FREEHOLD REGIONAL HIGH SCHOOL DISTRICT
OFFICE OF CURRICULUM AND INSTRUCTION
MATHEMATICS DEPARTMENT CURRICULUM

GEOMETRY AND HONORS GEOMETRY

Credits: 5

BOARD OF EDUCATION ADOPTION DATE: August 26, 2021
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FREEHOLD REGIONAL HIGH SCHOOL DISTRICT

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Geometry and Honors Geometry

Course Description

Without geometry life is pointless!
"The beauty of mathematics only shows itself to more patient followers." Maryam Mirzakhani
"Geometry is the archetype of the beauty of the world." Johannes Kepler

Geometry and *Honors Geometry* extend student understanding to describe our world with shape, measure, and proof. Students will formalize discourse using geometric terminology to communicate the location and measurements of objects, prove relationships, and develop geometric descriptions of rigid motions to transform figures. Applying transformation to congruence, students will prove theorems about triangles. Students will develop properties of quadrilaterals on the coordinate plane and then model three-dimensional situations with the surface area and volume of prisms and pyramids. Students will understand similarity in terms in terms of similarity transformations, verify theorems, and apply geometric methods to solve design problems. Students will define trigonometric ratios, apply trigonometry to solve problems about right triangles, and model situations with indirect measurement. Students will understand and apply theorems about circles, the lines and angles about them, as well as find arc lengths and areas of sectors. Continuing to three-dimensional contexts, students will apply the surface area and volume of cylinders, cones, and spheres. Finally, students will interpret data and describe random processes by using a probability model and computing probabilities of events to make and evaluate decisions.

Course Sequence and Pacing

Unit Title	**Section Focus**	**Suggested Pacing**	**Suggested Pacing Honors**
Unit 1: Foundations of Geometry	1.1 Geometry Basics 1.2 Reasoning, Proof, Parallel & Perpendicular Lines 1.3 Transformations	37 Sessions	34 Sessions
Unit 2: Congruence	2.1 Congruent Triangles 2.2 Special Segments 2.3 Congruence with Quadrilaterals & Other Polygons	31 Sessions	29 Sessions
Unit 3: Similarity	3.1 Scale Factors & Dilation 3.2 Similar Triangles 3.3 Trigonometry	24 Sessions	24 Sessions
Unit 4: Circles	4.1 Circles Basics 4.2 Parts of Circles 4.3 Volume & Density	18 Sessions	20 Sessions

Support Resources

Supporting resources and appendices for this curriculum are available. These include a Resource Catalog of standards-aligned activities, common formative assessment and interdisciplinary items for performance expectations and objectives in this course.

- Geometry and Honors Geometry Resource Catalog
- Appendix A: Accommodations and Modifications for Various Student Populations
- Appendix B: Assessment Evidence
- Appendix C: Interdisciplinary Connections
- Appendix D: Mathematics 2023 NJSLS Crosswalk
    - (*) in the front of NJSLS Indicates 2023 version.

Geometry and Honors Geometry		
NJSLS Computer Science, Career Awareness, Exploration, Preparation, and Training, and Life Literacies and Key Skills		**Section**
8.1.12.DA.5	Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.	3.3
9.2.12.CAP.6	Identify transferable skills in career choices and design alternative career plans based on those skills.	3.2
9.4.12.TL.2	Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.	2.1

