3*a^2*x^3 + 1/3*(c^2*x^2 - 1)*b^2*x*arcsin(c*x)^2/c^2 + 2/3*(c^2*x^2 - 1)
*a*b*x*arcsin(c*x)/c^2 + 1/3*b^2*x*arcsin(c*x)^2/c^2 - 2/27*(c^2*x^2 - 1)*b
^2*x/c^2 + 2/3*a*b*x*arcsin(c*x)/c^2 - 2/9*(-c^2*x^2 + 1)^(3/2)*b^2*arcsin(
c*x)/c^3 - 14/27*b^2*x/c^2 - 2/9*(-c^2*x^2 + 1)^(3/2)*a*b/c^3 + 2/3*sqrt(-c
^2*x^2 + 1)*b^2*arcsin(c*x)/c^3 + 2/3*sqrt(-c^2*x^2 + 1)*a*b/c^3
```

Mupad [F(-1)]

Timed out.

$$\int x^2(a+b\arcsin(cx))^2\,dx=\int x^2\,(a+b\,\mathrm{asin}(c\,x))^2\,dx$$

```
[In] int(x^2*(a + b*asin(c*x))^2,x)
[Out] int(x^2*(a + b*asin(c*x))^2, x)
```

3.149 $\int x(a+b\arcsin(cx))^2\,dx$

Optimal result

Integrand size = 12, antiderivative size = 76

$$\int x(a+b\arcsin(cx))^2\,dx=-\frac{1}{4}b^2x^2+\frac{bx\sqrt{1-c^2x^2}(a+b\arcsin(cx))}{2c}-\frac{(a+b\arcsin(cx))^2}{4c^2}+\frac{1}{2}x^2(a+b\arcsin(cx))^2$$

```
[Out] -1/4*b^2*x^2-1/4*(a+b*arcsin(c*x))^2/c^2+1/2*x^2*(a+b*arcsin(c*x))^2+1/2*b*
x*(a+b*arcsin(c*x))*(-c^2*x^2+1)^(1/2)/c
```

Rubi [A] (verified)

Time = 0.07 (sec) , antiderivative size = 76, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.333, Rules used = {4723, 4795, 4737, 30}

$$\int x(a+b\arcsin(cx))^2\,dx=\frac{bx\sqrt{1-c^2x^2}(a+b\arcsin(cx))}{2c}-\frac{(a+b\arcsin(cx))^2}{4c^2}+\frac{1}{2}x^2(a+b\arcsin(cx))^2-\frac{1}{4}b^2x^2$$

```
[In] Int[x*(a + b*ArcSin[c*x])^2,x]
```

```
[Out] -1/4*(b^2*x^2) + (b*x*Sqrt[1 - c^2*x^2]*(a + b*ArcSin[c*x]))/(2*c) - (a + b
*ArcSin[c*x])^2/(4*c^2) + (x^2*(a + b*ArcSin[c*x])^2)/2
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rule 4737

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)/Sqrt[(d_) + (e_.)*(x_)^2], x_S
ymbol] :> Simp[(1/(b*c*(n + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]]*(a
 + b*ArcSin[c*x])^(n + 1), x] /; FreeQ[{a, b, c, d, e, n}, x] && EqQ[c^2*d
+ e, 0] && NeQ[n, -1]
```

Rule 4795

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_)*((d_) + (e_.
)*(x_)^2)^(p_), x_Symbol] :> Simp[f*(f*x)^(m - 1)*(d + e*x^2)^(p + 1)*((a +
 b*ArcSin[c*x])^n/(e*(m + 2*p + 1))), x] + (Dist[f^2*((m - 1)/(c^2*(m + 2*p
 + 1))), Int[(f*x)^(m - 2)*(d + e*x^2)^p*(a + b*ArcSin[c*x])^n, x], x] + Di
st[b*f*(n/(c*(m + 2*p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], Int[(f*x)
^(m - 1)*(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x]) /; Fr
eeQ[{a, b, c, d, e, f, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && IGtQ[m,
1] && NeQ[m + 2*p + 1, 0]
```

Rubi steps

$$\begin{aligned}\text{integral} &= \frac{1}{2}x^2(a+b\arcsin(cx))^2-(bc)\int\frac{x^2(a+b\arcsin(cx))}{\sqrt{1-c^2x^2}}\,dx\\ &= \frac{bx\sqrt{1-c^2x^2}(a+b\arcsin(cx))}{2c}+\frac{1}{2}x^2(a+b\arcsin(cx))^2-\frac{1}{2}b^2\int x\,dx-\frac{b\int\frac{a+b\arcsin(cx)}{\sqrt{1-c^2x^2}}\,dx}{2c}\\ &= -\frac{1}{4}b^2x^2+\frac{bx\sqrt{1-c^2x^2}(a+b\arcsin(cx))}{2c}-\frac{(a+b\arcsin(cx))^2}{4c^2}+\frac{1}{2}x^2(a+b\arcsin(cx))^2\end{aligned}$$

Mathematica [A] (verified)

Time = 0.05 (sec) , antiderivative size = 73, normalized size of antiderivative = 0.96

$$\int x(a+b\arcsin(cx))^2\,dx = -\frac{b^2c^2x^2-2bcx\sqrt{1-c^2x^2}(a+b\arcsin(cx))+(a+b\arcsin(cx))^2-2c^2x^2(a+b\arcsin(cx))^2}{4c^2}$$

```
[In] Integrate[x*(a + b*ArcSin[c*x])^2,x]
```

```
[Out] -1/4*(b^2*c^2*x^2 - 2*b*c*x*Sqrt[1 - c^2*x^2]*(a + b*ArcSin[c*x]) + (a + b*
ArcSin[c*x])^2 - 2*c^2*x^2*(a + b*ArcSin[c*x])^2)/c^2
```

Maple [A] (verified)

Time = 0.04 (sec) , antiderivative size = 119, normalized size of antiderivative = 1.57

method	result
parts	$\frac{a^2x^2}{2} + \frac{b^2\left(\frac{\left(c^2x^2-1\right)\arcsin(cx)^2}{2} + \frac{\arcsin(cx)\left(cx\sqrt{-c^2x^2+1}+\arcsin(cx)\right)}{2} - \frac{\arcsin(cx)^2}{4} - \frac{c^2x^2}{4}\right)}{c^2} + \frac{2ab\left(\frac{c^2x^2\arcsin(cx)}{2} + \frac{cx\ldots\right.}{c\ldots}$
derivativedivides	$\frac{\frac{c^2x^2a^2}{2} + b^2\left(\frac{\left(c^2x^2-1\right)\arcsin(cx)^2}{2} + \frac{\arcsin(cx)\left(cx\sqrt{-c^2x^2+1}+\arcsin(cx)\right)}{2} - \frac{\arcsin(cx)^2}{4} - \frac{c^2x^2}{4}\right) + 2ab\left(\frac{c^2x^2\arcsin(cx)}{2} + \frac{cx\sqrt{-\ldots}}{\ldots}\right.}{c^2}$
default	$\frac{\frac{c^2x^2a^2}{2} + b^2\left(\frac{\left(c^2x^2-1\right)\arcsin(cx)^2}{2} + \frac{\arcsin(cx)\left(cx\sqrt{-c^2x^2+1}+\arcsin(cx)\right)}{2} - \frac{\arcsin(cx)^2}{4} - \frac{c^2x^2}{4}\right) + 2ab\left(\frac{c^2x^2\arcsin(cx)}{2} + \frac{cx\sqrt{-\ldots}}{\ldots}\right.}{c^2}$

```
[In] int(x*(a+b*arcsin(c*x))^2,x,method=_RETURNVERBOSE)
```

```
[Out] 1/2*a^2*x^2+b^2/c^2*(1/2*(c^2*x^2-1)*arcsin(c*x)^2+1/2*arcsin(c*x)*(c*x*(-c
^2*x^2+1)^(1/2)+arcsin(c*x))-1/4*arcsin(c*x)^2-1/4*c^2*x^2)+2*a*b/c^2*(1/2*
c^2*x^2*arcsin(c*x)+1/4*c*x*(-c^2*x^2+1)^(1/2)-1/4*arcsin(c*x))
```

Fricas [A] (verification not implemented)

none

Time = 0.25 (sec) , antiderivative size = 99, normalized size of antiderivative = 1.30

$$\int x(a+b\arcsin(cx))^2\,dx$$
$$= \frac{(2\,a^2-b^2)c^2x^2 + (2\,b^2c^2x^2-b^2)\arcsin{(cx)}^2 + 2\,(2\,abc^2x^2-ab)\arcsin{(cx)} + 2\,(b^2cx\arcsin{(cx)}+abcx)\sqrt{\ldots}}{4\,c^2}$$

```
[In] integrate(x*(a+b*arcsin(c*x))^2,x, algorithm="fricas")
```

```
[Out] 1/4*((2*a^2 - b^2)*c^2*x^2 + (2*b^2*c^2*x^2 - b^2)*arcsin(c*x)^2 + 2*(2*a*b
*c^2*x^2 - a*b)*arcsin(c*x) + 2*(b^2*c*x*arcsin(c*x) + a*b*c*x)*sqrt(-c^2*x
^2 + 1))/c^2
```

Sympy [A] (verification not implemented)

Time = 0.21 (sec) , antiderivative size = 126, normalized size of antiderivative = 1.66

$$\int x(a+b\arcsin(cx))^2\,dx$$
$$= \begin{cases} \frac{a^2x^2}{2} + abx^2\operatorname{asin}{(cx)} + \frac{abx\sqrt{-c^2x^2+1}}{2c} - \frac{ab\operatorname{asin}{(cx)}}{2c^2} + \frac{b^2x^2\operatorname{asin}^2{(cx)}}{2} - \frac{b^2x^2}{4} + \frac{b^2x\sqrt{-c^2x^2+1}\operatorname{asin}{(cx)}}{2c} - \frac{b^2\operatorname{asin}^2{(cx)}}{4c^2} & \text{fo}\ldots \\ \frac{a^2x^2}{2} & \text{ot}\ldots \end{cases}$$

```
[In] integrate(x*(a+b*asin(c*x))**2,x)
```

```
[Out] Piecewise((a**2*x**2/2 + a*b*x**2*asin(c*x) + a*b*x*sqrt(-c**2*x**2 + 1)/(2
*c) - a*b*asin(c*x)/(2*c**2) + b**2*x**2*asin(c*x)**2/2 - b**2*x**2/4 + b**
2*x*sqrt(-c**2*x**2 + 1)*asin(c*x)/(2*c) - b**2*asin(c*x)**2/(4*c**2), Ne(c
, 0)), (a**2*x**2/2, True))
```

Maxima [F]

$$\int x(a+b\arcsin(cx))^2\,dx=\int (b\arcsin{(cx)}+a)^2x\,dx$$

```
[In] integrate(x*(a+b*arcsin(c*x))^2,x, algorithm="maxima")
```

```
[Out] 1/2*a^2*x^2 + 1/2*(2*x^2*arcsin(c*x) + c*(sqrt(-c^2*x^2 + 1)*x/c^2 - arcsin
(c*x)/c^3))*a*b + 1/2*(x^2*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1))^2 + 2
*c*integrate(sqrt(c*x + 1)*sqrt(-c*x + 1)*x^2*arctan2(c*x, sqrt(c*x + 1)*sq
rt(-c*x + 1))/(c^2*x^2 - 1), x))*b^2
```

Giac [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 155 vs. $2(66)=132$.

Time = 0.27 (sec) , antiderivative size = 155, normalized size of antiderivative = 2.04

$$\begin{aligned}\int x(a+b\arcsin(cx))^2\,dx=&\ \frac{\sqrt{-c^2x^2+1}b^2x\arcsin{(cx)}}{2\,c}+\frac{(c^2x^2-1)b^2\arcsin{(cx)}^2}{2\,c^2}\\&+\frac{\sqrt{-c^2x^2+1}abx}{2\,c}+\frac{(c^2x^2-1)ab\arcsin{(cx)}}{c^2}+\frac{b^2\arcsin{(cx)}^2}{4\,c^2}\\&+\frac{(c^2x^2-1)a^2}{2\,c^2}-\frac{(c^2x^2-1)b^2}{4\,c^2}+\frac{ab\arcsin{(cx)}}{2\,c^2}-\frac{b^2}{8\,c^2}\end{aligned}$$

```
[In] integrate(x*(a+b*arcsin(c*x))^2,x, algorithm="giac")
```

```
[Out] 1/2*sqrt(-c^2*x^2 + 1)*b^2*x*arcsin(c*x)/c + 1/2*(c^2*x^2 - 1)*b^2*arcsin(c
*x)^2/c^2 + 1/2*sqrt(-c^2*x^2 + 1)*a*b*x/c + (c^2*x^2 - 1)*a*b*arcsin(c*x)/
c^2 + 1/4*b^2*arcsin(c*x)^2/c^2 + 1/2*(c^2*x^2 - 1)*a^2/c^2 - 1/4*(c^2*x^2
- 1)*b^2/c^2 + 1/2*a*b*arcsin(c*x)/c^2 - 1/8*b^2/c^2
```

Mupad [F(-1)]

Timed out.

$$\int x(a+b\arcsin(cx))^2\,dx=\int x\,(a+b\,\mathrm{asin}(c\,x))^2\,dx$$

```
[In] int(x*(a + b*asin(c*x))^2,x)
[Out] int(x*(a + b*asin(c*x))^2, x)
```

3.150 $\int (a+b \arcsin(cx))^2 \, dx$

Optimal result

Integrand size = 10, antiderivative size = 47

$$\int (a+b \arcsin(cx))^2 \, dx = -2b^2x + \frac{2b\sqrt{1-c^2x^2}(a+b\arcsin(cx))}{c} + x(a+b\arcsin(cx))^2$$

```
[Out] -2*b^2*x+x*(a+b*arcsin(c*x))^2+2*b*(a+b*arcsin(c*x))*(-c^2*x^2+1)^(1/2)/c
```

Rubi [A] (verified)

Time = 0.04 (sec) , antiderivative size = 47, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.300, Rules used = {4715, 4767, 8}

$$\int (a+b \arcsin(cx))^2 \, dx = \frac{2b\sqrt{1-c^2x^2}(a+b\arcsin(cx))}{c} + x(a+b\arcsin(cx))^2 - 2b^2x$$

```
[In] Int[(a + b*ArcSin[c*x])^2,x]
```

```
[Out] -2*b^2*x + (2*b*Sqrt[1 - c^2*x^2]*(a + b*ArcSin[c*x]))/c + x*(a + b*ArcSin[
c*x])^2
```

Rule 8

```
Int[a_, x_Symbol] :> Simp[a*x, x] /; FreeQ[a, x]
```

Rule 4715

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.), x_Symbol] :> Simp[x*(a + b*Ar
cSin[c*x])^n, x] - Dist[b*c*n, Int[x*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 -
c^2*x^2]), x], x] /; FreeQ[{a, b, c}, x] && GtQ[n, 0]
```

Rule 4767

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)*((d_) + (e_.)*(x_)^2)^(p_
.), x_Symbol] :> Simp[(d + e*x^2)^(p + 1)*((a + b*ArcSin[c*x])^n/(2*e*(p +
1))), x] + Dist[b*(n/(2*c*(p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], In
t[(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x] /; FreeQ[{a,
b, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && NeQ[p, -1]
```

Rubi steps

$$\begin{aligned}\text{integral} &= x(a+b\arcsin(cx))^2-(2bc)\int \frac{x(a+b\arcsin(cx))}{\sqrt{1-c^2x^2}}\,dx\\ &= \frac{2b\sqrt{1-c^2x^2}(a+b\arcsin(cx))}{c}+x(a+b\arcsin(cx))^2-\left(2b^2\right)\int 1\,dx\\ &= -2b^2x+\frac{2b\sqrt{1-c^2x^2}(a+b\arcsin(cx))}{c}+x(a+b\arcsin(cx))^2\end{aligned}$$

Mathematica [A] (verified)

Time = 0.03 (sec) , antiderivative size = 47, normalized size of antiderivative = 1.00

$$\int (a+b\arcsin(cx))^2\,dx=-2b^2x+\frac{2b\sqrt{1-c^2x^2}(a+b\arcsin(cx))}{c}+x(a+b\arcsin(cx))^2$$

```
[In] Integrate[(a + b*ArcSin[c*x])^2,x]
[Out] -2*b^2*x + (2*b*Sqrt[1 - c^2*x^2]*(a + b*ArcSin[c*x]))/c + x*(a + b*ArcSin[
c*x])^2
```

Maple [A] (verified)

Time = 0.04 (sec) , antiderivative size = 72, normalized size of antiderivative = 1.53

method	result	size
derivativedivides	$\frac{cx\,a^2+b^2\left(cx\arcsin(cx)^2-2cx+2\arcsin(cx)\sqrt{-c^2x^2+1}\right)+2ab\left(cx\arcsin(cx)+\sqrt{-c^2x^2+1}\right)}{c}$	72
default	$\frac{cx\,a^2+b^2\left(cx\arcsin(cx)^2-2cx+2\arcsin(cx)\sqrt{-c^2x^2+1}\right)+2ab\left(cx\arcsin(cx)+\sqrt{-c^2x^2+1}\right)}{c}$	72
parts	$a^2x+\frac{b^2\left(cx\arcsin(cx)^2-2cx+2\arcsin(cx)\sqrt{-c^2x^2+1}\right)}{c}+\frac{2ab\left(cx\arcsin(cx)+\sqrt{-c^2x^2+1}\right)}{c}$	73

```
[In] int((a+b*arcsin(c*x))^2,x,method=_RETURNVERBOSE)
```

```
[Out] 1/c*(c*x*a^2+b^2*(c*x*arcsin(c*x)^2-2*c*x+2*arcsin(c*x)*(-c^2*x^2+1)^(1/2))
+2*a*b*(c*x*arcsin(c*x)+(-c^2*x^2+1)^(1/2)))
```

Fricas [A] (verification not implemented)

none

Time = 0.25 (sec) , antiderivative size = 65, normalized size of antiderivative = 1.38

$$\int (a+b\arcsin(cx))^2\,dx = \frac{b^2cx\arcsin{(cx)}^2 + 2\,abcx\arcsin{(cx)} + (a^2-2\,b^2)cx + 2\,\sqrt{-c^2x^2+1}(b^2\arcsin{(cx)}+ab)}{c}$$

```
[In] integrate((a+b*arcsin(c*x))^2,x, algorithm="fricas")
```

```
[Out] (b^2*c*x*arcsin(c*x)^2 + 2*a*b*c*x*arcsin(c*x) + (a^2 - 2*b^2)*c*x + 2*sqrt
(-c^2*x^2 + 1)*(b^2*arcsin(c*x) + a*b))/c
```

Sympy [A] (verification not implemented)

Time = 0.10 (sec) , antiderivative size = 82, normalized size of antiderivative = 1.74

$$\int (a+b\arcsin(cx))^2\,dx = \begin{cases} a^2x + 2abx\operatorname{asin}{(cx)} + \frac{2ab\sqrt{-c^2x^2+1}}{c} + b^2x\operatorname{asin}^2{(cx)} - 2b^2x + \frac{2b^2\sqrt{-c^2x^2+1}\operatorname{asin}{(cx)}}{c} & \text{for } c \neq 0 \\ a^2x & \text{otherwise} \end{cases}$$

```
[In] integrate((a+b*asin(c*x))**2,x)
```

```
[Out] Piecewise((a**2*x + 2*a*b*x*asin(c*x) + 2*a*b*sqrt(-c**2*x**2 + 1)/c + b**2
*x*asin(c*x)**2 - 2*b**2*x + 2*b**2*sqrt(-c**2*x**2 + 1)*asin(c*x)/c, Ne(c,
 0)), (a**2*x, True))
```

Maxima [A] (verification not implemented)

none

Time = 0.29 (sec) , antiderivative size = 72, normalized size of antiderivative = 1.53

$$\int (a+b\arcsin(cx))^2\,dx = b^2x\arcsin{(cx)}^2 - 2\,b^2\left(x - \frac{\sqrt{-c^2x^2+1}\arcsin{(cx)}}{c}\right) + a^2x + \frac{2\,\left(cx\arcsin{(cx)} + \sqrt{-c^2x^2+1}\right)ab}{c}$$

```
[In] integrate((a+b*arcsin(c*x))^2,x, algorithm="maxima")
```

```
[Out] b^2*x*arcsin(c*x)^2 - 2*b^2*(x - sqrt(-c^2*x^2 + 1)*arcsin(c*x)/c) + a^2*x
+ 2*(c*x*arcsin(c*x) + sqrt(-c^2*x^2 + 1))*a*b/c
```

Giac [A] (verification not implemented)

none

Time = 0.29 (sec) , antiderivative size = 75, normalized size of antiderivative = 1.60

$$\int (a+b\arcsin(cx))^2\,dx = b^2x\arcsin(cx)^2 + 2\,abx\arcsin(cx) + a^2x - 2\,b^2x + \frac{2\,\sqrt{-c^2x^2+1}b^2\arcsin(cx)}{c} + \frac{2\,\sqrt{-c^2x^2+1}ab}{c}$$

```
[In] integrate((a+b*arcsin(c*x))^2,x, algorithm="giac")
```

```
[Out] b^2*x*arcsin(c*x)^2 + 2*a*b*x*arcsin(c*x) + a^2*x - 2*b^2*x + 2*sqrt(-c^2*x
^2 + 1)*b^2*arcsin(c*x)/c + 2*sqrt(-c^2*x^2 + 1)*a*b/c
```

Mupad [B] (verification not implemented)

Time = 0.38 (sec) , antiderivative size = 142, normalized size of antiderivative = 3.02

$$\int (a+b\arcsin(cx))^2\,dx = \begin{cases} b^2\left(x\left(\operatorname{asin}(c\,x)^2-2\right)+2\operatorname{asin}(c\,x)\,\sqrt{\frac{1}{c^2}-x^2}\right)+a^2\,x+\frac{2\,a\,b\left(\sqrt{1-c^2\,x^2}+c\,x\operatorname{asin}(c\,x)\right)}{c} & \text{if } 0<c \\ a^2\,x+b^2\,x\left(\operatorname{asin}(c\,x)^2-2\right)+\frac{2\,b^2\operatorname{asin}(c\,x)\,\sqrt{1-c^2\,x^2}}{c}+\frac{2\,a\,b\left(\sqrt{1-c^2\,x^2}+c\,x\operatorname{asin}(c\,x)\right)}{c} & \text{if } \neg 0<c \end{cases}$$

```
[In] int((a + b*asin(c*x))^2,x)
```

```
[Out] piecewise(0 < c, b^2*(x*(asin(c*x)^2 - 2) + 2*asin(c*x)*(1/c^2 - x^2)^(1/2)
) + a^2*x + (2*a*b*((- c^2*x^2 + 1)^(1/2) + c*x*asin(c*x)))/c, ~0 < c, a^2*
x + b^2*x*(asin(c*x)^2 - 2) + (2*b^2*asin(c*x)*(- c^2*x^2 + 1)^(1/2))/c + (
2*a*b*((- c^2*x^2 + 1)^(1/2) + c*x*asin(c*x)))/c)
```

3.151 $\int \frac{(a+b\arcsin(cx))^2}{x}\,dx$

Optimal result

Integrand size = 14, antiderivative size = 90

$$\int \frac{(a+b\arcsin(cx))^2}{x}\,dx = -\frac{i(a+b\arcsin(cx))^3}{3b} + (a+b\arcsin(cx))^2\log\left(1-e^{2i\arcsin(cx)}\right) - ib(a+b\arcsin(cx))\,\text{PolyLog}\left(2,e^{2i\arcsin(cx)}\right) + \frac{1}{2}b^2\,\text{PolyLog}\left(3,e^{2i\arcsin(cx)}\right)$$

```
[Out] -1/3*I*(a+b*arcsin(c*x))^3/b+(a+b*arcsin(c*x))^2*ln(1-(I*c*x+(-c^2*x^2+1)^(
1/2))^2)-I*b*(a+b*arcsin(c*x))*polylog(2,(I*c*x+(-c^2*x^2+1)^(1/2))^2)+1/2*
b^2*polylog(3,(I*c*x+(-c^2*x^2+1)^(1/2))^2)
```

Rubi [A] (verified)

Time = 0.08 (sec) , antiderivative size = 90, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 6, $\frac{\text{number of rules}}{\text{integrand size}} = 0.429$, Rules used = {4721, 3798, 2221, 2611, 2320, 6724}

$$\int \frac{(a+b\arcsin(cx))^2}{x}\,dx = -ib\,\text{PolyLog}\left(2,e^{2i\arcsin(cx)}\right)(a+b\arcsin(cx)) - \frac{i(a+b\arcsin(cx))^3}{3b} + \log\left(1-e^{2i\arcsin(cx)}\right)(a+b\arcsin(cx))^2 + \frac{1}{2}b^2\,\text{PolyLog}\left(3,e^{2i\arcsin(cx)}\right)$$

```
[In] Int[(a + b*ArcSin[c*x])^2/x,x]
```

```
[Out] ((-1/3*I)*(a + b*ArcSin[c*x])^3)/b + (a + b*ArcSin[c*x])^2*Log[1 - E^((2*I)
*ArcSin[c*x])] - I*b*(a + b*ArcSin[c*x])*PolyLog[2, E^((2*I)*ArcSin[c*x])]
+ (b^2*PolyLog[3, E^((2*I)*ArcSin[c*x])])/2
```

Rule 2221

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m/(b*f*g*n*Log[F]))*Log[1 + b*((F^(g*(e + f*x)))^n/a)], x] - Di
st[d*(m/(b*f*g*n*Log[F])), Int[(c + d*x)^(m - 1)*Log[1 + b*((F^(g*(e + f*x)
))^n/a)], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2320

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2611

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> Simp[(-(f + g*x)^m)*(PolyLog[2, (-e)*(F^(c*(a +
b*x)))^n]/(b*c*n*Log[F])), x] + Dist[g*(m/(b*c*n*Log[F])), Int[(f + g*x)^(m
 - 1)*PolyLog[2, (-e)*(F^(c*(a + b*x)))^n], x], x] /; FreeQ[{F, a, b, c, e,
 f, g, n}, x] && GtQ[m, 0]
```

Rule 3798

```
Int[((c_.) + (d_.)*(x_))^(m_.)*tan[(e_.) + Pi*(k_.) + (f_.)*(x_)], x_Symbol
] :> Simp[I*((c + d*x)^(m + 1)/(d*(m + 1))), x] - Dist[2*I, Int[(c + d*x)^m
*E^(2*I*k*Pi)*(E^(2*I*(e + f*x))/(1 + E^(2*I*k*Pi)*E^(2*I*(e + f*x)))), x],
 x] /; FreeQ[{c, d, e, f}, x] && IntegerQ[4*k] && IGtQ[m, 0]
```

Rule 4721

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)/(x_), x_Symbol] :> Subst[Int[(
a + b*x)^n*Cot[x], x], x, ArcSin[c*x]] /; FreeQ[{a, b, c}, x] && IGtQ[n, 0]
```

Rule 6724

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rubi steps

$$\text{integral} = \text{Subst}\left(\int (a+bx)^2 \cot(x)\, dx, x, \arcsin(cx)\right)$$

$$= -\frac{i(a+b\arcsin(cx))^3}{3b} - 2i\text{Subst}\left(\int \frac{e^{2ix}(a+bx)^2}{1-e^{2ix}}\,dx, x, \arcsin(cx)\right)$$

$$= -\frac{i(a+b\arcsin(cx))^3}{3b} + (a+b\arcsin(cx))^2\log\left(1-e^{2i\arcsin(cx)}\right) - (2b)\text{Subst}\left(\int (a+bx)\log\left(1-e^{2ix}\right)\,dx, x, \arcsin(cx)\right)$$

$$= -\frac{i(a+b\arcsin(cx))^3}{3b} + (a+b\arcsin(cx))^2\log\left(1-e^{2i\arcsin(cx)}\right) - ib(a+b\arcsin(cx))\,\text{PolyLog}\left(2, e^{2i\arcsin(cx)}\right) + \left(ib^2\right)\text{Subst}\left(\int \text{PolyLog}\left(2, e^{2ix}\right)\,dx, x, \arcsin(cx)\right)$$

$$= -\frac{i(a+b\arcsin(cx))^3}{3b} + (a+b\arcsin(cx))^2\log\left(1-e^{2i\arcsin(cx)}\right) - ib(a+b\arcsin(cx))\,\text{PolyLog}\left(2, e^{2i\arcsin(cx)}\right) + \frac{1}{2}b^2\text{Subst}\left(\int \frac{\text{PolyLog}(2,x)}{x}\,dx, x, e^{2i\arcsin(cx)}\right)$$

$$= -\frac{i(a+b\arcsin(cx))^3}{3b} + (a+b\arcsin(cx))^2\log\left(1-e^{2i\arcsin(cx)}\right) - ib(a+b\arcsin(cx))\,\text{PolyLog}\left(2, e^{2i\arcsin(cx)}\right) + \frac{1}{2}b^2\,\text{PolyLog}\left(3, e^{2i\arcsin(cx)}\right)$$

Mathematica [A] (verified)

Time = 0.12 (sec) , antiderivative size = 143, normalized size of antiderivative = 1.59

$$\int \frac{(a+b\arcsin(cx))^2}{x}\,dx = a^2\log(cx) + 2ab\left(\arcsin(cx)\log\left(1-e^{2i\arcsin(cx)}\right) - \frac{1}{2}i\left(\arcsin(cx)^2 + \text{PolyLog}\left(2, e^{2i\arcsin(cx)}\right)\right)\right) + b^2\left(-\frac{i\pi^3}{24} + \frac{1}{3}i\arcsin(cx)^3 + \arcsin(cx)^2\log\left(1-e^{-2i\arcsin(cx)}\right) + i\arcsin(cx)\,\text{PolyLog}\left(2, e^{-2i\arcsin(cx)}\right) + \frac{1}{2}\text{PolyLog}\left(3, e^{-2i\arcsin(cx)}\right)\right)$$

```
[In] Integrate[(a + b*ArcSin[c*x])^2/x,x]
```

```
[Out] a^2*Log[c*x] + 2*a*b*(ArcSin[c*x]*Log[1 - E^((2*I)*ArcSin[c*x])] - (I/2)*(A
rcSin[c*x]^2 + PolyLog[2, E^((2*I)*ArcSin[c*x])])) + b^2*((-1/24*I)*Pi^3 +
(I/3)*ArcSin[c*x]^3 + ArcSin[c*x]^2*Log[1 - E^((-2*I)*ArcSin[c*x])] + I*Arc
Sin[c*x]*PolyLog[2, E^((-2*I)*ArcSin[c*x])] + PolyLog[3, E^((-2*I)*ArcSin[c
*x])]/2)
```

Maple [B] (verified)

Both result and optimal contain complex but leaf count of result is larger than twice the leaf count of optimal. 293 vs. 2(114) = 228.

Time = 0.07 (sec) , antiderivative size = 294, normalized size of antiderivative = 3.27

method	result
parts	$a^2\ln(x)+b^2\left(-\frac{i\arcsin(cx)^3}{3}+\arcsin(cx)^2\ln\left(1+icx+\sqrt{-c^2x^2+1}\right)-2i\arcsin(cx)\,\text{poly}\right.$
derivativedivides	$a^2\ln(cx)+b^2\left(-\frac{i\arcsin(cx)^3}{3}+\arcsin(cx)^2\ln\left(1+icx+\sqrt{-c^2x^2+1}\right)-2i\arcsin(cx)\,\text{po}\right.$
default	$a^2\ln(cx)+b^2\left(-\frac{i\arcsin(cx)^3}{3}+\arcsin(cx)^2\ln\left(1+icx+\sqrt{-c^2x^2+1}\right)-2i\arcsin(cx)\,\text{po}\right.$

```
[In] int((a+b*arcsin(c*x))^2/x,x,method=_RETURNVERBOSE)
```

```
[Out] a^2*ln(x)+b^2*(-1/3*I*arcsin(c*x)^3+arcsin(c*x)^2*ln(1+I*c*x+(-c^2*x^2+1)^(
1/2))-2*I*arcsin(c*x)*polylog(2,-I*c*x-(-c^2*x^2+1)^(1/2))+2*polylog(3,-I*c
*x-(-c^2*x^2+1)^(1/2))+arcsin(c*x)^2*ln(1-I*c*x-(-c^2*x^2+1)^(1/2))-2*I*arc
sin(c*x)*polylog(2,I*c*x+(-c^2*x^2+1)^(1/2))+2*polylog(3,I*c*x+(-c^2*x^2+1)
^(1/2)))+2*a*b*(-1/2*I*arcsin(c*x)^2+arcsin(c*x)*ln(1+I*c*x+(-c^2*x^2+1)^(1
/2))-I*polylog(2,-I*c*x-(-c^2*x^2+1)^(1/2))+arcsin(c*x)*ln(1-I*c*x-(-c^2*x^
2+1)^(1/2))-I*polylog(2,I*c*x+(-c^2*x^2+1)^(1/2)))
```

Fricas [F]

$$\int \frac{(a+b\arcsin(cx))^2}{x}\,dx = \int \frac{(b\arcsin(cx)+a)^2}{x}\,dx$$

```
[In] integrate((a+b*arcsin(c*x))^2/x,x, algorithm="fricas")
```

```
[Out] integral((b^2*arcsin(c*x)^2 + 2*a*b*arcsin(c*x) + a^2)/x, x)
```

Sympy [F]

$$\int \frac{(a+b\arcsin(cx))^2}{x}\,dx = \int \frac{(a+b\,\text{asin}(cx))^2}{x}\,dx$$

```
[In] integrate((a+b*asin(c*x))**2/x,x)
```

```
[Out] Integral((a + b*asin(c*x))**2/x, x)
```

Maxima [F]

$$\int \frac{(a+b\arcsin(cx))^2}{x}\,dx = \int \frac{(b\arcsin(cx)+a)^2}{x}\,dx$$

```
[In] integrate((a+b*arcsin(c*x))^2/x,x, algorithm="maxima")
```

```
[Out] a^2*log(x) + integrate((b^2*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1))^2 +
2*a*b*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1)))/x, x)
```

Giac [F]

$$\int \frac{(a+b\arcsin(cx))^2}{x}\,dx = \int \frac{(b\arcsin(cx)+a)^2}{x}\,dx$$

```
[In] integrate((a+b*arcsin(c*x))^2/x,x, algorithm="giac")
```

```
[Out] integrate((b*arcsin(c*x) + a)^2/x, x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{(a+b\arcsin(cx))^2}{x}\,dx = \int \frac{(a+b\,\mathrm{asin}(c\,x))^2}{x}\,dx$$

```
[In] int((a + b*asin(c*x))^2/x,x)
```

```
[Out] int((a + b*asin(c*x))^2/x, x)
```

3.152 $\int \frac{(a+b\arcsin(cx))^2}{x^2}\,dx$

Optimal result

Integrand size = 14, antiderivative size = 81

$$\int \frac{(a+b\arcsin(cx))^2}{x^2}\,dx = -\frac{(a+b\arcsin(cx))^2}{x} - 4bc(a+b\arcsin(cx))\operatorname{arctanh}\left(e^{i\arcsin(cx)}\right) + 2ib^2c\operatorname{PolyLog}\left(2,-e^{i\arcsin(cx)}\right) - 2ib^2c\operatorname{PolyLog}\left(2,e^{i\arcsin(cx)}\right)$$

```
[Out] -(a+b*arcsin(c*x))^2/x-4*b*c*(a+b*arcsin(c*x))*arctanh(I*c*x+(-c^2*x^2+1)^(
1/2))+2*I*b^2*c*polylog(2,-I*c*x-(-c^2*x^2+1)^(1/2))-2*I*b^2*c*polylog(2,I*
c*x+(-c^2*x^2+1)^(1/2))
```

Rubi [A] (verified)

Time = 0.08 (sec) , antiderivative size = 81, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 5, $\frac{\text{number of rules}}{\text{integrand size}} = 0.357$, Rules used = {4723, 4803, 4268, 2317, 2438}

$$\int \frac{(a+b\arcsin(cx))^2}{x^2}\,dx = -4bc\operatorname{arctanh}\left(e^{i\arcsin(cx)}\right)(a+b\arcsin(cx)) - \frac{(a+b\arcsin(cx))^2}{x} + 2ib^2c\operatorname{PolyLog}\left(2,-e^{i\arcsin(cx)}\right) - 2ib^2c\operatorname{PolyLog}\left(2,e^{i\arcsin(cx)}\right)$$

```
[In] Int[(a + b*ArcSin[c*x])^2/x^2,x]
```

```
[Out] -((a + b*ArcSin[c*x])^2/x) - 4*b*c*(a + b*ArcSin[c*x])*ArcTanh[E^(I*ArcSin[
c*x])] + (2*I)*b^2*c*PolyLog[2, -E^(I*ArcSin[c*x])] - (2*I)*b^2*c*PolyLog[2
, E^(I*ArcSin[c*x])]
```

Rule 2317

```
Int[Log[(a_) + (b_.)*((F_)^((e_.)*((c_.) + (d_.)*(x_))))^(n_.)], x_Symbol]
:> Dist[1/(d*e*n*Log[F]), Subst[Int[Log[a + b*x]/x, x], x, (F^(e*(c + d*x))
```

```
)^n], x] /; FreeQ[{F, a, b, c, d, e, n}, x] && GtQ[a, 0]
```

Rule 2438

```
Int[Log[(c_.)*((d_) + (e_.)*(x_)^(n_.))]/(x_), x_Symbol] :> Simp[-PolyLog[2
, (-c)*e*x^n]/n, x] /; FreeQ[{c, d, e, n}, x] && EqQ[c*d, 1]
```

Rule 4268

```
Int[csc[(e_.) + (f_.)*(x_)]*((c_.) + (d_.)*(x_))^(m_.), x_Symbol] :> Simp[-
2*(c + d*x)^m*(ArcTanh[E^(I*(e + f*x))]/f), x] + (-Dist[d*(m/f), Int[(c + d
*x)^(m - 1)*Log[1 - E^(I*(e + f*x))], x], x] + Dist[d*(m/f), Int[(c + d*x)^
(m - 1)*Log[1 + E^(I*(e + f*x))], x], x]) /; FreeQ[{c, d, e, f}, x] && IGtQ
[m, 0]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rule 4803

```
Int[(((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_))/Sqrt[(d_) + (e_.)*
(x_)^2], x_Symbol] :> Dist[(1/c^(m + 1))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*
x^2]], Subst[Int[(a + b*x)^n*Sin[x]^m, x], x, ArcSin[c*x]], x] /; FreeQ[{a,
 b, c, d, e}, x] && EqQ[c^2*d + e, 0] && IGtQ[n, 0] && IntegerQ[m]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= -\frac{(a+b\arcsin(cx))^2}{x} + (2bc)\int \frac{a+b\arcsin(cx)}{x\sqrt{1-c^2x^2}}\,dx \\
&= -\frac{(a+b\arcsin(cx))^2}{x} + (2bc)\text{Subst}\Big(\int (a+bx)\csc(x)\,dx, x, \arcsin(cx)\Big) \\
&= -\frac{(a+b\arcsin(cx))^2}{x} - 4bc(a+b\arcsin(cx))\text{arctanh}\left(e^{i\arcsin(cx)}\right) \\
&\quad - \left(2b^2c\right)\text{Subst}\left(\int \log\left(1-e^{ix}\right)\,dx, x, \arcsin(cx)\right) \\
&\quad + \left(2b^2c\right)\text{Subst}\left(\int \log\left(1+e^{ix}\right)\,dx, x, \arcsin(cx)\right)
\end{aligned}$$

$$= -\frac{(a+b\arcsin(cx))^2}{x} - 4bc(a+b\arcsin(cx))\text{arctanh}\left(e^{i\arcsin(cx)}\right) + (2ib^2c)\,\text{Subst}\left(\int \frac{\log(1-x)}{x}\,dx, x, e^{i\arcsin(cx)}\right) - (2ib^2c)\,\text{Subst}\left(\int \frac{\log(1+x)}{x}\,dx, x, e^{i\arcsin(cx)}\right)$$

$$= -\frac{(a+b\arcsin(cx))^2}{x} - 4bc(a+b\arcsin(cx))\text{arctanh}\left(e^{i\arcsin(cx)}\right) + 2ib^2c\,\text{PolyLog}\left(2, -e^{i\arcsin(cx)}\right) - 2ib^2c\,\text{PolyLog}\left(2, e^{i\arcsin(cx)}\right)$$

Mathematica [A] (verified)

Time = 0.21 (sec) , antiderivative size = 126, normalized size of antiderivative = 1.56

$$\int \frac{(a+b\arcsin(cx))^2}{x^2}\,dx = -\frac{a^2 + 2ab\left(\arcsin(cx) + cx\text{arctanh}\left(\sqrt{1-c^2x^2}\right)\right) - ib^2\left(i\arcsin(cx)\left(\arcsin(cx) + 2cx\left(-\log\left(1 - e^{i\arcsin(cx}\right.\right.\right.\right.}{x}$$

```
[In] Integrate[(a + b*ArcSin[c*x])^2/x^2,x]
```

```
[Out] -((a^2 + 2*a*b*(ArcSin[c*x] + c*x*ArcTanh[Sqrt[1 - c^2*x^2]]) - I*b^2*(I*Ar
cSin[c*x]*(ArcSin[c*x] + 2*c*x*(-Log[1 - E^(I*ArcSin[c*x])] + Log[1 + E^(I*
ArcSin[c*x])])) + 2*c*x*PolyLog[2, -E^(I*ArcSin[c*x])] - 2*c*x*PolyLog[2, E
^(I*ArcSin[c*x])]))/x)
```

Maple [A] (verified)

Time = 0.04 (sec) , antiderivative size = 165, normalized size of antiderivative = 2.04

method	result
parts	$-\frac{a^2}{x} + b^2c\left(-\frac{\arcsin(cx)^2}{cx} + 2\arcsin(cx)\ln\left(1 - icx - \sqrt{-c^2x^2+1}\right) - 2\arcsin(cx)\ln\left(1 + \right.\right.$
derivativedivides	$c\left(-\frac{a^2}{cx} + b^2\left(-\frac{\arcsin(cx)^2}{cx} + 2\arcsin(cx)\ln\left(1 - icx - \sqrt{-c^2x^2+1}\right) - 2\arcsin(cx)\ln\left(1 + \right.\right.\right.$
default	$c\left(-\frac{a^2}{cx} + b^2\left(-\frac{\arcsin(cx)^2}{cx} + 2\arcsin(cx)\ln\left(1 - icx - \sqrt{-c^2x^2+1}\right) - 2\arcsin(cx)\ln\left(1 + \right.\right.\right.$

```
[In] int((a+b*arcsin(c*x))^2/x^2,x,method=_RETURNVERBOSE)
```

```
[Out] -a^2/x+b^2*c*(-1/c/x*arcsin(c*x)^2+2*arcsin(c*x)*ln(1-I*c*x-(-c^2*x^2+1)^(1
/2))-2*arcsin(c*x)*ln(1+I*c*x+(-c^2*x^2+1)^(1/2))+2*I*dilog(1+I*c*x+(-c^2*x
^2+1)^(1/2))-2*I*dilog(1-I*c*x-(-c^2*x^2+1)^(1/2)))+2*a*b*c*(-1/c/x*arcsin(
c*x)-arctanh(1/(-c^2*x^2+1)^(1/2)))
```

Fricas [F]

$$\int \frac{(a+b\arcsin(cx))^2}{x^2}\,dx = \int \frac{(b\arcsin(cx)+a)^2}{x^2}\,dx$$

```
[In] integrate((a+b*arcsin(c*x))^2/x^2,x, algorithm="fricas")
[Out] integral((b^2*arcsin(c*x)^2 + 2*a*b*arcsin(c*x) + a^2)/x^2, x)
```

Sympy [F]

$$\int \frac{(a+b\arcsin(cx))^2}{x^2}\,dx = \int \frac{(a+b\,\mathrm{asin}\,(cx))^2}{x^2}\,dx$$

```
[In] integrate((a+b*asin(c*x))**2/x**2,x)
[Out] Integral((a + b*asin(c*x))**2/x**2, x)
```

Maxima [F]

$$\int \frac{(a+b\arcsin(cx))^2}{x^2}\,dx = \int \frac{(b\arcsin(cx)+a)^2}{x^2}\,dx$$

```
[In] integrate((a+b*arcsin(c*x))^2/x^2,x, algorithm="maxima")
[Out] -2*(c*log(2*sqrt(-c^2*x^2 + 1)/abs(x) + 2/abs(x)) + arcsin(c*x)/x)*a*b - (2
*c*x*integrate(sqrt(c*x + 1)*sqrt(-c*x + 1)*arctan2(c*x, sqrt(c*x + 1)*sqrt
(-c*x + 1))/(c^2*x^3 - x), x) + arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1))^
2)*b^2/x - a^2/x
```

Giac [F]

$$\int \frac{(a+b\arcsin(cx))^2}{x^2}\,dx = \int \frac{(b\arcsin(cx)+a)^2}{x^2}\,dx$$

```
[In] integrate((a+b*arcsin(c*x))^2/x^2,x, algorithm="giac")
[Out] integrate((b*arcsin(c*x) + a)^2/x^2, x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{(a+b\arcsin(cx))^2}{x^2}\,dx = \int \frac{\left(a+b\,\mathrm{asin}(c\,x)\right)^2}{x^2}\,dx$$

```
[In] int((a + b*asin(c*x))^2/x^2,x)
```

```
[Out] int((a + b*asin(c*x))^2/x^2, x)
```

3.153 $\int x^2(a+b\arcsin(cx))^3\,dx$

Optimal result

Integrand size = 14, antiderivative size = 178

$$\int x^2(a+b\arcsin(cx))^3\,dx=-\frac{4ab^2x}{3c^2}-\frac{14b^3\sqrt{1-c^2x^2}}{9c^3}+\frac{2b^3(1-c^2x^2)^{3/2}}{27c^3}-\frac{4b^3x\arcsin(cx)}{3c^2}-\frac{2}{9}b^2x^3(a+b\arcsin(cx))+\frac{2b\sqrt{1-c^2x^2}(a+b\arcsin(cx))^2}{3c^3}+\frac{bx^2\sqrt{1-c^2x^2}(a+b\arcsin(cx))^2}{3c}+\frac{1}{3}x^3(a+b\arcsin(cx))^3$$

```
[Out] -4/3*a*b^2*x/c^2+2/27*b^3*(-c^2*x^2+1)^(3/2)/c^3-4/3*b^3*x*arcsin(c*x)/c^2-
2/9*b^2*x^3*(a+b*arcsin(c*x))+1/3*x^3*(a+b*arcsin(c*x))^3-14/9*b^3*(-c^2*x^
2+1)^(1/2)/c^3+2/3*b*(a+b*arcsin(c*x))^2*(-c^2*x^2+1)^(1/2)/c^3+1/3*b*x^2*(
a+b*arcsin(c*x))^2*(-c^2*x^2+1)^(1/2)/c
```

Rubi [A] (verified)

Time = 0.19 (sec) , antiderivative size = 178, normalized size of antiderivative = 1.00, number of steps used = 10, number of rules used = 7, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {4723, 4795, 4767, 4715, 267, 272, 45}

$$\int x^2(a+b\arcsin(cx))^3\,dx=-\frac{2}{9}b^2x^3(a+b\arcsin(cx))+\frac{bx^2\sqrt{1-c^2x^2}(a+b\arcsin(cx))^2}{3c}+\frac{2b\sqrt{1-c^2x^2}(a+b\arcsin(cx))^2}{3c^3}+\frac{1}{3}x^3(a+b\arcsin(cx))^3-\frac{4ab^2x}{3c^2}-\frac{4b^3x\arcsin(cx)}{3c^2}+\frac{2b^3(1-c^2x^2)^{3/2}}{27c^3}-\frac{14b^3\sqrt{1-c^2x^2}}{9c^3}$$

```
[In] Int[x^2*(a + b*ArcSin[c*x])^3,x]
```

```
[Out] (-4*a*b^2*x)/(3*c^2) - (14*b^3*Sqrt[1 - c^2*x^2])/(9*c^3) + (2*b^3*(1 - c^2
*x^2)^(3/2))/(27*c^3) - (4*b^3*x*ArcSin[c*x])/(3*c^2) - (2*b^2*x^3*(a + b*A
rcSin[c*x]))/9 + (2*b*Sqrt[1 - c^2*x^2]*(a + b*ArcSin[c*x])^2)/(3*c^3) + (b
*x^2*Sqrt[1 - c^2*x^2]*(a + b*ArcSin[c*x])^2)/(3*c) + (x^3*(a + b*ArcSin[c*
x])^3)/3
```

Rule 45

```
Int[((a_.) + (b_.)*(x_))^(m_.)*((c_.) + (d_.)*(x_))^(n_.), x_Symbol] :> Int
[ExpandIntegrand[(a + b*x)^m*(c + d*x)^n, x], x] /; FreeQ[{a, b, c, d, n},
x] && NeQ[b*c - a*d, 0] && IGtQ[m, 0] && ( !IntegerQ[n] || (EqQ[c, 0] && Le
Q[7*m + 4*n + 4, 0]) || LtQ[9*m + 5*(n + 1), 0] || GtQ[m + n + 2, 0])
```

Rule 267

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[(a + b*x^n)
^(p + 1)/(b*n*(p + 1)), x] /; FreeQ[{a, b, m, n, p}, x] && EqQ[m, n - 1] &&
 NeQ[p, -1]
```

Rule 272

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[1/n, Subst[
Int[x^(Simplify[(m + 1)/n] - 1)*(a + b*x)^p, x], x, x^n], x] /; FreeQ[{a, b
, m, n, p}, x] && IntegerQ[Simplify[(m + 1)/n]]
```

Rule 4715

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.), x_Symbol] :> Simp[x*(a + b*Ar
cSin[c*x])^n, x] - Dist[b*c*n, Int[x*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 -
c^2*x^2]), x], x] /; FreeQ[{a, b, c}, x] && GtQ[n, 0]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rule 4767

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)*((d_) + (e_.)*(x_)^2)^(p_
.), x_Symbol] :> Simp[(d + e*x^2)^(p + 1)*((a + b*ArcSin[c*x])^n/(2*e*(p +
1))), x] + Dist[b*(n/(2*c*(p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], In
t[(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x] /; FreeQ[{a,
b, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && NeQ[p, -1]
```

Rule 4795

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_)*((d_) + (e_.
)*(x_)^2)^(p_), x_Symbol] :> Simp[f*(f*x)^(m - 1)*(d + e*x^2)^(p + 1)*((a +
 b*ArcSin[c*x])^n/(e*(m + 2*p + 1))), x] + (Dist[f^2*((m - 1)/(c^2*(m + 2*p
 + 1))), Int[(f*x)^(m - 2)*(d + e*x^2)^p*(a + b*ArcSin[c*x])^n, x], x] + Di
st[b*f*(n/(c*(m + 2*p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], Int[(f*x)
^(m - 1)*(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x]) /; Fr
eeQ[{a, b, c, d, e, f, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && IGtQ[m,
1] && NeQ[m + 2*p + 1, 0]
```

Rubi steps

$$
\begin{aligned}
\text{integral} &= \frac{1}{3}x^3(a+b\arcsin(cx))^3-(bc)\int\frac{x^3(a+b\arcsin(cx))^2}{\sqrt{1-c^2x^2}}\,dx\\
&= \frac{bx^2\sqrt{1-c^2x^2}(a+b\arcsin(cx))^2}{3c}+\frac{1}{3}x^3(a+b\arcsin(cx))^3\\
&\quad -\frac{1}{3}\left(2b^2\right)\int x^2(a+b\arcsin(cx))\,dx-\frac{(2b)\int\frac{x(a+b\arcsin(cx))^2}{\sqrt{1-c^2x^2}}\,dx}{3c}\\
&= -\frac{2}{9}b^2x^3(a+b\arcsin(cx))+\frac{2b\sqrt{1-c^2x^2}(a+b\arcsin(cx))^2}{3c^3}\\
&\quad +\frac{bx^2\sqrt{1-c^2x^2}(a+b\arcsin(cx))^2}{3c}+\frac{1}{3}x^3(a+b\arcsin(cx))^3\\
&\quad -\frac{\left(4b^2\right)\int(a+b\arcsin(cx))\,dx}{3c^2}+\frac{1}{9}\left(2b^3c\right)\int\frac{x^3}{\sqrt{1-c^2x^2}}\,dx\\
&= -\frac{4ab^2x}{3c^2}-\frac{2}{9}b^2x^3(a+b\arcsin(cx))+\frac{2b\sqrt{1-c^2x^2}(a+b\arcsin(cx))^2}{3c^3}\\
&\quad +\frac{bx^2\sqrt{1-c^2x^2}(a+b\arcsin(cx))^2}{3c}+\frac{1}{3}x^3(a+b\arcsin(cx))^3\\
&\quad -\frac{\left(4b^3\right)\int\arcsin(cx)\,dx}{3c^2}+\frac{1}{9}\left(b^3c\right)\operatorname{Subst}\left(\int\frac{x}{\sqrt{1-c^2x}}\,dx,x,x^2\right)\\
&= -\frac{4ab^2x}{3c^2}-\frac{4b^3x\arcsin(cx)}{3c^2}-\frac{2}{9}b^2x^3(a+b\arcsin(cx))\\
&\quad +\frac{2b\sqrt{1-c^2x^2}(a+b\arcsin(cx))^2}{3c^3}+\frac{bx^2\sqrt{1-c^2x^2}(a+b\arcsin(cx))^2}{3c}\\
&\quad +\frac{1}{3}x^3(a+b\arcsin(cx))^3+\frac{\left(4b^3\right)\int\frac{x}{\sqrt{1-c^2x^2}}\,dx}{3c}\\
&\quad +\frac{1}{9}\left(b^3c\right)\operatorname{Subst}\left(\int\left(\frac{1}{c^2\sqrt{1-c^2x}}-\frac{\sqrt{1-c^2x}}{c^2}\right)dx,x,x^2\right)
\end{aligned}
$$

$$= -\frac{4ab^2x}{3c^2} - \frac{14b^3\sqrt{1-c^2x^2}}{9c^3} + \frac{2b^3(1-c^2x^2)^{3/2}}{27c^3} - \frac{4b^3x\arcsin(cx)}{3c^2} - \frac{2}{9}b^2x^3(a+b\arcsin(cx)) + \frac{2b\sqrt{1-c^2x^2}(a+b\arcsin(cx))^2}{3c^3} + \frac{bx^2\sqrt{1-c^2x^2}(a+b\arcsin(cx))^2}{3c} + \frac{1}{3}x^3(a+b\arcsin(cx))^3$$

Mathematica [A] (verified)

Time = 0.30 (sec) , antiderivative size = 163, normalized size of antiderivative = 0.92

$$\int x^2(a+b\arcsin(cx))^3\,dx = \frac{1}{27}\left(9x^3(a+b\arcsin(cx))^3 + \frac{b\left(9c^2x^2\sqrt{1-c^2x^2}(a+b\arcsin(cx))^2 - 2b\left(b\sqrt{1-c^2x^2}(2+c^2x^2) + 3c^3x^3(a+b\arcsin(cx))\right) + 18\left(\sqrt{1-\right.\right.}{c^3}\right.$$

```
[In] Integrate[x^2*(a + b*ArcSin[c*x])^3,x]
```

```
[Out] (9*x^3*(a + b*ArcSin[c*x])^3 + (b*(9*c^2*x^2*Sqrt[1 - c^2*x^2]*(a + b*ArcSi
n[c*x])^2 - 2*b*(b*Sqrt[1 - c^2*x^2]*(2 + c^2*x^2) + 3*c^3*x^3*(a + b*ArcSi
n[c*x])) + 18*(Sqrt[1 - c^2*x^2]*(a + b*ArcSin[c*x])^2 - 2*b*(a*c*x + b*Sqr
t[1 - c^2*x^2] + b*c*x*ArcSin[c*x]))))/c^3)/27
```

Maple [A] (verified)

Time = 0.05 (sec) , antiderivative size = 235, normalized size of antiderivative = 1.32

method	result
derivativedivides	$\frac{\frac{a^3c^3x^3}{3}+b^3\left(\frac{c^3x^3\arcsin(cx)^3}{3}+\frac{\arcsin(cx)^2\left(c^2x^2+2\right)\sqrt{-c^2x^2+1}}{3}-\frac{4\sqrt{-c^2x^2+1}}{3}-\frac{4cx\arcsin(cx)}{3}-\frac{2c^3x^3\arcsin(cx)}{9}-\frac{2\left(c^2x^2+2\right)\sqrt{}}{27}\right.}{}$
default	$\frac{\frac{a^3c^3x^3}{3}+b^3\left(\frac{c^3x^3\arcsin(cx)^3}{3}+\frac{\arcsin(cx)^2\left(c^2x^2+2\right)\sqrt{-c^2x^2+1}}{3}-\frac{4\sqrt{-c^2x^2+1}}{3}-\frac{4cx\arcsin(cx)}{3}-\frac{2c^3x^3\arcsin(cx)}{9}-\frac{2\left(c^2x^2+2\right)\sqrt{}}{27}\right.}{}$
parts	$\frac{a^3x^3}{3}+\frac{b^3\left(\frac{c^3x^3\arcsin(cx)^3}{3}+\frac{\arcsin(cx)^2\left(c^2x^2+2\right)\sqrt{-c^2x^2+1}}{3}-\frac{4\sqrt{-c^2x^2+1}}{3}-\frac{4cx\arcsin(cx)}{3}-\frac{2c^3x^3\arcsin(cx)}{9}-\frac{2\left(c^2x^2+2\right)\sqrt{}}{27}\right.}{c^3}$

```
[In] int(x^2*(a+b*arcsin(c*x))^3,x,method=_RETURNVERBOSE)
```

```
[Out] 1/c^3*(1/3*a^3*c^3*x^3+b^3*(1/3*c^3*x^3*arcsin(c*x)^3+1/3*arcsin(c*x)^2*(c^
2*x^2+2)*(-c^2*x^2+1)^(1/2)-4/3*(-c^2*x^2+1)^(1/2)-4/3*c*x*arcsin(c*x)-2/9*
c^3*x^3*arcsin(c*x)-2/27*(c^2*x^2+2)*(-c^2*x^2+1)^(1/2))+3*a*b^2*(1/3*c^3*x
^3*arcsin(c*x)^2+2/9*arcsin(c*x)*(c^2*x^2+2)*(-c^2*x^2+1)^(1/2)-2/27*c^3*x^
```

```
3-4/9*c*x)+3*a^2*b*(1/3*c^3*x^3*arcsin(c*x)+1/9*c^2*x^2*(-c^2*x^2+1)^(1/2)+
2/9*(-c^2*x^2+1)^(1/2)))
```

Fricas [A] (verification not implemented)

none

Time = 0.25 (sec) , antiderivative size = 194, normalized size of antiderivative = 1.09

$$\int x^2(a+b\arcsin(cx))^3\,dx$$
$$=\frac{9\,b^3c^3x^3\arcsin\left(cx\right)^3+27\,ab^2c^3x^3\arcsin\left(cx\right)^2+3\left(3\,a^3-2\,ab^2\right)c^3x^3-36\,ab^2cx+3\left(\left(9\,a^2b-2\,b^3\right)c^3x^3-1\right.}{}$$

```
[In] integrate(x^2*(a+b*arcsin(c*x))^3,x, algorithm="fricas")
```

```
[Out] 1/27*(9*b^3*c^3*x^3*arcsin(c*x)^3 + 27*a*b^2*c^3*x^3*arcsin(c*x)^2 + 3*(3*a
^3 - 2*a*b^2)*c^3*x^3 - 36*a*b^2*c*x + 3*((9*a^2*b - 2*b^3)*c^3*x^3 - 12*b^
3*c*x)*arcsin(c*x) + ((9*a^2*b - 2*b^3)*c^2*x^2 + 18*a^2*b - 40*b^3 + 9*(b^
3*c^2*x^2 + 2*b^3)*arcsin(c*x)^2 + 18*(a*b^2*c^2*x^2 + 2*a*b^2)*arcsin(c*x)
)*sqrt(-c^2*x^2 + 1))/c^3
```

Sympy [A] (verification not implemented)

Time = 0.37 (sec) , antiderivative size = 328, normalized size of antiderivative = 1.84

$$\int x^2(a+b\arcsin(cx))^3\,dx$$
$$=\begin{cases}\frac{a^3x^3}{3}+a^2bx^3\operatorname{asin}\left(cx\right)+\frac{a^2bx^2\sqrt{-c^2x^2+1}}{3c}+\frac{2a^2b\sqrt{-c^2x^2+1}}{3c^3}+ab^2x^3\operatorname{asin}^2\left(cx\right)-\frac{2ab^2x^3}{9}+\frac{2ab^2x^2\sqrt{-c^2x^2+1}\operatorname{asin}\left(cx\right)}{3c} \\ \frac{a^3x^3}{3}\end{cases}$$

```
[In] integrate(x**2*(a+b*asin(c*x))**3,x)
```

```
[Out] Piecewise((a**3*x**3/3 + a**2*b*x**3*asin(c*x) + a**2*b*x**2*sqrt(-c**2*x**
2 + 1)/(3*c) + 2*a**2*b*sqrt(-c**2*x**2 + 1)/(3*c**3) + a*b**2*x**3*asin(c*
x)**2 - 2*a*b**2*x**3/9 + 2*a*b**2*x**2*sqrt(-c**2*x**2 + 1)*asin(c*x)/(3*c
) - 4*a*b**2*x/(3*c**2) + 4*a*b**2*sqrt(-c**2*x**2 + 1)*asin(c*x)/(3*c**3)
+ b**3*x**3*asin(c*x)**3/3 - 2*b**3*x**3*asin(c*x)/9 + b**3*x**2*sqrt(-c**2
*x**2 + 1)*asin(c*x)**2/(3*c) - 2*b**3*x**2*sqrt(-c**2*x**2 + 1)/(27*c) - 4
*b**3*x*asin(c*x)/(3*c**2) + 2*b**3*sqrt(-c**2*x**2 + 1)*asin(c*x)**2/(3*c*
*3) - 40*b**3*sqrt(-c**2*x**2 + 1)/(27*c**3), Ne(c, 0)), (a**3*x**3/3, True
))
```

Maxima [A] (verification not implemented)

none

Time = 0.32 (sec) , antiderivative size = 273, normalized size of antiderivative = 1.53

$$
\begin{aligned}
\int x^2(a+b\arcsin(cx))^3\,dx &= \frac{1}{3}\,b^3x^3\arcsin\left(cx\right)^3+ab^2x^3\arcsin\left(cx\right)^2+\frac{1}{3}\,a^3x^3\\
&+\frac{1}{3}\left(3\,x^3\arcsin\left(cx\right)+c\left(\frac{\sqrt{-c^2x^2+1}x^2}{c^2}+\frac{2\sqrt{-c^2x^2+1}}{c^4}\right)\right)a^2b\\
&+\frac{2}{9}\left(3\,c\left(\frac{\sqrt{-c^2x^2+1}x^2}{c^2}+\frac{2\sqrt{-c^2x^2+1}}{c^4}\right)\arcsin\left(cx\right)-\frac{c^2x^3+6\,x}{c^2}\right)ab^2\\
&+\frac{1}{27}\left(9\,c\left(\frac{\sqrt{-c^2x^2+1}x^2}{c^2}+\frac{2\sqrt{-c^2x^2+1}}{c^4}\right)\arcsin\left(cx\right)^2-2\,c\left(\frac{\sqrt{-c^2x^2+1}x^2+\frac{20\sqrt{-c^2x^2+1}}{c^2}}{c^2}+\frac{3\left(c^2x^3+\right.}{}\right.\right.
\end{aligned}
$$

```
[In] integrate(x^2*(a+b*arcsin(c*x))^3,x, algorithm="maxima")
```

```
[Out] 1/3*b^3*x^3*arcsin(c*x)^3 + a*b^2*x^3*arcsin(c*x)^2 + 1/3*a^3*x^3 + 1/3*(3*
x^3*arcsin(c*x) + c*(sqrt(-c^2*x^2 + 1)*x^2/c^2 + 2*sqrt(-c^2*x^2 + 1)/c^4)
)*a^2*b + 2/9*(3*c*(sqrt(-c^2*x^2 + 1)*x^2/c^2 + 2*sqrt(-c^2*x^2 + 1)/c^4)*
arcsin(c*x) - (c^2*x^3 + 6*x)/c^2)*a*b^2 + 1/27*(9*c*(sqrt(-c^2*x^2 + 1)*x^
2/c^2 + 2*sqrt(-c^2*x^2 + 1)/c^4)*arcsin(c*x)^2 - 2*c*((sqrt(-c^2*x^2 + 1)*
x^2 + 20*sqrt(-c^2*x^2 + 1)/c^2)/c^2 + 3*(c^2*x^3 + 6*x)*arcsin(c*x)/c^3))*
b^3
```

Giac [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 368 vs. 2(154) = 308.

Time = 0.29 (sec) , antiderivative size = 368, normalized size of antiderivative = 2.07

$$
\begin{aligned}
\int x^2(a+b\arcsin(cx))^3\,dx &= \frac{1}{3}\,a^3x^3 + \frac{(c^2x^2-1)b^3x\arcsin{(cx)}^3}{3\,c^2} \\
&+ \frac{(c^2x^2-1)ab^2x\arcsin{(cx)}^2}{c^2} + \frac{b^3x\arcsin{(cx)}^3}{3\,c^2} \\
&+ \frac{(c^2x^2-1)a^2bx\arcsin{(cx)}}{c^2} - \frac{2\,(c^2x^2-1)b^3x\arcsin{(cx)}}{9\,c^2} \\
&+ \frac{ab^2x\arcsin{(cx)}^2}{c^2} - \frac{(-c^2x^2+1)^{\frac{3}{2}}b^3\arcsin{(cx)}^2}{3\,c^3} \\
&- \frac{2\,(c^2x^2-1)ab^2x}{9\,c^2} + \frac{a^2bx\arcsin{(cx)}}{c^2} \\
&- \frac{14\,b^3x\arcsin{(cx)}}{9\,c^2} - \frac{2\,(-c^2x^2+1)^{\frac{3}{2}}ab^2\arcsin{(cx)}}{3\,c^3} \\
&+ \frac{\sqrt{-c^2x^2+1}b^3\arcsin{(cx)}^2}{c^3} - \frac{14\,ab^2x}{9\,c^2} - \frac{(-c^2x^2+1)^{\frac{3}{2}}a^2b}{3\,c^3} \\
&+ \frac{2\,(-c^2x^2+1)^{\frac{3}{2}}b^3}{27\,c^3} + \frac{2\,\sqrt{-c^2x^2+1}ab^2\arcsin{(cx)}}{c^3} \\
&+ \frac{\sqrt{-c^2x^2+1}a^2b}{c^3} - \frac{14\,\sqrt{-c^2x^2+1}b^3}{9\,c^3}
\end{aligned}
$$

```
[In] integrate(x^2*(a+b*arcsin(c*x))^3,x, algorithm="giac")
```

```
[Out] 1/3*a^3*x^3 + 1/3*(c^2*x^2 - 1)*b^3*x*arcsin(c*x)^3/c^2 + (c^2*x^2 - 1)*a*b
^2*x*arcsin(c*x)^2/c^2 + 1/3*b^3*x*arcsin(c*x)^3/c^2 + (c^2*x^2 - 1)*a^2*b*
x*arcsin(c*x)/c^2 - 2/9*(c^2*x^2 - 1)*b^3*x*arcsin(c*x)/c^2 + a*b^2*x*arcsi
n(c*x)^2/c^2 - 1/3*(-c^2*x^2 + 1)^(3/2)*b^3*arcsin(c*x)^2/c^3 - 2/9*(c^2*x^
2 - 1)*a*b^2*x/c^2 + a^2*b*x*arcsin(c*x)/c^2 - 14/9*b^3*x*arcsin(c*x)/c^2 -
 2/3*(-c^2*x^2 + 1)^(3/2)*a*b^2*arcsin(c*x)/c^3 + sqrt(-c^2*x^2 + 1)*b^3*ar
csin(c*x)^2/c^3 - 14/9*a*b^2*x/c^2 - 1/3*(-c^2*x^2 + 1)^(3/2)*a^2*b/c^3 + 2
/27*(-c^2*x^2 + 1)^(3/2)*b^3/c^3 + 2*sqrt(-c^2*x^2 + 1)*a*b^2*arcsin(c*x)/c
^3 + sqrt(-c^2*x^2 + 1)*a^2*b/c^3 - 14/9*sqrt(-c^2*x^2 + 1)*b^3/c^3
```

Mupad [F(-1)]

Timed out.

$$
\int x^2(a+b\arcsin(cx))^3\,dx = \int x^2\,{\left(a+b\,\mathrm{asin}\left(c\,x\right)\right)}^3\,dx
$$

```
[In] int(x^2*(a + b*asin(c*x))^3,x)
```

```
[Out] int(x^2*(a + b*asin(c*x))^3, x)
```

3.154 $\int x(a+b\arcsin(cx))^3\,dx$

Optimal result

Integrand size = 12, antiderivative size = 125

$$\int x(a+b\arcsin(cx))^3\,dx = -\frac{3b^3x\sqrt{1-c^2x^2}}{8c}+\frac{3b^3\arcsin(cx)}{8c^2}-\frac{3}{4}b^2x^2(a+b\arcsin(cx))+\frac{3bx\sqrt{1-c^2x^2}(a+b\arcsin(cx))^2}{4c}-\frac{(a+b\arcsin(cx))^3}{4c^2}+\frac{1}{2}x^2(a+b\arcsin(cx))^3$$

```
[Out] 3/8*b^3*arcsin(c*x)/c^2-3/4*b^2*x^2*(a+b*arcsin(c*x))-1/4*(a+b*arcsin(c*x))
^3/c^2+1/2*x^2*(a+b*arcsin(c*x))^3-3/8*b^3*x*(-c^2*x^2+1)^(1/2)/c+3/4*b*x*(
a+b*arcsin(c*x))^2*(-c^2*x^2+1)^(1/2)/c
```

Rubi [A] (verified)

Time = 0.13 (sec) , antiderivative size = 125, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 5, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.417, Rules used = {4723, 4795, 4737, 327, 222}

$$\int x(a+b\arcsin(cx))^3\,dx = -\frac{3}{4}b^2x^2(a+b\arcsin(cx))+\frac{3bx\sqrt{1-c^2x^2}(a+b\arcsin(cx))^2}{4c}-\frac{(a+b\arcsin(cx))^3}{4c^2}+\frac{1}{2}x^2(a+b\arcsin(cx))^3+\frac{3b^3\arcsin(cx)}{8c^2}-\frac{3b^3x\sqrt{1-c^2x^2}}{8c}$$

```
[In] Int[x*(a + b*ArcSin[c*x])^3,x]
```

```
[Out] (-3*b^3*x*Sqrt[1 - c^2*x^2])/(8*c) + (3*b^3*ArcSin[c*x])/(8*c^2) - (3*b^2*x
^2*(a + b*ArcSin[c*x]))/4 + (3*b*x*Sqrt[1 - c^2*x^2]*(a + b*ArcSin[c*x])^2)
/(4*c) - (a + b*ArcSin[c*x])^3/(4*c^2) + (x^2*(a + b*ArcSin[c*x])^3)/2
```

Rule 222

```
Int[1/Sqrt[(a_) + (b_.)*(x_)^2], x_Symbol] :> Simp[ArcSin[Rt[-b, 2]*(x/Sqrt
[a])]/Rt[-b, 2], x] /; FreeQ[{a, b}, x] && GtQ[a, 0] && NegQ[b]
```

Rule 327

```
Int[((c_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[c^(n
 - 1)*(c*x)^(m - n + 1)*((a + b*x^n)^(p + 1)/(b*(m + n*p + 1))), x] - Dist[
a*c^n*((m - n + 1)/(b*(m + n*p + 1))), Int[(c*x)^(m - n)*(a + b*x^n)^p, x],
 x] /; FreeQ[{a, b, c, p}, x] && IGtQ[n, 0] && GtQ[m, n - 1] && NeQ[m + n*p
 + 1, 0] && IntBinomialQ[a, b, c, n, m, p, x]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rule 4737

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)/Sqrt[(d_) + (e_.)*(x_)^2], x_S
ymbol] :> Simp[(1/(b*c*(n + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]]*(a
 + b*ArcSin[c*x])^(n + 1), x] /; FreeQ[{a, b, c, d, e, n}, x] && EqQ[c^2*d
+ e, 0] && NeQ[n, -1]
```

Rule 4795

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_)*((d_) + (e_.
)*(x_)^2)^(p_), x_Symbol] :> Simp[f*(f*x)^(m - 1)*(d + e*x^2)^(p + 1)*((a +
 b*ArcSin[c*x])^n/(e*(m + 2*p + 1))), x] + (Dist[f^2*((m - 1)/(c^2*(m + 2*p
 + 1))), Int[(f*x)^(m - 2)*(d + e*x^2)^p*(a + b*ArcSin[c*x])^n, x], x] + Di
st[b*f*(n/(c*(m + 2*p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], Int[(f*x)
^(m - 1)*(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x]) /; Fr
eeQ[{a, b, c, d, e, f, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && IGtQ[m,
1] && NeQ[m + 2*p + 1, 0]
```

Rubi steps

$$\text{integral} = \frac{1}{2}x^2(a+b\arcsin(cx))^3 - \frac{1}{2}(3bc)\int \frac{x^2(a+b\arcsin(cx))^2}{\sqrt{1-c^2x^2}}\,dx$$

$$= \frac{3bx\sqrt{1-c^2x^2}(a+b\arcsin(cx))^2}{4c} + \frac{1}{2}x^2(a+b\arcsin(cx))^3 - \frac{1}{2}(3b^2)\int x(a+b\arcsin(cx))\,dx - \frac{(3b)\int \frac{(a+b\arcsin(cx))^2}{\sqrt{1-c^2x^2}}\,dx}{4c}$$

$$= -\frac{3}{4}b^2x^2(a+b\arcsin(cx)) + \frac{3bx\sqrt{1-c^2x^2}(a+b\arcsin(cx))^2}{4c} - \frac{(a+b\arcsin(cx))^3}{4c^2} + \frac{1}{2}x^2(a+b\arcsin(cx))^3 + \frac{1}{4}(3b^3c)\int \frac{x^2}{\sqrt{1-c^2x^2}}\,dx$$

$$= -\frac{3b^3x\sqrt{1-c^2x^2}}{8c} - \frac{3}{4}b^2x^2(a+b\arcsin(cx)) + \frac{3bx\sqrt{1-c^2x^2}(a+b\arcsin(cx))^2}{4c} - \frac{(a+b\arcsin(cx))^3}{4c^2} + \frac{1}{2}x^2(a+b\arcsin(cx))^3 + \frac{(3b^3)\int \frac{1}{\sqrt{1-c^2x^2}}\,dx}{8c}$$

$$= -\frac{3b^3x\sqrt{1-c^2x^2}}{8c} + \frac{3b^3\arcsin(cx)}{8c^2} - \frac{3}{4}b^2x^2(a+b\arcsin(cx)) + \frac{3bx\sqrt{1-c^2x^2}(a+b\arcsin(cx))^2}{4c} - \frac{(a+b\arcsin(cx))^3}{4c^2} + \frac{1}{2}x^2(a+b\arcsin(cx))^3$$

Mathematica [A] (verified)

Time = 0.09 (sec) , antiderivative size = 114, normalized size of antiderivative = 0.91

$$\int x(a+b\arcsin(cx))^3\,dx = \frac{6bcx\sqrt{1-c^2x^2}(a+b\arcsin(cx))^2 - 2(a+b\arcsin(cx))^3 + 4c^2x^2(a+b\arcsin(cx))^3 - 3b^2\left(cx\left(2acx+b\sqrt{1\right.\right.}{8c^2}$$

```
[In] Integrate[x*(a + b*ArcSin[c*x])^3,x]
```

```
[Out] (6*b*c*x*Sqrt[1 - c^2*x^2]*(a + b*ArcSin[c*x])^2 - 2*(a + b*ArcSin[c*x])^3
+ 4*c^2*x^2*(a + b*ArcSin[c*x])^3 - 3*b^2*(c*x*(2*a*c*x + b*Sqrt[1 - c^2*x^
2]) + b*(-1 + 2*c^2*x^2)*ArcSin[c*x]))/(8*c^2)
```

Maple [A] (verified)

Time = 0.05 (sec) , antiderivative size = 219, normalized size of antiderivative = 1.75

method	result
derivativedivides	$\frac{\frac{c^2x^2a^3}{2}+b^3\left(\frac{(c^2x^2-1)\arcsin(cx)^3}{2}+\frac{3\arcsin(cx)^2\left(cx\sqrt{-c^2x^2+1}+\arcsin(cx)\right)}{4}-\frac{3(c^2x^2-1)\arcsin(cx)}{4}-\frac{3cx\sqrt{-c^2x^2+1}}{8}-\frac{3\arcsin}{8}\right.}{}$
default	$\frac{\frac{c^2x^2a^3}{2}+b^3\left(\frac{(c^2x^2-1)\arcsin(cx)^3}{2}+\frac{3\arcsin(cx)^2\left(cx\sqrt{-c^2x^2+1}+\arcsin(cx)\right)}{4}-\frac{3(c^2x^2-1)\arcsin(cx)}{4}-\frac{3cx\sqrt{-c^2x^2+1}}{8}-\frac{3\arcsin}{8}\right.}{}$
parts	$\frac{a^3x^2}{2}+\frac{b^3\left(\frac{(c^2x^2-1)\arcsin(cx)^3}{2}+\frac{3\arcsin(cx)^2\left(cx\sqrt{-c^2x^2+1}+\arcsin(cx)\right)}{4}-\frac{3(c^2x^2-1)\arcsin(cx)}{4}-\frac{3cx\sqrt{-c^2x^2+1}}{8}-\frac{3\arcsin}{8}\right.}{c^2}$

```
[In] int(x*(a+b*arcsin(c*x))^3,x,method=_RETURNVERBOSE)
```

```
[Out] 1/c^2*(1/2*c^2*x^2*a^3+b^3*(1/2*(c^2*x^2-1)*arcsin(c*x)^3+3/4*arcsin(c*x)^2
*(c*x*(-c^2*x^2+1)^(1/2)+arcsin(c*x))-3/4*(c^2*x^2-1)*arcsin(c*x)-3/8*c*x*(
-c^2*x^2+1)^(1/2)-3/8*arcsin(c*x)-1/2*arcsin(c*x)^3)+3*a*b^2*(1/2*(c^2*x^2-
1)*arcsin(c*x)^2+1/2*arcsin(c*x)*(c*x*(-c^2*x^2+1)^(1/2)+arcsin(c*x))-1/4*a
rcsin(c*x)^2-1/4*c^2*x^2)+3*a^2*b*(1/2*c^2*x^2*arcsin(c*x)+1/4*c*x*(-c^2*x^
2+1)^(1/2)-1/4*arcsin(c*x)))
```

Fricas [A] (verification not implemented)

none

Time = 0.24 (sec) , antiderivative size = 169, normalized size of antiderivative = 1.35

$$\int x(a+b\arcsin(cx))^3\,dx$$
$$=\frac{2\,(2\,a^3-3\,ab^2)c^2x^2+2\,(2\,b^3c^2x^2-b^3)\arcsin{(cx)}^3+6\,(2\,ab^2c^2x^2-ab^2)\arcsin{(cx)}^2+3\,(2\,(2\,a^2b-b^3)c^2x}{8\,c^2}$$

```
[In] integrate(x*(a+b*arcsin(c*x))^3,x, algorithm="fricas")
```

```
[Out] 1/8*(2*(2*a^3 - 3*a*b^2)*c^2*x^2 + 2*(2*b^3*c^2*x^2 - b^3)*arcsin(c*x)^3 +
6*(2*a*b^2*c^2*x^2 - a*b^2)*arcsin(c*x)^2 + 3*(2*(2*a^2*b - b^3)*c^2*x^2 -
2*a^2*b + b^3)*arcsin(c*x) + 3*(2*b^3*c*x*arcsin(c*x)^2 + 4*a*b^2*c*x*arcsi
n(c*x) + (2*a^2*b - b^3)*c*x)*sqrt(-c^2*x^2 + 1))/c^2
```

Sympy [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 264 vs. 2(116) = 232.

Time = 0.29 (sec) , antiderivative size = 264, normalized size of antiderivative = 2.11

$$\int x(a+b\arcsin(cx))^3\,dx$$
$$=\begin{cases}\frac{a^3x^2}{2}+\frac{3a^2bx^2\operatorname{asin}(cx)}{2}+\frac{3a^2bx\sqrt{-c^2x^2+1}}{4c}-\frac{3a^2b\operatorname{asin}(cx)}{4c^2}+\frac{3ab^2x^2\operatorname{asin}^2(cx)}{2}-\frac{3ab^2x^2}{4}+\frac{3ab^2x\sqrt{-c^2x^2+1}\operatorname{asin}(cx)}{2c}-\frac{3ab^2\operatorname{asi}}{4c}\\ \frac{a^3x^2}{2}\end{cases}$$

```
[In] integrate(x*(a+b*asin(c*x))**3,x)
```

```
[Out] Piecewise((a**3*x**2/2 + 3*a**2*b*x**2*asin(c*x)/2 + 3*a**2*b*x*sqrt(-c**2*
x**2 + 1)/(4*c) - 3*a**2*b*asin(c*x)/(4*c**2) + 3*a*b**2*x**2*asin(c*x)**2/
2 - 3*a*b**2*x**2/4 + 3*a*b**2*x*sqrt(-c**2*x**2 + 1)*asin(c*x)/(2*c) - 3*a
*b**2*asin(c*x)**2/(4*c**2) + b**3*x**2*asin(c*x)**3/2 - 3*b**3*x**2*asin(c
*x)/4 + 3*b**3*x*sqrt(-c**2*x**2 + 1)*asin(c*x)**2/(4*c) - 3*b**3*x*sqrt(-c
**2*x**2 + 1)/(8*c) - b**3*asin(c*x)**3/(4*c**2) + 3*b**3*asin(c*x)/(8*c**2
), Ne(c, 0)), (a**3*x**2/2, True))
```

Maxima [F]

$$\int x(a+b\arcsin(cx))^3\,dx=\int (b\arcsin(cx)+a)^3x\,dx$$

```
[In] integrate(x*(a+b*arcsin(c*x))^3,x, algorithm="maxima")
```

```
[Out] 1/2*b^3*x^2*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1))^3 + 1/2*a^3*x^2 + 3/
4*(2*x^2*arcsin(c*x) + c*(sqrt(-c^2*x^2 + 1)*x/c^2 - arcsin(c*x)/c^3))*a^2*
b + integrate(3/2*(sqrt(c*x + 1)*sqrt(-c*x + 1)*b^3*c*x^2*arctan2(c*x, sqrt
(c*x + 1)*sqrt(-c*x + 1))^2 + 2*(a*b^2*c^2*x^3 - a*b^2*x)*arctan2(c*x, sqrt
(c*x + 1)*sqrt(-c*x + 1))^2)/(c^2*x^2 - 1), x)
```

Giac [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 285 vs. 2(109) = 218.

Time = 0.28 (sec) , antiderivative size = 285, normalized size of antiderivative = 2.28

$$\int x(a+b\arcsin(cx))^3\,dx = \frac{3\sqrt{-c^2x^2+1}b^3x\arcsin{(cx)}^2}{4c} + \frac{(c^2x^2-1)b^3\arcsin{(cx)}^3}{2c^2} + \frac{3\sqrt{-c^2x^2+1}ab^2x\arcsin{(cx)}}{2c} + \frac{3(c^2x^2-1)ab^2\arcsin{(cx)}^2}{2c^2} + \frac{b^3\arcsin{(cx)}^3}{4c^2} + \frac{3\sqrt{-c^2x^2+1}a^2bx}{4c} - \frac{3\sqrt{-c^2x^2+1}b^3x}{8c} + \frac{3(c^2x^2-1)a^2b\arcsin{(cx)}}{2c^2} - \frac{3(c^2x^2-1)b^3\arcsin{(cx)}}{4c^2} + \frac{3ab^2\arcsin{(cx)}^2}{4c^2} + \frac{(c^2x^2-1)a^3}{2c^2} - \frac{3(c^2x^2-1)ab^2}{4c^2} + \frac{3a^2b\arcsin{(cx)}}{4c^2} - \frac{3b^3\arcsin{(cx)}}{8c^2} - \frac{3ab^2}{8c^2}$$

```
[In] integrate(x*(a+b*arcsin(c*x))^3,x, algorithm="giac")
```

```
[Out] 3/4*sqrt(-c^2*x^2 + 1)*b^3*x*arcsin(c*x)^2/c + 1/2*(c^2*x^2 - 1)*b^3*arcsin
(c*x)^3/c^2 + 3/2*sqrt(-c^2*x^2 + 1)*a*b^2*x*arcsin(c*x)/c + 3/2*(c^2*x^2 -
 1)*a*b^2*arcsin(c*x)^2/c^2 + 1/4*b^3*arcsin(c*x)^3/c^2 + 3/4*sqrt(-c^2*x^2
 + 1)*a^2*b*x/c - 3/8*sqrt(-c^2*x^2 + 1)*b^3*x/c + 3/2*(c^2*x^2 - 1)*a^2*b*
arcsin(c*x)/c^2 - 3/4*(c^2*x^2 - 1)*b^3*arcsin(c*x)/c^2 + 3/4*a*b^2*arcsin(
c*x)^2/c^2 + 1/2*(c^2*x^2 - 1)*a^3/c^2 - 3/4*(c^2*x^2 - 1)*a*b^2/c^2 + 3/4*
a^2*b*arcsin(c*x)/c^2 - 3/8*b^3*arcsin(c*x)/c^2 - 3/8*a*b^2/c^2
```

Mupad [F(-1)]

Timed out.

$$\int x(a+b\arcsin(cx))^3\,dx = \int x\,(a+b\,\mathrm{asin}(c\,x))^3\,dx$$

```
[In] int(x*(a + b*asin(c*x))^3,x)
```

```
[Out] int(x*(a + b*asin(c*x))^3, x)
```

3.155 $\int (a+b \arcsin(cx))^3 \, dx$

Optimal result

Integrand size = 10, antiderivative size = 82

$$\int (a+b \arcsin(cx))^3 \, dx = -6ab^2x - \frac{6b^3\sqrt{1-c^2x^2}}{c} - 6b^3x \arcsin(cx) + \frac{3b\sqrt{1-c^2x^2}(a+b \arcsin(cx))^2}{c} + x(a+b \arcsin(cx))^3$$

```
[Out] -6*a*b^2*x-6*b^3*x*arcsin(c*x)+x*(a+b*arcsin(c*x))^3-6*b^3*(-c^2*x^2+1)^(1/
2)/c+3*b*(a+b*arcsin(c*x))^2*(-c^2*x^2+1)^(1/2)/c
```

Rubi [A] (verified)

Time = 0.07 (sec) , antiderivative size = 82, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.300, Rules used = {4715, 4767, 267}

$$\int (a+b \arcsin(cx))^3 \, dx = \frac{3b\sqrt{1-c^2x^2}(a+b \arcsin(cx))^2}{c} + x(a+b \arcsin(cx))^3 - 6ab^2x - 6b^3x \arcsin(cx) - \frac{6b^3\sqrt{1-c^2x^2}}{c}$$

```
[In] Int[(a + b*ArcSin[c*x])^3,x]
```

```
[Out] -6*a*b^2*x - (6*b^3*Sqrt[1 - c^2*x^2])/c - 6*b^3*x*ArcSin[c*x] + (3*b*Sqrt[
1 - c^2*x^2]*(a + b*ArcSin[c*x])^2)/c + x*(a + b*ArcSin[c*x])^3
```

Rule 267

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[(a + b*x^n)
^(p + 1)/(b*n*(p + 1)), x] /; FreeQ[{a, b, m, n, p}, x] && EqQ[m, n - 1] &&
```

```
NeQ[p, -1]
```

Rule 4715

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.), x_Symbol] :> Simp[x*(a + b*Ar
cSin[c*x])^n, x] - Dist[b*c*n, Int[x*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 -
c^2*x^2]), x], x] /; FreeQ[{a, b, c}, x] && GtQ[n, 0]
```

Rule 4767

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)*((d_) + (e_.)*(x_)^2)^(p_
.), x_Symbol] :> Simp[(d + e*x^2)^(p + 1)*((a + b*ArcSin[c*x])^n/(2*e*(p +
1))), x] + Dist[b*(n/(2*c*(p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], In
t[(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x] /; FreeQ[{a,
b, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && NeQ[p, -1]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= x(a+b\arcsin(cx))^3-(3bc)\int\frac{x(a+b\arcsin(cx))^2}{\sqrt{1-c^2x^2}}\,dx\\
&= \frac{3b\sqrt{1-c^2x^2}(a+b\arcsin(cx))^2}{c}+x(a+b\arcsin(cx))^3-\left(6b^2\right)\int(a+b\arcsin(cx))\,dx\\
&= -6ab^2x+\frac{3b\sqrt{1-c^2x^2}(a+b\arcsin(cx))^2}{c}+x(a+b\arcsin(cx))^3-\left(6b^3\right)\int\arcsin(cx)\,dx\\
&= -6ab^2x-6b^3x\arcsin(cx)+\frac{3b\sqrt{1-c^2x^2}(a+b\arcsin(cx))^2}{c}\\
&\quad+x(a+b\arcsin(cx))^3+\left(6b^3c\right)\int\frac{x}{\sqrt{1-c^2x^2}}\,dx\\
&= -6ab^2x-\frac{6b^3\sqrt{1-c^2x^2}}{c}-6b^3x\arcsin(cx)\\
&\quad+\frac{3b\sqrt{1-c^2x^2}(a+b\arcsin(cx))^2}{c}+x(a+b\arcsin(cx))^3
\end{aligned}$$

Mathematica [A] (verified)

Time = 0.06 (sec) , antiderivative size = 77, normalized size of antiderivative = 0.94

$$\begin{aligned}
&\int(a+b\arcsin(cx))^3\,dx\\
&= x(a+b\arcsin(cx))^3\\
&\quad+\frac{3b\left(\sqrt{1-c^2x^2}(a+b\arcsin(cx))^2-2b\left(acx+b\sqrt{1-c^2x^2}+bcx\arcsin(cx)\right)\right)}{c}
\end{aligned}$$

```
[In] Integrate[(a + b*ArcSin[c*x])^3,x]
```

```
[Out] x*(a + b*ArcSin[c*x])^3 + (3*b*(Sqrt[1 - c^2*x^2]*(a + b*ArcSin[c*x])^2 - 2
*b*(a*c*x + b*Sqrt[1 - c^2*x^2] + b*c*x*ArcSin[c*x])))/c
```

Maple [A] (verified)

Time = 0.04 (sec) , antiderivative size = 132, normalized size of antiderivative = 1.61

method	result
derivativedivides	$\frac{cx\,a^3+b^3\left(cx\arcsin(cx)^3+3\arcsin(cx)^2\sqrt{-c^2x^2+1}-6\sqrt{-c^2x^2+1}-6cx\arcsin(cx)\right)+3a\,b^2\left(cx\arcsin(cx)^2-2cx+2\arcsin(\right.}{c}$
default	$\frac{cx\,a^3+b^3\left(cx\arcsin(cx)^3+3\arcsin(cx)^2\sqrt{-c^2x^2+1}-6\sqrt{-c^2x^2+1}-6cx\arcsin(cx)\right)+3a\,b^2\left(cx\arcsin(cx)^2-2cx+2\arcsin(\right.}{c}$
parts	$x\,a^3+\frac{b^3\left(cx\arcsin(cx)^3+3\arcsin(cx)^2\sqrt{-c^2x^2+1}-6\sqrt{-c^2x^2+1}-6cx\arcsin(cx)\right)}{c}+\frac{3a\,b^2\left(cx\arcsin(cx)^2-2cx+2\,\mathrm{ar}\right.}{c}$

```
[In] int((a+b*arcsin(c*x))^3,x,method=_RETURNVERBOSE)
```

```
[Out] 1/c*(c*x*a^3+b^3*(c*x*arcsin(c*x)^3+3*arcsin(c*x)^2*(-c^2*x^2+1)^(1/2)-6*(-
c^2*x^2+1)^(1/2)-6*c*x*arcsin(c*x))+3*a*b^2*(c*x*arcsin(c*x)^2-2*c*x+2*arcs
in(c*x)*(-c^2*x^2+1)^(1/2))+3*a^2*b*(c*x*arcsin(c*x)+(-c^2*x^2+1)^(1/2)))
```

Fricas [A] (verification not implemented)

none

Time = 0.25 (sec) , antiderivative size = 108, normalized size of antiderivative = 1.32

$$\int (a+b\arcsin(cx))^3\,dx$$
$$=\frac{b^3cx\arcsin{(cx)}^3+3\,ab^2cx\arcsin{(cx)}^2+3\,(a^2b-2\,b^3)cx\arcsin{(cx)}+(a^3-6\,ab^2)cx+3\,\big(b^3\arcsin{(cx)}^2+}{c}$$

```
[In] integrate((a+b*arcsin(c*x))^3,x, algorithm="fricas")
```

```
[Out] (b^3*c*x*arcsin(c*x)^3 + 3*a*b^2*c*x*arcsin(c*x)^2 + 3*(a^2*b - 2*b^3)*c*x*
arcsin(c*x) + (a^3 - 6*a*b^2)*c*x + 3*(b^3*arcsin(c*x)^2 + 2*a*b^2*arcsin(c
*x) + a^2*b - 2*b^3)*sqrt(-c^2*x^2 + 1))/c
```

Sympy [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 160 vs. 2(76) = 152.

Time = 0.14 (sec) , antiderivative size = 160, normalized size of antiderivative = 1.95

$$\int (a + b \arcsin(cx))^3 \, dx$$
$$= \begin{cases} a^3x + 3a^2bx\,\mathrm{asin}\,(cx) + \frac{3a^2b\sqrt{-c^2x^2+1}}{c} + 3ab^2x\,\mathrm{asin}^2\,(cx) - 6ab^2x + \frac{6ab^2\sqrt{-c^2x^2+1}\,\mathrm{asin}\,(cx)}{c} + b^3x\,\mathrm{asin}^3\,(cx) - \\ a^3x \end{cases}$$

[In] integrate((a+b*asin(c*x))**3,x)

[Out] Piecewise((a**3*x + 3*a**2*b*x*asin(c*x) + 3*a**2*b*sqrt(-c**2*x**2 + 1)/c + 3*a*b**2*x*asin(c*x)**2 - 6*a*b**2*x + 6*a*b**2*sqrt(-c**2*x**2 + 1)*asin (c*x)/c + b**3*x*asin(c*x)**3 - 6*b**3*x*asin(c*x) + 3*b**3*sqrt(-c**2*x**2 + 1)*asin(c*x)**2/c - 6*b**3*sqrt(-c**2*x**2 + 1)/c, Ne(c, 0)), (a**3*x, T rue))

Maxima [A] (verification not implemented)

none

Time = 0.31 (sec) , antiderivative size = 141, normalized size of antiderivative = 1.72

$$\int (a + b \arcsin(cx))^3 \, dx$$
$$= b^3x \arcsin(cx)^3 + 3\,ab^2x \arcsin(cx)^2 + 3\left(\frac{\sqrt{-c^2x^2+1}\arcsin(cx)^2}{c} - \frac{2\left(cx\arcsin(cx) + \sqrt{-c^2x^2+1}\right)}{c}\right)b^3 - 6\,ab^2\left(x - \frac{\sqrt{-c^2x^2+1}\arcsin(cx)}{c}\right) + a^3x + \frac{3\left(cx\arcsin(cx) + \sqrt{-c^2x^2+1}\right)a^2b}{c}$$

[In] integrate((a+b*arcsin(c*x))^3,x, algorithm="maxima")

[Out] b^3*x*arcsin(c*x)^3 + 3*a*b^2*x*arcsin(c*x)^2 + 3*(sqrt(-c^2*x^2 + 1)*arcsi n(c*x)^2/c - 2*(c*x*arcsin(c*x) + sqrt(-c^2*x^2 + 1))/c)*b^3 - 6*a*b^2*(x - sqrt(-c^2*x^2 + 1)*arcsin(c*x)/c) + a^3*x + 3*(c*x*arcsin(c*x) + sqrt(-c^2 *x^2 + 1))*a^2*b/c

Giac [A] (verification not implemented)

none

Time = 0.27 (sec) , antiderivative size = 150, normalized size of antiderivative = 1.83

$$\int (a+b\arcsin(cx))^3\,dx = b^3x\arcsin(cx)^3 + 3\,ab^2x\arcsin(cx)^2 + 3\,a^2bx\arcsin(cx) - 6\,b^3x\arcsin(cx) + \frac{3\,\sqrt{-c^2x^2+1}b^3\arcsin(cx)^2}{c} + a^3x - 6\,ab^2x + \frac{6\,\sqrt{-c^2x^2+1}ab^2\arcsin(cx)}{c} + \frac{3\,\sqrt{-c^2x^2+1}a^2b}{c} - \frac{6\,\sqrt{-c^2x^2+1}b^3}{c}$$

```
[In] integrate((a+b*arcsin(c*x))^3,x, algorithm="giac")
```

```
[Out] b^3*x*arcsin(c*x)^3 + 3*a*b^2*x*arcsin(c*x)^2 + 3*a^2*b*x*arcsin(c*x) - 6*b
^3*x*arcsin(c*x) + 3*sqrt(-c^2*x^2 + 1)*b^3*arcsin(c*x)^2/c + a^3*x - 6*a*b
^2*x + 6*sqrt(-c^2*x^2 + 1)*a*b^2*arcsin(c*x)/c + 3*sqrt(-c^2*x^2 + 1)*a^2*
b/c - 6*sqrt(-c^2*x^2 + 1)*b^3/c
```

Mupad [B] (verification not implemented)

Time = 0.44 (sec) , antiderivative size = 242, normalized size of antiderivative = 2.95

$$\int (a+b\arcsin(cx))^3\,dx = \begin{cases} a^3\,x - b^3\,\left(x\,\left(6\,\mathrm{asin}(c\,x) - \mathrm{asin}(c\,x)^3\right) - \sqrt{\frac{1}{c^2} - x^2}\,\left(3\,\mathrm{asin}(c\,x)^2 - 6\right)\right) + 3\,a\,b^2\,\left(x\,\left(\mathrm{asin}(c\,x)^2 - 2\right) + 2\,\mathrm{as}\right. \\ a^3\,x + \frac{3\,a^2\,b\,\left(\sqrt{1-c^2\,x^2}+c\,x\,\mathrm{asin}(c\,x)\right)}{c} + 3\,a\,b^2\,x\,\left(\mathrm{asin}(c\,x)^2 - 2\right) + b^3\,x\,\mathrm{asin}(c\,x)\,\left(\mathrm{asin}(c\,x)^2 - 6\right) + \frac{3\,b^3\,\sqrt{}}{} \end{cases}$$

```
[In] int((a + b*asin(c*x))^3,x)
```

```
[Out] piecewise(0 < c, a^3*x - b^3*(x*(6*asin(c*x) - asin(c*x)^3) - (1/c^2 - x^2)
^(1/2)*(3*asin(c*x)^2 - 6)) + 3*a*b^2*(x*(asin(c*x)^2 - 2) + 2*asin(c*x)*(1
/c^2 - x^2)^(1/2)) + (3*a^2*b*((- c^2*x^2 + 1)^(1/2) + c*x*asin(c*x)))/c, ~
0 < c, a^3*x + (3*a^2*b*((- c^2*x^2 + 1)^(1/2) + c*x*asin(c*x)))/c + 3*a*b^
2*x*(asin(c*x)^2 - 2) + b^3*x*asin(c*x)*(asin(c*x)^2 - 6) + (3*b^3*(- c^2*x
^2 + 1)^(1/2)*(asin(c*x)^2 - 2))/c + (6*a*b^2*asin(c*x)*(- c^2*x^2 + 1)^(1/
2))/c)
```

3.156 $\int \frac{(a+b\arcsin(cx))^3}{x}\,dx$

Optimal result

Integrand size = 14, antiderivative size = 123

$$\int \frac{(a+b\arcsin(cx))^3}{x}\,dx = -\frac{i(a+b\arcsin(cx))^4}{4b}+(a+b\arcsin(cx))^3\log\left(1-e^{2i\arcsin(cx)}\right) -\frac{3}{2}ib(a+b\arcsin(cx))^2\operatorname{PolyLog}\left(2,e^{2i\arcsin(cx)}\right) +\frac{3}{2}b^2(a+b\arcsin(cx))\operatorname{PolyLog}\left(3,e^{2i\arcsin(cx)}\right) +\frac{3}{4}ib^3\operatorname{PolyLog}\left(4,e^{2i\arcsin(cx)}\right)$$

```
[Out] -1/4*I*(a+b*arcsin(c*x))^4/b+(a+b*arcsin(c*x))^3*ln(1-(I*c*x+(-c^2*x^2+1)^(
1/2))^2)-3/2*I*b*(a+b*arcsin(c*x))^2*polylog(2,(I*c*x+(-c^2*x^2+1)^(1/2))^2
)+3/2*b^2*(a+b*arcsin(c*x))*polylog(3,(I*c*x+(-c^2*x^2+1)^(1/2))^2)+3/4*I*b
^3*polylog(4,(I*c*x+(-c^2*x^2+1)^(1/2))^2)
```

Rubi [A] (verified)

Time = 0.10 (sec) , antiderivative size = 123, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 7, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {4721, 3798, 2221, 2611, 6744, 2320, 6724}

$$\int \frac{(a+b\arcsin(cx))^3}{x}\,dx = \frac{3}{2}b^2\operatorname{PolyLog}\left(3,e^{2i\arcsin(cx)}\right)(a+b\arcsin(cx)) -\frac{3}{2}ib\operatorname{PolyLog}\left(2,e^{2i\arcsin(cx)}\right)(a+b\arcsin(cx))^2 -\frac{i(a+b\arcsin(cx))^4}{4b}+\log\left(1-e^{2i\arcsin(cx)}\right)(a+b\arcsin(cx))^3 +\frac{3}{4}ib^3\operatorname{PolyLog}\left(4,e^{2i\arcsin(cx)}\right)$$

```
[In] Int[(a + b*ArcSin[c*x])^3/x,x]
```

```
[Out] ((-1/4*I)*(a + b*ArcSin[c*x])^4)/b + (a + b*ArcSin[c*x])^3*Log[1 - E^((2*I)
*ArcSin[c*x])] - ((3*I)/2)*b*(a + b*ArcSin[c*x])^2*PolyLog[2, E^((2*I)*ArcS
in[c*x])] + (3*b^2*(a + b*ArcSin[c*x])*PolyLog[3, E^((2*I)*ArcSin[c*x])])/2
 + ((3*I)/4)*b^3*PolyLog[4, E^((2*I)*ArcSin[c*x])]
```

Rule 2221

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m/(b*f*g*n*Log[F]))*Log[1 + b*((F^(g*(e + f*x)))^n/a)], x] - Di
st[d*(m/(b*f*g*n*Log[F])), Int[(c + d*x)^(m - 1)*Log[1 + b*((F^(g*(e + f*x)
))^n/a)], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2320

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2611

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> Simp[(-(f + g*x)^m)*(PolyLog[2, (-e)*(F^(c*(a +
b*x)))^n]/(b*c*n*Log[F])), x] + Dist[g*(m/(b*c*n*Log[F])), Int[(f + g*x)^(m
 - 1)*PolyLog[2, (-e)*(F^(c*(a + b*x)))^n], x], x] /; FreeQ[{F, a, b, c, e,
 f, g, n}, x] && GtQ[m, 0]
```

Rule 3798

```
Int[((c_.) + (d_.)*(x_))^(m_.)*tan[(e_.) + Pi*(k_.) + (f_.)*(x_)], x_Symbol
] :> Simp[I*((c + d*x)^(m + 1)/(d*(m + 1))), x] - Dist[2*I, Int[(c + d*x)^m
*E^(2*I*k*Pi)*(E^(2*I*(e + f*x))/(1 + E^(2*I*k*Pi)*E^(2*I*(e + f*x)))), x],
 x] /; FreeQ[{c, d, e, f}, x] && IntegerQ[4*k] && IGtQ[m, 0]
```

Rule 4721

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)/(x_), x_Symbol] :> Subst[Int[(
a + b*x)^n*Cot[x], x], x, ArcSin[c*x]] /; FreeQ[{a, b, c}, x] && IGtQ[n, 0]
```

Rule 6724

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
```

```
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rule 6744

```
Int[((e_.) + (f_.)*(x_))^(m_.)*PolyLog[n_, (d_.)*((F_)^((c_.)*((a_.) + (b_.
)*(x_))))^(p_.)], x_Symbol] :> Simp[(e + f*x)^m*(PolyLog[n + 1, d*(F^(c*(a
+ b*x)))^p]/(b*c*p*Log[F])), x] - Dist[f*(m/(b*c*p*Log[F])), Int[(e + f*x)^
(m - 1)*PolyLog[n + 1, d*(F^(c*(a + b*x)))^p], x], x] /; FreeQ[{F, a, b, c,
 d, e, f, n, p}, x] && GtQ[m, 0]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= \text{Subst}\left(\int (a+bx)^3\cot(x)\,dx, x, \arcsin(cx)\right)\\
&= -\frac{i(a+b\arcsin(cx))^4}{4b} - 2i\text{Subst}\left(\int \frac{e^{2ix}(a+bx)^3}{1-e^{2ix}}\,dx, x, \arcsin(cx)\right)\\
&= -\frac{i(a+b\arcsin(cx))^4}{4b} + (a+b\arcsin(cx))^3\log\left(1-e^{2i\arcsin(cx)}\right)\\
&\quad - (3b)\text{Subst}\left(\int (a+bx)^2\log\left(1-e^{2ix}\right)\,dx, x, \arcsin(cx)\right)\\
&= -\frac{i(a+b\arcsin(cx))^4}{4b} + (a+b\arcsin(cx))^3\log\left(1-e^{2i\arcsin(cx)}\right)\\
&\quad - \frac{3}{2}ib(a+b\arcsin(cx))^2\,\text{PolyLog}\left(2, e^{2i\arcsin(cx)}\right)\\
&\quad + \left(3ib^2\right)\text{Subst}\left(\int (a+bx)\,\text{PolyLog}\left(2, e^{2ix}\right)\,dx, x, \arcsin(cx)\right)\\
&= -\frac{i(a+b\arcsin(cx))^4}{4b} + (a+b\arcsin(cx))^3\log\left(1-e^{2i\arcsin(cx)}\right)\\
&\quad - \frac{3}{2}ib(a+b\arcsin(cx))^2\,\text{PolyLog}\left(2, e^{2i\arcsin(cx)}\right)\\
&\quad + \frac{3}{2}b^2(a+b\arcsin(cx))\,\text{PolyLog}\left(3, e^{2i\arcsin(cx)}\right)\\
&\quad - \frac{1}{2}\left(3b^3\right)\text{Subst}\left(\int \text{PolyLog}\left(3, e^{2ix}\right)\,dx, x, \arcsin(cx)\right)\\
&= -\frac{i(a+b\arcsin(cx))^4}{4b} + (a+b\arcsin(cx))^3\log\left(1-e^{2i\arcsin(cx)}\right)\\
&\quad - \frac{3}{2}ib(a+b\arcsin(cx))^2\,\text{PolyLog}\left(2, e^{2i\arcsin(cx)}\right)\\
&\quad + \frac{3}{2}b^2(a+b\arcsin(cx))\,\text{PolyLog}\left(3, e^{2i\arcsin(cx)}\right)\\
&\quad + \frac{1}{4}\left(3ib^3\right)\text{Subst}\left(\int \frac{\text{PolyLog}(3,x)}{x}\,dx, x, e^{2i\arcsin(cx)}\right)
\end{aligned}$$

$$= -\frac{i(a+b\arcsin(cx))^4}{4b} + (a+b\arcsin(cx))^3\log\left(1-e^{2i\arcsin(cx)}\right) - \frac{3}{2}ib(a+b\arcsin(cx))^2\operatorname{PolyLog}\left(2,e^{2i\arcsin(cx)}\right) + \frac{3}{2}b^2(a+b\arcsin(cx))\operatorname{PolyLog}\left(3,e^{2i\arcsin(cx)}\right) + \frac{3}{4}ib^3\operatorname{PolyLog}\left(4,e^{2i\arcsin(cx)}\right)$$

Mathematica [A] (verified)

Time = 0.17 (sec) , antiderivative size = 244, normalized size of antiderivative = 1.98

$$\int \frac{(a+b\arcsin(cx))^3}{x}\,dx = a^3\log(cx) + 3a^2b\left(\arcsin(cx)\log\left(1-e^{2i\arcsin(cx)}\right) - \frac{1}{2}i\left(\arcsin(cx)^2 + \operatorname{PolyLog}\left(2,e^{2i\arcsin(cx)}\right)\right)\right) + \frac{1}{8}ab^2\left(-i\pi^3 + 8i\arcsin(cx)^3 + 24\arcsin(cx)^2\log\left(1-e^{-2i\arcsin(cx)}\right) + 24i\arcsin(cx)\operatorname{PolyLog}\left(2,e^{-2i\arcsin(cx)}\right) + 12\operatorname{PolyLog}\left(3,e^{-2i\arcsin(cx)}\right)\right) - \frac{1}{64}ib^3\left(\pi^4 - 16\arcsin(cx)^4 + 64i\arcsin(cx)^3\log\left(1-e^{-2i\arcsin(cx)}\right) - 96\arcsin(cx)^2\operatorname{PolyLog}\left(2,e^{-2i\arcsin(cx)}\right) + 96i\arcsin(cx)\operatorname{PolyLog}\left(3,e^{-2i\arcsin(cx)}\right) + 48\operatorname{PolyLog}\left(4,e^{-2i\arcsin(cx)}\right)\right)$$

```
[In] Integrate[(a + b*ArcSin[c*x])^3/x,x]
```

```
[Out] a^3*Log[c*x] + 3*a^2*b*(ArcSin[c*x]*Log[1 - E^((2*I)*ArcSin[c*x])] - (I/2)*
(ArcSin[c*x]^2 + PolyLog[2, E^((2*I)*ArcSin[c*x])])) + (a*b^2*((-I)*Pi^3 +
(8*I)*ArcSin[c*x]^3 + 24*ArcSin[c*x]^2*Log[1 - E^((-2*I)*ArcSin[c*x])] + (2
4*I)*ArcSin[c*x]*PolyLog[2, E^((-2*I)*ArcSin[c*x])] + 12*PolyLog[3, E^((-2*
I)*ArcSin[c*x])]))/8 - (I/64)*b^3*(Pi^4 - 16*ArcSin[c*x]^4 + (64*I)*ArcSin[
c*x]^3*Log[1 - E^((-2*I)*ArcSin[c*x])] - 96*ArcSin[c*x]^2*PolyLog[2, E^((-2
*I)*ArcSin[c*x])] + (96*I)*ArcSin[c*x]*PolyLog[3, E^((-2*I)*ArcSin[c*x])] +
 48*PolyLog[4, E^((-2*I)*ArcSin[c*x])])
```

Maple [B] (verified)

Both result and optimal contain complex but leaf count of result is larger than twice the leaf count of optimal. 529 vs. 2(152) = 304.

