**CCGPS Key Standards**

**Understand similarity in terms of similarity transformations**

MCC9-12.G.SRT.1 Verify experimentally the properties of dilations given by a center and a scale factor:

a. A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged.

b. The dilation of a line segment is longer or shorter in the ratio given by the scale factor.

MCC9-12.G.SRT.2 Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.

MCC9-12.G.SRT.3 Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.

**Prove theorems involving similarity**

MCC9-12.G.SRT.4 Prove theorems about triangles. Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity.

MCC9-12.G.SRT.5 Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.

**Understand congruence in terms of rigid motions**

MCC9-12.G.CO.6 Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.

MCC9-12.G.CO.7 Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.

MCC9-12.G.CO.8 Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.

**Prove geometric theorems**

MCC9-12.G.CO.9 Prove theorems about lines and angles. Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment’s endpoints.

MCC9-12.G.CO.10 Prove theorems about triangles. Theorems include: measures of interior angles of a triangle sum to 180 degrees; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.

MCC9-12.G.CO.11 Prove theorems about parallelograms. Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals.

**Make geometric constructions**

MCC9-12.G.CO.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.

MCC9-12.G.CO.13 Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.

**Essential Understandings**

- Given a center and a scale factor, verify experimentally, that when dilating a figure in a coordinate plane, a segment of the pre-image that does not pass through the center of the dilation, is parallel to its image when the dilation is performed. However, a segment that passes through the center remains unchanged.

- Given a center and a scale factor, verify experimentally, that when performing dilations of a line
segment, the pre-image, the segment which becomes the image is longer or shorter based on the ratio given by the scale factor.

- Use the idea of dilation transformations to develop the definition of similarity.
- Given two figures determine whether they are similar and explain their similarity based on the equality of corresponding angles and the proportionality of corresponding sides.
- Use the properties of similarity transformations to develop the criteria for proving similar triangles: AA.
- Use AA, SAS, SSS similarity theorems to prove triangles are similar.
- Prove a line parallel to one side of a triangle divides the other two proportionally, and its converse.
- Prove the Pythagorean Theorem using triangle similarity.
- Use similarity theorems to prove that two triangles are congruent.
- Use descriptions of rigid motion and transformed geometric figures to predict the effects rigid motion has on figures in the coordinate plane.
- Knowing that rigid transformations preserve size and shape or distance and angle, use this fact to connect the idea of congruency and develop the definition of congruent.
- Use the definition of congruence, based on rigid motion, to show two triangles are congruent if and only if their corresponding sides and corresponding angles are congruent.
- Use the definition of congruence, based on rigid motion, to develop and explain the triangle congruence criteria: ASA, SSS, and SAS.
- Prove vertical angles are congruent.
- Prove when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent.
- Prove points on a perpendicular bisector of a line segment are exactly those equidistant from the segment’s endpoints.
- Prove the measures of interior angles of a triangle have a sum of 180°.
- Prove base angles of isosceles triangles are congruent.
- Prove the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length.
- Prove the medians of a triangle meet at a point.
- Prove properties of parallelograms including: opposite sides are congruent, opposite angles are congruent, diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals.
- Copy a segment and an angle.
- Bisect a segment and an angle.
- Construct perpendicular lines, including the perpendicular bisector of a line segment.
- Construct a line parallel to a given line through a point not on the line.
- Construct an equilateral triangle so that each vertex of the equilateral triangle is on the circle.
- Construct a square so that each vertex of the square is on the circle.
- Construct a regular hexagon so that each vertex of the regular hexagon is on the circle.

**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.
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<th>Differentiation Techniques</th>
<th>Concept/Skills To Maintain</th>
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<td><strong>Remediation:</strong></td>
<td>Students should be expected to have prior knowledge/experience related to the concepts and skills identified below. Pre-assessment may be necessary to determine whether instructional time should be spent on conceptual activities that help students develop a deeper understanding of these ideas.</td>
</tr>
<tr>
<td>• USAtestprep.com benchmarks</td>
<td>• Understand and use reflections, translations, and rotations.</td>
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<tr>
<td>• Khan Academy Videos</td>
<td>• Define the following terms: circle, bisector, perpendicular and parallel.</td>
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<td>• Cognitive Tutor software (Carnegie Learning)</td>
<td>• Solve multi-step equations.</td>
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<td>• Graphic Organizers</td>
<td>• Understand angle sum and exterior angle of triangles.</td>
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<td>• Know angles created when parallel lines are cut by a transversal.</td>
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<td>• Know facts about supplementary, complementary, vertical, and adjacent angles.</td>
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<td>• Solve problems involving scale drawings of geometric figures.</td>
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<td>• Draw geometric shapes with given conditions.</td>
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<td>• 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.</td>
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<td>• Draw polygons in the coordinate plane given coordinates for the vertices.</td>
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<td><strong>Enrichment:</strong></td>
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<tr>
<td>• Cognitive Tutor software (Carnegie Learning)</td>
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<td>• Show Me Videos/Presentations</td>
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<td>• Compare and Contrast Techniques</td>
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<td>• Give One/Get One</td>
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**Inter-curricular Connections**

Concepts taught in Analytic Geometry apply to many fields. Application problems involve agriculture, engineering, construction, Sonar, and many other disciplines.

**Research Based Instructional Strategies**

- Identifying Similarities and Differences
- Summarizing and Note taking which describes how unit relates to “real” life
- Reinforcing effort and recognition
- Daily class work and homework will serve as needed practice
- Cooperative Learning

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<td>1st and Ten: Problems given to evaluate understanding of prior day’s instruction</td>
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