Practice 5.9.3: Problem Solving with the Pythagorean Theorem and Trigonometry

Unless otherwise specified, round all final answers to the nearest whole number.

1. Brianna is hiking on a mountain trail. She hikes 345 feet uphill but a horizontal distance of 295 feet. To the nearest degree, what is the angle of elevation of the trail?

2. A building is 100 meters tall and, at a certain time of day, casts a shadow from the sun that is 56 meters long. What is the angle of elevation of the sun at that time?

3. A blimp provides aerial footage of a football game at an altitude, or vertical height, of 400 meters. The television crew estimates the distance of their line of sight to the stadium to be 3,282.2 meters. What is the television crew's angle of depression from inside the blimp?

4. It is estimated that 20,000 to 25,000 homes get their water through a pipeline from the Lake Lanier reservoir. One section of the pipeline slopes down with a 21° angle of depression for a horizontal distance of 4,000 feet. To the nearest foot, how long is that section of the pipeline?

5. A parasailing company uses a 50-foot cable to connect the parasail to the back of a boat. About how far is the parasail from the water when the cable has a 35° angle of elevation? What is the horizontal distance from the boat to the parasail at the same angle of elevation?
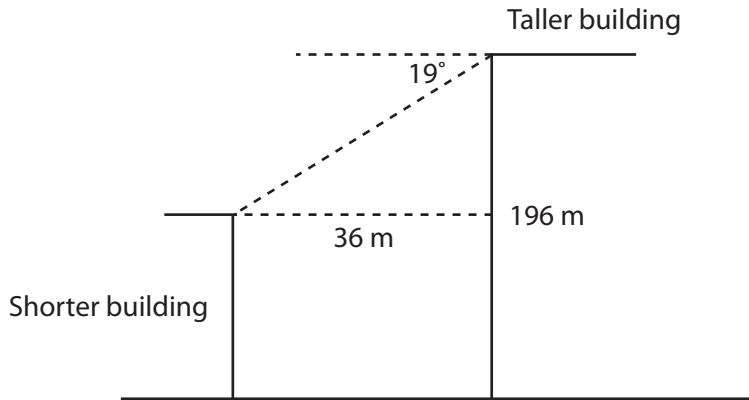
6. Two office buildings are 36 meters apart. The height of the taller building is 196 meters. The angle of depression from the top of the taller building to the top of the shorter building is 19°. What is the height of the shorter building? Refer to the diagram below.

Taller building

19°

196 m

36 m

Shorter building

7. Kalani is standing at the bottom of a hill. Mark is standing on the hill so that when Kalani's line of sight is perpendicular to her body, she is looking at Mark's shoes. If Kalani's eyes are 5 feet above the ground and 14.5 feet from Mark's shoes, what is the angle of elevation of the hill to the nearest degree? How far are Kalani's shoes from Mark's shoes, to the nearest foot? Refer to the diagram below.
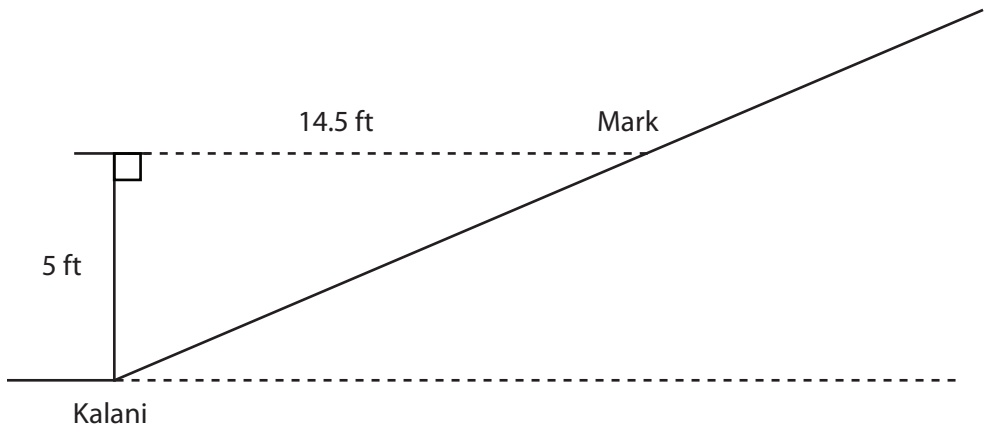
14.5 ft   Mark

5 ft

Kalani

continued

Use the following scenario to complete problems 8 and 9.

> A salvage ship's sonar locates wreckage at a 12° angle of depression east of the ship. A diver attached to a thick cord is lowered 45 meters to the ocean floor.

8. How far east does the diver have to swim to reach the wreckage? What is the length of the rope once the diver reaches the wreckage?

9. A sudden wind moves the boat 10 meters west of its starting location. What is the angle of elevation from the wreckage and how long is the rope extended now?

Read the scenario that follows and use the information to answer the questions.

10. You and your friend are standing on a steep hill directly across from the axis of a wind turbine. You know that this wind turbine is 160 meters to its axis (or center of rotation) and that the rotor tips reach a height of 205 meters when they are in line, or at 180°, with the wind turbine pole. Your friend is 6 feet tall, and says that the angle of elevation to the rotor tip is 32° and that his eyes are level with the axis of the wind turbine.

    a. What is the distance from your friend's line of sight to the axis?

    b. What is the distance from your friend's line of sight to the base of the wind turbine?

    c. What is the distance from your friend's line of sight to the tip of a rotor at its tallest point?