MATH NEWS

5th Grade Math

Module 5: Addition and Multiplication with Volume and Area

Math Parent Letter

This document is created to give parents and students an understanding of the math concepts found in Eureka Math (© 2013 Common Core, Inc.) that is also posted as the Engage New York material which is taught in the classroom. Grade 5 Module 5 of Eureka Math (Engage New York) covers Addition and Multiplication with Volume and Area. This newsletter will discuss Module 5, Topic B. In this topic students come to see that multiplying side lengths or multiplying the area by the number of layers yields an equivalent volume.

Topic B: Volume and the Operations of Multiplication and Addition

Words to know:

- area
- solid figure
- base
- length/width/height
- capacity
- volume
- cubic centimeters
- face
- milliliters

Things to Remember!

Area – the number of square units that covers a two-dimensional figure

Volume – measurement of space or capacity

Space – the amount of cubes that will fit inside a solid; ***packing***

Capacity – the amount of liquid that fills a container; ***filling***

Face – any flat surface of a three-dimensional figure

Cubic Centimeter – all sides measure 1 centimeter; abbreviation cm

Milliliter – unit of capacity equal to one-thousandth of a liter; abbreviation is mL

cm^3 is read centimeters cubed. **cm^2** read centimeters squared.

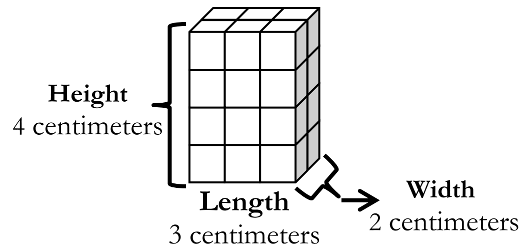
OBJECTIVES OF TOPIC B

- **Use multiplication to calculate volume.**
- **Use multiplication to connect volume as *packing* with volume as *filling.***
- **Find the total volume of solid figures composed of two non-overlapping rectangular prisms.**
- **Solve word problems involving the volume of rectangular prisms with whole number edge lengths.**
- **Apply concepts and formulas of volume to design a sculpture using rectangular prisms within given parameters.**

Focus Area– Topic B

Module 5: Addition and Multiplication with Volume and Area

Find the volume by multiplying side measures



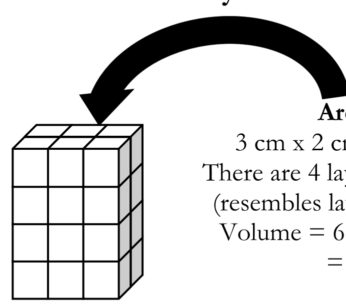
Volume $= (3 \text{ cm} \times 2 \text{ cm}) \times 4 \text{ cm}$
$= 6 \text{ cm}^2 \times 4 \text{ cm}$
$= 24 \text{ cm}^3$

Volume $= (2 \text{ cm} \times 4 \text{ cm}) \times 3 \text{ cm}$
$= 8 \text{ cm}^2 \times 3 \text{ cm}$
$= 24 \text{ cm}^3$

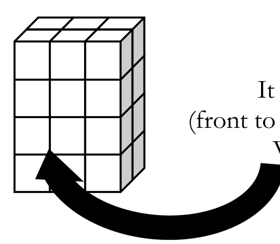
Volume $= (4 \text{ cm} \times 3 \text{ cm}) \times 2 \text{ cm}$
$= 12 \text{ cm}^2 \times 2 \text{ cm}$
$= 24 \text{ cm}^3$

All three yield the same volume. This shows that the order does not matter when multiplying the measure of each side.

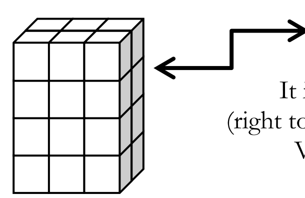
Calculate the volume by multiplying the area of one face by the number of layers



Area
$3 \text{ cm} \times 2 \text{ cm} = 6 \text{ cm}^2$
There are 4 layers of 6 cm^2.
(resembles layers of cake)
Volume $= 6 \text{ cm}^2 \times 4 \text{ cm}$
$= 24 \text{ cm}^3$



Area
$3 \text{ cm} \times 4 \text{ cm} = 12 \text{ cm}^2$
It is 2 layers deep of 12 cm^2.
(front to back – resembles stacked books)
Volume $= 12 \text{ cm}^2 \times 2 \text{ cm}$
$= 24 \text{ cm}^3$

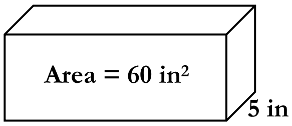


Area
$2 \text{ cm} \times 4 \text{ cm} = 8 \text{ cm}^2$
It is 3 layers deep of 8 cm^2.
(right to left – resembles bread slices)
Volume $= 8 \text{ cm}^2 \times 3 \text{ cm}$
$= 24 \text{ cm}^3$

All three yield the same volume.

