

Surface Area and Volume



A **solid** is a three-dimensional figure that encloses part of space. The **surface area** S of a solid is the sum of the areas of all of its surfaces. The **volume** V of a solid is the amount of space that the solid occupies. In the formulas for surface area and volume, the number π (pi) is approximately equal to 3.14 or $\frac{22}{7}$.

Right Rectangular Prism

$$S = 2B + Ph$$

$$= 2lw + 2hw + 2lh$$

$$V = Bh$$

$$= lwh$$

Right Circular Cylinder

$$S = 2B + Ch$$

$$= 2\pi r^2 + 2\pi rh$$

$$V = Bh$$

$$= \pi r^2 h$$

Regular Pyramid

$$S = B + \frac{1}{2}Pl$$

$$V = \frac{1}{3}Bh$$

Right Circular Cone

$$S = B + Cl$$

$$= \pi r^2 + \pi rl$$

$$V = \frac{1}{3}Bh$$

$$= \frac{1}{3}\pi r^2 h$$

Sphere

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

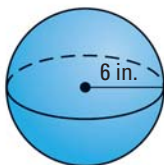
$$V = \frac{4}{3}\pi r^3$$

In this book, the adjectives *right* and *circular* will be assumed and therefore will not be used in naming solids.

EXAMPLE

Find the surface area of the solid.

a. Sphere



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

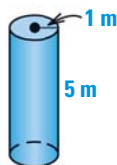
$$= 4\pi(6^2)$$

$$= 144\pi \text{ in.}^2$$

$$\approx 144(3.14)$$

$$\approx 452.2 \text{ in.}^2$$

b. Cylinder



$$S = 2\pi r^2 + 2\pi rh$$

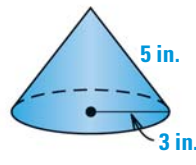
$$= 2\pi(1^2) + 2\pi(1)(5)$$

$$= 2\pi + 10\pi$$

$$= 12\pi \text{ m}^2$$

$$\approx 12(3.14) \approx 37.7 \text{ m}^2$$

c. Cone



$$S = \pi r^2 + \pi rl$$

$$= \pi(3^2) + \pi(3)(5)$$

$$= 9\pi + 15\pi$$

$$= 24\pi \text{ in.}^2$$

$$\approx 24(3.14) \approx 75.4 \text{ in.}^2$$