

Solving Trig with a Table of Values

If you have a table with the values of each of the three trig ratios from $1^\circ - 89^\circ$, then you can use substitution to determine the value of any angle or side in a trigonometric problem. Simply look up the angle or value of the fraction that is closest to what you have, and substitute that value in the problem.

EXAMPLEDetermine $\sin(34^\circ)$.

Angle	Fraction as a decimal		
$\angle A$	$\sin A$	$\cos A$	$\tan A$
34°	0.5592	0.8290	0.6745

$$\sin(34^\circ) = \boxed{0.5592}$$

1. Determine $\tan(79^\circ)$.2. Determine $\cos(29^\circ)$.**EXAMPLE**Determine $\cos(57^\circ)$.

Angle	Fraction as a decimal		
$\angle A$	$\sin A$	$\cos A$	$\tan A$
57°	0.8387	0.5446	1.5399

$$\cos(57^\circ) = \boxed{0.5446}$$

3. Determine $\sin(84^\circ)$.4. Determine $\tan(17^\circ)$.**EXAMPLE**Determine $\tan^{-1}\left(\frac{7}{9}\right)$.

First, write the fraction as a decimal.

$$\begin{array}{r} 0.7778 \text{ (rounded up)} \\ 9 \overline{) 7.0000} \\ \underline{-63} \\ 70 \\ \underline{-63} \\ 70 \\ \dots \end{array}$$

$$\tan^{-1}\left(\frac{7}{9}\right) = \tan^{-1}(0.7778)$$

Look down the trig table for the two \tan decimals that 0.7778 is **between**.

Angle	Fraction as a decimal		
$\angle A$	$\sin A$	$\cos A$	$\tan A$
37°	0.6018	0.7986	0.7536
38°	0.6157	0.7880	0.7813

0.7778 is between 0.7536 & 0.7813...

Figure out which one is closer (line up the last digit and ignore the decimal).

$$\begin{array}{r} .7536 \\ \text{difference: } 7778 - 7536 = 242 \end{array}$$

$$\begin{array}{r} .7778 \\ \text{difference: } 7813 - 7778 = 35 \end{array}$$

$$.7813$$

7778 is closer to 7813, which means that $\tan^{-1}\left(\frac{7}{9}\right)$ is closer to 38° than 37° .

$$\text{So... } \tan^{-1}\left(\frac{7}{9}\right) = \boxed{38^\circ}$$

5. Determine $\sin^{-1}\left(\frac{3}{8}\right)$.6. Determine $\cos^{-1}\left(\frac{5}{12}\right)$.

EXAMPLE

Determine $\cos^{-1}\left(\frac{4}{15}\right)$.

Write as a rounded decimal (4 places).

$$4 \div 15 = 0.2667$$

$$\cos^{-1}\left(\frac{4}{15}\right) = \cos^{-1}(0.2667)$$

0.2667 is between what cos values?

Angle	Fraction as a decimal		
$\angle A$	sin A	cos A	tan A
74°	0.9613	0.2756	3.4874
75°	0.9659	0.2588	3.7321

0.2667 is between 0.2756 & 0.2588...

Figure out which one is closer.

.2756

$$\text{difference: } 2756 - 2667 = 89$$

.2667

$$\text{difference: } 2667 - 2588 = 79$$

.2588

2667 is closer to 2588, which means

$\cos^{-1}\left(\frac{4}{15}\right)$ is closer to 75° than 74°.

So... $\cos^{-1}\left(\frac{4}{15}\right) = \boxed{75^\circ}$

7. Determine $\cos^{-1}\left(\frac{2}{7}\right)$.

8. Determine $\tan^{-1}\left(\frac{9}{8}\right)$.

Now that we know how to determine what the trig equals, it's time to plug it into an equation and solve it.

EXAMPLE

Determine the value of x. Round to the nearest tenth.

$$\sin(42^\circ) = \frac{x}{2}$$

First, solve for x.

$$2(\sin(42^\circ)) = \frac{x}{2} \cdot 2$$

$$x = 2(\sin(42^\circ))$$

Now, look up what $\sin(42^\circ)$ equals, and plug it in.

