**Grade 5 Target I**

**Domain, Target, Standards, DOK, Vertical Alignments, Achievement Levels, Evidence Required, Vocabulary, Response Types, Materials, Attributes, Question Types, and Question Banks (Examples)**

**Content Domain: Measurement and Data**

**Target I [m]: 5.NF.A  Use equivalent fractions as a strategy to add and subtract fractions.**

**Standards included in Target 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.5**

**Vertical Alignment**

**Achievement Level Descriptors**

**Evidence Required**

**Vocabulary**

**Response Types**

**Materials**

**Attributes**

**Claim 1: Concepts and Procedures (DOK 1, 2) Question Banks**

**Claim 2 Problem Solving Questions Banks**

**Claim 3 Communicating Reasoning Question Banks**

**Content Domain: Measurement and Data**

**Target I [m]: 5.NF.A  Use equivalent fractions as a strategy to add and subtract fractions.**

**Standards included in Target 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.5**

**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...

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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.

**Vertical Alignment**

**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.

**Achievement Level Descriptors**

**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

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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.

**Vocabulary**
area array, right rectangular prism, associative property, cube, volume, length, width

**Response Types**
Matching Tables; Equation/Numeric

**Materials**
right rectangular prism models

**Attributes**
Items are limited to right rectangular prisms with whole-number edge lengths.

**Claim 1: Concepts and Procedures (DOK 1, 2) Question Banks**
Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.

**5.MD.C.3 DOK Level 2**

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 Level 2**

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

**Evidence Required:**

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

**Question Type 1:** The student is presented with a model of a completed right rectangular prism and a diagram of the individual layers of the prism.

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

![Diagram of layers of a rectangular prism]

**Key**

represents 1 cubic cm

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

**Question Type 2:** 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.

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

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

**Question Type 3**: The student is presented with a model of a completed right rectangular prism.

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

**5.MD.C.5 DOK Level 1**

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.

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Evidence Required:

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.

**Question Type 1:** 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.

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

![Diagram of a right rectangular prism with dimensions and area labeled]

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

**Question Type 2:** 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.

![Diagram of a right rectangular prism with dimensions and area labeled]

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

**Question Type 3:** The student is presented with the height and area of the base of a right rectangular prism in a real-world context.

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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.

**Question Type 4:** The student is presented with a model of a right rectangular prism in mathematical context, with all three dimensions labeled.

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.

**Question Type 5:** The student is presented with a model of a right rectangular prism in a real-world context, with all three dimensions labeled.

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.

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5.MD.C.5  DOK Level 2

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:**

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.

**Question Type 1:** 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.

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

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**Question Type 2:** The student is presented with a model showing two non-overlapping right rectangular prisms with whole number dimensions in a real-world context.

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.

![Diagram of two non-overlapping right rectangular prisms](image)

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

**Question Type 3:** The student is presented with a visual model showing the dimensions of a right rectangular prism.

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

![Diagram of a right rectangular prism](image)

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

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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

<table>
<thead>
<tr>
<th>Equation</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V = 18 \times 4$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$V = (6 + 3) \times 4$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$V = 6 \times 3 \times 4$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$V = 9 \times 4$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$V = 6 \times (3 \times 4)$</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Claim 2 Problem Solving Questions Banks
Claim Descriptors and Targets

Students can solve a range of complex well-posed problems in pure and applied mathematics, making productive use of knowledge and problem-solving strategies.

Example 1

A rectangular box is completely filled with 48 same-sized cubes arranged as shown. Julie opens the top of the box and sees 16 cubes.

Julie closes the top and then opens the right side of the box. How many cubes should she see? Enter your answer in the response box.

Rubric: (1 point) The student provides the correct number of cubes for the right side of the box (12).

Response Type: Equation/Numeric

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**Example 2**

The figure shown was created by joining two rectangular prisms.

![Diagram of two rectangular prisms joined at a right angle.

Rubric: (1 point) The student correctly enters the total volume of the figure in cubic centimeters (168 or 168 cm³).

Response Type: Equation/Numeric

**Claim 3 Communicating Reasoning Question Banks**

**Claim Descriptors and Targets**

Students can clearly and precisely construct viable arguments to support their own reasoning and to critique the reasoning of others.

**Example 1**

The dimensions of a right rectangular prism are:

- length = 9 centimeters
- width = 3 centimeters
- height = 5 centimeters

What will happen to the volume of the right rectangular prism if the length, the width, and the height are each doubled?

The new volume will be [drop-down choices: 2, 4, 6, 8] times the original volume because $(2 \times 9)(2 \times 3)(2 \times 5)=$

[drop-down choices: 2, 4, 6, 8] \times (9 \times 3 \times 5).

Rubric: (1 point) The student selects the correct multiplier (e.g., 8) in both drop-down menus.

Response Type: Drop-down menu

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