Geometry and Honors Geometry **Unit 1: Foundations of Geometry** **Section 1.1**	**Suggested Pacing: 18 Sessions** **Suggested Honors Pacing: 17 Sessions**
Section Focus: Geometry Basics	
NJSLS-M Performance Expectations	
G-CO.A.1 Know precise definitions of angle, (UNIT 4: circles), perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, (UNIT 4: distance around a circular arc)	
G-CO.C.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; (Unit 2: points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints).	
G-CO.D.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; (UNIT 2: 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.	
G-GPE.B.7* Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.★	
Standards-Aligned Objectives. Instruction and assessment will align to the following objectives:	
G-CO.A.1 [1] Describe, using clear and precise language, the terms point, line, and distance along a line in a plane.	
G-CO.A.1 [2A] ; G-CO.D.12 [1A] - Define, using clear and precise language: line segments. - Perform geometric constructions using a variety of tools and methods: copying a segment.	
G-CO.A.1 [2B] ; G-CO.D.12 [1B] - Define, using clear and precise language: angles. - Perform geometric constructions using a variety of tools and methods: copying an angle. *Note constructions are introduced as the vocabulary is introduced (copying an angle with defining an angle).	
G-GPE.B.7* [1] A. Use the distance and midpoint formulas. B. Find segment lengths using midpoints and segment bisectors. Incorporate reinforcement with solving linear equations and the Pythagorean Theorem.	
G-GPE.B.7* [H1] A. Use the distance and midpoint formulas. B. Find segment lengths using midpoints and segment bisectors. Incorporate reinforcement with solving linear and SIMPLE QUADRATIC equations AND PERFORM OPERATIONS ON POLYNOMIALS.	
G-GPE.B.7* [2] Use the coordinates of the vertices of a triangle and rectangle to find the perimeter.	
G-GPE.B.7* [3] A. Use the coordinates of the vertices of a triangle to find necessary dimensions (base, height) for finding area. B. Use the coordinates of the vertices of a rectangle to find the area.	
G-CO.A.1 [3] Identify and use pairs of angles: complementary, supplementary, linear pairs, and vertical angles. Incorporate reinforcement with solving linear equations.	
G-CO.A.1 [H3] Identify and use pairs of angles: complementary, supplementary, linear pairs, and vertical angles. Incorporate reinforcement with solving linear and SIMPLE QUADRATIC equations.	
G-CO.C.9 [1] Prove statements about solving equations (algebraic proof).	
G-CO.C.9 [2] Prove statements about segments and angles using properties of equality, congruence, and postulates (e.g., adding and subtracting angles or segments). Include supplementary, complementary, and bisect.	
G-CO.C.9 [3] Prove geometric relationships (including that vertical angles are congruent).	

Geometry and Honors Geometry **Unit 1: Foundations of Geometry** **Section 1.2**	**Suggested Pacing: 8 Sessions** **Suggested Honors Pacing: 7 Sessions**
Section Focus: Reasoning, Proof, Parallel & Perpendicular Lines	
NJSLS-M Performance Expectations	
G-CO.A.1 Know precise definitions of angle, (UNIT 4: circles), perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, (UNIT 4: distance around a circular arc)	
G-CO.C.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; (Unit 2: points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints).	
G-CO.D.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; (UNIT 2: 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.	
G-GPE.B.5 Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).	
Standards-Aligned Objectives. Instruction and assessment will align to the following objectives:	
G-CO.A.1 [4] Define, using clear and precise language, perpendicular lines and parallel lines.	
G-GPE.B.5 [1] Recognize that slopes of parallel lines are equal and recognize that slopes of perpendicular lines are opposite reciprocals. (Moved from Section 2.3)	
G-CO.C.9 [4] Identify and use properties of vertical angles, parallel lines with transversals, corresponding angles, alternate interior angles, alternate exterior angles, consecutive interior angles.	
G-CO.C.9 [5] Prove special angle relationships (corresponding angles, alternate interior angles, alternate exterior angles, consecutive interior angles) when two parallel lines are cut by a transversal and converse.	
G-CO.C.9 [6] Solve application problems using theorems where appropriate (vertical angles theorems, angles formed by two parallel lines and a transversal).	
G-CO.D.12 [3] Perform geometric constructions using a variety of tools and methods: constructing a line parallel to a given line through a point not on the line.	
G-GPE.B.5 [H3] A. Write and graph the equation of a line parallel to a given line that passes through a given point. B. Write and graph the equation of a line perpendicular to a given line that passes through a given point. C. Find the distance between a point and a line.	

Geometry and Honors Geometry **Unit 1: Foundations of Geometry** **Section 1.3**	**Suggested Pacing: 11 Sessions** **Suggested Honors Pacing: 10 Sessions**
Section Focus: Transformations	
NJSLS-M Performance Expectations	
G-CO.A.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).	
G-CO.A.3 Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.	
G-CO.A.4 Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.	
G-CO.A.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.	