Time = 0.08 (sec) , antiderivative size = 530, normalized size of antiderivative = 4.31

method	result
parts	$a^3 \ln(x) + b^3\left(-\frac{i \arcsin(cx)^4}{4} + \arcsin(cx)^3 \ln\left(1 + icx + \sqrt{-c^2x^2+1}\right) - 3i \arcsin(cx)^2 \text{p}\right.$
derivativedivides	$a^3 \ln(cx) + b^3\left(-\frac{i \arcsin(cx)^4}{4} + \arcsin(cx)^3 \ln\left(1 + icx + \sqrt{-c^2x^2+1}\right) - 3i \arcsin(cx)^2 \text{p}\right.$
default	$a^3 \ln(cx) + b^3\left(-\frac{i \arcsin(cx)^4}{4} + \arcsin(cx)^3 \ln\left(1 + icx + \sqrt{-c^2x^2+1}\right) - 3i \arcsin(cx)^2 \text{p}\right.$

```
[In] int((a+b*arcsin(c*x))^3/x,x,method=_RETURNVERBOSE)
```

```
[Out] a^3*ln(x)+b^3*(-1/4*I*arcsin(c*x)^4+arcsin(c*x)^3*ln(1+I*c*x+(-c^2*x^2+1)^(
1/2))-3*I*arcsin(c*x)^2*polylog(2,-I*c*x-(-c^2*x^2+1)^(1/2))+6*arcsin(c*x)*
polylog(3,-I*c*x-(-c^2*x^2+1)^(1/2))+6*I*polylog(4,-I*c*x-(-c^2*x^2+1)^(1/2
))+arcsin(c*x)^3*ln(1-I*c*x-(-c^2*x^2+1)^(1/2))-3*I*arcsin(c*x)^2*polylog(2
,I*c*x+(-c^2*x^2+1)^(1/2))+6*arcsin(c*x)*polylog(3,I*c*x+(-c^2*x^2+1)^(1/2)
)+6*I*polylog(4,I*c*x+(-c^2*x^2+1)^(1/2)))+3*a*b^2*(-1/3*I*arcsin(c*x)^3+ar
csin(c*x)^2*ln(1+I*c*x+(-c^2*x^2+1)^(1/2))-2*I*arcsin(c*x)*polylog(2,-I*c*x
-(-c^2*x^2+1)^(1/2))+2*polylog(3,-I*c*x-(-c^2*x^2+1)^(1/2))+arcsin(c*x)^2*l
n(1-I*c*x-(-c^2*x^2+1)^(1/2))-2*I*arcsin(c*x)*polylog(2,I*c*x+(-c^2*x^2+1)^
(1/2))+2*polylog(3,I*c*x+(-c^2*x^2+1)^(1/2)))+3*a^2*b*(-1/2*I*arcsin(c*x)^2
+arcsin(c*x)*ln(1+I*c*x+(-c^2*x^2+1)^(1/2))-I*polylog(2,-I*c*x-(-c^2*x^2+1)
^(1/2))+arcsin(c*x)*ln(1-I*c*x-(-c^2*x^2+1)^(1/2))-I*polylog(2,I*c*x+(-c^2*
x^2+1)^(1/2)))
```

Fricas [F]

$$\int \frac{(a + b \arcsin(cx))^3}{x} \, dx = \int \frac{(b \arcsin(cx) + a)^3}{x} \, dx$$

```
[In] integrate((a+b*arcsin(c*x))^3/x,x, algorithm="fricas")
```

```
[Out] integral((b^3*arcsin(c*x)^3 + 3*a*b^2*arcsin(c*x)^2 + 3*a^2*b*arcsin(c*x) +
 a^3)/x, x)
```

Sympy [F]

$$\int \frac{(a+b\arcsin(cx))^3}{x}\,dx = \int \frac{(a+b\operatorname{asin}(cx))^3}{x}\,dx$$

```
[In] integrate((a+b*asin(c*x))**3/x,x)
```

```
[Out] Integral((a + b*asin(c*x))**3/x, x)
```

Maxima [F]

$$\int \frac{(a+b\arcsin(cx))^3}{x}\,dx = \int \frac{(b\arcsin(cx)+a)^3}{x}\,dx$$

```
[In] integrate((a+b*arcsin(c*x))^3/x,x, algorithm="maxima")
```

```
[Out] a^3*log(x) + integrate((b^3*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1))^3 +
3*a*b^2*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1))^2 + 3*a^2*b*arctan2(c*x,
 sqrt(c*x + 1)*sqrt(-c*x + 1)))/x, x)
```

Giac [F]

$$\int \frac{(a+b\arcsin(cx))^3}{x}\,dx = \int \frac{(b\arcsin(cx)+a)^3}{x}\,dx$$

```
[In] integrate((a+b*arcsin(c*x))^3/x,x, algorithm="giac")
```

```
[Out] integrate((b*arcsin(c*x) + a)^3/x, x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{(a+b\arcsin(cx))^3}{x}\,dx = \int \frac{(a+b\operatorname{asin}(c\,x))^3}{x}\,dx$$

```
[In] int((a + b*asin(c*x))^3/x,x)
```

```
[Out] int((a + b*asin(c*x))^3/x, x)
```

3.157 $\int \frac{(a+b\arcsin(cx))^3}{x^2}\,dx$

Optimal result

Integrand size = 14, antiderivative size = 137

$$\begin{aligned}\int \frac{(a+b\arcsin(cx))^3}{x^2}\,dx = &-\frac{(a+b\arcsin(cx))^3}{x}-6bc(a+b\arcsin(cx))^2\operatorname{arctanh}\left(e^{i\arcsin(cx)}\right)\\&+6ib^2c(a+b\arcsin(cx))\operatorname{PolyLog}\left(2,-e^{i\arcsin(cx)}\right)\\&-6ib^2c(a+b\arcsin(cx))\operatorname{PolyLog}\left(2,e^{i\arcsin(cx)}\right)\\&-6b^3c\operatorname{PolyLog}\left(3,-e^{i\arcsin(cx)}\right)+6b^3c\operatorname{PolyLog}\left(3,e^{i\arcsin(cx)}\right)\end{aligned}$$

```
[Out] -(a+b*arcsin(c*x))^3/x-6*b*c*(a+b*arcsin(c*x))^2*arctanh(I*c*x+(-c^2*x^2+1)
^(1/2))+6*I*b^2*c*(a+b*arcsin(c*x))*polylog(2,-I*c*x-(-c^2*x^2+1)^(1/2))-6*
I*b^2*c*(a+b*arcsin(c*x))*polylog(2,I*c*x+(-c^2*x^2+1)^(1/2))-6*b^3*c*polyl
og(3,-I*c*x-(-c^2*x^2+1)^(1/2))+6*b^3*c*polylog(3,I*c*x+(-c^2*x^2+1)^(1/2))
```

Rubi [A] (verified)

Time = 0.14 (sec) , antiderivative size = 137, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 6, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.429, Rules used = {4723, 4803, 4268, 2611, 2320, 6724}

$$\begin{aligned}\int \frac{(a+b\arcsin(cx))^3}{x^2}\,dx = &-6bc\operatorname{arctanh}\left(e^{i\arcsin(cx)}\right)(a+b\arcsin(cx))^2\\&+6ib^2c\operatorname{PolyLog}\left(2,-e^{i\arcsin(cx)}\right)(a+b\arcsin(cx))\\&-6ib^2c\operatorname{PolyLog}\left(2,e^{i\arcsin(cx)}\right)(a+b\arcsin(cx))\\&-\frac{(a+b\arcsin(cx))^3}{x}-6b^3c\operatorname{PolyLog}\left(3,-e^{i\arcsin(cx)}\right)\\&+6b^3c\operatorname{PolyLog}\left(3,e^{i\arcsin(cx)}\right)\end{aligned}$$

```
[In] Int[(a + b*ArcSin[c*x])^3/x^2,x]
```

```
[Out] -((a + b*ArcSin[c*x])^3/x) - 6*b*c*(a + b*ArcSin[c*x])^2*ArcTanh[E^(I*ArcSi
n[c*x])] + (6*I)*b^2*c*(a + b*ArcSin[c*x])*PolyLog[2, -E^(I*ArcSin[c*x])] -
 (6*I)*b^2*c*(a + b*ArcSin[c*x])*PolyLog[2, E^(I*ArcSin[c*x])] - 6*b^3*c*Po
lyLog[3, -E^(I*ArcSin[c*x])] + 6*b^3*c*PolyLog[3, E^(I*ArcSin[c*x])]
```

Rule 2320

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2611

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> Simp[(-(f + g*x)^m)*(PolyLog[2, (-e)*(F^(c*(a +
b*x)))^n]/(b*c*n*Log[F])), x] + Dist[g*(m/(b*c*n*Log[F])), Int[(f + g*x)^(m
 - 1)*PolyLog[2, (-e)*(F^(c*(a + b*x)))^n], x], x] /; FreeQ[{F, a, b, c, e,
 f, g, n}, x] && GtQ[m, 0]
```

Rule 4268

```
Int[csc[(e_.) + (f_.)*(x_)]*((c_.) + (d_.)*(x_))^(m_.), x_Symbol] :> Simp[-
2*(c + d*x)^m*(ArcTanh[E^(I*(e + f*x))]/f), x] + (-Dist[d*(m/f), Int[(c + d
*x)^(m - 1)*Log[1 - E^(I*(e + f*x))], x], x] + Dist[d*(m/f), Int[(c + d*x)^
(m - 1)*Log[1 + E^(I*(e + f*x))], x], x]) /; FreeQ[{c, d, e, f}, x] && IGtQ
[m, 0]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rule 4803

```
Int[(((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_))/Sqrt[(d_) + (e_.)*
(x_)^2], x_Symbol] :> Dist[(1/c^(m + 1))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*
x^2]], Subst[Int[(a + b*x)^n*Sin[x]^m, x], x, ArcSin[c*x]], x] /; FreeQ[{a,
 b, c, d, e}, x] && EqQ[c^2*d + e, 0] && IGtQ[n, 0] && IntegerQ[m]
```

Rule 6724

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= -\frac{(a+b\arcsin(cx))^3}{x}+(3bc)\int\frac{(a+b\arcsin(cx))^2}{x\sqrt{1-c^2x^2}}\,dx\\
&= -\frac{(a+b\arcsin(cx))^3}{x}+(3bc)\text{Subst}\left(\int(a+bx)^2\csc(x)\,dx,x,\arcsin(cx)\right)\\
&= -\frac{(a+b\arcsin(cx))^3}{x}-6bc(a+b\arcsin(cx))^2\operatorname{arctanh}\left(e^{i\arcsin(cx)}\right)\\
&\quad-\left(6b^2c\right)\text{Subst}\left(\int(a+bx)\log\left(1-e^{ix}\right)\,dx,x,\arcsin(cx)\right)\\
&\quad+\left(6b^2c\right)\text{Subst}\left(\int(a+bx)\log\left(1+e^{ix}\right)\,dx,x,\arcsin(cx)\right)\\
&= -\frac{(a+b\arcsin(cx))^3}{x}-6bc(a+b\arcsin(cx))^2\operatorname{arctanh}\left(e^{i\arcsin(cx)}\right)\\
&\quad+6ib^2c(a+b\arcsin(cx))\,\text{PolyLog}\left(2,-e^{i\arcsin(cx)}\right)\\
&\quad-6ib^2c(a+b\arcsin(cx))\,\text{PolyLog}\left(2,e^{i\arcsin(cx)}\right)\\
&\quad-\left(6ib^3c\right)\text{Subst}\left(\int\text{PolyLog}\left(2,-e^{ix}\right)\,dx,x,\arcsin(cx)\right)\\
&\quad+\left(6ib^3c\right)\text{Subst}\left(\int\text{PolyLog}\left(2,e^{ix}\right)\,dx,x,\arcsin(cx)\right)\\
&= -\frac{(a+b\arcsin(cx))^3}{x}-6bc(a+b\arcsin(cx))^2\operatorname{arctanh}\left(e^{i\arcsin(cx)}\right)\\
&\quad+6ib^2c(a+b\arcsin(cx))\,\text{PolyLog}\left(2,-e^{i\arcsin(cx)}\right)\\
&\quad-6ib^2c(a+b\arcsin(cx))\,\text{PolyLog}\left(2,e^{i\arcsin(cx)}\right)\\
&\quad-\left(6b^3c\right)\text{Subst}\left(\int\frac{\text{PolyLog}(2,-x)}{x}\,dx,x,e^{i\arcsin(cx)}\right)\\
&\quad+\left(6b^3c\right)\text{Subst}\left(\int\frac{\text{PolyLog}(2,x)}{x}\,dx,x,e^{i\arcsin(cx)}\right)\\
&= -\frac{(a+b\arcsin(cx))^3}{x}-6bc(a+b\arcsin(cx))^2\operatorname{arctanh}\left(e^{i\arcsin(cx)}\right)\\
&\quad+6ib^2c(a+b\arcsin(cx))\,\text{PolyLog}\left(2,-e^{i\arcsin(cx)}\right)\\
&\quad-6ib^2c(a+b\arcsin(cx))\,\text{PolyLog}\left(2,e^{i\arcsin(cx)}\right)\\
&\quad-6b^3c\,\text{PolyLog}\left(3,-e^{i\arcsin(cx)}\right)+6b^3c\,\text{PolyLog}\left(3,e^{i\arcsin(cx)}\right)
\end{aligned}$$

Mathematica [B] (verified)

Both result and optimal contain complex but leaf count is larger than twice the leaf count of optimal. 283 vs. 2(137) = 274.

Time = 0.24 (sec) , antiderivative size = 283, normalized size of antiderivative = 2.07

$$\int \frac{(a+b\arcsin(cx))^3}{x^2}\,dx = -\frac{a^3}{x}-\frac{3a^2b\arcsin(cx)}{x}+3a^2bc\log(x)-3a^2bc\log\left(1+\sqrt{1-c^2x^2}\right) + 3ab^2c\Bigg(-\arcsin(cx)\left(\frac{\arcsin(cx)}{cx}-2\log\left(1-e^{i\arcsin(cx)}\right) + 2\log\left(1+e^{i\arcsin(cx)}\right)\right)+2i\operatorname{PolyLog}\left(2,-e^{i\arcsin(cx)}\right) - 2i\operatorname{PolyLog}\left(2,e^{i\arcsin(cx)}\right)\Bigg) + b^3c\Bigg(-\frac{\arcsin(cx)^3}{cx}+3\arcsin(cx)^2\log\left(1-e^{i\arcsin(cx)}\right) - 3\arcsin(cx)^2\log\left(1+e^{i\arcsin(cx)}\right) + 6i\arcsin(cx)\operatorname{PolyLog}\left(2,-e^{i\arcsin(cx)}\right) - 6i\arcsin(cx)\operatorname{PolyLog}\left(2,e^{i\arcsin(cx)}\right) - 6\operatorname{PolyLog}\left(3,-e^{i\arcsin(cx)}\right)+6\operatorname{PolyLog}\left(3,e^{i\arcsin(cx)}\right)\Bigg)$$

```
[In] Integrate[(a + b*ArcSin[c*x])^3/x^2,x]
```

```
[Out] -(a^3/x) - (3*a^2*b*ArcSin[c*x])/x + 3*a^2*b*c*Log[x] - 3*a^2*b*c*Log[1 + S
qrt[1 - c^2*x^2]] + 3*a*b^2*c*(-(ArcSin[c*x]*(ArcSin[c*x]/(c*x) - 2*Log[1 -
 E^(I*ArcSin[c*x])] + 2*Log[1 + E^(I*ArcSin[c*x])])) + (2*I)*PolyLog[2, -E^
(I*ArcSin[c*x])] - (2*I)*PolyLog[2, E^(I*ArcSin[c*x])]) + b^3*c*(-(ArcSin[c
*x]^3/(c*x)) + 3*ArcSin[c*x]^2*Log[1 - E^(I*ArcSin[c*x])] - 3*ArcSin[c*x]^2
*Log[1 + E^(I*ArcSin[c*x])] + (6*I)*ArcSin[c*x]*PolyLog[2, -E^(I*ArcSin[c*x
])] - (6*I)*ArcSin[c*x]*PolyLog[2, E^(I*ArcSin[c*x])] - 6*PolyLog[3, -E^(I*
ArcSin[c*x])] + 6*PolyLog[3, E^(I*ArcSin[c*x])])
```

Maple [A] (verified)

Time = 0.10 (sec) , antiderivative size = 349, normalized size of antiderivative = 2.55

method	result
parts	$-\frac{a^3}{x}+b^3c\left(-\frac{\arcsin(cx)^3}{cx}-3\arcsin\left(cx\right)^2\ln\left(1+icx+\sqrt{-c^2x^2+1}\right)+6i\arcsin\left(cx\right)\mathrm{polyl}\right.$
derivativedivides	$c\left(-\frac{a^3}{cx}+b^3\left(-\frac{\arcsin(cx)^3}{cx}-3\arcsin\left(cx\right)^2\ln\left(1+icx+\sqrt{-c^2x^2+1}\right)+6i\arcsin\left(cx\right)\mathrm{pol}\right.\right.$
default	$c\left(-\frac{a^3}{cx}+b^3\left(-\frac{\arcsin(cx)^3}{cx}-3\arcsin\left(cx\right)^2\ln\left(1+icx+\sqrt{-c^2x^2+1}\right)+6i\arcsin\left(cx\right)\mathrm{pol}\right.\right.$

```
[In] int((a+b*arcsin(c*x))^3/x^2,x,method=_RETURNVERBOSE)
```

```
[Out] -a^3/x+b^3*c*(-1/c/x*arcsin(c*x)^3-3*arcsin(c*x)^2*ln(1+I*c*x+(-c^2*x^2+1)^
(1/2))+6*I*arcsin(c*x)*polylog(2,-I*c*x-(-c^2*x^2+1)^(1/2))-6*polylog(3,-I*
c*x-(-c^2*x^2+1)^(1/2))+3*arcsin(c*x)^2*ln(1-I*c*x-(-c^2*x^2+1)^(1/2))-6*I*
arcsin(c*x)*polylog(2,I*c*x+(-c^2*x^2+1)^(1/2))+6*polylog(3,I*c*x+(-c^2*x^2
+1)^(1/2)))+3*a*b^2*c*(-1/c/x*arcsin(c*x)^2+2*arcsin(c*x)*ln(1-I*c*x-(-c^2*
x^2+1)^(1/2))-2*arcsin(c*x)*ln(1+I*c*x+(-c^2*x^2+1)^(1/2))+2*I*dilog(1+I*c*
x+(-c^2*x^2+1)^(1/2))-2*I*dilog(1-I*c*x-(-c^2*x^2+1)^(1/2)))+3*a^2*b*c*(-1/
c/x*arcsin(c*x)-arctanh(1/(-c^2*x^2+1)^(1/2)))
```

Fricas [F]

$$\int \frac{(a+b\arcsin(cx))^3}{x^2}\,dx=\int \frac{\left(b\arcsin\left(cx\right)+a\right)^3}{x^2}\,dx$$

```
[In] integrate((a+b*arcsin(c*x))^3/x^2,x, algorithm="fricas")
```

```
[Out] integral((b^3*arcsin(c*x)^3 + 3*a*b^2*arcsin(c*x)^2 + 3*a^2*b*arcsin(c*x) +
 a^3)/x^2, x)
```

Sympy [F]

$$\int \frac{(a+b\arcsin(cx))^3}{x^2}\,dx=\int \frac{\left(a+b\,\mathrm{asin}\left(cx\right)\right)^3}{x^2}\,dx$$

```
[In] integrate((a+b*asin(c*x))**3/x**2,x)
```

```
[Out] Integral((a + b*asin(c*x))**3/x**2, x)
```

Maxima [F]

$$\int \frac{(a+b\arcsin(cx))^3}{x^2}\,dx=\int \frac{(b\arcsin{(cx)}+a)^3}{x^2}\,dx$$

```
[In] integrate((a+b*arcsin(c*x))^3/x^2,x, algorithm="maxima")
```

```
[Out] -3*(c*log(2*sqrt(-c^2*x^2 + 1)/abs(x) + 2/abs(x)) + arcsin(c*x)/x)*a^2*b -
a^3/x - (b^3*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1))^3 + x*integrate(3*(
sqrt(c*x + 1)*sqrt(-c*x + 1)*b^3*c*x*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x +
 1))^2 - (a*b^2*c^2*x^2 - a*b^2)*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1))
^2)/(c^2*x^4 - x^2), x))/x
```

Giac [F]

$$\int \frac{(a+b\arcsin(cx))^3}{x^2}\,dx=\int \frac{(b\arcsin{(cx)}+a)^3}{x^2}\,dx$$

```
[In] integrate((a+b*arcsin(c*x))^3/x^2,x, algorithm="giac")
```

```
[Out] integrate((b*arcsin(c*x) + a)^3/x^2, x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{(a+b\arcsin(cx))^3}{x^2}\,dx=\int \frac{(a+b\,\mathrm{asin}(c\,x))^3}{x^2}\,dx$$

```
[In] int((a + b*asin(c*x))^3/x^2,x)
```

```
[Out] int((a + b*asin(c*x))^3/x^2, x)
```

3.158 $\int \frac{x^2}{a+b \arcsin(cx)} \, dx$

Optimal result

Integrand size = 14, antiderivative size = 121

$$\int \frac{x^2}{a+b\arcsin(cx)}\,dx=\frac{\cos\left(\frac{a}{b}\right)\text{CosIntegral}\left(\frac{a+b\arcsin(cx)}{b}\right)}{4bc^3}-\frac{\cos\left(\frac{3a}{b}\right)\text{CosIntegral}\left(\frac{3(a+b\arcsin(cx))}{b}\right)}{4bc^3}+\frac{\sin\left(\frac{a}{b}\right)\text{Si}\left(\frac{a+b\arcsin(cx)}{b}\right)}{4bc^3}-\frac{\sin\left(\frac{3a}{b}\right)\text{Si}\left(\frac{3(a+b\arcsin(cx))}{b}\right)}{4bc^3}$$

```
[Out] 1/4*Ci((a+b*arcsin(c*x))/b)*cos(a/b)/b/c^3-1/4*Ci(3*(a+b*arcsin(c*x))/b)*co
s(3*a/b)/b/c^3+1/4*Si((a+b*arcsin(c*x))/b)*sin(a/b)/b/c^3-1/4*Si(3*(a+b*arc
sin(c*x))/b)*sin(3*a/b)/b/c^3
```

Rubi [A] (verified)

Time = 0.15 (sec) , antiderivative size = 121, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 5, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.357, Rules used = {4731, 4491, 3384, 3380, 3383}

$$\int \frac{x^2}{a+b\arcsin(cx)}\,dx=\frac{\cos\left(\frac{a}{b}\right)\text{CosIntegral}\left(\frac{a+b\arcsin(cx)}{b}\right)}{4bc^3}-\frac{\cos\left(\frac{3a}{b}\right)\text{CosIntegral}\left(\frac{3(a+b\arcsin(cx))}{b}\right)}{4bc^3}+\frac{\sin\left(\frac{a}{b}\right)\text{Si}\left(\frac{a+b\arcsin(cx)}{b}\right)}{4bc^3}-\frac{\sin\left(\frac{3a}{b}\right)\text{Si}\left(\frac{3(a+b\arcsin(cx))}{b}\right)}{4bc^3}$$

```
[In] Int[x^2/(a + b*ArcSin[c*x]),x]
```

```
[Out] (Cos[a/b]*CosIntegral[(a + b*ArcSin[c*x])/b])/(4*b*c^3) - (Cos[(3*a)/b]*Cos
Integral[(3*(a + b*ArcSin[c*x]))/b])/(4*b*c^3) + (Sin[a/b]*SinIntegral[(a +
 b*ArcSin[c*x])/b])/(4*b*c^3) - (Sin[(3*a)/b]*SinIntegral[(3*(a + b*ArcSin[
c*x]))/b])/(4*b*c^3)
```

Rule 3380

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Simp[SinInte
gral[e + f*x]/d, x] /; FreeQ[{c, d, e, f}, x] && EqQ[d*e - c*f, 0]
```

Rule 3383

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Simp[CosInte
gral[e - Pi/2 + f*x]/d, x] /; FreeQ[{c, d, e, f}, x] && EqQ[d*(e - Pi/2) -
c*f, 0]
```

Rule 3384

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Dist[Cos[(d*
e - c*f)/d], Int[Sin[c*(f/d) + f*x]/(c + d*x), x], x] + Dist[Sin[(d*e - c*f
)/d], Int[Cos[c*(f/d) + f*x]/(c + d*x), x], x] /; FreeQ[{c, d, e, f}, x] &&
 NeQ[d*e - c*f, 0]
```

Rule 4491

```
Int[Cos[(a_.) + (b_.)*(x_)]^(p_.)*((c_.) + (d_.)*(x_))^(m_.)*Sin[(a_.) + (b
_.)*(x_)]^(n_.), x_Symbol] :> Int[ExpandTrigReduce[(c + d*x)^m, Sin[a + b*x
]^n*Cos[a + b*x]^p, x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && IG
tQ[p, 0]
```

Rule 4731

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Dist[1
/(b*c^(m + 1)), Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b], x], x, a +
 b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, n}, x] && IGtQ[m, 0]
```

Rule steps

$$\begin{aligned}
\text{integral} &= \frac{\text{Subst}\left(\int \frac{\cos\left(\frac{a}{b}-\frac{x}{b}\right)\sin^2\left(\frac{a}{b}-\frac{x}{b}\right)}{x}\,dx, x, a+b\arcsin(cx)\right)}{bc^3} \\
&= \frac{\text{Subst}\left(\int \left(-\frac{\cos\left(\frac{3a}{b}-\frac{3x}{b}\right)}{4x}+\frac{\cos\left(\frac{a}{b}-\frac{x}{b}\right)}{4x}\right)\,dx, x, a+b\arcsin(cx)\right)}{bc^3} \\
&= -\frac{\text{Subst}\left(\int \frac{\cos\left(\frac{3a}{b}-\frac{3x}{b}\right)}{x}\,dx, x, a+b\arcsin(cx)\right)}{4bc^3}+\frac{\text{Subst}\left(\int \frac{\cos\left(\frac{a}{b}-\frac{x}{b}\right)}{x}\,dx, x, a+b\arcsin(cx)\right)}{4bc^3}
\end{aligned}$$

$$= \frac{\cos\left(\frac{a}{b}\right)\text{Subst}\left(\int \frac{\cos\left(\frac{x}{b}\right)}{x}\,dx, x, a+b\arcsin(cx)\right)}{4bc^3} - \frac{\cos\left(\frac{3a}{b}\right)\text{Subst}\left(\int \frac{\cos\left(\frac{3x}{b}\right)}{x}\,dx, x, a+b\arcsin(cx)\right)}{4bc^3} + \frac{\sin\left(\frac{a}{b}\right)\text{Subst}\left(\int \frac{\sin\left(\frac{x}{b}\right)}{x}\,dx, x, a+b\arcsin(cx)\right)}{4bc^3} - \frac{\sin\left(\frac{3a}{b}\right)\text{Subst}\left(\int \frac{\sin\left(\frac{3x}{b}\right)}{x}\,dx, x, a+b\arcsin(cx)\right)}{4bc^3}$$

$$= \frac{\cos\left(\frac{a}{b}\right)\text{CosIntegral}\left(\frac{a+b\arcsin(cx)}{b}\right)}{4bc^3} - \frac{\cos\left(\frac{3a}{b}\right)\text{CosIntegral}\left(\frac{3(a+b\arcsin(cx))}{b}\right)}{4bc^3} + \frac{\sin\left(\frac{a}{b}\right)\text{Si}\left(\frac{a+b\arcsin(cx)}{b}\right)}{4bc^3} - \frac{\sin\left(\frac{3a}{b}\right)\text{Si}\left(\frac{3(a+b\arcsin(cx))}{b}\right)}{4bc^3}$$

Mathematica [A] (verified)

Time = 0.22 (sec) , antiderivative size = 91, normalized size of antiderivative = 0.75

$$\int \frac{x^2}{a+b\arcsin(cx)}\,dx = \frac{\cos\left(\frac{a}{b}\right)\text{CosIntegral}\left(\frac{a}{b}+\arcsin(cx)\right) - \cos\left(\frac{3a}{b}\right)\text{CosIntegral}\left(3\left(\frac{a}{b}+\arcsin(cx)\right)\right) + \sin\left(\frac{a}{b}\right)\text{Si}\left(\frac{a}{b}+\arcsin(\right.}{4bc^3}$$

```
[In] Integrate[x^2/(a + b*ArcSin[c*x]),x]
```

```
[Out] (Cos[a/b]*CosIntegral[a/b + ArcSin[c*x]] - Cos[(3*a)/b]*CosIntegral[3*(a/b
+ ArcSin[c*x])] + Sin[a/b]*SinIntegral[a/b + ArcSin[c*x]] - Sin[(3*a)/b]*Si
nIntegral[3*(a/b + ArcSin[c*x])])/(4*b*c^3)
```

Maple [A] (verified)

Time = 0.04 (sec) , antiderivative size = 102, normalized size of antiderivative = 0.84

method	result	size
derivativedivides	$\frac{\frac{\text{Si}\left(\arcsin(cx)+\frac{a}{b}\right)\sin\left(\frac{a}{b}\right)}{4b}+\frac{\text{Ci}\left(\arcsin(cx)+\frac{a}{b}\right)\cos\left(\frac{a}{b}\right)}{4b}-\frac{\text{Si}\left(3\arcsin(cx)+\frac{3a}{b}\right)\sin\left(\frac{3a}{b}\right)}{4b}-\frac{\text{Ci}\left(3\arcsin(cx)+\frac{3a}{b}\right)\cos\left(\frac{3a}{b}\right)}{4b}}{c^3}$	102
default	$\frac{\frac{\text{Si}\left(\arcsin(cx)+\frac{a}{b}\right)\sin\left(\frac{a}{b}\right)}{4b}+\frac{\text{Ci}\left(\arcsin(cx)+\frac{a}{b}\right)\cos\left(\frac{a}{b}\right)}{4b}-\frac{\text{Si}\left(3\arcsin(cx)+\frac{3a}{b}\right)\sin\left(\frac{3a}{b}\right)}{4b}-\frac{\text{Ci}\left(3\arcsin(cx)+\frac{3a}{b}\right)\cos\left(\frac{3a}{b}\right)}{4b}}{c^3}$	102

```
[In] int(x^2/(a+b*arcsin(c*x)),x,method=_RETURNVERBOSE)
```

```
[Out] 1/c^3*(1/4*Si(arcsin(c*x)+a/b)*sin(a/b)/b+1/4*Ci(arcsin(c*x)+a/b)*cos(a/b)/
b-1/4*Si(3*arcsin(c*x)+3*a/b)*sin(3*a/b)/b-1/4*Ci(3*arcsin(c*x)+3*a/b)*cos(
3*a/b)/b)
```

Fricas [F]

$$\int \frac{x^2}{a+b\arcsin(cx)}\,dx = \int \frac{x^2}{b\arcsin(cx)+a}\,dx$$

```
[In] integrate(x^2/(a+b*arcsin(c*x)),x, algorithm="fricas")
[Out] integral(x^2/(b*arcsin(c*x) + a), x)
```

Sympy [F]

$$\int \frac{x^2}{a+b\arcsin(cx)}\,dx = \int \frac{x^2}{a+b\,\mathrm{asin}(cx)}\,dx$$

```
[In] integrate(x**2/(a+b*asin(c*x)),x)
[Out] Integral(x**2/(a + b*asin(c*x)), x)
```

Maxima [F]

$$\int \frac{x^2}{a+b\arcsin(cx)}\,dx = \int \frac{x^2}{b\arcsin(cx)+a}\,dx$$

```
[In] integrate(x^2/(a+b*arcsin(c*x)),x, algorithm="maxima")
[Out] integrate(x^2/(b*arcsin(c*x) + a), x)
```

Giac [A] (verification not implemented)

none

Time = 0.27 (sec) , antiderivative size = 173, normalized size of antiderivative = 1.43

$$\begin{aligned}\int \frac{x^2}{a+b\arcsin(cx)}\,dx = &-\frac{\cos\left(\frac{a}{b}\right)^3\mathrm{Ci}\left(\frac{3a}{b}+3\arcsin(cx)\right)}{bc^3}\\&-\frac{\cos\left(\frac{a}{b}\right)^2\sin\left(\frac{a}{b}\right)\mathrm{Si}\left(\frac{3a}{b}+3\arcsin(cx)\right)}{bc^3}\\&+\frac{3\cos\left(\frac{a}{b}\right)\mathrm{Ci}\left(\frac{3a}{b}+3\arcsin(cx)\right)}{4bc^3}+\frac{\cos\left(\frac{a}{b}\right)\mathrm{Ci}\left(\frac{a}{b}+\arcsin(cx)\right)}{4bc^3}\\&+\frac{\sin\left(\frac{a}{b}\right)\mathrm{Si}\left(\frac{3a}{b}+3\arcsin(cx)\right)}{4bc^3}+\frac{\sin\left(\frac{a}{b}\right)\mathrm{Si}\left(\frac{a}{b}+\arcsin(cx)\right)}{4bc^3}\end{aligned}$$

```
[In] integrate(x^2/(a+b*arcsin(c*x)),x, algorithm="giac")
```

```
[Out] -cos(a/b)^3*cos_integral(3*a/b + 3*arcsin(c*x))/(b*c^3) - cos(a/b)^2*sin(a/
b)*sin_integral(3*a/b + 3*arcsin(c*x))/(b*c^3) + 3/4*cos(a/b)*cos_integral(
3*a/b + 3*arcsin(c*x))/(b*c^3) + 1/4*cos(a/b)*cos_integral(a/b + arcsin(c*x
))/(b*c^3) + 1/4*sin(a/b)*sin_integral(3*a/b + 3*arcsin(c*x))/(b*c^3) + 1/4
*sin(a/b)*sin_integral(a/b + arcsin(c*x))/(b*c^3)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x^2}{a+b\arcsin(cx)}\,dx=\int \frac{x^2}{a+b\,\mathrm{asin}\left(c\,x\right)}\,dx$$

```
[In] int(x^2/(a + b*asin(c*x)),x)
```

```
[Out] int(x^2/(a + b*asin(c*x)), x)
```

3.159 $\int \frac{x}{a+b\arcsin(cx)}\,dx$

Optimal result

Integrand size = 12, antiderivative size = 63

$$\int \frac{x}{a+b\arcsin(cx)}\,dx=-\frac{\text{CosIntegral}\left(\frac{2(a+b\arcsin(cx))}{b}\right)\sin\left(\frac{2a}{b}\right)}{2bc^2}+\frac{\cos\left(\frac{2a}{b}\right)\text{Si}\left(\frac{2(a+b\arcsin(cx))}{b}\right)}{2bc^2}$$

```
[Out] 1/2*cos(2*a/b)*Si(2*(a+b*arcsin(c*x))/b)/b/c^2-1/2*Ci(2*(a+b*arcsin(c*x))/b
)*sin(2*a/b)/b/c^2
```

Rubi [A] (verified)

Time = 0.07 (sec) , antiderivative size = 63, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 6, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {4731, 4491, 12, 3384, 3380, 3383}

$$\int \frac{x}{a+b\arcsin(cx)}\,dx=\frac{\cos\left(\frac{2a}{b}\right)\text{Si}\left(\frac{2(a+b\arcsin(cx))}{b}\right)}{2bc^2}-\frac{\sin\left(\frac{2a}{b}\right)\text{CosIntegral}\left(\frac{2(a+b\arcsin(cx))}{b}\right)}{2bc^2}$$

```
[In] Int[x/(a + b*ArcSin[c*x]),x]
```

```
[Out] -1/2*(CosIntegral[(2*(a + b*ArcSin[c*x]))/b]*Sin[(2*a)/b])/(b*c^2) + (Cos[(
2*a)/b]*SinIntegral[(2*(a + b*ArcSin[c*x]))/b])/(2*b*c^2)
```

Rule 12

```
Int[(a_)*(u_), x_Symbol] :> Dist[a, Int[u, x], x] /; FreeQ[a, x] && !Match
Q[u, (b_)*(v_) /; FreeQ[b, x]]
```

Rule 3380

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Simp[SinInte
gral[e + f*x]/d, x] /; FreeQ[{c, d, e, f}, x] && EqQ[d*e - c*f, 0]
```

Rule 3383

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Simp[CosInte
gral[e - Pi/2 + f*x]/d, x] /; FreeQ[{c, d, e, f}, x] && EqQ[d*(e - Pi/2) -
c*f, 0]
```

Rule 3384

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Dist[Cos[(d*
e - c*f)/d], Int[Sin[c*(f/d) + f*x]/(c + d*x), x], x] + Dist[Sin[(d*e - c*f
)/d], Int[Cos[c*(f/d) + f*x]/(c + d*x), x], x] /; FreeQ[{c, d, e, f}, x] &&
 NeQ[d*e - c*f, 0]
```

Rule 4491

```
Int[Cos[(a_.) + (b_.)*(x_)]^(p_.)*((c_.) + (d_.)*(x_))^(m_.)*Sin[(a_.) + (b
_.)*(x_)]^(n_.), x_Symbol] :> Int[ExpandTrigReduce[(c + d*x)^m, Sin[a + b*x
]^n*Cos[a + b*x]^p, x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && IG
tQ[p, 0]
```

Rule 4731

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Dist[1
/(b*c^(m + 1)), Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b], x], x, a +
 b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, n}, x] && IGtQ[m, 0]
```

Rule steps

$$\begin{aligned}
\text{integral} &= -\frac{\text{Subst}\left(\int \frac{\cos\left(\frac{a}{b}-\frac{x}{b}\right)\sin\left(\frac{a}{b}-\frac{x}{b}\right)}{x}\,dx, x, a+b\arcsin(cx)\right)}{bc^2}\\
&= -\frac{\text{Subst}\left(\int \frac{\sin\left(\frac{2a}{b}-\frac{2x}{b}\right)}{2x}\,dx, x, a+b\arcsin(cx)\right)}{bc^2}\\
&= -\frac{\text{Subst}\left(\int \frac{\sin\left(\frac{2a}{b}-\frac{2x}{b}\right)}{x}\,dx, x, a+b\arcsin(cx)\right)}{2bc^2}\\
&= \frac{\cos\left(\frac{2a}{b}\right)\text{Subst}\left(\int \frac{\sin\left(\frac{2x}{b}\right)}{x}\,dx, x, a+b\arcsin(cx)\right)}{2bc^2}\\
&\quad - \frac{\sin\left(\frac{2a}{b}\right)\text{Subst}\left(\int \frac{\cos\left(\frac{2x}{b}\right)}{x}\,dx, x, a+b\arcsin(cx)\right)}{2bc^2}
\end{aligned}$$

$$= -\frac{\text{CosIntegral}\left(\frac{2(a+b\arcsin(cx))}{b}\right)\sin\left(\frac{2a}{b}\right)}{2bc^2} + \frac{\cos\left(\frac{2a}{b}\right)\text{Si}\left(\frac{2(a+b\arcsin(cx))}{b}\right)}{2bc^2}$$

Mathematica [A] (verified)

Time = 0.08 (sec) , antiderivative size = 56, normalized size of antiderivative = 0.89

$$\int \frac{x}{a+b\arcsin(cx)}\,dx = \frac{-\text{CosIntegral}\left(\frac{2a}{b}+2\arcsin(cx)\right)\sin\left(\frac{2a}{b}\right)+\cos\left(\frac{2a}{b}\right)\text{Si}\left(\frac{2a}{b}+2\arcsin(cx)\right)}{2bc^2}$$

```
[In] Integrate[x/(a + b*ArcSin[c*x]),x]
[Out] (-(CosIntegral[(2*a)/b + 2*ArcSin[c*x]]*Sin[(2*a)/b]) + Cos[(2*a)/b]*SinInt
egral[(2*a)/b + 2*ArcSin[c*x]])/(2*b*c^2)
```

Maple [A] (verified)

Time = 0.03 (sec) , antiderivative size = 58, normalized size of antiderivative = 0.92

method	result	size
derivativedivides	$\frac{\frac{\text{Si}\left(2\arcsin(cx)+\frac{2a}{b}\right)\cos\left(\frac{2a}{b}\right)}{2b}-\frac{\text{Ci}\left(2\arcsin(cx)+\frac{2a}{b}\right)\sin\left(\frac{2a}{b}\right)}{2b}}{c^2}$	58
default	$\frac{\frac{\text{Si}\left(2\arcsin(cx)+\frac{2a}{b}\right)\cos\left(\frac{2a}{b}\right)}{2b}-\frac{\text{Ci}\left(2\arcsin(cx)+\frac{2a}{b}\right)\sin\left(\frac{2a}{b}\right)}{2b}}{c^2}$	58

```
[In] int(x/(a+b*arcsin(c*x)),x,method=_RETURNVERBOSE)
[Out] 1/c^2*(1/2*Si(2*arcsin(c*x)+2*a/b)*cos(2*a/b)/b-1/2*Ci(2*arcsin(c*x)+2*a/b)
*sin(2*a/b)/b)
```

Fricas [F]

$$\int \frac{x}{a+b\arcsin(cx)}\,dx = \int \frac{x}{b\arcsin(cx)+a}\,dx$$

```
[In] integrate(x/(a+b*arcsin(c*x)),x, algorithm="fricas")
[Out] integral(x/(b*arcsin(c*x) + a), x)
```

Sympy [F]

$$\int \frac{x}{a+b\arcsin(cx)}\,dx = \int \frac{x}{a+b\operatorname{asin}{(cx)}}\,dx$$

```
[In] integrate(x/(a+b*asin(c*x)),x)
```

```
[Out] Integral(x/(a + b*asin(c*x)), x)
```

Maxima [F]

$$\int \frac{x}{a+b\arcsin(cx)}\,dx = \int \frac{x}{b\arcsin{(cx)}+a}\,dx$$

```
[In] integrate(x/(a+b*arcsin(c*x)),x, algorithm="maxima")
```

```
[Out] integrate(x/(b*arcsin(c*x) + a), x)
```

Giac [A] (verification not implemented)

none

Time = 0.27 (sec) , antiderivative size = 86, normalized size of antiderivative = 1.37

$$\int \frac{x}{a+b\arcsin(cx)}\,dx = -\frac{\cos\left(\frac{a}{b}\right)\operatorname{Ci}\left(\frac{2a}{b}+2\arcsin{(cx)}\right)\sin\left(\frac{a}{b}\right)}{bc^2} + \frac{\cos\left(\frac{a}{b}\right)^2\operatorname{Si}\left(\frac{2a}{b}+2\arcsin{(cx)}\right)}{bc^2} - \frac{\operatorname{Si}\left(\frac{2a}{b}+2\arcsin{(cx)}\right)}{2\,bc^2}$$

```
[In] integrate(x/(a+b*arcsin(c*x)),x, algorithm="giac")
```

```
[Out] -cos(a/b)*cos_integral(2*a/b + 2*arcsin(c*x))*sin(a/b)/(b*c^2) + cos(a/b)^2
*sin_integral(2*a/b + 2*arcsin(c*x))/(b*c^2) - 1/2*sin_integral(2*a/b + 2*a
rcsin(c*x))/(b*c^2)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x}{a+b\arcsin(cx)}\,dx=\int \frac{x}{a+b\,\mathrm{asin}\left(c\,x\right)}\,dx$$

```
[In] int(x/(a + b*asin(c*x)),x)
[Out] int(x/(a + b*asin(c*x)), x)
```

3.160 $\int \frac{1}{a+b\arcsin(cx)}\,dx$

Optimal result

Integrand size = 10, antiderivative size = 53

$$\int \frac{1}{a+b\arcsin(cx)}\,dx=\frac{\cos\left(\frac{a}{b}\right)\text{CosIntegral}\left(\frac{a+b\arcsin(cx)}{b}\right)}{bc}+\frac{\sin\left(\frac{a}{b}\right)\text{Si}\left(\frac{a+b\arcsin(cx)}{b}\right)}{bc}$$

```
[Out] Ci((a+b*arcsin(c*x))/b)*cos(a/b)/b/c+Si((a+b*arcsin(c*x))/b)*sin(a/b)/b/c
```

Rubi [A] (verified)

Time = 0.04 (sec) , antiderivative size = 53, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.400, Rules used = {4719, 3384, 3380, 3383}

$$\int \frac{1}{a+b\arcsin(cx)}\,dx=\frac{\cos\left(\frac{a}{b}\right)\text{CosIntegral}\left(\frac{a+b\arcsin(cx)}{b}\right)}{bc}+\frac{\sin\left(\frac{a}{b}\right)\text{Si}\left(\frac{a+b\arcsin(cx)}{b}\right)}{bc}$$

```
[In] Int[(a + b*ArcSin[c*x])^(-1),x]
```

```
[Out] (Cos[a/b]*CosIntegral[(a + b*ArcSin[c*x])/b])/(b*c) + (Sin[a/b]*SinIntegral
[(a + b*ArcSin[c*x])/b])/(b*c)
```

Rule 3380

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Simp[SinInte
gral[e + f*x]/d, x] /; FreeQ[{c, d, e, f}, x] && EqQ[d*e - c*f, 0]
```

Rule 3383

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Simp[CosInte
gral[e - Pi/2 + f*x]/d, x] /; FreeQ[{c, d, e, f}, x] && EqQ[d*(e - Pi/2) -
```

```
c*f, 0]
```

Rule 3384

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Dist[Cos[(d*
e - c*f)/d], Int[Sin[c*(f/d) + f*x]/(c + d*x), x], x] + Dist[Sin[(d*e - c*f
)/d], Int[Cos[c*(f/d) + f*x]/(c + d*x), x], x] /; FreeQ[{c, d, e, f}, x] &&
 NeQ[d*e - c*f, 0]
```

Rule 4719

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_), x_Symbol] :> Dist[1/(b*c), Sub
st[Int[x^n*Cos[-a/b + x/b], x], x, a + b*ArcSin[c*x]], x] /; FreeQ[{a, b, c
, n}, x]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= \frac{\text{Subst}\left(\int \frac{\cos\left(\frac{a}{b}-\frac{x}{b}\right)}{x}\,dx, x, a+b\arcsin(cx)\right)}{bc}\\
&= \frac{\cos\left(\frac{a}{b}\right)\text{Subst}\left(\int \frac{\cos\left(\frac{x}{b}\right)}{x}\,dx, x, a+b\arcsin(cx)\right)}{bc}\\
&\quad+\frac{\sin\left(\frac{a}{b}\right)\text{Subst}\left(\int \frac{\sin\left(\frac{x}{b}\right)}{x}\,dx, x, a+b\arcsin(cx)\right)}{bc}\\
&= \frac{\cos\left(\frac{a}{b}\right)\text{CosIntegral}\left(\frac{a+b\arcsin(cx)}{b}\right)}{bc}+\frac{\sin\left(\frac{a}{b}\right)\text{Si}\left(\frac{a+b\arcsin(cx)}{b}\right)}{bc}
\end{aligned}$$

Mathematica [A] (verified)

Time = 0.06 (sec) , antiderivative size = 44, normalized size of antiderivative = 0.83

$$\int \frac{1}{a+b\arcsin(cx)}\,dx=\frac{\cos\left(\frac{a}{b}\right)\text{CosIntegral}\left(\frac{a}{b}+\arcsin(cx)\right)+\sin\left(\frac{a}{b}\right)\text{Si}\left(\frac{a}{b}+\arcsin(cx)\right)}{bc}$$

```
[In] Integrate[(a + b*ArcSin[c*x])^(-1),x]
[Out] (Cos[a/b]*CosIntegral[a/b + ArcSin[c*x]] + Sin[a/b]*SinIntegral[a/b + ArcSi
n[c*x]])/(b*c)
```

Maple [A] (verified)

Time = 0.03 (sec) , antiderivative size = 48, normalized size of antiderivative = 0.91

method	result	size
derivativedivides	$\frac{\frac{\mathrm{Si}\left(\arcsin(cx)+\frac{a}{b}\right)\sin\left(\frac{a}{b}\right)}{b}+\frac{\mathrm{Ci}\left(\arcsin(cx)+\frac{a}{b}\right)\cos\left(\frac{a}{b}\right)}{b}}{c}$	48
default	$\frac{\frac{\mathrm{Si}\left(\arcsin(cx)+\frac{a}{b}\right)\sin\left(\frac{a}{b}\right)}{b}+\frac{\mathrm{Ci}\left(\arcsin(cx)+\frac{a}{b}\right)\cos\left(\frac{a}{b}\right)}{b}}{c}$	48

```
[In] int(1/(a+b*arcsin(c*x)),x,method=_RETURNVERBOSE)
[Out] 1/c*(Si(arcsin(c*x)+a/b)*sin(a/b)/b+Ci(arcsin(c*x)+a/b)*cos(a/b)/b)
```

Fricas [F]

$$\int \frac{1}{a+b\arcsin(cx)}\,dx=\int \frac{1}{b\arcsin{(cx)}+a}\,dx$$

```
[In] integrate(1/(a+b*arcsin(c*x)),x, algorithm="fricas")
[Out] integral(1/(b*arcsin(c*x) + a), x)
```

Sympy [F]

$$\int \frac{1}{a+b\arcsin(cx)}\,dx=\int \frac{1}{a+b\operatorname{asin}{(cx)}}\,dx$$

```
[In] integrate(1/(a+b*asin(c*x)),x)
[Out] Integral(1/(a + b*asin(c*x)), x)
```

Maxima [F]

$$\int \frac{1}{a+b\arcsin(cx)}\,dx=\int \frac{1}{b\arcsin{(cx)}+a}\,dx$$

```
[In] integrate(1/(a+b*arcsin(c*x)),x, algorithm="maxima")
[Out] integrate(1/(b*arcsin(c*x) + a), x)
```

Giac [A] (verification not implemented)

none

Time = 0.29 (sec) , antiderivative size = 49, normalized size of antiderivative = 0.92

$$\int \frac{1}{a+b\arcsin(cx)}\,dx=\frac{\cos\left(\frac{a}{b}\right)\operatorname{Ci}\left(\frac{a}{b}+\arcsin\left(cx\right)\right)}{bc}+\frac{\sin\left(\frac{a}{b}\right)\operatorname{Si}\left(\frac{a}{b}+\arcsin\left(cx\right)\right)}{bc}$$

```
[In] integrate(1/(a+b*arcsin(c*x)),x, algorithm="giac")
[Out] cos(a/b)*cos_integral(a/b + arcsin(c*x))/(b*c) + sin(a/b)*sin_integral(a/b
+ arcsin(c*x))/(b*c)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{1}{a+b\arcsin(cx)}\,dx=\int \frac{1}{a+b\,\mathrm{asin}\left(c\,x\right)}\,dx$$

```
[In] int(1/(a + b*asin(c*x)),x)
[Out] int(1/(a + b*asin(c*x)), x)
```

3.161 $\int \frac{1}{x(a+b\arcsin(cx))}\,dx$

Optimal result

Integrand size = 14, antiderivative size = 14

$$\int \frac{1}{x(a+b\arcsin(cx))}\,dx = \text{Int}\left(\frac{1}{x(a+b\arcsin(cx))},x\right)$$

```
[Out] Unintegrable(1/x/(a+b*arcsin(c*x)),x)
```

Rubi [N/A]

Not integrable

Time = 0.02 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{1}{x(a+b\arcsin(cx))}\,dx = \int \frac{1}{x(a+b\arcsin(cx))}\,dx$$

```
[In] Int[1/(x*(a + b*ArcSin[c*x])),x]
```

```
[Out] Defer[Int][1/(x*(a + b*ArcSin[c*x])), x]
```

Rubi steps

$$\text{integral} = \int \frac{1}{x(a+b\arcsin(cx))}\,dx$$

Mathematica [N/A]

Not integrable

Time = 0.21 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.14

$$\int \frac{1}{x(a+b\arcsin(cx))}\,dx = \int \frac{1}{x(a+b\arcsin(cx))}\,dx$$

```
[In] Integrate[1/(x*(a + b*ArcSin[c*x])),x]
[Out] Integrate[1/(x*(a + b*ArcSin[c*x])), x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.07 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00

$$\int \frac{1}{x\left(a+b\arcsin\left(cx\right)\right)}dx$$

```
[In] int(1/x/(a+b*arcsin(c*x)),x)
[Out] int(1/x/(a+b*arcsin(c*x)),x)
```

Fricas [N/A]

Not integrable

Time = 0.24 (sec) , antiderivative size = 15, normalized size of antiderivative = 1.07

$$\int \frac{1}{x(a+b\arcsin(cx))}\,dx = \int \frac{1}{(b\arcsin\left(cx\right)+a)x}\,dx$$

```
[In] integrate(1/x/(a+b*arcsin(c*x)),x, algorithm="fricas")
[Out] integral(1/(b*x*arcsin(c*x) + a*x), x)
```

Sympy [N/A]

Not integrable

Time = 0.65 (sec) , antiderivative size = 12, normalized size of antiderivative = 0.86

$$\int \frac{1}{x(a+b\arcsin(cx))}\,dx = \int \frac{1}{x\left(a+b\operatorname{asin}\left(cx\right)\right)}\,dx$$

```
[In] integrate(1/x/(a+b*asin(c*x)),x)
[Out] Integral(1/(x*(a + b*asin(c*x))), x)
```

Maxima [N/A]

Not integrable

Time = 0.35 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.14

$$\int \frac{1}{x(a+b\arcsin(cx))}\,dx = \int \frac{1}{(b\arcsin{(cx)}+a)x}\,dx$$

```
[In] integrate(1/x/(a+b*arcsin(c*x)),x, algorithm="maxima")
[Out] integrate(1/((b*arcsin(c*x) + a)*x), x)
```

Giac [F(-2)]

Exception generated.

$$\int \frac{1}{x(a+b\arcsin(cx))}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate(1/x/(a+b*arcsin(c*x)),x, algorithm="giac")
[Out] Exception raised: TypeError >> an error occurred running a Giac command:INP
UT:sage2:=int(sage0,sageVARx):;OUTPUT:Not invertible Error: Bad Argument Va
lue
```

Mupad [N/A]

Not integrable

Time = 0.11 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.14

$$\int \frac{1}{x(a+b\arcsin(cx))}\,dx = \int \frac{1}{x\,\left(a+b\,\mathrm{asin}\left(c\,x\right)\right)}\,dx$$

```
[In] int(1/(x*(a + b*asin(c*x))),x)
[Out] int(1/(x*(a + b*asin(c*x))), x)
```

3.162 $\int \frac{1}{x^2(a+b\arcsin(cx))}\,dx$

Optimal result

Integrand size = 14, antiderivative size = 14

$$\int \frac{1}{x^2(a+b\arcsin(cx))}\,dx = \text{Int}\left(\frac{1}{x^2(a+b\arcsin(cx))},x\right)$$

```
[Out] Unintegrable(1/x^2/(a+b*arcsin(c*x)),x)
```

Rubi [N/A]

Not integrable

Time = 0.02 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{1}{x^2(a+b\arcsin(cx))}\,dx = \int \frac{1}{x^2(a+b\arcsin(cx))}\,dx$$

```
[In] Int[1/(x^2*(a + b*ArcSin[c*x])),x]
[Out] Defer[Int][1/(x^2*(a + b*ArcSin[c*x])), x]
```

Rubi steps

$$\text{integral} = \int \frac{1}{x^2(a+b\arcsin(cx))}\,dx$$

Mathematica [N/A]

Not integrable

Time = 1.92 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.14

$$\int \frac{1}{x^2(a+b\arcsin(cx))}\,dx=\int \frac{1}{x^2(a+b\arcsin(cx))}\,dx$$

```
[In] Integrate[1/(x^2*(a + b*ArcSin[c*x])),x]
[Out] Integrate[1/(x^2*(a + b*ArcSin[c*x])), x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.10 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00

$$\int \frac{1}{x^{2} \left(a+b\arcsin \left(c x \right)\right)}dx$$

```
[In] int(1/x^2/(a+b*arcsin(c*x)),x)
[Out] int(1/x^2/(a+b*arcsin(c*x)),x)
```

Fricas [N/A]

Not integrable

Time = 0.23 (sec) , antiderivative size = 19, normalized size of antiderivative = 1.36

$$\int \frac{1}{x^2(a+b\arcsin(cx))}\,dx=\int \frac{1}{(b\arcsin \left(cx\right)+a)x^{2}}\,dx$$

```
[In] integrate(1/x^2/(a+b*arcsin(c*x)),x, algorithm="fricas")
[Out] integral(1/(b*x^2*arcsin(c*x) + a*x^2), x)
```

Sympy [N/A]

Not integrable

Time = 0.59 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00

$$\int \frac{1}{x^2(a+b\arcsin(cx))}\,dx=\int \frac{1}{x^{2} \left(a+b\operatorname{asin}\left(cx\right)\right)}\,dx$$

```
[In] integrate(1/x**2/(a+b*asin(c*x)),x)
[Out] Integral(1/(x**2*(a + b*asin(c*x))), x)
```

Maxima [N/A]

Not integrable

Time = 0.36 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.14

$$\int \frac{1}{x^2(a+b\arcsin(cx))}\,dx = \int \frac{1}{(b\arcsin{(cx)}+a)x^2}\,dx$$

```
[In] integrate(1/x^2/(a+b*arcsin(c*x)),x, algorithm="maxima")
[Out] integrate(1/((b*arcsin(c*x) + a)*x^2), x)
```

Giac [N/A]

Not integrable

Time = 0.55 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.14

$$\int \frac{1}{x^2(a+b\arcsin(cx))}\,dx = \int \frac{1}{(b\arcsin{(cx)}+a)x^2}\,dx$$

```
[In] integrate(1/x^2/(a+b*arcsin(c*x)),x, algorithm="giac")
[Out] integrate(1/((b*arcsin(c*x) + a)*x^2), x)
```

Mupad [N/A]

Not integrable

Time = 0.11 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.14

$$\int \frac{1}{x^2(a+b\arcsin(cx))}\,dx = \int \frac{1}{x^2\,\left(a+b\,\mathrm{asin}\left(c\,x\right)\right)}\,dx$$

```
[In] int(1/(x^2*(a + b*asin(c*x))),x)
[Out] int(1/(x^2*(a + b*asin(c*x))), x)
```

3.163 $\int \frac{x^2}{(a+b\arcsin(cx))^2}\,dx$

Optimal result

Integrand size = 14, antiderivative size = 156

$$\int \frac{x^2}{(a+b\arcsin(cx))^2}\,dx = -\frac{x^2\sqrt{1-c^2x^2}}{bc(a+b\arcsin(cx))} + \frac{\text{CosIntegral}\left(\frac{a+b\arcsin(cx)}{b}\right)\sin\left(\frac{a}{b}\right)}{4b^2c^3} - \frac{3\,\text{CosIntegral}\left(\frac{3(a+b\arcsin(cx))}{b}\right)\sin\left(\frac{3a}{b}\right)}{4b^2c^3} - \frac{\cos\left(\frac{a}{b}\right)\text{Si}\left(\frac{a+b\arcsin(cx)}{b}\right)}{4b^2c^3} + \frac{3\cos\left(\frac{3a}{b}\right)\text{Si}\left(\frac{3(a+b\arcsin(cx))}{b}\right)}{4b^2c^3}$$

```
[Out] -1/4*cos(a/b)*Si((a+b*arcsin(c*x))/b)/b^2/c^3+3/4*cos(3*a/b)*Si(3*(a+b*arcs
in(c*x))/b)/b^2/c^3+1/4*Ci((a+b*arcsin(c*x))/b)*sin(a/b)/b^2/c^3-3/4*Ci(3*(
a+b*arcsin(c*x))/b)*sin(3*a/b)/b^2/c^3-x^2*(-c^2*x^2+1)^(1/2)/b/c/(a+b*arcs
in(c*x))
```

Rubi [A] (verified)

Time = 0.10 (sec) , antiderivative size = 156, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 4, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.286, Rules used = {4727, 3384, 3380, 3383}

$$\int \frac{x^2}{(a+b\arcsin(cx))^2}\,dx = \frac{\sin\left(\frac{a}{b}\right)\text{CosIntegral}\left(\frac{a+b\arcsin(cx)}{b}\right)}{4b^2c^3} - \frac{3\sin\left(\frac{3a}{b}\right)\text{CosIntegral}\left(\frac{3(a+b\arcsin(cx))}{b}\right)}{4b^2c^3} - \frac{\cos\left(\frac{a}{b}\right)\text{Si}\left(\frac{a+b\arcsin(cx)}{b}\right)}{4b^2c^3} + \frac{3\cos\left(\frac{3a}{b}\right)\text{Si}\left(\frac{3(a+b\arcsin(cx))}{b}\right)}{4b^2c^3} - \frac{x^2\sqrt{1-c^2x^2}}{bc(a+b\arcsin(cx))}$$

```
[In] Int[x^2/(a + b*ArcSin[c*x])^2,x]
```

```
[Out] -((x^2*Sqrt[1 - c^2*x^2])/(b*c*(a + b*ArcSin[c*x]))) + (CosIntegral[(a + b*
ArcSin[c*x])/b]*Sin[a/b])/(4*b^2*c^3) - (3*CosIntegral[(3*(a + b*ArcSin[c*x
]))/b]*Sin[(3*a)/b])/(4*b^2*c^3) - (Cos[a/b]*SinIntegral[(a + b*ArcSin[c*x]
)/b])/(4*b^2*c^3) + (3*Cos[(3*a)/b]*SinIntegral[(3*(a + b*ArcSin[c*x]))/b])
/(4*b^2*c^3)
```

Rule 3380

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Simp[SinInte
gral[e + f*x]/d, x] /; FreeQ[{c, d, e, f}, x] && EqQ[d*e - c*f, 0]
```

Rule 3383

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Simp[CosInte
gral[e - Pi/2 + f*x]/d, x] /; FreeQ[{c, d, e, f}, x] && EqQ[d*(e - Pi/2) -
c*f, 0]
```

Rule 3384

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Dist[Cos[(d*
e - c*f)/d], Int[Sin[c*(f/d) + f*x]/(c + d*x), x], x] + Dist[Sin[(d*e - c*f
)/d], Int[Cos[c*(f/d) + f*x]/(c + d*x), x], x] /; FreeQ[{c, d, e, f}, x] &&
 NeQ[d*e - c*f, 0]
```

Rule 4727

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^m*Sqrt[1 - c^2*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] - Dist
```

```
[1/(b^2*c^(m + 1)*(n + 1)), Subst[Int[ExpandTrigReduce[x^(n + 1), Sin[-a/b
+ x/b]^(m - 1)*(m - (m + 1)*Sin[-a/b + x/b]^2), x], x], x, a + b*ArcSin[c*x
]], x] /; FreeQ[{a, b, c}, x] && IGtQ[m, 0] && GeQ[n, -2] && LtQ[n, -1]
```

Rubi steps

$$\begin{aligned}
&\text{integral}\\
&= -\frac{x^2\sqrt{1-c^2x^2}}{bc(a+b\arcsin(cx))} + \frac{\text{Subst}\left(\int \left(-\frac{3\sin\left(\frac{3a}{b}-\frac{3x}{b}\right)}{4x} + \frac{\sin\left(\frac{a}{b}-\frac{x}{b}\right)}{4x}\right) dx, x, a+b\arcsin(cx)\right)}{b^2c^3}\\
&= -\frac{x^2\sqrt{1-c^2x^2}}{bc(a+b\arcsin(cx))} + \frac{\text{Subst}\left(\int \frac{\sin\left(\frac{a}{b}-\frac{x}{b}\right)}{x} dx, x, a+b\arcsin(cx)\right)}{4b^2c^3}\\
&\quad - \frac{3\text{Subst}\left(\int \frac{\sin\left(\frac{3a}{b}-\frac{3x}{b}\right)}{x} dx, x, a+b\arcsin(cx)\right)}{4b^2c^3}\\
&= -\frac{x^2\sqrt{1-c^2x^2}}{bc(a+b\arcsin(cx))} - \frac{\cos\left(\frac{a}{b}\right)\text{Subst}\left(\int \frac{\sin\left(\frac{x}{b}\right)}{x} dx, x, a+b\arcsin(cx)\right)}{4b^2c^3}\\
&\quad + \frac{\left(3\cos\left(\frac{3a}{b}\right)\right)\text{Subst}\left(\int \frac{\sin\left(\frac{3x}{b}\right)}{x} dx, x, a+b\arcsin(cx)\right)}{4b^2c^3}\\
&\quad + \frac{\sin\left(\frac{a}{b}\right)\text{Subst}\left(\int \frac{\cos\left(\frac{x}{b}\right)}{x} dx, x, a+b\arcsin(cx)\right)}{4b^2c^3}\\
&\quad - \frac{\left(3\sin\left(\frac{3a}{b}\right)\right)\text{Subst}\left(\int \frac{\cos\left(\frac{3x}{b}\right)}{x} dx, x, a+b\arcsin(cx)\right)}{4b^2c^3}\\
&= -\frac{x^2\sqrt{1-c^2x^2}}{bc(a+b\arcsin(cx))} + \frac{\text{CosIntegral}\left(\frac{a+b\arcsin(cx)}{b}\right)\sin\left(\frac{a}{b}\right)}{4b^2c^3}\\
&\quad - \frac{3\,\text{CosIntegral}\left(\frac{3(a+b\arcsin(cx))}{b}\right)\sin\left(\frac{3a}{b}\right)}{4b^2c^3}\\
&\quad - \frac{\cos\left(\frac{a}{b}\right)\text{Si}\left(\frac{a+b\arcsin(cx)}{b}\right)}{4b^2c^3} + \frac{3\cos\left(\frac{3a}{b}\right)\text{Si}\left(\frac{3(a+b\arcsin(cx))}{b}\right)}{4b^2c^3}
\end{aligned}$$

Mathematica [A] (verified)

Time = 0.56 (sec) , antiderivative size = 125, normalized size of antiderivative = 0.80

$$\int \frac{x^2}{(a + b \arcsin(cx))^2} \, dx = \frac{-\frac{4bc^2x^2\sqrt{1-c^2x^2}}{a+b\arcsin(cx)} + \text{CosIntegral}\left(\frac{a}{b} + \arcsin(cx)\right)\sin\left(\frac{a}{b}\right) - 3\,\text{CosIntegral}\left(3\left(\frac{a}{b} + \arcsin(cx)\right)\right)\sin\left(\frac{3a}{b}\right) - \cos\left(\cdots\right)}{4b^2c^3}$$

```
[In] Integrate[x^2/(a + b*ArcSin[c*x])^2,x]
```

```
[Out] ((-4*b*c^2*x^2*Sqrt[1 - c^2*x^2])/(a + b*ArcSin[c*x]) + CosIntegral[a/b + A
rcSin[c*x]]*Sin[a/b] - 3*CosIntegral[3*(a/b + ArcSin[c*x])]*Sin[(3*a)/b] -
Cos[a/b]*SinIntegral[a/b + ArcSin[c*x]] + 3*Cos[(3*a)/b]*SinIntegral[3*(a/b
 + ArcSin[c*x])])/(4*b^2*c^3)
```

Maple [A] (verified)

Time = 0.04 (sec) , antiderivative size = 149, normalized size of antiderivative = 0.96

method	result
derivativedivides	$\frac{-\frac{\sqrt{-c^2x^2+1}}{4(a+b\arcsin(cx))b} - \frac{\text{Si}\left(\arcsin(cx)+\frac{a}{b}\right)\cos\left(\frac{a}{b}\right) - \text{Ci}\left(\arcsin(cx)+\frac{a}{b}\right)\sin\left(\frac{a}{b}\right)}{4b^2} + \frac{\cos(3\arcsin(cx))}{4(a+b\arcsin(cx))b} + \frac{\frac{3\ \text{Si}\left(3\arcsin(cx)+\frac{3a}{b}\right)\cos\left(\frac{3a}{b}\right)}{4} \cdots}{b \cdots}}{c^3}$
default	$\frac{-\frac{\sqrt{-c^2x^2+1}}{4(a+b\arcsin(cx))b} - \frac{\text{Si}\left(\arcsin(cx)+\frac{a}{b}\right)\cos\left(\frac{a}{b}\right) - \text{Ci}\left(\arcsin(cx)+\frac{a}{b}\right)\sin\left(\frac{a}{b}\right)}{4b^2} + \frac{\cos(3\arcsin(cx))}{4(a+b\arcsin(cx))b} + \frac{\frac{3\ \text{Si}\left(3\arcsin(cx)+\frac{3a}{b}\right)\cos\left(\frac{3a}{b}\right)}{4} \cdots}{b \cdots}}{c^3}$

```
[In] int(x^2/(a+b*arcsin(c*x))^2,x,method=_RETURNVERBOSE)
```

```
[Out] 1/c^3*(-1/4*(-c^2*x^2+1)^(1/2)/(a+b*arcsin(c*x))/b-1/4*(Si(arcsin(c*x)+a/b)
*cos(a/b)-Ci(arcsin(c*x)+a/b)*sin(a/b))/b^2+1/4*cos(3*arcsin(c*x))/(a+b*arc
sin(c*x))/b+3/4*(Si(3*arcsin(c*x)+3*a/b)*cos(3*a/b)-Ci(3*arcsin(c*x)+3*a/b)
*sin(3*a/b))/b^2)
```

Fricas [F]

$$\int \frac{x^2}{(a + b \arcsin(cx))^2} \, dx = \int \frac{x^2}{\left(b \arcsin\left(cx\right) + a\right)^2} \, dx$$

```
[In] integrate(x^2/(a+b*arcsin(c*x))^2,x, algorithm="fricas")
```

```
[Out] integral(x^2/(b^2*arcsin(c*x)^2 + 2*a*b*arcsin(c*x) + a^2), x)
```

Sympy [F]

$$\int \frac{x^2}{(a+b\arcsin(cx))^2}\,dx = \int \frac{x^2}{(a+b\,\mathrm{asin}\,(cx))^2}\,dx$$

```
[In] integrate(x**2/(a+b*asin(c*x))**2,x)
```

```
[Out] Integral(x**2/(a + b*asin(c*x))**2, x)
```

Maxima [F]

$$\int \frac{x^2}{(a+b\arcsin(cx))^2}\,dx = \int \frac{x^2}{(b\arcsin(cx)+a)^2}\,dx$$

```
[In] integrate(x^2/(a+b*arcsin(c*x))^2,x, algorithm="maxima")
```

```
[Out] -(sqrt(c*x + 1)*sqrt(-c*x + 1)*x^2 - (b^2*c*arctan2(c*x, sqrt(c*x + 1)*sqrt
(-c*x + 1)) + a*b*c)*integrate((3*c^2*x^3 - 2*x)*sqrt(c*x + 1)*sqrt(-c*x +
1)/(a*b*c^3*x^2 - a*b*c + (b^2*c^3*x^2 - b^2*c)*arctan2(c*x, sqrt(c*x + 1)*
sqrt(-c*x + 1))), x))/(b^2*c*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1)) + a
*b*c)
```

Giac [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 646 vs. $2(146) = 292$.

Time = 0.31 (sec) , antiderivative size = 646, normalized size of antiderivative = 4.14

$$\int \frac{x^2}{(a+b\arcsin(cx))^2}\,dx = -\frac{3\,b\arcsin(cx)\cos\left(\frac{a}{b}\right)^2\operatorname{Ci}\left(\frac{3\,a}{b}+3\,\arcsin(cx)\right)\sin\left(\frac{a}{b}\right)}{b^3c^3\arcsin(cx)+ab^2c^3} + \frac{3\,b\arcsin(cx)\cos\left(\frac{a}{b}\right)^3\operatorname{Si}\left(\frac{3\,a}{b}+3\,\arcsin(cx)\right)}{b^3c^3\arcsin(cx)+ab^2c^3} - \frac{3\,a\cos\left(\frac{a}{b}\right)^2\operatorname{Ci}\left(\frac{3\,a}{b}+3\,\arcsin(cx)\right)\sin\left(\frac{a}{b}\right)}{b^3c^3\arcsin(cx)+ab^2c^3} + \frac{3\,a\cos\left(\frac{a}{b}\right)^3\operatorname{Si}\left(\frac{3\,a}{b}+3\,\arcsin(cx)\right)}{b^3c^3\arcsin(cx)+ab^2c^3} + \frac{3\,b\arcsin(cx)\operatorname{Ci}\left(\frac{3\,a}{b}+3\,\arcsin(cx)\right)\sin\left(\frac{a}{b}\right)}{4\,(b^3c^3\arcsin(cx)+ab^2c^3)} + \frac{b\arcsin(cx)\operatorname{Ci}\left(\frac{a}{b}+\arcsin(cx)\right)\sin\left(\frac{a}{b}\right)}{4\,(b^3c^3\arcsin(cx)+ab^2c^3)} - \frac{9\,b\arcsin(cx)\cos\left(\frac{a}{b}\right)\operatorname{Si}\left(\frac{3\,a}{b}+3\,\arcsin(cx)\right)}{4\,(b^3c^3\arcsin(cx)+ab^2c^3)} - \frac{b\arcsin(cx)\cos\left(\frac{a}{b}\right)\operatorname{Si}\left(\frac{a}{b}+\arcsin(cx)\right)}{4\,(b^3c^3\arcsin(cx)+ab^2c^3)} + \frac{3\,a\operatorname{Ci}\left(\frac{3\,a}{b}+3\,\arcsin(cx)\right)\sin\left(\frac{a}{b}\right)}{4\,(b^3c^3\arcsin(cx)+ab^2c^3)} + \frac{a\operatorname{Ci}\left(\frac{a}{b}+\arcsin(cx)\right)\sin\left(\frac{a}{b}\right)}{4\,(b^3c^3\arcsin(cx)+ab^2c^3)} - \frac{9\,a\cos\left(\frac{a}{b}\right)\operatorname{Si}\left(\frac{3\,a}{b}+3\,\arcsin(cx)\right)}{4\,(b^3c^3\arcsin(cx)+ab^2c^3)} - \frac{a\cos\left(\frac{a}{b}\right)\operatorname{Si}\left(\frac{a}{b}+\arcsin(cx)\right)}{4\,(b^3c^3\arcsin(cx)+ab^2c^3)} + \frac{(-c^2x^2+1)^{\frac{3}{2}}b}{b^3c^3\arcsin(cx)+ab^2c^3} - \frac{\sqrt{-c^2x^2+1}b}{b^3c^3\arcsin(cx)+ab^2c^3}$$

```
[In] integrate(x^2/(a+b*arcsin(c*x))^2,x, algorithm="giac")
```

```
[Out] -3*b*arcsin(c*x)*cos(a/b)^2*cos_integral(3*a/b + 3*arcsin(c*x))*sin(a/b)/(b
^3*c^3*arcsin(c*x) + a*b^2*c^3) + 3*b*arcsin(c*x)*cos(a/b)^3*sin_integral(3
*a/b + 3*arcsin(c*x))/(b^3*c^3*arcsin(c*x) + a*b^2*c^3) - 3*a*cos(a/b)^2*co
s_integral(3*a/b + 3*arcsin(c*x))*sin(a/b)/(b^3*c^3*arcsin(c*x) + a*b^2*c^3
) + 3*a*cos(a/b)^3*sin_integral(3*a/b + 3*arcsin(c*x))/(b^3*c^3*arcsin(c*x)
 + a*b^2*c^3) + 3/4*b*arcsin(c*x)*cos_integral(3*a/b + 3*arcsin(c*x))*sin(a
```

```
/b)/(b^3*c^3*arcsin(c*x) + a*b^2*c^3) + 1/4*b*arcsin(c*x)*cos_integral(a/b
+ arcsin(c*x))*sin(a/b)/(b^3*c^3*arcsin(c*x) + a*b^2*c^3) - 9/4*b*arcsin(c*
x)*cos(a/b)*sin_integral(3*a/b + 3*arcsin(c*x))/(b^3*c^3*arcsin(c*x) + a*b^
2*c^3) - 1/4*b*arcsin(c*x)*cos(a/b)*sin_integral(a/b + arcsin(c*x))/(b^3*c^
3*arcsin(c*x) + a*b^2*c^3) + 3/4*a*cos_integral(3*a/b + 3*arcsin(c*x))*sin(
a/b)/(b^3*c^3*arcsin(c*x) + a*b^2*c^3) + 1/4*a*cos_integral(a/b + arcsin(c*
x))*sin(a/b)/(b^3*c^3*arcsin(c*x) + a*b^2*c^3) - 9/4*a*cos(a/b)*sin_integra
l(3*a/b + 3*arcsin(c*x))/(b^3*c^3*arcsin(c*x) + a*b^2*c^3) - 1/4*a*cos(a/b)
*sin_integral(a/b + arcsin(c*x))/(b^3*c^3*arcsin(c*x) + a*b^2*c^3) + (-c^2*
x^2 + 1)^(3/2)*b/(b^3*c^3*arcsin(c*x) + a*b^2*c^3) - sqrt(-c^2*x^2 + 1)*b/(
b^3*c^3*arcsin(c*x) + a*b^2*c^3)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x^2}{(a+b\arcsin(cx))^2}\,dx = \int \frac{x^2}{\left(a+b\,\mathrm{asin}\left(c\,x\right)\right)^2}\,dx$$

```
[In] int(x^2/(a + b*asin(c*x))^2,x)
[Out] int(x^2/(a + b*asin(c*x))^2, x)
```

3.164 $\int \frac{x}{(a+b\arcsin(cx))^2}\,dx$

Optimal result

Integrand size = 12, antiderivative size = 90

$$\int \frac{x}{(a+b\arcsin(cx))^2}\,dx = -\frac{x\sqrt{1-c^2x^2}}{bc(a+b\arcsin(cx))} + \frac{\cos\left(\frac{2a}{b}\right)\text{CosIntegral}\left(\frac{2(a+b\arcsin(cx))}{b}\right)}{b^2c^2} + \frac{\sin\left(\frac{2a}{b}\right)\text{Si}\left(\frac{2(a+b\arcsin(cx))}{b}\right)}{b^2c^2}$$

```
[Out] Ci(2*(a+b*arcsin(c*x))/b)*cos(2*a/b)/b^2/c^2+Si(2*(a+b*arcsin(c*x))/b)*sin(
2*a/b)/b^2/c^2-x*(-c^2*x^2+1)^(1/2)/b/c/(a+b*arcsin(c*x))
```

Rubi [A] (verified)

Time = 0.05 (sec) , antiderivative size = 90, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.333, Rules used = {4727, 3384, 3380, 3383}

$$\int \frac{x}{(a+b\arcsin(cx))^2}\,dx = \frac{\cos\left(\frac{2a}{b}\right)\text{CosIntegral}\left(\frac{2(a+b\arcsin(cx))}{b}\right)}{b^2c^2} + \frac{\sin\left(\frac{2a}{b}\right)\text{Si}\left(\frac{2(a+b\arcsin(cx))}{b}\right)}{b^2c^2} - \frac{x\sqrt{1-c^2x^2}}{bc(a+b\arcsin(cx))}$$

```
[In] Int[x/(a + b*ArcSin[c*x])^2,x]
```

```
[Out] -((x*Sqrt[1 - c^2*x^2])/(b*c*(a + b*ArcSin[c*x]))) + (Cos[(2*a)/b]*CosInteg
ral[(2*(a + b*ArcSin[c*x]))/b])/(b^2*c^2) + (Sin[(2*a)/b]*SinIntegral[(2*(a
 + b*ArcSin[c*x]))/b])/(b^2*c^2)
```

Rule 3380

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Simp[SinInte
gral[e + f*x]/d, x] /; FreeQ[{c, d, e, f}, x] && EqQ[d*e - c*f, 0]
```

Rule 3383

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Simp[CosInte
gral[e - Pi/2 + f*x]/d, x] /; FreeQ[{c, d, e, f}, x] && EqQ[d*(e - Pi/2) -
c*f, 0]
```

Rule 3384

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Dist[Cos[(d*
e - c*f)/d], Int[Sin[c*(f/d) + f*x]/(c + d*x), x], x] + Dist[Sin[(d*e - c*f
)/d], Int[Cos[c*(f/d) + f*x]/(c + d*x), x], x] /; FreeQ[{c, d, e, f}, x] &&
 NeQ[d*e - c*f, 0]
```

Rule 4727

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^m*Sqrt[1 - c^2*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] - Dist
[1/(b^2*c^(m + 1)*(n + 1)), Subst[Int[ExpandTrigReduce[x^(n + 1), Sin[-a/b
+ x/b]^(m - 1)*(m - (m + 1)*Sin[-a/b + x/b]^2), x], x], x, a + b*ArcSin[c*x
]], x] /; FreeQ[{a, b, c}, x] && IGtQ[m, 0] && GeQ[n, -2] && LtQ[n, -1]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= -\frac{x\sqrt{1-c^2x^2}}{bc(a+b\arcsin(cx))}+\frac{\text{Subst}\left(\int\frac{\cos\left(\frac{2a}{b}-\frac{2x}{b}\right)}{x}\,dx,x,a+b\arcsin(cx)\right)}{b^2c^2}\\
&= -\frac{x\sqrt{1-c^2x^2}}{bc(a+b\arcsin(cx))}+\frac{\cos\left(\frac{2a}{b}\right)\text{Subst}\left(\int\frac{\cos\left(\frac{2x}{b}\right)}{x}\,dx,x,a+b\arcsin(cx)\right)}{b^2c^2}\\
&\quad+\frac{\sin\left(\frac{2a}{b}\right)\text{Subst}\left(\int\frac{\sin\left(\frac{2x}{b}\right)}{x}\,dx,x,a+b\arcsin(cx)\right)}{b^2c^2}\\
&= -\frac{x\sqrt{1-c^2x^2}}{bc(a+b\arcsin(cx))}+\frac{\cos\left(\frac{2a}{b}\right)\text{CosIntegral}\left(\frac{2(a+b\arcsin(cx))}{b}\right)}{b^2c^2}+\frac{\sin\left(\frac{2a}{b}\right)\text{Si}\left(\frac{2(a+b\arcsin(cx))}{b}\right)}{b^2c^2}
\end{aligned}$$

Mathematica [A] (verified)

Time = 0.32 (sec) , antiderivative size = 79, normalized size of antiderivative = 0.88

$$\int \frac{x}{(a+b\arcsin(cx))^2}\,dx = \frac{-\frac{bcx\sqrt{1-c^2x^2}}{a+b\arcsin(cx)}+\cos\left(\frac{2a}{b}\right)\text{CosIntegral}\left(2\left(\frac{a}{b}+\arcsin(cx)\right)\right)+\sin\left(\frac{2a}{b}\right)\text{Si}\left(2\left(\frac{a}{b}+\arcsin(cx)\right)\right)}{b^2c^2}$$

```
[In] Integrate[x/(a + b*ArcSin[c*x])^2,x]
```

```
[Out] (-((b*c*x*Sqrt[1 - c^2*x^2])/(a + b*ArcSin[c*x])) + Cos[(2*a)/b]*CosIntegra
l[2*(a/b + ArcSin[c*x])] + Sin[(2*a)/b]*SinIntegral[2*(a/b + ArcSin[c*x])])
/(b^2*c^2)
```

Maple [A] (verified)

Time = 0.03 (sec) , antiderivative size = 77, normalized size of antiderivative = 0.86

method	result	size
derivativedivides	$\frac{-\frac{\sin(2\arcsin(cx))}{2(a+b\arcsin(cx))b}+\frac{\text{Si}\left(2\arcsin(cx)+\frac{2a}{b}\right)\sin\left(\frac{2a}{b}\right)+\text{Ci}\left(2\arcsin(cx)+\frac{2a}{b}\right)\cos\left(\frac{2a}{b}\right)}{b^2}}{c^2}$	77
default	$\frac{-\frac{\sin(2\arcsin(cx))}{2(a+b\arcsin(cx))b}+\frac{\text{Si}\left(2\arcsin(cx)+\frac{2a}{b}\right)\sin\left(\frac{2a}{b}\right)+\text{Ci}\left(2\arcsin(cx)+\frac{2a}{b}\right)\cos\left(\frac{2a}{b}\right)}{b^2}}{c^2}$	77

```
[In] int(x/(a+b*arcsin(c*x))^2,x,method=_RETURNVERBOSE)
```

```
[Out] 1/c^2*(-1/2*sin(2*arcsin(c*x))/(a+b*arcsin(c*x))/b+(Si(2*arcsin(c*x)+2*a/b)
*sin(2*a/b)+Ci(2*arcsin(c*x)+2*a/b)*cos(2*a/b))/b^2)
```

Fricas [F]

$$\int \frac{x}{(a+b\arcsin(cx))^2}\,dx = \int \frac{x}{(b\arcsin(cx)+a)^2}\,dx$$

```
[In] integrate(x/(a+b*arcsin(c*x))^2,x, algorithm="fricas")
```

```
[Out] integral(x/(b^2*arcsin(c*x)^2 + 2*a*b*arcsin(c*x) + a^2), x)
```

Sympy [F]

$$\int \frac{x}{(a+b\arcsin(cx))^2}\,dx = \int \frac{x}{\left(a+b\operatorname{asin}(cx)\right)^2}\,dx$$

```
[In] integrate(x/(a+b*asin(c*x))**2,x)
[Out] Integral(x/(a + b*asin(c*x))**2, x)
```

Maxima [F]

$$\int \frac{x}{(a+b\arcsin(cx))^2}\,dx = \int \frac{x}{\left(b\arcsin(cx)+a\right)^2}\,dx$$

```
[In] integrate(x/(a+b*arcsin(c*x))^2,x, algorithm="maxima")
[Out] -(sqrt(c*x + 1)*sqrt(-c*x + 1)*x - (b^2*c*arctan2(c*x, sqrt(c*x + 1)*sqrt(-
c*x + 1)) + a*b*c)*integrate((2*c^2*x^2 - 1)*sqrt(c*x + 1)*sqrt(-c*x + 1)/(
a*b*c^3*x^2 - a*b*c + (b^2*c^3*x^2 - b^2*c)*arctan2(c*x, sqrt(c*x + 1)*sqrt
(-c*x + 1))), x))/(b^2*c*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1)) + a*b*c
)
```

Giac [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 326 vs. 2(88) = 176.

Time = 0.28 (sec) , antiderivative size = 326, normalized size of antiderivative = 3.62

$$\begin{aligned}\int \frac{x}{(a+b\arcsin(cx))^2}\,dx &= \frac{2\,b\arcsin(cx)\cos\left(\frac{a}{b}\right)^2\operatorname{Ci}\left(\frac{2a}{b}+2\arcsin(cx)\right)}{b^3c^2\arcsin(cx)+ab^2c^2} \\ &\quad+\frac{2\,b\arcsin(cx)\cos\left(\frac{a}{b}\right)\sin\left(\frac{a}{b}\right)\operatorname{Si}\left(\frac{2a}{b}+2\arcsin(cx)\right)}{b^3c^2\arcsin(cx)+ab^2c^2} \\ &\quad+\frac{2\,a\cos\left(\frac{a}{b}\right)^2\operatorname{Ci}\left(\frac{2a}{b}+2\arcsin(cx)\right)}{b^3c^2\arcsin(cx)+ab^2c^2} \\ &\quad+\frac{2\,a\cos\left(\frac{a}{b}\right)\sin\left(\frac{a}{b}\right)\operatorname{Si}\left(\frac{2a}{b}+2\arcsin(cx)\right)}{b^3c^2\arcsin(cx)+ab^2c^2} \\ &\quad-\frac{\sqrt{-c^2x^2+1}bcx}{b^3c^2\arcsin(cx)+ab^2c^2}-\frac{b\arcsin(cx)\operatorname{Ci}\left(\frac{2a}{b}+2\arcsin(cx)\right)}{b^3c^2\arcsin(cx)+ab^2c^2} \\ &\quad-\frac{a\operatorname{Ci}\left(\frac{2a}{b}+2\arcsin(cx)\right)}{b^3c^2\arcsin(cx)+ab^2c^2}\end{aligned}$$

```
[In] integrate(x/(a+b*arcsin(c*x))^2,x, algorithm="giac")
```

```
[Out] 2*b*arcsin(c*x)*cos(a/b)^2*cos_integral(2*a/b + 2*arcsin(c*x))/(b^3*c^2*arc
sin(c*x) + a*b^2*c^2) + 2*b*arcsin(c*x)*cos(a/b)*sin(a/b)*sin_integral(2*a/
b + 2*arcsin(c*x))/(b^3*c^2*arcsin(c*x) + a*b^2*c^2) + 2*a*cos(a/b)^2*cos_i
ntegral(2*a/b + 2*arcsin(c*x))/(b^3*c^2*arcsin(c*x) + a*b^2*c^2) + 2*a*cos(
a/b)*sin(a/b)*sin_integral(2*a/b + 2*arcsin(c*x))/(b^3*c^2*arcsin(c*x) + a*
b^2*c^2) - sqrt(-c^2*x^2 + 1)*b*c*x/(b^3*c^2*arcsin(c*x) + a*b^2*c^2) - b*a
rcsin(c*x)*cos_integral(2*a/b + 2*arcsin(c*x))/(b^3*c^2*arcsin(c*x) + a*b^2
*c^2) - a*cos_integral(2*a/b + 2*arcsin(c*x))/(b^3*c^2*arcsin(c*x) + a*b^2*
c^2)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x}{(a+b\arcsin(cx))^2}\,dx=\int \frac{x}{{\left(a+b\,\mathrm{asin}\left(c\,x\right)\right)}^2}\,dx$$

```
[In] int(x/(a + b*asin(c*x))^2,x)
```

```
[Out] int(x/(a + b*asin(c*x))^2, x)
```

3.165 $\int \frac{1}{(a+b\arcsin(cx))^2}\,dx$

Optimal result

Integrand size = 10, antiderivative size = 86

$$\int \frac{1}{(a+b\arcsin(cx))^2}\,dx = -\frac{\sqrt{1-c^2x^2}}{bc(a+b\arcsin(cx))}+\frac{\text{CosIntegral}\left(\frac{a+b\arcsin(cx)}{b}\right)\sin\left(\frac{a}{b}\right)}{b^2c} - \frac{\cos\left(\frac{a}{b}\right)\text{Si}\left(\frac{a+b\arcsin(cx)}{b}\right)}{b^2c}$$

```
[Out] -cos(a/b)*Si((a+b*arcsin(c*x))/b)/b^2/c+Ci((a+b*arcsin(c*x))/b)*sin(a/b)/b^
2/c-(-c^2*x^2+1)^(1/2)/b/c/(a+b*arcsin(c*x))
```

Rubi [A] (verified)

Time = 0.10 (sec) , antiderivative size = 86, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {4717, 4809, 3384, 3380, 3383}

$$\int \frac{1}{(a+b\arcsin(cx))^2}\,dx = \frac{\sin\left(\frac{a}{b}\right)\text{CosIntegral}\left(\frac{a+b\arcsin(cx)}{b}\right)}{b^2c} - \frac{\cos\left(\frac{a}{b}\right)\text{Si}\left(\frac{a+b\arcsin(cx)}{b}\right)}{b^2c} - \frac{\sqrt{1-c^2x^2}}{bc(a+b\arcsin(cx))}$$

```
[In] Int[(a + b*ArcSin[c*x])^(-2),x]
```

```
[Out] -(Sqrt[1 - c^2*x^2]/(b*c*(a + b*ArcSin[c*x]))) + (CosIntegral[(a + b*ArcSin
[c*x])/b]*Sin[a/b])/(b^2*c) - (Cos[a/b]*SinIntegral[(a + b*ArcSin[c*x])/b])
/(b^2*c)
```

Rule 3380

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Simp[SinInte
gral[e + f*x]/d, x] /; FreeQ[{c, d, e, f}, x] && EqQ[d*e - c*f, 0]
```

Rule 3383

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Simp[CosInte
gral[e - Pi/2 + f*x]/d, x] /; FreeQ[{c, d, e, f}, x] && EqQ[d*(e - Pi/2) -
c*f, 0]
```

Rule 3384

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Dist[Cos[(d*
e - c*f)/d], Int[Sin[c*(f/d) + f*x]/(c + d*x), x], x] + Dist[Sin[(d*e - c*f
)/d], Int[Cos[c*(f/d) + f*x]/(c + d*x), x], x] /; FreeQ[{c, d, e, f}, x] &&
 NeQ[d*e - c*f, 0]
```

Rule 4717

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_), x_Symbol] :> Simp[Sqrt[1 - c^2
*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] + Dist[c/(b*(n + 1)),
 Int[x*((a + b*ArcSin[c*x])^(n + 1)/Sqrt[1 - c^2*x^2]), x], x] /; FreeQ[{a,
 b, c}, x] && LtQ[n, -1]
```

Rule 4809

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_.)*((d_) + (e_.)*(x_)^
2)^(p_.), x_Symbol] :> Dist[(1/(b*c^(m + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x
^2)^p], Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b]^(2*p + 1), x], x, a
 + b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, d, e, n}, x] && EqQ[c^2*d + e, 0]
&& IGtQ[2*p + 2, 0] && IGtQ[m, 0]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= -\frac{\sqrt{1-c^2x^2}}{bc(a+b\arcsin(cx))}-\frac{c\int \frac{x}{\sqrt{1-c^2x^2}(a+b\arcsin(cx))}\,dx}{b}\\
&= -\frac{\sqrt{1-c^2x^2}}{bc(a+b\arcsin(cx))}+\frac{\text{Subst}\left(\int \frac{\sin\left(\frac{a}{b}-\frac{x}{b}\right)}{x}\,dx,x,a+b\arcsin(cx)\right)}{b^2c}\\
&= -\frac{\sqrt{1-c^2x^2}}{bc(a+b\arcsin(cx))}-\frac{\cos\left(\frac{a}{b}\right)\text{Subst}\left(\int \frac{\sin\left(\frac{x}{b}\right)}{x}\,dx,x,a+b\arcsin(cx)\right)}{b^2c}\\
&\quad+\frac{\sin\left(\frac{a}{b}\right)\text{Subst}\left(\int \frac{\cos\left(\frac{x}{b}\right)}{x}\,dx,x,a+b\arcsin(cx)\right)}{b^2c}
\end{aligned}$$

$$= -\frac{\sqrt{1-c^2x^2}}{bc(a+b\arcsin(cx))} + \frac{\text{CosIntegral}\left(\frac{a+b\arcsin(cx)}{b}\right)\sin\left(\frac{a}{b}\right)}{b^2c} - \frac{\cos\left(\frac{a}{b}\right)\text{Si}\left(\frac{a+b\arcsin(cx)}{b}\right)}{b^2c}$$

Mathematica [A] (verified)

Time = 0.21 (sec) , antiderivative size = 72, normalized size of antiderivative = 0.84

$$\int \frac{1}{(a+b\arcsin(cx))^2}\,dx = \frac{-\frac{b\sqrt{1-c^2x^2}}{a+b\arcsin(cx)} + \text{CosIntegral}\left(\frac{a}{b}+\arcsin(cx)\right)\sin\left(\frac{a}{b}\right) - \cos\left(\frac{a}{b}\right)\text{Si}\left(\frac{a}{b}+\arcsin(cx)\right)}{b^2c}$$

```
[In] Integrate[(a + b*ArcSin[c*x])^(-2),x]
[Out] (-((b*Sqrt[1 - c^2*x^2])/(a + b*ArcSin[c*x])) + CosIntegral[a/b + ArcSin[c*
x]]*Sin[a/b] - Cos[a/b]*SinIntegral[a/b + ArcSin[c*x]])/(b^2*c)
```

Maple [A] (verified)

Time = 0.04 (sec) , antiderivative size = 76, normalized size of antiderivative = 0.88

method	result	size
derivativedivides	$\frac{-\frac{\sqrt{-c^2x^2+1}}{(a+b\arcsin(cx))b}-\frac{\text{Si}\left(\arcsin(cx)+\frac{a}{b}\right)\cos\left(\frac{a}{b}\right)-\text{Ci}\left(\arcsin(cx)+\frac{a}{b}\right)\sin\left(\frac{a}{b}\right)}{b^2}}{c}$	76
default	$\frac{-\frac{\sqrt{-c^2x^2+1}}{(a+b\arcsin(cx))b}-\frac{\text{Si}\left(\arcsin(cx)+\frac{a}{b}\right)\cos\left(\frac{a}{b}\right)-\text{Ci}\left(\arcsin(cx)+\frac{a}{b}\right)\sin\left(\frac{a}{b}\right)}{b^2}}{c}$	76

```
[In] int(1/(a+b*arcsin(c*x))^2,x,method=_RETURNVERBOSE)
[Out] 1/c*(-(-c^2*x^2+1)^(1/2)/(a+b*arcsin(c*x))/b-(Si(arcsin(c*x)+a/b)*cos(a/b)-
Ci(arcsin(c*x)+a/b)*sin(a/b))/b^2)
```

Fricas [F]

$$\int \frac{1}{(a+b\arcsin(cx))^2}\,dx = \int \frac{1}{(b\arcsin(cx)+a)^2}\,dx$$

```
[In] integrate(1/(a+b*arcsin(c*x))^2,x, algorithm="fricas")
[Out] integral(1/(b^2*arcsin(c*x)^2 + 2*a*b*arcsin(c*x) + a^2), x)
```

Sympy [F]

$$\int \frac{1}{(a+b\arcsin(cx))^2}\,dx = \int \frac{1}{\left(a+b\,\mathrm{asin}\,(cx)\right)^2}\,dx$$

```
[In] integrate(1/(a+b*asin(c*x))**2,x)
[Out] Integral((a + b*asin(c*x))**(-2), x)
```

Maxima [F]

$$\int \frac{1}{(a+b\arcsin(cx))^2}\,dx = \int \frac{1}{\left(b\arcsin\,(cx)+a\right)^2}\,dx$$

```
[In] integrate(1/(a+b*arcsin(c*x))^2,x, algorithm="maxima")
[Out] ((b^2*c^2*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1)) + a*b*c^2)*integrate(s
qrt(c*x + 1)*sqrt(-c*x + 1)*x/(a*b*c^2*x^2 - a*b + (b^2*c^2*x^2 - b^2)*arct
an2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1))), x) - sqrt(c*x + 1)*sqrt(-c*x + 1))
/(b^2*c*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1)) + a*b*c)
```

Giac [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 192 vs. 2(84) = 168.

Time = 0.28 (sec) , antiderivative size = 192, normalized size of antiderivative = 2.23

$$\begin{aligned}\int \frac{1}{(a+b\arcsin(cx))^2}\,dx &= \frac{b\arcsin\,(cx)\,\mathrm{Ci}\left(\frac{a}{b}+\arcsin\,(cx)\right)\sin\left(\frac{a}{b}\right)}{b^3c\arcsin\,(cx)+ab^2c} \\ &\quad - \frac{b\arcsin\,(cx)\cos\left(\frac{a}{b}\right)\mathrm{Si}\left(\frac{a}{b}+\arcsin\,(cx)\right)}{b^3c\arcsin\,(cx)+ab^2c} \\ &\quad + \frac{a\,\mathrm{Ci}\left(\frac{a}{b}+\arcsin\,(cx)\right)\sin\left(\frac{a}{b}\right)}{b^3c\arcsin\,(cx)+ab^2c} \\ &\quad - \frac{a\cos\left(\frac{a}{b}\right)\mathrm{Si}\left(\frac{a}{b}+\arcsin\,(cx)\right)}{b^3c\arcsin\,(cx)+ab^2c} - \frac{\sqrt{-c^2x^2+1}b}{b^3c\arcsin\,(cx)+ab^2c}\end{aligned}$$

```
[In] integrate(1/(a+b*arcsin(c*x))^2,x, algorithm="giac")
[Out] b*arcsin(c*x)*cos_integral(a/b + arcsin(c*x))*sin(a/b)/(b^3*c*arcsin(c*x) +
 a*b^2*c) - b*arcsin(c*x)*cos(a/b)*sin_integral(a/b + arcsin(c*x))/(b^3*c*a
rcsin(c*x) + a*b^2*c) + a*cos_integral(a/b + arcsin(c*x))*sin(a/b)/(b^3*c*a
rcsin(c*x) + a*b^2*c) - a*cos(a/b)*sin_integral(a/b + arcsin(c*x))/(b^3*c*a
rcsin(c*x) + a*b^2*c) - sqrt(-c^2*x^2 + 1)*b/(b^3*c*arcsin(c*x) + a*b^2*c)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{1}{(a+b\arcsin(cx))^2}\,dx = \int \frac{1}{\left(a+b\,\mathrm{asin}\left(c\,x\right)\right)^2}\,dx$$

```
[In] int(1/(a + b*asin(c*x))^2,x)
[Out] int(1/(a + b*asin(c*x))^2, x)
```

3.166 $\int \frac{1}{x(a+b\arcsin(cx))^2}\,dx$

Optimal result

Integrand size = 14, antiderivative size = 14

$$\int \frac{1}{x(a+b\arcsin(cx))^2}\,dx = \text{Int}\left(\frac{1}{x(a+b\arcsin(cx))^2},x\right)$$

```
[Out] Unintegrable(1/x/(a+b*arcsin(c*x))^2,x)
```

Rubi [N/A]

Not integrable

Time = 0.01 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{1}{x(a+b\arcsin(cx))^2}\,dx = \int \frac{1}{x(a+b\arcsin(cx))^2}\,dx$$

```
[In] Int[1/(x*(a + b*ArcSin[c*x])^2),x]
[Out] Defer[Int][1/(x*(a + b*ArcSin[c*x])^2), x]
```

Rubi steps

$$\text{integral} = \int \frac{1}{x(a+b\arcsin(cx))^2}\,dx$$

Mathematica [N/A]

Not integrable

Time = 5.01 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.14

$$\int \frac{1}{x(a+b\arcsin(cx))^2}\,dx=\int \frac{1}{x(a+b\arcsin(cx))^2}\,dx$$

```
[In] Integrate[1/(x*(a + b*ArcSin[c*x])^2),x]
[Out] Integrate[1/(x*(a + b*ArcSin[c*x])^2), x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.07 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00

$$\int \frac{1}{x\left(a+b\arcsin\left(cx\right)\right)^{2}}dx$$

```
[In] int(1/x/(a+b*arcsin(c*x))^2,x)
[Out] int(1/x/(a+b*arcsin(c*x))^2,x)
```

Fricas [N/A]

Not integrable

Time = 0.24 (sec) , antiderivative size = 30, normalized size of antiderivative = 2.14

$$\int \frac{1}{x(a+b\arcsin(cx))^2}\,dx=\int \frac{1}{\left(b\arcsin\left(cx\right)+a\right)^{2}x}\,dx$$

```
[In] integrate(1/x/(a+b*arcsin(c*x))^2,x, algorithm="fricas")
[Out] integral(1/(b^2*x*arcsin(c*x)^2 + 2*a*b*x*arcsin(c*x) + a^2*x), x)
```

Sympy [N/A]

Not integrable

Time = 1.07 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00

$$\int \frac{1}{x(a+b\arcsin(cx))^2}\,dx=\int \frac{1}{x\left(a+b\operatorname{asin}\left(cx\right)\right)^{2}}\,dx$$

```
[In] integrate(1/x/(a+b*asin(c*x))**2,x)
[Out] Integral(1/(x*(a + b*asin(c*x))**2), x)
```

Maxima [N/A]

Not integrable

Time = 0.61 (sec) , antiderivative size = 165, normalized size of antiderivative = 11.79

$$\int \frac{1}{x(a+b\arcsin(cx))^2}\,dx = \int \frac{1}{\left(b\arcsin\left(cx\right)+a\right)^2 x}\,dx$$

```
[In] integrate(1/x/(a+b*arcsin(c*x))^2,x, algorithm="maxima")
```

```
[Out] ((b^2*c*x*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1)) + a*b*c*x)*integrate(s
qrt(c*x + 1)*sqrt(-c*x + 1)/(a*b*c^3*x^4 - a*b*c*x^2 + (b^2*c^3*x^4 - b^2*c
*x^2)*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1))), x) - sqrt(c*x + 1)*sqrt(
-c*x + 1))/(b^2*c*x*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1)) + a*b*c*x)
```

Giac [N/A]

Not integrable

Time = 0.53 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.14

$$\int \frac{1}{x(a+b\arcsin(cx))^2}\,dx = \int \frac{1}{\left(b\arcsin\left(cx\right)+a\right)^2 x}\,dx$$

```
[In] integrate(1/x/(a+b*arcsin(c*x))^2,x, algorithm="giac")
```

```
[Out] integrate(1/((b*arcsin(c*x) + a)^2*x), x)
```

Mupad [N/A]

Not integrable

Time = 0.12 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.14

$$\int \frac{1}{x(a+b\arcsin(cx))^2}\,dx = \int \frac{1}{x\,{\left(a+b\,\mathrm{asin}\left(c\,x\right)\right)}^2}\,dx$$

```
[In] int(1/(x*(a + b*asin(c*x))^2),x)
```

```
[Out] int(1/(x*(a + b*asin(c*x))^2), x)
```

3.167 $\int \frac{1}{x^2(a+b\arcsin(cx))^2}\,dx$

Optimal result

Integrand size = 14, antiderivative size = 14

$$\int \frac{1}{x^2(a+b\arcsin(cx))^2}\,dx = \text{Int}\left(\frac{1}{x^2(a+b\arcsin(cx))^2},x\right)$$

```
[Out] Unintegrable(1/x^2/(a+b*arcsin(c*x))^2,x)
```

Rubi [N/A]

Not integrable

Time = 0.02 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}} = 0.000$, Rules used = {}

$$\int \frac{1}{x^2(a+b\arcsin(cx))^2}\,dx = \int \frac{1}{x^2(a+b\arcsin(cx))^2}\,dx$$

```
[In] Int[1/(x^2*(a + b*ArcSin[c*x])^2),x]
[Out] Defer[Int][1/(x^2*(a + b*ArcSin[c*x])^2), x]
```

Rubi steps

$$\text{integral} = \int \frac{1}{x^2(a+b\arcsin(cx))^2}\,dx$$

Mathematica [N/A]

Not integrable

Time = 34.23 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.14

$$\int \frac{1}{x^2(a+b\arcsin(cx))^2}\,dx=\int \frac{1}{x^2(a+b\arcsin(cx))^2}\,dx$$

```
[In] Integrate[1/(x^2*(a + b*ArcSin[c*x])^2),x]
[Out] Integrate[1/(x^2*(a + b*ArcSin[c*x])^2), x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.09 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00

$$\int \frac{1}{x^{2} \left(a+b \arcsin \left(c x \right)\right)^{2}}d x$$

```
[In] int(1/x^2/(a+b*arcsin(c*x))^2,x)
[Out] int(1/x^2/(a+b*arcsin(c*x))^2,x)
```

Fricas [N/A]

Not integrable

Time = 0.24 (sec) , antiderivative size = 36, normalized size of antiderivative = 2.57

$$\int \frac{1}{x^2(a+b\arcsin(cx))^2}\,dx=\int \frac{1}{{\left(b \arcsin\left(c x\right) + a\right)}^{2} x^{2}}\,dx$$

```
[In] integrate(1/x^2/(a+b*arcsin(c*x))^2,x, algorithm="fricas")
[Out] integral(1/(b^2*x^2*arcsin(c*x)^2 + 2*a*b*x^2*arcsin(c*x) + a^2*x^2), x)
```

Sympy [N/A]

Not integrable

Time = 0.97 (sec) , antiderivative size = 15, normalized size of antiderivative = 1.07

$$\int \frac{1}{x^2(a+b\arcsin(cx))^2}\,dx=\int \frac{1}{x^{2} \left(a + b \operatorname{asin}{\left(c x \right)}\right)^{2}}\,dx$$

```
[In] integrate(1/x**2/(a+b*asin(c*x))**2,x)
[Out] Integral(1/(x**2*(a + b*asin(c*x))**2), x)
```

Maxima [N/A]

Not integrable

Time = 0.77 (sec) , antiderivative size = 182, normalized size of antiderivative = 13.00

$$\int \frac{1}{x^2(a+b\arcsin(cx))^2}\,dx = \int \frac{1}{\left(b\arcsin\left(cx\right)+a\right)^2x^2}\,dx$$

```
[In] integrate(1/x^2/(a+b*arcsin(c*x))^2,x, algorithm="maxima")
```

```
[Out] -((b^2*c*x^2*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1)) + a*b*c*x^2)*integr
ate((c^2*x^2 - 2)*sqrt(c*x + 1)*sqrt(-c*x + 1)/(a*b*c^3*x^5 - a*b*c*x^3 + (
b^2*c^3*x^5 - b^2*c*x^3)*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1))), x) +
sqrt(c*x + 1)*sqrt(-c*x + 1))/(b^2*c*x^2*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c
*x + 1)) + a*b*c*x^2)
```

Giac [N/A]

Not integrable

Time = 0.84 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.14

$$\int \frac{1}{x^2(a+b\arcsin(cx))^2}\,dx = \int \frac{1}{\left(b\arcsin\left(cx\right)+a\right)^2x^2}\,dx$$

```
[In] integrate(1/x^2/(a+b*arcsin(c*x))^2,x, algorithm="giac")
```

```
[Out] integrate(1/((b*arcsin(c*x) + a)^2*x^2), x)
```

Mupad [N/A]

Not integrable

Time = 0.12 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.14

$$\int \frac{1}{x^2(a+b\arcsin(cx))^2}\,dx = \int \frac{1}{x^2\left(a+b\,\mathrm{asin}\left(c\,x\right)\right)^2}\,dx$$

```
[In] int(1/(x^2*(a + b*asin(c*x))^2),x)
```

```
[Out] int(1/(x^2*(a + b*asin(c*x))^2), x)
```

3.168 $\int \frac{x^2}{(a+b\arcsin(cx))^3}\,dx$

Optimal result

Integrand size = 14, antiderivative size = 197

$$\int \frac{x^2}{(a+b\arcsin(cx))^3}\,dx = -\frac{x^2\sqrt{1-c^2x^2}}{2bc(a+b\arcsin(cx))^2} - \frac{x}{b^2c^2(a+b\arcsin(cx))} + \frac{3x^3}{2b^2(a+b\arcsin(cx))} - \frac{\cos\left(\frac{a}{b}\right)\text{CosIntegral}\left(\frac{a+b\arcsin(cx)}{b}\right)}{8b^3c^3} + \frac{9\cos\left(\frac{3a}{b}\right)\text{CosIntegral}\left(\frac{3(a+b\arcsin(cx))}{b}\right)}{8b^3c^3} - \frac{\sin\left(\frac{a}{b}\right)\text{Si}\left(\frac{a+b\arcsin(cx)}{b}\right)}{8b^3c^3} + \frac{9\sin\left(\frac{3a}{b}\right)\text{Si}\left(\frac{3(a+b\arcsin(cx))}{b}\right)}{8b^3c^3}$$

```
[Out] -x/b^2/c^2/(a+b*arcsin(c*x))+3/2*x^3/b^2/(a+b*arcsin(c*x))-1/8*Ci((a+b*arcs
in(c*x))/b)*cos(a/b)/b^3/c^3+9/8*Ci(3*(a+b*arcsin(c*x))/b)*cos(3*a/b)/b^3/c
^3-1/8*Si((a+b*arcsin(c*x))/b)*sin(a/b)/b^3/c^3+9/8*Si(3*(a+b*arcsin(c*x))/
b)*sin(3*a/b)/b^3/c^3-1/2*x^2*(-c^2*x^2+1)^(1/2)/b/c/(a+b*arcsin(c*x))^2
```

Rubi [A] (verified)

Time = 0.32 (sec) , antiderivative size = 197, normalized size of antiderivative = 1.00, number of steps used = 16, number of rules used = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.571, Rules used

$= \{4729, 4807, 4731, 4491, 3384, 3380, 3383, 4719\}$

$$\int \frac{x^2}{(a+b\arcsin(cx))^3}\,dx = -\frac{\cos\left(\frac{a}{b}\right)\text{CosIntegral}\left(\frac{a+b\arcsin(cx)}{b}\right)}{8b^3c^3} + \frac{9\cos\left(\frac{3a}{b}\right)\text{CosIntegral}\left(\frac{3(a+b\arcsin(cx))}{b}\right)}{8b^3c^3} - \frac{\sin\left(\frac{a}{b}\right)\text{Si}\left(\frac{a+b\arcsin(cx)}{b}\right)}{8b^3c^3} + \frac{9\sin\left(\frac{3a}{b}\right)\text{Si}\left(\frac{3(a+b\arcsin(cx))}{b}\right)}{8b^3c^3} - \frac{x}{b^2c^2(a+b\arcsin(cx))} + \frac{3x^3}{2b^2(a+b\arcsin(cx))} - \frac{x^2\sqrt{1-c^2x^2}}{2bc(a+b\arcsin(cx))^2}$$

```
[In] Int[x^2/(a + b*ArcSin[c*x])^3,x]
```

```
[Out] -1/2*(x^2*Sqrt[1 - c^2*x^2])/(b*c*(a + b*ArcSin[c*x])^2) - x/(b^2*c^2*(a +
b*ArcSin[c*x])) + (3*x^3)/(2*b^2*(a + b*ArcSin[c*x])) - (Cos[a/b]*CosIntegr
al[(a + b*ArcSin[c*x])/b])/(8*b^3*c^3) + (9*Cos[(3*a)/b]*CosIntegral[(3*(a
+ b*ArcSin[c*x]))/b])/(8*b^3*c^3) - (Sin[a/b]*SinIntegral[(a + b*ArcSin[c*x
])/b])/(8*b^3*c^3) + (9*Sin[(3*a)/b]*SinIntegral[(3*(a + b*ArcSin[c*x]))/b]
)/(8*b^3*c^3)
```

Rule 3380

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Simp[SinInte
gral[e + f*x]/d, x] /; FreeQ[{c, d, e, f}, x] && EqQ[d*e - c*f, 0]
```

Rule 3383

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Simp[CosInte
gral[e - Pi/2 + f*x]/d, x] /; FreeQ[{c, d, e, f}, x] && EqQ[d*(e - Pi/2) -
c*f, 0]
```

Rule 3384

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Dist[Cos[(d*
e - c*f)/d], Int[Sin[c*(f/d) + f*x]/(c + d*x), x], x] + Dist[Sin[(d*e - c*f
)/d], Int[Cos[c*(f/d) + f*x]/(c + d*x), x], x] /; FreeQ[{c, d, e, f}, x] &&
 NeQ[d*e - c*f, 0]
```

Rule 4491

```
Int[Cos[(a_.) + (b_.)*(x_)]^(p_.)*((c_.) + (d_.)*(x_))^(m_.)*Sin[(a_.) + (b
_.)*(x_)]^(n_.), x_Symbol] :> Int[ExpandTrigReduce[(c + d*x)^m, Sin[a + b*x
```

```
]^n*Cos[a + b*x]^p, x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && IG
tQ[p, 0]
```

Rule 4719

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_), x_Symbol] :> Dist[1/(b*c), Sub
st[Int[x^n*Cos[-a/b + x/b], x], x, a + b*ArcSin[c*x]], x] /; FreeQ[{a, b, c
, n}, x]
```

Rule 4729

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^m*Sqrt[1 - c^2*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] + (Dis
t[c*((m + 1)/(b*(n + 1))), Int[x^(m + 1)*((a + b*ArcSin[c*x])^(n + 1)/Sqrt[
1 - c^2*x^2]), x], x] - Dist[m/(b*c*(n + 1)), Int[x^(m - 1)*((a + b*ArcSin[
c*x])^(n + 1)/Sqrt[1 - c^2*x^2]), x], x]) /; FreeQ[{a, b, c}, x] && IGtQ[m,
 0] && LtQ[n, -2]
```

Rule 4731

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Dist[1
/(b*c^(m + 1)), Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b], x], x, a +
 b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, n}, x] && IGtQ[m, 0]
```

Rule 4807

