PRESCOTT UNIFIED SCHOOL DISTRICT
District Instructional Guide
updated 7/19/2018

Grade Level: 8-12	Subject: Geometry	Time: 1st Semester/ 2nd Semester	Core Text: Geometry, Mathematics Vision Project, 2018

Time	Unit/Topic	Standards	Assessments
1st Semester	1-Transformations and Symmetry	**G.G-CO.A.1.** Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc. **G.G-CO.A.4.** Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments. **G.G-CO.A.5.** Given a geometric figure and a rotation, reflection, or translation draw the transformed figure. Specify a sequence of transformations that will carry a given figure onto another. **G.G-GPE.B.5.** Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems, including finding the equation of a line parallel or perpendicular to a given line that passes through a given point. **G.G-CO.A.2.** Represent and describe transformations in the plane 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.G-CO.A.3.** Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself. **G.G-CO.B.6.** Use geometric definitions 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.	Formative/Summative Unit Assessments
	2-Congruence, Construction and Proof	**G.G-CO.D.12.** Make formal geometric constructions with a variety of tools and methods. Constructions include: copying segments; copying angles; bisecting segments; bisecting angles; 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.G-CO.D.13.** Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle; with a variety of tools and methods.	Formative/Summative Unit Assessments

		G.G-CO.A.5. Given a geometric figure and a rotation, reflection, or translation draw the transformed figure. Specify a sequence of transformations that will carry a given figure onto another. **G.G-CO.B.6.** Use geometric definitions 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.G-CO.B.7.** Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent. **G.G-CO.B.8.** Explain how the criteria for triangle congruence (ASA, AAS, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.	
	3-Geometric Figures	**G.G-CO.C.10.** Prove theorems about triangles. Theorems include: measures of interior angles of a triangle sum to 180°; base angles of isosceles triangle 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. *Note: Encourage multiple ways of writing proofs, such as in narrative paragraphs, using flow diagrams, in two-column format, and using diagrams without words. Students should be encouraged to focus on the validity of the underlying reasoning while exploring a variety of formats for expressing that reasoning.* **G.G-CO.C.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.G-CO.C.11.** Prove theorems about parallelograms. Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and rectangles are parallelograms with congruent diagonals.	Formative/Summative Unit Assessments

	4-Similarity and Right Triangle Trigonometry	**G.G-SRT.A.1.** Verify experimentally the properties of dilations given by a center and a scale factor: a. Dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged. b. The dilation of a line segment is longer or shorter in the ratio given by the scale factor. **G.G-SRT.A.2.** Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides. **G.G-SRT.B.4.** Prove theorems about triangles. Theorems include: an interior line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity. **G.G-SRT.A.3.** Use the properties of similarity transformations to establish the AA, SAS, and SSS criterion for two triangles to be similar. **G.G-CO.C.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.G-CO.C.10.** Prove theorems about triangles. Theorems include: measures of interior angles of a triangle sum to 180°; base angles of isosceles triangle 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. *Note: Encourage multiple ways of writing proofs, such as in narrative paragraphs, using flow diagrams, in two-column format, and using diagrams without words. Students should be encouraged to focus on the validity of the underlying reasoning while exploring a variety of formats for expressing that reasoning.* **G.G-SRT.B.5.** Use congruence and similarity criteria to prove relationships in geometric figures and solve problems utilizing real-world context. **G.G-GPE.B.6.** Find the point on a directed line segment between two given points that partitions the segment in a given ratio. **G.G-SRT.C.6.** Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.	Formative/Summative Unit Assessments

		G.G-SRT.C.8. Use trigonometric ratios (including inverse trigonometric ratios) and the Pythagorean Theorem to find unknown measurements in right triangles utilizing real-world context. **G.G-SRT.C.7.** Explain and use the relationship between the sine and cosine of complementary angles. **F.TF.8.** Prove the Pythagorean identity $\sin^2 + \cos^2 = 1$ and use it to find sin(θ), cos(θ), or tan(θ) given sin(θ), cos(θ), or tan(θ) and the quadrant of the angle. *Note: the High School Geometry course focuses on angles in quadrant I, that is, angles that can be found in a right triangle.*	
	5-Circles: A Geometric Perspective	**G.G-C.A.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.G-C.A.1.** Prove that all circles are similar. **G.G-C.A.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. **G.G-GMD.A.1.** Analyze and verify the formulas for the volume of a cylinder, pyramid, and cone. Use dissection arguments, Cavalieri's principle, and informal limit arguments. **G.G-C.B.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. Convert between degrees and radians. *Note: Emphasize the similarity of all circles. Note that by similarity of sectors with the same central angle, arc lengths are proportional to the radius. Use this as a basis for introducing radian as a unit of measure. It is not intended that it be applied to the development of circular trigonometry in this course.* **G.G-GMD.A.3.** Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems utilizing real-world context. **G.GMD.2.** Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures.	Formative/Summative Unit Assessments

2nd Semester	6-Connecting Algebra and Geometry	**G.G-GPE.A.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. **P.G-GPE.A.2**. Derive the equation of a parabola given a focus and directrix. **G.G-GPE.B.4**. Use coordinates to algebraically prove or disprove geometric relationships. Relationships include: proving or disproving geometric figures given specific points in the coordinate plane; and proving or disproving if a specific point lies on a given circle. **G.G-GPE.B.5**. Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems, including finding the equation of a line parallel or perpendicular to a given line that passes through a given point. **G.G-GPE.B.7.** Use coordinates to compute perimeters of polygons and areas of triangles and rectangles.	Formative/Summative Unit Assessments
	7-Modeling with Geometry	**G.G-MG.A.1**. Use geometric shapes, their measures, and their properties to describe objects utilizing real-world context. **G.G-MG.A.2**. Apply concepts of density based on area and volume in modeling situations utilizing real-world context. **G.G-MG.A.3**. Apply geometric methods to solve design problems utilizing real-world context. **G.G-GMD.B.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. **P.G-SRT.D.9**. Derive the formula A = ½ ab sin(C) for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side. **P.GSRT.D.10**. Prove the Laws of Sines and Cosines and use them to solve problems. **P.GSRT.D.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).	Formative/Summative Unit Assessments
	8-Probability	**S.CP.6.** Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in terms of the model. **P.S.MD.B.7.** Analyze decisions and strategies using probability concepts (e.g. product testing,	Formative/Summative Unit Assessments

		medical testing, pulling a hockey goalie at the end of a game). **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. **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.7.** Apply the Addition Rule and interpret the answer in terms of the model. **S.CP.2.** Understand that two events A and B are independent 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), and interpret 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.5.** Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. *For example, compare the change of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.*	

Mathematical Practices (MP)

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.

7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.