Beal City High School
Geometry Curriculum and Alignment

UNIT 1 Geometry Basics (Chapter 1)

1. Points, lines and planes (1-1, 1-2)
2. Axioms (postulates), theorems, definitions (Ch 1)
3. Angles (1-3)
4. Constructions (segment and angle) (1-2, 1-3)
5. Angle relationships (vertical angles, linear pair, supplementary, complementary) (1-4)
6. Area and perimeter (1-5)
7. Area and circumference of circles (1-5)
8. Distance and midpoint (1-6)

CCSS:

N-Q.1. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.

- Interpret units in the context of the problem
- When solving a multi-step problem, use units to evaluate the appropriateness of the solution.
- Choose the appropriate units for a specific formula and interpret the meaning of the unit in that context.
- Choose and interpret both the scale and the origin in graphs and data displays

N-Q.2. Define appropriate quantities for the purpose of descriptive modeling.

- Determine and interpret appropriate quantities when using descriptive modeling.

N-Q.3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

- Determine the accuracy of values based on their limitations in the context of the situation.

A-CED.1. Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions.*

- Create linear, quadratic, rational and exponential equations and inequalities in one variable and use them in a contextual situation to solve problems.

A-REI.3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

- Solve linear equations in one variable, including coefficients represented by letters.
- Solve linear inequalities in one variable, including coefficients represented by letters.

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.

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.

- Copy a segment
- Copy an angle.
- Bisect a segment
- Bisect an angle

G-GPE.6. Find the point on a directed line segment between two given points that partitions the segment in a given ratio.

- Given two points, find the point on the line segment between the two points that divides the segment into a given ratio.

UNIT 2 Logic and Parallel Lines (Chapters 2 and 3)

1. Inductive/deductive reasoning (2-1, 2-3, include logical vs. statistical)
2. Conditional statements (converse, inverse, contrapositive) and counterexamples (2-2)
3. Truth tables (Ch 2 extension pg 128)
4. Biconditionals (2-4)
5. Proof structure (algebra proofs) (2-5)
6. Angle relationships and proofs (2-6)
7. Parallel lines (angle relationships and proofs) (3-1, 3-2, 3-3)
8. Constructions (parallel, perpendicular, perpendicular bisector) (3-3, 3-4)

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N-Q.2. Define appropriate quantities for the purpose of descriptive modeling.

- Determine and interpret appropriate quantities when using descriptive modeling.

N-Q.3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

- Determine the accuracy of values based on their limitations in the context of the situation.

A-CED.1. Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions.*

- Create linear, quadratic, rational and exponential equations and inequalities in one variable and use them in a contextual situation to solve problems.

A-REI.1. Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.

- Assuming an equation has a solution, construct a convincing argument that justifies each step in the solution process. Justifications may include the associative, commutative, and division properties, combining like terms, multiplication by 1, etc.

A-REI.3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

- Solve linear equations in one variable, including coefficients represented by letters.
- Solve linear inequalities in one variable, including coefficients represented by letters.

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.

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.

- Prove theorems pertaining to lines and angles.
- Prove vertical angles are congruent.
- Prove when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angels are congruent.
- Prove points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.

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.

- Construct perpendicular lines, including the perpendicular bisector of a line segment.
- Construct a line parallel to a given line through a point not on the line.

UNIT 3 Congruent and Similar Triangles (Chapters 4 and 7)

1. Classifying triangles (4-1)
2. Angle relationships in triangles (triangle sum and exterior angle) (4-2)
3. Congruent triangles (SSS, SAS, ASA, AAS, HL) (4-3, 4-4, 4-5)
4. Congruent triangle proofs (include CPCTC) (4-6)
5. Similar triangles (proportions) (7-2)
6. Similar triangle proofs (AA~, SSS~, SAS~) (7-3)

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- Interpret units in the context of the problem
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- Choose the appropriate units for a specific formula and interpret the meaning of the unit in that context.
- Choose and interpret both the scale and the origin in graphs and data displays

N-Q.2. Define appropriate quantities for the purpose of descriptive modeling.

- Determine and interpret appropriate quantities when using descriptive modeling.

