Claim 1: Concepts and Procedures
Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.

Content Domain: **Geometry**

Target H [s]: Solve real-world and mathematical problems involving area, surface area, and volume. (DOK Levels 1, 2)

Tasks for this target will ask students to find area (triangles, special quadrilaterals, and polygons) using composition and decomposition; to find volume of right rectangular prisms with fractional edge lengths (see connections to 6.NS Target B); identify and use nets of three-dimensional figures to find surface area; and draw polygons in the coordinate plane with given coordinates or determine the length of a side of a polygon given the coordinates for the vertices.

Many tasks for this target will provide context for Claims 2–4 and connect the content of this target to several other targets across Claim 1 (see, for example, 6.NS Targets B and C, 6.EE Targets E, F, and G).

Standards: 6.G.A, 6.G.A.1, 6.G.A.2, 6.G.A.3, 6.G.A.4	**6.G.A Solve real-world and mathematical problems involving area, surface area, and volume.** **6.G.A.1** Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems. **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. **6.G.A.3** Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems. **6.G.A.4** Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.
Related Below-Grade and Above-Grade Standards for Purposes of Planning for Vertical Scaling: 5.MD.C, 5.MD.C.4, 5.MD.C.5 7.G.A, 7.G.A.1, 7.G.A.2, 7G.B, 7.G.B.6	**Related Grade 5 Standards** **5.MD.C Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.** **5.MD.C.4** Measure volumes by counting unit cubes, using cubic cm, cubic in, cubit 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.

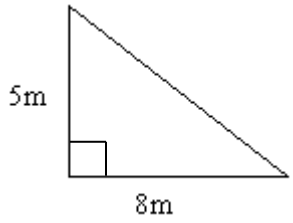
	b. Apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real-world and mathematical problems. c. Recognize volume as additive. Find volumes of solid figures composed 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 Grade 7 Standards** **7.G.A Draw, construct, and describe geometrical figures and describe the relationships between them.** **7.G.A.1** Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing at a different scale. **7.G.A.2** Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures or angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle. **7.G.B Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.** **7.G.B.6** Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes and right prisms.
DOK Levels:	1, 2
Achievement Level Descriptors:	
RANGE Achievement Level Descriptor (Range ALD) Target H: Solve real-world and mathematical problems involving area, surface area, and volume.	**Level 1** Students should be able to find areas of right triangles; draw polygons with positive coordinates on a grid with a scale in one-unit increments, given nonnegative integer-valued coordinates for the vertices; and find the volume of right rectangular prisms with one side expressed as a fraction or a mixed number in halves or fourths.
	Level 2 Students should be able to find areas of special quadrilaterals and triangles; draw polygons in the four-quadrant coordinate plane with scales in one-unit increments, given integer-valued coordinates for the vertices; and find the volume of right rectangular prisms with one side expressed as a fraction or a mixed number.
	Level 3 Students should be able to solve problems that involve finding areas of polygons and special quadrilaterals and triangles and find the volume of right rectangular prisms with all sides expressed as a fraction or a mixed number. They should be able to solve problems by drawing polygons in the four-quadrant coordinate plane with scales in various integer increments, given integer-valued coordinates for the vertices or coordinates containing a mix of integers and half, quarter, or tenth units.
	Level 4 Students should be able to solve problems by finding surface areas of three-dimensional shapes composed of rectangles and triangles. They should be able to find the volume of a compound figure composed of right rectangular prisms to solve problems.

Evidence Required:	1. The student determines the area of triangles, special quadrilaterals, and polygons using composition and decomposition in solving real-world and mathematical problems. 2. The student determines the volume of right rectangular prisms with fractional edge lengths in solving real-world and mathematical problems. 3. The student draws polygons in the coordinate plane, given coordinates for the vertices in the context of solving real-world and mathematical problems. 4. The student determines the length of a side of a polygon in the coordinate plane, given coordinates for the vertices in the context of solving real-world and mathematical problems. 5. The student determines the surface area of three-dimensional figures formed by nets of polygons in the context of solving real-world and mathematical problems.
Allowable Response Types:	Equation/Numeric; Graphing
Allowable Stimulus Materials:	coordinate planes, diagrams representing two– and three–dimensional figures
Construct-Relevant Vocabulary:	coordinate, ordered pair, coordinate plane, compose/decompose, vertices, right triangle, unit fraction, edge length, area, surface area, volume, nets, faces, edges, vertices
Allowable Tools:	Calculator
Target-Specific Attributes:	Given dimensions should be positive integers, decimals, or fractions; radicals should not be used as given dimensions. Nets must only be composed of rectangles, triangles, or a combination of both.
Non-Targeted Constructs:	
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

[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

	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:	Many tasks for this target will provide context for Claims 2–4 and connect the content of this target to several other targets across Claim 1 (see, for example, 6.NS Targets B and C, 6.EE Targets E, F, and G).