```
Int[(((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*((f_.)*(x_))^(m_.))/Sqrt[(d_)
+ (e_.)*(x_)^2], x_Symbol] :> Simp[((f*x)^m/(b*c*(n + 1)))*Simp[Sqrt[1 - c^
2*x^2]/Sqrt[d + e*x^2]]*(a + b*ArcSin[c*x])^(n + 1), x] - Dist[f*(m/(b*c*(n
 + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]], Int[(f*x)^(m - 1)*(a + b*A
rcSin[c*x])^(n + 1), x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && EqQ[c^2*d
 + e, 0] && LtQ[n, -1]
```

Rubi steps

$$\begin{aligned}
&\text{integral}\\
&= -\frac{x^2\sqrt{1-c^2x^2}}{2bc(a+b\arcsin(cx))^2} + \frac{\int \frac{x}{\sqrt{1-c^2x^2}(a+b\arcsin(cx))^2}\,dx}{bc} - \frac{(3c)\int \frac{x^3}{\sqrt{1-c^2x^2}(a+b\arcsin(cx))^2}\,dx}{2b}\\
&= -\frac{x^2\sqrt{1-c^2x^2}}{2bc(a+b\arcsin(cx))^2} - \frac{x}{b^2c^2(a+b\arcsin(cx))}\\
&\quad + \frac{3x^3}{2b^2(a+b\arcsin(cx))} - \frac{9\int \frac{x^2}{a+b\arcsin(cx)}\,dx}{2b^2} + \frac{\int \frac{1}{a+b\arcsin(cx)}\,dx}{b^2c^2}
\end{aligned}$$

$$= -\frac{x^2\sqrt{1-c^2x^2}}{2bc(a+b\arcsin(cx))^2} - \frac{x}{b^2c^2(a+b\arcsin(cx))} + \frac{3x^3}{2b^2(a+b\arcsin(cx))} + \frac{\text{Subst}\left(\int \frac{\cos\left(\frac{a}{b}-\frac{x}{b}\right)}{x}\,dx, x, a+b\arcsin(cx)\right)}{b^3c^3} - \frac{9\text{Subst}\left(\int \frac{\cos\left(\frac{a}{b}-\frac{x}{b}\right)\sin^2\left(\frac{a}{b}-\frac{x}{b}\right)}{x}\,dx, x, a+b\arcsin(cx)\right)}{2b^3c^3}$$

$$= -\frac{x^2\sqrt{1-c^2x^2}}{2bc(a+b\arcsin(cx))^2} - \frac{x}{b^2c^2(a+b\arcsin(cx))} + \frac{3x^3}{2b^2(a+b\arcsin(cx))} - \frac{9\text{Subst}\left(\int \left(-\frac{\cos\left(\frac{3a}{b}-\frac{3x}{b}\right)}{4x}+\frac{\cos\left(\frac{a}{b}-\frac{x}{b}\right)}{4x}\right)dx, x, a+b\arcsin(cx)\right)}{2b^3c^3} + \frac{\cos\left(\frac{a}{b}\right)\text{Subst}\left(\int \frac{\cos\left(\frac{x}{b}\right)}{x}\,dx, x, a+b\arcsin(cx)\right)}{b^3c^3} + \frac{\sin\left(\frac{a}{b}\right)\text{Subst}\left(\int \frac{\sin\left(\frac{x}{b}\right)}{x}\,dx, x, a+b\arcsin(cx)\right)}{b^3c^3}$$

$$= -\frac{x^2\sqrt{1-c^2x^2}}{2bc(a+b\arcsin(cx))^2} - \frac{x}{b^2c^2(a+b\arcsin(cx))} + \frac{3x^3}{2b^2(a+b\arcsin(cx))} + \frac{\cos\left(\frac{a}{b}\right)\text{CosIntegral}\left(\frac{a+b\arcsin(cx)}{b}\right)}{b^3c^3} + \frac{\sin\left(\frac{a}{b}\right)\text{Si}\left(\frac{a+b\arcsin(cx)}{b}\right)}{b^3c^3} + \frac{9\text{Subst}\left(\int \frac{\cos\left(\frac{3a}{b}-\frac{3x}{b}\right)}{x}\,dx, x, a+b\arcsin(cx)\right)}{8b^3c^3} - \frac{9\text{Subst}\left(\int \frac{\cos\left(\frac{a}{b}-\frac{x}{b}\right)}{x}\,dx, x, a+b\arcsin(cx)\right)}{8b^3c^3}$$

$$= -\frac{x^2\sqrt{1-c^2x^2}}{2bc(a+b\arcsin(cx))^2} - \frac{x}{b^2c^2(a+b\arcsin(cx))} + \frac{3x^3}{2b^2(a+b\arcsin(cx))} + \frac{\cos\left(\frac{a}{b}\right)\text{CosIntegral}\left(\frac{a+b\arcsin(cx)}{b}\right)}{b^3c^3} + \frac{\sin\left(\frac{a}{b}\right)\text{Si}\left(\frac{a+b\arcsin(cx)}{b}\right)}{b^3c^3} - \frac{\left(9\cos\left(\frac{a}{b}\right)\right)\text{Subst}\left(\int \frac{\cos\left(\frac{x}{b}\right)}{x}\,dx, x, a+b\arcsin(cx)\right)}{8b^3c^3} + \frac{\left(9\cos\left(\frac{3a}{b}\right)\right)\text{Subst}\left(\int \frac{\cos\left(\frac{3x}{b}\right)}{x}\,dx, x, a+b\arcsin(cx)\right)}{8b^3c^3} - \frac{\left(9\sin\left(\frac{a}{b}\right)\right)\text{Subst}\left(\int \frac{\sin\left(\frac{x}{b}\right)}{x}\,dx, x, a+b\arcsin(cx)\right)}{8b^3c^3} + \frac{\left(9\sin\left(\frac{3a}{b}\right)\right)\text{Subst}\left(\int \frac{\sin\left(\frac{3x}{b}\right)}{x}\,dx, x, a+b\arcsin(cx)\right)}{8b^3c^3}$$

$$= -\frac{x^2\sqrt{1-c^2x^2}}{2bc(a+b\arcsin(cx))^2} - \frac{x}{b^2c^2(a+b\arcsin(cx))} + \frac{3x^3}{2b^2(a+b\arcsin(cx))} - \frac{\cos\left(\frac{a}{b}\right)\text{CosIntegral}\left(\frac{a+b\arcsin(cx)}{b}\right)}{8b^3c^3} + \frac{9\cos\left(\frac{3a}{b}\right)\text{CosIntegral}\left(\frac{3(a+b\arcsin(cx))}{b}\right)}{8b^3c^3} - \frac{\sin\left(\frac{a}{b}\right)\text{Si}\left(\frac{a+b\arcsin(cx)}{b}\right)}{8b^3c^3} + \frac{9\sin\left(\frac{3a}{b}\right)\text{Si}\left(\frac{3(a+b\arcsin(cx))}{b}\right)}{8b^3c^3}$$

Mathematica [A] (verified)

Time = 0.57 (sec) , antiderivative size = 168, normalized size of antiderivative = 0.85

$$\int \frac{x^2}{(a+b\arcsin(cx))^3}\,dx = -\frac{\frac{4b^2x^2\sqrt{1-c^2x^2}}{c(a+b\arcsin(cx))^2} + \frac{8bx}{c^2(a+b\arcsin(cx))} - \frac{12bx^3}{a+b\arcsin(cx)} + \frac{\cos\left(\frac{a}{b}\right)\text{CosIntegral}\left(\frac{a}{b}+\arcsin(cx)\right)}{c^3} - \frac{9\cos\left(\frac{3a}{b}\right)\text{CosIntegral}\left(3\left(\frac{a}{b}+\arcsin(c\right.\right.}{c^3}}{8b^3}$$

```
[In] Integrate[x^2/(a + b*ArcSin[c*x])^3,x]
```

```
[Out] -1/8*((4*b^2*x^2*Sqrt[1 - c^2*x^2])/(c*(a + b*ArcSin[c*x])^2) + (8*b*x)/(c^
2*(a + b*ArcSin[c*x])) - (12*b*x^3)/(a + b*ArcSin[c*x]) + (Cos[a/b]*CosInte
gral[a/b + ArcSin[c*x]])/c^3 - (9*Cos[(3*a)/b]*CosIntegral[3*(a/b + ArcSin[
c*x])])/c^3 + (Sin[a/b]*SinIntegral[a/b + ArcSin[c*x]])/c^3 - (9*Sin[(3*a)/
b]*SinIntegral[3*(a/b + ArcSin[c*x])])/c^3)/b^3
```

Maple [A] (verified)

Time = 0.04 (sec) , antiderivative size = 290, normalized size of antiderivative = 1.47

method	result
derivativedivides	$-\frac{\sqrt{-c^2x^2+1}}{8(a+b\arcsin(cx))^2 b} - \frac{\arcsin(cx)\,\text{Si}\left(\arcsin(cx)+\frac{a}{b}\right)\sin\left(\frac{a}{b}\right)b+\arcsin(cx)\,\text{Ci}\left(\arcsin(cx)+\frac{a}{b}\right)\cos\left(\frac{a}{b}\right)b+\text{Si}\left(\arcsin(cx)+\frac{a}{b}\right)\sin\left(\frac{a}{b}\right)a+\text{Ci}}{8(a+b\arcsin(cx))b^3}$
default	$-\frac{\sqrt{-c^2x^2+1}}{8(a+b\arcsin(cx))^2 b} - \frac{\arcsin(cx)\,\text{Si}\left(\arcsin(cx)+\frac{a}{b}\right)\sin\left(\frac{a}{b}\right)b+\arcsin(cx)\,\text{Ci}\left(\arcsin(cx)+\frac{a}{b}\right)\cos\left(\frac{a}{b}\right)b+\text{Si}\left(\arcsin(cx)+\frac{a}{b}\right)\sin\left(\frac{a}{b}\right)a+\text{Ci}}{8(a+b\arcsin(cx))b^3}$

```
[In] int(x^2/(a+b*arcsin(c*x))^3,x,method=_RETURNVERBOSE)
```

```
[Out] 1/c^3*(-1/8*(-c^2*x^2+1)^(1/2)/(a+b*arcsin(c*x))^2/b-1/8*(arcsin(c*x)*Si(ar
csin(c*x)+a/b)*sin(a/b)*b+arcsin(c*x)*Ci(arcsin(c*x)+a/b)*cos(a/b)*b+Si(arc
sin(c*x)+a/b)*sin(a/b)*a+Ci(arcsin(c*x)+a/b)*cos(a/b)*a-x*b*c)/(a+b*arcsin(
c*x))/b^3+1/8*cos(3*arcsin(c*x))/(a+b*arcsin(c*x))^2/b+3/8*(3*arcsin(c*x)*S
i(3*arcsin(c*x)+3*a/b)*sin(3*a/b)*b+3*arcsin(c*x)*Ci(3*arcsin(c*x)+3*a/b)*c
```

```
os(3*a/b)*b+3*Si(3*arcsin(c*x)+3*a/b)*sin(3*a/b)*a+3*Ci(3*arcsin(c*x)+3*a/b
)*cos(3*a/b)*a-sin(3*arcsin(c*x))*b)/(a+b*arcsin(c*x))/b^3)
```

Fricas [F]

$$\int \frac{x^2}{(a+b\arcsin(cx))^3}\,dx = \int \frac{x^2}{(b\arcsin(cx)+a)^3}\,dx$$

```
[In] integrate(x^2/(a+b*arcsin(c*x))^3,x, algorithm="fricas")
```

```
[Out] integral(x^2/(b^3*arcsin(c*x)^3 + 3*a*b^2*arcsin(c*x)^2 + 3*a^2*b*arcsin(c*
x) + a^3), x)
```

Sympy [F]

$$\int \frac{x^2}{(a+b\arcsin(cx))^3}\,dx = \int \frac{x^2}{(a+b\operatorname{asin}(cx))^3}\,dx$$

```
[In] integrate(x**2/(a+b*asin(c*x))**3,x)
```

```
[Out] Integral(x**2/(a + b*asin(c*x))**3, x)
```

Maxima [F]

$$\int \frac{x^2}{(a+b\arcsin(cx))^3}\,dx = \int \frac{x^2}{(b\arcsin(cx)+a)^3}\,dx$$

```
[In] integrate(x^2/(a+b*arcsin(c*x))^3,x, algorithm="maxima")
```

```
[Out] 1/2*(3*a*c^2*x^3 - sqrt(c*x + 1)*sqrt(-c*x + 1)*b*c*x^2 - 2*a*x + (3*b*c^2*
x^3 - 2*b*x)*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1)) - 2*(b^4*c^2*arctan
2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1))^2 + 2*a*b^3*c^2*arctan2(c*x, sqrt(c*x
+ 1)*sqrt(-c*x + 1)) + a^2*b^2*c^2)*integrate(1/2*(9*c^2*x^2 - 2)/(b^3*c^2*
arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1)) + a*b^2*c^2), x))/(b^4*c^2*arcta
n2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1))^2 + 2*a*b^3*c^2*arctan2(c*x, sqrt(c*x
 + 1)*sqrt(-c*x + 1)) + a^2*b^2*c^2)
```

Giac [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 1539 vs. $2(183) = 366$.

Time = 0.36 (sec) , antiderivative size = 1539, normalized size of antiderivative = 7.81

$$\int \frac{x^2}{(a+b\arcsin(cx))^3}\,dx = \text{Too large to display}$$

```
[In] integrate(x^2/(a+b*arcsin(c*x))^3,x, algorithm="giac")
[Out] 9/2*b^2*arcsin(c*x)^2*cos(a/b)^3*cos_integral(3*a/b + 3*arcsin(c*x))/(b^5*c
^3*arcsin(c*x)^2 + 2*a*b^4*c^3*arcsin(c*x) + a^2*b^3*c^3) + 9/2*b^2*arcsin(
c*x)^2*cos(a/b)^2*sin(a/b)*sin_integral(3*a/b + 3*arcsin(c*x))/(b^5*c^3*arc
sin(c*x)^2 + 2*a*b^4*c^3*arcsin(c*x) + a^2*b^3*c^3) + 9*a*b*arcsin(c*x)*cos
(a/b)^3*cos_integral(3*a/b + 3*arcsin(c*x))/(b^5*c^3*arcsin(c*x)^2 + 2*a*b^
4*c^3*arcsin(c*x) + a^2*b^3*c^3) + 9*a*b*arcsin(c*x)*cos(a/b)^2*sin(a/b)*si
n_integral(3*a/b + 3*arcsin(c*x))/(b^5*c^3*arcsin(c*x)^2 + 2*a*b^4*c^3*arcs
in(c*x) + a^2*b^3*c^3) + 3/2*(c^2*x^2 - 1)*b^2*c*x*arcsin(c*x)/(b^5*c^3*arc
sin(c*x)^2 + 2*a*b^4*c^3*arcsin(c*x) + a^2*b^3*c^3) - 27/8*b^2*arcsin(c*x)^
2*cos(a/b)*cos_integral(3*a/b + 3*arcsin(c*x))/(b^5*c^3*arcsin(c*x)^2 + 2*a
*b^4*c^3*arcsin(c*x) + a^2*b^3*c^3) + 9/2*a^2*cos(a/b)^3*cos_integral(3*a/b
 + 3*arcsin(c*x))/(b^5*c^3*arcsin(c*x)^2 + 2*a*b^4*c^3*arcsin(c*x) + a^2*b^
3*c^3) - 1/8*b^2*arcsin(c*x)^2*cos(a/b)*cos_integral(a/b + arcsin(c*x))/(b^
5*c^3*arcsin(c*x)^2 + 2*a*b^4*c^3*arcsin(c*x) + a^2*b^3*c^3) - 9/8*b^2*arcs
in(c*x)^2*sin(a/b)*sin_integral(3*a/b + 3*arcsin(c*x))/(b^5*c^3*arcsin(c*x)
^2 + 2*a*b^4*c^3*arcsin(c*x) + a^2*b^3*c^3) + 9/2*a^2*cos(a/b)^2*sin(a/b)*s
in_integral(3*a/b + 3*arcsin(c*x))/(b^5*c^3*arcsin(c*x)^2 + 2*a*b^4*c^3*arc
sin(c*x) + a^2*b^3*c^3) - 1/8*b^2*arcsin(c*x)^2*sin(a/b)*sin_integral(a/b +
 arcsin(c*x))/(b^5*c^3*arcsin(c*x)^2 + 2*a*b^4*c^3*arcsin(c*x) + a^2*b^3*c^
3) + 3/2*(c^2*x^2 - 1)*a*b*c*x/(b^5*c^3*arcsin(c*x)^2 + 2*a*b^4*c^3*arcsin(
c*x) + a^2*b^3*c^3) + 1/2*b^2*c*x*arcsin(c*x)/(b^5*c^3*arcsin(c*x)^2 + 2*a*
b^4*c^3*arcsin(c*x) + a^2*b^3*c^3) - 27/4*a*b*arcsin(c*x)*cos(a/b)*cos_inte
gral(3*a/b + 3*arcsin(c*x))/(b^5*c^3*arcsin(c*x)^2 + 2*a*b^4*c^3*arcsin(c*x
) + a^2*b^3*c^3) - 1/4*a*b*arcsin(c*x)*cos(a/b)*cos_integral(a/b + arcsin(c
*x))/(b^5*c^3*arcsin(c*x)^2 + 2*a*b^4*c^3*arcsin(c*x) + a^2*b^3*c^3) - 9/4*
a*b*arcsin(c*x)*sin(a/b)*sin_integral(3*a/b + 3*arcsin(c*x))/(b^5*c^3*arcsi
n(c*x)^2 + 2*a*b^4*c^3*arcsin(c*x) + a^2*b^3*c^3) - 1/4*a*b*arcsin(c*x)*sin
(a/b)*sin_integral(a/b + arcsin(c*x))/(b^5*c^3*arcsin(c*x)^2 + 2*a*b^4*c^3*
arcsin(c*x) + a^2*b^3*c^3) + 1/2*a*b*c*x/(b^5*c^3*arcsin(c*x)^2 + 2*a*b^4*c
^3*arcsin(c*x) + a^2*b^3*c^3) - 27/8*a^2*cos(a/b)*cos_integral(3*a/b + 3*ar
csin(c*x))/(b^5*c^3*arcsin(c*x)^2 + 2*a*b^4*c^3*arcsin(c*x) + a^2*b^3*c^3)
- 1/8*a^2*cos(a/b)*cos_integral(a/b + arcsin(c*x))/(b^5*c^3*arcsin(c*x)^2 +
 2*a*b^4*c^3*arcsin(c*x) + a^2*b^3*c^3) - 9/8*a^2*sin(a/b)*sin_integral(3*a
/b + 3*arcsin(c*x))/(b^5*c^3*arcsin(c*x)^2 + 2*a*b^4*c^3*arcsin(c*x) + a^2*
b^3*c^3) - 1/8*a^2*sin(a/b)*sin_integral(a/b + arcsin(c*x))/(b^5*c^3*arcsin
```

```
(c*x)^2 + 2*a*b^4*c^3*arcsin(c*x) + a^2*b^3*c^3) + 1/2*(-c^2*x^2 + 1)^(3/2)
*b^2/(b^5*c^3*arcsin(c*x)^2 + 2*a*b^4*c^3*arcsin(c*x) + a^2*b^3*c^3) - 1/2*
sqrt(-c^2*x^2 + 1)*b^2/(b^5*c^3*arcsin(c*x)^2 + 2*a*b^4*c^3*arcsin(c*x) + a
^2*b^3*c^3)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x^2}{(a+b\arcsin(cx))^3}\,dx=\int \frac{x^2}{{\left(a+b\,\mathrm{asin}\left(c\,x\right)\right)}^3}\,dx$$

```
[In] int(x^2/(a + b*asin(c*x))^3,x)
```

```
[Out] int(x^2/(a + b*asin(c*x))^3, x)
```

3.169 $\int \frac{x}{(a+b\arcsin(cx))^3} \, dx$

Optimal result

Integrand size = 12, antiderivative size = 130

$$\int \frac{x}{(a+b\arcsin(cx))^3} \, dx = -\frac{x\sqrt{1-c^2x^2}}{2bc(a+b\arcsin(cx))^2} - \frac{1}{2b^2c^2(a+b\arcsin(cx))} + \frac{x^2}{b^2(a+b\arcsin(cx))} + \frac{\text{CosIntegral}\left(\frac{2(a+b\arcsin(cx))}{b}\right)\sin\left(\frac{2a}{b}\right)}{b^3c^2} - \frac{\cos\left(\frac{2a}{b}\right)\text{Si}\left(\frac{2(a+b\arcsin(cx))}{b}\right)}{b^3c^2}$$

```
[Out] -1/2/b^2/c^2/(a+b*arcsin(c*x))+x^2/b^2/(a+b*arcsin(c*x))-cos(2*a/b)*Si(2*(a
+b*arcsin(c*x))/b)/b^3/c^2+Ci(2*(a+b*arcsin(c*x))/b)*sin(2*a/b)/b^3/c^2-1/2
*x*(-c^2*x^2+1)^(1/2)/b/c/(a+b*arcsin(c*x))^2
```

Rubi [A] (verified)

Time = 0.19 (sec) , antiderivative size = 130, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 9, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.750, Rules used = {4729, 4807, 4731, 4491, 12, 3384, 3380, 3383, 4737}

$$\int \frac{x}{(a+b\arcsin(cx))^3} \, dx = \frac{\sin\left(\frac{2a}{b}\right)\text{CosIntegral}\left(\frac{2(a+b\arcsin(cx))}{b}\right)}{b^3c^2} - \frac{\cos\left(\frac{2a}{b}\right)\text{Si}\left(\frac{2(a+b\arcsin(cx))}{b}\right)}{b^3c^2} - \frac{1}{2b^2c^2(a+b\arcsin(cx))} + \frac{x^2}{b^2(a+b\arcsin(cx))} - \frac{x\sqrt{1-c^2x^2}}{2bc(a+b\arcsin(cx))^2}$$

```
[In] Int[x/(a + b*ArcSin[c*x])^3,x]
```

```
[Out] -1/2*(x*Sqrt[1 - c^2*x^2])/(b*c*(a + b*ArcSin[c*x])^2) - 1/(2*b^2*c^2*(a +
b*ArcSin[c*x])) + x^2/(b^2*(a + b*ArcSin[c*x])) + (CosIntegral[(2*(a + b*Ar
cSin[c*x]))/b]*Sin[(2*a)/b])/(b^3*c^2) - (Cos[(2*a)/b]*SinIntegral[(2*(a +
b*ArcSin[c*x]))/b])/(b^3*c^2)
```

Rule 12

```
Int[(a_)*(u_), x_Symbol] :> Dist[a, Int[u, x], x] /; FreeQ[a, x] &&  !Match
Q[u, (b_)*(v_) /; FreeQ[b, x]]
```

Rule 3380

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Simp[SinInte
gral[e + f*x]/d, x] /; FreeQ[{c, d, e, f}, x] && EqQ[d*e - c*f, 0]
```

Rule 3383

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Simp[CosInte
gral[e - Pi/2 + f*x]/d, x] /; FreeQ[{c, d, e, f}, x] && EqQ[d*(e - Pi/2) -
c*f, 0]
```

Rule 3384

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Dist[Cos[(d*
e - c*f)/d], Int[Sin[c*(f/d) + f*x]/(c + d*x), x], x] + Dist[Sin[(d*e - c*f
)/d], Int[Cos[c*(f/d) + f*x]/(c + d*x), x], x] /; FreeQ[{c, d, e, f}, x] &&
 NeQ[d*e - c*f, 0]
```

Rule 4491

```
Int[Cos[(a_.) + (b_.)*(x_)]^(p_.)*((c_.) + (d_.)*(x_))^(m_.)*Sin[(a_.) + (b
_.)*(x_)]^(n_.), x_Symbol] :> Int[ExpandTrigReduce[(c + d*x)^m, Sin[a + b*x
]^n*Cos[a + b*x]^p, x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && IG
tQ[p, 0]
```

Rule 4729

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^m*Sqrt[1 - c^2*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] + (Dis
t[c*((m + 1)/(b*(n + 1))), Int[x^(m + 1)*((a + b*ArcSin[c*x])^(n + 1)/Sqrt[
1 - c^2*x^2]), x], x] - Dist[m/(b*c*(n + 1)), Int[x^(m - 1)*((a + b*ArcSin[
c*x])^(n + 1)/Sqrt[1 - c^2*x^2]), x], x]) /; FreeQ[{a, b, c}, x] && IGtQ[m,
 0] && LtQ[n, -2]
```

Rule 4731

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Dist[1
/(b*c^(m + 1)), Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b], x], x, a +
 b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, n}, x] && IGtQ[m, 0]
```

Rule 4737

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)/Sqrt[(d_) + (e_.)*(x_)^2], x_S
ymbol] :> Simp[(1/(b*c*(n + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]]*(a
 + b*ArcSin[c*x])^(n + 1), x] /; FreeQ[{a, b, c, d, e, n}, x] && EqQ[c^2*d
+ e, 0] && NeQ[n, -1]
```

Rule 4807

```
Int[(((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*((f_.)*(x_))^(m_.))/Sqrt[(d_)
+ (e_.)*(x_)^2], x_Symbol] :> Simp[((f*x)^m/(b*c*(n + 1)))*Simp[Sqrt[1 - c^
2*x^2]/Sqrt[d + e*x^2]]*(a + b*ArcSin[c*x])^(n + 1), x] - Dist[f*(m/(b*c*(n
 + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]], Int[(f*x)^(m - 1)*(a + b*A
rcSin[c*x])^(n + 1), x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && EqQ[c^2*d
 + e, 0] && LtQ[n, -1]
```

Rubi steps

$$
\begin{aligned}
\text{integral} &= -\frac{x\sqrt{1-c^2x^2}}{2bc(a+b\arcsin(cx))^2}+\frac{\int \frac{1}{\sqrt{1-c^2x^2}(a+b\arcsin(cx))^2}\,dx}{2bc}-\frac{c\int \frac{x^2}{\sqrt{1-c^2x^2}(a+b\arcsin(cx))^2}\,dx}{b}\\
&=-\frac{x\sqrt{1-c^2x^2}}{2bc(a+b\arcsin(cx))^2}-\frac{1}{2b^2c^2(a+b\arcsin(cx))}+\frac{x^2}{b^2(a+b\arcsin(cx))}-\frac{2\int \frac{x}{a+b\arcsin(cx)}\,dx}{b^2}\\
&=-\frac{x\sqrt{1-c^2x^2}}{2bc(a+b\arcsin(cx))^2}-\frac{1}{2b^2c^2(a+b\arcsin(cx))}+\frac{x^2}{b^2(a+b\arcsin(cx))}\\
&\quad+\frac{2\text{Subst}\left(\int \frac{\cos\left(\frac{a}{b}-\frac{x}{b}\right)\sin\left(\frac{a}{b}-\frac{x}{b}\right)}{x}\,dx,x,a+b\arcsin(cx)\right)}{b^3c^2}\\
&=-\frac{x\sqrt{1-c^2x^2}}{2bc(a+b\arcsin(cx))^2}-\frac{1}{2b^2c^2(a+b\arcsin(cx))}\\
&\quad+\frac{x^2}{b^2(a+b\arcsin(cx))}+\frac{2\text{Subst}\left(\int \frac{\sin\left(\frac{2a}{b}-\frac{2x}{b}\right)}{2x}\,dx,x,a+b\arcsin(cx)\right)}{b^3c^2}\\
&=-\frac{x\sqrt{1-c^2x^2}}{2bc(a+b\arcsin(cx))^2}-\frac{1}{2b^2c^2(a+b\arcsin(cx))}\\
&\quad+\frac{x^2}{b^2(a+b\arcsin(cx))}+\frac{\text{Subst}\left(\int \frac{\sin\left(\frac{2a}{b}-\frac{2x}{b}\right)}{x}\,dx,x,a+b\arcsin(cx)\right)}{b^3c^2}
\end{aligned}
$$

$$= -\frac{x\sqrt{1-c^2x^2}}{2bc(a+b\arcsin(cx))^2} - \frac{1}{2b^2c^2(a+b\arcsin(cx))} + \frac{x^2}{b^2(a+b\arcsin(cx))} - \frac{\cos\left(\frac{2a}{b}\right)\text{Subst}\left(\int \frac{\sin\left(\frac{2x}{b}\right)}{x}\,dx, x, a+b\arcsin(cx)\right)}{b^3c^2} + \frac{\sin\left(\frac{2a}{b}\right)\text{Subst}\left(\int \frac{\cos\left(\frac{2x}{b}\right)}{x}\,dx, x, a+b\arcsin(cx)\right)}{b^3c^2}$$

$$= -\frac{x\sqrt{1-c^2x^2}}{2bc(a+b\arcsin(cx))^2} - \frac{1}{2b^2c^2(a+b\arcsin(cx))} + \frac{x^2}{b^2(a+b\arcsin(cx))} + \frac{\text{CosIntegral}\left(\frac{2(a+b\arcsin(cx))}{b}\right)\sin\left(\frac{2a}{b}\right)}{b^3c^2} - \frac{\cos\left(\frac{2a}{b}\right)\text{Si}\left(\frac{2(a+b\arcsin(cx))}{b}\right)}{b^3c^2}$$

Mathematica [A] (verified)

Time = 0.29 (sec) , antiderivative size = 108, normalized size of antiderivative = 0.83

$$\int \frac{x}{(a+b\arcsin(cx))^3}\,dx = \frac{-\frac{b^2cx\sqrt{1-c^2x^2}}{(a+b\arcsin(cx))^2} + \frac{b(-1+2c^2x^2)}{a+b\arcsin(cx)} + 2\,\text{CosIntegral}\left(2\left(\frac{a}{b}+\arcsin(cx)\right)\right)\sin\left(\frac{2a}{b}\right) - 2\cos\left(\frac{2a}{b}\right)\text{Si}\left(2\left(\frac{a}{b}+\arcsin(c\right.\right.}{2b^3c^2}$$

```
[In] Integrate[x/(a + b*ArcSin[c*x])^3,x]
[Out] (-((b^2*c*x*Sqrt[1 - c^2*x^2])/(a + b*ArcSin[c*x])^2) + (b*(-1 + 2*c^2*x^2)
)/(a + b*ArcSin[c*x]) + 2*CosIntegral[2*(a/b + ArcSin[c*x])]*Sin[(2*a)/b] -
 2*Cos[(2*a)/b]*SinIntegral[2*(a/b + ArcSin[c*x])])/(2*b^3*c^2)
```

Maple [A] (verified)

Time = 0.03 (sec) , antiderivative size = 157, normalized size of antiderivative = 1.21

method	result
derivativedivides	$\frac{-\frac{\sin(2\arcsin(cx))}{4(a+b\arcsin(cx))^2b} - \frac{2\arcsin(cx)\,\text{Si}\left(2\arcsin(cx)+\frac{2a}{b}\right)\cos\left(\frac{2a}{b}\right)b - 2\arcsin(cx)\,\text{Ci}\left(2\arcsin(cx)+\frac{2a}{b}\right)\sin\left(\frac{2a}{b}\right)b + 2\,\text{Si}\left(2\arcsin(cx)+\right.}{2(a+b\arcsin(cx))b^3}}{c^2}$
default	$\frac{-\frac{\sin(2\arcsin(cx))}{4(a+b\arcsin(cx))^2b} - \frac{2\arcsin(cx)\,\text{Si}\left(2\arcsin(cx)+\frac{2a}{b}\right)\cos\left(\frac{2a}{b}\right)b - 2\arcsin(cx)\,\text{Ci}\left(2\arcsin(cx)+\frac{2a}{b}\right)\sin\left(\frac{2a}{b}\right)b + 2\,\text{Si}\left(2\arcsin(cx)+\right.}{2(a+b\arcsin(cx))b^3}}{c^2}$

```
[In] int(x/(a+b*arcsin(c*x))^3,x,method=_RETURNVERBOSE)
[Out] 1/c^2*(-1/4*sin(2*arcsin(c*x))/(a+b*arcsin(c*x))^2/b-1/2*(2*arcsin(c*x)*Si(
2*arcsin(c*x)+2*a/b)*cos(2*a/b)*b-2*arcsin(c*x)*Ci(2*arcsin(c*x)+2*a/b)*sin
(2*a/b)*b+2*Si(2*arcsin(c*x)+2*a/b)*cos(2*a/b)*a-2*Ci(2*arcsin(c*x)+2*a/b)*
sin(2*a/b)*a+cos(2*arcsin(c*x))*b)/(a+b*arcsin(c*x))/b^3)
```

Fricas [F]

$$\int \frac{x}{(a+b\arcsin(cx))^3}\,dx = \int \frac{x}{(b\arcsin(cx)+a)^3}\,dx$$

[In] integrate(x/(a+b*arcsin(c*x))^3,x, algorithm="fricas")

[Out] integral(x/(b^3*arcsin(c*x)^3 + 3*a*b^2*arcsin(c*x)^2 + 3*a^2*b*arcsin(c*x) + a^3), x)

Sympy [F]

$$\int \frac{x}{(a+b\arcsin(cx))^3}\,dx = \int \frac{x}{(a+b\operatorname{asin}(cx))^3}\,dx$$

[In] integrate(x/(a+b*asin(c*x))**3,x)

[Out] Integral(x/(a + b*asin(c*x))**3, x)

Maxima [F]

$$\int \frac{x}{(a+b\arcsin(cx))^3}\,dx = \int \frac{x}{(b\arcsin(cx)+a)^3}\,dx$$

[In] integrate(x/(a+b*arcsin(c*x))^3,x, algorithm="maxima")

[Out] 1/2*(2*a*c^2*x^2 - sqrt(c*x + 1)*sqrt(-c*x + 1)*b*c*x + (2*b*c^2*x^2 - b)*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1)) - 4*(b^4*c^2*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1))^2 + 2*a*b^3*c^2*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1)) + a^2*b^2*c^2)*integrate(x/(b^3*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1)) + a*b^2), x) - a)/(b^4*c^2*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1))^2 + 2*a*b^3*c^2*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1)) + a^2*b^2*c^2)

Giac [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 864 vs. $2(124) = 248$.

Time = 0.34 (sec) , antiderivative size = 864, normalized size of antiderivative = 6.65

$$\int \frac{x}{(a+b\arcsin(cx))^3}\,dx = \text{Too large to display}$$

[In] integrate(x/(a+b*arcsin(c*x))^3,x, algorithm="giac")

```
[Out] 2*b^2*arcsin(c*x)^2*cos(a/b)*cos_integral(2*a/b + 2*arcsin(c*x))*sin(a/b)/(
b^5*c^2*arcsin(c*x)^2 + 2*a*b^4*c^2*arcsin(c*x) + a^2*b^3*c^2) - 2*b^2*arcs
in(c*x)^2*cos(a/b)^2*sin_integral(2*a/b + 2*arcsin(c*x))/(b^5*c^2*arcsin(c*
x)^2 + 2*a*b^4*c^2*arcsin(c*x) + a^2*b^3*c^2) + 4*a*b*arcsin(c*x)*cos(a/b)*
cos_integral(2*a/b + 2*arcsin(c*x))*sin(a/b)/(b^5*c^2*arcsin(c*x)^2 + 2*a*b
^4*c^2*arcsin(c*x) + a^2*b^3*c^2) - 4*a*b*arcsin(c*x)*cos(a/b)^2*sin_integr
al(2*a/b + 2*arcsin(c*x))/(b^5*c^2*arcsin(c*x)^2 + 2*a*b^4*c^2*arcsin(c*x)
+ a^2*b^3*c^2) + 2*a^2*cos(a/b)*cos_integral(2*a/b + 2*arcsin(c*x))*sin(a/b
)/(b^5*c^2*arcsin(c*x)^2 + 2*a*b^4*c^2*arcsin(c*x) + a^2*b^3*c^2) + b^2*arc
sin(c*x)^2*sin_integral(2*a/b + 2*arcsin(c*x))/(b^5*c^2*arcsin(c*x)^2 + 2*a
*b^4*c^2*arcsin(c*x) + a^2*b^3*c^2) - 2*a^2*cos(a/b)^2*sin_integral(2*a/b +
 2*arcsin(c*x))/(b^5*c^2*arcsin(c*x)^2 + 2*a*b^4*c^2*arcsin(c*x) + a^2*b^3*
c^2) - 1/2*sqrt(-c^2*x^2 + 1)*b^2*c*x/(b^5*c^2*arcsin(c*x)^2 + 2*a*b^4*c^2*
arcsin(c*x) + a^2*b^3*c^2) + (c^2*x^2 - 1)*b^2*arcsin(c*x)/(b^5*c^2*arcsin(
c*x)^2 + 2*a*b^4*c^2*arcsin(c*x) + a^2*b^3*c^2) + 2*a*b*arcsin(c*x)*sin_int
egral(2*a/b + 2*arcsin(c*x))/(b^5*c^2*arcsin(c*x)^2 + 2*a*b^4*c^2*arcsin(c*
x) + a^2*b^3*c^2) + (c^2*x^2 - 1)*a*b/(b^5*c^2*arcsin(c*x)^2 + 2*a*b^4*c^2*
arcsin(c*x) + a^2*b^3*c^2) + 1/2*b^2*arcsin(c*x)/(b^5*c^2*arcsin(c*x)^2 + 2
*a*b^4*c^2*arcsin(c*x) + a^2*b^3*c^2) + a^2*sin_integral(2*a/b + 2*arcsin(c
*x))/(b^5*c^2*arcsin(c*x)^2 + 2*a*b^4*c^2*arcsin(c*x) + a^2*b^3*c^2) + 1/2*
a*b/(b^5*c^2*arcsin(c*x)^2 + 2*a*b^4*c^2*arcsin(c*x) + a^2*b^3*c^2)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x}{(a+b\arcsin(cx))^3}\,dx = \int \frac{x}{(a+b\,\mathrm{asin}\,(c\,x))^3}\,dx$$

```
[In] int(x/(a + b*asin(c*x))^3,x)
```

```
[Out] int(x/(a + b*asin(c*x))^3, x)
```

3.170 $\int \frac{1}{(a+b\arcsin(cx))^3}\,dx$

Optimal result

Integrand size = 10, antiderivative size = 111

$$\int \frac{1}{(a+b\arcsin(cx))^3}\,dx=-\frac{\sqrt{1-c^2x^2}}{2bc(a+b\arcsin(cx))^2}+\frac{x}{2b^2(a+b\arcsin(cx))}-\frac{\cos\left(\frac{a}{b}\right)\text{CosIntegral}\left(\frac{a+b\arcsin(cx)}{b}\right)}{2b^3c}-\frac{\sin\left(\frac{a}{b}\right)\text{Si}\left(\frac{a+b\arcsin(cx)}{b}\right)}{2b^3c}$$

```
[Out] 1/2*x/b^2/(a+b*arcsin(c*x))-1/2*Ci((a+b*arcsin(c*x))/b)*cos(a/b)/b^3/c-1/2*
Si((a+b*arcsin(c*x))/b)*sin(a/b)/b^3/c-1/2*(-c^2*x^2+1)^(1/2)/b/c/(a+b*arcs
in(c*x))^2
```

Rubi [A] (verified)

Time = 0.11 (sec) , antiderivative size = 111, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 6, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.600, Rules used = {4717, 4807, 4719, 3384, 3380, 3383}

$$\int \frac{1}{(a+b\arcsin(cx))^3}\,dx=-\frac{\cos\left(\frac{a}{b}\right)\text{CosIntegral}\left(\frac{a+b\arcsin(cx)}{b}\right)}{2b^3c}-\frac{\sin\left(\frac{a}{b}\right)\text{Si}\left(\frac{a+b\arcsin(cx)}{b}\right)}{2b^3c}+\frac{x}{2b^2(a+b\arcsin(cx))}-\frac{\sqrt{1-c^2x^2}}{2bc(a+b\arcsin(cx))^2}$$

```
[In] Int[(a + b*ArcSin[c*x])^(-3),x]
```

```
[Out] -1/2*Sqrt[1 - c^2*x^2]/(b*c*(a + b*ArcSin[c*x])^2) + x/(2*b^2*(a + b*ArcSin
[c*x])) - (Cos[a/b]*CosIntegral[(a + b*ArcSin[c*x])/b])/(2*b^3*c) - (Sin[a/
b]*SinIntegral[(a + b*ArcSin[c*x])/b])/(2*b^3*c)
```

Rule 3380

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Simp[SinInte
gral[e + f*x]/d, x] /; FreeQ[{c, d, e, f}, x] && EqQ[d*e - c*f, 0]
```

Rule 3383

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Simp[CosInte
gral[e - Pi/2 + f*x]/d, x] /; FreeQ[{c, d, e, f}, x] && EqQ[d*(e - Pi/2) -
c*f, 0]
```

Rule 3384

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Dist[Cos[(d*
e - c*f)/d], Int[Sin[c*(f/d) + f*x]/(c + d*x), x], x] + Dist[Sin[(d*e - c*f
)/d], Int[Cos[c*(f/d) + f*x]/(c + d*x), x], x] /; FreeQ[{c, d, e, f}, x] &&
 NeQ[d*e - c*f, 0]
```

Rule 4717

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_), x_Symbol] :> Simp[Sqrt[1 - c^2
*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] + Dist[c/(b*(n + 1)),
 Int[x*((a + b*ArcSin[c*x])^(n + 1)/Sqrt[1 - c^2*x^2]), x], x] /; FreeQ[{a,
 b, c}, x] && LtQ[n, -1]
```

Rule 4719

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_), x_Symbol] :> Dist[1/(b*c), Sub
st[Int[x^n*Cos[-a/b + x/b], x], x, a + b*ArcSin[c*x]], x] /; FreeQ[{a, b, c
, n}, x]
```

Rule 4807

```
Int[(((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*((f_.)*(x_))^(m_.))/Sqrt[(d_)
+ (e_.)*(x_)^2], x_Symbol] :> Simp[((f*x)^m/(b*c*(n + 1)))*Simp[Sqrt[1 - c^
2*x^2]/Sqrt[d + e*x^2]]*(a + b*ArcSin[c*x])^(n + 1), x] - Dist[f*(m/(b*c*(n
 + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]], Int[(f*x)^(m - 1)*(a + b*A
rcSin[c*x])^(n + 1), x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && EqQ[c^2*d
 + e, 0] && LtQ[n, -1]
```

Rule steps

$$\begin{aligned}\text{integral} &= -\frac{\sqrt{1-c^2x^2}}{2bc(a+b\arcsin(cx))^2} - \frac{c\int \frac{x}{\sqrt{1-c^2x^2}(a+b\arcsin(cx))^2}\,dx}{2b} \\ &= -\frac{\sqrt{1-c^2x^2}}{2bc(a+b\arcsin(cx))^2} + \frac{x}{2b^2(a+b\arcsin(cx))} - \frac{\int \frac{1}{a+b\arcsin(cx)}\,dx}{2b^2}\end{aligned}$$

$$= -\frac{\sqrt{1-c^2x^2}}{2bc(a+b\arcsin(cx))^2} + \frac{x}{2b^2(a+b\arcsin(cx))} - \frac{\text{Subst}\left(\int \frac{\cos\left(\frac{a}{b}-\frac{x}{b}\right)}{x}\,dx, x, a+b\arcsin(cx)\right)}{2b^3c}$$

$$= -\frac{\sqrt{1-c^2x^2}}{2bc(a+b\arcsin(cx))^2} + \frac{x}{2b^2(a+b\arcsin(cx))} - \frac{\cos\left(\frac{a}{b}\right)\text{Subst}\left(\int \frac{\cos\left(\frac{x}{b}\right)}{x}\,dx, x, a+b\arcsin(cx)\right)}{2b^3c} - \frac{\sin\left(\frac{a}{b}\right)\text{Subst}\left(\int \frac{\sin\left(\frac{x}{b}\right)}{x}\,dx, x, a+b\arcsin(cx)\right)}{2b^3c}$$

$$= -\frac{\sqrt{1-c^2x^2}}{2bc(a+b\arcsin(cx))^2} + \frac{x}{2b^2(a+b\arcsin(cx))} - \frac{\cos\left(\frac{a}{b}\right)\text{CosIntegral}\left(\frac{a+b\arcsin(cx)}{b}\right)}{2b^3c} - \frac{\sin\left(\frac{a}{b}\right)\text{Si}\left(\frac{a+b\arcsin(cx)}{b}\right)}{2b^3c}$$

Mathematica [A] (verified)

Time = 0.32 (sec) , antiderivative size = 93, normalized size of antiderivative = 0.84

$$\int \frac{1}{(a+b\arcsin(cx))^3}\,dx = -\frac{\frac{b\left(\frac{b\sqrt{1-c^2x^2}}{c}-x(a+b\arcsin(cx))\right)}{(a+b\arcsin(cx))^2} + \frac{\cos\left(\frac{a}{b}\right)\text{CosIntegral}\left(\frac{a}{b}+\arcsin(cx)\right)}{c} + \frac{\sin\left(\frac{a}{b}\right)\text{Si}\left(\frac{a}{b}+\arcsin(cx)\right)}{c}}{2b^3}$$

```
[In] Integrate[(a + b*ArcSin[c*x])^(-3),x]
```

```
[Out] -1/2*((b*((b*Sqrt[1 - c^2*x^2])/c - x*(a + b*ArcSin[c*x])))/(a + b*ArcSin[c
*x])^2 + (Cos[a/b]*CosIntegral[a/b + ArcSin[c*x]])/c + (Sin[a/b]*SinIntegra
l[a/b + ArcSin[c*x]])/c)/b^3
```

Maple [A] (verified)

Time = 0.03 (sec) , antiderivative size = 138, normalized size of antiderivative = 1.24

method	result
derivativedivides	$\frac{-\frac{\sqrt{-c^2x^2+1}}{2(a+b\arcsin(cx))^2b}-\frac{\arcsin(cx)\,\text{Si}\left(\arcsin(cx)+\frac{a}{b}\right)\sin\left(\frac{a}{b}\right)b+\arcsin(cx)\,\text{Ci}\left(\arcsin(cx)+\frac{a}{b}\right)\cos\left(\frac{a}{b}\right)b+\text{Si}\left(\arcsin(cx)+\frac{a}{b}\right)\sin\left(\frac{a}{b}\right)a+\text{Ci}\cdots}{2(a+b\arcsin(cx))b^3}}{c}$
default	$\frac{-\frac{\sqrt{-c^2x^2+1}}{2(a+b\arcsin(cx))^2b}-\frac{\arcsin(cx)\,\text{Si}\left(\arcsin(cx)+\frac{a}{b}\right)\sin\left(\frac{a}{b}\right)b+\arcsin(cx)\,\text{Ci}\left(\arcsin(cx)+\frac{a}{b}\right)\cos\left(\frac{a}{b}\right)b+\text{Si}\left(\arcsin(cx)+\frac{a}{b}\right)\sin\left(\frac{a}{b}\right)a+\text{Ci}\cdots}{2(a+b\arcsin(cx))b^3}}{c}$

```
[In] int(1/(a+b*arcsin(c*x))^3,x,method=_RETURNVERBOSE)
```

```
[Out] 1/c*(-1/2*(-c^2*x^2+1)^(1/2)/(a+b*arcsin(c*x))^2/b-1/2*(arcsin(c*x)*Si(arcs
in(c*x)+a/b)*sin(a/b)*b+arcsin(c*x)*Ci(arcsin(c*x)+a/b)*cos(a/b)*b+Si(arcsi
n(c*x)+a/b)*sin(a/b)*a+Ci(arcsin(c*x)+a/b)*cos(a/b)*a-x*b*c)/(a+b*arcsin(c*
x))/b^3)
```

Fricas [F]

$$\int \frac{1}{(a+b\arcsin(cx))^3}\,dx = \int \frac{1}{(b\arcsin(cx)+a)^3}\,dx$$

```
[In] integrate(1/(a+b*arcsin(c*x))^3,x, algorithm="fricas")
```

```
[Out] integral(1/(b^3*arcsin(c*x)^3 + 3*a*b^2*arcsin(c*x)^2 + 3*a^2*b*arcsin(c*x)
 + a^3), x)
```

Sympy [F]

$$\int \frac{1}{(a+b\arcsin(cx))^3}\,dx = \int \frac{1}{(a+b\,\mathrm{asin}(cx))^3}\,dx$$

```
[In] integrate(1/(a+b*asin(c*x))**3,x)
```

```
[Out] Integral((a + b*asin(c*x))**(-3), x)
```

Maxima [F]

$$\int \frac{1}{(a+b\arcsin(cx))^3}\,dx = \int \frac{1}{(b\arcsin(cx)+a)^3}\,dx$$

```
[In] integrate(1/(a+b*arcsin(c*x))^3,x, algorithm="maxima")
```

```
[Out] 1/2*(b*c*x*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1)) + a*c*x - sqrt(c*x +
1)*sqrt(-c*x + 1)*b - 2*(b^4*c*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1))^2
 + 2*a*b^3*c*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1)) + a^2*b^2*c)*integr
ate(1/2/(b^3*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1)) + a*b^2), x))/(b^4*
c*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1))^2 + 2*a*b^3*c*arctan2(c*x, sqr
t(c*x + 1)*sqrt(-c*x + 1)) + a^2*b^2*c)
```

Giac [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 482 vs. 2(101) = 202.

Time = 0.33 (sec) , antiderivative size = 482, normalized size of antiderivative = 4.34

$$\int \frac{1}{(a+b\arcsin(cx))^3}\,dx = -\frac{b^2\arcsin(cx)^2\cos\left(\frac{a}{b}\right)\operatorname{Ci}\left(\frac{a}{b}+\arcsin(cx)\right)}{2\left(b^5c\arcsin(cx)^2+2\,ab^4c\arcsin(cx)+a^2b^3c\right)} - \frac{b^2\arcsin(cx)^2\sin\left(\frac{a}{b}\right)\operatorname{Si}\left(\frac{a}{b}+\arcsin(cx)\right)}{2\left(b^5c\arcsin(cx)^2+2\,ab^4c\arcsin(cx)+a^2b^3c\right)} + \frac{b^2cx\arcsin(cx)}{2\left(b^5c\arcsin(cx)^2+2\,ab^4c\arcsin(cx)+a^2b^3c\right)} - \frac{ab\arcsin(cx)\cos\left(\frac{a}{b}\right)\operatorname{Ci}\left(\frac{a}{b}+\arcsin(cx)\right)}{b^5c\arcsin(cx)^2+2\,ab^4c\arcsin(cx)+a^2b^3c} - \frac{ab\arcsin(cx)\sin\left(\frac{a}{b}\right)\operatorname{Si}\left(\frac{a}{b}+\arcsin(cx)\right)}{b^5c\arcsin(cx)^2+2\,ab^4c\arcsin(cx)+a^2b^3c} + \frac{abcx}{2\left(b^5c\arcsin(cx)^2+2\,ab^4c\arcsin(cx)+a^2b^3c\right)} - \frac{a^2\cos\left(\frac{a}{b}\right)\operatorname{Ci}\left(\frac{a}{b}+\arcsin(cx)\right)}{2\left(b^5c\arcsin(cx)^2+2\,ab^4c\arcsin(cx)+a^2b^3c\right)} - \frac{a^2\sin\left(\frac{a}{b}\right)\operatorname{Si}\left(\frac{a}{b}+\arcsin(cx)\right)}{2\left(b^5c\arcsin(cx)^2+2\,ab^4c\arcsin(cx)+a^2b^3c\right)} - \frac{\sqrt{-c^2x^2+1}\,b^2}{2\left(b^5c\arcsin(cx)^2+2\,ab^4c\arcsin(cx)+a^2b^3c\right)}$$

```
[In] integrate(1/(a+b*arcsin(c*x))^3,x, algorithm="giac")
```

```
[Out] -1/2*b^2*arcsin(c*x)^2*cos(a/b)*cos_integral(a/b + arcsin(c*x))/(b^5*c*arcs
in(c*x)^2 + 2*a*b^4*c*arcsin(c*x) + a^2*b^3*c) - 1/2*b^2*arcsin(c*x)^2*sin(
a/b)*sin_integral(a/b + arcsin(c*x))/(b^5*c*arcsin(c*x)^2 + 2*a*b^4*c*arcsi
n(c*x) + a^2*b^3*c) + 1/2*b^2*c*x*arcsin(c*x)/(b^5*c*arcsin(c*x)^2 + 2*a*b^
4*c*arcsin(c*x) + a^2*b^3*c) - a*b*arcsin(c*x)*cos(a/b)*cos_integral(a/b +
arcsin(c*x))/(b^5*c*arcsin(c*x)^2 + 2*a*b^4*c*arcsin(c*x) + a^2*b^3*c) - a*
b*arcsin(c*x)*sin(a/b)*sin_integral(a/b + arcsin(c*x))/(b^5*c*arcsin(c*x)^2
 + 2*a*b^4*c*arcsin(c*x) + a^2*b^3*c) + 1/2*a*b*c*x/(b^5*c*arcsin(c*x)^2 +
2*a*b^4*c*arcsin(c*x) + a^2*b^3*c) - 1/2*a^2*cos(a/b)*cos_integral(a/b + ar
csin(c*x))/(b^5*c*arcsin(c*x)^2 + 2*a*b^4*c*arcsin(c*x) + a^2*b^3*c) - 1/2*
a^2*sin(a/b)*sin_integral(a/b + arcsin(c*x))/(b^5*c*arcsin(c*x)^2 + 2*a*b^4
*c*arcsin(c*x) + a^2*b^3*c) - 1/2*sqrt(-c^2*x^2 + 1)*b^2/(b^5*c*arcsin(c*x)
^2 + 2*a*b^4*c*arcsin(c*x) + a^2*b^3*c)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{1}{(a+b\arcsin(cx))^3}\,dx=\int \frac{1}{{\left(a+b\,\mathrm{asin}\left(c\,x\right)\right)}^3}\,dx$$

```
[In] int(1/(a + b*asin(c*x))^3,x)
[Out] int(1/(a + b*asin(c*x))^3, x)
```

3.171 $\int \frac{1}{x(a+b\arcsin(cx))^3} dx$

Optimal result

Integrand size = 14, antiderivative size = 14

$$\int \frac{1}{x(a+b\arcsin(cx))^3} dx = \operatorname{Int}\left(\frac{1}{x(a+b\arcsin(cx))^3}, x\right)$$

```
[Out] Unintegrable(1/x/(a+b*arcsin(c*x))^3,x)
```

Rubi [N/A]

Not integrable

Time = 0.01 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}} = 0.000$, Rules used = {}

$$\int \frac{1}{x(a+b\arcsin(cx))^3} dx = \int \frac{1}{x(a+b\arcsin(cx))^3} dx$$

```
[In] Int[1/(x*(a + b*ArcSin[c*x])^3),x]
```

```
[Out] Defer[Int][1/(x*(a + b*ArcSin[c*x])^3), x]
```

Rubi steps

$$\text{integral} = \int \frac{1}{x(a+b\arcsin(cx))^3} dx$$

Mathematica [N/A]

Not integrable

Time = 1.71 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.14

$$\int \frac{1}{x(a+b\arcsin(cx))^3}\,dx=\int \frac{1}{x(a+b\arcsin(cx))^3}\,dx$$

```
[In] Integrate[1/(x*(a + b*ArcSin[c*x])^3),x]
```

```
[Out] Integrate[1/(x*(a + b*ArcSin[c*x])^3), x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.07 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00

$$\int \frac{1}{x\left(a+b\arcsin\left(cx\right)\right)^{3}}dx$$

```
[In] int(1/x/(a+b*arcsin(c*x))^3,x)
```

```
[Out] int(1/x/(a+b*arcsin(c*x))^3,x)
```

Fricas [N/A]

Not integrable

Time = 0.25 (sec) , antiderivative size = 45, normalized size of antiderivative = 3.21

$$\int \frac{1}{x(a+b\arcsin(cx))^3}\,dx=\int \frac{1}{\left(b\arcsin\left(cx\right)+a\right)^{3}x}\,dx$$

```
[In] integrate(1/x/(a+b*arcsin(c*x))^3,x, algorithm="fricas")
```

```
[Out] integral(1/(b^3*x*arcsin(c*x)^3 + 3*a*b^2*x*arcsin(c*x)^2 + 3*a^2*b*x*arcsi
n(c*x) + a^3*x), x)
```

Sympy [N/A]

Not integrable

Time = 1.66 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00

$$\int \frac{1}{x(a+b\arcsin(cx))^3}\,dx=\int \frac{1}{x\,(a+b\,\mathrm{asin}\,(cx))^3}\,dx$$

```
[In] integrate(1/x/(a+b*asin(c*x))**3,x)
[Out] Integral(1/(x*(a + b*asin(c*x))**3), x)
```

Maxima [N/A]

Not integrable

Time = 2.28 (sec) , antiderivative size = 254, normalized size of antiderivative = 18.14

$$\int \frac{1}{x(a+b\arcsin(cx))^3}\,dx=\int \frac{1}{(b\arcsin\,(cx)+a)^3x}\,dx$$

```
[In] integrate(1/x/(a+b*arcsin(c*x))^3,x, algorithm="maxima")
[Out] -1/2*(sqrt(c*x + 1)*sqrt(-c*x + 1)*b*c*x - b*arctan2(c*x, sqrt(c*x + 1)*sqr
t(-c*x + 1)) - 2*(b^4*c^2*x^2*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1))^2
+ 2*a*b^3*c^2*x^2*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1)) + a^2*b^2*c^2*
x^2)*integrate(1/(b^3*c^2*x^3*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1)) +
a*b^2*c^2*x^3), x) - a)/(b^4*c^2*x^2*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x +
 1))^2 + 2*a*b^3*c^2*x^2*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1)) + a^2*b
^2*c^2*x^2)
```

Giac [N/A]

Not integrable

Time = 0.82 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.14

$$\int \frac{1}{x(a+b\arcsin(cx))^3}\,dx=\int \frac{1}{(b\arcsin\,(cx)+a)^3x}\,dx$$

```
[In] integrate(1/x/(a+b*arcsin(c*x))^3,x, algorithm="giac")
[Out] integrate(1/((b*arcsin(c*x) + a)^3*x), x)
```

Mupad [N/A]

Not integrable

Time = 0.12 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.14

$$\int \frac{1}{x(a+b\arcsin(cx))^3}\,dx=\int \frac{1}{x\,(a+b\,\mathrm{asin}\left(c\,x\right))^3}\,dx$$

```
[In] int(1/(x*(a + b*asin(c*x))^3),x)
[Out] int(1/(x*(a + b*asin(c*x))^3), x)
```

3.172 $\int \frac{1}{x^2(a+b\arcsin(cx))^3}\,dx$

Optimal result

Integrand size = 14, antiderivative size = 14

$$\int \frac{1}{x^2(a+b\arcsin(cx))^3}\,dx = \text{Int}\left(\frac{1}{x^2(a+b\arcsin(cx))^3},x\right)$$

```
[Out] Unintegrable(1/x^2/(a+b*arcsin(c*x))^3,x)
```

Rubi [N/A]

Not integrable

Time = 0.01 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{1}{x^2(a+b\arcsin(cx))^3}\,dx = \int \frac{1}{x^2(a+b\arcsin(cx))^3}\,dx$$

```
[In] Int[1/(x^2*(a + b*ArcSin[c*x])^3),x]
[Out] Defer[Int][1/(x^2*(a + b*ArcSin[c*x])^3), x]
```

Rubi steps

$$\text{integral} = \int \frac{1}{x^2(a+b\arcsin(cx))^3}\,dx$$

Mathematica [N/A]

Not integrable

Time = 15.53 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.14

$$\int \frac{1}{x^2(a+b\arcsin(cx))^3}\,dx=\int \frac{1}{x^2(a+b\arcsin(cx))^3}\,dx$$

```
[In] Integrate[1/(x^2*(a + b*ArcSin[c*x])^3),x]
[Out] Integrate[1/(x^2*(a + b*ArcSin[c*x])^3), x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.09 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00

$$\int \frac{1}{x^{2} \left(a+b \arcsin \left(c x\right)\right)^{3}}dx$$

```
[In] int(1/x^2/(a+b*arcsin(c*x))^3,x)
[Out] int(1/x^2/(a+b*arcsin(c*x))^3,x)
```

Fricas [N/A]

Not integrable

Time = 0.25 (sec) , antiderivative size = 53, normalized size of antiderivative = 3.79

$$\int \frac{1}{x^2(a+b\arcsin(cx))^3}\,dx=\int \frac{1}{{\left(b \arcsin \left(c x\right) + a\right)}^{3} x^{2}}\,dx$$

```
[In] integrate(1/x^2/(a+b*arcsin(c*x))^3,x, algorithm="fricas")
[Out] integral(1/(b^3*x^2*arcsin(c*x)^3 + 3*a*b^2*x^2*arcsin(c*x)^2 + 3*a^2*b*x^2
*arcsin(c*x) + a^3*x^2), x)
```

Sympy [N/A]

Not integrable

Time = 1.55 (sec) , antiderivative size = 15, normalized size of antiderivative = 1.07

$$\int \frac{1}{x^2(a+b\arcsin(cx))^3}\,dx = \int \frac{1}{x^2\,(a+b\,\mathrm{asin}\,(cx))^3}\,dx$$

```
[In] integrate(1/x**2/(a+b*asin(c*x))**3,x)
[Out] Integral(1/(x**2*(a + b*asin(c*x))**3), x)
```

Maxima [N/A]

Not integrable

Time = 2.67 (sec) , antiderivative size = 283, normalized size of antiderivative = 20.21

$$\int \frac{1}{x^2(a+b\arcsin(cx))^3}\,dx = \int \frac{1}{(b\arcsin(cx)+a)^3x^2}\,dx$$

```
[In] integrate(1/x^2/(a+b*arcsin(c*x))^3,x, algorithm="maxima")
[Out] -1/2*(a*c^2*x^2 + sqrt(c*x + 1)*sqrt(-c*x + 1)*b*c*x + (b*c^2*x^2 - 2*b)*ar
ctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1)) + 2*(b^4*c^2*x^3*arctan2(c*x, sqrt
(c*x + 1)*sqrt(-c*x + 1))^2 + 2*a*b^3*c^2*x^3*arctan2(c*x, sqrt(c*x + 1)*sq
rt(-c*x + 1)) + a^2*b^2*c^2*x^3)*integrate(1/2*(c^2*x^2 - 6)/(b^3*c^2*x^4*a
rctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1)) + a*b^2*c^2*x^4), x) - 2*a)/(b^4*
c^2*x^3*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1))^2 + 2*a*b^3*c^2*x^3*arct
an2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1)) + a^2*b^2*c^2*x^3)
```

Giac [N/A]

Not integrable

Time = 1.39 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.14

$$\int \frac{1}{x^2(a+b\arcsin(cx))^3}\,dx = \int \frac{1}{(b\arcsin(cx)+a)^3x^2}\,dx$$

```
[In] integrate(1/x^2/(a+b*arcsin(c*x))^3,x, algorithm="giac")
[Out] integrate(1/((b*arcsin(c*x) + a)^3*x^2), x)
```

Mupad [N/A]

Not integrable

Time = 0.12 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.14

$$\int \frac{1}{x^2(a+b\arcsin(cx))^3}\,dx=\int \frac{1}{x^2\,{\left(a+b\,\mathrm{asin}\left(c\,x\right)\right)}^3} \,d x$$

```
[In] int(1/(x^2*(a + b*asin(c*x))^3),x)
[Out] int(1/(x^2*(a + b*asin(c*x))^3), x)
```

3.173 $\int x^2\sqrt{a+b\arcsin(cx)}\,dx$

Optimal result

Integrand size = 16, antiderivative size = 242

$$\begin{aligned}\int x^2\sqrt{a+b\arcsin(cx)}\,dx=&\ \frac{1}{3}x^3\sqrt{a+b\arcsin(cx)}\\&-\frac{\sqrt{b}\sqrt{\frac{\pi}{2}}\cos\left(\frac{a}{b}\right)\operatorname{FresnelS}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{4c^3}\\&+\frac{\sqrt{b}\sqrt{\frac{\pi}{6}}\cos\left(\frac{3a}{b}\right)\operatorname{FresnelS}\left(\frac{\sqrt{\frac{6}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{12c^3}\\&+\frac{\sqrt{b}\sqrt{\frac{\pi}{2}}\operatorname{FresnelC}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)\sin\left(\frac{a}{b}\right)}{4c^3}\\&-\frac{\sqrt{b}\sqrt{\frac{\pi}{6}}\operatorname{FresnelC}\left(\frac{\sqrt{\frac{6}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)\sin\left(\frac{3a}{b}\right)}{12c^3}\end{aligned}$$

```
[Out] 1/72*cos(3*a/b)*FresnelS(6^(1/2)/Pi^(1/2)*(a+b*arcsin(c*x))^(1/2)/b^(1/2))*
b^(1/2)*6^(1/2)*Pi^(1/2)/c^3-1/72*FresnelC(6^(1/2)/Pi^(1/2)*(a+b*arcsin(c*x
))^(1/2)/b^(1/2))*sin(3*a/b)*b^(1/2)*6^(1/2)*Pi^(1/2)/c^3-1/8*cos(a/b)*Fres
nelS(2^(1/2)/Pi^(1/2)*(a+b*arcsin(c*x))^(1/2)/b^(1/2))*b^(1/2)*2^(1/2)*Pi^(
1/2)/c^3+1/8*FresnelC(2^(1/2)/Pi^(1/2)*(a+b*arcsin(c*x))^(1/2)/b^(1/2))*sin
(a/b)*b^(1/2)*2^(1/2)*Pi^(1/2)/c^3+1/3*x^3*(a+b*arcsin(c*x))^(1/2)
```

Rubi [A] (verified)

Time = 0.38 (sec) , antiderivative size = 242, normalized size of antiderivative = 1.00, number of steps used = 14, number of rules used = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {4725, 4809, 3393, 3387, 3386, 3432, 3385, 3433}

$$\int x^2\sqrt{a+b\arcsin(cx)}\,dx = \frac{\sqrt{\frac{\pi}{2}}\sqrt{b}\sin\left(\frac{a}{b}\right)\text{FresnelC}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{4c^3} - \frac{\sqrt{\frac{\pi}{6}}\sqrt{b}\sin\left(\frac{3a}{b}\right)\text{FresnelC}\left(\frac{\sqrt{\frac{6}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{12c^3} - \frac{\sqrt{\frac{\pi}{2}}\sqrt{b}\cos\left(\frac{a}{b}\right)\text{FresnelS}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{4c^3} + \frac{\sqrt{\frac{\pi}{6}}\sqrt{b}\cos\left(\frac{3a}{b}\right)\text{FresnelS}\left(\frac{\sqrt{\frac{6}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{12c^3} + \frac{1}{3}x^3\sqrt{a+b\arcsin(cx)}$$

```
[In] Int[x^2*Sqrt[a + b*ArcSin[c*x]],x]
```

```
[Out] (x^3*Sqrt[a + b*ArcSin[c*x]])/3 - (Sqrt[b]*Sqrt[Pi/2]*Cos[a/b]*FresnelS[(Sq
rt[2/Pi]*Sqrt[a + b*ArcSin[c*x]])/Sqrt[b]])/(4*c^3) + (Sqrt[b]*Sqrt[Pi/6]*C
os[(3*a)/b]*FresnelS[(Sqrt[6/Pi]*Sqrt[a + b*ArcSin[c*x]])/Sqrt[b]])/(12*c^3
) + (Sqrt[b]*Sqrt[Pi/2]*FresnelC[(Sqrt[2/Pi]*Sqrt[a + b*ArcSin[c*x]])/Sqrt[
b]]*Sin[a/b])/(4*c^3) - (Sqrt[b]*Sqrt[Pi/6]*FresnelC[(Sqrt[6/Pi]*Sqrt[a + b
*ArcSin[c*x]])/Sqrt[b]]*Sin[(3*a)/b])/(12*c^3)
```

Rule 3385

```
Int[sin[Pi/2 + (e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> D
ist[2/d, Subst[Int[Cos[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d
, e, f}, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3386

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[2/d
, Subst[Int[Sin[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d, e, f}
, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3387

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[Cos
[(d*e - c*f)/d], Int[Sin[c*(f/d) + f*x]/Sqrt[c + d*x], x], x] + Dist[Sin[(d
```

```
*e - c*f)/d], Int[Cos[c*(f/d) + f*x]/Sqrt[c + d*x], x], x] /; FreeQ[{c, d,
e, f}, x] && ComplexFreeQ[f] && NeQ[d*e - c*f, 0]
```

Rule 3393

```
Int[((c_.) + (d_.)*(x_))^(m_)*sin[(e_.) + (f_.)*(x_)]^(n_), x_Symbol] :> In
t[ExpandTrigReduce[(c + d*x)^m, Sin[e + f*x]^n, x], x] /; FreeQ[{c, d, e, f
, m}, x] && IGtQ[n, 1] && ( !RationalQ[m] || (GeQ[m, -1] && LtQ[m, 1]))
```

Rule 3432

```
Int[Sin[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelS[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 3433

```
Int[Cos[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelC[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4725

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^(m + 1)*((a + b*ArcSin[c*x])^n/(m + 1)), x] - Dist[b*c*(n/(m + 1)), Int[x^
(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*x^2]), x], x] /; FreeQ[{a
, b, c}, x] && IGtQ[m, 0] && GtQ[n, 0]
```

Rule 4809

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_.)*((d_) + (e_.)*(x_)^
2)^(p_.), x_Symbol] :> Dist[(1/(b*c^(m + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x
^2)^p], Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b]^(2*p + 1), x], x, a
 + b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, d, e, n}, x] && EqQ[c^2*d + e, 0]
&& IGtQ[2*p + 2, 0] && IGtQ[m, 0]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= \frac{1}{3}x^3\sqrt{a+b\arcsin(cx)}-\frac{1}{6}(bc)\int\frac{x^3}{\sqrt{1-c^2x^2}\sqrt{a+b\arcsin(cx)}}\,dx\\
&= \frac{1}{3}x^3\sqrt{a+b\arcsin(cx)}+\frac{\text{Subst}\left(\int\frac{\sin^3\left(\frac{a}{b}-\frac{x}{b}\right)}{\sqrt{x}}\,dx,x,a+b\arcsin(cx)\right)}{6c^3}\\
&= \frac{1}{3}x^3\sqrt{a+b\arcsin(cx)}+\frac{\text{Subst}\left(\int\left(-\frac{\sin\left(\frac{3a}{b}-\frac{3x}{b}\right)}{4\sqrt{x}}+\frac{3\sin\left(\frac{a}{b}-\frac{x}{b}\right)}{4\sqrt{x}}\right)\,dx,x,a+b\arcsin(cx)\right)}{6c^3}
\end{aligned}$$

$$= \frac{1}{3}x^3\sqrt{a+b\arcsin(cx)} - \frac{\text{Subst}\left(\int \frac{\sin\left(\frac{3a}{b}-\frac{3x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{24c^3} + \frac{\text{Subst}\left(\int \frac{\sin\left(\frac{a}{b}-\frac{x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{8c^3}$$

$$= \frac{1}{3}x^3\sqrt{a+b\arcsin(cx)} - \frac{\cos\left(\frac{a}{b}\right)\text{Subst}\left(\int \frac{\sin\left(\frac{x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{8c^3} + \frac{\cos\left(\frac{3a}{b}\right)\text{Subst}\left(\int \frac{\sin\left(\frac{3x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{24c^3} + \frac{\sin\left(\frac{a}{b}\right)\text{Subst}\left(\int \frac{\cos\left(\frac{x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{8c^3} - \frac{\sin\left(\frac{3a}{b}\right)\text{Subst}\left(\int \frac{\cos\left(\frac{3x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{24c^3}$$

$$= \frac{1}{3}x^3\sqrt{a+b\arcsin(cx)} - \frac{\cos\left(\frac{a}{b}\right)\text{Subst}\left(\int \sin\left(\frac{x^2}{b}\right)\,dx, x, \sqrt{a+b\arcsin(cx)}\right)}{4c^3} + \frac{\cos\left(\frac{3a}{b}\right)\text{Subst}\left(\int \sin\left(\frac{3x^2}{b}\right)\,dx, x, \sqrt{a+b\arcsin(cx)}\right)}{12c^3} + \frac{\sin\left(\frac{a}{b}\right)\text{Subst}\left(\int \cos\left(\frac{x^2}{b}\right)\,dx, x, \sqrt{a+b\arcsin(cx)}\right)}{4c^3} - \frac{\sin\left(\frac{3a}{b}\right)\text{Subst}\left(\int \cos\left(\frac{3x^2}{b}\right)\,dx, x, \sqrt{a+b\arcsin(cx)}\right)}{12c^3}$$

$$= \frac{1}{3}x^3\sqrt{a+b\arcsin(cx)} - \frac{\sqrt{b}\sqrt{\frac{\pi}{2}}\cos\left(\frac{a}{b}\right)\text{FresnelS}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{4c^3} + \frac{\sqrt{b}\sqrt{\frac{\pi}{6}}\cos\left(\frac{3a}{b}\right)\text{FresnelS}\left(\frac{\sqrt{\frac{6}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{12c^3} + \frac{\sqrt{b}\sqrt{\frac{\pi}{2}}\text{FresnelC}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)\sin\left(\frac{a}{b}\right)}{4c^3} - \frac{\sqrt{b}\sqrt{\frac{\pi}{6}}\text{FresnelC}\left(\frac{\sqrt{\frac{6}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)\sin\left(\frac{3a}{b}\right)}{12c^3}$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.21 (sec) , antiderivative size = 227, normalized size of antiderivative = 0.94

$$\int x^2\sqrt{a+b\arcsin(cx)}\,dx$$
$$=\frac{be^{-\frac{3ia}{b}}\left(9e^{\frac{2ia}{b}}\sqrt{-\frac{i(a+b\arcsin(cx))}{b}}\Gamma\left(\frac{3}{2},-\frac{i(a+b\arcsin(cx))}{b}\right)+9e^{\frac{4ia}{b}}\sqrt{\frac{i(a+b\arcsin(cx))}{b}}\Gamma\left(\frac{3}{2},\frac{i(a+b\arcsin(cx))}{b}\right)-\sqrt{3}\left(\sqrt{-\right.\right.}{72c^3\sqrt{a+b\arcsin(cx)}}$$

```
[In] Integrate[x^2*Sqrt[a + b*ArcSin[c*x]],x]
```

```
[Out] (b*(9*E^(((2*I)*a)/b)*Sqrt[((-I)*(a + b*ArcSin[c*x]))/b]*Gamma[3/2, ((-I)*(
a + b*ArcSin[c*x]))/b] + 9*E^(((4*I)*a)/b)*Sqrt[(I*(a + b*ArcSin[c*x]))/b]*
Gamma[3/2, (I*(a + b*ArcSin[c*x]))/b] - Sqrt[3]*(Sqrt[((-I)*(a + b*ArcSin[c
*x]))/b]*Gamma[3/2, ((-3*I)*(a + b*ArcSin[c*x]))/b] + E^(((6*I)*a)/b)*Sqrt[
(I*(a + b*ArcSin[c*x]))/b]*Gamma[3/2, ((3*I)*(a + b*ArcSin[c*x]))/b])))/(72
*c^3*E^(((3*I)*a)/b)*Sqrt[a + b*ArcSin[c*x]])
```

Maple [A] (verified)

Time = 0.13 (sec) , antiderivative size = 361, normalized size of antiderivative = 1.49

method	result
default	$-\frac{-9\cos\left(\frac{a}{b}\right)\operatorname{FresnelS}\left(\frac{\sqrt{2}\,\sqrt{a+b\arcsin(cx)}}{\sqrt{\pi}\,\sqrt{-\frac{1}{b}}\,b}\right)\sqrt{2}\,\sqrt{\pi}\,\sqrt{-\frac{1}{b}}\,\sqrt{a+b\arcsin(cx)}\,b-9\sin\left(\frac{a}{b}\right)\operatorname{FresnelC}\left(\frac{\sqrt{2}\,\sqrt{a+b\arcsin(cx)}}{\sqrt{\pi}\,\sqrt{-\frac{1}{b}}\,b}\right)\sqrt{2}\,\sqrt{\pi}\,\sqrt{-\frac{1}{b}}\,\sqrt{}}{}$

```
[In] int(x^2*(a+b*arcsin(c*x))^(1/2),x,method=_RETURNVERBOSE)
```

```
[Out] -1/72/c^3/(a+b*arcsin(c*x))^(1/2)*(-9*cos(a/b)*FresnelS(2^(1/2)/Pi^(1/2)/(-
1/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)/b)*2^(1/2)*Pi^(1/2)*(-1/b)^(1/2)*(a+b*ar
csin(c*x))^(1/2)*b-9*sin(a/b)*FresnelC(2^(1/2)/Pi^(1/2)/(-1/b)^(1/2)*(a+b*a
rcsin(c*x))^(1/2)/b)*2^(1/2)*Pi^(1/2)*(-1/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)*
b+cos(3*a/b)*FresnelS(3*2^(1/2)/Pi^(1/2)/(-3/b)^(1/2)*(a+b*arcsin(c*x))^(1/
2)/b)*2^(1/2)*Pi^(1/2)*(-3/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)*b+sin(3*a/b)*Fr
esnelC(3*2^(1/2)/Pi^(1/2)/(-3/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)/b)*2^(1/2)*P
i^(1/2)*(-3/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)*b+18*arcsin(c*x)*sin(-(a+b*arc
sin(c*x))/b+a/b)*b+18*sin(-(a+b*arcsin(c*x))/b+a/b)*a-6*arcsin(c*x)*sin(-3*
(a+b*arcsin(c*x))/b+3*a/b)*b-6*sin(-3*(a+b*arcsin(c*x))/b+3*a/b)*a)
```

Fricas [F(-2)]

Exception generated.

$$\int x^2 \sqrt{a + b \arcsin(cx)}\, dx = \text{Exception raised: TypeError}$$

```
[In] integrate(x^2*(a+b*arcsin(c*x))^(1/2),x, algorithm="fricas")
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int x^2 \sqrt{a + b \arcsin(cx)}\, dx = \int x^2 \sqrt{a + b \operatorname{asin}(cx)}\, dx$$

```
[In] integrate(x**2*(a+b*asin(c*x))**(1/2),x)
[Out] Integral(x**2*sqrt(a + b*asin(c*x)), x)
```

Maxima [F]

$$\int x^2 \sqrt{a + b \arcsin(cx)}\, dx = \int \sqrt{b \arcsin(cx) + a} x^2\, dx$$

```
[In] integrate(x^2*(a+b*arcsin(c*x))^(1/2),x, algorithm="maxima")
[Out] integrate(sqrt(b*arcsin(c*x) + a)*x^2, x)
```

Giac [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 0.93 (sec) , antiderivative size = 1057, normalized size of antiderivative = 4.37

$$\int x^2 \sqrt{a + b \arcsin(cx)}\, dx = \text{Too large to display}$$

```
[In] integrate(x^2*(a+b*arcsin(c*x))^(1/2),x, algorithm="giac")
[Out] 1/8*sqrt(2)*sqrt(pi)*a*b*erf(-1/2*I*sqrt(2)*sqrt(b*arcsin(c*x) + a)/sqrt(ab
s(b)) - 1/2*sqrt(2)*sqrt(b*arcsin(c*x) + a)*sqrt(abs(b))/b)*e^(I*a/b)/((I*b
^2/sqrt(abs(b)) + b*sqrt(abs(b)))*c^3) + 1/16*I*sqrt(2)*sqrt(pi)*b^2*erf(-1
```

```
/2*I*sqrt(2)*sqrt(b*arcsin(c*x) + a)/sqrt(abs(b)) - 1/2*sqrt(2)*sqrt(b*arcs
in(c*x) + a)*sqrt(abs(b))/b)*e^(I*a/b)/((I*b^2/sqrt(abs(b)) + b*sqrt(abs(b)
))*c^3) + 1/8*sqrt(2)*sqrt(pi)*a*b*erf(1/2*I*sqrt(2)*sqrt(b*arcsin(c*x) + a
)/sqrt(abs(b)) - 1/2*sqrt(2)*sqrt(b*arcsin(c*x) + a)*sqrt(abs(b))/b)*e^(-I*
a/b)/((-I*b^2/sqrt(abs(b)) + b*sqrt(abs(b)))*c^3) - 1/16*I*sqrt(2)*sqrt(pi)
*b^2*erf(1/2*I*sqrt(2)*sqrt(b*arcsin(c*x) + a)/sqrt(abs(b)) - 1/2*sqrt(2)*s
qrt(b*arcsin(c*x) + a)*sqrt(abs(b))/b)*e^(-I*a/b)/((-I*b^2/sqrt(abs(b)) + b
*sqrt(abs(b)))*c^3) - 1/4*sqrt(pi)*a*sqrt(b)*erf(-1/2*sqrt(6)*sqrt(b*arcsin
(c*x) + a)/sqrt(b) - 1/2*I*sqrt(6)*sqrt(b*arcsin(c*x) + a)*sqrt(b)/abs(b))*
e^(3*I*a/b)/((sqrt(6)*b + I*sqrt(6)*b^2/abs(b))*c^3) - 1/24*I*sqrt(pi)*b^(3
/2)*erf(-1/2*sqrt(6)*sqrt(b*arcsin(c*x) + a)/sqrt(b) - 1/2*I*sqrt(6)*sqrt(b
*arcsin(c*x) + a)*sqrt(b)/abs(b))*e^(3*I*a/b)/((sqrt(6)*b + I*sqrt(6)*b^2/a
bs(b))*c^3) - 1/4*sqrt(pi)*a*sqrt(b)*erf(-1/2*sqrt(6)*sqrt(b*arcsin(c*x) +
a)/sqrt(b) + 1/2*I*sqrt(6)*sqrt(b*arcsin(c*x) + a)*sqrt(b)/abs(b))*e^(-3*I*
a/b)/((sqrt(6)*b - I*sqrt(6)*b^2/abs(b))*c^3) + 1/24*I*sqrt(pi)*b^(3/2)*erf
(-1/2*sqrt(6)*sqrt(b*arcsin(c*x) + a)/sqrt(b) + 1/2*I*sqrt(6)*sqrt(b*arcsin
(c*x) + a)*sqrt(b)/abs(b))*e^(-3*I*a/b)/((sqrt(6)*b - I*sqrt(6)*b^2/abs(b))
*c^3) + 1/4*sqrt(pi)*a*erf(-1/2*sqrt(6)*sqrt(b*arcsin(c*x) + a)/sqrt(b) - 1
/2*I*sqrt(6)*sqrt(b*arcsin(c*x) + a)*sqrt(b)/abs(b))*e^(3*I*a/b)/((sqrt(6)*
sqrt(b) + I*sqrt(6)*b^(3/2)/abs(b))*c^3) - 1/4*sqrt(pi)*a*erf(-1/2*I*sqrt(2
)*sqrt(b*arcsin(c*x) + a)/sqrt(abs(b)) - 1/2*sqrt(2)*sqrt(b*arcsin(c*x) + a
)*sqrt(abs(b))/b)*e^(I*a/b)/(c^3*(I*sqrt(2)*b/sqrt(abs(b)) + sqrt(2)*sqrt(a
bs(b)))) - 1/4*sqrt(pi)*a*erf(1/2*I*sqrt(2)*sqrt(b*arcsin(c*x) + a)/sqrt(ab
s(b)) - 1/2*sqrt(2)*sqrt(b*arcsin(c*x) + a)*sqrt(abs(b))/b)*e^(-I*a/b)/(c^3
*(-I*sqrt(2)*b/sqrt(abs(b)) + sqrt(2)*sqrt(abs(b)))) + 1/4*sqrt(pi)*a*erf(-
1/2*sqrt(6)*sqrt(b*arcsin(c*x) + a)/sqrt(b) + 1/2*I*sqrt(6)*sqrt(b*arcsin(c
*x) + a)*sqrt(b)/abs(b))*e^(-3*I*a/b)/((sqrt(6)*sqrt(b) - I*sqrt(6)*b^(3/2)
/abs(b))*c^3) + 1/24*I*sqrt(b*arcsin(c*x) + a)*e^(3*I*arcsin(c*x))/c^3 - 1/
8*I*sqrt(b*arcsin(c*x) + a)*e^(I*arcsin(c*x))/c^3 + 1/8*I*sqrt(b*arcsin(c*x
) + a)*e^(-I*arcsin(c*x))/c^3 - 1/24*I*sqrt(b*arcsin(c*x) + a)*e^(-3*I*arcs
in(c*x))/c^3
```

Mupad [F(-1)]

Timed out.

$$\int x^2\sqrt{a+b\arcsin(cx)}\,dx=\int x^2\,\sqrt{a+b\,\mathrm{asin}\left(c\,x\right)}\,dx$$

```
[In] int(x^2*(a + b*asin(c*x))^(1/2),x)
[Out] int(x^2*(a + b*asin(c*x))^(1/2), x)
```

3.174 $\int x\sqrt{a+b\arcsin(cx)}\,dx$

Optimal result

Integrand size = 14, antiderivative size = 137

$$\int x\sqrt{a+b\arcsin(cx)}\,dx = -\frac{\sqrt{a+b\arcsin(cx)}}{4c^2}+\frac{1}{2}x^2\sqrt{a+b\arcsin(cx)} + \frac{\sqrt{b}\sqrt{\pi}\cos\left(\frac{2a}{b}\right)\text{FresnelC}\left(\frac{2\sqrt{a+b\arcsin(cx)}}{\sqrt{b}\sqrt{\pi}}\right)}{8c^2} + \frac{\sqrt{b}\sqrt{\pi}\,\text{FresnelS}\left(\frac{2\sqrt{a+b\arcsin(cx)}}{\sqrt{b}\sqrt{\pi}}\right)\sin\left(\frac{2a}{b}\right)}{8c^2}$$

```
[Out] 1/8*cos(2*a/b)*FresnelC(2*(a+b*arcsin(c*x))^(1/2)/b^(1/2)/Pi^(1/2))*b^(1/2)
*Pi^(1/2)/c^2+1/8*FresnelS(2*(a+b*arcsin(c*x))^(1/2)/b^(1/2)/Pi^(1/2))*sin(
2*a/b)*b^(1/2)*Pi^(1/2)/c^2-1/4*(a+b*arcsin(c*x))^(1/2)/c^2+1/2*x^2*(a+b*ar
csin(c*x))^(1/2)
```

Rubi [A] (verified)

Time = 0.22 (sec) , antiderivative size = 137, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.571, Rules used = {4725, 4809, 3393, 3387, 3386, 3432, 3385, 3433}

$$\int x\sqrt{a+b\arcsin(cx)}\,dx = \frac{\sqrt{\pi}\sqrt{b}\cos\left(\frac{2a}{b}\right)\text{FresnelC}\left(\frac{2\sqrt{a+b\arcsin(cx)}}{\sqrt{b}\sqrt{\pi}}\right)}{8c^2} + \frac{\sqrt{\pi}\sqrt{b}\sin\left(\frac{2a}{b}\right)\text{FresnelS}\left(\frac{2\sqrt{a+b\arcsin(cx)}}{\sqrt{b}\sqrt{\pi}}\right)}{8c^2} - \frac{\sqrt{a+b\arcsin(cx)}}{4c^2}+\frac{1}{2}x^2\sqrt{a+b\arcsin(cx)}$$

```
[In] Int[x*Sqrt[a + b*ArcSin[c*x]],x]
```

```
[Out] -1/4*Sqrt[a + b*ArcSin[c*x]]/c^2 + (x^2*Sqrt[a + b*ArcSin[c*x]])/2 + (Sqrt[
b]*Sqrt[Pi]*Cos[(2*a)/b]*FresnelC[(2*Sqrt[a + b*ArcSin[c*x]])/(Sqrt[b]*Sqrt
[Pi])])/(8*c^2) + (Sqrt[b]*Sqrt[Pi]*FresnelS[(2*Sqrt[a + b*ArcSin[c*x]])/(S
qrt[b]*Sqrt[Pi])]*Sin[(2*a)/b])/(8*c^2)
```

Rule 3385

```
Int[sin[Pi/2 + (e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> D
ist[2/d, Subst[Int[Cos[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d
, e, f}, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3386

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[2/d
, Subst[Int[Sin[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d, e, f}
, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3387

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[Cos
[(d*e - c*f)/d], Int[Sin[c*(f/d) + f*x]/Sqrt[c + d*x], x], x] + Dist[Sin[(d
*e - c*f)/d], Int[Cos[c*(f/d) + f*x]/Sqrt[c + d*x], x], x] /; FreeQ[{c, d,
e, f}, x] && ComplexFreeQ[f] && NeQ[d*e - c*f, 0]
```

Rule 3393

```
Int[((c_.) + (d_.)*(x_))^(m_)*sin[(e_.) + (f_.)*(x_)]^(n_), x_Symbol] :> In
t[ExpandTrigReduce[(c + d*x)^m, Sin[e + f*x]^n, x], x] /; FreeQ[{c, d, e, f
, m}, x] && IGtQ[n, 1] && ( !RationalQ[m] || (GeQ[m, -1] && LtQ[m, 1]))
```

Rule 3432

```
Int[Sin[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelS[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 3433

```
Int[Cos[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelC[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4725

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^(m + 1)*((a + b*ArcSin[c*x])^n/(m + 1)), x] - Dist[b*c*(n/(m + 1)), Int[x^
(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*x^2]), x], x] /; FreeQ[{a
```

```
, b, c}, x] && IGtQ[m, 0] && GtQ[n, 0]
```

Rule 4809

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_.)*((d_) + (e_.)*(x_)^
2)^(p_.), x_Symbol] :> Dist[(1/(b*c^(m + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x
^2)^p], Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b]^(2*p + 1), x], x, a
 + b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, d, e, n}, x] && EqQ[c^2*d + e, 0]
&& IGtQ[2*p + 2, 0] && IGtQ[m, 0]
```

Rubi steps

$$\text{integral} = \frac{1}{2}x^2\sqrt{a+b\arcsin(cx)} - \frac{1}{4}(bc)\int \frac{x^2}{\sqrt{1-c^2x^2}\sqrt{a+b\arcsin(cx)}}\,dx$$

$$= \frac{1}{2}x^2\sqrt{a+b\arcsin(cx)} - \frac{\text{Subst}\left(\int \frac{\sin^2\left(\frac{a}{b}-\frac{x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{4c^2}$$

$$= \frac{1}{2}x^2\sqrt{a+b\arcsin(cx)} - \frac{\text{Subst}\left(\int \left(\frac{1}{2\sqrt{x}} - \frac{\cos\left(\frac{2a}{b}-\frac{2x}{b}\right)}{2\sqrt{x}}\right)dx, x, a+b\arcsin(cx)\right)}{4c^2}$$

$$= -\frac{\sqrt{a+b\arcsin(cx)}}{4c^2} + \frac{1}{2}x^2\sqrt{a+b\arcsin(cx)} + \frac{\text{Subst}\left(\int \frac{\cos\left(\frac{2a}{b}-\frac{2x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{8c^2}$$

$$= -\frac{\sqrt{a+b\arcsin(cx)}}{4c^2} + \frac{1}{2}x^2\sqrt{a+b\arcsin(cx)} + \frac{\cos\left(\frac{2a}{b}\right)\text{Subst}\left(\int \frac{\cos\left(\frac{2x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{8c^2} + \frac{\sin\left(\frac{2a}{b}\right)\text{Subst}\left(\int \frac{\sin\left(\frac{2x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{8c^2}$$

$$= -\frac{\sqrt{a+b\arcsin(cx)}}{4c^2} + \frac{1}{2}x^2\sqrt{a+b\arcsin(cx)} + \frac{\cos\left(\frac{2a}{b}\right)\text{Subst}\left(\int \cos\left(\frac{2x^2}{b}\right)dx, x, \sqrt{a+b\arcsin(cx)}\right)}{4c^2} + \frac{\sin\left(\frac{2a}{b}\right)\text{Subst}\left(\int \sin\left(\frac{2x^2}{b}\right)dx, x, \sqrt{a+b\arcsin(cx)}\right)}{4c^2}$$

$$= -\frac{\sqrt{a+b\arcsin(cx)}}{4c^2} + \frac{1}{2}x^2\sqrt{a+b\arcsin(cx)} + \frac{\sqrt{b}\sqrt{\pi}\cos\left(\frac{2a}{b}\right)\text{FresnelC}\left(\frac{2\sqrt{a+b\arcsin(cx)}}{\sqrt{b}\sqrt{\pi}}\right)}{8c^2} + \frac{\sqrt{b}\sqrt{\pi}\,\text{FresnelS}\left(\frac{2\sqrt{a+b\arcsin(cx)}}{\sqrt{b}\sqrt{\pi}}\right)\sin\left(\frac{2a}{b}\right)}{8c^2}$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.05 (sec) , antiderivative size = 127, normalized size of antiderivative = 0.93

$$\int x\sqrt{a+b\arcsin(cx)}\,dx$$
$$=\frac{ibe^{-\frac{2ia}{b}}\left(-\sqrt{-\frac{i(a+b\arcsin(cx))}{b}}\Gamma\left(\frac{3}{2},-\frac{2i(a+b\arcsin(cx))}{b}\right)+e^{\frac{4ia}{b}}\sqrt{\frac{i(a+b\arcsin(cx))}{b}}\Gamma\left(\frac{3}{2},\frac{2i(a+b\arcsin(cx))}{b}\right)\right)}{8\sqrt{2}c^2\sqrt{a+b\arcsin(cx)}}$$

```
[In] Integrate[x*Sqrt[a + b*ArcSin[c*x]],x]
```

```
[Out] ((I/8)*b*(-(Sqrt[((-I)*(a + b*ArcSin[c*x]))/b]*Gamma[3/2, ((-2*I)*(a + b*Ar
cSin[c*x]))/b]) + E^(((4*I)*a)/b)*Sqrt[(I*(a + b*ArcSin[c*x]))/b]*Gamma[3/2
, ((2*I)*(a + b*ArcSin[c*x]))/b]))/(Sqrt[2]*c^2*E^(((2*I)*a)/b)*Sqrt[a + b*
ArcSin[c*x]])
```

Maple [A] (verified)

Time = 0.06 (sec) , antiderivative size = 186, normalized size of antiderivative = 1.36

method	result
default	$-\frac{-\sqrt{a+b\arcsin(cx)}\,\sqrt{\pi}\,\sqrt{-\frac{1}{b}}\,\cos\left(\frac{2a}{b}\right)\text{FresnelC}\left(\frac{2\sqrt{2}\,\sqrt{a+b\arcsin(cx)}}{\sqrt{\pi}\,\sqrt{-\frac{2}{b}}\,b}\right)b+\sqrt{a+b\arcsin(cx)}\,\sqrt{\pi}\,\sqrt{-\frac{1}{b}}\,\sin\left(\frac{2a}{b}\right)\text{FresnelS}\left(\frac{2\sqrt{2}\,\sqrt{a+b\,\text{ar}}}{\sqrt{\pi}\,\sqrt{-}}\right.}{8c^2\sqrt{a+b\arcsin(cx)}}$

```
[In] int(x*(a+b*arcsin(c*x))^(1/2),x,method=_RETURNVERBOSE)
```

```
[Out] -1/8/c^2/(a+b*arcsin(c*x))^(1/2)*(-(a+b*arcsin(c*x))^(1/2)*Pi^(1/2)*(-1/b)^
(1/2)*cos(2*a/b)*FresnelC(2*2^(1/2)/Pi^(1/2)/(-2/b)^(1/2)*(a+b*arcsin(c*x))
^(1/2)/b)*b+(a+b*arcsin(c*x))^(1/2)*Pi^(1/2)*(-1/b)^(1/2)*sin(2*a/b)*Fresne
lS(2*2^(1/2)/Pi^(1/2)/(-2/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)/b)*b+2*arcsin(c*
x)*cos(-2*(a+b*arcsin(c*x))/b+2*a/b)*b+2*cos(-2*(a+b*arcsin(c*x))/b+2*a/b)*
a)
```

Fricas [F(-2)]

Exception generated.

$$\int x\sqrt{a+b\arcsin(cx)}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate(x*(a+b*arcsin(c*x))^(1/2),x, algorithm="fricas")
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int x\sqrt{a+b\arcsin(cx)}\,dx = \int x\sqrt{a+b\,\mathrm{asin}\,(cx)}\,dx$$

```
[In] integrate(x*(a+b*asin(c*x))**(1/2),x)
[Out] Integral(x*sqrt(a + b*asin(c*x)), x)
```

Maxima [F]

$$\int x\sqrt{a+b\arcsin(cx)}\,dx = \int \sqrt{b\arcsin(cx)+a}\,x\,dx$$

```
[In] integrate(x*(a+b*arcsin(c*x))^(1/2),x, algorithm="maxima")
[Out] integrate(sqrt(b*arcsin(c*x) + a)*x, x)
```

Giac [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 0.70 (sec) , antiderivative size = 448, normalized size of antiderivative = 3.27

$$\int x\sqrt{a+b\arcsin(cx)}\,dx = \frac{i\sqrt{\pi}a\sqrt{b}\,\mathrm{erf}\left(-\frac{\sqrt{b\arcsin(cx)+a}}{\sqrt{b}}-\frac{i\sqrt{b\arcsin(cx)+a}\sqrt{b}}{|b|}\right)e^{\left(\frac{2ia}{b}\right)}}{4\left(b+\frac{ib^2}{|b|}\right)c^2} - \frac{\sqrt{\pi}b^{\frac{3}{2}}\,\mathrm{erf}\left(-\frac{\sqrt{b\arcsin(cx)+a}}{\sqrt{b}}-\frac{i\sqrt{b\arcsin(cx)+a}\sqrt{b}}{|b|}\right)e^{\left(\frac{2ia}{b}\right)}}{16\left(b+\frac{ib^2}{|b|}\right)c^2} - \frac{i\sqrt{\pi}a\sqrt{b}\,\mathrm{erf}\left(-\frac{\sqrt{b\arcsin(cx)+a}}{\sqrt{b}}+\frac{i\sqrt{b\arcsin(cx)+a}\sqrt{b}}{|b|}\right)e^{\left(-\frac{2ia}{b}\right)}}{4\left(b-\frac{ib^2}{|b|}\right)c^2} - \frac{\sqrt{\pi}b^{\frac{3}{2}}\,\mathrm{erf}\left(-\frac{\sqrt{b\arcsin(cx)+a}}{\sqrt{b}}+\frac{i\sqrt{b\arcsin(cx)+a}\sqrt{b}}{|b|}\right)e^{\left(-\frac{2ia}{b}\right)}}{16\left(b-\frac{ib^2}{|b|}\right)c^2} + \frac{i\sqrt{\pi}a\,\mathrm{erf}\left(-\frac{\sqrt{b\arcsin(cx)+a}}{\sqrt{b}}+\frac{i\sqrt{b\arcsin(cx)+a}\sqrt{b}}{|b|}\right)e^{\left(-\frac{2ia}{b}\right)}}{4c^2\left(\sqrt{b}-\frac{ib^{\frac{3}{2}}}{|b|}\right)} - \frac{i\sqrt{\pi}a\,\mathrm{erf}\left(-\frac{\sqrt{b\arcsin(cx)+a}}{\sqrt{b}}-\frac{i\sqrt{b\arcsin(cx)+a}\sqrt{b}}{|b|}\right)e^{\left(\frac{2ia}{b}\right)}}{4\sqrt{b}c^2\left(\frac{ib}{|b|}+1\right)} - \frac{\sqrt{b\arcsin(cx)+a}e^{(2i\arcsin(cx))}}{8c^2} - \frac{\sqrt{b\arcsin(cx)+a}e^{(-2i\arcsin(cx))}}{8c^2}$$

```
[In] integrate(x*(a+b*arcsin(c*x))^(1/2),x, algorithm="giac")
```

```
[Out] 1/4*I*sqrt(pi)*a*sqrt(b)*erf(-sqrt(b*arcsin(c*x) + a)/sqrt(b) - I*sqrt(b*ar
csin(c*x) + a)*sqrt(b)/abs(b))*e^(2*I*a/b)/((b + I*b^2/abs(b))*c^2) - 1/16*
sqrt(pi)*b^(3/2)*erf(-sqrt(b*arcsin(c*x) + a)/sqrt(b) - I*sqrt(b*arcsin(c*x
) + a)*sqrt(b)/abs(b))*e^(2*I*a/b)/((b + I*b^2/abs(b))*c^2) - 1/4*I*sqrt(pi
)*a*sqrt(b)*erf(-sqrt(b*arcsin(c*x) + a)/sqrt(b) + I*sqrt(b*arcsin(c*x) + a
)*sqrt(b)/abs(b))*e^(-2*I*a/b)/((b - I*b^2/abs(b))*c^2) - 1/16*sqrt(pi)*b^(
3/2)*erf(-sqrt(b*arcsin(c*x) + a)/sqrt(b) + I*sqrt(b*arcsin(c*x) + a)*sqrt(
b)/abs(b))*e^(-2*I*a/b)/((b - I*b^2/abs(b))*c^2) + 1/4*I*sqrt(pi)*a*erf(-sq
rt(b*arcsin(c*x) + a)/sqrt(b) + I*sqrt(b*arcsin(c*x) + a)*sqrt(b)/abs(b))*e
^(-2*I*a/b)/(c^2*(sqrt(b) - I*b^(3/2)/abs(b))) - 1/4*I*sqrt(pi)*a*erf(-sqrt
(b*arcsin(c*x) + a)/sqrt(b) - I*sqrt(b*arcsin(c*x) + a)*sqrt(b)/abs(b))*e^(
2*I*a/b)/(sqrt(b)*c^2*(I*b/abs(b) + 1)) - 1/8*sqrt(b*arcsin(c*x) + a)*e^(2*
I*arcsin(c*x))/c^2 - 1/8*sqrt(b*arcsin(c*x) + a)*e^(-2*I*arcsin(c*x))/c^2
```

Mupad [F(-1)]

Timed out.

$$\int x\sqrt{a+b\arcsin(cx)}\,dx=\int x\,\sqrt{a+b\,\mathrm{asin}\left(c\,x\right)}\,dx$$

```
[In] int(x*(a + b*asin(c*x))^(1/2),x)
[Out] int(x*(a + b*asin(c*x))^(1/2), x)
```

3.175 $\int \sqrt{a+b \arcsin (c x)} \, dx$

Optimal result

Integrand size = 12, antiderivative size = 120

$$\int \sqrt{a+b \arcsin (c x)} \, dx = x \sqrt{a+b \arcsin (c x)}-\frac{\sqrt{b} \sqrt{\frac{\pi}{2}} \cos \left(\frac{a}{b}\right) \operatorname{FresnelS}\left(\frac{\sqrt{\frac{2}{\pi}} \sqrt{a+b \arcsin (c x)}}{\sqrt{b}}\right)}{c}+\frac{\sqrt{b} \sqrt{\frac{\pi}{2}} \operatorname{FresnelC}\left(\frac{\sqrt{\frac{2}{\pi}} \sqrt{a+b \arcsin (c x)}}{\sqrt{b}}\right) \sin \left(\frac{a}{b}\right)}{c}$$

```
[Out] -1/2*cos(a/b)*FresnelS(2^(1/2)/Pi^(1/2)*(a+b*arcsin(c*x))^(1/2)/b^(1/2))*b^
(1/2)*2^(1/2)*Pi^(1/2)/c+1/2*FresnelC(2^(1/2)/Pi^(1/2)*(a+b*arcsin(c*x))^(1
/2)/b^(1/2))*sin(a/b)*b^(1/2)*2^(1/2)*Pi^(1/2)/c+x*(a+b*arcsin(c*x))^(1/2)
```

Rubi [A] (verified)

Time = 0.15 (sec) , antiderivative size = 120, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 7, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.583, Rules used = {4715, 4809, 3387, 3386, 3432, 3385, 3433}

$$\int \sqrt{a+b \arcsin (c x)} \, dx = \frac{\sqrt{\frac{\pi}{2}} \sqrt{b} \sin \left(\frac{a}{b}\right) \operatorname{FresnelC}\left(\frac{\sqrt{\frac{2}{\pi}} \sqrt{a+b \arcsin (c x)}}{\sqrt{b}}\right)}{c}-\frac{\sqrt{\frac{\pi}{2}} \sqrt{b} \cos \left(\frac{a}{b}\right) \operatorname{FresnelS}\left(\frac{\sqrt{\frac{2}{\pi}} \sqrt{a+b \arcsin (c x)}}{\sqrt{b}}\right)}{c}+x \sqrt{a+b \arcsin (c x)}$$

```
[In] Int[Sqrt[a + b*ArcSin[c*x]],x]
```

```
[Out] x*Sqrt[a + b*ArcSin[c*x]] - (Sqrt[b]*Sqrt[Pi/2]*Cos[a/b]*FresnelS[(Sqrt[2/P
i]*Sqrt[a + b*ArcSin[c*x]])/Sqrt[b]])/c + (Sqrt[b]*Sqrt[Pi/2]*FresnelC[(Sqr
t[2/Pi]*Sqrt[a + b*ArcSin[c*x]])/Sqrt[b]]*Sin[a/b])/c
```

Rule 3385

```
Int[sin[Pi/2 + (e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> D
ist[2/d, Subst[Int[Cos[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d
, e, f}, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3386

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[2/d
, Subst[Int[Sin[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d, e, f}
, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3387

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[Cos
[(d*e - c*f)/d], Int[Sin[c*(f/d) + f*x]/Sqrt[c + d*x], x], x] + Dist[Sin[(d
*e - c*f)/d], Int[Cos[c*(f/d) + f*x]/Sqrt[c + d*x], x], x] /; FreeQ[{c, d,
e, f}, x] && ComplexFreeQ[f] && NeQ[d*e - c*f, 0]
```

Rule 3432

```
Int[Sin[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelS[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 3433

```
Int[Cos[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelC[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4715

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.), x_Symbol] :> Simp[x*(a + b*Ar
cSin[c*x])^n, x] - Dist[b*c*n, Int[x*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 -
c^2*x^2]), x], x] /; FreeQ[{a, b, c}, x] && GtQ[n, 0]
```

Rule 4809

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_.)*((d_) + (e_.)*(x_)^
2)^(p_.), x_Symbol] :> Dist[(1/(b*c^(m + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x
^2)^p], Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b]^(2*p + 1), x], x, a
 + b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, d, e, n}, x] && EqQ[c^2*d + e, 0]
&& IGtQ[2*p + 2, 0] && IGtQ[m, 0]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= x\sqrt{a+b\arcsin(cx)} - \frac{1}{2}(bc)\int \frac{x}{\sqrt{1-c^2x^2}\sqrt{a+b\arcsin(cx)}}\,dx \\
&= x\sqrt{a+b\arcsin(cx)} + \frac{\text{Subst}\left(\int \frac{\sin\left(\frac{a}{b}-\frac{x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{2c} \\
&= x\sqrt{a+b\arcsin(cx)} - \frac{\cos\left(\frac{a}{b}\right)\text{Subst}\left(\int \frac{\sin\left(\frac{x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{2c} \\
&\quad + \frac{\sin\left(\frac{a}{b}\right)\text{Subst}\left(\int \frac{\cos\left(\frac{x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{2c} \\
&= x\sqrt{a+b\arcsin(cx)} - \frac{\cos\left(\frac{a}{b}\right)\text{Subst}\left(\int \sin\left(\frac{x^2}{b}\right)\,dx, x, \sqrt{a+b\arcsin(cx)}\right)}{c} \\
&\quad + \frac{\sin\left(\frac{a}{b}\right)\text{Subst}\left(\int \cos\left(\frac{x^2}{b}\right)\,dx, x, \sqrt{a+b\arcsin(cx)}\right)}{c} \\
&= x\sqrt{a+b\arcsin(cx)} - \frac{\sqrt{b}\sqrt{\frac{\pi}{2}}\cos\left(\frac{a}{b}\right)\text{FresnelS}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{c} \\
&\quad + \frac{\sqrt{b}\sqrt{\frac{\pi}{2}}\text{FresnelC}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)\sin\left(\frac{a}{b}\right)}{c}
\end{aligned}$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.09 (sec) , antiderivative size = 119, normalized size of antiderivative = 0.99

$$\int \sqrt{a+b\arcsin(cx)}\,dx = \frac{be^{-\frac{ia}{b}}\left(\sqrt{-\frac{i(a+b\arcsin(cx))}{b}}\Gamma\left(\frac{3}{2},-\frac{i(a+b\arcsin(cx))}{b}\right)+e^{\frac{2ia}{b}}\sqrt{\frac{i(a+b\arcsin(cx))}{b}}\Gamma\left(\frac{3}{2},\frac{i(a+b\arcsin(cx))}{b}\right)\right)}{2c\sqrt{a+b\arcsin(cx)}}$$

```
[In] Integrate[Sqrt[a + b*ArcSin[c*x]],x]
```

```
[Out] (b*(Sqrt[((-I)*(a + b*ArcSin[c*x]))/b]*Gamma[3/2, ((-I)*(a + b*ArcSin[c*x])
)/b] + E^(((2*I)*a)/b)*Sqrt[(I*(a + b*ArcSin[c*x]))/b]*Gamma[3/2, (I*(a + b
*ArcSin[c*x]))/b]))/(2*c*E^((I*a)/b)*Sqrt[a + b*ArcSin[c*x]])
```

Maple [A] (verified)

Time = 0.05 (sec) , antiderivative size = 187, normalized size of antiderivative = 1.56

method	result
default	$-\frac{-\cos\left(\frac{a}{b}\right) \operatorname{FresnelS}\left(\frac{\sqrt{2}\,\sqrt{a+b\arcsin(cx)}}{\sqrt{\pi}\,\sqrt{-\frac{1}{b}}\,b}\right)\sqrt{2}\,\sqrt{\pi}\,\sqrt{-\frac{1}{b}}\,\sqrt{a+b\arcsin(cx)}\,b-\sin\left(\frac{a}{b}\right) \operatorname{FresnelC}\left(\frac{\sqrt{2}\,\sqrt{a+b\arcsin(cx)}}{\sqrt{\pi}\,\sqrt{-\frac{1}{b}}\,b}\right)\sqrt{2}\,\sqrt{\pi}\,\sqrt{-\frac{1}{b}}\,\sqrt{a}}{2c\sqrt{a+b\arcsin(cx)}}$

```
[In] int((a+b*arcsin(c*x))^(1/2),x,method=_RETURNVERBOSE)
```

```
[Out] -1/2/c/(a+b*arcsin(c*x))^(1/2)*(-cos(a/b)*FresnelS(2^(1/2)/Pi^(1/2)/(-1/b)^
(1/2)*(a+b*arcsin(c*x))^(1/2)/b)*2^(1/2)*Pi^(1/2)*(-1/b)^(1/2)*(a+b*arcsin(
c*x))^(1/2)*b-sin(a/b)*FresnelC(2^(1/2)/Pi^(1/2)/(-1/b)^(1/2)*(a+b*arcsin(c
*x))^(1/2)/b)*2^(1/2)*Pi^(1/2)*(-1/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)*b+2*arc
sin(c*x)*sin(-(a+b*arcsin(c*x))/b+a/b)*b+2*sin(-(a+b*arcsin(c*x))/b+a/b)*a)
```

Fricas [F(-2)]

Exception generated.

$$\int \sqrt{a+b\arcsin(cx)}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate((a+b*arcsin(c*x))^(1/2),x, algorithm="fricas")
```

```
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int \sqrt{a+b\arcsin(cx)}\,dx = \int \sqrt{a+b\operatorname{asin}(cx)}\,dx$$

```
[In] integrate((a+b*asin(c*x))**(1/2),x)
```

```
[Out] Integral(sqrt(a + b*asin(c*x)), x)
```

Maxima [F]

$$\int \sqrt{a+b\arcsin(cx)}\,dx = \int \sqrt{b\arcsin(cx)+a}\,dx$$

```
[In] integrate((a+b*arcsin(c*x))^(1/2),x, algorithm="maxima")
[Out] integrate(sqrt(b*arcsin(c*x) + a), x)
```

Giac [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 0.55 (sec) , antiderivative size = 531, normalized size of antiderivative = 4.42

$$\begin{aligned}\int \sqrt{a+b\arcsin(cx)}\,dx = {} & \frac{\sqrt{2}\sqrt{\pi}ab\operatorname{erf}\left(-\frac{i\sqrt{2}\sqrt{b\arcsin(cx)+a}}{2\sqrt{|b|}}-\frac{\sqrt{2}\sqrt{b\arcsin(cx)+a}\sqrt{|b|}}{2b}\right)e^{\left(\frac{ia}{b}\right)}}{2\left(\frac{ib^2}{\sqrt{|b|}}+b\sqrt{|b|}\right)c} \\ & + \frac{i\sqrt{2}\sqrt{\pi}b^2\operatorname{erf}\left(-\frac{i\sqrt{2}\sqrt{b\arcsin(cx)+a}}{2\sqrt{|b|}}-\frac{\sqrt{2}\sqrt{b\arcsin(cx)+a}\sqrt{|b|}}{2b}\right)e^{\left(\frac{ia}{b}\right)}}{4\left(\frac{ib^2}{\sqrt{|b|}}+b\sqrt{|b|}\right)c} \\ & + \frac{\sqrt{2}\sqrt{\pi}ab\operatorname{erf}\left(\frac{i\sqrt{2}\sqrt{b\arcsin(cx)+a}}{2\sqrt{|b|}}-\frac{\sqrt{2}\sqrt{b\arcsin(cx)+a}\sqrt{|b|}}{2b}\right)e^{\left(-\frac{ia}{b}\right)}}{2\left(-\frac{ib^2}{\sqrt{|b|}}+b\sqrt{|b|}\right)c} \\ & - \frac{i\sqrt{2}\sqrt{\pi}b^2\operatorname{erf}\left(\frac{i\sqrt{2}\sqrt{b\arcsin(cx)+a}}{2\sqrt{|b|}}-\frac{\sqrt{2}\sqrt{b\arcsin(cx)+a}\sqrt{|b|}}{2b}\right)e^{\left(-\frac{ia}{b}\right)}}{4\left(-\frac{ib^2}{\sqrt{|b|}}+b\sqrt{|b|}\right)c} \\ & - \frac{\sqrt{\pi}a\operatorname{erf}\left(-\frac{i\sqrt{2}\sqrt{b\arcsin(cx)+a}}{2\sqrt{|b|}}-\frac{\sqrt{2}\sqrt{b\arcsin(cx)+a}\sqrt{|b|}}{2b}\right)e^{\left(\frac{ia}{b}\right)}}{c\left(\frac{i\sqrt{2}b}{\sqrt{|b|}}+\sqrt{2}\sqrt{|b|}\right)} \\ & - \frac{\sqrt{\pi}a\operatorname{erf}\left(\frac{i\sqrt{2}\sqrt{b\arcsin(cx)+a}}{2\sqrt{|b|}}-\frac{\sqrt{2}\sqrt{b\arcsin(cx)+a}\sqrt{|b|}}{2b}\right)e^{\left(-\frac{ia}{b}\right)}}{c\left(-\frac{i\sqrt{2}b}{\sqrt{|b|}}+\sqrt{2}\sqrt{|b|}\right)} \\ & - \frac{i\sqrt{b\arcsin(cx)+a}e^{(i\arcsin(cx))}}{2c} \\ & + \frac{i\sqrt{b\arcsin(cx)+a}e^{(-i\arcsin(cx))}}{2c}\end{aligned}$$

```
[In] integrate((a+b*arcsin(c*x))^(1/2),x, algorithm="giac")
[Out] 1/2*sqrt(2)*sqrt(pi)*a*b*erf(-1/2*I*sqrt(2)*sqrt(b*arcsin(c*x) + a)/sqrt(ab
s(b)) - 1/2*sqrt(2)*sqrt(b*arcsin(c*x) + a)*sqrt(abs(b))/b)*e^(I*a/b)/((I*b
```

```
^2/sqrt(abs(b)) + b*sqrt(abs(b)))*c) + 1/4*I*sqrt(2)*sqrt(pi)*b^2*erf(-1/2*
I*sqrt(2)*sqrt(b*arcsin(c*x) + a)/sqrt(abs(b)) - 1/2*sqrt(2)*sqrt(b*arcsin(
c*x) + a)*sqrt(abs(b))/b)*e^(I*a/b)/((I*b^2/sqrt(abs(b)) + b*sqrt(abs(b)))*
c) + 1/2*sqrt(2)*sqrt(pi)*a*b*erf(1/2*I*sqrt(2)*sqrt(b*arcsin(c*x) + a)/sqr
t(abs(b)) - 1/2*sqrt(2)*sqrt(b*arcsin(c*x) + a)*sqrt(abs(b))/b)*e^(-I*a/b)/
((-I*b^2/sqrt(abs(b)) + b*sqrt(abs(b)))*c) - 1/4*I*sqrt(2)*sqrt(pi)*b^2*erf
(1/2*I*sqrt(2)*sqrt(b*arcsin(c*x) + a)/sqrt(abs(b)) - 1/2*sqrt(2)*sqrt(b*ar
csin(c*x) + a)*sqrt(abs(b))/b)*e^(-I*a/b)/((-I*b^2/sqrt(abs(b)) + b*sqrt(ab
s(b)))*c) - sqrt(pi)*a*erf(-1/2*I*sqrt(2)*sqrt(b*arcsin(c*x) + a)/sqrt(abs(
b)) - 1/2*sqrt(2)*sqrt(b*arcsin(c*x) + a)*sqrt(abs(b))/b)*e^(I*a/b)/(c*(I*s
qrt(2)*b/sqrt(abs(b)) + sqrt(2)*sqrt(abs(b)))) - sqrt(pi)*a*erf(1/2*I*sqrt(
2)*sqrt(b*arcsin(c*x) + a)/sqrt(abs(b)) - 1/2*sqrt(2)*sqrt(b*arcsin(c*x) +
a)*sqrt(abs(b))/b)*e^(-I*a/b)/(c*(-I*sqrt(2)*b/sqrt(abs(b)) + sqrt(2)*sqrt(
abs(b)))) - 1/2*I*sqrt(b*arcsin(c*x) + a)*e^(I*arcsin(c*x))/c + 1/2*I*sqrt(
b*arcsin(c*x) + a)*e^(-I*arcsin(c*x))/c
```

