Claim 1: Concepts and Procedures Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.	
Content Domain: **Measurement and Data**	
Target I [m]: Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition. (DOK 1, 2) Tasks for this target will ask students to find the volume of right rectangular prisms with whole-number edge lengths using unit cubes and formulas. Some tasks should ask students to consider the effect of changing the size of the unit cube (e.g., doubling the edge length of a unit cube) using values that do not cause gaps or overlaps when packed into the solid. Other tasks will ask students to find the volume of two non-overlapping right rectangular prisms, often together with targets from Claim 2 or Claim 4.	
Standards: 5.MD.C, 5.MD.C.3, 5.MD.C.3a, 5.MD.C.3b, 5.MD.C.4, 5.MD.C.5, 5.MD.C.5a, 5.MD.C.5b, 5.MD.C.5c	**5.MD.C Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.** **5.MD.C.3** Recognize volume as an attribute of solid figures and understand concepts of volume measurement. **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. **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. **5.MD.C.4** Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units. **5.MD.C.5** Relate volume to the operations of multiplication and addition and solve real-world and mathematical problems involving volume. **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. **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. **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.

Related Below-Grade and Above-Grade Standards for Purposes of Planning for Vertical Scaling: 4.MD.A, 4.MD.A.2, 4.MD.A.3 6.G.A, 6.G.A.2	**Related Grade 4 Standards** **4.MD.A Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.** **4.MD.A.2** Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale. **4.MD.A.3** Apply the area and perimeter formulas for rectangles in real-world and mathematical problems. *For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.* **Related Grade 6 Standards** **6.G.A Solve real-world and mathematical problems involving area, surface area, and volume.** **6.G.A.2** Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = lwh$ and $V = bh$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.
DOK Level(s):	1, 2
Achievement LEVEL Descriptors:	
RANGE Achievement Level Descriptors (Range ALD) Target I: Geometric measurement: understand concepts of volume and relate volume to multiplication and addition.	**Level 1** Students should be able to use unit cubes to find the volume of rectangular prisms with whole-number edge lengths.
	Level 2 Students should be able to understand the concept that the volume of a rectangular prism packed with unit cubes is related to the edge lengths.
	Level 3 Students should be able to use the formulas $V = l \times w \times h$ and $V = b \times h$ to find the volume of rectangular prisms. They should be able to find the volume of two non-overlapping right rectangular prisms.
	Level 4 Students should be able to find the volume of a right rectangular prism after doubling the edge length of a side and compare it to the original.
Evidence Required:	1. The student determines the volume of a right rectangular prism with whole-number side lengths by counting or packing unit cubes. 2. The student applies the formulas $V = l \times w \times h$ and $V = b \times h$ to solve real-world and mathematical problems involving volumes of right rectangular prisms.

Allowable Response Types:	Matching Tables; Equation/Numeric
Allowable Stimulus Materials:	right rectangular prism models
Construct-Relevant Vocabulary:	area array, right rectangular prism, associative property, cube, volume, length, width
Allowable Tools:	None
Target-Specific Attributes:	Items are limited to right rectangular prisms with whole-number edge lengths.
Non-Targeted Constructs:	None
Accessibility Guidance:	Item writers should consider the following Language and Visual Element/Design guidelines[1] when developing items. Language Key Considerations: • Use simple, clear, and easy-to-understand language needed to assess the construct or aid in the understanding of the context • Avoid sentences with multiple clauses • Use vocabulary that is at or below grade level • Avoid ambiguous or obscure words, idioms, jargon, unusual names and references Visual Elements/Design Key Considerations: • Include visual elements only if the graphic is needed to assess the construct or it aids in the understanding of the context • Use the simplest graphic possible with the greatest degree of contrast, and include clear, concise labels where necessary • Avoid crowding of details and graphics Items are selected for a student's test according to the blueprint, which selects items based on Claims and targets, not task models. As such, careful consideration is given to making sure fully accessible items are available to cover the content of every Claim and target, even if some item formats are not fully accessible using current technology.[2]
Development Notes:	Other tasks will ask students to find the volume of two non-overlapping right rectangular prisms, often together with targets from Claim 2 or Claim 4. Tasks that ask students to show that the volume of a prism found by packing it with unit cubes is the same as would be found by multiplying the side lengths will be assessed in Claim 3.

