

Algebra II
Section 14-3
Right Triangles and
Trig Ratios

Goal: to find side lengths and angle measures in a right triangle.

For any right triangle, we can find missing angles or side lengths using trig ratios.

SohCahToa

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

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

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

If $\tan E = \frac{3}{4}$, what are $\sin E$ and $\cos E$?

$\sin E = \frac{\text{opp}}{\text{hyp}} = \frac{3}{5}$

$\sin^{-1} \approx 36.9^\circ$

$\cos E = \frac{\text{adj}}{\text{hyp}} = \frac{4}{5}$

$\cos^{-1} \approx$

Inverse Trig Ratios

$\sin = \frac{\text{opp}}{\text{hyp}}$ \Rightarrow $\text{csc} = \frac{\text{hyp}}{\text{opp}}$

$\cos = \frac{\text{adj}}{\text{hyp}}$ \Rightarrow $\text{sec} = \frac{\text{hyp}}{\text{adj}}$

$\tan = \frac{\text{opp}}{\text{adj}}$ \Rightarrow $\text{cot} = \frac{\text{adj}}{\text{opp}}$

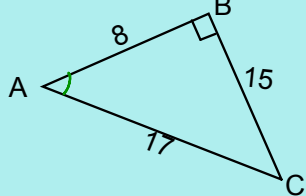
pg 120

#27. Sketch a right triangle with θ as the measure of one of the acute angles. Find the other 5 ratios.

$\cos \theta = \frac{7 \text{ adj}}{20 \text{ hyp}}$

$\sin \theta = \frac{18.73}{20}$

$\text{cot} = \frac{\text{adj}}{\text{opp}} = \frac{7}{18.73}$



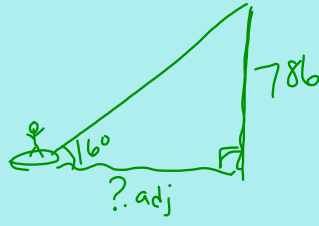
Find:

$\sin A: \frac{15}{17}$
 $\sec A: \frac{\text{hyp}}{\text{adj}} = \frac{17}{8}$
 $\cot C: \frac{\text{adj}}{\text{opp}} = \frac{15}{8}$

Find angle measures for A and C.

$A: \sin^{-1}\left(\frac{15}{17}\right) \approx 61.9^\circ$
 $C: 180 - 90 - 61.9 \approx 28.1^\circ$

You are on a sailboat at sea and spot a 786-ft bluff on the shore. You measure the angle from your sailboat to the top of the bluff and find that it is 16 degrees. About how far are you from the shore at the foot of the bluff?

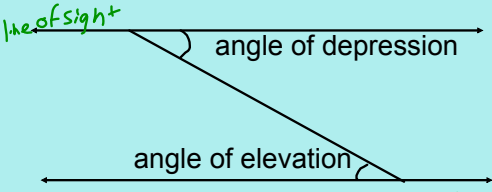


$$x \cdot \tan 16 = \frac{786 \cdot x}{x}$$

$$\frac{x \cdot \tan 16}{\tan 16} = \frac{786}{\tan 16}$$

$$x \approx 2741.1' \text{ away}$$

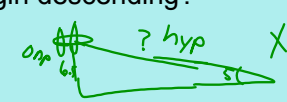
Angles of Depression and Angle of Elevation:



Ex: Standing on a tower + looking down.
looking up from the ground.
airplane's descent

A commercial airline pilot is flying at an altitude of 6.5 miles. To make a gentle decent for landing, the pilot begins descending toward the airport when still fairly far away.

If the plane's path is to make an angle of 5 degrees with the runway (without further adjustments), how far from the airport must the pilot begin descending?



$$x \cdot \sin 5 = \frac{6.5}{\sin 5}$$

$$x \approx 75 \text{ miles}$$

Hwk: pg. 924 - 925

#12, 14, 15-18, 22, 28, 40, 42

Attachments

sohcahtoa-trigonometric-laws.jpg