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.
Standards-Aligned Objectives. Instruction and assessment will align to the following objectives:
G-CO.A.2 [1] Describe the different types of rigid transformations (isometries) and represent them on the coordinate plane: A. translations B. reflections C. rotations
G-CO.A.2 [2] Write transformations as functions that take points from the preimage in the coordinate plane as inputs and give other points for the image as outputs. (EX: (x,y) -> (x + 2, y - 4))
G-CO.A.2 [3] Compare transformations that preserve distance and angle measure ("rigid" transformation) to those that do not ("non-rigid").
G-CO.A.4 [1] Develop definitions of rotations, reflections and translations in terms of angles, circles, perpendicular lines, parallel lines, line segments and vectors.
G-CO.A.3 [1] Using line symmetry and rotational symmetry describe rotations and reflections that carry a rectangle, parallelogram, trapezoid, or regular polygon onto itself,
G-CO.A.5 [1] Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure. **Include reflection over the line x=c and y = c*
G-CO.A.5 [2] Use a composition of transformations and specify the sequence of transformations that were used to carry the given figure onto the other. **Include reflection over the line x=c and y = c*
G-CO.B.6 [1] Use geometric descriptions of rigid motions to transform figures.
G-CO.B.6 [2] Determine if two figures are congruent using the definition of congruence in terms of rigid motions.

Geometry and Honors Geometry **Unit 2: Congruence** **Section 2.1**	**Suggested Pacing: 11 Sessions** **Suggested Honors Pacing: 10 Sessions**
Section Focus: Congruent Triangles	
NJSLS-M Performance Expectations	
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.	
G-CO.B.8 Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.	
G-CO.C.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.	
G-GPE.B.4 Use coordinates to prove simple geometric theorems algebraically. For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; (UNIT 4: prove or disprove that the point (1, $\sqrt{3}$) lies on the circle centered at the origin and containing the point (0, 2)).	
G-SRT.B.5 Use congruence and (Unit 3: similarity) criteria for triangles to solve problems and to prove relationships in geometric figures.	
Standards-Aligned Objectives. Instruction and assessment will align to the following objectives:	
G-CO.C.10 [1] A. Classify triangles by sides (scalene, isosceles, equilateral) and angles (acute, right, obtuse, equiangular). B. Prove that measure of the interior angles of a triangle sum to 180. C. Find interior and exterior angle measures of triangles. Incorporate reinforcement with solving linear equations.	
G-CO.C.10 [H1] A. Classify triangles by sides (scalene, isosceles, equilateral) and angles (acute, right, obtuse, equiangular).	

B. Prove that measure of the interior angles of a triangle sum to 180. C. Find interior and exterior angle measures of triangles. Incorporate reinforcement with solving linear and QUADRATIC equations.
G-CO.B.7 [1] A. Identify corresponding angles and sides of two congruent triangles. B. 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. C. Justify congruence of two triangles using transformations.
G-CO.B.8 [1] A. Understand that a triangle is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations B. Use dynamic software and/or straightedge and compass to explain how to use rigid motions to take angles to angles and segments to segments in triangles.
G-CO.B.8 [2] A. Explain how the SAS criterion for triangle congruence follows from the definition of congruence in terms of rigid motions. B. Justify the congruence of two triangles using Side-Angle-Side (SAS)
G-CO.B.8 [3] A. Explain how the SSS criterion for triangle congruence follows from the definition of congruence in terms of rigid motions. B. Justify the congruence of two triangles using Side-Side-Side (SSS) and Hypotenuse-Leg (HL).
G-CO.B.8 [4] A. Explain how the ASA criterion for triangle congruence follows from the definition of congruence in terms of rigid motions. B. Justify the congruence of two triangles using Angle-Side-Angle (ASA) and Angle-Angle-Side (AAS).
G-CO.C.10 [2] Prove base angles of an isosceles triangle are congruent and equilateral triangles are equiangular.
G-SRT.B.5 [1] Use congruence theorems for triangles to solve problems and prove relationships.
G-GPE.B.4 [1] Use coordinates to prove triangles congruent in the coordinate plane.

Geometry and Honors Geometry **Unit 2: Congruence** **Section 2.2**	**Suggested Pacing: 8 Sessions** **Suggested Honors Pacing: 7 Sessions**
Section Focus: Special Segments of FIgures	
NJSLS-M Performance Expectations	
G-CO.C.9 Prove theorems about lines and angles. Theorems include: (UNIT 1: 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.	
G-CO.C.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.	
G-C.A.3 Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.	
G-CO.D.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.	
G-CO.D.13 Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.	
Standards-Aligned Objectives. Instruction and assessment will align to the following objectives:	
G-CO.D.12 [2] Perform geometric constructions using a variety of tools and methods, including: A. bisecting a segment	

B. bisecting an angle
C. perpendicular lines
D. perpendicular bisector of a line segment

G-CO.C.9 [7]
A. Prove points on a perpendicular bisector of a line segment are exactly equidistant from the segment's endpoint.
B. Use theorems about perpendicular bisectors to solve problems.
Incorporate reinforcement with solving linear equations.

