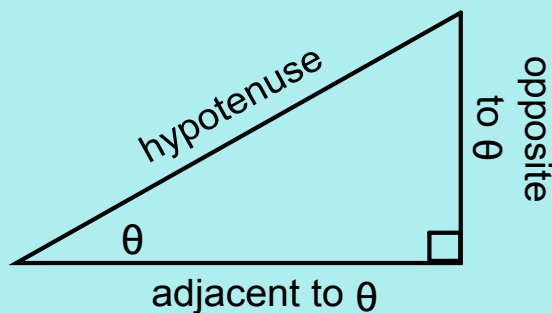


For any angle of interest, there are three (3) primary trigonometric ratios.

$$\text{sine of } \theta = \frac{\text{opposite}}{\text{hypotenuse}}$$

$$\text{cosine of } \theta = \frac{\text{adjacent}}{\text{hypotenuse}}$$

$$\text{tangent of } \theta = \frac{\text{opposite}}{\text{adjacent}}$$



S o h C a h T o a

Dec 7-9:58 PM

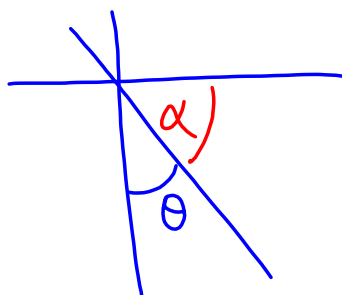
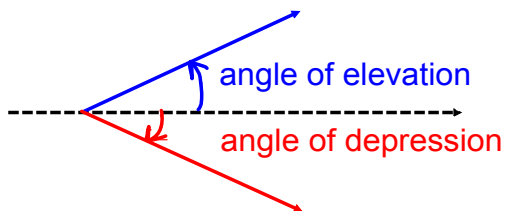
Solving Problems with Trigonometric Ratios

may 13/2016

Terminology:

Angle of Elevation (or Inclination): the angle measured above the horizontal.

Angle of Depression (or Declination): the angle measured below the horizontal.



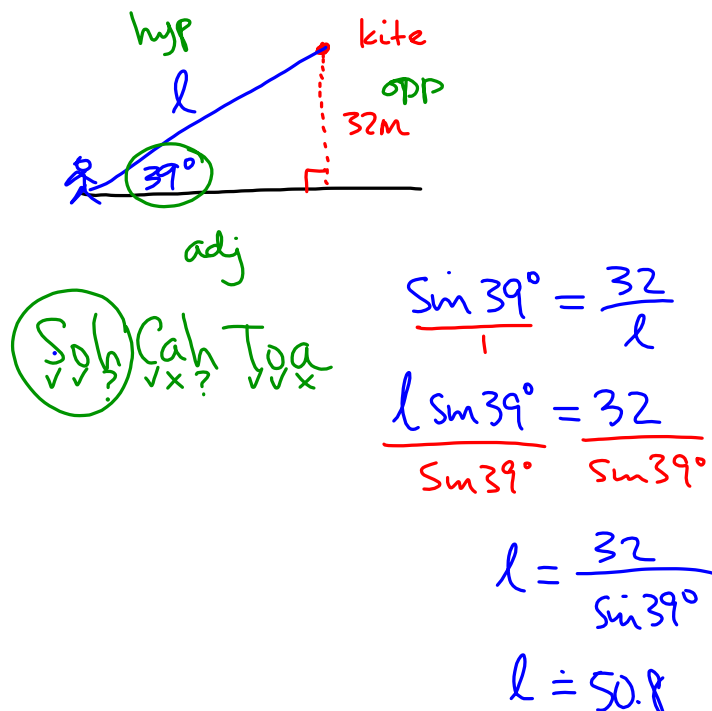
Dec 9-9:41 PM

Steps:

- 1) If possible, draw a good diagram of the situation.
- 2) Identify the unknown (what are you looking for?).
- 3) Label the sides of the triangle as opposite, hypotenuse, and adjacent with respect to the given angle (or the unknown if angle is what you are looking for).
- 4) Identify the trigonometric ratio that relates to the unknown and two of the unknowns OR Pythagorean Theorem OR the sum of the angles in a triangle.
- 5) Solve.

