Learn to find the volume of prisms and cylinders.

Vocabulary
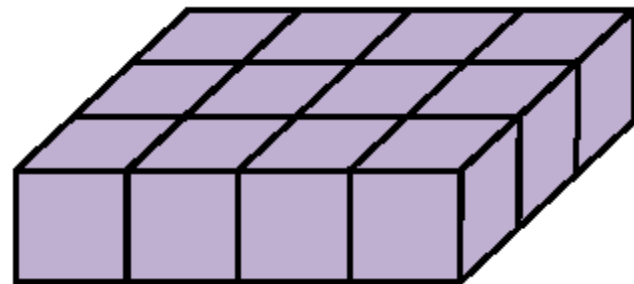
volume

Any solid figure can be filled completely with congruent cubes and parts of cubes. The **volume** of a solid is the number of cubes it can hold. Each cube represents a unit of measure called a cubic unit.

Additional Example 1: Using Cubes to Find the Volume of a Rectangular Prism

Find how many cubes the prism holds. Then give the prism's volume.

You can find the volume of this prism by counting how many cubes tall, long, and wide the prism is and then multiplying.

1 · 4 · 3 = 12

There are 12 cubes in the prism, so the volume is 12 cubic units.

Try This: Example 1

Find how many cubes the prism holds. Then give the prism's volume.

You can find the volume of this prism by counting how many cubes tall, long, and wide the prism is and then multiplying.
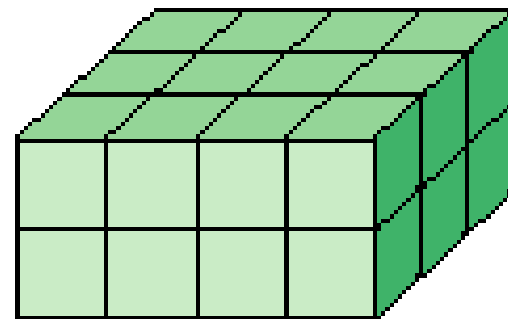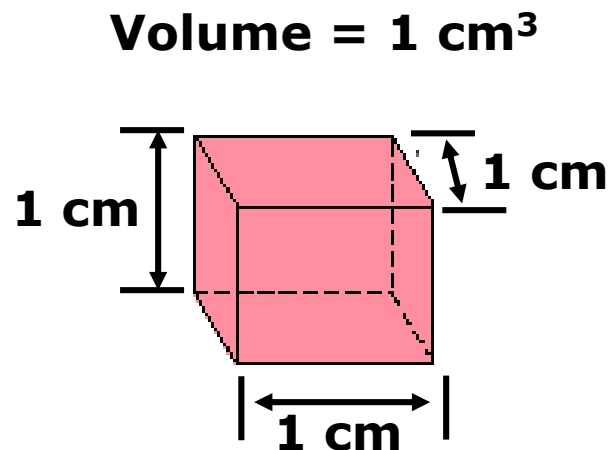

2 · 4 · 3 = 24

There are 24 cubes in the prism, so the volume is 24 cubic units.

A cube that measures one centimeter on each side represents one cubic centimeter of volume. Suppose the cubes in the prism in Additional Example 1 measure one centimeter on each side. The volume of the prism would be 12 cm³.
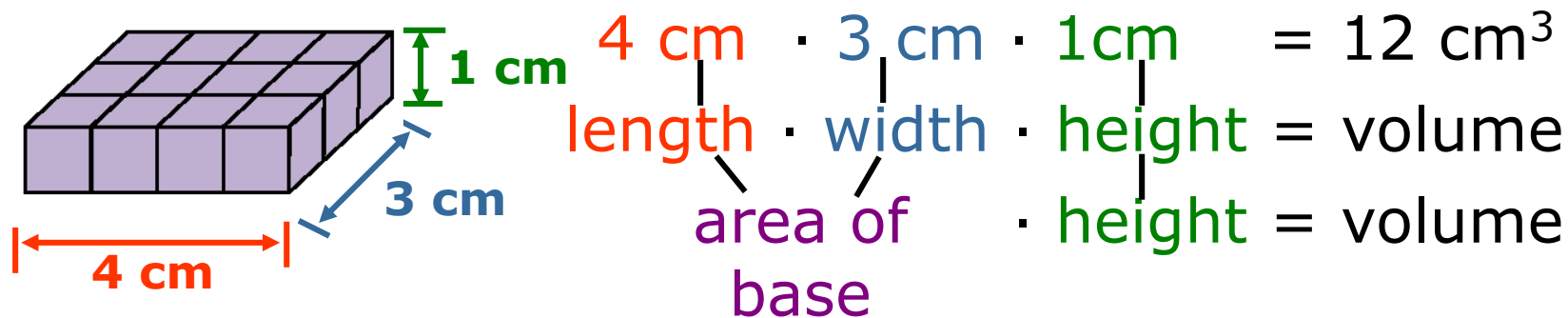
Volume = 1 cm³

1 cm

1 cm

1 cm

This volume is found by multiplying the prism's length times its width times its height.

Reading Math

Any unit of measurement with an exponent of 3 is a cubic unit. For example, cm³ means "cubic centimeter" and in³ means "cubic inch."

