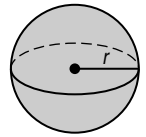


13-3 Study Guide and Intervention

Volumes of Spheres

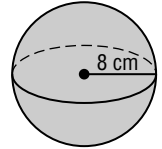
Volumes of Spheres A sphere has one basic measurement, the length of its radius. If you know the radius of a sphere, you can calculate its volume.



Volume of a Sphere	If a sphere has a volume of V cubic units and a radius of r units, then $V = \frac{4}{3}\pi r^3$.
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Example 1 Find the volume of a sphere with radius 8 centimeters.

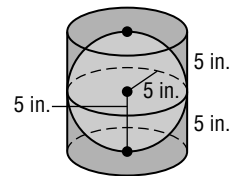
$$\begin{aligned} V &= \frac{4}{3}\pi r^3 && \text{Volume of a sphere} \\ &= \frac{4}{3}\pi(8)^3 && r = 8 \\ &\approx 2144.7 && \text{Simplify.} \end{aligned}$$



The volume is about 2144.7 cubic centimeters.

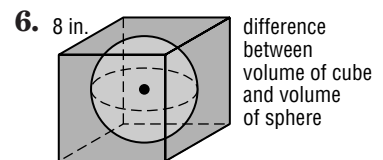
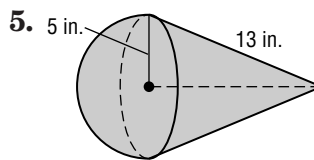
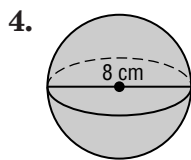
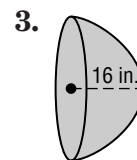
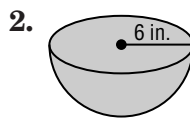
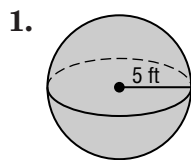
Example 2 A sphere with radius 5 inches just fits inside a cylinder. What is the difference between the volume of the cylinder and the volume of the sphere? Round to the nearest cubic inch.

The base of the cylinder is $25\pi \text{ in}^2$ and the height is 10 in., so the volume of the cylinder is $250\pi \text{ in}^3$. The volume of the sphere is $\frac{4}{3}\pi(5)^3$ or $\frac{500\pi}{3} \text{ in}^3$. The difference in the volumes is $250\pi - \frac{500\pi}{3}$ or about 262 in^3 .



Exercises

Find the volume of each solid. Round to the nearest tenth.



7. A hemisphere with radius 16 centimeters just fits inside a rectangular prism. What is the difference between the volume of the prism and the volume of the hemisphere? Round to the nearest cubic centimeter.

13-3 Study Guide and Intervention *(continued)*

Volumes of Spheres

Solve Problems Involving Volumes of Spheres If you want to know if a sphere can be packed inside another container, or if you want to compare the capacity of a sphere and another shape, you can compare volumes.

Example

Compare the volumes of the sphere and the cylinder. Determine which quantity is greater.

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

Volume of sphere

$$V = \pi r^2 h$$

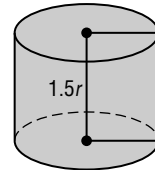
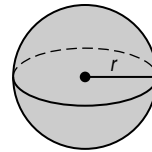
Volume of cylinder

$$= \pi r^2(1.5r)$$

$$h = 1.5r$$

$$= 1.5\pi r^3$$

Simplify.



Compare $\frac{4}{3}\pi r^3$ with $1.5\pi r^3$. Since $\frac{4}{3}$ is less than 1.5, it follows that the volume of the sphere is less than the volume of the cylinder.

Exercises

Compare the volume of a sphere with radius r to the volume of each figure below. Which figure has a greater volume?

