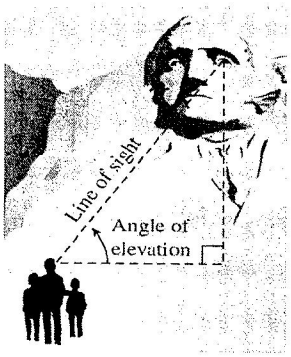
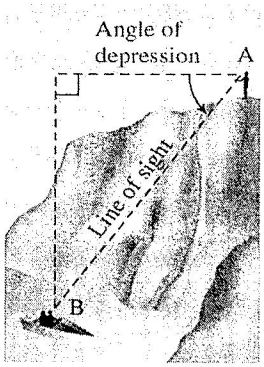
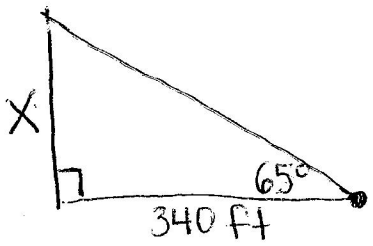


*__Angle of Elevation__–from the horizontal up

*__Angle of Depression__–from the horizontal down



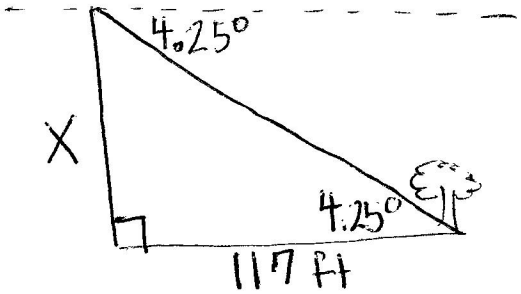
Example 1 From a point 340 ft away from the base of the Peach Tree Center Plaza in Atlanta, GA the angle of elevation to the top of the building is 65°. What is the height of the building? Give the EXACT answer & the answer rounded to the nearest ft



$\tan 65^\circ = \frac{x}{340}$

$x = 340 \tan 65^\circ \text{ ft} \approx 729 \text{ ft}$

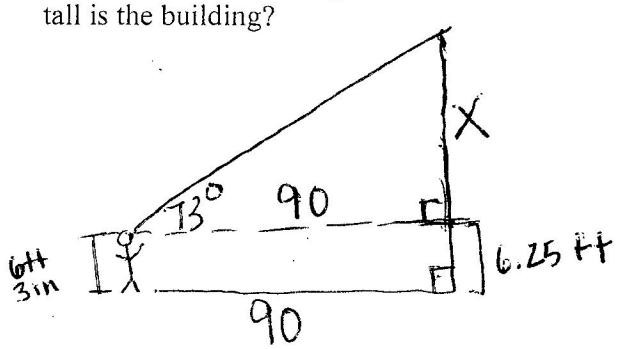
Example 2 The angle of depression from the edge of a cliff to the base of a tree on the ground below is 4.25°. If the base of the cliff is 117ft from the base of the tree, how high is the cliff?



$\tan 4.25^\circ = \frac{x}{117}$

$x = 117 \tan 4.25^\circ \approx 8.7 \text{ ft}$

Example 3 On November 13, 2007 The New Frontier hotel and casino in Las Vegas, NV was to be demolished. To help calculate the safety zone for spectators to watch, the head demolition engineer needed to calculate the height of the New Frontier. His eyes are 6 ft 3in from the ground and his line of sight to the top of the New Frontier forms a 73° angle with the horizontal. If he is standing 90 feet from the base of the building, how tall is the building?



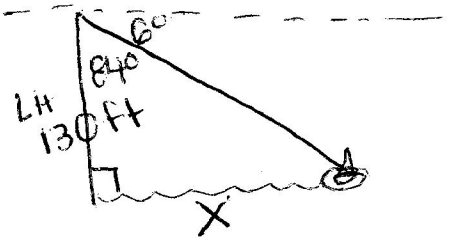
$\tan 73^\circ = \frac{x}{90}$

$x = 90 \tan 73^\circ \approx 294.38 \text{ ft}$

$+ 6.25$

300.63 ft

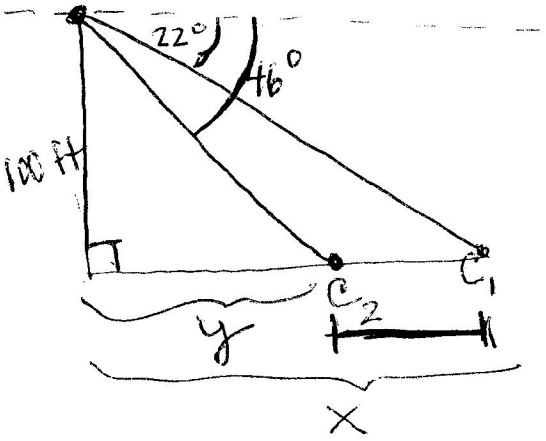
Example 4 The angle of depression of a buoy from the top of the Barnegat Bay lighthouse 130 feet above the surface of the water is 6°. Find the distance x from the base of the lighthouse to the buoy.

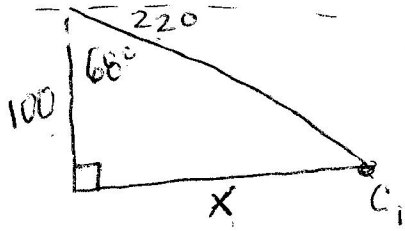


$$\tan 84^\circ = \frac{x}{130}$$

$$x = 130 \tan 84^\circ \approx 1236.9 \text{ ft}$$

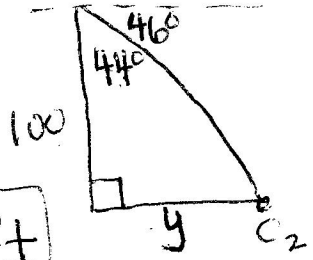
Example 5 From the top of a 100-ft building a man observes a moving car. If the angle of depression of the car changes from 22° to 46° during the period of observation, how far does the car travel? Is the car moving to or from the building?





$$\tan 68^\circ = \frac{x}{100}$$

$$x = 100 \tan 68^\circ$$

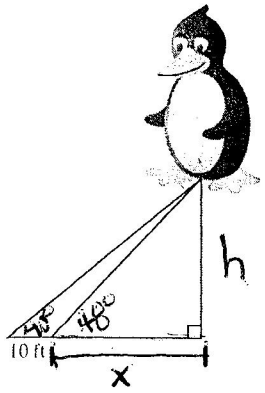


$$\tan 44^\circ = \frac{y}{100}$$

$$y = 100 \tan 44^\circ$$

$$x - y = \boxed{150.9 \text{ ft}}$$

Example 6 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?



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

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

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

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

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

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

$$h = \nearrow \cdot \tan 48^\circ \approx \boxed{34.3 \text{ ft}}$$