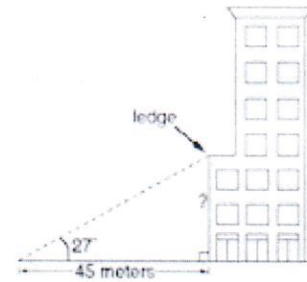
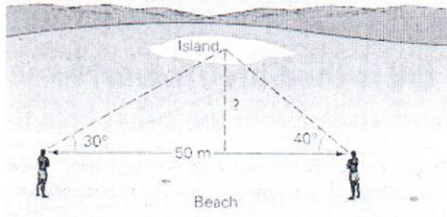
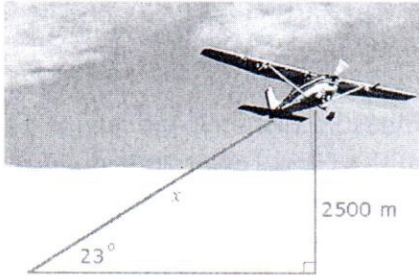


# SOH CAH TOA

**Objectives:**

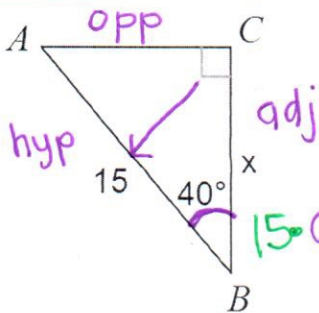
- I can set up all 6 trigonometric ratios and use them to find side lengths of right triangles.

Guess what?? Trigonometry is actually useful in real life!!



**Practice Problems:** Use trigonometry to solve for the missing side lengths

1.



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

$15 \cos 40^\circ = \frac{x}{15} \cdot 15$

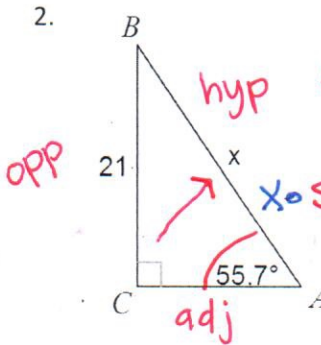
$x = 15 \cos 40^\circ$

$x = 11.5$

**Steps:**

- Identify sides  $\Rightarrow$  Trig Ratio (sin/cos/tan)
- Set up ratio (Ex:  $\sin 36^\circ = \frac{x}{12}$ )
- Solve for x (Multiply by denominator. Divide if necessary.)

2.



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

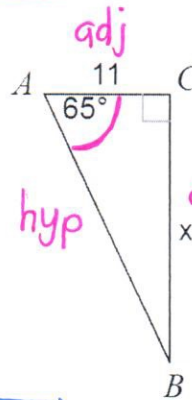
$x \sin 55.7 = \frac{21}{x} \cdot x$

$\frac{x \sin 55.7}{\sin 55.7} = \frac{21}{\sin 55.7}$

$x = \frac{21}{\sin 55.7}$

$x = 25.4$

3.

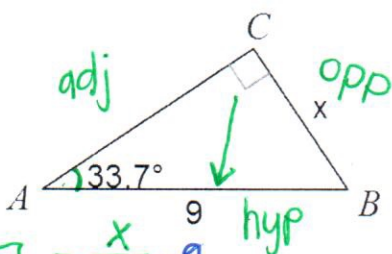


$11 \cdot \tan 65^\circ = \frac{x}{11} \cdot 11$

$x = 11 \tan 65^\circ$

$x = 23.6$

4.

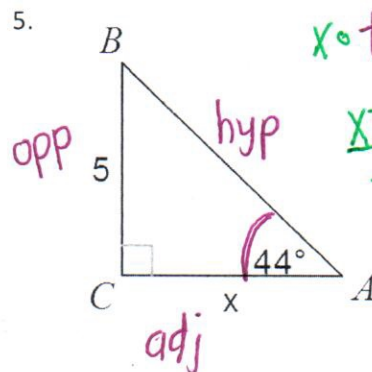


$9 \cdot \sin 33.7 = \frac{x}{9} \cdot 9$

$x = 9 \sin 33.7^\circ$

$x = 5.0$

5.