Application Problems:

Eddie says more information is needed to find the volume of the rectangular prism. Explain why Eddie is mistaken and calculate the volume.



Eddie can multiply the area of the face by the width of 5 in.

Volume = 60 in^2 x 5 in
= 300 in^3

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What is the volume of a jewelry box with a length of 10 centimeters, a width of 4 centimeters, and a height of 3 centimeters?

Volume = (10 cm x 4 cm) x 3 cm
= 40 cm^2 x 3 cm
= 120 cm^3

The volume of the jewelry box is 120 cm^3.

Remember the order does not matter when multiplying the measure of each side.

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A rectangular prism has a volume of 30 cubic feet. Its height is 5 feet. Which are possible dimensions for the base of the prism?

A. 1 foot x 6 feet

B. 3 feet x 10 feet

C. 3 feet x 3 feet

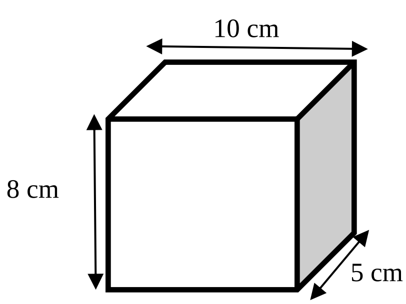
D. 12 feet x 12 feet

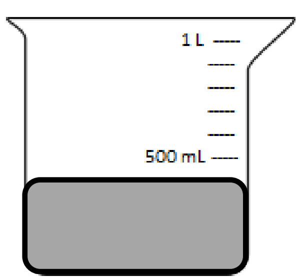
Correct Answer: A (1 ft x 6 ft) x 5 ft = 30 cubic feet or 30 ft^3

Liquid Volume

From an activity in Lesson 5, students will conclude that 1 cm^3 is equivalent to 1 mL. Milliliters are units of capacity which tell the amount of liquid a container will hold. There are 1,000 mL in a liter.

Problem: Find the volume of the prism and then shade the beaker to show how much liquid would fill the box.

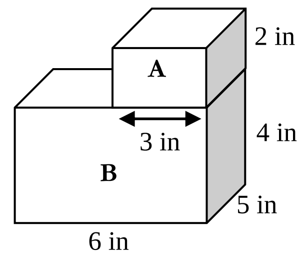




Volume = (8 cm x 5 cm) x 10 cm
= 40 cm^2 x 10 cm
= 400 cm^3

Since 1 cm^3 equals 1 mL, 400 cm^3 equals 400 mL.

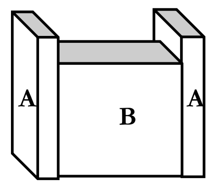
Total volume of a solid figure compose of two or more non-overlapping prisms



Prism A	Prism B
Length – 3 inches Width – 5 inches Height – 2 inches Volume = 3 in x (5 in x 2 in) = 3 in x 10 in^2 = 30 in^3	Length – 6 inches Width – 5 inches Height – 4 inches Volume = (6 in x 5 in) x 4 in = 30 in^2 x 4 in = 120 in^3

Total volume = 30 in^3 + 120 in^3
= 150 in^3

Application Problem: A planting box pictured below is made of two sizes of rectangular prisms. One type of prism measures 2 inches by 5 inches by 12 inches. The other type measures 12 inches by 4 inches by 10 inches. What is the total volume of three such boxes?



Prism A	Prism B
Volume = (2 in x 5 in) x 12 in = 10 in^2 x 12 in = 120 in^3 There are two prisms '**A**.' 120 in^3 x 2 = 240 in^3	Volume = (12 in x 4 in) x 10 in = 48 in^2 x 10 in = 480 in^3

240 in^3
+480 in^3
720 in^3

The total volume of the planting box is 720 cubic inches.