

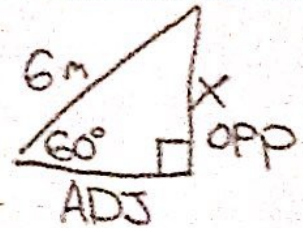
Draw a diagram and solve the problems. Round your answers to two decimal places, as needed.

1. A six-meter-long ladder leans against a building. If the ladder has an angle of elevation of  $60^\circ$  with the ground.

- a. ...how far up the wall does the ladder reach?

$$6(\sin 60^\circ) = \frac{X}{6} \quad X = 6(\sin 60^\circ) \approx$$

$$\boxed{5.20 \text{ m}}$$

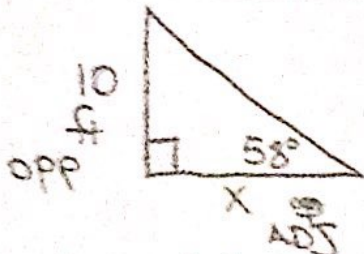


- b. How far from the wall is the base of the ladder?

$$\cos 60^\circ = \frac{Y}{6}$$

$$Y = 6(\cos 60^\circ) \approx \boxed{3 \text{ m}}$$

2. Find the shadow cast by a 10 foot lamp post when the angle of elevation of the sun is  $58^\circ$ .

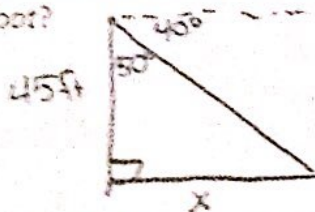


$$\tan 58^\circ = \frac{10}{X}$$

$$X(\tan 58^\circ) = 10$$

$$X = \frac{10}{\tan 58^\circ} \approx \boxed{6.25 \text{ ft}}$$

3. From the top of a fire tower, a forest ranger sees his partner on the ground at an angle of depression of  $40^\circ$ . If the tower is 45 feet in height, how far is the partner from the base of the tower, to the nearest tenth of a foot?



$$\tan 50^\circ = \frac{X}{45}$$

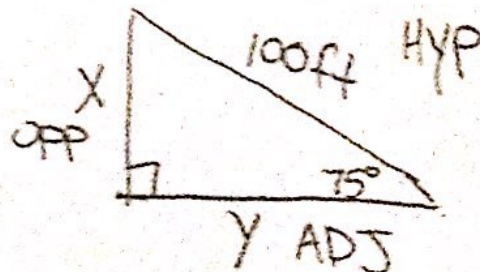
$$X = 45(\tan 50^\circ) \approx \boxed{53.63}$$

4. Suppose you're flying a kite, and it gets caught at the very top of a tree. You sit down in frustration so that the string is touching the ground. You've let out all 100 feet of string for the kite, and the angle of elevation is  $75^\circ$ . Instead of worrying about how to get your kite back, you wonder:

- a. "How tall is that tree?"

$$\sin 75^\circ = \frac{X}{100}$$

$$X = 100(\sin 75^\circ) \approx 96.59 \text{ ft}$$

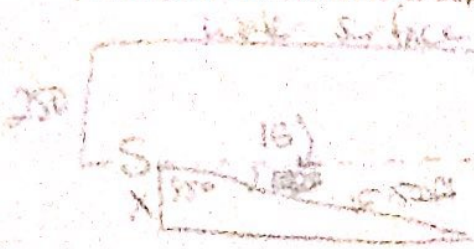


- b. "How far away from the tree am I?"

$$\cos 75^\circ = \frac{Y}{100}$$

$$Y = 100(\cos 75^\circ) \approx 25.88 \text{ ft}$$

5. A submarine dives at an angle of depression of  $15^\circ$  with respect to a line parallel to the water's surface.  
 a. If the submarine starts at a depth of 250 ft below sea level and travels a distance of 1500 feet during the dive, what is its depth now?



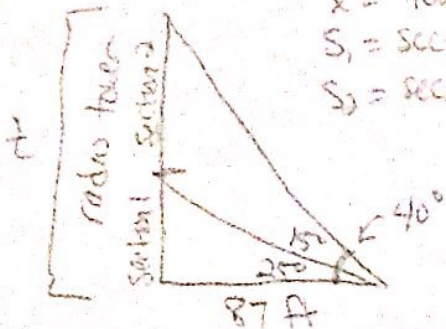
$$\cos 85^\circ = \frac{x}{1500}$$

$$x = 1500 \cos 85^\circ$$

$$x \approx 130.73 \text{ ft}$$

Sub is now  $250 + 130.73 = 380.73$  ft below sea level

6. A radio station tower was built in two sections. From a point 87 feet from the base of the tower, the angle of elevation of the top of the first section is  $25^\circ$ , and the angle of elevation of the top of the second section is  $40^\circ$ . To the nearest foot, what is the height of the top section of the tower?



$x$  = tower height  
 $S_1$  = section 1 height  
 $S_2$  = section 2 height (top section)

$$\tan 40^\circ = \frac{t}{87}$$

$$t \approx 73.00 \text{ ft}$$

$$\tan 25^\circ = \frac{S_1}{87}$$

$$S_1 \approx 40.57 \text{ ft}$$

$$S_2 = t - S_1$$

$$S_2 = 73.00 - 40.57$$

top section is 32.43 ft tall

7. Brothers Bob and Tom Katz buy a tent that has a center pole 6.25 feet high. If the sides of the tent are supposed to make a  $50^\circ$  angle with the ground, how wide is the tent?

width =  $2x$

$$\tan 50^\circ = \frac{6.25}{x}$$

$$x \approx 5.24$$

width is about 10.48 ft

