Course Name - Strategic Math - Geometry

Qtr./Mon.	Content	HSCE	Essential Skills	Assessment	Vocabulary
Sem. 1 Sept.	**Points & Lines**	G1.1.6 Recognize Euclidean geometry as an axiom system. Know the key axioms and understand the meaning of and distinguish between undefined terms, axioms, definitions, and theorems.	• Differentiate between 4 descriptions of a point • Perspective vs. non-perspective drawing • Understanding a need for undefined terms • Point-Line-Plane Postulate • Betweeness and Distance	Homework, Quizzes, Tests	Betweeness and Distance Perspective Drawing Postulate
Sept.	**Conditionals and Sets**	L3.2.2 Use the connectives "not," "and," "or," and "if…, then," in mathematical and everyday settings. Know the truth table of each connective and how to logically negate statements involving these connectives. L3.2.4 Write the converse, inverse, and contrapositive of an "if…, then…" statement. Use the fact, in mathematical and everyday settings, that the contrapositive is logically equivalent to the original, while the inverse and converse are not.	• Good definitions • Conditional Statements • Union & Intersection of Sets • Conjectures	Homework, Quizzes, Tests	Good definitions Conditional Statements Union & Intersection of Sets Conjectures
October	**Angles**	L3.1.3 Define and explain the roles of axioms (postulates), definitions, theorems, counterexamples, and proofs in the logical structure of mathematics. Identify and give examples of each. G1.1.1 Solve multistep problems and construct proofs involving vertical angles, linear pairs of angles supplementary angles, complementary angles, and right angles.	• Characteristics & properties of angles • Algebraic properties used in geometry	Homework, Quizzes, Tests	axioms definitions

Course Name - Strategic Math - Geometry

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October	**Angles**	G1.1.3 Perform and justify constructions, including midpoint of a line segment and bisector of an angle, using straightedge and compass. G1.1.4 Given a line and a point, construct a line through the point that is parallel to the original line using straightedge and compass. Given a line and a point, construct a line through the point that is perpendicular to the original line. Justify the steps of the constructions. G1.6.3 Solve problems and justify arguments about central angles, inscribed angles, and triangles in circles.	• Introduction to proof • Parallel & Perpendicular lines		theorems central angles inscribed angles
Oct. / Nov.	**Reflections**	L1.2.3 Use vectors to represent quantities that have magnitude and direction, interpret direction and magnitude of a vector numerically, and calculate the sum and difference of two vectors. L3.1.3 Define and explain the roles of axioms (postulates), definitions, theorems, counterexamples, and proofs in the logical structure of mathematics. Identify and give examples of each. L3.3.1 Know the basic structure for the proof of an "if…, then…" statement (assuming the hypothesis and ending with the conclusion) and that proving the contrapositive is equivalent. G1.1.1 Solve multistep problems and construct proofs involving vertical angles, linear pairs of angles supplementary angles, complementary angles, and right angles. G3.1.1 Define reflection, rotation, translation, and glide reflection and find the image of a figure under a given isometry.	• Reflecting points and figures • Composite reflections over parallel and intersecting lines • Translations & vectors • Isometries • Introduce congruence	Homework, Quizzes, Tests	reflections translations & vectors vertical angles linear pairs

Course Name - Strategic Math - Geometry

Qtr./Mon.	Content	HSCE	Essential Skills	Assessment	Vocabulary
Oct. / Nov.	**Reflections**	G3.1.2 Given two figures that are images of each other under an isometry, find the isometry and describe it completely. G3.1.3 Find the image of a figure under the composition of two or more isometries and determine whether the resulting figure is a reflection, rotation, translation, or glide reflection image of the original figure. G3.2.1 Know the definition of dilation and find the image of a figure under a given dilation. G3.2.2 Given two figures that are images of each other under some dilation, identify the center and magniture of the dilation.			
Nov.	**Proofs using Congruence**	L3.1.3 Define and explain the roles of axioms (postulates), definitions, theorems, counterexamples, and proofs in the logical structure of mathematics. Identify and give examples of each. L3.3.1 Know the basic structure for the proof of an "if…, then…" statement (assuming the hypothesis and ending with the conclusion) and that proving the contrapositive is equivalent. G1.1.1 Solve multistep problems and construct proofs involving vertical angles, linear pairs of angles supplementary angles, complementary angles, and right angles. G1.2.1 Prove that the angle sum of a triangle is 180° and that an exterior angle of a triangle is the sum of the two remote interior angles. G1.5.2 Know, justify, and use formulas for the perimeter and area of a regular n-gon and formulas to find interior and exterior angles of a regular n-gon and their sums.	• CPCF • Transitivity in proofs • Reflections in proofs • Justifications for congruence • Uniqueness	Homework, Quizzes, Tests	transitivity contrapositive uniqueness