Angle	Fraction as a decimal		
$\angle A$	sin A	cos A	tan A
42°	0.6691	0.7431	0.9004

$$x = 2(\sin(42^\circ)) = 2(0.6691)$$

$$x = 1.3382 = \boxed{1.3}$$

9. Determine the value of x. Round to the nearest tenth.

$$\tan(64^\circ) = \frac{x}{8}$$

10. Determine the value of x. Round to the nearest tenth.

$$\cos(13^\circ) = \frac{x}{11}$$

EXAMPLE

Determine the value of x. Round to the nearest tenth.

$$\tan(73^\circ) = \frac{x}{15}$$

$$15(\tan(73^\circ)) = \frac{x}{15} \cdot 15$$

$$x = 15(\tan(73^\circ))$$

Angle	Fraction as a decimal		
$\angle A$	sin A	cos A	tan A
73°	0.9563	0.2924	3.2709

$$x = 15(\tan(73^\circ)) = 15(3.2709)$$

$$x = 49.0635 = \boxed{49.1}$$

11. Determine the value of x. Round to the nearest tenth.

$$\cos(25^\circ) = \frac{x}{10}$$

12. Determine the value of x. Round to the nearest tenth.

$$\sin(68^\circ) = \frac{x}{6}$$

EXAMPLE

Determine the value of x . Round to the nearest tenth.

$$\tan(51^\circ) = \frac{3}{x}$$

$$x = \frac{3}{\tan(51^\circ)}$$

Angle $\angle A$	Fraction as a decimal		
	$\sin A$	$\cos A$	$\tan A$
51°	0.7771	0.6293	1.2349

$$x = \frac{3}{\tan(51^\circ)} = \frac{3}{1.2349}$$

$$x = 2.4293 \dots = \boxed{2.4}$$

13. Determine the value of x . Round to the nearest tenth.

$$\cos(63^\circ) = \frac{5}{x}$$

14. Determine the value of x . Round to the nearest tenth.

$$\sin(64^\circ) = \frac{12}{x}$$

EXAMPLE

Determine the value of x . Round to the nearest degree.

$$\cos(x^\circ) = \frac{3}{5}$$

Get x alone, and write the fraction as a decimal to 4 places.

$$x^\circ = \cos^{-1}\left(\frac{3}{5}\right) = \cos^{-1}(0.6000)$$

Check the table.

Angle $\angle A$	Fraction as a decimal		
	$\sin A$	$\cos A$	$\tan A$
53°	0.7986	0.6018	1.3270
54°	0.8090	0.5878	1.3764

Find the closer value...

.6018

difference: $6018 - 6000 = 18$

.6000

difference: $6000 - 5878 = 122$

.5878

0.6018 is closer, so the angle is 53° .

$$x^\circ = \cos^{-1}(0.6000) = \boxed{53^\circ}$$

15. Determine the value of x . Round to the nearest degree.

$$\tan(x^\circ) = \frac{6}{7}$$

16. Determine the value of x . Round to the nearest degree.

$$\sin(x^\circ) = \frac{5}{12}$$

EXAMPLE

Determine the value of x . Round to the nearest degree.

$$\sin(x^\circ) = \frac{9}{12}$$

Solve for x .

$$x^\circ = \sin^{-1}\left(\frac{9}{12}\right) = \sin^{-1}(0.7500)$$

Angle $\angle A$	Fraction as a decimal		
	$\sin A$	$\cos A$	$\tan A$
48°	0.7431	0.6691	1.1106
49°	0.7547	0.6561	1.1504

.7431

difference: $7500 - 7431 = 69$

.7500

difference: $7547 - 7500 = 47$

.7547

0.7547 is closer, so the angle is 49° .

