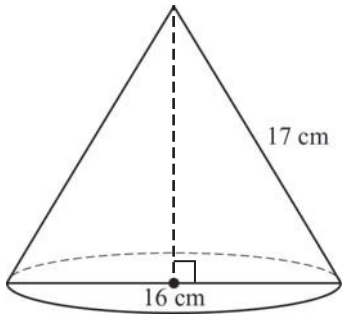
REVIEW EXAMPLES

1. What is the volume of the cone shown below?



Solution:

The diameter of the cone is 16 cm. So the radius is 16 cm ÷ 2 = 8 cm. Use the Pythagorean theorem, $a^2 + b^2 = c^2$, to find the height of the cone. Substitute 8 for b and 17 for c and solve for a:

$$a^2 + 8^2 = 17^2$$
$$a^2 + 64 = 289$$
$$a^2 = 225$$
$$a = 15$$

The formula for the volume of a cone is $V = \frac{1}{3}\pi r^2 h$. Substitute 8 for r and 15 for h:

$$V = \frac{1}{3}\pi r^2 h = \frac{1}{3}\pi (8)^2 (15)$$

The volume is 320π cm^3.

2. A sphere has a radius of 3 feet. What is the volume of the sphere?

Solution:

The formula for the volume of a sphere is $V = \frac{4}{3}\pi r^3$. Substitute 3 for r and solve.

$$V = \frac{4}{3}\pi r^3$$
$$V = \frac{4}{3}\pi (3)^3$$
$$V = \frac{4}{3}\pi (27)$$
$$V = 36\pi \text{ ft}^3$$

3. A cylinder has a radius of 10 cm and a height of 9 cm. A cone has a radius of 10 cm and a height of 9 cm. Show that the volume of the cylinder is three times the volume of the cone.

Solution:

The formula for the volume of a cylinder is $V = \pi r^2 h$. Substitute 10 for r and 9 for h:

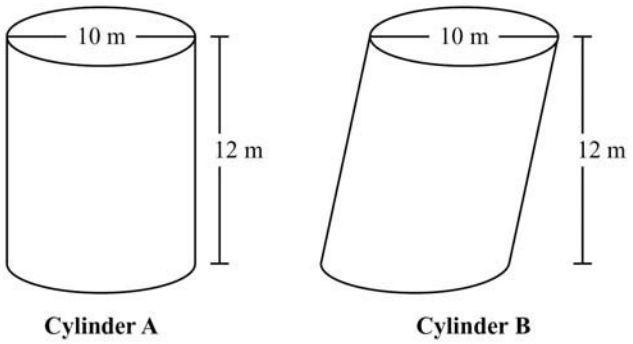
$$\begin{aligned} V &= \pi r^2 h \\ &= \pi(10)^2(9) \\ &= \pi(100)(9) \\ &= 900\pi \text{ cm}^3 \end{aligned}$$

The formula for the volume of a cone is $V = \frac{1}{3}\pi r^2 h$. Substitute 10 for r and 9 for h:

$$\begin{aligned} V &= \frac{1}{3}\pi r^2 h \\ &= \frac{1}{3}\pi(10)^2(9) \\ &= \frac{1}{3}\pi(100)(9) \\ &= 300\pi \text{ cm}^3 \end{aligned}$$

Divide: $900\pi \div 300\pi = 3$

4. Cylinder A and Cylinder B are shown below. What is the volume of each cylinder?



Solution:

To find the volume of Cylinder A, use the formula for the volume of a cylinder, which is $V = \pi r^2 h$. Divide the diameter by 2 to find the radius: $10 \div 2 = 5$. Substitute 5 for r and 12 for h:

$$\begin{aligned} V_{\text{Cylinder A}} &= \pi r^2 h \\ &= \pi (5)^2 (12) \\ &= \pi (25)(12) \\ &= 300\pi \text{ m}^3 \\ &\approx 942 \text{ m}^3 \end{aligned}$$

Notice that Cylinder B has the same height and the same radius as Cylinder A. The only difference is that Cylinder B is slanted. For both cylinders, the cross section at every plane parallel to the bases is a circle with the same area. By Cavalieri's principle, the cylinders have the same volume; therefore, the volume of Cylinder B is 300π m^3, or about 942 m^3.