GEOMETRY NEXT GENERATION REGENTS STANDARDS

Sections refer to the *Geometry Next Generation Course Workbook* (2024-2025).

Standard	***Description***	***Sections***
G.CO	**Congruence**	
(A)	***Experiment with transformations in the plane.***	
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 as these exist within a plane.	1.1
G.CO.2	Represent transformations as geometric functions that take points in the plane as inputs and give points as outputs. Compare transformations that preserve distance and angle measure to those that do not. *[See NG Note 4, p. 7]*	4.1 – 4.4, 5.1 – 5.3, 6.1
G.CO.3	Given a regular or irregular polygon, describe the rotations and reflections (symmetries) that carry the polygon onto itself. *[See NG Note 1, p. 7]*	4.5
G.CO.4	Develop definitions of rotations, reflections, and translations in terms of points, angles, circles, perpendicular lines, parallel lines, and line segments. Note: Include point reflections. *[See NG Note 2, p. 7]*	4.1 – 4.4
G.CO.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: Include point reflections. *[See NG Notes 2 and 4, p. 7]*	4.1 – 4.4, 6.2
(B)	***Understand congruence in terms of rigid motions***	
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. *[See NG Note 2, p. 7]*	6.3
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.	6.3
G.CO.8	Explain how the criteria for triangle congruence (ASA, SAS, SSS, AAS and HL (Hypotenuse Leg)) follow from the definition of congruence in terms of rigid motions.	10.2

(C)	***Prove geometric theorems.***	
G.CO.9	Prove and apply theorems about lines and angles. Note: Examples of theorems include but are not limited to: • Vertical angles are congruent. • If two parallel lines are cut by a transversal, then the alternate interior angles are congruent. • The points on a perpendicular bisector are equidistant from the endpoints of the line segment. *[See NG Note 3, p. 7]*	8.1 – 8.2, 12.2
G.CO.10	Prove and apply theorems about triangles. Note: Examples of theorems include but are not limited to: • Angle Relationships: o The sum of the interior angles of a triangle is 180 degrees. o The measure of an exterior angle of a triangle is equal to the sum of the two non-adjacent interior angles of the triangle. • Side Relationships: o The length of one side of a triangle is less than the sum of the lengths of the other two sides. o In a triangle, the segment joining the midpoints of any two sides will be parallel to the third side and half its length. • Isosceles Triangles: o Base angles of an isosceles triangle are congruent. *[See NG Note 3, p. 7]*	9.1 – 9.7, 10.1 – 10.6, 11.1 – 11.2, 12.1 – 12.3
G.CO.11	Prove and apply theorems about parallelograms. Notes: • Examples of theorems include but are not limited to: o A diagonal divides a parallelogram into two congruent triangles. o Opposite sides/angles of a parallelogram are congruent. o The diagonals of parallelogram bisect each other. o If the diagonals of quadrilateral bisect each other, then quadrilateral is a parallelogram. o If the diagonals of a parallelogram are congruent then the parallelogram is a rectangle. • Additional theorems covered allow for proving that a given quadrilateral is a particular parallelogram (rhombus, rectangle, square) based on given properties. *[See NG Notes 1 and 3, p. 7]*	14.1 – 14.5

(D)	***Make geometric constructions***	
G.CO.12	Make, justify, and apply formal geometric constructions. Note: • Examples of constructions include but are not limited to: o Copy segments and angles. o Bisect segments and angles. o Construct perpendicular lines including through a point on or off a given line. o Construct a line parallel to a given line through a point not on the line. o Construct a triangle with given lengths. o Construct points of concurrency of a triangle (centroid, circumcenter, incenter, and orthocenter). o Construct the inscribed circle of a triangle. o Construct the circumscribed circle of a triangle. o Constructions of transformations. (see G.CO.A.5)	17.1 – 17.8
G.CO.13	Make and justify the constructions for inscribing an equilateral triangle, a square and a regular hexagon in a circle.	17.6