Mupad [F(-1)]

Timed out.

$$\int \sqrt{a+b\arcsin(cx)}\,dx=\int \sqrt{a+b\,\mathrm{asin}\left(c\,x\right)}\,dx$$

```
[In] int((a + b*asin(c*x))^(1/2),x)
[Out] int((a + b*asin(c*x))^(1/2), x)
```

3.176 $\int \frac{\sqrt{a+b \arcsin(cx)}}{x} dx$

Optimal result

Integrand size = 16, antiderivative size = 16

$$\int \frac{\sqrt{a+b \arcsin(cx)}}{x} dx = \text{Int}\left(\frac{\sqrt{a+b \arcsin(cx)}}{x}, x\right)$$

```
[Out] Unintegrable((a+b*arcsin(c*x))^(1/2)/x,x)
```

Rubi [N/A]

Not integrable

Time = 0.02 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\sqrt{a+b \arcsin(cx)}}{x} dx = \int \frac{\sqrt{a+b \arcsin(cx)}}{x} dx$$

```
[In] Int[Sqrt[a + b*ArcSin[c*x]]/x,x]
```

```
[Out] Defer[Int][Sqrt[a + b*ArcSin[c*x]]/x, x]
```

Rubi steps

$$\text{integral} = \int \frac{\sqrt{a+b \arcsin(cx)}}{x} dx$$

Mathematica [N/A]

Not integrable

Time = 1.85 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.12

$$\int \frac{\sqrt{a+b\arcsin(cx)}}{x}\,dx = \int \frac{\sqrt{a+b\arcsin(cx)}}{x}\,dx$$

```
[In] Integrate[Sqrt[a + b*ArcSin[c*x]]/x,x]
[Out] Integrate[Sqrt[a + b*ArcSin[c*x]]/x, x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.08 (sec) , antiderivative size = 14, normalized size of antiderivative = 0.88

$$\int \frac{\sqrt{a+b\arcsin(cx)}}{x}dx$$

```
[In] int((a+b*arcsin(c*x))^(1/2)/x,x)
[Out] int((a+b*arcsin(c*x))^(1/2)/x,x)
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{\sqrt{a+b\arcsin(cx)}}{x}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate((a+b*arcsin(c*x))^(1/2)/x,x, algorithm="fricas")
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [N/A]

Not integrable

Time = 0.39 (sec) , antiderivative size = 14, normalized size of antiderivative = 0.88

$$\int \frac{\sqrt{a+b\arcsin(cx)}}{x}\,dx = \int \frac{\sqrt{a+b\operatorname{asin}(cx)}}{x}\,dx$$

```
[In] integrate((a+b*asin(c*x))**(1/2)/x,x)
[Out] Integral(sqrt(a + b*asin(c*x))/x, x)
```

Maxima [N/A]

Not integrable

Time = 0.61 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.00

$$\int \frac{\sqrt{a+b\arcsin(cx)}}{x}\,dx=\int \frac{\sqrt{b\arcsin(cx)+a}}{x}\,dx$$

```
[In] integrate((a+b*arcsin(c*x))^(1/2)/x,x, algorithm="maxima")
[Out] integrate(sqrt(b*arcsin(c*x) + a)/x, x)
```

Giac [N/A]

Not integrable

Time = 0.89 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.00

$$\int \frac{\sqrt{a+b\arcsin(cx)}}{x}\,dx=\int \frac{\sqrt{b\arcsin(cx)+a}}{x}\,dx$$

```
[In] integrate((a+b*arcsin(c*x))^(1/2)/x,x, algorithm="giac")
[Out] integrate(sqrt(b*arcsin(c*x) + a)/x, x)
```

Mupad [N/A]

Not integrable

Time = 0.10 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.00

$$\int \frac{\sqrt{a+b\arcsin(cx)}}{x}\,dx=\int \frac{\sqrt{a+b\,\mathrm{asin}\left(c\,x\right)}}{x}\,dx$$

```
[In] int((a + b*asin(c*x))^(1/2)/x,x)
[Out] int((a + b*asin(c*x))^(1/2)/x, x)
```

3.177 $\int \frac{\sqrt{a+b\arcsin(cx)}}{x^2}\,dx$

Optimal result

Integrand size = 16, antiderivative size = 16

$$\int \frac{\sqrt{a+b\arcsin(cx)}}{x^2}\,dx = \operatorname{Int}\left(\frac{\sqrt{a+b\arcsin(cx)}}{x^2},x\right)$$

```
[Out] Unintegrable((a+b*arcsin(c*x))^(1/2)/x^2,x)
```

Rubi [N/A]

Not integrable

Time = 0.02 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\sqrt{a+b\arcsin(cx)}}{x^2}\,dx = \int \frac{\sqrt{a+b\arcsin(cx)}}{x^2}\,dx$$

```
[In] Int[Sqrt[a + b*ArcSin[c*x]]/x^2,x]
[Out] Defer[Int][Sqrt[a + b*ArcSin[c*x]]/x^2, x]
```

Rubi steps

$$\text{integral} = \int \frac{\sqrt{a+b\arcsin(cx)}}{x^2}\,dx$$

Mathematica [N/A]

Not integrable

Time = 5.65 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.12

$$\int \frac{\sqrt{a+b\arcsin(cx)}}{x^2}\,dx=\int \frac{\sqrt{a+b\arcsin(cx)}}{x^2}\,dx$$

```
[In] Integrate[Sqrt[a + b*ArcSin[c*x]]/x^2,x]
[Out] Integrate[Sqrt[a + b*ArcSin[c*x]]/x^2, x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.10 (sec) , antiderivative size = 14, normalized size of antiderivative = 0.88

$$\int \frac{\sqrt{a+b\arcsin\left(cx\right)}}{x^{2}}d x$$

```
[In] int((a+b*arcsin(c*x))^(1/2)/x^2,x)
[Out] int((a+b*arcsin(c*x))^(1/2)/x^2,x)
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{\sqrt{a+b\arcsin(cx)}}{x^2}\,dx=\text{Exception raised: TypeError}$$

```
[In] integrate((a+b*arcsin(c*x))^(1/2)/x^2,x, algorithm="fricas")
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [N/A]

Not integrable

Time = 0.36 (sec) , antiderivative size = 15, normalized size of antiderivative = 0.94

$$\int \frac{\sqrt{a+b\arcsin(cx)}}{x^2}\,dx=\int \frac{\sqrt{a+b\operatorname{asin}{\left(cx \right)}}}{x^{2}}\,dx$$

```
[In] integrate((a+b*asin(c*x))**(1/2)/x**2,x)
[Out] Integral(sqrt(a + b*asin(c*x))/x**2, x)
```

Maxima [N/A]

Not integrable

Time = 0.61 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.00

$$\int \frac{\sqrt{a + b \arcsin(cx)}}{x^2} \, dx = \int \frac{\sqrt{b \arcsin(cx) + a}}{x^2} \, dx$$

```
[In] integrate((a+b*arcsin(c*x))^(1/2)/x^2,x, algorithm="maxima")
[Out] integrate(sqrt(b*arcsin(c*x) + a)/x^2, x)
```

Giac [N/A]

Not integrable

Time = 0.96 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.00

$$\int \frac{\sqrt{a + b \arcsin(cx)}}{x^2} \, dx = \int \frac{\sqrt{b \arcsin(cx) + a}}{x^2} \, dx$$

```
[In] integrate((a+b*arcsin(c*x))^(1/2)/x^2,x, algorithm="giac")
[Out] integrate(sqrt(b*arcsin(c*x) + a)/x^2, x)
```

Mupad [N/A]

Not integrable

Time = 0.09 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.00

$$\int \frac{\sqrt{a + b \arcsin(cx)}}{x^2} \, dx = \int \frac{\sqrt{a + b \operatorname{asin}(c\,x)}}{x^2} \, dx$$

```
[In] int((a + b*asin(c*x))^(1/2)/x^2,x)
[Out] int((a + b*asin(c*x))^(1/2)/x^2, x)
```

3.178 $\int x^2(a+b\arcsin(cx))^{3/2}\,dx$

Optimal result

Integrand size = 16, antiderivative size = 313

$$\begin{aligned}\int x^2(a+b\arcsin(cx))^{3/2}\,dx &= \frac{b\sqrt{1-c^2x^2}\sqrt{a+b\arcsin(cx)}}{3c^3} \\ &+ \frac{bx^2\sqrt{1-c^2x^2}\sqrt{a+b\arcsin(cx)}}{6c} \\ &+ \frac{1}{3}x^3(a+b\arcsin(cx))^{3/2} - \frac{3b^{3/2}\sqrt{\frac{\pi}{2}}\cos\left(\frac{a}{b}\right)\operatorname{FresnelC}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{8c^3} \\ &+ \frac{b^{3/2}\sqrt{\frac{\pi}{6}}\cos\left(\frac{3a}{b}\right)\operatorname{FresnelC}\left(\frac{\sqrt{\frac{6}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{24c^3} \\ &- \frac{3b^{3/2}\sqrt{\frac{\pi}{2}}\operatorname{FresnelS}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)\sin\left(\frac{a}{b}\right)}{8c^3} \\ &+ \frac{b^{3/2}\sqrt{\frac{\pi}{6}}\operatorname{FresnelS}\left(\frac{\sqrt{\frac{6}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)\sin\left(\frac{3a}{b}\right)}{24c^3}\end{aligned}$$

```
[Out] 1/3*x^3*(a+b*arcsin(c*x))^(3/2)+1/144*b^(3/2)*cos(3*a/b)*FresnelC(6^(1/2)/P
i^(1/2)*(a+b*arcsin(c*x))^(1/2)/b^(1/2))*6^(1/2)*Pi^(1/2)/c^3+1/144*b^(3/2)
*FresnelS(6^(1/2)/Pi^(1/2)*(a+b*arcsin(c*x))^(1/2)/b^(1/2))*sin(3*a/b)*6^(1
/2)*Pi^(1/2)/c^3-3/16*b^(3/2)*cos(a/b)*FresnelC(2^(1/2)/Pi^(1/2)*(a+b*arcsi
n(c*x))^(1/2)/b^(1/2))*2^(1/2)*Pi^(1/2)/c^3-3/16*b^(3/2)*FresnelS(2^(1/2)/P
i^(1/2)*(a+b*arcsin(c*x))^(1/2)/b^(1/2))*sin(a/b)*2^(1/2)*Pi^(1/2)/c^3+1/3*
b*(-c^2*x^2+1)^(1/2)*(a+b*arcsin(c*x))^(1/2)/c^3+1/6*b*x^2*(-c^2*x^2+1)^(1/
2)*(a+b*arcsin(c*x))^(1/2)/c
```

Rubi [A] (verified)

Time = 0.54 (sec) , antiderivative size = 313, normalized size of antiderivative = 1.00, number of steps used = 22, number of rules used = 11, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.688, Rules used = {4725, 4795, 4767, 4719, 3387, 3386, 3432, 3385, 3433, 4731, 4491}

$$\int x^2(a+b\arcsin(cx))^{3/2}\,dx=-\frac{3\sqrt{\frac{\pi}{2}}b^{3/2}\cos\left(\frac{a}{b}\right)\text{FresnelC}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{8c^3}+\frac{\sqrt{\frac{\pi}{6}}b^{3/2}\cos\left(\frac{3a}{b}\right)\text{FresnelC}\left(\frac{\sqrt{\frac{6}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{24c^3}-\frac{3\sqrt{\frac{\pi}{2}}b^{3/2}\sin\left(\frac{a}{b}\right)\text{FresnelS}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{8c^3}+\frac{\sqrt{\frac{\pi}{6}}b^{3/2}\sin\left(\frac{3a}{b}\right)\text{FresnelS}\left(\frac{\sqrt{\frac{6}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{24c^3}+\frac{bx^2\sqrt{1-c^2x^2}\sqrt{a+b\arcsin(cx)}}{6c}+\frac{b\sqrt{1-c^2x^2}\sqrt{a+b\arcsin(cx)}}{3c^3}+\frac{1}{3}x^3(a+b\arcsin(cx))^{3/2}$$

```
[In] Int[x^2*(a + b*ArcSin[c*x])^(3/2),x]
```

```
[Out] (b*Sqrt[1 - c^2*x^2]*Sqrt[a + b*ArcSin[c*x]])/(3*c^3) + (b*x^2*Sqrt[1 - c^2
*x^2]*Sqrt[a + b*ArcSin[c*x]])/(6*c) + (x^3*(a + b*ArcSin[c*x])^(3/2))/3 -
(3*b^(3/2)*Sqrt[Pi/2]*Cos[a/b]*FresnelC[(Sqrt[2/Pi]*Sqrt[a + b*ArcSin[c*x]]
)/Sqrt[b]])/(8*c^3) + (b^(3/2)*Sqrt[Pi/6]*Cos[(3*a)/b]*FresnelC[(Sqrt[6/Pi]
*Sqrt[a + b*ArcSin[c*x]])/Sqrt[b]])/(24*c^3) - (3*b^(3/2)*Sqrt[Pi/2]*Fresne
lS[(Sqrt[2/Pi]*Sqrt[a + b*ArcSin[c*x]])/Sqrt[b]]*Sin[a/b])/(8*c^3) + (b^(3/
2)*Sqrt[Pi/6]*FresnelS[(Sqrt[6/Pi]*Sqrt[a + b*ArcSin[c*x]])/Sqrt[b]]*Sin[(3
*a)/b])/(24*c^3)
```

Rule 3385

```
Int[sin[Pi/2 + (e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> D
ist[2/d, Subst[Int[Cos[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d
, e, f}, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3386

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[2/d
, Subst[Int[Sin[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d, e, f}
, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3387

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[Cos
[(d*e - c*f)/d], Int[Sin[c*(f/d) + f*x]/Sqrt[c + d*x], x], x] + Dist[Sin[(d
*e - c*f)/d], Int[Cos[c*(f/d) + f*x]/Sqrt[c + d*x], x], x] /; FreeQ[{c, d,
e, f}, x] && ComplexFreeQ[f] && NeQ[d*e - c*f, 0]
```

Rule 3432

```
Int[Sin[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelS[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 3433

```
Int[Cos[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelC[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4491

```
Int[Cos[(a_.) + (b_.)*(x_)]^(p_.)*((c_.) + (d_.)*(x_))^(m_.)*Sin[(a_.) + (b
_.)*(x_)]^(n_.), x_Symbol] :> Int[ExpandTrigReduce[(c + d*x)^m, Sin[a + b*x
]^n*Cos[a + b*x]^p, x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && IG
tQ[p, 0]
```

Rule 4719

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_), x_Symbol] :> Dist[1/(b*c), Sub
st[Int[x^n*Cos[-a/b + x/b], x], x, a + b*ArcSin[c*x]], x] /; FreeQ[{a, b, c
, n}, x]
```

Rule 4725

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^(m + 1)*((a + b*ArcSin[c*x])^n/(m + 1)), x] - Dist[b*c*(n/(m + 1)), Int[x^
(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*x^2]), x], x] /; FreeQ[{a
, b, c}, x] && IGtQ[m, 0] && GtQ[n, 0]
```

Rule 4731

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Dist[1
/(b*c^(m + 1)), Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b], x], x, a +
 b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, n}, x] && IGtQ[m, 0]
```

Rule 4767

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)*((d_) + (e_.)*(x_)^2)^(p_
.), x_Symbol] :> Simp[(d + e*x^2)^(p + 1)*((a + b*ArcSin[c*x])^n/(2*e*(p +
1))), x] + Dist[b*(n/(2*c*(p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], In
```

```
t[(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x] /; FreeQ[{a,
b, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && NeQ[p, -1]
```

Rule 4795

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_)*((d_) + (e_.
)*(x_)^2)^(p_), x_Symbol] :> Simp[f*(f*x)^(m - 1)*(d + e*x^2)^(p + 1)*((a +
 b*ArcSin[c*x])^n/(e*(m + 2*p + 1))), x] + (Dist[f^2*((m - 1)/(c^2*(m + 2*p
 + 1))), Int[(f*x)^(m - 2)*(d + e*x^2)^p*(a + b*ArcSin[c*x])^n, x], x] + Di
st[b*f*(n/(c*(m + 2*p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], Int[(f*x)
^(m - 1)*(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x]) /; Fr
eeQ[{a, b, c, d, e, f, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && IGtQ[m,
1] && NeQ[m + 2*p + 1, 0]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= \frac{1}{3}x^3(a+b\arcsin(cx))^{3/2}-\frac{1}{2}(bc)\int\frac{x^3\sqrt{a+b\arcsin(cx)}}{\sqrt{1-c^2x^2}}\,dx\\
&= \frac{bx^2\sqrt{1-c^2x^2}\sqrt{a+b\arcsin(cx)}}{6c}+\frac{1}{3}x^3(a+b\arcsin(cx))^{3/2}\\
&\quad -\frac{1}{12}b^2\int\frac{x^2}{\sqrt{a+b\arcsin(cx)}}\,dx-\frac{b\int\frac{x\sqrt{a+b\arcsin(cx)}}{\sqrt{1-c^2x^2}}\,dx}{3c}\\
&= \frac{b\sqrt{1-c^2x^2}\sqrt{a+b\arcsin(cx)}}{3c^3}+\frac{bx^2\sqrt{1-c^2x^2}\sqrt{a+b\arcsin(cx)}}{6c}+\frac{1}{3}x^3(a\\
&\qquad +b\arcsin(cx))^{3/2}\\
&\quad -\frac{b\text{Subst}\left(\int\frac{\cos\left(\frac{a}{b}-\frac{x}{b}\right)\sin^2\left(\frac{a}{b}-\frac{x}{b}\right)}{\sqrt{x}}\,dx,x,a+b\arcsin(cx)\right)}{12c^3}-\frac{b^2\int\frac{1}{\sqrt{a+b\arcsin(cx)}}\,dx}{6c^2}\\
&= \frac{b\sqrt{1-c^2x^2}\sqrt{a+b\arcsin(cx)}}{3c^3}\\
&\quad +\frac{bx^2\sqrt{1-c^2x^2}\sqrt{a+b\arcsin(cx)}}{6c}+\frac{1}{3}x^3(a+b\arcsin(cx))^{3/2}\\
&\quad -\frac{b\text{Subst}\left(\int\left(-\frac{\cos\left(\frac{3a}{b}-\frac{3x}{b}\right)}{4\sqrt{x}}+\frac{\cos\left(\frac{a}{b}-\frac{x}{b}\right)}{4\sqrt{x}}\right)dx,x,a+b\arcsin(cx)\right)}{12c^3}\\
&\quad -\frac{b\text{Subst}\left(\int\frac{\cos\left(\frac{a}{b}-\frac{x}{b}\right)}{\sqrt{x}}\,dx,x,a+b\arcsin(cx)\right)}{6c^3}
\end{aligned}$$

$$= \frac{b\sqrt{1-c^2x^2}\sqrt{a+b\arcsin(cx)}}{3c^3} + \frac{bx^2\sqrt{1-c^2x^2}\sqrt{a+b\arcsin(cx)}}{6c}$$
$$+ \frac{1}{3}x^3(a+b\arcsin(cx))^{3/2} + \frac{b\text{Subst}\left(\int \frac{\cos\left(\frac{3a}{b}-\frac{3x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{48c^3}$$
$$- \frac{b\text{Subst}\left(\int \frac{\cos\left(\frac{a}{b}-\frac{x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{48c^3}$$
$$- \frac{\left(b\cos\left(\frac{a}{b}\right)\right)\text{Subst}\left(\int \frac{\cos\left(\frac{x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{6c^3}$$
$$- \frac{\left(b\sin\left(\frac{a}{b}\right)\right)\text{Subst}\left(\int \frac{\sin\left(\frac{x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{6c^3}$$

$$= \frac{b\sqrt{1-c^2x^2}\sqrt{a+b\arcsin(cx)}}{3c^3} + \frac{bx^2\sqrt{1-c^2x^2}\sqrt{a+b\arcsin(cx)}}{6c}$$
$$+ \frac{1}{3}x^3(a+b\arcsin(cx))^{3/2} - \frac{\left(b\cos\left(\frac{a}{b}\right)\right)\text{Subst}\left(\int \frac{\cos\left(\frac{x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{48c^3}$$
$$- \frac{\left(b\cos\left(\frac{a}{b}\right)\right)\text{Subst}\left(\int \cos\left(\frac{x^2}{b}\right)\,dx, x, \sqrt{a+b\arcsin(cx)}\right)}{3c^3}$$
$$+ \frac{\left(b\cos\left(\frac{3a}{b}\right)\right)\text{Subst}\left(\int \frac{\cos\left(\frac{3x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{48c^3}$$
$$- \frac{\left(b\sin\left(\frac{a}{b}\right)\right)\text{Subst}\left(\int \frac{\sin\left(\frac{x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{48c^3}$$
$$- \frac{\left(b\sin\left(\frac{a}{b}\right)\right)\text{Subst}\left(\int \sin\left(\frac{x^2}{b}\right)\,dx, x, \sqrt{a+b\arcsin(cx)}\right)}{3c^3}$$
$$+ \frac{\left(b\sin\left(\frac{3a}{b}\right)\right)\text{Subst}\left(\int \frac{\sin\left(\frac{3x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{48c^3}$$

$$= \frac{b\sqrt{1-c^2x^2}\sqrt{a+b\arcsin(cx)}}{3c^3} + \frac{bx^2\sqrt{1-c^2x^2}\sqrt{a+b\arcsin(cx)}}{6c} + \frac{1}{3}x^3(a+b\arcsin(cx))^{3/2} - \frac{b^{3/2}\sqrt{\frac{\pi}{2}}\cos\left(\frac{a}{b}\right)\text{FresnelC}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{3c^3} - \frac{b^{3/2}\sqrt{\frac{\pi}{2}}\text{FresnelS}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)\sin\left(\frac{a}{b}\right)}{3c^3} - \frac{\left(b\cos\left(\frac{a}{b}\right)\right)\text{Subst}\left(\int\cos\left(\frac{x^2}{b}\right)\,dx, x, \sqrt{a+b\arcsin(cx)}\right)}{24c^3} + \frac{\left(b\cos\left(\frac{3a}{b}\right)\right)\text{Subst}\left(\int\cos\left(\frac{3x^2}{b}\right)\,dx, x, \sqrt{a+b\arcsin(cx)}\right)}{24c^3} - \frac{\left(b\sin\left(\frac{a}{b}\right)\right)\text{Subst}\left(\int\sin\left(\frac{x^2}{b}\right)\,dx, x, \sqrt{a+b\arcsin(cx)}\right)}{24c^3} + \frac{\left(b\sin\left(\frac{3a}{b}\right)\right)\text{Subst}\left(\int\sin\left(\frac{3x^2}{b}\right)\,dx, x, \sqrt{a+b\arcsin(cx)}\right)}{24c^3}$$

$$= \frac{b\sqrt{1-c^2x^2}\sqrt{a+b\arcsin(cx)}}{3c^3} + \frac{bx^2\sqrt{1-c^2x^2}\sqrt{a+b\arcsin(cx)}}{6c} + \frac{1}{3}x^3(a+b\arcsin(cx))^{3/2} - \frac{3b^{3/2}\sqrt{\frac{\pi}{2}}\cos\left(\frac{a}{b}\right)\text{FresnelC}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{8c^3} + \frac{b^{3/2}\sqrt{\frac{\pi}{6}}\cos\left(\frac{3a}{b}\right)\text{FresnelC}\left(\frac{\sqrt{\frac{6}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{24c^3} - \frac{3b^{3/2}\sqrt{\frac{\pi}{2}}\text{FresnelS}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)\sin\left(\frac{a}{b}\right)}{8c^3} + \frac{b^{3/2}\sqrt{\frac{\pi}{6}}\text{FresnelS}\left(\frac{\sqrt{\frac{6}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)\sin\left(\frac{3a}{b}\right)}{24c^3}$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.22 (sec) , antiderivative size = 245, normalized size of antiderivative = 0.78

$$\int x^2(a+b\arcsin(cx))^{3/2}\,dx = \frac{be^{-\frac{3ia}{b}}\sqrt{a+b\arcsin(cx)}\left(27e^{\frac{2ia}{b}}\sqrt{\frac{i(a+b\arcsin(cx))}{b}}\Gamma\left(\frac{5}{2},-\frac{i(a+b\arcsin(cx))}{b}\right)+27e^{\frac{4ia}{b}}\sqrt{-\frac{i(a}{}}\right.}{}$$

```
[In] Integrate[x^2*(a + b*ArcSin[c*x])^(3/2),x]
```

```
[Out] (b*Sqrt[a + b*ArcSin[c*x]]*(27*E^(((2*I)*a)/b)*Sqrt[(I*(a + b*ArcSin[c*x]))
/b]*Gamma[5/2, ((-I)*(a + b*ArcSin[c*x]))/b] + 27*E^(((4*I)*a)/b)*Sqrt[((-I
)*(a + b*ArcSin[c*x]))/b]*Gamma[5/2, (I*(a + b*ArcSin[c*x]))/b] - Sqrt[3]*(
Sqrt[(I*(a + b*ArcSin[c*x]))/b]*Gamma[5/2, ((-3*I)*(a + b*ArcSin[c*x]))/b]
+ E^(((6*I)*a)/b)*Sqrt[((-I)*(a + b*ArcSin[c*x]))/b]*Gamma[5/2, ((3*I)*(a +
 b*ArcSin[c*x]))/b])))/(216*c^3*E^(((3*I)*a)/b)*Sqrt[(a + b*ArcSin[c*x])^2/
b^2])
```

Maple [B] (verified)

Leaf count of result is larger than twice the leaf count of optimal. 546 vs. 2(241) = 482.

Time = 0.10 (sec) , antiderivative size = 547, normalized size of antiderivative = 1.75

method	result
default	$-\frac{-\sqrt{-\frac{3}{b}}\,\sqrt{\pi}\,\sqrt{2}\,\sqrt{a+b\arcsin(cx)}\,\cos\left(\frac{3a}{b}\right)\operatorname{FresnelC}\left(\frac{3\sqrt{2}\,\sqrt{a+b\arcsin(cx)}}{\sqrt{\pi}\,\sqrt{-\frac{3}{b}}\,b}\right)b^{2}+\sqrt{-\frac{3}{b}}\,\sqrt{\pi}\,\sqrt{2}\,\sqrt{a+b\arcsin(cx)}\,\sin\left(\frac{3a}{b}\right)\operatorname{FresnelS}\left(\frac{3\sqrt{}}{}\right.}{}$

```
[In] int(x^2*(a+b*arcsin(c*x))^(3/2),x,method=_RETURNVERBOSE)
```

```
[Out] -1/144/c^3*(-(-3/b)^(1/2)*Pi^(1/2)*2^(1/2)*(a+b*arcsin(c*x))^(1/2)*cos(3*a/
b)*FresnelC(3*2^(1/2)/Pi^(1/2)/(-3/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)/b)*b^2+
(-3/b)^(1/2)*Pi^(1/2)*2^(1/2)*(a+b*arcsin(c*x))^(1/2)*sin(3*a/b)*FresnelS(3
*2^(1/2)/Pi^(1/2)/(-3/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)/b)*b^2+27*Pi^(1/2)*2
^(1/2)*(a+b*arcsin(c*x))^(1/2)*cos(a/b)*FresnelC(2^(1/2)/Pi^(1/2)/(-1/b)^(1
/2)*(a+b*arcsin(c*x))^(1/2)/b)*(-1/b)^(1/2)*b^2-27*Pi^(1/2)*2^(1/2)*(a+b*ar
csin(c*x))^(1/2)*sin(a/b)*FresnelS(2^(1/2)/Pi^(1/2)/(-1/b)^(1/2)*(a+b*arcsi
n(c*x))^(1/2)/b)*(-1/b)^(1/2)*b^2+36*arcsin(c*x)^2*sin(-(a+b*arcsin(c*x))/b
+a/b)*b^2-12*arcsin(c*x)^2*sin(-3*(a+b*arcsin(c*x))/b+3*a/b)*b^2+72*arcsin(
c*x)*sin(-(a+b*arcsin(c*x))/b+a/b)*a*b-54*arcsin(c*x)*cos(-(a+b*arcsin(c*x)
)/b+a/b)*b^2-24*arcsin(c*x)*sin(-3*(a+b*arcsin(c*x))/b+3*a/b)*a*b+6*arcsin(
c*x)*cos(-3*(a+b*arcsin(c*x))/b+3*a/b)*b^2+36*sin(-(a+b*arcsin(c*x))/b+a/b)
*a^2-54*cos(-(a+b*arcsin(c*x))/b+a/b)*a*b-12*sin(-3*(a+b*arcsin(c*x))/b+3*a
/b)*a^2+6*cos(-3*(a+b*arcsin(c*x))/b+3*a/b)*a*b)/(a+b*arcsin(c*x))^(1/2)
```

Fricas [F(-2)]

Exception generated.

$$\int x^2(a+b\arcsin(cx))^{3/2}\,dx=\text{Exception raised: TypeError}$$

```
[In] integrate(x^2*(a+b*arcsin(c*x))^(3/2),x, algorithm="fricas")
```

```
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int x^2(a+b\arcsin(cx))^{3/2}\,dx=\int x^2(a+b\operatorname{asin}(cx))^{\frac{3}{2}}\,dx$$

```
[In] integrate(x**2*(a+b*asin(c*x))**(3/2),x)
```

```
[Out] Integral(x**2*(a + b*asin(c*x))**(3/2), x)
```

Maxima [F]

$$\int x^2(a+b\arcsin(cx))^{3/2}\,dx=\int (b\arcsin(cx)+a)^{\frac{3}{2}}x^2\,dx$$

```
[In] integrate(x^2*(a+b*arcsin(c*x))^(3/2),x, algorithm="maxima")
```

```
[Out] integrate((b*arcsin(c*x) + a)^(3/2)*x^2, x)
```

Giac [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 1.68 (sec) , antiderivative size = 1967, normalized size of antiderivative = 6.28

$$\int x^2(a+b\arcsin(cx))^{3/2}\,dx=\text{Too large to display}$$

```
[In] integrate(x^2*(a+b*arcsin(c*x))^(3/2),x, algorithm="giac")
```

```
[Out] 1/8*sqrt(2)*sqrt(pi)*a^2*b^2*erf(-1/2*I*sqrt(2)*sqrt(b*arcsin(c*x) + a)/sqr
t(abs(b)) - 1/2*sqrt(2)*sqrt(b*arcsin(c*x) + a)*sqrt(abs(b))/b)*e^(I*a/b)/(
(I*b^3/sqrt(abs(b)) + b^2*sqrt(abs(b)))*c^3) + 1/8*I*sqrt(2)*sqrt(pi)*a*b^3
```

*erf(-1/2*I*sqrt(2)*sqrt(b*arcsin(c*x) + a)/sqrt(abs(b)) - 1/2*sqrt(2)*sqrt
(b*arcsin(c*x) + a)*sqrt(abs(b))/b)*e^(I*a/b)/((I*b^3/sqrt(abs(b)) + b^2*sq
rt(abs(b)))*c^3) + 1/8*sqrt(2)*sqrt(pi)*a^2*b^2*erf(1/2*I*sqrt(2)*sqrt(b*ar
csin(c*x) + a)/sqrt(abs(b)) - 1/2*sqrt(2)*sqrt(b*arcsin(c*x) + a)*sqrt(abs(
b))/b)*e^(-I*a/b)/((-I*b^3/sqrt(abs(b)) + b^2*sqrt(abs(b)))*c^3) - 1/8*I*sq
rt(2)*sqrt(pi)*a*b^3*erf(1/2*I*sqrt(2)*sqrt(b*arcsin(c*x) + a)/sqrt(abs(b))
 - 1/2*sqrt(2)*sqrt(b*arcsin(c*x) + a)*sqrt(abs(b))/b)*e^(-I*a/b)/((-I*b^3/
sqrt(abs(b)) + b^2*sqrt(abs(b)))*c^3) - 1/4*sqrt(pi)*a^2*b^(3/2)*erf(-1/2*s
qrt(6)*sqrt(b*arcsin(c*x) + a)/sqrt(b) - 1/2*I*sqrt(6)*sqrt(b*arcsin(c*x) +
 a)*sqrt(b)/abs(b))*e^(3*I*a/b)/((sqrt(6)*b^2 + I*sqrt(6)*b^3/abs(b))*c^3)
 - 1/12*I*sqrt(pi)*a*b^(5/2)*erf(-1/2*sqrt(6)*sqrt(b*arcsin(c*x) + a)/sqrt(b
) - 1/2*I*sqrt(6)*sqrt(b*arcsin(c*x) + a)*sqrt(b)/abs(b))*e^(3*I*a/b)/((sqr
t(6)*b^2 + I*sqrt(6)*b^3/abs(b))*c^3) - 1/8*I*sqrt(2)*sqrt(pi)*a*b^2*erf(-1
/2*I*sqrt(2)*sqrt(b*arcsin(c*x) + a)/sqrt(abs(b)) - 1/2*sqrt(2)*sqrt(b*arcs
in(c*x) + a)*sqrt(abs(b))/b)*e^(I*a/b)/((I*b^2/sqrt(abs(b)) + b*sqrt(abs(b)
))*c^3) + 3/32*sqrt(2)*sqrt(pi)*b^3*erf(-1/2*I*sqrt(2)*sqrt(b*arcsin(c*x) +
 a)/sqrt(abs(b)) - 1/2*sqrt(2)*sqrt(b*arcsin(c*x) + a)*sqrt(abs(b))/b)*e^(I
*a/b)/((I*b^2/sqrt(abs(b)) + b*sqrt(abs(b)))*c^3) + 1/8*I*sqrt(2)*sqrt(pi)*
a*b^2*erf(1/2*I*sqrt(2)*sqrt(b*arcsin(c*x) + a)/sqrt(abs(b)) - 1/2*sqrt(2)*
sqrt(b*arcsin(c*x) + a)*sqrt(abs(b))/b)*e^(-I*a/b)/((-I*b^2/sqrt(abs(b)) +
b*sqrt(abs(b)))*c^3) + 3/32*sqrt(2)*sqrt(pi)*b^3*erf(1/2*I*sqrt(2)*sqrt(b*a
rcsin(c*x) + a)/sqrt(abs(b)) - 1/2*sqrt(2)*sqrt(b*arcsin(c*x) + a)*sqrt(abs
(b))/b)*e^(-I*a/b)/((-I*b^2/sqrt(abs(b)) + b*sqrt(abs(b)))*c^3) - 1/4*sqrt(
pi)*a^2*b^(3/2)*erf(-1/2*sqrt(6)*sqrt(b*arcsin(c*x) + a)/sqrt(b) + 1/2*I*sq
rt(6)*sqrt(b*arcsin(c*x) + a)*sqrt(b)/abs(b))*e^(-3*I*a/b)/((sqrt(6)*b^2 -
I*sqrt(6)*b^3/abs(b))*c^3) + 1/12*I*sqrt(pi)*a*b^(5/2)*erf(-1/2*sqrt(6)*sqr
t(b*arcsin(c*x) + a)/sqrt(b) + 1/2*I*sqrt(6)*sqrt(b*arcsin(c*x) + a)*sqrt(b
)/abs(b))*e^(-3*I*a/b)/((sqrt(6)*b^2 - I*sqrt(6)*b^3/abs(b))*c^3) + 1/4*sqr
t(pi)*a^2*b*erf(-1/2*sqrt(6)*sqrt(b*arcsin(c*x) + a)/sqrt(b) - 1/2*I*sqrt(6
)*sqrt(b*arcsin(c*x) + a)*sqrt(b)/abs(b))*e^(3*I*a/b)/((sqrt(6)*b^(3/2) + I
*sqrt(6)*b^(5/2)/abs(b))*c^3) + 1/12*I*sqrt(pi)*a*b^2*erf(-1/2*sqrt(6)*sqrt
(b*arcsin(c*x) + a)/sqrt(b) - 1/2*I*sqrt(6)*sqrt(b*arcsin(c*x) + a)*sqrt(b)
/abs(b))*e^(3*I*a/b)/((sqrt(6)*b^(3/2) + I*sqrt(6)*b^(5/2)/abs(b))*c^3) - 1
/4*sqrt(pi)*a^2*b*erf(-1/2*I*sqrt(2)*sqrt(b*arcsin(c*x) + a)/sqrt(abs(b)) -
 1/2*sqrt(2)*sqrt(b*arcsin(c*x) + a)*sqrt(abs(b))/b)*e^(I*a/b)/((I*sqrt(2)*
b^2/sqrt(abs(b)) + sqrt(2)*b*sqrt(abs(b)))*c^3) - 1/4*sqrt(pi)*a^2*b*erf(1/
2*I*sqrt(2)*sqrt(b*arcsin(c*x) + a)/sqrt(abs(b)) - 1/2*sqrt(2)*sqrt(b*arcsi
n(c*x) + a)*sqrt(abs(b))/b)*e^(-I*a/b)/((-I*sqrt(2)*b^2/sqrt(abs(b)) + sqrt
(2)*b*sqrt(abs(b)))*c^3) + 1/4*sqrt(pi)*a^2*b*erf(-1/2*sqrt(6)*sqrt(b*arcsi
n(c*x) + a)/sqrt(b) + 1/2*I*sqrt(6)*sqrt(b*arcsin(c*x) + a)*sqrt(b)/abs(b))
*e^(-3*I*a/b)/((sqrt(6)*b^(3/2) - I*sqrt(6)*b^(5/2)/abs(b))*c^3) - 1/12*I*s
qrt(pi)*a*b^2*erf(-1/2*sqrt(6)*sqrt(b*arcsin(c*x) + a)/sqrt(b) + 1/2*I*sqrt
(6)*sqrt(b*arcsin(c*x) + a)*sqrt(b)/abs(b))*e^(-3*I*a/b)/((sqrt(6)*b^(3/2)
 - I*sqrt(6)*b^(5/2)/abs(b))*c^3) - 1/48*sqrt(pi)*b^(5/2)*erf(-1/2*sqrt(6)*s
qrt(b*arcsin(c*x) + a)/sqrt(b) - 1/2*I*sqrt(6)*sqrt(b*arcsin(c*x) + a)*sqrt

```
(b)/abs(b))*e^(3*I*a/b)/((sqrt(6)*b + I*sqrt(6)*b^2/abs(b))*c^3) - 1/48*sqr
t(pi)*b^(5/2)*erf(-1/2*sqrt(6)*sqrt(b*arcsin(c*x) + a)/sqrt(b) + 1/2*I*sqrt
(6)*sqrt(b*arcsin(c*x) + a)*sqrt(b)/abs(b))*e^(-3*I*a/b)/((sqrt(6)*b - I*sq
rt(6)*b^2/abs(b))*c^3) + 1/24*I*sqrt(b*arcsin(c*x) + a)*b*arcsin(c*x)*e^(3*
I*arcsin(c*x))/c^3 - 1/8*I*sqrt(b*arcsin(c*x) + a)*b*arcsin(c*x)*e^(I*arcsi
n(c*x))/c^3 + 1/8*I*sqrt(b*arcsin(c*x) + a)*b*arcsin(c*x)*e^(-I*arcsin(c*x)
)/c^3 - 1/24*I*sqrt(b*arcsin(c*x) + a)*b*arcsin(c*x)*e^(-3*I*arcsin(c*x))/c
^3 + 1/24*I*sqrt(b*arcsin(c*x) + a)*a*e^(3*I*arcsin(c*x))/c^3 - 1/48*sqrt(b
*arcsin(c*x) + a)*b*e^(3*I*arcsin(c*x))/c^3 - 1/8*I*sqrt(b*arcsin(c*x) + a)
*a*e^(I*arcsin(c*x))/c^3 + 3/16*sqrt(b*arcsin(c*x) + a)*b*e^(I*arcsin(c*x))
/c^3 + 1/8*I*sqrt(b*arcsin(c*x) + a)*a*e^(-I*arcsin(c*x))/c^3 + 3/16*sqrt(b
*arcsin(c*x) + a)*b*e^(-I*arcsin(c*x))/c^3 - 1/24*I*sqrt(b*arcsin(c*x) + a)
*a*e^(-3*I*arcsin(c*x))/c^3 - 1/48*sqrt(b*arcsin(c*x) + a)*b*e^(-3*I*arcsin
(c*x))/c^3
```

Mupad [F(-1)]

Timed out.

$$\int x^2(a+b\arcsin(cx))^{3/2}\,dx=\int x^2\,\left(a+b\,\mathrm{asin}(c\,x)\right)^{3/2}\,dx$$

```
[In] int(x^2*(a + b*asin(c*x))^(3/2),x)
[Out] int(x^2*(a + b*asin(c*x))^(3/2), x)
```

3.179 $\int x(a+b\arcsin(cx))^{3/2}\,dx$

Optimal result

Integrand size = 14, antiderivative size = 172

$$\int x(a+b\arcsin(cx))^{3/2}\,dx=\frac{3bx\sqrt{1-c^2x^2}\sqrt{a+b\arcsin(cx)}}{8c}-\frac{(a+b\arcsin(cx))^{3/2}}{4c^2}+\frac{1}{2}x^2(a+b\arcsin(cx))^{3/2}-\frac{3b^{3/2}\sqrt{\pi}\cos\left(\frac{2a}{b}\right)\text{FresnelS}\left(\frac{2\sqrt{a+b\arcsin(cx)}}{\sqrt{b}\sqrt{\pi}}\right)}{32c^2}+\frac{3b^{3/2}\sqrt{\pi}\,\text{FresnelC}\left(\frac{2\sqrt{a+b\arcsin(cx)}}{\sqrt{b}\sqrt{\pi}}\right)\sin\left(\frac{2a}{b}\right)}{32c^2}$$

```
[Out] -1/4*(a+b*arcsin(c*x))^(3/2)/c^2+1/2*x^2*(a+b*arcsin(c*x))^(3/2)-3/32*b^(3/
2)*cos(2*a/b)*FresnelS(2*(a+b*arcsin(c*x))^(1/2)/b^(1/2)/Pi^(1/2))*Pi^(1/2)
/c^2+3/32*b^(3/2)*FresnelC(2*(a+b*arcsin(c*x))^(1/2)/b^(1/2)/Pi^(1/2))*sin(
2*a/b)*Pi^(1/2)/c^2+3/8*b*x*(-c^2*x^2+1)^(1/2)*(a+b*arcsin(c*x))^(1/2)/c
```

Rubi [A] (verified)

Time = 0.26 (sec) , antiderivative size = 172, normalized size of antiderivative = 1.00, number of steps used = 11, number of rules used = 11, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.786, Rules used = {4725, 4795, 4737, 4731, 4491, 12, 3387, 3386, 3432, 3385, 3433}

$$\int x(a+b\arcsin(cx))^{3/2}\,dx=\frac{3\sqrt{\pi}b^{3/2}\sin\left(\frac{2a}{b}\right)\text{FresnelC}\left(\frac{2\sqrt{a+b\arcsin(cx)}}{\sqrt{b}\sqrt{\pi}}\right)}{32c^2}-\frac{3\sqrt{\pi}b^{3/2}\cos\left(\frac{2a}{b}\right)\text{FresnelS}\left(\frac{2\sqrt{a+b\arcsin(cx)}}{\sqrt{b}\sqrt{\pi}}\right)}{32c^2}+\frac{3bx\sqrt{1-c^2x^2}\sqrt{a+b\arcsin(cx)}}{8c}-\frac{(a+b\arcsin(cx))^{3/2}}{4c^2}+\frac{1}{2}x^2(a+b\arcsin(cx))^{3/2}$$

```
[In] Int[x*(a + b*ArcSin[c*x])^(3/2),x]
```

```
[Out] (3*b*x*Sqrt[1 - c^2*x^2]*Sqrt[a + b*ArcSin[c*x]])/(8*c) - (a + b*ArcSin[c*x
])^(3/2)/(4*c^2) + (x^2*(a + b*ArcSin[c*x])^(3/2))/2 - (3*b^(3/2)*Sqrt[Pi]*
Cos[(2*a)/b]*FresnelS[(2*Sqrt[a + b*ArcSin[c*x]])/(Sqrt[b]*Sqrt[Pi])])/(32*
c^2) + (3*b^(3/2)*Sqrt[Pi]*FresnelC[(2*Sqrt[a + b*ArcSin[c*x]])/(Sqrt[b]*Sq
rt[Pi])]*Sin[(2*a)/b])/(32*c^2)
```

Rule 12

```
Int[(a_)*(u_), x_Symbol] :> Dist[a, Int[u, x], x] /; FreeQ[a, x] &&  !Match
Q[u, (b_)*(v_) /; FreeQ[b, x]]
```

Rule 3385

```
Int[sin[Pi/2 + (e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> D
ist[2/d, Subst[Int[Cos[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d
, e, f}, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3386

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[2/d
, Subst[Int[Sin[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d, e, f}
, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3387

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[Cos
[(d*e - c*f)/d], Int[Sin[c*(f/d) + f*x]/Sqrt[c + d*x], x], x] + Dist[Sin[(d
*e - c*f)/d], Int[Cos[c*(f/d) + f*x]/Sqrt[c + d*x], x], x] /; FreeQ[{c, d,
e, f}, x] && ComplexFreeQ[f] && NeQ[d*e - c*f, 0]
```

Rule 3432

```
Int[Sin[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelS[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 3433

```
Int[Cos[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelC[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4491

```
Int[Cos[(a_.) + (b_.)*(x_)]^(p_.)*((c_.) + (d_.)*(x_))^(m_.)*Sin[(a_.) + (b
_.)*(x_)]^(n_.), x_Symbol] :> Int[ExpandTrigReduce[(c + d*x)^m, Sin[a + b*x
]^n*Cos[a + b*x]^p, x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && IG
```

```
tQ[p, 0]
```

Rule 4725

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^(m + 1)*((a + b*ArcSin[c*x])^n/(m + 1)), x] - Dist[b*c*(n/(m + 1)), Int[x^
(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*x^2]), x], x] /; FreeQ[{a
, b, c}, x] && IGtQ[m, 0] && GtQ[n, 0]
```

Rule 4731

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Dist[1
/(b*c^(m + 1)), Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b], x], x, a +
 b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, n}, x] && IGtQ[m, 0]
```

Rule 4737

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)/Sqrt[(d_) + (e_.)*(x_)^2], x_S
ymbol] :> Simp[(1/(b*c*(n + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]]*(a
 + b*ArcSin[c*x])^(n + 1), x] /; FreeQ[{a, b, c, d, e, n}, x] && EqQ[c^2*d
+ e, 0] && NeQ[n, -1]
```

Rule 4795

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_)*((d_) + (e_.
)*(x_)^2)^(p_), x_Symbol] :> Simp[f*(f*x)^(m - 1)*(d + e*x^2)^(p + 1)*((a +
 b*ArcSin[c*x])^n/(e*(m + 2*p + 1))), x] + (Dist[f^2*((m - 1)/(c^2*(m + 2*p
 + 1))), Int[(f*x)^(m - 2)*(d + e*x^2)^p*(a + b*ArcSin[c*x])^n, x], x] + Di
st[b*f*(n/(c*(m + 2*p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], Int[(f*x)
^(m - 1)*(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x]) /; Fr
eeQ[{a, b, c, d, e, f, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && IGtQ[m,
1] && NeQ[m + 2*p + 1, 0]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= \frac{1}{2}x^2(a+b\arcsin(cx))^{3/2} - \frac{1}{4}(3bc)\int \frac{x^2\sqrt{a+b\arcsin(cx)}}{\sqrt{1-c^2x^2}}\,dx \\
&= \frac{3bx\sqrt{1-c^2x^2}\sqrt{a+b\arcsin(cx)}}{8c} + \frac{1}{2}x^2(a+b\arcsin(cx))^{3/2} \\
&\quad - \frac{1}{16}(3b^2)\int \frac{x}{\sqrt{a+b\arcsin(cx)}}\,dx - \frac{(3b)\int \frac{\sqrt{a+b\arcsin(cx)}}{\sqrt{1-c^2x^2}}\,dx}{8c}
\end{aligned}$$

$$= \frac{3bx\sqrt{1-c^2x^2}\sqrt{a+b\arcsin(cx)}}{8c} - \frac{(a+b\arcsin(cx))^{3/2}}{4c^2} + \frac{1}{2}x^2(a+b\arcsin(cx))^{3/2} + \frac{(3b)\text{Subst}\left(\int \frac{\cos\left(\frac{a}{b}-\frac{x}{b}\right)\sin\left(\frac{a}{b}-\frac{x}{b}\right)}{\sqrt{x}}dx, x, a+b\arcsin(cx)\right)}{16c^2}$$

$$= \frac{3bx\sqrt{1-c^2x^2}\sqrt{a+b\arcsin(cx)}}{8c} - \frac{(a+b\arcsin(cx))^{3/2}}{4c^2} + \frac{1}{2}x^2(a+b\arcsin(cx))^{3/2} + \frac{(3b)\text{Subst}\left(\int \frac{\sin\left(\frac{2a}{b}-\frac{2x}{b}\right)}{2\sqrt{x}}dx, x, a+b\arcsin(cx)\right)}{16c^2}$$

$$= \frac{3bx\sqrt{1-c^2x^2}\sqrt{a+b\arcsin(cx)}}{8c} - \frac{(a+b\arcsin(cx))^{3/2}}{4c^2} + \frac{1}{2}x^2(a+b\arcsin(cx))^{3/2} + \frac{(3b)\text{Subst}\left(\int \frac{\sin\left(\frac{2a}{b}-\frac{2x}{b}\right)}{\sqrt{x}}dx, x, a+b\arcsin(cx)\right)}{32c^2}$$

$$= \frac{3bx\sqrt{1-c^2x^2}\sqrt{a+b\arcsin(cx)}}{8c} - \frac{(a+b\arcsin(cx))^{3/2}}{4c^2} + \frac{1}{2}x^2(a+b\arcsin(cx))^{3/2} - \frac{\left(3b\cos\left(\frac{2a}{b}\right)\right)\text{Subst}\left(\int \frac{\sin\left(\frac{2x}{b}\right)}{\sqrt{x}}dx, x, a+b\arcsin(cx)\right)}{32c^2} + \frac{\left(3b\sin\left(\frac{2a}{b}\right)\right)\text{Subst}\left(\int \frac{\cos\left(\frac{2x}{b}\right)}{\sqrt{x}}dx, x, a+b\arcsin(cx)\right)}{32c^2}$$

$$= \frac{3bx\sqrt{1-c^2x^2}\sqrt{a+b\arcsin(cx)}}{8c} - \frac{(a+b\arcsin(cx))^{3/2}}{4c^2} + \frac{1}{2}x^2(a+b\arcsin(cx))^{3/2} - \frac{\left(3b\cos\left(\frac{2a}{b}\right)\right)\text{Subst}\left(\int \sin\left(\frac{2x^2}{b}\right)dx, x, \sqrt{a+b\arcsin(cx)}\right)}{16c^2} + \frac{\left(3b\sin\left(\frac{2a}{b}\right)\right)\text{Subst}\left(\int \cos\left(\frac{2x^2}{b}\right)dx, x, \sqrt{a+b\arcsin(cx)}\right)}{16c^2}$$

$$= \frac{3bx\sqrt{1-c^2x^2}\sqrt{a+b\arcsin(cx)}}{8c} - \frac{(a+b\arcsin(cx))^{3/2}}{4c^2} + \frac{1}{2}x^2(a+b\arcsin(cx))^{3/2} - \frac{3b^{3/2}\sqrt{\pi}\cos\left(\frac{2a}{b}\right)\text{FresnelS}\left(\frac{2\sqrt{a+b\arcsin(cx)}}{\sqrt{b}\sqrt{\pi}}\right)}{32c^2} + \frac{3b^{3/2}\sqrt{\pi}\,\text{FresnelC}\left(\frac{2\sqrt{a+b\arcsin(cx)}}{\sqrt{b}\sqrt{\pi}}\right)\sin\left(\frac{2a}{b}\right)}{32c^2}$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.05 (sec) , antiderivative size = 126, normalized size of antiderivative = 0.73

$$\int x(a+b\arcsin(cx))^{3/2}\,dx = \frac{b^2e^{-\frac{2ia}{b}}\left(\sqrt{-\frac{i(a+b\arcsin(cx))}{b}}\Gamma\left(\frac{5}{2},-\frac{2i(a+b\arcsin(cx))}{b}\right)+e^{\frac{4ia}{b}}\sqrt{\frac{i(a+b\arcsin(cx))}{b}}\Gamma\left(\frac{5}{2},\frac{2i(a+b\arcsin(cx))}{b}\right)\right)}{16\sqrt{2}c^2\sqrt{a+b\arcsin(cx)}}$$

```
[In] Integrate[x*(a + b*ArcSin[c*x])^(3/2),x]
```

```
[Out] (b^2*(Sqrt[((-I)*(a + b*ArcSin[c*x]))/b]*Gamma[5/2, ((-2*I)*(a + b*ArcSin[c
*x]))/b] + E^(((4*I)*a)/b)*Sqrt[(I*(a + b*ArcSin[c*x]))/b]*Gamma[5/2, ((2*I
)*(a + b*ArcSin[c*x]))/b]))/(16*Sqrt[2]*c^2*E^(((2*I)*a)/b)*Sqrt[a + b*ArcS
in[c*x]])
```

Maple [B] (verified)

Leaf count of result is larger than twice the leaf count of optimal. 280 vs. 2(134) = 268.

Time = 0.07 (sec) , antiderivative size = 281, normalized size of antiderivative = 1.63

method	result
default	$-\frac{-3\sqrt{-\frac{1}{b}}\,\sqrt{\pi}\,\cos\left(\frac{2a}{b}\right)\text{FresnelS}\left(\frac{2\sqrt{2}\,\sqrt{a+b\arcsin(cx)}}{\sqrt{\pi}\,\sqrt{-\frac{2}{b}}\,b}\right)\sqrt{a+b\arcsin(cx)}\,b^2-3\sqrt{-\frac{1}{b}}\,\sqrt{\pi}\,\sin\left(\frac{2a}{b}\right)\text{FresnelC}\left(\frac{2\sqrt{2}\,\sqrt{a+b\arcsin(cx)}}{\sqrt{\pi}\,\sqrt{-\frac{2}{b}}\,b}\right)\sqrt{a-}}{}$

```
[In] int(x*(a+b*arcsin(c*x))^(3/2),x,method=_RETURNVERBOSE)
```

```
[Out] -1/32/c^2/(a+b*arcsin(c*x))^(1/2)*(-3*(-1/b)^(1/2)*Pi^(1/2)*cos(2*a/b)*Fres
nelS(2*2^(1/2)/Pi^(1/2)/(-2/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)/b)*(a+b*arcsin
(c*x))^(1/2)*b^2-3*(-1/b)^(1/2)*Pi^(1/2)*sin(2*a/b)*FresnelC(2*2^(1/2)/Pi^(
1/2)/(-2/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)/b)*(a+b*arcsin(c*x))^(1/2)*b^2+8*
arcsin(c*x)^2*cos(-2*(a+b*arcsin(c*x))/b+2*a/b)*b^2+16*arcsin(c*x)*cos(-2*(
a+b*arcsin(c*x))/b+2*a/b)*a*b+6*arcsin(c*x)*sin(-2*(a+b*arcsin(c*x))/b+2*a/
b)*b^2+8*cos(-2*(a+b*arcsin(c*x))/b+2*a/b)*a^2+6*sin(-2*(a+b*arcsin(c*x))/b
+2*a/b)*a*b)
```

Fricas [F(-2)]

Exception generated.

$$\int x(a+b\arcsin(cx))^{3/2}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate(x*(a+b*arcsin(c*x))^(3/2),x, algorithm="fricas")
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int x(a+b\arcsin(cx))^{3/2}\,dx = \int x(a+b\operatorname{asin}(cx))^{\frac{3}{2}}\,dx$$

```
[In] integrate(x*(a+b*asin(c*x))**(3/2),x)
[Out] Integral(x*(a + b*asin(c*x))**(3/2), x)
```

Maxima [F]

$$\int x(a+b\arcsin(cx))^{3/2}\,dx = \int (b\arcsin(cx)+a)^{\frac{3}{2}}x\,dx$$

```
[In] integrate(x*(a+b*arcsin(c*x))^(3/2),x, algorithm="maxima")
[Out] integrate((b*arcsin(c*x) + a)^(3/2)*x, x)
```

Giac [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 0.95 (sec) , antiderivative size = 845, normalized size of antiderivative = 4.91

$$\int x(a+b\arcsin(cx))^{3/2}\,dx = \text{Too large to display}$$

```
[In] integrate(x*(a+b*arcsin(c*x))^(3/2),x, algorithm="giac")
[Out] 1/4*I*sqrt(pi)*a^2*b^(3/2)*erf(-sqrt(b*arcsin(c*x) + a)/sqrt(b) - I*sqrt(b*
arcsin(c*x) + a)*sqrt(b)/abs(b))*e^(2*I*a/b)/((b^2 + I*b^3/abs(b))*c^2) - 1
/8*sqrt(pi)*a*b^(5/2)*erf(-sqrt(b*arcsin(c*x) + a)/sqrt(b) - I*sqrt(b*arcsi
```

```
n(c*x) + a)*sqrt(b)/abs(b))*e^(2*I*a/b)/((b^2 + I*b^3/abs(b))*c^2) - 1/4*I*
sqrt(pi)*a^2*b^(3/2)*erf(-sqrt(b*arcsin(c*x) + a)/sqrt(b) + I*sqrt(b*arcsin
(c*x) + a)*sqrt(b)/abs(b))*e^(-2*I*a/b)/((b^2 - I*b^3/abs(b))*c^2) - 1/8*sq
rt(pi)*a*b^(5/2)*erf(-sqrt(b*arcsin(c*x) + a)/sqrt(b) + I*sqrt(b*arcsin(c*x
) + a)*sqrt(b)/abs(b))*e^(-2*I*a/b)/((b^2 - I*b^3/abs(b))*c^2) + 1/8*sqrt(p
i)*a*b^2*erf(-sqrt(b*arcsin(c*x) + a)/sqrt(b) - I*sqrt(b*arcsin(c*x) + a)*s
qrt(b)/abs(b))*e^(2*I*a/b)/((b^(3/2) + I*b^(5/2)/abs(b))*c^2) + 1/4*I*sqrt(
pi)*a^2*b*erf(-sqrt(b*arcsin(c*x) + a)/sqrt(b) + I*sqrt(b*arcsin(c*x) + a)*
sqrt(b)/abs(b))*e^(-2*I*a/b)/((b^(3/2) - I*b^(5/2)/abs(b))*c^2) + 1/8*sqrt(
pi)*a*b^2*erf(-sqrt(b*arcsin(c*x) + a)/sqrt(b) + I*sqrt(b*arcsin(c*x) + a)*
sqrt(b)/abs(b))*e^(-2*I*a/b)/((b^(3/2) - I*b^(5/2)/abs(b))*c^2) - 1/4*I*sqr
t(pi)*a^2*sqrt(b)*erf(-sqrt(b*arcsin(c*x) + a)/sqrt(b) - I*sqrt(b*arcsin(c*
x) + a)*sqrt(b)/abs(b))*e^(2*I*a/b)/((b + I*b^2/abs(b))*c^2) + 3/64*I*sqrt(
pi)*b^(5/2)*erf(-sqrt(b*arcsin(c*x) + a)/sqrt(b) - I*sqrt(b*arcsin(c*x) + a
)*sqrt(b)/abs(b))*e^(2*I*a/b)/((b + I*b^2/abs(b))*c^2) - 3/64*I*sqrt(pi)*b^
(5/2)*erf(-sqrt(b*arcsin(c*x) + a)/sqrt(b) + I*sqrt(b*arcsin(c*x) + a)*sqrt
(b)/abs(b))*e^(-2*I*a/b)/((b - I*b^2/abs(b))*c^2) - 1/8*sqrt(b*arcsin(c*x)
+ a)*b*arcsin(c*x)*e^(2*I*arcsin(c*x))/c^2 - 1/8*sqrt(b*arcsin(c*x) + a)*b*
arcsin(c*x)*e^(-2*I*arcsin(c*x))/c^2 - 1/8*sqrt(b*arcsin(c*x) + a)*a*e^(2*I
*arcsin(c*x))/c^2 - 3/32*I*sqrt(b*arcsin(c*x) + a)*b*e^(2*I*arcsin(c*x))/c^
2 - 1/8*sqrt(b*arcsin(c*x) + a)*a*e^(-2*I*arcsin(c*x))/c^2 + 3/32*I*sqrt(b*
arcsin(c*x) + a)*b*e^(-2*I*arcsin(c*x))/c^2
```

Mupad [F(-1)]

Timed out.

$$\int x(a+b\arcsin(cx))^{3/2}\,dx=\int x\,(a+b\,\mathrm{asin}(c\,x))^{3/2}\,dx$$

```
[In] int(x*(a + b*asin(c*x))^(3/2),x)
[Out] int(x*(a + b*asin(c*x))^(3/2), x)
```

3.180 $\int (a+b \arcsin(cx))^{3/2} \, dx$

Optimal result

Integrand size = 12, antiderivative size = 159

$$\int (a+b \arcsin(cx))^{3/2} \, dx = \frac{3b\sqrt{1-c^2x^2}\sqrt{a+b\arcsin(cx)}}{2c} + x(a+b\arcsin(cx))^{3/2} - \frac{3b^{3/2}\sqrt{\frac{\pi}{2}}\cos\left(\frac{a}{b}\right)\operatorname{FresnelC}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{2c} - \frac{3b^{3/2}\sqrt{\frac{\pi}{2}}\operatorname{FresnelS}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)\sin\left(\frac{a}{b}\right)}{2c}$$

```
[Out] x*(a+b*arcsin(c*x))^(3/2)-3/4*b^(3/2)*cos(a/b)*FresnelC(2^(1/2)/Pi^(1/2)*(a
+b*arcsin(c*x))^(1/2)/b^(1/2))*2^(1/2)*Pi^(1/2)/c-3/4*b^(3/2)*FresnelS(2^(1
/2)/Pi^(1/2)*(a+b*arcsin(c*x))^(1/2)/b^(1/2))*sin(a/b)*2^(1/2)*Pi^(1/2)/c+3
/2*b*(-c^2*x^2+1)^(1/2)*(a+b*arcsin(c*x))^(1/2)/c
```

Rubi [A] (verified)

Time = 0.15 (sec) , antiderivative size = 159, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.667, Rules used = {4715, 4767, 4719, 3387, 3386, 3432, 3385, 3433}

$$\int (a+b \arcsin(cx))^{3/2} \, dx = -\frac{3\sqrt{\frac{\pi}{2}}b^{3/2}\cos\left(\frac{a}{b}\right)\operatorname{FresnelC}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{2c} - \frac{3\sqrt{\frac{\pi}{2}}b^{3/2}\sin\left(\frac{a}{b}\right)\operatorname{FresnelS}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{2c} + \frac{3b\sqrt{1-c^2x^2}\sqrt{a+b\arcsin(cx)}}{2c} + x(a+b\arcsin(cx))^{3/2}$$

```
[In] Int[(a + b*ArcSin[c*x])^(3/2),x]
```

```
[Out] (3*b*Sqrt[1 - c^2*x^2]*Sqrt[a + b*ArcSin[c*x]])/(2*c) + x*(a + b*ArcSin[c*x
])^(3/2) - (3*b^(3/2)*Sqrt[Pi/2]*Cos[a/b]*FresnelC[(Sqrt[2/Pi]*Sqrt[a + b*A
rcSin[c*x]])/Sqrt[b]])/(2*c) - (3*b^(3/2)*Sqrt[Pi/2]*FresnelS[(Sqrt[2/Pi]*S
qrt[a + b*ArcSin[c*x]])/Sqrt[b]]*Sin[a/b])/(2*c)
```

Rule 3385

```
Int[sin[Pi/2 + (e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> D
ist[2/d, Subst[Int[Cos[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d
, e, f}, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3386

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[2/d
, Subst[Int[Sin[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d, e, f}
, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3387

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[Cos
[(d*e - c*f)/d], Int[Sin[c*(f/d) + f*x]/Sqrt[c + d*x], x], x] + Dist[Sin[(d
*e - c*f)/d], Int[Cos[c*(f/d) + f*x]/Sqrt[c + d*x], x], x] /; FreeQ[{c, d,
e, f}, x] && ComplexFreeQ[f] && NeQ[d*e - c*f, 0]
```

Rule 3432

```
Int[Sin[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelS[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 3433

```
Int[Cos[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelC[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4715

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.), x_Symbol] :> Simp[x*(a + b*Ar
cSin[c*x])^n, x] - Dist[b*c*n, Int[x*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 -
c^2*x^2]), x], x] /; FreeQ[{a, b, c}, x] && GtQ[n, 0]
```

Rule 4719

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_), x_Symbol] :> Dist[1/(b*c), Sub
st[Int[x^n*Cos[-a/b + x/b], x], x, a + b*ArcSin[c*x]], x] /; FreeQ[{a, b, c
, n}, x]
```

Rule 4767

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)*((d_) + (e_.)*(x_)^2)^(p_
.), x_Symbol] :> Simp[(d + e*x^2)^(p + 1)*((a + b*ArcSin[c*x])^n/(2*e*(p +
1))), x] + Dist[b*(n/(2*c*(p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], In
t[(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x] /; FreeQ[{a,
b, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && NeQ[p, -1]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= x(a+b\arcsin(cx))^{3/2}-\frac{1}{2}(3bc)\int\frac{x\sqrt{a+b\arcsin(cx)}}{\sqrt{1-c^2x^2}}\,dx\\
&=\frac{3b\sqrt{1-c^2x^2}\sqrt{a+b\arcsin(cx)}}{2c}+x(a+b\arcsin(cx))^{3/2}-\frac{1}{4}\left(3b^2\right)\int\frac{1}{\sqrt{a+b\arcsin(cx)}}\,dx\\
&=\frac{3b\sqrt{1-c^2x^2}\sqrt{a+b\arcsin(cx)}}{2c}+x(a+b\arcsin(cx))^{3/2}\\
&\quad-\frac{(3b)\text{Subst}\left(\int\frac{\cos\left(\frac{a}{b}-\frac{x}{b}\right)}{\sqrt{x}}\,dx,x,a+b\arcsin(cx)\right)}{4c}\\
&=\frac{3b\sqrt{1-c^2x^2}\sqrt{a+b\arcsin(cx)}}{2c}+x(a+b\arcsin(cx))^{3/2}\\
&\quad-\frac{\left(3b\cos\left(\frac{a}{b}\right)\right)\text{Subst}\left(\int\frac{\cos\left(\frac{x}{b}\right)}{\sqrt{x}}\,dx,x,a+b\arcsin(cx)\right)}{4c}\\
&\quad-\frac{\left(3b\sin\left(\frac{a}{b}\right)\right)\text{Subst}\left(\int\frac{\sin\left(\frac{x}{b}\right)}{\sqrt{x}}\,dx,x,a+b\arcsin(cx)\right)}{4c}\\
&=\frac{3b\sqrt{1-c^2x^2}\sqrt{a+b\arcsin(cx)}}{2c}+x(a+b\arcsin(cx))^{3/2}\\
&\quad-\frac{\left(3b\cos\left(\frac{a}{b}\right)\right)\text{Subst}\left(\int\cos\left(\frac{x^2}{b}\right)\,dx,x,\sqrt{a+b\arcsin(cx)}\right)}{2c}\\
&\quad-\frac{\left(3b\sin\left(\frac{a}{b}\right)\right)\text{Subst}\left(\int\sin\left(\frac{x^2}{b}\right)\,dx,x,\sqrt{a+b\arcsin(cx)}\right)}{2c}\\
&=\frac{3b\sqrt{1-c^2x^2}\sqrt{a+b\arcsin(cx)}}{2c}+x(a+b\arcsin(cx))^{3/2}\\
&\quad-\frac{3b^{3/2}\sqrt{\frac{\pi}{2}}\cos\left(\frac{a}{b}\right)\text{FresnelC}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{2c}\\
&\quad-\frac{3b^{3/2}\sqrt{\frac{\pi}{2}}\text{FresnelS}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)\sin\left(\frac{a}{b}\right)}{2c}
\end{aligned}$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 2.59 (sec) , antiderivative size = 289, normalized size of antiderivative = 1.82

$$\int (a + b \arcsin(cx))^{3/2} \, dx = \frac{abe^{-\frac{ia}{b}} \left(\sqrt{-\frac{i(a+b\arcsin(cx))}{b}} \Gamma\left(\frac{3}{2}, -\frac{i(a+b\arcsin(cx))}{b}\right) + e^{\frac{2ia}{b}} \sqrt{\frac{i(a+b\arcsin(cx))}{b}} \Gamma\left(\frac{3}{2}, \frac{i(a+b\arcsin(cx}{b}\right.\right.}{2c\sqrt{a+b\arcsin(cx)}} + \frac{\sqrt{b}\left(2\sqrt{b}\sqrt{a+b\arcsin(cx)}\left(3\sqrt{1-c^2x^2}+2cx\arcsin(cx)\right) - \sqrt{2\pi}\,\mathrm{FresnelC}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)\left(3b\cos\left(\frac{a}{b}\right)\right.\right.}{4c}$$

```
[In] Integrate[(a + b*ArcSin[c*x])^(3/2),x]
```

```
[Out] (a*b*(Sqrt[((-I)*(a + b*ArcSin[c*x]))/b]*Gamma[3/2, ((-I)*(a + b*ArcSin[c*x
]))/b] + E^(((2*I)*a)/b)*Sqrt[(I*(a + b*ArcSin[c*x]))/b]*Gamma[3/2, (I*(a +
 b*ArcSin[c*x]))/b]))/(2*c*E^((I*a)/b)*Sqrt[a + b*ArcSin[c*x]]) + (Sqrt[b]*
(2*Sqrt[b]*Sqrt[a + b*ArcSin[c*x]]*(3*Sqrt[1 - c^2*x^2] + 2*c*x*ArcSin[c*x]
) - Sqrt[2*Pi]*FresnelC[(Sqrt[2/Pi]*Sqrt[a + b*ArcSin[c*x]])/Sqrt[b]]*(3*b*
Cos[a/b] + 2*a*Sin[a/b]) + Sqrt[2*Pi]*FresnelS[(Sqrt[2/Pi]*Sqrt[a + b*ArcSi
n[c*x]])/Sqrt[b]]*(2*a*Cos[a/b] - 3*b*Sin[a/b])))/(4*c)
```

Maple [B] (verified)

Leaf count of result is larger than twice the leaf count of optimal. 277 vs. 2(123) = 246.

Time = 0.06 (sec) , antiderivative size = 278, normalized size of antiderivative = 1.75

method	result
default	$-\frac{3\sqrt{\pi}\sqrt{2}\sqrt{a+b\arcsin(cx)}\cos\left(\frac{a}{b}\right)\mathrm{FresnelC}\left(\frac{\sqrt{2}\sqrt{a+b\arcsin(cx)}}{\sqrt{\pi}\sqrt{-\frac{1}{b}}\,b}\right)\sqrt{-\frac{1}{b}}\,b^2 - 3\sqrt{\pi}\sqrt{2}\sqrt{a+b\arcsin(cx)}\sin\left(\frac{a}{b}\right)\mathrm{FresnelS}\left(\frac{\sqrt{2}\sqrt{a+b\arcs}}{\sqrt{\pi}\sqrt{-\frac{1}{b}}}\right.}{}$

```
[In] int((a+b*arcsin(c*x))^(3/2),x,method=_RETURNVERBOSE)
```

```
[Out] -1/4/c*(3*Pi^(1/2)*2^(1/2)*(a+b*arcsin(c*x))^(1/2)*cos(a/b)*FresnelC(2^(1/2
)/Pi^(1/2)/(-1/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)/b)*(-1/b)^(1/2)*b^2-3*Pi^(1
/2)*2^(1/2)*(a+b*arcsin(c*x))^(1/2)*sin(a/b)*FresnelS(2^(1/2)/Pi^(1/2)/(-1/
b)^(1/2)*(a+b*arcsin(c*x))^(1/2)/b)*(-1/b)^(1/2)*b^2+4*arcsin(c*x)^2*sin(-(
a+b*arcsin(c*x))/b+a/b)*b^2+8*arcsin(c*x)*sin(-(a+b*arcsin(c*x))/b+a/b)*a*b
-6*arcsin(c*x)*cos(-(a+b*arcsin(c*x))/b+a/b)*b^2+4*sin(-(a+b*arcsin(c*x))/b
+a/b)*a^2-6*cos(-(a+b*arcsin(c*x))/b+a/b)*a*b)/(a+b*arcsin(c*x))^(1/2)
```

Fricas [F(-2)]

Exception generated.

$$\int (a+b\arcsin(cx))^{3/2}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate((a+b*arcsin(c*x))^(3/2),x, algorithm="fricas")
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int (a+b\arcsin(cx))^{3/2}\,dx = \int (a+b\operatorname{asin}(cx))^{\frac{3}{2}}\,dx$$

```
[In] integrate((a+b*asin(c*x))**(3/2),x)
[Out] Integral((a + b*asin(c*x))**(3/2), x)
```

Maxima [F]

$$\int (a+b\arcsin(cx))^{3/2}\,dx = \int (b\arcsin(cx)+a)^{\frac{3}{2}}\,dx$$

```
[In] integrate((a+b*arcsin(c*x))^(3/2),x, algorithm="maxima")
[Out] integrate((b*arcsin(c*x) + a)^(3/2), x)
```

Giac [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 1.12 (sec) , antiderivative size = 993, normalized size of antiderivative = 6.25

$$\int (a+b\arcsin(cx))^{3/2}\,dx = \text{Too large to display}$$

```
[In] integrate((a+b*arcsin(c*x))^(3/2),x, algorithm="giac")
[Out] 1/2*sqrt(2)*sqrt(pi)*a^2*b^2*erf(-1/2*I*sqrt(2)*sqrt(b*arcsin(c*x) + a)/sqr
t(abs(b)) - 1/2*sqrt(2)*sqrt(b*arcsin(c*x) + a)*sqrt(abs(b))/b)*e^(I*a/b)/(
(I*b^3/sqrt(abs(b)) + b^2*sqrt(abs(b)))*c) + 1/2*I*sqrt(2)*sqrt(pi)*a*b^3*e
```

```
rf(-1/2*I*sqrt(2)*sqrt(b*arcsin(c*x) + a)/sqrt(abs(b)) - 1/2*sqrt(2)*sqrt(b
*arcsin(c*x) + a)*sqrt(abs(b))/b)*e^(I*a/b)/((I*b^3/sqrt(abs(b)) + b^2*sqrt
(abs(b)))*c) + 1/2*sqrt(2)*sqrt(pi)*a^2*b^2*erf(1/2*I*sqrt(2)*sqrt(b*arcsin
(c*x) + a)/sqrt(abs(b)) - 1/2*sqrt(2)*sqrt(b*arcsin(c*x) + a)*sqrt(abs(b))/
b)*e^(-I*a/b)/((-I*b^3/sqrt(abs(b)) + b^2*sqrt(abs(b)))*c) - 1/2*I*sqrt(2)*
sqrt(pi)*a*b^3*erf(1/2*I*sqrt(2)*sqrt(b*arcsin(c*x) + a)/sqrt(abs(b)) - 1/2
*sqrt(2)*sqrt(b*arcsin(c*x) + a)*sqrt(abs(b))/b)*e^(-I*a/b)/((-I*b^3/sqrt(a
bs(b)) + b^2*sqrt(abs(b)))*c) - 1/2*I*sqrt(2)*sqrt(pi)*a*b^2*erf(-1/2*I*sqr
t(2)*sqrt(b*arcsin(c*x) + a)/sqrt(abs(b)) - 1/2*sqrt(2)*sqrt(b*arcsin(c*x)
+ a)*sqrt(abs(b))/b)*e^(I*a/b)/((I*b^2/sqrt(abs(b)) + b*sqrt(abs(b)))*c) +
3/8*sqrt(2)*sqrt(pi)*b^3*erf(-1/2*I*sqrt(2)*sqrt(b*arcsin(c*x) + a)/sqrt(ab
s(b)) - 1/2*sqrt(2)*sqrt(b*arcsin(c*x) + a)*sqrt(abs(b))/b)*e^(I*a/b)/((I*b
^2/sqrt(abs(b)) + b*sqrt(abs(b)))*c) + 1/2*I*sqrt(2)*sqrt(pi)*a*b^2*erf(1/2
*I*sqrt(2)*sqrt(b*arcsin(c*x) + a)/sqrt(abs(b)) - 1/2*sqrt(2)*sqrt(b*arcsin
(c*x) + a)*sqrt(abs(b))/b)*e^(-I*a/b)/((-I*b^2/sqrt(abs(b)) + b*sqrt(abs(b)
))*c) + 3/8*sqrt(2)*sqrt(pi)*b^3*erf(1/2*I*sqrt(2)*sqrt(b*arcsin(c*x) + a)/
sqrt(abs(b)) - 1/2*sqrt(2)*sqrt(b*arcsin(c*x) + a)*sqrt(abs(b))/b)*e^(-I*a/
b)/((-I*b^2/sqrt(abs(b)) + b*sqrt(abs(b)))*c) - sqrt(pi)*a^2*b*erf(-1/2*I*s
qrt(2)*sqrt(b*arcsin(c*x) + a)/sqrt(abs(b)) - 1/2*sqrt(2)*sqrt(b*arcsin(c*x
) + a)*sqrt(abs(b))/b)*e^(I*a/b)/((I*sqrt(2)*b^2/sqrt(abs(b)) + sqrt(2)*b*s
qrt(abs(b)))*c) - sqrt(pi)*a^2*b*erf(1/2*I*sqrt(2)*sqrt(b*arcsin(c*x) + a)/
sqrt(abs(b)) - 1/2*sqrt(2)*sqrt(b*arcsin(c*x) + a)*sqrt(abs(b))/b)*e^(-I*a/
b)/((-I*sqrt(2)*b^2/sqrt(abs(b)) + sqrt(2)*b*sqrt(abs(b)))*c) - 1/2*I*sqrt(
b*arcsin(c*x) + a)*b*arcsin(c*x)*e^(I*arcsin(c*x))/c + 1/2*I*sqrt(b*arcsin(
c*x) + a)*b*arcsin(c*x)*e^(-I*arcsin(c*x))/c - 1/2*I*sqrt(b*arcsin(c*x) + a
)*a*e^(I*arcsin(c*x))/c + 3/4*sqrt(b*arcsin(c*x) + a)*b*e^(I*arcsin(c*x))/c
 + 1/2*I*sqrt(b*arcsin(c*x) + a)*a*e^(-I*arcsin(c*x))/c + 3/4*sqrt(b*arcsin
(c*x) + a)*b*e^(-I*arcsin(c*x))/c
```

Mupad [F(-1)]

Timed out.

$$\int (a+b\arcsin(cx))^{3/2}\,dx=\int (a+b\,\mathrm{asin}(c\,x))^{3/2}\,dx$$

```
[In] int((a + b*asin(c*x))^(3/2),x)
```

```
[Out] int((a + b*asin(c*x))^(3/2), x)
```

3.181 $\int \frac{(a+b\arcsin(cx))^{3/2}}{x}\,dx$

Optimal result

Integrand size = 16, antiderivative size = 16

$$\int \frac{(a+b\arcsin(cx))^{3/2}}{x}\,dx = \text{Int}\left(\frac{(a+b\arcsin(cx))^{3/2}}{x},x\right)$$

```
[Out] Unintegrable((a+b*arcsin(c*x))^(3/2)/x,x)
```

Rubi [N/A]

Not integrable

Time = 0.03 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{(a+b\arcsin(cx))^{3/2}}{x}\,dx = \int \frac{(a+b\arcsin(cx))^{3/2}}{x}\,dx$$

```
[In] Int[(a + b*ArcSin[c*x])^(3/2)/x,x]
[Out] Defer[Int][(a + b*ArcSin[c*x])^(3/2)/x, x]
```

Rubi steps

$$\text{integral} = \int \frac{(a+b\arcsin(cx))^{3/2}}{x}\,dx$$

Mathematica [N/A]

Not integrable

Time = 0.48 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.12

$$\int \frac{(a+b\arcsin(cx))^{3/2}}{x}\,dx=\int \frac{(a+b\arcsin(cx))^{3/2}}{x}\,dx$$

```
[In] Integrate[(a + b*ArcSin[c*x])^(3/2)/x,x]
[Out] Integrate[(a + b*ArcSin[c*x])^(3/2)/x, x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.08 (sec) , antiderivative size = 14, normalized size of antiderivative = 0.88

$$\int \frac{(a+b\arcsin\left(cx\right))^{\frac{3}{2}}}{x}dx$$

```
[In] int((a+b*arcsin(c*x))^(3/2)/x,x)
[Out] int((a+b*arcsin(c*x))^(3/2)/x,x)
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{(a+b\arcsin(cx))^{3/2}}{x}\,dx=\text{Exception raised: TypeError}$$

```
[In] integrate((a+b*arcsin(c*x))^(3/2)/x,x, algorithm="fricas")
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [N/A]

Not integrable

Time = 13.99 (sec) , antiderivative size = 14, normalized size of antiderivative = 0.88

$$\int \frac{(a+b\arcsin(cx))^{3/2}}{x}\,dx=\int \frac{(a+b\,\mathrm{asin}\,(cx))^{\frac{3}{2}}}{x}\,dx$$

```
[In] integrate((a+b*asin(c*x))**(3/2)/x,x)
[Out] Integral((a + b*asin(c*x))**(3/2)/x, x)
```

Maxima [N/A]

Not integrable

Time = 0.77 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.00

$$\int \frac{(a+b\arcsin(cx))^{3/2}}{x}\,dx = \int \frac{(b\arcsin(cx)+a)^{\frac{3}{2}}}{x}\,dx$$

```
[In] integrate((a+b*arcsin(c*x))^(3/2)/x,x, algorithm="maxima")
[Out] integrate((b*arcsin(c*x) + a)^(3/2)/x, x)
```

Giac [N/A]

Not integrable

Time = 1.01 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.00

$$\int \frac{(a+b\arcsin(cx))^{3/2}}{x}\,dx = \int \frac{(b\arcsin(cx)+a)^{\frac{3}{2}}}{x}\,dx$$

```
[In] integrate((a+b*arcsin(c*x))^(3/2)/x,x, algorithm="giac")
[Out] integrate((b*arcsin(c*x) + a)^(3/2)/x, x)
```

Mupad [N/A]

Not integrable

Time = 0.09 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.00

$$\int \frac{(a+b\arcsin(cx))^{3/2}}{x}\,dx = \int \frac{(a+b\,\mathrm{asin}(c\,x))^{3/2}}{x}\,dx$$

```
[In] int((a + b*asin(c*x))^(3/2)/x,x)
[Out] int((a + b*asin(c*x))^(3/2)/x, x)
```

3.182 $\int \frac{(a+b\arcsin(cx))^{3/2}}{x^2}\,dx$

Optimal result

Integrand size = 16, antiderivative size = 16

$$\int \frac{(a+b\arcsin(cx))^{3/2}}{x^2}\,dx=\text{Int}\left(\frac{(a+b\arcsin(cx))^{3/2}}{x^2},x\right)$$

```
[Out] Unintegrable((a+b*arcsin(c*x))^(3/2)/x^2,x)
```

Rubi [N/A]

Not integrable

Time = 0.02 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{(a+b\arcsin(cx))^{3/2}}{x^2}\,dx=\int \frac{(a+b\arcsin(cx))^{3/2}}{x^2}\,dx$$

```
[In] Int[(a + b*ArcSin[c*x])^(3/2)/x^2,x]
```

```
[Out] Defer[Int][(a + b*ArcSin[c*x])^(3/2)/x^2, x]
```

Rubi steps

$$\text{integral}=\int \frac{(a+b\arcsin(cx))^{3/2}}{x^2}\,dx$$

Mathematica [N/A]

Not integrable

Time = 4.11 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.12

$$\int \frac{(a+b\arcsin(cx))^{3/2}}{x^2}\,dx=\int \frac{(a+b\arcsin(cx))^{3/2}}{x^2}\,dx$$

```
[In] Integrate[(a + b*ArcSin[c*x])^(3/2)/x^2,x]
[Out] Integrate[(a + b*ArcSin[c*x])^(3/2)/x^2, x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.10 (sec) , antiderivative size = 14, normalized size of antiderivative = 0.88

$$\int \frac{(a+b\arcsin(cx))^{\frac{3}{2}}}{x^2}dx$$

```
[In] int((a+b*arcsin(c*x))^(3/2)/x^2,x)
[Out] int((a+b*arcsin(c*x))^(3/2)/x^2,x)
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{(a+b\arcsin(cx))^{3/2}}{x^2}\,dx=\text{Exception raised: TypeError}$$

```
[In] integrate((a+b*arcsin(c*x))^(3/2)/x^2,x, algorithm="fricas")
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [N/A]

Not integrable

Time = 2.70 (sec) , antiderivative size = 15, normalized size of antiderivative = 0.94

$$\int \frac{(a+b\arcsin(cx))^{3/2}}{x^2}\,dx=\int \frac{(a+b\operatorname{asin}(cx))^{\frac{3}{2}}}{x^2}\,dx$$

```
[In] integrate((a+b*asin(c*x))**(3/2)/x**2,x)
[Out] Integral((a + b*asin(c*x))**(3/2)/x**2, x)
```

Maxima [N/A]

Not integrable

Time = 0.72 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.00

$$\int \frac{(a+b\arcsin(cx))^{3/2}}{x^2}\,dx = \int \frac{(b\arcsin{(cx)}+a)^{\frac{3}{2}}}{x^2}\,dx$$

```
[In] integrate((a+b*arcsin(c*x))^(3/2)/x^2,x, algorithm="maxima")
[Out] integrate((b*arcsin(c*x) + a)^(3/2)/x^2, x)
```

Giac [N/A]

Not integrable

Time = 1.10 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.00

$$\int \frac{(a+b\arcsin(cx))^{3/2}}{x^2}\,dx = \int \frac{(b\arcsin{(cx)}+a)^{\frac{3}{2}}}{x^2}\,dx$$

```
[In] integrate((a+b*arcsin(c*x))^(3/2)/x^2,x, algorithm="giac")
[Out] integrate((b*arcsin(c*x) + a)^(3/2)/x^2, x)
```

Mupad [N/A]

Not integrable

Time = 0.09 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.00

$$\int \frac{(a+b\arcsin(cx))^{3/2}}{x^2}\,dx = \int \frac{(a+b\,\mathrm{asin}(c\,x))^{3/2}}{x^2}\,dx$$

```
[In] int((a + b*asin(c*x))^(3/2)/x^2,x)
[Out] int((a + b*asin(c*x))^(3/2)/x^2, x)
```

3.183 $\int x^2(a+b\arcsin(cx))^{5/2}\,dx$

Optimal result

Integrand size = 16, antiderivative size = 358

$$\int x^2(a+b\arcsin(cx))^{5/2}\,dx = -\frac{5b^2x\sqrt{a+b\arcsin(cx)}}{6c^2} - \frac{5}{36}b^2x^3\sqrt{a+b\arcsin(cx)} + \frac{5b\sqrt{1-c^2x^2}(a+b\arcsin(cx))^{3/2}}{9c^3} + \frac{5bx^2\sqrt{1-c^2x^2}(a+b\arcsin(cx))^{3/2}}{18c} + \frac{1}{3}x^3(a+b\arcsin(cx))^{5/2} + \frac{15b^{5/2}\sqrt{\frac{\pi}{2}}\cos\left(\frac{a}{b}\right)\text{FresnelS}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{16c^3} - \frac{5b^{5/2}\sqrt{\frac{\pi}{6}}\cos\left(\frac{3a}{b}\right)\text{FresnelS}\left(\frac{\sqrt{\frac{6}{\pi}} \ldots}{\ldots}\right)}{144c^3}$$

```
[Out] 1/3*x^3*(a+b*arcsin(c*x))^(5/2)-5/864*b^(5/2)*cos(3*a/b)*FresnelS(6^(1/2)/P
i^(1/2)*(a+b*arcsin(c*x))^(1/2)/b^(1/2))*6^(1/2)*Pi^(1/2)/c^3+5/864*b^(5/2)
*FresnelC(6^(1/2)/Pi^(1/2)*(a+b*arcsin(c*x))^(1/2)/b^(1/2))*sin(3*a/b)*6^(1
/2)*Pi^(1/2)/c^3+15/32*b^(5/2)*cos(a/b)*FresnelS(2^(1/2)/Pi^(1/2)*(a+b*arcs
in(c*x))^(1/2)/b^(1/2))*2^(1/2)*Pi^(1/2)/c^3-15/32*b^(5/2)*FresnelC(2^(1/2)
/Pi^(1/2)*(a+b*arcsin(c*x))^(1/2)/b^(1/2))*sin(a/b)*2^(1/2)*Pi^(1/2)/c^3+5/
9*b*(a+b*arcsin(c*x))^(3/2)*(-c^2*x^2+1)^(1/2)/c^3+5/18*b*x^2*(a+b*arcsin(c
*x))^(3/2)*(-c^2*x^2+1)^(1/2)/c-5/6*b^2*x*(a+b*arcsin(c*x))^(1/2)/c^2-5/36*
b^2*x^3*(a+b*arcsin(c*x))^(1/2)
```

Rubi [A] (verified)

Time = 0.74 (sec) , antiderivative size = 358, normalized size of antiderivative = 1.00, number of steps used = 24, number of rules used = 11, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.688, Rules used = {4725, 4795, 4767, 4715, 4809, 3387, 3386, 3432, 3385, 3433, 3393}

$$\int x^2(a+b\arcsin(cx))^{5/2}\,dx = -\frac{15\sqrt{\frac{\pi}{2}}b^{5/2}\sin\left(\frac{a}{b}\right)\text{FresnelC}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{16c^3}$$
$$+\frac{5\sqrt{\frac{\pi}{6}}b^{5/2}\sin\left(\frac{3a}{b}\right)\text{FresnelC}\left(\frac{\sqrt{\frac{6}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{144c^3}$$
$$+\frac{15\sqrt{\frac{\pi}{2}}b^{5/2}\cos\left(\frac{a}{b}\right)\text{FresnelS}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{16c^3}$$
$$-\frac{5\sqrt{\frac{\pi}{6}}b^{5/2}\cos\left(\frac{3a}{b}\right)\text{FresnelS}\left(\frac{\sqrt{\frac{6}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{144c^3}-\frac{5b^2x\sqrt{a+b\arcsin(cx)}}{6c^2}$$
$$-\frac{5}{36}b^2x^3\sqrt{a+b\arcsin(cx)}+\frac{5bx^2\sqrt{1-c^2x^2}(a+b\arcsin(cx))^{3/2}}{18c}$$
$$+\frac{5b\sqrt{1-c^2x^2}(a+b\arcsin(cx))^{3/2}}{9c^3}+\frac{1}{3}x^3(a+b\arcsin(cx))^{5/2}$$

```
[In] Int[x^2*(a + b*ArcSin[c*x])^(5/2),x]
```

```
[Out] (-5*b^2*x*Sqrt[a + b*ArcSin[c*x]])/(6*c^2) - (5*b^2*x^3*Sqrt[a + b*ArcSin[c
*x]])/36 + (5*b*Sqrt[1 - c^2*x^2]*(a + b*ArcSin[c*x])^(3/2))/(9*c^3) + (5*b
*x^2*Sqrt[1 - c^2*x^2]*(a + b*ArcSin[c*x])^(3/2))/(18*c) + (x^3*(a + b*ArcS
in[c*x])^(5/2))/3 + (15*b^(5/2)*Sqrt[Pi/2]*Cos[a/b]*FresnelS[(Sqrt[2/Pi]*Sq
rt[a + b*ArcSin[c*x]])/Sqrt[b]])/(16*c^3) - (5*b^(5/2)*Sqrt[Pi/6]*Cos[(3*a)
/b]*FresnelS[(Sqrt[6/Pi]*Sqrt[a + b*ArcSin[c*x]])/Sqrt[b]])/(144*c^3) - (15
*b^(5/2)*Sqrt[Pi/2]*FresnelC[(Sqrt[2/Pi]*Sqrt[a + b*ArcSin[c*x]])/Sqrt[b]]*
Sin[a/b])/(16*c^3) + (5*b^(5/2)*Sqrt[Pi/6]*FresnelC[(Sqrt[6/Pi]*Sqrt[a + b*
ArcSin[c*x]])/Sqrt[b]]*Sin[(3*a)/b])/(144*c^3)
```

Rule 3385

```
Int[sin[Pi/2 + (e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> D
ist[2/d, Subst[Int[Cos[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d
, e, f}, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3386

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[2/d
, Subst[Int[Sin[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d, e, f}
```

```
, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3387

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[Cos
[(d*e - c*f)/d], Int[Sin[c*(f/d) + f*x]/Sqrt[c + d*x], x], x] + Dist[Sin[(d
*e - c*f)/d], Int[Cos[c*(f/d) + f*x]/Sqrt[c + d*x], x], x] /; FreeQ[{c, d,
e, f}, x] && ComplexFreeQ[f] && NeQ[d*e - c*f, 0]
```

Rule 3393

```
Int[((c_.) + (d_.)*(x_))^(m_)*sin[(e_.) + (f_.)*(x_)]^(n_), x_Symbol] :> In
t[ExpandTrigReduce[(c + d*x)^m, Sin[e + f*x]^n, x], x] /; FreeQ[{c, d, e, f
, m}, x] && IGtQ[n, 1] && ( !RationalQ[m] || (GeQ[m, -1] && LtQ[m, 1]))
```

Rule 3432

```
Int[Sin[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelS[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 3433

```
Int[Cos[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelC[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4715

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.), x_Symbol] :> Simp[x*(a + b*Ar
cSin[c*x])^n, x] - Dist[b*c*n, Int[x*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 -
c^2*x^2]), x], x] /; FreeQ[{a, b, c}, x] && GtQ[n, 0]
```

Rule 4725

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^(m + 1)*((a + b*ArcSin[c*x])^n/(m + 1)), x] - Dist[b*c*(n/(m + 1)), Int[x^
(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*x^2]), x], x] /; FreeQ[{a
, b, c}, x] && IGtQ[m, 0] && GtQ[n, 0]
```

Rule 4767

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)*((d_) + (e_.)*(x_)^2)^(p_
.), x_Symbol] :> Simp[(d + e*x^2)^(p + 1)*((a + b*ArcSin[c*x])^n/(2*e*(p +
1))), x] + Dist[b*(n/(2*c*(p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], In
t[(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x] /; FreeQ[{a,
b, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && NeQ[p, -1]
```

Rule 4795

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_)*((d_) + (e_.
)*(x_)^2)^(p_), x_Symbol] :> Simp[f*(f*x)^(m - 1)*(d + e*x^2)^(p + 1)*((a +
 b*ArcSin[c*x])^n/(e*(m + 2*p + 1))), x] + (Dist[f^2*((m - 1)/(c^2*(m + 2*p
 + 1))), Int[(f*x)^(m - 2)*(d + e*x^2)^p*(a + b*ArcSin[c*x])^n, x], x] + Di
st[b*f*(n/(c*(m + 2*p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], Int[(f*x)
^(m - 1)*(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x]) /; Fr
eeQ[{a, b, c, d, e, f, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && IGtQ[m,
1] && NeQ[m + 2*p + 1, 0]
```

Rule 4809

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_.)*((d_) + (e_.)*(x_)^
2)^(p_.), x_Symbol] :> Dist[(1/(b*c^(m + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x
^2)^p], Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b]^(2*p + 1), x], x, a
 + b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, d, e, n}, x] && EqQ[c^2*d + e, 0]
&& IGtQ[2*p + 2, 0] && IGtQ[m, 0]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= \frac{1}{3}x^3(a+b\arcsin(cx))^{5/2}-\frac{1}{6}(5bc)\int\frac{x^3(a+b\arcsin(cx))^{3/2}}{\sqrt{1-c^2x^2}}\,dx\\
&= \frac{5bx^2\sqrt{1-c^2x^2}(a+b\arcsin(cx))^{3/2}}{18c}+\frac{1}{3}x^3(a+b\arcsin(cx))^{5/2}\\
&\quad -\frac{1}{12}(5b^2)\int x^2\sqrt{a+b\arcsin(cx)}\,dx-\frac{(5b)\int\frac{x(a+b\arcsin(cx))^{3/2}}{\sqrt{1-c^2x^2}}\,dx}{9c}\\
&= -\frac{5}{36}b^2x^3\sqrt{a+b\arcsin(cx)}+\frac{5b\sqrt{1-c^2x^2}(a+b\arcsin(cx))^{3/2}}{9c^3}\\
&\quad +\frac{5bx^2\sqrt{1-c^2x^2}(a+b\arcsin(cx))^{3/2}}{18c}+\frac{1}{3}x^3(a+b\arcsin(cx))^{5/2}\\
&\quad -\frac{(5b^2)\int\sqrt{a+b\arcsin(cx)}\,dx}{6c^2}+\frac{1}{72}(5b^3c)\int\frac{x^3}{\sqrt{1-c^2x^2}\sqrt{a+b\arcsin(cx)}}\,dx\\
&= -\frac{5b^2x\sqrt{a+b\arcsin(cx)}}{6c^2}-\frac{5}{36}b^2x^3\sqrt{a+b\arcsin(cx)}\\
&\quad +\frac{5b\sqrt{1-c^2x^2}(a+b\arcsin(cx))^{3/2}}{9c^3}\\
&\quad +\frac{5bx^2\sqrt{1-c^2x^2}(a+b\arcsin(cx))^{3/2}}{18c}+\frac{1}{3}x^3(a+b\arcsin(cx))^{5/2}\\
&\quad -\frac{(5b^2)\,\text{Subst}\left(\int\frac{\sin^3\left(\frac{a}{b}-\frac{x}{b}\right)}{\sqrt{x}}\,dx,x,a+b\arcsin(cx)\right)}{72c^3}+\frac{(5b^3)\int\frac{x}{\sqrt{1-c^2x^2}\sqrt{a+b\arcsin(cx)}}\,dx}{12c}
\end{aligned}$$

$$= -\frac{5b^2x\sqrt{a+b\arcsin(cx)}}{6c^2} - \frac{5}{36}b^2x^3\sqrt{a+b\arcsin(cx)} + \frac{5b\sqrt{1-c^2x^2}(a+b\arcsin(cx))^{3/2}}{9c^3} + \frac{5bx^2\sqrt{1-c^2x^2}(a+b\arcsin(cx))^{3/2}}{18c} + \frac{1}{3}x^3(a+b\arcsin(cx))^{5/2} - \frac{(5b^2)\operatorname{Subst}\left(\int\left(-\frac{\sin\left(\frac{3a}{b}-\frac{3x}{b}\right)}{4\sqrt{x}} + \frac{3\sin\left(\frac{a}{b}-\frac{x}{b}\right)}{4\sqrt{x}}\right)dx, x, a+b\arcsin(cx)\right)}{72c^3} - \frac{(5b^2)\operatorname{Subst}\left(\int\frac{\sin\left(\frac{a}{b}-\frac{x}{b}\right)}{\sqrt{x}}dx, x, a+b\arcsin(cx)\right)}{12c^3}$$

$$= -\frac{5b^2x\sqrt{a+b\arcsin(cx)}}{6c^2} - \frac{5}{36}b^2x^3\sqrt{a+b\arcsin(cx)} + \frac{5b\sqrt{1-c^2x^2}(a+b\arcsin(cx))^{3/2}}{9c^3} + \frac{5bx^2\sqrt{1-c^2x^2}(a+b\arcsin(cx))^{3/2}}{18c} + \frac{1}{3}x^3(a+b\arcsin(cx))^{5/2} + \frac{(5b^2)\operatorname{Subst}\left(\int\frac{\sin\left(\frac{3a}{b}-\frac{3x}{b}\right)}{\sqrt{x}}dx, x, a+b\arcsin(cx)\right)}{288c^3} - \frac{(5b^2)\operatorname{Subst}\left(\int\frac{\sin\left(\frac{a}{b}-\frac{x}{b}\right)}{\sqrt{x}}dx, x, a+b\arcsin(cx)\right)}{96c^3} + \frac{\left(5b^2\cos\left(\frac{a}{b}\right)\right)\operatorname{Subst}\left(\int\frac{\sin\left(\frac{x}{b}\right)}{\sqrt{x}}dx, x, a+b\arcsin(cx)\right)}{12c^3} - \frac{\left(5b^2\sin\left(\frac{a}{b}\right)\right)\operatorname{Subst}\left(\int\frac{\cos\left(\frac{x}{b}\right)}{\sqrt{x}}dx, x, a+b\arcsin(cx)\right)}{12c^3}$$

$$= -\frac{5b^2x\sqrt{a+b\arcsin(cx)}}{6c^2} - \frac{5}{36}b^2x^3\sqrt{a+b\arcsin(cx)} + \frac{5b\sqrt{1-c^2x^2}(a+b\arcsin(cx))^{3/2}}{9c^3} + \frac{5bx^2\sqrt{1-c^2x^2}(a+b\arcsin(cx))^{3/2}}{18c} + \frac{1}{3}x^3(a+b\arcsin(cx))^{5/2} + \frac{\left(5b^2\cos\left(\frac{a}{b}\right)\right)\text{Subst}\left(\int\frac{\sin\left(\frac{x}{b}\right)}{\sqrt{x}}\,dx,x,a+b\arcsin(cx)\right)}{96c^3} + \frac{\left(5b^2\cos\left(\frac{a}{b}\right)\right)\text{Subst}\left(\int\sin\left(\frac{x^2}{b}\right)\,dx,x,\sqrt{a+b\arcsin(cx)}\right)}{6c^3} - \frac{\left(5b^2\cos\left(\frac{3a}{b}\right)\right)\text{Subst}\left(\int\frac{\sin\left(\frac{3x}{b}\right)}{\sqrt{x}}\,dx,x,a+b\arcsin(cx)\right)}{288c^3} - \frac{\left(5b^2\sin\left(\frac{a}{b}\right)\right)\text{Subst}\left(\int\frac{\cos\left(\frac{x}{b}\right)}{\sqrt{x}}\,dx,x,a+b\arcsin(cx)\right)}{96c^3} - \frac{\left(5b^2\sin\left(\frac{a}{b}\right)\right)\text{Subst}\left(\int\cos\left(\frac{x^2}{b}\right)\,dx,x,\sqrt{a+b\arcsin(cx)}\right)}{6c^3} + \frac{\left(5b^2\sin\left(\frac{3a}{b}\right)\right)\text{Subst}\left(\int\frac{\cos\left(\frac{3x}{b}\right)}{\sqrt{x}}\,dx,x,a+b\arcsin(cx)\right)}{288c^3}$$

$$= -\frac{5b^2x\sqrt{a+b\arcsin(cx)}}{6c^2} - \frac{5}{36}b^2x^3\sqrt{a+b\arcsin(cx)} + \frac{5b\sqrt{1-c^2x^2}(a+b\arcsin(cx))^{3/2}}{9c^3} + \frac{5bx^2\sqrt{1-c^2x^2}(a+b\arcsin(cx))^{3/2}}{18c} + \frac{1}{3}x^3(a+b\arcsin(cx))^{5/2} + \frac{5b^{5/2}\sqrt{\frac{\pi}{2}}\cos\left(\frac{a}{b}\right)\text{FresnelS}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{6c^3} - \frac{5b^{5/2}\sqrt{\frac{\pi}{2}}\,\text{FresnelC}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)\sin\left(\frac{a}{b}\right)}{6c^3} + \frac{\left(5b^2\cos\left(\frac{a}{b}\right)\right)\text{Subst}\left(\int\sin\left(\frac{x^2}{b}\right)\,dx,x,\sqrt{a+b\arcsin(cx)}\right)}{48c^3} - \frac{\left(5b^2\cos\left(\frac{3a}{b}\right)\right)\text{Subst}\left(\int\sin\left(\frac{3x^2}{b}\right)\,dx,x,\sqrt{a+b\arcsin(cx)}\right)}{144c^3} - \frac{\left(5b^2\sin\left(\frac{a}{b}\right)\right)\text{Subst}\left(\int\cos\left(\frac{x^2}{b}\right)\,dx,x,\sqrt{a+b\arcsin(cx)}\right)}{48c^3} + \frac{\left(5b^2\sin\left(\frac{3a}{b}\right)\right)\text{Subst}\left(\int\cos\left(\frac{3x^2}{b}\right)\,dx,x,\sqrt{a+b\arcsin(cx)}\right)}{144c^3}$$

$$
\begin{aligned}
&= -\frac{5b^2x\sqrt{a+b\arcsin(cx)}}{6c^2} - \frac{5}{36}b^2x^3\sqrt{a+b\arcsin(cx)} \\
&+ \frac{5b\sqrt{1-c^2x^2}(a+b\arcsin(cx))^{3/2}}{9c^3} + \frac{5bx^2\sqrt{1-c^2x^2}(a+b\arcsin(cx))^{3/2}}{18c} \\
&+ \frac{1}{3}x^3(a+b\arcsin(cx))^{5/2} + \frac{15b^{5/2}\sqrt{\frac{\pi}{2}}\cos\left(\frac{a}{b}\right)\text{FresnelS}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{16c^3} \\
&- \frac{5b^{5/2}\sqrt{\frac{\pi}{6}}\cos\left(\frac{3a}{b}\right)\text{FresnelS}\left(\frac{\sqrt{\frac{6}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{144c^3} \\
&- \frac{15b^{5/2}\sqrt{\frac{\pi}{2}}\text{FresnelC}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)\sin\left(\frac{a}{b}\right)}{16c^3} \\
&+ \frac{5b^{5/2}\sqrt{\frac{\pi}{6}}\text{FresnelC}\left(\frac{\sqrt{\frac{6}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)\sin\left(\frac{3a}{b}\right)}{144c^3}
\end{aligned}
$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.20 (sec) , antiderivative size = 228, normalized size of antiderivative = 0.64

$$
\int x^2(a+b\arcsin(cx))^{5/2}\,dx = \frac{b^3e^{-\frac{3ia}{b}}\left(-81e^{\frac{2ia}{b}}\sqrt{-\frac{i(a+b\arcsin(cx))}{b}}\Gamma\left(\frac{7}{2},-\frac{i(a+b\arcsin(cx))}{b}\right) - 81e^{\frac{4ia}{b}}\sqrt{\frac{i(a+b\arcsin(cx))}{b}}\Gamma\left(\frac{7}{2},\right.\right.}{}
$$

```
[In] Integrate[x^2*(a + b*ArcSin[c*x])^(5/2),x]
```

```
[Out] (b^3*(-81*E^(((2*I)*a)/b)*Sqrt[((-I)*(a + b*ArcSin[c*x]))/b]*Gamma[7/2, ((-
I)*(a + b*ArcSin[c*x]))/b] - 81*E^(((4*I)*a)/b)*Sqrt[(I*(a + b*ArcSin[c*x])
)/b]*Gamma[7/2, (I*(a + b*ArcSin[c*x]))/b] + Sqrt[3]*(Sqrt[((-I)*(a + b*Arc
Sin[c*x]))/b]*Gamma[7/2, ((-3*I)*(a + b*ArcSin[c*x]))/b] + E^(((6*I)*a)/b)*
Sqrt[(I*(a + b*ArcSin[c*x]))/b]*Gamma[7/2, ((3*I)*(a + b*ArcSin[c*x]))/b]))
)/(648*c^3*E^(((3*I)*a)/b)*Sqrt[a + b*ArcSin[c*x]])
```

Maple [B] (verified)

Leaf count of result is larger than twice the leaf count of optimal. 818 vs. 2(278) = 556.

Time = 0.12 (sec) , antiderivative size = 819, normalized size of antiderivative = 2.29

method	result	size
default	Expression too large to display	819

```
[In] int(x^2*(a+b*arcsin(c*x))^(5/2),x,method=_RETURNVERBOSE)
```

```
[Out] -1/864/c^3*b*(36*arcsin(c*x)^2*2^(1/2)*Pi^(1/2)*(-1/b)^(1/2)*(a+b*arcsin(c*
x))^(1/2)*sin(-3*(a+b*arcsin(c*x))/b+3*a/b)*b^2-108*arcsin(c*x)^2*2^(1/2)*P
i^(1/2)*(-1/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)*sin(-(a+b*arcsin(c*x))/b+a/b)*
b^2+72*arcsin(c*x)*2^(1/2)*Pi^(1/2)*(-1/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)*si
n(-3*(a+b*arcsin(c*x))/b+3*a/b)*a*b-30*arcsin(c*x)*2^(1/2)*Pi^(1/2)*(-1/b)^
(1/2)*(a+b*arcsin(c*x))^(1/2)*cos(-3*(a+b*arcsin(c*x))/b+3*a/b)*b^2-216*arc
sin(c*x)*2^(1/2)*Pi^(1/2)*(-1/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)*sin(-(a+b*ar
csin(c*x))/b+a/b)*a*b+270*arcsin(c*x)*2^(1/2)*Pi^(1/2)*(-1/b)^(1/2)*(a+b*ar
csin(c*x))^(1/2)*cos(-(a+b*arcsin(c*x))/b+a/b)*b^2+5*Pi*cos(3*a/b)*FresnelS
(3*2^(1/2)/Pi^(1/2)/(-3/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)/b)*(-1/b)^(1/2)*(-
3/b)^(1/2)*b^3+5*Pi*sin(3*a/b)*FresnelC(3*2^(1/2)/Pi^(1/2)/(-3/b)^(1/2)*(a+
b*arcsin(c*x))^(1/2)/b)*(-1/b)^(1/2)*(-3/b)^(1/2)*b^3+36*2^(1/2)*Pi^(1/2)*(
-1/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)*sin(-3*(a+b*arcsin(c*x))/b+3*a/b)*a^2-1
5*2^(1/2)*Pi^(1/2)*(-1/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)*sin(-3*(a+b*arcsin(
c*x))/b+3*a/b)*b^2-30*2^(1/2)*Pi^(1/2)*(-1/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)
*cos(-3*(a+b*arcsin(c*x))/b+3*a/b)*a*b-108*2^(1/2)*Pi^(1/2)*(-1/b)^(1/2)*(a
+b*arcsin(c*x))^(1/2)*sin(-(a+b*arcsin(c*x))/b+a/b)*a^2+405*2^(1/2)*Pi^(1/2
)*(-1/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)*sin(-(a+b*arcsin(c*x))/b+a/b)*b^2+27
0*2^(1/2)*Pi^(1/2)*(-1/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)*cos(-(a+b*arcsin(c*
x))/b+a/b)*a*b+405*Pi*b^2*sin(a/b)*FresnelC(2^(1/2)/Pi^(1/2)/(-1/b)^(1/2)*(
a+b*arcsin(c*x))^(1/2)/b)+405*Pi*b^2*cos(a/b)*FresnelS(2^(1/2)/Pi^(1/2)/(-1
/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)/b))*2^(1/2)/Pi^(1/2)*(-1/b)^(1/2)
```

Fricas [F(-2)]

Exception generated.

$$\int x^2(a+b\arcsin(cx))^{5/2}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate(x^2*(a+b*arcsin(c*x))^(5/2),x, algorithm="fricas")
```

```
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int x^2(a+b\arcsin(cx))^{5/2}\,dx = \int x^2(a+b\operatorname{asin}(cx))^{\frac{5}{2}}\,dx$$

```
[In] integrate(x**2*(a+b*asin(c*x))**(5/2),x)
[Out] Integral(x**2*(a + b*asin(c*x))**(5/2), x)
```

Maxima [F]

$$\int x^2(a+b\arcsin(cx))^{5/2}\,dx = \int (b\arcsin(cx)+a)^{\frac{5}{2}}x^2\,dx$$

```
[In] integrate(x^2*(a+b*arcsin(c*x))^(5/2),x, algorithm="maxima")
[Out] integrate((b*arcsin(c*x) + a)^(5/2)*x^2, x)
```

Giac [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 2.40 (sec) , antiderivative size = 2466, normalized size of antiderivative = 6.89

$$\int x^2(a+b\arcsin(cx))^{5/2}\,dx = \text{Too large to display}$$

