Common Core Standards Curriculum Map - Geometry
Quarter One

Unit One - Geometric Foundations, Constructions and Relationships (24 days/12 blocks)

Common Core Standards ***and*** ***Content to Be Learned***	***Mathematical Practices*** ***and*** ***Essential Questions***	***Prior Learning, Current Learning and Future Learning***
Experiment with transformations in the plane. **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. **Make geometric constructions** ***[Formalize and explain processes]*** **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.* **Prove geometric theorems.** ***[Focus on validity of underlying reasoning while using a variety of ways of writing proofs]*** **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.*~~	**SMP 3** Construct viable arguments and critique the reasoning of others. **SMP 5** Use appropriate tools strategically. **SMP 7** Look for and make use of structure. How does the use of the language of geometry help you to understand more complex geometric ideas and theorems? In what situations would it be better to use a geometric sketch as opposed to a formal construction? How does the knowledge of theorems, postulates, and definitions help to prove geometric concepts?	**<u>Prior Learning:</u>** In grade 4, students drew and identified points, lines, line segments, rays, angles, and parallel and perpendicular lines (4.G.1). Students also classified 2-D figures, based on the presence or absence of parallel and perpendicular lines and angles, including right triangles (4.G.2). In grade 7, students drew geometric shapes freehand as well as with tools such as rulers, protractors, and technology (7.G.2). Students also used supplementary, complementary, vertical, and adjacent angles to write and solve simple equations involving an unknown angle (7.G.5). In grade 8, students used informal arguments to establish facts about angle relationships such as the angle sum and exterior angles of triangles as well as angle relationships formed by parallel lines cut by a transversal (8.G.5). Students explained a proof of the Pythagorean Theorem and its converse and applied it to find unknown side lengths or the distance between two points in a coordinate system (8.G. 6, 7, 8). **<u>Current Learning:</u>** Students study 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. Students make formal geometric constructions with a variety of tools and methods using a compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc. (e.g., copy a segment and an angle, bisect a segment and an angle, construct perpendicular lines, the perpendicular bisector of a line segment, and a line parallel to a given line through a point not on the line). Students prove theorems about lines and angles (e.g., relationships between parallel lines and a transversal, and vertical angles) and they prove the triangle angle sum theorem. **<u>Future Learning:</u>** Students will use the basic geometric terms and definitions throughout the year.

A)• Know precise definitions of geometric terms (e.g., 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. B)• Make formal geometric constructions with a variety of tools and methods. Constructions include: o Copying a segment/angle. o Bisecting a segment/angle. o Constructing perpendicular lines. o Constructing a perpendicular bisector of a line segment. o Constructing a line parallel to a given line through a point not on the line. C)• Prove theorems about lines and angles. Theorems include, but are not limited to: o Congruency of vertical angles. o Relationship between angles formed by intersection of parallel lines and a transversal. D)• Prove the triangle angle sum theorem.		In addition, students will revisit and expand upon construction and proofs later this year in units on triangle congruency [unit 1.2], right triangles [unit 2.2], polygons [unit 3.1] and circles [units 3.3, 4.1]. Students will continue to use critical and logical thinking in algebra 2 and fourth-year math courses. The basic geometric terms and constructions are applicable to real-life situations and professions such as civil engineering, architecture, and construction-related work.

Unit Two - Triangle Congruency (16 days/8 blocks)

Common Core Standards* and *Content to Be Learned	***Mathematical Practices* and *Essential Questions***	***Prior Learning, Current Learning and Future Learning***
Understand congruence in terms of rigid motions *[Build on rigid motions as a familiar starting point for development of concept of geometric proof].* **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.	**SMP 2** Reason abstractly and quantiatively. **SMP 3** Construct viable arguments and critique the reasoning of others.	**<u>Prior Learning:</u>** In grade 7, students created triangles with rulers and protractors given the measures of all three angles and sides, and they recognized the conditions that create a unique triangle, more than one triangle, or no triangle (7.G.2). In grade 8, students understood that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations (8.G.2).

