Plainfield Public Schools
Mathematics
Unit Planning Organizer

Grade	Accelerated 7
Unit of Study	**Unit 4 Geometry**
Pacing	7 instructional weeks

Standards for Mathematical Practices
MP1. Make sense of problems and persevere in solving them.
MP2. Reason abstractly and quantitatively.
MP3. Construct viable arguments and critique the reasoning of others.
MP4. Model with mathematics.
MP5. Use appropriate tools strategically.
MP6. Attend to precision.
MP7. Look for and make use of structure.
MP8. Look for and express regularity in repeated reasoning.

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UNIT STANDARDS
7.G.2. Draw (with technology, with ruler and protractor, as well as freehand) 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.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.*** **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.** **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.** **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.** **7.RP.3. Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.** **7.EE. 4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.** a. **Solve word problems leading to equations of the form *px + q = r* and *p(x + q) = r,* where *p, q, and r* are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. *For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?*** b. **Solve word problems leading to equations of the form *px + q > r or px + q < r,* where *p, q, and r* are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. *For example: As a***

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salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make and describe the solutions.

8.G.A.1 Verify experimentally the properties of rotations, reflections, and translations:
8.G.A.1.A Lines are transformed to lines, and line segments to line segments of the same length.
8.G.A.1.B Angles are transformed to angles of the same measure.
8.G.A.1.C Parallel lines are transformed 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, and translations, and dilations; given two similar two-dimensional figures, describes 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.

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"Unwrapped" Skills (students need to be able to do)	"Unwrapped" Concepts (students need to know)	DOK Levels
FOCUS STANDARD: **7.RP.3. Use proportional relationships to solve multistep ratio and percent problems. *Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.***		
Use Solve	Proportional Relationships Ratio Percent	2 3

"Unwrapped" Skills (students need to be able to do)	"Unwrapped" Concepts (students need to know)	DOK Levels
FOCUS STANDARD: **7.EE.B.4Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.**		
Use Construct	Equations Inequalities	2 3

"Unwrapped" Skills (students need to be able to do)	"Unwrapped" Concepts (students need to know)	DOK Levels
FOCUS STANDARD: **7.EE.B.4.A Solve word problems leading to equations of the form px + q = r and p(x + q) = r, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. *For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?***		
Solve	Variable Equations and inequalities	2 3

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"Unwrapped" Skills (students need to be able to do)	"Unwrapped" Concepts (students need to know)	DOK Levels
FOCUS STANDARD: **7.EE. 4b. Solve word problems leading to equations of the form *px + q > r or px + q < r,* where *p, q, and r* are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. *For example: As a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make and describe the solutions*.**		
Solve Graph	Equations inequalities	2 2 3

"Unwrapped" Skills (students need to be able to do)	"Unwrapped" Concepts (students need to know)	DOK Levels
ADDITIONAL STANDARD: ***7.G.2. Draw (with technology, with ruler and protractor, as well as freehand) 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.***		
Draw	Geometric figures	2

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"Unwrapped" Skills (students need to be able to do)	"Unwrapped" Concepts (students need to know)	DOK Levels
ADDITIONAL STANDARD: **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.**		
Describe	Two – dimensional figures Three dimensional figures	1

"Unwrapped" Skills (students need to be able to do)	"Unwrapped" Concepts (students need to know)	DOK Levels
ADDITIONAL 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.**		
Know Solve	Circumference area	1 2

"Unwrapped" Skills (students need to be able to do)	"Unwrapped" Concepts (students need to know)	DOK Levels
ADDITIONAL 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.**		
Use Solve	Simple equations	2 2

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"Unwrapped" Skills (students need to be able to do)	"Unwrapped" Concepts (students need to know)	DOK Levels
ADDITIONAL STANDARD: **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.**		
Solve	Area, Volume, surface area	2

"Unwrapped" Skills (students need to be able to do)	"Unwrapped" Concepts (students need to know)	DOK Levels
ADDITIONAL STANDARD: **8.G.1 Verify experimentally the properties of rotations, reflections, and translations.**		
Verify	Rotation, reflection, translation	1

"Unwrapped" Skills (students need to be able to do)	"Unwrapped" Concepts (students need to know)	DOK Levels
ADDITIONAL STANDARD **8.G.A.1.A Lines are transformed to lines, and line segments to line segments of the same length.**		
(Verify)	Line, line segment	1

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"Unwrapped" Skills (students need to be able to do)	"Unwrapped" Concepts (students need to know)	DOK Levels
ADDITIONAL STANDARD: 8.G.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.		
Understand	congruent , rotations, reflections, and translations;	1

"Unwrapped" Skills (students need to be able to do)	"Unwrapped" Concepts (students need to know)	DOK Levels
ADDITIONAL STANDARD: 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, and translations, and dilations; given two similar two-dimensional figures, describes a sequence that exhibits the similarity between them.		
Understand	rotations, reflections, and translations, and dilations;	1

"Unwrapped" Skills (students need to be able to do)	"Unwrapped" Concepts (students need to know)	DOK Levels
ADDITIONAL STANDARD: 8.G.5 Use 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.		
Use	the angle sum , exterior angle of triangles, parallel lines ,a transversal, and the angle-angle criterion for similarity of triangles.	2

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II. Mathematical Standards & Practices …….. …Examples and Explanations

Geometry (G)

Draw, construct, and describe geometrical figures and describe the relationships between them.

