Union County Educational Services Commission
High School Course Syllabus

Title: Geometry

Timeline: Full Year; 5 Credits

Course Description:
This course is designed to emphasize the study of the properties and applications of common geometric figures in two and three dimensions. It includes the study of transformations in a coordinate plane and congruence in terms of rigid motions. Students make geometric constructions to assist in the comprehension of geometric concepts. These concepts are also applied to modeling situations. Similarity, special right triangles, right triangles, trigonometric ratios, circles, volume, and surface area of solids are also covered. Inductive and deductive thinking skills are used in problem solving situations, and applications to the real world are stressed. Students will also be introduced to the basics of writing proofs to solve (prove) properties algebra and geometric figures.

Scope and Sequence:

I. Geometric Constructions; Geometric Reasoning; Parallel/ Perpendicular Lines
II. Triangle Basics; Triangle Congruence; Triangle Properties and Attributes
III. Transformational Geometry; Similarity
IV. Two Dimensional Measurements; Three Dimensional Measurements

Refer to attached curriculum map for a detailed outline of course objectives.

Curriculum Alignment:
New Jersey Student Learning Standards – Mathematics

Grading Procedures:

Do Now	10%
Participation	20%
Class Assignments	50%
Assessments	20%

Adoption Date:
June 2024

Union County Educational Services Commission
Curriculum Mapping – Geometry

	Unit 1			**Unit 2**		
Weeks	4 Weeks	3 Weeks	3 Weeks	3 Weeks	3 Weeks	4 Weeks
Topics	Geometric Constructions	Geometric Reasoning	Parallel/ Perpendicular Lines	Triangle Basics	Triangle Congruence	Triangle Properties and Attributes
Standards	G.GPE.B.6 Find the point on a directed line segment between two given points that partitions the segment in a given ratio. G.GPE.B.7 Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula G.CO.D.12 Make formal geometric constructions with a variety of tools and methods (compass and	G.GPE.B.6 Find the point on a directed line segment between two given points that partitions the segment in a given ratio. G.GPE.B.7 Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula G.CO.D.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic	G.CO.A.1 Know precise definitions of angle, circle, 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.CO.C.9 Prove theorems about lines and angles. Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate	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. 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	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	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.SRT.B.4 Prove theorems about triangles. Theorems include: a line parallel to

	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.	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.	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.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).	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.	side and half the length; the medians of a triangle meet at a point.	one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity. G.SRT.B.5 Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.
Standards for	MP.1 Make sense of problems and persevere in solving them.					

Mathematical Content	MP.2 Reason abstractly and quantitatively. MP.3 Construct viable arguments & critique the reasoning of others. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.7 Look for and make use of structure.					
Content	Formulas from Coordinate Geometry (Slope, Midpoint, and Distance) (G.GPE.7) Coordinate Plane Slope Distance Formula Midpoint Formula Coordinate/Formula Segment/Angle 1D & 2D Vocabulary: Point, Line, Ray, Segment, Plane, Collinear Angles: Construct, Measure, Name, Classify, Int/Ext Bisecting a Segment/Angle Segment Bisector	Proof Theorem Conclusion Conditional Conjecture Converse Inverse hypothesis two-column proof truth value Negation Converse Inverse contrapositive Equivalent statements	Alternate exterior angles Alternate interior angles Corresponding angles Parallel Lines Parallel Planes Skew lines Transversals	Triangle Leg Right Triangle Isosceles Triangle Equilateral Triangle	Leg Hypotenuse Congruent notation Isosceles triangle Equilateral triangle	Indirect proof Indirect reasoning Midsegment Perpendicular Bisectors Angle Bisectors Medians Equidistant Altitude of a triangle