[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 1 **Response Type: Equation / Numeric** **DOK Level 1** **6.G.A.1** Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems. **Evidence Required:** 1. The student determines the area of triangles, special quadrilaterals, and polygons using composition and decomposition in solving real-world and mathematical problems. **Tools:** Calculator	**Prompt Features:** The student is prompted to determine the areas of triangles in solving mathematical and real-world problems. **Stimulus Guidelines:** • If used, context should be familiar to students 11 to 13 years old. • Rational numbers used should be appropriate for the situation. • Item difficulty can be adjusted via these example methods: o Measurements of shapes can be whole numbers, fractions, or decimals. o Students find the area of right triangles. o Students find the area of non-right triangles such as isosceles triangle, equilateral triangle, or scalene triangle. **TM1a** **Stimulus:** The student is presented with a mathematical problem involving triangles. **Example Stem:** Consider this figure.  Enter the area of the right triangle in square meters. **Rubric:** (1 point) Student enters the correct area of the figure (e.g., 20). Correct answer should be a single numerical value and units should be assumed from the stem. **Response Type:** Equation/Numeric

Task Model 1

Response Type: Equation / Numeric

DOK Level 2

6.G.A.1
Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.

Evidence Required:
1. The student determines the area of triangles, special quadrilaterals, and polygons using composition and decomposition in solving real-world and mathematical problems.

Tools: Calculator

Accessibility Note: When including diagrams, clearly indicate dimensions. Where reasonable, include the dimensions in the stem.

Prompt Features: The student is prompted to determine the areas of triangles, special quadrilaterals, and other polygons in solving mathematical and real-world problems.

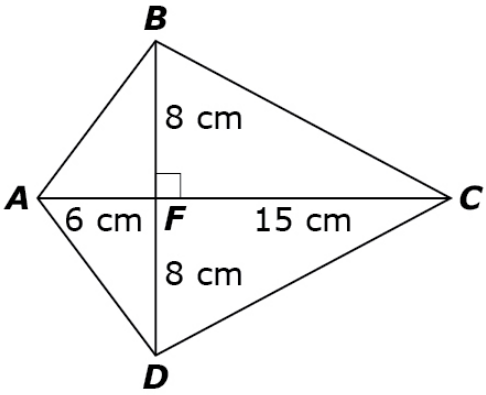
Stimulus Guidelines:

- If used, context should be familiar to students 11 to 13 years old.
- Rational numbers used should be appropriate for the situation.
- Item difficulty can be adjusted via these example methods:
  - Students find area of non-right triangles/special quadrilaterals with whole-number measures.
  - Students find area of polygon that can be decomposed into quadrilaterals and triangles with whole number measures.
  - Students find area of triangles/special quadrilaterals with fraction/decimal measures.
  - Students find area of polygon that can be decomposed into quadrilaterals and triangles with fraction/decimal measures.

TM1b

Stimulus: The student is presented with a mathematical or real-world problem involving composition or decomposition of a triangle, special quadrilateral, or other polygon.

Example Stem 1: Consider this figure.



Enter the total area, in square centimeters, of kite *ABCD*.

Example Stem 2: Figure A is composed of two shapes.

- A rectangle with length 9 inches and width 2 inches
- A square with side length 3 inches

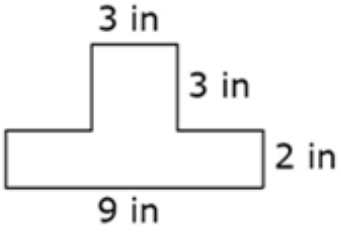
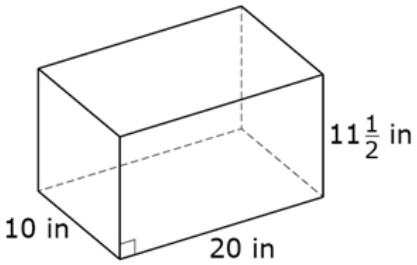
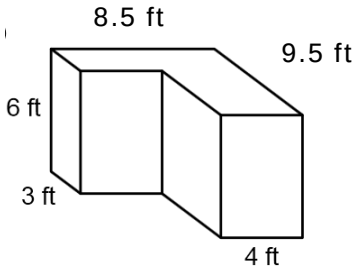