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. **Prove geometric theorems *[Focus on validity of underlying reasoning while using a variety of ways of writing proofs]*.** **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.* A)• Apply and describe the effects of rigid motions (translation, reflection, rotation) on a given figure. B)• Compare corresponding parts of triangles to determine congruency. C)• Explain and utilize the criteria for triangle congruency. o ASA, SAS, SSS o AAS, HL o CPCTC could be taught here. D)• Prove theorems about lines and angles using the triangle congruency criteria, for example: o Points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints. o Points on an angle bisector are equidistant from sides of the angle. E)• Prove theorems about triangles using the triangle congruency criteria. Examples include: o Base angles of isosceles triangles are congruent. o The segment joining midpoints of two sides of a triangle is	**SMP 7** Look for and make use of structure. How is rigid motion used to identify corresponding parts of sides and angles? Why is congruence criteria an essential component of proofs and problem solving? Describe special segments and angles in triangles and explain how can they be used to solve problems? Given a proof, how can you use logical reasoning to critique, analyze, and improve the argument? Why are AAA and SSA invalid criteria for proving triangle congruence?	**Current Learning:** Students use the definition of congruence in terms of rigid motions to show that two triangles are congruent only if corresponding pairs of sides and corresponding pairs of angles are congruent (CPCTC). Students explain how the criteria for triangle congruence (ASA, SAS, SSS, AAS and HL) follow from the definition of congruence in terms of rigid motions. They 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, they use the definition of congruence in terms of rigid motions to decide if they are congruent. Students prove theorems about lines and angles (e.g., points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints). Students prove theorems about triangles (e.g., 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). **Future Learning:** Students will encounter congruent figures in future units (e.g., similarity [unit 2.1], transformations [unit 2.3], polygons [unit 3.1] and circles [unit 3.3]). The concept of congruency is utilized in fields such as arts, architecture, interior design, engineering, industrial design, and construction-related work.

parallel to the third side and half the length. o The medians of a triangle meet at a point (centroid).		

Quarter Two

Unit Three - Triangle Similarity (12 days/6 blocks)

Common Core Standards* and *Content to Be Learned	***Mathematical Practices* and *Essential Questions***	***Prior Learning, Current Learning and Future Learning***
Understand similarity in terms of similarity transformations. **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. **Prove theorems involving similarity.** **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. A)• Establish the AA, SSS, and SAS triangle similarity criteria using similarity transformations.	**SMP 1** Make sense of problems and persevere in solving them. **SMP 3** Construct viable arguments and critique the reasoning of others. What can you conclude about similar triangles, and how can you prove two triangles are similar? How can similar triangles be used to measure objects, and what are the benefits of using indirect measurement?	**<u>Prior Learning:</u>** In grade 7, students solved problems involving scale drawings of geometric figures. They calculated actual lengths and areas from a scale drawing and reproduced scale drawings from a different scale (7.G.1). In grade 8, students used a sequence of rotations, reflections, transformations, and dilations to understand similarity between two-dimensional figures. Students also made informal arguments to establish the AA criterion for similar triangles (8.G.4). In addition to using the Pythagorean Theorem, students explained a proof of the theorem and its converse (8.G.6 and 7). Also, students used similar triangles to derive the equation y = mx and y = mx + b (8.EE.6). In unit 1.1, students learned about angle relationships formed by parallel lines. In unit 1.2, students learned about rigid motions, congruency in objects, and more specifically, triangles. **<u>Current Learning:</u>** Students use the properties of similarity transformations to establish the AA criterion for two triangles to be similar. Given two figures, students use the definition of similarity in terms of similarity transformations to decide if they are similar. Students explain the meaning of similarity for triangles as

B)• Determine if two triangles are similar by using the definition of similarity. C)• Explain the meaning of similarity for triangles using similarity transformations. D)• Prove theorems about triangles using triangle similarity; examples include: o A line parallel to one side of a triangle divides the other two proportionally. o The Pythagorean Theorem. E)• Prove theorems and solve problems involving similarity using congruence and similarity criteria.	How can you use triangle similarity to prove the Pythagorean Theorem? What are the similarities and differences, in regard to transformations, between triangle similarity and triangle congruence criteria?	the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides. Students prove theorems about triangles. Theorems include: • A line parallel to one side of a triangle divides the other two proportionally. • The Pythagorean Theorem (proved using triangle similarity). Students use the congruence and similarity criteria for triangles in order to solve problems and to prove relationships in geometric figures. **Future Learning:** Students will use their knowledge of triangle similarity when studying trigonometric ratios (unit 2.2), similarity transformations (unit 2.3), and circles (unit 3.3). The concept of similarity is useful in fields such as arts, architecture, interior design, engineering, surveying and construction related work.

