**9.** In the 8-sided figure below, adjacent sides meet at right angles and the lengths given are in meters. What is the perimeter of the figure, in meters?

8

12

20
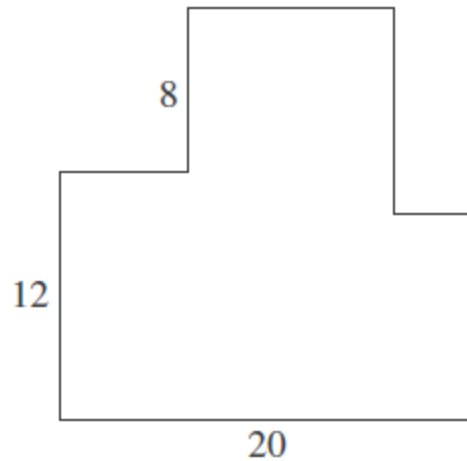
A. 40
B. 80
C. 120
D. 160
E. 400

14. What is the length, in feet, of the hypotenuse of a right triangle with legs that are 6 feet long and 7 feet long, respectively?

F. $\sqrt{13}$

G. $\sqrt{85}$

H. 13

J. 21

K. 42

15. Hexagon *ABCDEF* shown below was drawn on a grid with unit squares. Each vertex is at the intersection of 2 grid lines. What is the area of the hexagon, in square units?
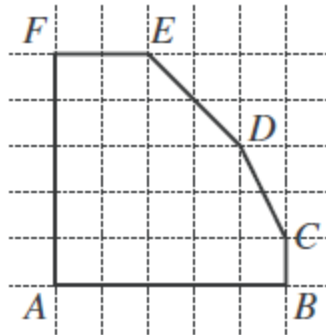
A. 18
B. 19
C. 20
D. 22
E. 25

16. In the figure below, $\overline{AD}$ is perpendicular to $\overline{BD}$, $\overline{AC}$ is perpendicular to $\overline{BC}$, and $\overline{AD} \cong \overline{BC}$. Which of the following congruences is NOT necessarily true?
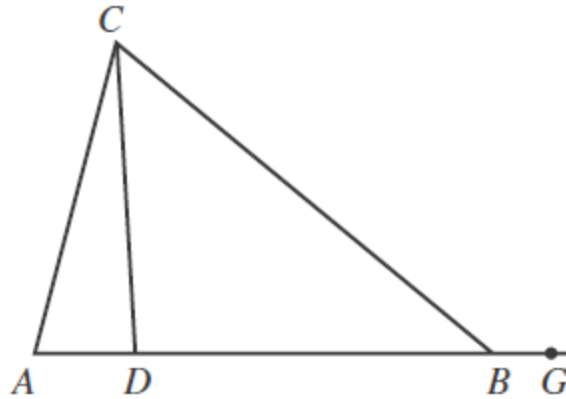
F. $\overline{AC} \cong \overline{BD}$

G. $\overline{AD} \cong \overline{AE}$

H. $\overline{AE} \cong \overline{BE}$

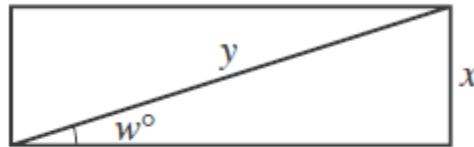J. $\angle DAB \cong \angle CBA$

K. $\angle EAB \cong \angle EBA$
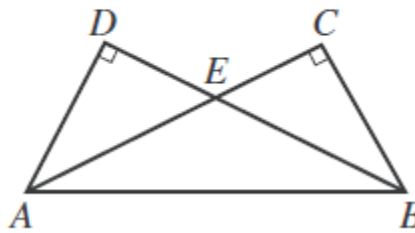
18. In the figure below, A, D, B, and G are collinear. If $\angle CAD$ measures $76°$, $\angle BCD$ measures $47°$, and $\angle CBG$ measures $140°$, what is the degree measure of $\angle ACD$?

F. $12°$
G. $14°$
H. $17°$
J. $36°$
K. $43°$

25. Which of the following trigonometric equations is valid for the side measurement x inches, diagonal measurement y inches, and angle measurement $w°$ in the rectangle shown below?
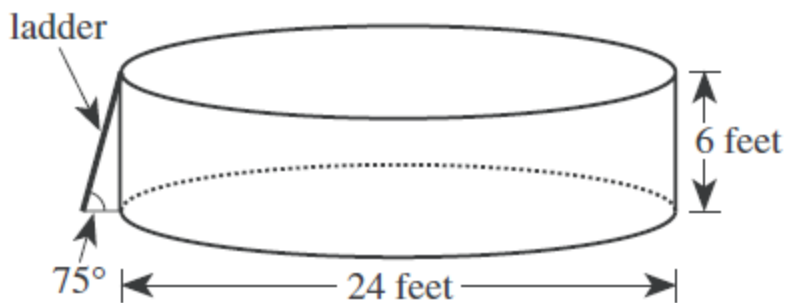

A. $\cos w° = \dfrac{x}{y}$

B. $\cot w° = \dfrac{x}{y}$

C. $\sec w° = \dfrac{x}{y}$

D. $\sin w° = \dfrac{x}{y}$

E. $\tan w° = \dfrac{x}{y}$

3

> Use the following information to answer questions 29–32.

