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Volume of a Right Rectangular Prism

Unit 6 Lesson 5

Students will be able to:

- Learn how to calculate volume of rectangular prism by counting unit cubes.
- Learn how to find the volume of the rectangular prism by finding the base area and height.
- Learn how to find the volume of the rectangular prism by multiplying its dimensions.
- Apply the two formula for finding the volume of rectangular prisms.

Key Vocabulary: Volume Unit Cube **Rectangular Prism** Layer **Base Area** Height Width Length



<u>Rectangular Prisms</u>

Rectangular prisms are three-dimensional figures made up of six faces of rectangles. It has dimensions: length, width and height.



We can construct rectangular prisms by stacking up cubes. Its volume can be determined, given that one small cube is 1 cubic unit.

<u>Rectangular Prisms</u>

Example:



This rectangular prism has 24 cubes its volume is 24 cubic units.



Rectangular prism has 45 cubes so volume of prism is **45 units³**.

Sample Problem 1:

Find the volume of the following rectangular prisms given that 1 cube has a volume of 1 in³.



2.





1

Solution:



Rectangular prism has 40 cubes so volume of prism is 40 in³.



Rectangular prism has 30 cubes so volume of prism is 30 in³.

Dimensions of Rectangular Prisms

Rectangular prisms have three dimensions: length, width, and height as shown below. These measurements can help us find the prism's volume easier.



Example:

Given that $\mathbf{w} = 1 \text{ cm}^3$, we can find the dimensions of the prism shown below. Since the cube has a volume of 1 cm³, this means that one side of the cube is equal to 1 cm.



A cube that has a volume of 1 cm³ has length, width and height all equal to 1.



Example:

Using the measurement of one side of the cube, then we can find the dimensions of the rectangular prism.



Sample Problem 2:

Find the dimensions of the prism shown below, given that 1 cube has a volume of 1 cm^3 .



Solution:

Find the dimensions of the prism shown below, given that 1 cube has a volume of 1 cm^3 .



length = 7 cm width = 4 cm height = 5 cm

<u>Volume of Rectangular Prisms (Area x Height)</u>

Another way to find the volume of a prism faster is by finding the area of the base of the prism, then multiplying it by its height.





Example:

Volume of the prism



Example:

Volume of the prism =
$$(3 \text{ cm} \times 4 \text{ cm}) \times 3 \text{ cm}$$

= $12 \text{ cm}^2 \times 3 \text{ cm}$
= 36 cm^3



Example:

Base Area = 16 cm^2



Sample Problem 3:

Find the volume of the following rectangular prisms.



Volume of Rectangular Prisms (Length x Width x Height)

We can find the volume of the rectangular prisms in three different ways using their base areas and height.





Volume of Rectangular Prisms (Length x Width x Height)



From this particular example, we can see that Volume = $3 \times 2 \times 4 = 24$ units³ = $4 \times 2 \times 3 = 24$ units³ = $2 \times 4 \times 3 = 24$ units³

This means that regardless of the order, we'll end up with the same volume when we multiply the dimensions to each other.

Volume of Rectangular Prisms (Length x Width x Height)

In general, we can use this formula below when finding the volume of the rectangular prism.

Volume = Length \times Width \times Height V = L \times W \times H







Sample Problem 4:

Find the volume of the figures shown below.



Solution:

