Southern Cayuga Central School District – Curriculum Map

Subject: **Regents Geometry** School Year: 2023-2024

Title or Topics w/NYS Standard	Essential Questions and Vocabulary	Content Skills (activities to cover essential questions)	Major Assessments (test, projects, etc.)	Time Frame
Title: Essential Geometric Terms and Concepts Standards: **GEO-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. **GEO-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. **GEO-G.CO.9.** Prove and apply theorems about lines and angles. **GEO-G.CO.10.** Prove and apply theorems about triangles. **GEO-G.CO.12.** Make, justify, and apply formal geometric constructions. **GEO-G.CO.13.** Make and justify the constructions for inscribing an equilateral triangle, a square and a regular hexagon in a circle. **GEO-G.SRT.5.** Use congruence and similarity criteria for triangles to: **GEO-G.SRT.5.a.** Solve problems algebraically and geometrically. **GEO-G.SRT.5.b.** Prove relationships in geometric figures. **GEO-G.GPE.6.** Find the point on a directed line segment between two given points that partitions the segment in a given ratio.	Questions: • How can we prove without measuring with traditional methods that two objects are the same size and shape? • What does it mean to be congruent? • Is congruent the same as equal? • What is the Side-Side-Side (SSS) Theorem for Triangle Congruence? Vocabulary: • Points • Distance • Collinear • Line • Ray • Angle • Measure of an Angle • Acute • Obtuse • Right • Straight • Reflex • Complementary Angles • Supplementary Angles • Circle • Equilateral • Midpoint • Segment Bisector • Angle Bisector • Perpendicular	• Class Observations and Discussions with Line Segments, Rays, Lines, and Angles • Measuring Line Segments with a Ruler • Measuring Angles with a Protractor • Classifying Angles with and without Measuring • Introduction to Using a Compass • Constructing a Triangle Given its Sides • Verifying Important Definitions and Properties of Lines	• eMath Homework • Exit Tickets and Classroom Observations • Quizzes • End of Unit Exam	September (12-14 days)
Title: Transformations, Rigid Motions, and Congruence	Questions: • Why do we call certain	• Using Tracing Paper to Explore	• eMath Homework	September - October

Standards: **GEO-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. **GEO-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. **GEO-G.CO.3.** Given a regular or irregular polygon, describe the rotations and reflections (symmetries) that carry the polygon onto itself. **GEO-G.CO.4.** Develop definitions of rotations, reflections, and translations in terms of points, angles, circles, perpendicular lines, parallel lines, and line segments. **GEO-G.SRT.5.** Use congruence and similarity criteria for triangles to: **GEO-G.SRT.5.b.** Prove relationships in geometric figures. **GEO-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. **GEO-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. **GEO-G.SRT.1.** Verify experimentally the properties of dilations given by a center and a scale factor. **GEO-G.CO.9.** Prove and apply theorems about lines and angles. **GEO-G.CO.10.** Prove and apply theorems about triangles. **GEO-G.CO.12.** Make, justify, and apply formal geometric constructions.	transformations “rigid motions”? ● What are the properties of “rigid motions”? ● What are the geometric properties of rotations, reflections, and translations? ● What does it mean for two figures to be congruent in the plane? ● How can the properties that we’ve learned help us to write basic proofs? Vocabulary: ● Rigid Motion ● Transformation ● Rotations ● Reflections ● Isosceles Triangles ● Translations ● Parallel Lines ● Vertical Angles ● Corresponding Angles ● Lines of Symmetry	Transformations and Rigid Motions ● Chunked Version of Proofs ● Using Rulers to Verify if Something is Size Preserving ● Using Compasses and Protractors to Verify if Something is Angle Preserving ● Constructing Perpendicular Bisectors with a Compass	● Exit Tickets and Classroom Observations ● Quizzes ● End of Unit Exam	(12-14 days)

