

Reteaching with Practice

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 $S = 4\pi r^2$.

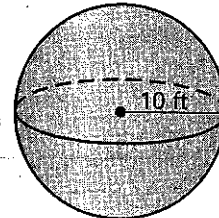
Theorem 12.12 Volume of a Sphere The volume V of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.

EXAMPLE 1**Finding the Surface Area of a Sphere**

Find the surface area of the sphere.

SOLUTION

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

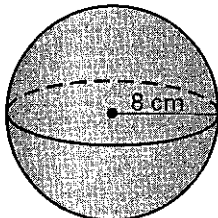


So, the surface area of the sphere is 400π square feet, or about 1256.6 square feet.

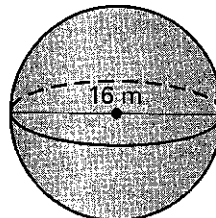
Exercises for Example 1

Find the surface area of the sphere.

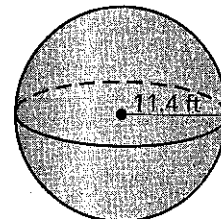
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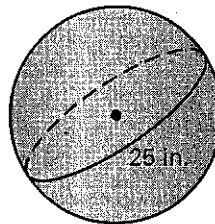


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EXAMPLE 2 Using a Great Circle

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



SOLUTION

Begin by finding the radius of the sphere.

$$C = 2\pi r \quad \text{Formula for circumference of a circle}$$

$$25 = 2\pi r \quad \text{Substitute.}$$

$$4 \approx r \quad \text{Divide each side by } 2\pi.$$

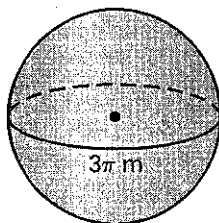
Using a radius of 4 cm, the surface area is $S = 4\pi r^2 = 4\pi(4)^2 = 64\pi \text{ in.}^2$

So, the surface area of the sphere is $64\pi \text{ in.}^2$, or about 201.1 in.^2

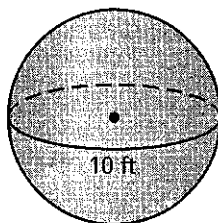
Exercises for Example 2

Find the surface area of the sphere.

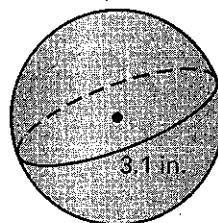
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EXAMPLE 3 Finding the Volume of a Sphere

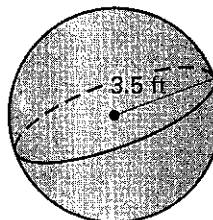
Find the volume of the sphere.

SOLUTION

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

$$= \frac{4}{3}\pi(3.5)^3 \quad \text{Substitute.}$$

$$\approx 179.6 \quad \text{Simplify.}$$

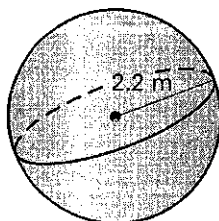


So, the volume of the sphere is about 179.6 cubic feet.

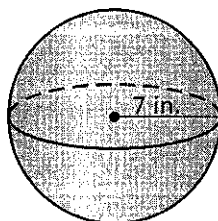
Exercises for Example 3

Find the volume of the sphere.

7.



8.



9.