Unit Four - Right Triangle Trigonometry (14 days/7 blocks)

***Common Core Standards** and Content to Be Learned*	***Mathematical Practices** and Essential Questions*	***Prior Learning, Current Learning and Future Learning***
Define trigonometric ratios and solve problems involving right triangles. **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. ★ **Apply trigonometry to general triangles.** ***[as per the PARCC Model Content Frameworks, these three standards may be an extension to right triangle geometry].***	**SMP 4** Model with mathematics. **SMP 6** Attend to precision. **SMP 8** Look for and express regularity in repeated reasoning. How can you apply your knowledge of triangle-relationships to find a	**Prior Learning:** In grade 6, students found the area of right triangles by composing into rectangles. (6.G.1) In grade 7, students used facts about supplementary, complementary, vertical, and adjacent angles in a multistep problem to solve for an unknown angle in a figure (7.G.5). Students also recognized and represented proportional relationships between quantities. (7.RP.2a-c). In grade 8, students applied the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. (8.G.7) In unit 2.1 of this course, students used the definition of similarity in terms of transformations to decide whether two triangles are similar. They explained similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides. (G.SRT.2)

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). A)• Define trigonometric ratios (sine, cosine, tangents) in right triangles by understanding 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. B)• Calculate the side lengths and the trigonometric ratios associated with special right triangles. • Explain and use the relationship between the sine and cosine of complementary angles. C)• Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.★ + Apply trigonometry to general triangles: D)• 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). E)• Prove the Laws of Sines and Cosines and use them to solve problems. F)• 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. (contextualize) G)• Given a real-world situation, create and solve a system of equations. (decontextualize).	side length or angle measure of a triangle? How are right triangle trigonometric ratios related to similarity?	**Current Learning:** Students understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios (sine, cosine, and tangent) for acute angles. Students can explain and use the relationship between the sine and cosine of complementary angles. Students utilize trigonometric ratios and the Pythagorean Theorem to solve applied problems involving right triangles to determine heights, distances, and angle measure. + Students understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles in real-world problems such as surveying problems and resultant forces. Students prove the Laws of Sines and Cosines and use them to solve problems. Students 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. **Future Learning:** Students will build upon their knowledge of trigonometry in algebra 2 and fourth-year mathematics courses, as well as college courses. Students will also use this knowledge in engineering, construction, and computer science professions.

Unit Five - Transformations (14 days/7 blocks)

Common Core Standards and *Content to Be Learned*	*Mathematical Practices* and *Essential Questions*	*Prior Learning, Current Learning and Future Learning*
Experiment with transformations in the plane. **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. **Understand similarity in terms of similarity transformations.** **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. b. The dilation of a line segment is longer or shorter in the ratio given by the scale factor. A)• Represent, construct, and draw transformations (reflections, translations, dilations, and rotations) in the plane using a variety of tools, such as transparencies and geometry	**SMP 4** Model with mathematics. **SMP 5** Use appropriate tools strategically. **SMP 6** Attend to precision. After a transformation (rotation, dilation, translation, reflection) has taken place on the coordinate plane, where does the image lie and what does it look like? What tools or methods would you use to construct a figure under a reflection, translation, rotation, and dilation? Compare dilation to rigid motions, how are they similar? How are they different? Where would you find transformations in the real world?	**Prior Learning:** In grade 5, students defined the coordinate system and graphed ordered pairs called coordinates. (5.G.1) In grade 6, students drew polygons in the coordinate plane given coordinates for the vertices. (6.G.3) In grade 7, students drew (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. (7.G.2) Students also solved problems involving scale drawings of geometric figures. This included computing actual lengths and areas and reproducing scale drawings at a different scale. (7.G.1) In grade 8, students verified experimentally the properties of rotations, reflections, and translations. They learned that lines, segments, and angles maintain their shape and size when transformed. (8.G.1) Students recognized that a two-dimensional figure is congruent (8.G.2)/similar (8.G.4) to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations. Furthermore, students described the effect of dilations, translation, rotations, and reflections on two-dimensional figures using coordinates. (8.G.3) In unit 1.2 of this course, students studied the concept of rigid motion and its effect on polygons. **Current Learning:** Students represent, construct, and draw transformations in the plane using a variety of tools such as transparencies and geometry software. They describe transformations as functions that take points in the plane as inputs and give other points as outputs. Students compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch). Students develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments. Students specify a sequence of transformations that will carry a given figure onto another.

software. B)• Describe transformations as functions that take points in the plane as inputs and give other points as outputs. C)• Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch). D)• Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments. E)• State a sequence of transformations that will carry a given figure onto another. F)• Verify experimentally the properties of dilations given by a center and a scale factor: o The dilation of a line segment is longer or shorter depending on the scale factor. o 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.		Students 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. • 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. **Future Learning:** In algebra 2 and precalculus, students will use their knowledge of transformations when building functions from existing functions. Students pursuing art-related programs and careers will continue the study of visual transformations.

