

# Grade 5 Unit 6

## Volume and Measurement

Volume 1 Issue 6

### References

#### Helpful Links:

<https://smart.wikispaces.com/cpss.org/Grade+5+Measurement+and+Data>

<http://www.xpmath.com/forums/arcade.php?do=play&gameid=118#.UgGYD1PodJM>

<http://www.xpmath.com/forums/arcade.php?do=play&gameid=118#.UgGYD1PodJM>

#### Math Grade 5 Textbook Connection:

Ch. 11, Lessons 1, 2, 4 – 13

Ch. 12, Lesson 4

#### Textbook Online:

<http://connected.mcgraw-hill.com/connected/login.do>

Ask your teacher for the online passcode.

### Dear Parents,

Your student's math class is calling for students to be actively engaged in doing math in order to learn math. In the classroom, students will frequently work on tasks and activities to discover and apply mathematical thinking. Students will be expected to explain or justify their answers and to write clearly and properly. Your students will receive a consumable textbook and online access from their teacher.

### Concepts Students will Use and Understand

- Change units to related units within the same measurement system by multiplying or dividing using conversion factors.
- Use line plots to display a data set of measurements that includes fractions.
- Use operations to solve problems based on data displayed in a line plot.
- Recognize volume as an attribute of three-dimensional space.
- Understand that volume can be measured by finding the total number of same size units of volume required to fill the space without gaps or overlaps.
- Understand that a 1-unit by 1-unit by 1-unit cube is the standard unit for measuring volume.
- Select appropriate units, strategies, and tools for solving problems that involve estimating and measuring volume.
- Decompose three-dimensional shapes and find volumes of right rectangular prisms by viewing them as decomposed into layers of arrays of cubes.
- Measure necessary attributes of shapes in order to determine volumes to solve real world and mathematical problems.
- Communicate precisely by engaging in discussion about their reasoning using appropriate mathematical language.

### Vocabulary

**Volume:** The amount of space that a three-dimensional figure contains. Volume is expressed in cubic units, (how many small cubes would fit inside a solid figure).

**Three-Dimensional Figure:** A measure in three directions, such as length, and width.

**Line Plot:** A number line long enough to encompass all numbers in the sample, showing an "x" over the position corresponding to each number.

**Mass:** A measure of how much matter is in an object.

**Capacity:** How much liquid a container can hold (see volume).

**Rectangular Prism:** A prism with two identical, rectangular bases.

**Right Prism:** A solid three-dimensional figure with two identical, parallel bases. All other faces are rectangles.

## Symbols

- cm (centimeter)
- m (meter)
- mm (millimeter)
- in (inches)
- ft (foot/feet)
- B (base)
- $u^3$  (cubic units)

## Example 1

To convert from one unit to another unit in the standard and metric system, the relationship between the units must be known. In order for students to have a better understanding of the relationships between units, they need to use measuring tools in class. The number of units must relate to the size of the unit.

*Example 1:* 100 cm = 1 meter

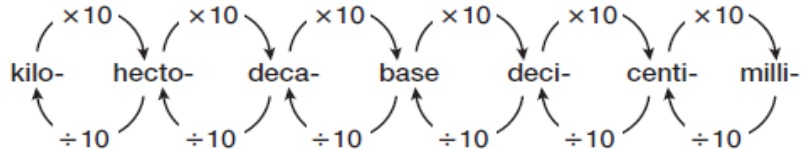
*Example 2:* 12 inches = 1 foot and 3 feet = 1 yard

## Example 2

The metric system of measurement is based on 10 and powers of 10. The prefixes used for length, capacity, and mass tell what part of the basic unit is being considered. The symbols for each unit of measure are given in parentheses ( ). The most commonly used units are shown in **bold** below.

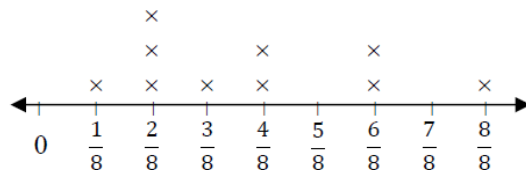
prefix	meaning	measure of length	measure of capacity	measure of mass
kilo-	1,000	<b>kilometer</b> (km)	kiloliter (kL)	<b>kilogram</b> (kg)
hecto-	100	hectometer (hm)	hectoliter (hL)	hectogram (hg)
deka-	10	dekameter (dkm)	dekaliter (dkL)	dekagram (dkg)
base unit	1	<b>meter</b> (m)	<b>liter</b> (L)	<b>gram</b> (g)
deci-	0.1	<b>decimeter</b> (dm)	deciliter (dL)	decigram (dg)
centi-	0.01	<b>centimeter</b> (cm)	centiliter (cL)	centigram (cg)
milli-	0.001	<b>millimeter</b> (mm)	<b>milliliter</b> (mL)	<b>milligram</b> (mg)

To change from a larger unit to a smaller unit, multiply by the appropriate power of 10. To change from a smaller unit to a larger unit, divide by the appropriate power of 10.



## Example 3

Students measured objects in their desk to the nearest  $\frac{1}{2}$ ,  $\frac{1}{4}$ , or  $\frac{1}{8}$  of an inch then displayed data collected on a line plot. How many objects measured  $\frac{1}{4}$ ?  $\frac{1}{2}$ ? If you put all the objects together end to end what would be the total length of all the objects?



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## Example 4

*Example:*

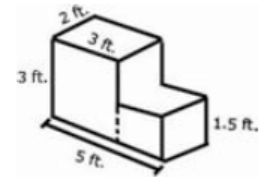
When given 24 cubes, students make as many rectangular prisms as possible with a volume of 24 cubic units. Students build the prisms and record possible dimensions.

Length	Width	Height
1	2	12
2	2	6
4	2	3
8	3	1

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## Example 5

Students determine the volume of concrete needed to build the steps in the diagram below.



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## Activities at Home:

- Make flash cards of different geometric figures and their properties.
- Identify different plane and solid figures in your environment.
- Find the volume of real-world objects in your home.
- Make nets for different solid figures using graph paper. Compare nets that work to nets that do not fold correctly to make the figures.
- Compare the estimated volume of a carton or bottle of liquid (such as 1/2 gallon juice or milk or two liter bottle of lemonade) in cubic inches or centimeters to its stated volume in ounces or milliliters.