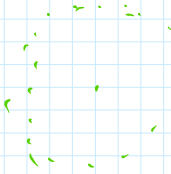# What You Will Learn

▶ Find surface areas of spheres.
▶ Find volumes of spheres.

If a plane intersects a sphere, then the intersection is either a single point or a circle. If the plane contains the center of the sphere, then the intersection is a **great circle** of the sphere. The circumference of a great circle is the circumference of the sphere. Every great circle of a sphere separates the sphere into two congruent halves called *hemispheres*.
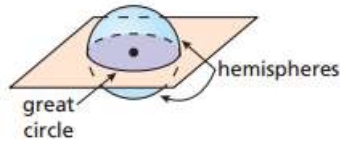
G.C - a cross-section of a sphere that contains
the center of the sphere.
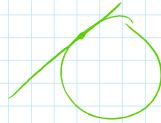
Surface Area of a Sphere

The surface area S of a sphere is

$$S = 4\pi r^2$$

where r is the radius of the sphere.

$S = 4\pi r^2$

Surface area of a sphere = 4 × Area of a great
circle of the sphere.

To understand the formula for the surface area of a sphere, think of a baseball. The surface area of a baseball is sewn from two congruent shapes, each of which resembles two joined circles.

So, the entire covering of the baseball consists of four circles, each with radius r. The area A of a circle with radius r is $A = \pi r^2$. So, the area of the covering can be approximated by $4\pi r^2$. This is the formula for the surface area of a sphere.

leather covering

Find the surface area of each sphere.

b.

$C = 15\pi$ m

7.5
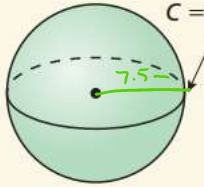
$S = 4\pi r^2$

$4\pi (7.5m)^2$

$4\pi\, 56.25m^2$

$$S = 225\pi m^2$$
$$S \approx 706.9 m^2$$

$C = 2\pi r$

$\dfrac{15\pi m}{2\pi} = \dfrac{2\pi r}{2\pi}$

$7.5\, m = r$

Find the diameter of the sphere.
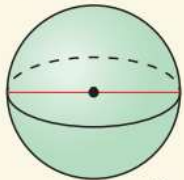
$S = 144\pi$ cm²

$S = 4\pi r^2$

$\dfrac{144\pi cm^2}{4\pi} = \dfrac{4\pi r^2}{4\pi}$

$\sqrt{36 cm^2} = \sqrt{r^2}$

$6\, cm = r$

$$\boxed{Diameter = 12\, cm}$$

Volume of a Sphere

The volume V of a sphere is

$$V = \frac{4}{3}\pi r^3$$

where r is the radius of the sphere.

$V = \frac{4}{3}\pi r^3$

The surface area of a sphere is 676π square inches. Find the volume of the sphere.

$S = 4\pi r^2$

$\dfrac{676\pi in^2}{4\pi} = \dfrac{4\pi r^2}{4\pi}$

$\sqrt{169 in^2} = \sqrt{r^2}$

$V = \frac{4}{3}\pi r^3$

$\frac{4}{3}\pi (13in)^3$

$\frac{4}{3}(2197 in^3)\pi$

$$\boxed{V = 2929.3\pi\, in^3}$$

≈ 9202 in³

$$V = 2929.3\pi \, in^3$$

$$V \approx 9202.8 \, in^3$$

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10 in.   **12 in.**
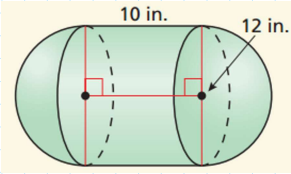
How would you find the volume of this solid?

Write down the formulas you'd need to find the volume of this solid.

Divide the solid into sections that I can find the volume of then add those sections' volumes together

$V = Bh + \frac{4}{3}\pi r^3$
   cylinder   sphere

$r = 6 in$

$h = 10 in$

$B = \pi r^2$

Practice *sec 11.8* **pg. 652:**

1-3A, 5-19EO