

Lesson 11-2

Example 1 Volume of a Rectangular Prism

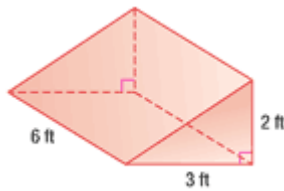
Find the volume of a rectangular prism having length 12 inches, width 5 inches, and height 3 inches.

$$\begin{aligned}V &= Bh && \text{Formula for volume of a prism} \\V &= (\ell \cdot w)h && \text{The base is a rectangle, so } B = \ell \cdot w. \\V &= (12 \cdot 5)3 && \ell = 12, w = 5, h = 3 \\V &= 180 && \text{Simplify.}\end{aligned}$$

The volume is 180 cubic inches.

Example 2 Volume of a Triangular Prism

Find the volume of the triangular prism shown below.



$$\begin{aligned}V &= Bh \\V &= \left(\frac{1}{2} \cdot 3 \cdot 2\right)h \\V &= \left(\frac{1}{2} \cdot 3 \cdot 2\right)(6) \\V &= 18\end{aligned}$$

Formula for volume of a prism
 $B = \text{area of base or } \frac{1}{2} \cdot 3 \cdot 2$

The height of the prism is 6 ft.

Simplify.

The volume is 18 cubic feet.

Example 3 Height of a Prism

A rectangular prism has length 12 meters, width 7.5 meters and a volume of 405 cubic meters. Find its height.

$$\begin{aligned}V &= Bh && \text{Formula for volume of a prism} \\V &= \ell \cdot w \cdot h && \text{Formula for volume of a rectangular prism.} \\405 &= 12 \cdot 7.5 \cdot h && \text{Replace } V \text{ with } 405, \ell \text{ with } 12 \text{ and } w \text{ with } 7.5. \\405 &= 90h && \text{Simplify.} \\4.5 &= h && \text{Divide each side by } 90.\end{aligned}$$

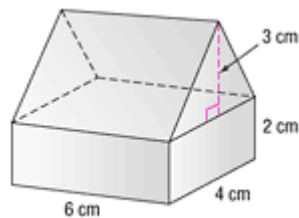
The height of the prism is 4.5 meters.

Example 4 Volume of a Complex Solid**Multiple-Choice Test Item**

Find the volume of the solid at the right.

- A. 84 cm^3
 C. 36 cm^3

- B. 106 cm^3
 D. 148 cm^3

**Read the Test Item**

The solid is made up of a rectangular prism and a triangular prism. The *volume of the solid* is the sum of both volumes.

Solve the Test Item

Step 1 The volume of the rectangular prism is $6(4)(2)$ or 48 cubic cm.

Step 2 In the triangular prism, the area of the base is $\frac{1}{2}(4)(3)$, and the height is 6.

Therefore, the volume is $\frac{1}{2}(4)(3)(6)$ or 36 cubic cm.

Step 3 Add the volumes.

$$48 \text{ cubic cm} + 36 \text{ cubic cm} = 84 \text{ cubic cm}$$

The answer is A.

Example 5 Volume of a Cylinder

Find the volume of a each cylinder. Round to the nearest tenth.

a. radius of base 8 in. and height 20 in.

$$V = \pi r^2 h \quad \text{Formula for volume of a cylinder}$$

$$V = \pi \cdot 8^2 \cdot 20 \quad \text{Replace } r \text{ with 8 and } h \text{ with 20.}$$

$$V \approx 4021.2 \quad \text{Simplify.}$$

The volume is about 4021.1 cubic inches.

b. diameter of base 12.4 cm and height 13.3 cm.

Since the diameter is 12.4 cm, the radius is 6.2 cm.

$$V = \pi r^2 h \quad \text{Formula for volume of a cylinder}$$

$$V = \pi \cdot (6.2)^2 \cdot 13.3 \quad \text{Replace } r \text{ with 6.2 and } h \text{ with 13.3.}$$

$$V \approx 1606.1 \quad \text{Simplify.}$$

The volume is about 1606.1 cubic centimeters.