$$x^\circ = \sin^{-1}(0.7500) = \boxed{49^\circ}$$

17. Determine the value of x . Round to the nearest degree.

$$\cos(x^\circ) = \frac{1}{6}$$

18. Determine the value of x . Round to the nearest degree.

$$\sin(x^\circ) = \frac{8}{14}$$

Table of Trigonometric Values

Angle	Fraction as a decimal		
$\angle A$	$\sin A$	$\cos A$	$\tan A$
1°	0.0175	0.9998	0.0175
2°	0.0349	0.9994	0.0349
3°	0.0523	0.9986	0.0524
4°	0.0698	0.9976	0.0699
5°	0.0872	0.9962	0.0875
6°	0.1045	0.9945	0.1051
7°	0.1219	0.9925	0.1228
8°	0.1392	0.9903	0.1405
9°	0.1564	0.9877	0.1584
10°	0.1736	0.9848	0.1763
11°	0.1908	0.9816	0.1944
12°	0.2079	0.9781	0.2126
13°	0.2250	0.9744	0.2309
14°	0.2419	0.9703	0.2493
15°	0.2588	0.9659	0.2679
16°	0.2756	0.9613	0.2867
17°	0.2924	0.9563	0.3057
18°	0.3090	0.9511	0.3249
19°	0.3256	0.9455	0.3443
20°	0.3420	0.9397	0.3640
21°	0.3584	0.9336	0.3839
22°	0.3746	0.9272	0.4040
23°	0.3907	0.9205	0.4245
24°	0.4067	0.9135	0.4452
25°	0.4226	0.9063	0.4663
26°	0.4384	0.8988	0.4877
27°	0.4540	0.8910	0.5095
28°	0.4695	0.8829	0.5317
29°	0.4848	0.8746	0.5543
30°	0.5000	0.8660	0.5774
31°	0.5150	0.8572	0.6009
32°	0.5299	0.8480	0.6249
33°	0.5446	0.8387	0.6494
34°	0.5592	0.8290	0.6745
35°	0.5736	0.8192	0.7002
36°	0.5878	0.8090	0.7265
37°	0.6018	0.7986	0.7536
38°	0.6157	0.7880	0.7813
39°	0.6293	0.7771	0.8098
40°	0.6428	0.7660	0.8391
41°	0.6561	0.7547	0.8693
42°	0.6691	0.7431	0.9004
43°	0.6820	0.7314	0.9325
44°	0.6947	0.7193	0.9657
45°	0.7071	0.7071	1.0000

Angle	Fraction as a decimal		
$\angle A$	$\sin A$	$\cos A$	$\tan A$
46°	0.7193	0.6947	1.0355
47°	0.7314	0.6820	1.0724
48°	0.7431	0.6691	1.1106
49°	0.7547	0.6561	1.1504
50°	0.7660	0.6428	1.1918
51°	0.7771	0.6293	1.2349
52°	0.7880	0.6157	1.2799
53°	0.7986	0.6018	1.3270
54°	0.8090	0.5878	1.3764
55°	0.8192	0.5736	1.4281
56°	0.8290	0.5592	1.4826
57°	0.8387	0.5446	1.5399
58°	0.8480	0.5299	1.6003
59°	0.8572	0.5150	1.6643
60°	0.8660	0.5000	1.7321
61°	0.8746	0.4848	1.8040
62°	0.8829	0.4695	1.8807
63°	0.8910	0.4540	1.9626
64°	0.8988	0.4384	2.0503
65°	0.9063	0.4226	2.1445
66°	0.9135	0.4067	2.2460
67°	0.9205	0.3907	2.3559
68°	0.9272	0.3746	2.4751
69°	0.9336	0.3584	2.6051
70°	0.9397	0.3420	2.7475
71°	0.9455	0.3256	2.9042
72°	0.9511	0.3090	3.0777
73°	0.9563	0.2924	3.2709
74°	0.9613	0.2756	3.4874
75°	0.9659	0.2588	3.7321
76°	0.9703	0.2419	4.0108
77°	0.9744	0.2250	4.3315
78°	0.9781	0.2079	4.7046
79°	0.9816	0.1908	5.1446
80°	0.9848	0.1736	5.6713
81°	0.9877	0.1564	6.3138
82°	0.9903	0.1392	7.1154
83°	0.9925	0.1219	8.1443
84°	0.9945	0.1045	9.5144
85°	0.9962	0.0872	11.4301
86°	0.9976	0.0698	14.3007
87°	0.9986	0.0523	19.0811
88°	0.9994	0.0349	28.6363
89°	0.9998	0.0175	57.2900