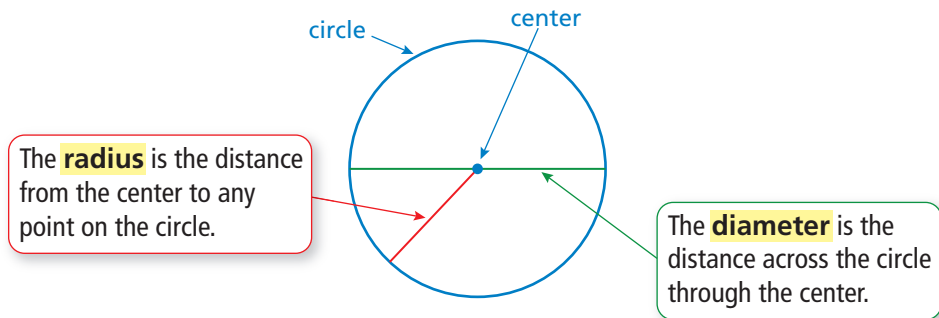A **circle** is the set of all points in a plane that are the same distance from a point called the **center**.

circle | center

The **radius** is the distance from the center to any point on the circle.

The **diameter** is the distance across the circle through the center.

Key Idea

Radius and Diameter

Words The diameter d of a circle is twice the radius r. The radius r of a circle is one-half the diameter d.

Algebra **Diameter:** $d = 2r$ **Radius:** $r = \dfrac{d}{2}$

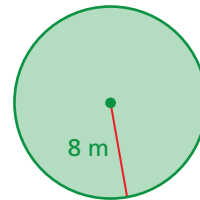## EXAMPLE 1 Finding a Radius and a Diameter

a. The diameter of a circle is 12 feet. Find the radius.

b. The radius of a circle is 8 meters. Find the diameter.

12 ft

8 m
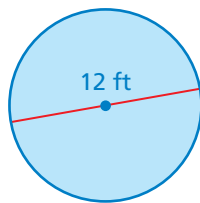
$r = \dfrac{d}{2}$ Radius of a circle

$= \dfrac{12}{2}$ Substitute 12 for d.

$= 6$ Divide.

The radius is 6 feet.

$d = 2r$ Diameter of a circle

$= 2(8)$ Substitute 8 for r.

$= 16$ Multiply.

The diameter is 16 meters.

Practice

1. **DIAMETER** The radius of a dartboard is 9 inches. Find the diameter.

2. **RADIUS** The diameter of a clock is 1 foot. Find the radius.

Multi-Language Glossary at BigIdeasMath com.

The distance around a circle is called the **circumference**. The ratio $\frac{\text{circumference}}{\text{diameter}}$ is the same for *every* circle and is represented by the Greek letter π, called **pi**. The value of π can be approximated as 3.14 or $\frac{22}{7}$.
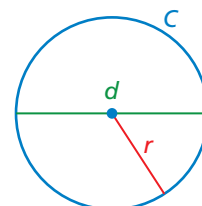
Key Ideas

Circumference of a Circle

Words The circumference C of a circle is equal to the product of π and the diameter d or the product of π and twice the radius r.

Algebra $C = \pi d$ or $C = 2\pi r$

Area of a Circle

Words The area A of a circle is the product of π and the square of the radius r.

Algebra $A = \pi r^2$

EXAMPLE 2 Finding the Circumference and Area of a Circle

Find (a) the circumference and (b) the area of the sticker. Use 3.14 for π.

3 cm

a. $C = 2\pi r$

$\approx 2 \cdot 3.14 \cdot 3$ Substitute.

$= 6.28 \cdot 3$ Simplify.

$= 18.84$ Simplify.

⋮ The circumference is about 18.84 centimeters.
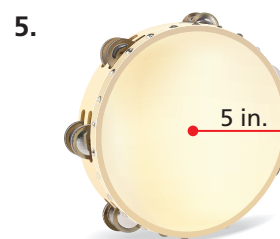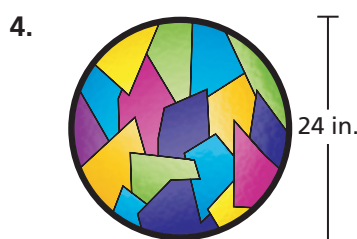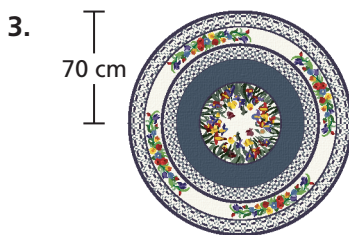
b. $A = \pi r^2$

$\approx 3.14 \cdot (3)^2$

$= 3.14 \cdot 9$

$= 28.26$

⋮ The area is about 28.26 square centimeters.

Practice

Find the circumference and area of the object. Use 3.14 or $\frac{22}{7}$ for π.

3.

70 cm

4.

24 in.

5.

5 in.

6. TIRE The diameter of a bicycle tire is 26 inches.

   a. Find the circumference of the tire. Use 3.14 for π.

   b. How many rotations does the tire make to travel 95 feet? Explain your reasoning.