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 E [a]: Draw, construct, and describe geometrical figures and describe the relationships between them. (DOK Levels 1, 2)

Tasks associated with this target will ask students to create scale drawings or apply an understanding of scale factor to solve a problem, often paired with 7.RP Target A.

Other tasks for this target will require students to draw geometric shapes with given conditions. Some tasks, such as those that require students to provide reasoning to explain why certain conditions cannot lead to a particular shape, will lead to evidence for Claim 3.

Standards: 7.G.A, 7.G.A.1, 7.G.A.2, 7.G.A.3	**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 and reproducing 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 of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle. **7.G.A.3** Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right-rectangular prisms and right-rectangular pyramids.
Related Below-Grade and Above-Grade Standards for Purposes of Planning for Vertical Scaling: 6.G.A, 6.G.A.1, 6.G.A.3, 6.G.A.4 8.G.A, 8.G.A.1, 8.G.A.2, 8.G.A.3, 8.G.A.4, 8.G.A.5, 8.G.B, 8.G.B.6, 8.G.B.7, 8.G.B.8	**Related Grade 6 standards** **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.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 Grade 8 Standards** **8.G.A Understand congruence and similarity using physical models, transparencies, or geometry software.** **8.G.A.1** Verify experimentally the properties of rotations, reflections, and translations: a. Lines are taken to lines, and line segments to line segments of the same length.

	b. Angles are taken to angles of the same measure. c. Parallel lines are taken to parallel lines. **8.G.A.2** Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them. **8.G.A.3** Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. **8.G.A.4** Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them. **8.G.A.5** Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. *For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.* **8.G.B Understand and apply the Pythagorean Theorem.** **8.G.B.6** Explain a proof of the Pythagorean Theorem and its converse. **8.G.B.7** Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. **8.G.B.8** Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.
DOK Levels:	1, 2
Achievement Level Descriptors:	
RANGE Achievement Level Descriptor (Range ALD) Target E: Draw, construct, and describe geometrical figures, and describe the relationships between them.	**Level 1** Students should be able to draw or construct geometric shapes with given conditions by freehand, with ruler and protractor, and by using technology.
	Level 2 Students should be able to describe geometric shapes with given conditions, and determine whether or not a set of any three given angle or side-length measures can result in a unique triangle, more than one triangle, or no triangle at all. They should be able to describe the relationship between a geometric figure and its scale drawing by finding the scale factor between them.
	Level 3 Students should be able to compute actual lengths and areas from a scale drawing, and reproduce a scale drawing using a different scale. They should be able to describe the two-dimensional figures that result from slicing prisms and pyramids by planes that are parallel to a given face.
	Level 4 Students should be able to describe the two-dimensional figures that result from slicing cones, spheres, cylinders, or other three-dimensional figures with rectangular or triangular faces by planes that are not parallel to a given face.
Evidence Required:	1. The student creates scale drawings. 2. The student solves problems involving scale drawings using proportional reasoning.

	3. The student draws, constructs, or describes geometric shapes given certain conditions. 4. The student describes a two-dimensional figure resulting from slicing a three-dimensional figure by a plane.
Allowable Response Types:	Multiple Choice, multiple correct response; Matching Tables; Equation/Numeric; Graphing
Allowable Stimulus Materials:	
Construct-Relevant Vocabulary:	scale drawing, scale, scale factor, ratio, proportion, polygon, triangle (right, acute, obtuse, equilateral, isosceles, scalene), quadrilateral, trapezoid, parallelogram, cube, right-rectangular prism, right-rectangular pyramid, square pyramid, cone, cylinder, plane, perpendicular, parallel, base of a three-dimensional figure, horizontal slice, vertical slice
Allowable Tools:	Calculator (varies by task model)
Target-Specific Attributes:	
Non-Targeted Constructs:	Understanding the relationship between the areas of two polygons in a scale drawing as the square of the scale factor.
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]

[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

Development Notes:	Other tasks for this target will require students to draw geometric shapes with given conditions. Some tasks, such as those that require students to provide reasoning to explain why certain conditions cannot lead to a particular shape, will lead to evidence for Claim 3.

