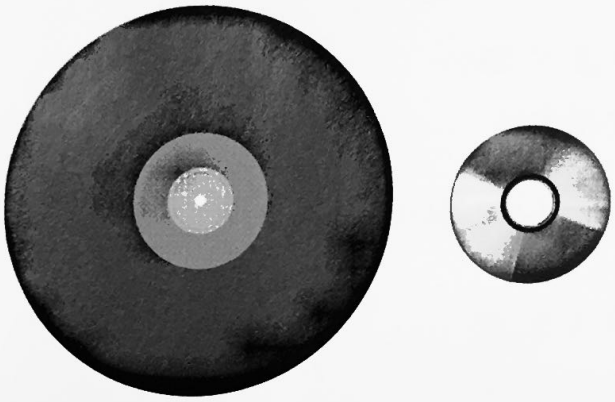
For Exercises 18–22, you may want to make scale drawings on grid paper to help find the missing measurements.

18. Derek's dinner plate has a diameter of about 9 inches. Find its circumference and area.

19. A bicycle wheel is about 26 inches in diameter. Find its radius, circumference, and area.

20. The spray from a lawn sprinkler makes a circle 40 feet in radius. What are the approximate diameter, circumference, and area of the circle of lawn watered?

21. An old-fashioned Long Play (LP) record (that people used for listening to music in the past) has a 12-inch diameter; a compact disc has a $4\frac{5}{8}$-inch diameter.



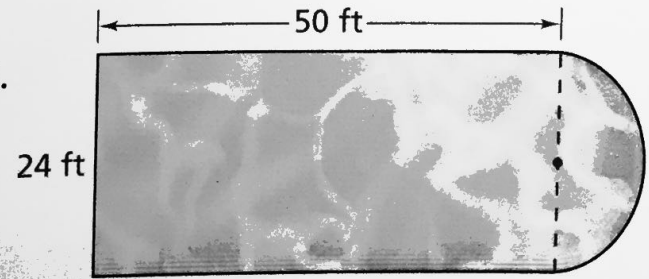
a. Find the radius, circumference, and area of each object. For the area, disregard the hole in the center of each object.

b. How many trips around the compact disc would equal one trip around the LP record?

c. How many compact discs (cut into pieces) would it take to cover the LP record? Disregard the hole in the center of each object.

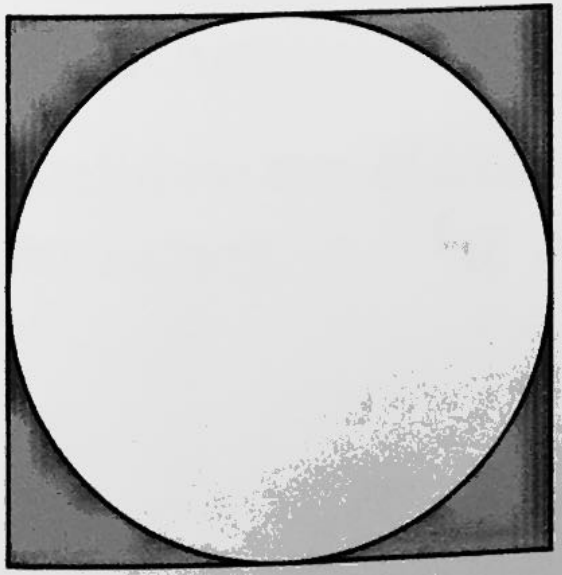
22. A rectangular lawn has a perimeter of 36 meters and a circular exercise run has a circumference of 36 meters. Which shape will give Rico's dog more area to run? Explain.

23. The swimming pool at the right is a rectangle with a semicircle at one end. What are the area and perimeter of the pool?

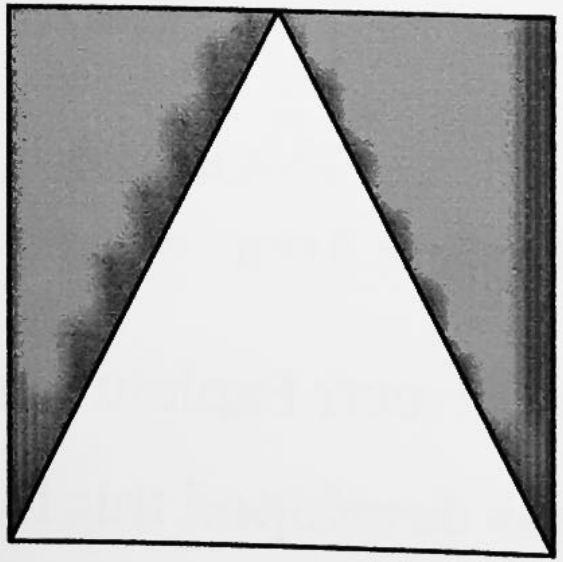


32. A group of students submitted these designs for a school flag. The side length of each flag is 6 feet. Each flag has two colors. How much of each color of material will be needed?

a.