N-Q.3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

- Determine the accuracy of values based on their limitations in the context of the situation.

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- Create linear, quadratic, rational and exponential equations and inequalities in one variable and use them in a contextual situation to solve problems.

A-REI.3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

- Solve linear equations in one variable, including coefficients represented by letters.
- Solve linear inequalities in one variable, including coefficients represented by letters.

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.

- Use descriptions of rigid motion and transformed geometric figures to predict the effects rigid motion has on figures in the coordinate plane.
- Knowing that rigid transformations preserve size and shape or distance and angle, use this fact to connect the idea of congruency and develop the definition of 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.

- Use the definition of congruence, based on rigid motion, to show two triangles are congruent if and only if their corresponding sides and corresponding angles are congruent.

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.

- Use the definition of congruence, based on rigid motion, to develop and explain the triangle congruence criteria; ASA, SSS, and SAS.

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.

- Prove theorems pertaining to triangles.
- Prove the measures of interior angles of a triangle have a sum of 180º.
- Prove base angles of isosceles triangles are congruent.
- Prove the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length.

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.

- Use the idea of dilation transformations to develop the definition of similarity.
- Given two figures determine whether they are similar and explain their similarity based on the equality of corresponding angles and the proportionality of corresponding sides.

G-SRT.3. Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.

- Use the properties of similarity transformations to develop the criteria for proving similar triangles; AA.

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.

- Use AA, SAS, SSS similarity theorems to prove triangles are similar.
- Use triangle similarity to prove other theorems about triangles
- Prove a line parallel to one side of a triangle divides the other two proportionally, and its converse

G-SRT.5. Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.

- Using similarity theorems, prove that two triangles are congruent.
- Prove geometric figures, other than triangles, are similar and/or congruent.

UNIT 4 Transformations (Chapters 1 and 12)

1. Isometries (reflection, rotation, translation) (1-7, 12-1, 12-2, 12-3)
2. Composition of isometries (12-4)
3. Dilations (12-7)
4. Tessellations (extension) (12-6)

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- Interpret units in the context of the problem
- When solving a multi-step problem, use units to evaluate the appropriateness of the solution.

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N-Q.3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

- Determine the accuracy of values based on their limitations in the context of the situation.

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).

- Use various technologies such as transparencies, geometry software, interactive whiteboards, and digital visual presenters to represent and compare rigid and size transformations of figures in a coordinate plane. Comparing transformations that preserve distance and angle to those that do not.

- Describe and compare function transformations on a set of points as inputs to produce another set of points as outputs, to include translations and horizontal and vertical stretching.

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

- Using previous comparisons and descriptions of transformations, develop and understand the meaning of rotations, reflections, and translations based on angles, circles, perpendicular lines, parallel lines, and line segments.

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.

- Transform a geometric figure given a rotation, reflection, or translation using graph paper, tracing paper, or geometric software.
- Create sequences of transformations that map a geometric figure on to itself and another geometric figure.

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.

- Use descriptions of rigid motion and transformed geometric figures to predict the effects rigid motion has on figures in the coordinate plane.
- Knowing that rigid transformations preserve size and shape or distance and angle, use this fact to connect the idea of congruency and develop the definition of congruent.

G-SRT.1. Verify experimentally the properties of dilations given by a center and a scale factor:

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. (Given a center and a scale factor, verify experimentally, that when dilating a figure in a coordinate plane, a segment of the pre-image that does not pass through the center of the dilation, is parallel to its image when the dilation is performed. However, a segment that passes through the center remains unchanged.)

b. The dilation of a line segment is longer or shorter in the ratio given by the scale factor. (Given a center and a scale factor, verify experimentally, that when performing dilations of a line segment, the pre-image, the segment which becomes the image is longer or shorter based on the ratio given by the scale factor.)

