AMSCO Geometry

Next Generation New York Math Standards	Geometry Lesson
Geometry	
Congruence	
Experiment with transformations in the plane. **G.CO.A.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.	1.1, 4.1, 4.3, 8.1
G.CO.A.2 Represent transformations as geometric functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle measure to those that do not (e.g., translation versus horizontal stretch). *Note: Use a variety of strategies, which include transparencies and software programs.*	1.4, 1.5, 1.6, 1.7, 2.2, 2.4
G.CO.A.3 Given a regular or irregular polygon, describe the rotations and reflections that carry it onto itself.	1.5
G.CO.A.4 Develop definitions of rotations, reflections, and translations in terms of points, angles, circles, perpendicular lines, parallel lines, and line segments.	1.3, 1.5, 1.6, 1.7, 11.3
G.CO.A.5 Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure. Specify a sequence of transformations that will carry a given figure onto another. *Note: Drawing tools, which could include graph paper, tracing paper, and geometry software.*	1.3, 1.4, 1.5, 1.6, 1.7, 2.4
Understand congruence in terms of rigid motions. **G.CO.B.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. *Note: With rotations, the center of the transformation must be specified.*	1.3, 1.4, 1.5, 1.6, 1.7
G.CO.B.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.	1.3, 5.4
G.CO.B.8 Explain how the criteria for triangle congruence (ASA, SAS, SSS) follow from the definition of congruence in terms of rigid motions.	5.4
Prove geometric theorems. **G.CO.C.9** Prove and apply theorems about lines and angles. *Note: Include multi-step proofs and algebraic problems built upon these concepts.*	3.4, 4.1, 4.2, 4.3, 6.2
G.CO.C.9a Prove and apply theorems about relationships, specifically: i. Vertical angles. ii. Angles created by a transversal intersecting parallel lines. iii. Points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.	3.4, 4.1, 4.2, 6.2

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G.CO.C.10 Prove and apply theorems about triangles. *Note: Include multi-step proofs and algebraic problems built upon these concepts.*	4.5, 5.1, 5.2, 5.3, 5.4, 6.1, 6.3, 6.4
G.CO.C.10a Prove and apply theorems about angle relationships, specifically: i. Interior angles sum to 180 degrees. ii. Exterior angles sum to 360 degrees. iii. The measure of an exterior angle of a triangle is equal to the sum of the measures of its two non-adjacent interior angles of the triangle.	4.5
G.CO.C.10b Prove and apply theorems about isosceles triangles.	5.1
G.CO.C.10c Prove and apply theorems about the midsegment of a triangle (parallel to the third side and half the length).	6.1
G.CO.C.11 Prove and apply theorems about parallelograms. *Note: Include multi-step proofs and algebraic problems built on these concepts.* *Note: Based on the inclusive definition of a trapezoid (specifically, a quadrilateral with at least one pair of parallel sides), a parallelogram is a trapezoid.*	9.1, 9.2, 9.3
G.CO.C.11a Prove and apply theorems about properties which include opposite sides are congruent, opposite angles are congruent, and that the diagonals bisect each other.	9.1, 9.3
G.CO.C.11b Prove and apply theorems about special parallelograms and the properties that distinguish them.	9.2
Make geometric constructions **G.CO.D.12** Make formal geometric constructions while developing fluency with the use of construction tools. *Note: Use a variety of tools and methods for construction, which include compass and straightedge, string, reflective devices, paper folding, dynamic geometry software, etc.*	1.1, 4.3, 5.1, 6.2
G.CO.D.12a Copy segments and angles.	1.1
G.CO.D.12b Bisect segments and angles.	6.2
G.CO.D.12c Construct perpendicular lines, including through a point on or off a given line.	4.3
G.CO.D.12d Construct a line parallel to a given line, through a point not on the line.	4.3
G.CO.D.12e Construct an isosceles triangle with given lengths.	
G.CO.D.12f Construct points of concurrency of a triangle (centroid, circumcenter, and incenter).	
G.CO.D.13 Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.	8.3, 9.6

Next Generation New York Math Standards	Geometry Lesson
Similarity, Right Triangles, & Trigonometry	
Understand similarity in terms of similarity transformations. **G.SRT.A.1** Verify experimentally the properties of dilations given by a center and a scale factor.	2.2
G.SRT.A.1a 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.	2.2
G.SRT.A.1b The dilation of a line segment is longer or shorter in the ratio given by the scale factor.	2.2
G.SRT.A.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. *Note: With dilations or rotations, the center of the transformation must be specified.*	2.1, 2.2, 2.3, 2.4
G.SRT.A.3 Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.	7.1
Prove theorems involving similarity. **G.SRT.B.4** Prove and apply theorems about triangles. *Note: Include multi-step proofs and algebraic problems built upon these concepts.*	6.1, 7.4
G.SRT.B.4a Prove that a line parallel to one side of a triangle divides the other two sides proportionally, and conversely.	6.1
G.SRT.B.4b Prove that the length of the altitude drawn from the vertex of the right angle of a right triangle to its hypotenuse is the geometric mean between the lengths of the two segments of the hypotenuse.	7.4
G.SRT.B.4c Prove the Pythagorean theorem using triangle similarity.	
G.SRT.B.5 Use congruence and similarity criteria for triangle with fluency to: a. solve problems algebraically and geometrically. b. prove relationships in geometric figures. *Note: ASA, SAS, SS, AAS, and HL theorems are valid criteria for triangle congruence. AA, SAS, SSS are valid criteria for triangle similarity.*	2.2, 2.3, 5.2, 5.3, 5.4, 7.1, 7.2, 7.4
Define trigonometric ratios and solve problems involving right triangles. **G.SRT.C.6** Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to the definitions of sine, cosine, and tangent ratios for acute angles.	7.6
G.SRT.C.7 Explain and use the relationship between the sine and cosine of complementary angles.	7.6
G.SRT.C.8 Use sine, cosine, and tangent, as well as the Pythagorean Theorem, to solve right triangles in applied problems.	7.3, 7.6, 9.8

