G-E-T High School Curriculum
Align, Explore, Empower
Scope and Sequence
Geometry

Unit 0 - Tools of Geometry/Vocabulary	~3 Weeks
In this unit, students will apply properties of points, lines and planes, they will also apply properties of acute, obtuse, right, vertical, linear, complementary, supplementary, and adjacent angles. Students will be able to calculate area and perimeter/circumference of triangles, squares, rectangles and circles.	

Standards for Geometry
G-CO.1: Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the unde ned notions of point, line, distance along a line, and distance around a circular arc. G-CO.9: Prove theorems about line and angles. Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on the perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints. G-CO.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.

Unit 1 - Geometric Constructions	~2 weeks
In this unit, students will learn how to construct segments, angles, angle bisectors, segment bisectors, perpendicular lines and parallel lines with a compass and straightedge. Students will also learn how to construct inscribed regular polygons.	

Standards for Geometry
G-CO.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.

G-CO.13: Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.

Unit 2 - Parallel and Perpendicular Lines	~ 4 weeks
In this unit, students will apply properties of angles created by parallel lines and transversals. They will also find slope, write equations, and graph parallel and perpendicular lines.	

Standards for Geometry

G-CO.9: Prove theorems about lines and angles. Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on the perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.

G-GPE.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).

Unit 3 - Congruent Triangles ~ 4 weeks

In this unit, students will identify congruence transformations (reflection, rotation, translation) and graph images using these congruent transformations. They will also determine whether triangles are congruent using the SSS, SAS, AAS, ASA, and HL shortcuts. Students will also prove whether triangles are congruent using flowchart, two-column, and paragraph proofs. They will also apply properties of isosceles and equilateral triangles.

Standards for Geometry

G-CO.2: 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).

G-CO.3: Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.

G-CO.4: Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.

G-CO.5: Given a geometric figure and a rotation, refection, 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-CO.6: Use geometric descriptions of rigid motions to transform gures and to predict the effect of a given rigid motion on a given figure; given two gures, use the de nition of congruence in terms of rigid motions to decide if they are congruent.

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.

G-CO.8: Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the de nition of congruence in terms of rigid motions.

G-CO.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.

Unit 4 - Properties of Quadrilaterals ~ 4 weeks

In this unit, students will apply properties of parallelograms to finding missing values. They will also determine whether quadrilaterals are parallelograms algebraically and graphically.

Standards for Geometry

G-CO.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.

G-CPE.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).*

Unit 5 - Constructing Segments of Triangles ~ 1 week

In this unit, students will construct medians, altitudes, perpendicular bisectors, and angle bisectors of triangles. They will also locate points of concurrency and apply their properties.

Standards for Geometry
G-CO.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.

Unit 6 - Similarity ~ 4 weeks

In this unit, students will determine whether polygons are similar using AA, SSS, and SAS shortcuts. They will also use proportions to solve problems using similar triangles. Students will use similar triangle theorems to solve for missing parts of triangles and parallel lines in triangles to find missing parts. They will also use dilations to graph images of line segments and triangles.

Standards for Geometry
G-SRT.1: Verify experimentally the properties of dilations given by a center and a scale factor: 1.a: A 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. 1.b: The dilation of a line segment is longer or shorter in the ratio given by the scale factor. 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 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.3: Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar. G-SRT.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-SRT.5: Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.

Unit 7 - Trigonometry and Right Triangles ~ 4 weeks

In this unit, students will find Sin, Cos, and Tan of angles in a Right Triangle. They will also use the Law of Sines in all triangles to find sides and angles. Students will find missing sides and angles in Right Triangles using trig ratios, Pythagorean theorem, 30-60-90 properties, and 45-45-90 properties.

Standards for Geometry
G-SRT.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. G-SRT.7: Explain and use the relationship between the sine and cosine of complementary angles. G-SRT.8: Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. G-SRT.10: Prove the Laws of Sines and Cosines and use them to solve problems. G-SRT.11: Understand and apply the Law of Sines and the Law of Cosines to and unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).

Unit 8 - Circles ~ 4 weeks

In this unit, students will find and apply properties of central angles. They will also find and use circumference and area of circles. Students will find arc length and area of sectors along with applying properties of congruent chords. They will apply properties of tangents, radii, inscribed quadrilaterals, and right triangles. Students will also prove that all circles are similar and apply properties of angles formed by secants and tangents intersecting inside and outside of circles. They will write the equation of a circle given radius and center or graph and graph circles from equations.

Standards for Geometry
G-C.1: Prove that all circles are similar. G-C.2: 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.* G-C.3: Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.

G-C.5: Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and denote the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.

G-GPE.1: 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.

Unit 9 - Area of 2-Dimensional Shapes ~ 2 weeks

In this unit, students will calculate the area of regular polygons, parallelograms, parts of circles, trapezoids, and graphs. They will also find missing parts of polygons from a given area.

Standards for Geometry

G-GPE.7: Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.

Unit 10 - Surface Area and Volume of 3-Dimensional Solids ~ 3 weeks

In this unit, students will explain and calculate the volume of Prisms, Pyramids, Cylinders, Cones, Spheres, and Hemispheres. They will also describe cross-sections of 3-D solids and calculate surface area of 3-D solids by finding area of 2-D shapes.

Standards for Geometry

G-GMD.1: Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of cylinders, pyramids, and cones.

G-GMD.3: Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.

G-GMD.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.

G-MG.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).