G-CO.C.9 [H7]
A. Prove points on a perpendicular bisector of a line segment are exactly equidistant from the segment's endpoint.
B. Use theorems about perpendicular bisectors to solve problems.
Incorporate reinforcement with solving linear and QUADRATIC equations.

G-CO.C.9 [8]
A. Prove points on the angle bisector of an angle are equidistant from the angle's sides.
B. Use theorems about angle bisectors to solve problems.
Incorporate reinforcement with solving linear equations.

G-CO.C.9 [H8]
A. Prove points on the angle bisector of an angle are equidistant from the angle's sides.
B. Use theorems about angle bisectors to solve problems.
Incorporate reinforcement with solving linear and QUADRATIC equations.

G-CO.C.10 [3] Verify the properties of midsegments of triangles.

G-CO.C.10 [5] Understand inequality relationships in triangles to make comparisons:
A List sides and angles of a triangle in order by size.
B. Use the Triangle Inequality Theorem to find possible side lengths of triangles.

G-CO.D.13 [1] Perform geometric constructions using a variety of tools and methods, including:
A. equilateral triangle
B. square
C. regular hexagon inscribed in a circle.

Geometry and Honors Geometry **Suggested Pacing: 11 Sessions**
Unit 2: Congruence
Section 2.3

Section Focus: Congruence with Quadrilaterals & Other Polygons

NJSLS-M Performance Expectations

G-CO.C.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.

G-GPE.B.4 Use coordinates to prove simple geometric theorems algebraically. For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; (UNIT 4: prove or disprove that the point (1, $\sqrt{3}$) lies on the circle centered at the origin and containing the point (0, 2)).

G-GPE.B.5 (UNIT 3: Prove the slope criteria for parallel and perpendicular lines and) use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).

Standards-Aligned Objectives. Instruction and assessment will align to the following objectives:

G-CO.C.11 [1]
A. Develop an argument for finding the sum of the interior and exterior angle measures in a polygon in relation to the number of sides in a polygon.
B. Recognize the Exterior angle sum of a polygon is 360 .
C. Calculate the exterior angle measures of polygons.
D. Recognize the Interior angle sum of a polygon is (n-2) * 180 and note the implications as n approaches infinity.
E. Calculate the interior angle sum of a polygon and each interior angle measure.
Incorporate reinforcement with solving linear equations.

G-CO.C.11 [H1] A. Develop an argument for finding the sum of the interior and exterior angle measures in a polygon in relation to the number of sides in a polygon. B. Recognize the Exterior angle sum of a polygon is 360 . C. Calculate the exterior angle measures of polygons. D. Recognize the Interior angle sum of a polygon is (n-2) * 180 and note the implications as n approaches infinity. E. Calculate the interior angle sum of a polygon and each interior angle measure. Incorporate reinforcement with solving linear equations and SIMPLE QUADRATIC equations.
G-CO.C.11 [2] Use properties to find side lengths and angles of parallelograms.
G-CO.C.11 [3] Prove theorems about parallelograms. Theorems include: A. opposite sides are congruent B. opposite angles are congruent C. the diagonals of a parallelogram bisect each other D. rectangles are parallelograms with congruent diagonals
G-CO.C.11 [4] Verify a quadrilateral with certain properties is a parallelogram. Include verification on the coordinate plane.
G-CO.C.11 [5] Classify and use properties of special parallelograms: rectangle, rhombus, and square. Include classification on the coordinate plane.
G-CO.C.11 [6] Identify and use properties of quadrilaterals: trapezoid, isosceles trapezoid, and kite. Include classification on the coordinate plane.
G-GPE.B.4 [2] Use coordinates to prove simple geometric theorems algebraically to classify quadrilaterals.
G-GPE.B.5 [2] Use the slope criteria for parallel and perpendicular lines to solve geometric problems.
G-GPE.B.5 [2] Use the slope criteria for parallel and perpendicular lines to solve geometric problems.