Title: Euclidean Triangle Proof Standards: **GEO-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. **GEO-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. **GEO-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. **GEO-G.CO.9.** Prove and apply theorems about lines and angles. **GEO-G.CO.10.** Prove and apply theorems about triangles. **GEO-G.SRT.5.** Use congruence and similarity criteria for triangles to: **GEO-G.SRT.5.a.** Solve problems algebraically and geometrically. **GEO-G.SRT.5.b.** Prove relationships in geometric figures.	Questions: ● What are the requirements to prove that a pair of triangles are congruent? ● What are the axioms of equality and how can I use these to help me in proofs? ● What is sufficient evidence to prove that two lines are parallel? Vocabulary ● Median/Altitude of a Triangle ● S.A.S., A.S.A., S.S.S., A.A.S., H.L. Triangle Theorems ● CPCTC	● Drawing Inferences from Given Information Using Known Definitions and Properties ● Using Equality Axioms in Basic Fill-in the Blank Proofs ● Proving Triangles are Congruent using Triangle Theorems ● Proofs with Partitioning and Axioms of Equality ● Using Properties of Parallel Lines in Proofs	● eMath Homework ● Exit Tickets and Classroom Observations ● Quizzes ● End of Unit Exam	October - November (14-16 days)
Title: Constructions Standards: **GEO-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. **GEO-G.CO.9.** Prove and apply theorems about lines and angles. **GEO-G.CO.10.** Prove and apply theorems about triangles. **GEO-G.CO.12.** Make, justify, and apply formal geometric constructions. **GEO-G.CO.13.** Make and justify the constructions for inscribing an equilateral triangle, a square and a regular hexagon in a circle.	Questions: ● What are the rules for constructions? ● What uses do we have for inscribed and circumscribed objects? Vocabulary: ● Equidistant ● Bisector ● Perpendicular Bisector ● Circumscribe ● Inscribe ● Regular Polygons	● Constructing and Proving Isosceles Triangles ● Constructing Parallel Lines, Perpendicular Lines, and Copies of Angles ● Using a Compass to Construct an Angle Bisector	● eMath Homework ● Exit Tickets and Classroom Observations ● Quizzes ● End of Unit Exam	November - December (10-12 days)

GEO-G.SRT.5. Use congruence and similarity criteria for triangles to: **GEO-G.SRT.5.b.** Prove relationships in geometric figures. **GEO-G.C.2b.** Identify, describe and apply relationships among radii, chords, tangents, and secants of a circle.				
Title: The Tools of Coordinate Geometry <u>Standards:</u> **GEO-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. **GEO-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. **GEO-G.CO.3.** Given a regular or irregular polygon, describe the rotations and reflections (symmetries) that carry the polygon onto itself. **GEO-G.CO.4.** Develop definitions of rotations, reflections, and translations in terms of points, angles, circles, perpendicular lines, parallel lines, and line segments. **GEO-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. Understand congruence in terms of rigid motions. **GEO-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. **GEO-G.CO.10.** Prove and apply theorems about triangles.	Questions: ● What advantages does point-slope form offer? ● How can I use slope to prove that lines are parallel or perpendicular? ● What are the properties of horizontal lines and vertical lines? ● What can I use the Pythagorean Theorem for in Right Triangles? Vocabulary: ● Slope/Average Rate of Change ● Point-Slope Form ● Horizontal ● Vertical ● Pythagorean Theorem ● Distance Formula ● Midpoint Formula	● Explorations to Prove Parallel or Perpendicular Using Geogebra ● Determining a Line That is Parallel or Perpendicular to a Given Line Through a Given Point ○ Given a graph ○ Given an equation ● Converting Between Point-Slope and Slope-Intercept Form ● Using the Pythagorean Theorem to Find Missing Sides ● Deriving the Distance Formula from the Pythagorean Theorem ● Using the Distance Formula to Verify that Reflections, Rotations, and Translations are Size Preserving	● eMath Homework ● Exit Tickets and Classroom Observations ● Quizzes ● End of Unit Exam	December - January (16-18 days)

GEO-G.GPE.5. On the coordinate plane: **GEO-G.GPE.5.a.** Explore the proof for the relationship between slopes of parallel and perpendicular lines; **GEO-G.GPE.5.b.** Determine if lines are parallel, perpendicular, or neither, based on their slopes; and **GEO-G.GPE.5.c.** Apply properties of parallel and perpendicular lines to solve geometric problems. **GEO-G.GPE.6.** Find the point on a directed line segment between two given points that partitions the segment in a given ratio. **GEO-G.GPE.7.** Use coordinates to compute perimeters of polygons and areas of triangles and rectangles. **GEO-G.SRT.8.** Use sine, cosine, tangent, the Pythagorean Theorem and properties of special right triangles to solve right triangles in applied problems.				
Title: Quadrilaterals <u>Standards</u>: **GEO-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. **GEO-G.CO.11.** Prove and apply theorems about parallelograms. **GEO-G.GPE.5.** On the coordinate plane: **GEO-G.GPE.5.a.** Explore the proof for the relationship between slopes of parallel and perpendicular lines; **GEO-G.GPE.5.b.** Determine if lines are parallel, perpendicular, or neither, based on their slopes; and **GEO-G.GPE.5.c.** Apply properties of parallel and perpendicular lines to solve geometric problems. **GEO-G.GPE.6.** Find the point on a directed line segment	Questions: ● What is needed to prove that something is a parallelogram? ● How are all of the quadrilaterals that we are learning about related? Vocabulary: ● Quadrilateral ● Trapezoid ● Parallelogram ● Rectangle ● Rhombus (Rhombi) ● Squares	● Proving that a Shape is a Trapezoid or a Parallelogram ● Stating and Proving the Properties of a Parallelogram ● Properties of the Midpoints of a Triangle ● Stating and Proving the Properties of a Rectangle ● Stating and Proving the Properties of a Rhombus ● Stating and Proving the Properties of a Square ● Use of Supplemental Materials (in addition to eMath) to Aide in Theory and Coordinate Grid Proofs such as: ○ Matching Puzzles ○ Fill in the Blank Reasons and Statements ○ Scaffolded	● eMath Homework ● Exit Tickets and Classroom Observations ● Quizzes ● End of Unit Exam ● Quadrilateral Family Tree Project - Time Permitting	January (10-12 days)