Quarter Three

Unit Six - Polygons (20 days/10 blocks)

Common Core Standards ***and*** ***Content to Be Learned***	***Mathematical Practices*** ***and*** ***Essential Questions***	***Prior Learning, Current Learning and Future Learning***
Prove geometric theorems *[Focus on validity of underlying reasoning while using a variety of ways of writing proofs]*. **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*	**SMP 1** Makes sense or problems and perseveres in solving them. **SMP 2** Reason abstractly and quantiatively	**Prior knowledge:** In grade 8 students explain a proof of the Pythagorean Theorem and its converse. They apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two dimensions. They apply the Pythagorean Theorem to find the

diagonals. **Use coordinates to prove simple geometric theorems algebraically *[Include distance formula; relate Pythagorean Theorem].*** **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).* **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.6.** Find the point on a directed line segment between two given points that partitions the segment in a given ratio. **G-GPE.7.** Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.★ **Experiment with transformations in the plane.** **G-CO.3.** Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself. **Apply geometric concepts in modeling situations.** **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).★	**SMP 3** Construct viable arguments and critique the reasoning of others. **SMP 4** Model with mathematics. **SMP 7** Look for and make use of structure **SMP 8** Look for and express regularity in repeated reasoning How can different quadrilaterals in the coordinate plane be identified and verified? What are the similarities and differences of squares, rectangles, rhombi, kites trapezoids and parallelograms? How would you use the various properties of quadrilaterals to calculate missing sides and angles? How do you use the number of sides of a polygon to calculate the interior and exterior angle measures and their sums?	distance between two points in a coordinate system. **Current Learning:** Building on their work with the Pythagorean theorem in grade 8 to find distances, students use a rectangular coordinate system to verify geometric relationships, including properties of special triangles and quadrilaterals and slopes of parallel and perpendicular lines, which relates back to work done in the first course. **Future Learning:** In Algebra 2 students use coordinates to prove simple geometric theorems algebraically. They will apply geometric concepts in modeling situations.

Unit Seven - 2-D and 3-D Measurements and Modeling (10 days/5 blocks)

Common Core Standards* and *Content to Be Learned	***Mathematical Practices* and *Essential Questions***	***Prior Learning, Current Learning and Future Learning***
Apply geometric concepts in modeling situations. **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).★ **Explain volume formulas and use them to solve problems.** **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,	**SMP 4** Model with mathematics. **SMP 6** Attend to precision. How is surface area and lateral area the same and how are they different? In what ways can the use of calculating volume be applied to real world situations? What are the connections between two-dimensional and three-dimensional figures?	**Prior Learning:** In grade 7 students solve real-life problems involving the area and circumference of a circle and surface area and volume of three-dimensional objects, and grade 8 students know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems. **Current Learning:** Students' experience with two-dimensional and three-dimensional objects is extended to include informal explanations of circumference, area and volume formulas. Additionally, students apply their knowledge of two-dimensional shapes to consider the shapes of cross-sections and the result of rotating a two-dimensional object about a line. **Future Learning:** In future courses, students will continue to use the relationships between two and three-dimensional objects by applying them to modeling situations.

and spheres to solve problems.★	What does the dissection of a three dimensional figure produce? When is it appropriate to use the formulas for area, surface area and volume of geometric figures? What are the differences between units of area and units of length?	

