Geometry Scope & Sequence

Days May Vary	Unit	Standard(s)/Outcome(s)	Essential/Guiding Questions
9-11	Unit 1: Foundations of Geometry	• HSG-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. • HSG-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). • HSG-CO.C.9 Prove theorems about lines and angles. Theorems include the following: 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	• What algebra skills are used when examining geometry concepts.

		equidistant from the segment's endpoints. ● HSG.GPE.B.7: Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula ● HSG.GPE.B.6: Find the point on a directed line segment between two given points that partitions the segment in a given ratio. ● HSG.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.	
11-13	Unit 2: Transformations	● HSG-CO.A.3: Given a rectangle, parallelogram, trapezoid, or	● How are rigid transformations used in

		regular polygon, describe the rotations and reflections that carry it onto itself. ● HSG-CO.A.4: Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments. ● HSG-CO.A.2: Experiment with transformations in the plane. 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). ● HSG-CO.B.6: Understand congruence in terms of rigid motions. 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	real life ● How are rigid transformations related to congruence

		definition of congruence in terms of rigid motions to decide if they are congruent. ● HSG-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.	
9-11	Unit 3: Reasoning and Congruence	● HSG-CO.C.9 Prove theorems about lines and angles ● HSG-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; prove or disprove that the point (1,) lies on the circle centered at the origin and containing the point (0,2). ● HSG-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	● How can you apply special segments of a triangle in real life applications? ● How are non-rigid and rigid transformations related to design, architecture, and art?

		perpendicular to a given line that passes through a given point). ● HSG-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. ● HSG-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. ● HSG.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.	
8-10	Unit 4: Similarity and Dilations	● HSG-SRT.A.1a: A dilation takes a line not passing through the center of the dilation to a	● How can you apply special segments of a triangle in real life applications?

		parallel line, and leaves a line passing through the center unchanged. ● HSG-SRT.A.1b: The dilation of a line segment is longer or shorter in the ratio given by the scale factor. ● HSG-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.B.4 - Prove theorems about triangles. ● G-SRT.A.3 - 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-MG.A.3 - Apply geometric methods to solve design	● How are non-rigid and rigid transformations related to design, architecture, and art?

		problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios). ● HSG-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.	
8-10	Unit 5: Centers of Triangles	● HSG-C.A.3 Construct the inscribed and circumscribed circles of a triangle and prove properties of angles for a quadrilateral inscribed in a circle. ● HSG-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	● What is a point of concurrency? ● Where are the points of concurrency located? ● What is the relationship between the points of concurrency and the circles/triangles

		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.	
11-13	Unit 6: Trigonometry	• HSG-SRT.C.8: Use trigonometric ratios and the Pythagorean theorem to solve right triangles in applied problems. • HSG-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. • HSG-SRT.C.7: Explain and use the relationship between the sine and cosine of complementary angles. • HSG-SRT.D.9: Derive the formula A=12 absin(c) A=12absin(c) for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.	• How are non-rigid transformations related to design, architecture, and art? • How is right triangle trigonometry and non-right triangle trigonometry used in calculating measurements?
10-12	Unit 7: Circles	• HSG-C.A.1: Understand and apply theorems about circles. Prove that all circles are similar. • HSG-C.A.2: Understand and	How can properties of circles be applied in natural settings and industry?

		apply theorems about circles. 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.* ● HSG-GPE.A.1: Translate between the geometric description and the equation for a conic section. 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. ● HSG-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; prove or disprove that the point 1, 3 $\sqrt{3}$ lies on the circle centered at the origin	

		and containing the point (0, 2) ● HSG-C.A.4: Construct a tangent line from a point outside a given circle to the circle. ● SG-C.A.1: Understand and apply theorems about circles. Prove that all circles are similar. ● HSG-GMD.A.1: Explain volume formulas and use them to solve problems. 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. ● HSG-C.B.5: Find arc lengths and areas of sectors of circles. 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 secto	
10-12	Unit 8: Quadrilaterals	● HSG-CO.D.13: Construct an equilateral triangle, a square,	● What is the importance of knowing the properties of

		and a regular hexagon inscribed in a circle. ● HSG-C.A.3: Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle. ● HSG-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. ● HSG-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; prove or disprove that the point (1, 3) lies on the circle centered at the origin and containing the point (0,2).	quadrilaterals in a real-world situation? ● How is similarity of quadrilaterals applied and verified? ● How do formulas for perimeter and area of quadrilaterals apply to objects in the real-world?
9-11	Unit 9:	● HSG-CO.D.13: Construct an	● How can formulas for

	Solids	equilateral triangle, a square, and a regular hexagon inscribed in a circle. ● HSG-C.A.3: Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle. ● HSG-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. ● HSG-GMD.A.2: Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures. ● HSG-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). ● HSG-MG.A.2: Apply concepts of density based on area and volume in modeling situations	calculating the area of one and two dimensional geometric figures apply to real-world problems? ● How can formulas for calculating the area and volume of two and three dimensional geometric solids apply to real world problems?

		(e.g. persons per square mile, BTU's per cubic foot). ● HSG.MG.A.3: Apply geometric models 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). ● HSG-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. ● HSG-GMD.A.3: Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.	