G.SRT	**Similarity, Right Triangles, and Trigonometry**	
(A)	***Understand similarity in terms of similarity transformations.***	
G.SRT.1	Verify experimentally the properties of dilations given by a center and a scale factor. a. Verify experimentally that 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. Verify experimentally that the dilation of a line segment is longer or shorter in the ratio given by the scale factor.	5.1 – 5.3
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 that similar triangles have equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides. Note: The center and scale factor of the dilation must always be specified with dilation. *[See NG Note 2, p. 7]*	6.4
G.SRT.3	Use the properties of similarity transformations to establish the AA~, SSS~, and SAS~ criterion for two triangles to be similar.	10.2

(B)	***Prove theorems involving similarity.***	
G.SRT.4	Prove and apply similarity theorems about triangles. Note: Examples of theorems include but are not limited to: • If a line parallel to one side of a triangle intersects the other two sides of the triangle, then the line divides these two sides proportionally (and conversely). • 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. • The centroid of the triangle divides each median in the ratio 2:1. *[See NG Note 3, p. 7]*	10.1 – 10.6, 11.1 – 11.2, 12.3
G.SRT.5	Use congruence and similarity criteria for triangles to: a. Solve problems algebraically and geometrically. b. Prove relationships in geometric figures. Note: ASA, SAS, SSS, AAS, and Hypotenuse-Leg (HL) theorems are valid criteria for triangle congruence. AA~, SAS~, and SSS~ are valid criteria for triangle similarity.	9.1 – 9.7, 10.1 – 10.6, 11.1 – 11.2, 12.1 – 12.3
(C)	***Define trigonometric ratios and solve problems involving right triangles.***	
G.SRT.6	Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of sine, cosine and tangent ratios for acute angles.	13.1
G.SRT.7	Explain and use the relationship between the sine and cosine of complementary angles.	13.5
G.SRT.8	Use sine, cosine, tangent, the Pythagorean Theorem and properties of special right triangles to solve right triangles in applied problems. Note: Special right triangles refer to the 30-60-90 and 45-45-90 triangles.	13.2 – 13.4
(D)	***Apply Trigonometry to general triangles***	
G.SRT.9	Justify and apply the formula $A = \frac{1}{2}ab \sin C$ to find the area of any triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.	13.6

G.C	Circles	
(A)	***Understand and apply theorems about circles.***	
G.C.1	Prove that all circles are similar.	6.4
G.C.2	a. Identify, describe and apply relationships between the angles and their intercepted arcs of a circle. b. Identify, describe and apply relationships among radii, chords, tangents, and secants of a circle. Notes: • These relationships that pertain to the circle may be utilized to prove other relationships in geometric figures, e.g., the opposite angles in any quadrilateral inscribed in a circle are supplements of each other. • Include algebraic problems built upon these concepts.	15.2 – 15.5
(B)	***Find arc lengths and area of sectors of circles.***	
G.C.5	Using proportionality, find one of the following given two others: the central angle, arc length, radius or area of sector. Note: Angle measure is in degrees.	15.6

G.GPE	Expressing Geometric Properties with Equations	
(A)	***Translate between the geometric description and the equation of a conic section.***	
G.GPE.1	a. Derive the equation of a circle of given center and radius using the Pythagorean Theorem. Find the center and radius of a circle, given the equation of the circle. Notes: • Finding the center and radius may involve completing the square. The completing the square expectation for Geometry follows Algebra I: leading coefficients will be 1 (after possible removal of GCF) and the coefficients of the linear terms will be even. • Completing the square may yield a fractional radius. b. Graph circles given their equation. Note: For circles being graphed, the center will be an ordered pair of integers and the radius will be a positive integer.	7.1 – 7.2
(B)	***Use coordinates to prove simple geometric theorems algebraically.***	
G.GPE.4	On the coordinate plane, algebraically prove geometric theorems and properties. Note: Examples include but are not limited to: • Given points and/or characteristics, prove or disprove a polygon is a specified quadrilateral or triangle based on its properties. • Given a point that lies on a circle with a given center, prove or disprove that a specified point lies on the same circle.	2.3 – 2.5, 3.1 – 3.2, 6.3 – 6.4

