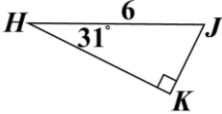


Using Trig to Solve Right Triangles (Part 1)

Example: Evaluate HK .



Step 1: Choose your angle of focus: I know that $m\angle H = 31^\circ$, so I'll use that angle.

Step 2: Identify your sides.

Step 3: Choose the two sides you will use
 ↓ (always the sides you either have or want).

Focus on $\angle H$

$m\angle H = 31^\circ$	\overline{JK}	Opp	
$m\angle J = 59^\circ$	\overline{HK}	Adj	← side I want
$m\angle K = 90^\circ$	$HJ = 6$	Hyp	← side I have

Step 4: Use SOHCAHTOA to determine which trig ratio you should use.

I want Adj (A) and I have Hyp (H): SO[H] C[A|H] TO[A] The only ratio that uses my two chosen sides is COSINE.

Step 5: Set up the trig ratio. $\cos(\text{focus angle}) = \frac{\text{Adj}}{\text{Hyp}} \rightarrow \cos(H) = \frac{HK}{HJ}$

Step 6: Substitute the information you have. $\cos(31) = \frac{HK}{6}$

Step 7 (to find a side): Cross multiply and isolate the desired part.

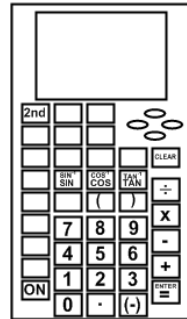
$$\begin{aligned} \frac{\cos(31)}{1} &= \frac{HK}{6} \\ 6[\cos(31)] &= HK \\ HK &= 6[\cos(31)] \end{aligned}$$

Step 8: Use a trig table (or a calculator) to determine the value of the side to the nearest tenth or the angle to the nearest degree.

Trig Table - to find sides

Angle	Fraction as a decimal		
	$\sin A$	$\cos A$	$\tan A$
31°	0.5150	0.8572	0.6009
33°	0.5446	0.8387	0.6745
34°	0.5592	0.8290	0.6745

$$\begin{aligned} HK &= 6[\cos(31)] \\ HK &= 6[0.8572] \\ HK &= 5.1432 \\ HK &= \underline{5.1} \end{aligned}$$



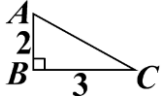
Calculator - to find sides

$$HK = 6[\cos(31)]$$

Type **6 x (cos (31)) =**

The screen will say: 5.1430038042...
 Round to the nearest tenth. $HK = \underline{5.1}$

Example: Evaluate $m\angle C$.



Step 1: Focus Angle: I want $m\angle C$, so I'll use that angle.

Step 2: Identify your sides.

Step 3: Choose the two sides you will use
 ↓ (always the sides you either have or want).

Focus on $\angle C$

$\angle C$	$AB = 2$	Opp	← side I have
$\angle A$	$BC = 3$	Adj	← side I have
$m\angle B = 90^\circ$	\overline{AC}	Hyp	

Step 4: SOHCAHTOA: I have Opp (O) and I have Adj (A): S[O]H CA[H] T[O]A

The only ratio that uses my two chosen sides is TANGENT.

Step 5: $\tan(\text{focus angle}) = \frac{\text{Opp}}{\text{Adj}} \rightarrow \tan(C) = \frac{AB}{BC}$

Step 6: $\tan(C) = \frac{2}{3}$

Step 7 (to find an angle): Rewrite the ratio equation as an inverse. $\tan(C) = \frac{2}{3} \rightarrow \tan^{-1}\left(\frac{2}{3}\right) = m\angle C$

$$m\angle C = \tan^{-1}\left(\frac{2}{3}\right)$$

Step 8 (skip if using calculator): Divide the fraction to four decimal places. $m\angle C = \tan^{-1}(0.6667)$

Step 9: Use a trig table (or a calculator) to determine the value of the side to the nearest tenth or the angle to the nearest degree.

Trig Table - to find angles

If $m\angle C = \tan^{-1}(0.6667)$, which is closer 33° or 34° ?