Geometry and Honors Geometry **Unit 3: Similarity** **Section 3.1**	**Suggested Pacing: 5 Sessions**
Section Focus: Scale Factor & Dilations	
NJSLS-M Performance Expectations	
G-MG.A.3* Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).	
(*) G-GPE.B.6 (+) G-GPE.B.6 Find the point on a directed line segment between two given points that partitions the segment in a given ratio. *(+ for 2023)*	
G-SRT.A.1.a Verify experimentally the properties of dilations given by a center and a scale factor: 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.	
G-SRT.A.1.b The dilation of a line segment is longer or shorter in the ratio given by the scale factor.	
Standards-Aligned Objectives. Instruction and assessment will align to the following objectives:	
G-GPE.B.6 [1] Given a line segment (including those with positive and negative slopes) and a ratio, find the point on the segment that partitions the segment into the given ratio. (+ for 2023)	
G-SRT.A.1.a [1] A. Define and identify image, preimage, scale factor, center, reduction, enlargement, and similar figures as they relate to dilations. B. Identify a dilation stating its scale factor and center.	
G-SRT.A.1.a [2] Verify experimentally that a dilated image is similar to its preimage by showing congruent corresponding angles and proportional sides.	
G-SRT.A.1.b [1] A. Explain that the scale factor represents how many times longer or shorter a dilated line segment is than its preimage. B. Verify experimentally that the dilation of a line segment is longer or shorter in the ratio given by the scale factor.	

G-SRT.A.1.a [3] A. Verify experimentally that dilation leaves a line passing through the center of the dilation unchanged, by showing that it is the same line. B. Verify experimentally that a dilation takes a line not passing through the center of the dilation to a parallel line by showing the lines are parallel.
G-MG.A.3* [2] Apply geometric methods to solve design problems (e.g., create scale model or a perspective drawing).

Geometry and Honors Geometry **Unit 3: Similarity** **Section 3.2**	**Suggested Pacing: 11 Sessions** **Suggested Honors Pacing: 9 Sessions**
Section Focus: Similar Triangles	
NJSLS-M Performance Expectations	
G-GPE.B.5 Prove the slope criteria for parallel and perpendicular lines (UNIT 2: and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point)).	
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.	
G-SRT.A.3 Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.	
G-SRT.B.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.	
G-SRT.B.5 Use (Unit 2: congruence and) similarity criteria for triangles to solve problems and to prove relationships in geometric figures.	
Standards-Aligned Objectives. Instruction and assessment will align to the following objectives:	
G-SRT.A.2 [1] Given two figures, decide if they are similar by using the definition of similarity in terms of similarity transformations. Write similarity statements and statements of proportionality.	
G-SRT.A.3 [1] Establish the AA, SSS, and SAS criteria for similarity of triangles by extending the properties of similarity transformations.	
G-SRT.B.5[2] Use similarity theorems for triangles to solve problems.	
G-GPE.B.5 [H3] Prove the slope criteria for parallel and perpendicular lines. (Using similar triangles)	
G-SRT.B.4 [1] Prove and use the theorem that a line parallel to one side of a triangle divides the other two proportionally, and conversely.	
G-SRT.B.4 [2] Prove and use the Pythagorean Theorem and its converse using triangle similarity.	
G-SRT.B.4 [4] A. Use properties of similar triangles to find side lengths for special right triangles (30-60-90 and 45-45-90). B. Incorporate operations and properties of square roots and express solutions as exact values.	
G-SRT.B.4 [H4] A. Use properties of similar triangles to find side lengths for special right triangles (30-60-90 and 45-45-90). B. Incorporate operations and properties of square roots and express solutions as exact values. C. SIMPLIFY RADICAL EXPRESSIONS BY RATIONALIZING THE DENOMINATOR.	