G.GPE.5	On the coordinate plane: a. Explore the proof for the relationship between slopes of parallel and perpendicular lines; b. Determine if lines are parallel, perpendicular, or neither, based on their slopes; and c. Apply properties of parallel and perpendicular lines to solve geometric problems.	2.2
G.GPE.6	Find the point on a directed line segment between two given points that partitions the segment in a given ratio. Note: Midpoint formula is a derivative of this standard.	2.6
G.GPE.7	Use coordinates to compute perimeters of polygons and areas of triangles and rectangles.	3.3

G.GMD	**Geometric Measurement and Dimension**	
(A)	***Explain volume formulas and use them to solve problems.***	
G.GMD.1	Provide informal arguments for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone.	1.3 – 1.4, 16.2 – 16.3
G.GMD.3	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.	16.1 – 16.3
(B)	***Visualize relationships between two-dimensional and three-dimensional objects.***	
G.GMD.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.	16.6 – 16.7

G.MG	**Modeling with Geometry**	
(A)	***Apply geometric concepts in modeling situations.***	
G.MG.1	Use geometric shapes, their measures, and their properties to describe objects.	*throughout*
G.MG.2	Apply concepts of density based on area and volume of geometric figures in modeling situations.	16.4
G.MG.3	Apply geometric methods to solve design problems. Note: Applications may include designing an object or structure to satisfy constraints such as area, volume, mass, and cost.	16.4 – 16.5

Next Generation Notes:

1. The inclusive definition of a trapezoid will be utilized, which defines a trapezoid as "A quadrilateral with at least one pair of parallel sides."
2. A translation displaces every point in the plane by the same distance (in the same direction) and can be described using a vector. A rotation requires knowing the center (point) and the measure/direction of the angle of rotation. A line reflection requires a line and the knowledge of perpendicular bisectors. Singular transformations that are equivalent to a sequence of transformations may be utilized, such as a glide reflection. However, glide reflections are not an expectation of the course.
3. Include multi-step proofs and algebraic problems built upon these concepts.
4. Instructional strategies may include graph paper, tracing paper, and geometry software.

CORRELATION TO STANDARDS

Sections refer to the *Geometry Next Generation Course Workbook* (2024-2025).

Chapter	*Section*	*Standards*
Chapter 1.	**Basic Geometry**	
1.1	Lines, Angles and Shapes	G.CO.1
1.2	Pythagorean Theorem	
1.3	Perimeter and Circumference	G.GMD.1
1.4	Area	G.GMD.1
Chapter 2.	**Coordinate Geometry**	
2.1	Forms of Linear Equations	
2.2	Parallel and Perpendicular Lines	G.GPE.5
2.3	Distance Formula	G.GPE.4
2.4	Midpoint Formula	G.GPE.4
2.5	Perpendicular Bisectors	G.GPE.4
2.6	Directed Line Segments	G.GPE.6
Chapter 3.	**Polygons in the Coordinate Plane**	
3.1	Triangles in the Coordinate Plane	G.GPE.4
3.2	Quadrilaterals in the Coordinate Plane	G.GPE.4
3.3	Perimeter and Area using Coordinates	G.GPE.7
Chapter 4.	**Rigid Motions**	
4.1	Translations	G.CO.2,4,5
4.2	Line Reflections	G.CO.2,4,5
4.3	Rotations	G.CO.2,4,5
4.4	Point Reflections	G.CO.2,4,5
4.5	Carry a Polygon onto Itself	G.CO.3
Chapter 5.	**Dilations**	
5.1	Dilations of Line Segments	G.CO.2, G.SRT.1
5.2	Dilations of Polygons	G.CO.2, G.SRT.1
5.3	Dilations of Lines	G.CO.2, G.SRT.1
Chapter 6.	**Transformation Proofs**	
6.1	Properties of Transformations	G.CO.2
6.2	Sequences of Transformations	G.CO.5
6.3	Transformations and Congruence	G.CO.6,7, G.GPE.4
6.4	Transformations and Similarity	G.SRT.2, G.C.1, G.GPE.4
Chapter 7.	**Circles in the Coordinate Plane**	
7.1	Equation of a Circle	G.GPE.1
7.2	Graph Circles	G.GPE.1
Chapter 8.	**Foundations of Euclidean Geometry**	
8.1	Postulates, Theorems and Proofs	G.CO.9
8.2	Parallel Lines and Transversals	G.CO.9

