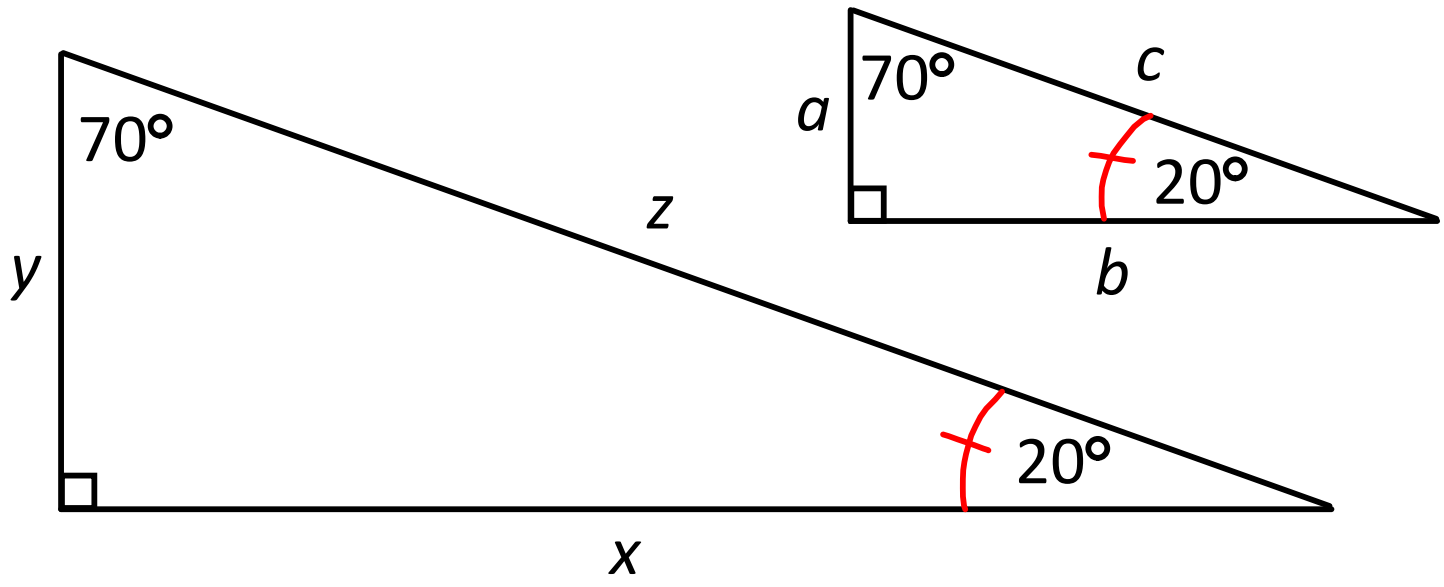
A TRIGONOMETRIC RATIO is a ratio of thelengths of two sides of a right triangle

3 Basic Trig Ratios: SINE (sin)

COSINE (cos)

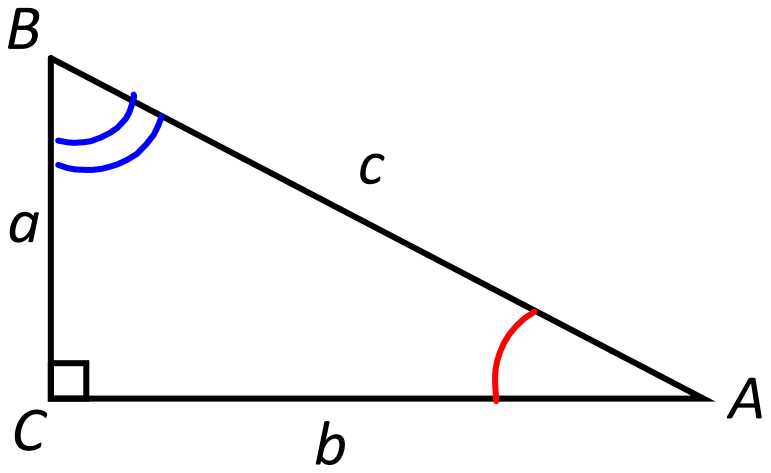
TANGENT (tan)

What do we know about the ratios of two corresponding sides of two similar right triangles?



