High School (9-12)
Gateway High School
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Gateway School District
Curriculum Map

Curriculum Map: Mathematics

Course: Honors Geometry
Grade(s): 9

Unit 1: Tools of Geometry

Brief Summary of Unit	
Stage One—Desired Results	
Established Goals: (Standards of Learning, Content Standards) 1. Complete patterns using inductive reasoning and make conjectures 2. Name basic geometric figures and identify types of angles 3. Find the length of segments using the ruler and segment addition postulates 4. Find the measure of unknown angles using the angle addition postulate 5. Find the distance or midpoint between 2 points using the distance or midpoint formula 6. Find perimeter and area of squares, rectangles, and circles using the formulas	
Understandings: 1. **Lengths of segments can be found using the ruler postulate or the distance formula depending on where the segment is (space or coordinate plane).** 2. **Other formulas and properties can help in finding the perimeter and area of various figures.** 3. **Geometry is a mathematical system built on accepted facts, basic terms, and definitions.** 4. **Special angle pairs can be used to identify geometric relationships and to find angle measures.** 5. **Formulas can be used to find the midpoint and length of any segment in the coordinate plane.**	**Essential Questions:** **1.** What is the process of using inductive reasoning? **2.** What are the basic terms of geometry? **3.** What are the relationships between the basic building blocks of geometry? **4.** What are segments and rays and parallel lines? **5.** What is the distance between two points in a coordinate plane? **6.** What is the midpoint of two points in a coordinate plane? **7.** What is the perimeter of a geometric figure? **8.** What is the area of a geometric figure?

6. **Perimeter and area are two different ways of measuring the size of geometric figures.**	

Stage Two—Assessment Evidence

Performance Tasks:

Other Evidence: :(quizzes, tests and so on)

Stage Three—Learning Plan

Unit 2: Reasoning and Proof

Brief Summary of Unit

Stage One—Desired Results

Established Goals: (Standards of Learning, Content Standards)

1. Justify steps in a logical argument
2. Use the Law of Detachment
3. Use the Law of Syllogism
4. Write biconditionals
5. Recognize 'good' definitions
6. Recognize conditional statements
7. Write converse/inverse/negations of conditional statements
8. Connect reasoning in algebra and geometry
9. Write two-column proofs involving algebraic properties

Understandings:	**Essential Questions:**
1. **How deductive reasoning works and how to use it to form algebraic conclusions** 2. **Critical reading is based on logic.** 3. **Patterns in some number sequences and some sequences of geometric figures can be used to discover relationships.** 4. **Some mathematical relationships can be described using a variety of if-then statements.** 5. **Algebraic properties of equality are used in geometry to solve problems and justify reasoning.** 6. **Given information, definitions, properties, postulates, and previously proven theorems can be used as reasons in a proof.**	**1.** How can you make a conjecture and prove that it is true? **2.** What is the difference(s) between deductive and inductive reasoning? **3.** How does deductive reasoning lead to logical conclusions?

Stage Two—Assessment Evidence

Performance Tasks:

Other Evidence: :(quizzes, tests and so on)

Stage Three—Learning Plan

Unit 3: Parallel & Perpendicular Lines

Brief Summary of Unit

Stage One—Desired Results

Established Goals: (Standards of Learning, Content Standards)

1. Graph linear equations / functions
2. Write linear equations using various given information
3. Make predictions from linear models
4. Write linear equation of parallel and perpendicular lines.
5. Identify the different special pairs of angles formed by two lines and a transversal.
6. (alternate interior, alternate exterior, same-side interior, corresponding, vertical, linear pairs)

Understandings:

1. **Linear equations represent and model real world situations.**
2. **Comparing the slopes of two lines can show whether the lines are parallel or perpendicular.**
3. **A line can be graphed and its equation written when certain facts about the line, such as its slope and a point on a line are known.**
4. **Predictions can be made about real world situations using linear relationships.**
5. **Not all lines and not all planes intersect.**
6. **When a line intersects two or more lines, the angles formed at intersection points create special angle pairs.**
7. **Certain angle pairs can be used to decide whether two lines are parallel.**
8. **The relationships of two lines to a third line can be used to decide whether two lines are parallel or perpendicular to each other.**

Essential Questions:

1. How do you prove that two lines are parallel or perpendicular?
2. How do you write an equation of a line in the coordinate plane?

Stage Two—Assessment Evidence

Performance Tasks:

Other Evidence: :(quizzes, tests and so on)

Stage Three—Learning Plan

Unit 4: Congruent Triangles

Brief Summary of Unit

Stage One—Desired Results

Established Goals: (Standards of Learning, Content Standards)

1. Identify congruent polygons and name the corresponding parts
2. Identify congruent triangles using the congruence postulates (SSS, SAS, ASA, AAS), HL Theorem
3. Use CPCTC to identify that corresponding parts of congruent triangles are congruent
4. Identify an isosceles triangle using the theorem and its converse
5. Find unknown parts of triangles using the isosceles triangle theorem and its converse

Understandings:

1. **Various properties and theorems can be used in addition to the congruence postulates and theorems in order to identify congruent polygons.**
2. **Comparing the corresponding parts of two figures can show whether the figures are congruent.**
3. **Two triangles can be proven to be congruent without having to show that all corresponding parts are congruent.**
4. **Unknown parts of triangles can be found using CPCTC, properties, and theorems of triangles.**
5. **The angles and sides of isosceles and equilateral triangles have special relationships.**

Essential Questions:

1. How do you identify corresponding parts of congruent triangles?
2. How do you show that two triangles are congruent?
3. How can you tell whether a triangle is isosceles or equilateral?

