SD Common Core State Standards Disaggregated Math Template

Domain:	Geometry	**Cluster:**	Draw, construct, and describe geometrical figures and describe the relationships between them	**Grade level:**	7

Correlating Standard in Previous Year	Number Sequence & Standard	Correlating Standard in Following Year
6.RP.3. Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.	7.G.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.	8.G.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.EE.6 Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation y = mx for a line through the origin and the equation y = mx + b for a line intercepting the vertical axis at b.

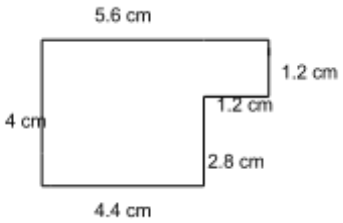
Student Friendly Language:
I can enlarge and reduce figures by a given scale. I can describe the impact of a scale on the side lengths of scaled figures. I can describe the impact of a scale on the area of scaled figures. I can find unknown side lengths of similar figures. I can find the areas of similar figures.

Know (Factual)	Understand (Conceptual) The students will understand that:	Do (Procedural, Application, Extended Thinking)
• Scale • Similar figures • Area formula/strategy	When figures are scaled, the side lengths are scaled proportionately. When figures are scaled, the angle measurements remain the same. When figures are scaled, the area changes exponentially. Missing side lengths can be found by determining the scale factor of similar figures.	Reproduce a figure at a different scale. Find missing side lengths of similar figures. Find the area of scaled figures.

Key Vocabulary:				
scale drawing	dimensions	scale factor	similar	area

Relevance and Applications: How might the grade level expectation be applied at home, on the job or in a real-world, relevant context? Include at least one example stem for the conversation with students to answer the question "why do I have to learn this"?

Katniss shows the scale drawing of her room below.

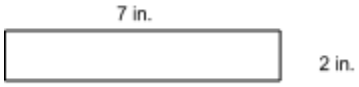


If each 2 cm on the scale drawing equals 5 ft, what are the actual dimensions of Katniss' room? Reproduce the drawing at 3 times its current size.

Solution:

5.6 cm
14 ft
1.2 cm
3 ft
2.8 cm
7 ft
4.4 cm
11 ft

If the rectangle below is enlarged using a scale factor of 1.5, what will be the perimeter and area of the new rectangle?



Solution:

The perimeter is linear or one-dimensional. Multiply the perimeter of the given rectangle (18 in.) by the scale factor (1.5) to give an answer of 27 in. Students could also increase the length and width by the scale factor of 1.5 to get 10.5 in. for the length and 3 in. for the width. The perimeter could be found by adding 10.5 + 10.5 + 3 + 3 to get 27 in.

The area is two-dimensional so the scale factor must be squared. The area of the new rectangle would be 14 x 1.5 or 31.5 in. squared.

- Provide a simple house plan for students to study. Students can calculate their own scale and recreate the floor plan on graph paper. Then, they determine the cost of carpet and laminate flooring (after researching local stores' bids on carpet and flooring) for the bedroom, living room, and kitchen in this home.

The example two story home above is illustrated at:
http://www.houseplans.com/771-square-feet-1-bedrooms-1-5-bathroom-traditional-house-plans-1-garage-35663
Teachers could also add to the experience by having students:
* calculate savings for a 15% off sale on laminate flooring
* redraw the living room to a different scale and use catalogs to draw furnishings to scale
* make a scale drawing of their own bedroom.

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6.G.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.	7.G.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.	8.G.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.*

Student Friendly Language:

I can draw freehand geometric shapes when given angle measures or side lengths.

I can draw geometric shapes when given angle measures or side lengths using a ruler and protractor.

I can draw freehand geometric shapes when given angle measures or side lengths using technology.

I can determine if three given lengths of line segments can be used to construct a triangle; and if so, how many.

I can determine if three given angle measurements can be used to construct a triangle; and if so, how many.

Know (Factual)	Understand (Conceptual) The students will understand that:	Do (Procedural, Application, Extended Thinking)
• construction of geometric shapes (freehand, ruler and protractor, technology) • triangle properties (angle sum, side lengths) • unique triangle	The sum of the angles in a triangle will always equal 180 degrees. When given three lengths, the sum of two lengths has to be greater than the length of the third side if they are going to be used to construct a triangle. Triangles can have characteristics that classify them under more than one name. For example, a triangle with dimensions of 3, 4, and 5 is a right scalene triangle.	Draw freehand geometric shapes when given specific conditions. Draw geometric shapes when given specific conditions using a ruler and protractor. Draw geometric shapes when given specific conditions using technology. Examine three lengths and determine if they could be used to create a triangle. Examine three angles and determine if they could be used to create a triangle. Create a unique triangle when given specific conditions.

Key Vocabulary:

polygonn angle triangle obtuse triangle acute triangle right triangle
scalene triangle isosceles triangle equilateral equiangular <u>unique triangle</u>
ruler freehand protractor

Relevance and Applications: How might the grade level expectation be applied at home, on the job or in a real-world, relevant context? Include at least one example stem for the conversation with students to answer the question "why do I have to learn this"?