[1] For more information, refer to the General Accessibility Guidelines at: http://www.smarterbalanced.org/wordpress/wp-content/uploads/2012/05/TaskItemSpecifications/Guidelines/AccessibilityandAccommodations/GeneralAccessibilityGuidelines.pdf

[2] For more information about student accessibility resources and policies, refer to http://www.smarterbalanced.org/wordpress/wp-content/uploads/2014/08/SmarterBalanced_Guidelines.pdf

Task Model 1a

Response Type:
Equation / Numeric

DOK Level 2

5.MD.C.3
Recognize volume as an attribute of solid figures and understand concepts of volume measurement.
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.
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.

5.MD.4
Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.

Evidence Required:
1. The student determines the volume of a right rectangular prism with whole-number side lengths by counting or packing unit cubes.

Tools: None

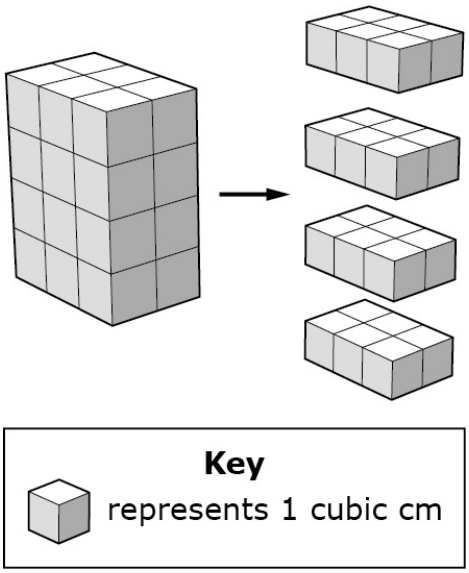
Accessibility Note:
Care should be given to make sure the dimensions of the prism and layers can be adequately Brailled.

Prompt Features: The student is prompted to determine the volume of a right rectangular prism with whole-number side lengths by counting unit cubes.

Stimulus Guidelines:
- Items are limited to right rectangular prisms with whole-number edge lengths.
- Right rectangular prisms can be filled or partially filled with customary unit cubes.
- The volume of a single unit cube is provided.

TM1a
Stimulus: The student is presented with a model of a completed right rectangular prism and a diagram of the individual layers of the prism.

Example Stem: The layers of a rectangular prism are shown to the right of the prism.



Enter the volume, in cubic centimeters, of the rectangular prism.

Rubric: (1 point) The student correctly enters the volume of the completed rectangular prism (e.g., 24).

Response Type: Equation/Numeric

Task Model 1b-c

Response Type:
Equation / Numeric

DOK Level 2

5.MD.C.3
Recognize volume as an attribute of solid figures and understand concepts of volume measurement.
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.
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.

5.MD.C.4
Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.

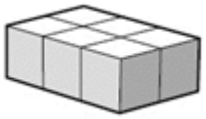
Evidence Required:
1. The student determines the volume of a right rectangular prism with whole-number side lengths by counting or packing unit cubes.

Tools: None

Accessibility Note:
Care should be given to make sure the dimensions of the prism and layers can be adequately Brailled.

TM1b
Stimulus: The student is presented with the model of the bottom layer of a right rectangular prism and the number of layers in the completed prism.

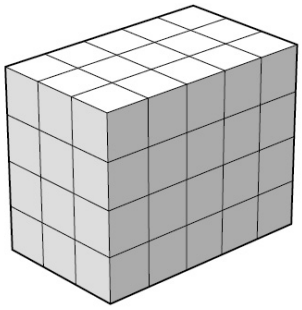
Example Stem: Elias is building a rectangular prism. The bottom layer of the rectangular prism is shown.



He builds a prism that has 4 layers. Enter the volume, in cubic centimeters, of the **completed** rectangular prism.

TM1c
Stimulus: The student is presented with a model of a completed right rectangular prism.

Example Stem: The rectangular prism shown is solid.



Enter the volume, in cubic centimeters, of the rectangular prism.

Rubric: (1 point) The student correctly enters the volume of the completed rectangular prism (e.g., 24; 60).

Response Type: Equation/Numeric

Note: TM1d has been retired.

Task Model 2a-b

Response Type: Equation / Numeric

DOK Level 1

5.MD.C.5
Relate volume to the operations of multiplication and addition and solve real-world and mathematical problems involving volume.
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.

Evidence Required:
2. The student applies the formulas $V = l \times w \times h$ and $V = b \times h$ to solve real-world and mathematical problems involving volumes of right rectangular prisms.

