Volume of Prisms and Cylinders

Warm UP: Add Volume formulas to Graphic Organizer
Each one goes in its own box.

Volume of Prism

V = Bh
B = area of base

Volume of Cylinder

V = Bh
B = area of base (πr^2)

Volume of Sphere

V = 4/3 πr^3

Volume of Pyramid

V = 1/3Bh
B = area of base

Volume of Cone

V = 1/3Bh
B = area of base (πr^2)

Volume Prisms and Cylinders

MCC7.G.6: Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.

MCC8.G.9: Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-wold and mathematical problems.

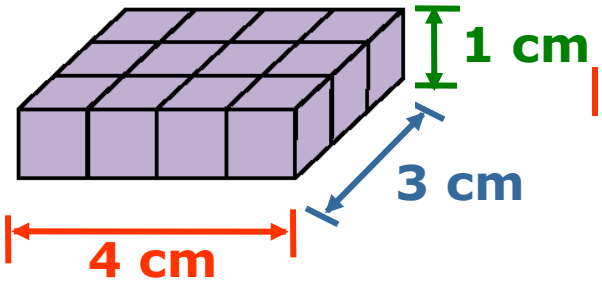
Essential Question: How can you use volume formulas to solve problems?

Volume of Prisms and Cylinders

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

Volume of Prisms and Cylinders

To find the volume of a rectangular prism, you can count cubes or multiply the lengths of the edges.

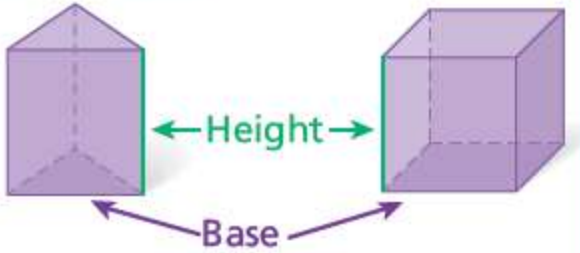


$4\text{ cm} \cdot 3\text{ cm} \cdot 1\text{cm} = 12\text{ cm}^3$

length · width · height = volume

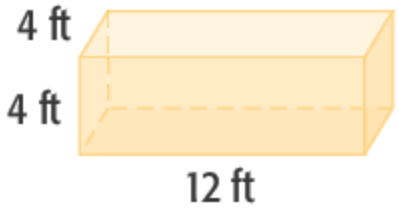
area of base · height = volume

Volume of Prisms and Cylinders

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 1A: Using a Formula to Find the Volume of a Prism

Find the volume of the figure.



$V = Bh$ *Use the formula.*

The base is a square: $B = 4 \cdot 4 = 16$.

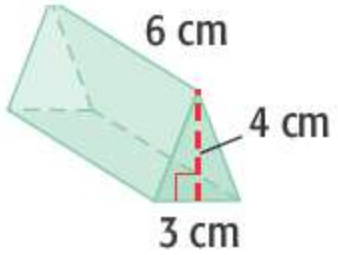
$V = 16 \cdot 12$ *Substitute for B and h.*

$V = 192$ *Multiply.*

The volume of the prism is 192 ft^3.

Additional Example 1B: Using a Formula to Find the Volume of a Prism

Find the volume of the figure.



$V = Bh$ *Use the formula.*

The base is a triangle: $B = 1/2 \cdot 3 \cdot 4 = 6$.

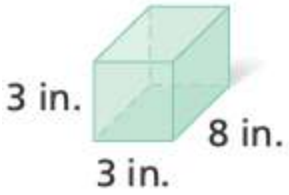
$V = 6 \cdot 6$ *Substitute for B and h.*

$V = 36$ *Multiply.*

The volume of the triangular prism is 36 cm^3.

Check It Out: Example 1A

Find the volume of the figure.



$V = Bh$ *Use the formula.*

The base is a square: $B = 3 \cdot 3 = 9$.

$V = 9 \cdot 8$ *Substitute for B and h.*

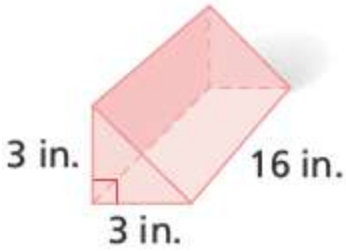
$V = 72$ *Multiply.*

The volume of the prism is 72 in^3.

Volume of Prisms and Cylinders

Check It Out: Example 1B

Find the volume of the figure.



$V = Bh$ *Use the formula.*

The base is a triangle: $B = 1/2 \cdot 3 \cdot 3 = 4.5$.