```
[In] integrate(x^2*(a+b*arcsin(c*x))^(5/2),x, algorithm="giac")
[Out] 1/576*(72*sqrt(2)*sqrt(pi)*a^3*b^2*erf(-1/2*I*sqrt(2)*sqrt(b*arcsin(c*x) +
a)/sqrt(abs(b)) - 1/2*sqrt(2)*sqrt(b*arcsin(c*x) + a)*sqrt(abs(b))/b)*e^(I*
a/b)/(I*b^3/sqrt(abs(b)) + b^2*sqrt(abs(b))) + 72*sqrt(2)*sqrt(pi)*a^3*b^2*
erf(1/2*I*sqrt(2)*sqrt(b*arcsin(c*x) + a)/sqrt(abs(b)) - 1/2*sqrt(2)*sqrt(b
*arcsin(c*x) + a)*sqrt(abs(b))/b)*e^(-I*a/b)/(-I*b^3/sqrt(abs(b)) + b^2*sqr
t(abs(b))) + 216*I*sqrt(2)*sqrt(pi)*a^2*b^2*erf(-1/2*I*sqrt(2)*sqrt(b*arcsi
n(c*x) + a)/sqrt(abs(b)) - 1/2*sqrt(2)*sqrt(b*arcsin(c*x) + a)*sqrt(abs(b))
/b)*e^(I*a/b)/(I*b^2/sqrt(abs(b)) + b*sqrt(abs(b))) - 216*I*sqrt(2)*sqrt(pi
)*a^2*b^2*erf(1/2*I*sqrt(2)*sqrt(b*arcsin(c*x) + a)/sqrt(abs(b)) - 1/2*sqrt
(2)*sqrt(b*arcsin(c*x) + a)*sqrt(abs(b))/b)*e^(-I*a/b)/(-I*b^2/sqrt(abs(b))
 + b*sqrt(abs(b))) + 24*I*sqrt(b*arcsin(c*x) + a)*b^2*arcsin(c*x)^2*e^(3*I*
arcsin(c*x)) - 72*I*sqrt(b*arcsin(c*x) + a)*b^2*arcsin(c*x)^2*e^(I*arcsin(c
*x)) + 72*I*sqrt(b*arcsin(c*x) + a)*b^2*arcsin(c*x)^2*e^(-I*arcsin(c*x)) -
24*I*sqrt(b*arcsin(c*x) + a)*b^2*arcsin(c*x)^2*e^(-3*I*arcsin(c*x)) - 144*s
qrt(pi)*a^3*sqrt(b)*erf(-1/2*sqrt(6)*sqrt(b*arcsin(c*x) + a)/sqrt(b) - 1/2*
```

I*sqrt(6)*sqrt(b*arcsin(c*x) + a)*sqrt(b)/abs(b))*e^(3*I*a/b)/(sqrt(6)*b +
I*sqrt(6)*b^2/abs(b)) - 144*I*sqrt(pi)*a^2*b^(3/2)*erf(-1/2*sqrt(6)*sqrt(b*
arcsin(c*x) + a)/sqrt(b) - 1/2*I*sqrt(6)*sqrt(b*arcsin(c*x) + a)*sqrt(b)/ab
s(b))*e^(3*I*a/b)/(sqrt(6)*b + I*sqrt(6)*b^2/abs(b)) - 216*I*sqrt(2)*sqrt(p
i)*a^2*b*erf(-1/2*I*sqrt(2)*sqrt(b*arcsin(c*x) + a)/sqrt(abs(b)) - 1/2*sqrt
(2)*sqrt(b*arcsin(c*x) + a)*sqrt(abs(b))/b)*e^(I*a/b)/(I*b/sqrt(abs(b)) + s
qrt(abs(b))) - 135*I*sqrt(2)*sqrt(pi)*b^3*erf(-1/2*I*sqrt(2)*sqrt(b*arcsin(
c*x) + a)/sqrt(abs(b)) - 1/2*sqrt(2)*sqrt(b*arcsin(c*x) + a)*sqrt(abs(b))/b
)*e^(I*a/b)/(I*b/sqrt(abs(b)) + sqrt(abs(b))) + 216*I*sqrt(2)*sqrt(pi)*a^2*
b*erf(1/2*I*sqrt(2)*sqrt(b*arcsin(c*x) + a)/sqrt(abs(b)) - 1/2*sqrt(2)*sqrt
(b*arcsin(c*x) + a)*sqrt(abs(b))/b)*e^(-I*a/b)/(-I*b/sqrt(abs(b)) + sqrt(ab
s(b))) + 135*I*sqrt(2)*sqrt(pi)*b^3*erf(1/2*I*sqrt(2)*sqrt(b*arcsin(c*x) +
a)/sqrt(abs(b)) - 1/2*sqrt(2)*sqrt(b*arcsin(c*x) + a)*sqrt(abs(b))/b)*e^(-I
*a/b)/(-I*b/sqrt(abs(b)) + sqrt(abs(b))) - 144*sqrt(pi)*a^3*sqrt(b)*erf(-1/
2*sqrt(6)*sqrt(b*arcsin(c*x) + a)/sqrt(b) + 1/2*I*sqrt(6)*sqrt(b*arcsin(c*x
) + a)*sqrt(b)/abs(b))*e^(-3*I*a/b)/(sqrt(6)*b - I*sqrt(6)*b^2/abs(b)) + 14
4*I*sqrt(pi)*a^2*b^(3/2)*erf(-1/2*sqrt(6)*sqrt(b*arcsin(c*x) + a)/sqrt(b) +
 1/2*I*sqrt(6)*sqrt(b*arcsin(c*x) + a)*sqrt(b)/abs(b))*e^(-3*I*a/b)/(sqrt(6
)*b - I*sqrt(6)*b^2/abs(b)) + 48*I*sqrt(b*arcsin(c*x) + a)*a*b*arcsin(c*x)*
e^(3*I*arcsin(c*x)) - 20*sqrt(b*arcsin(c*x) + a)*b^2*arcsin(c*x)*e^(3*I*arc
sin(c*x)) - 144*I*sqrt(b*arcsin(c*x) + a)*a*b*arcsin(c*x)*e^(I*arcsin(c*x))
 + 180*sqrt(b*arcsin(c*x) + a)*b^2*arcsin(c*x)*e^(I*arcsin(c*x)) + 144*I*sq
rt(b*arcsin(c*x) + a)*a*b*arcsin(c*x)*e^(-I*arcsin(c*x)) + 180*sqrt(b*arcsi
n(c*x) + a)*b^2*arcsin(c*x)*e^(-I*arcsin(c*x)) - 48*I*sqrt(b*arcsin(c*x) +
a)*a*b*arcsin(c*x)*e^(-3*I*arcsin(c*x)) - 20*sqrt(b*arcsin(c*x) + a)*b^2*ar
csin(c*x)*e^(-3*I*arcsin(c*x)) + 144*sqrt(pi)*a^3*erf(-1/2*sqrt(6)*sqrt(b*a
rcsin(c*x) + a)/sqrt(b) - 1/2*I*sqrt(6)*sqrt(b*arcsin(c*x) + a)*sqrt(b)/abs
(b))*e^(3*I*a/b)/(sqrt(6)*sqrt(b) + I*sqrt(6)*b^(3/2)/abs(b)) + 144*I*sqrt(
pi)*a^2*b*erf(-1/2*sqrt(6)*sqrt(b*arcsin(c*x) + a)/sqrt(b) - 1/2*I*sqrt(6)*
sqrt(b*arcsin(c*x) + a)*sqrt(b)/abs(b))*e^(3*I*a/b)/(sqrt(6)*sqrt(b) + I*sq
rt(6)*b^(3/2)/abs(b)) + 36*sqrt(pi)*a*b^2*erf(-1/2*sqrt(6)*sqrt(b*arcsin(c*
x) + a)/sqrt(b) - 1/2*I*sqrt(6)*sqrt(b*arcsin(c*x) + a)*sqrt(b)/abs(b))*e^(
3*I*a/b)/(sqrt(6)*sqrt(b) + I*sqrt(6)*b^(3/2)/abs(b)) - 144*sqrt(pi)*a^3*er
f(-1/2*I*sqrt(2)*sqrt(b*arcsin(c*x) + a)/sqrt(abs(b)) - 1/2*sqrt(2)*sqrt(b*
arcsin(c*x) + a)*sqrt(abs(b))/b)*e^(I*a/b)/(I*sqrt(2)*b/sqrt(abs(b)) + sqrt
(2)*sqrt(abs(b))) - 144*sqrt(pi)*a^3*erf(1/2*I*sqrt(2)*sqrt(b*arcsin(c*x) +
 a)/sqrt(abs(b)) - 1/2*sqrt(2)*sqrt(b*arcsin(c*x) + a)*sqrt(abs(b))/b)*e^(-
I*a/b)/(-I*sqrt(2)*b/sqrt(abs(b)) + sqrt(2)*sqrt(abs(b))) + 144*sqrt(pi)*a^
3*erf(-1/2*sqrt(6)*sqrt(b*arcsin(c*x) + a)/sqrt(b) + 1/2*I*sqrt(6)*sqrt(b*a
rcsin(c*x) + a)*sqrt(b)/abs(b))*e^(-3*I*a/b)/(sqrt(6)*sqrt(b) - I*sqrt(6)*b
^(3/2)/abs(b)) - 144*I*sqrt(pi)*a^2*b*erf(-1/2*sqrt(6)*sqrt(b*arcsin(c*x) +
 a)/sqrt(b) + 1/2*I*sqrt(6)*sqrt(b*arcsin(c*x) + a)*sqrt(b)/abs(b))*e^(-3*I
*a/b)/(sqrt(6)*sqrt(b) - I*sqrt(6)*b^(3/2)/abs(b)) + 36*sqrt(pi)*a*b^2*erf(
-1/2*sqrt(6)*sqrt(b*arcsin(c*x) + a)/sqrt(b) + 1/2*I*sqrt(6)*sqrt(b*arcsin(
c*x) + a)*sqrt(b)/abs(b))*e^(-3*I*a/b)/(sqrt(6)*sqrt(b) - I*sqrt(6)*b^(3/2)

```
/abs(b)) - 36*sqrt(pi)*a*b^(3/2)*erf(-1/2*sqrt(6)*sqrt(b*arcsin(c*x) + a)/s
qrt(b) - 1/2*I*sqrt(6)*sqrt(b*arcsin(c*x) + a)*sqrt(b)/abs(b))*e^(3*I*a/b)/
(sqrt(6) + I*sqrt(6)*b/abs(b)) + 10*I*sqrt(pi)*b^(5/2)*erf(-1/2*sqrt(6)*sqr
t(b*arcsin(c*x) + a)/sqrt(b) - 1/2*I*sqrt(6)*sqrt(b*arcsin(c*x) + a)*sqrt(b
)/abs(b))*e^(3*I*a/b)/(sqrt(6) + I*sqrt(6)*b/abs(b)) - 36*sqrt(pi)*a*b^(3/2
)*erf(-1/2*sqrt(6)*sqrt(b*arcsin(c*x) + a)/sqrt(b) + 1/2*I*sqrt(6)*sqrt(b*a
rcsin(c*x) + a)*sqrt(b)/abs(b))*e^(-3*I*a/b)/(sqrt(6) - I*sqrt(6)*b/abs(b))
 - 10*I*sqrt(pi)*b^(5/2)*erf(-1/2*sqrt(6)*sqrt(b*arcsin(c*x) + a)/sqrt(b) +
 1/2*I*sqrt(6)*sqrt(b*arcsin(c*x) + a)*sqrt(b)/abs(b))*e^(-3*I*a/b)/(sqrt(6
) - I*sqrt(6)*b/abs(b)) + 24*I*sqrt(b*arcsin(c*x) + a)*a^2*e^(3*I*arcsin(c*
x)) - 20*sqrt(b*arcsin(c*x) + a)*a*b*e^(3*I*arcsin(c*x)) - 10*I*sqrt(b*arcs
in(c*x) + a)*b^2*e^(3*I*arcsin(c*x)) - 72*I*sqrt(b*arcsin(c*x) + a)*a^2*e^(
I*arcsin(c*x)) + 180*sqrt(b*arcsin(c*x) + a)*a*b*e^(I*arcsin(c*x)) + 270*I*
sqrt(b*arcsin(c*x) + a)*b^2*e^(I*arcsin(c*x)) + 72*I*sqrt(b*arcsin(c*x) + a
)*a^2*e^(-I*arcsin(c*x)) + 180*sqrt(b*arcsin(c*x) + a)*a*b*e^(-I*arcsin(c*x
)) - 270*I*sqrt(b*arcsin(c*x) + a)*b^2*e^(-I*arcsin(c*x)) - 24*I*sqrt(b*arc
sin(c*x) + a)*a^2*e^(-3*I*arcsin(c*x)) - 20*sqrt(b*arcsin(c*x) + a)*a*b*e^(
-3*I*arcsin(c*x)) + 10*I*sqrt(b*arcsin(c*x) + a)*b^2*e^(-3*I*arcsin(c*x)))/
c^3
```

Mupad [F(-1)]

Timed out.

$$\int x^2(a+b\arcsin(cx))^{5/2}\,dx=\int x^2\,(a+b\,\mathrm{asin}(c\,x))^{5/2}\,dx$$

```
[In] int(x^2*(a + b*asin(c*x))^(5/2),x)
```

```
[Out] int(x^2*(a + b*asin(c*x))^(5/2), x)
```

3.184 $\int x(a+b\arcsin(cx))^{5/2}\,dx$

Optimal result

Integrand size = 14, antiderivative size = 216

$$\int x(a+b\arcsin(cx))^{5/2}\,dx=\frac{15b^2\sqrt{a+b\arcsin(cx)}}{64c^2}-\frac{15}{32}b^2x^2\sqrt{a+b\arcsin(cx)}+\frac{5bx\sqrt{1-c^2x^2}(a+b\arcsin(cx))^{3/2}}{8c}-\frac{(a+b\arcsin(cx))^{5/2}}{4c^2}+\frac{1}{2}x^2(a+b\arcsin(cx))^{5/2}-\frac{15b^{5/2}\sqrt{\pi}\cos\left(\frac{2a}{b}\right)\text{FresnelC}\left(\frac{2\sqrt{a+b\arcsin(cx)}}{\sqrt{b}\sqrt{\pi}}\right)}{128c^2}-\frac{15b^{5/2}\sqrt{\pi}\,\text{FresnelS}\left(\frac{2\sqrt{a+b\arcsin(cx)}}{\sqrt{b}\sqrt{\pi}}\right)\sin\left(\frac{2a}{b}\right)}{128c^2}$$

```
[Out] -1/4*(a+b*arcsin(c*x))^(5/2)/c^2+1/2*x^2*(a+b*arcsin(c*x))^(5/2)-15/128*b^(
5/2)*cos(2*a/b)*FresnelC(2*(a+b*arcsin(c*x))^(1/2)/b^(1/2)/Pi^(1/2))*Pi^(1/
2)/c^2-15/128*b^(5/2)*FresnelS(2*(a+b*arcsin(c*x))^(1/2)/b^(1/2)/Pi^(1/2))*
sin(2*a/b)*Pi^(1/2)/c^2+5/8*b*x*(a+b*arcsin(c*x))^(3/2)*(-c^2*x^2+1)^(1/2)/
c+15/64*b^2*(a+b*arcsin(c*x))^(1/2)/c^2-15/32*b^2*x^2*(a+b*arcsin(c*x))^(1/
2)
```

Rubi [A] (verified)

Time = 0.41 (sec) , antiderivative size = 216, normalized size of antiderivative = 1.00, number of steps used = 12, number of rules used = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.714, Rules used = {4725, 4795, 4737, 4809, 3393, 3387, 3386, 3432, 3385, 3433}

$$\int x(a+b\arcsin(cx))^{5/2}\,dx = -\frac{15\sqrt{\pi}b^{5/2}\cos\left(\frac{2a}{b}\right)\text{FresnelC}\left(\frac{2\sqrt{a+b\arcsin(cx)}}{\sqrt{b}\sqrt{\pi}}\right)}{128c^2} - \frac{15\sqrt{\pi}b^{5/2}\sin\left(\frac{2a}{b}\right)\text{FresnelS}\left(\frac{2\sqrt{a+b\arcsin(cx)}}{\sqrt{b}\sqrt{\pi}}\right)}{128c^2} + \frac{15b^2\sqrt{a+b\arcsin(cx)}}{64c^2} - \frac{15}{32}b^2x^2\sqrt{a+b\arcsin(cx)} + \frac{5bx\sqrt{1-c^2x^2}(a+b\arcsin(cx))^{3/2}}{8c} - \frac{(a+b\arcsin(cx))^{5/2}}{4c^2} + \frac{1}{2}x^2(a+b\arcsin(cx))^{5/2}$$

```
[In] Int[x*(a + b*ArcSin[c*x])^(5/2),x]
```

```
[Out] (15*b^2*Sqrt[a + b*ArcSin[c*x]])/(64*c^2) - (15*b^2*x^2*Sqrt[a + b*ArcSin[c
*x]])/32 + (5*b*x*Sqrt[1 - c^2*x^2]*(a + b*ArcSin[c*x])^(3/2))/(8*c) - (a +
 b*ArcSin[c*x])^(5/2)/(4*c^2) + (x^2*(a + b*ArcSin[c*x])^(5/2))/2 - (15*b^(
5/2)*Sqrt[Pi]*Cos[(2*a)/b]*FresnelC[(2*Sqrt[a + b*ArcSin[c*x]])/(Sqrt[b]*Sq
rt[Pi])])/(128*c^2) - (15*b^(5/2)*Sqrt[Pi]*FresnelS[(2*Sqrt[a + b*ArcSin[c*
x]])/(Sqrt[b]*Sqrt[Pi])]*Sin[(2*a)/b])/(128*c^2)
```

Rule 3385

```
Int[sin[Pi/2 + (e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> D
ist[2/d, Subst[Int[Cos[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d
, e, f}, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3386

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[2/d
, Subst[Int[Sin[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d, e, f}
, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3387

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[Cos
[(d*e - c*f)/d], Int[Sin[c*(f/d) + f*x]/Sqrt[c + d*x], x], x] + Dist[Sin[(d
*e - c*f)/d], Int[Cos[c*(f/d) + f*x]/Sqrt[c + d*x], x], x] /; FreeQ[{c, d,
e, f}, x] && ComplexFreeQ[f] && NeQ[d*e - c*f, 0]
```

Rule 3393

```
Int[((c_.) + (d_.)*(x_))^(m_)*sin[(e_.) + (f_.)*(x_)]^(n_), x_Symbol] :> In
t[ExpandTrigReduce[(c + d*x)^m, Sin[e + f*x]^n, x], x] /; FreeQ[{c, d, e, f
, m}, x] && IGtQ[n, 1] && ( !RationalQ[m] || (GeQ[m, -1] && LtQ[m, 1]))
```

Rule 3432

```
Int[Sin[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelS[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 3433

```
Int[Cos[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelC[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4725

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^(m + 1)*((a + b*ArcSin[c*x])^n/(m + 1)), x] - Dist[b*c*(n/(m + 1)), Int[x^
(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*x^2]), x], x] /; FreeQ[{a
, b, c}, x] && IGtQ[m, 0] && GtQ[n, 0]
```

Rule 4737

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)/Sqrt[(d_) + (e_.)*(x_)^2], x_S
ymbol] :> Simp[(1/(b*c*(n + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]]*(a
 + b*ArcSin[c*x])^(n + 1), x] /; FreeQ[{a, b, c, d, e, n}, x] && EqQ[c^2*d
+ e, 0] && NeQ[n, -1]
```

Rule 4795

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_)*((d_) + (e_.
)*(x_)^2)^(p_), x_Symbol] :> Simp[f*(f*x)^(m - 1)*(d + e*x^2)^(p + 1)*((a +
 b*ArcSin[c*x])^n/(e*(m + 2*p + 1))), x] + (Dist[f^2*((m - 1)/(c^2*(m + 2*p
 + 1))), Int[(f*x)^(m - 2)*(d + e*x^2)^p*(a + b*ArcSin[c*x])^n, x], x] + Di
st[b*f*(n/(c*(m + 2*p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], Int[(f*x)
^(m - 1)*(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x]) /; Fr
eeQ[{a, b, c, d, e, f, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && IGtQ[m,
1] && NeQ[m + 2*p + 1, 0]
```

Rule 4809

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_.)*((d_) + (e_.)*(x_)^
2)^(p_.), x_Symbol] :> Dist[(1/(b*c^(m + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x
^2)^p], Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b]^(2*p + 1), x], x, a
 + b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, d, e, n}, x] && EqQ[c^2*d + e, 0]
&& IGtQ[2*p + 2, 0] && IGtQ[m, 0]
```

Rubi steps

$$\text{integral} = \frac{1}{2}x^2(a+b\arcsin(cx))^{5/2} - \frac{1}{4}(5bc)\int \frac{x^2(a+b\arcsin(cx))^{3/2}}{\sqrt{1-c^2x^2}}\,dx$$

$$= \frac{5bx\sqrt{1-c^2x^2}(a+b\arcsin(cx))^{3/2}}{8c} + \frac{1}{2}x^2(a+b\arcsin(cx))^{5/2} - \frac{1}{16}(15b^2)\int x\sqrt{a+b\arcsin(cx)}\,dx - \frac{(5b)\int \frac{(a+b\arcsin(cx))^{3/2}}{\sqrt{1-c^2x^2}}\,dx}{8c}$$

$$= -\frac{15}{32}b^2x^2\sqrt{a+b\arcsin(cx)} + \frac{5bx\sqrt{1-c^2x^2}(a+b\arcsin(cx))^{3/2}}{8c} - \frac{(a+b\arcsin(cx))^{5/2}}{4c^2} + \frac{1}{2}x^2(a+b\arcsin(cx))^{5/2} + \frac{1}{64}(15b^3c)\int \frac{x^2}{\sqrt{1-c^2x^2}\sqrt{a+b\arcsin(cx)}}\,dx$$

$$= -\frac{15}{32}b^2x^2\sqrt{a+b\arcsin(cx)} + \frac{5bx\sqrt{1-c^2x^2}(a+b\arcsin(cx))^{3/2}}{8c} - \frac{(a+b\arcsin(cx))^{5/2}}{4c^2} + \frac{1}{2}x^2(a+b\arcsin(cx))^{5/2} + \frac{(15b^2)\,\text{Subst}\left(\int \frac{\sin^2\left(\frac{a}{b}-\frac{x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{64c^2}$$

$$= -\frac{15}{32}b^2x^2\sqrt{a+b\arcsin(cx)} + \frac{5bx\sqrt{1-c^2x^2}(a+b\arcsin(cx))^{3/2}}{8c} - \frac{(a+b\arcsin(cx))^{5/2}}{4c^2} + \frac{1}{2}x^2(a+b\arcsin(cx))^{5/2} + \frac{(15b^2)\,\text{Subst}\left(\int \left(\frac{1}{2\sqrt{x}} - \frac{\cos\left(\frac{2a}{b}-\frac{2x}{b}\right)}{2\sqrt{x}}\right)\,dx, x, a+b\arcsin(cx)\right)}{64c^2}$$

$$= \frac{15b^2\sqrt{a+b\arcsin(cx)}}{64c^2} - \frac{15}{32}b^2x^2\sqrt{a+b\arcsin(cx)} + \frac{5bx\sqrt{1-c^2x^2}(a+b\arcsin(cx))^{3/2}}{8c} - \frac{(a+b\arcsin(cx))^{5/2}}{4c^2} + \frac{1}{2}x^2(a+b\arcsin(cx))^{5/2} - \frac{(15b^2)\,\text{Subst}\left(\int \frac{\cos\left(\frac{2a}{b}-\frac{2x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{128c^2}$$

$$= \frac{15b^2\sqrt{a+b\arcsin(cx)}}{64c^2} - \frac{15}{32}b^2x^2\sqrt{a+b\arcsin(cx)} + \frac{5bx\sqrt{1-c^2x^2}(a+b\arcsin(cx))^{3/2}}{8c} - \frac{(a+b\arcsin(cx))^{5/2}}{4c^2} + \frac{1}{2}x^2(a+b\arcsin(cx))^{5/2} - \frac{\left(15b^2\cos\left(\frac{2a}{b}\right)\right)\text{Subst}\left(\int \frac{\cos\left(\frac{2x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{128c^2} - \frac{\left(15b^2\sin\left(\frac{2a}{b}\right)\right)\text{Subst}\left(\int \frac{\sin\left(\frac{2x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{128c^2}$$

$$
\begin{aligned}
&= \frac{15b^2\sqrt{a+b\arcsin(cx)}}{64c^2} - \frac{15}{32}b^2x^2\sqrt{a+b\arcsin(cx)} \\
&+ \frac{5bx\sqrt{1-c^2x^2}(a+b\arcsin(cx))^{3/2}}{8c} \\
&- \frac{(a+b\arcsin(cx))^{5/2}}{4c^2} + \frac{1}{2}x^2(a+b\arcsin(cx))^{5/2} \\
&- \frac{\left(15b^2\cos\left(\frac{2a}{b}\right)\right)\text{Subst}\left(\int\cos\left(\frac{2x^2}{b}\right)\,dx, x, \sqrt{a+b\arcsin(cx)}\right)}{64c^2} \\
&- \frac{\left(15b^2\sin\left(\frac{2a}{b}\right)\right)\text{Subst}\left(\int\sin\left(\frac{2x^2}{b}\right)\,dx, x, \sqrt{a+b\arcsin(cx)}\right)}{64c^2}
\end{aligned}
$$

$$
\begin{aligned}
&= \frac{15b^2\sqrt{a+b\arcsin(cx)}}{64c^2} - \frac{15}{32}b^2x^2\sqrt{a+b\arcsin(cx)} \\
&+ \frac{5bx\sqrt{1-c^2x^2}(a+b\arcsin(cx))^{3/2}}{8c} - \frac{(a+b\arcsin(cx))^{5/2}}{4c^2} \\
&+ \frac{1}{2}x^2(a+b\arcsin(cx))^{5/2} - \frac{15b^{5/2}\sqrt{\pi}\cos\left(\frac{2a}{b}\right)\text{FresnelC}\left(\frac{2\sqrt{a+b\arcsin(cx)}}{\sqrt{b}\sqrt{\pi}}\right)}{128c^2} \\
&- \frac{15b^{5/2}\sqrt{\pi}\,\text{FresnelS}\left(\frac{2\sqrt{a+b\arcsin(cx)}}{\sqrt{b}\sqrt{\pi}}\right)\sin\left(\frac{2a}{b}\right)}{128c^2}
\end{aligned}
$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.05 (sec) , antiderivative size = 129, normalized size of antiderivative = 0.60

$$
\int x(a+b\arcsin(cx))^{5/2}\,dx = \frac{ib^3e^{-\frac{2ia}{b}}\left(\sqrt{-\frac{i(a+b\arcsin(cx))}{b}}\Gamma\left(\frac{7}{2}, -\frac{2i(a+b\arcsin(cx))}{b}\right) - e^{\frac{4ia}{b}}\sqrt{\frac{i(a+b\arcsin(cx))}{b}}\Gamma\left(\frac{7}{2}, \frac{2i(a+b\arcsin(cx))}{b}\right)\right)}{32\sqrt{2}c^2\sqrt{a+b\arcsin(cx)}}
$$

```
[In] Integrate[x*(a + b*ArcSin[c*x])^(5/2),x]
```

```
[Out] ((I/32)*b^3*(Sqrt[((-I)*(a + b*ArcSin[c*x]))/b]*Gamma[7/2, ((-2*I)*(a + b*A
rcSin[c*x]))/b] - E^(((4*I)*a)/b)*Sqrt[(I*(a + b*ArcSin[c*x]))/b]*Gamma[7/2
, ((2*I)*(a + b*ArcSin[c*x]))/b]))/(Sqrt[2]*c^2*E^(((2*I)*a)/b)*Sqrt[a + b*
ArcSin[c*x]])
```

Maple [B] (verified)

Leaf count of result is larger than twice the leaf count of optimal. 407 vs. $2(170) = 340$.

Time = 0.08 (sec) , antiderivative size = 408, normalized size of antiderivative = 1.89

method	result
default	$-\frac{15\sqrt{\pi}\,\sqrt{-\frac{1}{b}}\,\cos\left(\frac{2a}{b}\right)\mathrm{FresnelC}\left(\frac{2\sqrt{2}\,\sqrt{a+b\arcsin(cx)}}{\sqrt{\pi}\,\sqrt{-\frac{2}{b}}\,b}\right)\sqrt{a+b\arcsin(cx)}\,b^{3}-15\sqrt{\pi}\,\sqrt{-\frac{1}{b}}\,\sin\left(\frac{2a}{b}\right)\mathrm{FresnelS}\left(\frac{2\sqrt{2}\,\sqrt{a+b\arcsin(cx)}}{\sqrt{\pi}\,\sqrt{-\frac{2}{b}}\,b}\right)\sqrt{}}{}$

```
[In] int(x*(a+b*arcsin(c*x))^(5/2),x,method=_RETURNVERBOSE)
```

```
[Out] -1/128/c^2/(a+b*arcsin(c*x))^(1/2)*(15*Pi^(1/2)*(-1/b)^(1/2)*cos(2*a/b)*Fre
snelC(2*2^(1/2)/Pi^(1/2)/(-2/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)/b)*(a+b*arcsi
n(c*x))^(1/2)*b^3-15*Pi^(1/2)*(-1/b)^(1/2)*sin(2*a/b)*FresnelS(2*2^(1/2)/Pi
^(1/2)/(-2/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)/b)*(a+b*arcsin(c*x))^(1/2)*b^3+
32*arcsin(c*x)^3*cos(-2*(a+b*arcsin(c*x))/b+2*a/b)*b^3+96*arcsin(c*x)^2*cos
(-2*(a+b*arcsin(c*x))/b+2*a/b)*a*b^2+40*arcsin(c*x)^2*sin(-2*(a+b*arcsin(c*
x))/b+2*a/b)*b^3+96*arcsin(c*x)*cos(-2*(a+b*arcsin(c*x))/b+2*a/b)*a^2*b-30*
arcsin(c*x)*cos(-2*(a+b*arcsin(c*x))/b+2*a/b)*b^3+80*arcsin(c*x)*sin(-2*(a+
b*arcsin(c*x))/b+2*a/b)*a*b^2+32*cos(-2*(a+b*arcsin(c*x))/b+2*a/b)*a^3-30*c
os(-2*(a+b*arcsin(c*x))/b+2*a/b)*a*b^2+40*sin(-2*(a+b*arcsin(c*x))/b+2*a/b)
*a^2*b)
```

Fricas [F(-2)]

Exception generated.

$$\int x(a+b\arcsin(cx))^{5/2}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate(x*(a+b*arcsin(c*x))^(5/2),x, algorithm="fricas")
```

```
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int x(a+b\arcsin(cx))^{5/2}\,dx = \int x(a+b\operatorname{asin}(cx))^{\frac{5}{2}}\,dx$$

```
[In] integrate(x*(a+b*asin(c*x))**(5/2),x)
```

```
[Out] Integral(x*(a + b*asin(c*x))**(5/2), x)
```

Maxima [F]

$$\int x(a+b\arcsin(cx))^{5/2}\,dx=\int (b\arcsin{(cx)}+a)^{\frac{5}{2}}x\,dx$$

```
[In] integrate(x*(a+b*arcsin(c*x))^(5/2),x, algorithm="maxima")
[Out] integrate((b*arcsin(c*x) + a)^(5/2)*x, x)
```

Giac [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 1.22 (sec) , antiderivative size = 1307, normalized size of antiderivative = 6.05

$$\int x(a+b\arcsin(cx))^{5/2}\,dx=\text{Too large to display}$$

```
[In] integrate(x*(a+b*arcsin(c*x))^(5/2),x, algorithm="giac")
[Out] 1/4*I*sqrt(pi)*a^3*b^(3/2)*erf(-sqrt(b*arcsin(c*x) + a)/sqrt(b) - I*sqrt(b*
arcsin(c*x) + a)*sqrt(b)/abs(b))*e^(2*I*a/b)/((b^2 + I*b^3/abs(b))*c^2) - 3
/8*sqrt(pi)*a^2*b^(5/2)*erf(-sqrt(b*arcsin(c*x) + a)/sqrt(b) - I*sqrt(b*arc
sin(c*x) + a)*sqrt(b)/abs(b))*e^(2*I*a/b)/((b^2 + I*b^3/abs(b))*c^2) - 1/4*
I*sqrt(pi)*a^3*b^(3/2)*erf(-sqrt(b*arcsin(c*x) + a)/sqrt(b) + I*sqrt(b*arcs
in(c*x) + a)*sqrt(b)/abs(b))*e^(-2*I*a/b)/((b^2 - I*b^3/abs(b))*c^2) - 3/8*
sqrt(pi)*a^2*b^(5/2)*erf(-sqrt(b*arcsin(c*x) + a)/sqrt(b) + I*sqrt(b*arcsin
(c*x) + a)*sqrt(b)/abs(b))*e^(-2*I*a/b)/((b^2 - I*b^3/abs(b))*c^2) - 1/8*sq
rt(b*arcsin(c*x) + a)*b^2*arcsin(c*x)^2*e^(2*I*arcsin(c*x))/c^2 - 1/8*sqrt(
b*arcsin(c*x) + a)*b^2*arcsin(c*x)^2*e^(-2*I*arcsin(c*x))/c^2 + 3/8*sqrt(pi
)*a^2*b^2*erf(-sqrt(b*arcsin(c*x) + a)/sqrt(b) - I*sqrt(b*arcsin(c*x) + a)*
sqrt(b)/abs(b))*e^(2*I*a/b)/((b^(3/2) + I*b^(5/2)/abs(b))*c^2) - 9/64*I*sqr
t(pi)*a*b^3*erf(-sqrt(b*arcsin(c*x) + a)/sqrt(b) - I*sqrt(b*arcsin(c*x) + a
)*sqrt(b)/abs(b))*e^(2*I*a/b)/((b^(3/2) + I*b^(5/2)/abs(b))*c^2) + 1/4*I*sq
rt(pi)*a^3*b*erf(-sqrt(b*arcsin(c*x) + a)/sqrt(b) + I*sqrt(b*arcsin(c*x) +
a)*sqrt(b)/abs(b))*e^(-2*I*a/b)/((b^(3/2) - I*b^(5/2)/abs(b))*c^2) + 3/8*sq
rt(pi)*a^2*b^2*erf(-sqrt(b*arcsin(c*x) + a)/sqrt(b) + I*sqrt(b*arcsin(c*x)
+ a)*sqrt(b)/abs(b))*e^(-2*I*a/b)/((b^(3/2) - I*b^(5/2)/abs(b))*c^2) + 9/64
*I*sqrt(pi)*a*b^3*erf(-sqrt(b*arcsin(c*x) + a)/sqrt(b) + I*sqrt(b*arcsin(c*
x) + a)*sqrt(b)/abs(b))*e^(-2*I*a/b)/((b^(3/2) - I*b^(5/2)/abs(b))*c^2) - 1
/4*I*sqrt(pi)*a^3*sqrt(b)*erf(-sqrt(b*arcsin(c*x) + a)/sqrt(b) - I*sqrt(b*a
rcsin(c*x) + a)*sqrt(b)/abs(b))*e^(2*I*a/b)/((b + I*b^2/abs(b))*c^2) + 9/64
*I*sqrt(pi)*a*b^(5/2)*erf(-sqrt(b*arcsin(c*x) + a)/sqrt(b) - I*sqrt(b*arcsi
n(c*x) + a)*sqrt(b)/abs(b))*e^(2*I*a/b)/((b + I*b^2/abs(b))*c^2) + 15/256*s
qrt(pi)*b^(7/2)*erf(-sqrt(b*arcsin(c*x) + a)/sqrt(b) - I*sqrt(b*arcsin(c*x)
```

```
 + a)*sqrt(b)/abs(b))*e^(2*I*a/b)/((b + I*b^2/abs(b))*c^2) - 9/64*I*sqrt(pi
)*a*b^(5/2)*erf(-sqrt(b*arcsin(c*x) + a)/sqrt(b) + I*sqrt(b*arcsin(c*x) + a
)*sqrt(b)/abs(b))*e^(-2*I*a/b)/((b - I*b^2/abs(b))*c^2) + 15/256*sqrt(pi)*b
^(7/2)*erf(-sqrt(b*arcsin(c*x) + a)/sqrt(b) + I*sqrt(b*arcsin(c*x) + a)*sqr
t(b)/abs(b))*e^(-2*I*a/b)/((b - I*b^2/abs(b))*c^2) - 1/4*sqrt(b*arcsin(c*x)
 + a)*a*b*arcsin(c*x)*e^(2*I*arcsin(c*x))/c^2 - 5/32*I*sqrt(b*arcsin(c*x) +
 a)*b^2*arcsin(c*x)*e^(2*I*arcsin(c*x))/c^2 - 1/4*sqrt(b*arcsin(c*x) + a)*a
*b*arcsin(c*x)*e^(-2*I*arcsin(c*x))/c^2 + 5/32*I*sqrt(b*arcsin(c*x) + a)*b^
2*arcsin(c*x)*e^(-2*I*arcsin(c*x))/c^2 - 1/8*sqrt(b*arcsin(c*x) + a)*a^2*e^
(2*I*arcsin(c*x))/c^2 - 5/32*I*sqrt(b*arcsin(c*x) + a)*a*b*e^(2*I*arcsin(c*
x))/c^2 + 15/128*sqrt(b*arcsin(c*x) + a)*b^2*e^(2*I*arcsin(c*x))/c^2 - 1/8*
sqrt(b*arcsin(c*x) + a)*a^2*e^(-2*I*arcsin(c*x))/c^2 + 5/32*I*sqrt(b*arcsin
(c*x) + a)*a*b*e^(-2*I*arcsin(c*x))/c^2 + 15/128*sqrt(b*arcsin(c*x) + a)*b^
2*e^(-2*I*arcsin(c*x))/c^2
```

Mupad [F(-1)]

Timed out.

$$\int x(a+b\arcsin(cx))^{5/2}\,dx=\int x\,(a+b\,\mathrm{asin}(c\,x))^{5/2}\,dx$$

```
[In] int(x*(a + b*asin(c*x))^(5/2),x)
```

```
[Out] int(x*(a + b*asin(c*x))^(5/2), x)
```

3.185 $\int (a+b\arcsin(cx))^{5/2}\,dx$

Optimal result

Integrand size = 12, antiderivative size = 179

$$\int (a+b\arcsin(cx))^{5/2}\,dx = -\frac{15}{4}b^2x\sqrt{a+b\arcsin(cx)} + \frac{5b\sqrt{1-c^2x^2}(a+b\arcsin(cx))^{3/2}}{2c} + x(a+b\arcsin(cx))^{5/2} + \frac{15b^{5/2}\sqrt{\frac{\pi}{2}}\cos\left(\frac{a}{b}\right)\text{FresnelS}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{4c} - \frac{15b^{5/2}\sqrt{\frac{\pi}{2}}\text{FresnelC}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)\sin\left(\frac{a}{b}\right)}{4c}$$

```
[Out] x*(a+b*arcsin(c*x))^(5/2)+15/8*b^(5/2)*cos(a/b)*FresnelS(2^(1/2)/Pi^(1/2)*(
a+b*arcsin(c*x))^(1/2)/b^(1/2))*2^(1/2)*Pi^(1/2)/c-15/8*b^(5/2)*FresnelC(2^
(1/2)/Pi^(1/2)*(a+b*arcsin(c*x))^(1/2)/b^(1/2))*sin(a/b)*2^(1/2)*Pi^(1/2)/c
+5/2*b*(a+b*arcsin(c*x))^(3/2)*(-c^2*x^2+1)^(1/2)/c-15/4*b^2*x*(a+b*arcsin(
c*x))^(1/2)
```

Rubi [A] (verified)

Time = 0.25 (sec) , antiderivative size = 179, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 8, $\frac{\text{number of rules}}{\text{integrand size}} = 0.667$, Rules used

$= \{4715, 4767, 4809, 3387, 3386, 3432, 3385, 3433\}$

$$\int (a+b\arcsin(cx))^{5/2}\,dx = -\frac{15\sqrt{\frac{\pi}{2}}b^{5/2}\sin\left(\frac{a}{b}\right)\text{FresnelC}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{4c} + \frac{15\sqrt{\frac{\pi}{2}}b^{5/2}\cos\left(\frac{a}{b}\right)\text{FresnelS}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{4c} - \frac{15}{4}b^2x\sqrt{a+b\arcsin(cx)} + \frac{5b\sqrt{1-c^2x^2}(a+b\arcsin(cx))^{3/2}}{2c} + x(a+b\arcsin(cx))^{5/2}$$

```
[In] Int[(a + b*ArcSin[c*x])^(5/2),x]
```

```
[Out] (-15*b^2*x*Sqrt[a + b*ArcSin[c*x]])/4 + (5*b*Sqrt[1 - c^2*x^2]*(a + b*ArcSi
n[c*x])^(3/2))/(2*c) + x*(a + b*ArcSin[c*x])^(5/2) + (15*b^(5/2)*Sqrt[Pi/2]
*Cos[a/b]*FresnelS[(Sqrt[2/Pi]*Sqrt[a + b*ArcSin[c*x]])/Sqrt[b]])/(4*c) - (
15*b^(5/2)*Sqrt[Pi/2]*FresnelC[(Sqrt[2/Pi]*Sqrt[a + b*ArcSin[c*x]])/Sqrt[b]
]*Sin[a/b])/(4*c)
```

Rule 3385

```
Int[sin[Pi/2 + (e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> D
ist[2/d, Subst[Int[Cos[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d
, e, f}, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3386

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[2/d
, Subst[Int[Sin[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d, e, f}
, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3387

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[Cos
[(d*e - c*f)/d], Int[Sin[c*(f/d) + f*x]/Sqrt[c + d*x], x], x] + Dist[Sin[(d
*e - c*f)/d], Int[Cos[c*(f/d) + f*x]/Sqrt[c + d*x], x], x] /; FreeQ[{c, d,
e, f}, x] && ComplexFreeQ[f] && NeQ[d*e - c*f, 0]
```

Rule 3432

```
Int[Sin[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelS[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 3433

```
Int[Cos[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelC[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4715

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.), x_Symbol] :> Simp[x*(a + b*Ar
cSin[c*x])^n, x] - Dist[b*c*n, Int[x*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 -
c^2*x^2]), x], x] /; FreeQ[{a, b, c}, x] && GtQ[n, 0]
```

Rule 4767

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)*((d_) + (e_.)*(x_)^2)^(p_
.), x_Symbol] :> Simp[(d + e*x^2)^(p + 1)*((a + b*ArcSin[c*x])^n/(2*e*(p +
1))), x] + Dist[b*(n/(2*c*(p + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x^2)^p], In
t[(1 - c^2*x^2)^(p + 1/2)*(a + b*ArcSin[c*x])^(n - 1), x], x] /; FreeQ[{a,
b, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && GtQ[n, 0] && NeQ[p, -1]
```

Rule 4809

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_.)*((d_) + (e_.)*(x_)^
2)^(p_.), x_Symbol] :> Dist[(1/(b*c^(m + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x
^2)^p], Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b]^(2*p + 1), x], x, a
 + b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, d, e, n}, x] && EqQ[c^2*d + e, 0]
&& IGtQ[2*p + 2, 0] && IGtQ[m, 0]
```

Rubi steps

$$
\begin{aligned}
\text{integral} &= x(a+b\arcsin(cx))^{5/2}-\frac{1}{2}(5bc)\int\frac{x(a+b\arcsin(cx))^{3/2}}{\sqrt{1-c^2x^2}}\,dx\\
&=\frac{5b\sqrt{1-c^2x^2}(a+b\arcsin(cx))^{3/2}}{2c}+x(a+b\arcsin(cx))^{5/2}-\frac{1}{4}\left(15b^2\right)\int\sqrt{a+b\arcsin(cx)}\,dx\\
&=-\frac{15}{4}b^2x\sqrt{a+b\arcsin(cx)}+\frac{5b\sqrt{1-c^2x^2}(a+b\arcsin(cx))^{3/2}}{2c}\\
&\quad+x(a+b\arcsin(cx))^{5/2}+\frac{1}{8}\left(15b^3c\right)\int\frac{x}{\sqrt{1-c^2x^2}\sqrt{a+b\arcsin(cx)}}\,dx\\
&=-\frac{15}{4}b^2x\sqrt{a+b\arcsin(cx)}+\frac{5b\sqrt{1-c^2x^2}(a+b\arcsin(cx))^{3/2}}{2c}\\
&\quad+x(a+b\arcsin(cx))^{5/2}-\frac{\left(15b^2\right)\operatorname{Subst}\left(\int\frac{\sin\left(\frac{a}{b}-\frac{x}{b}\right)}{\sqrt{x}}\,dx,x,a+b\arcsin(cx)\right)}{8c}\\
&=-\frac{15}{4}b^2x\sqrt{a+b\arcsin(cx)}+\frac{5b\sqrt{1-c^2x^2}(a+b\arcsin(cx))^{3/2}}{2c}\\
&\quad+x(a+b\arcsin(cx))^{5/2}+\frac{\left(15b^2\cos\left(\frac{a}{b}\right)\right)\operatorname{Subst}\left(\int\frac{\sin\left(\frac{x}{b}\right)}{\sqrt{x}}\,dx,x,a+b\arcsin(cx)\right)}{8c}\\
&\quad-\frac{\left(15b^2\sin\left(\frac{a}{b}\right)\right)\operatorname{Subst}\left(\int\frac{\cos\left(\frac{x}{b}\right)}{\sqrt{x}}\,dx,x,a+b\arcsin(cx)\right)}{8c}
\end{aligned}
$$

$$= -\frac{15}{4}b^2x\sqrt{a+b\arcsin(cx)} + \frac{5b\sqrt{1-c^2x^2}(a+b\arcsin(cx))^{3/2}}{2c} + x(a+b\arcsin(cx))^{5/2} + \frac{\left(15b^2\cos\left(\frac{a}{b}\right)\right)\text{Subst}\left(\int\sin\left(\frac{x^2}{b}\right)dx,x,\sqrt{a+b\arcsin(cx)}\right)}{4c} - \frac{\left(15b^2\sin\left(\frac{a}{b}\right)\right)\text{Subst}\left(\int\cos\left(\frac{x^2}{b}\right)dx,x,\sqrt{a+b\arcsin(cx)}\right)}{4c}$$

$$= -\frac{15}{4}b^2x\sqrt{a+b\arcsin(cx)} + \frac{5b\sqrt{1-c^2x^2}(a+b\arcsin(cx))^{3/2}}{2c} + x(a+b\arcsin(cx))^{5/2} + \frac{15b^{5/2}\sqrt{\frac{\pi}{2}}\cos\left(\frac{a}{b}\right)\text{FresnelS}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{4c} - \frac{15b^{5/2}\sqrt{\frac{\pi}{2}}\text{FresnelC}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)\sin\left(\frac{a}{b}\right)}{4c}$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 2.77 (sec) , antiderivative size = 366, normalized size of antiderivative = 2.04

$$\int(a+b\arcsin(cx))^{5/2}\,dx = \frac{\sqrt{b}e^{-\frac{ia}{b}}\left(i(4a^2+15b^2)\left(-1+e^{\frac{2ia}{b}}\right)\sqrt{2\pi}\sqrt{a+b\arcsin(cx)}\,\text{FresnelC}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right.\right.}{}$$

```
[In] Integrate[(a + b*ArcSin[c*x])^(5/2),x]
```

```
[Out] (Sqrt[b]*(I*(4*a^2 + 15*b^2)*(-1 + E^(((2*I)*a)/b))*Sqrt[2*Pi]*Sqrt[a + b*A
rcSin[c*x]]*FresnelC[(Sqrt[2/Pi]*Sqrt[a + b*ArcSin[c*x]])/Sqrt[b]] + (4*a^2
 + 15*b^2)*(1 + E^(((2*I)*a)/b))*Sqrt[2*Pi]*Sqrt[a + b*ArcSin[c*x]]*Fresnel
S[(Sqrt[2/Pi]*Sqrt[a + b*ArcSin[c*x]])/Sqrt[b]] + 4*Sqrt[b]*(E^((I*a)/b)*(a
 + b*ArcSin[c*x])*(-15*b*c*x + 10*a*Sqrt[1 - c^2*x^2] + 2*(4*a*c*x + 5*b*Sq
rt[1 - c^2*x^2])*ArcSin[c*x] + 4*b*c*x*ArcSin[c*x]^2) + 2*a^2*Sqrt[((-I)*(a
 + b*ArcSin[c*x]))/b]*Gamma[3/2, ((-I)*(a + b*ArcSin[c*x]))/b] + 2*a^2*E^((
(2*I)*a)/b)*Sqrt[(I*(a + b*ArcSin[c*x]))/b]*Gamma[3/2, (I*(a + b*ArcSin[c*x
]))/b])))/(16*c*E^((I*a)/b)*Sqrt[a + b*ArcSin[c*x]])
```

Maple [B] (verified)

Leaf count of result is larger than twice the leaf count of optimal. 400 vs. 2(139) = 278.

Time = 0.07 (sec) , antiderivative size = 401, normalized size of antiderivative = 2.24

method	result
default	$-\frac{15\cos\left(\frac{a}{b}\right)\operatorname{FresnelS}\left(\frac{\sqrt{2}\,\sqrt{a+b\arcsin(cx)}}{\sqrt{\pi}\,\sqrt{-\frac{1}{b}}\,b}\right)\sqrt{a+b\arcsin(cx)}\,\sqrt{2}\,\sqrt{\pi}\,\sqrt{-\frac{1}{b}}\,b^{3}+15\sin\left(\frac{a}{b}\right)\operatorname{FresnelC}\left(\frac{\sqrt{2}\,\sqrt{a+b\arcsin(cx)}}{\sqrt{\pi}\,\sqrt{-\frac{1}{b}}\,b}\right)\sqrt{a+b\arcsin(c}}{}$

```
[In] int((a+b*arcsin(c*x))^(5/2),x,method=_RETURNVERBOSE)
```

```
[Out] -1/8/c*(15*cos(a/b)*FresnelS(2^(1/2)/Pi^(1/2)/(-1/b)^(1/2)*(a+b*arcsin(c*x)
)^(1/2)/b)*(a+b*arcsin(c*x))^(1/2)*2^(1/2)*Pi^(1/2)*(-1/b)^(1/2)*b^3+15*sin
(a/b)*FresnelC(2^(1/2)/Pi^(1/2)/(-1/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)/b)*(a+
b*arcsin(c*x))^(1/2)*2^(1/2)*Pi^(1/2)*(-1/b)^(1/2)*b^3+8*arcsin(c*x)^3*sin(
-(a+b*arcsin(c*x))/b+a/b)*b^3+24*arcsin(c*x)^2*sin(-(a+b*arcsin(c*x))/b+a/b
)*a*b^2-20*arcsin(c*x)^2*cos(-(a+b*arcsin(c*x))/b+a/b)*b^3+24*arcsin(c*x)*s
in(-(a+b*arcsin(c*x))/b+a/b)*a^2*b-30*arcsin(c*x)*sin(-(a+b*arcsin(c*x))/b+
a/b)*b^3-40*arcsin(c*x)*cos(-(a+b*arcsin(c*x))/b+a/b)*a*b^2+8*sin(-(a+b*arc
sin(c*x))/b+a/b)*a^3-30*sin(-(a+b*arcsin(c*x))/b+a/b)*a*b^2-20*cos(-(a+b*ar
csin(c*x))/b+a/b)*a^2*b)/(a+b*arcsin(c*x))^(1/2)
```

Fricas [F(-2)]

Exception generated.

$$\int (a+b\arcsin(cx))^{5/2}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate((a+b*arcsin(c*x))^(5/2),x, algorithm="fricas")
```

```
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int (a+b\arcsin(cx))^{5/2}\,dx = \int (a+b\operatorname{asin}(cx))^{\frac{5}{2}}\,dx$$

```
[In] integrate((a+b*asin(c*x))**(5/2),x)
```

```
[Out] Integral((a + b*asin(c*x))**(5/2), x)
```

Maxima [F]

$$\int (a+b\arcsin(cx))^{5/2}\,dx = \int (b\arcsin(cx)+a)^{\frac{5}{2}}\,dx$$

[In] integrate((a+b*arcsin(c*x))^(5/2),x, algorithm="maxima")

[Out] integrate((b*arcsin(c*x) + a)^(5/2), x)

Giac [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 1.49 (sec) , antiderivative size = 1179, normalized size of antiderivative = 6.59

$$\int (a+b\arcsin(cx))^{5/2}\,dx = \text{Too large to display}$$

[In] integrate((a+b*arcsin(c*x))^(5/2),x, algorithm="giac")

[Out] 1/2*sqrt(2)*sqrt(pi)*a^3*b^3*erf(-1/2*I*sqrt(2)*sqrt(b*arcsin(c*x) + a)/sqrt(abs(b)) - 1/2*sqrt(2)*sqrt(b*arcsin(c*x) + a)*sqrt(abs(b))/b)*e^(I*a/b)/((I*b^4/sqrt(abs(b)) + b^3*sqrt(abs(b)))*c) + 1/2*sqrt(2)*sqrt(pi)*a^3*b^3*erf(1/2*I*sqrt(2)*sqrt(b*arcsin(c*x) + a)/sqrt(abs(b)) - 1/2*sqrt(2)*sqrt(b*arcsin(c*x) + a)*sqrt(abs(b))/b)*e^(-I*a/b)/((-I*b^4/sqrt(abs(b)) + b^3*sqrt(abs(b)))*c) + 3/2*I*sqrt(2)*sqrt(pi)*a^2*b^3*erf(-1/2*I*sqrt(2)*sqrt(b*arcsin(c*x) + a)/sqrt(abs(b)) - 1/2*sqrt(2)*sqrt(b*arcsin(c*x) + a)*sqrt(abs(b))/b)*e^(I*a/b)/((I*b^3/sqrt(abs(b)) + b^2*sqrt(abs(b)))*c) - 3/2*I*sqrt(2)*sqrt(pi)*a^2*b^3*erf(1/2*I*sqrt(2)*sqrt(b*arcsin(c*x) + a)/sqrt(abs(b)) - 1/2*sqrt(2)*sqrt(b*arcsin(c*x) + a)*sqrt(abs(b))/b)*e^(-I*a/b)/((-I*b^3/sqrt(abs(b)) + b^2*sqrt(abs(b)))*c) - 3/2*I*sqrt(2)*sqrt(pi)*a^2*b^2*erf(-1/2*I*sqrt(2)*sqrt(b*arcsin(c*x) + a)/sqrt(abs(b)) - 1/2*sqrt(2)*sqrt(b*arcsin(c*x) + a)*sqrt(abs(b))/b)*e^(I*a/b)/((I*b^2/sqrt(abs(b)) + b*sqrt(abs(b)))*c) - 15/16*I*sqrt(2)*sqrt(pi)*b^4*erf(-1/2*I*sqrt(2)*sqrt(b*arcsin(c*x) + a)/sqrt(abs(b)) - 1/2*sqrt(2)*sqrt(b*arcsin(c*x) + a)*sqrt(abs(b))/b)*e^(I*a/b)/((I*b^2/sqrt(abs(b)) + b*sqrt(abs(b)))*c) + 3/2*I*sqrt(2)*sqrt(pi)*a^2*b^2*erf(1/2*I*sqrt(2)*sqrt(b*arcsin(c*x) + a)/sqrt(abs(b)) - 1/2*sqrt(2)*sqrt(b*arcsin(c*x) + a)*sqrt(abs(b))/b)*e^(-I*a/b)/((-I*b^2/sqrt(abs(b)) + b*sqrt(abs(b)))*c) + 15/16*I*sqrt(2)*sqrt(pi)*b^4*erf(1/2*I*sqrt(2)*sqrt(b*arcsin(c*x) + a)/sqrt(abs(b)) - 1/2*sqrt(2)*sqrt(b*arcsin(c*x) + a)*sqrt(abs(b))/b)*e^(-I*a/b)/((-I*b^2/sqrt(abs(b)) + b*sqrt(abs(b)))*c) - 1/2*I*sqrt(b*arcsin(c*x) + a)*b^2*arcsin(c*x)^2*e^(I*arcsin(c*x))/c + 1/2*I*sqrt(b*arcsin(c*x) + a)*b^2*arcsin(c*x)^2*e^(-I*arcsin(c*x))/c - sqrt(pi)*a^3*b*erf(-1/2*I*sqrt(2)*sqrt(b*arcsin(c*x) + a)/sqrt(abs(b)) - 1/2*sqrt(2)*sqrt(b*arcsin(c*x) + a)*sqrt(abs(b))/b)*e^(I*a/b)/((I*sqrt(2)*b^2/sqrt(abs(b)) + sqrt

```
(2)*b*sqrt(abs(b)))*c) - sqrt(pi)*a^3*b*erf(1/2*I*sqrt(2)*sqrt(b*arcsin(c*x
) + a)/sqrt(abs(b)) - 1/2*sqrt(2)*sqrt(b*arcsin(c*x) + a)*sqrt(abs(b))/b)*e
^(-I*a/b)/((-I*sqrt(2)*b^2/sqrt(abs(b)) + sqrt(2)*b*sqrt(abs(b)))*c) - I*sq
rt(b*arcsin(c*x) + a)*a*b*arcsin(c*x)*e^(I*arcsin(c*x))/c + 5/4*sqrt(b*arcs
in(c*x) + a)*b^2*arcsin(c*x)*e^(I*arcsin(c*x))/c + I*sqrt(b*arcsin(c*x) + a
)*a*b*arcsin(c*x)*e^(-I*arcsin(c*x))/c + 5/4*sqrt(b*arcsin(c*x) + a)*b^2*ar
csin(c*x)*e^(-I*arcsin(c*x))/c - 1/2*I*sqrt(b*arcsin(c*x) + a)*a^2*e^(I*arc
sin(c*x))/c + 5/4*sqrt(b*arcsin(c*x) + a)*a*b*e^(I*arcsin(c*x))/c + 15/8*I*
sqrt(b*arcsin(c*x) + a)*b^2*e^(I*arcsin(c*x))/c + 1/2*I*sqrt(b*arcsin(c*x)
+ a)*a^2*e^(-I*arcsin(c*x))/c + 5/4*sqrt(b*arcsin(c*x) + a)*a*b*e^(-I*arcsi
n(c*x))/c - 15/8*I*sqrt(b*arcsin(c*x) + a)*b^2*e^(-I*arcsin(c*x))/c
```

Mupad [F(-1)]

Timed out.

$$\int (a+b\arcsin(cx))^{5/2}\,dx=\int (a+b\,\mathrm{asin}(c\,x))^{5/2}\,dx$$

```
[In] int((a + b*asin(c*x))^(5/2),x)
[Out] int((a + b*asin(c*x))^(5/2), x)
```

3.186 $\int \frac{(a+b\arcsin(cx))^{5/2}}{x}\,dx$

Optimal result

Integrand size = 16, antiderivative size = 16

$$\int \frac{(a+b\arcsin(cx))^{5/2}}{x}\,dx = \text{Int}\left(\frac{(a+b\arcsin(cx))^{5/2}}{x},x\right)$$

```
[Out] Unintegrable((a+b*arcsin(c*x))^(5/2)/x,x)
```

Rubi [N/A]

Not integrable

Time = 0.03 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}} = 0.000$, Rules used = {}

$$\int \frac{(a+b\arcsin(cx))^{5/2}}{x}\,dx = \int \frac{(a+b\arcsin(cx))^{5/2}}{x}\,dx$$

```
[In] Int[(a + b*ArcSin[c*x])^(5/2)/x,x]
[Out] Defer[Int][(a + b*ArcSin[c*x])^(5/2)/x, x]
```

Rubi steps

$$\text{integral} = \int \frac{(a+b\arcsin(cx))^{5/2}}{x}\,dx$$

Mathematica [N/A]

Not integrable

Time = 0.56 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.12

$$\int \frac{(a+b\arcsin(cx))^{5/2}}{x}\,dx = \int \frac{(a+b\arcsin(cx))^{5/2}}{x}\,dx$$

```
[In] Integrate[(a + b*ArcSin[c*x])^(5/2)/x,x]
[Out] Integrate[(a + b*ArcSin[c*x])^(5/2)/x, x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.09 (sec) , antiderivative size = 14, normalized size of antiderivative = 0.88

$$\int \frac{(a+b\arcsin(cx))^{\frac{5}{2}}}{x}dx$$

```
[In] int((a+b*arcsin(c*x))^(5/2)/x,x)
[Out] int((a+b*arcsin(c*x))^(5/2)/x,x)
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{(a+b\arcsin(cx))^{5/2}}{x}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate((a+b*arcsin(c*x))^(5/2)/x,x, algorithm="fricas")
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [N/A]

Not integrable

Time = 31.59 (sec) , antiderivative size = 14, normalized size of antiderivative = 0.88

$$\int \frac{(a+b\arcsin(cx))^{5/2}}{x}\,dx = \int \frac{(a+b\operatorname{asin}(cx))^{\frac{5}{2}}}{x}\,dx$$

```
[In] integrate((a+b*asin(c*x))**(5/2)/x,x)
[Out] Integral((a + b*asin(c*x))**(5/2)/x, x)
```

Maxima [N/A]

Not integrable

Time = 0.82 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.00

$$\int \frac{(a+b\arcsin(cx))^{5/2}}{x}\,dx = \int \frac{(b\arcsin(cx)+a)^{\frac{5}{2}}}{x}\,dx$$

```
[In] integrate((a+b*arcsin(c*x))^(5/2)/x,x, algorithm="maxima")
[Out] integrate((b*arcsin(c*x) + a)^(5/2)/x, x)
```

Giac [N/A]

Not integrable

Time = 1.06 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.00

$$\int \frac{(a+b\arcsin(cx))^{5/2}}{x}\,dx = \int \frac{(b\arcsin(cx)+a)^{\frac{5}{2}}}{x}\,dx$$

```
[In] integrate((a+b*arcsin(c*x))^(5/2)/x,x, algorithm="giac")
[Out] integrate((b*arcsin(c*x) + a)^(5/2)/x, x)
```

Mupad [N/A]

Not integrable

Time = 0.09 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.00

$$\int \frac{(a+b\arcsin(cx))^{5/2}}{x}\,dx = \int \frac{(a+b\,\mathrm{asin}(c\,x))^{5/2}}{x}\,dx$$

```
[In] int((a + b*asin(c*x))^(5/2)/x,x)
[Out] int((a + b*asin(c*x))^(5/2)/x, x)
```

3.187 $\int \frac{(a+b\arcsin(cx))^{5/2}}{x^2}\,dx$

Optimal result

Integrand size = 16, antiderivative size = 16

$$\int \frac{(a+b\arcsin(cx))^{5/2}}{x^2}\,dx = \mathrm{Int}\left(\frac{(a+b\arcsin(cx))^{5/2}}{x^2},x\right)$$

```
[Out] Unintegrable((a+b*arcsin(c*x))^(5/2)/x^2,x)
```

Rubi [N/A]

Not integrable

Time = 0.02 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{(a+b\arcsin(cx))^{5/2}}{x^2}\,dx = \int \frac{(a+b\arcsin(cx))^{5/2}}{x^2}\,dx$$

```
[In] Int[(a + b*ArcSin[c*x])^(5/2)/x^2,x]
[Out] Defer[Int][(a + b*ArcSin[c*x])^(5/2)/x^2, x]
```

Rubi steps

$$\text{integral} = \int \frac{(a+b\arcsin(cx))^{5/2}}{x^2}\,dx$$

Mathematica [N/A]

Not integrable

Time = 4.27 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.12

$$\int \frac{(a+b\arcsin(cx))^{5/2}}{x^2}\,dx = \int \frac{(a+b\arcsin(cx))^{5/2}}{x^2}\,dx$$

```
[In] Integrate[(a + b*ArcSin[c*x])^(5/2)/x^2,x]
[Out] Integrate[(a + b*ArcSin[c*x])^(5/2)/x^2, x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.10 (sec) , antiderivative size = 14, normalized size of antiderivative = 0.88

$$\int \frac{(a+b\arcsin{(cx)})^{\frac{5}{2}}}{x^2}dx$$

```
[In] int((a+b*arcsin(c*x))^(5/2)/x^2,x)
[Out] int((a+b*arcsin(c*x))^(5/2)/x^2,x)
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{(a+b\arcsin(cx))^{5/2}}{x^2}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate((a+b*arcsin(c*x))^(5/2)/x^2,x, algorithm="fricas")
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [N/A]

Not integrable

Time = 22.37 (sec) , antiderivative size = 15, normalized size of antiderivative = 0.94

$$\int \frac{(a+b\arcsin(cx))^{5/2}}{x^2}\,dx = \int \frac{(a+b\,\mathrm{asin}\,(cx))^{\frac{5}{2}}}{x^2}\,dx$$

```
[In] integrate((a+b*asin(c*x))**(5/2)/x**2,x)
[Out] Integral((a + b*asin(c*x))**(5/2)/x**2, x)
```

Maxima [N/A]

Not integrable

Time = 0.82 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.00

$$\int \frac{(a+b\arcsin(cx))^{5/2}}{x^2}\,dx = \int \frac{(b\arcsin(cx)+a)^{\frac{5}{2}}}{x^2}\,dx$$

```
[In] integrate((a+b*arcsin(c*x))^(5/2)/x^2,x, algorithm="maxima")
[Out] integrate((b*arcsin(c*x) + a)^(5/2)/x^2, x)
```

Giac [N/A]

Not integrable

Time = 1.13 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.00

$$\int \frac{(a+b\arcsin(cx))^{5/2}}{x^2}\,dx = \int \frac{(b\arcsin(cx)+a)^{\frac{5}{2}}}{x^2}\,dx$$

```
[In] integrate((a+b*arcsin(c*x))^(5/2)/x^2,x, algorithm="giac")
[Out] integrate((b*arcsin(c*x) + a)^(5/2)/x^2, x)
```

Mupad [N/A]

Not integrable

Time = 0.09 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.00

$$\int \frac{(a+b\arcsin(cx))^{5/2}}{x^2}\,dx = \int \frac{(a+b\,\mathrm{asin}(c\,x))^{5/2}}{x^2}\,dx$$

```
[In] int((a + b*asin(c*x))^(5/2)/x^2,x)
[Out] int((a + b*asin(c*x))^(5/2)/x^2, x)
```

3.188 $\int \frac{x^2}{\sqrt{a+b\arcsin(cx)}}\,dx$

Optimal result

Integrand size = 16, antiderivative size = 223

$$\int \frac{x^2}{\sqrt{a+b\arcsin(cx)}}\,dx = \frac{\sqrt{\frac{\pi}{2}}\cos\left(\frac{a}{b}\right)\text{FresnelC}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{2\sqrt{b}c^3} - \frac{\sqrt{\frac{\pi}{6}}\cos\left(\frac{3a}{b}\right)\text{FresnelC}\left(\frac{\sqrt{\frac{6}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{2\sqrt{b}c^3} + \frac{\sqrt{\frac{\pi}{2}}\text{FresnelS}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)\sin\left(\frac{a}{b}\right)}{2\sqrt{b}c^3} - \frac{\sqrt{\frac{\pi}{6}}\text{FresnelS}\left(\frac{\sqrt{\frac{6}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)\sin\left(\frac{3a}{b}\right)}{2\sqrt{b}c^3}$$

```
[Out] -1/12*cos(3*a/b)*FresnelC(6^(1/2)/Pi^(1/2)*(a+b*arcsin(c*x))^(1/2)/b^(1/2))
*6^(1/2)*Pi^(1/2)/c^3/b^(1/2)-1/12*FresnelS(6^(1/2)/Pi^(1/2)*(a+b*arcsin(c*
x))^(1/2)/b^(1/2))*sin(3*a/b)*6^(1/2)*Pi^(1/2)/c^3/b^(1/2)+1/4*cos(a/b)*Fre
snelC(2^(1/2)/Pi^(1/2)*(a+b*arcsin(c*x))^(1/2)/b^(1/2))*2^(1/2)*Pi^(1/2)/c^
3/b^(1/2)+1/4*FresnelS(2^(1/2)/Pi^(1/2)*(a+b*arcsin(c*x))^(1/2)/b^(1/2))*si
n(a/b)*2^(1/2)*Pi^(1/2)/c^3/b^(1/2)
```

Rubi [A] (verified)

Time = 0.16 (sec) , antiderivative size = 223, normalized size of antiderivative = 1.00, number of steps used = 13, number of rules used = 7, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.438, Rules used = {4731, 4491, 3387, 3386, 3432, 3385, 3433}

$$\int \frac{x^2}{\sqrt{a+b\arcsin(cx)}}\,dx = \frac{\sqrt{\frac{\pi}{2}}\cos\left(\frac{a}{b}\right)\text{FresnelC}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{2\sqrt{b}c^3} - \frac{\sqrt{\frac{\pi}{6}}\cos\left(\frac{3a}{b}\right)\text{FresnelC}\left(\frac{\sqrt{\frac{6}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{2\sqrt{b}c^3} + \frac{\sqrt{\frac{\pi}{2}}\sin\left(\frac{a}{b}\right)\text{FresnelS}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{2\sqrt{b}c^3} - \frac{\sqrt{\frac{\pi}{6}}\sin\left(\frac{3a}{b}\right)\text{FresnelS}\left(\frac{\sqrt{\frac{6}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{2\sqrt{b}c^3}$$

```
[In] Int[x^2/Sqrt[a + b*ArcSin[c*x]],x]
```

```
[Out] (Sqrt[Pi/2]*Cos[a/b]*FresnelC[(Sqrt[2/Pi]*Sqrt[a + b*ArcSin[c*x]])/Sqrt[b]]
)/(2*Sqrt[b]*c^3) - (Sqrt[Pi/6]*Cos[(3*a)/b]*FresnelC[(Sqrt[6/Pi]*Sqrt[a +
b*ArcSin[c*x]])/Sqrt[b]])/(2*Sqrt[b]*c^3) + (Sqrt[Pi/2]*FresnelS[(Sqrt[2/Pi
]*Sqrt[a + b*ArcSin[c*x]])/Sqrt[b]]*Sin[a/b])/(2*Sqrt[b]*c^3) - (Sqrt[Pi/6]
*FresnelS[(Sqrt[6/Pi]*Sqrt[a + b*ArcSin[c*x]])/Sqrt[b]]*Sin[(3*a)/b])/(2*Sq
rt[b]*c^3)
```

Rule 3385

```
Int[sin[Pi/2 + (e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> D
ist[2/d, Subst[Int[Cos[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d
, e, f}, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3386

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[2/d
, Subst[Int[Sin[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d, e, f}
, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3387

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[Cos
[(d*e - c*f)/d], Int[Sin[c*(f/d) + f*x]/Sqrt[c + d*x], x], x] + Dist[Sin[(d
*e - c*f)/d], Int[Cos[c*(f/d) + f*x]/Sqrt[c + d*x], x], x] /; FreeQ[{c, d,
```

```
e, f}, x] && ComplexFreeQ[f] && NeQ[d*e - c*f, 0]
```

Rule 3432

```
Int[Sin[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelS[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 3433

```
Int[Cos[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelC[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4491

```
Int[Cos[(a_.) + (b_.)*(x_)]^(p_.)*((c_.) + (d_.)*(x_))^(m_.)*Sin[(a_.) + (b
_.)*(x_)]^(n_.), x_Symbol] :> Int[ExpandTrigReduce[(c + d*x)^m, Sin[a + b*x
]^n*Cos[a + b*x]^p, x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && IG
tQ[p, 0]
```

Rule 4731

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Dist[1
/(b*c^(m + 1)), Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b], x], x, a +
 b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, n}, x] && IGtQ[m, 0]
```

Rubi steps

$$
\begin{aligned}
\text{integral} &= \frac{\text{Subst}\left(\int \frac{\cos\left(\frac{a}{b}-\frac{x}{b}\right)\sin^2\left(\frac{a}{b}-\frac{x}{b}\right)}{\sqrt{x}}\,dx,x,a+b\arcsin(cx)\right)}{bc^3}\\
&= \frac{\text{Subst}\left(\int \left(-\frac{\cos\left(\frac{3a}{b}-\frac{3x}{b}\right)}{4\sqrt{x}}+\frac{\cos\left(\frac{a}{b}-\frac{x}{b}\right)}{4\sqrt{x}}\right)\,dx,x,a+b\arcsin(cx)\right)}{bc^3}\\
&= -\frac{\text{Subst}\left(\int \frac{\cos\left(\frac{3a}{b}-\frac{3x}{b}\right)}{\sqrt{x}}\,dx,x,a+b\arcsin(cx)\right)}{4bc^3}+\frac{\text{Subst}\left(\int \frac{\cos\left(\frac{a}{b}-\frac{x}{b}\right)}{\sqrt{x}}\,dx,x,a+b\arcsin(cx)\right)}{4bc^3}\\
&= \frac{\cos\left(\frac{a}{b}\right)\text{Subst}\left(\int \frac{\cos\left(\frac{x}{b}\right)}{\sqrt{x}}\,dx,x,a+b\arcsin(cx)\right)}{4bc^3}\\
&\quad -\frac{\cos\left(\frac{3a}{b}\right)\text{Subst}\left(\int \frac{\cos\left(\frac{3x}{b}\right)}{\sqrt{x}}\,dx,x,a+b\arcsin(cx)\right)}{4bc^3}\\
&\quad +\frac{\sin\left(\frac{a}{b}\right)\text{Subst}\left(\int \frac{\sin\left(\frac{x}{b}\right)}{\sqrt{x}}\,dx,x,a+b\arcsin(cx)\right)}{4bc^3}\\
&\quad -\frac{\sin\left(\frac{3a}{b}\right)\text{Subst}\left(\int \frac{\sin\left(\frac{3x}{b}\right)}{\sqrt{x}}\,dx,x,a+b\arcsin(cx)\right)}{4bc^3}
\end{aligned}
$$

$$= \frac{\cos\left(\frac{a}{b}\right)\text{Subst}\left(\int \cos\left(\frac{x^2}{b}\right)\,dx, x, \sqrt{a+b\arcsin(cx)}\right)}{2bc^3} - \frac{\cos\left(\frac{3a}{b}\right)\text{Subst}\left(\int \cos\left(\frac{3x^2}{b}\right)\,dx, x, \sqrt{a+b\arcsin(cx)}\right)}{2bc^3} + \frac{\sin\left(\frac{a}{b}\right)\text{Subst}\left(\int \sin\left(\frac{x^2}{b}\right)\,dx, x, \sqrt{a+b\arcsin(cx)}\right)}{2bc^3} - \frac{\sin\left(\frac{3a}{b}\right)\text{Subst}\left(\int \sin\left(\frac{3x^2}{b}\right)\,dx, x, \sqrt{a+b\arcsin(cx)}\right)}{2bc^3}$$

$$= \frac{\sqrt{\frac{\pi}{2}}\cos\left(\frac{a}{b}\right)\text{FresnelC}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{2\sqrt{b}c^3} - \frac{\sqrt{\frac{\pi}{6}}\cos\left(\frac{3a}{b}\right)\text{FresnelC}\left(\frac{\sqrt{\frac{6}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{2\sqrt{b}c^3} + \frac{\sqrt{\frac{\pi}{2}}\text{FresnelS}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)\sin\left(\frac{a}{b}\right)}{2\sqrt{b}c^3} - \frac{\sqrt{\frac{\pi}{6}}\text{FresnelS}\left(\frac{\sqrt{\frac{6}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)\sin\left(\frac{3a}{b}\right)}{2\sqrt{b}c^3}$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.19 (sec) , antiderivative size = 228, normalized size of antiderivative = 1.02

$$\int \frac{x^2}{\sqrt{a+b\arcsin(cx)}}\,dx = -\frac{ie^{-\frac{3ia}{b}}\left(3e^{\frac{2ia}{b}}\sqrt{-\frac{i(a+b\arcsin(cx))}{b}}\Gamma\left(\frac{1}{2}, -\frac{i(a+b\arcsin(cx))}{b}\right) - 3e^{\frac{4ia}{b}}\sqrt{\frac{i(a+b\arcsin(cx))}{b}}\Gamma\left(\frac{1}{2}, \frac{i(a+b\arcsin(cx))}{b}\right) + \sqrt{3}\left(-\right.\right.}{24c^3\sqrt{a+b\arcsin(c}}$$

```
[In] Integrate[x^2/Sqrt[a + b*ArcSin[c*x]],x]
```

```
[Out] ((-1/24*I)*(3*E^(((2*I)*a)/b)*Sqrt[((-I)*(a + b*ArcSin[c*x]))/b]*Gamma[1/2,
 ((-I)*(a + b*ArcSin[c*x]))/b] - 3*E^(((4*I)*a)/b)*Sqrt[(I*(a + b*ArcSin[c*
x]))/b]*Gamma[1/2, (I*(a + b*ArcSin[c*x]))/b] + Sqrt[3]*(-(Sqrt[((-I)*(a +
b*ArcSin[c*x]))/b]*Gamma[1/2, ((-3*I)*(a + b*ArcSin[c*x]))/b]) + E^(((6*I)*
a)/b)*Sqrt[(I*(a + b*ArcSin[c*x]))/b]*Gamma[1/2, ((3*I)*(a + b*ArcSin[c*x])
)/b])))/(c^3*E^(((3*I)*a)/b)*Sqrt[a + b*ArcSin[c*x]])
```

Maple [A] (verified)

Time = 0.08 (sec) , antiderivative size = 196, normalized size of antiderivative = 0.88

method	result
default	$-\frac{\sqrt{\pi}\,\sqrt{2}\,\sqrt{-\frac{3}{b}}\,\left(\sqrt{-\frac{1}{b}}\,\sqrt{-\frac{3}{b}}\,\cos\left(\frac{a}{b}\right)\mathrm{FresnelC}\left(\frac{\sqrt{2}\,\sqrt{a+b\arcsin(cx)}}{\sqrt{\pi}\,\sqrt{-\frac{1}{b}}\,b}\right)b-\sqrt{-\frac{1}{b}}\,\sqrt{-\frac{3}{b}}\,\sin\left(\frac{a}{b}\right)\mathrm{FresnelS}\left(\frac{\sqrt{2}\,\sqrt{a+b\arcsin(cx)}}{\sqrt{\pi}\,\sqrt{-\frac{1}{b}}\,b}\right)b+\cos\left(\cdots\right.}{12c^3}$

```
[In] int(x^2/(a+b*arcsin(c*x))^(1/2),x,method=_RETURNVERBOSE)
```

```
[Out] -1/12/c^3*Pi^(1/2)*2^(1/2)*(-3/b)^(1/2)*((-1/b)^(1/2)*(-3/b)^(1/2)*cos(a/b)
*FresnelC(2^(1/2)/Pi^(1/2)/(-1/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)/b)*b-(-1/b)
^(1/2)*(-3/b)^(1/2)*sin(a/b)*FresnelS(2^(1/2)/Pi^(1/2)/(-1/b)^(1/2)*(a+b*ar
csin(c*x))^(1/2)/b)*b+cos(3*a/b)*FresnelC(3*2^(1/2)/Pi^(1/2)/(-3/b)^(1/2)*(
a+b*arcsin(c*x))^(1/2)/b)-sin(3*a/b)*FresnelS(3*2^(1/2)/Pi^(1/2)/(-3/b)^(1/
2)*(a+b*arcsin(c*x))^(1/2)/b))
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{x^2}{\sqrt{a+b\arcsin(cx)}}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate(x^2/(a+b*arcsin(c*x))^(1/2),x, algorithm="fricas")
```

```
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int \frac{x^2}{\sqrt{a+b\arcsin(cx)}}\,dx = \int \frac{x^2}{\sqrt{a+b\,\mathrm{asin}\,(cx)}}\,dx$$

```
[In] integrate(x**2/(a+b*asin(c*x))**(1/2),x)
```

```
[Out] Integral(x**2/sqrt(a + b*asin(c*x)), x)
```

Maxima [F]

$$\int \frac{x^2}{\sqrt{a + b \arcsin(cx)}}\, dx = \int \frac{x^2}{\sqrt{b \arcsin(cx) + a}}\, dx$$

```
[In] integrate(x^2/(a+b*arcsin(c*x))^(1/2),x, algorithm="maxima")
```

```
[Out] integrate(x^2/sqrt(b*arcsin(c*x) + a), x)
```

Giac [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 0.46 (sec) , antiderivative size = 317, normalized size of antiderivative = 1.42

$$\int \frac{x^2}{\sqrt{a + b \arcsin(cx)}}\, dx = \frac{\sqrt{\pi} \operatorname{erf}\left(-\frac{\sqrt{6}\sqrt{b \arcsin(cx)+a}}{2\sqrt{b}} - \frac{i\sqrt{6}\sqrt{b \arcsin(cx)+a}\sqrt{b}}{2|b|}\right) e^{\left(\frac{3ia}{b}\right)}}{4\left(\sqrt{6}\sqrt{b} + \frac{i\sqrt{6}b^{\frac{3}{2}}}{|b|}\right)c^3} - \frac{\sqrt{\pi} \operatorname{erf}\left(-\frac{i\sqrt{2}\sqrt{b \arcsin(cx)+a}}{2\sqrt{|b|}} - \frac{\sqrt{2}\sqrt{b \arcsin(cx)+a}\sqrt{|b|}}{2b}\right) e^{\left(\frac{ia}{b}\right)}}{4c^3\left(\frac{i\sqrt{2}b}{\sqrt{|b|}} + \sqrt{2}\sqrt{|b|}\right)} - \frac{\sqrt{\pi} \operatorname{erf}\left(\frac{i\sqrt{2}\sqrt{b \arcsin(cx)+a}}{2\sqrt{|b|}} - \frac{\sqrt{2}\sqrt{b \arcsin(cx)+a}\sqrt{|b|}}{2b}\right) e^{\left(-\frac{ia}{b}\right)}}{4c^3\left(-\frac{i\sqrt{2}b}{\sqrt{|b|}} + \sqrt{2}\sqrt{|b|}\right)} + \frac{\sqrt{\pi} \operatorname{erf}\left(-\frac{\sqrt{6}\sqrt{b \arcsin(cx)+a}}{2\sqrt{b}} + \frac{i\sqrt{6}\sqrt{b \arcsin(cx)+a}\sqrt{b}}{2|b|}\right) e^{\left(-\frac{3ia}{b}\right)}}{4\left(\sqrt{6}\sqrt{b} - \frac{i\sqrt{6}b^{\frac{3}{2}}}{|b|}\right)c^3}$$

```
[In] integrate(x^2/(a+b*arcsin(c*x))^(1/2),x, algorithm="giac")
```

```
[Out] 1/4*sqrt(pi)*erf(-1/2*sqrt(6)*sqrt(b*arcsin(c*x) + a)/sqrt(b) - 1/2*I*sqrt(
6)*sqrt(b*arcsin(c*x) + a)*sqrt(b)/abs(b))*e^(3*I*a/b)/((sqrt(6)*sqrt(b) +
I*sqrt(6)*b^(3/2)/abs(b))*c^3) - 1/4*sqrt(pi)*erf(-1/2*I*sqrt(2)*sqrt(b*arc
sin(c*x) + a)/sqrt(abs(b)) - 1/2*sqrt(2)*sqrt(b*arcsin(c*x) + a)*sqrt(abs(b
))/b)*e^(I*a/b)/(c^3*(I*sqrt(2)*b/sqrt(abs(b)) + sqrt(2)*sqrt(abs(b)))) - 1
/4*sqrt(pi)*erf(1/2*I*sqrt(2)*sqrt(b*arcsin(c*x) + a)/sqrt(abs(b)) - 1/2*sq
rt(2)*sqrt(b*arcsin(c*x) + a)*sqrt(abs(b))/b)*e^(-I*a/b)/(c^3*(-I*sqrt(2)*b
/sqrt(abs(b)) + sqrt(2)*sqrt(abs(b)))) + 1/4*sqrt(pi)*erf(-1/2*sqrt(6)*sqrt
(b*arcsin(c*x) + a)/sqrt(b) + 1/2*I*sqrt(6)*sqrt(b*arcsin(c*x) + a)*sqrt(b)
/abs(b))*e^(-3*I*a/b)/((sqrt(6)*sqrt(b) - I*sqrt(6)*b^(3/2)/abs(b))*c^3)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x^2}{\sqrt{a+b\arcsin(cx)}}\,dx=\int \frac{x^2}{\sqrt{a+b\,\mathrm{asin}\left(c\,x\right)}}\,dx$$

```
[In] int(x^2/(a + b*asin(c*x))^(1/2),x)
[Out] int(x^2/(a + b*asin(c*x))^(1/2), x)
```

3.189 $\int \frac{x}{\sqrt{a+b\arcsin(cx)}}\,dx$

Optimal result

Integrand size = 14, antiderivative size = 99

$$\int \frac{x}{\sqrt{a+b\arcsin(cx)}}\,dx = \frac{\sqrt{\pi}\cos\left(\frac{2a}{b}\right)\text{FresnelS}\left(\frac{2\sqrt{a+b\arcsin(cx)}}{\sqrt{b}\sqrt{\pi}}\right)}{2\sqrt{b}c^2} - \frac{\sqrt{\pi}\,\text{FresnelC}\left(\frac{2\sqrt{a+b\arcsin(cx)}}{\sqrt{b}\sqrt{\pi}}\right)\sin\left(\frac{2a}{b}\right)}{2\sqrt{b}c^2}$$

```
[Out] 1/2*cos(2*a/b)*FresnelS(2*(a+b*arcsin(c*x))^(1/2)/b^(1/2)/Pi^(1/2))*Pi^(1/2
)/c^2/b^(1/2)-1/2*FresnelC(2*(a+b*arcsin(c*x))^(1/2)/b^(1/2)/Pi^(1/2))*sin(
2*a/b)*Pi^(1/2)/c^2/b^(1/2)
```

Rubi [A] (verified)

Time = 0.08 (sec) , antiderivative size = 99, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.571, Rules used = {4731, 4491, 12, 3387, 3386, 3432, 3385, 3433}

$$\int \frac{x}{\sqrt{a+b\arcsin(cx)}}\,dx = \frac{\sqrt{\pi}\cos\left(\frac{2a}{b}\right)\text{FresnelS}\left(\frac{2\sqrt{a+b\arcsin(cx)}}{\sqrt{b}\sqrt{\pi}}\right)}{2\sqrt{b}c^2} - \frac{\sqrt{\pi}\sin\left(\frac{2a}{b}\right)\text{FresnelC}\left(\frac{2\sqrt{a+b\arcsin(cx)}}{\sqrt{b}\sqrt{\pi}}\right)}{2\sqrt{b}c^2}$$

```
[In] Int[x/Sqrt[a + b*ArcSin[c*x]],x]
```

```
[Out] (Sqrt[Pi]*Cos[(2*a)/b]*FresnelS[(2*Sqrt[a + b*ArcSin[c*x]])/(Sqrt[b]*Sqrt[P
i])])/(2*Sqrt[b]*c^2) - (Sqrt[Pi]*FresnelC[(2*Sqrt[a + b*ArcSin[c*x]])/(Sqr
t[b]*Sqrt[Pi])]*Sin[(2*a)/b])/(2*Sqrt[b]*c^2)
```

Rule 12

```
Int[(a_)*(u_), x_Symbol] :> Dist[a, Int[u, x], x] /; FreeQ[a, x] &&  !Match
Q[u, (b_)*(v_) /; FreeQ[b, x]]
```

Rule 3385

```
Int[sin[Pi/2 + (e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> D
ist[2/d, Subst[Int[Cos[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d
, e, f}, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3386

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[2/d
, Subst[Int[Sin[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d, e, f}
, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3387

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[Cos
[(d*e - c*f)/d], Int[Sin[c*(f/d) + f*x]/Sqrt[c + d*x], x], x] + Dist[Sin[(d
*e - c*f)/d], Int[Cos[c*(f/d) + f*x]/Sqrt[c + d*x], x], x] /; FreeQ[{c, d,
e, f}, x] && ComplexFreeQ[f] && NeQ[d*e - c*f, 0]
```

Rule 3432

```
Int[Sin[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelS[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 3433

```
Int[Cos[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelC[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4491

```
Int[Cos[(a_.) + (b_.)*(x_)]^(p_.)*((c_.) + (d_.)*(x_))^(m_.)*Sin[(a_.) + (b
_.)*(x_)]^(n_.), x_Symbol] :> Int[ExpandTrigReduce[(c + d*x)^m, Sin[a + b*x
]^n*Cos[a + b*x]^p, x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && IG
tQ[p, 0]
```

Rule 4731

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Dist[1
/(b*c^(m + 1)), Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b], x], x, a +
 b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, n}, x] && IGtQ[m, 0]
```

Rubi steps

$$\text{integral} = -\frac{\text{Subst}\left(\int \frac{\cos\left(\frac{a}{b}-\frac{x}{b}\right)\sin\left(\frac{a}{b}-\frac{x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{bc^2}$$
$$= -\frac{\text{Subst}\left(\int \frac{\sin\left(\frac{2a}{b}-\frac{2x}{b}\right)}{2\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{bc^2}$$
$$= -\frac{\text{Subst}\left(\int \frac{\sin\left(\frac{2a}{b}-\frac{2x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{2bc^2}$$
$$= \frac{\cos\left(\frac{2a}{b}\right)\text{Subst}\left(\int \frac{\sin\left(\frac{2x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{2bc^2} - \frac{\sin\left(\frac{2a}{b}\right)\text{Subst}\left(\int \frac{\cos\left(\frac{2x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{2bc^2}$$
$$= \frac{\cos\left(\frac{2a}{b}\right)\text{Subst}\left(\int \sin\left(\frac{2x^2}{b}\right)\,dx, x, \sqrt{a+b\arcsin(cx)}\right)}{bc^2} - \frac{\sin\left(\frac{2a}{b}\right)\text{Subst}\left(\int \cos\left(\frac{2x^2}{b}\right)\,dx, x, \sqrt{a+b\arcsin(cx)}\right)}{bc^2}$$
$$= \frac{\sqrt{\pi}\cos\left(\frac{2a}{b}\right)\text{FresnelS}\left(\frac{2\sqrt{a+b\arcsin(cx)}}{\sqrt{b}\sqrt{\pi}}\right)}{2\sqrt{b}c^2} - \frac{\sqrt{\pi}\,\text{FresnelC}\left(\frac{2\sqrt{a+b\arcsin(cx)}}{\sqrt{b}\sqrt{\pi}}\right)\sin\left(\frac{2a}{b}\right)}{2\sqrt{b}c^2}$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.05 (sec) , antiderivative size = 123, normalized size of antiderivative = 1.24

$$\int \frac{x}{\sqrt{a+b\arcsin(cx)}}\,dx = -\frac{e^{-\frac{2ia}{b}}\left(\sqrt{-\frac{i(a+b\arcsin(cx))}{b}}\,\Gamma\left(\frac{1}{2}, -\frac{2i(a+b\arcsin(cx))}{b}\right) + e^{\frac{4ia}{b}}\sqrt{\frac{i(a+b\arcsin(cx))}{b}}\,\Gamma\left(\frac{1}{2}, \frac{2i(a+b\arcsin(cx))}{b}\right)\right)}{4\sqrt{2}c^2\sqrt{a+b\arcsin(cx)}}$$

```
[In] Integrate[x/Sqrt[a + b*ArcSin[c*x]],x]
```

```
[Out] -1/4*(Sqrt[((-I)*(a + b*ArcSin[c*x]))/b]*Gamma[1/2, ((-2*I)*(a + b*ArcSin[c
*x]))/b] + E^(((4*I)*a)/b)*Sqrt[(I*(a + b*ArcSin[c*x]))/b]*Gamma[1/2, ((2*I
)*(a + b*ArcSin[c*x]))/b])/(Sqrt[2]*c^2*E^(((2*I)*a)/b)*Sqrt[a + b*ArcSin[c
*x]])
```

Maple [A] (verified)

Time = 0.05 (sec) , antiderivative size = 91, normalized size of antiderivative = 0.92

method	result	size
default	$-\frac{\sqrt{\pi}\,\sqrt{-\frac{1}{b}}\,\left(\cos\left(\frac{2a}{b}\right)\operatorname{FresnelS}\left(\frac{2\sqrt{2}\,\sqrt{a+b\arcsin\left(cx\right)}}{\sqrt{\pi}\,\sqrt{-\frac{2}{b}}\,b}\right)+\sin\left(\frac{2a}{b}\right)\operatorname{FresnelC}\left(\frac{2\sqrt{2}\,\sqrt{a+b\arcsin\left(cx\right)}}{\sqrt{\pi}\,\sqrt{-\frac{2}{b}}\,b}\right)\right)}{2c^{2}}$	91

```
[In] int(x/(a+b*arcsin(c*x))^(1/2),x,method=_RETURNVERBOSE)
```

```
[Out] -1/2*Pi^(1/2)*(-1/b)^(1/2)*(cos(2*a/b)*FresnelS(2*2^(1/2)/Pi^(1/2)/(-2/b)^(
1/2)*(a+b*arcsin(c*x))^(1/2)/b)+sin(2*a/b)*FresnelC(2*2^(1/2)/Pi^(1/2)/(-2/
b)^(1/2)*(a+b*arcsin(c*x))^(1/2)/b))/c^2
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{x}{\sqrt{a+b\arcsin(cx)}}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate(x/(a+b*arcsin(c*x))^(1/2),x, algorithm="fricas")
```

```
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int \frac{x}{\sqrt{a+b\arcsin(cx)}}\,dx = \int \frac{x}{\sqrt{a+b\,\mathrm{asin}\,(cx)}}\,dx$$

```
[In] integrate(x/(a+b*asin(c*x))**(1/2),x)
```

```
[Out] Integral(x/sqrt(a + b*asin(c*x)), x)
```

Maxima [F]

$$\int \frac{x}{\sqrt{a+b\arcsin(cx)}}\,dx = \int \frac{x}{\sqrt{b\arcsin(cx)+a}}\,dx$$

```
[In] integrate(x/(a+b*arcsin(c*x))^(1/2),x, algorithm="maxima")
[Out] integrate(x/sqrt(b*arcsin(c*x) + a), x)
```

Giac [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 0.40 (sec) , antiderivative size = 132, normalized size of antiderivative = 1.33

$$\int \frac{x}{\sqrt{a+b\arcsin(cx)}}\,dx = \frac{i\sqrt{\pi}\,\mathrm{erf}\left(-\frac{\sqrt{b\arcsin(cx)+a}}{\sqrt{b}}+\frac{i\sqrt{b\arcsin(cx)+a}\sqrt{b}}{|b|}\right)e^{\left(-\frac{2ia}{b}\right)}}{4c^2\left(\sqrt{b}-\frac{ib^{\frac{3}{2}}}{|b|}\right)} - \frac{i\sqrt{\pi}\,\mathrm{erf}\left(-\frac{\sqrt{b\arcsin(cx)+a}}{\sqrt{b}}-\frac{i\sqrt{b\arcsin(cx)+a}\sqrt{b}}{|b|}\right)e^{\left(\frac{2ia}{b}\right)}}{4\sqrt{b}c^2\left(\frac{ib}{|b|}+1\right)}$$

```
[In] integrate(x/(a+b*arcsin(c*x))^(1/2),x, algorithm="giac")
[Out] 1/4*I*sqrt(pi)*erf(-sqrt(b*arcsin(c*x) + a)/sqrt(b) + I*sqrt(b*arcsin(c*x)
+ a)*sqrt(b)/abs(b))*e^(-2*I*a/b)/(c^2*(sqrt(b) - I*b^(3/2)/abs(b))) - 1/4*
I*sqrt(pi)*erf(-sqrt(b*arcsin(c*x) + a)/sqrt(b) - I*sqrt(b*arcsin(c*x) + a)
*sqrt(b)/abs(b))*e^(2*I*a/b)/(sqrt(b)*c^2*(I*b/abs(b) + 1))
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x}{\sqrt{a+b\arcsin(cx)}}\,dx = \int \frac{x}{\sqrt{a+b\,\mathrm{asin}(c\,x)}}\,dx$$

```
[In] int(x/(a + b*asin(c*x))^(1/2),x)
[Out] int(x/(a + b*asin(c*x))^(1/2), x)
```

3.190 $\int \frac{1}{\sqrt{a+b\arcsin(cx)}}\,dx$

Optimal result

Integrand size = 12, antiderivative size = 101

$$\int \frac{1}{\sqrt{a+b\arcsin(cx)}}\,dx = \frac{\sqrt{2\pi}\cos\left(\frac{a}{b}\right)\text{FresnelC}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{\sqrt{b}c} + \frac{\sqrt{2\pi}\,\text{FresnelS}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)\sin\left(\frac{a}{b}\right)}{\sqrt{b}c}$$

```
[Out] cos(a/b)*FresnelC(2^(1/2)/Pi^(1/2)*(a+b*arcsin(c*x))^(1/2)/b^(1/2))*2^(1/2)
*Pi^(1/2)/c/b^(1/2)+FresnelS(2^(1/2)/Pi^(1/2)*(a+b*arcsin(c*x))^(1/2)/b^(1/
2))*sin(a/b)*2^(1/2)*Pi^(1/2)/c/b^(1/2)
```

Rubi [A] (verified)

Time = 0.06 (sec) , antiderivative size = 101, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 6, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {4719, 3387, 3386, 3432, 3385, 3433}

$$\int \frac{1}{\sqrt{a+b\arcsin(cx)}}\,dx = \frac{\sqrt{2\pi}\cos\left(\frac{a}{b}\right)\text{FresnelC}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{\sqrt{b}c} + \frac{\sqrt{2\pi}\sin\left(\frac{a}{b}\right)\text{FresnelS}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{\sqrt{b}c}$$

```
[In] Int[1/Sqrt[a + b*ArcSin[c*x]],x]
```

```
[Out] (Sqrt[2*Pi]*Cos[a/b]*FresnelC[(Sqrt[2/Pi]*Sqrt[a + b*ArcSin[c*x]])/Sqrt[b]]
)/(Sqrt[b]*c) + (Sqrt[2*Pi]*FresnelS[(Sqrt[2/Pi]*Sqrt[a + b*ArcSin[c*x]])/S
qrt[b]]*Sin[a/b])/(Sqrt[b]*c)
```

Rule 3385

```
Int[sin[Pi/2 + (e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> D
ist[2/d, Subst[Int[Cos[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d
, e, f}, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3386

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[2/d
, Subst[Int[Sin[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d, e, f}
, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3387

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[Cos
[(d*e - c*f)/d], Int[Sin[c*(f/d) + f*x]/Sqrt[c + d*x], x], x] + Dist[Sin[(d
*e - c*f)/d], Int[Cos[c*(f/d) + f*x]/Sqrt[c + d*x], x], x] /; FreeQ[{c, d,
e, f}, x] && ComplexFreeQ[f] && NeQ[d*e - c*f, 0]
```

Rule 3432

```
Int[Sin[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelS[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 3433

```
Int[Cos[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelC[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4719

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_), x_Symbol] :> Dist[1/(b*c), Sub
st[Int[x^n*Cos[-a/b + x/b], x], x, a + b*ArcSin[c*x]], x] /; FreeQ[{a, b, c
, n}, x]
```

Rubi steps

$$\begin{aligned}\text{integral} &= \frac{\text{Subst}\left(\int \frac{\cos\left(\frac{a}{b}-\frac{x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{bc}\\ &= \frac{\cos\left(\frac{a}{b}\right)\text{Subst}\left(\int \frac{\cos\left(\frac{x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{bc}\\ &\quad+\frac{\sin\left(\frac{a}{b}\right)\text{Subst}\left(\int \frac{\sin\left(\frac{x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{bc}\end{aligned}$$

$$= \frac{\left(2\cos\left(\frac{a}{b}\right)\right)\text{Subst}\left(\int\cos\left(\frac{x^2}{b}\right)\,dx, x, \sqrt{a+b\arcsin(cx)}\right)}{bc} + \frac{\left(2\sin\left(\frac{a}{b}\right)\right)\text{Subst}\left(\int\sin\left(\frac{x^2}{b}\right)\,dx, x, \sqrt{a+b\arcsin(cx)}\right)}{bc}$$

$$= \frac{\sqrt{2\pi}\cos\left(\frac{a}{b}\right)\text{FresnelC}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{\sqrt{b}c} + \frac{\sqrt{2\pi}\,\text{FresnelS}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)\sin\left(\frac{a}{b}\right)}{\sqrt{b}c}$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.08 (sec) , antiderivative size = 121, normalized size of antiderivative = 1.20

$$\int \frac{1}{\sqrt{a+b\arcsin(cx)}}\,dx = \frac{ie^{-\frac{ia}{b}}\left(-\sqrt{-\frac{i(a+b\arcsin(cx))}{b}}\,\Gamma\left(\frac{1}{2}, -\frac{i(a+b\arcsin(cx))}{b}\right) + e^{\frac{2ia}{b}}\sqrt{\frac{i(a+b\arcsin(cx))}{b}}\,\Gamma\left(\frac{1}{2}, \frac{i(a+b\arcsin(cx))}{b}\right)\right)}{2c\sqrt{a+b\arcsin(cx)}}$$

```
[In] Integrate[1/Sqrt[a + b*ArcSin[c*x]],x]
```

```
[Out] ((I/2)*(-(Sqrt[((-I)*(a + b*ArcSin[c*x]))/b]*Gamma[1/2, ((-I)*(a + b*ArcSin
[c*x]))/b]) + E^(((2*I)*a)/b)*Sqrt[(I*(a + b*ArcSin[c*x]))/b]*Gamma[1/2, (I
*(a + b*ArcSin[c*x]))/b]))/(c*E^((I*a)/b)*Sqrt[a + b*ArcSin[c*x]])
```

Maple [A] (verified)

Time = 0.04 (sec) , antiderivative size = 90, normalized size of antiderivative = 0.89

method	result	size
default	$\frac{\sqrt{2}\,\sqrt{\pi}\,\sqrt{-\frac{1}{b}}\left(\cos\left(\frac{a}{b}\right)\text{FresnelC}\left(\frac{\sqrt{2}\,\sqrt{a+b\arcsin(cx)}}{\sqrt{\pi}\,\sqrt{-\frac{1}{b}}\,b}\right)-\sin\left(\frac{a}{b}\right)\text{FresnelS}\left(\frac{\sqrt{2}\,\sqrt{a+b\arcsin(cx)}}{\sqrt{\pi}\,\sqrt{-\frac{1}{b}}\,b}\right)\right)}{c}$	90

```
[In] int(1/(a+b*arcsin(c*x))^(1/2),x,method=_RETURNVERBOSE)
```

```
[Out] 2^(1/2)*Pi^(1/2)*(-1/b)^(1/2)*(cos(a/b)*FresnelC(2^(1/2)/Pi^(1/2)/(-1/b)^(1
/2)*(a+b*arcsin(c*x))^(1/2)/b)-sin(a/b)*FresnelS(2^(1/2)/Pi^(1/2)/(-1/b)^(1
/2)*(a+b*arcsin(c*x))^(1/2)/b))/c
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{1}{\sqrt{a+b\arcsin(cx)}}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate(1/(a+b*arcsin(c*x))^(1/2),x, algorithm="fricas")
```

```
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int \frac{1}{\sqrt{a+b\arcsin(cx)}}\,dx = \int \frac{1}{\sqrt{a+b\,\mathrm{asin}\,(cx)}}\,dx$$

```
[In] integrate(1/(a+b*asin(c*x))**(1/2),x)
```

```
[Out] Integral(1/sqrt(a + b*asin(c*x)), x)
```

Maxima [F]

$$\int \frac{1}{\sqrt{a+b\arcsin(cx)}}\,dx = \int \frac{1}{\sqrt{b\arcsin(cx)+a}}\,dx$$

```
[In] integrate(1/(a+b*arcsin(c*x))^(1/2),x, algorithm="maxima")
```

```
[Out] integrate(1/sqrt(b*arcsin(c*x) + a), x)
```

Giac [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 0.35 (sec) , antiderivative size = 159, normalized size of antiderivative = 1.57

$$\int \frac{1}{\sqrt{a+b\arcsin(cx)}}\,dx = -\frac{\sqrt{\pi}\,\mathrm{erf}\left(-\frac{i\sqrt{2}\sqrt{b\arcsin(cx)+a}}{2\sqrt{|b|}}-\frac{\sqrt{2}\sqrt{b\arcsin(cx)+a}\sqrt{|b|}}{2\,b}\right)e^{\left(\frac{i\,a}{b}\right)}}{c\left(\frac{i\sqrt{2}b}{\sqrt{|b|}}+\sqrt{2}\sqrt{|b|}\right)} - \frac{\sqrt{\pi}\,\mathrm{erf}\left(\frac{i\sqrt{2}\sqrt{b\arcsin(cx)+a}}{2\sqrt{|b|}}-\frac{\sqrt{2}\sqrt{b\arcsin(cx)+a}\sqrt{|b|}}{2\,b}\right)e^{\left(-\frac{i\,a}{b}\right)}}{c\left(-\frac{i\sqrt{2}b}{\sqrt{|b|}}+\sqrt{2}\sqrt{|b|}\right)}$$

```
[In] integrate(1/(a+b*arcsin(c*x))^(1/2),x, algorithm="giac")
```

```
[Out] -sqrt(pi)*erf(-1/2*I*sqrt(2)*sqrt(b*arcsin(c*x) + a)/sqrt(abs(b)) - 1/2*sqr
t(2)*sqrt(b*arcsin(c*x) + a)*sqrt(abs(b))/b)*e^(I*a/b)/(c*(I*sqrt(2)*b/sqrt
(abs(b)) + sqrt(2)*sqrt(abs(b)))) - sqrt(pi)*erf(1/2*I*sqrt(2)*sqrt(b*arcsi
n(c*x) + a)/sqrt(abs(b)) - 1/2*sqrt(2)*sqrt(b*arcsin(c*x) + a)*sqrt(abs(b))
/b)*e^(-I*a/b)/(c*(-I*sqrt(2)*b/sqrt(abs(b)) + sqrt(2)*sqrt(abs(b))))
```

Mupad [F(-1)]

Timed out.

$$\int \frac{1}{\sqrt{a+b\arcsin(cx)}}\,dx=\int \frac{1}{\sqrt{a+b\,\mathrm{asin}\left(c\,x\right)}}\,dx$$

```
[In] int(1/(a + b*asin(c*x))^(1/2),x)
```

```
[Out] int(1/(a + b*asin(c*x))^(1/2), x)
```

3.191 $\int \frac{1}{x\sqrt{a+b\arcsin(cx)}}\,dx$

Optimal result

Integrand size = 16, antiderivative size = 16

$$\int \frac{1}{x\sqrt{a+b\arcsin(cx)}}\,dx = \text{Int}\left(\frac{1}{x\sqrt{a+b\arcsin(cx)}},x\right)$$

```
[Out] Unintegrable(1/x/(a+b*arcsin(c*x))^(1/2),x)
```

Rubi [N/A]

Not integrable

Time = 0.02 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{1}{x\sqrt{a+b\arcsin(cx)}}\,dx = \int \frac{1}{x\sqrt{a+b\arcsin(cx)}}\,dx$$

```
[In] Int[1/(x*Sqrt[a + b*ArcSin[c*x]]),x]
```

```
[Out] Defer[Int][1/(x*Sqrt[a + b*ArcSin[c*x]]), x]
```

Rubi steps

$$\text{integral} = \int \frac{1}{x\sqrt{a+b\arcsin(cx)}}\,dx$$

Mathematica [N/A]

Not integrable

Time = 1.04 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.12

$$\int \frac{1}{x\sqrt{a+b\arcsin(cx)}}\,dx=\int \frac{1}{x\sqrt{a+b\arcsin(cx)}}\,dx$$

```
[In] Integrate[1/(x*Sqrt[a + b*ArcSin[c*x]]),x]
[Out] Integrate[1/(x*Sqrt[a + b*ArcSin[c*x]]), x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.08 (sec) , antiderivative size = 14, normalized size of antiderivative = 0.88

$$\int \frac{1}{x\sqrt{a+b\arcsin\left(cx\right)}}dx$$

```
[In] int(1/x/(a+b*arcsin(c*x))^(1/2),x)
[Out] int(1/x/(a+b*arcsin(c*x))^(1/2),x)
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{1}{x\sqrt{a+b\arcsin(cx)}}\,dx=\text{Exception raised: TypeError}$$

```
[In] integrate(1/x/(a+b*arcsin(c*x))^(1/2),x, algorithm="fricas")
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [N/A]

Not integrable

Time = 0.42 (sec) , antiderivative size = 15, normalized size of antiderivative = 0.94

$$\int \frac{1}{x\sqrt{a+b\arcsin(cx)}}\,dx=\int \frac{1}{x\sqrt{a+b\operatorname{asin}\left(cx\right)}}\,dx$$

```
[In] integrate(1/x/(a+b*asin(c*x))**(1/2),x)
[Out] Integral(1/(x*sqrt(a + b*asin(c*x))), x)
```

Maxima [N/A]

Not integrable

Time = 0.63 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.00

$$\int \frac{1}{x\sqrt{a+b\arcsin(cx)}}\,dx = \int \frac{1}{\sqrt{b\arcsin(cx)+a}\,x}\,dx$$

```
[In] integrate(1/x/(a+b*arcsin(c*x))^(1/2),x, algorithm="maxima")
[Out] integrate(1/(sqrt(b*arcsin(c*x) + a)*x), x)
```

Giac [N/A]

Not integrable

Time = 0.59 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.00

$$\int \frac{1}{x\sqrt{a+b\arcsin(cx)}}\,dx = \int \frac{1}{\sqrt{b\arcsin(cx)+a}\,x}\,dx$$

```
[In] integrate(1/x/(a+b*arcsin(c*x))^(1/2),x, algorithm="giac")
[Out] integrate(1/(sqrt(b*arcsin(c*x) + a)*x), x)
```

Mupad [N/A]

Not integrable

Time = 0.09 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.00

$$\int \frac{1}{x\sqrt{a+b\arcsin(cx)}}\,dx = \int \frac{1}{x\,\sqrt{a+b\,\mathrm{asin}\left(c\,x\right)}}\,dx$$

```
[In] int(1/(x*(a + b*asin(c*x))^(1/2)),x)
[Out] int(1/(x*(a + b*asin(c*x))^(1/2)), x)
```

3.192 $\int \frac{1}{x^2\sqrt{a+b\arcsin(cx)}}\,dx$

Optimal result

Integrand size = 16, antiderivative size = 16

$$\int \frac{1}{x^2\sqrt{a+b\arcsin(cx)}}\,dx = \mathrm{Int}\left(\frac{1}{x^2\sqrt{a+b\arcsin(cx)}},x\right)$$

```
[Out] Unintegrable(1/x^2/(a+b*arcsin(c*x))^(1/2),x)
```

Rubi [N/A]

Not integrable

Time = 0.02 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}} = 0.000$, Rules used = {}

$$\int \frac{1}{x^2\sqrt{a+b\arcsin(cx)}}\,dx = \int \frac{1}{x^2\sqrt{a+b\arcsin(cx)}}\,dx$$

```
[In] Int[1/(x^2*Sqrt[a + b*ArcSin[c*x]]),x]
[Out] Defer[Int][1/(x^2*Sqrt[a + b*ArcSin[c*x]]), x]
```

Rubi steps

$$\text{integral} = \int \frac{1}{x^2\sqrt{a+b\arcsin(cx)}}\,dx$$

Mathematica [N/A]

Not integrable

Time = 4.55 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.12

$$\int \frac{1}{x^2\sqrt{a+b\arcsin(cx)}}\,dx=\int \frac{1}{x^2\sqrt{a+b\arcsin(cx)}}\,dx$$

```
[In] Integrate[1/(x^2*Sqrt[a + b*ArcSin[c*x]]),x]
[Out] Integrate[1/(x^2*Sqrt[a + b*ArcSin[c*x]]), x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.10 (sec) , antiderivative size = 14, normalized size of antiderivative = 0.88

$$\int \frac{1}{x^2\sqrt{a+b\arcsin\left(cx\right)}}dx$$

```
[In] int(1/x^2/(a+b*arcsin(c*x))^(1/2),x)
[Out] int(1/x^2/(a+b*arcsin(c*x))^(1/2),x)
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{1}{x^2\sqrt{a+b\arcsin(cx)}}\,dx=\text{Exception raised: TypeError}$$

```
[In] integrate(1/x^2/(a+b*arcsin(c*x))^(1/2),x, algorithm="fricas")
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [N/A]

Not integrable

Time = 0.53 (sec) , antiderivative size = 17, normalized size of antiderivative = 1.06

$$\int \frac{1}{x^2\sqrt{a+b\arcsin(cx)}}\,dx=\int \frac{1}{x^2\sqrt{a+b\,\mathrm{asin}\,(cx)}}\,dx$$

```
[In] integrate(1/x**2/(a+b*asin(c*x))**(1/2),x)
[Out] Integral(1/(x**2*sqrt(a + b*asin(c*x))), x)
```

Maxima [N/A]

Not integrable

Time = 0.63 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.00

$$\int \frac{1}{x^2\sqrt{a+b\arcsin(cx)}}\,dx=\int \frac{1}{\sqrt{b\arcsin{(cx)}+a}x^2}\,dx$$

```
[In] integrate(1/x^2/(a+b*arcsin(c*x))^(1/2),x, algorithm="maxima")
[Out] integrate(1/(sqrt(b*arcsin(c*x) + a)*x^2), x)
```

Giac [N/A]

Not integrable

Time = 0.65 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.00

$$\int \frac{1}{x^2\sqrt{a+b\arcsin(cx)}}\,dx=\int \frac{1}{\sqrt{b\arcsin{(cx)}+a}x^2}\,dx$$

```
[In] integrate(1/x^2/(a+b*arcsin(c*x))^(1/2),x, algorithm="giac")
[Out] integrate(1/(sqrt(b*arcsin(c*x) + a)*x^2), x)
```

Mupad [N/A]

Not integrable

Time = 0.09 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.00

$$\int \frac{1}{x^2\sqrt{a+b\arcsin(cx)}}\,dx=\int \frac{1}{x^2\,\sqrt{a+b\,\mathrm{asin}\left(c\,x\right)}}\,dx$$

```
[In] int(1/(x^2*(a + b*asin(c*x))^(1/2)),x)
[Out] int(1/(x^2*(a + b*asin(c*x))^(1/2)), x)
```

3.193 $\int \frac{x^2}{(a+b\arcsin(cx))^{3/2}}\,dx$

Optimal result

Integrand size = 16, antiderivative size = 250

$$\int \frac{x^2}{(a+b\arcsin(cx))^{3/2}}\,dx = -\frac{2x^2\sqrt{1-c^2x^2}}{bc\sqrt{a+b\arcsin(cx)}} - \frac{\sqrt{\frac{\pi}{2}}\cos\left(\frac{a}{b}\right)\operatorname{FresnelS}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{b^{3/2}c^3} + \frac{\sqrt{\frac{3\pi}{2}}\cos\left(\frac{3a}{b}\right)\operatorname{FresnelS}\left(\frac{\sqrt{\frac{6}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{b^{3/2}c^3} + \frac{\sqrt{\frac{\pi}{2}}\operatorname{FresnelC}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)\sin\left(\frac{a}{b}\right)}{b^{3/2}c^3} - \frac{\sqrt{\frac{3\pi}{2}}\operatorname{FresnelC}\left(\frac{\sqrt{\frac{6}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)\sin\left(\frac{3a}{b}\right)}{b^{3/2}c^3}$$

```
[Out] -1/2*cos(a/b)*FresnelS(2^(1/2)/Pi^(1/2)*(a+b*arcsin(c*x))^(1/2)/b^(1/2))*2^
(1/2)*Pi^(1/2)/b^(3/2)/c^3+1/2*FresnelC(2^(1/2)/Pi^(1/2)*(a+b*arcsin(c*x))^
(1/2)/b^(1/2))*sin(a/b)*2^(1/2)*Pi^(1/2)/b^(3/2)/c^3+1/2*cos(3*a/b)*Fresnel
S(6^(1/2)/Pi^(1/2)*(a+b*arcsin(c*x))^(1/2)/b^(1/2))*6^(1/2)*Pi^(1/2)/b^(3/2
)/c^3-1/2*FresnelC(6^(1/2)/Pi^(1/2)*(a+b*arcsin(c*x))^(1/2)/b^(1/2))*sin(3*
a/b)*6^(1/2)*Pi^(1/2)/b^(3/2)/c^3-2*x^2*(-c^2*x^2+1)^(1/2)/b/c/(a+b*arcsin(
c*x))^(1/2)
```

