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Practice with Examples

For use with pages 759–765

GOAL **Find the surface area of a sphere and find the volume of a sphere**

VOCABULARY

A **sphere** is the locus of points in space that are a given distance from a point called the **center of the sphere**.

A **radius of a sphere** is a segment from the center to a point on the sphere.

A **chord of a sphere** is a segment whose endpoints are on the sphere.

A **diameter of a sphere** is a chord that contains the center.

If a plane that intersects a sphere contains the center of the sphere, the intersection is a **great circle** of the sphere.

A great circle of a sphere separates the sphere into two congruent halves called **hemispheres**.

Theorem 12.11 Surface Area of a Sphere   The surface area S of a sphere with radius r is $S = 4\pi r^2$.
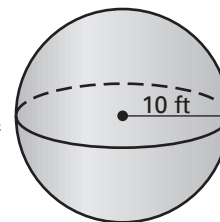
Theorem 12.12 Volume of a Sphere   The volume V of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.

EXAMPLE 1 *Finding the Surface Area of a Sphere*

Find the surface area of the sphere.

SOLUTION

$$S = 4\pi r^2 \qquad \text{Formula for surface area of sphere}$$
$$= 4\pi(10)^2 \qquad \text{Substitute.}$$
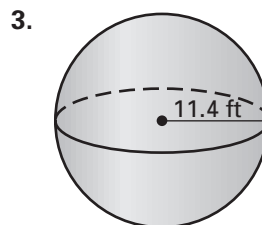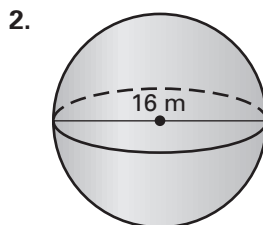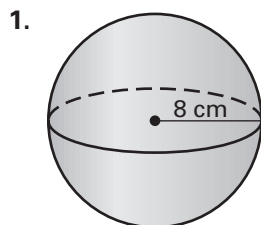$$= 400\pi \qquad \text{Simplify.}$$

So, the surface area of the sphere is 400π square feet, or about 1256.6 square feet.

10 ft

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Exercises for Example 1

Find the surface area of the sphere.

1.

8 cm

2.

16 m

3.

11.4 ft

EXAMPLE 2 *Using a Great Circle*

The circumference of a great circle of a sphere
is 25 inches. Find the surface area of the sphere.

25 in.

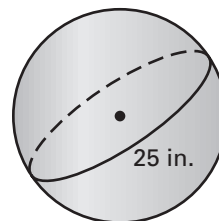### SOLUTION

Begin by finding the radius of the sphere.

$C = 2\pi r$ — Formula for circumference of a circle

$25 = 2\pi r$ — Substitute.

$4 \approx r$ — Divide each side by 2π.
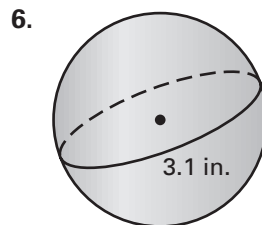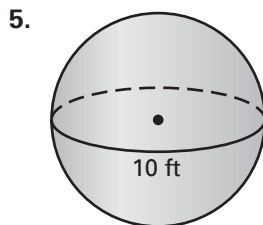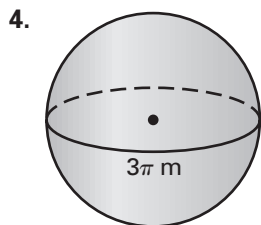
Using a radius of 4 cm, the surface area is $S = 4\pi r^2 = 4\pi(4)^2 = 64\pi$ in.^{2}

So, the surface area of the sphere is 64π in.^{2}, or about 201.1 in.^{2}

Exercises for Example 2

Find the surface area of the sphere.

4.

3π m

5.

10 ft

6.

3.1 in.

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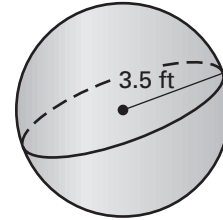
EXAMPLE 3 *Finding the Volume of a Sphere*

Find the volume of the sphere.

SOLUTION

$$V = \frac{4}{3}\pi r^3 \qquad \text{Formula for volume of sphere}$$

$$= \frac{4}{3}\pi (3.5)^3 \qquad \text{Substitute.}$$
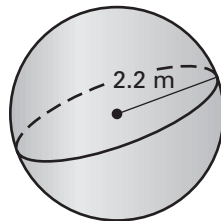
$$\approx 179.6 \qquad \text{Simplify.}$$

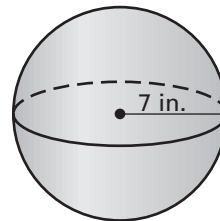So, the volume of the sphere is about 179.6 cubic feet.

3.5 ft

Exercises for Example 3

Find the volume of the sphere.

7.

2.2 m

8.

7 in.

9.

12 cm