Task Model 1

Response Type: Graphing

DOK Level 2

7.G.A.1
Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.

Evidence Required:
1. The student creates scale drawings.

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 create a scale drawing of a polygon on a grid using drawing tools.

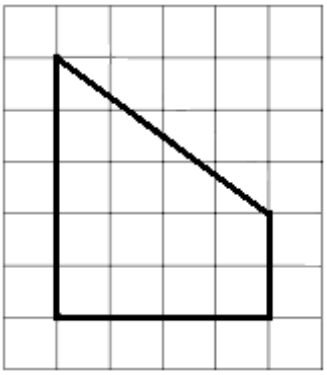
Stimulus Guidelines: Item difficulty can be adjusted via these example methods:

- Figures may consist of polygons such as quadrilaterals, trapezoids or parallelograms.
- Lengths and angles may be positive integers or rational numbers.
- Scale factor may be a positive rational number.

TM1a
Stimulus: The student is presented with a simple polygon on a grid and a scale factor.

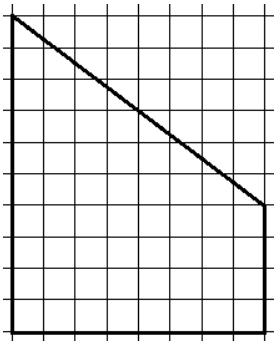
Example Stem: This figure is a scale drawing of a garden. Create another scale drawing of this figure where all side lengths are twice as long.

Use the Connect Line tool to draw the resulting figure.

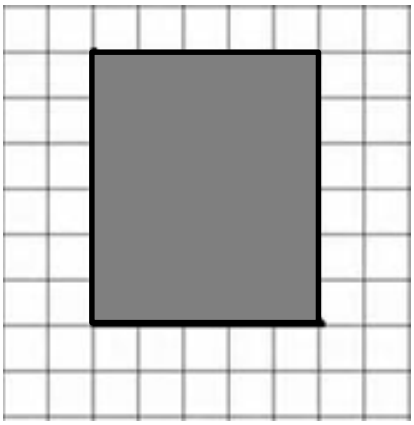


Interaction: The student is given the Connect Line, Add Point, and Delete tools to draw the polygon on a grid.

Rubric: (1 point) Student draws the correct figure with correct dimensions. Allow for correct scoring regardless of orientation of the figure (see one example of a correct response below).



Response Types: Graphing

Task Model 1 **Response Type: Equation/Numeric** **DOK Level 2** **7.G.A.1** Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale. **Evidence Required:** 1. The student creates scale drawings. 2. The student solves problems involving scale drawings using proportional reasoning. **Tools:** Calculator	**Prompt Features:** The student is prompted to give the area of an actual figure based on a scale drawing and scale factor. **Stimulus Guidelines:** Item difficulty can be adjusted via these example methods: • Types of polygons (square, rectangle, parallelogram, or right triangle). • Linear dimensions can be rational numbers. • Area can be a rational number. **TM1b** **Stimulus:** The student is presented with a polygon (square, rectangle, parallelogram, or right triangle) on a grid and the scale factor at which it was created. **Example Stem:** This diagram of a rectangular city park was drawn using a scale factor of 1 centimeter to 20 meters.  In the diagram shown, assume each square on the grid is 1 centimeter in length. What is the area, in square meters, of the actual park on which this scale drawing is based? **Rubric:** (1 point) Student enters the correct area (e.g., 12000). **Response Type:** Equation/Numeric

Task Model 2

Response Type: Equation/Numeric

DOK Level 1

7.G.A.1
Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.

Evidence Required:
2. The student solves problems involving scale drawings using proportional reasoning.

Tools: Calculator

Prompt Features: The student is prompted to give the length of one or more sides of a polygon or the scale factor being applied based on a scale drawing.

Stimulus Guidelines:

- Scale factor and side lengths may be positive rational numbers.
- Item difficulty can be adjusted via these example methods:
  - Types of polygons (square, rectangle, parallelogram, or right triangle).
  - Linear dimensions can be a combination of rational numbers.
  - Lengths of corresponding sides of similar polygons are not all labeled.
  - Inclusion of extraneous information.