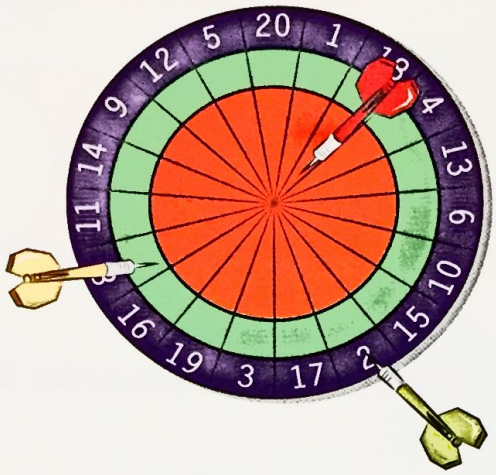


b.

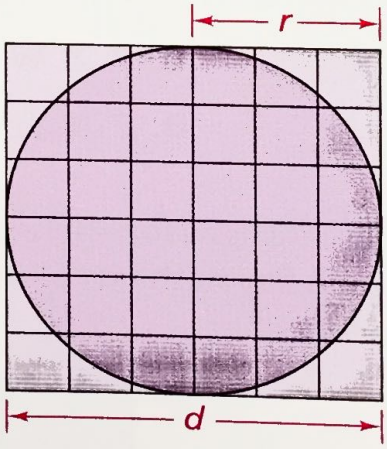


33. This circular dartboard has three circles with the same center. (These are called *concentric circles.*) The diameter of the largest circle is 20 inches. The diameters of the inner circles decrease by 4 inches as you move from the largest to the smallest. Each of the circular bands will be a different color with different points assigned to it.

Find the area of each band.



34. A circle is inscribed in a square with side length d units. Kaylee and Cassie were trying to find a formula for the area of a circle. They came up with two formulas for the area:



Kaylee: Area $\approx \frac{3}{4}d^2$ **Cassie:** Area $\approx 3r^2$

a. Who is correct? Explain why.

b. The class developed this formula for the area of a circle:

Area $= \pi r^2$

How do Kaylee and Cassie's formulas compare with the class formula?

c. If the diameter of a circle is 15 centimeters, what is its area?

d. If the area of a circle is 98 square inches, what is its radius?

48. The diameter of Earth is approximately 42,000,000 feet. If a 6-foot-tall man walked around Earth along the equator, how much farther would his head move than his feet?

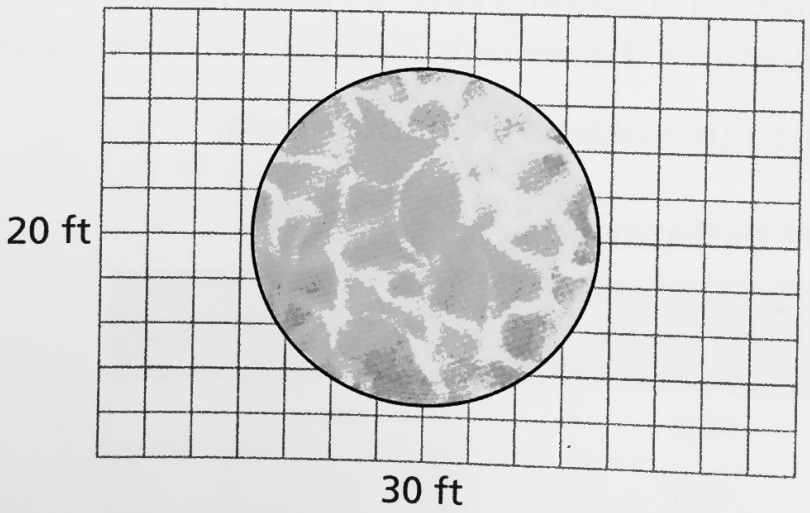
49. Suppose a piece of rope wraps around Earth. Then rope is added to make the entire rope 3 feet longer.

a. Suppose the new rope circles Earth exactly the same distance away from the surface at all points. How far is the new rope from Earth's surface?

b. A piece of rope is wrapped around a person's waist. Then rope is added to make it 3 inches longer. How far from the waist is the rope if the distance is the same all around?

c. Compare the results in parts (a) and (b).

50. The Nevins want to install a circular pool with a 15-foot diameter in their rectangular patio. The patio will be surrounded by new fencing, and the patio area surrounding the pool will be covered with new tiles.



a. How many feet of fencing are needed to enclose the patio?

b. How much plastic is needed to cover the pool if there is a 1-foot overhang?

c. How many feet of plastic tubing are needed to fit around the edge of the pool?

d. How many square feet of ground will be covered with tiles?