Chapter	*Section*	*Standards*
Chapter 9.	**Triangles and Congruence**	
9.1	Angles of Triangles	G.CO.10, G.SRT.5
9.2	Triangle Inequality Theorem	G.CO.10, G.SRT.5
9.3	Segments in Triangles	G.CO.10, G.SRT.5
9.4	Isosceles and Equilateral Triangles	G.CO.10, G.SRT.5
9.5	Triangle Congruence Methods	G.CO.10, G.SRT.5
9.6	Prove Triangles Congruent	G.CO.10, G.SRT.5
9.7	Overlapping Triangles	G.CO.10, G.SRT.5
Chapter 10.	**Triangles and Similarity**	
10.1	Properties of Similar Triangles	G.CO.10, G.SRT.4,5
10.2	Triangle Similarity Methods	G.CO.8,10, G.SRT.3,4,5
10.3	Prove Triangles Similar	G.CO.10, G.SRT.4,5
10.4	Triangle Angle Bisector Theorem	G.CO.10, G.SRT.4,5
10.5	Side Splitter Theorem	G.CO.10, G.SRT.4,5
10.6	Triangle Midsegment Theorem	G.CO.10, G.SRT.4,5
Chapter 11.	**Points of Concurrency**	
11.1	Incenter and Circumcenter	G.CO.10, G.SRT.4,5
11.2	Orthocenter and Centroid	G.CO.10, G.SRT.4,5
Chapter 12.	**Right Triangles**	
12.1	Congruent Right Triangles	G.CO.10, G.SRT.5
12.2	Equidistance Theorems	G.CO.9,10, G.SRT.5
12.3	Geometric Mean Theorems	G.CO.10, G.SRT.4,5
Chapter 13.	**Trigonometry**	
13.1	Trigonometric Ratios	G.SRT.6
13.2	Use Trigonometry to Find a Side	G.SRT.8
13.3	Use Trigonometry to Find an Angle	G.SRT.8
13.4	Special Triangles	G.SRT.8
13.5	Cofunctions	G.SRT.7
13.6	SAS Sine Formula for Area of a Triangle	G.SRT.9
Chapter 14.	**Quadrilaterals**	
14.1	Angles of Polygons	G.CO.11
14.2	Properties of Quadrilaterals	G.CO.11
14.3	Trapezoids	G.CO.11
14.4	Use Quadrilateral Properties in Proofs	G.CO.11
14.5	Prove Types of Quadrilaterals	G.CO.11
Chapter 15.	**Circles**	
15.1	Circumference and Rotation	
15.2	Arcs and Chords	G.C.2
15.3	Tangents	G.C.2
15.4	Secants	G.C.2
15.5	Circle Proofs	G.C.2
15.6	Arc Lengths and Sectors	G.C.5

SUGGESTED PACING CALENDAR

Sections refer to the *Geometry Next Generation Course Workbook* (2024-2025).

Chapter	*Section*	*Regents Questions **	*Days*
Chapter 1.	**Basic Geometry**	**11**	**5**
1.1	Lines, Angles and Shapes	1	1
1.2	Pythagorean Theorem	1	1
1.3	Perimeter and Circumference	0	1
1.4	Area	9	2
Chapter 2.	**Coordinate Geometry**	**41**	**11**
2.1	Forms of Linear Equations	0	1
2.2	Parallel and Perpendicular Lines	14	3
2.3	Distance Formula	2	1
2.4	Midpoint Formula	0	1
2.5	Perpendicular Bisectors	4	1
2.6	Directed Line Segments	21	4
Chapter 3.	**Polygons in the Coordinate Plane**	**38**	**7**
3.1	Triangles in the Coordinate Plane	9	2
3.2	Quadrilaterals in the Coordinate Plane	17	3
3.3	Perimeter and Area using Coordinates	12	2
Chapter 4.	**Rigid Motions**	**42**	**9**
4.1	Translations	1	1
4.2	Line Reflections	4	1
4.3	Rotations	7	1
4.4	Point Reflections *[new to NG]*	*[10]*	2
4.5	Carry a Polygon onto Itself	20	4
Chapter 5.	**Dilations**	**44**	**9**
5.1	Dilations of Line Segments	12	2
5.2	Dilations of Polygons	14	3
5.3	Dilations of Lines	18	4
Chapter 6.	**Transformation Proofs**	**66**	**14**
6.1	Properties of Transformations	9	2
6.2	Sequences of Transformations	31	6
6.3	Transformations and Congruence	18	4
6.4	Transformations and Similarity	8	2
Chapter 7.	**Circles in the Coordinate Plane**	**32**	**6**
7.1	Equation of a Circle	22	4
7.2	Graph Circles *[new to NG]*	*[10]*	2
Chapter 8.	**Foundations of Euclidean Geometry**	**2**	**2**
8.1	Postulates, Theorems and Proofs	0	1
8.2	Parallel Lines and Transversals	2	1