TM2a
Stimulus: The student is presented with two polygons and a scale factor. A side length is given and the corresponding side is labeled with a variable.

Example Stem: Figure A is a scale image of Figure B, as shown.

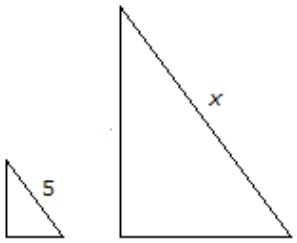
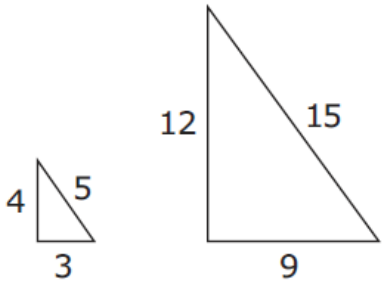


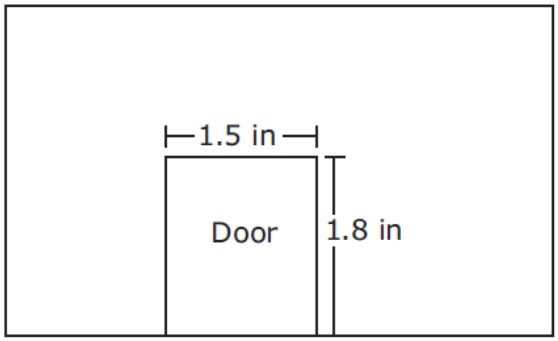
Figure A Figure B

The scale that maps Figure A onto Figure B is $1:3\frac{1}{2}$. Enter the value of x.

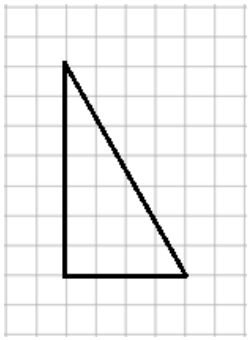
Rubric: (1 point) Student gives the correct value of the variable, which is a single numeric answer. Units, if given, should be assumed from the stem (e.g., 17.5).

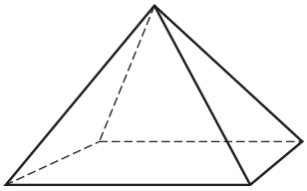
Response Type: Equation/Numeric

Task Model 2 **Response Type: Equation/Numeric** **DOK Level 1** **7.G.A.1** Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale. **Evidence Required:** 2. The student solves problems involving scale drawings using proportional reasoning. **Tools:** Calculator	**TM2b** **Stimulus:** The student is presented with two polygons with lengths of some or all corresponding sides given or indicated by a grid. **Example Stem:** Figure B is a scale image of Figure A, as shown.  **Figure A** **Figure B** Enter the scale factor applied to Figure A to produce Figure B. **Rubric:** (1 point) Student gives the correct scale factor, which is a single numeric answer. The keypad should only contain numbers (e.g., 3). **Response Type:** Equation/Numeric

Task Model 2
 	
Response Type: Equation/Numeric
 	
DOK Level 2
 	
7.G.A.1
Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.
 	
Evidence Required:
2. The student solves problems involving scale drawings using proportional reasoning.
 	
Tools: Calculator
	Prompt Features: The student is prompted to give the length of one side of an actual figure based on a scale drawing.
	
	Stimulus Guidelines:
	• Context should be familiar to 12–14 year olds.
	• Scale factor may be given in a key.
	• Item difficulty can be adjusted via these example methods:
	  ○ Numbers can be rational.
	  ○ Combinations of area and length are provided.
	  ○ Extra information is provided.
	  ○ Unit conversion is used.
	  ○ Scale factor may be a positive rational number.
	
	TM2c
	Stimulus: The student is presented with information about the area and/or dimensions of a scale drawing, including the scale factor.
	
	Example Stem: The front side of a playhouse is shown in this scale drawing. The height of the door in the drawing is 1.8 inches.
	