Standards *Students are expected to:*	*Mathematical Practices*	*Explanations and Examples*
7.G.2. Draw (with technology, with ruler and protractor, as well as freehand) 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.MP.4. Model with mathematics.* *7.MP.5. Use appropriate tools strategically.* *7.MP.6. Attend to precision.* *7.MP.7. Look for and make use of structure.* *7.MP.8. Look for and express regularity in repeated reasoning.*	Conditions may involve points, line segments, angles, parallelism, congruence, angles, and perpendicularity. Examples: • Is it possible to draw a triangle with a 90˚ angle and one leg that is 4 inches long and one leg that is 3 inches long? If so, draw one. Is there more than one such triangle? • Draw a triangle with angles that are 60 degrees. Is this a unique triangle? Why or why not? • Draw an isosceles triangle with only one 80 degree angle. Is this the only possibility or can you draw another triangle that will also meet these conditions?  • Can you draw a triangle with sides that are 13 cm, 5 cm and 6cm? • Draw a quadrilateral with one set of parallel sides and no right angles.
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.	*7.MP.2. Reason abstractly and quantitatively.* *7.MP.4. Model with mathematics.* *7.MP.5. Use appropriate tools strategically.* *7.MP.7. Look for and make use of structure.*	Example: • Using a clay model of a rectangular prism, describe the shapes that are created when planar cuts are made diagonally, perpendicularly, and parallel to the base.

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		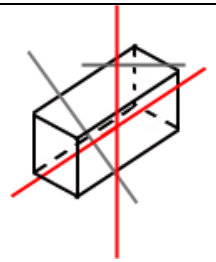

Geometry (G)

Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.

Standards *Students are expected to:*	*Mathematical Practices*	*Explanations and Examples*
7.G.B.4. Know the formulas for the area and circumference of a circle and solve problems; give an informal derivation of the relationship between the circumference and area of a circle.	*7.MP.1.* Make sense of problems and persevere in solving them. *7.MP.2.* Reason abstractly and quantitatively. *7.MP.3.* Construct viable arguments and critique the reasoning of others. *7.MP.4.* Model with mathematics. *7.MP.5.* Use appropriate tools strategically. *7.MP.6.* Attend to precision. *7.MP.7.* Look for and make use of structure. *7.MP.8.* Look for and express regularity in repeated reasoning.	Examples: ● The seventh grade class is building a mini golf game for the school carnival. The end of the putting green will be a circle. If the circle is 10 feet in diameter, how many square feet of grass carpet will they need to buy to cover the circle? How might you communicate this information to the salesperson to make sure you receive a piece of carpet that is the correct size? ● Students measure the circumference and diameter of several circular objects in the room (clock, trash can, door knob, wheel, etc.). Students organize their information and discover the relationship between circumference and diameter by noticing the pattern in the ratio of the measures. Students write an expression that could be used to find the circumference of a circle with any diameter and check their expression on other circles. ● Students will use a circle as a model to make several equal parts as you would in a pie model. The greater number the cuts, the better. The pie pieces are laid out to form a shape similar to a parallelogram. Students will then write an expression for the area of the parallelogram related to the radius (note: the length of the base of the parallelogram is half the circumference, or πr, and the height is r, resulting in an area of πr^2. Extension: If students are given the circumference of a circle, could they write a formula to determine the circle's area or, given the area of a circle, could they write the formula for the circumference?

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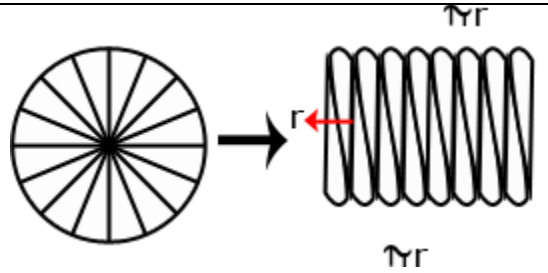
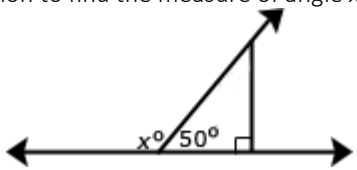
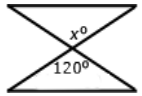
		

Geometry (G)

Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.

Standards *Students are expected to:*	*Mathematical Practices*	*Explanations and Examples*
7.G.B.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.	*7.MP.3.* Construct viable arguments and critique the reasoning of others. *7.MP.4.* Model with mathematics. *7.MP.5.* Use appropriate tools strategically. *7.MP.6.* Attend to precision. *7.MP.7.* Look for and make use of structure.	Angle relationships that can be explored include but are not limited to: ● Same-side (consecutive) interior and same-side (consecutive) exterior angles are supplementary. Examples: ● Write and solve an equation to find the measure of angle *x*.  ● Write and solve an equation to find the measure of angle *x*. 