	Angle Bisector Segments/Angles					
Skills	Finding the Midpoint of a Segment on a Coordinate Plane, Finding the Endpoint of a Segment on a Coordinate Plane, Finding the Distance between Two Points, Copying a Segment/Angle, Bisecting a Segment/Angle, Measuring and Classifying Angles, Naming Points, Lines, and Planes, Naming Segments and Rays, Measuring Segment Lengths, Using the Segment Addition Postulate, Comparing Segment Lengths, Using the Midpoint of a Segment, Naming Angles,	Finding and Using a Pattern, Using Inductive Reasoning, Collecting Information to Make a Conjecture, Making a Prediction, Finding a Counterexample, Conditional Statements, Identifying the Hypothesis and Conclusion, Writing a Conditional Statement, Finding and Writing the Truth Value of a Conditional Biconditionals and Definitions, Writing a biconditional statement, Identifying the conditionals in a biconditional, Writing a Definition as a Biconditional,	Lines and Angles Angles Formed by Parallel Lines and Transversal Proving Lines Parallel Perpendicular Lines Slopes and Lines Lines in the Coordinate Plane	Classifying Triangles Angle Relationship in Triangles	Proving Triangle Congruence (SSS, SAS, ASA, AAS, HL, and CPCTC) Isosceles and Equilateral Triangle Properties	Perpendicular and Angle Bisectors Bisectors of Triangles Circumcenters and Incenters Medians and Altitudes of Triangles The Triangle Midsegment Theorem Inequalities in One Triangle Inequalities in Two Triangles The Pythagorean Theorem Applying Special Right Triangles

	Measuring and Classifying Angles, Using Congruent Angles, Using the Angle Addition Postulate, Identify Angle Pairs, Finding Missing Angles, Using an Angle Bisector to Find Angle Measures	Identifying Good Definitions, Counterexample, Inductive Reasoning, Deductive Reasoning, Biconditional Statements, Algebraic Proofs				

	Unit 3		**Unit 4**		
Number of Weeks	6 Weeks	3 Weeks	3 Weeks	4 Weeks	4 Weeks
Topics	Transformational Geometry	Similarity	Properties of Polygons and Quadrilaterals	Two Dimensional Measurements	Three Dimensional Measurements
Standards	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.SRT.A.1 Verify experimentally the properties of dilations given by a center and a scale factor: 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	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.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.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). G.MG.A.2 Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).	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.

		Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.	G.SRT.B.5 Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.		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.
Standards for Mathematical Content	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.3 Construct viable arguments & critique the reasoning of others. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.7 Look for and make use of structure.				
Skills	Writing a rule to describe a translation Reflecting a point across a line Graphing a reflection image Drawing a rotation of an image for a	Prove a quadrilateral is a parallelogram Prove rhombuses, rectangles, and squares are equal with If Then statements	Find the area and perimeter of triangles, quadrilaterals, and circles Use the coordinate plane system to find the area and perimeter	Find the surface area and volume of three-dimensional figures Solve word problems involving the surface area and volume of various real-life figures.	Use ratios and proportions to find missing values of sides and angles

	particular degree measure Identifying lines of symmetry, rotational symmetry and symmetry in three-dimensional objects Finding a scale factor for dilations Identifying symmetries in a tessellation	Find missing angle values of kites and trapezoids	of two-dimensional figures.		
Content	Reflections Translations Rotations Composition of Transformations Symmetry Tessellations Dilations	Ratios and Proportions Ratios in Similar Polygons Triangle Similarity: AS, SSS, and SAS. Applying Properties of Similar Triangles Using Proportional Relationships Dilations and Similarity in the Coordinate Plane	Properties of Polygons Attributes of Polygons Properties of Parallelograms Conditions of Parallelograms Properties of Special Parallelograms Conditions of Special Parallelograms Properties of Trapezoids Properties of Kites Review of all Polygons and Quadrilaterals	Triangle and Quadrilateral (Area and Perimeter) Circles (Area and Circumference) Area and Perimeter of Composite Figures Area and Perimeter of Regular Polygons (Equilateral Triangle, Square, and Regular Hexagon w/o Right Triangle Trigonometry) Area and Perimeter of Coordinate Plane Effect of Changing Dimensions Proportionally	Solid Geometry Representations of Three Dimensional Figures Formulas in Three-Dimensional Space Surface/Lateral Area (Cylinders, Prisms, Cones, Pyramids and Spheres) Volumes (Cylinders, Prisms, Cones, Pyramids, and Spheres) Comparing Surface Areas and Volumes