Rubi [A] (verified)

Time = 0.19 (sec) , antiderivative size = 250, normalized size of antiderivative = 1.00, number of steps used = 12, number of rules used = 6, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used

$= \{4727, 3387, 3386, 3432, 3385, 3433\}$

$$\int \frac{x^2}{(a+b\arcsin(cx))^{3/2}}\,dx = \frac{\sqrt{\frac{\pi}{2}}\sin\left(\frac{a}{b}\right)\text{FresnelC}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{b^{3/2}c^3} - \frac{\sqrt{\frac{3\pi}{2}}\sin\left(\frac{3a}{b}\right)\text{FresnelC}\left(\frac{\sqrt{\frac{6}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{b^{3/2}c^3} - \frac{\sqrt{\frac{\pi}{2}}\cos\left(\frac{a}{b}\right)\text{FresnelS}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{b^{3/2}c^3} + \frac{\sqrt{\frac{3\pi}{2}}\cos\left(\frac{3a}{b}\right)\text{FresnelS}\left(\frac{\sqrt{\frac{6}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{b^{3/2}c^3} - \frac{2x^2\sqrt{1-c^2x^2}}{bc\sqrt{a+b\arcsin(cx)}}$$

```
[In] Int[x^2/(a + b*ArcSin[c*x])^(3/2),x]
```

```
[Out] (-2*x^2*Sqrt[1 - c^2*x^2])/(b*c*Sqrt[a + b*ArcSin[c*x]]) - (Sqrt[Pi/2]*Cos[
a/b]*FresnelS[(Sqrt[2/Pi]*Sqrt[a + b*ArcSin[c*x]])/Sqrt[b]])/(b^(3/2)*c^3)
+ (Sqrt[(3*Pi)/2]*Cos[(3*a)/b]*FresnelS[(Sqrt[6/Pi]*Sqrt[a + b*ArcSin[c*x]]
)/Sqrt[b]])/(b^(3/2)*c^3) + (Sqrt[Pi/2]*FresnelC[(Sqrt[2/Pi]*Sqrt[a + b*Arc
Sin[c*x]])/Sqrt[b]]*Sin[a/b])/(b^(3/2)*c^3) - (Sqrt[(3*Pi)/2]*FresnelC[(Sqr
t[6/Pi]*Sqrt[a + b*ArcSin[c*x]])/Sqrt[b]]*Sin[(3*a)/b])/(b^(3/2)*c^3)
```

Rule 3385

```
Int[sin[Pi/2 + (e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> D
ist[2/d, Subst[Int[Cos[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d
, e, f}, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3386

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[2/d
, Subst[Int[Sin[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d, e, f}
, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3387

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[Cos
[(d*e - c*f)/d], Int[Sin[c*(f/d) + f*x]/Sqrt[c + d*x], x], x] + Dist[Sin[(d
*e - c*f)/d], Int[Cos[c*(f/d) + f*x]/Sqrt[c + d*x], x], x] /; FreeQ[{c, d,
e, f}, x] && ComplexFreeQ[f] && NeQ[d*e - c*f, 0]
```

Rule 3432

```
Int[Sin[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelS[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 3433

```
Int[Cos[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelC[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4727

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^m*Sqrt[1 - c^2*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] - Dist
[1/(b^2*c^(m + 1)*(n + 1)), Subst[Int[ExpandTrigReduce[x^(n + 1), Sin[-a/b
+ x/b]^(m - 1)*(m - (m + 1)*Sin[-a/b + x/b]^2), x], x], x, a + b*ArcSin[c*x
]], x] /; FreeQ[{a, b, c}, x] && IGtQ[m, 0] && GeQ[n, -2] && LtQ[n, -1]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= -\frac{2x^2\sqrt{1-c^2x^2}}{bc\sqrt{a+b\arcsin(cx)}} \\
&\quad+\frac{2\text{Subst}\left(\int\left(-\frac{3\sin\left(\frac{3a}{b}-\frac{3x}{b}\right)}{4\sqrt{x}}+\frac{\sin\left(\frac{a}{b}-\frac{x}{b}\right)}{4\sqrt{x}}\right)\,dx,x,a+b\arcsin(cx)\right)}{b^2c^3} \\
&= -\frac{2x^2\sqrt{1-c^2x^2}}{bc\sqrt{a+b\arcsin(cx)}}+\frac{\text{Subst}\left(\int\frac{\sin\left(\frac{a}{b}-\frac{x}{b}\right)}{\sqrt{x}}\,dx,x,a+b\arcsin(cx)\right)}{2b^2c^3} \\
&\quad-\frac{3\text{Subst}\left(\int\frac{\sin\left(\frac{3a}{b}-\frac{3x}{b}\right)}{\sqrt{x}}\,dx,x,a+b\arcsin(cx)\right)}{2b^2c^3} \\
&= -\frac{2x^2\sqrt{1-c^2x^2}}{bc\sqrt{a+b\arcsin(cx)}}-\frac{\cos\left(\frac{a}{b}\right)\text{Subst}\left(\int\frac{\sin\left(\frac{x}{b}\right)}{\sqrt{x}}\,dx,x,a+b\arcsin(cx)\right)}{2b^2c^3} \\
&\quad+\frac{\left(3\cos\left(\frac{3a}{b}\right)\right)\text{Subst}\left(\int\frac{\sin\left(\frac{3x}{b}\right)}{\sqrt{x}}\,dx,x,a+b\arcsin(cx)\right)}{2b^2c^3} \\
&\quad+\frac{\sin\left(\frac{a}{b}\right)\text{Subst}\left(\int\frac{\cos\left(\frac{x}{b}\right)}{\sqrt{x}}\,dx,x,a+b\arcsin(cx)\right)}{2b^2c^3} \\
&\quad-\frac{\left(3\sin\left(\frac{3a}{b}\right)\right)\text{Subst}\left(\int\frac{\cos\left(\frac{3x}{b}\right)}{\sqrt{x}}\,dx,x,a+b\arcsin(cx)\right)}{2b^2c^3}
\end{aligned}$$

$$= -\frac{2x^2\sqrt{1-c^2x^2}}{bc\sqrt{a+b\arcsin(cx)}} - \frac{\cos\left(\frac{a}{b}\right)\text{Subst}\left(\int\sin\left(\frac{x^2}{b}\right)\,dx,x,\sqrt{a+b\arcsin(cx)}\right)}{b^2c^3} + \frac{\left(3\cos\left(\frac{3a}{b}\right)\right)\text{Subst}\left(\int\sin\left(\frac{3x^2}{b}\right)\,dx,x,\sqrt{a+b\arcsin(cx)}\right)}{b^2c^3} + \frac{\sin\left(\frac{a}{b}\right)\text{Subst}\left(\int\cos\left(\frac{x^2}{b}\right)\,dx,x,\sqrt{a+b\arcsin(cx)}\right)}{b^2c^3} - \frac{\left(3\sin\left(\frac{3a}{b}\right)\right)\text{Subst}\left(\int\cos\left(\frac{3x^2}{b}\right)\,dx,x,\sqrt{a+b\arcsin(cx)}\right)}{b^2c^3}$$

$$= -\frac{2x^2\sqrt{1-c^2x^2}}{bc\sqrt{a+b\arcsin(cx)}} - \frac{\sqrt{\frac{\pi}{2}}\cos\left(\frac{a}{b}\right)\text{FresnelS}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{b^{3/2}c^3} + \frac{\sqrt{\frac{3\pi}{2}}\cos\left(\frac{3a}{b}\right)\text{FresnelS}\left(\frac{\sqrt{\frac{6}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{b^{3/2}c^3} + \frac{\sqrt{\frac{\pi}{2}}\,\text{FresnelC}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)\sin\left(\frac{a}{b}\right)}{b^{3/2}c^3} - \frac{\sqrt{\frac{3\pi}{2}}\,\text{FresnelC}\left(\frac{\sqrt{\frac{6}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)\sin\left(\frac{3a}{b}\right)}{b^{3/2}c^3}$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.32 (sec) , antiderivative size = 343, normalized size of antiderivative = 1.37

$$\int \frac{x^2}{(a+b\arcsin(cx))^{3/2}}\,dx = \frac{e^{-\frac{3i(a+b\arcsin(cx))}{b}}\left(e^{\frac{3ia}{b}} - e^{\frac{3ia}{b}+2i\arcsin(cx)} - e^{\frac{3ia}{b}+4i\arcsin(cx)} + e^{\frac{3i(a+2b\arcsin(cx))}{b}} + e^{\frac{2ia}{b}}\right.}{}$$

```
[In] Integrate[x^2/(a + b*ArcSin[c*x])^(3/2),x]
```

```
[Out] (E^(((3*I)*a)/b) - E^(((3*I)*a)/b + (2*I)*ArcSin[c*x]) - E^(((3*I)*a)/b + (
4*I)*ArcSin[c*x]) + E^(((3*I)*(a + 2*b*ArcSin[c*x]))/b) + E^(((2*I)*a)/b +
(3*I)*ArcSin[c*x])*Sqrt[((-I)*(a + b*ArcSin[c*x]))/b]*Gamma[1/2, ((-I)*(a +
 b*ArcSin[c*x]))/b] + E^(((4*I)*a)/b + (3*I)*ArcSin[c*x])*Sqrt[(I*(a + b*Ar
cSin[c*x]))/b]*Gamma[1/2, (I*(a + b*ArcSin[c*x]))/b] - Sqrt[3]*E^((3*I)*Arc
Sin[c*x])*Sqrt[((-I)*(a + b*ArcSin[c*x]))/b]*Gamma[1/2, ((-3*I)*(a + b*ArcS
in[c*x]))/b] - Sqrt[3]*E^((3*I)*((2*a)/b + ArcSin[c*x]))*Sqrt[(I*(a + b*Arc
Sin[c*x]))/b]*Gamma[1/2, ((3*I)*(a + b*ArcSin[c*x]))/b])/(4*b*c^3*E^(((3*I)
*(a + b*ArcSin[c*x]))/b)*Sqrt[a + b*ArcSin[c*x]])
```

Maple [A] (verified)

Time = 0.08 (sec) , antiderivative size = 301, normalized size of antiderivative = 1.20

method	result
default	$-\frac{\sqrt{2}\sqrt{-\frac{3}{b}}\,\sqrt{a+b\arcsin(cx)}\,\cos\left(\frac{3a}{b}\right)\mathrm{FresnelS}\left(\frac{3\sqrt{2}\,\sqrt{a+b\arcsin(cx)}}{\sqrt{\pi}\,\sqrt{-\frac{3}{b}}\,b}\right)\sqrt{\pi}+\sqrt{2}\,\sqrt{-\frac{3}{b}}\,\sqrt{a+b\arcsin(cx)}\,\sin\left(\frac{3a}{b}\right)\mathrm{FresnelC}\left(\frac{3\sqrt{2}\,\sqrt{a+b\,\mathrm{ar}}}{\sqrt{\pi}\,\sqrt{-}}\right.}{}$

```
[In] int(x^2/(a+b*arcsin(c*x))^(3/2),x,method=_RETURNVERBOSE)
```

```
[Out] -1/2/c^3/b*(2^(1/2)*(-3/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)*cos(3*a/b)*Fresnel
S(3*2^(1/2)/Pi^(1/2)/(-3/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)/b)*Pi^(1/2)+2^(1/
2)*(-3/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)*sin(3*a/b)*FresnelC(3*2^(1/2)/Pi^(1
/2)/(-3/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)/b)*Pi^(1/2)-2^(1/2)*(a+b*arcsin(c*
x))^(1/2)*cos(a/b)*FresnelS(2^(1/2)/Pi^(1/2)/(-1/b)^(1/2)*(a+b*arcsin(c*x))
^(1/2)/b)*(-1/b)^(1/2)*Pi^(1/2)-2^(1/2)*(a+b*arcsin(c*x))^(1/2)*sin(a/b)*Fr
esnelC(2^(1/2)/Pi^(1/2)/(-1/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)/b)*(-1/b)^(1/2
)*Pi^(1/2)+cos(-(a+b*arcsin(c*x))/b+a/b)-cos(-3*(a+b*arcsin(c*x))/b+3*a/b))
/(a+b*arcsin(c*x))^(1/2)
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{x^2}{(a+b\arcsin(cx))^{3/2}}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate(x^2/(a+b*arcsin(c*x))^(3/2),x, algorithm="fricas")
```

```
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int \frac{x^2}{(a+b\arcsin(cx))^{3/2}}\,dx = \int \frac{x^2}{(a+b\,\mathrm{asin}\,(cx))^{\frac{3}{2}}}\,dx$$

```
[In] integrate(x**2/(a+b*asin(c*x))**(3/2),x)
```

```
[Out] Integral(x**2/(a + b*asin(c*x))**(3/2), x)
```

Maxima [F]

$$\int \frac{x^2}{(a+b\arcsin(cx))^{3/2}}\,dx = \int \frac{x^2}{(b\arcsin(cx)+a)^{\frac{3}{2}}}\,dx$$

```
[In] integrate(x^2/(a+b*arcsin(c*x))^(3/2),x, algorithm="maxima")
[Out] integrate(x^2/(b*arcsin(c*x) + a)^(3/2), x)
```

Giac [F]

$$\int \frac{x^2}{(a+b\arcsin(cx))^{3/2}}\,dx = \int \frac{x^2}{(b\arcsin(cx)+a)^{\frac{3}{2}}}\,dx$$

```
[In] integrate(x^2/(a+b*arcsin(c*x))^(3/2),x, algorithm="giac")
[Out] integrate(x^2/(b*arcsin(c*x) + a)^(3/2), x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x^2}{(a+b\arcsin(cx))^{3/2}}\,dx = \int \frac{x^2}{(a+b\,\mathrm{asin}(c\,x))^{3/2}}\,dx$$

```
[In] int(x^2/(a + b*asin(c*x))^(3/2),x)
[Out] int(x^2/(a + b*asin(c*x))^(3/2), x)
```

3.194 $\int \frac{x}{(a+b\arcsin(cx))^{3/2}}\,dx$

Optimal result

Integrand size = 14, antiderivative size = 130

$$\int \frac{x}{(a+b\arcsin(cx))^{3/2}}\,dx = -\frac{2x\sqrt{1-c^2x^2}}{bc\sqrt{a+b\arcsin(cx)}} + \frac{2\sqrt{\pi}\cos\left(\frac{2a}{b}\right)\text{FresnelC}\left(\frac{2\sqrt{a+b\arcsin(cx)}}{\sqrt{b}\sqrt{\pi}}\right)}{b^{3/2}c^2} + \frac{2\sqrt{\pi}\,\text{FresnelS}\left(\frac{2\sqrt{a+b\arcsin(cx)}}{\sqrt{b}\sqrt{\pi}}\right)\sin\left(\frac{2a}{b}\right)}{b^{3/2}c^2}$$

```
[Out] 2*cos(2*a/b)*FresnelC(2*(a+b*arcsin(c*x))^(1/2)/b^(1/2)/Pi^(1/2))*Pi^(1/2)/
b^(3/2)/c^2+2*FresnelS(2*(a+b*arcsin(c*x))^(1/2)/b^(1/2)/Pi^(1/2))*sin(2*a/
b)*Pi^(1/2)/b^(3/2)/c^2-2*x*(-c^2*x^2+1)^(1/2)/b/c/(a+b*arcsin(c*x))^(1/2)
```

Rubi [A] (verified)

Time = 0.07 (sec) , antiderivative size = 130, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 6, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.429, Rules used = {4727, 3387, 3386, 3432, 3385, 3433}

$$\int \frac{x}{(a+b\arcsin(cx))^{3/2}}\,dx = \frac{2\sqrt{\pi}\cos\left(\frac{2a}{b}\right)\text{FresnelC}\left(\frac{2\sqrt{a+b\arcsin(cx)}}{\sqrt{b}\sqrt{\pi}}\right)}{b^{3/2}c^2} + \frac{2\sqrt{\pi}\sin\left(\frac{2a}{b}\right)\text{FresnelS}\left(\frac{2\sqrt{a+b\arcsin(cx)}}{\sqrt{b}\sqrt{\pi}}\right)}{b^{3/2}c^2} - \frac{2x\sqrt{1-c^2x^2}}{bc\sqrt{a+b\arcsin(cx)}}$$

```
[In] Int[x/(a + b*ArcSin[c*x])^(3/2),x]
```

```
[Out] (-2*x*Sqrt[1 - c^2*x^2])/(b*c*Sqrt[a + b*ArcSin[c*x]]) + (2*Sqrt[Pi]*Cos[(2
*a)/b]*FresnelC[(2*Sqrt[a + b*ArcSin[c*x]])/(Sqrt[b]*Sqrt[Pi])])/(b^(3/2)*c
```

```
^2) + (2*Sqrt[Pi]*FresnelS[(2*Sqrt[a + b*ArcSin[c*x]])/(Sqrt[b]*Sqrt[Pi])]*
Sin[(2*a)/b])/(b^(3/2)*c^2)
```

Rule 3385

```
Int[sin[Pi/2 + (e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> D
ist[2/d, Subst[Int[Cos[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d
, e, f}, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3386

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[2/d
, Subst[Int[Sin[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d, e, f}
, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3387

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[Cos
[(d*e - c*f)/d], Int[Sin[c*(f/d) + f*x]/Sqrt[c + d*x], x], x] + Dist[Sin[(d
*e - c*f)/d], Int[Cos[c*(f/d) + f*x]/Sqrt[c + d*x], x], x] /; FreeQ[{c, d,
e, f}, x] && ComplexFreeQ[f] && NeQ[d*e - c*f, 0]
```

Rule 3432

```
Int[Sin[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelS[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 3433

```
Int[Cos[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelC[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4727

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^m*Sqrt[1 - c^2*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] - Dist
[1/(b^2*c^(m + 1)*(n + 1)), Subst[Int[ExpandTrigReduce[x^(n + 1), Sin[-a/b
+ x/b]^(m - 1)*(m - (m + 1)*Sin[-a/b + x/b]^2), x], x], x, a + b*ArcSin[c*x
]], x] /; FreeQ[{a, b, c}, x] && IGtQ[m, 0] && GeQ[n, -2] && LtQ[n, -1]
```

Rubi steps

$$\text{integral} = -\frac{2x\sqrt{1-c^2x^2}}{bc\sqrt{a+b\arcsin(cx)}} + \frac{2\text{Subst}\left(\int \frac{\cos\left(\frac{2a}{b}-\frac{2x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{b^2c^2}$$

$$= -\frac{2x\sqrt{1-c^2x^2}}{bc\sqrt{a+b\arcsin(cx)}} + \frac{\left(2\cos\left(\frac{2a}{b}\right)\right)\text{Subst}\left(\int\frac{\cos\left(\frac{2x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{b^2c^2} + \frac{\left(2\sin\left(\frac{2a}{b}\right)\right)\text{Subst}\left(\int\frac{\sin\left(\frac{2x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{b^2c^2}$$

$$= -\frac{2x\sqrt{1-c^2x^2}}{bc\sqrt{a+b\arcsin(cx)}} + \frac{\left(4\cos\left(\frac{2a}{b}\right)\right)\text{Subst}\left(\int\cos\left(\frac{2x^2}{b}\right)\,dx, x, \sqrt{a+b\arcsin(cx)}\right)}{b^2c^2} + \frac{\left(4\sin\left(\frac{2a}{b}\right)\right)\text{Subst}\left(\int\sin\left(\frac{2x^2}{b}\right)\,dx, x, \sqrt{a+b\arcsin(cx)}\right)}{b^2c^2}$$

$$= -\frac{2x\sqrt{1-c^2x^2}}{bc\sqrt{a+b\arcsin(cx)}} + \frac{2\sqrt{\pi}\cos\left(\frac{2a}{b}\right)\text{FresnelC}\left(\frac{2\sqrt{a+b\arcsin(cx)}}{\sqrt{b}\sqrt{\pi}}\right)}{b^{3/2}c^2} + \frac{2\sqrt{\pi}\,\text{FresnelS}\left(\frac{2\sqrt{a+b\arcsin(cx)}}{\sqrt{b}\sqrt{\pi}}\right)\sin\left(\frac{2a}{b}\right)}{b^{3/2}c^2}$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.12 (sec) , antiderivative size = 155, normalized size of antiderivative = 1.19

$$\int\frac{x}{(a+b\arcsin(cx))^{3/2}}\,dx = \frac{ie^{-\frac{2ia}{b}}\left(-\sqrt{2}\sqrt{-\frac{i(a+b\arcsin(cx))}{b}}\Gamma\left(\frac{1}{2},-\frac{2i(a+b\arcsin(cx))}{b}\right)+\sqrt{2}e^{\frac{4ia}{b}}\sqrt{\frac{i(a+b\arcsin(cx))}{b}}\Gamma\right.}{2bc^2\sqrt{a+b\arcsin(cx)}}$$

```
[In] Integrate[x/(a + b*ArcSin[c*x])^(3/2),x]
```

```
[Out] ((I/2)*(-(Sqrt[2]*Sqrt[((-I)*(a + b*ArcSin[c*x]))/b]*Gamma[1/2, ((-2*I)*(a
+ b*ArcSin[c*x]))/b]) + Sqrt[2]*E^(((4*I)*a)/b)*Sqrt[(I*(a + b*ArcSin[c*x])
)/b]*Gamma[1/2, ((2*I)*(a + b*ArcSin[c*x]))/b] + (2*I)*E^(((2*I)*a)/b)*Sin[
2*ArcSin[c*x]]))/(b*c^2*E^(((2*I)*a)/b)*Sqrt[a + b*ArcSin[c*x]])
```

Maple [A] (verified)

Time = 0.07 (sec) , antiderivative size = 156, normalized size of antiderivative = 1.20

method	result
default	$\frac{2\sqrt{-\frac{1}{b}}\cos\left(\frac{2a}{b}\right)\text{FresnelC}\left(\frac{2\sqrt{2}\sqrt{a+b\arcsin(cx)}}{\sqrt{\pi}\sqrt{-\frac{2}{b}}\,b}\right)\sqrt{a+b\arcsin(cx)}\sqrt{\pi}-2\sqrt{-\frac{1}{b}}\sin\left(\frac{2a}{b}\right)\text{FresnelS}\left(\frac{2\sqrt{2}\sqrt{a+b\arcsin(cx)}}{\sqrt{\pi}\sqrt{-\frac{2}{b}}\,b}\right)\sqrt{a+b\arcsin(c}}{c^2b\sqrt{a+b\arcsin(cx)}}$

```
[In] int(x/(a+b*arcsin(c*x))^(3/2),x,method=_RETURNVERBOSE)
```

```
[Out] 1/c^2/b*(2*(-1/b)^(1/2)*cos(2*a/b)*FresnelC(2*2^(1/2)/Pi^(1/2)/(-2/b)^(1/2)
*(a+b*arcsin(c*x))^(1/2)/b)*(a+b*arcsin(c*x))^(1/2)*Pi^(1/2)-2*(-1/b)^(1/2)
*sin(2*a/b)*FresnelS(2*2^(1/2)/Pi^(1/2)/(-2/b)^(1/2)*(a+b*arcsin(c*x))^(1/2
)/b)*(a+b*arcsin(c*x))^(1/2)*Pi^(1/2)+sin(-2*(a+b*arcsin(c*x))/b+2*a/b))/(a
+b*arcsin(c*x))^(1/2)
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{x}{(a+b\arcsin(cx))^{3/2}}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate(x/(a+b*arcsin(c*x))^(3/2),x, algorithm="fricas")
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int \frac{x}{(a+b\arcsin(cx))^{3/2}}\,dx = \int \frac{x}{(a+b\operatorname{asin}(cx))^{\frac{3}{2}}}\,dx$$

```
[In] integrate(x/(a+b*asin(c*x))**(3/2),x)
[Out] Integral(x/(a + b*asin(c*x))**(3/2), x)
```

Maxima [F]

$$\int \frac{x}{(a+b\arcsin(cx))^{3/2}}\,dx = \int \frac{x}{(b\arcsin(cx)+a)^{\frac{3}{2}}}\,dx$$

```
[In] integrate(x/(a+b*arcsin(c*x))^(3/2),x, algorithm="maxima")
[Out] integrate(x/(b*arcsin(c*x) + a)^(3/2), x)
```

Giac [F]

$$\int \frac{x}{(a+b\arcsin(cx))^{3/2}}\,dx = \int \frac{x}{(b\arcsin(cx)+a)^{\frac{3}{2}}}\,dx$$

```
[In] integrate(x/(a+b*arcsin(c*x))^(3/2),x, algorithm="giac")
[Out] integrate(x/(b*arcsin(c*x) + a)^(3/2), x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x}{(a+b\arcsin(cx))^{3/2}}\,dx = \int \frac{x}{(a+b\,\mathrm{asin}(c\,x))^{3/2}}\,dx$$

```
[In] int(x/(a + b*asin(c*x))^(3/2),x)
[Out] int(x/(a + b*asin(c*x))^(3/2), x)
```

3.195 $\int \frac{1}{(a+b\arcsin(cx))^{3/2}}\,dx$

Optimal result

Integrand size = 12, antiderivative size = 137

$$\int \frac{1}{(a+b\arcsin(cx))^{3/2}}\,dx = -\frac{2\sqrt{1-c^2x^2}}{bc\sqrt{a+b\arcsin(cx)}} - \frac{2\sqrt{2\pi}\cos\left(\frac{a}{b}\right)\operatorname{FresnelS}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{b^{3/2}c} + \frac{2\sqrt{2\pi}\operatorname{FresnelC}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)\sin\left(\frac{a}{b}\right)}{b^{3/2}c}$$

```
[Out] -2*cos(a/b)*FresnelS(2^(1/2)/Pi^(1/2)*(a+b*arcsin(c*x))^(1/2)/b^(1/2))*2^(1
/2)*Pi^(1/2)/b^(3/2)/c+2*FresnelC(2^(1/2)/Pi^(1/2)*(a+b*arcsin(c*x))^(1/2)/
b^(1/2))*sin(a/b)*2^(1/2)*Pi^(1/2)/b^(3/2)/c-2*(-c^2*x^2+1)^(1/2)/b/c/(a+b*
arcsin(c*x))^(1/2)
```

Rubi [A] (verified)

Time = 0.14 (sec) , antiderivative size = 137, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 7, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.583, Rules used = {4717, 4809, 3387, 3386, 3432, 3385, 3433}

$$\int \frac{1}{(a+b\arcsin(cx))^{3/2}}\,dx = \frac{2\sqrt{2\pi}\sin\left(\frac{a}{b}\right)\operatorname{FresnelC}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{b^{3/2}c} - \frac{2\sqrt{2\pi}\cos\left(\frac{a}{b}\right)\operatorname{FresnelS}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{b^{3/2}c} - \frac{2\sqrt{1-c^2x^2}}{bc\sqrt{a+b\arcsin(cx)}}$$

```
[In] Int[(a + b*ArcSin[c*x])^(-3/2),x]
```

```
[Out] (-2*Sqrt[1 - c^2*x^2])/(b*c*Sqrt[a + b*ArcSin[c*x]]) - (2*Sqrt[2*Pi]*Cos[a/
b]*FresnelS[(Sqrt[2/Pi]*Sqrt[a + b*ArcSin[c*x]])/Sqrt[b]])/(b^(3/2)*c) + (2
*Sqrt[2*Pi]*FresnelC[(Sqrt[2/Pi]*Sqrt[a + b*ArcSin[c*x]])/Sqrt[b]]*Sin[a/b]
)/(b^(3/2)*c)
```

Rule 3385

```
Int[sin[Pi/2 + (e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> D
ist[2/d, Subst[Int[Cos[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d
, e, f}, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3386

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[2/d
, Subst[Int[Sin[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d, e, f}
, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3387

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[Cos
[(d*e - c*f)/d], Int[Sin[c*(f/d) + f*x]/Sqrt[c + d*x], x], x] + Dist[Sin[(d
*e - c*f)/d], Int[Cos[c*(f/d) + f*x]/Sqrt[c + d*x], x], x] /; FreeQ[{c, d,
e, f}, x] && ComplexFreeQ[f] && NeQ[d*e - c*f, 0]
```

Rule 3432

```
Int[Sin[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelS[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 3433

```
Int[Cos[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelC[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4717

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_), x_Symbol] :> Simp[Sqrt[1 - c^2
*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] + Dist[c/(b*(n + 1)),
 Int[x*((a + b*ArcSin[c*x])^(n + 1)/Sqrt[1 - c^2*x^2]), x], x] /; FreeQ[{a,
 b, c}, x] && LtQ[n, -1]
```

Rule 4809

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_.)*((d_) + (e_.)*(x_)^
2)^(p_.), x_Symbol] :> Dist[(1/(b*c^(m + 1)))*Simp[(d + e*x^2)^p/(1 - c^2*x
^2)^p], Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b]^(2*p + 1), x], x, a
```

```
 + b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, d, e, n}, x] && EqQ[c^2*d + e, 0]
&& IGtQ[2*p + 2, 0] && IGtQ[m, 0]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= -\frac{2\sqrt{1-c^2x^2}}{bc\sqrt{a+b\arcsin(cx)}}-\frac{(2c)\int\frac{x}{\sqrt{1-c^2x^2}\sqrt{a+b\arcsin(cx)}}\,dx}{b}\\
&= -\frac{2\sqrt{1-c^2x^2}}{bc\sqrt{a+b\arcsin(cx)}}+\frac{2\mathrm{Subst}\left(\int\frac{\sin\left(\frac{a}{b}-\frac{x}{b}\right)}{\sqrt{x}}\,dx,x,a+b\arcsin(cx)\right)}{b^2c}\\
&= -\frac{2\sqrt{1-c^2x^2}}{bc\sqrt{a+b\arcsin(cx)}}-\frac{\left(2\cos\left(\frac{a}{b}\right)\right)\mathrm{Subst}\left(\int\frac{\sin\left(\frac{x}{b}\right)}{\sqrt{x}}\,dx,x,a+b\arcsin(cx)\right)}{b^2c}\\
&\quad+\frac{\left(2\sin\left(\frac{a}{b}\right)\right)\mathrm{Subst}\left(\int\frac{\cos\left(\frac{x}{b}\right)}{\sqrt{x}}\,dx,x,a+b\arcsin(cx)\right)}{b^2c}\\
&= -\frac{2\sqrt{1-c^2x^2}}{bc\sqrt{a+b\arcsin(cx)}}-\frac{\left(4\cos\left(\frac{a}{b}\right)\right)\mathrm{Subst}\left(\int\sin\left(\frac{x^2}{b}\right)\,dx,x,\sqrt{a+b\arcsin(cx)}\right)}{b^2c}\\
&\quad+\frac{\left(4\sin\left(\frac{a}{b}\right)\right)\mathrm{Subst}\left(\int\cos\left(\frac{x^2}{b}\right)\,dx,x,\sqrt{a+b\arcsin(cx)}\right)}{b^2c}\\
&= -\frac{2\sqrt{1-c^2x^2}}{bc\sqrt{a+b\arcsin(cx)}}-\frac{2\sqrt{2\pi}\cos\left(\frac{a}{b}\right)\mathrm{FresnelS}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{b^{3/2}c}\\
&\quad+\frac{2\sqrt{2\pi}\,\mathrm{FresnelC}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)\sin\left(\frac{a}{b}\right)}{b^{3/2}c}
\end{aligned}$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.24 (sec) , antiderivative size = 167, normalized size of antiderivative = 1.22

$$\int\frac{1}{(a+b\arcsin(cx))^{3/2}}\,dx=\frac{e^{-\frac{i(a+b\arcsin(cx))}{b}}\left(e^{i\arcsin(cx)}\sqrt{-\frac{i(a+b\arcsin(cx))}{b}}\Gamma\left(\frac{1}{2},-\frac{i(a+b\arcsin(cx))}{b}\right)+e^{\frac{ia}{b}}\left(-1-\right.\right.}{bc\sqrt{a+b\arcsin(}}$$

```
[In] Integrate[(a + b*ArcSin[c*x])^(-3/2),x]
[Out] (E^(I*ArcSin[c*x])*Sqrt[((-I)*(a + b*ArcSin[c*x]))/b]*Gamma[1/2, ((-I)*(a +
 b*ArcSin[c*x]))/b] + E^((I*a)/b)*(-1 - E^((2*I)*ArcSin[c*x]) + E^((I*(a +
b*ArcSin[c*x]))/b)*Sqrt[(I*(a + b*ArcSin[c*x]))/b]*Gamma[1/2, (I*(a + b*Arc
Sin[c*x]))/b]))/(b*c*E^((I*(a + b*ArcSin[c*x]))/b)*Sqrt[a + b*ArcSin[c*x]])
```

Maple [A] (verified)

Time = 0.06 (sec) , antiderivative size = 158, normalized size of antiderivative = 1.15

method	result
default	$-\frac{2\left(-\sqrt{2}\,\sqrt{a+b\arcsin(cx)}\,\cos\left(\frac{a}{b}\right)\operatorname{FresnelS}\left(\frac{\sqrt{2}\,\sqrt{a+b\arcsin(cx)}}{\sqrt{\pi}\,\sqrt{-\frac{1}{b}}\,b}\right)\sqrt{-\frac{1}{b}}\,\sqrt{\pi}-\sqrt{2}\,\sqrt{a+b\arcsin(cx)}\,\sin\left(\frac{a}{b}\right)\operatorname{FresnelC}\left(\frac{\sqrt{2}\,\sqrt{a+b\arcsin(c}}{\sqrt{\pi}\,\sqrt{-\frac{1}{b}}\,b}\right.\right.}{cb\sqrt{a+b\arcsin(cx)}}$

```
[In] int(1/(a+b*arcsin(c*x))^(3/2),x,method=_RETURNVERBOSE)
[Out] -2/c/b*(-2^(1/2)*(a+b*arcsin(c*x))^(1/2)*cos(a/b)*FresnelS(2^(1/2)/Pi^(1/2)
/(-1/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)/b)*(-1/b)^(1/2)*Pi^(1/2)-2^(1/2)*(a+b
*arcsin(c*x))^(1/2)*sin(a/b)*FresnelC(2^(1/2)/Pi^(1/2)/(-1/b)^(1/2)*(a+b*ar
csin(c*x))^(1/2)/b)*(-1/b)^(1/2)*Pi^(1/2)+cos(-(a+b*arcsin(c*x))/b+a/b))/(a
+b*arcsin(c*x))^(1/2)
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{1}{(a+b\arcsin(cx))^{3/2}}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate(1/(a+b*arcsin(c*x))^(3/2),x, algorithm="fricas")
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int \frac{1}{(a+b\arcsin(cx))^{3/2}}\,dx = \int \frac{1}{(a+b\,\mathrm{asin}\,(cx))^{\frac{3}{2}}}\,dx$$

```
[In] integrate(1/(a+b*asin(c*x))**(3/2),x)
[Out] Integral((a + b*asin(c*x))**(-3/2), x)
```

Maxima [F]

$$\int \frac{1}{(a+b\arcsin(cx))^{3/2}}\,dx = \int \frac{1}{(b\arcsin{(cx)}+a)^{\frac{3}{2}}}\,dx$$

```
[In] integrate(1/(a+b*arcsin(c*x))^(3/2),x, algorithm="maxima")
[Out] integrate((b*arcsin(c*x) + a)^(-3/2), x)
```

Giac [F]

$$\int \frac{1}{(a+b\arcsin(cx))^{3/2}}\,dx = \int \frac{1}{(b\arcsin{(cx)}+a)^{\frac{3}{2}}}\,dx$$

```
[In] integrate(1/(a+b*arcsin(c*x))^(3/2),x, algorithm="giac")
[Out] integrate((b*arcsin(c*x) + a)^(-3/2), x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{1}{(a+b\arcsin(cx))^{3/2}}\,dx = \int \frac{1}{{\left(a+b\,\mathrm{asin}\left(c\,x\right)\right)}^{3/2}}\,dx$$

```
[In] int(1/(a + b*asin(c*x))^(3/2),x)
[Out] int(1/(a + b*asin(c*x))^(3/2), x)
```

3.196 $\int \frac{1}{x(a+b\arcsin(cx))^{3/2}}\,dx$

Optimal result

Integrand size = 16, antiderivative size = 16

$$\int \frac{1}{x(a+b\arcsin(cx))^{3/2}}\,dx=\text{Int}\left(\frac{1}{x(a+b\arcsin(cx))^{3/2}},x\right)$$

```
[Out] Unintegrable(1/x/(a+b*arcsin(c*x))^(3/2),x)
```

Rubi [N/A]

Not integrable

Time = 0.03 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{1}{x(a+b\arcsin(cx))^{3/2}}\,dx=\int \frac{1}{x(a+b\arcsin(cx))^{3/2}}\,dx$$

```
[In] Int[1/(x*(a + b*ArcSin[c*x])^(3/2)),x]
[Out] Defer[Int][1/(x*(a + b*ArcSin[c*x])^(3/2)), x]
```

Rubi steps

$$\text{integral}=\int \frac{1}{x(a+b\arcsin(cx))^{3/2}}\,dx$$

Mathematica [N/A]

Not integrable

Time = 0.87 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.12

$$\int \frac{1}{x(a+b\arcsin(cx))^{3/2}}\,dx=\int \frac{1}{x(a+b\arcsin(cx))^{3/2}}\,dx$$

```
[In] Integrate[1/(x*(a + b*ArcSin[c*x])^(3/2)),x]
[Out] Integrate[1/(x*(a + b*ArcSin[c*x])^(3/2)), x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.08 (sec) , antiderivative size = 14, normalized size of antiderivative = 0.88

$$\int \frac{1}{x\left(a+b\arcsin\left(cx\right)\right)^{\frac{3}{2}}}dx$$

```
[In] int(1/x/(a+b*arcsin(c*x))^(3/2),x)
[Out] int(1/x/(a+b*arcsin(c*x))^(3/2),x)
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{1}{x(a+b\arcsin(cx))^{3/2}}\,dx=\text{Exception raised: TypeError}$$

```
[In] integrate(1/x/(a+b*arcsin(c*x))^(3/2),x, algorithm="fricas")
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [N/A]

Not integrable

Time = 1.65 (sec) , antiderivative size = 15, normalized size of antiderivative = 0.94

$$\int \frac{1}{x(a+b\arcsin(cx))^{3/2}}\,dx=\int \frac{1}{x\left(a+b\operatorname{asin}\left(cx\right)\right)^{\frac{3}{2}}}\,dx$$

```
[In] integrate(1/x/(a+b*asin(c*x))**(3/2),x)
[Out] Integral(1/(x*(a + b*asin(c*x))**(3/2)), x)
```

Maxima [N/A]

Not integrable

Time = 0.59 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.00

$$\int \frac{1}{x(a+b\arcsin(cx))^{3/2}}\,dx = \int \frac{1}{(b\arcsin(cx)+a)^{\frac{3}{2}}x}\,dx$$

```
[In] integrate(1/x/(a+b*arcsin(c*x))^(3/2),x, algorithm="maxima")
[Out] integrate(1/((b*arcsin(c*x) + a)^(3/2)*x), x)
```

Giac [F(-2)]

Exception generated.

$$\int \frac{1}{x(a+b\arcsin(cx))^{3/2}}\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(1/x/(a+b*arcsin(c*x))^(3/2),x, algorithm="giac")
[Out] Exception raised: RuntimeError >> an error occurred running a Giac command:
INPUT:sage2OUTPUT:sym2poly/r2sym(const gen & e,const index_m & i,const vect
eur & l) Error: Bad Argument Value
```

Mupad [N/A]

Not integrable

Time = 0.10 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.00

$$\int \frac{1}{x(a+b\arcsin(cx))^{3/2}}\,dx = \int \frac{1}{x\,{\left(a+b\,\mathrm{asin}\left(c\,x\right)\right)}^{3/2}}\,dx$$

```
[In] int(1/(x*(a + b*asin(c*x))^(3/2)),x)
[Out] int(1/(x*(a + b*asin(c*x))^(3/2)), x)
```

3.197 $\int \frac{1}{x^2(a+b\arcsin(cx))^{3/2}}\,dx$

Optimal result

Integrand size = 16, antiderivative size = 16

$$\int \frac{1}{x^2(a+b\arcsin(cx))^{3/2}}\,dx = \text{Int}\left(\frac{1}{x^2(a+b\arcsin(cx))^{3/2}},x\right)$$

```
[Out] Unintegrable(1/x^2/(a+b*arcsin(c*x))^(3/2),x)
```

Rubi [N/A]

Not integrable

Time = 0.03 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}} = 0.000$, Rules used = {}

$$\int \frac{1}{x^2(a+b\arcsin(cx))^{3/2}}\,dx = \int \frac{1}{x^2(a+b\arcsin(cx))^{3/2}}\,dx$$

```
[In] Int[1/(x^2*(a + b*ArcSin[c*x])^(3/2)),x]
[Out] Defer[Int][1/(x^2*(a + b*ArcSin[c*x])^(3/2)), x]
```

Rubi steps

$$\text{integral} = \int \frac{1}{x^2(a+b\arcsin(cx))^{3/2}}\,dx$$

Mathematica [N/A]

Not integrable

Time = 4.53 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.12

$$\int \frac{1}{x^2(a+b\arcsin(cx))^{3/2}}\,dx=\int \frac{1}{x^2(a+b\arcsin(cx))^{3/2}}\,dx$$

```
[In] Integrate[1/(x^2*(a + b*ArcSin[c*x])^(3/2)),x]
[Out] Integrate[1/(x^2*(a + b*ArcSin[c*x])^(3/2)), x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.10 (sec) , antiderivative size = 14, normalized size of antiderivative = 0.88

$$\int \frac{1}{x^2\left(a+b\arcsin\left(cx\right)\right)^{\frac{3}{2}}}dx$$

```
[In] int(1/x^2/(a+b*arcsin(c*x))^(3/2),x)
[Out] int(1/x^2/(a+b*arcsin(c*x))^(3/2),x)
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{1}{x^2(a+b\arcsin(cx))^{3/2}}\,dx=\text{Exception raised: TypeError}$$

```
[In] integrate(1/x^2/(a+b*arcsin(c*x))^(3/2),x, algorithm="fricas")
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [N/A]

Not integrable

Time = 2.32 (sec) , antiderivative size = 17, normalized size of antiderivative = 1.06

$$\int \frac{1}{x^2(a+b\arcsin(cx))^{3/2}}\,dx=\int \frac{1}{x^2\left(a+b\operatorname{asin}\left(cx\right)\right)^{\frac{3}{2}}}\,dx$$

```
[In] integrate(1/x**2/(a+b*asin(c*x))**(3/2),x)
[Out] Integral(1/(x**2*(a + b*asin(c*x))**(3/2)), x)
```

Maxima [N/A]

Not integrable

Time = 0.63 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.00

$$\int \frac{1}{x^2(a+b\arcsin(cx))^{3/2}}\,dx = \int \frac{1}{(b\arcsin{(cx)}+a)^{\frac{3}{2}}x^2}\,dx$$

```
[In] integrate(1/x^2/(a+b*arcsin(c*x))^(3/2),x, algorithm="maxima")
[Out] integrate(1/((b*arcsin(c*x) + a)^(3/2)*x^2), x)
```

Giac [N/A]

Not integrable

Time = 1.15 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.00

$$\int \frac{1}{x^2(a+b\arcsin(cx))^{3/2}}\,dx = \int \frac{1}{(b\arcsin{(cx)}+a)^{\frac{3}{2}}x^2}\,dx$$

```
[In] integrate(1/x^2/(a+b*arcsin(c*x))^(3/2),x, algorithm="giac")
[Out] integrate(1/((b*arcsin(c*x) + a)^(3/2)*x^2), x)
```

Mupad [N/A]

Not integrable

Time = 0.09 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.00

$$\int \frac{1}{x^2(a+b\arcsin(cx))^{3/2}}\,dx = \int \frac{1}{x^2\,{\left(a+b\,\mathrm{asin}\left(c\,x\right)\right)}^{3/2}}\,dx$$

```
[In] int(1/(x^2*(a + b*asin(c*x))^(3/2)),x)
[Out] int(1/(x^2*(a + b*asin(c*x))^(3/2)), x)
```

3.198 $\int \frac{x^2}{(a+b\arcsin(cx))^{5/2}}\,dx$

Optimal result

Integrand size = 16, antiderivative size = 291

$$\int \frac{x^2}{(a+b\arcsin(cx))^{5/2}}\,dx = -\frac{2x^2\sqrt{1-c^2x^2}}{3bc(a+b\arcsin(cx))^{3/2}} - \frac{8x}{3b^2c^2\sqrt{a+b\arcsin(cx)}} + \frac{4x^3}{b^2\sqrt{a+b\arcsin(cx)}} - \frac{\sqrt{2\pi}\cos\left(\frac{a}{b}\right)\text{FresnelC}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{3b^{5/2}c^3} + \frac{\sqrt{6\pi}\cos\left(\frac{3a}{b}\right)\text{FresnelC}\left(\frac{\sqrt{\frac{6}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{b^{5/2}c^3} - \frac{\sqrt{2\pi}\,\text{FresnelS}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)\sin\left(\frac{a}{b}\right)}{3b^{5/2}c^3} + \frac{\sqrt{6\pi}\,\text{FresnelS}\left(\frac{\sqrt{\frac{6}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)\sin\left(\frac{3a}{b}\right)}{b^{5/2}c^3}$$

```
[Out] -1/3*cos(a/b)*FresnelC(2^(1/2)/Pi^(1/2)*(a+b*arcsin(c*x))^(1/2)/b^(1/2))*2^
(1/2)*Pi^(1/2)/b^(5/2)/c^3-1/3*FresnelS(2^(1/2)/Pi^(1/2)*(a+b*arcsin(c*x))^
(1/2)/b^(1/2))*sin(a/b)*2^(1/2)*Pi^(1/2)/b^(5/2)/c^3+cos(3*a/b)*FresnelC(6^
(1/2)/Pi^(1/2)*(a+b*arcsin(c*x))^(1/2)/b^(1/2))*6^(1/2)*Pi^(1/2)/b^(5/2)/c^
3+FresnelS(6^(1/2)/Pi^(1/2)*(a+b*arcsin(c*x))^(1/2)/b^(1/2))*sin(3*a/b)*6^(
1/2)*Pi^(1/2)/b^(5/2)/c^3-2/3*x^2*(-c^2*x^2+1)^(1/2)/b/c/(a+b*arcsin(c*x))^
(3/2)-8/3*x/b^2/c^2/(a+b*arcsin(c*x))^(1/2)+4*x^3/b^2/(a+b*arcsin(c*x))^(1/
2)
```

Rubi [A] (verified)

Time = 0.54 (sec) , antiderivative size = 291, normalized size of antiderivative = 1.00, number of steps used = 22, number of rules used = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.625, Rules used = {4729, 4807, 4731, 4491, 3387, 3386, 3432, 3385, 3433, 4719}

$$\int \frac{x^2}{(a+b\arcsin(cx))^{5/2}}\,dx = -\frac{\sqrt{2\pi}\cos\left(\frac{a}{b}\right)\text{FresnelC}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{3b^{5/2}c^3} + \frac{\sqrt{6\pi}\cos\left(\frac{3a}{b}\right)\text{FresnelC}\left(\frac{\sqrt{\frac{6}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{b^{5/2}c^3} - \frac{\sqrt{2\pi}\sin\left(\frac{a}{b}\right)\text{FresnelS}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{3b^{5/2}c^3} + \frac{\sqrt{6\pi}\sin\left(\frac{3a}{b}\right)\text{FresnelS}\left(\frac{\sqrt{\frac{6}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{b^{5/2}c^3} - \frac{8x}{3b^2c^2\sqrt{a+b\arcsin(cx)}} + \frac{4x^3}{b^2\sqrt{a+b\arcsin(cx)}} - \frac{2x^2\sqrt{1-c^2x^2}}{3bc(a+b\arcsin(cx))^{3/2}}$$

```
[In] Int[x^2/(a + b*ArcSin[c*x])^(5/2),x]
```

```
[Out] (-2*x^2*Sqrt[1 - c^2*x^2])/(3*b*c*(a + b*ArcSin[c*x])^(3/2)) - (8*x)/(3*b^2
*c^2*Sqrt[a + b*ArcSin[c*x]]) + (4*x^3)/(b^2*Sqrt[a + b*ArcSin[c*x]]) - (Sq
rt[2*Pi]*Cos[a/b]*FresnelC[(Sqrt[2/Pi]*Sqrt[a + b*ArcSin[c*x]])/Sqrt[b]])/(
3*b^(5/2)*c^3) + (Sqrt[6*Pi]*Cos[(3*a)/b]*FresnelC[(Sqrt[6/Pi]*Sqrt[a + b*A
rcSin[c*x]])/Sqrt[b]])/(b^(5/2)*c^3) - (Sqrt[2*Pi]*FresnelS[(Sqrt[2/Pi]*Sqr
t[a + b*ArcSin[c*x]])/Sqrt[b]]*Sin[a/b])/(3*b^(5/2)*c^3) + (Sqrt[6*Pi]*Fres
nelS[(Sqrt[6/Pi]*Sqrt[a + b*ArcSin[c*x]])/Sqrt[b]]*Sin[(3*a)/b])/(b^(5/2)*c
^3)
```

Rule 3385

```
Int[sin[Pi/2 + (e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> D
ist[2/d, Subst[Int[Cos[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d
, e, f}, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3386

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[2/d
, Subst[Int[Sin[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d, e, f}
, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3387

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[Cos
[(d*e - c*f)/d], Int[Sin[c*(f/d) + f*x]/Sqrt[c + d*x], x], x] + Dist[Sin[(d
*e - c*f)/d], Int[Cos[c*(f/d) + f*x]/Sqrt[c + d*x], x], x] /; FreeQ[{c, d,
e, f}, x] && ComplexFreeQ[f] && NeQ[d*e - c*f, 0]
```

Rule 3432

```
Int[Sin[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelS[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 3433

```
Int[Cos[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelC[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4491

```
Int[Cos[(a_.) + (b_.)*(x_)]^(p_.)*((c_.) + (d_.)*(x_))^(m_.)*Sin[(a_.) + (b
_.)*(x_)]^(n_.), x_Symbol] :> Int[ExpandTrigReduce[(c + d*x)^m, Sin[a + b*x
]^n*Cos[a + b*x]^p, x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && IG
tQ[p, 0]
```

Rule 4719

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_), x_Symbol] :> Dist[1/(b*c), Sub
st[Int[x^n*Cos[-a/b + x/b], x], x, a + b*ArcSin[c*x]], x] /; FreeQ[{a, b, c
, n}, x]
```

Rule 4729

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^m*Sqrt[1 - c^2*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] + (Dis
t[c*((m + 1)/(b*(n + 1))), Int[x^(m + 1)*((a + b*ArcSin[c*x])^(n + 1)/Sqrt[
1 - c^2*x^2]), x], x] - Dist[m/(b*c*(n + 1)), Int[x^(m - 1)*((a + b*ArcSin[
c*x])^(n + 1)/Sqrt[1 - c^2*x^2]), x], x]) /; FreeQ[{a, b, c}, x] && IGtQ[m,
 0] && LtQ[n, -2]
```

Rule 4731

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Dist[1
/(b*c^(m + 1)), Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b], x], x, a +
 b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, n}, x] && IGtQ[m, 0]
```

Rule 4807

```
Int[(((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*((f_.)*(x_))^(m_.))/Sqrt[(d_)
+ (e_.)*(x_)^2], x_Symbol] :> Simp[((f*x)^m/(b*c*(n + 1)))*Simp[Sqrt[1 - c^
```

```
2*x^2]/Sqrt[d + e*x^2]]*(a + b*ArcSin[c*x])^(n + 1), x] - Dist[f*(m/(b*c*(n
 + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]], Int[(f*x)^(m - 1)*(a + b*A
rcSin[c*x])^(n + 1), x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && EqQ[c^2*d
 + e, 0] && LtQ[n, -1]
```

Rubi steps

$$\text{integral} = -\frac{2x^2\sqrt{1-c^2x^2}}{3bc(a+b\arcsin(cx))^{3/2}} + \frac{4\int \frac{x}{\sqrt{1-c^2x^2}(a+b\arcsin(cx))^{3/2}}\,dx}{3bc} - \frac{(2c)\int \frac{x^3}{\sqrt{1-c^2x^2}(a+b\arcsin(cx))^{3/2}}\,dx}{b}$$

$$= -\frac{2x^2\sqrt{1-c^2x^2}}{3bc(a+b\arcsin(cx))^{3/2}} - \frac{8x}{3b^2c^2\sqrt{a+b\arcsin(cx)}} + \frac{4x^3}{b^2\sqrt{a+b\arcsin(cx)}} - \frac{12\int \frac{x^2}{\sqrt{a+b\arcsin(cx)}}\,dx}{b^2} + \frac{8\int \frac{1}{\sqrt{a+b\arcsin(cx)}}\,dx}{3b^2c^2}$$

$$= -\frac{2x^2\sqrt{1-c^2x^2}}{3bc(a+b\arcsin(cx))^{3/2}} - \frac{8x}{3b^2c^2\sqrt{a+b\arcsin(cx)}} + \frac{4x^3}{b^2\sqrt{a+b\arcsin(cx)}} + \frac{8\text{Subst}\left(\int \frac{\cos\left(\frac{a}{b}-\frac{x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{3b^3c^3} - \frac{12\text{Subst}\left(\int \frac{\cos\left(\frac{a}{b}-\frac{x}{b}\right)\sin^2\left(\frac{a}{b}-\frac{x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{b^3c^3}$$

$$= -\frac{2x^2\sqrt{1-c^2x^2}}{3bc(a+b\arcsin(cx))^{3/2}} - \frac{8x}{3b^2c^2\sqrt{a+b\arcsin(cx)}} + \frac{4x^3}{b^2\sqrt{a+b\arcsin(cx)}} - \frac{12\text{Subst}\left(\int \left(-\frac{\cos\left(\frac{3a}{b}-\frac{3x}{b}\right)}{4\sqrt{x}} + \frac{\cos\left(\frac{a}{b}-\frac{x}{b}\right)}{4\sqrt{x}}\right)dx, x, a+b\arcsin(cx)\right)}{b^3c^3} + \frac{\left(8\cos\left(\frac{a}{b}\right)\right)\text{Subst}\left(\int \frac{\cos\left(\frac{x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{3b^3c^3} + \frac{\left(8\sin\left(\frac{a}{b}\right)\right)\text{Subst}\left(\int \frac{\sin\left(\frac{x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{3b^3c^3}$$

$$= -\frac{2x^2\sqrt{1-c^2x^2}}{3bc(a+b\arcsin(cx))^{3/2}} - \frac{8x}{3b^2c^2\sqrt{a+b\arcsin(cx)}} + \frac{4x^3}{b^2\sqrt{a+b\arcsin(cx)}} + \frac{3\text{Subst}\left(\int \frac{\cos\left(\frac{3a}{b}-\frac{3x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{b^3c^3} - \frac{3\text{Subst}\left(\int \frac{\cos\left(\frac{a}{b}-\frac{x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{b^3c^3} + \frac{\left(16\cos\left(\frac{a}{b}\right)\right)\text{Subst}\left(\int \cos\left(\frac{x^2}{b}\right)\,dx, x, \sqrt{a+b\arcsin(cx)}\right)}{3b^3c^3} + \frac{\left(16\sin\left(\frac{a}{b}\right)\right)\text{Subst}\left(\int \sin\left(\frac{x^2}{b}\right)\,dx, x, \sqrt{a+b\arcsin(cx)}\right)}{3b^3c^3}$$

$$= -\frac{2x^2\sqrt{1-c^2x^2}}{3bc(a+b\arcsin(cx))^{3/2}} - \frac{8x}{3b^2c^2\sqrt{a+b\arcsin(cx)}} + \frac{4x^3}{b^2\sqrt{a+b\arcsin(cx)}} + \frac{8\sqrt{2\pi}\cos\left(\frac{a}{b}\right)\text{FresnelC}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{3b^{5/2}c^3} + \frac{8\sqrt{2\pi}\,\text{FresnelS}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)\sin\left(\frac{a}{b}\right)}{3b^{5/2}c^3} - \frac{\left(3\cos\left(\frac{a}{b}\right)\right)\text{Subst}\left(\int \frac{\cos\left(\frac{x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{b^3c^3} + \frac{\left(3\cos\left(\frac{3a}{b}\right)\right)\text{Subst}\left(\int \frac{\cos\left(\frac{3x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{b^3c^3} - \frac{\left(3\sin\left(\frac{a}{b}\right)\right)\text{Subst}\left(\int \frac{\sin\left(\frac{x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{b^3c^3} + \frac{\left(3\sin\left(\frac{3a}{b}\right)\right)\text{Subst}\left(\int \frac{\sin\left(\frac{3x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{b^3c^3}$$

$$
\begin{aligned}
&= -\frac{2x^2\sqrt{1-c^2x^2}}{3bc(a+b\arcsin(cx))^{3/2}} - \frac{8x}{3b^2c^2\sqrt{a+b\arcsin(cx)}} \\
&+ \frac{4x^3}{b^2\sqrt{a+b\arcsin(cx)}} + \frac{8\sqrt{2\pi}\cos\left(\frac{a}{b}\right)\text{FresnelC}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{3b^{5/2}c^3} \\
&+ \frac{8\sqrt{2\pi}\,\text{FresnelS}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)\sin\left(\frac{a}{b}\right)}{3b^{5/2}c^3} \\
&- \frac{\left(6\cos\left(\frac{a}{b}\right)\right)\text{Subst}\left(\int\cos\left(\frac{x^2}{b}\right)\,dx, x, \sqrt{a+b\arcsin(cx)}\right)}{b^3c^3} \\
&+ \frac{\left(6\cos\left(\frac{3a}{b}\right)\right)\text{Subst}\left(\int\cos\left(\frac{3x^2}{b}\right)\,dx, x, \sqrt{a+b\arcsin(cx)}\right)}{b^3c^3} \\
&- \frac{\left(6\sin\left(\frac{a}{b}\right)\right)\text{Subst}\left(\int\sin\left(\frac{x^2}{b}\right)\,dx, x, \sqrt{a+b\arcsin(cx)}\right)}{b^3c^3} \\
&+ \frac{\left(6\sin\left(\frac{3a}{b}\right)\right)\text{Subst}\left(\int\sin\left(\frac{3x^2}{b}\right)\,dx, x, \sqrt{a+b\arcsin(cx)}\right)}{b^3c^3} \\
&= -\frac{2x^2\sqrt{1-c^2x^2}}{3bc(a+b\arcsin(cx))^{3/2}} - \frac{8x}{3b^2c^2\sqrt{a+b\arcsin(cx)}} + \frac{4x^3}{b^2\sqrt{a+b\arcsin(cx)}} \\
&- \frac{\sqrt{2\pi}\cos\left(\frac{a}{b}\right)\text{FresnelC}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{3b^{5/2}c^3} + \frac{\sqrt{6\pi}\cos\left(\frac{3a}{b}\right)\text{FresnelC}\left(\frac{\sqrt{\frac{6}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{b^{5/2}c^3} \\
&- \frac{\sqrt{2\pi}\,\text{FresnelS}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)\sin\left(\frac{a}{b}\right)}{3b^{5/2}c^3} + \frac{\sqrt{6\pi}\,\text{FresnelS}\left(\frac{\sqrt{\frac{6}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)\sin\left(\frac{3a}{b}\right)}{b^{5/2}c^3}
\end{aligned}
$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 1.53 (sec) , antiderivative size = 370, normalized size of antiderivative = 1.27

$$
\int \frac{x^2}{(a+b\arcsin(cx))^{5/2}}\,dx = \frac{-6iae^{-3i\arcsin(cx)} + be^{-3i\arcsin(cx)}(1-6i\arcsin(cx)) + e^{3i\arcsin(cx)}(6ia+b+6ib
$$

```
[In] Integrate[x^2/(a + b*ArcSin[c*x])^(5/2),x]
```

```
[Out] (((-6*I)*a)/E^((3*I)*ArcSin[c*x]) + (b*(1 - (6*I)*ArcSin[c*x]))/E^((3*I)*Ar
cSin[c*x]) + E^((3*I)*ArcSin[c*x])*((6*I)*a + b + (6*I)*b*ArcSin[c*x]) - I*
E^(I*ArcSin[c*x])*(2*a - I*b + 2*b*ArcSin[c*x]) - (2*b*(((-I)*(a + b*ArcSin
[c*x]))/b)^(3/2)*Gamma[1/2, ((-I)*(a + b*ArcSin[c*x]))/b])/E^((I*a)/b) + (I
```

```
*(2*a + I*b + 2*b*ArcSin[c*x] + (2*I)*b*E^((I*(a + b*ArcSin[c*x]))/b)*((I*(
a + b*ArcSin[c*x]))/b)^(3/2)*Gamma[1/2, (I*(a + b*ArcSin[c*x]))/b]))/E^(I*A
rcSin[c*x]) + (6*Sqrt[3]*b*(((-I)*(a + b*ArcSin[c*x]))/b)^(3/2)*Gamma[1/2,
((-3*I)*(a + b*ArcSin[c*x]))/b])/E^(((3*I)*a)/b) + 6*Sqrt[3]*b*E^(((3*I)*a)
/b)*((I*(a + b*ArcSin[c*x]))/b)^(3/2)*Gamma[1/2, ((3*I)*(a + b*ArcSin[c*x])
)/b])/(12*b^2*c^3*(a + b*ArcSin[c*x])^(3/2))
```

Maple [B] (verified)

Leaf count of result is larger than twice the leaf count of optimal. 671 vs. $2(235) = 470$.

Time = 0.10 (sec) , antiderivative size = 672, normalized size of antiderivative = 2.31

method	result
default	$-\frac{-6\arcsin(cx)\sqrt{-\frac{3}{b}}\,\sqrt{a+b\arcsin(cx)}\,\cos\left(\frac{3a}{b}\right)\operatorname{FresnelC}\left(\frac{3\sqrt{2}\,\sqrt{a+b\arcsin(cx)}}{\sqrt{\pi}\,\sqrt{-\frac{3}{b}}\,b}\right)\sqrt{\pi}\,\sqrt{2}\,b+6\arcsin(cx)\sqrt{-\frac{3}{b}}\,\sqrt{a+b\arcsin(cx)}\,\sin\left(\frac{3a}{b}\right.}{}$

```
[In] int(x^2/(a+b*arcsin(c*x))^(5/2),x,method=_RETURNVERBOSE)
```

```
[Out] -1/6/c^3/b^2*(-6*arcsin(c*x)*(-3/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)*cos(3*a/b
)*FresnelC(3*2^(1/2)/Pi^(1/2)/(-3/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)/b)*Pi^(1
/2)*2^(1/2)*b+6*arcsin(c*x)*(-3/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)*sin(3*a/b)
*FresnelS(3*2^(1/2)/Pi^(1/2)/(-3/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)/b)*Pi^(1/
2)*2^(1/2)*b+2*arcsin(c*x)*(a+b*arcsin(c*x))^(1/2)*cos(a/b)*FresnelC(2^(1/2
)/Pi^(1/2)/(-1/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)/b)*Pi^(1/2)*2^(1/2)*(-1/b)^
(1/2)*b-2*arcsin(c*x)*(a+b*arcsin(c*x))^(1/2)*sin(a/b)*FresnelS(2^(1/2)/Pi^
(1/2)/(-1/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)/b)*Pi^(1/2)*2^(1/2)*(-1/b)^(1/2)
*b-6*(-3/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)*cos(3*a/b)*FresnelC(3*2^(1/2)/Pi^
(1/2)/(-3/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)/b)*Pi^(1/2)*2^(1/2)*a+6*(-3/b)^(
1/2)*(a+b*arcsin(c*x))^(1/2)*sin(3*a/b)*FresnelS(3*2^(1/2)/Pi^(1/2)/(-3/b)^
(1/2)*(a+b*arcsin(c*x))^(1/2)/b)*Pi^(1/2)*2^(1/2)*a+2*(a+b*arcsin(c*x))^(1/
2)*cos(a/b)*FresnelC(2^(1/2)/Pi^(1/2)/(-1/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)/
b)*Pi^(1/2)*2^(1/2)*(-1/b)^(1/2)*a-2*(a+b*arcsin(c*x))^(1/2)*sin(a/b)*Fresn
elS(2^(1/2)/Pi^(1/2)/(-1/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)/b)*Pi^(1/2)*2^(1/
2)*(-1/b)^(1/2)*a+2*arcsin(c*x)*sin(-(a+b*arcsin(c*x))/b+a/b)*b-6*arcsin(c*
x)*sin(-3*(a+b*arcsin(c*x))/b+3*a/b)*b+cos(-(a+b*arcsin(c*x))/b+a/b)*b+2*si
n(-(a+b*arcsin(c*x))/b+a/b)*a-cos(-3*(a+b*arcsin(c*x))/b+3*a/b)*b-6*sin(-3*
(a+b*arcsin(c*x))/b+3*a/b)*a)/(a+b*arcsin(c*x))^(3/2)
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{x^2}{(a+b\arcsin(cx))^{5/2}}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate(x^2/(a+b*arcsin(c*x))^(5/2),x, algorithm="fricas")
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int \frac{x^2}{(a+b\arcsin(cx))^{5/2}}\,dx = \int \frac{x^2}{(a+b\operatorname{asin}(cx))^{\frac{5}{2}}}\,dx$$

```
[In] integrate(x**2/(a+b*asin(c*x))**(5/2),x)
[Out] Integral(x**2/(a + b*asin(c*x))**(5/2), x)
```

Maxima [F]

$$\int \frac{x^2}{(a+b\arcsin(cx))^{5/2}}\,dx = \int \frac{x^2}{(b\arcsin(cx)+a)^{\frac{5}{2}}}\,dx$$

```
[In] integrate(x^2/(a+b*arcsin(c*x))^(5/2),x, algorithm="maxima")
[Out] integrate(x^2/(b*arcsin(c*x) + a)^(5/2), x)
```

Giac [F]

$$\int \frac{x^2}{(a+b\arcsin(cx))^{5/2}}\,dx = \int \frac{x^2}{(b\arcsin(cx)+a)^{\frac{5}{2}}}\,dx$$

```
[In] integrate(x^2/(a+b*arcsin(c*x))^(5/2),x, algorithm="giac")
[Out] integrate(x^2/(b*arcsin(c*x) + a)^(5/2), x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x^2}{(a+b\arcsin(cx))^{5/2}}\,dx=\int \frac{x^2}{{\left(a+b\,\mathrm{asin}\left(c\,x\right)\right)}^{5/2}}\,dx$$

```
[In] int(x^2/(a + b*asin(c*x))^(5/2),x)
[Out] int(x^2/(a + b*asin(c*x))^(5/2), x)
```

3.199 $\int \frac{x}{(a+b\arcsin(cx))^{5/2}}\,dx$

Optimal result

Integrand size = 14, antiderivative size = 180

$$\int \frac{x}{(a+b\arcsin(cx))^{5/2}}\,dx = -\frac{2x\sqrt{1-c^2x^2}}{3bc(a+b\arcsin(cx))^{3/2}} - \frac{4}{3b^2c^2\sqrt{a+b\arcsin(cx)}} + \frac{8x^2}{3b^2\sqrt{a+b\arcsin(cx)}} - \frac{8\sqrt{\pi}\cos\left(\frac{2a}{b}\right)\text{FresnelS}\left(\frac{2\sqrt{a+b\arcsin(cx)}}{\sqrt{b}\sqrt{\pi}}\right)}{3b^{5/2}c^2} + \frac{8\sqrt{\pi}\,\text{FresnelC}\left(\frac{2\sqrt{a+b\arcsin(cx)}}{\sqrt{b}\sqrt{\pi}}\right)\sin\left(\frac{2a}{b}\right)}{3b^{5/2}c^2}$$

```
[Out] -8/3*cos(2*a/b)*FresnelS(2*(a+b*arcsin(c*x))^(1/2)/b^(1/2)/Pi^(1/2))*Pi^(1/
2)/b^(5/2)/c^2+8/3*FresnelC(2*(a+b*arcsin(c*x))^(1/2)/b^(1/2)/Pi^(1/2))*sin
(2*a/b)*Pi^(1/2)/b^(5/2)/c^2-2/3*x*(-c^2*x^2+1)^(1/2)/b/c/(a+b*arcsin(c*x))
^(3/2)-4/3/b^2/c^2/(a+b*arcsin(c*x))^(1/2)+8/3*x^2/b^2/(a+b*arcsin(c*x))^(1
/2)
```

Rubi [A] (verified)

Time = 0.28 (sec) , antiderivative size = 180, normalized size of antiderivative = 1.00, number of steps used = 11, number of rules used = 11, $\frac{\text{number of rules}}{\text{integrand size}} = 0.786$, Rules used = {4729, 4807, 4731, 4491, 12, 3387, 3386, 3432, 3385, 3433, 4737}

$$\int \frac{x}{(a+b\arcsin(cx))^{5/2}}\,dx = \frac{8\sqrt{\pi}\sin\left(\frac{2a}{b}\right)\text{FresnelC}\left(\frac{2\sqrt{a+b\arcsin(cx)}}{\sqrt{b}\sqrt{\pi}}\right)}{3b^{5/2}c^2} - \frac{8\sqrt{\pi}\cos\left(\frac{2a}{b}\right)\text{FresnelS}\left(\frac{2\sqrt{a+b\arcsin(cx)}}{\sqrt{b}\sqrt{\pi}}\right)}{3b^{5/2}c^2} - \frac{4}{3b^2c^2\sqrt{a+b\arcsin(cx)}} + \frac{8x^2}{3b^2\sqrt{a+b\arcsin(cx)}} - \frac{2x\sqrt{1-c^2x^2}}{3bc(a+b\arcsin(cx))^{3/2}}$$

```
[In] Int[x/(a + b*ArcSin[c*x])^(5/2),x]
```

```
[Out] (-2*x*Sqrt[1 - c^2*x^2])/(3*b*c*(a + b*ArcSin[c*x])^(3/2)) - 4/(3*b^2*c^2*S
qrt[a + b*ArcSin[c*x]]) + (8*x^2)/(3*b^2*Sqrt[a + b*ArcSin[c*x]]) - (8*Sqrt
[Pi]*Cos[(2*a)/b]*FresnelS[(2*Sqrt[a + b*ArcSin[c*x]])/(Sqrt[b]*Sqrt[Pi])])
/(3*b^(5/2)*c^2) + (8*Sqrt[Pi]*FresnelC[(2*Sqrt[a + b*ArcSin[c*x]])/(Sqrt[b
]*Sqrt[Pi])]*Sin[(2*a)/b])/(3*b^(5/2)*c^2)
```

Rule 12

```
Int[(a_)*(u_), x_Symbol] :> Dist[a, Int[u, x], x] /; FreeQ[a, x] &&  !Match
Q[u, (b_)*(v_) /; FreeQ[b, x]]
```

Rule 3385

```
Int[sin[Pi/2 + (e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> D
ist[2/d, Subst[Int[Cos[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d
, e, f}, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3386

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[2/d
, Subst[Int[Sin[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d, e, f}
, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3387

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[Cos
[(d*e - c*f)/d], Int[Sin[c*(f/d) + f*x]/Sqrt[c + d*x], x], x] + Dist[Sin[(d
*e - c*f)/d], Int[Cos[c*(f/d) + f*x]/Sqrt[c + d*x], x], x] /; FreeQ[{c, d,
e, f}, x] && ComplexFreeQ[f] && NeQ[d*e - c*f, 0]
```

Rule 3432

```
Int[Sin[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelS[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 3433

```
Int[Cos[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelC[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4491

```
Int[Cos[(a_.) + (b_.)*(x_)]^(p_.)*((c_.) + (d_.)*(x_))^(m_.)*Sin[(a_.) + (b
_.)*(x_)]^(n_.), x_Symbol] :> Int[ExpandTrigReduce[(c + d*x)^m, Sin[a + b*x
]^n*Cos[a + b*x]^p, x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && IG
```

```
tQ[p, 0]
```

Rule 4729

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Simp[x
^m*Sqrt[1 - c^2*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] + (Dis
t[c*((m + 1)/(b*(n + 1))), Int[x^(m + 1)*((a + b*ArcSin[c*x])^(n + 1)/Sqrt[
1 - c^2*x^2]), x], x] - Dist[m/(b*c*(n + 1)), Int[x^(m - 1)*((a + b*ArcSin[
c*x])^(n + 1)/Sqrt[1 - c^2*x^2]), x], x]) /; FreeQ[{a, b, c}, x] && IGtQ[m,
 0] && LtQ[n, -2]
```

Rule 4731

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> Dist[1
/(b*c^(m + 1)), Subst[Int[x^n*Sin[-a/b + x/b]^m*Cos[-a/b + x/b], x], x, a +
 b*ArcSin[c*x]], x] /; FreeQ[{a, b, c, n}, x] && IGtQ[m, 0]
```

Rule 4737

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)/Sqrt[(d_) + (e_.)*(x_)^2], x_S
ymbol] :> Simp[(1/(b*c*(n + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]]*(a
 + b*ArcSin[c*x])^(n + 1), x] /; FreeQ[{a, b, c, d, e, n}, x] && EqQ[c^2*d
+ e, 0] && NeQ[n, -1]
```

Rule 4807

```
Int[(((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*((f_.)*(x_))^(m_.))/Sqrt[(d_)
+ (e_.)*(x_)^2], x_Symbol] :> Simp[((f*x)^m/(b*c*(n + 1)))*Simp[Sqrt[1 - c^
2*x^2]/Sqrt[d + e*x^2]]*(a + b*ArcSin[c*x])^(n + 1), x] - Dist[f*(m/(b*c*(n
 + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]], Int[(f*x)^(m - 1)*(a + b*A
rcSin[c*x])^(n + 1), x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && EqQ[c^2*d
 + e, 0] && LtQ[n, -1]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= -\frac{2x\sqrt{1-c^2x^2}}{3bc(a+b\arcsin(cx))^{3/2}}+\frac{2\int\frac{1}{\sqrt{1-c^2x^2}(a+b\arcsin(cx))^{3/2}}\,dx}{3bc} \\
&\quad -\frac{(4c)\int\frac{x^2}{\sqrt{1-c^2x^2}(a+b\arcsin(cx))^{3/2}}\,dx}{3b} \\
&= -\frac{2x\sqrt{1-c^2x^2}}{3bc(a+b\arcsin(cx))^{3/2}}-\frac{4}{3b^2c^2\sqrt{a+b\arcsin(cx)}} \\
&\quad +\frac{8x^2}{3b^2\sqrt{a+b\arcsin(cx)}}-\frac{16\int\frac{x}{\sqrt{a+b\arcsin(cx)}}\,dx}{3b^2}
\end{aligned}$$

$$= -\frac{2x\sqrt{1-c^2x^2}}{3bc(a+b\arcsin(cx))^{3/2}} - \frac{4}{3b^2c^2\sqrt{a+b\arcsin(cx)}} + \frac{8x^2}{3b^2\sqrt{a+b\arcsin(cx)}} + \frac{16\text{Subst}\left(\int \frac{\cos\left(\frac{a}{b}-\frac{x}{b}\right)\sin\left(\frac{a}{b}-\frac{x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{3b^3c^2}$$

$$= -\frac{2x\sqrt{1-c^2x^2}}{3bc(a+b\arcsin(cx))^{3/2}} - \frac{4}{3b^2c^2\sqrt{a+b\arcsin(cx)}} + \frac{8x^2}{3b^2\sqrt{a+b\arcsin(cx)}} + \frac{16\text{Subst}\left(\int \frac{\sin\left(\frac{2a}{b}-\frac{2x}{b}\right)}{2\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{3b^3c^2}$$

$$= -\frac{2x\sqrt{1-c^2x^2}}{3bc(a+b\arcsin(cx))^{3/2}} - \frac{4}{3b^2c^2\sqrt{a+b\arcsin(cx)}} + \frac{8x^2}{3b^2\sqrt{a+b\arcsin(cx)}} + \frac{8\text{Subst}\left(\int \frac{\sin\left(\frac{2a}{b}-\frac{2x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{3b^3c^2}$$

$$= -\frac{2x\sqrt{1-c^2x^2}}{3bc(a+b\arcsin(cx))^{3/2}} - \frac{4}{3b^2c^2\sqrt{a+b\arcsin(cx)}} + \frac{8x^2}{3b^2\sqrt{a+b\arcsin(cx)}} - \frac{\left(8\cos\left(\frac{2a}{b}\right)\right)\text{Subst}\left(\int \frac{\sin\left(\frac{2x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{3b^3c^2} + \frac{\left(8\sin\left(\frac{2a}{b}\right)\right)\text{Subst}\left(\int \frac{\cos\left(\frac{2x}{b}\right)}{\sqrt{x}}\,dx, x, a+b\arcsin(cx)\right)}{3b^3c^2}$$

$$= -\frac{2x\sqrt{1-c^2x^2}}{3bc(a+b\arcsin(cx))^{3/2}} - \frac{4}{3b^2c^2\sqrt{a+b\arcsin(cx)}} + \frac{8x^2}{3b^2\sqrt{a+b\arcsin(cx)}} - \frac{\left(16\cos\left(\frac{2a}{b}\right)\right)\text{Subst}\left(\int \sin\left(\frac{2x^2}{b}\right)\,dx, x, \sqrt{a+b\arcsin(cx)}\right)}{3b^3c^2} + \frac{\left(16\sin\left(\frac{2a}{b}\right)\right)\text{Subst}\left(\int \cos\left(\frac{2x^2}{b}\right)\,dx, x, \sqrt{a+b\arcsin(cx)}\right)}{3b^3c^2}$$

$$= -\frac{2x\sqrt{1-c^2x^2}}{3bc(a+b\arcsin(cx))^{3/2}} - \frac{4}{3b^2c^2\sqrt{a+b\arcsin(cx)}} + \frac{8x^2}{3b^2\sqrt{a+b\arcsin(cx)}} - \frac{8\sqrt{\pi}\cos\left(\frac{2a}{b}\right)\text{FresnelS}\left(\frac{2\sqrt{a+b\arcsin(cx)}}{\sqrt{b}\sqrt{\pi}}\right)}{3b^{5/2}c^2} + \frac{8\sqrt{\pi}\,\text{FresnelC}\left(\frac{2\sqrt{a+b\arcsin(cx)}}{\sqrt{b}\sqrt{\pi}}\right)\sin\left(\frac{2a}{b}\right)}{3b^{5/2}c^2}$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.94 (sec) , antiderivative size = 173, normalized size of antiderivative = 0.96

$$\int \frac{x}{(a+b\arcsin(cx))^{5/2}}\,dx =$$

$$-\frac{2(a+b\arcsin(cx))\left(e^{-2i\arcsin(cx)}+e^{2i\arcsin(cx)}-\sqrt{2}e^{-\frac{2ia}{b}}\sqrt{-\frac{i(a+b\arcsin(cx))}{b}}\Gamma\left(\frac{1}{2},-\frac{2i(a+b\arcsin(cx))}{b}\right)-\sqrt{2}e^{\frac{2i}{}}\right.}{3b^2c^2(a+b\arcsin(cx))^{3/2}}$$

```
[In] Integrate[x/(a + b*ArcSin[c*x])^(5/2),x]
```

```
[Out] -1/3*(2*(a + b*ArcSin[c*x])*(E^((-2*I)*ArcSin[c*x]) + E^((2*I)*ArcSin[c*x])
 - (Sqrt[2]*Sqrt[((-I)*(a + b*ArcSin[c*x]))/b]*Gamma[1/2, ((-2*I)*(a + b*Ar
cSin[c*x]))/b])/E^(((2*I)*a)/b) - Sqrt[2]*E^(((2*I)*a)/b)*Sqrt[(I*(a + b*Ar
cSin[c*x]))/b]*Gamma[1/2, ((2*I)*(a + b*ArcSin[c*x]))/b]) + b*Sin[2*ArcSin[
c*x]])/(b^2*c^2*(a + b*ArcSin[c*x])^(3/2))
```

Maple [B] (verified)

Leaf count of result is larger than twice the leaf count of optimal. 339 vs. 2(142) = 284.

Time = 0.07 (sec) , antiderivative size = 340, normalized size of antiderivative = 1.89

method	result
default	$-\frac{-8\arcsin(cx)\sqrt{-\frac{1}{b}}\sqrt{\pi}\cos\left(\frac{2a}{b}\right)\text{FresnelS}\left(\frac{2\sqrt{2}\sqrt{a+b\arcsin(cx)}}{\sqrt{\pi}\sqrt{-\frac{2}{b}}b}\right)\sqrt{a+b\arcsin(cx)}\,b-8\arcsin(cx)\sqrt{-\frac{1}{b}}\sqrt{\pi}\sin\left(\frac{2a}{b}\right)\text{FresnelC}\left(\frac{2\sqrt{2}}{}\right.}{}$

```
[In] int(x/(a+b*arcsin(c*x))^(5/2),x,method=_RETURNVERBOSE)
```

```
[Out] -1/3/c^2/b^2*(-8*arcsin(c*x)*(-1/b)^(1/2)*Pi^(1/2)*cos(2*a/b)*FresnelS(2*2^
(1/2)/Pi^(1/2)/(-2/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)/b)*(a+b*arcsin(c*x))^(1
/2)*b-8*arcsin(c*x)*(-1/b)^(1/2)*Pi^(1/2)*sin(2*a/b)*FresnelC(2*2^(1/2)/Pi^
(1/2)/(-2/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)/b)*(a+b*arcsin(c*x))^(1/2)*b-8*(
-1/b)^(1/2)*Pi^(1/2)*cos(2*a/b)*FresnelS(2*2^(1/2)/Pi^(1/2)/(-2/b)^(1/2)*(a
+b*arcsin(c*x))^(1/2)/b)*(a+b*arcsin(c*x))^(1/2)*a-8*(-1/b)^(1/2)*Pi^(1/2)*
sin(2*a/b)*FresnelC(2*2^(1/2)/Pi^(1/2)/(-2/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)
/b)*(a+b*arcsin(c*x))^(1/2)*a+4*arcsin(c*x)*cos(-2*(a+b*arcsin(c*x))/b+2*a/
b)*b-sin(-2*(a+b*arcsin(c*x))/b+2*a/b)*b+4*cos(-2*(a+b*arcsin(c*x))/b+2*a/b
)*a)/(a+b*arcsin(c*x))^(3/2)
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{x}{(a+b\arcsin(cx))^{5/2}}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate(x/(a+b*arcsin(c*x))^(5/2),x, algorithm="fricas")
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int \frac{x}{(a+b\arcsin(cx))^{5/2}}\,dx = \int \frac{x}{(a+b\,\mathrm{asin}\,(cx))^{\frac{5}{2}}}\,dx$$

```
[In] integrate(x/(a+b*asin(c*x))**(5/2),x)
[Out] Integral(x/(a + b*asin(c*x))**(5/2), x)
```

Maxima [F]

$$\int \frac{x}{(a+b\arcsin(cx))^{5/2}}\,dx = \int \frac{x}{(b\arcsin\,(cx)+a)^{\frac{5}{2}}}\,dx$$

```
[In] integrate(x/(a+b*arcsin(c*x))^(5/2),x, algorithm="maxima")
[Out] integrate(x/(b*arcsin(c*x) + a)^(5/2), x)
```

Giac [F]

$$\int \frac{x}{(a+b\arcsin(cx))^{5/2}}\,dx = \int \frac{x}{(b\arcsin\,(cx)+a)^{\frac{5}{2}}}\,dx$$

```
[In] integrate(x/(a+b*arcsin(c*x))^(5/2),x, algorithm="giac")
[Out] integrate(x/(b*arcsin(c*x) + a)^(5/2), x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{x}{(a+b\arcsin(cx))^{5/2}}\,dx = \int \frac{x}{\left(a+b\,\mathrm{asin}\left(c\,x\right)\right)^{5/2}}\,dx$$

```
[In] int(x/(a + b*asin(c*x))^(5/2),x)
[Out] int(x/(a + b*asin(c*x))^(5/2), x)
```

3.200 $\int \frac{1}{(a+b\arcsin(cx))^{5/2}}\,dx$

Optimal result

Integrand size = 12, antiderivative size = 163

$$\int \frac{1}{(a+b\arcsin(cx))^{5/2}}\,dx = -\frac{2\sqrt{1-c^2x^2}}{3bc(a+b\arcsin(cx))^{3/2}} + \frac{4x}{3b^2\sqrt{a+b\arcsin(cx)}} - \frac{4\sqrt{2\pi}\cos\left(\frac{a}{b}\right)\operatorname{FresnelC}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{3b^{5/2}c} - \frac{4\sqrt{2\pi}\operatorname{FresnelS}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)\sin\left(\frac{a}{b}\right)}{3b^{5/2}c}$$

```
[Out] -4/3*cos(a/b)*FresnelC(2^(1/2)/Pi^(1/2)*(a+b*arcsin(c*x))^(1/2)/b^(1/2))*2^
(1/2)*Pi^(1/2)/b^(5/2)/c-4/3*FresnelS(2^(1/2)/Pi^(1/2)*(a+b*arcsin(c*x))^(1
/2)/b^(1/2))*sin(a/b)*2^(1/2)*Pi^(1/2)/b^(5/2)/c-2/3*(-c^2*x^2+1)^(1/2)/b/c
/(a+b*arcsin(c*x))^(3/2)+4/3*x/b^2/(a+b*arcsin(c*x))^(1/2)
```

Rubi [A] (verified)

Time = 0.17 (sec) , antiderivative size = 163, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 8, $\frac{\text{number of rules}}{\text{integrand size}} = 0.667$, Rules used

= {4717, 4807, 4719, 3387, 3386, 3432, 3385, 3433}

$$\int \frac{1}{(a+b\arcsin(cx))^{5/2}}\,dx = -\frac{4\sqrt{2\pi}\cos\left(\frac{a}{b}\right)\text{FresnelC}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{3b^{5/2}c} - \frac{4\sqrt{2\pi}\sin\left(\frac{a}{b}\right)\text{FresnelS}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{3b^{5/2}c} + \frac{4x}{3b^2\sqrt{a+b\arcsin(cx)}} - \frac{2\sqrt{1-c^2x^2}}{3bc(a+b\arcsin(cx))^{3/2}}$$

```
[In] Int[(a + b*ArcSin[c*x])^(-5/2),x]
```

```
[Out] (-2*Sqrt[1 - c^2*x^2])/(3*b*c*(a + b*ArcSin[c*x])^(3/2)) + (4*x)/(3*b^2*Sqr
t[a + b*ArcSin[c*x]]) - (4*Sqrt[2*Pi]*Cos[a/b]*FresnelC[(Sqrt[2/Pi]*Sqrt[a
+ b*ArcSin[c*x]])/Sqrt[b]])/(3*b^(5/2)*c) - (4*Sqrt[2*Pi]*FresnelS[(Sqrt[2/
Pi]*Sqrt[a + b*ArcSin[c*x]])/Sqrt[b]]*Sin[a/b])/(3*b^(5/2)*c)
```

Rule 3385

```
Int[sin[Pi/2 + (e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> D
ist[2/d, Subst[Int[Cos[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d
, e, f}, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3386

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[2/d
, Subst[Int[Sin[f*(x^2/d)], x], x, Sqrt[c + d*x]], x] /; FreeQ[{c, d, e, f}
, x] && ComplexFreeQ[f] && EqQ[d*e - c*f, 0]
```

Rule 3387

```
Int[sin[(e_.) + (f_.)*(x_)]/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :> Dist[Cos
[(d*e - c*f)/d], Int[Sin[c*(f/d) + f*x]/Sqrt[c + d*x], x], x] + Dist[Sin[(d
*e - c*f)/d], Int[Cos[c*(f/d) + f*x]/Sqrt[c + d*x], x], x] /; FreeQ[{c, d,
e, f}, x] && ComplexFreeQ[f] && NeQ[d*e - c*f, 0]
```

Rule 3432

```
Int[Sin[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelS[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 3433

```
Int[Cos[(d_.)*((e_.) + (f_.)*(x_))^2], x_Symbol] :> Simp[(Sqrt[Pi/2]/(f*Rt[
d, 2]))*FresnelC[Sqrt[2/Pi]*Rt[d, 2]*(e + f*x)], x] /; FreeQ[{d, e, f}, x]
```

Rule 4717

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_), x_Symbol] :> Simp[Sqrt[1 - c^2
*x^2]*((a + b*ArcSin[c*x])^(n + 1)/(b*c*(n + 1))), x] + Dist[c/(b*(n + 1)),
 Int[x*((a + b*ArcSin[c*x])^(n + 1)/Sqrt[1 - c^2*x^2]), x], x] /; FreeQ[{a,
 b, c}, x] && LtQ[n, -1]
```

Rule 4719

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_), x_Symbol] :> Dist[1/(b*c), Sub
st[Int[x^n*Cos[-a/b + x/b], x], x, a + b*ArcSin[c*x]], x] /; FreeQ[{a, b, c
, n}, x]
```

Rule 4807

```
Int[(((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_)*((f_.)*(x_))^(m_.))/Sqrt[(d_)
+ (e_.)*(x_)^2], x_Symbol] :> Simp[((f*x)^m/(b*c*(n + 1)))*Simp[Sqrt[1 - c^
2*x^2]/Sqrt[d + e*x^2]]*(a + b*ArcSin[c*x])^(n + 1), x] - Dist[f*(m/(b*c*(n
 + 1)))*Simp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]], Int[(f*x)^(m - 1)*(a + b*A
rcSin[c*x])^(n + 1), x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && EqQ[c^2*d
 + e, 0] && LtQ[n, -1]
```

Rubi steps

$$
\begin{aligned}
\text{integral} &= -\frac{2\sqrt{1-c^2x^2}}{3bc(a+b\arcsin(cx))^{3/2}}-\frac{(2c)\int\frac{x}{\sqrt{1-c^2x^2}(a+b\arcsin(cx))^{3/2}}\,dx}{3b}\\
&= -\frac{2\sqrt{1-c^2x^2}}{3bc(a+b\arcsin(cx))^{3/2}}+\frac{4x}{3b^2\sqrt{a+b\arcsin(cx)}}-\frac{4\int\frac{1}{\sqrt{a+b\arcsin(cx)}}\,dx}{3b^2}\\
&= -\frac{2\sqrt{1-c^2x^2}}{3bc(a+b\arcsin(cx))^{3/2}}+\frac{4x}{3b^2\sqrt{a+b\arcsin(cx)}}\\
&\quad-\frac{4\text{Subst}\left(\int\frac{\cos\left(\frac{a}{b}-\frac{x}{b}\right)}{\sqrt{x}}\,dx,x,a+b\arcsin(cx)\right)}{3b^3c}\\
&= -\frac{2\sqrt{1-c^2x^2}}{3bc(a+b\arcsin(cx))^{3/2}}+\frac{4x}{3b^2\sqrt{a+b\arcsin(cx)}}\\
&\quad-\frac{\left(4\cos\left(\frac{a}{b}\right)\right)\text{Subst}\left(\int\frac{\cos\left(\frac{x}{b}\right)}{\sqrt{x}}\,dx,x,a+b\arcsin(cx)\right)}{3b^3c}\\
&\quad-\frac{\left(4\sin\left(\frac{a}{b}\right)\right)\text{Subst}\left(\int\frac{\sin\left(\frac{x}{b}\right)}{\sqrt{x}}\,dx,x,a+b\arcsin(cx)\right)}{3b^3c}
\end{aligned}
$$

$$= -\frac{2\sqrt{1-c^2x^2}}{3bc(a+b\arcsin(cx))^{3/2}} + \frac{4x}{3b^2\sqrt{a+b\arcsin(cx)}} - \frac{\left(8\cos\left(\frac{a}{b}\right)\right)\text{Subst}\left(\int\cos\left(\frac{x^2}{b}\right)dx, x, \sqrt{a+b\arcsin(cx)}\right)}{3b^3c} - \frac{\left(8\sin\left(\frac{a}{b}\right)\right)\text{Subst}\left(\int\sin\left(\frac{x^2}{b}\right)dx, x, \sqrt{a+b\arcsin(cx)}\right)}{3b^3c}$$

$$= -\frac{2\sqrt{1-c^2x^2}}{3bc(a+b\arcsin(cx))^{3/2}} + \frac{4x}{3b^2\sqrt{a+b\arcsin(cx)}} - \frac{4\sqrt{2\pi}\cos\left(\frac{a}{b}\right)\text{FresnelC}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)}{3b^{5/2}c} - \frac{4\sqrt{2\pi}\,\text{FresnelS}\left(\frac{\sqrt{\frac{2}{\pi}}\sqrt{a+b\arcsin(cx)}}{\sqrt{b}}\right)\sin\left(\frac{a}{b}\right)}{3b^{5/2}c}$$

Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.67 (sec) , antiderivative size = 214, normalized size of antiderivative = 1.31

$$\int \frac{1}{(a+b\arcsin(cx))^{5/2}}\,dx = \frac{e^{-\frac{i(a+b\arcsin(cx))}{b}}\left(-2be^{i\arcsin(cx)}\left(-\frac{i(a+b\arcsin(cx))}{b}\right)^{3/2}\Gamma\left(\frac{1}{2},-\frac{i(a+b\arcsin(cx))}{b}\right) - ie^{\frac{ia}{b}}\cdots\right.}{\cdots}$$

```
[In] Integrate[(a + b*ArcSin[c*x])^(-5/2),x]
```

```
[Out] (-2*b*E^(I*ArcSin[c*x])*(((-I)*(a + b*ArcSin[c*x]))/b)^(3/2)*Gamma[1/2, ((-
I)*(a + b*ArcSin[c*x]))/b] - I*E^((I*a)/b)*(2*a*(-1 + E^((2*I)*ArcSin[c*x])
) + b*(-I - 2*ArcSin[c*x] + E^((2*I)*ArcSin[c*x])*(-I + 2*ArcSin[c*x])) - (
2*I)*b*E^((I*(a + b*ArcSin[c*x]))/b)*((I*(a + b*ArcSin[c*x]))/b)^(3/2)*Gamm
a[1/2, (I*(a + b*ArcSin[c*x]))/b]))/(3*b^2*c*E^((I*(a + b*ArcSin[c*x]))/b)*
(a + b*ArcSin[c*x])^(3/2))
```

Maple [B] (verified)

Leaf count of result is larger than twice the leaf count of optimal. 339 vs. 2(129) = 258.

Time = 0.06 (sec) , antiderivative size = 340, normalized size of antiderivative = 2.09

method	result
default	$-\frac{2\left(2\arcsin(cx)\sqrt{a+b\arcsin(cx)}\,\cos\left(\frac{a}{b}\right)\text{FresnelC}\left(\frac{\sqrt{2}\,\sqrt{a+b\arcsin(cx)}}{\sqrt{\pi}\,\sqrt{-\frac{1}{b}}\,b}\right)\sqrt{\pi}\,\sqrt{2}\,\sqrt{-\frac{1}{b}}\,b-2\arcsin(cx)\sqrt{a+b\arcsin(cx)}\,\sin\left(\frac{a}{b}\right)\text{Fresne}$

```
[In] int(1/(a+b*arcsin(c*x))^(5/2),x,method=_RETURNVERBOSE)
```

```
[Out] -2/3/c/b^2*(2*arcsin(c*x)*(a+b*arcsin(c*x))^(1/2)*cos(a/b)*FresnelC(2^(1/2)
/Pi^(1/2)/(-1/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)/b)*Pi^(1/2)*2^(1/2)*(-1/b)^(
1/2)*b-2*arcsin(c*x)*(a+b*arcsin(c*x))^(1/2)*sin(a/b)*FresnelS(2^(1/2)/Pi^(
1/2)/(-1/b)^(1/2)*(a+b*arcsin(c*x))^(1/2)/b)*Pi^(1/2)*2^(1/2)*(-1/b)^(1/2)*
b+2*(a+b*arcsin(c*x))^(1/2)*cos(a/b)*FresnelC(2^(1/2)/Pi^(1/2)/(-1/b)^(1/2)
*(a+b*arcsin(c*x))^(1/2)/b)*Pi^(1/2)*2^(1/2)*(-1/b)^(1/2)*a-2*(a+b*arcsin(c
*x))^(1/2)*sin(a/b)*FresnelS(2^(1/2)/Pi^(1/2)/(-1/b)^(1/2)*(a+b*arcsin(c*x)
)^(1/2)/b)*Pi^(1/2)*2^(1/2)*(-1/b)^(1/2)*a+2*arcsin(c*x)*sin(-(a+b*arcsin(c
*x))/b+a/b)*b+cos(-(a+b*arcsin(c*x))/b+a/b)*b+2*sin(-(a+b*arcsin(c*x))/b+a/
b)*a)/(a+b*arcsin(c*x))^(3/2)
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{1}{(a+b\arcsin(cx))^{5/2}}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate(1/(a+b*arcsin(c*x))^(5/2),x, algorithm="fricas")
```

```
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [F]

$$\int \frac{1}{(a+b\arcsin(cx))^{5/2}}\,dx = \int \frac{1}{(a+b\operatorname{asin}(cx))^{\frac{5}{2}}}\,dx$$

```
[In] integrate(1/(a+b*asin(c*x))**(5/2),x)
```

```
[Out] Integral((a + b*asin(c*x))**(-5/2), x)
```

Maxima [F]

$$\int \frac{1}{(a+b\arcsin(cx))^{5/2}}\,dx = \int \frac{1}{(b\arcsin(cx)+a)^{\frac{5}{2}}}\,dx$$

```
[In] integrate(1/(a+b*arcsin(c*x))^(5/2),x, algorithm="maxima")
[Out] integrate((b*arcsin(c*x) + a)^(-5/2), x)
```

Giac [F]

$$\int \frac{1}{(a+b\arcsin(cx))^{5/2}}\,dx = \int \frac{1}{(b\arcsin(cx)+a)^{\frac{5}{2}}}\,dx$$

```
[In] integrate(1/(a+b*arcsin(c*x))^(5/2),x, algorithm="giac")
[Out] integrate((b*arcsin(c*x) + a)^(-5/2), x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{1}{(a+b\arcsin(cx))^{5/2}}\,dx = \int \frac{1}{(a+b\,\mathrm{asin}(c\,x))^{5/2}}\,dx$$

```
[In] int(1/(a + b*asin(c*x))^(5/2),x)
[Out] int(1/(a + b*asin(c*x))^(5/2), x)
```

3.201 $\int \frac{1}{x(a+b\arcsin(cx))^{5/2}}\,dx$

Optimal result

Integrand size = 16, antiderivative size = 16

$$\int \frac{1}{x(a+b\arcsin(cx))^{5/2}}\,dx = \operatorname{Int}\left(\frac{1}{x(a+b\arcsin(cx))^{5/2}},x\right)$$

```
[Out] Unintegrable(1/x/(a+b*arcsin(c*x))^(5/2),x)
```

Rubi [N/A]

Not integrable

Time = 0.03 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{1}{x(a+b\arcsin(cx))^{5/2}}\,dx = \int \frac{1}{x(a+b\arcsin(cx))^{5/2}}\,dx$$

```
[In] Int[1/(x*(a + b*ArcSin[c*x])^(5/2)),x]
[Out] Defer[Int][1/(x*(a + b*ArcSin[c*x])^(5/2)), x]
```

Rubi steps

$$\text{integral} = \int \frac{1}{x(a+b\arcsin(cx))^{5/2}}\,dx$$

Mathematica [N/A]

Not integrable

Time = 0.89 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.12

$$\int \frac{1}{x(a+b\arcsin(cx))^{5/2}}\,dx=\int \frac{1}{x(a+b\arcsin(cx))^{5/2}}\,dx$$

```
[In] Integrate[1/(x*(a + b*ArcSin[c*x])^(5/2)),x]
[Out] Integrate[1/(x*(a + b*ArcSin[c*x])^(5/2)), x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.07 (sec) , antiderivative size = 14, normalized size of antiderivative = 0.88

$$\int \frac{1}{x\left(a+b\arcsin\left(cx\right)\right)^{\frac{5}{2}}}dx$$

```
[In] int(1/x/(a+b*arcsin(c*x))^(5/2),x)
[Out] int(1/x/(a+b*arcsin(c*x))^(5/2),x)
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{1}{x(a+b\arcsin(cx))^{5/2}}\,dx=\text{Exception raised: TypeError}$$

```
[In] integrate(1/x/(a+b*arcsin(c*x))^(5/2),x, algorithm="fricas")
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [N/A]

Not integrable

Time = 8.41 (sec) , antiderivative size = 15, normalized size of antiderivative = 0.94

$$\int \frac{1}{x(a+b\arcsin(cx))^{5/2}}\,dx=\int \frac{1}{x\left(a+b\operatorname{asin}\left(cx\right)\right)^{\frac{5}{2}}}\,dx$$

```
[In] integrate(1/x/(a+b*asin(c*x))**(5/2),x)
[Out] Integral(1/(x*(a + b*asin(c*x))**(5/2)), x)
```

Maxima [N/A]

Not integrable

Time = 0.72 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.00

$$\int \frac{1}{x(a+b\arcsin(cx))^{5/2}}\,dx = \int \frac{1}{(b\arcsin(cx)+a)^{\frac{5}{2}}x}\,dx$$

```
[In] integrate(1/x/(a+b*arcsin(c*x))^(5/2),x, algorithm="maxima")
[Out] integrate(1/((b*arcsin(c*x) + a)^(5/2)*x), x)
```

Giac [F(-2)]

Exception generated.

$$\int \frac{1}{x(a+b\arcsin(cx))^{5/2}}\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate(1/x/(a+b*arcsin(c*x))^(5/2),x, algorithm="giac")
[Out] Exception raised: RuntimeError >> an error occurred running a Giac command:
INPUT:sage2OUTPUT:sym2poly/r2sym(const gen & e,const index_m & i,const vect
eur & l) Error: Bad Argument Value
```

Mupad [N/A]

Not integrable

Time = 0.10 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.00

$$\int \frac{1}{x(a+b\arcsin(cx))^{5/2}}\,dx = \int \frac{1}{x\,(a+b\,\mathrm{asin}\,(c\,x))^{5/2}}\,dx$$

```
[In] int(1/(x*(a + b*asin(c*x))^(5/2)),x)
[Out] int(1/(x*(a + b*asin(c*x))^(5/2)), x)
```

3.202 $\int \frac{1}{x^2(a+b\arcsin(cx))^{5/2}}\,dx$

Optimal result

Integrand size = 16, antiderivative size = 16

$$\int \frac{1}{x^2(a+b\arcsin(cx))^{5/2}}\,dx=\text{Int}\left(\frac{1}{x^2(a+b\arcsin(cx))^{5/2}},x\right)$$

```
[Out] Unintegrable(1/x^2/(a+b*arcsin(c*x))^(5/2),x)
```

Rubi [N/A]

Not integrable

Time = 0.03 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{1}{x^2(a+b\arcsin(cx))^{5/2}}\,dx=\int \frac{1}{x^2(a+b\arcsin(cx))^{5/2}}\,dx$$

```
[In] Int[1/(x^2*(a + b*ArcSin[c*x])^(5/2)),x]
[Out] Defer[Int][1/(x^2*(a + b*ArcSin[c*x])^(5/2)), x]
```

Rubi steps

$$\text{integral}=\int \frac{1}{x^2(a+b\arcsin(cx))^{5/2}}\,dx$$

Mathematica [N/A]

Not integrable

Time = 4.79 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.12

$$\int \frac{1}{x^2(a+b\arcsin(cx))^{5/2}}\,dx=\int \frac{1}{x^2(a+b\arcsin(cx))^{5/2}}\,dx$$

```
[In] Integrate[1/(x^2*(a + b*ArcSin[c*x])^(5/2)),x]
[Out] Integrate[1/(x^2*(a + b*ArcSin[c*x])^(5/2)), x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.10 (sec) , antiderivative size = 14, normalized size of antiderivative = 0.88

$$\int \frac{1}{x^2\left(a+b\arcsin\left(cx\right)\right)^{\frac{5}{2}}}dx$$

```
[In] int(1/x^2/(a+b*arcsin(c*x))^(5/2),x)
[Out] int(1/x^2/(a+b*arcsin(c*x))^(5/2),x)
```

Fricas [F(-2)]

Exception generated.

$$\int \frac{1}{x^2(a+b\arcsin(cx))^{5/2}}\,dx=\text{Exception raised: TypeError}$$

```
[In] integrate(1/x^2/(a+b*arcsin(c*x))^(5/2),x, algorithm="fricas")
[Out] Exception raised: TypeError >>  Error detected within library code:   integ
rate: implementation incomplete (constant residues)
```

Sympy [N/A]

Not integrable

Time = 16.24 (sec) , antiderivative size = 17, normalized size of antiderivative = 1.06

$$\int \frac{1}{x^2(a+b\arcsin(cx))^{5/2}}\,dx=\int \frac{1}{x^2\left(a+b\operatorname{asin}\left(cx\right)\right)^{\frac{5}{2}}}\,dx$$

```
[In] integrate(1/x**2/(a+b*asin(c*x))**(5/2),x)
[Out] Integral(1/(x**2*(a + b*asin(c*x))**(5/2)), x)
```

Maxima [N/A]

Not integrable

Time = 0.70 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.00

$$\int \frac{1}{x^2(a+b\arcsin(cx))^{5/2}}\,dx = \int \frac{1}{(b\arcsin(cx)+a)^{\frac{5}{2}}x^2}\,dx$$

```
[In] integrate(1/x^2/(a+b*arcsin(c*x))^(5/2),x, algorithm="maxima")
[Out] integrate(1/((b*arcsin(c*x) + a)^(5/2)*x^2), x)
```

Giac [N/A]

Not integrable

Time = 1.57 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.00

$$\int \frac{1}{x^2(a+b\arcsin(cx))^{5/2}}\,dx = \int \frac{1}{(b\arcsin(cx)+a)^{\frac{5}{2}}x^2}\,dx$$

```
[In] integrate(1/x^2/(a+b*arcsin(c*x))^(5/2),x, algorithm="giac")
[Out] integrate(1/((b*arcsin(c*x) + a)^(5/2)*x^2), x)
```

Mupad [N/A]

Not integrable

Time = 0.09 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.00

$$\int \frac{1}{x^2(a+b\arcsin(cx))^{5/2}}\,dx = \int \frac{1}{x^2\,(a+b\,\mathrm{asin}\,(c\,x))^{5/2}}\,dx$$

```
[In] int(1/(x^2*(a + b*asin(c*x))^(5/2)),x)
[Out] int(1/(x^2*(a + b*asin(c*x))^(5/2)), x)
```

3.203 $\int (dx)^{5/2}(a+b\arcsin(cx))\,dx$

Optimal result

Integrand size = 16, antiderivative size = 120

$$\int (dx)^{5/2}(a+b\arcsin(cx))\,dx = \frac{20bd^2\sqrt{dx}\sqrt{1-c^2x^2}}{147c^3}+\frac{4b(dx)^{5/2}\sqrt{1-c^2x^2}}{49c}+\frac{2(dx)^{7/2}(a+b\arcsin(cx))}{7d}-\frac{20bd^{5/2}\operatorname{EllipticF}\left(\arcsin\left(\frac{\sqrt{c}\sqrt{dx}}{\sqrt{d}}\right),-1\right)}{147c^{7/2}}$$

```
[Out] 2/7*(d*x)^(7/2)*(a+b*arcsin(c*x))/d-20/147*b*d^(5/2)*EllipticF(c^(1/2)*(d*x
)^(1/2)/d^(1/2),I)/c^(7/2)+4/49*b*(d*x)^(5/2)*(-c^2*x^2+1)^(1/2)/c+20/147*b
*d^2*(d*x)^(1/2)*(-c^2*x^2+1)^(1/2)/c^3
```

Rubi [A] (verified)

Time = 0.05 (sec) , antiderivative size = 120, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 4, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.250, Rules used = {4723, 327, 335, 227}

$$\int (dx)^{5/2}(a+b\arcsin(cx))\,dx = \frac{2(dx)^{7/2}(a+b\arcsin(cx))}{7d}-\frac{20bd^{5/2}\operatorname{EllipticF}\left(\arcsin\left(\frac{\sqrt{c}\sqrt{dx}}{\sqrt{d}}\right),-1\right)}{147c^{7/2}}+\frac{4b\sqrt{1-c^2x^2}(dx)^{5/2}}{49c}+\frac{20bd^2\sqrt{1-c^2x^2}\sqrt{dx}}{147c^3}$$

```
[In] Int[(d*x)^(5/2)*(a + b*ArcSin[c*x]),x]
```

```
[Out] (20*b*d^2*Sqrt[d*x]*Sqrt[1 - c^2*x^2])/(147*c^3) + (4*b*(d*x)^(5/2)*Sqrt[1
- c^2*x^2])/(49*c) + (2*(d*x)^(7/2)*(a + b*ArcSin[c*x]))/(7*d) - (20*b*d^(5
/2)*EllipticF[ArcSin[(Sqrt[c]*Sqrt[d*x])/Sqrt[d]], -1])/(147*c^(7/2))
```

Rule 227

```
Int[1/Sqrt[(a_) + (b_.)*(x_)^4], x_Symbol] :> Simp[EllipticF[ArcSin[Rt[-b,
4]*(x/Rt[a, 4])], -1]/(Rt[a, 4]*Rt[-b, 4]), x] /; FreeQ[{a, b}, x] && NegQ[
b/a] && GtQ[a, 0]
```

Rule 327

```
Int[((c_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[c^(n
 - 1)*(c*x)^(m - n + 1)*((a + b*x^n)^(p + 1)/(b*(m + n*p + 1))), x] - Dist[
a*c^n*((m - n + 1)/(b*(m + n*p + 1))), Int[(c*x)^(m - n)*(a + b*x^n)^p, x],
 x] /; FreeQ[{a, b, c, p}, x] && IGtQ[n, 0] && GtQ[m, n - 1] && NeQ[m + n*p
 + 1, 0] && IntBinomialQ[a, b, c, n, m, p, x]
```

Rule 335

```
Int[((c_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> With[{k =
 Denominator[m]}, Dist[k/c, Subst[Int[x^(k*(m + 1) - 1)*(a + b*(x^(k*n)/c^n
))^p, x], x, (c*x)^(1/k)], x]] /; FreeQ[{a, b, c, p}, x] && IGtQ[n, 0] && F
ractionQ[m] && IntBinomialQ[a, b, c, n, m, p, x]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= \frac{2(dx)^{7/2}(a+b\arcsin(cx))}{7d}-\frac{(2bc)\int\frac{(dx)^{7/2}}{\sqrt{1-c^2x^2}}\,dx}{7d}\\
&=\frac{4b(dx)^{5/2}\sqrt{1-c^2x^2}}{49c}+\frac{2(dx)^{7/2}(a+b\arcsin(cx))}{7d}-\frac{(10bd)\int\frac{(dx)^{3/2}}{\sqrt{1-c^2x^2}}\,dx}{49c}\\
&=\frac{20bd^2\sqrt{dx}\sqrt{1-c^2x^2}}{147c^3}+\frac{4b(dx)^{5/2}\sqrt{1-c^2x^2}}{49c}\\
&\quad+\frac{2(dx)^{7/2}(a+b\arcsin(cx))}{7d}-\frac{(10bd^3)\int\frac{1}{\sqrt{dx}\sqrt{1-c^2x^2}}\,dx}{147c^3}\\
&=\frac{20bd^2\sqrt{dx}\sqrt{1-c^2x^2}}{147c^3}+\frac{4b(dx)^{5/2}\sqrt{1-c^2x^2}}{49c}\\
&\quad+\frac{2(dx)^{7/2}(a+b\arcsin(cx))}{7d}-\frac{(20bd^2)\,\text{Subst}\left(\int\frac{1}{\sqrt{1-\frac{c^2x^4}{d^2}}}\,dx,x,\sqrt{dx}\right)}{147c^3}
\end{aligned}$$

$$=\frac{20bd^2\sqrt{dx}\sqrt{1-c^2x^2}}{147c^3}+\frac{4b(dx)^{5/2}\sqrt{1-c^2x^2}}{49c}+\frac{2(dx)^{7/2}(a+b\arcsin(cx))}{7d}-\frac{20bd^{5/2}\,\text{EllipticF}\left(\arcsin\left(\frac{\sqrt{c}\sqrt{dx}}{\sqrt{d}}\right),-1\right)}{147c^{7/2}}$$

Mathematica [C] (verified)

Result contains higher order function than in optimal. Order 5 vs. order 4 in optimal.

Time = 0.03 (sec) , antiderivative size = 100, normalized size of antiderivative = 0.83

$$\int (dx)^{5/2}(a+b\arcsin(cx))\,dx=\frac{2d^2\sqrt{dx}\left(21ac^3x^3+10b\sqrt{1-c^2x^2}+6bc^2x^2\sqrt{1-c^2x^2}+21bc^3x^3\arcsin(cx)-10b\,\text{Hyperg}\right.}{147c^3}$$

[In] Integrate[(d*x)^(5/2)*(a + b*ArcSin[c*x]),x]

[Out] (2*d^2*Sqrt[d*x]*(21*a*c^3*x^3 + 10*b*Sqrt[1 - c^2*x^2] + 6*b*c^2*x^2*Sqrt[1 - c^2*x^2] + 21*b*c^3*x^3*ArcSin[c*x] - 10*b*Hypergeometric2F1[1/4, 1/2, 5/4, c^2*x^2]))/(147*c^3)

Maple [A] (verified)

Time = 1.27 (sec) , antiderivative size = 144, normalized size of antiderivative = 1.20

method	result
derivativedivides	$\frac{\frac{2a(dx)^{\frac{7}{2}}}{7}+2b\left(\frac{(dx)^{\frac{7}{2}}\arcsin(cx)}{7}-\frac{2c\left(-\frac{d^2(dx)^{\frac{5}{2}}\sqrt{-c^2x^2+1}}{7c^2}-\frac{5d^4\sqrt{dx}\sqrt{-c^2x^2+1}}{21c^4}+\frac{5d^4\sqrt{-cx+1}\sqrt{cx+1}\,\text{EllipticF}\left(\sqrt{dx}\sqrt{\frac{c}{d}},i\right)}{21c^4\sqrt{\frac{c}{d}}\sqrt{-c^2x^2+1}}\right)}{7d}\right)}{d}$
default	$\frac{\frac{2a(dx)^{\frac{7}{2}}}{7}+2b\left(\frac{(dx)^{\frac{7}{2}}\arcsin(cx)}{7}-\frac{2c\left(-\frac{d^2(dx)^{\frac{5}{2}}\sqrt{-c^2x^2+1}}{7c^2}-\frac{5d^4\sqrt{dx}\sqrt{-c^2x^2+1}}{21c^4}+\frac{5d^4\sqrt{-cx+1}\sqrt{cx+1}\,\text{EllipticF}\left(\sqrt{dx}\sqrt{\frac{c}{d}},i\right)}{21c^4\sqrt{\frac{c}{d}}\sqrt{-c^2x^2+1}}\right)}{7d}\right)}{d}$
parts	$\frac{2a(dx)^{\frac{7}{2}}}{7d}+\frac{2b\left(\frac{(dx)^{\frac{7}{2}}\arcsin(cx)}{7}-\frac{2c\left(-\frac{d^2(dx)^{\frac{5}{2}}\sqrt{-c^2x^2+1}}{7c^2}-\frac{5d^4\sqrt{dx}\sqrt{-c^2x^2+1}}{21c^4}+\frac{5d^4\sqrt{-cx+1}\sqrt{cx+1}\,\text{EllipticF}\left(\sqrt{dx}\sqrt{\frac{c}{d}},i\right)}{21c^4\sqrt{\frac{c}{d}}\sqrt{-c^2x^2+1}}\right)}{7d}\right)}{d}$

[In] int((d*x)^(5/2)*(a+b*arcsin(c*x)),x,method=_RETURNVERBOSE)

[Out] 2/d*(1/7*a*(d*x)^(7/2)+b*(1/7*(d*x)^(7/2)*arcsin(c*x)-2/7*c/d*(-1/7/c^2*d^2*(d*x)^(5/2)*(-c^2*x^2+1)^(1/2)-5/21/c^4*d^4*(d*x)^(1/2)*(-c^2*x^2+1)^(1/2)

```
+5/21/c^4*d^4/(c/d)^(1/2)*(-c*x+1)^(1/2)*(c*x+1)^(1/2)/(-c^2*x^2+1)^(1/2)*E
llipticF((d*x)^(1/2)*(c/d)^(1/2),I))))
```

Fricas [C] (verification not implemented)

Result contains higher order function than in optimal. Order 9 vs. order 4.

Time = 0.10 (sec) , antiderivative size = 99, normalized size of antiderivative = 0.82

$$\int (dx)^{5/2}(a+b\arcsin(cx))\,dx = \frac{2\left(10\sqrt{-c^2d}bd^2\text{weierstrassPInverse}\left(\frac{4}{c^2},0,x\right)+\left(21\,bc^5d^2x^3\arcsin\left(cx\right)+21\,ac^5d^2x^3+2\right.\right.}{147\,c^5}$$

```
[In] integrate((d*x)^(5/2)*(a+b*arcsin(c*x)),x, algorithm="fricas")
```

```
[Out] 2/147*(10*sqrt(-c^2*d)*b*d^2*weierstrassPInverse(4/c^2, 0, x) + (21*b*c^5*d
^2*x^3*arcsin(c*x) + 21*a*c^5*d^2*x^3 + 2*(3*b*c^4*d^2*x^2 + 5*b*c^2*d^2)*s
qrt(-c^2*x^2 + 1))*sqrt(d*x))/c^5
```

Sympy [A] (verification not implemented)

Time = 68.12 (sec) , antiderivative size = 85, normalized size of antiderivative = 0.71

$$\int (dx)^{5/2}(a+b\arcsin(cx))\,dx = a\left(\begin{cases}\frac{2(dx)^{\frac{7}{2}}}{7d} & \text{for}\ d\neq 0\\ 0 & \text{otherwise}\end{cases}\right) - bc\left(\begin{cases}\frac{d^{\frac{5}{2}}x^{\frac{9}{2}}\Gamma\left(\frac{9}{4}\right){}_2F_1\left(\begin{matrix}\frac{1}{2},\frac{9}{4}\\ \frac{13}{4}\end{matrix}\middle| c^2x^2e^{2i\pi}\right)}{7\Gamma\left(\frac{13}{4}\right)} & \text{for}\ d>-\infty\wedge d<\infty\wedge d\neq 0\\ 0 & \text{otherwise}\end{cases}\right) + b\left(\begin{cases}\frac{2(dx)^{\frac{7}{2}}}{7d} & \text{for}\ d\neq 0\\ 0 & \text{otherwise}\end{cases}\right)\operatorname{asin}\left(cx\right)$$

```
[In] integrate((d*x)**(5/2)*(a+b*asin(c*x)),x)
```

```
[Out] a*Piecewise((2*(d*x)**(7/2)/(7*d), Ne(d, 0)), (0, True)) - b*c*Piecewise((d
**(5/2)*x**(9/2)*gamma(9/4)*hyper((1/2, 9/4), (13/4,), c**2*x**2*exp_polar(
2*I*pi))/(7*gamma(13/4)), (d > -oo) & (d < oo) & Ne(d, 0)), (0, True)) + b*
Piecewise((2*(d*x)**(7/2)/(7*d), Ne(d, 0)), (0, True))*asin(c*x)
```

Maxima [F]

$$\int (dx)^{5/2}(a+b\arcsin(cx))\,dx=\int (dx)^{\frac{5}{2}}\,(b\arcsin{(cx)}+a)\,dx$$

```
[In] integrate((d*x)^(5/2)*(a+b*arcsin(c*x)),x, algorithm="maxima")
```

```
[Out] 2/7*b*d^(5/2)*x^(7/2)*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1)) + 2/7*(a*d
^2*x^(7/2) + 7*b*c*d^2*integrate(1/7*sqrt(c*x + 1)*sqrt(-c*x + 1)*x^(7/2)/(
c^2*x^2 - 1), x))*sqrt(d)
```

Giac [F]

$$\int (dx)^{5/2}(a+b\arcsin(cx))\,dx=\int (dx)^{\frac{5}{2}}\,(b\arcsin{(cx)}+a)\,dx$$

```
[In] integrate((d*x)^(5/2)*(a+b*arcsin(c*x)),x, algorithm="giac")
```

```
[Out] integrate((d*x)^(5/2)*(b*arcsin(c*x) + a), x)
```

Mupad [F(-1)]

Timed out.

$$\int (dx)^{5/2}(a+b\arcsin(cx))\,dx=\int (a+b\,\mathrm{asin}(c\,x))\,\left(d\,x\right)^{5/2}\,dx$$

```
[In] int((a + b*asin(c*x))*(d*x)^(5/2),x)
```

```
[Out] int((a + b*asin(c*x))*(d*x)^(5/2), x)
```

3.204 $\int (dx)^{3/2}(a+b\arcsin(cx))\,dx$

Optimal result

Integrand size = 16, antiderivative size = 124

$$\int (dx)^{3/2}(a+b\arcsin(cx))\,dx=\frac{4b(dx)^{3/2}\sqrt{1-c^2x^2}}{25c}+\frac{2(dx)^{5/2}(a+b\arcsin(cx))}{5d}-\frac{12bd^{3/2}E\left(\arcsin\left(\frac{\sqrt{c}\sqrt{dx}}{\sqrt{d}}\right)\middle|-1\right)}{25c^{5/2}}+\frac{12bd^{3/2}\,\text{EllipticF}\left(\arcsin\left(\frac{\sqrt{c}\sqrt{dx}}{\sqrt{d}}\right),-1\right)}{25c^{5/2}}$$

```
[Out] 2/5*(d*x)^(5/2)*(a+b*arcsin(c*x))/d-12/25*b*d^(3/2)*EllipticE(c^(1/2)*(d*x)
^(1/2)/d^(1/2),I)/c^(5/2)+12/25*b*d^(3/2)*EllipticF(c^(1/2)*(d*x)^(1/2)/d^(
1/2),I)/c^(5/2)+4/25*b*(d*x)^(3/2)*(-c^2*x^2+1)^(1/2)/c
```

Rubi [A] (verified)

Time = 0.06 (sec) , antiderivative size = 124, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 7, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.438, Rules used = {4723, 327, 335, 313, 227, 1213, 435}

$$\int (dx)^{3/2}(a+b\arcsin(cx))\,dx=\frac{2(dx)^{5/2}(a+b\arcsin(cx))}{5d}+\frac{12bd^{3/2}\,\text{EllipticF}\left(\arcsin\left(\frac{\sqrt{c}\sqrt{dx}}{\sqrt{d}}\right),-1\right)}{25c^{5/2}}-\frac{12bd^{3/2}E\left(\arcsin\left(\frac{\sqrt{c}\sqrt{dx}}{\sqrt{d}}\right)\middle|-1\right)}{25c^{5/2}}+\frac{4b\sqrt{1-c^2x^2}(dx)^{3/2}}{25c}$$

```
[In] Int[(d*x)^(3/2)*(a + b*ArcSin[c*x]),x]
```

```
[Out] (4*b*(d*x)^(3/2)*Sqrt[1 - c^2*x^2])/(25*c) + (2*(d*x)^(5/2)*(a + b*ArcSin[c
*x]))/(5*d) - (12*b*d^(3/2)*EllipticE[ArcSin[(Sqrt[c]*Sqrt[d*x])/Sqrt[d]],
```

```
-1])/(25*c^(5/2)) + (12*b*d^(3/2)*EllipticF[ArcSin[(Sqrt[c]*Sqrt[d*x])/Sqrt
[d]], -1])/(25*c^(5/2))
```

Rule 227

```
Int[1/Sqrt[(a_) + (b_.)*(x_)^4], x_Symbol] :> Simp[EllipticF[ArcSin[Rt[-b,
4]*(x/Rt[a, 4])], -1]/(Rt[a, 4]*Rt[-b, 4]), x] /; FreeQ[{a, b}, x] && NegQ[
b/a] && GtQ[a, 0]
```

Rule 313

```
Int[(x_)^2/Sqrt[(a_) + (b_.)*(x_)^4], x_Symbol] :> With[{q = Rt[-b/a, 2]},
Dist[-q^(-1), Int[1/Sqrt[a + b*x^4], x], x] + Dist[1/q, Int[(1 + q*x^2)/Sqr
t[a + b*x^4], x], x]] /; FreeQ[{a, b}, x] && NegQ[b/a]
```

Rule 327

```
Int[((c_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[c^(n
 - 1)*(c*x)^(m - n + 1)*((a + b*x^n)^(p + 1)/(b*(m + n*p + 1))), x] - Dist[
a*c^n*((m - n + 1)/(b*(m + n*p + 1))), Int[(c*x)^(m - n)*(a + b*x^n)^p, x],
 x] /; FreeQ[{a, b, c, p}, x] && IGtQ[n, 0] && GtQ[m, n - 1] && NeQ[m + n*p
 + 1, 0] && IntBinomialQ[a, b, c, n, m, p, x]
```

Rule 335

```
Int[((c_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> With[{k =
 Denominator[m]}, Dist[k/c, Subst[Int[x^(k*(m + 1) - 1)*(a + b*(x^(k*n)/c^n
))^p, x], x, (c*x)^(1/k)], x]] /; FreeQ[{a, b, c, p}, x] && IGtQ[n, 0] && F
ractionQ[m] && IntBinomialQ[a, b, c, n, m, p, x]
```

Rule 435

```
Int[Sqrt[(a_) + (b_.)*(x_)^2]/Sqrt[(c_) + (d_.)*(x_)^2], x_Symbol] :> Simp[
(Sqrt[a]/(Sqrt[c]*Rt[-d/c, 2]))*EllipticE[ArcSin[Rt[-d/c, 2]*x], b*(c/(a*d)
)], x] /; FreeQ[{a, b, c, d}, x] && NegQ[d/c] && GtQ[c, 0] && GtQ[a, 0]
```

Rule 1213

```
Int[((d_) + (e_.)*(x_)^2)/Sqrt[(a_) + (c_.)*(x_)^4], x_Symbol] :> Dist[d/Sq
rt[a], Int[Sqrt[1 + e*(x^2/d)]/Sqrt[1 - e*(x^2/d)], x], x] /; FreeQ[{a, c,
d, e}, x] && NegQ[c/a] && EqQ[c*d^2 + a*e^2, 0] && GtQ[a, 0]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
```

```
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rubi steps

$$\text{integral} = \frac{2(dx)^{5/2}(a+b\arcsin(cx))}{5d} - \frac{(2bc)\int \frac{(dx)^{5/2}}{\sqrt{1-c^2x^2}}\,dx}{5d}$$
$$= \frac{4b(dx)^{3/2}\sqrt{1-c^2x^2}}{25c} + \frac{2(dx)^{5/2}(a+b\arcsin(cx))}{5d} - \frac{(6bd)\int \frac{\sqrt{dx}}{\sqrt{1-c^2x^2}}\,dx}{25c}$$
$$= \frac{4b(dx)^{3/2}\sqrt{1-c^2x^2}}{25c} + \frac{2(dx)^{5/2}(a+b\arcsin(cx))}{5d} - \frac{(12b)\text{Subst}\left(\int \frac{x^2}{\sqrt{1-\frac{c^2x^4}{d^2}}}\,dx, x, \sqrt{dx}\right)}{25c}$$
$$= \frac{4b(dx)^{3/2}\sqrt{1-c^2x^2}}{25c} + \frac{2(dx)^{5/2}(a+b\arcsin(cx))}{5d} + \frac{(12bd)\text{Subst}\left(\int \frac{1}{\sqrt{1-\frac{c^2x^4}{d^2}}}\,dx, x, \sqrt{dx}\right)}{25c^2} - \frac{(12bd)\text{Subst}\left(\int \frac{1+\frac{cx^2}{d}}{\sqrt{1-\frac{c^2x^4}{d^2}}}\,dx, x, \sqrt{dx}\right)}{25c^2}$$
$$= \frac{4b(dx)^{3/2}\sqrt{1-c^2x^2}}{25c} + \frac{2(dx)^{5/2}(a+b\arcsin(cx))}{5d} + \frac{12bd^{3/2}\,\text{EllipticF}\left(\arcsin\left(\frac{\sqrt{c}\sqrt{dx}}{\sqrt{d}}\right), -1\right)}{25c^{5/2}} - \frac{(12bd)\text{Subst}\left(\int \frac{\sqrt{1+\frac{cx^2}{d}}}{\sqrt{1-\frac{cx^2}{d}}}\,dx, x, \sqrt{dx}\right)}{25c^2}$$
$$= \frac{4b(dx)^{3/2}\sqrt{1-c^2x^2}}{25c} + \frac{2(dx)^{5/2}(a+b\arcsin(cx))}{5d} - \frac{12bd^{3/2}E\left(\arcsin\left(\frac{\sqrt{c}\sqrt{dx}}{\sqrt{d}}\right)\middle|-1\right)}{25c^{5/2}} + \frac{12bd^{3/2}\,\text{EllipticF}\left(\arcsin\left(\frac{\sqrt{c}\sqrt{dx}}{\sqrt{d}}\right), -1\right)}{25c^{5/2}}$$

Mathematica [C] (verified)

Result contains higher order function than in optimal. Order 5 vs. order 4 in optimal.