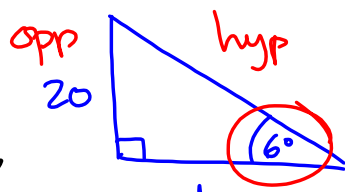
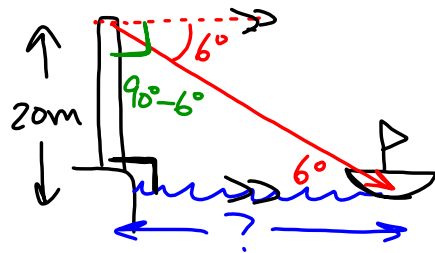
May 13-12:15 PM

Ex.1 A kite is 32 m above the ground. The string makes an angle of 39° with the ground. How long is the string?



Dec 10-10:22 PM

Ex.2 A lighthouse observation deck is about 20 m above sea level. A boat is viewed at an *angle of depression* of 6° . How far is the boat from the base of the lighthouse?



Soh Cah Toa
 $\checkmark \checkmark \times \checkmark ? \times \checkmark \checkmark ?$

$$\tan 6^\circ = \frac{20}{d}$$

$$d \tan 6^\circ = 20$$

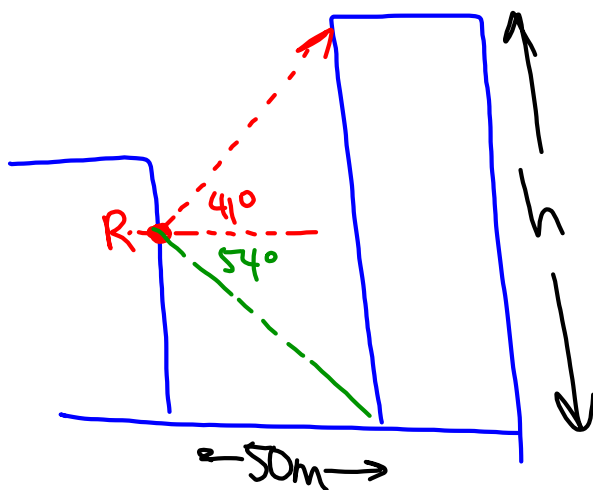
$$d = \frac{20}{\tan 6^\circ}$$

$$d \approx 190.3$$

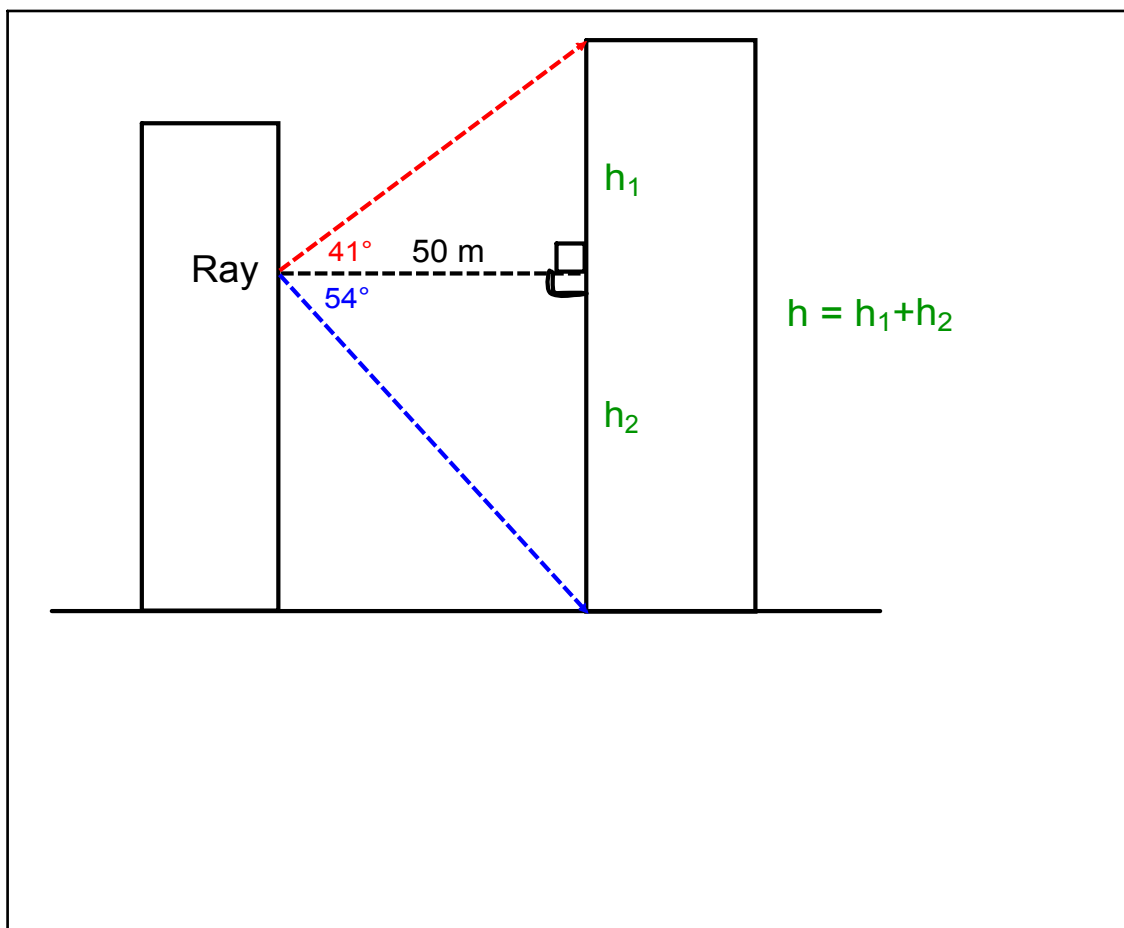
\therefore the boat is
 190m away.