Using the 20° angle, its opposite side divided by its hypotenuse $\Rightarrow$

$$\frac{a}{c} = \frac{y}{z}$$



$$\sin A = \frac{\text{leg opp} \angle A}{\text{hyp}} = \frac{a}{c} \qquad \sin B = \frac{b}{c}$$

$$\cos A = \frac{\text{leg adj} \angle A}{\text{hyp}} = \frac{b}{c} \qquad \cos B = \frac{a}{c}$$

$$\tan A = \frac{\text{leg opp} \angle A}{\text{leg adj} \angle A} = \frac{a}{b} \qquad \tan B = \frac{b}{a}$$

Lesson 2 - Intro to Trig Ratios Marked

Table of Trigonometric Ratios

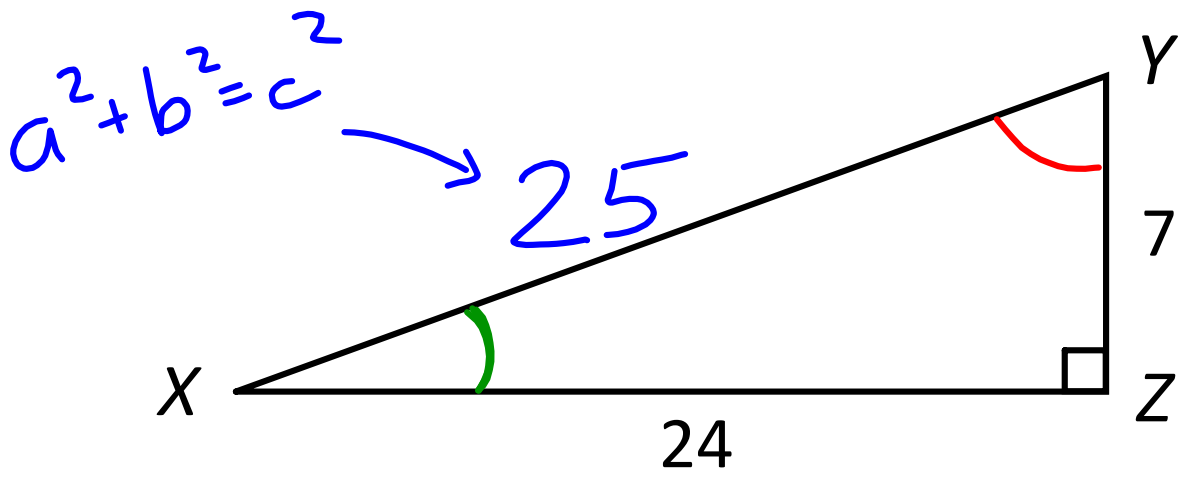
Angle	Sine	Cosine	Tangent
1°	.0175	.9998	.0175
2°	.0349	.9994	.0349
3°	.0523	.9986	.0524
4°	.0698	.9976	.0699
5°	.0872	.9962	.0875
6°	.1045	.9945	.1051
7°	.1219	.9925	.1228
8°	.1392	.9903	.1405
9°	.1564	.9877	.1584
10°	.1736	.9848	.1763
11°	.1908	.9816	.1944
12°	.2079	.9781	.2126
13°	.2250	.9744	.2309
14°	.2419	.9703	.2493
15°	.2588	.9659	.2679
16°	.2756	.9613	.2867
17°	.2924	.9563	.3057
18°	.3090	.9511	.3249
19°	[illegible]	.9455	.3443
20°	.3420	.9397	.3640
21°	.3584	.9336	.3839
22°	.3746	.9272	.4040
23°	.3907	.9205	.4245
24°	.4067	.9135	.4452
25°	.4226	.9063	.4663
26°	.4384	.8988	.4877
27°	.4540	.8910	.5095
28°	.4695	.8829	.5317
29°	.4848	.8746	.5543
30°	.5000	.8660	.5774
31°	.5150	.8572	.6009
32°	.5299	.8480	.6249
33°	.5446	.8387	.6494
34°	.5592	.8290	.6745
35°	.5736	.8192	.7002
36°	.5878	.8090	.7265
37°	.6018	.7986	.7536
38°	.6157	.7880	.7813
39°	.6293	.7771	.8098
40°	.6428	.7660	.8391
41°	.6561	.7547	.8693
42°	.6691	.7431	.9004
43°	.6820	.7314	.9325
44°	.6947	.7193	.9657
45°	.7071	.7071	1.0000