UNIT 5 Triangle Properties and Trigonometry (Chapters 5 and 8)

1. Medians, altitudes, perpendicular bisectors, angle bisectors of a triangle (5-1, 5-2, 5-3)
2. Indirect proof (5-5)
3. Triangle inequality (5-5)
4. Pythagorean Theorem (5-7)
5. Special right triangles (5-8)
6. Trig ratios (SOHCAHTOA) (8-2, 8-3, 8-4)
7. Law of Sines (8-5)
8. Law of Cosines(8-5)
9. Area of a triangle(extension)
10. Vectors (8-6)
11. Unit circle (Ch 8 extension pg 570)

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N-VM.1. (+) Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., $\boldsymbol{v}$, $|\boldsymbol{v}|$, $\|\boldsymbol{v}\|$, v).

- Know that a vector is a directed line segment representing magnitude and direction.
- Use the appropriate symbol representation for vectors and their magnitude.

N-VM.2. (+) Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point.

- Find the component form of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point, therefore placing the initial point of the vector at the origin.

N-VM.4. (+) Add and subtract vectors.

A-CED.1. Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions.*

- Create linear, quadratic, rational and exponential equations and inequalities in one variable and use them in a contextual situation to solve problems.

A-REI.3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

- Solve linear equations in one variable, including coefficients represented by letters.
- Solve linear inequalities in one variable, including coefficients represented by letters.

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.

- Prove points on a 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.

- Prove theorems pertaining to triangles.
- Prove the medians of a triangle meet at a point.

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.

- Prove the Pythagorean Theorem using triangle similarity.

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.

- Using a corresponding angle of similar right triangles, show that the relationships of the side ratios are the same, which leads to the definition of trigonometric ratios for acute angles.

G-SRT.7. Explain and use the relationship between the sine and cosine of complementary angles.

- Explore the sine of an acute angle and the cosine of its complement and determine their relationship.

G-SRT.8. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.

- Apply both trigonometric ratios and Pythagorean Theorem to solve application problems involving right triangles.

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.

- For a triangle that is not a right triangle, draw an auxiliary line from a vertex, perpendicular to the opposite side and derive the formula, A=½ ab sin (C), for the area of a triangle, using the fact that the height of the triangle is, h=a sin(C).

G-SRT.10. (+) Prove the Laws of Sines and Cosines and use them to solve problems.

- Using trigonometry and the relationship among sides and angles of any triangle, such as sin(C)=(h/a) , prove the Law of Sines.
- Using trigonometry and the relationship among sides and angles of any triangle and the Pythagorean Theorem to prove the Law of Cosines.
- Use the Laws of Sines to solve problems.
- Use the Laws of Cosines to solve problems.

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).

- Understand and apply the Law of Sines and the Law of Cosines to find unknown measures in right triangles.
- Understand and apply the Law of Sines and the Law of Cosines to find unknown measures in non-right triangles.

G-C.3. Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.

- Construct inscribed circles of a triangle.
- Construct circumscribed circles of a triangle.

UNIT 6 Measurements in 2- and 3- Dimensional Figures (Chapters 9 and 10)

1. Area and perimeter extended (9-1)
2. Relationship between area formulas (9-1)
3. Area and circumference extended (9-2)
4. Area of composite figures (9-3)
5. Effects of changing dimensions (9-5)
6. Solids, including classification, nets, and cross sections (10-1)
7. Revolving figures (Int 2 text)
8. Symmetry in solids (12-5)
9. Area of regular polygons (9-2)
10. Surface area of prisms, cylinders, pyramids, and cones (10-4, 10-5)
11. Volume of prisms, cylinders, pyramids, and cones (10-6, 10-7)
12. Surface area and volume of spheres (10-8)

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- Determine and interpret appropriate quantities when using descriptive modeling.

N-Q.3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

- Determine the accuracy of values based on their limitations in the context of the situation.

A-CED.1. Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions.*

- Create linear, quadratic, rational and exponential equations and inequalities in one variable and use them in a contextual situation to solve problems.

A-REI.3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

- Solve linear equations in one variable, including coefficients represented by letters.
- Solve linear inequalities in one variable, including coefficients represented by letters.

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

- Describe the rotations and reflections of a rectangle, parallelogram, trapezoid, or regular polygon that maps each figure onto itself.

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.

- Explain the formulas for the circumference of a circle and the area of a circle by determining the meaning of each term or factor.