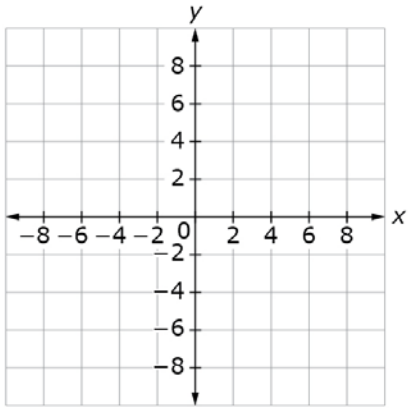
Figure A

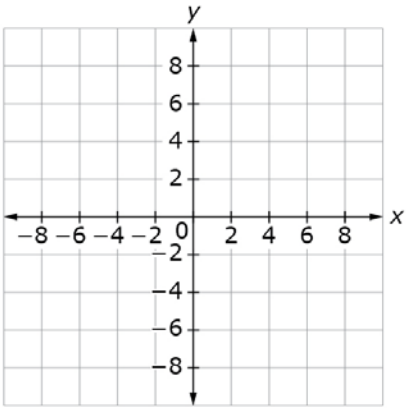
Enter the total area, in square inches, of the Figure A.

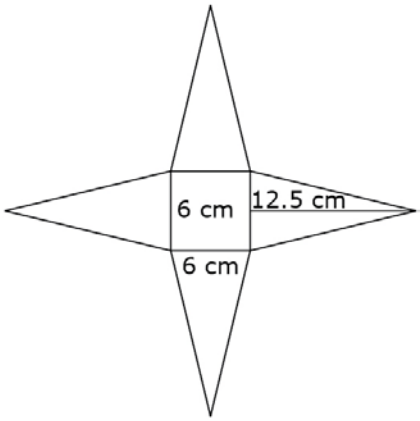
	Rubric: (1 point) Student enters the correct area of the figure (e.g., 168; 27). Correct answer should be a single numerical value and units should be assumed from the stem. **Response Type:** Equation/Numeric

Task Model 2 **Response Type: Equation / Numeric** **DOK Level 1** **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. **Evidence Required:** 2. The student determines the volume of right rectangular prisms with fractional edge lengths in solving real-world and mathematical problems. **Tools:** Calculator	**Prompt Features:** The student is prompted to determine the volume of a right rectangular prism by applying the formulas *V* = *lwh* and *V* = *bh*. **Stimulus Guidelines:** • If used, context should be familiar to students 11 to 13 years old. • Item difficulty can be adjusted via these example methods: o Students find volume of rectangular prism with one side measure expressed as fraction/mixed number in halves or fourths. o Students find volume of rectangular prism with one side measure expressed as fraction/mixed number. o Students find volume of rectangular prism with all side measures expressed as fractions/mixed numbers. **TM2a** **Stimulus:** The student is presented with a right rectangular prism with fractional edge lengths in the context of a mathematical or real-world problem. **Example Stem:** Consider this figure.  Enter the volume, in cubic inches, of the right rectangular prism. **Rubric:** (1 point) Student enters the correct volume (e.g., 2300). Correct answer should be a single numerical value and units should be assumed from the stem. **Response Type:** Equation/Numeric

Task Model 2 **Response Type: Equation / Numeric** **DOK Level 2** **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. **Evidence Required:** 2. The student determines the volume of right rectangular prisms with fractional edge lengths in solving real-world and mathematical problems. **Tools:** Calculator	**Prompt Features:** The student is prompted to determine the volume of a compound figure composed of right rectangular prisms by applying the formulas *V* = *lwh* and *V* = *bh*. **Stimulus Guidelines:** • If used, context should be familiar to students 11 to 13 years old. • Item difficulty can be adjusted via these example methods: o Use whole-numbers, fractions, or decimals for the side measurements. **TM2b** **Stimulus:** The student is presented with a compound figure composed of right rectangular prisms in the context of a mathematical or real-world problem. **Example Stem:** This figure was created by joining two right rectangular prisms.  Enter the volume, in cubic feet, of the figure. **Rubric:** (1 point) Student enters the correct volume (e.g., 309). Correct answer should be a single numerical value and units should be assumed from the stem. **Response Type:** Equation/Numeric