Geometry and Honors Geometry **Unit 3: Similarity** **Section 3.3**	**Suggested Pacing: 6 Sessions** **Suggested Honors Pacing: 9 Sessions**
Section Focus: Trigonometry	
NJSLS-M Performance Expectations	
G-SRT.C.6 Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.	
G-SRT.C.7 Explain and use the relationship between the sine and cosine of complementary angles.	
G-SRT.C.8 Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.	
G-SRT.D.10+ Prove the Laws of Sines and Cosines and use them to solve problems.	
G-SRT.D.11+ Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).	
G-SRT.D.9+ Derive the formula A = 1/2 ab sin(C) for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.	
Standards-Aligned Objectives. Instruction and assessment will align to the following objectives:	
G-SRT.C.6 [1] Write trigonometric ratios of acute angles in right triangles.	
G-SRT.C.7 [1] Explain how the sine and cosine of complementary angles are related to each other by using geometric simulation software,applets, and graphing calculators to explore the relationship.	
G-SRT.C.8 [1] Solve for an unknown angle or side of a right triangle using sine, cosine, and tangent.	
G-SRT.C.8 [2] Recognize which methods could be used to solve right triangles in applied problems. Include use of angle of elevation, angle of depression, and inverse trigonometry.	
G-SRT.C.8 [3] Apply right triangle trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. Include use of angle of depression and angle of elevation.	
G-SRT.D.10 [H1] Prove the Law of Sines.	
G-SRT.D.10 [H2] Prove the Law of Cosines.	
G-SRT.D.10 [H3] Use the Laws of Sines and Cosines to find missing angles or side length measurements. Incorporate operations and properties of square roots and express solutions as exact values.	
G-SRT.D.11 [H1] Determine from given measurements in right and non-right triangles whether it is appropriate to use the Law of Sines or Cosines.	
G-SRT.D.11 [H2] Apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).	
G-SRT.D.9 [H1] Derive the formula A = 1/2 ab sin(C) for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.	

Geometry and Honors Geometry **Unit 4: Circles** **Section 4.1**	**Suggested Pacing: 14 Sessions** **Suggested Honors Pacing: 15 Sessions**
Section Focus: Circle Basics	
NJSLS-M Performance Expectations	
G-CO.A.1 Know precise definitions of circle, (UNIT 1: angle,perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line), and distance around a circular arc	
G-C.A.2 Identify and describe relationships among inscribed angles, radii, and chords. Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.	
(*) G-GPE.A.1 Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation. (+ for 2023)	
G-C.A.4+ Construct a tangent line from a point outside a given circle to the circle.	
G-GPE.B.4 Use coordinates to prove simple geometric theorems algebraically. For example, (UNIT 2: prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle); prove or disprove that the point (1, $\sqrt{3}$) lies on the circle centered at the origin and containing the point (0, 2).	
Standards-Aligned Objectives. Instruction and assessment will align to the following objectives:	
G-CO.A.1 [5] Define circle.	
G-C.A.2 [1] Identify: A. radii B. diameter C. tanget D. secant E. chords.	
G-C.A.2 [2] Recognize that the radius of a circle is perpendicular to the tangent where the radius intersects the circle.	
G-C.A.2 [3] Recognize that tangents drawn from a common external point are congruent.	
G-C.A.2 [4] Find segment lengths using tangents, chords, and secants. *Incorporate reinforcement with solving equations whose solutions require expanding expressions using the distributive property and collecting like terms.	
G-C.A.2 [H4] Find segment lengths using tangents, chords secants. Incorporate reinforcement with solving equations whose solutions require expanding expressions using the distributive property and collecting like terms and QUADRATIC equations as in finding the radius of a circle.	
G-C.A.2 [5] A. Identify types of arcs: major, minor, intercepted arc B. Find arc measures. C. Identify congruent arcs.	
G-C.A.2 [6] Use chords of circles to find lengths and arc measures. *Incorporate reinforcement with solving equations whose solutions require expanding expressions using the distributive property and collecting like terms.	
G-C.A.2 [7] Identify angles formed about circles A. inscribed angles D. central angles E. circumscribed angles	
G-C.A.2 [8] Recognize that inscribed angles on a diameter are right angles.	
G-C.A.2 [9] Examine the relationship between central and inscribed angles by applying theorems about their measures and find angle measures.	
G-C.A.3 [4] Prove properties of angles for a quadrilateral inscribed in a circle. (MOVED FROM UNIT 2)	

G-C.A.2 [10] Find angle measures using tangents, chords, secants Incorporate reinforcement with solving equations.
G-C.A.4 [H1] Construct a tangent line.
G-GPE.A.1 [1] (+ for 2023) A. Derive equation of a circle using the Pythagorean Theorem, given coordinates of the center and length of the radius. B. Write and graph equations of circles. Note: Students are not required to complete the square to find the center & radius.
G-GPE.A.1 [H2] Complete the square of a quadratic equation. (+ for 2023)
G-GPE.A.1 [H3] Determine the center and radius by completing the square. (+ for 2023)
G-GPE.B.4 [3] Derive simple proofs involving circles. Incorporate reinforcement of polynomial operations and algebra in the coordinate plane