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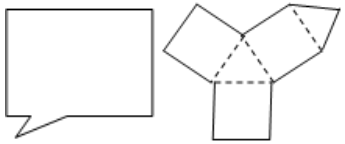
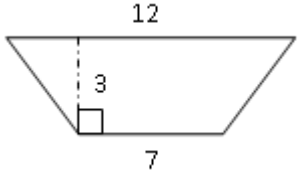
7.G.B.6. Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.	*7.MP.1.* Make sense of problems and persevere in solving them. *7.MP.2.* Reason abstractly and quantitatively. *7.MP.3.* Construct viable arguments and critique the reasoning of others. *7.MP.4.* Model with mathematics. *7.MP.5.* Use appropriate tools strategically. *7.MP.6.* Attend to precision. *7.MP.7.* Look for and make use of structure. *7.MP.8.* Look for and express regularity in repeated reasoning.	Students understanding of volume can be supported by focusing on the area of base times the height to calculate volume. Students understanding of surface area can be supported by focusing on the sum of the area of the faces. Nets can be used to evaluate surface area calculations. **Examples**: • Choose one of the figures shown below and write a step by step procedure for determining the area. Find another person that chose the same figure as you did. How are your procedures the same and different? Do they yield the same result?  • A cereal box is a rectangular prism. What is the volume of the cereal box? What is the surface area of the cereal box? (Hint: Create a net of the cereal box and use the net to calculate the surface area.) Make a poster explaining your work to share with the class. *Continued on next page* • Find the area of a triangle with a base length of three units and a height of four units. • Find the area of the trapezoid shown below using the formulas for rectangles and triangles. 

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Expressions and Equations (EE)

Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

Standards *Students are expected to:*	*Mathematical Practices*	*Explanations and Examples*
7.EE.B.4. Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. a. Solve word problems leading to equations of the form *px+q=r* and *p(x+q)=r*, where *p*, *q*, and *r* are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. *For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?* *Continued on next page*	*7.MP.1.* Make sense of problems and persevere in solving them. *7.MP.2.* Reason abstractly and quantitatively. *7.MP.3.* Construct viable arguments and critique the reasoning of others. *7.MP.4.* Model with mathematics. *7.MP.5.* Use appropriate tools strategically. *7.MP.6.* Attend to precision. *7.MP.7.* Look for and make use of structure. *7.MP.8.* Look for and express regularity in repeated reasoning.	**Examples**: ● Amie had $26 dollars to spend on school supplies. After buying 10 pens, she had $14.30 left. How much did each pen cost? ● The sum of three consecutive even numbers is 48. What is the smallest of these numbers? ● Solve: $\frac{5}{4}n + 5 = 20$ ● Florencia has at most $60 to spend on clothes. She wants to buy a pair of jeans for $22 dollars and spend the rest on t-shirts. Each t-shirt costs $8. Write an inequality for the number of t-shirts she can purchase. ● Steven has $25 dollars. He spent $10.81, including tax, to buy a new DVD. He needs to set aside $10.00 to pay for his lunch next week. If peanuts cost $0.38 per package including tax, what is the maximum number of packages that Steven can buy? Write an equation or inequality to model the situation. Explain how you determined whether to write an equation or inequality and the properties of the real number system that you used to find a solution. ● Solve $\frac{1}{2}x + 3 > 2$ and graph your solution on a number line.

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Expressions and Equations (EE) **Solve real-life and mathematical problems using numerical and algebraic expressions and equations.** *continued*		
Standards *Students are expected to:*	*Mathematical Practices*	*Explanations and Examples*
7.EE.B.4. *continued* b. Solve word problems leading to inequalities of the form $px+q>r$ or $px+q<r$, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. *For example: As a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solutions.*		

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<table>
<tr>
<td>7.RP.A.3. Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.</td>
<td>7.MP.1. Make sense of problems and persevere in solving them.

7.MP.2. Reason abstractly and quantitatively.

7.MP.3. Construct viable arguments and critique the reasoning of others.

7.MP.4. Model with mathematics.

7.MP.5. Use appropriate tools strategically.

7.MP.6. Attend to precision.

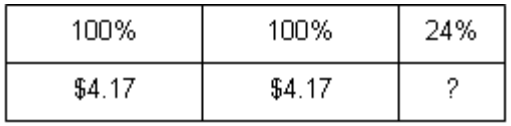
7.MP.7. Look for and make use of structure.

7.MP.8. Look for and express regularity in repeated reasoning.</td>
<td>Students should be able to explain or show their work using a representation (numbers, words, pictures, physical objects, or equations) and verify that their answer is reasonable. Models help students to identify the parts of the problem and how the values are related. For percent increase and decrease, students identify the starting value, determine the difference, and compare the difference in the two values to the starting value.

