| Honors Geometry Pacing First Nine Weeks | | | |
|---|---|---|---|
| Unit | Topic | CCSS | |
| 1 | *To recognize points, lines and planes.* | G-CO. 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. |
| | *To be able to recognize and measure segments and angles.* | | |
| | *To classify angles and name the parts of a degree* | | |
| | *To recognize collinearity and betweenness of points* | 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). |
| | *To recognize triangle inequality and how to interpret diagrams* | G-CO. 4 | Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments. |
| | *To identify midpoints, bisectors and trisectors* | | |
| | *To write 2 column and paragraph proofs* | | |
| | *To recognize conditional statements and their conversions* | | |
| | *To understand and use propositions and truth values* | | |
| | *To apply deductive reasoning using the Laws of Detachment and Syllogism* | | |
| | *To write linear equations* | | |
| | *To find the distance between 2 points on the coordinate plane* | | |
| | *To use reflections on the coordinate plane* | | |

| | | | |
|---|---|---|---|
| 2 | *To recognize the need for clarity and concision in proofs* | G-CO. 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. |
| | *To understand the concept of perpendicularity* | | |
| | *To recognize complementary and supplementary angles* | | |
| | *To follow a five-step procedure to draw logical conclusions* | 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 a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints. |
| | *To prove angles congruent by means of four new theorems* | 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. |
| | *To apply the addition and subtraction properties of segments and angles* | | |
| | *To apply the multiplication and division properties of segments and angles* | | |
| | *To apply the transitive properties of angles and segments* | | |
| | *To apply the Substitution Property* | | |
| | *To recognize opposite rays and vertical angles* | | |
| 3 | *To understand the concept of congruent figures and to identify the corresponding parts of those figures* | G-CO.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. |

| | | | |
|---|---|---|---|
| 3 | *To identify included angles and included sides* | 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). |
| | *To apply the SSS, SAS, and ASA postulates* | G-CO.4 | Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments. |
| | *To recognize some basic properties of circles* | G-CO.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. |
| | *To identify medians and altitudes of triangles* | 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. |
| | *To understand why auxiliary lines are used in some proofs* | G-CO.8 | Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions. |
| | *To write proofs involving steps beyond CPCTC* | 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 a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints. |
| | *To use overlapping triangles in proofs* | 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. |

| | | | |
|---|---|---|---|
| 3 | *To name the various types of triangles and their parts* | 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. |
| | *To apply theorems relating the angle measures and side lengths of triangles.* | G-SRT.5 | Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. |
| | *To use the HL postulate to prove right triangles congruent.* | | |
| **Honors Geometry Pacing Second Nine Weeks** | | | |
| Unit | Topic | CCSS | |
| 4 | *To use detour proofs* | G-CO.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. |
| | *To apply the midpoint formula* | 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). |
| | *To organize the information in, and draw diagrams for, problems presented in words* | G-CO.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. |
| | *To recognize the relationship between equidistance and perpendicular bisection* | G-CO.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. |
| Project | *Dirichlet Domains* | | To support equidistance theorems and introduce the concurrence points |
| Project | *Dead Mathematician Society* | | Using mathematics history to support mathematical practices |

| | | | |
|---|---|---|---|
| | *To recognize planes* | 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. |
| | *To recognize transversals* | 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 a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints. |
| | *To identify the pairs of angles formed by a transversal* | 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. |
| 4 | *To recognize parallel lines* | G-SRT.5 | Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. |
| | *To understand the concept of slope* | G-GPE.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). |
| | *To relate the slope of a line to its orientation in the coordinate plane* | 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). |
| | *To recognize the relationships between the slopes of parallel and perpendicular lines* | G-GPE.6 | Find the point on a directed line segment between two given points that partitions the segment in a given ratio. |
| | | G-C.3 | Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle. |

