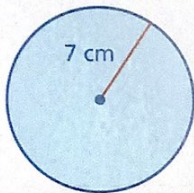## 8.4 Lesson

Key Idea

Area of a Circle

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

Algebra $A = \pi r^2$

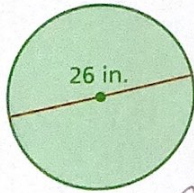### Example 1 Finding Areas of Circles

a. Find the area of the circle.

7 cm

$A = \pi r^2$ Write formula for area.

$= \pi \cdot 7^2$ Substitute 7 for r.

$= 49\pi$ Simplify.

▶ The area is $49\pi \approx 49 \cdot \dfrac{22}{7} = 154$ square centimeters.

Estimate

$3 \times 7^2 \approx 3 \times 50$

$= 150$

Reasonable?

$154 \approx 150$ ✓

b. Find the area of the circle.

The radius is $26 \div 2 = 13$ inches.

26 in.

$A = \pi r^2$ Write formula for area.

$= \pi \cdot 13^2$ Substitute 13 for r.

$= 169\pi$ Simplify.

▶ The area is $169\pi \approx 169 \cdot 3.14 = 530.66$ square inches.

Estimate

$3 \times 13^2 \approx 3 \times 170$

$= 510$

Reasonable?

$530.66 \approx 510$ ✓

[handwritten: r=13, $13^2 = 169 \cdot 3.14$]

Try It

1. Find the area of a circle with a radius of 6 feet.

   [handwritten: $6^2 = 36 \cdot 3.14 = 113.04 \, ft^2$]

2. Find the area of a circle with a diameter of 28 meters.

   [handwritten: r = 14, $14^2 = 196 \cdot 3.14 = 615.44 \, m^2$]

GO DIGITAL

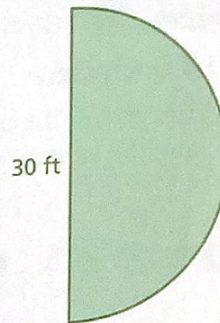# Example 2 Finding the Area of a Semicircle

Find the area of the semicircle.

The area of the semicircle is one-half the area of a circle with a diameter of 30 feet. The radius of the circle is $30 \div 2 = 15$ feet.

$$\frac{A}{2} = \frac{\pi r^2}{2} \qquad \text{Divide the area by 2.}$$

$$= \frac{\pi \cdot 15^2}{2} \qquad \text{Substitute 15 for } r.$$

$$= \frac{225\pi}{2} \qquad \text{Simplify.}$$
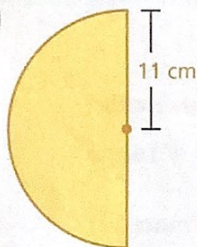
30 ft

▶ The area of the semicircle is $\dfrac{225\pi}{2} \approx \dfrac{225 \cdot 3.14}{2} = 353.25$ square feet.

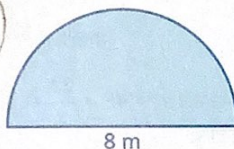**Try It** **Find the area of the semicircle.**

3.

11 cm

$11^2 = 121 \cdot 3.14$

$= 379.94 \div 2$

$= 189.97 \text{cm}^2$

4.

8 m

$r = 4$

$4^2 = 16 \cdot 3.14$

$50.24 \div 2$

$= 25.12 \text{ m}^2$

5.

5 yd

3 MTR ADAPT A PROCEDURE

How can you find the area of one-fourth of a circle? three-fourths of a circle?
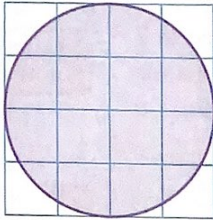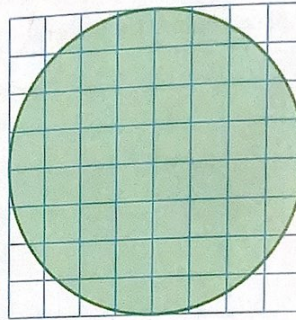
GO DIGITAL

Concepts, Skills, & Problem Solving

ESTIMATING AN AREA Use the grid to estimate the area of the circle. (See Exploration 1.)
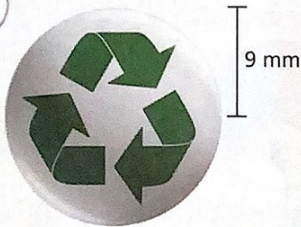
5. diameter of 3 centimeters

6. diameter of 1.6 inches

FINDING AN AREA Find the area of the circle. (See Example 1.)

▶7.
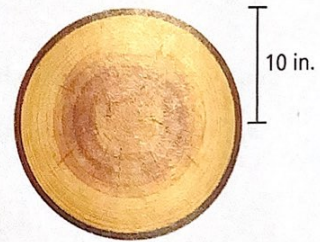

9 mm

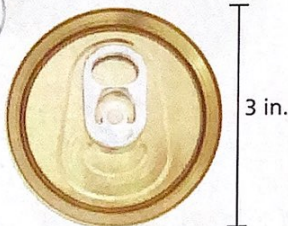$9^2 = 81 \cdot 3.14$
$= 254.34 \text{mm}^2$

8.

14 cm

$14^2 = 196$
$196 \cdot 3.14$
$= 615.44 \text{cm}^2$

9.

10 in.

10.

3 in.
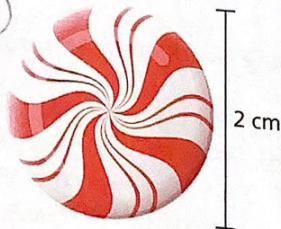
$r = 1.5$
$1.5^2 = 2.25 \cdot 3.14$
7.065in^2

11.

2 cm

$r = 1$
$1^2 \cdot 3.14$
3.14cm^2

12.

1.5 ft

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