Could you ever have a triangular yard? Here is the story. I move into this house that is located on a small acreage. Behind the barn, the previous owner left three different piles of usable sections of fence. There is a place to build a triangular fenced in area in the backyard.

Possibilities to examine are:
a. 36 feet, 15 feet, and 16 feet
b. 35 feet, 35 feet, and 35 feet
c. 22 meters, 17 meters, 16 meters
Explain how you know which group of fencing will work.

So, think about it: Which three sides of any length create a triangle? .
Solution:
"A" above will not work; "B" and "C" will work. Students recognize that the sum of the two smaller sides must be larger than the third side.

Pretend you have a huge rectangular bedroom. It is 40 ft. by 30 ft. The drawback is that you have to share it with a sibling who loves triangles. You split the room in half with one diagonal line, so you can keep your roommate happy. What kind of triangle did you just create? What is the length of this diagonal line?

Extension: Thinking about the triangle you just created, create similar triangles by doubling the dimensions of your triangle or a 10:1 scale factor. What do you observe? (NOTE for teachers: Pythagorean Theorem is NOT expected – this is an exploration experiment only.)

Another extension: Could you find the area needed to carpet your side of the room? the wood flooring for your sibling's side of the room? Why would you need to know the length of the diagonal now? (You may possibly want to put a transition strip between the carpet and wood flooring.)

Garden in a Triangle: there are three sections of metal panel fence. All three sections are the same length. What kind of triangle would I create for my garden fence? What would the angles measure in the corners of my garden?
Extension: I have special angle corners to help me build my triangle garden. I have a 33 degree angle corner, an angle corner with an unknown measurement (because its tag fell off), and a 90 degree angle corner. If I am trying to create a triangle, what does my unknown angle corner have to measure?

Construction Zone: create a sequence of steps for drawing your favorite geometric shape. Give this recipe to a friend. Did they draw what you had in mind? Or were they unable to follow directions? Try to create unusual geometric shapes for each other to design. You may eventually want to put your shapes into some type of painting or collage to display on the wall.

Draw an isosceles triangle with only one 70 degree angle for your quilt pattern block. Is this the only possibility or can another triangle be drawn that will meet these conditions? (By experimenting, students realize that the sum of the angles of any triangle will be 180 degrees.) Draw out on paper what a quilt would look like with isosceles triangles used for the quilt blocks.

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Correlating Standard in Previous Year	Number Sequence & Standard	Correlating Standard in Following Year
6.G.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.	7.G.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.	8.G.9. Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

Student Friendly Language:
I can slice 3-D figures such as right rectangular prisms and right rectangular pyramids. I can describe the 2-D figures that result from slicing 3-D figures. I can consider what 2-D figure will result depending on what part of the 3-D figure is sliced.

Know (Factual)	Understand (Conceptual) The students will understand that:	Do (Procedural, Application, Extended Thinking)
• names of three-dimensional figures (right rectangular figures, right rectangular pyramids, etc) • names of two-dimensional figures (parallelogram, trapezoid, etc) • parallel and perpendicular cuts	Two-dimensional figures result from slicing 3-D figures. The two-dimensional figures that result from slicing three-dimensional figures depend on what part of the figure (face, vertex) is sliced. The two-dimensional figures that result from slicing three-dimensional figures depends on the kind of cut (parallel, perpendicular).	Slice three-dimensional figures through a vertex. Slice and three-dimensional figures through a face. Describe the two-dimensional shape formed from a parallel cut to a given face. Describe the two-dimensional shape formed from a perpendicular cut to a given face through a vertex. Describe the two-dimensional shape formed from a perpendicular cut through a given face.

Key Vocabulary:

prism	pyramid	right angle	face	base
lateral	parallel cut	perpendicular cut	cross section	intersection

Relevance and Applications: How might the grade level expectation be applied at home, on the job or in a real-world, relevant context? Include at least one example stem for the conversation with students to answer the question "why do I have to learn this"?

http://intermath.coe.uga.edu/dictnary/descript.asp?termID=95

The Body Worlds exhibits are constructed using cross sections. How might the two-dimensional cross-section of particular body results compare to the overall three-dimensional shape?

The volume of a cube is 512 cm^3. What is the area of a cross section taken parallel to the base?

You want to create a circular stamp. Which of the following shapes could you take a cross section of to get your desired stamp and how do know? (sphere, rectangular prism, triangular pyramid, cylinder, etc)

SD Common Core State Standards Disaggregated Math Template

Domain:	Geometry	**Cluster:**	Solve real-life and mathematical problems involving angle measure, area, surface area, and volume	**Grade level:**	7

Correlating Standard in Previous Year	Number Sequence & Standard	Correlating Standard in Following Year
Introduction to standard No previous standard	7.G.4 Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.	8.G.9 Know the formulas for the volumes of cone, cylinders, and spheres and us them to solve real-world and mathematical problems.

