

# Unit 5: Volume and Measurement

<b>Unit #:</b>	APSDO-00016998	<b>Duration:</b>	19.0 Day(s)	<b>Date(s)</b>	01-03-2017
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**Grade(s)**  
 5

**Subject(s)**  
 Mathematics

## Unit Focus

In this unit, students will recognize volume as an attribute of three-dimensional space. They will learn that volume can be found by finding the total number of same-size unit cubes to fill a space. Students will understand measuring the volume of rectangular prisms and composed rectangular prisms. A secondary focus of this unit is measurement conversions. Students will use their understanding of multiplication and division to convert standard measurement units in a given measurement system. Primary instructional materials for this unit include On Core and Everyday Mathematics.

## Stage 1: Desired Results - Key Understandings

Standard(s)	Transfer				
<p><b>Common Core</b>  <i>Mathematics: 5</i></p> <ul style="list-style-type: none"> <li>• A cube with side length 1 unit, called a unit cube, is said to have one cubic unit of volume, and can be used to measure volume.  <i>CCSS.MATH.CONTENT.5.MD.C.3A</i></li> <li>• Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.  <i>CCSS.MATH.CONTENT.5.MD.A.1</i></li> </ul>	<p><b>T1</b> (T30) Describe, classify, and compare objects.  <b>T2</b> (T32) Apply appropriate formulas to determine the unknown.  <b>T3</b> (T50) Based on an understanding of any problem, initiate a plan, execute it and evaluate the reasonableness of the solution.  <b>T4</b> (T53) Articulate how mathematical concepts relate to one another in the context of a problem or in the theoretical sense.  <b>T5</b> (T51) Examine alternate methods to accurately and efficiently solve problems.  <b>T6</b> (T52) Use appropriate tools strategically to deepen understanding of mathematical concepts.</p>				
	<b>Meaning</b>				
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 50%; text-align: center;">Understanding(s)</th> <th style="width: 50%; text-align: center;">Essential Question(s)</th> </tr> <tr> <td style="height: 20px;"> </td> <td style="height: 20px;"> </td> </tr> </table>	Understanding(s)	Essential Question(s)		
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- Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication.  
*CCSS.MATH.CONTENT.5.MD.C.5A*
- A solid figure which can be packed without gaps or overlaps using  $n$  unit cubes is said to have a volume of  $n$  cubic units. *CCSS.MATH.CONTENT.5.MD.C.3B*
- Apply the formulas  $V = l \times w \times h$  and  $V = b \times h$  for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems.  
*CCSS.MATH.CONTENT.5.MD.C.5B*
- Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.  
*CCSS.MATH.CONTENT.5.MD.C.5C*
- Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.  
*CCSS.MATH.CONTENT.5.MD.C.4*

- U1** (U300) Every measurement has a unit in which it is expressed.
- U2** (U301) There are many appropriate units that can be used to measure an object(s), but the precision is dependent on the situation.
- U3** (U303) Measurements with the same unit can be compared and combined.
- U4** (U400) Objects in the world can be described by their shape.
- U5** (U402) Shapes in different categories may share attributes that can define a larger category.
- U6** (U414) 3-D shapes can be categorized by the number and nature of their surfaces.
- U7** (U503) Effective problem solvers try multiple strategies when struggling.
- U8** (U530) Every problem belongs to a category of problems that has a similar structure and set of characteristics; which means it can be solved using a similar model.
- U9** (U541) The accuracy of a solution depends upon the proper selection and effective use of a mathematical tool.
- U10** (U550) Attention to detail, such as specifying units of measure and labeling, leads to clarity in expressing mathematical information.
- U11** (U521) Evaluating arguments creates clarity about a problem, its model, and the viability of a solution.

- Q1** (Q300) What properties of the object am I trying to measure? How do I measure them?
- Q2** (Q301) How precise do I need to be in my measurement?
- Q3** (Q302) How do I compare/combine measurements of objects?
- Q4** (Q305) What measurements are appropriate to describe the properties of the data set?
- Q5** (Q308) Have I accurately applied the appropriate measurement formula?
- Q6** (Q400) What kinds of attributes/characteristics would I use to describe this object? What category do they belong to?
- Q7** (Q406) What is the theorem/formula necessary to solve this problem? (Gr. 5-12)
- Q8** (Q407) How much space does this shape (2-D and 3-D) take up/enclose? (Gr. 5-12)
- Q9** (Q500) What is a reasonable estimate?
- Q10** (Q502) What is important here? What is not important?
- Q11** (Q505) Is my answer correct? OR Does my solution make sense?
- Q12** (Q552) Does my solution make sense?
- Q13** (Q532) Which model best represents this problem?
- Q14** (Q540) What tool(s) is appropriate for use with this model?
- Q15** (Q550) Did I use clear language (symbols, labels, terms, units of measure and significant digits) to explain my reasoning to others?
- Q16** (Q520) Does the argument/thought process/logic make sense?

<b>Acquisition of Knowledge and Skill</b>	
<b>Knowledge</b>	<b>Skill(s)</b>
	<b>S1</b>

		<p>Count unit cubes that fill a solid figure to find volume</p> <p><b>S2</b></p> <p>Estimate the volume of a rectangular prism</p> <p><b>S3</b></p> <p>Find the volume of rectangular prisms</p> <p><b>S4</b></p> <p>Use a formula to find the volume of a rectangular prism</p> <p><b>S5</b></p> <p>Use the strategy make a table to compare volumes</p> <p><b>S6</b></p> <p>Find the volume of a figure composed of rectangular prisms</p> <p><b>S7</b></p> <p>Understand unit cubes and how they can be used to build a solid figure</p> <p><b>S8</b></p> <p>Understand the concept of volume and how to measure it</p> <p><b>S9</b></p> <p>Compare, contrast, and convert customary units of length</p> <p><b>S10</b></p> <p>Compare, contrast, and convert customary units of capacity</p>
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