| | | | |
|---|---|---|---|
| | *To write indirect proofs* | G-GPE.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). |
| | *To apply the Exterior Angle Inequality Theorem* | 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). |
| | *To use various methods to prove lines parallel* | G-GPE.6 | Find the point on a directed line segment between two given points that partitions the segment in a given ratio. |
| | *To apply the Parallel Theorem* | G-MG.3 | Apply geometric methods 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).★ |
| 5 | *To identify the pairs of angles formed by a transversal cutting parallel lines* | G-CO.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. |
| | *To apply six theorems about parallel lines* | G-CO.3 | Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself. |
| | *To recognize polygons and understand how polygons are named* | G-CO.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. |
| | *To recognize convex polygons and the diagonals of polygons* | 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 a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints. |

| | | | |
|---|---|---|---|
| 5 | *To identify special types of quadrilaterals* | 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. |
| | *To identify some properties of parallelograms, rectangles, kites, rhombuses, squares, and isosceles trapezoids* | 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. |
| | *To prove that a quadrilateral is a parallelogram* | G-CO.13 | Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle. |
| | *To prove that a quadrilateral is a rectangle, kite, rhombus, square or an isosceles trapezoid.* | | |
| 6 | *To understand basic concepts relating to planes* | 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 a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints. |
| | *To recognize when a line is perpendicular to a plane* | 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. |
| | *To apply the basic theorem concerning the perpendicularity of a line and a plane* | 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. |
| | *To recognize lines parallel to planes, parallel planes, and skew lines* | | |
| | *To use properties relating parallel lines and planes* | | |

| | | | |
|---|---|---|---|
| 7 | *To apply theorems about the interior angles, the exterior angles, and the midlines of triangles* | 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 a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints. |
| | *To apply the No-Choice Theorem and the AAS Theorem* | 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. |
| | *To use some important formulas which apply to polygons* | 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. |
| | *To recognize regular polygons and to use a formula to find the measure of an exterior angle of an equiangular polygon* | 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. |

**Honors Geometry Pacing Third Nine Weeks**

| Unit | Topic | CCSS | |
|---|---|---|---|
| 8 | *To recognize and work with ratios and proportions* | G-SRT.1a | Verify experimentally the properties of dilations given by a center and a scale factor: 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. |
| | *To apply the product and ratio theorems* | G-SRT.1b | Verify experimentally the properties of dilations given by a center and a scale factor: the dilation of a line segment is longer or shorter in the ratio given by the scale factor. |

| | | | |
|---|---|---|---|
| 8 | *To calculate geometric means* | 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. |
| | *To identify the characteristics of similar figures* | G-SRT.3 | Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar. |
| | *To use several methods to prove that triangles are 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. |
| | *To use the concept of similarity to establish the congruence of angles and the proportionality of segments* | G-SRT.5 | Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. |
| | *To apply three theorems frequently used to establish proportionality* | 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-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). |
| Project | Golden Ratio Cake Project | | This project supports Geometric Constructions and uses the Golden Ratio as a proportional application |
| | | | |
| | | | |
| 9 | *To simplify radical expressions and solve quadratic equations* | 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. |
| | *To identify the relationships between the parts of a right triangle when an altitude is drawn to the hypotenuse* | G-SRT.5 | Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. |

| | | | |
|---|---|---|---|
| | *To use the Pythagorean Theorem and its converse* | 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. |
| 9 | *To use the Distance Formula to compute lengths of segments in the coordinate plane* | G-SRT.7 | Explain and use the relationship between the sine and cosine of complementary angles. |
| | *To recognize groups of whole numbers known as Pythagorean triples* | G-SRT.8 | Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. * |
| | *To apply the Principle of the Reduced Triangle* | G-SRT.9 | Derive the formula A = 1/2 ab sin(C) for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side. |
| | *To identify the ratio of side lengths in a 30-60-90 triangle* | G-SRT.10 | Prove the Laws of Sines and Cosines and use them to solve problems. |
| | *To identify the ratio of side lengths in a 45-45-90 triangle* | G-SRT.11 | Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces). |
| | *To apply the Pythagorean Theorem to solid figures* | G-CO.4 | Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments. |
| | *To understand three basic trigonometric relationships* | | |
| | *To use trigonometric ratios to solve right triangles* | | |
| | *To use the Law of Sines and the Law of Cosines in solving right triangles* | | |
| 10 | *To identify the characteristics of circles* | G-C.1 | Prove that all circles are similar. |
| | *To apply the relationships between congruent chords of a circle* | 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. |

