

Advanced Math/Precalc: Chapter 5 Real-world Applications**Directions:** Do your work on a separate piece of paper. Write the summary of answers below. (5 pts each)

1) _____

5) _____

9) _____

2) _____

6) _____

10) _____

3) _____

7) _____

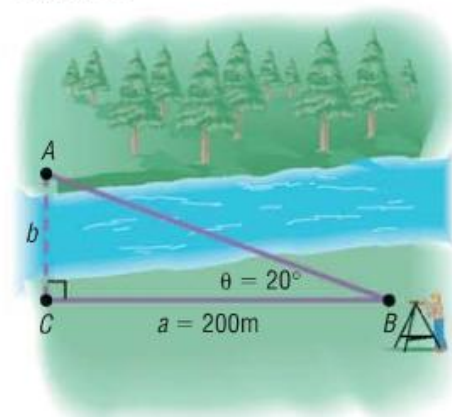
11) _____

4) _____

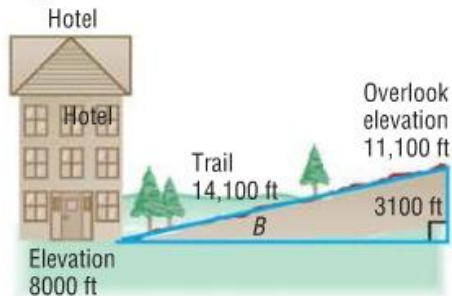
8) _____

12) _____

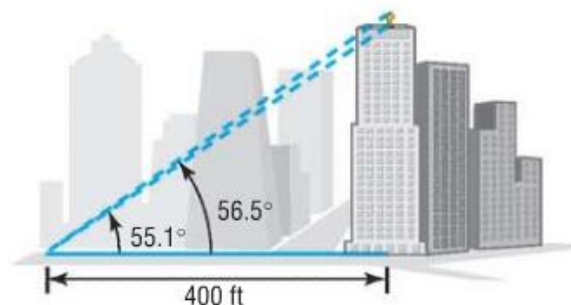
- 1) A surveyor can measure the width of a river by setting up a transit* at a point C on one side of the river and taking a sighting of a point A on the other side. Refer to Figure 10. After turning through an angle of 90° at C , the surveyor walks a distance of 200 meters to point B . Using the transit at B , the angle θ is measured and found to be 20° . What is the width of the river rounded to the nearest meter?

Figure 10

- 2) A straight trail leads from the Alpine Hotel, elevation 8000 feet, to a scenic overlook, elevation 11,100 feet. The length of the trail is 14,100 feet. What is the inclination (grade) of the trail? That is, what is the angle B in Figure 11?

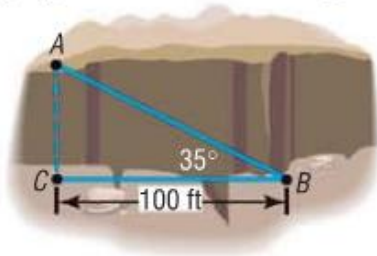
Figure 11

- 3) Adorning the top of the Board of Trade building in Chicago is a statue of Ceres, the Roman goddess of wheat. From street level, two observations are taken 400 feet from the center of the building. The angle of elevation to the base of the statue is found to be 55.1° and the angle of elevation to the top of the statue is 56.5° . See Figure 14(a). What is the height of the statue?

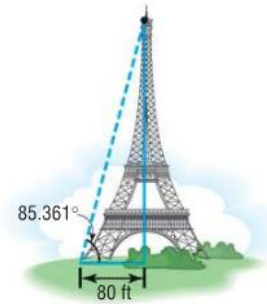
**Figure 14 (a)**

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- 4) **Finding the Width of a Gorge** Find the distance from A to C across the gorge illustrated in the figure.



- 5) **The Eiffel Tower** The tallest tower built before the era of television masts, the Eiffel Tower was completed on March 31, 1889. Find the height of the Eiffel Tower (before a television mast was added to the top) using the information given in the illustration.



- 6) **Security** A security camera in a neighborhood bank is mounted on a wall 9 feet above the floor. What angle of depression should be used if the camera is to be directed to a spot 6 feet above the floor and 12 feet from the wall?
- 7) To measure the height of a mountain, a surveyor takes two sightings of the peak at a distance 900 meters apart on a direct line to the mountain.* See Figure 31(a). The first observation results in an angle of elevation of 47° , and the second results in an angle of elevation of 35° . If the transit is 2 meters high, what is the height h of the mountain?

