**Vocabulary:** Fill in the blanks.

1. When you are given three sides of a triangle, you use the Law of _____ to find the three angles of the triangle.

2. When you are given two angles and any side of a triangle, you use the Law of _____ to solve the triangle.

4. The Law of Cosines can be used to establish a formula for finding the area of a triangle called _____ _____ Formula.

Using the Law of Cosines In Exercises 5–24, use the Law of Cosines to solve the triangle. Round your answers to two decimal places.

5.

$b = 12$, $a = 10$, $c = 16$

10.

$b = 4.5$, $105°$, $a = 9$, c
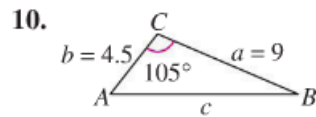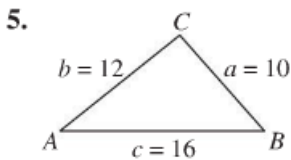
14. $a = 55$, $b = 25$, $c = 72$ 23. $C = 43°$, $a = \frac{4}{9}$, $b = \frac{7}{9}$

Finding Measures in a Parallelogram In Exercises 25–30, complete the table by solving the parallelogram shown in the figure. (The lengths of the diagonals are given by c and d.)
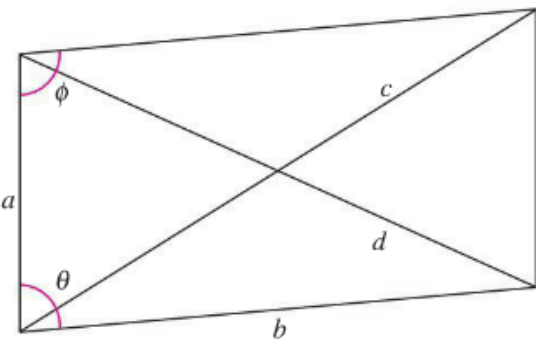

29. 15   ▮   25   20   ▮   ▮

Solving a Triangle In Exercises 31–36, determine whether the Law of Sines or the Law of Cosines is needed to solve the triangle. Then solve (if possible) the triangle. If two solutions exist, find both. Round your answers to two decimal places.

31. $a = 8$, $c = 5$, $B = 40°$

33. $A = 24°$, $a = 4$, $b = 18$

46. Navigation A plane flies 810 miles from Franklin to Centerville with a bearing of 75°. Then it flies 648 miles from Centerville to Rosemount with a bearing of 32°. Draw a figure that visually represents the situation. Then find the straight-line distance and bearing from Franklin to Rosemount.

58. Geometry A parking lot has the shape of a parallelogram (see figure). The lengths of two adjacent sides are 70 meters and 100 meters. The angle between the two sides is 70°. What is the area of the parking lot?

70 m

70°

100 m
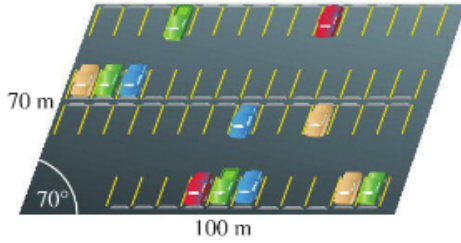
56. Engine Design

An engine has a seven-inch connecting rod fastened to a crank (see figure).

1.5 in.   7 in.

θ

x
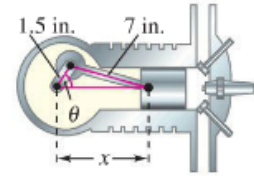
(a) Use the Law of Cosines to write an equation giving the relationship between x and θ.

(b) Write x as a function of θ. (Select the sign that yields positive values of x.)

(c) Use a graphing utility to graph the function in part (b).

(d) Use the graph in part (c) to determine the total distance the piston moves in one cycle.