The youth center has installed a swimming pool on level ground. The pool is a right circular cylinder with a diameter of 24 feet and a height of 6 feet. A diagram of the pool and its entry ladder is shown below.
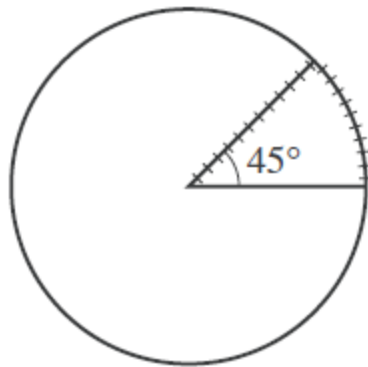
ladder

6 feet

75° |← —————— 24 feet ——————→|

29. To the nearest cubic foot, what is the volume of water that will be in the pool when it is filled with water to a depth of 5 feet?

(Note: The volume of a cylinder is given by $\pi r^2 h$, where r is the radius and h is the height.)

A.   942
B.   1,885
C.   2,262
D.   9,047
E.   11,310

30. A plastic cover is made for the pool. The cover will rest on the top of the pool and will include a wedge-shaped flap that forms a 45° angle at the center of the cover, as shown in the figure below. A zipper will go along 1 side of the wedge-shaped flap and around the arc. Which of the following is closest to the length, in feet, of the zipper?

45°

F. 17
G. 22
H. 24
J. 29
K. 57

32. The directions for assembling the pool state that the ladder should be placed at an angle of 75° relative to level ground. Which of the following expressions involving tangent gives the distance, in feet, that the bottom of the ladder should be placed away from the bottom edge of the pool in order to comply with the directions?
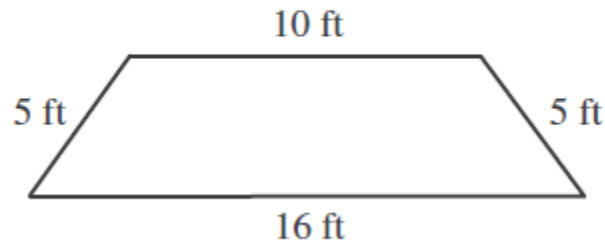
F. $\dfrac{6}{\tan 75°}$

G. $\dfrac{\tan 75°}{6}$

H. $\dfrac{1}{6 \tan 75°}$

J. $6 \tan 75°$

K. $\tan(6 \cdot 75°)$

35. The parallel sides of the isosceles trapezoid shown below are 10 feet long and 16 feet long, respectively. What is the distance, in feet, between these 2 sides?

A. 3
B. 4
C. 5
D. 10
E. 16

10 ft

5 ft   5 ft

16 ft

39. In the figure below, line l is parallel to line m. Transversals t and u intersect at point A on l and intersect m at points C and B, respectively. Point X is on m, the measure of $\angle ACX$ is 130°, and the measure of $\angle BAC$ is 80°. How many of the angles formed by rays of l, m, t, and u have measure 50° ?
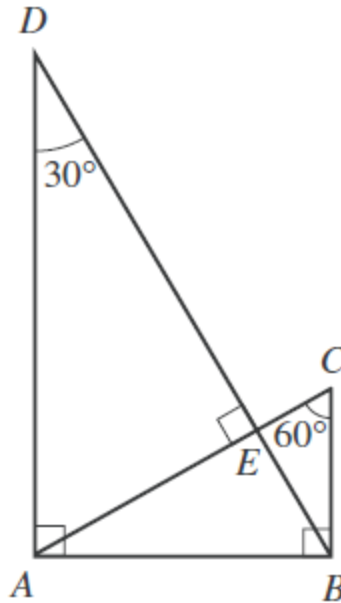

A.   4
B.   6
C.   8
D. 10
E. 12
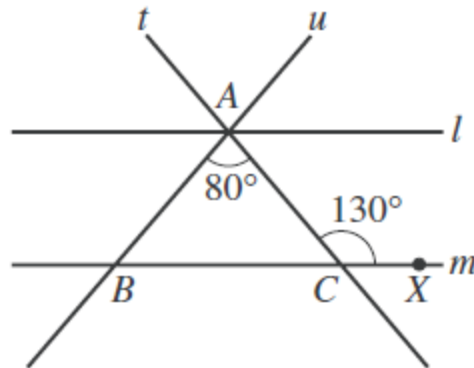
**44.** For the triangles in the figure below, which of the following ratios of side lengths is equivalent to the ratio of the perimeter of $\triangle ABC$ to the perimeter of $\triangle DAB$?

F. $AB{:}AD$
G. $AB{:}BD$
H. $AD{:}BD$
J. $BC{:}AD$
K. $BC{:}BD$

45. In the figure below, 2 nonadjacent sides of a regular pentagon (5 congruent sides and 5 congruent interior angles) are extended until they meet at point X. What is the measure of $\angle X$?