Course Name - Strategic Math - Geometry

Qtr./Mon.	Content	HSCE	Essential Skills	Assessment	Vocabulary
Nov.	**Proofs using Congruence**	G1.4.4 Prove theorems about the interior and exterior angle sums of a quadrilateral.	• Angle measure in polygons		
Dec.	**Polygons & Symmetry**	L3.1.3 Define and explain the roles of axioms (postulates), definitions, theorems, counterexamples, and proofs in the logical structure of mathematics. Identify and give examples of each. L3.3.1 Know the basic structure for the proof of an "if…, then…" statement (assuming the hypothesis and ending with the conclusion) and that proving the contrapositive is equivalent. G1.1.1 Solve multistep problems and construct proofs involving vertical angles, linear pairs of angles supplementary angles, complementary angles, and right angles. G1.1.2 Solve multistep problems and construct proofs involving corresponding angles, alternate interior angles, alternate exterior angles, and same-side (consecutive) interior angles. G1.4.1 Solve multistep problems and construct proofs involving angle measure, side length, diagonal length, perimeter, and area of squares, rectangles, parallelograms, kites, and trapezoids. G1.4.3 Describe and justify hierarchical relationships among quadrilaterals.	• Symmetry properties • Properties of isosceles triangle • Properties of quadrilaterals • Regular polygons & applications	Homework, Quizzes, Tests	
Dec. /Jan.	**Triangle Congruence**	L3.1.3 Define and explain the roles of axioms (postulates), definitions, theorems, counterexamples, and proofs in the logical structure of mathematics. Identify and give examples of each. L3.3.1 Know the basic structure for the proof of an "if…, then…" statement (assuming the hypothesis and ending with the conclusion) and that proving the contrapositive is equivalent.	• Draw & construct triangles • Triangle congruency proofs	Homework, Quizzes, Tests	triangle congruency tesselations

Course Name - Strategic Math - Geometry

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Dec. /Jan.	**Triangle Congruence**	L3.3.3 Explain the difference between a necessary and a sufficient condition within the statement of a theorem. Determine the correct conclusions based on interpreting a theorem in which necessary or sufficient conditions in the theorem or hypothesis are satisfied.	• Tesselations		sufficient conditions
		G1.1.1 Solve multistep problems and construct proofs involving vertical angles, linear pairs of angles supplementary angles, complementary angles, and right angles.	• Proofs on parallelograms		
		G1.2.2 Construct and justify arguments and solve multistep problems involving angle measure, side length, perimeter, and area of all types of triangles.	• Properties of angles of triangles		
		G1.2.5 Solve multistep problems and construct proofs about the properties of medians, altitudes, perpendicular bisectors to the sides of a triangle, and the angle bisectors of a triangle. Using a straightedge and compass, construct these lines.	• SSS		
		G1.4.1 Solve multistep problems and construct proofs involving angle measure, side length, diagonal length, perimeter, and area of squares, rectangles, parallelograms, kites, and trapezoids.	• SAS		
		G1.5.2 Know, justify, and use formulas for the perimeter and area of a regular n-gon and formulas to find interior and exterior angles of a regular n-gon and their sums.	• ASA		
		G2.3.1 Prove that triangles are congruent using the SSS, SAS, ASA, and AAS criteria, and that right triangles, are congruent using the hypotenuse-leg criterion.	• AAS		
		G2.3.2 Use theorems about congruent triangles to prove additional theorems and solve problems, with and without use of coordinates.	• HL		

Course Name - Strategic Math - Geometry

Qtr./Mon.	Content	HSCE	Essential Skills	Assessment	Vocabulary
Sem. 2 Jan. /Feb.	**Perimeters & Areas**	L1.1.6 Explain the importance of the irrational numbers and in basic right triangle trigonometry, and the importance of because of its role in circle relationships. L2.3.1 Convert units of measurement within and between systems; explain how arithmetic operations on measurements affect units, and carry units through calculations correctly. G1.2.2 Construct and justify arguments and solve multistep problems involving angle measure, side length, perimeter, and area of all types of triangles. G1.2.3 Know a proof of the Pythagorean Theorem, and use the Pythagorean Theorem and its converse to solve multistep problems. G1.2.5 Solve multistep problems and construct proofs about the properties of medians, altitudes, perpendicular bisectors to the sides of a triangle, and the angle bisectors of a triangle. Using a straightedge and compass, construct these lines. G1.4.1 Solve multistep problems and construct proofs involving angle measure, side length, diagonal length, perimeter, and area of squares, rectangles, parallelograms, kites, and trapezoids. G1.5.1 Know and use subdivision or circumscription methods to find areas of polygons. G1.5.2 Know, justify, and use formulas for the perimeter and area of a regular n-gon and formulas to find interior and exterior angles of a regular n-gon and their sums. G1.6.1 Solve multistep problems involving circumference and area of circles. G1.6.3 Solve problems and justify arguments about central angles, inscribed angles, and triangles in circles.	• Know & apply perimeter formulas • Know & apply area formulas • Pythagorean Theorem • Arc Length & Area of sector • Area • Base • Height/Altitude • Radius	Homework, Quizzes, Tests	irrational numbers pythagoreian theorem perimeter area base altitude