Dec 10-10:23 PM

Ex.3 From the window of a building, Ray finds the angle of elevation to the top of a second building to be 41° . The angle of depression to the bottom is 54° . The buildings are 50 m apart. How tall is the second building?



Dec 10-10:25 PM



Dec 10-10:33 PM

Solve one triangle for h_1 and the other triangle for h_2

Soh Cah (To a)
 $\tan 41^\circ = \frac{h_1}{50}$
 $h_1 = 50 \tan 41^\circ$
 $h_1 \approx 43.4643$

Soh Cah (To a)
 $\tan 54^\circ = \frac{h_2}{50}$
 $h_2 = 50 \tan 54^\circ$
 $h_2 \approx 68.8191$

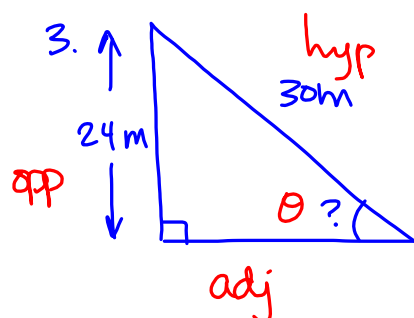
$h = h_1 + h_2$
 $h \approx 112.3$

\therefore the other building is 112.3 m tall.

Dec 10-10:33 PM

Assigned Work:

p.412 # 2, 3, 7, 10, 11



Soh Cah Toa
 ? ✓ ✓ ? x ✓ ? ✓ x

$$(\sin \theta) = \frac{24}{30}$$

$$\theta = \sin^{-1}\left(\frac{24}{30}\right)$$

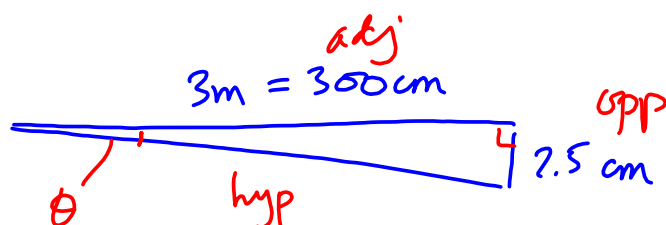
$$\theta = 53.1^\circ$$

$$x^2 = 9$$

$$x = \pm\sqrt{9}$$

Dec 10-10:43 PM

7.



Soh Cah Toa

$$\tan \theta = \frac{2.5}{300}$$

$$\theta = \tan^{-1}\left(\frac{2.5}{300}\right)$$

$$\theta = 0.5^\circ$$

∴ ~~~~~

May 16-2:09 PM

11.

Diagram showing a large triangle divided into two right triangles by an altitude h . The base is 65m . The left right triangle has a 35° angle and an adjacent side of x . The right right triangle has a 30° angle and an adjacent side of $65-x$.

Soh Cah Toa

$$\tan 35^\circ = \frac{h}{x} \quad \tan 30^\circ = \frac{h}{65-x}$$

$$x \tan 35^\circ = h \quad (65-x) \tan 30^\circ = h$$

$$x \tan 35^\circ = (65-x) \tan 30^\circ$$

$$x(0.7002) = (65-x)(0.5773)$$

$$x = \underline{\hspace{2cm}}$$

Sub x to find h .

May 16-2:14 PM