Stage Two—Assessment Evidence

Performance Tasks:

Other Evidence: :(quizzes, tests and so on)

Stage Three—Learning Plan

Unit 5: Triangle Relationships

Brief Summary of Unit

Stage One—Desired Results

Established Goals: (Standards of Learning, Content Standards)

1. Use properties of midsegments to solve problems
2. Use properties of perpendicular bisectors and angle bisectors
3. Identify properties of perpendicular bisectors, angle bisectors, medians, and altitudes
4. Use inequalities involving angles of triangles
5. Use inequalities involving sides of triangles

Understandings:	**Essential Questions:**
1. **Perpendicular bisectors, angle bisectors, medians, and altitudes have similarities and differences.** 2. **The measures of the angles of a triangle are related to the lengths of the opposite sides.** 3. **Properties and theorems of midsegments, perpendicular bisectors, angle bisectors, medians, and altitudes can be used to find unknown lengths and angle measures in triangles.** 4. **In triangles that have two pairs of congruent sides, there is a relationship between the included angles and the third pair of sides.**	**1.** How do you use coordinate geometry to find relationships within triangles? **2.** How do you solve problems that involve measurements of triangles? **3.** How do you write indirect proofs?

Stage Two—Assessment Evidence

Performance Tasks:

Other Evidence: :(quizzes, tests and so on)

Stage Three—Learning Plan

Unit 6: Quadrilaterals

Brief Summary of Unit

Stage One—Desired Results

Established Goals: (Standards of Learning, Content Standards)

1. Define and classify special types of quadrilaterals
2. Use relationships among sides and among angles of parallelograms
3. Use relationships involving diagonals of parallelograms or transversals
4. Determine whether a quadrilateral is a parallelogram and specify a type of parallelogram
5. Use properties of diagonals of rhombuses and rectangles and properties of trapezoids and kites.

Understandings:	**Essential Questions:**
1. **Given information can be used to classify quadrilaterals.**	**1.** How can you find the sum of the measures of polygon angles?

2. **Parallelograms have special properties regarding their sides, angles, and diagonals.** 3. **If a quadrilateral's sides, angles, and diagonals have certain properties, it can be shown that the quadrilateral is a parallelogram.** 4. **Variables can be used to name the coordinates of a figure in the coordinate plane. This allows relationships to be shown to be true for a general case.**	**2.** How can you classify quadrilaterals? **3.** How can you use coordinate geometry to prove general relationships?
Stage Two—Assessment Evidence	
Performance Tasks:	
Other Evidence: :(quizzes, tests and so on)	
Stage Three—Learning Plan	

Unit 7: Area

Brief Summary of Unit	
Stage One—Desired Results	
Established Goals: (Standards of Learning, Content Standards) 1. Calculate the area of various polygons 2. Calculate the area of a circle 3. Find missing dimensions of diagrams using formulas 4. Calculate geometric probability given a figure 5. Calculate lengths of arcs in circles 6. Calculate areas of sectors in circles	
Understandings: 1. **Missing parts of right triangles can be found using the Pythagorean Theorem or properties of special right triangles.** 2. **In some cases, dimensions required to calculate area must be derived using other formulas.** 3. **Geometric probability is used to make decisions about complex problems.** 4. **Ratios can be used to compare the perimeters and areas of similar figures.** 5. **The area formula for a rectangle can be used to derive the area formulas for triangles, parallelograms, trapezoids, kites, and circles.**	**Essential Questions:** **1.** How do you find the area of polygon? **2.** How do you find the circumference of a circle? **3.** How do you find the area of a circle? **4.** How do perimeters and areas of similar polygons compare?

Stage Two—Assessment Evidence
Performance Tasks:
Other Evidence: :(quizzes, tests and so on)
Stage Three—Learning Plan

Unit 8: Similarity

Brief Summary of Unit

Stage One—Desired Results

Established Goals: (Standards of Learning, Content Standards)

1. Write ratios of similar figures
2. Set up and solve proportions of similar figures using the properties of proportions
3. Find unknown lengths using indirect measurement
4. Solve proportions using theorems of similar triangles
5. Find the ratio of similarity, perimeters, and area using the others
6. Use the AA, SAS, SSS similarity postulates to show triangles are similar.