- Explain the formulas for the volume of a cylinder, pyramid and cone by determining the meaning of each term or factor.

G-GMD.2. (+) Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures.

- Using Cavalieri's Principle, provide informal arguments to develop the formulas for the volume of spheres and other solid figures.

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

- Solve problems using volume formulas for cylinders, pyramids, cones, and spheres.

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.

- Given a three- dimensional object, identify the shape made when the object is cut into cross-sections.
- When rotating a two- dimensional figure, such as a square, know the three-dimensional figure that is generated, such as a cylinder. Understand that a cross section of a solid is an intersection of a plane (two-dimensional) and a solid (three-dimensional).

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).

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).

- Use the concept of density when referring to situations involving area and volume models, such as persons per square mile.

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)

- Solve design problems by designing an object or structure that satisfies certain constraints, such as minimizing cost or working with a grid system based on ratios (i.e., The enlargement of a picture using a grid and ratios and proportions)

UNIT 7 Quadrilaterals (Chapter 6)

1. Interior and exterior angles of regular polygons (6-1)
2. Quadrilateral hierarchy (Int 2 text)
3. Parallelograms properties and conditions (6-2, 6-3)
4. Rectangles, rhombuses, and squares properties and conditions(6-4, 6-5)
5. Kites and trapezoids (6-6)
6. Coordinate proof (6-2/6)

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- Determine and interpret appropriate quantities when using descriptive modeling.

N-Q.3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

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- Create linear, quadratic, rational and exponential equations and inequalities in one variable and use them in a contextual situation to solve problems.

A-REI.3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

- Solve linear equations in one variable, including coefficients represented by letters.
- Solve linear inequalities in one variable, including coefficients represented by letters.

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

- Describe the rotations and reflections of a rectangle, parallelogram, trapezoid, or regular polygon that maps each figure onto itself.

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.

- Prove theorems pertaining to parallelograms.
- Prove opposite sides are congruent.
- Prove opposite angles are congruent.
- Prove the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals.

G-C.3. Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.

- Using definitions, properties, and theorems, prove properties of angles for a quadrilateral inscribed in a circle.

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 $(1, \sqrt{3})$ lies on the circle centered at the origin and containing the point $(0, 2)$.

- Use coordinate geometry to prove geometric theorems algebraically; such as prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point $(1, \sqrt{3})$ lies on the circle centered at the origin and containing the point $(0, 2)$.

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).

- Using slope, prove lines are parallel or perpendicular
- Find equations of lines based on certain slope criteria such as; finding the equation of a line parallel or perpendicular to a given line that passes through a given point.

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

- Use coordinate geometry and the distance formula to find the perimeters of polygons and the areas of triangles and rectangles.

Unit 8 Circles (Chapter 11)

1. Lines that intersect circles (11-1)
2. Central angles and arcs (11-2)
3. Sectors (11-3)
4. Inscribed angles (11-4)
5. Angle/segment relationships in circles (11-5, 11-6)
6. Equation of a circle (11-7)

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- Determine the accuracy of values based on their limitations in the context of the situation.

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- Create linear, quadratic, rational and exponential equations and inequalities in one variable and use them in a contextual situation to solve problems.

A-REI.3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

- Solve linear equations in one variable, including coefficients represented by letters.
- Solve linear inequalities in one variable, including coefficients represented by letters.

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.

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

- Construct an equilateral triangle so that each vertex of the equilateral triangle is on the circle.
- Construct a square so that each vertex of the square is on the circle.
- Construct a regular hexagon so that each vertex of the regular hexagon is on the circle.

G-C.1. Prove that all circles are similar.

- Using the fact that the ratio of diameter to circumference is the same for circles, 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.

- Using definitions, properties, and theorems, identify and describe relationships among inscribed angles, radii, and chords. Include central, inscribed, and circumscribed angles.
- Understand that inscribed angles on a diameter are right angles.
- Understand that the radius of a circle is perpendicular to the tangent where the radius intersects the 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 define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.