Angle	Sine	Cosine	Tangent
46°	.7193	.6947	1.0355
47°	.7314	.6820	1.0724
48°	.7431	.6691	1.1106
49°	.7547	.6561	1.1504
50°	.7660	.6428	1.1918
51°	.7771	.6293	1.2349
52°	.7880	.6157	1.2799
53°	.7986	.6018	1.3270
54°	.8090	.5878	1.3764
55°	.8192	.5736	1.4281
56°	.8290	.5592	1.4826
57°	.8387	.5446	1.5399
58°	.8480	.5299	1.6003
59°	.8572	.5150	1.6643
60°	.8660	.5000	1.7321
61°	.8746	.4848	1.8040
62°	.8829	.4695	1.8807
63°	.8910	.4540	1.9626
64°	.8988	.4384	2.0503
65°	.9063	.4226	2.1445
66°	.9135	.4067	2.2460
67°	.9205	.3907	2.3559
68°	.9272	.3746	2.4751
69°	.9336	[illegible]	2.6051
70°	.9397	.3420	2.7475
71°	.9455	.3256	2.9042
72°	.9511	.3090	3.0777
73°	.9563	.2924	3.2709
74°	.9613	.2756	3.4874
75°	.9659	.2588	3.7321
76°	.9703	.2419	4.0108
77°	.9744	.2250	4.3315
78°	.9781	.2079	4.7046
79°	.9816	.1908	5.1446
80°	.9848	.1736	5.6713
81°	.9877	.1564	6.3138
82°	.9903	.1392	7.1154
83°	.9925	.1219	8.1443
84°	.9945	.1045	9.5144
85°	.9962	.0872	11.4301
86°	.9976	.0698	14.3007
87°	.9986	.0523	19.0811
88°	.9994	.0349	28.6363
89°	.9998	.0175	57.2900

$$\sin = \frac{\text{opp}}{\text{hyp}} \qquad \cos = \frac{\text{adj}}{\text{hyp}} \qquad \tan = \frac{\text{opp}}{\text{adj}}$$

How to Remember?

SOHCAHTOA



sin X = $7/25$

cos X = $24/25$

tan X = $7/24$

sin Y = $24/25$

cos Y = $7/25$

tan Y = $24/7$

Acute Angle Equivalents:

** In any right triangle, the two acute angles will always add up to equal 90°.
Therefore, they are said to be COMPLEMENTARY.

If one of the acute angles of a triangle is 20°, then which trig ratio would have an equivalent value to the sin of this angle?

SIN20 = COS70

A and *B* are the acute angles of a right triangle.
If tan*A* = 3/4. then what is tan*B*? 4/3

Use a calculator to find the value of each trig ratio (rounded to three decimal places), and state the equivalent ratio

** calculator must be in "degree" mode

	Value	Equivalent Ratio
sin 36°	0.588	cos 54
cos 28°	0.883	sin 62
tan 79°	5.145	$\frac{1}{\tan 11}$

Given each trig ratio, use a calculator to find the value of the acute angle

** use the INVERSE of the function

$\sin A = 0.673 \Rightarrow m\angle A = \sin^{-1}(0.673)$

$\approx 42.299°$

$\cos B = 0.113 \Rightarrow m\angle B = \cos^{-1}(0.113)$

$\approx 83.512°$

$\tan C = 4.617 \Rightarrow m\angle C = \tan^{-1}(4.617)$

$\approx 77.779°$

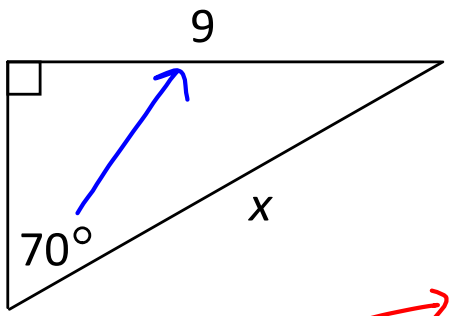
Solving for Parts of a Right Triangle

1. Identify the parts of the triangle that are labeled with information

2. Determine which trig ratio you will need, and set-up an appropriate equation

3. Solve for *x*

Lesson 2 - Intro to Trig Ratios Marked



$\angle = 70$

opp = 9

SIN → hyp = x

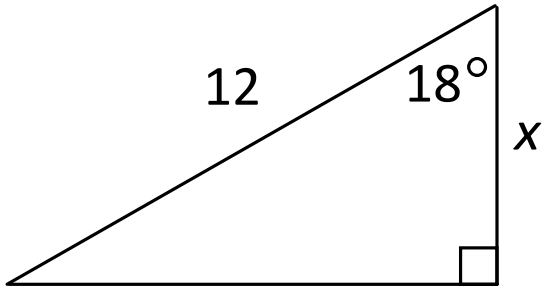
$$\sin \angle = \frac{\text{opp}}{\text{hyp}}$$