Time = 0.02 (sec) , antiderivative size = 66, normalized size of antiderivative = 0.53

$$\int (dx)^{3/2}(a+b\arcsin(cx))\,dx = \frac{2(dx)^{3/2}\left(5acx+2b\sqrt{1-c^2x^2}+5bcx\arcsin(cx)-2b\,\text{Hypergeometric2F1}\left(\frac{1}{2},\frac{3}{4},\frac{7}{4},c^2x^2\right)\right.}{25c}$$

```
[In] Integrate[(d*x)^(3/2)*(a + b*ArcSin[c*x]),x]
[Out] (2*(d*x)^(3/2)*(5*a*c*x + 2*b*Sqrt[1 - c^2*x^2] + 5*b*c*x*ArcSin[c*x] - 2*b
*Hypergeometric2F1[1/2, 3/4, 7/4, c^2*x^2]))/(25*c)
```

Maple [A] (verified)

Time = 0.64 (sec) , antiderivative size = 138, normalized size of antiderivative = 1.11

method	result
derivativedivides	$\frac{\frac{2(dx)^{\frac{5}{2}}a}{5}+2b\left(\frac{(dx)^{\frac{5}{2}}\arcsin(cx)}{5}-\frac{2c\left(-\frac{d^2(dx)^{\frac{3}{2}}\sqrt{-c^2x^2+1}}{5c^2}-\frac{3d^3\sqrt{-cx+1}\sqrt{cx+1}\left(\text{EllipticF}\left(\sqrt{dx}\sqrt{\frac{c}{d}},i\right)-\text{EllipticE}\left(\sqrt{dx}\sqrt{\frac{c}{d}},i\right)\right)}{5c^3\sqrt{\frac{c}{d}}\sqrt{-c^2x^2+1}}\right)}{5d}\right)}{d}$
default	$\frac{\frac{2(dx)^{\frac{5}{2}}a}{5}+2b\left(\frac{(dx)^{\frac{5}{2}}\arcsin(cx)}{5}-\frac{2c\left(-\frac{d^2(dx)^{\frac{3}{2}}\sqrt{-c^2x^2+1}}{5c^2}-\frac{3d^3\sqrt{-cx+1}\sqrt{cx+1}\left(\text{EllipticF}\left(\sqrt{dx}\sqrt{\frac{c}{d}},i\right)-\text{EllipticE}\left(\sqrt{dx}\sqrt{\frac{c}{d}},i\right)\right)}{5c^3\sqrt{\frac{c}{d}}\sqrt{-c^2x^2+1}}\right)}{5d}\right)}{d}$
parts	$\frac{2a(dx)^{\frac{5}{2}}}{5d}+\frac{2b\left(\frac{(dx)^{\frac{5}{2}}\arcsin(cx)}{5}-\frac{2c\left(-\frac{d^2(dx)^{\frac{3}{2}}\sqrt{-c^2x^2+1}}{5c^2}-\frac{3d^3\sqrt{-cx+1}\sqrt{cx+1}\left(\text{EllipticF}\left(\sqrt{dx}\sqrt{\frac{c}{d}},i\right)-\text{EllipticE}\left(\sqrt{dx}\sqrt{\frac{c}{d}},i\right)\right)}{5c^3\sqrt{\frac{c}{d}}\sqrt{-c^2x^2+1}}\right)}{5d}\right)}{d}$

```
[In] int((d*x)^(3/2)*(a+b*arcsin(c*x)),x,method=_RETURNVERBOSE)
```

```
[Out] 2/d*(1/5*(d*x)^(5/2)*a+b*(1/5*(d*x)^(5/2)*arcsin(c*x)-2/5*c/d*(-1/5/c^2*d^2
*(d*x)^(3/2)*(-c^2*x^2+1)^(1/2)-3/5/c^3*d^3/(c/d)^(1/2)*(-c*x+1)^(1/2)*(c*x
+1)^(1/2)/(-c^2*x^2+1)^(1/2)*(EllipticF((d*x)^(1/2)*(c/d)^(1/2),I)-Elliptic
E((d*x)^(1/2)*(c/d)^(1/2),I)))))
```

Fricas [C] (verification not implemented)

Result contains higher order function than in optimal. Order 9 vs. order 4.

Time = 0.09 (sec) , antiderivative size = 85, normalized size of antiderivative = 0.69

$$\int (dx)^{3/2}(a+b\arcsin(cx))\,dx = -\frac{2\left(6\sqrt{-c^2d}bd\text{weierstrassZeta}\left(\frac{4}{c^2},0,\text{weierstrassPInverse}\left(\frac{4}{c^2},0,x\right)\right)-\left(5\,bc^3dx^2\arcsin\left(cx\right)+5\,ac^3dx^2+2\,\sqrt{\right.}\right.}{25\,c^3}$$

```
[In] integrate((d*x)^(3/2)*(a+b*arcsin(c*x)),x, algorithm="fricas")
```

```
[Out] -2/25*(6*sqrt(-c^2*d)*b*d*weierstrassZeta(4/c^2, 0, weierstrassPInverse(4/c
^2, 0, x)) - (5*b*c^3*d*x^2*arcsin(c*x) + 5*a*c^3*d*x^2 + 2*sqrt(-c^2*x^2 +
 1)*b*c^2*d*x)*sqrt(d*x))/c^3
```

Sympy [A] (verification not implemented)

Time = 11.19 (sec) , antiderivative size = 85, normalized size of antiderivative = 0.69

$$\int (dx)^{3/2}(a+b\arcsin(cx))\,dx = a\left(\begin{cases}\frac{2(dx)^{\frac{5}{2}}}{5d} & \text{for } d\neq 0\\ 0 & \text{otherwise}\end{cases}\right) - bc\left(\begin{cases}\frac{d^{\frac{3}{2}}x^{\frac{7}{2}}\Gamma\left(\frac{7}{4}\right){}_2F_1\left(\begin{matrix}\frac{1}{2},\frac{7}{4}\\ \frac{11}{4}\end{matrix}\middle| c^2x^2e^{2i\pi}\right)}{5\Gamma\left(\frac{11}{4}\right)} & \text{for } d>-\infty\wedge d<\infty\wedge d\neq 0\\ 0 & \text{otherwise}\end{cases}\right) + b\left(\begin{cases}\frac{2(dx)^{\frac{5}{2}}}{5d} & \text{for } d\neq 0\\ 0 & \text{otherwise}\end{cases}\right)\operatorname{asin}(cx)$$

```
[In] integrate((d*x)**(3/2)*(a+b*asin(c*x)),x)
```

```
[Out] a*Piecewise((2*(d*x)**(5/2)/(5*d), Ne(d, 0)), (0, True)) - b*c*Piecewise((d
**(3/2)*x**(7/2)*gamma(7/4)*hyper((1/2, 7/4), (11/4,), c**2*x**2*exp_polar(
2*I*pi))/(5*gamma(11/4)), (d > -oo) & (d < oo) & Ne(d, 0)), (0, True)) + b*
Piecewise((2*(d*x)**(5/2)/(5*d), Ne(d, 0)), (0, True))*asin(c*x)
```

Maxima [F]

$$\int (dx)^{3/2}(a+b\arcsin(cx))\,dx = \int (dx)^{\frac{3}{2}}\left(b\arcsin(cx)+a\right)dx$$

```
[In] integrate((d*x)^(3/2)*(a+b*arcsin(c*x)),x, algorithm="maxima")
```

```
[Out] 2/5*b*d^(3/2)*x^(5/2)*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1)) + 2/5*(a*d
*x^(5/2) + 5*b*c*d*integrate(1/5*sqrt(c*x + 1)*sqrt(-c*x + 1)*x^(5/2)/(c^2*
x^2 - 1), x))*sqrt(d)
```

Giac [F]

$$\int (dx)^{3/2}(a+b\arcsin(cx))\,dx = \int (dx)^{\frac{3}{2}}\left(b\arcsin(cx)+a\right)dx$$

```
[In] integrate((d*x)^(3/2)*(a+b*arcsin(c*x)),x, algorithm="giac")
```

```
[Out] integrate((d*x)^(3/2)*(b*arcsin(c*x) + a), x)
```

Mupad [F(-1)]

Timed out.

$$\int (dx)^{3/2}(a + b\arcsin(cx))\,dx = \int (a + b\,\mathrm{asin}(c\,x))\,\,(d\,x)^{3/2}\,dx$$

```
[In] int((a + b*asin(c*x))*(d*x)^(3/2),x)
[Out] int((a + b*asin(c*x))*(d*x)^(3/2), x)
```

3.205 $\int \sqrt{dx}(a+b\arcsin(cx))\,dx$

Optimal result

Integrand size = 16, antiderivative size = 88

$$\int \sqrt{dx}(a+b\arcsin(cx))\,dx=\frac{4b\sqrt{dx}\sqrt{1-c^2x^2}}{9c}+\frac{2(dx)^{3/2}(a+b\arcsin(cx))}{3d}-\frac{4b\sqrt{d}\,\text{EllipticF}\left(\arcsin\left(\frac{\sqrt{c}\sqrt{dx}}{\sqrt{d}}\right),-1\right)}{9c^{3/2}}$$

```
[Out] 2/3*(d*x)^(3/2)*(a+b*arcsin(c*x))/d-4/9*b*EllipticF(c^(1/2)*(d*x)^(1/2)/d^(
1/2),I)*d^(1/2)/c^(3/2)+4/9*b*(d*x)^(1/2)*(-c^2*x^2+1)^(1/2)/c
```

Rubi [A] (verified)

Time = 0.03 (sec) , antiderivative size = 88, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.250, Rules used = {4723, 327, 335, 227}

$$\int \sqrt{dx}(a+b\arcsin(cx))\,dx=\frac{2(dx)^{3/2}(a+b\arcsin(cx))}{3d}-\frac{4b\sqrt{d}\,\text{EllipticF}\left(\arcsin\left(\frac{\sqrt{c}\sqrt{dx}}{\sqrt{d}}\right),-1\right)}{9c^{3/2}}+\frac{4b\sqrt{1-c^2x^2}\sqrt{dx}}{9c}$$

```
[In] Int[Sqrt[d*x]*(a + b*ArcSin[c*x]),x]
```

```
[Out] (4*b*Sqrt[d*x]*Sqrt[1 - c^2*x^2])/(9*c) + (2*(d*x)^(3/2)*(a + b*ArcSin[c*x]
))/(3*d) - (4*b*Sqrt[d]*EllipticF[ArcSin[(Sqrt[c]*Sqrt[d*x])/Sqrt[d]], -1])
/(9*c^(3/2))
```

Rule 227

```
Int[1/Sqrt[(a_) + (b_.)*(x_)^4], x_Symbol] :> Simp[EllipticF[ArcSin[Rt[-b,
4]*(x/Rt[a, 4])], -1]/(Rt[a, 4]*Rt[-b, 4]), x] /; FreeQ[{a, b}, x] && NegQ[
b/a] && GtQ[a, 0]
```

Rule 327

```
Int[((c_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[c^(n
 - 1)*(c*x)^(m - n + 1)*((a + b*x^n)^(p + 1)/(b*(m + n*p + 1))), x] - Dist[
a*c^n*((m - n + 1)/(b*(m + n*p + 1))), Int[(c*x)^(m - n)*(a + b*x^n)^p, x],
 x] /; FreeQ[{a, b, c, p}, x] && IGtQ[n, 0] && GtQ[m, n - 1] && NeQ[m + n*p
 + 1, 0] && IntBinomialQ[a, b, c, n, m, p, x]
```

Rule 335

```
Int[((c_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> With[{k =
 Denominator[m]}, Dist[k/c, Subst[Int[x^(k*(m + 1) - 1)*(a + b*(x^(k*n)/c^n
))^p, x], x, (c*x)^(1/k)], x]] /; FreeQ[{a, b, c, p}, x] && IGtQ[n, 0] && F
ractionQ[m] && IntBinomialQ[a, b, c, n, m, p, x]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= \frac{2(dx)^{3/2}(a+b\arcsin(cx))}{3d} - \frac{(2bc)\int \frac{(dx)^{3/2}}{\sqrt{1-c^2x^2}}\,dx}{3d}\\
&= \frac{4b\sqrt{dx}\sqrt{1-c^2x^2}}{9c} + \frac{2(dx)^{3/2}(a+b\arcsin(cx))}{3d} - \frac{(2bd)\int \frac{1}{\sqrt{dx}\sqrt{1-c^2x^2}}\,dx}{9c}\\
&= \frac{4b\sqrt{dx}\sqrt{1-c^2x^2}}{9c} + \frac{2(dx)^{3/2}(a+b\arcsin(cx))}{3d} - \frac{(4b)\text{Subst}\left(\int \frac{1}{\sqrt{1-\frac{c^2x^4}{d^2}}}\,dx, x, \sqrt{dx}\right)}{9c}\\
&= \frac{4b\sqrt{dx}\sqrt{1-c^2x^2}}{9c} + \frac{2(dx)^{3/2}(a+b\arcsin(cx))}{3d} - \frac{4b\sqrt{d}\,\text{EllipticF}\left(\arcsin\left(\frac{\sqrt{c}\sqrt{dx}}{\sqrt{d}}\right), -1\right)}{9c^{3/2}}
\end{aligned}$$

Mathematica [C] (verified)

Result contains higher order function than in optimal. Order 5 vs. order 4 in optimal.

Time = 0.02 (sec) , antiderivative size = 66, normalized size of antiderivative = 0.75

$$\int \sqrt{dx}(a+b\arcsin(cx))\,dx = \frac{2\sqrt{dx}\left(3acx+2b\sqrt{1-c^2x^2}+3bcx\arcsin(cx)-2b\,\text{Hypergeometric2F1}\left(\frac{1}{4},\frac{1}{2},\frac{5}{4},c^2x^2\right)\right)}{9c}$$

```
[In] Integrate[Sqrt[d*x]*(a + b*ArcSin[c*x]),x]
[Out] (2*Sqrt[d*x]*(3*a*c*x + 2*b*Sqrt[1 - c^2*x^2] + 3*b*c*x*ArcSin[c*x] - 2*b*H
ypergeometric2F1[1/4, 1/2, 5/4, c^2*x^2]))/(9*c)
```

Maple [A] (verified)

Time = 0.41 (sec) , antiderivative size = 119, normalized size of antiderivative = 1.35

method	result	size
derivativedivides	$\frac{\frac{2(dx)^{\frac{3}{2}}a}{3}+2b\left(\frac{(dx)^{\frac{3}{2}}\arcsin(cx)}{3}-\frac{2c\left(-\frac{d^2\sqrt{dx}\,\sqrt{-c^2x^2+1}}{3c^2}+\frac{d^2\sqrt{-cx+1}\,\sqrt{cx+1}\,\text{EllipticF}\left(\sqrt{dx}\,\sqrt{\frac{c}{d}},i\right)}{3c^2\sqrt{\frac{c}{d}}\,\sqrt{-c^2x^2+1}}\right)}{3d}\right)}{d}$	119
default	$\frac{\frac{2(dx)^{\frac{3}{2}}a}{3}+2b\left(\frac{(dx)^{\frac{3}{2}}\arcsin(cx)}{3}-\frac{2c\left(-\frac{d^2\sqrt{dx}\,\sqrt{-c^2x^2+1}}{3c^2}+\frac{d^2\sqrt{-cx+1}\,\sqrt{cx+1}\,\text{EllipticF}\left(\sqrt{dx}\,\sqrt{\frac{c}{d}},i\right)}{3c^2\sqrt{\frac{c}{d}}\,\sqrt{-c^2x^2+1}}\right)}{3d}\right)}{d}$	119
parts	$\frac{2a(dx)^{\frac{3}{2}}}{3d}+\frac{2b\left(\frac{(dx)^{\frac{3}{2}}\arcsin(cx)}{3}-\frac{2c\left(-\frac{d^2\sqrt{dx}\,\sqrt{-c^2x^2+1}}{3c^2}+\frac{d^2\sqrt{-cx+1}\,\sqrt{cx+1}\,\text{EllipticF}\left(\sqrt{dx}\,\sqrt{\frac{c}{d}},i\right)}{3c^2\sqrt{\frac{c}{d}}\,\sqrt{-c^2x^2+1}}\right)}{3d}\right)}{d}$	121

```
[In] int((d*x)^(1/2)*(a+b*arcsin(c*x)),x,method=_RETURNVERBOSE)
[Out] 2/d*(1/3*(d*x)^(3/2)*a+b*(1/3*(d*x)^(3/2)*arcsin(c*x)-2/3*c/d*(-1/3/c^2*d^2
*(d*x)^(1/2)*(-c^2*x^2+1)^(1/2)+1/3/c^2*d^2/(c/d)^(1/2)*(-c*x+1)^(1/2)*(c*x
+1)^(1/2)/(-c^2*x^2+1)^(1/2)*EllipticF((d*x)^(1/2)*(c/d)^(1/2),I))))
```

Fricas [C] (verification not implemented)

Result contains higher order function than in optimal. Order 9 vs. order 4.

Time = 0.09 (sec) , antiderivative size = 68, normalized size of antiderivative = 0.77

$$\int \sqrt{dx}(a+b\arcsin(cx))\,dx$$
$$= \frac{2\left(2\sqrt{-c^2d}b\text{weierstrassPInverse}\left(\frac{4}{c^2},0,x\right)+\left(3\,bc^3x\arcsin\left(cx\right)+3\,ac^3x+2\sqrt{-c^2x^2+1}bc^2\right)\sqrt{dx}\right)}{9\,c^3}$$

```
[In] integrate((d*x)^(1/2)*(a+b*arcsin(c*x)),x, algorithm="fricas")
```

```
[Out] 2/9*(2*sqrt(-c^2*d)*b*weierstrassPInverse(4/c^2, 0, x) + (3*b*c^3*x*arcsin(
c*x) + 3*a*c^3*x + 2*sqrt(-c^2*x^2 + 1)*b*c^2)*sqrt(d*x))/c^3
```

Sympy [A] (verification not implemented)

Time = 3.26 (sec) , antiderivative size = 85, normalized size of antiderivative = 0.97

$$\int \sqrt{dx}(a+b\arcsin(cx))\,dx$$
$$= a\left(\begin{cases}\frac{2(dx)^{\frac{3}{2}}}{3d} & \text{for } d\neq 0\\ 0 & \text{otherwise}\end{cases}\right) - bc\left(\begin{cases}\frac{\sqrt{d}x^{\frac{5}{2}}\Gamma\left(\frac{5}{4}\right){}_2F_1\left(\begin{matrix}\frac{1}{2},\frac{5}{4}\\ \frac{9}{4}\end{matrix}\middle| c^2x^2e^{2i\pi}\right)}{3\Gamma\left(\frac{9}{4}\right)} & \text{for } d>-\infty\wedge d<\infty\wedge d\neq 0\\ 0 & \text{otherwise}\end{cases}\right) + b\left(\begin{cases}\frac{2(dx)^{\frac{3}{2}}}{3d} & \text{for } d\neq 0\\ 0 & \text{otherwise}\end{cases}\right)\operatorname{asin}\left(cx\right)$$

```
[In] integrate((d*x)**(1/2)*(a+b*asin(c*x)),x)
```

```
[Out] a*Piecewise((2*(d*x)**(3/2)/(3*d), Ne(d, 0)), (0, True)) - b*c*Piecewise((s
qrt(d)*x**(5/2)*gamma(5/4)*hyper((1/2, 5/4), (9/4,), c**2*x**2*exp_polar(2*
I*pi))/(3*gamma(9/4)), (d > -oo) & (d < oo) & Ne(d, 0)), (0, True)) + b*Pie
cewise((2*(d*x)**(3/2)/(3*d), Ne(d, 0)), (0, True))*asin(c*x)
```

Maxima [F]

$$\int \sqrt{dx}(a+b\arcsin(cx))\,dx = \int \sqrt{dx}(b\arcsin(cx)+a)\,dx$$

```
[In] integrate((d*x)^(1/2)*(a+b*arcsin(c*x)),x, algorithm="maxima")
```

```
[Out] 2/3*b*sqrt(d)*x^(3/2)*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1)) + 2/3*(3*b
*c*integrate(1/3*sqrt(c*x + 1)*sqrt(-c*x + 1)*x^(3/2)/(c^2*x^2 - 1), x) + a
*x^(3/2))*sqrt(d)
```

Giac [F]

$$\int \sqrt{dx}(a+b\arcsin(cx))\,dx = \int \sqrt{dx}(b\arcsin(cx)+a)\,dx$$

```
[In] integrate((d*x)^(1/2)*(a+b*arcsin(c*x)),x, algorithm="giac")
```

```
[Out] integrate(sqrt(d*x)*(b*arcsin(c*x) + a), x)
```

Mupad [F(-1)]

Timed out.

$$\int \sqrt{dx}(a+b\arcsin(cx))\,dx = \int (a+b\,\mathrm{asin}(c\,x))\,\sqrt{d\,x}\,dx$$

```
[In] int((a + b*asin(c*x))*(d*x)^(1/2),x)
```

```
[Out] int((a + b*asin(c*x))*(d*x)^(1/2), x)
```

3.206 $\int \frac{a+b\arcsin(cx)}{\sqrt{dx}}\,dx$

Optimal result

Integrand size = 16, antiderivative size = 89

$$\int \frac{a+b\arcsin(cx)}{\sqrt{dx}}\,dx = \frac{2\sqrt{dx}(a+b\arcsin(cx))}{d} - \frac{4bE\left(\arcsin\left(\frac{\sqrt{c}\sqrt{dx}}{\sqrt{d}}\right)\middle|-1\right)}{\sqrt{c}\sqrt{d}} + \frac{4b\,\text{EllipticF}\left(\arcsin\left(\frac{\sqrt{c}\sqrt{dx}}{\sqrt{d}}\right),-1\right)}{\sqrt{c}\sqrt{d}}$$

```
[Out] -4*b*EllipticE(c^(1/2)*(d*x)^(1/2)/d^(1/2),I)/c^(1/2)/d^(1/2)+4*b*EllipticF
(c^(1/2)*(d*x)^(1/2)/d^(1/2),I)/c^(1/2)/d^(1/2)+2*(a+b*arcsin(c*x))*(d*x)^(
1/2)/d
```

Rubi [A] (verified)

Time = 0.05 (sec) , antiderivative size = 89, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 6, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {4723, 335, 313, 227, 1213, 435}

$$\int \frac{a+b\arcsin(cx)}{\sqrt{dx}}\,dx = \frac{2\sqrt{dx}(a+b\arcsin(cx))}{d} + \frac{4b\,\text{EllipticF}\left(\arcsin\left(\frac{\sqrt{c}\sqrt{dx}}{\sqrt{d}}\right),-1\right)}{\sqrt{c}\sqrt{d}} - \frac{4bE\left(\arcsin\left(\frac{\sqrt{c}\sqrt{dx}}{\sqrt{d}}\right)\middle|-1\right)}{\sqrt{c}\sqrt{d}}$$

```
[In] Int[(a + b*ArcSin[c*x])/Sqrt[d*x],x]
```

```
[Out] (2*Sqrt[d*x]*(a + b*ArcSin[c*x]))/d - (4*b*EllipticE[ArcSin[(Sqrt[c]*Sqrt[d
*x])/Sqrt[d]], -1])/(Sqrt[c]*Sqrt[d]) + (4*b*EllipticF[ArcSin[(Sqrt[c]*Sqrt
[d*x])/Sqrt[d]], -1])/(Sqrt[c]*Sqrt[d])
```

Rule 227

```
Int[1/Sqrt[(a_) + (b_.)*(x_)^4], x_Symbol] :> Simp[EllipticF[ArcSin[Rt[-b,
4]*(x/Rt[a, 4])], -1]/(Rt[a, 4]*Rt[-b, 4]), x] /; FreeQ[{a, b}, x] && NegQ[
b/a] && GtQ[a, 0]
```

Rule 313

```
Int[(x_)^2/Sqrt[(a_) + (b_.)*(x_)^4], x_Symbol] :> With[{q = Rt[-b/a, 2]},
Dist[-q^(-1), Int[1/Sqrt[a + b*x^4], x], x] + Dist[1/q, Int[(1 + q*x^2)/Sqr
t[a + b*x^4], x], x]] /; FreeQ[{a, b}, x] && NegQ[b/a]
```

Rule 335

```
Int[((c_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> With[{k =
 Denominator[m]}, Dist[k/c, Subst[Int[x^(k*(m + 1) - 1)*(a + b*(x^(k*n)/c^n
))^p, x], x, (c*x)^(1/k)], x]] /; FreeQ[{a, b, c, p}, x] && IGtQ[n, 0] && F
ractionQ[m] && IntBinomialQ[a, b, c, n, m, p, x]
```

Rule 435

```
Int[Sqrt[(a_) + (b_.)*(x_)^2]/Sqrt[(c_) + (d_.)*(x_)^2], x_Symbol] :> Simp[
(Sqrt[a]/(Sqrt[c]*Rt[-d/c, 2]))*EllipticE[ArcSin[Rt[-d/c, 2]*x], b*(c/(a*d)
)], x] /; FreeQ[{a, b, c, d}, x] && NegQ[d/c] && GtQ[c, 0] && GtQ[a, 0]
```

Rule 1213

```
Int[((d_) + (e_.)*(x_)^2)/Sqrt[(a_) + (c_.)*(x_)^4], x_Symbol] :> Dist[d/Sq
rt[a], Int[Sqrt[1 + e*(x^2/d)]/Sqrt[1 - e*(x^2/d)], x], x] /; FreeQ[{a, c,
d, e}, x] && NegQ[c/a] && EqQ[c*d^2 + a*e^2, 0] && GtQ[a, 0]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rubi steps

$$\text{integral} = \frac{2\sqrt{dx}(a+b\arcsin(cx))}{d} - \frac{(2bc)\int \frac{\sqrt{dx}}{\sqrt{1-c^2x^2}}\,dx}{d}$$

$$= \frac{2\sqrt{dx}(a+b\arcsin(cx))}{d} - \frac{(4bc)\text{Subst}\left(\int \frac{x^2}{\sqrt{1-\frac{c^2x^4}{d^2}}}\,dx, x, \sqrt{dx}\right)}{d^2}$$

$$
\begin{aligned}
&= \frac{2\sqrt{dx}(a+b\arcsin(cx))}{d} + \frac{(4b)\text{Subst}\left(\int \frac{1}{\sqrt{1-\frac{c^2x^4}{d^2}}}\,dx, x, \sqrt{dx}\right)}{d} \\
&\quad - \frac{(4b)\text{Subst}\left(\int \frac{1+\frac{cx^2}{d}}{\sqrt{1-\frac{c^2x^4}{d^2}}}\,dx, x, \sqrt{dx}\right)}{d} \\
&= \frac{2\sqrt{dx}(a+b\arcsin(cx))}{d} + \frac{4b\,\text{EllipticF}\left(\arcsin\left(\frac{\sqrt{c}\sqrt{dx}}{\sqrt{d}}\right), -1\right)}{\sqrt{c}\sqrt{d}} \\
&\quad - \frac{(4b)\text{Subst}\left(\int \frac{\sqrt{1+\frac{cx^2}{d}}}{\sqrt{1-\frac{cx^2}{d}}}\,dx, x, \sqrt{dx}\right)}{d} \\
&= \frac{2\sqrt{dx}(a+b\arcsin(cx))}{d} - \frac{4bE\left(\arcsin\left(\frac{\sqrt{c}\sqrt{dx}}{\sqrt{d}}\right)\middle| -1\right)}{\sqrt{c}\sqrt{d}} + \frac{4b\,\text{EllipticF}\left(\arcsin\left(\frac{\sqrt{c}\sqrt{dx}}{\sqrt{d}}\right), -1\right)}{\sqrt{c}\sqrt{d}}
\end{aligned}
$$

Mathematica [C] (verified)

Result contains higher order function than in optimal. Order 5 vs. order 4 in optimal.

Time = 0.02 (sec) , antiderivative size = 45, normalized size of antiderivative = 0.51

$$
\int \frac{a+b\arcsin(cx)}{\sqrt{dx}}\,dx = \frac{2x\left(3(a+b\arcsin(cx)) - 2bcx\,\text{Hypergeometric2F1}\left(\frac{1}{2}, \frac{3}{4}, \frac{7}{4}, c^2x^2\right)\right)}{3\sqrt{dx}}
$$

```
[In] Integrate[(a + b*ArcSin[c*x])/Sqrt[d*x],x]
[Out] (2*x*(3*(a + b*ArcSin[c*x]) - 2*b*c*x*Hypergeometric2F1[1/2, 3/4, 7/4, c^2*
x^2]))/(3*Sqrt[d*x])
```

Maple [A] (verified)

Time = 0.27 (sec) , antiderivative size = 98, normalized size of antiderivative = 1.10

method	result	size
derivativedivides	$\frac{2\sqrt{dx}\,a+2b\left(\sqrt{dx}\,\arcsin(cx)+\frac{2\sqrt{-cx+1}\,\sqrt{cx+1}\,\left(\text{EllipticF}\left(\sqrt{dx}\,\sqrt{\frac{c}{d}}, i\right)-\text{EllipticE}\left(\sqrt{dx}\,\sqrt{\frac{c}{d}}, i\right)\right)}{\sqrt{\frac{c}{d}}\,\sqrt{-c^2x^2+1}}\right)}{d}$	98
default	$\frac{2\sqrt{dx}\,a+2b\left(\sqrt{dx}\,\arcsin(cx)+\frac{2\sqrt{-cx+1}\,\sqrt{cx+1}\,\left(\text{EllipticF}\left(\sqrt{dx}\,\sqrt{\frac{c}{d}}, i\right)-\text{EllipticE}\left(\sqrt{dx}\,\sqrt{\frac{c}{d}}, i\right)\right)}{\sqrt{\frac{c}{d}}\,\sqrt{-c^2x^2+1}}\right)}{d}$	98
parts	$\frac{2a\sqrt{dx}}{d}+\frac{2b\left(\sqrt{dx}\,\arcsin(cx)+\frac{2\sqrt{-cx+1}\,\sqrt{cx+1}\,\left(\text{EllipticF}\left(\sqrt{dx}\,\sqrt{\frac{c}{d}}, i\right)-\text{EllipticE}\left(\sqrt{dx}\,\sqrt{\frac{c}{d}}, i\right)\right)}{\sqrt{\frac{c}{d}}\,\sqrt{-c^2x^2+1}}\right)}{d}$	101

```
[In] int((a+b*arcsin(c*x))/(d*x)^(1/2),x,method=_RETURNVERBOSE)
```

```
[Out] 2/d*((d*x)^(1/2)*a+b*((d*x)^(1/2)*arcsin(c*x)+2/(c/d)^(1/2)*(-c*x+1)^(1/2)*
(c*x+1)^(1/2)/(-c^2*x^2+1)^(1/2)*(EllipticF((d*x)^(1/2)*(c/d)^(1/2),I)-Elli
pticE((d*x)^(1/2)*(c/d)^(1/2),I))))
```

Fricas [C] (verification not implemented)

Result contains higher order function than in optimal. Order 9 vs. order 4.

Time = 0.09 (sec) , antiderivative size = 53, normalized size of antiderivative = 0.60

$$\int \frac{a+b\arcsin(cx)}{\sqrt{dx}}\,dx = -\frac{2\left(2\sqrt{-c^2d}b\text{weierstrassZeta}\left(\frac{4}{c^2},0,\text{weierstrassPInverse}\left(\frac{4}{c^2},0,x\right)\right)-(bc\arcsin{(cx)}+ac)\sqrt{dx}\right)}{cd}$$

```
[In] integrate((a+b*arcsin(c*x))/(d*x)^(1/2),x, algorithm="fricas")
```

```
[Out] -2*(2*sqrt(-c^2*d)*b*weierstrassZeta(4/c^2, 0, weierstrassPInverse(4/c^2, 0
, x)) - (b*c*arcsin(c*x) + a*c)*sqrt(d*x))/(c*d)
```

Sympy [F(-2)]

Exception generated.

$$\int \frac{a+b\arcsin(cx)}{\sqrt{dx}}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate((a+b*asin(c*x))/(d*x)**(1/2),x)
```

```
[Out] Exception raised: TypeError >> Invalid comparison of non-real zoo
```

Maxima [F]

$$\int \frac{a+b\arcsin(cx)}{\sqrt{dx}}\,dx = \int \frac{b\arcsin{(cx)}+a}{\sqrt{dx}}\,dx$$

```
[In] integrate((a+b*arcsin(c*x))/(d*x)^(1/2),x, algorithm="maxima")
```

```
[Out] 2*(b*sqrt(d)*sqrt(x)*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1)) + (b*c*d*in
tegrate(sqrt(c*x + 1)*sqrt(-c*x + 1)*sqrt(x)/(c^2*d*x^2 - d), x) + a*sqrt(x
))*sqrt(d))/d
```

Giac [F]

$$\int \frac{a+b\arcsin(cx)}{\sqrt{dx}}\,dx = \int \frac{b\arcsin(cx)+a}{\sqrt{dx}}\,dx$$

```
[In] integrate((a+b*arcsin(c*x))/(d*x)^(1/2),x, algorithm="giac")
[Out] integrate((b*arcsin(c*x) + a)/sqrt(d*x), x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{a+b\arcsin(cx)}{\sqrt{dx}}\,dx = \int \frac{a+b\operatorname{asin}(c\,x)}{\sqrt{d\,x}}\,dx$$

```
[In] int((a + b*asin(c*x))/(d*x)^(1/2),x)
[Out] int((a + b*asin(c*x))/(d*x)^(1/2), x)
```

3.207 $\int \frac{a+b \arcsin(cx)}{(dx)^{3/2}} dx$

Optimal result

Integrand size = 16, antiderivative size = 55

$$\int \frac{a+b\arcsin(cx)}{(dx)^{3/2}}\,dx=-\frac{2(a+b\arcsin(cx))}{d\sqrt{dx}}+\frac{4b\sqrt{c}\,\text{EllipticF}\left(\arcsin\left(\frac{\sqrt{c}\sqrt{dx}}{\sqrt{d}}\right),-1\right)}{d^{3/2}}$$

```
[Out] 4*b*EllipticF(c^(1/2)*(d*x)^(1/2)/d^(1/2),I)*c^(1/2)/d^(3/2)-2*(a+b*arcsin(
c*x))/d/(d*x)^(1/2)
```

Rubi [A] (verified)

Time = 0.02 (sec) , antiderivative size = 55, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.188, Rules used = {4723, 335, 227}

$$\int \frac{a+b\arcsin(cx)}{(dx)^{3/2}}\,dx=\frac{4b\sqrt{c}\,\text{EllipticF}\left(\arcsin\left(\frac{\sqrt{c}\sqrt{dx}}{\sqrt{d}}\right),-1\right)}{d^{3/2}}-\frac{2(a+b\arcsin(cx))}{d\sqrt{dx}}$$

```
[In] Int[(a + b*ArcSin[c*x])/(d*x)^(3/2),x]
```

```
[Out] (-2*(a + b*ArcSin[c*x]))/(d*Sqrt[d*x]) + (4*b*Sqrt[c]*EllipticF[ArcSin[(Sqr
t[c]*Sqrt[d*x])/Sqrt[d]], -1])/d^(3/2)
```

Rule 227

```
Int[1/Sqrt[(a_) + (b_.)*(x_)^4], x_Symbol] :> Simp[EllipticF[ArcSin[Rt[-b,
4]*(x/Rt[a, 4])], -1]/(Rt[a, 4]*Rt[-b, 4]), x] /; FreeQ[{a, b}, x] && NegQ[
b/a] && GtQ[a, 0]
```

Rule 335

```
Int[((c_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> With[{k =
 Denominator[m]}, Dist[k/c, Subst[Int[x^(k*(m + 1) - 1)*(a + b*(x^(k*n)/c^n
))^p, x], x, (c*x)^(1/k)], x]] /; FreeQ[{a, b, c, p}, x] && IGtQ[n, 0] && F
ractionQ[m] && IntBinomialQ[a, b, c, n, m, p, x]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= -\frac{2(a+b\arcsin(cx))}{d\sqrt{dx}}+\frac{(2bc)\int\frac{1}{\sqrt{dx}\sqrt{1-c^2x^2}}\,dx}{d}\\
&= -\frac{2(a+b\arcsin(cx))}{d\sqrt{dx}}+\frac{(4bc)\text{Subst}\left(\int\frac{1}{\sqrt{1-\frac{c^2x^4}{d^2}}}\,dx,x,\sqrt{dx}\right)}{d^2}\\
&= -\frac{2(a+b\arcsin(cx))}{d\sqrt{dx}}+\frac{4b\sqrt{c}\,\text{EllipticF}\left(\arcsin\left(\frac{\sqrt{c}\sqrt{dx}}{\sqrt{d}}\right),-1\right)}{d^{3/2}}
\end{aligned}$$

Mathematica [C] (verified)

Result contains higher order function than in optimal. Order 5 vs. order 4 in optimal.

Time = 0.01 (sec) , antiderivative size = 40, normalized size of antiderivative = 0.73

$$\int\frac{a+b\arcsin(cx)}{(dx)^{3/2}}\,dx=-\frac{2x\left(a+b\arcsin(cx)-2bcx\,\text{Hypergeometric2F1}\left(\frac{1}{4},\frac{1}{2},\frac{5}{4},c^2x^2\right)\right)}{(dx)^{3/2}}$$

```
[In] Integrate[(a + b*ArcSin[c*x])/(d*x)^(3/2),x]
[Out] (-2*x*(a + b*ArcSin[c*x] - 2*b*c*x*Hypergeometric2F1[1/4, 1/2, 5/4, c^2*x^2
]))/(d*x)^(3/2)
```

Maple [A] (verified)

Time = 0.16 (sec) , antiderivative size = 85, normalized size of antiderivative = 1.55

method	result	size
derivativedivides	$\frac{-\frac{2a}{\sqrt{dx}}+2b\left(-\frac{\arcsin(cx)}{\sqrt{dx}}+\frac{2c\sqrt{-cx+1}\,\sqrt{cx+1}\,\mathrm{EllipticF}\left(\sqrt{dx}\,\sqrt{\frac{c}{d}},i\right)}{d\sqrt{\frac{c}{d}}\,\sqrt{-c^2x^2+1}}\right)}{d}$	85
default	$\frac{-\frac{2a}{\sqrt{dx}}+2b\left(-\frac{\arcsin(cx)}{\sqrt{dx}}+\frac{2c\sqrt{-cx+1}\,\sqrt{cx+1}\,\mathrm{EllipticF}\left(\sqrt{dx}\,\sqrt{\frac{c}{d}},i\right)}{d\sqrt{\frac{c}{d}}\,\sqrt{-c^2x^2+1}}\right)}{d}$	85
parts	$-\frac{2a}{\sqrt{dx}\,d}+\frac{2b\left(-\frac{\arcsin(cx)}{\sqrt{dx}}+\frac{2c\sqrt{-cx+1}\,\sqrt{cx+1}\,\mathrm{EllipticF}\left(\sqrt{dx}\,\sqrt{\frac{c}{d}},i\right)}{d\sqrt{\frac{c}{d}}\,\sqrt{-c^2x^2+1}}\right)}{d}$	87

```
[In] int((a+b*arcsin(c*x))/(d*x)^(3/2),x,method=_RETURNVERBOSE)
```

```
[Out] 2/d*(-a/(d*x)^(1/2)+b*(-1/(d*x)^(1/2)*arcsin(c*x)+2*c/d/(c/d)^(1/2)*(-c*x+1
)^(1/2)*(c*x+1)^(1/2)/(-c^2*x^2+1)^(1/2)*EllipticF((d*x)^(1/2)*(c/d)^(1/2),
I)))
```

Fricas [C] (verification not implemented)

Result contains higher order function than in optimal. Order 9 vs. order 4.

Time = 0.08 (sec) , antiderivative size = 49, normalized size of antiderivative = 0.89

$$\int \frac{a+b\arcsin(cx)}{(dx)^{3/2}}\,dx = -\frac{2\left(2\sqrt{-c^2d}bx\mathrm{weierstrassPInverse}\left(\frac{4}{c^2},0,x\right)+(bc\arcsin(cx)+ac)\sqrt{dx}\right)}{cd^2x}$$

```
[In] integrate((a+b*arcsin(c*x))/(d*x)^(3/2),x, algorithm="fricas")
```

```
[Out] -2*(2*sqrt(-c^2*d)*b*x*weierstrassPInverse(4/c^2, 0, x) + (b*c*arcsin(c*x)
+ a*c)*sqrt(d*x))/(c*d^2*x)
```

Sympy [F(-2)]

Exception generated.

$$\int \frac{a+b\arcsin(cx)}{(dx)^{3/2}}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate((a+b*asin(c*x))/(d*x)**(3/2),x)
```

```
[Out] Exception raised: TypeError >> Invalid comparison of non-real zoo
```

Maxima [F]

$$\int \frac{a+b\arcsin(cx)}{(dx)^{3/2}}\,dx = \int \frac{b\arcsin(cx)+a}{(dx)^{\frac{3}{2}}}\,dx$$

```
[In] integrate((a+b*arcsin(c*x))/(d*x)^(3/2),x, algorithm="maxima")
```

```
[Out] -2*(b*sqrt(d)*sqrt(x)*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1)) + (b*c*d^2
*sqrt(x)*integrate(sqrt(c*x + 1)*sqrt(-c*x + 1)*sqrt(x)/(c^2*d^2*x^3 - d^2*
x), x) + a)*sqrt(d)*sqrt(x))/(d^2*x)
```

Giac [F]

$$\int \frac{a+b\arcsin(cx)}{(dx)^{3/2}}\,dx = \int \frac{b\arcsin(cx)+a}{(dx)^{\frac{3}{2}}}\,dx$$

```
[In] integrate((a+b*arcsin(c*x))/(d*x)^(3/2),x, algorithm="giac")
```

```
[Out] integrate((b*arcsin(c*x) + a)/(d*x)^(3/2), x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{a+b\arcsin(cx)}{(dx)^{3/2}}\,dx = \int \frac{a+b\,\mathrm{asin}(c\,x)}{(d\,x)^{3/2}}\,dx$$

```
[In] int((a + b*asin(c*x))/(d*x)^(3/2),x)
```

```
[Out] int((a + b*asin(c*x))/(d*x)^(3/2), x)
```

3.208 $\int \frac{a+b\arcsin(cx)}{(dx)^{5/2}}\,dx$

Optimal result

Integrand size = 16, antiderivative size = 125

$$\int \frac{a+b\arcsin(cx)}{(dx)^{5/2}}\,dx = -\frac{4bc\sqrt{1-c^2x^2}}{3d^2\sqrt{dx}}-\frac{2(a+b\arcsin(cx))}{3d(dx)^{3/2}} -\frac{4bc^{3/2}E\left(\arcsin\left(\frac{\sqrt{c}\sqrt{dx}}{\sqrt{d}}\right)\middle|-1\right)}{3d^{5/2}}+\frac{4bc^{3/2}\operatorname{EllipticF}\left(\arcsin\left(\frac{\sqrt{c}\sqrt{dx}}{\sqrt{d}}\right),-1\right)}{3d^{5/2}}$$

```
[Out] -2/3*(a+b*arcsin(c*x))/d/(d*x)^(3/2)-4/3*b*c^(3/2)*EllipticE(c^(1/2)*(d*x)^
(1/2)/d^(1/2),I)/d^(5/2)+4/3*b*c^(3/2)*EllipticF(c^(1/2)*(d*x)^(1/2)/d^(1/2
),I)/d^(5/2)-4/3*b*c*(-c^2*x^2+1)^(1/2)/d^2/(d*x)^(1/2)
```

Rubi [A] (verified)

Time = 0.06 (sec) , antiderivative size = 125, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 7, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.438, Rules used = {4723, 331, 335, 313, 227, 1213, 435}

$$\int \frac{a+b\arcsin(cx)}{(dx)^{5/2}}\,dx = -\frac{2(a+b\arcsin(cx))}{3d(dx)^{3/2}}+\frac{4bc^{3/2}\operatorname{EllipticF}\left(\arcsin\left(\frac{\sqrt{c}\sqrt{dx}}{\sqrt{d}}\right),-1\right)}{3d^{5/2}} -\frac{4bc^{3/2}E\left(\arcsin\left(\frac{\sqrt{c}\sqrt{dx}}{\sqrt{d}}\right)\middle|-1\right)}{3d^{5/2}}-\frac{4bc\sqrt{1-c^2x^2}}{3d^2\sqrt{dx}}$$

```
[In] Int[(a + b*ArcSin[c*x])/(d*x)^(5/2),x]
```

```
[Out] (-4*b*c*Sqrt[1 - c^2*x^2])/(3*d^2*Sqrt[d*x]) - (2*(a + b*ArcSin[c*x]))/(3*d
*(d*x)^(3/2)) - (4*b*c^(3/2)*EllipticE[ArcSin[(Sqrt[c]*Sqrt[d*x])/Sqrt[d]],
```

```
-1])/(3*d^(5/2)) + (4*b*c^(3/2)*EllipticF[ArcSin[(Sqrt[c]*Sqrt[d*x])/Sqrt[
d]], -1])/(3*d^(5/2))
```

Rule 227

```
Int[1/Sqrt[(a_) + (b_.)*(x_)^4], x_Symbol] :> Simp[EllipticF[ArcSin[Rt[-b,
4]*(x/Rt[a, 4])], -1]/(Rt[a, 4]*Rt[-b, 4]), x] /; FreeQ[{a, b}, x] && NegQ[
b/a] && GtQ[a, 0]
```

Rule 313

```
Int[(x_)^2/Sqrt[(a_) + (b_.)*(x_)^4], x_Symbol] :> With[{q = Rt[-b/a, 2]},
Dist[-q^(-1), Int[1/Sqrt[a + b*x^4], x], x] + Dist[1/q, Int[(1 + q*x^2)/Sqr
t[a + b*x^4], x], x]] /; FreeQ[{a, b}, x] && NegQ[b/a]
```

Rule 331

```
Int[((c_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[(c*x
)^(m + 1)*((a + b*x^n)^(p + 1)/(a*c*(m + 1))), x] - Dist[b*((m + n*(p + 1)
+ 1)/(a*c^n*(m + 1))), Int[(c*x)^(m + n)*(a + b*x^n)^p, x], x] /; FreeQ[{a,
 b, c, p}, x] && IGtQ[n, 0] && LtQ[m, -1] && IntBinomialQ[a, b, c, n, m, p,
 x]
```

Rule 335

```
Int[((c_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> With[{k =
 Denominator[m]}, Dist[k/c, Subst[Int[x^(k*(m + 1) - 1)*(a + b*(x^(k*n)/c^n
))^p, x], x, (c*x)^(1/k)], x]] /; FreeQ[{a, b, c, p}, x] && IGtQ[n, 0] && F
ractionQ[m] && IntBinomialQ[a, b, c, n, m, p, x]
```

Rule 435

```
Int[Sqrt[(a_) + (b_.)*(x_)^2]/Sqrt[(c_) + (d_.)*(x_)^2], x_Symbol] :> Simp[
(Sqrt[a]/(Sqrt[c]*Rt[-d/c, 2]))*EllipticE[ArcSin[Rt[-d/c, 2]*x], b*(c/(a*d)
)], x] /; FreeQ[{a, b, c, d}, x] && NegQ[d/c] && GtQ[c, 0] && GtQ[a, 0]
```

Rule 1213

```
Int[((d_) + (e_.)*(x_)^2)/Sqrt[(a_) + (c_.)*(x_)^4], x_Symbol] :> Dist[d/Sq
rt[a], Int[Sqrt[1 + e*(x^2/d)]/Sqrt[1 - e*(x^2/d)], x], x] /; FreeQ[{a, c,
d, e}, x] && NegQ[c/a] && EqQ[c*d^2 + a*e^2, 0] && GtQ[a, 0]
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
```

```
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= -\frac{2(a+b\arcsin(cx))}{3d(dx)^{3/2}}+\frac{(2bc)\int\frac{1}{(dx)^{3/2}\sqrt{1-c^2x^2}}\,dx}{3d}\\
&= -\frac{4bc\sqrt{1-c^2x^2}}{3d^2\sqrt{dx}}-\frac{2(a+b\arcsin(cx))}{3d(dx)^{3/2}}-\frac{(2bc^3)\int\frac{\sqrt{dx}}{\sqrt{1-c^2x^2}}\,dx}{3d^3}\\
&= -\frac{4bc\sqrt{1-c^2x^2}}{3d^2\sqrt{dx}}-\frac{2(a+b\arcsin(cx))}{3d(dx)^{3/2}}-\frac{(4bc^3)\,\text{Subst}\left(\int\frac{x^2}{\sqrt{1-\frac{c^2x^4}{d^2}}}\,dx,x,\sqrt{dx}\right)}{3d^4}\\
&= -\frac{4bc\sqrt{1-c^2x^2}}{3d^2\sqrt{dx}}-\frac{2(a+b\arcsin(cx))}{3d(dx)^{3/2}}+\frac{(4bc^2)\,\text{Subst}\left(\int\frac{1}{\sqrt{1-\frac{c^2x^4}{d^2}}}\,dx,x,\sqrt{dx}\right)}{3d^3}\\
&\quad-\frac{(4bc^2)\,\text{Subst}\left(\int\frac{1+\frac{cx^2}{d}}{\sqrt{1-\frac{c^2x^4}{d^2}}}\,dx,x,\sqrt{dx}\right)}{3d^3}\\
&= -\frac{4bc\sqrt{1-c^2x^2}}{3d^2\sqrt{dx}}-\frac{2(a+b\arcsin(cx))}{3d(dx)^{3/2}}+\frac{4bc^{3/2}\,\text{EllipticF}\left(\arcsin\left(\frac{\sqrt{c}\sqrt{dx}}{\sqrt{d}}\right),-1\right)}{3d^{5/2}}\\
&\quad-\frac{(4bc^2)\,\text{Subst}\left(\int\frac{\sqrt{1+\frac{cx^2}{d}}}{\sqrt{1-\frac{cx^2}{d}}}\,dx,x,\sqrt{dx}\right)}{3d^3}\\
&= -\frac{4bc\sqrt{1-c^2x^2}}{3d^2\sqrt{dx}}-\frac{2(a+b\arcsin(cx))}{3d(dx)^{3/2}}-\frac{4bc^{3/2}E\left(\arcsin\left(\frac{\sqrt{c}\sqrt{dx}}{\sqrt{d}}\right)\middle|-1\right)}{3d^{5/2}}\\
&\quad+\frac{4bc^{3/2}\,\text{EllipticF}\left(\arcsin\left(\frac{\sqrt{c}\sqrt{dx}}{\sqrt{d}}\right),-1\right)}{3d^{5/2}}
\end{aligned}$$

Mathematica [C] (verified)

Result contains higher order function than in optimal. Order 5 vs. order 4 in optimal.

Time = 0.02 (sec) , antiderivative size = 42, normalized size of antiderivative = 0.34

$$\int\frac{a+b\arcsin(cx)}{(dx)^{5/2}}\,dx=-\frac{2x\left(a+b\arcsin(cx)+2bcx\,\text{Hypergeometric2F1}\left(-\frac{1}{4},\frac{1}{2},\frac{3}{4},c^2x^2\right)\right)}{3(dx)^{5/2}}$$

```
[In] Integrate[(a + b*ArcSin[c*x])/(d*x)^(5/2),x]
[Out] (-2*x*(a + b*ArcSin[c*x] + 2*b*c*x*Hypergeometric2F1[-1/4, 1/2, 3/4, c^2*x^
2]))/(3*(d*x)^(5/2))
```

Maple [A] (verified)

Time = 0.30 (sec) , antiderivative size = 129, normalized size of antiderivative = 1.03

method	result	si
derivativedivides	$\frac{-\frac{2a}{3(dx)^{\frac{3}{2}}}+2b\left(-\frac{\arcsin(cx)}{3(dx)^{\frac{3}{2}}}+\frac{2c\left(-\frac{\sqrt{-c^2x^2+1}}{\sqrt{dx}}+\frac{c\sqrt{-cx+1}\,\sqrt{cx+1}\,\left(\text{EllipticF}\left(\sqrt{dx}\,\sqrt{\frac{c}{d}},i\right)-\text{EllipticE}\left(\sqrt{dx}\,\sqrt{\frac{c}{d}},i\right)\right)}{d\sqrt{\frac{c}{d}}\,\sqrt{-c^2x^2+1}}\right)}{3d}\right)}{d}$	12
default	$\frac{-\frac{2a}{3(dx)^{\frac{3}{2}}}+2b\left(-\frac{\arcsin(cx)}{3(dx)^{\frac{3}{2}}}+\frac{2c\left(-\frac{\sqrt{-c^2x^2+1}}{\sqrt{dx}}+\frac{c\sqrt{-cx+1}\,\sqrt{cx+1}\,\left(\text{EllipticF}\left(\sqrt{dx}\,\sqrt{\frac{c}{d}},i\right)-\text{EllipticE}\left(\sqrt{dx}\,\sqrt{\frac{c}{d}},i\right)\right)}{d\sqrt{\frac{c}{d}}\,\sqrt{-c^2x^2+1}}\right)}{3d}\right)}{d}$	12
parts	$-\frac{2a}{3(dx)^{\frac{3}{2}}d}+\frac{2b\left(-\frac{\arcsin(cx)}{3(dx)^{\frac{3}{2}}}+\frac{2c\left(-\frac{\sqrt{-c^2x^2+1}}{\sqrt{dx}}+\frac{c\sqrt{-cx+1}\,\sqrt{cx+1}\,\left(\text{EllipticF}\left(\sqrt{dx}\,\sqrt{\frac{c}{d}},i\right)-\text{EllipticE}\left(\sqrt{dx}\,\sqrt{\frac{c}{d}},i\right)\right)}{d\sqrt{\frac{c}{d}}\,\sqrt{-c^2x^2+1}}\right)}{3d}\right)}{d}$	13

```
[In] int((a+b*arcsin(c*x))/(d*x)^(5/2),x,method=_RETURNVERBOSE)
```

```
[Out] 2/d*(-1/3*a/(d*x)^(3/2)+b*(-1/3/(d*x)^(3/2)*arcsin(c*x)+2/3*c/d*(-(-c^2*x^2
+1)^(1/2)/(d*x)^(1/2)+c/d/(c/d)^(1/2)*(-c*x+1)^(1/2)*(c*x+1)^(1/2)/(-c^2*x^
2+1)^(1/2)*(EllipticF((d*x)^(1/2)*(c/d)^(1/2),I)-EllipticE((d*x)^(1/2)*(c/d
)^(1/2),I)))))
```

Fricas [C] (verification not implemented)

Result contains higher order function than in optimal. Order 9 vs. order 4.

Time = 0.09 (sec) , antiderivative size = 70, normalized size of antiderivative = 0.56

$$\int \frac{a+b\arcsin(cx)}{(dx)^{5/2}}\,dx =$$
$$-\frac{2\left(2\sqrt{-c^2d}bcx^2\text{weierstrassZeta}\left(\frac{4}{c^2},0,\text{weierstrassPInverse}\left(\frac{4}{c^2},0,x\right)\right)+\left(2\sqrt{-c^2x^2+1}bcx+b\arcsin\left(cx\right)+\right.\right.}{3\,d^3x^2}$$

```
[In] integrate((a+b*arcsin(c*x))/(d*x)^(5/2),x, algorithm="fricas")
```

```
[Out] -2/3*(2*sqrt(-c^2*d)*b*c*x^2*weierstrassZeta(4/c^2, 0, weierstrassPInverse(
4/c^2, 0, x)) + (2*sqrt(-c^2*x^2 + 1)*b*c*x + b*arcsin(c*x) + a)*sqrt(d*x))
/(d^3*x^2)
```

Sympy [F(-2)]

Exception generated.

$$\int \frac{a + b \arcsin(cx)}{(dx)^{5/2}} \, dx = \text{Exception raised: TypeError}$$

```
[In] integrate((a+b*asin(c*x))/(d*x)**(5/2),x)
```

```
[Out] Exception raised: TypeError >> Invalid comparison of non-real zoo
```

Maxima [F]

$$\int \frac{a + b \arcsin(cx)}{(dx)^{5/2}} \, dx = \int \frac{b \arcsin(cx) + a}{(dx)^{\frac{5}{2}}} \, dx$$

```
[In] integrate((a+b*arcsin(c*x))/(d*x)^(5/2),x, algorithm="maxima")
```

```
[Out] -2/3*(b*sqrt(d)*x^(3/2)*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1)) + (3*b*c
*d^3*x^(5/2)*integrate(1/3*sqrt(c*x + 1)*sqrt(-c*x + 1)*sqrt(x)/(c^2*d^3*x^
4 - d^3*x^2), x) + a*x)*sqrt(d)*sqrt(x))/(d^3*x^3)
```

Giac [F]

$$\int \frac{a + b \arcsin(cx)}{(dx)^{5/2}} \, dx = \int \frac{b \arcsin(cx) + a}{(dx)^{\frac{5}{2}}} \, dx$$

```
[In] integrate((a+b*arcsin(c*x))/(d*x)^(5/2),x, algorithm="giac")
```

```
[Out] integrate((b*arcsin(c*x) + a)/(d*x)^(5/2), x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{a + b \arcsin(cx)}{(dx)^{5/2}} \, dx = \int \frac{a + b \operatorname{asin}(c\,x)}{(d\,x)^{5/2}} \, dx$$

```
[In] int((a + b*asin(c*x))/(d*x)^(5/2),x)
```

```
[Out] int((a + b*asin(c*x))/(d*x)^(5/2), x)
```

3.209 $\int (dx)^{5/2}(a+b\arcsin(cx))^2\,dx$

Optimal result

Integrand size = 18, antiderivative size = 109

$$\int (dx)^{5/2}(a+b\arcsin(cx))^2\,dx=\frac{2(dx)^{7/2}(a+b\arcsin(cx))^2}{7d}-\frac{8bc(dx)^{9/2}(a+b\arcsin(cx))\,\text{Hypergeometric2F1}\left(\frac{1}{2},\frac{9}{4},\frac{13}{4},c^2x^2\right)}{63d^2}+\frac{16b^2c^2(dx)^{11/2}\,{}_3F_2\left(1,\frac{11}{4},\frac{11}{4};\frac{13}{4},\frac{15}{4};c^2x^2\right)}{693d^3}$$

```
[Out] 2/7*(d*x)^(7/2)*(a+b*arcsin(c*x))^2/d-8/63*b*c*(d*x)^(9/2)*(a+b*arcsin(c*x)
)*hypergeom([1/2, 9/4],[13/4],c^2*x^2)/d^2+16/693*b^2*c^2*(d*x)^(11/2)*hype
rgeom([1, 11/4, 11/4],[13/4, 15/4],c^2*x^2)/d^3
```

Rubi [A] (verified)

Time = 0.09 (sec) , antiderivative size = 109, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.111, Rules used = {4723, 4805}

$$\int (dx)^{5/2}(a+b\arcsin(cx))^2\,dx=\frac{16b^2c^2(dx)^{11/2}\,{}_3F_2\left(1,\frac{11}{4},\frac{11}{4};\frac{13}{4},\frac{15}{4};c^2x^2\right)}{693d^3}-\frac{8bc(dx)^{9/2}\,\text{Hypergeometric2F1}\left(\frac{1}{2},\frac{9}{4},\frac{13}{4},c^2x^2\right)(a+b\arcsin(cx))}{63d^2}+\frac{2(dx)^{7/2}(a+b\arcsin(cx))^2}{7d}$$

```
[In] Int[(d*x)^(5/2)*(a + b*ArcSin[c*x])^2,x]
```

```
[Out] (2*(d*x)^(7/2)*(a + b*ArcSin[c*x])^2)/(7*d) - (8*b*c*(d*x)^(9/2)*(a + b*Arc
Sin[c*x])*Hypergeometric2F1[1/2, 9/4, 13/4, c^2*x^2])/(63*d^2) + (16*b^2*c^
```

```
2*(d*x)^(11/2)*HypergeometricPFQ[{1, 11/4, 11/4}, {13/4, 15/4}, c^2*x^2])/(
693*d^3)
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rule 4805

```
Int[(((a_.) + ArcSin[(c_.)*(x_)]*(b_.))*((f_.)*(x_))^(m_))/Sqrt[(d_) + (e_.
)*(x_)^2], x_Symbol] :> Simp[((f*x)^(m + 1)/(f*(m + 1)))*Simp[Sqrt[1 - c^2*
x^2]/Sqrt[d + e*x^2]]*(a + b*ArcSin[c*x])*Hypergeometric2F1[1/2, (1 + m)/2,
 (3 + m)/2, c^2*x^2], x] - Simp[b*c*((f*x)^(m + 2)/(f^2*(m + 1)*(m + 2)))*S
imp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]]*HypergeometricPFQ[{1, 1 + m/2, 1 + m
/2}, {3/2 + m/2, 2 + m/2}, c^2*x^2], x] /; FreeQ[{a, b, c, d, e, f, m}, x]
&& EqQ[c^2*d + e, 0] &&  !IntegerQ[m]
```

Rubi steps

$$\begin{aligned}\text{integral} &= \frac{2(dx)^{7/2}(a+b\arcsin(cx))^2}{7d} - \frac{(4bc)\int \frac{(dx)^{7/2}(a+b\arcsin(cx))}{\sqrt{1-c^2x^2}}\,dx}{7d}\\ &= \frac{2(dx)^{7/2}(a+b\arcsin(cx))^2}{7d}\\ &\quad - \frac{8bc(dx)^{9/2}(a+b\arcsin(cx))\,\text{Hypergeometric2F1}\left(\frac{1}{2},\frac{9}{4},\frac{13}{4},c^2x^2\right)}{63d^2}\\ &\quad + \frac{16b^2c^2(dx)^{11/2}\,{}_3F_2\left(1,\frac{11}{4},\frac{11}{4};\frac{13}{4},\frac{15}{4};c^2x^2\right)}{693d^3}\end{aligned}$$

Mathematica [A] (verified)

Time = 0.05 (sec) , antiderivative size = 90, normalized size of antiderivative = 0.83

$$\int (dx)^{5/2}(a+b\arcsin(cx))^2\,dx = \frac{2}{693}x(dx)^{5/2}\left(11(a+b\arcsin(cx))\left(9(a+b\arcsin(cx))-4bcx\,\text{Hypergeometric2F1}\left(\frac{1}{2},\frac{9}{4}\right.\right.\right.$$

```
[In] Integrate[(d*x)^(5/2)*(a + b*ArcSin[c*x])^2,x]
```

```
[Out] (2*x*(d*x)^(5/2)*(11*(a + b*ArcSin[c*x])*(9*(a + b*ArcSin[c*x]) - 4*b*c*x*H
ypergeometric2F1[1/2, 9/4, 13/4, c^2*x^2]) + 8*b^2*c^2*x^2*HypergeometricPF
Q[{1, 11/4, 11/4}, {13/4, 15/4}, c^2*x^2]))/693
```

Maple [F]

$$\int (dx)^{\frac{5}{2}} (a + b \arcsin (cx))^2 \, dx$$

```
[In] int((d*x)^(5/2)*(a+b*arcsin(c*x))^2,x)
[Out] int((d*x)^(5/2)*(a+b*arcsin(c*x))^2,x)
```

Fricas [F]

$$\int (dx)^{5/2}(a + b \arcsin(cx))^2 \, dx = \int (dx)^{\frac{5}{2}} (b \arcsin (cx) + a)^2 \, dx$$

```
[In] integrate((d*x)^(5/2)*(a+b*arcsin(c*x))^2,x, algorithm="fricas")
[Out] integral((b^2*d^2*x^2*arcsin(c*x)^2 + 2*a*b*d^2*x^2*arcsin(c*x) + a^2*d^2*x
^2)*sqrt(d*x), x)
```

Sympy [F(-1)]

Timed out.

$$\int (dx)^{5/2}(a + b \arcsin(cx))^2 \, dx = \text{Timed out}$$

```
[In] integrate((d*x)**(5/2)*(a+b*asin(c*x))**2,x)
[Out] Timed out
```

Maxima [F]

$$\int (dx)^{5/2}(a + b \arcsin(cx))^2 \, dx = \int (dx)^{\frac{5}{2}} (b \arcsin (cx) + a)^2 \, dx$$

```
[In] integrate((d*x)^(5/2)*(a+b*arcsin(c*x))^2,x, algorithm="maxima")
[Out] 2/7*b^2*d^(5/2)*x^(7/2)*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1))^2 + 1/42
*a^2*c^2*d^(5/2)*(4*(3*c^2*x^(7/2) + 7*x^(3/2))/c^4 + 42*arctan(sqrt(c)*sqr
t(x))/c^(11/2) + 21*log((c*sqrt(x) - sqrt(c))/(c*sqrt(x) + sqrt(c)))/c^(11/
2)) + 14*a*b*c^2*d^(5/2)*integrate(1/7*x^(9/2)*arctan(c*x/(sqrt(c*x + 1)*sq
rt(-c*x + 1)))/(c^2*x^2 - 1), x) + 4*b^2*c*d^(5/2)*integrate(1/7*sqrt(c*x +
 1)*sqrt(-c*x + 1)*x^(7/2)*arctan(c*x/(sqrt(c*x + 1)*sqrt(-c*x + 1)))/(c^2*
x^2 - 1), x) - 1/6*a^2*d^(5/2)*(4*x^(3/2)/c^2 + 6*arctan(sqrt(c)*sqrt(x))/c
^(7/2) + 3*log((c*sqrt(x) - sqrt(c))/(c*sqrt(x) + sqrt(c)))/c^(7/2)) - 14*a
*b*d^(5/2)*integrate(1/7*x^(5/2)*arctan(c*x/(sqrt(c*x + 1)*sqrt(-c*x + 1)))
/(c^2*x^2 - 1), x)
```

Giac [F(-2)]

Exception generated.

$$\int (dx)^{5/2}(a+b\arcsin(cx))^2\,dx=\text{Exception raised: RuntimeError}$$

```
[In] integrate((d*x)^(5/2)*(a+b*arcsin(c*x))^2,x, algorithm="giac")
```

```
[Out] Exception raised: RuntimeError >> an error occurred running a Giac command:
INPUT:sage2OUTPUT:sym2poly/r2sym(const gen & e,const index_m & i,const vect
eur & l) Error: Bad Argument Value
```

Mupad [F(-1)]

Timed out.

$$\int (dx)^{5/2}(a+b\arcsin(cx))^2\,dx=\int (a+b\,\mathrm{asin}(c\,x))^2\,(d\,x)^{5/2}\,dx$$

```
[In] int((a + b*asin(c*x))^2*(d*x)^(5/2),x)
```

```
[Out] int((a + b*asin(c*x))^2*(d*x)^(5/2), x)
```

3.210 $\int (dx)^{3/2}(a+b\arcsin(cx))^2\,dx$

Optimal result

Integrand size = 18, antiderivative size = 109

$$\int (dx)^{3/2}(a+b\arcsin(cx))^2\,dx=\frac{2(dx)^{5/2}(a+b\arcsin(cx))^2}{5d}-\frac{8bc(dx)^{7/2}(a+b\arcsin(cx))\,\text{Hypergeometric2F1}\left(\frac{1}{2},\frac{7}{4},\frac{11}{4},c^2x^2\right)}{35d^2}+\frac{16b^2c^2(dx)^{9/2}\,{}_3F_2\left(1,\frac{9}{4},\frac{9}{4};\frac{11}{4},\frac{13}{4};c^2x^2\right)}{315d^3}$$

```
[Out] 2/5*(d*x)^(5/2)*(a+b*arcsin(c*x))^2/d-8/35*b*c*(d*x)^(7/2)*(a+b*arcsin(c*x)
)*hypergeom([1/2, 7/4],[11/4],c^2*x^2)/d^2+16/315*b^2*c^2*(d*x)^(9/2)*hyper
geom([1, 9/4, 9/4],[11/4, 13/4],c^2*x^2)/d^3
```

Rubi [A] (verified)

Time = 0.09 (sec) , antiderivative size = 109, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.111, Rules used = {4723, 4805}

$$\int (dx)^{3/2}(a+b\arcsin(cx))^2\,dx=\frac{16b^2c^2(dx)^{9/2}\,{}_3F_2\left(1,\frac{9}{4},\frac{9}{4};\frac{11}{4},\frac{13}{4};c^2x^2\right)}{315d^3}-\frac{8bc(dx)^{7/2}\,\text{Hypergeometric2F1}\left(\frac{1}{2},\frac{7}{4},\frac{11}{4},c^2x^2\right)(a+b\arcsin(cx))}{35d^2}+\frac{2(dx)^{5/2}(a+b\arcsin(cx))^2}{5d}$$

```
[In] Int[(d*x)^(3/2)*(a + b*ArcSin[c*x])^2,x]
```

```
[Out] (2*(d*x)^(5/2)*(a + b*ArcSin[c*x])^2)/(5*d) - (8*b*c*(d*x)^(7/2)*(a + b*Arc
Sin[c*x])*Hypergeometric2F1[1/2, 7/4, 11/4, c^2*x^2])/(35*d^2) + (16*b^2*c^
```

```
2*(d*x)^(9/2)*HypergeometricPFQ[{1, 9/4, 9/4}, {11/4, 13/4}, c^2*x^2])/(315
*d^3)
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rule 4805

```
Int[(((a_.) + ArcSin[(c_.)*(x_)]*(b_.))*((f_.)*(x_))^(m_))/Sqrt[(d_) + (e_.
)*(x_)^2], x_Symbol] :> Simp[((f*x)^(m + 1)/(f*(m + 1)))*Simp[Sqrt[1 - c^2*
x^2]/Sqrt[d + e*x^2]]*(a + b*ArcSin[c*x])*Hypergeometric2F1[1/2, (1 + m)/2,
 (3 + m)/2, c^2*x^2], x] - Simp[b*c*((f*x)^(m + 2)/(f^2*(m + 1)*(m + 2)))*S
imp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]]*HypergeometricPFQ[{1, 1 + m/2, 1 + m
/2}, {3/2 + m/2, 2 + m/2}, c^2*x^2], x] /; FreeQ[{a, b, c, d, e, f, m}, x]
&& EqQ[c^2*d + e, 0] &&  !IntegerQ[m]
```

Rubi steps

$$\begin{aligned}\text{integral} &= \frac{2(dx)^{5/2}(a+b\arcsin(cx))^2}{5d} - \frac{(4bc)\int \frac{(dx)^{5/2}(a+b\arcsin(cx))}{\sqrt{1-c^2x^2}}\,dx}{5d}\\ &= \frac{2(dx)^{5/2}(a+b\arcsin(cx))^2}{5d}\\ &\quad - \frac{8bc(dx)^{7/2}(a+b\arcsin(cx))\,\text{Hypergeometric2F1}\left(\frac{1}{2},\frac{7}{4},\frac{11}{4},c^2x^2\right)}{35d^2}\\ &\quad + \frac{16b^2c^2(dx)^{9/2}\,{}_3F_2\left(1,\frac{9}{4},\frac{9}{4};\frac{11}{4},\frac{13}{4};c^2x^2\right)}{315d^3}\end{aligned}$$

Mathematica [A] (verified)

Time = 0.04 (sec) , antiderivative size = 90, normalized size of antiderivative = 0.83

$$\int (dx)^{3/2}(a+b\arcsin(cx))^2\,dx = \frac{2}{315}x(dx)^{3/2}\left(9(a+b\arcsin(cx))\left(7(a+b\arcsin(cx))-4bcx\,\text{Hypergeometric2F1}\left(\frac{1}{2},\frac{7}{4},\right.\right.\right.$$

```
[In] Integrate[(d*x)^(3/2)*(a + b*ArcSin[c*x])^2,x]
```

```
[Out] (2*x*(d*x)^(3/2)*(9*(a + b*ArcSin[c*x])*(7*(a + b*ArcSin[c*x]) - 4*b*c*x*Hy
pergeometric2F1[1/2, 7/4, 11/4, c^2*x^2]) + 8*b^2*c^2*x^2*HypergeometricPFQ
[{1, 9/4, 9/4}, {11/4, 13/4}, c^2*x^2]))/315
```

Maple [F]

$$\int (dx)^{\frac{3}{2}} (a + b \arcsin (cx))^2 \, dx$$

[In] int((d*x)^(3/2)*(a+b*arcsin(c*x))^2,x)

[Out] int((d*x)^(3/2)*(a+b*arcsin(c*x))^2,x)

Fricas [F]

$$\int (dx)^{3/2}(a + b \arcsin(cx))^2 \, dx = \int (dx)^{\frac{3}{2}} (b \arcsin (cx) + a)^2 \, dx$$

[In] integrate((d*x)^(3/2)*(a+b*arcsin(c*x))^2,x, algorithm="fricas")

[Out] integral((b^2*d*x*arcsin(c*x)^2 + 2*a*b*d*x*arcsin(c*x) + a^2*d*x)*sqrt(d*x
), x)

Sympy [F]

$$\int (dx)^{3/2}(a + b \arcsin(cx))^2 \, dx = \int (dx)^{\frac{3}{2}} (a + b \operatorname{asin} (cx))^2 \, dx$$

[In] integrate((d*x)**(3/2)*(a+b*asin(c*x))**2,x)

[Out] Integral((d*x)**(3/2)*(a + b*asin(c*x))**2, x)

Maxima [F]

$$\int (dx)^{3/2}(a + b \arcsin(cx))^2 \, dx = \int (dx)^{\frac{3}{2}} (b \arcsin (cx) + a)^2 \, dx$$

[In] integrate((d*x)^(3/2)*(a+b*arcsin(c*x))^2,x, algorithm="maxima")

[Out] 2/5*b^2*d^(3/2)*x^(5/2)*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1))^2 + 1/10
*a^2*c^2*d^(3/2)*(4*(c^2*x^(5/2) + 5*sqrt(x))/c^4 - 10*arctan(sqrt(c)*sqrt(
x))/c^(9/2) + 5*log((c*sqrt(x) - sqrt(c))/(c*sqrt(x) + sqrt(c)))/c^(9/2)) +
 10*a*b*c^2*d^(3/2)*integrate(1/5*x^(7/2)*arctan(c*x/(sqrt(c*x + 1)*sqrt(-c
*x + 1)))/(c^2*x^2 - 1), x) + 4*b^2*c*d^(3/2)*integrate(1/5*sqrt(c*x + 1)*s
qrt(-c*x + 1)*x^(5/2)*arctan(c*x/(sqrt(c*x + 1)*sqrt(-c*x + 1)))/(c^2*x^2 -
 1), x) - 1/2*a^2*d^(3/2)*(4*sqrt(x)/c^2 - 2*arctan(sqrt(c)*sqrt(x))/c^(5/2
) + log((c*sqrt(x) - sqrt(c))/(c*sqrt(x) + sqrt(c)))/c^(5/2)) - 10*a*b*d^(3
/2)*integrate(1/5*x^(3/2)*arctan(c*x/(sqrt(c*x + 1)*sqrt(-c*x + 1)))/(c^2*x
^2 - 1), x)

Giac [F(-2)]

Exception generated.

$$\int (dx)^{3/2}(a+b\arcsin(cx))^2\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate((d*x)^(3/2)*(a+b*arcsin(c*x))^2,x, algorithm="giac")
```

```
[Out] Exception raised: RuntimeError >> an error occurred running a Giac command:
INPUT:sage2OUTPUT:sym2poly/r2sym(const gen & e,const index_m & i,const vect
eur & l) Error: Bad Argument Value
```

Mupad [F(-1)]

Timed out.

$$\int (dx)^{3/2}(a+b\arcsin(cx))^2\,dx = \int (a+b\,\mathrm{asin}(c\,x))^2\,(d\,x)^{3/2}\,dx$$

```
[In] int((a + b*asin(c*x))^2*(d*x)^(3/2),x)
```

```
[Out] int((a + b*asin(c*x))^2*(d*x)^(3/2), x)
```

3.211 $\int \sqrt{dx}(a+b\arcsin(cx))^2\,dx$

Optimal result

Integrand size = 18, antiderivative size = 109

$$\int \sqrt{dx}(a+b\arcsin(cx))^2\,dx = \frac{2(dx)^{3/2}(a+b\arcsin(cx))^2}{3d} - \frac{8bc(dx)^{5/2}(a+b\arcsin(cx))\,\text{Hypergeometric2F1}\left(\frac{1}{2},\frac{5}{4},\frac{9}{4},c^2x^2\right)}{15d^2} + \frac{16b^2c^2(dx)^{7/2}\,{}_3F_2\left(1,\frac{7}{4},\frac{7}{4};\frac{9}{4},\frac{11}{4};c^2x^2\right)}{105d^3}$$

```
[Out] 2/3*(d*x)^(3/2)*(a+b*arcsin(c*x))^2/d-8/15*b*c*(d*x)^(5/2)*(a+b*arcsin(c*x)
)*hypergeom([1/2, 5/4],[9/4],c^2*x^2)/d^2+16/105*b^2*c^2*(d*x)^(7/2)*hyperg
eom([1, 7/4, 7/4],[9/4, 11/4],c^2*x^2)/d^3
```

Rubi [A] (verified)

Time = 0.08 (sec) , antiderivative size = 109, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.111, Rules used = {4723, 4805}

$$\int \sqrt{dx}(a+b\arcsin(cx))^2\,dx = \frac{16b^2c^2(dx)^{7/2}\,{}_3F_2\left(1,\frac{7}{4},\frac{7}{4};\frac{9}{4},\frac{11}{4};c^2x^2\right)}{105d^3} - \frac{8bc(dx)^{5/2}\,\text{Hypergeometric2F1}\left(\frac{1}{2},\frac{5}{4},\frac{9}{4},c^2x^2\right)(a+b\arcsin(cx))}{15d^2} + \frac{2(dx)^{3/2}(a+b\arcsin(cx))^2}{3d}$$

```
[In] Int[Sqrt[d*x]*(a + b*ArcSin[c*x])^2,x]
```

```
[Out] (2*(d*x)^(3/2)*(a + b*ArcSin[c*x])^2)/(3*d) - (8*b*c*(d*x)^(5/2)*(a + b*Arc
Sin[c*x])*Hypergeometric2F1[1/2, 5/4, 9/4, c^2*x^2])/(15*d^2) + (16*b^2*c^2
*(d*x)^(7/2)*HypergeometricPFQ[{1, 7/4, 7/4}, {9/4, 11/4}, c^2*x^2])/(105*d
^3)
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rule 4805

```
Int[(((a_.) + ArcSin[(c_.)*(x_)]*(b_.))*((f_.)*(x_))^(m_))/Sqrt[(d_) + (e_.
)*(x_)^2], x_Symbol] :> Simp[((f*x)^(m + 1)/(f*(m + 1)))*Simp[Sqrt[1 - c^2*
x^2]/Sqrt[d + e*x^2]]*(a + b*ArcSin[c*x])*Hypergeometric2F1[1/2, (1 + m)/2,
 (3 + m)/2, c^2*x^2], x] - Simp[b*c*((f*x)^(m + 2)/(f^2*(m + 1)*(m + 2)))*S
imp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]]*HypergeometricPFQ[{1, 1 + m/2, 1 + m
/2}, {3/2 + m/2, 2 + m/2}, c^2*x^2], x] /; FreeQ[{a, b, c, d, e, f, m}, x]
&& EqQ[c^2*d + e, 0] &&  !IntegerQ[m]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= \frac{2(dx)^{3/2}(a+b\arcsin(cx))^2}{3d} - \frac{(4bc)\int \frac{(dx)^{3/2}(a+b\arcsin(cx))}{\sqrt{1-c^2x^2}}\,dx}{3d} \\
&= \frac{2(dx)^{3/2}(a+b\arcsin(cx))^2}{3d} \\
&\quad - \frac{8bc(dx)^{5/2}(a+b\arcsin(cx))\,\text{Hypergeometric2F1}\left(\frac{1}{2},\frac{5}{4},\frac{9}{4},c^2x^2\right)}{15d^2} \\
&\quad + \frac{16b^2c^2(dx)^{7/2}\,{}_3F_2\left(1,\frac{7}{4},\frac{7}{4};\frac{9}{4},\frac{11}{4};c^2x^2\right)}{105d^3}
\end{aligned}$$

Mathematica [A] (verified)

Time = 0.05 (sec) , antiderivative size = 90, normalized size of antiderivative = 0.83

$$\begin{aligned}
\int \sqrt{dx}(a+b\arcsin(cx))^2\,dx &= \frac{2}{105}x\sqrt{dx}\Bigg(7(a+b\arcsin(cx))\Bigg(5(a+b\arcsin(cx)) \\
&\quad - 4bcx\,\text{Hypergeometric2F1}\left(\frac{1}{2},\frac{5}{4},\frac{9}{4},c^2x^2\right)\Bigg) \\
&\quad + 8b^2c^2x^2\,{}_3F_2\left(1,\frac{7}{4},\frac{7}{4};\frac{9}{4},\frac{11}{4};c^2x^2\right)\Bigg)
\end{aligned}$$

```
[In] Integrate[Sqrt[d*x]*(a + b*ArcSin[c*x])^2,x]
```

```
[Out] (2*x*Sqrt[d*x]*(7*(a + b*ArcSin[c*x])*(5*(a + b*ArcSin[c*x]) - 4*b*c*x*Hype
rgeometric2F1[1/2, 5/4, 9/4, c^2*x^2]) + 8*b^2*c^2*x^2*HypergeometricPFQ[{1
, 7/4, 7/4}, {9/4, 11/4}, c^2*x^2]))/105
```

Maple [F]

$$\int \sqrt{dx}\,(a+b\arcsin{(cx)})^2\,dx$$

```
[In] int((d*x)^(1/2)*(a+b*arcsin(c*x))^2,x)
```

```
[Out] int((d*x)^(1/2)*(a+b*arcsin(c*x))^2,x)
```

Fricas [F]

$$\int \sqrt{dx}(a+b\arcsin(cx))^2\,dx=\int \sqrt{dx}(b\arcsin{(cx)}+a)^2\,dx$$

```
[In] integrate((d*x)^(1/2)*(a+b*arcsin(c*x))^2,x, algorithm="fricas")
```

```
[Out] integral((b^2*arcsin(c*x)^2 + 2*a*b*arcsin(c*x) + a^2)*sqrt(d*x), x)
```

Sympy [F]

$$\int \sqrt{dx}(a+b\arcsin(cx))^2\,dx=\int \sqrt{dx}(a+b\operatorname{asin}{(cx)})^2\,dx$$

```
[In] integrate((d*x)**(1/2)*(a+b*asin(c*x))**2,x)
```

```
[Out] Integral(sqrt(d*x)*(a + b*asin(c*x))**2, x)
```

Maxima [F]

$$\int \sqrt{dx}(a+b\arcsin(cx))^2\,dx=\int \sqrt{dx}(b\arcsin{(cx)}+a)^2\,dx$$

```
[In] integrate((d*x)^(1/2)*(a+b*arcsin(c*x))^2,x, algorithm="maxima")
```

```
[Out] 2/3*b^2*sqrt(d)*x^(3/2)*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1))^2 + 1/6*
a^2*c^2*sqrt(d)*(4*x^(3/2)/c^2 + 6*arctan(sqrt(c)*sqrt(x))/c^(7/2) + 3*log(
(c*sqrt(x) - sqrt(c))/(c*sqrt(x) + sqrt(c)))/c^(7/2)) + 6*a*b*c^2*sqrt(d)*i
```

```
ntegrate(1/3*x^(5/2)*arctan(c*x/(sqrt(c*x + 1)*sqrt(-c*x + 1)))/(c^2*x^2 -
1), x) + 4*b^2*c*sqrt(d)*integrate(1/3*sqrt(c*x + 1)*sqrt(-c*x + 1)*x^(3/2)
*arctan(c*x/(sqrt(c*x + 1)*sqrt(-c*x + 1)))/(c^2*x^2 - 1), x) - 1/2*a^2*sqr
t(d)*(2*arctan(sqrt(c)*sqrt(x))/c^(3/2) + log((c*sqrt(x) - sqrt(c))/(c*sqrt
(x) + sqrt(c)))/c^(3/2)) - 6*a*b*sqrt(d)*integrate(1/3*sqrt(x)*arctan(c*x/(
sqrt(c*x + 1)*sqrt(-c*x + 1)))/(c^2*x^2 - 1), x)
```

Giac [F(-2)]

Exception generated.

$$\int \sqrt{dx}(a + b \arcsin(cx))^2 \, dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate((d*x)^(1/2)*(a+b*arcsin(c*x))^2,x, algorithm="giac")
```

```
[Out] Exception raised: RuntimeError >> an error occurred running a Giac command:
INPUT:sage2OUTPUT:sym2poly/r2sym(const gen & e,const index_m & i,const vect
eur & l) Error: Bad Argument Value
```

Mupad [F(-1)]

Timed out.

$$\int \sqrt{dx}(a + b \arcsin(cx))^2 \, dx = \int (a + b \operatorname{asin}(c x))^2 \sqrt{d x} \, dx$$

```
[In] int((a + b*asin(c*x))^2*(d*x)^(1/2),x)
```

```
[Out] int((a + b*asin(c*x))^2*(d*x)^(1/2), x)
```

3.212 $\int \frac{(a+b\arcsin(cx))^2}{\sqrt{dx}}\,dx$

Optimal result

Integrand size = 18, antiderivative size = 107

$$\int \frac{(a+b\arcsin(cx))^2}{\sqrt{dx}}\,dx = \frac{2\sqrt{dx}(a+b\arcsin(cx))^2}{d} - \frac{8bc(dx)^{3/2}(a+b\arcsin(cx))\,\text{Hypergeometric2F1}\left(\frac{1}{2},\frac{3}{4},\frac{7}{4},c^2x^2\right)}{3d^2} + \frac{16b^2c^2(dx)^{5/2}\,{}_3F_2\left(1,\frac{5}{4},\frac{5}{4};\frac{7}{4},\frac{9}{4};c^2x^2\right)}{15d^3}$$

```
[Out] -8/3*b*c*(d*x)^(3/2)*(a+b*arcsin(c*x))*hypergeom([1/2, 3/4],[7/4],c^2*x^2)/
d^2+16/15*b^2*c^2*(d*x)^(5/2)*hypergeom([1, 5/4, 5/4],[7/4, 9/4],c^2*x^2)/d
^3+2*(a+b*arcsin(c*x))^2*(d*x)^(1/2)/d
```

Rubi [A] (verified)

Time = 0.08 (sec) , antiderivative size = 107, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.111, Rules used = {4723, 4805}

$$\int \frac{(a+b\arcsin(cx))^2}{\sqrt{dx}}\,dx = \frac{16b^2c^2(dx)^{5/2}\,{}_3F_2\left(1,\frac{5}{4},\frac{5}{4};\frac{7}{4},\frac{9}{4};c^2x^2\right)}{15d^3} - \frac{8bc(dx)^{3/2}\,\text{Hypergeometric2F1}\left(\frac{1}{2},\frac{3}{4},\frac{7}{4},c^2x^2\right)(a+b\arcsin(cx))}{3d^2} + \frac{2\sqrt{dx}(a+b\arcsin(cx))^2}{d}$$

```
[In] Int[(a + b*ArcSin[c*x])^2/Sqrt[d*x],x]
```

```
[Out] (2*Sqrt[d*x]*(a + b*ArcSin[c*x])^2)/d - (8*b*c*(d*x)^(3/2)*(a + b*ArcSin[c*
x])*Hypergeometric2F1[1/2, 3/4, 7/4, c^2*x^2])/(3*d^2) + (16*b^2*c^2*(d*x)^
(5/2)*HypergeometricPFQ[{1, 5/4, 5/4}, {7/4, 9/4}, c^2*x^2])/(15*d^3)
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rule 4805

```
Int[(((a_.) + ArcSin[(c_.)*(x_)]*(b_.))*((f_.)*(x_))^(m_))/Sqrt[(d_) + (e_.
)*(x_)^2], x_Symbol] :> Simp[((f*x)^(m + 1)/(f*(m + 1)))*Simp[Sqrt[1 - c^2*
x^2]/Sqrt[d + e*x^2]]*(a + b*ArcSin[c*x])*Hypergeometric2F1[1/2, (1 + m)/2,
 (3 + m)/2, c^2*x^2], x] - Simp[b*c*((f*x)^(m + 2)/(f^2*(m + 1)*(m + 2)))*S
imp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]]*HypergeometricPFQ[{1, 1 + m/2, 1 + m
/2}, {3/2 + m/2, 2 + m/2}, c^2*x^2], x] /; FreeQ[{a, b, c, d, e, f, m}, x]
&& EqQ[c^2*d + e, 0] &&  !IntegerQ[m]
```

Rubi steps

$$\text{integral} = \frac{2\sqrt{dx}(a+b\arcsin(cx))^2}{d} - \frac{(4bc)\int \frac{\sqrt{dx}(a+b\arcsin(cx))}{\sqrt{1-c^2x^2}}\,dx}{d}$$
$$= \frac{2\sqrt{dx}(a+b\arcsin(cx))^2}{d} - \frac{8bc(dx)^{3/2}(a+b\arcsin(cx))\,\text{Hypergeometric2F1}\left(\frac{1}{2},\frac{3}{4},\frac{7}{4},c^2x^2\right)}{3d^2} + \frac{16b^2c^2(dx)^{5/2}\,{}_3F_2\left(1,\frac{5}{4},\frac{5}{4};\frac{7}{4},\frac{9}{4};c^2x^2\right)}{15d^3}$$

Mathematica [A] (verified)

Time = 0.04 (sec) , antiderivative size = 90, normalized size of antiderivative = 0.84

$$\int \frac{(a+b\arcsin(cx))^2}{\sqrt{dx}}\,dx = \frac{2x\left(5(a+b\arcsin(cx))\left(3(a+b\arcsin(cx))-4bcx\,\text{Hypergeometric2F1}\left(\frac{1}{2},\frac{3}{4},\frac{7}{4},c^2x^2\right)\right)+8b^2c^2x^2\,{}_3F_2\left(1,\frac{5}{4}\right.\right.}{15\sqrt{dx}}$$

```
[In] Integrate[(a + b*ArcSin[c*x])^2/Sqrt[d*x],x]
```

```
[Out] (2*x*(5*(a + b*ArcSin[c*x])*(3*(a + b*ArcSin[c*x]) - 4*b*c*x*Hypergeometric
2F1[1/2, 3/4, 7/4, c^2*x^2]) + 8*b^2*c^2*x^2*HypergeometricPFQ[{1, 5/4, 5/4
}, {7/4, 9/4}, c^2*x^2]))/(15*Sqrt[d*x])
```

Maple [F]

$$\int \frac{(a+b\arcsin(cx))^2}{\sqrt{dx}}dx$$

```
[In] int((a+b*arcsin(c*x))^2/(d*x)^(1/2),x)
[Out] int((a+b*arcsin(c*x))^2/(d*x)^(1/2),x)
```

Fricas [F]

$$\int \frac{(a+b\arcsin(cx))^2}{\sqrt{dx}}\,dx = \int \frac{(b\arcsin(cx)+a)^2}{\sqrt{dx}}\,dx$$

```
[In] integrate((a+b*arcsin(c*x))^2/(d*x)^(1/2),x, algorithm="fricas")
[Out] integral((b^2*arcsin(c*x)^2 + 2*a*b*arcsin(c*x) + a^2)*sqrt(d*x)/(d*x), x)
```

Sympy [F(-2)]

Exception generated.

$$\int \frac{(a+b\arcsin(cx))^2}{\sqrt{dx}}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate((a+b*asin(c*x))**2/(d*x)**(1/2),x)
[Out] Exception raised: TypeError >> Invalid comparison of non-real zoo
```

Maxima [F]

$$\int \frac{(a+b\arcsin(cx))^2}{\sqrt{dx}}\,dx = \int \frac{(b\arcsin(cx)+a)^2}{\sqrt{dx}}\,dx$$

```
[In] integrate((a+b*arcsin(c*x))^2/(d*x)^(1/2),x, algorithm="maxima")
[Out] 1/2*(4*b^2*sqrt(x)*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1))^2 + (a^2*c^2*
sqrt(d)*(4*sqrt(x)/(c^2*d) - 2*arctan(sqrt(c)*sqrt(x))/(c^(5/2)*d) + log((c
*sqrt(x) - sqrt(c))/(c*sqrt(x) + sqrt(c)))/(c^(5/2)*d)) + 4*a*b*c^2*sqrt(d)
*integrate(x^(5/2)*arctan(c*x/(sqrt(c*x + 1)*sqrt(-c*x + 1)))/(c^2*d*x^3 -
d*x), x) + 8*b^2*c*sqrt(d)*integrate(sqrt(c*x + 1)*sqrt(-c*x + 1)*x^(3/2)*a
rctan(c*x/(sqrt(c*x + 1)*sqrt(-c*x + 1)))/(c^2*d*x^3 - d*x), x) + a^2*sqrt(
d)*(2*arctan(sqrt(c)*sqrt(x))/(sqrt(c)*d) - log((c*sqrt(x) - sqrt(c))/(c*sq
rt(x) + sqrt(c)))/(sqrt(c)*d)) - 4*a*b*sqrt(d)*integrate(sqrt(x)*arctan(c*x
/(sqrt(c*x + 1)*sqrt(-c*x + 1)))/(c^2*d*x^3 - d*x), x))*sqrt(d))/sqrt(d)
```

Giac [F]

$$\int \frac{(a+b\arcsin(cx))^2}{\sqrt{dx}}\,dx = \int \frac{(b\arcsin(cx)+a)^2}{\sqrt{dx}}\,dx$$

```
[In] integrate((a+b*arcsin(c*x))^2/(d*x)^(1/2),x, algorithm="giac")
[Out] integrate((b*arcsin(c*x) + a)^2/sqrt(d*x), x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{(a+b\arcsin(cx))^2}{\sqrt{dx}}\,dx = \int \frac{(a+b\,\mathrm{asin}(c\,x))^2}{\sqrt{d\,x}}\,dx$$

```
[In] int((a + b*asin(c*x))^2/(d*x)^(1/2),x)
[Out] int((a + b*asin(c*x))^2/(d*x)^(1/2), x)
```

3.213 $\int \frac{(a+b\arcsin(cx))^2}{(dx)^{3/2}}\,dx$

Optimal result

Integrand size = 18, antiderivative size = 105

$$\int \frac{(a+b\arcsin(cx))^2}{(dx)^{3/2}}\,dx = -\frac{2(a+b\arcsin(cx))^2}{d\sqrt{dx}} + \frac{8bc\sqrt{dx}(a+b\arcsin(cx))\,\text{Hypergeometric2F1}\left(\frac{1}{4},\frac{1}{2},\frac{5}{4},c^2x^2\right)}{d^2} - \frac{16b^2c^2(dx)^{3/2}\,{}_3F_2\left(\frac{3}{4},\frac{3}{4},1;\frac{5}{4},\frac{7}{4};c^2x^2\right)}{3d^3}$$

```
[Out] -16/3*b^2*c^2*(d*x)^(3/2)*hypergeom([3/4, 3/4, 1],[5/4, 7/4],c^2*x^2)/d^3-2
*(a+b*arcsin(c*x))^2/d/(d*x)^(1/2)+8*b*c*(a+b*arcsin(c*x))*hypergeom([1/4,
1/2],[5/4],c^2*x^2)*(d*x)^(1/2)/d^2
```

Rubi [A] (verified)

Time = 0.08 (sec) , antiderivative size = 105, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, $\frac{\text{number of rules}}{\text{integrand size}} = 0.111$, Rules used = {4723, 4805}

$$\int \frac{(a+b\arcsin(cx))^2}{(dx)^{3/2}}\,dx = -\frac{16b^2c^2(dx)^{3/2}\,{}_3F_2\left(\frac{3}{4},\frac{3}{4},1;\frac{5}{4},\frac{7}{4};c^2x^2\right)}{3d^3} + \frac{8bc\sqrt{dx}\,\text{Hypergeometric2F1}\left(\frac{1}{4},\frac{1}{2},\frac{5}{4},c^2x^2\right)(a+b\arcsin(cx))}{d^2} - \frac{2(a+b\arcsin(cx))^2}{d\sqrt{dx}}$$

```
[In] Int[(a + b*ArcSin[c*x])^2/(d*x)^(3/2),x]
```

```
[Out] (-2*(a + b*ArcSin[c*x])^2)/(d*Sqrt[d*x]) + (8*b*c*Sqrt[d*x]*(a + b*ArcSin[c
*x])*Hypergeometric2F1[1/4, 1/2, 5/4, c^2*x^2])/d^2 - (16*b^2*c^2*(d*x)^(3/
2)*HypergeometricPFQ[{3/4, 3/4, 1}, {5/4, 7/4}, c^2*x^2])/(3*d^3)
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rule 4805

```
Int[(((a_.) + ArcSin[(c_.)*(x_)]*(b_.))*((f_.)*(x_))^(m_))/Sqrt[(d_) + (e_.
)*(x_)^2], x_Symbol] :> Simp[((f*x)^(m + 1)/(f*(m + 1)))*Simp[Sqrt[1 - c^2*
x^2]/Sqrt[d + e*x^2]]*(a + b*ArcSin[c*x])*Hypergeometric2F1[1/2, (1 + m)/2,
 (3 + m)/2, c^2*x^2], x] - Simp[b*c*((f*x)^(m + 2)/(f^2*(m + 1)*(m + 2)))*S
imp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]]*HypergeometricPFQ[{1, 1 + m/2, 1 + m
/2}, {3/2 + m/2, 2 + m/2}, c^2*x^2], x] /; FreeQ[{a, b, c, d, e, f, m}, x]
&& EqQ[c^2*d + e, 0] &&  !IntegerQ[m]
```

Rubi steps

$$\begin{aligned}\text{integral} &= -\frac{2(a+b\arcsin(cx))^2}{d\sqrt{dx}} + \frac{(4bc)\int\frac{a+b\arcsin(cx)}{\sqrt{dx}\sqrt{1-c^2x^2}}\,dx}{d}\\ &= -\frac{2(a+b\arcsin(cx))^2}{d\sqrt{dx}}\\ &\quad+\frac{8bc\sqrt{dx}(a+b\arcsin(cx))\,\text{Hypergeometric2F1}\left(\frac{1}{4},\frac{1}{2},\frac{5}{4},c^2x^2\right)}{d^2}\\ &\quad-\frac{16b^2c^2(dx)^{3/2}\,{}_3F_2\left(\frac{3}{4},\frac{3}{4},1;\frac{5}{4},\frac{7}{4};c^2x^2\right)}{3d^3}\end{aligned}$$

Mathematica [A] (verified)

Time = 0.04 (sec) , antiderivative size = 87, normalized size of antiderivative = 0.83

$$\int\frac{(a+b\arcsin(cx))^2}{(dx)^{3/2}}\,dx = -\frac{2x\left(3(a+b\arcsin(cx))\left(a+b\arcsin(cx)-4bcx\,\text{Hypergeometric2F1}\left(\frac{1}{4},\frac{1}{2},\frac{5}{4},c^2x^2\right)\right)+8b^2c^2x^2\,{}_3F_2\left(\frac{3}{4},\frac{3}{4},1;\right.\right.}{3(dx)^{3/2}}$$

