

Summer School **CC Geometry A** Curricular Map Congruence through Constructions and Transformations

Week	Conceptual Category	CCSS-M Standards/Practices	Domains and Clusters	Resources
1	<p>Geometry - Congruence</p> <p><i>Make a variety of formal geometric constructions using a variety of tools.</i></p>	<p>G.CO. 12-13</p> <p>MP 1, 2, 3, 4, 7</p>	<p>G-CO-D-Make geometric constructions</p>	<p>Math Open Reference</p> <p>Math is Fun</p>
2	<p>Geometry - Congruence</p> <p><i>Develop precise definitions of geometric figures based on the undefined notions of point, line, distance along a line and distance around a circular arc.</i></p> <p><i>Experiment with transformations in the plane.</i></p>	<p>G.CO. 1 -5</p> <p>MP 1, 2, 3, 4, 7</p>	<p>G-CO-A-Experiment with transformations in the plane</p>	<p>Illustrative Math</p> <ul style="list-style-type: none"> Building a tile pattern by reflecting hexagons <p>Engage New York</p> <ul style="list-style-type: none"> Floor Pattern
3	<p>Geometry - Congruence</p> <p><i>Use rigid motion to map corresponding parts of congruent triangle onto each other.</i></p> <p><i>Explain triangle congruence in terms of rigid motions.</i></p> <p><i>Prove theorems about lines and angles, triangles; and parallelograms</i></p>	<p>G.CO. 6-8 G.CO. 9-11</p> <p>MP 1, 2, 3, 4, 7</p>	<p>G-CO-B- Understand congruence in terms of rigid motion</p> <p>G-CO-C-Prove geometric theorems</p>	<p>Illustrative Math</p> <ul style="list-style-type: none"> Analyzing Congruence Proofs – G-CO.6-8 <p>LAUSD Concept Task: Squaring Triangles</p>
4	<p>Geometry - Similarity, Right Triangles and Trigonometry</p>	<p>G-SRT. 1-3</p> <p>MP 1, 2, 3, 4, 7</p>	<p>G-SRT-A-Understand similarity in terms of similarity transformations</p>	<p>Illustrative Mathematics</p> <ul style="list-style-type: none"> Similar Triangles : G-SRT.3 <p>LAUSD Concept Task: Bermuda Triangle</p>
5	<p>Geometry - Similarity, Right Triangles and Trigonometry</p> <p><i>Apply geometric concepts in modeling situations</i></p>	<p>G-SRT. 4-5 G-MG 1-3</p> <p>MP 1, 2, 3, 4, 7</p>	<p>G-SRT-B-Prove theorems involving similarity</p> <p>G-MG 1-3-Modeling with Geometry: Applying geometric concepts in modeling situations</p>	<p>Mathematics Assessment Project (MARS Tasks): Solving Geometry Problems : Floodlights G-SRT.5, G.MG.1-3</p> <p>LAUSD Concept Task: Amazing Amanda</p>

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Week	Domains	Clusters and Standards
1	Make geometric constructions	<p>Make geometric constructions</p> <p>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 give line through a point not on the line.</p> <p>G.CO.13 Construct an equilateral triangle, a square, a regular hexagon inscribed in a circle. Make geometric constructions</p>
2	Experiment with transformations in the plane	<p>Experiment with transformations in the plane</p> <p>G.CO.1 Know precise definitions of angle, circle, perpendicular lines, parallel lines, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.</p> <p>G.CO.2 Represent transformations in the plane using e.g. transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g. translation versus horizontal stretch.)</p> <p>G.CO.3 Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.</p> <p>G.CO.4 Develop definitions of rotations, reflections, and translations in terms of angles, circles perpendicular lines, parallel lines, and line segments.</p> <p>G.CO.5 Given a geometric figure and a rotation, reflection or translation, draw the transformed figure using e.g. graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.</p>
3	Understand congruence in terms of rigid motion	<p>Understand congruence in terms of rigid motion</p> <p>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.</p> <p>G.CO.7 Use 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.</p> <p>G.CO.8 Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow the definition of congruence in terms of rigid motions.</p>