$$\frac{\sin 70}{1} = \frac{9}{x}$$

$$\frac{x \sin 70}{\sin 70} = \frac{9}{\sin 70}$$

$$x = \frac{9}{\sin 70} \approx 9.578$$

Lesson 2 - Intro to Trig Ratios Marked



$\angle = 18$

$adj = x$

$hyp = 12$

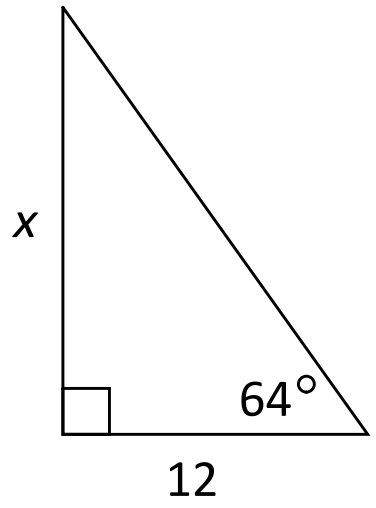
$\cos\angle = \frac{adj}{hyp}$

$12 \cdot \cos 18 = \frac{x}{12} \cdot 12$

$x = 12\cos 18$

$x \approx 11.413$

Lesson 2 - Intro to Trig Ratios Marked



$\angle = 64$

opp $= x$

adj $= 12$

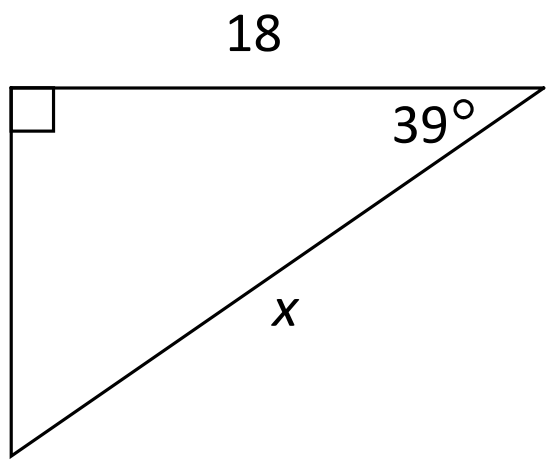
$\tan\angle = \frac{\text{opp}}{\text{adj}}$

$\tan 64 = \frac{x}{12}$

$x = 12\tan 64$

$x \approx 24.604$

Lesson 2 - Intro to Trig Ratios Marked



$\angle = 39$

adj $= 18$

hyp $= x$

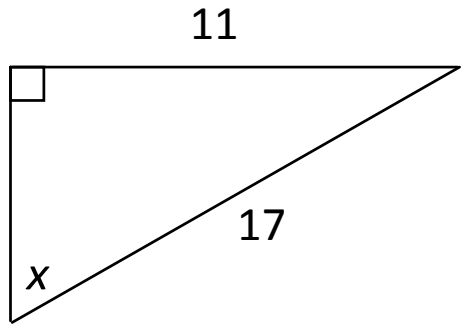
$$\cos\angle = \frac{\text{adj}}{\text{hyp}}$$

$$x \cdot \cos 39 = \frac{18}{x} \cdot x$$

$$x\cos 39 = 18$$

$$x = \frac{18}{\cos 39} \approx 23.162$$

Lesson 2 - Intro to Trig Ratios Marked



$\angle = x$

opp = 11

hyp = 17

$$\sin\angle = \frac{\text{opp}}{\text{hyp}}$$

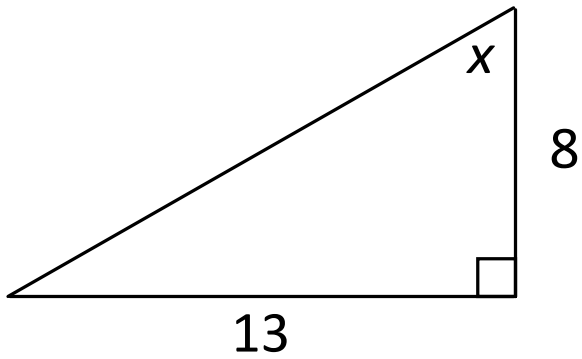
$$\sin x = \frac{11}{17}$$

$$\sin^{-1}(\sin x) = \sin^{-1}\left(\frac{11}{17}\right)$$

$$x = \sin^{-1}\left(\frac{11}{17}\right)$$

$$x \approx 40.320^\circ$$

Lesson 2 - Intro to Trig Ratios Marked



$\angle = x$

opp = 13

adj = 8

$\tan \angle = \frac{\text{opp}}{\text{adj}}$

$\tan x = \frac{13}{8}$

$x = \tan^{-1}(13/8)$

$x \approx 58.392^\circ$