A. $18°$
B. $30°$
C. $36°$
D. $45°$
E. $72°$
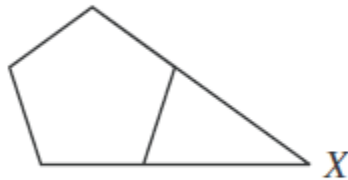
46. The edges of a cube are each 3 inches long. What is the surface area, in square inches, of this cube?

    F.   9
    G. 18
    H. 27
    J. 36
    K. 54

54. For a project in Home Economics class, Kirk is making a tablecloth for a circular table 3 feet in diameter. The finished tablecloth needs to hang down 5 inches over the edge of the table all the way around. To finish the edge of the tablecloth, Kirk will fold under and sew down 1 inch of the material all around the edge. Kirk is going to use a single piece of rectangular fabric that is 60 inches wide. What is the shortest length of fabric, in inches, Kirk could use to make the tablecloth without putting any separate pieces of fabric together?

    F. 15
    G. 24
    H. 30
    J. 42
    K. 48

55. The equations of the 2 graphs shown below are $y_1(t) = a_1 \sin(b_1 t)$ and $y_2(t) = a_2 \cos(b_2 t)$, where the constants b_1 and b_2 are both positive real numbers.
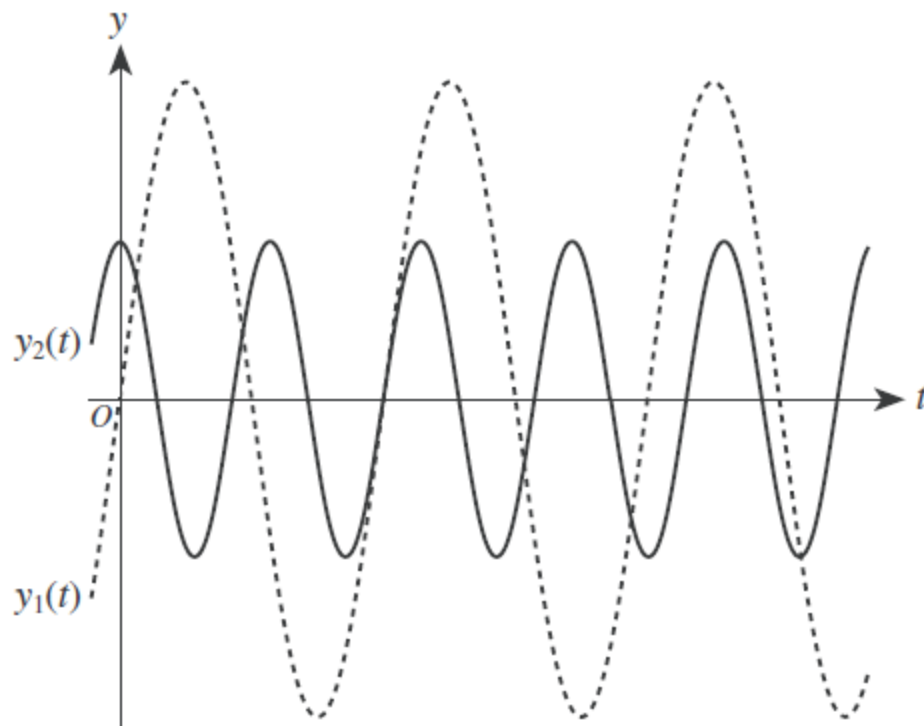
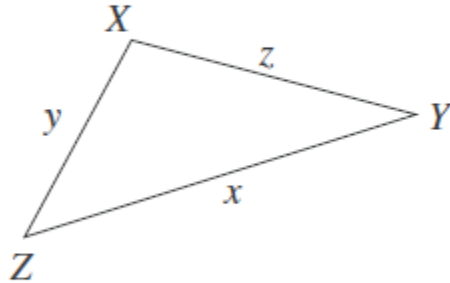Which of the following statements is true of the constants a_1 and a_2 ?

A. $0 < a_1 < a_2$

B. $0 < a_2 < a_1$

C. $a_1 < 0 < a_2$

D. $a_1 < a_2 < 0$

E. $a_2 < a_1 < 0$

56. For x such that $0 < x < \frac{\pi}{2}$, the expression

$$\frac{\sqrt{1-\cos^2 x}}{\sin x} + \frac{\sqrt{1-\sin^2 x}}{\cos x} \text{ is equivalent to:}$$

   F.   0
   G.   1
   H.   2
   J. $-\tan x$
   K. $\sin 2x$

58. The triangle, $\triangle XYZ$, that is shown below has side lengths of x, y, and z inches and is not a right triangle. Let X' be the image of X when the triangle is reflected across $\overline{YZ}$. Which of the following is an expression for the perimeter, in inches, of quadrilateral $X'YXZ$?

   F. $2(y + z) + x$
   G. $2(x + y + z)$
   H. $2(x + y)$
   J. $2(x + z)$
   K. $2(y + z)$