Chapter	*Section*	*Regents Questions **	*Days*
Chapter 9.	**Triangles and Congruence**	**45**	**11**
9.1	Angles of Triangles	11	2
9.2	Triangle Inequality Theorem	2	1
9.3	Segments in Triangles	1	1
9.4	Isosceles and Equilateral Triangles	13	3
9.5	Triangle Congruence Methods	12	2
9.6	Prove Triangles Congruent	3	1
9.7	Overlapping Triangles	3	1
Chapter 10.	**Triangles and Similarity**	**60**	**13**
10.1	Properties of Similar Triangles	6	1
10.2	Triangle Similarity Methods	26	5
10.3	Prove Triangles Similar	1	1
10.4	Triangle Angle Bisector Theorem	0	1
10.5	Side Splitter Theorem	21	4
10.6	Triangle Midsegment Theorem	6	1
Chapter 11.	**Points of Concurrency**	**3**	**2**
11.1	Incenter and Circumcenter	0	1
11.2	Orthocenter and Centroid	3	1
Chapter 12.	**Right Triangles**	**26**	**6**
12.1	Congruent Right Triangles	1	1
12.2	Equidistance Theorems	5	1
12.3	Geometric Mean Theorems	20	4
Chapter 13.	**Trigonometry**	**91**	**20**
13.1	Trigonometric Ratios	4	1
13.2	Use Trigonometry to Find a Side	35	7
13.3	Use Trigonometry to Find an Angle	18	4
13.4	Special Triangles	1	1
13.5	Cofunctions	23	5
13.6	SAS Sine Formula for Area of a Triangle *[new to NG] [10]*		2
Chapter 14.	**Quadrilaterals**	**61**	**13**
14.1	Angles of Polygons	0	1
14.2	Properties of Quadrilaterals	22	4
14.3	Trapezoids	3	1
14.4	Use Quadrilateral Properties in Proofs	6	1
14.5	Prove Types of Quadrilaterals	30	6
Chapter 15.	**Circles**	**65**	**13**
15.1	Circumference and Rotation	1	1
15.2	Arcs and Chords	21	4
15.3	Tangents	7	1
15.4	Secants	11	2
15.5	Circle Proofs	3	1
15.6	Arc Lengths and Sectors	22	4

Chapter	*Section*	*Regents Questions **	*Days*
Chapter 16.	**Solids**	**104**	**20**
16.1	Volume of a Sphere	7	1
16.2	Volume of a Prism or Cylinder	21	4
16.3	Volume of a Pyramid or Cone	22	4
16.4	Density	25	5
16.5	Lateral Area and Surface Area	1	1
16.6	Rotations of Two-Dimensional Objects	16	3
16.7	Cross Sections	12	2
Chapter 17.	**Constructions**	**35**	**8**
17.1	Copy Segments, Angles, and Triangles	5	1
17.2	Construct an Equilateral Triangle	0	1
17.3	Construct an Angle Bisector	2	1
17.4	Construct a Perpendicular Bisector	6	1
17.5	Construct Lines Through a Point	5	1
17.6	Construct Inscribed Regular Polygons	7	1
17.7	Construct Points of Concurrency *[new to NG]*	*[5]*	1
17.8	Construct Circles of Triangles *[new to NG]*	*[5]*	1
	Totals:	**766**	**169**

* Questions appearing on Geometry Common Core Regents exams, through Aug. '23.