Unit Eight - Relationships in Circles (10 days/5 blocks)

Common Core Standards* and *Content to Be Learned	***Mathematical Practices* and *Essential Questions***	***Prior Learning, Current Learning and Future Learning***
Understand and apply theorems about circles. **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.* **Find arc lengths and areas of sectors of circles *[Radian introduced only as unit of measure].*** **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.	**SMP 3** Construct viable arguments and critique the reasoning of others **SMP 4** Model with mathematics. **SMP 5** Use appropriate tools strategically. **SMP 6** Attend to precision. What is the relationship between central angles, arc length and circumference? What is the relationship between the circumference and diameter of a circle? What are the properties of circles and their relationships among angles, lines, and line segments in and around circles? How can the area of a circle be used to find the area of a sector?	**Current Learning:** In this unit students prove basic theorems about circles, such as a tangent line if perpendicular to a radius, inscribed angle theorem, and theorems about chords, secants, and tangents dealing with segment lengths and angle measures. They study relationships among segments on chords, secants, and tangents as an application of similarity. In the Cartesian coordinate system, students use the distance formula to write the equation of a circle when given the radius and the coordinates of its center. Given an equation of a circle, they draw the graph in the coordinate plane, and apply techniques for solving quadratic equations, which relates back to work done in the first course, to determine intersections between lines and circles or parabolas and between two circles.

Quarter Four

Unit Nine - Algebraic Representations (22 days/11 blocks)

Common Core Standards ***and*** ***Content to Be Learned***	***Mathematical Practices*** ***and*** ***Essential Questions***	***Prior Learning, Current Learning and Future Learning***
Understand and apply theorems about circles. **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.4.** (+) Construct a tangent line from a point outside a given circle to the circle. **Make geometric constructions *[Formalize and explain processes]*.** **G-CO.13.** Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle. **Use coordinates to prove simple geometric theorems algebraically *[Include distance formula, relate to Pythagorean theorem]*.** **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. **G-GPE.2.** Derive the equation of a parabola given a focus and directrix. **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. **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*	**SMP 3** Construct viable arguments and critique the reasoning of others. **SMP 4** Model with mathematics. **SMP 5** Use appropriate tools strategically. **SMP 6** Attend to precision. How can a circle be used to construct regular polygons? What characteristics of circles are necessary to graph and write the equations of circles?	**<u>Current Learning</u>:** Given an equation of a circle students draw the graph in the coordinate plane and apply techniques for solving quadratic equations, which relates back to work done in the first course, to determine intersections between lines and circles or parabolas and between two circles.

circle centered at the origin and containing the point (0, 2). **Visualize relationships between 2-D and 3-D objects.** **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.		

Unit Ten - Introduction to Conditional Probability (10 days/5 blocks)

Common Core Standards **and** ***Content to Be Learned***	***Mathematical Practices*** **and** ***Essential Questions***	***Prior Learning, Current Learning and Future Learning***
Understand independence and conditional probability and use them to interpret data *[Link to data from simulations or experiments].* **S-CP.1.** Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not"). **S-CP.2.** Understand that two events A and B are independent events. If the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent. **S-CP.3.** Understand the conditional probability of A given B as P(A and B)/P(B), interpret the independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B. **S-CP.4.** Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. *For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results.* **S-CP.5.** Recognise and explain the concepts of conditional probability and independence in every day language and everyday situations. *For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer).* **Use rules of probability to compute probabilities of compound events in a uniform probability model.** **S-CP.6.** Find the conditional probability of *A* given *B* as the	**SMP 1** Make sense of problems and persevere in solving them. **SMP 2** Reason abstractly and quantitatively. **SMP 4** Model with mathematics. How can data be analyzed to make inferences and/or predictions, based on surveys, experiments, probability and observational studies? What is the difference between the addition and multiplication principals of counting? How are the the probabilities of mutually exclusive events and of dependent events determined? What are conditional probabilities? *NOTE: S-CP standard is assessed in Algebra II, not in Geometry**	**Prior Learning:** In grade 7 students investigate chance processes and develop, use an evaluate probability models and understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. **Current Learning:** Students understand independence and conditional probability and use them to interpret data. They use rules of probability to compute probabilities of compound events in a uniform probability model, and they use probability to evaluate outcomes of decisions. They use probabilities to make fair decisions, and analyze decisions and strategies using probability concepts. **Future Learning:** This unit sets the stage for work in Algebra II, where the ideas of statistical inference are introduced. Evaluating the risks associated with conclusions drawn from sample data requires an understanding of probability concepts.

fraction of *B*'s outcomes that also belong to *A*, and interpret the answer in terms of the model. **S-CP.7.** Apply the Addition Rule, P(A or B) = P(A) + P(B) – P(A and B), and interpret the answer in terms of the model.		

Topics: Unions, intersections or complements of events, two-way frequency tables, collecting data from a random sample, finding conditional probability, applying the addition rule P(A or B) = P(A) + P(B) – P(A and B)