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Apply trigonometry to general triangles. **G.SRT.D.9** Explore the derivation of the formula for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side. Apply the formula to find the area of any triangle.	7.8
G.SRT.D.10 Explore the proofs and apply the Laws of Sines* and Cosines to solve problems. **The ambiguous case for Law of Sines (given one angle and two sides, find the other angle) is NOT addressed in this course.*	7.8
G.SRT.D.11 Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in any triangle. At this level, force diagrams should not be included.	7.8
Functions	
Extend the domain of trigonometric functions using the unit circle. **F.TF.A.3** Use special triangles to determine, geometrically, the values of sine, cosine, and tangent for 30, 45, and 60 degrees. Use the special triangles with the unit circle to find the values for sine, cosine, and tangent of 30, 45, 60, 120, 135, and 150 degrees. *Note: Side lengths could be given in radical form.*	7.6
Circles	
Understand and apply theorems about circles. **G.C.A.1** Prove that all circles are similar.	11.3
G.C.A.2 Identify, describe, and apply geometric properties of circles.	8.1, 8.2, 8.3, 8.4, 8.5
G.C.A.2a Identify, describe, and apply relationships among angles and intercepted arcs, specifically: i. central ii. inscribed iii. circumscribed iv. angles and arcs formed by any combination of intersecting tangents, secants or chords.	8.1, 8.2, 8.3, 8.4, 8.5
G.C.A.2b Identify, describe, and apply relationships among segments, specifically: i. radii ii. chords iii. tangents iv. secants	8.1, 8.2, 8.3, 8.4, 8.5
G.C.A.3 Prove properties of angles for a quadrilateral inscribed in a circle.	8.3, 9.6
G.C.A.4 Construct a tangent line from a point outside a given circle to the circle.	8.1, 8.2, 8.3, 8.4, 8.5
Find arc lengths and areas of sectors of circles. **G.C.B.5** Using proportionality, find one of the following given two others: the central angle, arc length, radius, or area of a sector.	8.5

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Expressing Geometric Properties with Equations	
Translate between the geometric description and the equation of a conic section. **G.GPE.A.1** Derive the equation of a circle, given center and radius, using the Pythagorean Theorem. Complete the square to find the center and radius of a circle given by an equation.	11.1, 11.3
Use coordinates to prove simple geometric theorems algebraically. **G.GPE.B.4** On the coordinate plane, algebraically prove and apply with fluency geometric theorems and properties.	5.4, 6.1, 6.4, 9.1, 9.5, 9.6
G.GPE.B.4a Given points and/or characteristics, prove or disprove a polygon is a specified quadrilateral or triangle based on its properties.	4.4, 9.6
G.GPE.B.4b Given a point that lies on a circle centered at the origin, prove or disprove that a specified point lies on the same circle. *Note: Coordinates of points could be given in radical form.*	
G.GPE.B.5 On the coordinate plane: i. explore the proof for the relationship between slopes of parallel and perpendicular lines; ii. fluently determine if lines are parallel, perpendicular, or neither, based on their slopes; and iii. fluently apply properties of parallel and perpendicular lines to solve geometric problems.	4.4, 9.1
G.GPE.B.6 Find the point on a directed line segment between two given points that partitions the segment in a given ratio.	1.2, 6.3, 6.4
G.GPE.B.7 Use coordinates with fluency to compute perimeters of polygons and areas of triangles and rectangles. *Note: Values may be given or computed in radical form.*	9.6
Geometric Measurement and Dimension	
Explain volume formulas and use them to solve problems. **G.GMD.A.1** Explore informal arguments for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone.	8.1, 10.3
G.GMD.A.3 Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.	10.3
Visualize relationships between two-dimensional and three-dimensional objects. **G.GMD.B.4** Identify the shapes of plane-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects. *Note: Plane sections are not limited to being parallel or perpendicular to the base.*	10.1, 11.1, 11.2, 11.5, 11.6

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Modeling with Geometry	
Apply geometric concepts in modeling situations. **G-MG.A.1** Use geometric shapes, their measures, and their properties to describe objects.	9.6, 9.7, 9.8, 10.2, 10.3
G-MG.A.2 Apply concepts of density based on area and volume in modeling situations using geometric figures.	9.6, 10.2, 10.5
G-MG.A.3 Apply geometric methods to solve design problems. *Note: Applications could include designing an object or structure to satisfy physical constraints or minimize cost, or to investigate applications of classical geometric problems like the Golden Ratio.*	9.6, 9.8, 10.2, 10.3