```
[In] Integrate[(a + b*ArcSin[c*x])^2/(d*x)^(3/2),x]
```

```
[Out] (-2*x*(3*(a + b*ArcSin[c*x])*(a + b*ArcSin[c*x] - 4*b*c*x*Hypergeometric2F1
[1/4, 1/2, 5/4, c^2*x^2]) + 8*b^2*c^2*x^2*HypergeometricPFQ[{3/4, 3/4, 1},
{5/4, 7/4}, c^2*x^2]))/(3*(d*x)^(3/2))
```

Maple [F]

$$\int \frac{(a + b \arcsin(cx))^2}{(dx)^{\frac{3}{2}}} dx$$

```
[In] int((a+b*arcsin(c*x))^2/(d*x)^(3/2),x)
```

```
[Out] int((a+b*arcsin(c*x))^2/(d*x)^(3/2),x)
```

Fricas [F]

$$\int \frac{(a + b \arcsin(cx))^2}{(dx)^{3/2}} dx = \int \frac{(b \arcsin(cx) + a)^2}{(dx)^{\frac{3}{2}}} dx$$

```
[In] integrate((a+b*arcsin(c*x))^2/(d*x)^(3/2),x, algorithm="fricas")
```

```
[Out] integral((b^2*arcsin(c*x)^2 + 2*a*b*arcsin(c*x) + a^2)*sqrt(d*x)/(d^2*x^2),
 x)
```

Sympy [F(-2)]

Exception generated.

$$\int \frac{(a + b \arcsin(cx))^2}{(dx)^{3/2}} dx = \text{Exception raised: TypeError}$$

```
[In] integrate((a+b*asin(c*x))**2/(d*x)**(3/2),x)
```

```
[Out] Exception raised: TypeError >> Invalid comparison of non-real zoo
```

Maxima [F]

$$\int \frac{(a + b \arcsin(cx))^2}{(dx)^{3/2}} dx = \int \frac{(b \arcsin(cx) + a)^2}{(dx)^{\frac{3}{2}}} dx$$

```
[In] integrate((a+b*arcsin(c*x))^2/(d*x)^(3/2),x, algorithm="maxima")
```

```
[Out] -1/2*(4*b^2*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1))^2 - (a^2*c^2*sqrt(d)
*(2*arctan(sqrt(c)*sqrt(x))/(c^(3/2)*d^2) + log((c*sqrt(x) - sqrt(c))/(c*sq
rt(x) + sqrt(c)))/(c^(3/2)*d^2)) + 4*a*b*c^2*sqrt(d)*integrate(x^(5/2)*arct
an(c*x/(sqrt(c*x + 1)*sqrt(-c*x + 1)))/(c^2*d^2*x^4 - d^2*x^2), x) - 8*b^2*
c*sqrt(d)*integrate(sqrt(c*x + 1)*sqrt(-c*x + 1)*x^(3/2)*arctan(c*x/(sqrt(c
*x + 1)*sqrt(-c*x + 1)))/(c^2*d^2*x^4 - d^2*x^2), x) - a^2*sqrt(d)*(2*sqrt(
```

```
c)*arctan(sqrt(c)*sqrt(x))/d^2 + sqrt(c)*log((c*sqrt(x) - sqrt(c))/(c*sqrt(
x) + sqrt(c)))/d^2 + 4/(d^2*sqrt(x))) - 4*a*b*sqrt(d)*integrate(sqrt(x)*arc
tan(c*x/(sqrt(c*x + 1)*sqrt(-c*x + 1)))/(c^2*d^2*x^4 - d^2*x^2), x))*d^(3/2
)*sqrt(x))/(d^(3/2)*sqrt(x))
```

Giac [F]

$$\int \frac{(a+b\arcsin(cx))^2}{(dx)^{3/2}}\,dx = \int \frac{(b\arcsin(cx)+a)^2}{(dx)^{\frac{3}{2}}}\,dx$$

```
[In] integrate((a+b*arcsin(c*x))^2/(d*x)^(3/2),x, algorithm="giac")
[Out] integrate((b*arcsin(c*x) + a)^2/(d*x)^(3/2), x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{(a+b\arcsin(cx))^2}{(dx)^{3/2}}\,dx = \int \frac{(a+b\,\mathrm{asin}(c\,x))^2}{(d\,x)^{3/2}}\,dx$$

```
[In] int((a + b*asin(c*x))^2/(d*x)^(3/2),x)
[Out] int((a + b*asin(c*x))^2/(d*x)^(3/2), x)
```

3.214 $\int \frac{(a+b\arcsin(cx))^2}{(dx)^{5/2}}\,dx$

Optimal result

Integrand size = 18, antiderivative size = 109

$$\int \frac{(a+b\arcsin(cx))^2}{(dx)^{5/2}}\,dx = -\frac{2(a+b\arcsin(cx))^2}{3d(dx)^{3/2}} - \frac{8bc(a+b\arcsin(cx))\,\text{Hypergeometric2F1}\left(-\frac{1}{4},\frac{1}{2},\frac{3}{4},c^2x^2\right)}{3d^2\sqrt{dx}} + \frac{16b^2c^2\sqrt{dx}\,{}_3F_2\left(\frac{1}{4},\frac{1}{4},1;\frac{3}{4},\frac{5}{4};c^2x^2\right)}{3d^3}$$

```
[Out] -2/3*(a+b*arcsin(c*x))^2/d/(d*x)^(3/2)-8/3*b*c*(a+b*arcsin(c*x))*hypergeom(
[-1/4, 1/2],[3/4],c^2*x^2)/d^2/(d*x)^(1/2)+16/3*b^2*c^2*hypergeom([1/4, 1/4
, 1],[3/4, 5/4],c^2*x^2)*(d*x)^(1/2)/d^3
```

Rubi [A] (verified)

Time = 0.09 (sec) , antiderivative size = 109, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.111, Rules used = {4723, 4805}

$$\int \frac{(a+b\arcsin(cx))^2}{(dx)^{5/2}}\,dx = \frac{16b^2c^2\sqrt{dx}\,{}_3F_2\left(\frac{1}{4},\frac{1}{4},1;\frac{3}{4},\frac{5}{4};c^2x^2\right)}{3d^3} - \frac{8bc\,\text{Hypergeometric2F1}\left(-\frac{1}{4},\frac{1}{2},\frac{3}{4},c^2x^2\right)(a+b\arcsin(cx))}{3d^2\sqrt{dx}} - \frac{2(a+b\arcsin(cx))^2}{3d(dx)^{3/2}}$$

```
[In] Int[(a + b*ArcSin[c*x])^2/(d*x)^(5/2),x]
```

```
[Out] (-2*(a + b*ArcSin[c*x])^2)/(3*d*(d*x)^(3/2)) - (8*b*c*(a + b*ArcSin[c*x])*H
ypergeometric2F1[-1/4, 1/2, 3/4, c^2*x^2])/(3*d^2*Sqrt[d*x]) + (16*b^2*c^2*
Sqrt[d*x]*HypergeometricPFQ[{1/4, 1/4, 1}, {3/4, 5/4}, c^2*x^2])/(3*d^3)
```

Rule 4723

```
Int[((a_.) + ArcSin[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^n/(d*(m + 1))), x] - Dist[b*c*(n
/(d*(m + 1))), Int[(d*x)^(m + 1)*((a + b*ArcSin[c*x])^(n - 1)/Sqrt[1 - c^2*
x^2]), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rule 4805

```
Int[(((a_.) + ArcSin[(c_.)*(x_)]*(b_.))*((f_.)*(x_))^(m_))/Sqrt[(d_) + (e_.
)*(x_)^2], x_Symbol] :> Simp[((f*x)^(m + 1)/(f*(m + 1)))*Simp[Sqrt[1 - c^2*
x^2]/Sqrt[d + e*x^2]]*(a + b*ArcSin[c*x])*Hypergeometric2F1[1/2, (1 + m)/2,
 (3 + m)/2, c^2*x^2], x] - Simp[b*c*((f*x)^(m + 2)/(f^2*(m + 1)*(m + 2)))*S
imp[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2]]*HypergeometricPFQ[{1, 1 + m/2, 1 + m
/2}, {3/2 + m/2, 2 + m/2}, c^2*x^2], x] /; FreeQ[{a, b, c, d, e, f, m}, x]
&& EqQ[c^2*d + e, 0] &&  !IntegerQ[m]
```

Rubi steps

$$\begin{aligned}\text{integral} &= -\frac{2(a+b\arcsin(cx))^2}{3d(dx)^{3/2}}+\frac{(4bc)\int\frac{a+b\arcsin(cx)}{(dx)^{3/2}\sqrt{1-c^2x^2}}\,dx}{3d}\\ &= -\frac{2(a+b\arcsin(cx))^2}{3d(dx)^{3/2}}-\frac{8bc(a+b\arcsin(cx))\,\text{Hypergeometric2F1}\left(-\frac{1}{4},\frac{1}{2},\frac{3}{4},c^2x^2\right)}{3d^2\sqrt{dx}}\\ &\quad+\frac{16b^2c^2\sqrt{dx}\,{}_3F_2\left(\frac{1}{4},\frac{1}{4},1;\frac{3}{4},\frac{5}{4};c^2x^2\right)}{3d^3}\end{aligned}$$

Mathematica [A] (verified)

Time = 0.04 (sec) , antiderivative size = 87, normalized size of antiderivative = 0.80

$$\int\frac{(a+b\arcsin(cx))^2}{(dx)^{5/2}}\,dx=\frac{x\left(-2(a+b\arcsin(cx))\left(a+b\arcsin(cx)+4bcx\,\text{Hypergeometric2F1}\left(-\frac{1}{4},\frac{1}{2},\frac{3}{4},c\right.\right.\right.}{3(dx)^{5/2}}$$

```
[In] Integrate[(a + b*ArcSin[c*x])^2/(d*x)^(5/2),x]
```

```
[Out] (x*(-2*(a + b*ArcSin[c*x])*(a + b*ArcSin[c*x] + 4*b*c*x*Hypergeometric2F1[-
1/4, 1/2, 3/4, c^2*x^2]) + 16*b^2*c^2*x^2*HypergeometricPFQ[{1/4, 1/4, 1},
{3/4, 5/4}, c^2*x^2]))/(3*(d*x)^(5/2))
```

Maple [F]

$$\int \frac{(a+b\arcsin(cx))^2}{(dx)^{\frac{5}{2}}}dx$$

```
[In] int((a+b*arcsin(c*x))^2/(d*x)^(5/2),x)
[Out] int((a+b*arcsin(c*x))^2/(d*x)^(5/2),x)
```

Fricas [F]

$$\int \frac{(a+b\arcsin(cx))^2}{(dx)^{5/2}}\,dx = \int \frac{(b\arcsin(cx)+a)^2}{(dx)^{\frac{5}{2}}}\,dx$$

```
[In] integrate((a+b*arcsin(c*x))^2/(d*x)^(5/2),x, algorithm="fricas")
[Out] integral((b^2*arcsin(c*x)^2 + 2*a*b*arcsin(c*x) + a^2)*sqrt(d*x)/(d^3*x^3),
 x)
```

Sympy [F(-2)]

Exception generated.

$$\int \frac{(a+b\arcsin(cx))^2}{(dx)^{5/2}}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate((a+b*asin(c*x))**2/(d*x)**(5/2),x)
[Out] Exception raised: TypeError >> Invalid comparison of non-real zoo
```

Maxima [F]

$$\int \frac{(a+b\arcsin(cx))^2}{(dx)^{5/2}}\,dx = \int \frac{(b\arcsin(cx)+a)^2}{(dx)^{\frac{5}{2}}}\,dx$$

```
[In] integrate((a+b*arcsin(c*x))^2/(d*x)^(5/2),x, algorithm="maxima")
[Out] -1/6*((3*a^2*c^2*sqrt(d)*(2*arctan(sqrt(c)*sqrt(x))/(sqrt(c)*d^3) - log((c*
sqrt(x) - sqrt(c))/(c*sqrt(x) + sqrt(c)))/(sqrt(c)*d^3)) - 36*a*b*c^2*sqrt(
d)*integrate(1/3*x^(5/2)*arctan(c*x/(sqrt(c*x + 1)*sqrt(-c*x + 1)))/(c^2*d^
3*x^5 - d^3*x^3), x) + 24*b^2*c*sqrt(d)*integrate(1/3*sqrt(c*x + 1)*sqrt(-c
*x + 1)*x^(3/2)*arctan(c*x/(sqrt(c*x + 1)*sqrt(-c*x + 1)))/(c^2*d^3*x^5 - d
^3*x^3), x) - a^2*sqrt(d)*(6*c^(3/2)*arctan(sqrt(c)*sqrt(x))/d^3 - 3*c^(3/2
```

```
)*log((c*sqrt(x) - sqrt(c))/(c*sqrt(x) + sqrt(c)))/d^3 - 4/(d^3*x^(3/2))) +
 36*a*b*sqrt(d)*integrate(1/3*sqrt(x)*arctan(c*x/(sqrt(c*x + 1)*sqrt(-c*x +
 1)))/(c^2*d^3*x^5 - d^3*x^3), x))*d^(5/2)*x^(3/2) + 4*b^2*arctan2(c*x, sqr
t(c*x + 1)*sqrt(-c*x + 1))^2)/(d^(5/2)*x^(3/2))
```

Giac [F]

$$\int \frac{(a+b\arcsin(cx))^2}{(dx)^{5/2}}\,dx = \int \frac{(b\arcsin(cx)+a)^2}{(dx)^{\frac{5}{2}}}\,dx$$

```
[In] integrate((a+b*arcsin(c*x))^2/(d*x)^(5/2),x, algorithm="giac")
[Out] integrate((b*arcsin(c*x) + a)^2/(d*x)^(5/2), x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{(a+b\arcsin(cx))^2}{(dx)^{5/2}}\,dx = \int \frac{(a+b\,\mathrm{asin}(c\,x))^2}{(d\,x)^{5/2}}\,dx$$

```
[In] int((a + b*asin(c*x))^2/(d*x)^(5/2),x)
[Out] int((a + b*asin(c*x))^2/(d*x)^(5/2), x)
```

3.215 $\int (dx)^{3/2}(a+b\arcsin(cx))^3\,dx$

Optimal result

Integrand size = 18, antiderivative size = 18

$$\int (dx)^{3/2}(a+b\arcsin(cx))^3\,dx=\frac{2(dx)^{5/2}(a+b\arcsin(cx))^3}{5d}-\frac{6bc\text{Int}\left(\frac{(dx)^{5/2}(a+b\arcsin(cx))^2}{\sqrt{1-c^2x^2}},x\right)}{5d}$$

```
[Out] 2/5*(d*x)^(5/2)*(a+b*arcsin(c*x))^3/d-6/5*b*c*Unintegrable((d*x)^(5/2)*(a+b
*arcsin(c*x))^2/(-c^2*x^2+1)^(1/2),x)/d
```

Rubi [N/A]

Not integrable

Time = 0.10 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int (dx)^{3/2}(a+b\arcsin(cx))^3\,dx=\int (dx)^{3/2}(a+b\arcsin(cx))^3\,dx$$

```
[In] Int[(d*x)^(3/2)*(a + b*ArcSin[c*x])^3,x]
```

```
[Out] (2*(d*x)^(5/2)*(a + b*ArcSin[c*x])^3)/(5*d) - (6*b*c*Defer[Int][((d*x)^(5/2
)*(a + b*ArcSin[c*x])^2)/Sqrt[1 - c^2*x^2], x])/(5*d)
```

Rubi steps

$$\text{integral}=\frac{2(dx)^{5/2}(a+b\arcsin(cx))^3}{5d}-\frac{(6bc)\int\frac{(dx)^{5/2}(a+b\arcsin(cx))^2}{\sqrt{1-c^2x^2}}\,dx}{5d}$$

Mathematica [N/A]

Not integrable

Time = 58.95 (sec) , antiderivative size = 20, normalized size of antiderivative = 1.11

$$\int (dx)^{3/2}(a+b\arcsin(cx))^3\,dx=\int (dx)^{3/2}(a+b\arcsin(cx))^3\,dx$$

```
[In] Integrate[(d*x)^(3/2)*(a + b*ArcSin[c*x])^3,x]
[Out] Integrate[(d*x)^(3/2)*(a + b*ArcSin[c*x])^3, x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.10 (sec) , antiderivative size = 16, normalized size of antiderivative = 0.89

$$\int (dx)^{\frac{3}{2}}\left(a+b\arcsin\left(cx\right)\right)^{3}dx$$

```
[In] int((d*x)^(3/2)*(a+b*arcsin(c*x))^3,x)
[Out] int((d*x)^(3/2)*(a+b*arcsin(c*x))^3,x)
```

Fricas [N/A]

Not integrable

Time = 0.26 (sec) , antiderivative size = 53, normalized size of antiderivative = 2.94

$$\int (dx)^{3/2}(a+b\arcsin(cx))^3\,dx=\int (dx)^{\frac{3}{2}}\left(b\arcsin\left(cx\right)+a\right)^{3}dx$$

```
[In] integrate((d*x)^(3/2)*(a+b*arcsin(c*x))^3,x, algorithm="fricas")
[Out] integral((b^3*d*x*arcsin(c*x)^3 + 3*a*b^2*d*x*arcsin(c*x)^2 + 3*a^2*b*d*x*a
rcsin(c*x) + a^3*d*x)*sqrt(d*x), x)
```

Sympy [N/A]

Not integrable

Time = 78.70 (sec) , antiderivative size = 17, normalized size of antiderivative = 0.94

$$\int (dx)^{3/2}(a+b\arcsin(cx))^3\,dx=\int (dx)^{\frac{3}{2}}\left(a+b\operatorname{asin}\left(cx\right)\right)^{3}\,dx$$

```
[In] integrate((d*x)**(3/2)*(a+b*asin(c*x))**3,x)
[Out] Integral((d*x)**(3/2)*(a + b*asin(c*x))**3, x)
```

Maxima [N/A]

Not integrable

Time = 3.55 (sec) , antiderivative size = 421, normalized size of antiderivative = 23.39

$$\int (dx)^{3/2}(a+b\arcsin(cx))^3\,dx = \int (dx)^{\frac{3}{2}}\,(b\arcsin{(cx)}+a)^3\,dx$$

```
[In] integrate((d*x)^(3/2)*(a+b*arcsin(c*x))^3,x, algorithm="maxima")
```

```
[Out] 2/5*b^3*d^(3/2)*x^(5/2)*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1))^3 + 1/10
*a^3*c^2*d^(3/2)*(4*(c^2*x^(5/2) + 5*sqrt(x))/c^4 - 10*arctan(sqrt(c)*sqrt(
x))/c^(9/2) + 5*log((c*sqrt(x) - sqrt(c))/(c*sqrt(x) + sqrt(c)))/c^(9/2)) +
 15*a*b^2*c^2*d^(3/2)*integrate(1/5*x^(7/2)*arctan(c*x/(sqrt(c*x + 1)*sqrt(
-c*x + 1)))^2/(c^2*x^2 - 1), x) + 15*a^2*b*c^2*d^(3/2)*integrate(1/5*x^(7/2
)*arctan(c*x/(sqrt(c*x + 1)*sqrt(-c*x + 1)))/(c^2*x^2 - 1), x) + 6*b^3*c*d^
(3/2)*integrate(1/5*sqrt(c*x + 1)*sqrt(-c*x + 1)*x^(5/2)*arctan(c*x/(sqrt(c
*x + 1)*sqrt(-c*x + 1)))^2/(c^2*x^2 - 1), x) - 1/2*a^3*d^(3/2)*(4*sqrt(x)/c
^2 - 2*arctan(sqrt(c)*sqrt(x))/c^(5/2) + log((c*sqrt(x) - sqrt(c))/(c*sqrt(
x) + sqrt(c)))/c^(5/2)) - 15*a*b^2*d^(3/2)*integrate(1/5*x^(3/2)*arctan(c*x
/(sqrt(c*x + 1)*sqrt(-c*x + 1)))^2/(c^2*x^2 - 1), x) - 15*a^2*b*d^(3/2)*int
egrate(1/5*x^(3/2)*arctan(c*x/(sqrt(c*x + 1)*sqrt(-c*x + 1)))/(c^2*x^2 - 1)
, x)
```

Giac [F(-2)]

Exception generated.

$$\int (dx)^{3/2}(a+b\arcsin(cx))^3\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate((d*x)^(3/2)*(a+b*arcsin(c*x))^3,x, algorithm="giac")
```

```
[Out] Exception raised: RuntimeError >> an error occurred running a Giac command:
INPUT:sage2OUTPUT:sym2poly/r2sym(const gen & e,const index_m & i,const vect
eur & l) Error: Bad Argument Value
```

Mupad [N/A]

Not integrable

Time = 0.13 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.00

$$\int (dx)^{3/2}(a+b\arcsin(cx))^3\,dx=\int (a+b\,\mathrm{asin}(c\,x))^3\,(d\,x)^{3/2}\,dx$$

```
[In] int((a + b*asin(c*x))^3*(d*x)^(3/2),x)
[Out] int((a + b*asin(c*x))^3*(d*x)^(3/2), x)
```

3.216 $\int \sqrt{dx}(a+b\arcsin(cx))^3\,dx$

Optimal result

Integrand size = 18, antiderivative size = 18

$$\int \sqrt{dx}(a+b\arcsin(cx))^3\,dx=\frac{2(dx)^{3/2}(a+b\arcsin(cx))^3}{3d}-\frac{2bc\text{Int}\left(\frac{(dx)^{3/2}(a+b\arcsin(cx))^2}{\sqrt{1-c^2x^2}},x\right)}{d}$$

```
[Out] 2/3*(d*x)^(3/2)*(a+b*arcsin(c*x))^3/d-2*b*c*Unintegrable((d*x)^(3/2)*(a+b*a
rcsin(c*x))^2/(-c^2*x^2+1)^(1/2),x)/d
```

Rubi [N/A]

Not integrable

Time = 0.09 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \sqrt{dx}(a+b\arcsin(cx))^3\,dx=\int \sqrt{dx}(a+b\arcsin(cx))^3\,dx$$

```
[In] Int[Sqrt[d*x]*(a + b*ArcSin[c*x])^3,x]
```

```
[Out] (2*(d*x)^(3/2)*(a + b*ArcSin[c*x])^3)/(3*d) - (2*b*c*Defer[Int][((d*x)^(3/2
)*(a + b*ArcSin[c*x])^2)/Sqrt[1 - c^2*x^2], x])/d
```

Rubi steps

$$\text{integral}=\frac{2(dx)^{3/2}(a+b\arcsin(cx))^3}{3d}-\frac{(2bc)\int \frac{(dx)^{3/2}(a+b\arcsin(cx))^2}{\sqrt{1-c^2x^2}}\,dx}{d}$$

Mathematica [N/A]

Not integrable

Time = 142.45 (sec) , antiderivative size = 20, normalized size of antiderivative = 1.11

$$\int \sqrt{dx}(a+b\arcsin(cx))^3\,dx=\int \sqrt{dx}(a+b\arcsin(cx))^3\,dx$$

```
[In] Integrate[Sqrt[d*x]*(a + b*ArcSin[c*x])^3,x]
[Out] Integrate[Sqrt[d*x]*(a + b*ArcSin[c*x])^3, x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.07 (sec) , antiderivative size = 16, normalized size of antiderivative = 0.89

$$\int \sqrt{dx}\,(a+b\arcsin{(cx)})^3\,dx$$

```
[In] int((d*x)^(1/2)*(a+b*arcsin(c*x))^3,x)
[Out] int((d*x)^(1/2)*(a+b*arcsin(c*x))^3,x)
```

Fricas [N/A]

Not integrable

Time = 0.25 (sec) , antiderivative size = 44, normalized size of antiderivative = 2.44

$$\int \sqrt{dx}(a+b\arcsin(cx))^3\,dx=\int \sqrt{dx}(b\arcsin{(cx)}+a)^3\,dx$$

```
[In] integrate((d*x)^(1/2)*(a+b*arcsin(c*x))^3,x, algorithm="fricas")
[Out] integral((b^3*arcsin(c*x)^3 + 3*a*b^2*arcsin(c*x)^2 + 3*a^2*b*arcsin(c*x) +
 a^3)*sqrt(d*x), x)
```

Sympy [N/A]

Not integrable

Time = 8.47 (sec) , antiderivative size = 17, normalized size of antiderivative = 0.94

$$\int \sqrt{dx}(a+b\arcsin(cx))^3\,dx=\int \sqrt{dx}(a+b\operatorname{asin}{(cx)})^3\;dx$$

```
[In] integrate((d*x)**(1/2)*(a+b*asin(c*x))**3,x)
[Out] Integral(sqrt(d*x)*(a + b*asin(c*x))**3, x)
```

Maxima [N/A]

Not integrable

Time = 3.59 (sec) , antiderivative size = 398, normalized size of antiderivative = 22.11

$$\int \sqrt{dx}(a+b\arcsin(cx))^3\,dx = \int \sqrt{dx}(b\arcsin{(cx)}+a)^3\,dx$$

```
[In] integrate((d*x)^(1/2)*(a+b*arcsin(c*x))^3,x, algorithm="maxima")
```

```
[Out] 2/3*b^3*sqrt(d)*x^(3/2)*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1))^3 + 1/6*
a^3*c^2*sqrt(d)*(4*x^(3/2)/c^2 + 6*arctan(sqrt(c)*sqrt(x))/c^(7/2) + 3*log(
(c*sqrt(x) - sqrt(c))/(c*sqrt(x) + sqrt(c)))/c^(7/2)) + 3*a*b^2*c^2*sqrt(d)
*integrate(x^(5/2)*arctan(c*x/(sqrt(c*x + 1)*sqrt(-c*x + 1)))^2/(c^2*x^2 -
1), x) + 3*a^2*b*c^2*sqrt(d)*integrate(x^(5/2)*arctan(c*x/(sqrt(c*x + 1)*sq
rt(-c*x + 1)))/(c^2*x^2 - 1), x) + 2*b^3*c*sqrt(d)*integrate(sqrt(c*x + 1)*
sqrt(-c*x + 1)*x^(3/2)*arctan(c*x/(sqrt(c*x + 1)*sqrt(-c*x + 1)))^2/(c^2*x^
2 - 1), x) - 1/2*a^3*sqrt(d)*(2*arctan(sqrt(c)*sqrt(x))/c^(3/2) + log((c*sq
rt(x) - sqrt(c))/(c*sqrt(x) + sqrt(c)))/c^(3/2)) - 3*a*b^2*sqrt(d)*integrat
e(sqrt(x)*arctan(c*x/(sqrt(c*x + 1)*sqrt(-c*x + 1)))^2/(c^2*x^2 - 1), x) -
3*a^2*b*sqrt(d)*integrate(sqrt(x)*arctan(c*x/(sqrt(c*x + 1)*sqrt(-c*x + 1))
)/(c^2*x^2 - 1), x)
```

Giac [F(-2)]

Exception generated.

$$\int \sqrt{dx}(a+b\arcsin(cx))^3\,dx = \text{Exception raised: RuntimeError}$$

```
[In] integrate((d*x)^(1/2)*(a+b*arcsin(c*x))^3,x, algorithm="giac")
```

```
[Out] Exception raised: RuntimeError >> an error occurred running a Giac command:
INPUT:sage2OUTPUT:sym2poly/r2sym(const gen & e,const index_m & i,const vect
eur & l) Error: Bad Argument Value
```

Mupad [N/A]

Not integrable

Time = 0.14 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.00

$$\int \sqrt{dx}(a+b\arcsin(cx))^3\,dx = \int {\left(a+b\,\mathrm{asin}\left(c\,x\right)\right)}^3\,\sqrt{d\,x} \,d x$$

```
[In] int((a + b*asin(c*x))^3*(d*x)^(1/2),x)
```

```
[Out] int((a + b*asin(c*x))^3*(d*x)^(1/2), x)
```

3.217 $\int \frac{(a+b\arcsin(cx))^3}{\sqrt{dx}}\,dx$

Optimal result

Integrand size = 18, antiderivative size = 18

$$\int \frac{(a+b\arcsin(cx))^3}{\sqrt{dx}}\,dx = \frac{2\sqrt{dx}(a+b\arcsin(cx))^3}{d} - \frac{6bc\text{Int}\left(\frac{\sqrt{dx}(a+b\arcsin(cx))^2}{\sqrt{1-c^2x^2}},x\right)}{d}$$

```
[Out] 2*(a+b*arcsin(c*x))^3*(d*x)^(1/2)/d-6*b*c*Unintegrable((a+b*arcsin(c*x))^2*
(d*x)^(1/2)/(-c^2*x^2+1)^(1/2),x)/d
```

Rubi [N/A]

Not integrable

Time = 0.09 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{(a+b\arcsin(cx))^3}{\sqrt{dx}}\,dx = \int \frac{(a+b\arcsin(cx))^3}{\sqrt{dx}}\,dx$$

```
[In] Int[(a + b*ArcSin[c*x])^3/Sqrt[d*x],x]
```

```
[Out] (2*Sqrt[d*x]*(a + b*ArcSin[c*x])^3)/d - (6*b*c*Defer[Int][(Sqrt[d*x]*(a + b
*ArcSin[c*x])^2)/Sqrt[1 - c^2*x^2], x])/d
```

Rubi steps

$$\text{integral} = \frac{2\sqrt{dx}(a+b\arcsin(cx))^3}{d} - \frac{(6bc)\int \frac{\sqrt{dx}(a+b\arcsin(cx))^2}{\sqrt{1-c^2x^2}}\,dx}{d}$$

Mathematica [N/A]

Not integrable

Time = 71.71 (sec) , antiderivative size = 20, normalized size of antiderivative = 1.11

$$\int \frac{(a+b\arcsin(cx))^3}{\sqrt{dx}}\,dx = \int \frac{(a+b\arcsin(cx))^3}{\sqrt{dx}}\,dx$$

```
[In] Integrate[(a + b*ArcSin[c*x])^3/Sqrt[d*x],x]
[Out] Integrate[(a + b*ArcSin[c*x])^3/Sqrt[d*x], x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.02 (sec) , antiderivative size = 16, normalized size of antiderivative = 0.89

$$\int \frac{(a+b\arcsin(cx))^3}{\sqrt{dx}}dx$$

```
[In] int((a+b*arcsin(c*x))^3/(d*x)^(1/2),x)
[Out] int((a+b*arcsin(c*x))^3/(d*x)^(1/2),x)
```

Fricas [N/A]

Not integrable

Time = 0.24 (sec) , antiderivative size = 50, normalized size of antiderivative = 2.78

$$\int \frac{(a+b\arcsin(cx))^3}{\sqrt{dx}}\,dx = \int \frac{(b\arcsin(cx)+a)^3}{\sqrt{dx}}\,dx$$

```
[In] integrate((a+b*arcsin(c*x))^3/(d*x)^(1/2),x, algorithm="fricas")
[Out] integral((b^3*arcsin(c*x)^3 + 3*a*b^2*arcsin(c*x)^2 + 3*a^2*b*arcsin(c*x) +
 a^3)*sqrt(d*x)/(d*x), x)
```

Sympy [F(-2)]

Exception generated.

$$\int \frac{(a+b\arcsin(cx))^3}{\sqrt{dx}}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate((a+b*asin(c*x))**3/(d*x)**(1/2),x)
[Out] Exception raised: TypeError >> Invalid comparison of non-real zoo
```

Maxima [N/A]

Not integrable

Time = 3.58 (sec) , antiderivative size = 438, normalized size of antiderivative = 24.33

$$\int \frac{(a+b\arcsin(cx))^3}{\sqrt{dx}}\,dx = \int \frac{(b\arcsin(cx)+a)^3}{\sqrt{dx}}\,dx$$

```
[In] integrate((a+b*arcsin(c*x))^3/(d*x)^(1/2),x, algorithm="maxima")
[Out] 1/2*(4*b^3*sqrt(x)*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1))^3 + (a^3*c^2*
sqrt(d)*(4*sqrt(x)/(c^2*d) - 2*arctan(sqrt(c)*sqrt(x))/(c^(5/2)*d) + log((c
*sqrt(x) - sqrt(c))/(c*sqrt(x) + sqrt(c)))/(c^(5/2)*d)) + 6*a*b^2*c^2*sqrt(
d)*integrate(x^(5/2)*arctan(c*x/(sqrt(c*x + 1)*sqrt(-c*x + 1)))^2/(c^2*d*x^
3 - d*x), x) + 6*a^2*b*c^2*sqrt(d)*integrate(x^(5/2)*arctan(c*x/(sqrt(c*x +
 1)*sqrt(-c*x + 1)))/(c^2*d*x^3 - d*x), x) + 12*b^3*c*sqrt(d)*integrate(sqr
t(c*x + 1)*sqrt(-c*x + 1)*x^(3/2)*arctan(c*x/(sqrt(c*x + 1)*sqrt(-c*x + 1))
)^2/(c^2*d*x^3 - d*x), x) + a^3*sqrt(d)*(2*arctan(sqrt(c)*sqrt(x))/(sqrt(c)
*d) - log((c*sqrt(x) - sqrt(c))/(c*sqrt(x) + sqrt(c)))/(sqrt(c)*d)) - 6*a*b
^2*sqrt(d)*integrate(sqrt(x)*arctan(c*x/(sqrt(c*x + 1)*sqrt(-c*x + 1)))^2/(
c^2*d*x^3 - d*x), x) - 6*a^2*b*sqrt(d)*integrate(sqrt(x)*arctan(c*x/(sqrt(c
*x + 1)*sqrt(-c*x + 1)))/(c^2*d*x^3 - d*x), x))*sqrt(d))/sqrt(d)
```

Giac [N/A]

Not integrable

Time = 0.57 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.00

$$\int \frac{(a+b\arcsin(cx))^3}{\sqrt{dx}}\,dx = \int \frac{(b\arcsin(cx)+a)^3}{\sqrt{dx}}\,dx$$

```
[In] integrate((a+b*arcsin(c*x))^3/(d*x)^(1/2),x, algorithm="giac")
[Out] integrate((b*arcsin(c*x) + a)^3/sqrt(d*x), x)
```

Mupad [N/A]

Not integrable

Time = 0.14 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.00

$$\int \frac{(a+b\arcsin(cx))^3}{\sqrt{dx}}\,dx=\int \frac{{\left(a+b\,\mathrm{asin}\left(c\,x\right)\right)}^3}{\sqrt{d\,x}} \,d x$$

```
[In] int((a + b*asin(c*x))^3/(d*x)^(1/2),x)
[Out] int((a + b*asin(c*x))^3/(d*x)^(1/2), x)
```

3.218 $\int \frac{(a+b\arcsin(cx))^3}{(dx)^{3/2}}\,dx$

Optimal result

Integrand size = 18, antiderivative size = 18

$$\int \frac{(a+b\arcsin(cx))^3}{(dx)^{3/2}}\,dx = -\frac{2(a+b\arcsin(cx))^3}{d\sqrt{dx}} + \frac{6bc\text{Int}\left(\frac{(a+b\arcsin(cx))^2}{\sqrt{dx}\sqrt{1-c^2x^2}},x\right)}{d}$$

```
[Out] -2*(a+b*arcsin(c*x))^3/d/(d*x)^(1/2)+6*b*c*Unintegrable((a+b*arcsin(c*x))^2
/(d*x)^(1/2)/(-c^2*x^2+1)^(1/2),x)/d
```

Rubi [N/A]

Not integrable

Time = 0.09 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{(a+b\arcsin(cx))^3}{(dx)^{3/2}}\,dx = \int \frac{(a+b\arcsin(cx))^3}{(dx)^{3/2}}\,dx$$

```
[In] Int[(a + b*ArcSin[c*x])^3/(d*x)^(3/2),x]
```

```
[Out] (-2*(a + b*ArcSin[c*x])^3)/(d*Sqrt[d*x]) + (6*b*c*Defer[Int][(a + b*ArcSin[
c*x])^2/(Sqrt[d*x]*Sqrt[1 - c^2*x^2]), x])/d
```

Rubi steps

$$\text{integral} = -\frac{2(a+b\arcsin(cx))^3}{d\sqrt{dx}} + \frac{(6bc)\int \frac{(a+b\arcsin(cx))^2}{\sqrt{dx}\sqrt{1-c^2x^2}}\,dx}{d}$$

Mathematica [N/A]

Not integrable

Time = 59.24 (sec) , antiderivative size = 20, normalized size of antiderivative = 1.11

$$\int \frac{(a+b\arcsin(cx))^3}{(dx)^{3/2}}\,dx = \int \frac{(a+b\arcsin(cx))^3}{(dx)^{3/2}}\,dx$$

```
[In] Integrate[(a + b*ArcSin[c*x])^3/(d*x)^(3/2),x]
[Out] Integrate[(a + b*ArcSin[c*x])^3/(d*x)^(3/2), x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.11 (sec) , antiderivative size = 16, normalized size of antiderivative = 0.89

$$\int \frac{\left(a+b\arcsin\left(cx\right)\right)^{3}}{\left(dx\right)^{\frac{3}{2}}}dx$$

```
[In] int((a+b*arcsin(c*x))^3/(d*x)^(3/2),x)
[Out] int((a+b*arcsin(c*x))^3/(d*x)^(3/2),x)
```

Fricas [N/A]

Not integrable

Time = 0.25 (sec) , antiderivative size = 50, normalized size of antiderivative = 2.78

$$\int \frac{(a+b\arcsin(cx))^3}{(dx)^{3/2}}\,dx = \int \frac{\left(b\arcsin\left(cx\right)+a\right)^{3}}{\left(dx\right)^{\frac{3}{2}}}\,dx$$

```
[In] integrate((a+b*arcsin(c*x))^3/(d*x)^(3/2),x, algorithm="fricas")
[Out] integral((b^3*arcsin(c*x)^3 + 3*a*b^2*arcsin(c*x)^2 + 3*a^2*b*arcsin(c*x) +
 a^3)*sqrt(d*x)/(d^2*x^2), x)
```

Sympy [F(-2)]

Exception generated.

$$\int \frac{(a+b\arcsin(cx))^3}{(dx)^{3/2}}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate((a+b*asin(c*x))**3/(d*x)**(3/2),x)
[Out] Exception raised: TypeError >> Invalid comparison of non-real zoo
```

Maxima [N/A]

Not integrable

Time = 3.52 (sec) , antiderivative size = 469, normalized size of antiderivative = 26.06

$$\int \frac{(a+b\arcsin(cx))^3}{(dx)^{3/2}}\,dx = \int \frac{(b\arcsin{(cx)}+a)^3}{(dx)^{\frac{3}{2}}}\,dx$$

```
[In] integrate((a+b*arcsin(c*x))^3/(d*x)^(3/2),x, algorithm="maxima")
[Out] -1/2*(4*b^3*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1))^3 - (a^3*c^2*sqrt(d)
*(2*arctan(sqrt(c)*sqrt(x))/(c^(3/2)*d^2) + log((c*sqrt(x) - sqrt(c))/(c*sq
rt(x) + sqrt(c)))/(c^(3/2)*d^2)) + 6*a*b^2*c^2*sqrt(d)*integrate(x^(5/2)*ar
ctan(c*x/(sqrt(c*x + 1)*sqrt(-c*x + 1)))^2/(c^2*d^2*x^4 - d^2*x^2), x) + 6*
a^2*b*c^2*sqrt(d)*integrate(x^(5/2)*arctan(c*x/(sqrt(c*x + 1)*sqrt(-c*x + 1
)))/(c^2*d^2*x^4 - d^2*x^2), x) - 12*b^3*c*sqrt(d)*integrate(sqrt(c*x + 1)*
sqrt(-c*x + 1)*x^(3/2)*arctan(c*x/(sqrt(c*x + 1)*sqrt(-c*x + 1)))^2/(c^2*d^
2*x^4 - d^2*x^2), x) - a^3*sqrt(d)*(2*sqrt(c)*arctan(sqrt(c)*sqrt(x))/d^2 +
 sqrt(c)*log((c*sqrt(x) - sqrt(c))/(c*sqrt(x) + sqrt(c)))/d^2 + 4/(d^2*sqrt
(x))) - 6*a*b^2*sqrt(d)*integrate(sqrt(x)*arctan(c*x/(sqrt(c*x + 1)*sqrt(-c
*x + 1)))^2/(c^2*d^2*x^4 - d^2*x^2), x) - 6*a^2*b*sqrt(d)*integrate(sqrt(x)
*arctan(c*x/(sqrt(c*x + 1)*sqrt(-c*x + 1)))/(c^2*d^2*x^4 - d^2*x^2), x))*d^
(3/2)*sqrt(x))/(d^(3/2)*sqrt(x))
```

Giac [N/A]

Not integrable

Time = 0.60 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.00

$$\int \frac{(a+b\arcsin(cx))^3}{(dx)^{3/2}}\,dx = \int \frac{(b\arcsin{(cx)}+a)^3}{(dx)^{\frac{3}{2}}}\,dx$$

```
[In] integrate((a+b*arcsin(c*x))^3/(d*x)^(3/2),x, algorithm="giac")
[Out] integrate((b*arcsin(c*x) + a)^3/(d*x)^(3/2), x)
```

Mupad [N/A]

Not integrable

Time = 0.13 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.00

$$\int \frac{(a+b\arcsin(cx))^3}{(dx)^{3/2}}\,dx=\int \frac{{\left(a+b\,\mathrm{asin}\left(c\,x\right)\right)}^3}{{\left(d\,x\right)}^{3/2}} \,d x$$

```
[In] int((a + b*asin(c*x))^3/(d*x)^(3/2),x)
[Out] int((a + b*asin(c*x))^3/(d*x)^(3/2), x)
```

3.219 $\int \frac{(a+b\arcsin(cx))^3}{(dx)^{5/2}}\,dx$

Optimal result

Integrand size = 18, antiderivative size = 18

$$\int \frac{(a+b\arcsin(cx))^3}{(dx)^{5/2}}\,dx = -\frac{2(a+b\arcsin(cx))^3}{3d(dx)^{3/2}} + \frac{2bc\mathrm{Int}\left(\frac{(a+b\arcsin(cx))^2}{(dx)^{3/2}\sqrt{1-c^2x^2}},x\right)}{d}$$

```
[Out] -2/3*(a+b*arcsin(c*x))^3/d/(d*x)^(3/2)+2*b*c*Unintegrable((a+b*arcsin(c*x))
^2/(d*x)^(3/2)/(-c^2*x^2+1)^(1/2),x)/d
```

Rubi [N/A]

Not integrable

Time = 0.10 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{(a+b\arcsin(cx))^3}{(dx)^{5/2}}\,dx = \int \frac{(a+b\arcsin(cx))^3}{(dx)^{5/2}}\,dx$$

```
[In] Int[(a + b*ArcSin[c*x])^3/(d*x)^(5/2),x]
```

```
[Out] (-2*(a + b*ArcSin[c*x])^3)/(3*d*(d*x)^(3/2)) + (2*b*c*Defer[Int][(a + b*Arc
Sin[c*x])^2/((d*x)^(3/2)*Sqrt[1 - c^2*x^2]), x])/d
```

Rubi steps

$$\text{integral} = -\frac{2(a+b\arcsin(cx))^3}{3d(dx)^{3/2}} + \frac{(2bc)\int \frac{(a+b\arcsin(cx))^2}{(dx)^{3/2}\sqrt{1-c^2x^2}}\,dx}{d}$$

Mathematica [N/A]

Not integrable

Time = 41.97 (sec) , antiderivative size = 20, normalized size of antiderivative = 1.11

$$\int \frac{(a+b\arcsin(cx))^3}{(dx)^{5/2}}\,dx=\int \frac{(a+b\arcsin(cx))^3}{(dx)^{5/2}}\,dx$$

```
[In] Integrate[(a + b*ArcSin[c*x])^3/(d*x)^(5/2),x]
[Out] Integrate[(a + b*ArcSin[c*x])^3/(d*x)^(5/2), x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.13 (sec) , antiderivative size = 16, normalized size of antiderivative = 0.89

$$\int \frac{\left(a+b\arcsin\left(cx\right)\right)^{3}}{\left(dx\right)^{\frac{5}{2}}}dx$$

```
[In] int((a+b*arcsin(c*x))^3/(d*x)^(5/2),x)
[Out] int((a+b*arcsin(c*x))^3/(d*x)^(5/2),x)
```

Fricas [N/A]

Not integrable

Time = 0.26 (sec) , antiderivative size = 50, normalized size of antiderivative = 2.78

$$\int \frac{(a+b\arcsin(cx))^3}{(dx)^{5/2}}\,dx=\int \frac{\left(b\arcsin\left(cx\right)+a\right)^{3}}{\left(dx\right)^{\frac{5}{2}}}\,dx$$

```
[In] integrate((a+b*arcsin(c*x))^3/(d*x)^(5/2),x, algorithm="fricas")
[Out] integral((b^3*arcsin(c*x)^3 + 3*a*b^2*arcsin(c*x)^2 + 3*a^2*b*arcsin(c*x) +
 a^3)*sqrt(d*x)/(d^3*x^3), x)
```

Sympy [F(-2)]

Exception generated.

$$\int \frac{(a+b\arcsin(cx))^3}{(dx)^{5/2}}\,dx = \text{Exception raised: TypeError}$$

```
[In] integrate((a+b*asin(c*x))**3/(d*x)**(5/2),x)
[Out] Exception raised: TypeError >> Invalid comparison of non-real zoo
```

Maxima [N/A]

Not integrable

Time = 3.59 (sec) , antiderivative size = 471, normalized size of antiderivative = 26.17

$$\int \frac{(a+b\arcsin(cx))^3}{(dx)^{5/2}}\,dx = \int \frac{(b\arcsin(cx)+a)^3}{(dx)^{\frac{5}{2}}}\,dx$$

```
[In] integrate((a+b*arcsin(c*x))^3/(d*x)^(5/2),x, algorithm="maxima")
[Out] -1/6*(4*b^3*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1))^3 + (3*a^3*c^2*sqrt(
d)*(2*arctan(sqrt(c)*sqrt(x))/(sqrt(c)*d^3) - log((c*sqrt(x) - sqrt(c))/(c*
sqrt(x) + sqrt(c)))/(sqrt(c)*d^3)) - 18*a*b^2*c^2*sqrt(d)*integrate(x^(5/2)
*arctan(c*x/(sqrt(c*x + 1)*sqrt(-c*x + 1)))^2/(c^2*d^3*x^5 - d^3*x^3), x) -
 18*a^2*b*c^2*sqrt(d)*integrate(x^(5/2)*arctan(c*x/(sqrt(c*x + 1)*sqrt(-c*x
 + 1)))/(c^2*d^3*x^5 - d^3*x^3), x) + 12*b^3*c*sqrt(d)*integrate(sqrt(c*x +
 1)*sqrt(-c*x + 1)*x^(3/2)*arctan(c*x/(sqrt(c*x + 1)*sqrt(-c*x + 1)))^2/(c^
2*d^3*x^5 - d^3*x^3), x) - a^3*sqrt(d)*(6*c^(3/2)*arctan(sqrt(c)*sqrt(x))/d
^3 - 3*c^(3/2)*log((c*sqrt(x) - sqrt(c))/(c*sqrt(x) + sqrt(c)))/d^3 - 4/(d^
3*x^(3/2))) + 18*a*b^2*sqrt(d)*integrate(sqrt(x)*arctan(c*x/(sqrt(c*x + 1)*
sqrt(-c*x + 1)))^2/(c^2*d^3*x^5 - d^3*x^3), x) + 18*a^2*b*sqrt(d)*integrate
(sqrt(x)*arctan(c*x/(sqrt(c*x + 1)*sqrt(-c*x + 1)))/(c^2*d^3*x^5 - d^3*x^3)
, x))*d^(5/2)*x^(3/2))/(d^(5/2)*x^(3/2))
```

Giac [N/A]

Not integrable

Time = 0.63 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.00

$$\int \frac{(a+b\arcsin(cx))^3}{(dx)^{5/2}}\,dx = \int \frac{(b\arcsin(cx)+a)^3}{(dx)^{\frac{5}{2}}}\,dx$$

```
[In] integrate((a+b*arcsin(c*x))^3/(d*x)^(5/2),x, algorithm="giac")
[Out] integrate((b*arcsin(c*x) + a)^3/(d*x)^(5/2), x)
```

Mupad [N/A]

Not integrable

Time = 0.13 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.00

$$\int \frac{(a+b\arcsin(cx))^3}{(dx)^{5/2}}\,dx=\int \frac{{\left(a+b\,\mathrm{asin}\left(c\,x\right)\right)}^3}{{\left(d\,x\right)}^{5/2}} \,d x$$

```
[In] int((a + b*asin(c*x))^3/(d*x)^(5/2),x)
[Out] int((a + b*asin(c*x))^3/(d*x)^(5/2), x)
```

3.220 $\int \frac{(dx)^{3/2}}{a+b\arcsin(cx)}\,dx$

Optimal result

Integrand size = 18, antiderivative size = 18

$$\int \frac{(dx)^{3/2}}{a+b\arcsin(cx)}\,dx = \text{Int}\left(\frac{(dx)^{3/2}}{a+b\arcsin(cx)},x\right)$$

```
[Out] Unintegrable((d*x)^(3/2)/(a+b*arcsin(c*x)),x)
```

Rubi [N/A]

Not integrable

Time = 0.02 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}} = 0.000$, Rules used = {}

$$\int \frac{(dx)^{3/2}}{a+b\arcsin(cx)}\,dx = \int \frac{(dx)^{3/2}}{a+b\arcsin(cx)}\,dx$$

```
[In] Int[(d*x)^(3/2)/(a + b*ArcSin[c*x]),x]
```

```
[Out] Defer[Int][(d*x)^(3/2)/(a + b*ArcSin[c*x]), x]
```

Rubi steps

$$\text{integral} = \int \frac{(dx)^{3/2}}{a+b\arcsin(cx)}\,dx$$

Mathematica [N/A]

Not integrable

Time = 1.85 (sec) , antiderivative size = 20, normalized size of antiderivative = 1.11

$$\int \frac{(dx)^{3/2}}{a+b\arcsin(cx)}\,dx = \int \frac{(dx)^{3/2}}{a+b\arcsin(cx)}\,dx$$

```
[In] Integrate[(d*x)^(3/2)/(a + b*ArcSin[c*x]),x]
[Out] Integrate[(d*x)^(3/2)/(a + b*ArcSin[c*x]), x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.08 (sec) , antiderivative size = 16, normalized size of antiderivative = 0.89

$$\int \frac{(dx)^{\frac{3}{2}}}{a+b\arcsin\left(cx\right)}dx$$

```
[In] int((d*x)^(3/2)/(a+b*arcsin(c*x)),x)
[Out] int((d*x)^(3/2)/(a+b*arcsin(c*x)),x)
```

Fricas [N/A]

Not integrable

Time = 0.24 (sec) , antiderivative size = 20, normalized size of antiderivative = 1.11

$$\int \frac{(dx)^{3/2}}{a+b\arcsin(cx)}\,dx = \int \frac{(dx)^{\frac{3}{2}}}{b\arcsin\left(cx\right)+a}\,dx$$

```
[In] integrate((d*x)^(3/2)/(a+b*arcsin(c*x)),x, algorithm="fricas")
[Out] integral(sqrt(d*x)*d*x/(b*arcsin(c*x) + a), x)
```

Sympy [N/A]

Not integrable

Time = 4.16 (sec) , antiderivative size = 15, normalized size of antiderivative = 0.83

$$\int \frac{(dx)^{3/2}}{a+b\arcsin(cx)}\,dx = \int \frac{(dx)^{\frac{3}{2}}}{a+b\operatorname{asin}\left(cx\right)}\,dx$$

```
[In] integrate((d*x)**(3/2)/(a+b*asin(c*x)),x)
[Out] Integral((d*x)**(3/2)/(a + b*asin(c*x)), x)
```

Maxima [N/A]

Not integrable

Time = 0.42 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.00

$$\int \frac{(dx)^{3/2}}{a+b\arcsin(cx)}\,dx = \int \frac{(dx)^{\frac{3}{2}}}{b\arcsin(cx)+a}\,dx$$

```
[In] integrate((d*x)^(3/2)/(a+b*arcsin(c*x)),x, algorithm="maxima")
[Out] integrate((d*x)^(3/2)/(b*arcsin(c*x) + a), x)
```

Giac [N/A]

Not integrable

Time = 0.31 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.00

$$\int \frac{(dx)^{3/2}}{a+b\arcsin(cx)}\,dx = \int \frac{(dx)^{\frac{3}{2}}}{b\arcsin(cx)+a}\,dx$$

```
[In] integrate((d*x)^(3/2)/(a+b*arcsin(c*x)),x, algorithm="giac")
[Out] integrate((d*x)^(3/2)/(b*arcsin(c*x) + a), x)
```

Mupad [N/A]

Not integrable

Time = 0.09 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.00

$$\int \frac{(dx)^{3/2}}{a+b\arcsin(cx)}\,dx = \int \frac{(d\,x)^{3/2}}{a+b\,\mathrm{asin}\,(c\,x)}\,dx$$

```
[In] int((d*x)^(3/2)/(a + b*asin(c*x)),x)
[Out] int((d*x)^(3/2)/(a + b*asin(c*x)), x)
```

3.221 $\int \frac{\sqrt{dx}}{a+b\arcsin(cx)}\,dx$

Optimal result

Integrand size = 18, antiderivative size = 18

$$\int \frac{\sqrt{dx}}{a+b\arcsin(cx)}\,dx = \text{Int}\left(\frac{\sqrt{dx}}{a+b\arcsin(cx)},x\right)$$

```
[Out] Unintegrable((d*x)^(1/2)/(a+b*arcsin(c*x)),x)
```

Rubi [N/A]

Not integrable

Time = 0.02 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\sqrt{dx}}{a+b\arcsin(cx)}\,dx = \int \frac{\sqrt{dx}}{a+b\arcsin(cx)}\,dx$$

```
[In] Int[Sqrt[d*x]/(a + b*ArcSin[c*x]),x]
```

```
[Out] Defer[Int][Sqrt[d*x]/(a + b*ArcSin[c*x]), x]
```

Rubi steps

$$\text{integral} = \int \frac{\sqrt{dx}}{a+b\arcsin(cx)}\,dx$$

Mathematica [N/A]

Not integrable

Time = 1.60 (sec) , antiderivative size = 20, normalized size of antiderivative = 1.11

$$\int \frac{\sqrt{dx}}{a + b\arcsin(cx)}\,dx = \int \frac{\sqrt{dx}}{a + b\arcsin(cx)}\,dx$$

```
[In] Integrate[Sqrt[d*x]/(a + b*ArcSin[c*x]),x]
[Out] Integrate[Sqrt[d*x]/(a + b*ArcSin[c*x]), x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.08 (sec) , antiderivative size = 16, normalized size of antiderivative = 0.89

$$\int \frac{\sqrt{dx}}{a + b\arcsin(cx)}dx$$

```
[In] int((d*x)^(1/2)/(a+b*arcsin(c*x)),x)
[Out] int((d*x)^(1/2)/(a+b*arcsin(c*x)),x)
```

Fricas [N/A]

Not integrable

Time = 0.23 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.00

$$\int \frac{\sqrt{dx}}{a + b\arcsin(cx)}\,dx = \int \frac{\sqrt{dx}}{b\arcsin(cx) + a}\,dx$$

```
[In] integrate((d*x)^(1/2)/(a+b*arcsin(c*x)),x, algorithm="fricas")
[Out] integral(sqrt(d*x)/(b*arcsin(c*x) + a), x)
```

Sympy [N/A]

Not integrable

Time = 0.49 (sec) , antiderivative size = 15, normalized size of antiderivative = 0.83

$$\int \frac{\sqrt{dx}}{a + b\arcsin(cx)}\,dx = \int \frac{\sqrt{dx}}{a + b\,\mathrm{asin}(cx)}\,dx$$

```
[In] integrate((d*x)**(1/2)/(a+b*asin(c*x)),x)
[Out] Integral(sqrt(d*x)/(a + b*asin(c*x)), x)
```

Maxima [N/A]

Not integrable

Time = 0.44 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.00

$$\int \frac{\sqrt{dx}}{a + b \arcsin(cx)} \, dx = \int \frac{\sqrt{dx}}{b \arcsin(cx) + a} \, dx$$

```
[In] integrate((d*x)^(1/2)/(a+b*arcsin(c*x)),x, algorithm="maxima")
[Out] integrate(sqrt(d*x)/(b*arcsin(c*x) + a), x)
```

Giac [N/A]

Not integrable

Time = 0.30 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.00

$$\int \frac{\sqrt{dx}}{a + b \arcsin(cx)} \, dx = \int \frac{\sqrt{dx}}{b \arcsin(cx) + a} \, dx$$

```
[In] integrate((d*x)^(1/2)/(a+b*arcsin(c*x)),x, algorithm="giac")
[Out] integrate(sqrt(d*x)/(b*arcsin(c*x) + a), x)
```

Mupad [N/A]

Not integrable

Time = 0.09 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.00

$$\int \frac{\sqrt{dx}}{a + b \arcsin(cx)} \, dx = \int \frac{\sqrt{d\,x}}{a + b\,\mathrm{asin}\left(c\,x\right)} \, dx$$

```
[In] int((d*x)^(1/2)/(a + b*asin(c*x)),x)
[Out] int((d*x)^(1/2)/(a + b*asin(c*x)), x)
```

3.222 $\int \frac{1}{\sqrt{dx}(a+b\arcsin(cx))}\,dx$

Optimal result

Integrand size = 18, antiderivative size = 18

$$\int \frac{1}{\sqrt{dx}(a+b\arcsin(cx))}\,dx = \operatorname{Int}\left(\frac{1}{\sqrt{dx}(a+b\arcsin(cx))},x\right)$$

```
[Out] Unintegrable(1/(d*x)^(1/2)/(a+b*arcsin(c*x)),x)
```

Rubi [N/A]

Not integrable

Time = 0.02 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}} = 0.000$, Rules used = {}

$$\int \frac{1}{\sqrt{dx}(a+b\arcsin(cx))}\,dx = \int \frac{1}{\sqrt{dx}(a+b\arcsin(cx))}\,dx$$

```
[In] Int[1/(Sqrt[d*x]*(a + b*ArcSin[c*x])),x]
```

```
[Out] Defer[Int][1/(Sqrt[d*x]*(a + b*ArcSin[c*x])), x]
```

Rubi steps

$$\text{integral} = \int \frac{1}{\sqrt{dx}(a+b\arcsin(cx))}\,dx$$

Mathematica [N/A]

Not integrable

Time = 0.96 (sec) , antiderivative size = 20, normalized size of antiderivative = 1.11

$$\int \frac{1}{\sqrt{dx}(a+b\arcsin(cx))}\,dx=\int \frac{1}{\sqrt{dx}(a+b\arcsin(cx))}\,dx$$

```
[In] Integrate[1/(Sqrt[d*x]*(a + b*ArcSin[c*x])),x]
[Out] Integrate[1/(Sqrt[d*x]*(a + b*ArcSin[c*x])), x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.08 (sec) , antiderivative size = 16, normalized size of antiderivative = 0.89

$$\int \frac{1}{\sqrt{dx}\,\left(a+b\arcsin\left(cx\right)\right)}dx$$

```
[In] int(1/(d*x)^(1/2)/(a+b*arcsin(c*x)),x)
[Out] int(1/(d*x)^(1/2)/(a+b*arcsin(c*x)),x)
```

Fricas [N/A]

Not integrable

Time = 0.24 (sec) , antiderivative size = 23, normalized size of antiderivative = 1.28

$$\int \frac{1}{\sqrt{dx}(a+b\arcsin(cx))}\,dx=\int \frac{1}{\sqrt{dx}(b\arcsin\left(cx\right)+a)}\,dx$$

```
[In] integrate(1/(d*x)^(1/2)/(a+b*arcsin(c*x)),x, algorithm="fricas")
[Out] integral(sqrt(d*x)/(b*d*x*arcsin(c*x) + a*d*x), x)
```

Sympy [N/A]

Not integrable

Time = 1.43 (sec) , antiderivative size = 17, normalized size of antiderivative = 0.94

$$\int \frac{1}{\sqrt{dx}(a+b\arcsin(cx))}\,dx=\int \frac{1}{\sqrt{dx}\,\left(a+b\,\mathrm{asin}\left(cx\right)\right)}\,dx$$

```
[In] integrate(1/(d*x)**(1/2)/(a+b*asin(c*x)),x)
[Out] Integral(1/(sqrt(d*x)*(a + b*asin(c*x))), x)
```

Maxima [N/A]

Not integrable

Time = 0.47 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.00

$$\int \frac{1}{\sqrt{dx}(a+b\arcsin(cx))}\,dx = \int \frac{1}{\sqrt{dx}(b\arcsin{(cx)}+a)}\,dx$$

```
[In] integrate(1/(d*x)^(1/2)/(a+b*arcsin(c*x)),x, algorithm="maxima")
[Out] integrate(1/(sqrt(d*x)*(b*arcsin(c*x) + a)), x)
```

Giac [N/A]

Not integrable

Time = 0.29 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.00

$$\int \frac{1}{\sqrt{dx}(a+b\arcsin(cx))}\,dx = \int \frac{1}{\sqrt{dx}(b\arcsin{(cx)}+a)}\,dx$$

```
[In] integrate(1/(d*x)^(1/2)/(a+b*arcsin(c*x)),x, algorithm="giac")
[Out] integrate(1/(sqrt(d*x)*(b*arcsin(c*x) + a)), x)
```

Mupad [N/A]

Not integrable

Time = 0.09 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.00

$$\int \frac{1}{\sqrt{dx}(a+b\arcsin(cx))}\,dx = \int \frac{1}{(a+b\,\mathrm{asin}\,(c\,x))\,\sqrt{d\,x}}\,dx$$

```
[In] int(1/((a + b*asin(c*x))*(d*x)^(1/2)),x)
[Out] int(1/((a + b*asin(c*x))*(d*x)^(1/2)), x)
```

3.223 $\int \frac{1}{(dx)^{3/2}(a+b\arcsin(cx))}\,dx$

Optimal result

Integrand size = 18, antiderivative size = 18

$$\int \frac{1}{(dx)^{3/2}(a+b\arcsin(cx))}\,dx = \text{Int}\left(\frac{1}{(dx)^{3/2}(a+b\arcsin(cx))},x\right)$$

```
[Out] Unintegrable(1/(d*x)^(3/2)/(a+b*arcsin(c*x)),x)
```

Rubi [N/A]

Not integrable

Time = 0.02 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}} = 0.000$, Rules used = {}

$$\int \frac{1}{(dx)^{3/2}(a+b\arcsin(cx))}\,dx = \int \frac{1}{(dx)^{3/2}(a+b\arcsin(cx))}\,dx$$

```
[In] Int[1/((d*x)^(3/2)*(a + b*ArcSin[c*x])),x]
```

```
[Out] Defer[Int][1/((d*x)^(3/2)*(a + b*ArcSin[c*x])), x]
```

Rubi steps

$$\text{integral} = \int \frac{1}{(dx)^{3/2}(a+b\arcsin(cx))}\,dx$$

Mathematica [N/A]

Not integrable

Time = 0.79 (sec) , antiderivative size = 20, normalized size of antiderivative = 1.11

$$\int \frac{1}{(dx)^{3/2}(a+b\arcsin(cx))}\,dx=\int \frac{1}{(dx)^{3/2}(a+b\arcsin(cx))}\,dx$$

```
[In] Integrate[1/((d*x)^(3/2)*(a + b*ArcSin[c*x])),x]
[Out] Integrate[1/((d*x)^(3/2)*(a + b*ArcSin[c*x])), x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.08 (sec) , antiderivative size = 16, normalized size of antiderivative = 0.89

$$\int \frac{1}{(dx)^{\frac{3}{2}}\left(a+b\arcsin\left(cx\right)\right)}dx$$

```
[In] int(1/(d*x)^(3/2)/(a+b*arcsin(c*x)),x)
[Out] int(1/(d*x)^(3/2)/(a+b*arcsin(c*x)),x)
```

Fricas [N/A]

Not integrable

Time = 0.23 (sec) , antiderivative size = 31, normalized size of antiderivative = 1.72

$$\int \frac{1}{(dx)^{3/2}(a+b\arcsin(cx))}\,dx=\int \frac{1}{(dx)^{\frac{3}{2}}\left(b\arcsin\left(cx\right)+a\right)}\,dx$$

```
[In] integrate(1/(d*x)^(3/2)/(a+b*arcsin(c*x)),x, algorithm="fricas")
[Out] integral(sqrt(d*x)/(b*d^2*x^2*arcsin(c*x) + a*d^2*x^2), x)
```

Sympy [N/A]

Not integrable

Time = 3.48 (sec) , antiderivative size = 17, normalized size of antiderivative = 0.94

$$\int \frac{1}{(dx)^{3/2}(a+b\arcsin(cx))}\,dx=\int \frac{1}{(dx)^{\frac{3}{2}}\left(a+b\,\mathrm{asin}\left(cx\right)\right)}\,dx$$

```
[In] integrate(1/(d*x)**(3/2)/(a+b*asin(c*x)),x)
[Out] Integral(1/((d*x)**(3/2)*(a + b*asin(c*x))), x)
```

Maxima [N/A]

Not integrable

Time = 0.51 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.00

$$\int \frac{1}{(dx)^{3/2}(a+b\arcsin(cx))}\,dx=\int \frac{1}{(dx)^{\frac{3}{2}}\,(b\arcsin{(cx)}+a)}\,dx$$

```
[In] integrate(1/(d*x)^(3/2)/(a+b*arcsin(c*x)),x, algorithm="maxima")
[Out] integrate(1/((d*x)^(3/2)*(b*arcsin(c*x) + a)), x)
```

Giac [N/A]

Not integrable

Time = 0.29 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.00

$$\int \frac{1}{(dx)^{3/2}(a+b\arcsin(cx))}\,dx=\int \frac{1}{(dx)^{\frac{3}{2}}\,(b\arcsin{(cx)}+a)}\,dx$$

```
[In] integrate(1/(d*x)^(3/2)/(a+b*arcsin(c*x)),x, algorithm="giac")
[Out] integrate(1/((d*x)^(3/2)*(b*arcsin(c*x) + a)), x)
```

Mupad [N/A]

Not integrable

Time = 0.09 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.00

$$\int \frac{1}{(dx)^{3/2}(a+b\arcsin(cx))}\,dx=\int \frac{1}{(a+b\,\mathrm{asin}\,(c\,x))\;(d\,x)^{3/2}}\,dx$$

```
[In] int(1/((a + b*asin(c*x))*(d*x)^(3/2)),x)
[Out] int(1/((a + b*asin(c*x))*(d*x)^(3/2)), x)
```

3.224 $\int \frac{(dx)^{3/2}}{(a+b\arcsin(cx))^2}\,dx$

Optimal result

Integrand size = 18, antiderivative size = 18

$$\int \frac{(dx)^{3/2}}{(a+b\arcsin(cx))^2}\,dx = \text{Int}\left(\frac{(dx)^{3/2}}{(a+b\arcsin(cx))^2},x\right)$$

```
[Out] Unintegrable((d*x)^(3/2)/(a+b*arcsin(c*x))^2,x)
```

Rubi [N/A]

Not integrable

Time = 0.02 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}} = 0.000$, Rules used = {}

$$\int \frac{(dx)^{3/2}}{(a+b\arcsin(cx))^2}\,dx = \int \frac{(dx)^{3/2}}{(a+b\arcsin(cx))^2}\,dx$$

```
[In] Int[(d*x)^(3/2)/(a + b*ArcSin[c*x])^2,x]
```

```
[Out] Defer[Int][(d*x)^(3/2)/(a + b*ArcSin[c*x])^2, x]
```

Rubi steps

$$\text{integral} = \int \frac{(dx)^{3/2}}{(a+b\arcsin(cx))^2}\,dx$$

Mathematica [N/A]

Not integrable

Time = 8.69 (sec) , antiderivative size = 20, normalized size of antiderivative = 1.11

$$\int \frac{(dx)^{3/2}}{(a+b\arcsin(cx))^2}\,dx = \int \frac{(dx)^{3/2}}{(a+b\arcsin(cx))^2}\,dx$$

```
[In] Integrate[(d*x)^(3/2)/(a + b*ArcSin[c*x])^2,x]
[Out] Integrate[(d*x)^(3/2)/(a + b*ArcSin[c*x])^2, x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.08 (sec) , antiderivative size = 16, normalized size of antiderivative = 0.89

$$\int \frac{(dx)^{\frac{3}{2}}}{\left(a+b\arcsin\left(cx\right)\right)^{2}}dx$$

```
[In] int((d*x)^(3/2)/(a+b*arcsin(c*x))^2,x)
[Out] int((d*x)^(3/2)/(a+b*arcsin(c*x))^2,x)
```

Fricas [N/A]

Not integrable

Time = 0.24 (sec) , antiderivative size = 34, normalized size of antiderivative = 1.89

$$\int \frac{(dx)^{3/2}}{(a+b\arcsin(cx))^2}\,dx = \int \frac{(dx)^{\frac{3}{2}}}{\left(b\arcsin\left(cx\right)+a\right)^{2}}\,dx$$

```
[In] integrate((d*x)^(3/2)/(a+b*arcsin(c*x))^2,x, algorithm="fricas")
[Out] integral(sqrt(d*x)*d*x/(b^2*arcsin(c*x)^2 + 2*a*b*arcsin(c*x) + a^2), x)
```

Sympy [N/A]

Not integrable

Time = 10.74 (sec) , antiderivative size = 17, normalized size of antiderivative = 0.94

$$\int \frac{(dx)^{3/2}}{(a+b\arcsin(cx))^2}\,dx = \int \frac{(dx)^{\frac{3}{2}}}{(a+b\,\mathrm{asin}\,(cx))^2}\,dx$$

```
[In] integrate((d*x)**(3/2)/(a+b*asin(c*x))**2,x)
```

```
[Out] Integral((d*x)**(3/2)/(a + b*asin(c*x))**2, x)
```

Maxima [N/A]

Not integrable

Time = 1.91 (sec) , antiderivative size = 182, normalized size of antiderivative = 10.11

$$\int \frac{(dx)^{3/2}}{(a+b\arcsin(cx))^2}\,dx = \int \frac{(dx)^{\frac{3}{2}}}{(b\arcsin\,(cx)+a)^2}\,dx$$

```
[In] integrate((d*x)^(3/2)/(a+b*arcsin(c*x))^2,x, algorithm="maxima")
```

```
[Out] -(sqrt(c*x + 1)*sqrt(-c*x + 1)*d^(3/2)*x^(3/2) - (b^2*c*arctan2(c*x, sqrt(c
*x + 1)*sqrt(-c*x + 1)) + a*b*c)*sqrt(d)*integrate(1/2*(5*c^2*d*x^2 - 3*d)*
sqrt(c*x + 1)*sqrt(-c*x + 1)*sqrt(x)/(a*b*c^3*x^2 - a*b*c + (b^2*c^3*x^2 -
b^2*c)*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1))), x))/(b^2*c*arctan2(c*x,
 sqrt(c*x + 1)*sqrt(-c*x + 1)) + a*b*c)
```

Giac [N/A]

Not integrable

Time = 0.31 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.00

$$\int \frac{(dx)^{3/2}}{(a+b\arcsin(cx))^2}\,dx = \int \frac{(dx)^{\frac{3}{2}}}{(b\arcsin\,(cx)+a)^2}\,dx$$

```
[In] integrate((d*x)^(3/2)/(a+b*arcsin(c*x))^2,x, algorithm="giac")
```

```
[Out] integrate((d*x)^(3/2)/(b*arcsin(c*x) + a)^2, x)
```

Mupad [N/A]

Not integrable

Time = 0.11 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.00

$$\int \frac{(dx)^{3/2}}{(a+b\arcsin(cx))^2}\,dx=\int \frac{{\left(d\,x\right)}^{3/2}}{{\left(a+b\,\mathrm{asin}\left(c\,x\right)\right)}^2}\,dx$$

[In] `int((d*x)^(3/2)/(a + b*asin(c*x))^2,x)`

[Out] `int((d*x)^(3/2)/(a + b*asin(c*x))^2, x)`

3.225 $\int \frac{\sqrt{dx}}{(a+b\arcsin(cx))^2}\,dx$

Optimal result

Integrand size = 18, antiderivative size = 18

$$\int \frac{\sqrt{dx}}{(a+b\arcsin(cx))^2}\,dx=\mathrm{Int}\left(\frac{\sqrt{dx}}{(a+b\arcsin(cx))^2},x\right)$$

```
[Out] Unintegrable((d*x)^(1/2)/(a+b*arcsin(c*x))^2,x)
```

Rubi [N/A]

Not integrable

Time = 0.02 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\sqrt{dx}}{(a+b\arcsin(cx))^2}\,dx=\int \frac{\sqrt{dx}}{(a+b\arcsin(cx))^2}\,dx$$

```
[In] Int[Sqrt[d*x]/(a + b*ArcSin[c*x])^2,x]
```

```
[Out] Defer[Int][Sqrt[d*x]/(a + b*ArcSin[c*x])^2, x]
```

Rubi steps

$$\text{integral}=\int \frac{\sqrt{dx}}{(a+b\arcsin(cx))^2}\,dx$$

Mathematica [N/A]

Not integrable

Time = 8.43 (sec) , antiderivative size = 20, normalized size of antiderivative = 1.11

$$\int \frac{\sqrt{dx}}{(a+b\arcsin(cx))^2}\,dx = \int \frac{\sqrt{dx}}{(a+b\arcsin(cx))^2}\,dx$$

```
[In] Integrate[Sqrt[d*x]/(a + b*ArcSin[c*x])^2,x]
[Out] Integrate[Sqrt[d*x]/(a + b*ArcSin[c*x])^2, x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.08 (sec) , antiderivative size = 16, normalized size of antiderivative = 0.89

$$\int \frac{\sqrt{dx}}{\left(a+b\arcsin\left(cx\right)\right)^{2}}dx$$

```
[In] int((d*x)^(1/2)/(a+b*arcsin(c*x))^2,x)
[Out] int((d*x)^(1/2)/(a+b*arcsin(c*x))^2,x)
```

Fricas [N/A]

Not integrable

Time = 0.23 (sec) , antiderivative size = 32, normalized size of antiderivative = 1.78

$$\int \frac{\sqrt{dx}}{(a+b\arcsin(cx))^2}\,dx = \int \frac{\sqrt{dx}}{\left(b\arcsin\left(cx\right)+a\right)^{2}}\,dx$$

```
[In] integrate((d*x)^(1/2)/(a+b*arcsin(c*x))^2,x, algorithm="fricas")
[Out] integral(sqrt(d*x)/(b^2*arcsin(c*x)^2 + 2*a*b*arcsin(c*x) + a^2), x)
```

Sympy [N/A]

Not integrable

Time = 1.99 (sec) , antiderivative size = 17, normalized size of antiderivative = 0.94

$$\int \frac{\sqrt{dx}}{(a+b\arcsin(cx))^2}\,dx = \int \frac{\sqrt{dx}}{(a+b\,\mathrm{asin}\,(cx))^2}\,dx$$

```
[In] integrate((d*x)**(1/2)/(a+b*asin(c*x))**2,x)
[Out] Integral(sqrt(d*x)/(a + b*asin(c*x))**2, x)
```

Maxima [N/A]

Not integrable

Time = 1.90 (sec) , antiderivative size = 180, normalized size of antiderivative = 10.00

$$\int \frac{\sqrt{dx}}{(a+b\arcsin(cx))^2}\,dx = \int \frac{\sqrt{dx}}{(b\arcsin(cx)+a)^2}\,dx$$

```
[In] integrate((d*x)^(1/2)/(a+b*arcsin(c*x))^2,x, algorithm="maxima")
[Out] ((b^2*c*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1)) + a*b*c)*sqrt(d)*integra
te(1/2*(3*c^2*x^2 - 1)*sqrt(c*x + 1)*sqrt(-c*x + 1)*sqrt(x)/(a*b*c^3*x^3 -
a*b*c*x + (b^2*c^3*x^3 - b^2*c*x)*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1)
)), x) - sqrt(c*x + 1)*sqrt(-c*x + 1)*sqrt(d)*sqrt(x))/(b^2*c*arctan2(c*x,
sqrt(c*x + 1)*sqrt(-c*x + 1)) + a*b*c)
```

Giac [N/A]

Not integrable

Time = 0.31 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.00

$$\int \frac{\sqrt{dx}}{(a+b\arcsin(cx))^2}\,dx = \int \frac{\sqrt{dx}}{(b\arcsin(cx)+a)^2}\,dx$$

```
[In] integrate((d*x)^(1/2)/(a+b*arcsin(c*x))^2,x, algorithm="giac")
[Out] integrate(sqrt(d*x)/(b*arcsin(c*x) + a)^2, x)
```

Mupad [N/A]

Not integrable

Time = 0.12 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.00

$$\int \frac{\sqrt{dx}}{(a+b\arcsin(cx))^2}\,dx = \int \frac{\sqrt{d\,x}}{\left(a+b\,\mathrm{asin}\left(c\,x\right)\right)^2}\,dx$$

```
[In] int((d*x)^(1/2)/(a + b*asin(c*x))^2,x)
[Out] int((d*x)^(1/2)/(a + b*asin(c*x))^2, x)
```

3.226 $\int \frac{1}{\sqrt{dx}(a+b\arcsin(cx))^2}\,dx$

Optimal result

Integrand size = 18, antiderivative size = 18

$$\int \frac{1}{\sqrt{dx}(a+b\arcsin(cx))^2}\,dx = \text{Int}\left(\frac{1}{\sqrt{dx}(a+b\arcsin(cx))^2},x\right)$$

```
[Out] Unintegrable(1/(d*x)^(1/2)/(a+b*arcsin(c*x))^2,x)
```

Rubi [N/A]

Not integrable

Time = 0.02 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}} = 0.000$, Rules used = {}

$$\int \frac{1}{\sqrt{dx}(a+b\arcsin(cx))^2}\,dx = \int \frac{1}{\sqrt{dx}(a+b\arcsin(cx))^2}\,dx$$

```
[In] Int[1/(Sqrt[d*x]*(a + b*ArcSin[c*x])^2),x]
```

```
[Out] Defer[Int][1/(Sqrt[d*x]*(a + b*ArcSin[c*x])^2), x]
```

Rubi steps

$$\text{integral} = \int \frac{1}{\sqrt{dx}(a+b\arcsin(cx))^2}\,dx$$

Mathematica [N/A]

Not integrable

Time = 24.11 (sec) , antiderivative size = 20, normalized size of antiderivative = 1.11

$$\int \frac{1}{\sqrt{dx}(a+b\arcsin(cx))^2}\,dx=\int \frac{1}{\sqrt{dx}(a+b\arcsin(cx))^2}\,dx$$

```
[In] Integrate[1/(Sqrt[d*x]*(a + b*ArcSin[c*x])^2),x]
[Out] Integrate[1/(Sqrt[d*x]*(a + b*ArcSin[c*x])^2), x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.10 (sec) , antiderivative size = 16, normalized size of antiderivative = 0.89

$$\int \frac{1}{\sqrt{dx}\,\left(a+b\arcsin\left(cx\right)\right)^{2}}dx$$

```
[In] int(1/(d*x)^(1/2)/(a+b*arcsin(c*x))^2,x)
[Out] int(1/(d*x)^(1/2)/(a+b*arcsin(c*x))^2,x)
```

Fricas [N/A]

Not integrable

Time = 0.25 (sec) , antiderivative size = 39, normalized size of antiderivative = 2.17

$$\int \frac{1}{\sqrt{dx}(a+b\arcsin(cx))^2}\,dx=\int \frac{1}{\sqrt{dx}(b\arcsin\left(cx\right)+a)^2}\,dx$$

```
[In] integrate(1/(d*x)^(1/2)/(a+b*arcsin(c*x))^2,x, algorithm="fricas")
[Out] integral(sqrt(d*x)/(b^2*d*x*arcsin(c*x)^2 + 2*a*b*d*x*arcsin(c*x) + a^2*d*x
), x)
```

Sympy [N/A]

Not integrable

Time = 4.07 (sec) , antiderivative size = 19, normalized size of antiderivative = 1.06

$$\int \frac{1}{\sqrt{dx}(a+b\arcsin(cx))^2}\,dx = \int \frac{1}{\sqrt{dx}\,(a+b\,\mathrm{asin}\,(cx))^2}\,dx$$

```
[In] integrate(1/(d*x)**(1/2)/(a+b*asin(c*x))**2,x)
[Out] Integral(1/(sqrt(d*x)*(a + b*asin(c*x))**2), x)
```

Maxima [N/A]

Not integrable

Time = 1.69 (sec) , antiderivative size = 195, normalized size of antiderivative = 10.83

$$\int \frac{1}{\sqrt{dx}(a+b\arcsin(cx))^2}\,dx = \int \frac{1}{\sqrt{dx}(b\arcsin(cx)+a)^2}\,dx$$

```
[In] integrate(1/(d*x)^(1/2)/(a+b*arcsin(c*x))^2,x, algorithm="maxima")
[Out] ((b^2*c*d*x*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1)) + a*b*c*d*x)*sqrt(d)
*integrate(1/2*(c^2*x^2 + 1)*sqrt(c*x + 1)*sqrt(-c*x + 1)*sqrt(x)/(a*b*c^3*
d*x^4 - a*b*c*d*x^2 + (b^2*c^3*d*x^4 - b^2*c*d*x^2)*arctan2(c*x, sqrt(c*x +
 1)*sqrt(-c*x + 1))), x) - sqrt(c*x + 1)*sqrt(-c*x + 1)*sqrt(d)*sqrt(x))/(b
^2*c*d*x*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1)) + a*b*c*d*x)
```

Giac [N/A]

Not integrable

Time = 0.32 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.00

$$\int \frac{1}{\sqrt{dx}(a+b\arcsin(cx))^2}\,dx = \int \frac{1}{\sqrt{dx}(b\arcsin(cx)+a)^2}\,dx$$

```
[In] integrate(1/(d*x)^(1/2)/(a+b*arcsin(c*x))^2,x, algorithm="giac")
[Out] integrate(1/(sqrt(d*x)*(b*arcsin(c*x) + a)^2), x)
```

Mupad [N/A]

Not integrable

Time = 0.12 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.00

$$\int \frac{1}{\sqrt{dx}(a+b\arcsin(cx))^2}\,dx=\int \frac{1}{{\left(a+b\,\mathrm{asin}\left(c\,x\right)\right)}^2\,\sqrt{d\,x}}\,dx$$

```
[In] int(1/((a + b*asin(c*x))^2*(d*x)^(1/2)),x)
[Out] int(1/((a + b*asin(c*x))^2*(d*x)^(1/2)), x)
```

3.227 $\int \frac{1}{(dx)^{3/2}(a+b\arcsin(cx))^2}\,dx$

Optimal result

Integrand size = 18, antiderivative size = 18

$$\int \frac{1}{(dx)^{3/2}(a+b\arcsin(cx))^2}\,dx = \mathrm{Int}\left(\frac{1}{(dx)^{3/2}(a+b\arcsin(cx))^2},x\right)$$

```
[Out] Unintegrable(1/(d*x)^(3/2)/(a+b*arcsin(c*x))^2,x)
```

Rubi [N/A]

Not integrable

Time = 0.02 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.00, number of steps used = 0, number of rules used = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{1}{(dx)^{3/2}(a+b\arcsin(cx))^2}\,dx = \int \frac{1}{(dx)^{3/2}(a+b\arcsin(cx))^2}\,dx$$

```
[In] Int[1/((d*x)^(3/2)*(a + b*ArcSin[c*x])^2),x]
[Out] Defer[Int][1/((d*x)^(3/2)*(a + b*ArcSin[c*x])^2), x]
```

Rubi steps

$$\text{integral} = \int \frac{1}{(dx)^{3/2}(a+b\arcsin(cx))^2}\,dx$$

Mathematica [N/A]

Not integrable

Time = 16.64 (sec) , antiderivative size = 20, normalized size of antiderivative = 1.11

$$\int \frac{1}{(dx)^{3/2}(a+b\arcsin(cx))^2}\,dx=\int \frac{1}{(dx)^{3/2}(a+b\arcsin(cx))^2}\,dx$$

```
[In] Integrate[1/((d*x)^(3/2)*(a + b*ArcSin[c*x])^2),x]
[Out] Integrate[1/((d*x)^(3/2)*(a + b*ArcSin[c*x])^2), x]
```

Maple [N/A] (verified)

Not integrable

Time = 0.09 (sec) , antiderivative size = 16, normalized size of antiderivative = 0.89

$$\int \frac{1}{(dx)^{\frac{3}{2}}\left(a+b\arcsin\left(cx\right)\right)^{2}}dx$$

```
[In] int(1/(d*x)^(3/2)/(a+b*arcsin(c*x))^2,x)
[Out] int(1/(d*x)^(3/2)/(a+b*arcsin(c*x))^2,x)
```

Fricas [N/A]

Not integrable

Time = 0.23 (sec) , antiderivative size = 51, normalized size of antiderivative = 2.83

$$\int \frac{1}{(dx)^{3/2}(a+b\arcsin(cx))^2}\,dx=\int \frac{1}{(dx)^{\frac{3}{2}}\left(b\arcsin\left(cx\right)+a\right)^{2}}\,dx$$

```
[In] integrate(1/(d*x)^(3/2)/(a+b*arcsin(c*x))^2,x, algorithm="fricas")
[Out] integral(sqrt(d*x)/(b^2*d^2*x^2*arcsin(c*x)^2 + 2*a*b*d^2*x^2*arcsin(c*x) +
 a^2*d^2*x^2), x)
```

Sympy [N/A]

Not integrable

Time = 11.47 (sec) , antiderivative size = 19, normalized size of antiderivative = 1.06

$$\int \frac{1}{(dx)^{3/2}(a+b\arcsin(cx))^2}\,dx = \int \frac{1}{(dx)^{\frac{3}{2}}\,(a+b\,\mathrm{asin}\,(cx))^2}\,dx$$

```
[In] integrate(1/(d*x)**(3/2)/(a+b*asin(c*x))**2,x)
[Out] Integral(1/((d*x)**(3/2)*(a + b*asin(c*x))**2), x)
```

Maxima [N/A]

Not integrable

Time = 1.97 (sec) , antiderivative size = 219, normalized size of antiderivative = 12.17

$$\int \frac{1}{(dx)^{3/2}(a+b\arcsin(cx))^2}\,dx = \int \frac{1}{(dx)^{\frac{3}{2}}\,(b\arcsin\,(cx)+a)^2}\,dx$$

```
[In] integrate(1/(d*x)^(3/2)/(a+b*arcsin(c*x))^2,x, algorithm="maxima")
[Out] -((b^2*c*d^2*x^2*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1)) + a*b*c*d^2*x^2
)*sqrt(d)*integrate(1/2*(c^2*x^2 - 3)*sqrt(c*x + 1)*sqrt(-c*x + 1)*sqrt(x)/
(a*b*c^3*d^2*x^5 - a*b*c*d^2*x^3 + (b^2*c^3*d^2*x^5 - b^2*c*d^2*x^3)*arctan
2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1))), x) + sqrt(c*x + 1)*sqrt(-c*x + 1)*sq
rt(d)*sqrt(x))/(b^2*c*d^2*x^2*arctan2(c*x, sqrt(c*x + 1)*sqrt(-c*x + 1)) +
a*b*c*d^2*x^2)
```

Giac [N/A]

Not integrable

Time = 0.29 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.00

$$\int \frac{1}{(dx)^{3/2}(a+b\arcsin(cx))^2}\,dx = \int \frac{1}{(dx)^{\frac{3}{2}}\,(b\arcsin\,(cx)+a)^2}\,dx$$

```
[In] integrate(1/(d*x)^(3/2)/(a+b*arcsin(c*x))^2,x, algorithm="giac")
[Out] integrate(1/((d*x)^(3/2)*(b*arcsin(c*x) + a)^2), x)
```

Mupad [N/A]

Not integrable

Time = 0.11 (sec) , antiderivative size = 18, normalized size of antiderivative = 1.00

$$\int \frac{1}{(dx)^{3/2}(a+b\arcsin(cx))^2}\,dx=\int \frac{1}{\left(a+b\,\mathrm{asin}\left(c\,x\right)\right)^2\,{\left(d\,x\right)}^{3/2}}\,dx$$

```
[In] int(1/((a + b*asin(c*x))^2*(d*x)^(3/2)),x)
[Out] int(1/((a + b*asin(c*x))^2*(d*x)^(3/2)), x)
```

CHAPTER 4

APPENDIX

4.1 Listing of Grading functions

The following are the current version of the grading functions used for grading the quality of the antiderivative with reference to the optimal antiderivative included in the test suite.

There is a version for Maple and for Mathematica/Rubi. There is a version for grading Sympy and version for use with Sagemath.

The following are links to the current source code.

The following are the listings of source code of the grading functions.

Mathematica and Rubi grading function

```
(* Original version thanks to Albert Rich emailed on 03/21/2017 *)
(* ::Package:: *)

(* Nasser: April 7,2022. add second output which gives reason for the grade *)
(*                      Small rewrite of logic in main function to make it*)
(*                      match Maple's logic. No change in functionality otherwise*)

(* ::Subsection:: *)
(*GradeAntiderivative[result,optimal]*)


(* ::Text:: *)
(*If result and optimal are mathematical expressions, *)
```

```
(*          GradeAntiderivative[result,optimal] returns*)
(*  "F" if the result fails to integrate an expression that*)
(*      is integrable*)
(*  "C" if result involves higher level functions than necessary*)
(*  "B" if result is more than twice the size of the optimal*)
(*      antiderivative*)
(*  "A" if result can be considered optimal*)


GradeAntiderivative[result_,optimal_] := Module[{expnResult,expnOptimal,leafCountResult,leafCou
    expnResult  = ExpnType[result];
    expnOptimal = ExpnType[optimal];
    leafCountResult = LeafCount[result];
    leafCountOptimal = LeafCount[optimal];

    (*Print["expnResult=",expnResult," expnOptimal=",expnOptimal];*)
    If[expnResult<=expnOptimal,
        If[Not[FreeQ[result,Complex]], (*result contains complex*)
            If[Not[FreeQ[optimal,Complex]], (*optimal contains complex*)
                If[leafCountResult<=2*leafCountOptimal,
                    finalresult={"A",""}
                    ,(*ELSE*)
                    finalresult={"B","Both result and optimal contain complex but leaf count is
                  ]
            ,(*ELSE*)
                finalresult={"C","Result contains complex when optimal does not."}
            ]
        ,(*ELSE*)(*result does not contains complex*)
            If[leafCountResult<=2*leafCountOptimal,
               finalresult={"A",""}
            ,(*ELSE*)
               finalresult={"B","Leaf count is larger than twice the leaf count of optimal. $"<
              ]
        ]
    ,(*ELSE*) (*expnResult>expnOptimal*)
        If[FreeQ[result,Integrate] && FreeQ[result,Int],
            finalresult={"C","Result contains higher order function than in optimal. Order "<>T
            ,
            finalresult={"F","Contains unresolved integral."}
        ]
    ];

    finalresult
]

(* ::Text:: *)
(*The following summarizes the type number assigned an *)
```

```
(*expression based on the functions it involves*)
(*1 = rational function*)
(*2 = algebraic function*)
(*3 = elementary function*)
(*4 = special function*)
(*5 = hyperpergeometric function*)
(*6 = appell function*)
(*7 = rootsum function*)
(*8 = integrate function*)
(*9 = unknown function*)


ExpnType[expn_] :=
  If[AtomQ[expn],
    1,
  If[ListQ[expn],
    Max[Map[ExpnType,expn]],
  If[Head[expn]===Power,
    If[IntegerQ[expn[[2]]],
      ExpnType[expn[[1]]],
    If[Head[expn[[2]]]===Rational,
      If[IntegerQ[expn[[1]]] || Head[expn[[1]]]===Rational,
        1,
      Max[ExpnType[expn[[1]]],2]],
    Max[ExpnType[expn[[1]]],ExpnType[expn[[2]]],3]]],
  If[Head[expn]===Plus || Head[expn]===Times,
    Max[ExpnType[First[expn]],ExpnType[Rest[expn]]],
  If[ElementaryFunctionQ[Head[expn]],
    Max[3,ExpnType[expn[[1]]]],
  If[SpecialFunctionQ[Head[expn]],
    Apply[Max,Append[Map[ExpnType,Apply[List,expn]],4]],
  If[HypergeometricFunctionQ[Head[expn]],
    Apply[Max,Append[Map[ExpnType,Apply[List,expn]],5]],
  If[AppellFunctionQ[Head[expn]],
    Apply[Max,Append[Map[ExpnType,Apply[List,expn]],6]],
  If[Head[expn]===RootSum,
    Apply[Max,Append[Map[ExpnType,Apply[List,expn]],7]],
  If[Head[expn]===Integrate || Head[expn]===Int,
    Apply[Max,Append[Map[ExpnType,Apply[List,expn]],8]],
  9]]]]]]]]]]


ElementaryFunctionQ[func_] :=
  MemberQ[{
  Exp,Log,
  Sin,Cos,Tan,Cot,Sec,Csc,
  ArcSin,ArcCos,ArcTan,ArcCot,ArcSec,ArcCsc,
```

```
  Sinh,Cosh,Tanh,Coth,Sech,Csch,
  ArcSinh,ArcCosh,ArcTanh,ArcCoth,ArcSech,ArcCsch
},func]


SpecialFunctionQ[func_] :=
  MemberQ[{
  Erf, Erfc, Erfi,
  FresnelS, FresnelC,
  ExpIntegralE, ExpIntegralEi, LogIntegral,
  SinIntegral, CosIntegral, SinhIntegral, CoshIntegral,
  Gamma, LogGamma, PolyGamma,
  Zeta, PolyLog, ProductLog,
  EllipticF, EllipticE, EllipticPi
},func]


HypergeometricFunctionQ[func_] :=
  MemberQ[{Hypergeometric1F1,Hypergeometric2F1,HypergeometricPFQ},func]


AppellFunctionQ[func_] :=
  MemberQ[{AppellF1},func]
```

Maple grading function

```
# File: GradeAntiderivative.mpl
# Original version thanks to Albert Rich emailed on 03/21/2017

#Nasser 03/22/2017  Use Maple leaf count instead since buildin
#Nasser 03/23/2017  missing 'ln' for ElementaryFunctionQ added
#Nasser 03/24/2017  corrected the check for complex result
#Nasser 10/27/2017  check for leafsize and do not call ExpnType()
#                   if leaf size is "too large". Set at 500,000
#Nasser 12/22/2019  Added debug flag, added 'dilog' to special functions
#                   see problem 156, file Apostol_Problems
#Nasser 4/07/2022   add second output which gives reason for the grade

GradeAntiderivative := proc(result,optimal)
local leaf_count_result,
        leaf_count_optimal,
        ExpnType_result,
        ExpnType_optimal,
        debug:=false;

        leaf_count_result:=leafcount(result);
```

```
        #do NOT call ExpnType() if leaf size is too large. Recursion problem
        if leaf_count_result > 500000 then
            return "B","result has leaf size over 500,000. Avoiding possible recursion issues
        fi;

        leaf_count_optimal := leafcount(optimal);
        ExpnType_result  := ExpnType(result);
        ExpnType_optimal := ExpnType(optimal);

        if debug then
            print("ExpnType_result",ExpnType_result," ExpnType_optimal=",ExpnType_optimal);
        fi;

# If result and optimal are mathematical expressions,
#  GradeAntiderivative[result,optimal] returns
#   "F" if the result fails to integrate an expression that
#       is integrable
#   "C" if result involves higher level functions than necessary
#   "B" if result is more than twice the size of the optimal
#       antiderivative
#   "A" if result can be considered optimal

    #This check below actually is not needed, since I only
    #call this grading only for passed integrals. i.e. I check
    #for "F" before calling this. But no harm of keeping it here.
    #just in case.


    if not type(result,freeof('int')) then
        return "F","Result contains unresolved integral";
    fi;


    if ExpnType_result<=ExpnType_optimal then
        if debug then
             print("ExpnType_result<=ExpnType_optimal");
        fi;
        if is_contains_complex(result) then
            if is_contains_complex(optimal) then
                if debug then
                        print("both result and optimal complex");
                fi;
                if leaf_count_result<=2*leaf_count_optimal then
                    return "A"," ";
                else
                   return "B",cat("Both result and optimal contain complex but leaf count of
                                convert(leaf_count_result,string)," vs. $2 (",
```

```
                                   convert(leaf_count_optimal,string)," ) = ",convert(2*leaf_co
                end if
            else #result contains complex but optimal is not
                if debug then
                        print("result contains complex but optimal is not");
                fi;
                return "C","Result contains complex when optimal does not.";
            fi;
        else # result do not contain complex
             # this assumes optimal do not as well. No check is needed here.
            if debug then
                   print("result do not contain complex, this assumes optimal do not as well")
            fi;
            if leaf_count_result<=2*leaf_count_optimal then
                if debug then
                    print("leaf_count_result<=2*leaf_count_optimal");
                fi;
                return "A"," ";
            else
                if debug then
                    print("leaf_count_result>2*leaf_count_optimal");
                fi;
                return "B",cat("Leaf count of result is larger than twice the leaf count of opt
                                   convert(leaf_count_result,string),"$ vs. $2(",
                                   convert(leaf_count_optimal,string),")=",convert(2*leaf_count
            fi;
        fi;
    else #ExpnType(result) > ExpnType(optimal)
        if debug then
            print("ExpnType(result) > ExpnType(optimal)");
        fi;
        return "C",cat("Result contains higher order function than in optimal. Order ",
                       convert(ExpnType_result,string)," vs. order ",
                       convert(ExpnType_optimal,string),".");
    fi;

end proc:

#
# is_contains_complex(result)
# takes expressions and returns true if it contains "I" else false
#
#Nasser 032417
is_contains_complex:= proc(expression)
  return (has(expression,I));
end proc:
```

```
# The following summarizes the type number assigned an expression
# based on the functions it involves
# 1 = rational function
# 2 = algebraic function
# 3 = elementary function
# 4 = special function
# 5 = hyperpergeometric function
# 6 = appell function
# 7 = rootsum function
# 8 = integrate function
# 9 = unknown function

ExpnType := proc(expn)
  if type(expn,'atomic') then
    1
  elif type(expn,'list') then
    apply(max,map(ExpnType,expn))
  elif type(expn,'sqrt') then
    if type(op(1,expn),'rational') then
       1
    else
       max(2,ExpnType(op(1,expn)))
    end if
  elif type(expn,'`^`') then
    if type(op(2,expn),'integer') then
      ExpnType(op(1,expn))
    elif type(op(2,expn),'rational') then
      if type(op(1,expn),'rational') then
         1
      else
         max(2,ExpnType(op(1,expn)))
      end if
    else
         max(3,ExpnType(op(1,expn)),ExpnType(op(2,expn)))
    end if
  elif type(expn,'`+`') or type(expn,'`*`') then
    max(ExpnType(op(1,expn)),max(ExpnType(rest(expn))))
  elif ElementaryFunctionQ(op(0,expn)) then
    max(3,ExpnType(op(1,expn)))
  elif SpecialFunctionQ(op(0,expn)) then
    max(4,apply(max,map(ExpnType,[op(expn)])))
  elif HypergeometricFunctionQ(op(0,expn)) then
    max(5,apply(max,map(ExpnType,[op(expn)])))
  elif AppellFunctionQ(op(0,expn)) then
    max(6,apply(max,map(ExpnType,[op(expn)])))
  elif op(0,expn)='int' then
    max(8,apply(max,map(ExpnType,[op(expn)]))) else
```

```
  9
  end if
end proc:


ElementaryFunctionQ := proc(func)
  member(func,[
        exp,log,ln,
        sin,cos,tan,cot,sec,csc,
        arcsin,arccos,arctan,arccot,arcsec,arccsc,
        sinh,cosh,tanh,coth,sech,csch,
        arcsinh,arccosh,arctanh,arccoth,arcsech,arccsch])
end proc:

SpecialFunctionQ := proc(func)
  member(func,[
        erf,erfc,erfi,
        FresnelS,FresnelC,
        Ei,Ei,Li,Si,Ci,Shi,Chi,
        GAMMA,lnGAMMA,Psi,Zeta,polylog,dilog,LambertW,
        EllipticF,EllipticE,EllipticPi])
end proc:

HypergeometricFunctionQ := proc(func)
  member(func,[Hypergeometric1F1,hypergeom,HypergeometricPFQ])
end proc:

AppellFunctionQ := proc(func)
  member(func,[AppellF1])
end proc:

# u is a sum or product.  rest(u) returns all but the
# first term or factor of u.
rest := proc(u) local v;
  if nops(u)=2 then
     op(2,u)
  else
     apply(op(0,u),op(2..nops(u),u))
  end if
end proc:

#leafcount(u) returns the number of nodes in u.
#Nasser 3/23/17  Replaced by build-in leafCount from package in Maple
leafcount := proc(u)
   MmaTranslator[Mma][LeafCount](u);
end proc:
```

Sympy grading function

```
#Dec 24, 2019. Nasser M. Abbasi:
#             Port of original Maple grading function by
#             Albert Rich to use with Sympy/Python
#Dec 27, 2019  Nasser. Added `RootSum`. See problem 177, Timofeev file
#             added 'exp_polar'
from sympy import *

def leaf_count(expr):
   #sympy do not have leaf count function. This is approximation
   return round(1.7*count_ops(expr))

def is_sqrt(expr):
   if isinstance(expr,Pow):
      if expr.args[1] == Rational(1,2):
         return True
      else:
         return False
   else:
      return False

def is_elementary_function(func):
   return func in [exp,log,ln,sin,cos,tan,cot,sec,csc,
         asin,acos,atan,acot,asec,acsc,sinh,cosh,tanh,coth,sech,csch,
         asinh,acosh,atanh,acoth,asech,acsch
      ]

def is_special_function(func):
   return func in [ erf,erfc,erfi,
          fresnels,fresnelc,Ei,Ei,Li,Si,Ci,Shi,Chi,
          gamma,loggamma,digamma,zeta,polylog,LambertW,
          elliptic_f,elliptic_e,elliptic_pi,exp_polar
       ]

def is_hypergeometric_function(func):
   return func in [hyper]

def is_appell_function(func):
   return func in [appellf1]

def is_atom(expn):
   try:
      if expn.isAtom or isinstance(expn,int) or isinstance(expn,float):
        return True
      else:
        return False
```

```
    except AttributeError as error:
        return False

def expnType(expn):
    debug=False
    if debug:
        print("expn=",expn,"type(expn)=",type(expn))

    if is_atom(expn):
      return 1
    elif isinstance(expn,list):
        return max(map(expnType, expn))    #apply(max,map(ExpnType,expn))
    elif  is_sqrt(expn):
        if isinstance(expn.args[0],Rational): #type(op(1,expn),'rational')
            return 1
        else:
            return max(2,expnType(expn.args[0]))  #max(2,ExpnType(op(1,expn)))
    elif isinstance(expn,Pow):    #type(expn,'`^`')
        if isinstance(expn.args[1],Integer):   #type(op(2,expn),'integer')
            return expnType(expn.args[0])    #ExpnType(op(1,expn))
        elif isinstance(expn.args[1],Rational):   #type(op(2,expn),'rational')
            if isinstance(expn.args[0],Rational): #type(op(1,expn),'rational')
                return 1
            else:
                return max(2,expnType(expn.args[0]))   #max(2,ExpnType(op(1,expn)))
        else:
            return max(3,expnType(expn.args[0]),expnType(expn.args[1])) #max(3,ExpnType(op(1,expn)),ExpnTy
    elif isinstance(expn,Add) or isinstance(expn,Mul): #type(expn,'`+`') or type(expn,'`*`')
        m1 = expnType(expn.args[0])
        m2 = expnType(list(expn.args[1:]))
        return max(m1,m2)   #max(ExpnType(op(1,expn)),max(ExpnType(rest(expn))))
    elif is_elementary_function(expn.func):   #ElementaryFunctionQ(op(0,expn))
        return max(3,expnType(expn.args[0]))   #max(3,ExpnType(op(1,expn)))
    elif is_special_function(expn.func): #SpecialFunctionQ(op(0,expn))
        m1 = max(map(expnType, list(expn.args)))
        return max(4,m1)    #max(4,apply(max,map(ExpnType,[op(expn)])))
    elif is_hypergeometric_function(expn.func): #HypergeometricFunctionQ(op(0,expn))
        m1 = max(map(expnType, list(expn.args)))
        return max(5,m1)    #max(5,apply(max,map(ExpnType,[op(expn)])))
    elif is_appell_function(expn.func):
        m1 = max(map(expnType, list(expn.args)))
        return max(6,m1)    #max(5,apply(max,map(ExpnType,[op(expn)])))
    elif isinstance(expn,RootSum):
        m1 = max(map(expnType, list(expn.args))) #Apply[Max,Append[Map[ExpnType,Apply[List,expn]],7]],
        return max(7,m1)
    elif str(expn).find("Integral") != -1:
```

```
        m1 = max(map(expnType, list(expn.args)))
        return max(8,m1)    #max(5,apply(max,map(ExpnType,[op(expn)])))
    else:
        return 9

#main function
def grade_antiderivative(result,optimal):

    #print ("Enter grade_antiderivative for sagemath")
    #print("Enter grade_antiderivative, result=",result," optimal=",optimal)

    leaf_count_result  = leaf_count(result)
    leaf_count_optimal = leaf_count(optimal)

    #print("leaf_count_result=",leaf_count_result)
    #print("leaf_count_optimal=",leaf_count_optimal)

    expnType_result  = expnType(result)
    expnType_optimal = expnType(optimal)

    if str(result).find("Integral") != -1:
        grade = "F"
        grade_annotation =""
    else:
        if expnType_result <= expnType_optimal:
            if result.has(I):
                if optimal.has(I): #both result and optimal complex
                    if leaf_count_result <= 2*leaf_count_optimal:
                        grade = "A"
                        grade_annotation =""
                    else:
                        grade = "B"
                        grade_annotation ="Both result and optimal contain complex but leaf count of result is large
                else: #result contains complex but optimal is not
                    grade = "C"
                    grade_annotation ="Result contains complex when optimal does not."
            else: # result do not contain complex, this assumes optimal do not as well
                if leaf_count_result <= 2*leaf_count_optimal:
                    grade = "A"
                    grade_annotation =""
                else:
                    grade = "B"
                    grade_annotation ="Leaf count of result is larger than twice the leaf count of optimal. "+str(le
        else:
            grade = "C"
            grade_annotation ="Result contains higher order function than in optimal. Order "+str(ExpnType_
```

```
    #print("Before returning. grade=",grade, " grade_annotation=",grade_annotation)

    return grade, grade_annotation
```

SageMath grading function

```
#Dec 24, 2019. Nasser: Ported original Maple grading function by
#              Albert Rich to use with Sagemath. This is used to
#              grade Fricas, Giac and Maxima results.
#Dec 24, 2019. Nasser: Added 'exp_integral_e' and 'sng', 'sin_integral'
#              'arctan2','floor','abs','log_integral'
#June 4, 2022  Made default grade_annotation "none" instead of "" due
#              issue later when reading the file.
#July 14, 2022. Added ellipticF. This is until they fix sagemath, then remove it.

from sage.all import *
from sage.symbolic.operators import add_vararg, mul_vararg

debug=False;

def tree_size(expr):
    r"""
    Return the tree size of this expression.
    """
    #print("Enter tree_size, expr is ",expr)

    if expr not in SR:
        # deal with lists, tuples, vectors
        return 1 + sum(tree_size(a) for a in expr)
    expr = SR(expr)
    x, aa = expr.operator(), expr.operands()
    if x is None:
        return 1
    else:
        return 1 + sum(tree_size(a) for a in aa)

def is_sqrt(expr):
    if expr.operator() == operator.pow:   #isinstance(expr,Pow):
        if expr.operands()[1]==1/2: #expr.args[1] == Rational(1,2):
            if debug: print ("expr is sqrt")
            return True
        else:
            return False
    else:
        return False
```

```
def is_elementary_function(func):
    #debug=False
    m = func.name() in ['exp','log','ln',
            'sin','cos','tan','cot','sec','csc',
            'arcsin','arccos','arctan','arccot','arcsec','arccsc',
            'sinh','cosh','tanh','coth','sech','csch',
            'arcsinh','arccosh','arctanh','arccoth','arcsech','arccsch','sgn',
        'arctan2','floor','abs'
        ]
    if debug:
        if m:
            print ("func ", func , " is elementary_function")
        else:
            print ("func ", func , " is NOT elementary_function")


    return m

def is_special_function(func):
    #debug=False
    if debug:
        print ("type(func)=", type(func))

    m= func.name() in ['erf','erfc','erfi','fresnel_sin','fresnel_cos','Ei',
          'Ei','Li','Si','sin_integral','Ci','cos_integral','Shi','sinh_integral'
          'Chi','cosh_integral','gamma','log_gamma','psi,zeta',
          'polylog','lambert_w','elliptic_f','elliptic_e','ellipticF',
          'elliptic_pi','exp_integral_e','log_integral']

    if debug:
        print ("m=",m)
        if m:
            print ("func ", func ," is special_function")
        else:
            print ("func ", func ," is NOT special_function")


    return m


def is_hypergeometric_function(func):
    return func.name() in ['hypergeometric','hypergeometric_M','hypergeometric_U']

def is_appell_function(func):
    return func.name() in ['hypergeometric']    #[appellf1] can't find this in sagemath
```

```
def is_atom(expn):

   #debug=False
   if debug:
       print ("Enter is_atom, expn=",expn)

   if not hasattr(expn, 'parent'):
      return False


   #thanks to answer at https://ask.sagemath.org/question/49179/what-is-sagemath-equivalent-to-atomic-t
   try:
      if expn.parent() is SR:
         return expn.operator() is None
      if expn.parent() in (ZZ, QQ, AA, QQbar):
         return expn in expn.parent() # Should always return True
      if hasattr(expn.parent(),"base_ring") and hasattr(expn.parent(),"gens"):
         return expn in expn.parent().base_ring() or expn in expn.parent().gens()

      return False

   except AttributeError as error:
      print("Exception,AttributeError in  is_atom")
      print ("cought exception" , type(error).__name__ )
      return False


def expnType(expn):

   if debug:
      print (">>>>>Enter expnType, expn=", expn)
      print (">>>>>is_atom(expn)=", is_atom(expn))

   if is_atom(expn):
      return 1
   elif type(expn)==list:   #isinstance(expn,list):
      return max(map(expnType, expn))    #apply(max,map(ExpnType,expn))
   elif  is_sqrt(expn):
      if  type(expn.operands()[0])==Rational:  #type(isinstance(expn.args[0],Rational):
         return 1
      else:
         return max(2,expnType(expn.operands()[0]))   #max(2,expnType(expn.args[0]))
   elif expn.operator() == operator.pow:    #isinstance(expn,Pow)
      if type(expn.operands()[1])==Integer:   #isinstance(expn.args[1],Integer)
         return expnType(expn.operands()[0])    #expnType(expn.args[0])
      elif type(expn.operands()[1])==Rational:   #isinstance(expn.args[1],Rational)
         if type(expn.operands()[0])==Rational:  #isinstance(expn.args[0],Rational)
```

```
            return 1
        else:
            return max(2,expnType(expn.operands()[0]))  #max(2,expnType(expn.args[0]))
    else:
        return max(3,expnType(expn.operands()[0]),expnType(expn.operands()[1])) #max(3,expnType(expn.
elif expn.operator() == add_vararg or expn.operator() == mul_vararg: #isinstance(expn,Add) or isinsta
    m1 = expnType(expn.operands()[0]) #expnType(expn.args[0])
    m2 = expnType(expn.operands()[1:]) #expnType(list(expn.args[1:]))
    return max(m1,m2)  #max(ExpnType(op(1,expn)),max(ExpnType(rest(expn))))
elif is_elementary_function(expn.operator()):  #is_elementary_function(expn.func)
    return max(3,expnType(expn.operands()[0]))
elif is_special_function(expn.operator()): #is_special_function(expn.func)
    m1 = max(map(expnType, expn.operands()))      #max(map(expnType, list(expn.args)))
    return max(4,m1)   #max(4,m1)
elif is_hypergeometric_function(expn.operator()): #is_hypergeometric_function(expn.func)
    m1 = max(map(expnType, expn.operands()))       #max(map(expnType, list(expn.args)))
    return max(5,m1)   #max(5,m1)
elif is_appell_function(expn.operator()):
    m1 = max(map(expnType, expn.operands()))       #max(map(expnType, list(expn.args)))
    return max(6,m1)   #max(6,m1)
elif str(expn).find("Integral") != -1: #this will never happen, since it
            #is checked before calling the grading function that is passed.
            #but kept it here.
    m1 = max(map(expnType, expn.operands()))       #max(map(expnType, list(expn.args)))
    return max(8,m1)   #max(5,apply(max,map(ExpnType,[op(expn)])))
else:
    return 9

#main function
def grade_antiderivative(result,optimal):



    if debug:
        print ("Enter grade_antiderivative for sagemath")
        print("Enter grade_antiderivative, result=",result)
        print("Enter grade_antiderivative, optimal=",optimal)
        print("type(anti)=",type(result))
        print("type(optimal)=",type(optimal))

    leaf_count_result  = tree_size(result) #leaf_count(result)
    leaf_count_optimal = tree_size(optimal) #leaf_count(optimal)

    #if debug: print ("leaf_count_result=", leaf_count_result, "leaf_count_optimal=",leaf_count_optimal)



    expnType_result  = expnType(result)
    expnType_optimal = expnType(optimal)
```

```
if debug: print ("expnType_result=", expnType_result, "expnType_optimal=",expnType_optimal)

if expnType_result <= expnType_optimal:
    if result.has(I):
        if optimal.has(I): #both result and optimal complex
            if leaf_count_result <= 2*leaf_count_optimal:
                grade = "A"
                grade_annotation ="none"
            else:
                grade = "B"
                grade_annotation ="Both result and optimal contain complex but leaf count of result is larger th
        else: #result contains complex but optimal is not
            grade = "C"
            grade_annotation ="Result contains complex when optimal does not."
    else: # result do not contain complex, this assumes optimal do not as well
        if leaf_count_result <= 2*leaf_count_optimal:
            grade = "A"
            grade_annotation ="none"
        else:
            grade = "B"
            grade_annotation ="Leaf count of result is larger than twice the leaf count of optimal. "+str(leaf_c
else:
    grade = "C"
    grade_annotation ="Result contains higher order function than in optimal. Order "+str(expnType_resul


print("Before returning. grade=",grade, " grade_annotation=",grade_annotation)

return grade, grade_annotation
```