$x \cdot \tan 44^\circ = \frac{5}{x} \cdot x$

$\frac{x \tan 44^\circ}{\tan 44^\circ} = \frac{5}{\tan 44^\circ}$

$x = \frac{5}{\tan 44^\circ}$

$x = 5.2$

# SOH CAH TOA

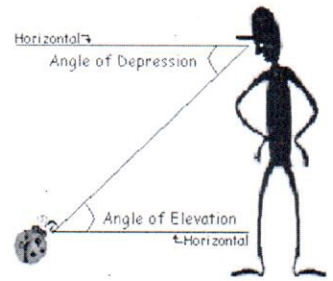
## Application Problems:

### Angle of Elevation:

angle looking up.

### Angle of Depression:

angle looking down



### How tall is the Eiffel Tower??

Surveyors go out with tools that help them measure distance and angles. Let's say that you are standing 200 feet away from the Eiffel Tower and you look up to the very top at an angle of 78.5 degrees. How tall is the Eiffel Tower?

$$200 \cdot \tan 78.5^\circ = \frac{x}{200} \cdot 200$$

$$x = 200 \tan 78.5^\circ$$

$$x = 983.03 \text{ ft}$$

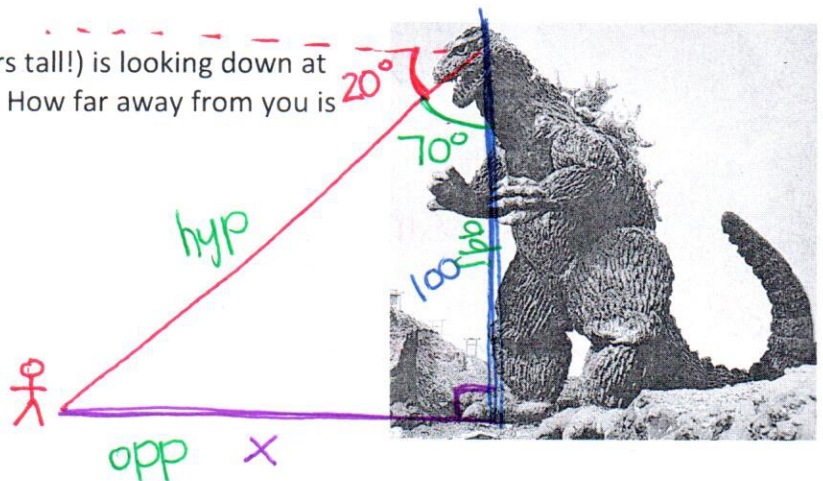
### How close is Godzilla??

Godzilla, the 2014 version (who is 100 meters tall!!) is looking down at you at an angle of depression of 20 degrees. How far away from you is Godzilla?

$$100 \cdot \tan 70^\circ = \frac{x}{100} \cdot 100$$

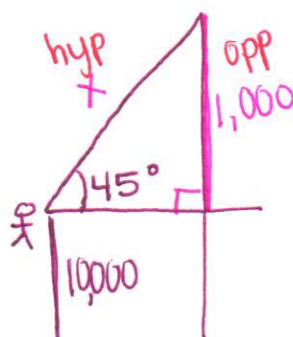
$$x = 100 \tan 70^\circ$$

$$x = 274.75 \text{ meters}$$



### How far do I have to go??

You are at an elevation of 10,000 feet when you look up and see the peak. The angle of elevation to the top is 45 degrees. You know that the height of the mountain is 11,000 feet. How much further do you have to hike?



$$\sin 45^\circ = \frac{1000}{x}$$

$$11,000 \quad x = \frac{1000}{\sin 45^\circ}$$

$$x = 1414.21 \text{ ft}$$