Angle	Fraction as a decimal		
	$\sin A$	$\cos A$	$\tan A$
33°	0.5446	0.8387	0.6494
34°	0.5592	0.8290	0.6745

$\begin{array}{r} 5 \\ .6667 \\ - .6494 \\ \hline .0173 \end{array}$
 smaller than 0.6667 by .0173
 $\begin{array}{r} 63 \\ .6745 \\ - .6667 \\ \hline .0078 \end{array}$
 bigger than 0.6667 by .0078

$$m\angle C = \underline{34^\circ}$$

Calculator - to find angles

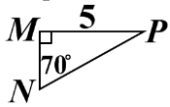
$$m\angle C = \tan^{-1}\left(\frac{2}{3}\right)$$

Type **2nd TAN (2 ÷ 3) =**

The screen will say: 33.690067526...
 Round to the nearest degree.

$$m\angle C = \underline{34^\circ}$$

Example: Evaluate NP .



Focus on $\angle N$		
$m\angle P = 20^\circ$	\overline{MN}	Adj
$m\angle N = 70^\circ$	$MP = 5$	Opp ← side I have
$m\angle M = 90^\circ$	\overline{NP}	Hyp ← side I want

$$\sin(\text{focus angle}) = \frac{\text{Opp}}{\text{Hyp}} \rightarrow \sin(N) = \frac{MP}{NP}$$

$$\sin(70) = \frac{5}{NP}$$

$$\frac{\sin(70)}{1} = \frac{NP}{5}$$

$$NP[\sin(70)] = 5$$

$$\div \sin(70) \div \sin(70)$$

$$NP = \frac{5}{\sin(70)}$$

Use the trig table or a calculator.

$$NP = \boxed{5.3}$$

Trig table:

Angle	Fraction as a decimal		
$\angle A$	$\sin A$	$\cos A$	$\tan A$
70°	0.9397	0.3420	2.7475

$$NP = \frac{5}{0.9397}$$

$$NP = 5.32$$

.9397 $\overline{)5.0}$
Move the decimal!

$$\begin{array}{r} 5.32 \\ .9397 \overline{)50000.00} \\ \underline{-46985} \\ 30150 \\ \underline{-28191} \\ 19590 \\ \underline{-18794} \\ 796 \end{array}$$

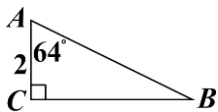
Calculator:

Type $\boxed{5} \boxed{\div} \boxed{(} \boxed{\sin} \boxed{(} \boxed{70} \boxed{)} \boxed{)} \boxed{=}$

The screen will say: 5.3208888624...

Evaluate sides to the nearest tenth and angles to the nearest degree.

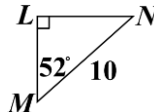
1. Evaluate BC .



Focus on \angle _____

$m\angle B =$	$\overline{AC} = 2$
$m\angle A = 64^\circ$	\overline{BC}
$m\angle C = 90^\circ$	\overline{AB}

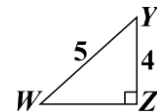
2. Evaluate LM .



Focus on \angle _____

$m\angle N =$	\overline{LM}
$m\angle M = 52^\circ$	\overline{LN}
$m\angle L = 90^\circ$	$\overline{MN} = 10$

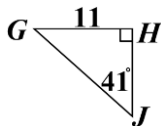
3. Evaluate $m\angle W$.



Focus on \angle _____

$\angle Y$	\overline{WZ}
$\angle W$	$YZ = 4$
$m\angle Z = 90^\circ$	$WY = 5$

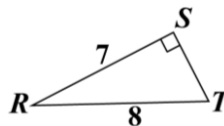
4. Evaluate GJ .



Focus on \angle _____

$m\angle J = 41^\circ$	$\overline{GH} = 11$
$m\angle G =$	\overline{JH}
$m\angle H = 90^\circ$	\overline{JG}

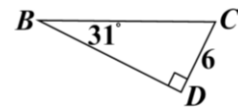
5. Evaluate $m\angle R$.



Focus on \angle _____

$\angle R$	\overline{ST}
$\angle T$	$RS = 7$
$m\angle S = 90^\circ$	$RT = 8$

6. Evaluate BD .



Focus on \angle _____

$m\angle B = 31^\circ$	$\overline{CD} = 6$
$m\angle C =$	\overline{BD}
$m\angle D = 90^\circ$	\overline{BC}

Using Trig to Solve Right Triangles (Part 1) Answers

1. $BC = 4.1$	2. $LM = 6.2$	3. $m\angle W = 53^\circ$	4. $GJ = 16.8$	5. $m\angle R = 29^\circ$	6. $BD = 10.0$
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Table of Trigonometric Values

<i>Angle</i>	<i>Fraction as a decimal</i>		
	$\angle A$	$\sin A$	$\cos A$
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

<i>Angle</i>	<i>Fraction as a decimal</i>		
	$\angle A$	$\sin A$	$\cos A$
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