$4 \text{ cm} \cdot 3 \text{ cm} \cdot 1 \text{cm} = 12 \text{ cm}^3$

length · width · height = volume

area of base · height = volume

Notice that for the rectangular prism, the volume is found by multiplying the area of its base times its height. This method can be used for finding the volume of any prism.
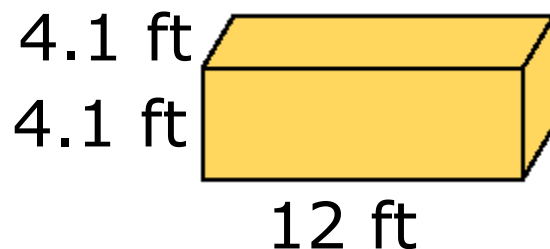
VOLUME OF A PRISM
The volume V of a prism is the area of its base B times its height h. $$V = Bh$$

Additional Example 2: Using a Formula to Find the Volume of a Prism

Find the volume of the prism to the nearest tenth.

4.1 ft
4.1 ft
12 ft

$V = Bh$ *Use the formula.*

The bases are rectangles.

The area of each rectangular base is $12 \cdot 4.1 = 49.2$

$V = 49.2 \cdot 4.1$ *Substitute for B and h.*

$V = 201.72$ *Multiply.*

The volume to the nearest tenth is 201.7 ft³.

Try This: Example 2

Find the volume of the prism to the nearest tenth.

6.3 ft
6.3 ft

8 ft
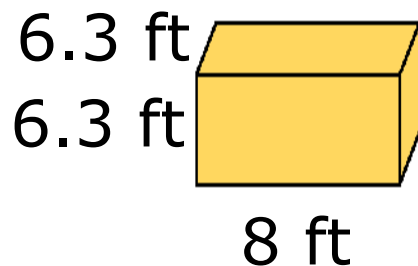
$V = Bh$ *Use the formula.*

The bases are rectangles.

The area of each rectangular base is 8 · 6.3 = 50.4

$V = 50.4 · 6.3$ *Substitute for B and h.*

$V = 317.52$ *Multiply.*

The volume to the nearest tenth is 317.5 ft³.

Finding the volume of a cylinder is similar to finding the volume of a prism.
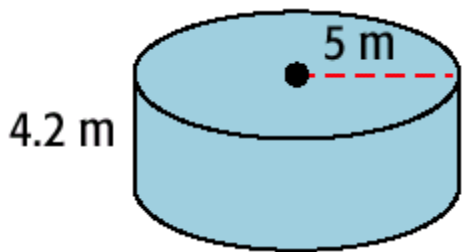
VOLUME OF A CYLINDER
The volume V of a cylinder is the area of its base, πr^2, times its height h. $$V = \pi r^2 h$$

Additional Example 3: Using a Formula to Find the Volume of a Cylinder

Find the volume of a cylinder to the nearest tenth. Use 3.14 for π.

5 m

4.2 m

$V = \pi r^2 h$ *Use the formula.*

The radius of the cylinder is 5 m, and the height is 4.2 m

$V \approx 3.14 \cdot 5^2 \cdot 4.2$ *Substitute for r and h.*
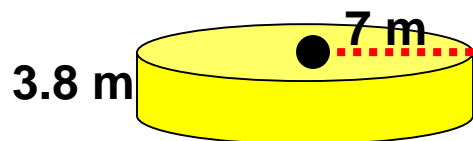
$V \approx 329.7$ *Multiply.*

The volume is about 329.7 m^3.

Try This: Example 3

Find the volume of a cylinder to the nearest tenth. Use 3.14 for π.

$V = \pi r^2 h$ *Use the formula.*

The radius of the cylinder is 7 m, and the height is 3.8 m

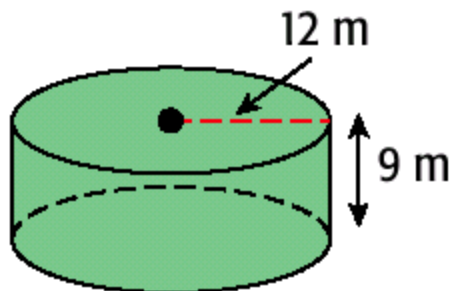$V \approx 3.14 \cdot 7^2 \cdot 3.8$ *Substitute for r and h.*

$V \approx 584.668$ *Multiply.*
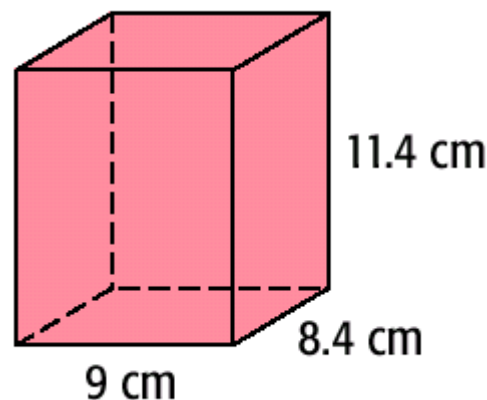
The volume is about 584.7 m³.

Lesson Quiz

Find the volume of each solid to the nearest tenth. Use 3.14 for π.

1.

12 m

9 m

4,069.4 m³

2.

11.4 cm

8.4 cm

9 cm

861.8 cm³

3. triangular prism: base area = 24 ft², height = 13 ft
312 ft³

Homework

9-2 Worksheet