between two given points that partitions the segment in a given ratio. **GEO-G.GPE.7.** Use coordinates to compute perimeters of polygons and areas of triangles and rectangles.		Coordinate Proof Activities		
Title: Dilations and Similarity <u>Standards</u>: **GEO-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. **GEO-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. Understand congruence in terms of rigid motions. **GEO-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. **GEO-G.SRT.1.** Verify experimentally the properties of dilations given by a center and a scale factor. **GEO-G.SRT.1.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. **GEO-G.SRT.1.b.** Verify experimentally that the dilation of a line segment is longer or shorter in the ratio given by the scale factor. **GEO-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	Questions: ● How does similarity relate to congruence? ● Why are dilations not rigid motions? ● What are the geometric properties of a dilation? ● What is sufficient evidence to prove that two figures are similar? ● What is special about the medians of a triangle? ● In terms of similarity, what is special about right triangles? Vocabulary: ● Dilations ● Similar Figures ● Similarity Transformations ● A.A., S.S.S., S.A.S. Criteria for Similarity ● Means and Extremes (aka Cross Product) ● Side Splitter Theorem ● Proportionally ● Partition ● Concurrent	● Exploration to Define the Properties of Dilations ● Using Slope and Distance Formulas to Draw Conclusions About Dilations in the Coordinate Grid ● Calculating Scale Factor ● Setting Ratios Between Similar Figures ● Using A.A., S.S.S., and S.A.S. Criteria for Similarity in Proofs ● Using Means and Extremes in Proofs with Similar Figures ● Using the Side Splitter Theorem in Algebraic and Proof Problems ● Proving and Using Right Triangle Similarity ● Proving the Pythagorean Theorem (Time Permitting)	● eMath Homework ● Exit Tickets and Classroom Observations ● Quizzes ● End of Unit Exam	February (16-18 days)

sides. **GEO-G.SRT.3.** Use the properties of similarity transformations to establish the AA~, SSS~, and SAS~ criterion for two triangles to be similar. **GEO-G.SRT.4.** Prove and apply similarity theorems about triangles. **GEO-G.SRT.5.** Use congruence and similarity criteria for triangles to: **GEO-G.SRT.5.a.** Solve problems algebraically and geometrically. **GEO-G.GPE.6.** Find the point on a directed line segment between two given points that partitions the segment in a given ratio. **GEO-G.GPE.7.** Use coordinates to compute perimeters of polygons and areas of triangles and rectangles.				
Title: Right Triangle Trigonometry <u>Standards:</u> **GEO-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. Prove geometric theorems. **GEO-G.CO.10.** Prove and apply theorems about triangles. **GEO-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. **GEO-G.SRT.3.** Use the properties of similarity transformations to establish the AA~, SSS~, and SAS~ criterion for two triangles to be similar. **GEO-G.SRT.5.** Use congruence and similarity criteria for triangles to: **GEO-G.SRT.5.a.** Solve problems algebraically and geometrically. **GEO-G.SRT.5.b.** Prove relationships in geometric figures. **GEO-G.SRT.7.**	Questions: ● How can we use trigonometry to find distances? ● What are the trigonometric ratios? ● What is the relationship between sine and cosine in the acute angles in a right triangle? Vocabulary: ● Trigonometry ● (Inverse) Sine ● (Inverse) Cosine ● (Inverse) Tangent ● Inverse Trigonometric Functions	● Finding Missing Sides of Similar Triangles Using Ratios ● Exploring Trigonometric Ratios with: ○ The calculator ○ Given side measures ● Finding Missing Sides of a Right Triangle with Trigonometry ● Real-life Applications with Trigonometry ● Exploring Using Trigonometry in Other Shapes	● eMath Homework ● Exit Tickets and Classroom Observations ● Quizzes ● End of Unit Exam	March (8-10 days)