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	Prove geometric theorems	<p>Prove geometric theorems</p> <p>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.</p> <p>G.CO.10 Prove theorems about triangles. Theorems include: measures of interior angles of a triangle sum to 180°; 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.</p> <p>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.</p>
4	Understand similarity in terms of similarity transformations	<p>Understand similarity in terms of similarity transformations</p> <p>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.</p> <p>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.</p> <p>G-SRT.3. Use the properties of similarity transformations to establish the Angle-Angle (AA) criterion for two triangles to be similar.</p>
5	Prove theorems involving similarity	<p>Prove theorems involving similarity</p> <p>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.</p> <p>G-SRT.5. Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures</p> <p>Supporting clusters: G-MG 1-3: Modeling with Geometry: Apply geometric concepts in modeling situations</p>

★ Indicates a modeling standard linking mathematics to everyday life, work, and decision-making.

(+) Indicates additional mathematics to prepare students for advanced courses.

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Mathematical Practices

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.**

Resources

Math Open Reference

- <http://mathopenref.com/tocs/constructionstoc.html>
(online resource that illustrates how to generate constructions)

Math is Fun

- <http://www.mathsisfun.com/geometry/constructions.html> H-G.CO.12, 13

Manga High

- http://www.mangahigh.com/en_us/games/transtar

Engage New York

- <http://www.engageny.org/sites/default/files/resource/attachments/geometry-m1-teacher-materials.pdf>
Circles in Triangles <http://map.mathshell.org/materials/tasks.php?taskid=256#task256>
- <http://map.mathshell.org/materials/tasks.php?taskid=258#task258>

Mathematics Assessment Project (MARS Tasks)

- Hopwell Geometry – G.SRT.5 <http://map.mathshell.org/materials/download.php?fileid=499>

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- Inscribing and Circumscribing Right Triangles – G.SRT: <http://map.mathshell.org/materials/lessons.php?taskid=403&subpage=problem>

Illustrative Mathematics

- Similar Triangles : G-SRT.3 <http://www.illustrativemathematics.org/illustrations/1422>
- Pythagorean Theorem : G-SRT.4 <http://www.illustrativemathematics.org/illustrations/1568>
- Joining two midpoints of sides of a triangle : G-SRT.4 <http://www.illustrativemathematics.org/illustrations/1095>

Illustrative Mathematics

- Dilating a Line : G-SRT.1 <http://www.illustrativemathematics.org/illustrations/602>
- Are they Similar? G-SRT.2 <http://www.illustrativemathematics.org/illustrations/603>
- Folding a Square into Thirds : G-SRT.5 <http://www.illustrativemathematics.org/illustrations/1572>

LAUSD Concept Lessons – <http://math.lausd.net>

- [Squaring Triangles](#)

Mathematics Assessment Project (MARS Tasks):

- Geometry Problems: Circles and Triangles – G-SRT <http://map.mathshell.org/materials/lessons.php?taskid=222#task222>
- Inscribing and Circumscribing Right Triangles - <http://map.mathshell.org/materials/lessons.php?taskid=403&subpage=problem>
- Modeling: Rolling Cups- <http://map.mathshell.org/materials/lessons.php?taskid=428&subpage=problem>
- Solving Geometry Problems: Floodlights – G-SRT.5, G-MG.1-3 <http://map.mathshell.org/materials/lessons.php?taskid=429&subpage=problem>
- Analyzing Congruence Proofs – G-CO.6-8 <http://map.mathshell.org/materials/lessons.php?taskid=452&subpage=concept>
- Calculating Volumes of Compound Objects – G-MD <http://map.mathshell.org/materials/lessons.php?taskid=216&subpage=concept>
- Proofs of the Pythagorean Theorem <http://map.mathshell.org/materials/lessons.php?taskid=419&subpage=concept>