| | | | |
|---|---|---|---|
| | *To identify the characteristics and relationships between arcs, chords and angles* | G-C.3 | Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle. |
| | *To identify secant and tangent lines* | G-C.4 | Construct a tangent line from a point outside a given circle to the circle. |
| 10 | *To recognize common internal and external tangents* | G-C.5 | 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 sector. |
| | *To determine measures of central angles, inscribed angles, chord-chord angles and tangent-tangent angles* | 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. |
| | *To recognize the relationship between angles, arcs and chord* | G-GPE.2 | Derive the equation of a parabola given a focus and directrix. |
| | *To recognize inscribed and circumscribed polygons* | G-GPE.3 | Derive the equations of ellipses and hyperbolas given the foci, using the fact that the sum or difference of distances from the foci is constant. |
| | *To apply the relationship between opposite angles of an inscribed quadrilateral* | | |
| | *To identify the characteristics of an inscribed parallelogram* | | |
| | *To apply the power theorems* | | |
| | *To determine the circumference of a circle* | | |
| | *To determine the length of an arc* | | |
| | *To derive and write the equations of circles* | | |
| | *To derive and write the equations of parabolas* | | |
| | *To derive and write the equations of ellipses* | | |

**Honors Geometry Pacing Fourth Nine Weeks**

| Unit | Topic | CCSS | |
|---|---|---|---|
| 11 | *To understand the concept of area and find the areas of rectangles and squares* | G-GPE.7 | Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.★ |
| | *To use the basic properties of area* | 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).★ |

| | | | |
|---|---|---|---|
| | *To find the areas of parallelograms and triangles* | G-MG.2 | Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).★ |
| | *To find the areas of trapezoids* | | |
| | *To use the measure of a trapezoid's median to find its area* | | |
| 11 | *To find the areas of kites* | | |
| | *To find the areas of circles, sectors and segments* | | |
| | *To find ratios of areas by calculating and comparing the areas* | | |
| | *To find the areas of figures by using Hero's formula and Brahmagupta's formula* | | |
| 12 | *To find the surface areas of prisms* | G-GMD.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. |
| | *To find the surface areas of pyramids* | G-GMD.2 | Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures. |
| | *To find the surface areas of circular solids* | G-GMD.3 | Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.★ |
| | *To find the volumes of right rectangular prisms, cylinders and other prisms.* | 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. |
| | *To use the area of a prism's or a cylinder's cross section to find the solid's volume* | 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).★ |
| | *To find the volumes of pyramids and cones* | G-MG.2 | Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).★ |

| | | | |
|---|---|---|---|
| | *To solve problems involving cross sections of pyramids and cones* | G-MG.3 | Apply geometric methods 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).★ |
| | *To find the volumes of spheres* | | |
| Project | *Tetrahedron Kite Project* | | The kite project is an application of volume and surface area of |
| | | | an iterated solid figure. |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| 13 | *To draw lines and circles that represent the solutions of equations* | 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. |
| | *To write equations that correspond to nonvertical, horizontal and vertical lines* | G-GPE.2 | Derive the equation of a parabola given a focus and directrix. |
| | *To identify various forms of linear equations* | G-GPE.3 | Derive the equations of ellipses and hyperbolas given the foci, using the fact that the sum or difference of distances from the foci is constant. |
| | *To use two methods to solve systems of equations* | G-GPE.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). |
| | *To graph inequalities* | 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). |
| | *To graph in three dimensions* | G-GPE.6 | Find the point on a directed line segment between two given points that partitions the segment in a given ratio. |

| | | | |
|---|---|---|---|
| | *To apply the properties of reflections* | G-GPE.7 | Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.★ |
| | *To write equations that correspond to circles* | | |
| | *To apply the principles of coordinate geometry in a variety of situations* | | |