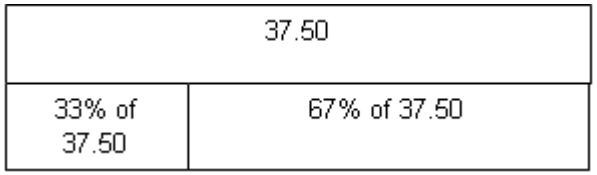
Examples:
● Gas prices are projected to increase 124% by April 2015. A gallon of gas currently costs $4.17. What is the projected cost of a gallon of gas for April 2015?

A student might say: “The original cost of a gallon of gas is $4.17. An increase of 100% means that the cost will double. I will also need to add another 24% to figure out the final projected cost of a gallon of gas. Since 25% of $4.17 is about $1.04, the projected cost of a gallon of gas should be around $9.40.”

$4.17 + 4.17 + (0.24 · 4.17) = 2.24 x 4.17

● A sweater is marked down 33%. Its original price was $37.50. What is the price of the sweater before sales tax?

The discount is 33% times 37.50. The sale price of the sweater is the original price minus the discount or 67% of the original price of the sweater, or Sale Price = 0.67 x Original Price.</td>
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7.RP.A.3. *continued*		• A shirt is on sale for 40% off. The sale price is \$12. What was the original price? What was the amount of the discount?  $0.60p = 12$ • At a certain store, 48 television sets were sold in April. The manager at the store wants to encourage the sales team to sell more TVs and is going to give all the sales team members a bonus if the number of TVs sold increases by 30% in May. How many TVs must the sales team sell in May to receive the bonus? Justify your solution. • A salesperson set a goal to earn \$2,000 in May. He receives a base salary of \$500 as well as a 10% commission for all sales. How much merchandise will he have to sell to meet his goal? • After eating at a restaurant, your bill before tax is \$52.60. The sales tax rate is 8%. You decide to leave a 20% tip for the waiter based on the pre-tax amount. How much is the tip you leave for the waiter? How much will the total bill be, including tax and tip? Express your solution as a multiple of the bill. The amount paid = 0.20 x \$52.50 + 0.08 x \$52.50 = 0.28 x \$52.50.

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Geometry (G) **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 transformed to lines, and line segments to line segments of the same length. b. Angles are transformed to angles of the same measure. c. Parallel lines are tranformed to parallel lines.	*8.MP.4. Model with mathematics.* *8.MP.5. Use appropriate tools strategically.* *8.MP.6. Attend to precision.* *8.MP.7. Look for and make use of structure.* *8.MP.8. Look for and express regularity in repeated reasoning.*	Students need multiple opportunities to explore the transformation of figures so that they can appreciate that points stay the same distance apart and lines stay at the same angle after they have been rotated, reflected, and/or translated. Students are not expected to work formally with properties of dilations until high school.

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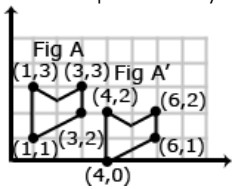
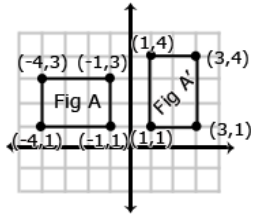
8.G.A.2. Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.	*8.MP.2.* Reason abstractly and quantitatively. *8.MP.4.* Model with mathematics. *8.MP.6.* Attend to precision. *8.MP.7.* Look for and make use of structure.	Examples: ● Is Figure A congruent to Figure A'? Explain how you know.  ● Describe the sequence of transformations that results in the transformation of Figure A to Figure A'. 

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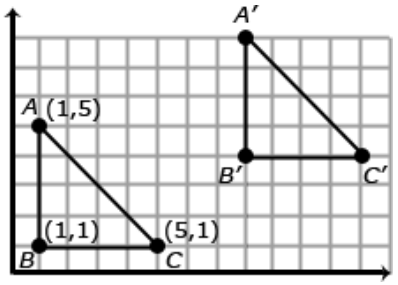
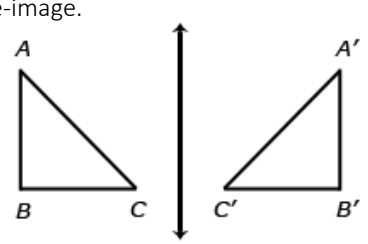
8.G.A.3. Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.	*8.MP.3.* Construct viable arguments and critique the reasoning of others. *8.MP.4.* Model with mathematics. *8.MP.5.* Use appropriate tools strategically. *8.MP.6.* Attend to precision. *8.MP.7.* Look for and make use of structure.	Dilation: A dilation is a transformation that moves each point along a ray emanating from a fixed center, and multiplies distances from the center by a common scale factor. In dilated figures, the dilated figure is *similar* to its pre-image. Translation: A translation is a transformation of an object that moves the object so that every point of the object moves in the same direction as well as the same distance. In a translation, the translated object is *congruent* to its pre-image. • ΔABC has been translated 7 units to the right and 3 units up. To get from A (1,5) to A' (8,8), move A 7 units to the right (from $x = 1$ to $x = 8$) and 3 units up (from $y = 5$ to $y = 8$). Points B + C also move in the same direction (7 units to the right and 3 units up).  Reflection: A reflection is a transformation that flips an object across a line of reflection (in a coordinate grid the line of reflection may be the x or y axis). In a rotation, the rotated object is *congruent* to its pre-image.  $\triangle ABC \cong \triangle A'B'C'$ When an object is reflected across the y axis, the reflected x coordinate is the opposite of the pre-image x coordinate.