Geometry and Honors Geometry **Unit 4: Circles** **Section 4.2**	**Suggested Pacing: 4 Sessions** **Suggested Honors Pacing: 5 Sessions**
Section Focus: Parts of Circles	
NJSLS-M Performance Expectations	
G-CO.A.1 Know precise definitions of circle, (UNIT 1: angle,perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line), and distance around a circular arc	
G-MG.A.2* Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile (Unit 4 Population Density), BTUs per cubic foot (Unit 3), finding mass of a material (Unit 3)).★	
G-GMD.A.1 Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. Use dissection arguments, Cavalieri's principle, and informal limit arguments.	
G-C.A.1 Prove that all circles are similar.	
G-C.B.5 Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.	
(*) S-CP.A.1* Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not"). (+ for 2023)	
Standards-Aligned Objectives. Instruction and assessment will align to the following objectives:	
G-C.A.1 [1] A. Discuss, develop, and compare the ratio of the circumference of a circle to the diameter of the circle for several circles. B. Determine that this ratio is constant for all circles. C. Justify that all circles are similar. (Note: identify concentric circles).	
G-GMD.A.1 [2] Give an informal argument for the formulas for the circumference and area of a circle.	
G-C.B.5 [1] A. Use the area and circumference of a circle to derive area of a sector and arc length. B. Calculate the area of a sector and the arc length.	
S-CP.A.1* [3] Define and determine Geometric Probability Incorporate shaded region problems that reinforce area of 2D figures. (+ for 2023)	
S-CP.A.1* [H3] Define and determine Geometric Probability Incorporate shaded region problems that reinforce 2D areas and VOLUME OF 3D & INCORPORATE GEOMETRIC FORMULAS AND REARRANGE TO HIGHLIGHT A QUANTITY OF INTEREST. (+ for 2023)	
G-MG.A.2* [2] , N-Q.A.3* [1] , N-Q.A.3* [4] A. Apply concept of population density to model real-life situations. B. Identify appropriate units of measurement to report quantities. C. Identify important quantities in a problem or real-world context.	

**Include conversion of units of measurements. **Incorporate reinforcement of basic area formulas from middle school including area of a circle.
G-C.B.5 [H2] Justify the radii of any two circles (r1 and r2) and the arc lengths (s1 and s2) determined by congruent central angles are proportional.
G-C.B.5 [3] A. Explain that 1° = ∏/180 radians. B. Convert between angle measures in degrees and radians.
G-C.B.5 [4] Determine the constant of proportionality (scale factor).
G-C.B.5 [H5] Verify that the constant of a proportion is the same as the radian measure, Θ, of the given central angle. Conclude s = r Θ.

Geometry and Honors Geometry **Unit 4: Circles** **Section 4.3**	**Suggested Pacing: 10 Sessions**
Section Focus: Volume & Density	
NJSLS-M Performance Expectations	
G-GMD.A.1 Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. Use dissection arguments, Cavalieri's principle, and informal limit arguments.	
G-GMD.A.3* Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.★	
G-MG.A.2* Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile (Unit 4 Population Density), BTUs per cubic foot (Unit 3), finding mass of a material (Unit 3)).★	
N.Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.	
G-GMD.A.1 Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. Use dissection arguments, Cavalieri's principle, and informal limit arguments.	
G-GMD.A.2+ Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures.	
G-GMD.A.3* Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.★	
G-GMD.B.4 Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.	
G-MG.A.1* Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).★	
N.Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.	
Standards-Aligned Objectives. Instruction and assessment will align to the following objectives:	
G-SRT.C.8 [4] Apply right triangle trigonometric ratios and the Pythagorean Theorem to find the area of regular polygons.	
G-GMD.B.4 [1] [2] -Use strategies to help visualize relationships between two-dimensional and three-dimensional objects. - Relate the shapes of two- dimensional cross-sections to their three-dimensional objects.	
G-GMD.B.4 [H3] Discover three-dimensional objects generated by rotations of two-dimensional objects.	
G-GMD.A.1 [1], G-GMD.A.3* [1], N-Q.A.3* [1], N-Q.A.3* [4] A. Define dissection arguments, Cavalieri's principle, and informal limit arguments. B. Give an informal argument for the formulas for the volume of prisms and cylinders. C. Use volume formulas for prisms and cylinders to solve contextual problems. D. Identify appropriate units of measurement to report quantities. E. Identify important quantities in a problem or real-world context.	
G-GMD.A.1 [H1], G-GMD.A.3* [H1], N-Q.A.3* [1] , N-Q.A.3* [4]	