Task Model 3 **Response Type: Graphing** **DOK Level 1** **6.G.A.3** Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems. **Evidence Required:** 3. The student draws polygons in the coordinate plane, given coordinates for the vertices in the context of solving real-world and mathematical problems. **Tools:** Calculator **Accessibility Note:** Graphing items are not currently able to be Brailled. Minimize the number of items developed to this TM.	**Prompt Features:** The student is prompted to draw polygons in the coordinate plane given coordinates for the vertices. **Stimulus Guidelines:** • If used, context should be familiar to students 11 to 13 years old. • Polygons should be limited to triangles, squares, rectangles, parallelograms, kites, rhombi, and trapezoids. • Coordinates of the ordered pairs should be integers. • Item difficulty can be adjusted via these example methods: o Students graph polygon in Quadrant I with one-unit increment axes. o Students graph polygon in all four quadrants with one-unit increment axes. o Students graph polygon in all four quadrants with varying integer increment axes. **TM3** **Stimulus:** The student is presented with the vertices of a polygon in the context of a real-world or mathematical problem. **Example Stem:** Consider these ordered pairs. Point A: (3, 2) Point B: (–3, 2) Point C: (3, –2)  Use the Connect Line tool to form triangle ABC. **Interaction:** The student is given the Connect Line, Add Point, and Delete tools to draw the polygon in the coordinate plane. **Rubric:** (1 point) Student plots all given points and connects the lines correctly. **Response Type:** Graphing

Task Model 4 **Response Type: Equation / Numeric** **DOK Level 2** **6.G.A.3** Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems. **Evidence Required:** 4. The student determines the length of a side of a polygon in the coordinate plane, given coordinates for the vertices in the context of solving real-world and mathematical problems. **Tools:** Calculator	**Prompt Features:** The student is prompted to determine the length of a side of a polygon in the coordinate plane given coordinates for the vertices that have the same first coordinate or the same second coordinate. **Stimulus Guidelines:** • If used, context should be familiar to students 11 to 13 years old. • Polygons should be limited to triangles, squares, rectangles, parallelograms, kites, rhombi, and trapezoids. • Coordinates of the ordered pairs should be integers. • Item difficulty can be adjusted via these example methods: o Coordinates of the side used are in the same quadrant. o Coordinates of the side used are in different quadrants. **TM4** **Stimulus:** The student is presented with coordinates for the side of a polygon in the coordinate plane with either the same first coordinate or the same second coordinate in the context of a mathematical or real-world problem. **Example Stem 1:** A triangle has these coordinates: Point A: (–5, 2) Point B: (–5, 6) Point C: (7, 2) Enter the length of side AC. **Example Stem 2:** Refer to the map as a coordinate grid. On the map, the library is located at (–5, 2), the bus station is located at (–5, 6), and the courthouse is located at (7, 2). Each square unit in the grid represents 1 square kilometer.  Enter the distance, in kilometers, from the courthouse to the library. **Rubric:** (1 point) Student enters the correct length (e.g., 12; 12). Correct answer should be a single numerical value and units should be assumed from the stem. **Response Type:** Equation/Numeric

Task Model 5 **Response Type: Equation / Numeric** **DOK Level 2** **6.G.A.4** Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems. **Evidence Required:** 5. The student determines the surface area of three-dimensional figures formed by nets of polygons in the context of solving real-world and mathematical problems. **Tools:** Calculator	**Prompt Features:** The student is prompted to determine the surface area of a three-dimensional figure formed from a net. **Stimulus Guidelines:** • If used, context should be familiar to students 11 to 13 years old. • Rational numbers used should be appropriate for the situation. • Item difficulty can be adjusted via these example methods: o Students find surface area of polygon with all side measures expressed as whole numbers. o Students find surface area of polygon with some side measures expressed as decimals. o Students find surface area of polygon with some side measures expressed as fractions/mixed numbers. **TM5** **Stimulus:** The student is presented with a net composed of rectangles, triangles, or a combination of the two in the context of a real-world or mathematical problem. **Example Stem:** Susan is painting the outside of a square pyramid. The net for the pyramid is shown.  Enter the total surface area, in square centimeters, of the pyramid that Susan will paint. **Rubric:** (1 point) Student enters the correct surface area (e.g., 186). Correct answer should be a single numerical value and units should be assumed from the stem. **Response Type:** Equation/Numeric