Student Friendly Language:

I can find the relationship between radius and diameter.
I can find and explain that the ratio of circumference/diameter is pi.
I can find the area and circumference of a circle.
I can use a ratio to compare and contrast the area and circumference of a circle.

Know (Factual)	Understand (Conceptual) The students will understand:	Do (Procedural, Application, Extended Thinking)
• Formulas for area of a circle • Formulas for circumference of a circle • pi • How to find the area of a circle using the formula • How to find the circumference of a circle using the formula • Explain the source of the relationship between the circumference and area of a circle	How to discover pi. The formula for finding the area is pi times radius squared. The formula for finding the circumference is two times pi times radius or pi times diameter. The relationship between the circumference and area of a circle is Pi. How to utilize the formula for area of a circle. How to utilize the formula for the circumference of a circle.	Compare/contrast the area and circumference of a circle.

Key Vocabulary:

circle circumference diameter radius area pi π formula

Relevance and Applications: How might the grade level expectation be applied at home, on the job or in a real-world, relevant context? Include at least one example stem for the conversation with students to answer the question "why do I have to learn this"?

Students might determine what item might be priced lower based on size (price per square inch of pizza).

Students will determine which bicycle tire to use during a road race based on the circumference of the tire at a constant speed.

Students will be able to find the area and circumference of the round pen (corral) I use for training my horse.

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Domain:	Geometry	**Cluster:**	Solve real-life and mathematical problems involving angle measure, area, surface area, and volume	**Grade level:**	7

Correlating Standard in Previous Year	Number Sequence & Standard	Correlating Standard in Following Year
n/a no previous standard	7.G.5 Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.	8.G.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.

Student Friendly Language:
I can state the relationship between supplementary, complementary, and vertical angles. I can solve equations for unknown angles using supplementary, complementary, vertical, and adjacent angles. I can use angle relationships to write algebraic equations for unknown angles to solve multi-step problems.

Know **(Factual)**	**Understand** **(Conceptual)** **The students will understand:**	**Do** **(Procedural, Application, Extended Thinking)**
• Supplementary angles • Complementary angles • Vertical angles • Adjacent angles	The similarities and differences between complementary and supplementary angles. The characteristics of adjacent and vertical angles.	Create and solve equations for unknown complementary, supplementary, adjacent and vertical angles.

Key Vocabulary:
supplementary angles complementary angles vertical angles adjacent angles intersecting lines right angle acute angle obtuse angle degrees straight line or straight angle
Relevance and Applications: How might the grade level expectation be applied at home, on the job or in a real-world, relevant context? Include at least one example stem for the conversation with students to answer the question “why do I have to learn this”?
Students will create sections of a garden using supplementary, complementary, vertical, and adjacent angles. Students will be able to draw examples of angles that represent real-world objects. (a support brace for a gate, a building or bridge has many supplementary, complementary, vertical and adjacent angle, etc.).

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Domain:	Geometry	**Cluster:**	Solve real-life and mathematical problems involving angle measure, area, surface area, and volume	**Grade level:**	7

Correlating Standard in Previous Year	Number Sequence & Standard	Correlating Standard in Following Year
6.G.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. 6.G.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 = l w h and V = b h to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.	7.G.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.	8.G.9 Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

Student Friendly Language:

I can determine the area of two-dimensional figures.
I can determine the surface area and volume of three-dimensional figures.
I can solve real-world problems involving area, surface area, and volume.

Know (Factual)	Understand (Conceptual) The students will understand that:	Do (Procedural, Application, Extended Thinking)
• Formulas for area • Formulas for volume • Formulas for surface area for two- and three-dimensional objects	Area is the number of square units that cover the surface of a closed figure. Volume is the number of cubic units that fit in a closed figure. Surface area is the sum of the areas of all the faces on a three-dimensional object.	Construct a two-dimensional figure and calculate the area. Construct a three-dimensional figure and calculate the surface area and volume.

Key Vocabulary:

length width base height altitude of a triangle area surface area volume polygon right prism cube quadrilateral triangle two-dimensional three-dimensional formula triangles polygon

Relevance and Applications: How might the grade level expectation be applied at home, on the job or in a real-world, relevant context? Include at least one example stem for the conversation with students to answer the question "why do I have to learn this"?

Students will be able to determine the area of a playground and surface area of a tent.

Students can calculate the volume of popcorn kernels in a pyramid compared to a prism.

Make a birdhouse: What three dimensional figures make up the birdhouse?(rectangular prism and triangular prism) What methods could you use to find the surface area of the birdhouse? (find the area of each face and add, then subtract any overlap) How could you find the volume of the birdhouse? (Find the volume of each shape separately and then add)

Discover the surface area of boxes and containers of different shapes, such as a cylindrical container of oats, a rectangular prism such as a pasta box, and a triangle prism such as a Toblerone package.