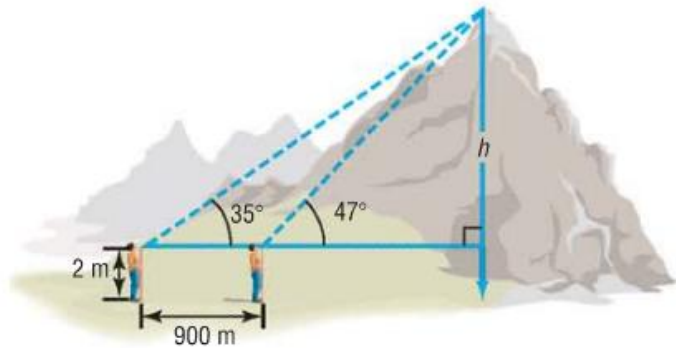
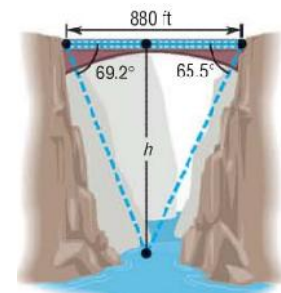


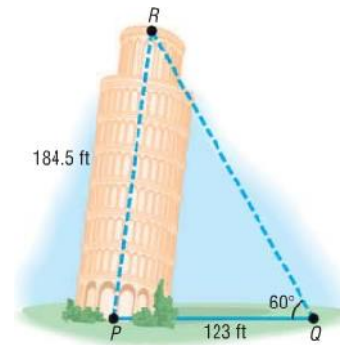
Figure 31 (a)

- 8) **Finding the Height of the Bridge over the Royal Gorge** The highest bridge in the world is the bridge over the Royal Gorge of the Arkansas River in Colorado. Sightings to the same point at water level directly under the bridge are taken from each side of the 880-foot-long bridge, as indicated in the figure. How high is the bridge?

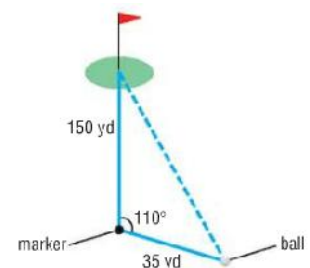


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- 9) **Finding the Lean of the Leaning Tower of Pisa** The famous Leaning Tower of Pisa was originally 184.5 feet high.* At a distance of 123 feet from the base of the tower, the angle of elevation to the top of the tower is found to be 60° . Find $\angle RPQ$ indicated in the figure. Also, find the perpendicular distance from R to PQ .

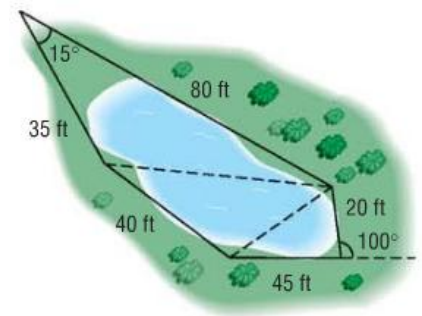


- 10) **Distance to the Green** A golfer hits an errant tee shot that lands in the rough. A marker in the center of the fairway is 150 yards from the center of the green. While standing on the marker and facing the green, the golfer turns 110° toward his ball. He then paces off 35 yards to his ball. See the figure. How far is the ball from the center of the green?



- 11) **Approximating the Area of a Lake** To approximate the area of a lake, a surveyor walks around the perimeter of the lake, taking the measurements shown in the illustration. Using this technique, what is the approximate area of the lake?

[Hint: Use the Law of Cosines on the three triangles shown and then find the sum of their areas.]



- 12) **Bermuda Triangle** The Bermuda Triangle is roughly defined by Hamilton, Bermuda; San Juan, Puerto Rico; and Fort Lauderdale, Florida. The distances from Hamilton to Fort Lauderdale, Fort Lauderdale to San Juan, and San Juan to Hamilton are approximately 1028, 1046, and 965 miles respectively. Ignoring the curvature of Earth, approximate the area of the Bermuda Triangle.