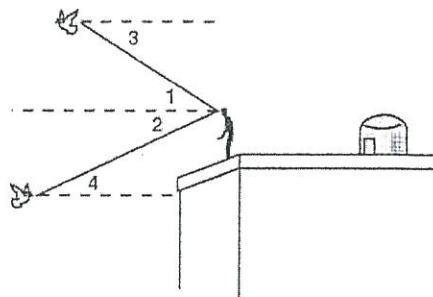


**LESSON**  
**8-4**

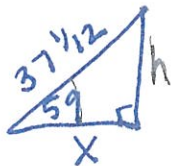
**Practice B**  
**Angles of Elevation and Depression**

Marco breeds and trains homing pigeons on the roof of his building. Classify each angle as an angle of elevation or an angle of depression.

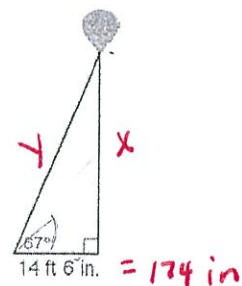
1.  $\angle 1$  elevation
2.  $\angle 2$  depression
3.  $\angle 3$  depression
4.  $\angle 4$  elevation



To attract customers to his car dealership, Frank tethers a large red balloon to the ground. In Exercises 5–7, give answers in feet and inches to the nearest inch. (Note: Assume the cord that attaches to the balloon makes a straight segment.)



5. The sun is directly overhead. The shadow of the balloon falls 14 feet 6 inches from the tether. Frank sights an angle of elevation of  $67^\circ$ . Find the height of the balloon.



$\tan 67 = \frac{x}{174}$

34 ft. 2 in.

6. Find the length of the cord that tethers the balloon.

37 ft. 1 in.

$\cos 67 = \frac{174}{y}$

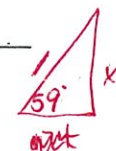
- \* 7. The wind picks up and the angle of elevation changes to  $59^\circ$ . Find the height of the balloon.

\*  $\sin 59 = \frac{x}{37 \frac{1}{2}}$

~~$\tan 59 = \frac{x}{174}$~~

~~24 ft. 2 in.~~

3 ft 9 in



Lindsey shouts down to Pete from her third-story window.

8. Lindsey is 9.2 meters up, and the angle of depression from Lindsey to Pete is  $79^\circ$ . Find the distance from Pete to the base of the building to the nearest tenth of a meter.

$\tan 79 = \frac{9.2}{x}$

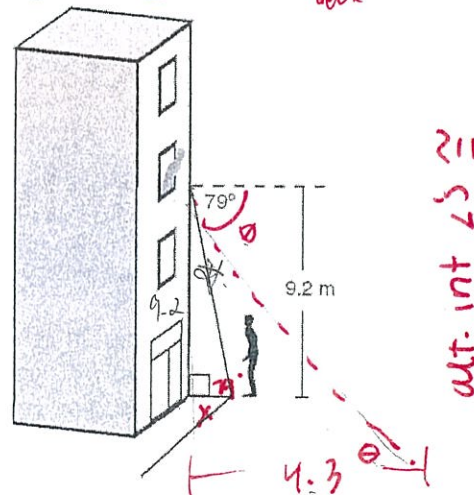
1.8 m

9. To see Lindsey better, Pete walks out into the street so he is 4.3 meters from the base of the building. Find the angle of depression from Lindsey to Pete to the nearest degree.

$\tan \theta = \frac{9.2}{4.3}$

$\approx 65^\circ$

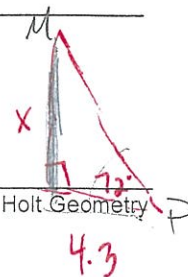
10. Mr. Shea lives in Lindsey's building. While Pete is still out in the street, Mr. Shea leans out his window to tell Lindsey and Pete to stop all the shouting. The angle of elevation from Pete to Mr. Shea is  $72^\circ$ . Tell whether Mr. Shea lives above or below Lindsey.



above

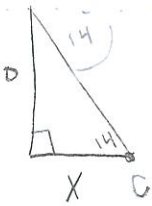
$\tan 72 = \frac{x}{4.3}$

$x = 13.23$



**LESSON**  
**8-4**

**Problem Solving**  
**Angles of Elevation and Depression**



$\tan 14 = \frac{30}{X}$

1. Mayuko is sitting 30 feet high in a football stadium. The angle of depression to the center of the field is  $14^\circ$ . What is the horizontal distance between Mayuko and the center of the field? Round to the nearest foot.