- Use similarity to derive the fact that the length of the arc intercepted by an angle is proportional to the radius, identifying the constant of proportionality as the radian measure of the angle.
- Find the arc length of a circle.
- Using similarity, derive the formula for the area of a sector.
- Find the area of a sector in a circle.

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.

- Use the Pythagorean Theorem to derive the equation of a circle, given the center and the radius.
- Given an equation of a circle, complete the square to find the center and radius of a circle.

Geometry—10th grade

Units		Common Core Standards	Vocabulary	Pacing
Unit 1: Geometry Basics	Chapter 1, Section 1 Chapter 1, Section 2 Chapter 1, Section 3 Chapter 1, Section 4 Chapter 1, Section 5 Chapter 1, Section 6	**N-Q.1.** Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. **N-Q.2.** Define appropriate quantities for the purpose of descriptive modeling. **N-Q.3.** Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. **A-CED.1.** Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions.* **A-REI.3.** Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. **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. **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-GPE.6.** Find the point on a directed line segment between two given points that partitions the segment in a given ratio. **Assessments:** Multiple quizzes Final test	Point Line Plane Ray Segment Angle Axiom Theorem Definition Constructions Vertical angles Linear pair Supplementary Complementary Area Perimeter Circumference Distance Midpoint	11 days

Geometry—10th grade

Units		Common Core Standards	Vocabulary	Pacing
Unit 2: Logic and Parallel Lines	Chapter 2, Section 1 Chapter 2, Section 3 Chapter 2, Section 2 Pg 128 Chapter 2, Section 4 Chapter 2, Section 5 Chapter 2, Section 6 Chapter 3, Section 1 Chapter 3, Section 2 Chapter 3, Section 3 Chapter 3, Section 4	**N-Q.1.** Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. **N-Q.2.** Define appropriate quantities for the purpose of descriptive modeling. **N-Q.3.** Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. **A-CED.1.** Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions.* **A-REI.1.** Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method. **A-REI.3.** Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. **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. **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. **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. **Assessments:** Multiple quizzes Final test	Inductive reasoning Deductive reasoning Logical argument Statistical argument Conditional Converse Inverse Contrapositive Counterexample Truth table Negation Conjunction Disjunction Biconditional Proof Given Vertical angles Supplementary Complementary Linear pair Substitution Transitive Parallel lines Corresponding angles Alternate interior angles Alternate exterior angles Same side interior angles Construction Perpendicular bisector	26 days

Geometry—10th grade

Units		Common Core Standards	Vocabulary	Pacing
Unit 3: Congruent and Similar Triangles	Chapter 4, Section 1 Chapter 4, Section 2 Chapter 4, Section 3 Chapter 4, Section 4 Chapter 4, Section 5 Chapter 4, Section 6 Chapter 7, Section 2 Chapter 7, Section 3	**N-Q.1.** Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. **N-Q.2.** Define appropriate quantities for the purpose of descriptive modeling. **N-Q.3.** Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. **A-CED.1.** Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions.* **A-REI.3.** Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. **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. **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 definition 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. **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. **Assessments:** Multiple quizzes Final test	Acute Right Obtuse Scalene Isosceles Equilateral Triangle sum theorem Exterior angle theorem Congruent triangles SSS SAS ASA AAS HL CPCTC Similar triangles Proportions AA~ SSS~ SAS~	17 days

Geometry—10th grade

Units		Common Core Standards	Vocabulary	Pacing
Unit 4: Transformations	Chapter 1, Section 7 Chapter 12, Section 1 Chapter 12, Section 2 Chapter 12, Section 3	**N-Q.1.** Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. **N-Q.2.** Define appropriate quantities for the purpose of descriptive modeling. **N-Q.3.** Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. **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.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, 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-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. **G-SRT.1.** Verify experimentally the properties of dilations given by a center and a scale factor: **Assessments:** Multiple quizzes Final test	Transformation Image Preimage Prime Reflection Rotation Translation Dilation Scale factor Tessellation	10 days

