

**Unit 3: Building Shapes, Building Volume**  
**5<sup>th</sup> Grade Math**  
26 Class Meetings

*Written October 2025*

**Essential Questions**

- How does understanding volume help us describe, compare, and solve real-world problems involving three-dimensional figures?
- Why do mathematicians group shapes into categories, and how do their shared properties help us make those classifications?
- How does understanding a shape's properties help us determine which category it belongs to and how it is related to other shapes?

**Enduring Understandings with Unit Goals**

**EU 1:** Volume is a measurable attribute of solid figures.

- Define volume as an attribute of solid figures and explain how unit cubes represent volume.
- Measure and calculate volume using cubic units (cm<sup>3</sup>, in<sup>3</sup>, ft<sup>3</sup>) by counting and by applying formulas.
- Explain and use the formulas  $V = l \times w \times h$  and  $V = b \times h$  to find the volume of right rectangular prisms with whole-number side lengths.
- Represent and apply the associative property of multiplication using three-dimensional models and volume relationships.
- Solve real-world and mathematical problems involving volume, including composite figures made of more than one rectangular prism.
- Understand and demonstrate that volume is additive by finding and combining volumes of non-overlapping parts.

**EU 2:** Geometric figures can be classified based on their attributes.

- Identify properties of two-dimensional shapes (such as right angles, parallel sides, equal sides).
- Classify shapes based on their attributes, organizing them in a hierarchy.
- Explain that shapes within a category inherit properties from the broader category, using reasoning and precise vocabulary.

**Standards**

**Common Core State Standards:**

- **CCSS.Math.Content.5.MD.C.3:** Recognize volume as an attribute of solid figures and understand concepts of volume measurement.
- **CCSS.Math.Content.5.MD.C.3.a:** 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.
- **CCSS.Math.Content.5.MD.C.3.b:** 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.4:** Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.

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- **CCSS.Math.Content.5.MD.C.5:** Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.
- **CCSS.Math.Content.5.MD.C.5.a:** 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.5.b:** 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.5.c:** 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.G.B.3:** Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.
- **CCSS.Math.Content.5.G.B.4:** Classify two-dimensional figures in a hierarchy based on properties.

### ISAAC Vision of the Graduate Competencies

**Competency 1:** Write effectively for a variety of purposes.

**Competency 2:** Speak to diverse audiences in an accountable manner.

**Competency 3:** Develop the behaviors needed to interact and contribute with others on a team.

**Competency 4:** Analyze and solve problems independently and collaboratively.

**Competency 5:** Be responsible, creative, and empathetic members of the community.

### Unit Content Overview

- **Volume of Three-Dimensional Figures**
  - Explore the concept of volume using unit cubes to understand that volume measures the amount of space inside a solid figure.
  - Count cubic units to determine volume and progress to using formulas such as  $V = l \times w \times h$  and  $V = b \times h$  for right rectangular prisms.
  - Investigate and model how to connect volume to multiplication and the associative property.
  - Demonstrate how layers of unit cubes form three-dimensional figures.
  - Apply their knowledge to solve real-world and mathematical problems, including finding the volume of composite figures by adding the volume of separate rectangular prisms.
  - Develop fluency in using cubic units, interpreting diagrams, and reasoning about how volume is additive.
- **Classification of Two-Dimensional Shapes**
  - Analyze two-dimensional shapes by examining their properties such as number of sides, right angles, and equal lengths.

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- Discover that shapes can be grouped into categories and subcategories based on these properties and that figures in a subcategory share all the attributes of the larger category.
- Discover how squares are a special type of rectangle and parallelogram.
- Organize shapes into a hierarchy.
- Use precise mathematical vocabulary to explain relationships and justify classifications.

**Vocabulary and Key Terms:** Volume, unit cube, cubic units, rectangular prism, base, height, length, width, edge lengths, formula,  $V = l \times w \times h$ ,  $V = b \times h$ , cubic centimeter, cubic inch, cubic foot, additive volume, composite figure, area of base, hierarchy, two-dimensional figure, quadrilateral, parallelogram, rectangle, square, rhombus, right angle, attributes, classify, category, subcategory, properties, faces, edges, vertices