120 ft



3. Shane is 61 feet high on a ride at an amusement park. The angle of depression to the park entrance is  $42^\circ$ , and the angle of depression to his friends standing below is  $80^\circ$ . How far from the entrance are his friends standing? Round to the nearest foot.

57 ft. (67.747 - 10.755)

Choose the best answer.

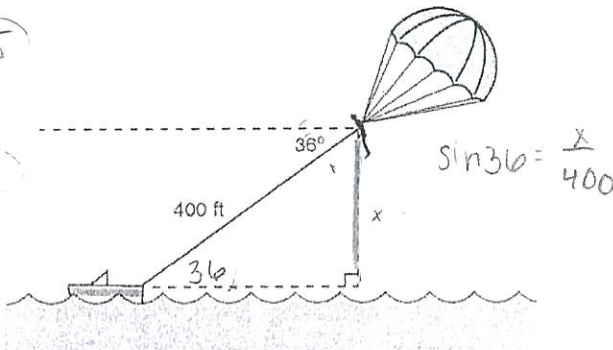
$\tan 80 = \frac{61}{Y}$

$Y \approx 10.755$

$\tan 42 = \frac{61}{Z}$

$Z \approx 67.747$

4. The figure shows a person parasailing. What is  $x$ , the height of the parasailer, to the nearest foot?



$\sin 36 = \frac{x}{400}$

- A 235 ft      C 290 ft  
B 245 ft      D 323 ft

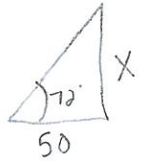
6. A lifeguard is in an observation chair and spots a person who needs help. The angle of depression to the person is  $22^\circ$ . The eye level of the lifeguard is 10 feet above the ground. What is the horizontal distance between the lifeguard and the person? Round to the nearest foot.



- A 4 ft      C 25 ft  
B 11 ft      D 27 ft

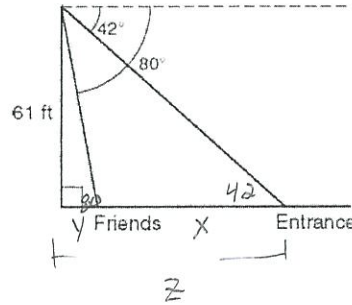
$\tan 22 = \frac{10}{X}$

2. A surveyor 50 meters from the base of a cliff measures the angle of elevation to the top of the cliff as  $72^\circ$ . What is the height of the cliff? Round to the nearest meter.

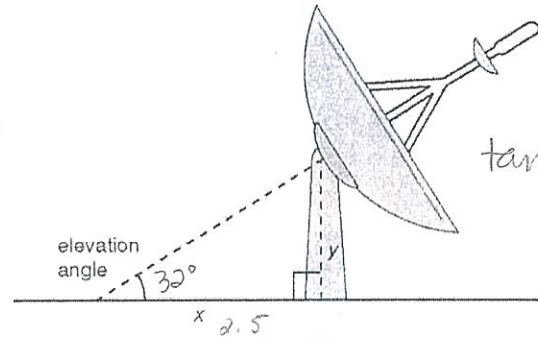


$\tan 72 = \frac{X}{50}$

154 m



5. The elevation angle from the ground to the object to which the satellite dish is pointed is  $32^\circ$ . If  $x = 2.5$  meters, which is the best estimate for  $y$ , the height of the satellite stand?



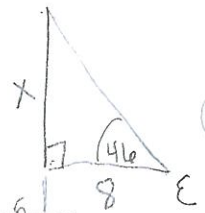
$\tan 32 = \frac{y}{2.5}$

- F 0.8 m      H 1.6 m  
G 1.3 m      J 2.1 m

7. At a topiary garden, Emily is 8 feet from a shrub that is shaped like a dolphin. From where she is looking, the angle of elevation to the top of the shrub is  $46^\circ$ . If she is 5 feet tall, which is the best estimate for the height of the shrub?

- F 6 ft      H 10 ft  
G 8 ft      J 13 ft

X + 5



$\tan 46 = \frac{X + 5}{8}$