

Unit 3: Building Shapes, Building Volume

5th Grade Math

26 Class Meetings

Revised June 2026

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^3 , in^3 , ft^3) 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: Measurement units are related and can be converted to solve real-world problems.

- Understand that measurements can be expressed using different units within the same system.
- Recognize that larger units can be converted to smaller units, and smaller units can be converted to larger units using multiplication and division.
- Use place value patterns and powers of 10 to explain relationships among metric units.
- Convert between different-sized standard measurement units within a given measurement system (e.g., centimeters, meters; ounces, pounds; cups, pints, quarts, gallons).
- Apply measurement conversions to solve real-world and mathematical problems involving length, weight, mass, capacity, and time.
- Explain how choosing an appropriate unit and converting measurements can improve accuracy and efficiency when solving problems.
- Use tables, diagrams, and equations to represent and justify measurement conversions.

EU 3: 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.

Unit 3: Building Shapes, Building Volume

5th Grade Math

26 Class Meetings

Revised June 2026

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.
- **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 3: Building Shapes, Building Volume

5th Grade Math

26 Class Meetings

Revised June 2026

Unit Content Overview

1. 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.

2. Classification of Two-Dimensional Shapes

- Analyze two-dimensional shapes by examining their properties such as number of sides, right angles, and equal lengths.
- 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, Science

Daily Learning Objectives with TWPS

Students will be able to...

- Find the area and perimeter of rectangles.
 - *What numbers correctly complete each equation?*
- Find the area and perimeter of irregular shapes.
 - *Select the symbol (<, >, or =) that correctly completes each equation.*
- Understand volume as an attribute of solid figures that are measured in cubic units and find the volume of concrete three-dimensional figures. Find the volume of pictorial three dimensional figures.
 - *Which one doesn't belong*
- Find the volume of a right rectangular prism by thinking about its layers.
 - *Amy says, "I see 2 layers of 8 unit cubes." Janet says, "I see 2 layers of 12 unit cubes." Who is correct?*
- 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.

Unit 3: Building Shapes, Building Volume

5th Grade Math

26 Class Meetings

Revised June 2026

- *Input output table: find the rule, fill in the rest of the table*
- Find the missing side length of a rectangular prism when given the volume.
 - *Luke has a 65 gallon rectangular aquarium with a base of 48 inches by 18 inches. He centers it on a rectangular tabletop. There are 3 inches between each side of the aquarium and each side of the tabletop. What is the area of the tabletop?*
- Understand that volume is additive. Find the volume of composite solid.
 - *Jamila has a gift box that is 8 cm long, 8 cm wide, and 2 cm high. It has a volume of 128 cubic cm. She has a second gift box that is the same width but twice the length, and three times the height. What is the volume of the second gift box?*
 - *Find the number using the clues.*
- Solve complex real world mathematical problems involving volume.
 - *Patrick has a box centered on a table. The box has a width of 12 in and a length of 35 in. There are 7 inches between each side of the box and the tabletop. What is the perimeter of the tabletop?*
- Convert units of measurement that involve length. Inches, feet, and yards.
 - *Find the missing symbols.*
- Convert units of measurement that involve weight. Ounces, pounds, and tons.
 - *Marsha is knitting a scarf. On the first four days she knitted the lengths of scarf shown on the table. What is the total length, in inches, that Marsha knitted on the first four days?*
- Convert between gallons, quarts, pints, and cups.
 - *Would you rather have 95 inches of fruit roll ups, have 9 feet of fruit roll up, have 5 yards of fruit roll up.*
- Convert metric measurements.
 - *The Smith family is painting the front of the house. The door is 8 ft tall and 2 ft wide, and each window is 2 ft tall and 2 ft wide. The door and windows don't need to be painted. How much space does the family need to paint?*
 - *The right rectangular prism shown has a length of 8 cm, a width of 4 cm, and a height of 6 cm. Determine whether each question can be used to find the volume of the prism.*
- Solve problems involving converting time.
 - *Find the missing symbols.*
- Find points on a coordinate plane.
 - *Jenna drank 8 liters of water. This is twice as much water as Jack drank. What is the amount of water, in milliliters, that Jenna drank? What is the amount of water, in milliliters, that Jack drank.*
- Plot points on a coordinate plane.
 - *Every day Josh feeds his puppy one cup of dog food in the morning, one cup in the afternoon, and one cup in the evening. How much food does Josh feed his puppy in 2 weeks?*
- Identify patterns with ordered pairs and then plot them on the coordinate plane.
 - *A student plots the following points. Which point is not plotted correctly?*
- Classify shapes as polygons versus non-polygons and classify polygons according to their number of sides.
 - *Use the coordinate grid to answer the questions. How many students own 5 pets? How many pets do 5 people own?*
- Classify triangles based on side and angle measures.
 - *Could Eleanor have used the rule x is 2 times y ? Why or why not?*

Unit 3: Building Shapes, Building Volume

5th Grade Math

26 Class Meetings

Revised June 2026

- 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.
 - *The coordinate grid is a map of the town where Diana lives. Diana is at school and needs to go to the supermarket and then the park. Select all the sets of coordinates that will get Diane from school to the supermarket, and then the park.*
- 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.
 - *Which has a greater volume?*
- 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.
 - *How can you tell Chase's rule is incorrect? What is the correct rule?*

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
- Non-verbal assessments

Assessments

FORMATIVE ASSESSMENTS:

- Do Now
- Academic Discourse
- Exit Slips

Unit 3: Building Shapes, Building Volume

5th Grade Math

26 Class Meetings

Revised June 2026

- 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