	The scale that maps the drawing to the actual playhouse is 1 inch to 2.5 feet.
	
	Scale Drawing of the Playhouse
	 
	
	Using the scale given, enter the actual height, in feet, of the playhouse door.
	
	Rubric: (1 point) Correct answer is a single numeric answer (e.g., 4.5).
	
	Response Type: Equation/Numeric

Task Model 2
 	
Response Type: Equation/Numeric
 	
DOK Level 2
 	
7.G.A.1
Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.
 	
Evidence Required:
2. The student solves problems involving scale drawings using proportional reasoning.
 	
Tools: Calculator
	Prompt Features: The student is prompted to give the area of an object in the real world that can be represented by a polygon based on a scale drawing.
	
	Stimulus Guidelines:
	• Context should be familiar to 12–14 year olds.
	• Item difficulty can be adjusted via these example methods:
	  ○ Dimensions can be a combination of positive rational numbers.
	  ○ Scale factor may be a positive rational number.
	
	TM2d
	Stimulus: The student is presented with a scale drawing of a polygon (square, rectangle, or right triangle) with dimensions labeled and the dimension for one side of the actual polygon given.
	
	Example Stem: This scale drawing of a rectangular rug has dimensions 8 inches by 5 inches. The length of the longer side of the actual rug is 32 feet.
	
	 
	
	Enter the area, in square feet, of the actual rug.
	
	Rubric: (1 point) Correct answer is a single numeric answer. Units should be assumed from the stem (e.g., 640).
	
	Response Type: Equation/Numeric

Task Model 3 **Response Type: Graphing** **DOK Level 1** **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 of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle. **Evidence Required:** 3. The student draws, constructs, or describes geometric shapes given certain conditions. **Tools:** None **Version 3 Update:** Retired TM3a **Accessibility Note:** Graphing items are not currently able to be Brailled. Minimize the number of items developed to TM3b.	**Prompt Features:** The student is prompted to generate geometric shapes based on given conditions. **Stimulus Guidelines:** Item difficulty can be adjusted via these example methods: • Figures may consist of triangles (right, acute, obtuse, equilateral, isosceles, scalene), quadrilaterals, trapezoids or parallelograms, or combinations of the above. • Combinations of given side lengths and angles. **TM3b** **Stimulus:** The student is presented with a series of conditions regarding a triangle or quadrilateral. The conditions should determine a unique polygon, and measurements should be positive integers reasonable for display in the workspace provided. **Example Stem:** Use the Connect Line tool to draw a triangle with a 90° angle, a side with a length of 7 units, and a side with a length of 4 units. Each square on the grid is 1 unit in length. **Interaction:** The student is given the Connect Line, Add Point, and Delete tools to generate line segments on a grid. **Rubric:** (1 point) The student correctly constructs the figure described.  **Response Type:** Graphing

Task Model 4 **Response Type: Multiple Choice, multiple correct response** **DOK Level 2** **7.G.A.3** Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right-rectangular prisms and right-rectangular pyramids. **Evidence Required:** 4. The student describes a two-dimensional figure resulting from slicing a three-dimensional figure by a plane. **Tools:** None	**Prompt Feature:** The student is prompted to identify a two-dimensional figure that results from slicing a given three-dimensional figure by a plane. **Stimulus Guidelines:** Item difficulty can be adjusted via these example methods: • Three-dimensional figures can be right-rectangular prisms or right-rectangular pyramids. • Slices may be horizontal planes or vertical planes. • Increasing number of possible answer choices. **TM4** **Stimulus:** The student is presented with a three-dimensional figure and a description of how the figure is sliced by a plane. **Example Stem:** This figure is a square pyramid.  Select **all** figures that can be formed by a vertical slice perpendicular to the base of the square pyramid. A. Isosceles Trapezoid B. Line segment C. Square D. Triangle **Answer Choices:** Answer choices will be names of polygons and can also include line segment as a choice. **Rubric:** (1 point) Student selects the correct figures (e.g., A, B, and D). **Response Type:** Multiple Choice, multiple correct response