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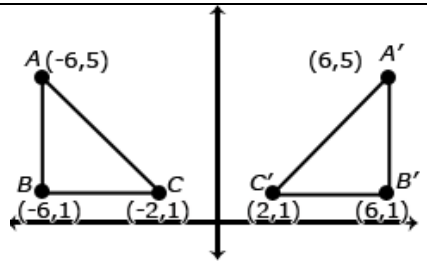
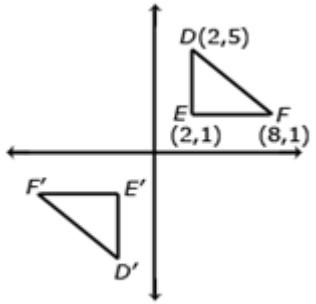


Rotation: A rotated figure is a figure that has been turned about a fixed point. This is called the center of rotation. A figure can be rotated up to 360˚. Rotated figures are *congruent* to their pre-image figures.

- Consider when ΔDEF is rotated 180˚ clockwise about the origin. The coordinates of ΔDEF are D(2,5), E(2,1), and F(8,1). When rotated 180˚, $\Delta D'E'F'$ has new coordinates D'(-2,-5),
  E'(-2,-1) and F'(-8,-1). Each coordinate is the opposite of its pre-image.



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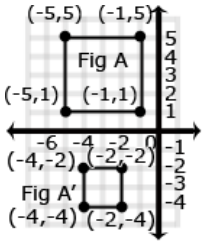
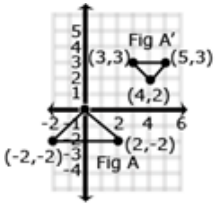
8.G.A.4. Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.	*8.MP.2.* Reason abstractly and quantitatively. *8.MP.4.* Model with mathematics. *8.MP.5.* Use appropriate tools strategically. *8.MP.6.* Attend to precision. *8.MP.7.* Look for and make use of structure.	**Examples**: ● Is Figure A similar to Figure A'? Explain how you know.  ● Describe the sequence of transformations that results in the transformation of  Figure A to Figure A'.
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*	*8.MP.3.* Construct viable arguments and critique the reasoning of others. *8.MP.4.* Model with mathematics. *8.MP.5.* Use appropriate tools strategically. *8.MP.6.* Attend to precision. *8.MP.7.* Look for and make use of structure.	Students can informally prove relationships with transversals. **Example**: ● Show that m $\angle 3$ + $m\angle 4$ + $m\angle 5$ = 180˚ if l and *m* are parallel lines and t_1 & t_2 are transversals. $\angle 1$ + $\angle 2$ + $\angle 3$ = 180˚. Angle 1 and Angle 5 are congruent because they are corresponding angles ($\angle 5 \cong \angle 1$). $\angle 1$ can be substituted for $\angle 5$. $\angle 4 \cong \angle 2$ because alternate interior angles are congruent. $\angle 4$ can be substituted for $\angle 2$. Therefore $m\angle 3$ + $m\angle 4$ + $m\angle 5$ = 180˚

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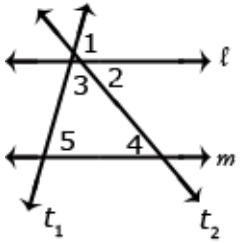
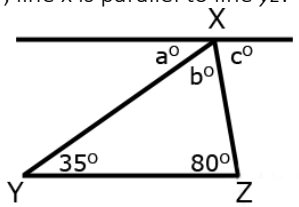
argument in terms of transversals why this is so.		 Students can informally conclude that the sum of a triangle is 180° (the angle-sum theorem) by applying their understanding of lines and alternate interior angles. Examples: ● In the figure below, line x is parallel to line *yz*:  $\overline{X} \parallel \overline{YZ}$ ● Angle *a* is 35 ° because it alternates with the angle inside the triangle that measures 35 °. Angle *c* is 80 ° because it alternates with the angle inside the triangle that measures 80 °. Because lines have a measure of 180 °, and angles *a + b + c* form a straight line, then angle *b* must be 65 ° (180 – 35 + 80 = 65). Therefore, the sum of the angles of the triangle are 35 ° + 65 ° + 80 °.

