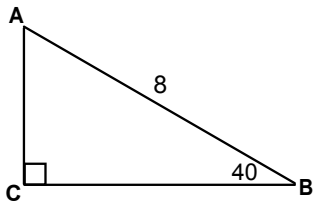
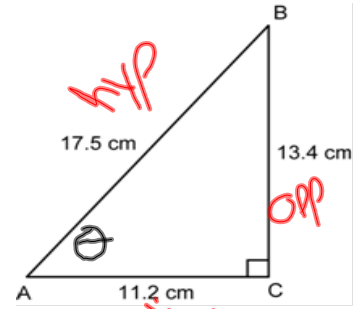


Using Sine, Cosine, and Tangent to Find Missing Side Lengths



DO IT NOW!



$$\sin \theta = \frac{13.4}{17.5} = 0.77$$

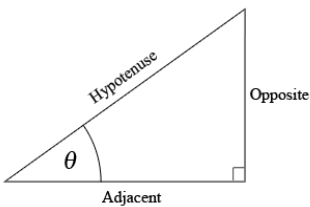
$$\cos \theta = \frac{11.2}{17.5} = 0.64$$

$$\tan \theta = \frac{13.4}{11.2} = 1.2$$

Review

Each angle has its own unique sine, cosine, and tangent ratio that never changes

S $\frac{O}{H}$ **C** $\frac{A}{H}$ **T** $\frac{O}{A}$



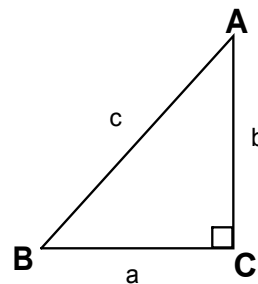
$$\sin \theta = \frac{\text{opposite}}{\text{hypotenuse}}$$

$$\cos \theta = \frac{\text{adjacent}}{\text{hypotenuse}}$$

$$\tan \theta = \frac{\text{opposite}}{\text{adjacent}}$$

REMEMBER:

- Label angles with a CAPITAL letter
- Label sides opposite the angles with the same letter in lower case.



$S \frac{O}{H} \quad C \frac{A}{H} \quad T \frac{O}{A}$

1 Find the length of side 'b'

$\sin \theta = \frac{\text{opp}}{\text{hyp.}}$
 $\sin 40 = \frac{b}{8}$
 $8(\sin 40) = b$
 $b = 5.14$

$S \frac{O}{H} \quad C \frac{A}{H} \quad T \frac{O}{A}$

2 Find the length of side 'c'

$\sin \theta = \frac{\text{opp}}{\text{hyp}}$
 $\sin 28 = \frac{c}{9.2}$
 $9.2(\sin 28) = c$
 $c = 4.32$

$S \frac{O}{H} \quad C \frac{A}{H} \quad T \frac{O}{A}$

3 Find 'x'

$\cos \theta = \frac{\text{adj}}{\text{hyp}}$
 $\cos 30 = \frac{20}{x}$
 $x(\cos 30) = 20$
 $x = \frac{20}{\cos 30}$
 $x = 23.09$

$S \frac{O}{H} \quad C \frac{A}{H} \quad T \frac{O}{A}$

4 Find the Length of a

$\cos 58 = \frac{a}{7.5}$
 $7.5(\cos 58) = a$
 $a = 3.97$

5 $S \frac{O}{H} \quad C \frac{A}{H} \quad T \frac{O}{A}$

Find 'x'

$\tan \theta = \frac{\text{opp}}{\text{adj.}}$
 $\tan 15 = \frac{x}{3.8}$
 $3.8(\tan 15) = x$
 $x = 1.02$

6 $S \frac{O}{H} \quad C \frac{A}{H} \quad T \frac{O}{A}$

Find the length of side 'b'

$\tan 63 = \frac{10}{b}$
 $b = \frac{10}{(\tan 63)}$
 $b = 5.1$

SOLVE THE TRIANGLE

7 $S \frac{O}{H} \quad C \frac{A}{H} \quad T \frac{O}{A}$

Solve the Triangle (find each of the missing side lengths and angles)

$\angle A = 180 - 90 - 38$
 $= 52^\circ$

$$\text{Side } a$$

$$\tan 38 = \frac{12}{a}$$

$$a = \frac{12}{\tan 38}$$

$$a = 15.36$$

$$\text{Side } c$$

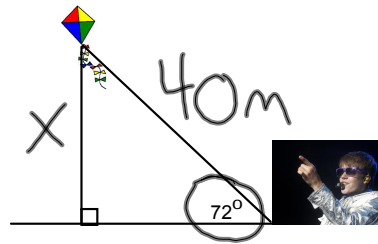
$$\sin 38 = \frac{12}{c}$$

$$c = \frac{12}{\sin 38}$$

$$c = 19.49$$

APPLICATION

Justin Bieber has let out 40 meters of his kite string, which makes an angle of 72 degrees with the ground. Find the height of the kite, to the nearest meter.



$$\sin 72 = \frac{x}{40}$$

$$40(\sin 72) = x$$

$$x = 38.04 \text{ m}$$

Complete the Worksheet!!