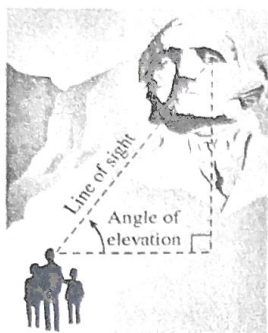
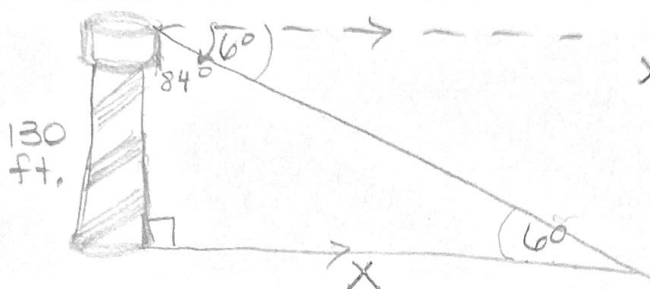


Notes (5.0)-----Solving Problems With Trigonometry

Remember which angle is which!!!

* Angle of Elevation—from the horizontal up* Angle of Depression—from the horizontal down**EXAMPLE 1 Using Angle of Depression**

The angle of depression of a buoy from the top of the Barnegat Bay lighthouse 130 feet above the surface of the water is 6° . Find the distance x from the base of the lighthouse to the buoy.



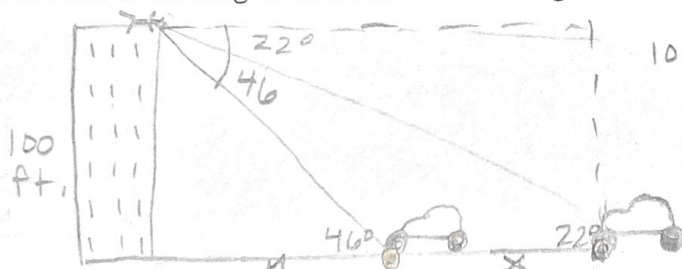
$$x \tan 6^\circ = \frac{130}{x} \cdot x$$

$$x = \frac{130}{\tan 6^\circ}$$

$$x \approx 1236.9 \text{ ft.}$$

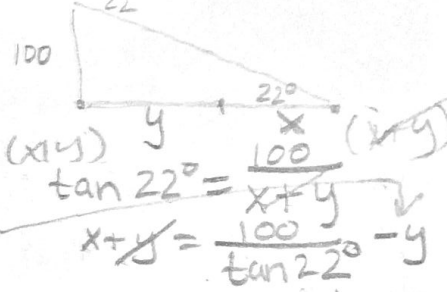
EXAMPLE 2 Making Indirect Measurements

From the top of a 100-ft building a man observes a moving car. If the angle of depression of the car changes from 22° to 46° during the period of observation, how far does the car travel? (can you tell if the car is moving to or from the building? Does this matter? Draw a picture for both)



$$\tan 46^\circ = \frac{100}{y}$$

$$y = \frac{100}{\tan 46^\circ}$$

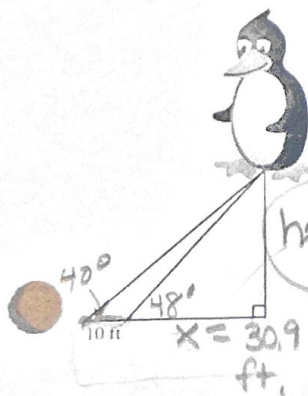


$$\tan 22^\circ = \frac{100}{x+y}$$

$$x+y = \frac{100}{\tan 22^\circ}$$

EXAMPLE 3 Finding Height Above Ground

A large, helium-filled penguin is awaiting the start of a parade. Two cables attached to the underside of the penguin make angles of 48° and 40° with the ground (see diagram). If the cables are attached to the ground 10 feet from each other, how high above the ground is the penguin?



$$\tan 40^\circ = \frac{h}{x+10}$$

$$(x+10) \tan 40^\circ = h$$

$$\tan 48^\circ = \frac{h}{x}$$

$$x \tan 48^\circ = h$$

$$(x+10) \tan 40^\circ = x \tan 48^\circ$$

$$x \tan 40^\circ + 10 \tan 40^\circ = x \tan 48^\circ$$

$$x \tan 40^\circ - x \tan 48^\circ = -10 \tan 40^\circ$$

$$x (\tan 40^\circ - \tan 48^\circ) = -10 \tan 40^\circ$$

$$x = \frac{-10 \tan 40^\circ}{\tan 40^\circ - \tan 48^\circ}$$

$$x = \frac{100}{\tan 22^\circ} - \frac{100}{\tan 46^\circ}$$

$$x \approx 150.9 \text{ ft.}$$