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III. Essential Questions ……Corresponding Big Ideas

Essential Questions	Corresponding Big Ideas
How do you calculate the surface area and volume of a prism?	Decomposing and rearranging provided a geometric way of both seeing that a measurement formula is the right one and seeing why it is the right one.
As the dimension of a prism by a certain scale factor; how do the volume and surface area change?	In addition to decomposing and rearranging, shearing provides another geometric way of both seeing that a measurement formula is the right one and seeing why it is the right one.
	Geometric images provide the content in relation to which properties can be noticed, definitions can be made, and invariances can be discerned.
How for you find the volume of any prism?	Symmetry provides a powerful way of working geometrically.
What surface shapes and three dimensional figures can be created by slicing a prism in any direction?	Geometric awareness develops through practice in visualizing, diagramming and constructing.
How is the circumference of circle used to derive the area of a circle?	Tools provide new sources of imagery as well as specific ways of thinking about geometric objects and processes,
How do shapes change after each transformation? How are they the same?	Geometric thinking turn tools into objects, and in geometry the process of turning an action undertaken with a tool into am object happens over and over again.
How do you manipulate a figure on the coordinate plane?	Naming is just not about nomenclature: it draws attention to properties and objects of geometric interest,
What are some examples from the real world of transformational geometry?	Definition can both generate and reflect structure; definitions are often dependent on a specific classification.

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Given the pre-image, how can you determine what transformation has taken place? What kinds of patterns/designs can be created through multiple transformations?	Conjectures can emerge out of a problem –posing process that generates claims that need to be justified. *Source:* *Lloyd, G., Herbel-Eisenmann, B., & Star, J.R. (2011). Developing essential understanding of Geometry in Grades 6-8. Reston, VA: The National Council of Teachers of Mathematics, Inc*

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IV. Student Learning Goals

Student Learning Goals	Concepts/Skills	***Instructional Clarification as per PARCC Mathematics Test Specification***	Mathematical Practices
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. 7.G.B.4	**Concept(s):** • Circumference **Students are able to:** • solve problems by finding the area and circumference of circles. • show that the area of a circle can be derived from the circumference.	• Tasks may or may not have context. • Tasks may require answers to be written in terms of π • Tasks require students to identify or produce a logical conclusion about the relationship between the circumference and the area of a circle	MP.1 MP.2 MP.3 MP.4 MP.5 MP.6 MP.7 MP.8
Write and solve *simple* multi-step algebraic equations involving supplementary, complementary, vertical, and adjacent angles. 7.G.B.5, 7.EE.B.4, 7.EE.B.4a	Concept(s): No new concept(s) introduced **Students are able to:** • use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations. • solve mathematical problems by writing and solving simple algebraic equations based on the relationships between and properties of angles	• Tasks may or may not have context. • Tasks involving writing or solving an equation should not go beyond the equation types described in 7.EE.4a. [px +q = r and p(x + q) = r where p, q, and r are specific rational numbers.]	MP.3. MP.4 MP.5 MP.6. MP.7

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	(supplementary, complementary, vertical, and adjacent. • write an equation of the form px + q = r or p (x + q) =r in order to solve a word problem. • fluently solve equations of the form px + q = r and p(x + q)=r		
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. 7.G.B.6.	**Concept(s):** No new concept(s) introduced **Students are able to:** • solve real-world and mathematical problems involving area of two dimensional objects composed of triangles, quadrilaterals, and polygons. • solve real-world and mathematical problems involving volume of three dimensional objects composed of cubes and right prisms. • solve real-world and mathematical problems involving surface area of three-dimensional objects composed of cubes and right prisms	• Tasks may or may not have context.	MP.1 MP.2. MP.3. MP.4 MP.5. MP.6. MP.7.
Use freehand, mechanical (i.e. ruler, protractor) and technological tools to draw geometric shapes with given conditions (e.g.	**Concept(s):** • Conditions for unique triangles, more than one triangle, and no triangle. **Students are able to:** • draw geometric shapes with given	• Tasks do not have a context. • Most of tasks should focus on the drawing component of this evidence statement.	MP.3. MP.5 MP.6 MP.7

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scale factor), focusing on constructing triangles. 7.G.B.2	conditions, including constructing triangles from three measures of angles or sides. recognize conditions determining a unique triangle, more than one triangle, or no triangle		
Describe all of the 2-dimensional figures that result when a 3-dimemsional figures are sliced from multiple angles. 7.G.A.3	**Concept(s):** • Cross-sections of three-dimensional objects **Students are able to:** • analyze three dimensional shapes (right rectangular pyramids and prisms) by examining and describing all of the 2-dimensional figures that result from slicing it at various angles.	Tasks have "thin context" or no context.	MP.5 MP.6 MP.7
Solve multi-step ratio and percent problems using proportional relationships (*simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error).* 7.RP.A.3	**Concept(s):** • Recognize percent as a ratio indicating the quantity *per one hundred.* **Students are able to:** • use proportions to solve multistep percent problems including simple interest, tax, markups, discounts, gratuities, commissions, fees, percent increase, percent decrease, percent error. • use proportions to solve multistep ratio problems.	• Solve multi-step contextual problems with degree of difficulty appropriate to grade 7, requiring application of knowledge and skills articulated in 6.RP.A, 6.EE.C, 6.G.	MP.1 MP.2 MP.4. MP.5 MP.6 MP.7.