Explain and use the relationship between the sine and cosine of complementary angles. **GEO-G.SRT.8.** Use sine, cosine, tangent, the Pythagorean Theorem and properties of special right triangles to solve right triangles in applied problems. **GEO-G.GPE.6.** Find the point on a directed line segment between two given points that partitions the segment in a given ratio. **GEO-G.GPE.7.** Use coordinates to compute perimeters of polygons and areas of triangles and rectangles.				
Title: Circle Geometry <u>Standards:</u> **GEO-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. **GEO-G.CO.10.** Prove and apply theorems about triangles. **GEO-G.CO.12.** Make, justify, and apply formal geometric constructions. **GEO-G.CO.13.** Make and justify the constructions for inscribing an equilateral triangle, a square, and a regular hexagon in a circle. **GEO-G.C.2a.** Identify, describe and apply relationships between the angles and their intercepted arcs of a circle. **GEO-G.C.2b.** Identify, describe and apply relationships among radii, chords, tangents, and secants of a circle. **GEO-G.C.5** Using proportionality, find one of the following given two others; the central angle, arc length, radius or area of sector. **GEO-G.SRT.5.** Use congruence and similarity criteria for triangles to: **GEO-G.SRT.5.b.** Prove relationships in geometric figures. **GEO-G.GPE.1a.** 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. **GEO-G.GPE.6.**	Questions: ● How can I find arc measures if I know certain angle measures in a circle? ● How can I find angle measures if I know certain arc lengths? ● What can be said about intersecting chords and angles? ● How is the equation of a circle related to the distance formula? ● How can I find the equation of a tangent line using the slope of the radius at the point of tangency? Vocabulary: ● Chords ● Tangents ● Secants ● Central Angle ● Major Arc ● Minor Arc ● Inscribed Angles ● Semicircle ● Standard Form ● Vertex Form	● Reviewing Circle Terms from Past Grades ● Measuring Inscribed and Central Angles as well as Their Arcs ● Using Properties of Inscribed Angles in Problems ● Using Chords, Tangents, and Secants to Determine Angles and Arcs ● Using Tangent and Secant Properties in Proofs ● Investigating the Relationship Between Secants and Tangents that have the same Starting Point ● Equations of Circles ○ Review of Completing the Square ● Constructing Tangents to Circles Using a Compass	● eMath Homework ● Exit Tickets and Classroom Observations ● Quizzes ● End of Unit Exam	March-April (16-18 days)

Find the point on a directed line segment between two given points that partitions the segment in a given ratio.				
Title: Measurement and Modeling <u>Standards:</u> **GEO-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. **GEO-G.CO.10.** Prove and apply theorems about triangles. **GEO-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. **GEO-G.SRT.8.** Use sine, cosine, tangent, the Pythagorean Theorem and properties of special right triangles to solve right triangles in applied problems. **GEO-G.SRT.9.** Justify and apply the formula A=(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. **GEO-G.C.1.** Prove that all circles are similar. **GEO-G.C.2a.** Identify, describe and apply relationships between the angles and their intercepted arcs of a circle. **GEO-G.C.2b.** Identify, describe and apply relationships among radii, chords, tangents, and secants of a circle. **GEO-G.C.5.** Using proportionality, find one of the following given two others; the central angle, arc length, radius or area of sector. **GEO-G.CO.12.** Make, justify, and apply formal geometric constructions. **GEO-G.CO.13.** Make and justify the constructions for inscribing an equilateral triangle, a square and a regular hexagon in a circle. **GEO-G.GPE.6.** Find the point on a directed line segment between two given points that partitions the segment in a given ratio. **GEO-G.GPE.7.**	Questions: ● What uses do we have for cross sectional measurements? ● Why are sectors of circles so important? ● How can trigonometry help me in finding the area of polygons? ● What is the relationship between radians and degrees? Vocabulary: ● Radians ● Sectors ● Truncated Cone ● Circumference ● Cross Section	● Multi-Step Perimeter Problems ○ Missing Sides ○ On the Coordinate Grid ○ Two Shapes Together (ex: rectangle and semicircle) ● Finding the area of: ○ Parallelograms ○ Triangles ○ Circles ● Finding the Radian Measurement of an Angle ● Describing Cross-Sections of 3-Dimensional Figures ● Finding the volume of: ○ Prisms ○ Cylinders ○ Pyramids ○ Cones ○ Spheres ○ Truncated Cones	● eMath Homework ● Exit Tickets and Classroom Observations ● Quizzes ● End of Unit Exam	April-May (16-18 days)

Use coordinates to compute perimeters of polygons and areas of triangles and rectangles. **GEO-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. **GEO-G.GMD.3.** Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. **GEO-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. **GEO-G.MG.1.** Use geometric shapes, their measures, and their properties to describe objects.				