

# MATH NEWS

Grade 5, Module 5, Topic A

## 5<sup>th</sup> 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 A. In this topic students will explore volume.

### Topic A: Concepts of Volume

#### Words to know:

- cube
- unit cubes
- base
- right rectangular prism
- cubic units
- volume of a solid
- solid figure
- face

#### Things to Remember!

- **Cube** – three-dimensional figure with six square sides
- **Unit Cubes/Cubic Units** – cubes of the same size used for measuring volume; all sides measure 1 unit
- **Base** – one face of a three-dimensional solid; often thought of as the surface upon which the solid rests
- **Volume of a Solid** – measurement of space or capacity
- **Solid Figure** – three-dimensional figure
- **Right Rectangular Prism** – rectangular prism with only 90° angles
- **Face** – any flat surface of a three-dimensional figure
- $u^3$  is read units cubed.  $cm^3$  is read centimeter cubed.

### OBJECTIVES OF TOPIC A

- Explore volume by building with and counting unit cubes.
- Find the volume of a right rectangular prism by packing with cubic units and counting.
- Compose and decompose right rectangular prisms using layers.

## Focus Area– Topic A

Module 5: Addition and Multiplication with Volume and Area

1. The following solids are made up of 1-cm cubes. Find the volume of each figure, and write in the chart below.

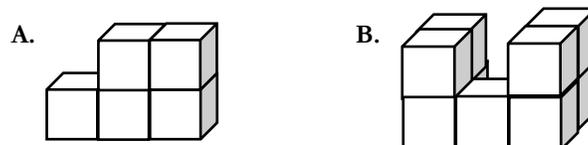
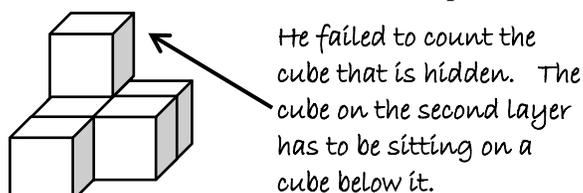


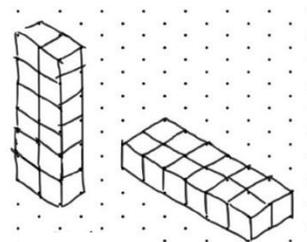
Figure	Volume	Explanation
A	5 cm <sup>3</sup> or 5 cubic cm	I counted the cubes.
B	9 cm <sup>3</sup> or 9 cubic cm	I counted 4 cubes on the right and then multiplied by 2 to include the cubes of the left side and then added the cube in the middle.

2. Dwight says that the figure below, made of 1-cm cubes, has a volume of 5 cubic centimeters. Explain his mistake.



### Application Problem:

Jack and Jill both have 12 centimeter cubes. Jack builds a tower that is 6 cubes high and 2 cubes wide. Jill builds one that is 6 cubes long and 2 cubes wide. Jack says his structure has the greater volume because it is taller. Jill says that the structures have the same volume. Who is correct? Draw a picture to explain how you know.



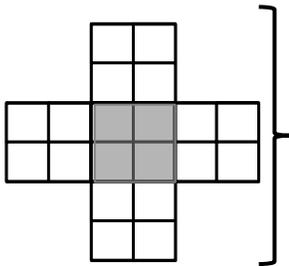
Jack's tower is 12 cubes.

Jill's tower is 12 cubes.

Jill is correct because both have a volume of 12 cubic centimeters. Jack's is standing upright and Jill's is lying down.

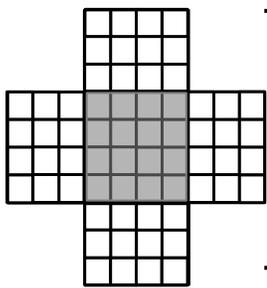
## Filling a box or rectangular prism with cubic units

The model below represents a **net** (pattern) of a rectangular prism or box. If you think of taking a cereal box and cutting it open to form a flat shape, this would create a **net** of the cereal box.



