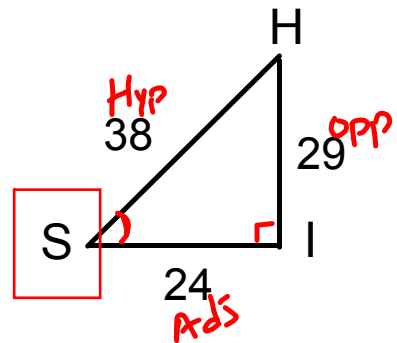


## Warm Up:

Find the value of the sine, cosine, and tangent ratios for angle S.



$$\begin{aligned} \sin S &= \frac{O}{H} & \cos S &= \frac{A}{H} \\ \sin S &= \frac{29}{38} & \cos S &= \frac{24}{38} \\ \sin S &= 0.7632 & \cos S &= 0.6316 \\ \hline \tan S &= \frac{O}{A} \\ \tan S &= \frac{29}{24} \\ \tan S &= 1.2083 \end{aligned}$$

## Solving for an Unknown Side

SOH CAH TOA helps us remember the 3 primary trig ratios:

$$\sin x = \frac{O}{H} \quad \cos x = \frac{A}{H} \quad \tan x = \frac{O}{A}$$

Trig ratios can be used to find the measures of a right triangle that are not known.

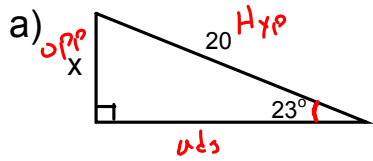
In order to do this we must follow the steps that will help us first identify the trig ratio (sin, cos, tan) that relates the given and needed information, and then solve for the unknown.

## Steps for Solving for an Unknown Side

1. Identify your reference angle
2. Label your triangle using the reference angle
3. Decide what ratio to use (using the Have, Need, Use method)
4. Cross multiply
5. Isolate  $x$
6. Conclude

Examples: For the following triangles, identify the trig ratio to use, write the equation and solve it to one decimal place.

SOH CAH TOA



Have: angle 23°  
Hyp 20

Need: opp

Use:  $\sin \theta = \frac{\text{opp}}{\text{Hyp}}$

Calculator:

20   23

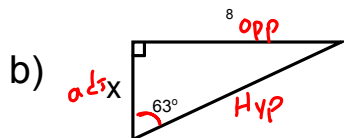
or

20  23

$$\frac{\sin 23^\circ}{1} = \frac{x}{20}$$

$$x = 20 \sin 23^\circ$$

$$x = 7.8$$



Have: angle 63°  
opp = 8

Need: Adj = ? x

Use:  $\tan \theta = \frac{O}{A}$

Calculator:

8   63

or

8  63

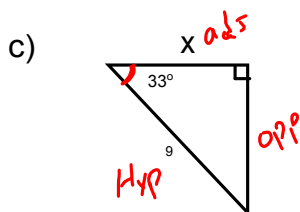
$$\frac{\tan 63^\circ}{1} = \frac{8}{x}$$

$$8 = x \frac{\tan 63^\circ}{\tan 63^\circ}$$

$$\frac{8}{\tan 63^\circ} = x$$

$$4.0762 = x$$

$$4.1 = x$$



Have: angle 33°

Hyp = 9

Need: adj = x

Use:  $\cos \theta = \frac{A}{H}$

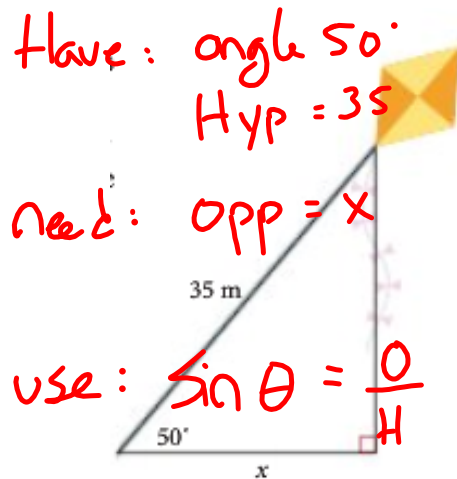
$$\frac{\cos 33^\circ}{1} = \frac{x}{9}$$

$$x = 9 \cos 33^\circ$$

$$x = 7.5480$$

$$x = 7.5$$

Ex. 2 Dana's kite string is 35 m long. It makes an angle of  $50^\circ$  with the ground. Let  $x$  be the ~~horizontal~~ <sup>vertical</sup> distance, in metres to the kite. How high is the kite?



Have: angle  $50^\circ$   
Hyp = 35

Need: opp =  $x$

use:  $\sin \theta = \frac{O}{H}$

$\therefore$  the kite is 26.8m above the ground

$$\frac{\sin 50^\circ}{1} = \frac{x}{35}$$

$$x = 35 \sin 50$$

$$x = 26.8116$$