#### **Interdisciplinary Connection:**

- ELA

### Daily Learning Objectives with *TWPS*

#### Students will be able to...

- Understand volume as an attribute of solid figures that are measured in cubic units and find the volume of concrete three-dimensional figures.
  - *How does using cubic units help us understand the space inside a solid figure, and why might some shapes be easier to measure than others?*
- Find the volume of pictorial three-dimensional figures.
  - *When looking at a drawing of a 3D figure, what strategies can we use to figure out its volume without seeing all its layers?*
- Find the volume of a right rectangular prism by thinking about its layers.
  - *How can imagining a prism as layers of cubes help you understand and calculate its volume?*
- Find the volume of a right rectangular prism using its side lengths.
  - *Why does multiplying length, width, and height give the same volume as counting layers of cubes?*
- Represent volume using expressions related to the formulas  $V=b \times h$  and  $V= l \times w \times h$  and use these formulas to find the volume of pictorial rectangular prisms.
  - *How are the formulas  $V = b \times h$  and  $V = l \times w \times h$  connected, and when might one be easier to use than the other?*
- Understand standard units for measuring volume, including cubic inches, cubic centimeters, cubic feet, and cubic meters. Solve real-world and mathematical problems involving these various units.
  - *How do different units of volume affect how we measure and describe the size of objects in the real world?*
- Solve more complex real-world and mathematical problems involving volume.
  - *What strategies can we use to solve volume problems when objects are made of more than one rectangular prism?*
- Understand that volume is additive. Find the volume of composite solid.
  - *Why can we add the volumes of non-overlapping parts of a solid to find the total volume?*
- Understand that volume is additive. Find the volume of composite solid.
  - *How does breaking a complex solid into smaller parts make it easier to calculate the total volume?*

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- Classify shapes as polygons versus non-polygons and classify polygons according to their number of sides.
  - *What makes a shape a polygon, and how can counting sides help us organize different polygons?*
- Classify quadrilaterals based on the presence or absence of one pair of parallel sides. Define trapezoids as quadrilaterals with at least one pair of parallel sides.
  - *How does identifying parallel sides help you decide if a quadrilateral is a trapezoid?*
- Classify trapezoids based on the presence of one or two sets of parallel sides. Define parallelograms as trapezoids with two sets of parallel sides.
  - *How is a parallelogram similar to a trapezoid, and what makes it different?*
- Classify parallelograms based on the presence or absence of right angles or based on the presence or absence of sides of equal length. Define rectangles as parallelograms with four right angles and rhombuses as parallelograms with four equal sides.
  - *How do right angles and equal sides help us tell apart rectangles, rhombuses, and other parallelograms?*
- Classify rectangles based on the presence or absence of sides of equal length, and classify rhombuses based on the presence or absence of right angles. Define square as quadrilaterals with sides of equal length and all right angles.
  - *Why is a square considered both a rectangle and a rhombus? How do its properties fit into a hierarchy of quadrilaterals?*
- Classify triangles based on side and angle measures.
  - *How can looking at both sides and angles help you decide what type of triangle you have?*

**Instructional Strategies/Differentiated Instruction**

- Whole group instruction
- Paragraph frames and sentence starters
- Teacher modeling
- Think-write-pair-share and small-group discussions
- Graphic organizers
- Accountable talk
- Homework
- Word walls with visuals
- Small group instruction
- Visual exemplars with teacher and student critiques
- Text and video chunking
- Spiraling back to guiding questions

**EL Differentiation Strategies**

- Word Banks and Word Walls with visuals
- TWPS (Think, write, pair, share)
- Culturally responsive teaching
- Explicit teacher modeling
- Key vocabulary
- Graphic organizers
- Strategic Grouping

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- Non-verbal assessments

**Assessments**

**FORMATIVE ASSESSMENTS:**

- Do Now
- Academic Discourse
- Exit Slips
- Accountable Talk Discussions
- Completed notes
- Homework
- Performance Task -- “Community Center” Performance Task
  - Teacher’s rubric/scoring guide

**SUMMATIVE ASSESSMENTS:**

- Quiz: Volume of Three-Dimensional Shapes, Classifying Two-Dimensional Shapes (EU1, EU2)
- IAB
- Unit Task: “Community Center” Performance Task (EU1, EU2 and EU3)

**Unit Task**

**Unit Task Name:** “Community Center” Performance Task

**Description:** Upon completion of the unit students will apply their understanding of volume and geometry to a real-world project by designing a community recreation center. They calculate volumes of rooms and composite spaces using formulas and models, classify two-dimensional shapes, and organize them into hierarchies based on properties. Students will be tasked with their town building a new Community Recreation Center. They will have to help design parts of the building using your knowledge of volume and geometry. The center will include storage spaces, activity rooms, and outdoor play areas. They will analyze shapes, calculate volume, and justify your reasoning using mathematical vocabulary.

**Evaluation:** Teacher’s Scoring Guide

**Unit Resources**

- Google Classroom
- Pear Assessment
- Math In Focus
- Math Antics
- State Common Core Standards Transition Tasks
- Match Fishtank
- Worksheets
- Individual White boards
- Interactive notebook
- Laptops
- SBAC Prep Online