Course Name - Strategic Math - Geometry

Qtr./Mon.	Content	HSCE	Essential Skills	Assessment	Vocabulary
Sem. 2 Jan. /Feb.	**Perimeters & Areas**	G1.6.4 Know and use properties of arcs and sectors and find lengths of arcs and areas of sectors. G2.1.1 Know and demonstrate the relationships between the area formula of a triangle, the area formula of a parallelogram, and the area formula of a trapezoid. G2.1.2 Know and demonstrate the relationships between the area formulas of various quadrilaterals. L1.1.6 Explain the importance of the irrational numbers and in basic right triangle trigonometry, and the importance of because of its role in circle relationships. G1.8.2 Identify symmetries of pyramids, prisms, cones, cylinders, hemispheres, and spheres. G2.2.1 Identify or sketch a possible three-dimensional figure, given two-dimensional views. Create a two-dimensional representation of a three-dimensional figure. G2.2.2 Identify or sketch cross sections of three-dimensional figures. Identify or sketch solids formed by revolving two-dimensional figures around lines.			
Feb. /Mar.	**3-D Figures**	L1.1.6 Explain the importance of the irrational numbers and in basic right triangle trigonometry, and the importance of because of its role in circle relationships. G1.8.1 Solve multistep problems involving surface area and volume of pyramids, prisms, cones, cylinders, hemispheres, and spheres.	• Know properties of points, lines and planes in space • Draw geometric figures and their nets	Homework, Quizzes, Tests	pyramids prisms

Course Name - Strategic Math - Geometry

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Feb. /Mar.	**3-D Figures**	G2.1.3 Know and use the relationship between the volumes of pyramids and prisms (of equal base and height) and cones and cylinders (of equal base and height).	• Know terminology of figures • Views of geometric figures • Reflection symmetry in space • 4-color theorem and applications		cones cylinders 4-color theorem
Mar.	**Surface Areas & Volume**	L3.1.1 Distinguish between inductive and deductive reasoning, identifying and providing examples of each. L3.3.2 Construct proofs by contradiction. Use counterexamples, when appropriate, to disprove a statement. G1.1.5 Given a line segment in terms of its endpoints in the coordinate plane, determine its length and midpoint. G1.4.2 Solve multistep problems and construct proofs involving quadrilaterals using Euclidean methods or coordinate geometry. G2.3.2 Use theorems about congruent triangles to prove additional theorems and solve problems, with and without use of coordinates.	• Know & apply formulas for surface area and volume of 3-D figures • Fundamental properties of volume • How does changing a dimension affect surface area and volume • Bases • Lateral edges • Lateral faces • Lateral area • Slant Height	Homework, Quizzes, Tests	lateral edges slant height inductive reasoning deductive reasoning contradiction
Apr.	**Coordinate Proofs**	G2.3.3 Prove that triangles are similar by using SSS, SAS, and AA conditions for similarity. G2.3.4 Use theorems about similar triangles to solve problems with and without use of coordinates.	• Know & apply formulas in 2 and 3 dimensions • Apply formulas to do coordinate proofs	Homework, Quizzes, Tests	scale factor dilation

Course Name - Strategic Math - Geometry

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Apr.	**Coordinate Proofs**	G2.3.5 Know and apply the theorem stating that the effect of a scale factor of k relating one two-dimensional figure to another or one three-dimensional figure to another, on the length, area, and volume of the figures is to multiply each by k, k2, and k3, respectively. G3.2.1 Know the definition of dilation and find the image of a figure under a given dilation. G3.2.2 Given two figures that are images of each other under some dilation, identify the center and magniture of the dilation.	• Inductive vs. Deductive Reasoning		
Apr./ May	**Similarity**	L1.1.6 Explain the importance of the irrational numbers and in basic right triangle trigonometry, and the importance of because of its role in circle relationships. G1.2.4 Prove and use the relationships among the side lengths and the angles of 30º- 60º- 90º triangles and 45º- 45º- 90º triangles. G1.3.1 Define the sine, cosine, and tangent of acute angles in a right triangle as ratios of sides. Solve problems about angles, side lengths, or areas using trigonometric ratios in right triangles. G1.3.2 Know and use the Law of Sines and the Law of Cosines and use them to solve problems. Find the area of a triangle with sides a and b and included angle q using the formula Area = (1/2) absin q. G1.3.3 Determine the exact values of sine, cosine, and tangent for 0°, 30°, 45°, 60°, and their integer multiples and apply in various contexts. G2.3.4 Use theorems about similar triangles to solve problems with and without use of coordinates.	• Size change with and without coordinates • Properties of size change • Proportions & Applications • Fundamental theorem of similarity • Ratio of similitude	Homework, Quizzes, Tests	size change proportions Law of Sines exact values

Course Name - Strategic Math - Geometry

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May / June	**Similar Triangles & Trigonometry**		• Triangle similarity theorems • Special properties of right triangles • 45-45-90 Triangle • 30-60-90 Triangle • Pythagorean Triples • Sine, Cosine, Tangent • Angles of elevation & depression • Hypotenuse, adjacent & opposite sides • Law of Sines • Law of Cosines • Area = ½ ab sinC	Homework, Quizzes, Tests	