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Explain and model the properties of rotations, reflections, and translations with physical representations and/or geometry software using pre-images and resultant images of lines, line segments, and angles. 8.G.A.1, 8.G.A.1a, 8.G.A.1b, 8.G.A.1c	**Concept(s):** • A property of rigid motion transformations (rotation, reflection, and translation) is that the measure of a two-dimensional object under the transformation remains unchanged. **Students are able to**: • show and explain that performing rotations, reflections, and translations on lines results in a line. • show and explain that performing rotations, reflections, and translations on line segments results in a line segment and does not alter the length of the line segment. • show and explain that performing rotations, reflections, and translations on angles results in an angle and does not alter the measure of the angle. • show and explain that performing rotations, reflections, and translations on parallel lines results in parallel lines. • explain that a property of rigid motion transformations (rotation, reflection, and translation) is that		MP.3 MP.5 MP.8

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	the measure of a two-dimensional object under the transformation remains unchanged		
Describe and perform a sequence of rotations, reflections, and/or translations on a two dimensional figure in order to prove that two figures are congruent. 8.G.A.2	**Concept(s):** • 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. **Students are able to**: • given two congruent figures, describe a transformation or sequence of transformations that shows the congruence between them.	.	MP.2 MP.7.
Use the coordinate plane to locate images or pre-images of two-dimensional figures and determine the coordinates of a resultant image after applying dilations, rotations, reflections, and translations. 8.G.A.3	**Concept(s**): No new concept(s) introduced **Students are able to**: • describe, using coordinates, the resulting two-dimensional figure after applying dilations with scale factor greater than, less than, and equal to 1. • describe, using coordinates, the resulting two-dimensional figure after applying translation, rotation, and reflection.	.	MP.2 MP.3 MP.5
Use the coordinate plane to locate images or pre-images of two-dimensional figures and determine the coordinates of a resultant image after applying dilations, rotations, reflections, and	**Concept(s**): No new concept(s) introduced **Students are able to:** • describe, using coordinates, the resulting two-dimensional figure after applying dilations with scale factor greater than, less than, and equal to 1. • describe, using coordinates, the		MP.2. MP.3 MP.5

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translations8.G.A.3	resulting two-dimensional figure after applying translation, rotation, and reflection.		
Apply an effective sequence of transformations to determine that figures are similar when corresponding angles are congruent and corresponding sides are proportional. Write similarity statements based on such transformations. 8.G.A.5	**Concept(s):** • 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. • Congruent figures are also similar. **Students are able to:** • describe a transformation or sequence of transformations that show the similarity between them given two similar two-dimensional figures.	.	MP.2. MP.3 MP.5
Give informal arguments to justify facts about the exterior angles of a triangle, the sum of the measures of the interior angles of a triangle, the angle-angle relationship used to determine similar triangles, and the angles created when parallel lines are cut by a transversal. 8.G.A.5	**Concept(s)**: No new concept(s) introduced **Students are able to:** • give informal arguments to establish facts about the angle sum of triangles. • give informal arguments to establish facts about exterior angles of triangles. • give informal arguments to establish facts about the angles created when parallel lines are cut by a transversal. • give informal arguments to establish the angle-angle criterion for similarity of triangles		MP.3 MP.5 MP.6

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IV. Unit Vocabulary

Unit Vocabulary			
Cone Cylinder Rectangular Prism Right Prism Prism Pyramid Sphere Triangular Circumference Diameter Radius Volume Area Surface area Net	Line segment Perpendicular line Parallel line Right angle Vertical Angle Adjacent angle Supplementary angles Complementary angles Exterior angles Interiors angles Polygons Regular polygon Irregular polygon	Rotation Reflection Translation Dilation	

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V. Differentiation/ Modifications Teaching Strategies

Research Based Effective Teaching Strategies	**Modifications (How do I differentiate instruction?)**	**Special Education**	**Strategies for English Language Learners**
Task /Activities that solidifies mathematical concepts Use questioning techniques to facilitate learning Reinforcing Effort, Providing Recognition Practice, reinforce and connect to other ideas within mathematics Promotes linguistic and nonlinguistic representations Cooperative Learning Setting Objectives, Providing Feedback Varied opportunities for students to communicate mathematically Use technological and /or	**Modifications** Before or after school tutorial program Leveled rubrics Increased intervention Small groups Change in pace Calculators Extended time Alternative assessments Tiered activities/products Color coded notes Use of movements Use any form of technology **Extension** *See Connected Math Program Classroom Differentiating for Gifted Students* *Students log and register onto https://calculationnation.nctm.org/ to play game Flip-n-Slide.Have two students compete against*	Change in pace Calculators Alternative assessments Accommodations as per IEP Modifications as per IEP Use graphic organizer to clarify mathematical functions for students with processing and organizing difficulties'. Constant review of math concepts to strengthen understanding of prior concepts for difficulties recalling facts. Use self-regulations strategies for student to monitor and assess their thinking and performance for difficultly attending to task Cooperative learning (small group, teaming, peer assisted	*Whiteboards* *Small Group / Triads* *Word Walls* *Partially Completed Solution* *Gestures* *Native Language Supports* *Pictures / Photos* *Partner Work* *Work Banks* *Teacher Modeling* *Math Journals* *See Connected Math Program Classroom Differentiating for English Language Learners*

