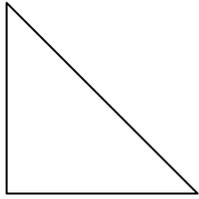# Chapter 7 - Applications of Trig Functions

Remember to round side lengths to the nearest hundredth and angle measures to the nearest tenth of a degree.

1. Find the exact value of the six trigonometric functions of the angle θ.

    sin θ =   csc θ =

    cos θ =   sec θ =

    tan θ =   cot θ =

2. Find the measures of the acute angles in the right triangle above.

3. A kite is 100 ft. above the ground. If the angle of elevation from the ground to the string is 35˚, how many feet of string are being used to fly the kite?

Determine the number of triangles. If there are any, solve them.

4. β= 63˚, a = 27, b = 25   5. α = 75˚, a = 24, b = 25

6. In triangle RST, r = 4, s = 5, and t = 6. Find the measure of the **largest angle** to the nearest degree.
    Find the **area** of triangle RST.

7. To approximate the area of a lake, Cindy 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?
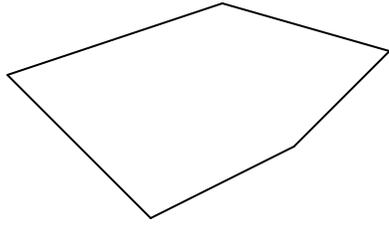
8. The Sears Tower in Chicago is 1454 feet tall and is situated about 1 mile inland from the shore of Lake Michigan, as indicated in the figure. An observer in a pleasure boat on the lake directly in front of the Sears Tower looks at the top of the tower and measures the angle of elevation as 5˚. How far offshore is the boat? (1 mile = 5280 ft)

9. Rebecca, the navigator of a ship at sea, spots two lighthouses that she knows to be 2 miles apart along a straight seashore. She determines that the angles formed between two line-of-sight observations of the lighthouses and the line from the ship directly to shore are 12˚ and 30˚. See the illustration.

    a. How far is the ship from lighthouse A?

b. How far is the ship from lighthouse B?

c. How far is the ship from shore?

10. A hot-air balloon is rising vertically. The angle of elevation from a point on level ground 125 feet from the balloon to a point directly under the passenger compartment changes from 19.2° to 31.7°. How far, to the nearest hundredth of a foot, does the balloon rise during this period?

11. The irregular parcel of land shown in the figure is being sold for $100 per square foot. What is the cost of this parcel?
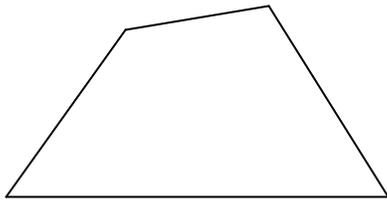
12. Find the **area** and **perimeter** of a regular hexagon inscribed in a circle with radius 12 in.
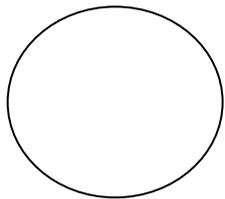
13. A ship passes by a buoy B which is known to be 3000 yd from peninsula P. The ship is steaming east along line BE and ∠PBE is measured at 28˚. After 10 minutes, the ship is at S and ∠PSE is measured as 63˚.

    a. How far from the peninsula is the ship when it is at S?

b. How fast (in yd/min) is the ship traveling?

c. If the ship continues east, what is the closest it will get to the peninsula?

14. A sailboat leaves St. Thomas bound for an island in the British West Indies, 200 miles away. Maintaining a constant speed of 18 miles per hour, but encountering heavy crosswinds and strong currents, the crew finds after 4 hours that the sailboat is off course by 15˚.
    a. How far is the sailboat from the island at this time?

    b. Through what angle should the sailboat turn to correct its course?

15. Fill in the blank to make the statement true. Use exact values where appropriate.

a. $\sin 22° - \cos \underline{\quad} = 0$ b. $\dfrac{\tan \dfrac{\pi}{14}}{\cot \underline{\quad}} = 1$

EXTRA CREDIT

A ship leaves the port of Miami with a bearing of S80°E and a speed of 15 knots (nautical miles per hour). After one hour, the ship turns 90 degrees toward the south. After 2 hours, maintaining the same speed, what is the bearing to the ship from port?