**Unit Abstract:**

The students will explore similarity and congruence. More specifically, they will be able to identify congruent and similar figures in the coordinate plane and use mapping rules to manipulate figures to insure congruence and/or similarity. Students will be able to identify angles and the relationships among angles associated with paralletl lines cut by transversals.

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| **Overarching Question:** How is the congruence of figures maintained through transformations and what changes and stays the same when we transform a figure into a similar figure? | | | | | | |
|  | | **This Unit:** congruence, similarity, parallel lines cut by a transversal, straight and triangular angle relationships | | | |  |
| **Questions to Focus Assessment and Instruction:**   * How do you prove two figures in the coordinate plane are congruent? * How do you prove two figures in a coordinate plane are similar? * How do “mapping rules” help us to move figures accurately? * How can we describe changes in a figures position accurately? * How can we express transformations with an algebraic language? | | | | **Standards for Mathematical Practice**  1.Make sense of problems and persevere in solving them.  **2.Reason abstractly and quantitatively.**  **3.Construct viable arguments and critique the reasoning of others.**  4.Model with mathematics.  5.Use appropriate tools strategically.  6.Attend to precision.  **7.Look for and make use of structure.**  8.Look for and express regularity in repeated reasoning. | | |
| **Academic Vocabulary**  *(5-8 most important content specific vocabulary words)* | Transformations  Reflection  Rotation  Dilation  Translation  Congruent  Similar figures  Transversal | |  | |  | |

| **Standards** | **Learning Targets** *(including relevant practice standards)* | **Explanations and Examples\*** | | **Assured Experiences**  *(common assessments and learning activities)* |
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| List number and text of the content standard; priority standards are bold-faced   * **7.RP.2 Recognize and represent proportional relationships between quantities.**  1. **Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.** 2. **Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.** 3. **Represent proportional relationships by equations.**   **Explain what a point *(x, y)* on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, *r)* where *r* is the unit rate.**  **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.**  **MP 7.Look for and make use of structure.**  **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.**  **MP 7.Look for and make use of structure.**  **MP** 3**.Construct viable arguments and critique the reasoning of others.**  8.G.1 Verify experimentally the properties of rotations, reflections, and translations:   1. Lines are taken to lines, and line segments to line segments of the same length. 2. Angles are taken to angles of the same measure. 3. Parallel lines are taken to parallel lines.   8.G.3. Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.  **MP.2.Reason abstractly and quantitatively.**  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.* | Students will….  Students will be able to describe the process used to change a figure.  Students will be able to define congruence.  Students will be able to use transformations to prove congruency.  Students will be able to define similarity.  Students will be able to use transformations to prove similarity.  Students will be able to analyze problems for errors and explain the reasons why.  Students will be able to create an accurate transformation given a mapping rule.  Students will be able to identify a mapping rule given a pre-image and an image.  Students will be able to find missing angles associated with parallel lines cut by transversals.  Students will be able to explain their reasoning behind finding the missing angles associated with parallel lines cut by transversals.  Students will determine the relationship between the exterior angle and the two remote interior angles. | | From state document  **8.G.2.** 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’.    **8.G.4.** 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.1 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.  8.G.3. 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. Δ*ABC* 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.    When an object is reflected across the y axis, the reflected x coordinate is the opposite of the pre-image x coordinate.    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 Δ*DEF* is rotated 180˚ clockwise about the origin. The coordinates of Δ*DEF* are D(2,5), E(2,1), and F(8,1). When rotated 180˚, Δ*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.  8.G.5. Examples: Students can informally prove relationships with transversals.  Show that m∡3+ *m*∡4+ *m*∡5= 180˚ if *l*and *m* are parallel lines and t1 & t2 are transversals.  ∡1+ ∡2+ ∡3= 180˚. Angle and Angle 5 are congruent because they are corresponding angles (∡5≅∡1). ∡1can be substituted for ∡5.  ∡4≅∡2 : because alternate interior angles are congruent. ∡4can be substituted for ∡2  Therefore m∡3+ m∡4+ m∡5= 180˚    Students can informally conclude that the sum of a triangle is 180º (the angle-sum theorem) by applying their understanding of lines and alternate interior angles. In the figure below, line x is parallel to line *yz*:    Angle *a* is 35º because it alternates with the angle inside the triangle that measures 35º. Angle *c* is 80º because it alternates with the angle inside the triangle that measures 80º. Because lines have a measure of 180º, and angles *a + b + c* form a straight line, then angle *b* must be 65 º (180 – 35 + 80 = 65). Therefore, the sum of the angles of the triangle are 35º + 65 º + 80 º | * Unit # common summative assessment * Learning activity:   <http://map.mathshell.org/download.php?fileid=1696>  Possible assusred experience?  http://www.cpsb.org/cms/lib07/LA01907308/Centricity/Domain/832/Math.8.ER.3d.pdf  http://geogebra.org/  Hands on exploration will be assessed using geogebra and physical manipulives. |

**Instructional resources** (including manipulatives, literature connections, professional resources)

Standard #1

Standard #2

Standard #3

Standard #4

Standard #5

<http://web.geogebra.org/#geometry>