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physical tools	*each other. After each move, the player who did not move should describe the path of the other player's triangle. The player who is moving should write down his path, and the player who is trying to guess should either dictate the path to the first player or write it down. The players can compare their paths to see if they match.* *Students can create creative pieces to help them remember the rules of transformations (ex: short story, song, poem, etc.).* *Give students two consecutive transformations. Then, have students try to find one transformation that gives the same result. They can create a record to see if there are any*	tutoring) to foster communication and strengthen confidence. Use technology and/or hands on devices to: clarify abstract concepts and process for: 1. Difficulty interpreting pictures and diagram. 2.difficulties with oral communications 3. Difficulty correctly identifying symbols of numeral 4.Difficulty maintaining attentions Simplify and reduces strategies / Goal structure to enhance motivation, foster independence and self-direction for: 1.Difficulty attending to task 2. Difficulty with following a	

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21st Century Learning Skills : Teamwork and Collaboration Initiative and Leadership Curiosity and Imagination Innovation and Creativity Critical thinking and Problem Solving Flexibility and Adaptability Effective Oral and Written Communication Accessing and Analyzing Information	*patterns of which transformations will and won't work.*	sequence of steps to solution. 3.Difficulty processing and organizing Scaffolding math idea/concepts guided practice and questioning strategies' to clarify and enhance understanding of math big ideas for : 1.Difficulty with process and organization 2.Difficulty with oral and written communication Models strategies' and think out aloud strategies to specify step by step process for 1.Difficulties processing and organization 2. Difficulty attending to tasks.	

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		Use bold numbers and/or words to draw students' attention to important information. *See Connected Math Program Classroom Differentiating for Special Needs*	

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VI. Instructional Resources

<table>
<tr><th colspan="3">Instructional Resources and Materials</th></tr>
<tr><th>Formative Assessment</th><th colspan="2">Print</th></tr>
<tr><td rowspan="3">Short constructed responses
Extended responses
Checks for Understanding
Exit tickets
Teacher observation
Projects
Timed Practice Test – Multiple Choice & Open-Ended Questions
<u>Performance Tasks:</u>

<u>7</u>
<u>7.G.B.6, 7.RP.A.3 Sand under the Swing Set</u>

<u>8.G.A.1 Reflections, Rotations, and Translations</u>

<u>Additional Performance Tasks</u>
<u>7.G.B.4 Wedges of a Circle</u>
<u>7.G.B.4 Eight Circles</u>
<u>7.G.A.2 A task related to 7.G.A.2</u>
<u>7.G.A.3 Cube Ninjas!</u>
<u>8.G.A.2 Congruent Triangles</u>
<u>8.G.A.3 Effects of Dilations on Length, Area, and Angles</u></td><td colspan="2">Connected Math Program Grade 7 Unit: Filling and Wrapping; Investigation 3-4
Connected Math Program Grade 7 Unit: Shape and Designs: Investigation 2-3
<u>Scope and Sequence Connected Math Program 3</u>
Connected Math Program 3 Grade 8 Unit: Butterflies, Pinwheels and Wallpaper: Symmetry and Transformation</td></tr>
<tr><td colspan="2">Additional Print and Digital Resources</td></tr>
<tr><td>Resources for teachers
<u>Annenberg Learning : Insight into Algebra 1</u>
<u>National Council of Teachers of Mathematics</u>
<u>Mathematics Assessment Projects</u>
<u>Achieve the Core</u>
<u>Illustrative Mathematics</u>
<u>Mathematics Assessment Projects</u>
<u>Get the Math</u>
<u>Webmath.com</u>
<u>sosmath.com</u>
<u>Mathplanet.com</u>
<u>Interactive Mathematics.com</u>
<u>Inside Mathmatics.org</u>
<u>Asia Pacific Economic Cooperation : :Lesson Study Videos</u>
<u>Genderchip.org</u>
<u>Interactive Geometry</u>
<u>Mathematical Association of America</u>
<u>learner.org</u>
<u>Connected Math Project (Michigan State University)</u></td><td>Resources for Students
<u>My Math Universe.com</u>
<u>Math is Fun website</u>
<u>Khan Academy</u>
<u>Figure This.org website</u>
<u>Virtual Nerd website</u>
<u>Math Snacks websites</u>
<u>Internet 4 Classroom website</u>
<u>A Maths Dictionary for kids</u></td></tr>
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Project *Teach 21 Problem Based Learning Project : The Art of Math*	*My Pearson Training : Connected Math Program*	

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