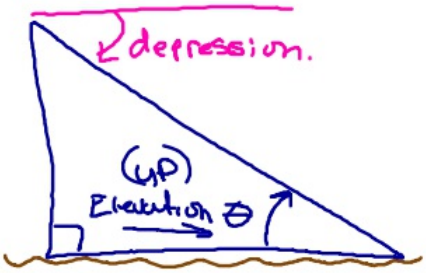
# Day 3: Trig in the Real World

**How to solve Real World Problems using Trig Functions.**

1) 1. DRAW A PICTURE!!!!
   2. Label the picture.
   3. Determine the variable (what you are solving for).
   4. Determine which trig function to use.
   5. Solve for the variable.
   6. Make sure your answer makes sense in the context of the problem and don't forget the units.

**Angle of Elevation vs. Angle of Depression**

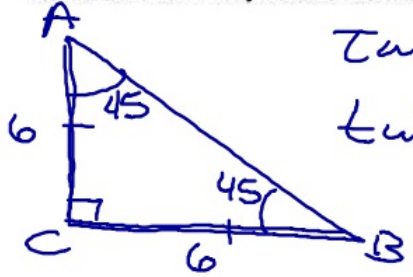
2) Angle of Elevation




Angle of Depression


**Draw a picture for each of the following situations. Round your answer to the nearest whole number.**

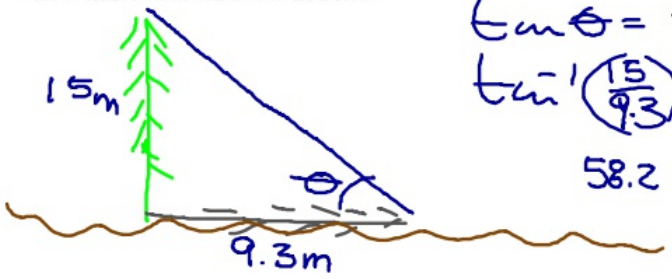
3) Right triangle $\triangle ABC$ has legs that each measure 6 inches. If $\angle C$ is the right angle, find the measure of $\angle A$ and $\angle B$. Why does this solution make sense in this situation?




$\tan\theta = \frac{6}{6}$

$\tan^{-1}\left(\frac{6}{6}\right) = \theta$

4) The height of a tree is 15 meters. What is the angle of elevation when the tree casts a shadow that is 9.3 meters long on level ground?



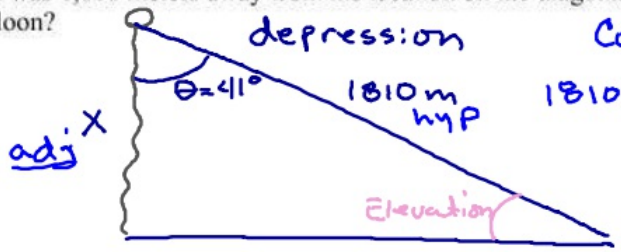

$\tan\theta = \frac{15}{9.3}$

$\tan^{-1}\left(\frac{15}{9.3}\right) = \theta$

$58.2 = \theta$

5) A meteorologist reads radio signals to get information from a weather balloon. The last alert indicated that the angle of depression of the weather balloon to the meteorologist was 41° and the balloon was 1,810 meters away from his location on the diagonal. How high above the ground was the balloon?

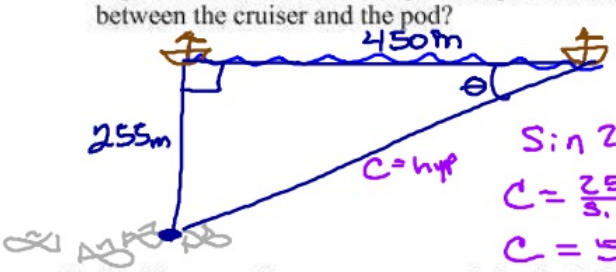



$\cos 41° = \frac{x}{1810}$

$1810(\cos 41°) = x$

$1366\text{ ft} = x$

6) A sonar operator on an anchored cruiser detects a pod of dolphins feeding at a depth of about 255 meters directly below. If the cruiser travels 450 meters west and the dolphins remain at the same depth to feed, what is the angle of depression, $x$, from the cruiser to the pod? What is the distance, $y$, between the cruiser and the pod?




$\tan\theta = \frac{255}{450}$

$\tan^{-1}\left(\frac{255}{450}\right) = \theta$

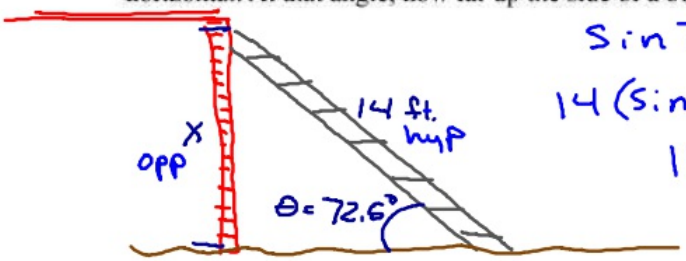
$29.5° = \theta$

$\sin 29.5° = \frac{255}{c}$

$c = \frac{255}{\sin 29.5}$

$c = 517\text{ m.}$

7) A ladder manufacturer recommends that its ladders be used on level ground at an angle of 72.5° to the horizontal. At that angle, how far up the side of a building will the top of a 14-foot ladder reach?

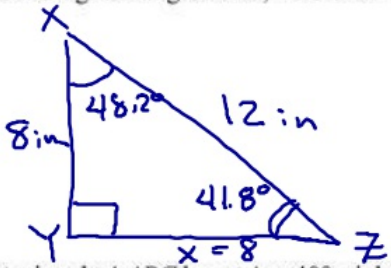



$\sin 72.5° = \frac{x}{14}$

$14(\sin 72.5°) = x$

$13.4\text{ ft} = x$

8) Solve the right triangle XYZ, where $\angle Y$ is a right angle, XZ = 12 inches, and XY = 8 inches.




$\angle X = 48.2°$

$\angle Y = 90°$

$\angle Z = 41.8°$

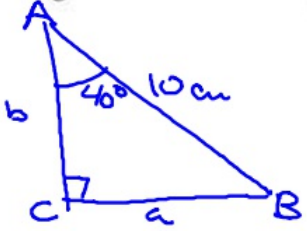
$\angle X = \cos^{-1}\left(\frac{8}{12}\right) = \theta$

$= 48.2°$

$\overline{YZ} \Rightarrow \sin 41.8° = \frac{x}{12}$

$x = 7.9983\ldots$

9) Right triangle $\triangle ABC$ has $\angle A$ at 40°, right angle $\angle C$, and a hypotenuse of 10 cm. Solve the triangle.




$\angle A = 40°$

$\angle B = 50°$

$\angle C = 90°$

$a = 6.43\text{ cm}$

$b = 7.66\text{ cm}$

$c = 10\text{ cm}$

a) $\sin 40° = \frac{a}{10}$

$10(\sin 40°) = a$

$6.43 = a$

b) $\cos 40° = \frac{b}{10}$

$10(\cos 40°) = b$

$7.66 = b$