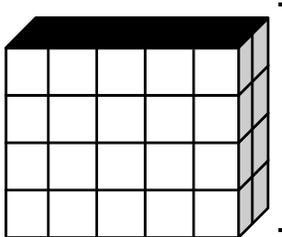
The shaded part is the base of the box. We can tell that it would take 4 cubes to cover the base. The flaps show that there are 2 layers.  
 $4 \times 2 = 8$   
 So the volume of this prism is 8 cubic units or  $8 \text{ u}^3$ .

**Problem #1:** If this net were to be folded into a box or rectangular prism, how many cubes would fill it?



It would take 16 cubes to cover the shaded part which is the base or bottom layer. The flaps show that there are 3 layers.  $16 \times 3 = 48$   
 So the volume of this box or rectangular prism is 48 cubic units or  $48 \text{ u}^3$ .  
 It would take 48 cubes to fill the box.

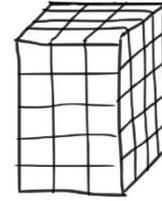
**Problem #2:** How many centimeter cubes would fit inside the box? Explain your answer using words.



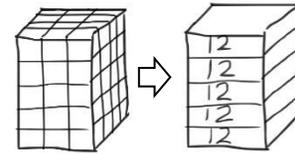
The front of the box has 4 rows with 5 cubes in each row which equals 20 cubes. The box is 2 layers deep. ( $20 \times 2 = 40$ ) So the volume of this box is 40 cubic centimeters or  $40 \text{ cm}^3$ .  
 It would take 40 centimeter cubes to fill the box.

## Decompose right rectangular prisms using layers

There are 3 different approaches to finding the volume of a rectangular prism. Using the prism below let's look at the three approaches. The prism is made of centimeter cubes.



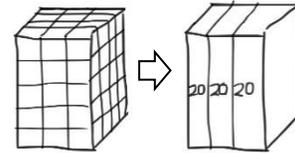
**Approach 1:** We could think of drawing horizontal lines to show the 5 layers of 12 cubes each. This resembles layers of cake.



$$12 \text{ cm}^3 + 12 \text{ cm}^3 + 12 \text{ cm}^3 + 12 \text{ cm}^3 + 12 \text{ cm}^3 = 60 \text{ cm}^3$$

$$5 \times 12 \text{ cubic centimeters} = 60 \text{ cm}^3$$

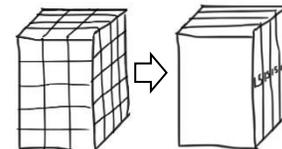
**Approach 2:** We could think of drawing vertical lines to show 3 layers of 20 cubes each. This resembles bread slices.



$$20 \text{ cm}^3 + 20 \text{ cm}^3 + 20 \text{ cm}^3 = 60 \text{ cm}^3$$

$$3 \times 20 \text{ cubic centimeters} = 60 \text{ cm}^3$$

**Approach 3:** We could think of drawing both a horizontal and a vertical line to show the front and back layers. There are 4 layers of 15 cubes each. This resembles books standing up.

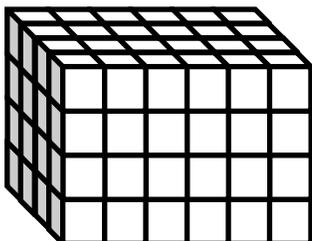


$$15 \text{ cm}^3 + 15 \text{ cm}^3 + 15 \text{ cm}^3 + 15 \text{ cm}^3 = 60 \text{ cm}^3$$

$$4 \times 15 \text{ cubic centimeters} = 60 \text{ cm}^3$$

*No matter which approach is used, the volume is the same. Students use the layers that are easier for them to visualize. A good practice is to use a second approach to check the volume determined from the first approach.*

**Application Problem:** Mary and Sue were finding the volume of the prism below. The girls agreed that 4 layers can be added together to find the volume. Mary said she could see on the end of the prism that each layer will have 16 cubes in it. Sue said each layer has 24 cubes in it. Who is right? Explain how you know.



Mary thought of vertical lines so it resembled bread slices. There are 16 cubes in each layer but there are 6 layers and not 4 layers.  
 Sue thought of horizontal lines so it resembled layers of cake. There are 24 cubes in each layer and there are 4 layers.  
 Answer: Sue is correct.