Geometry—10th grade

Units		Common Core Standards	Vocabulary	Pacing
Unit 5: Triangle Properties and Trigonometry	Chapter 5, Section 1 Chapter 5, Section 2 Chapter 5, Section 3 Chapter 5, Section 5 Chapter 5, Section 7 Chapter 5, Section 8 Chapter 8, Section 2 Chapter 8, Section 3 Chapter 8, Section 4 Chapter 8, Section 5 Extension Chapter 8, Section 6	**N-Q.1.** Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. **N-Q.2.** Define appropriate quantities for the purpose of descriptive modeling. **N-Q.3.** Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. **N-VM.1.** (+) Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., ***v***, $\|\boldsymbol{v}\|$, $\|\boldsymbol{v}\|$, *v*). **N-VM.2.** (+) Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point. **N-VM.4.** (+) Add and subtract vectors. **A-CED.1.** Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions.* **A-REI.3.** Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. **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. **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. **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. **Assessments:** Multiple quizzes Final test	Perpendicular bisector Point of concurrency Circumcenter Angle bisector Incenter Median Centroid Altitude Orthocenter Indirect proof Triangle inequality Pythagorean theorem Special right triangles Trig ratios SOHCAHTOA Law of sines Law of cosines Area of a triangle Vector Magnitude Direction	27 days

Geometry—10th grade

	Units	Common Core Standards (cont.)	Vocabulary	Pacing
Unit 5: Triangle Properties and Trigonometry (cont.)		**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.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. **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 find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces). **G-C.3.** Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.		

Geometry—10th grade

Units		Common Core Standards	Vocabulary	Pacing
Unit 6: Measurements in 2D and 3D	Chapter 9, Section 1 Chapter 9, Section 2 Chapter 9, Section 3 Chapter 9, Section 5 Chapter 10, Section 1 Chapter 12, Section 5 Chapter 10, Section 4 Chapter 10, Section 5 Chapter 10, Section 6 Chapter 10, Section 7 Chapter 10, Section 8	**N-Q.1.** Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. **N-Q.2.** Define appropriate quantities for the purpose of descriptive modeling. **N-Q.3.** Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. **A-CED.1.** Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions.* **A-REI.3.** Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. **G-CO.3.** Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself. **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. **G-GMD.2.** (+) Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures. **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). **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). **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) **Assessments:** Multiple quizzes Group project Final test	Area Perimeter Circumference Changing dimensions Solids Net Cross section Revolving figures Plane symmetry Axis symmetry Area of regular polygons Apothem Surface area Volume Prism Cylinder Pyramid Cone Sphere	25 days

Geometry—10th grade

Units		Common Core Standards	Vocabulary	Pacing
Unit 7: Quadrilaterals	Chapter 6, Section 1 Integrated 2 text Chapter 6, Section 2 Chapter 6, Section 3 Chapter 6, Section 4 Chapter 6, Section 5 Chapter 6, Section 6	**N-Q.1.** Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. **N-Q.2.** Define appropriate quantities for the purpose of descriptive modeling. **N-Q.3.** Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. **A-CED.1.** Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions.* **A-REI.3.** Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. **G-CO.3.** Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself. **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-C.3.** Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle. **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 $(1, \sqrt{3})$ lies on the circle centered at the origin and containing the point (0, 2). **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). **G-GPE.7.** Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula. **Assessments:** Multiple quizzes Group project Final test	Regular polygons Quadrilateral Trapezoid Isosceles trapezoid Parallelogram Rectangle Rhombus Square Kite Properties Conditions Diagonals Slope Distance Coordinate proof	23 days

Geometry—10th grade

Units		Common Core Standards	Vocabulary	Pacing
Unit 8: Circles	Chapter 11, Section 1 Chapter 11, Section 2 Chapter 11, Section 3 Chapter 11, Section 4 Chapter 11, Section 5 Chapter 11, Section 6 Chapter 11, Section 7	**N-Q.1.** Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. **N-Q.2.** Define appropriate quantities for the purpose of descriptive modeling. **N-Q.3.** Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. **A-CED.1.** Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions.* **A-REI.3.** Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. **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. **G-CO.13.** Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle. **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.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. **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.	Tangent Secant Radius Diameter Chord Center Arc Central angle Sector Arc length Segment of a circle Inscribed angle Angle relationships in circles Segment relationships in circles	15 days
		Assessments: Multiple quizzes Final test		