A. Define dissection arguments, Cavalieri's principle, and informal limit arguments. B. Give an informal argument for the formulas for the volume of prisms and cylinders. C. Use volume formulas for prisms and cylinders to solve contextual problems. Incorporate reinforcement of solving by FACTORING POLYNOMIALS COMPLETELY. D. Identify appropriate units of measurement to report quantities. E. Identify important quantities in a problem or real-world context.
G-MG.A.2* [1] Define density.
G-MG.A.2* [2] , N-Q.A.3* [1] , N-Q.A.3* [4] A. Apply concepts of density based on area and volume to model real-life situations. B. Identify appropriate units of measurement to report quantities. C. Identify important quantities in a problem or real-world context. **Include conversion of units of measurements. **Incorporate reinforcement of basic area formulas from middle school including area of a circle.
G-GMD.A.1 [1], G-GMD.A.3* [1], N-Q.A.3* [1], N-Q.A.3* [4] A. Give an informal argument for the formulas for the volume of pyramids. B. Use volume formulas for pyramids to solve contextual problems. C. Identify appropriate units of measurement to report quantities. D. Identify important quantities in a problem or real-world context.
G-GMD.A.1 [4] , N-Q.A.3* [1], N-Q.A.3* [4] A. Give an informal argument for the formula for the volume of a cone. B. Use the volume formula for cones to solve contextual problems. C. Identify appropriate units of measurement to report quantities. D. Identify important quantities in a problem or real-world context.
G-GMD.A.2 [H1] Give an informal argument using Cavalieri's principle for the formula for the volume of a sphere and other solid figures.
G-GMD.A.3* [3] Utilize the appropriate formula for volume and surface area, depending on the figure.
G-GMD.A.3* [4], N-Q.A.3* [1], N-Q.A.3* [4] A. Use volume and surface area formulas for prisms, cylinders, pyramids, cones, and spheres to solve contextual problems. Incorporate reinforcement with using square root and cube root symbols to represent solutions to equations. B. Identify appropriate units of measurement to report quantities. C. Identify important quantities in a problem or real-world context.
G-GMD.A.3* [H4], N-Q.A.3* [1], N-Q.A.3* [4] A. Use volume and surface area formulas for prisms, cylinders, pyramids, cones, and spheres to solve contextual problems. Incorporate reinforcement with using square root and cube root symbols to represent solutions to equations; REARRANGE FORMULAS TO HIGHLIGHT A QUANTITY OF INTEREST. B. Identify appropriate units of measurement to report quantities. C. Identify important quantities in a problem or real-world context.
G-MG.A.1* [1] Use measures and properties of geometric shapes to describe real-world objects.
G-MG.A.1* [2], N-Q.A.3* [1], N-Q.A.3* [4] A. Given a real world object, classify the object as a known geometric shape – use this to solve problems in context, B. Identify appropriate units of measurement to report quantities. C. Identify important quantities in a problem or real-world context.

NJSLS Career Awareness, Exploration, Preparation, and Training, and Life Literacies and Key Skills		Unit
9.4.12.CI.1	Demonstrate the ability to reflect, analyze and use creative skills and ideas.	1-4
9.4.12.CI.3	Investigate new challenges and opportunities for personal growth, advancement and transition	2
9.4.12.CT.1	Identify problem-solving strategies used in the development of an innovative product or practice.	2
9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving.	1-4
9.4.12.CT.4	Enlist input from a variety of stakeholders (e.g., community members, experts in the field) to design a service learning activity that addresses a local or global issue (e.g., environmental justice).	3
9.4.12.TL.1	Assess digital tools based on features such as accessibility options, capacities and utility for accomplishing a specified task	1-4
9.4.12.TL.4	Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem.	4
9.4.12.IML.2	Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources.	1-4
9.4.12.IML.3	Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions.	1-4
9.4.12.IML.4	Assess and critique the appropriateness and impact of existing data visualizations for an intended audience.	1-4
9.4.12.IML.7	Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change.	1-4
9.4.12.IML.9	Evaluate media sources for point of view, bias and motivations.	1-4
9.4.12.IML.10	Analyze the decisions creators make to reveal explicit and implicit messages within information and media.	1-4

(*) ID 9.2.12.CAP.11 duplicated in NJDOE NJSLS file page 1 and 2