Tools: None

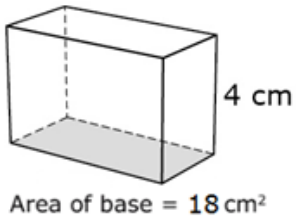
Accessibility Note:
Include the dimensions in the stem to increase access.

Prompt Features: The student is prompted to apply the formulas $V = l \times w \times h$ and $V = b \times h$ to solve real-world and mathematical problems involving rectangular prisms.

Stimulus Guidelines:
- The student is presented with right rectangular prisms in a mathematical or real-world context.
- Items may or may not include a visual model.
- Item difficulty can be adjusted via these example methods:
  - Area of base and height given as whole number values
  - Length, width, and height given as whole number values

TM2a
Stimulus: The student is presented with the model of a right rectangular prism in a mathematical context, with the height and area of the base labeled.

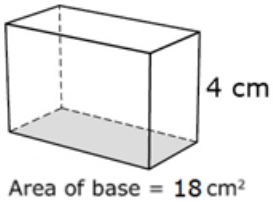
Example Stem: The area of the base of this right rectangular prism is 18 square centimeters and the height is 4 centimeters.



Enter the volume, in cubic centimeters, of this prism.

TM2b
Stimulus: The student is presented with the model of a right rectangular prism in a real-world context, with the height and area of the base labeled.

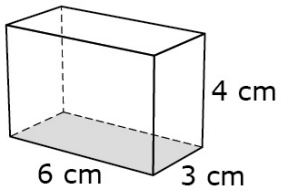
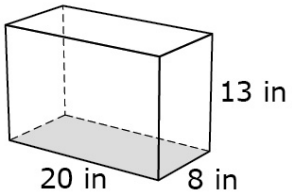
Example Stem: Sam has a small box in the shape of a right rectangular prism.
- The area of the base of the box is 18 square centimeters.
- The height of the box is 4 centimeters.



Enter the volume, in cubic centimeters, of Sam's box.

Rubric: (1 point) The student correctly enters the volume of the right rectangular prism (e.g., 72; 72; 72; 72; 2080).

Response Type: Equation/Numeric

Task Model 2c-e **Response Type: Equation / Numeric** **DOK Level 1** **5.MD.C.5** Relate volume to the operations of multiplication and addition and solve real-world and mathematical problems involving volume. 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. **Evidence Required:** 2. The student applies the formulas $V = l \times w \times h$ and $V = b \times h$ to solve real-world and mathematical problems involving volumes of right rectangular prisms. **Tools:** None **Accessibility Note:** Include the dimensions in the stem to increase access.	**TM2c** **Stimulus:** The student is presented with the height and area of the base of a right rectangular prism in a real-world context. **Example Stem:** Sara has a small box in the shape of a right rectangular prism. • The area of the base of the box is 18 square centimeters. • The height of the box is 4 centimeters. Enter the volume, in cubic centimeters, of Sara's box. **TM2d** **Stimulus:** The student is presented with a model of a right rectangular prism in mathematical context, with all three dimensions labeled. **Example Stem:** The edge lengths, in centimeters, of the right rectangular prism shown are 4, 3, and 6.  Enter the volume, in cubic centimeters, of this prism. **TM2e** **Stimulus:** The student is presented with a model of a right rectangular prism in a real-world context, with all three dimensions labeled. **Example Stem:** Danny has a fish tank, in the shape of a right rectangular prism. The edge lengths of the prism, in inches, are 8, 13, and 20.  Enter the volume, in cubic inches, of the fish tank. **Rubric:** (1 point) The student correctly enters the volume of the right rectangular prism (e.g., 72; 72; 2080). **Response Type:** Equation/Numeric

Task Model 2f

Response Type: Equation / Numeric

DOK Level 2

5.MD.C.5
Relate volume to the operations of multiplication and addition and solve real-world and mathematical problems involving volume.
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.

Evidence Required:
2. The student applies the formulas $V = l \times w \times h$ and $V = b \times h$ to solve real-world and mathematical problems involving volumes of right rectangular prisms.

Tools: None

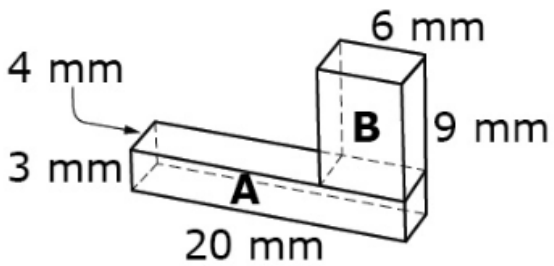
Accessibility Note:
Include the dimensions in the stem to increase access.