$V = 4.5 \cdot 16$ *Substitute for B and h.*

$V = 72$ *Multiply.*

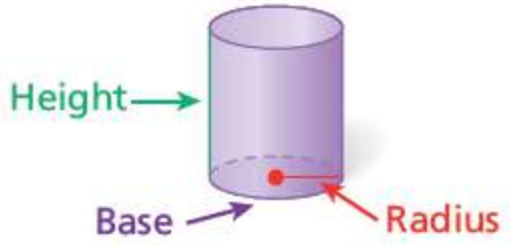
The volume of the triangular prism is 72 in^3.

Reading Math

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

Volume of Prisms and Cylinders

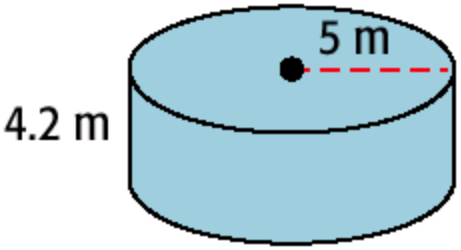
Finding the volume of a cylinder is similar to finding the volume of a prism.

VOLUME OF A CYLINDER		
The volume V of a cylinder is the area of its base B times its height h.	$V = Bh$ or $V = \pi r^2 h$	

Volume of Prisms and Cylinders

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

A can of tuna is shaped like a cylinder. Find its volume to the nearest tenth. Use 3.14 for π.



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

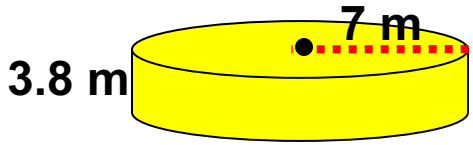
$V \approx 329.7$ *Multiply.*

The volume is about 329.7 m^3.

Volume of Prisms and Cylinders

Check It Out: Example 2

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.*

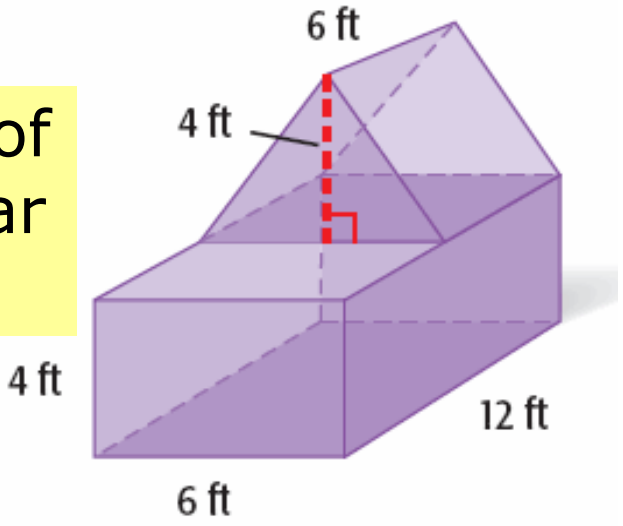
The volume is about 584.7 m^3.

Volume of Prisms and Cylinders

Additional Example 3: Finding The Volume of a Composite Figure

Find the volume of the composite figure to the nearest ft. Use 3.14 for π.

Volume of a composite figure	=	Volume of prism	+	Volume of triangular prism
V	=	Bh	+	Bh



$$V \approx (4)(6)(12) + (\tfrac{1}{2})(4)(6) \cdot (6)$$

$$V \approx 288 + 72$$

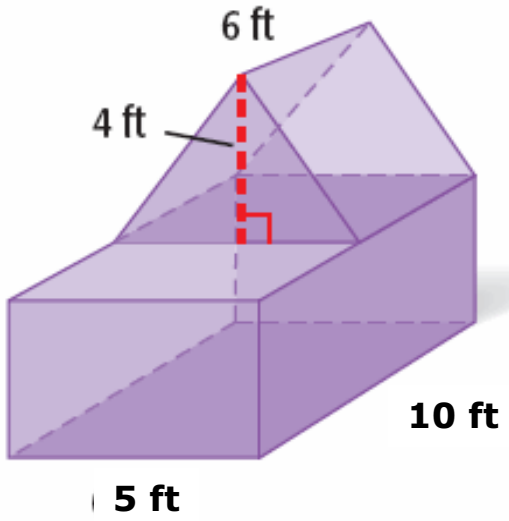
$$V \approx 360 \text{ ft}^3$$

Volume of Prisms and Cylinders

Check It Out: Example 3

Find the volume of the composite figure to the nearest ft. Use 3.14 for π.

Volume of a composite figure	=	Volume of prism	+	Volume of triangular prism
V	=	Bh	+	Bh



$$V \approx (4)(5)(10) + (\tfrac{1}{2})(4)(5) \cdot (6)$$

$$V \approx 200 + 60$$

$$V \approx 260 \text{ ft}^3$$

Review Video

Worksheet – finish for homework