Understandings:	Essential Questions:
1. **Ratios and proportions can be used to solve complex problems in such things as scale drawings and indirect measurement.** 2. **The Golden Ratio appears in everyday life in many common occurrences.** 3. **The ratio of similarity in similar figures can be used to find unknown lengths, the perimeter ratio (perimeter), and area ratio (area).** 4. **Ratios and proportions can be used to decide whether two polygons are similar and to find unknown side lengths of similar figures.** 5. **Drawing in the altitude to the hypotenuse of a right triangle forms three pairs of similar right triangles.** 6. **When two or more parallel lines intersect other lines, proportional segments are formed.**	**1.** How do you show two triangles are similar? **2.** How do you identify corresponding parts of similar triangles?

Stage Two—Assessment Evidence
Performance Tasks:
Other Evidence: :(quizzes, tests and so on)

Stage Three—Learning Plan

Unit 9: Surface Area & Volume

Brief Summary of Unit

Stage One—Desired Results

Established Goals: (Standards of Learning, Content Standards)

1. Identify the parts on a polyhedron
2. Find unknown number of faces, edges, or vertices using Euler's Formula
3. Find the surface area and volume of prisms, cylinders, pyramids, cones, and spheres
4. Find the volume of composite figures
5. Find the slant height or height in pyramids and cones using the Pythagorean Theorem

Understandings:	**Essential Questions:**
1. **Surface area and volume of three-dimensional objects can be used to solve complex problems.** 2. **A three-dimensional figure can be analyzed by describing the relationships among its vertices, edges, and faces.** 3. **The surface area of a three-dimensional figure is equal to the sum of the areas of each surface of the figure.** 4. **The volume of a pyramid is related to the volume of a prism with the same base and height.** 5. **Ratios can be used to compare the areas and volumes of similar solids.**	**1.** How can you determine the intersection of solid and a plane? **2.** How do you find the surface area and volume of a solid? **3.** How do the surface areas and volumes of similar solids compare?

Stage Two—Assessment Evidence

Performance Tasks:

Other Evidence: :(quizzes, tests and so on)

Stage Three—Learning Plan

Unit 10: CIRCLES

Brief Summary of Unit

Stage One—Desired Results

Established Goals: (Standards of Learning, Content Standards)

1. Find lengths and angle measures using the Tangent Theorem and its converse
2. Find the missing lengths of a triangle that is circumscribed about the circle
3. Find the distance from the center of the circle to the chord or the length of a chord using the theorems
4. Find missing angle and arc measures using the inscribed angle theorem
5. Find missing segment lengths using the theorem about segments in circles

Understandings:	**Essential Questions:**
1. **Missing angle measures, arc measures, and segment lengths can be found using the various theorems.** 2. **A radius of a circle and the tangent that intersects the endpoint of the radius on the circle have a special relationship.** 3. **Information about congruent parts of a circle (or congruent circles) can be used to find information about other parts of the circle (or circles).** 4. **The information of the equation of a circle allows the circle to be graphed. The equation of a circle can be written if its center and radius are known..**	**1.** How can you prove relationships between angles and arcs in a circle? **2.** When lines intersect a circle, or within a circle, how do you find the measures of resulting angles, arcs, and segments? **3.** How do you find the equation of a circle in the coordinate plane?

Stage Two—Assessment Evidence

Performance Tasks:

Other Evidence: :(quizzes, tests and so on)

Stage Three—Learning Plan

Unit 11: Right Triangle Trigonometry

Brief Summary of Unit

Stage One—Desired Results

Established Goals: (Standards of Learning, Content Standards)

1. Write sine, cosine, tangent ratios in reference to the parts of a right triangle.
2. Calculate missing side lengths and angles of a right triangle, given minimal information, by using the trigonometric ratios.
3. Use angles of elevation and depression to solve problems.
4. Describe vectors in terms of magnitude and direction.
5. Solve problems that involve vector addition.
6. Find the area of polygons using trigonometry.

Understandings:	**Essential Questions:**
1. If the lengths of any two sides of a right triangle are known, then the third side can	**1.** How do you write sin/cos/tan ratios in terms of the sides of a right triangle?

be found by using the Pythagorean Theorem. 2. Certain right triangles have properties that allow the lengths of their sides to be found without using the Pythagorean Theorem. 3. If certain combinations of side lengths and angles of a right triangle are known, ratios can be used to find the other sides and angles 4. The angles of elevation and depression are the acute angles of a right triangle formed by a horizontal distance and a vertical height. 5. Vectors can be used to model motion and direction. 6. The area of regular polygons can be found using the trigonometric functions. 7. Indirect measurement can be used to find distances by using trigonometric ratios. 1. **Missing angle measures, arc measures, and segment lengths can be found using the various theorems.** 2. **A radius of a circle and the tangent that intersects the endpoint of the radius on the circle have a special relationship.** 3. **Information about congruent parts of a circle (or congruent circles) can be used to find information about other parts of the circle (or circles).** 4. **The information of the equation of a circle allows the circle to be graphed. The equation of a circle can be written if its center and radius are known..**	**2.** How is trigonometry used to find missing distances in real-world situations? **3.** How is vector addition used to solve problems?

Stage Two—Assessment Evidence

Performance Tasks:

Other Evidence: :(quizzes, tests and so on)

Stage Three—Learning Plan