Prompt Features: The student is prompted to calculate the volume of two non-overlapping right rectangular prisms of given dimensions.

Stimulus Guidelines:
- All dimensions are whole numbers using the same units.
- All dimensions must be given in the stem and/or labeled on the prisms.

TM2f
Stimulus: The student is presented with a model showing two non-overlapping right rectangular prisms with whole number dimensions in a mathematical context and all dimensions given/labeled.

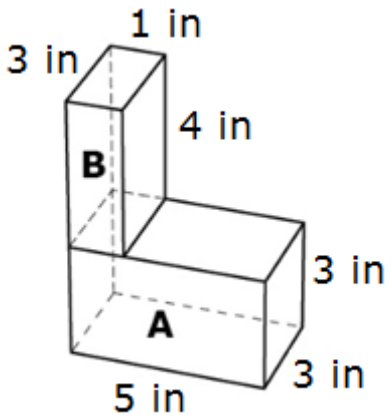
Example Stem: Right rectangular prisms A and B are combined to create this model.
- The dimensions of Prism A are 4 by 3 by 20 millimeters.
- The dimensions of Prism B are 6 by 9 by 4 millimeters.



Enter the combined volume, in cubic millimeters, of Prisms A and B.

Rubric: (1 point) The student correctly enters the combined volume in the specified units (e.g., 456).

Response Type: Equation/Numeric

Task Model 2g **Response Type: Equation / Numeric** **DOK Level 2** **5.MD.C.5** Relate volume to the operations of multiplication and addition and solve real-world and mathematical problems involving volume. 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. **Evidence Required:** 2. The student applies the formulas $V = l \times w \times h$ and $V = b \times h$ to solve real-world and mathematical problems involving volumes of right rectangular prisms. **Tools:** None **Accessibility Note:** Include the dimensions in the stem to increase access.	**TM2g** **Stimulus:** The student is presented with a model showing two non-overlapping right rectangular prisms with whole number dimensions in a real-world context. **Example Stem:** Sally uses Block A and Block B to create this model of a building. • The dimensions of Block A are 3 by 3 by 5 inches. • The dimensions of Block B are 1 by 3 by 4 inches.  Enter the combined volume, in cubic inches, of the entire model. **Rubric:** (1 point) The student correctly enters the combined volume in the specified units (e.g., 57). **Response Type:** Equation/Numeric

Task Model 2h

Response Type:
Matching Tables

DOK Level 2

5.MD.C.5
Relate volume to the operations of multiplication and addition and solve real-world and mathematical problems involving volume.
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.

Evidence Required:
2. The student applies the formulas $V = l \times w \times h$ and $V = b \times h$ to solve real-world and mathematical problems involving volumes of right rectangular prisms.

Tools: None

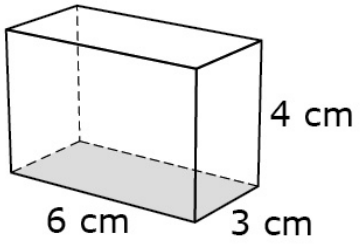
Accessibility Note:
Include the dimensions in the stem to increase access.

Prompt Features: The student is prompted to identify methods for finding the volume of a right rectangular prism.

Stimulus Guidelines:
- All dimensions are whole numbers using the same units.
- All items must use the same five equations in the table; only change the numbers in the equations to create an item.

TM2h
Stimulus: The student is presented with a visual model showing the dimensions of a right rectangular prism.

Example Stem: The right rectangular prism shown has a length 6 centimeters, width 3 centimeters, and height 4 centimeters.



Determine whether each equation can be used to find the volume (V) of this prism. Select Yes or No for each equation.

	Yes	No
$V = 18 \times 4$		
$V = (6 + 3) \times 4$		
$V = 6 \times 3 \times 4$		
$V = 9 \times 4$		
$V = 6 \times (3 \times 4)$		

Rubric: (1 point) The student correctly selects all of the equations that show a variety of ways volume can be determined with given dimensions, including $V = l \times w \times h$ and $V = b \times h$ (e.g., Y, N, Y, N, Y).

Response Type: Matching Tables