Ganado Unified School District
Geometry-10th Grade Level

PACING Guide SY 2018-2019

Timeline & Resources	AZ College and Career Readiness Standard	Essential Question (HESS Matrix)	Learning Goal	Vocabulary (Content/Academic)
Quarter 1 **Glencoe Geometry textbook** **Chapter** **1-5**	G.CO. Transformations and the Coordinate Plane. G.CO.1 Know precise definitions of geometric terms based on the undefined notion of point, line, distance along a line and distance around a circular arc. G.CO.4 Develop and use definitions of rigid motion (rotation, reflection and translation). G.CO.2. Compare transformations that	1. What is rigid motion? How is it used in geometry? 2. What is coordinate geometry? How is it used? 3. How can coordinate geometry describe rigid motion? 4. Explain the significance of undefined terms to the study of geometry.	I will define, name and sketch: Undefined terms (Point, Line, Plane), Ray, Segment, Angle, Vertex Length, Measure, Endpoints*, Midpoint, Distance, Congruent, Postulate, Theorem, Circle, Parallel lines, Perpendicular lines, etc. I will use notation for angles, points, segments, rays and planes. I will name and classify polygons. I will classify angles and	**Chapter 1** Acute angle, adjacent angles, angle, angle bisector, are, base, between, circumference, collinear , complementary angles, concave, cone, congruent, constructions, convex, coplanar, cylinder, degree, edge ,equiangular polygon, equilateral polygon,

	preserve distance and angle to those that do not. G.CO.2 Create input/output data tables representing various transformations G.CO.2 Use rigid motion to represent given transformation(s), using transparencies or software G.CO.2 Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure. G.CO.2. Describe transformations as functions that take points in the plane as inputs and give other points as outputs.		identify angle pairs (i.e. adjacent, vertical, complementary and supplementary). I will utilize postulates about points, lines and planes. I will distinguish between postulates and theorems. I will compute segment lengths, solve segment lengths on a coordinate plane, and convert unit lengths. I will solve for angle measures (i.e. supplementary, complementary, etc.) I will solve perimeter, circumference and area, including irregular polygons. I will define glide reflection,	exterior, face ,interior, intersection ,line, line segment, linear pair, midpoint, n-gon, obtuse angle, opposite rays, perimeter, perpendicular, plane ,platonic solid, point, polygon, polyhedron, prism, pyramid,ray, regular polygon, regular polyhedron, right angle, segment bisector, side , space, sphere, supplementary angles, surface area, undefined term, vertex, vertex of a

	G.GPE.5. Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems. G.GPE.4. Use Coordinate Geometry to prove simple geometric theorems, and properties algebraically. 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.		isometry, pre-image, post-image and line of symmetry. I will define rigid motions; translation, reflection and rotation. I will recognize, classify, and visualize rigid motions of 2D shapes; rotation, reflection, and translation. I will compare transformations that preserve distance and angle to those that do not. I will create input/output data tables representing various transformations. I will use rigid motion to represent given transformation(s), using transparencies or software. I will draw the	polygon, vertical angles ,volume **Chapter 2** algebraic proof, axiom,compound statement, conclusion, conditional statement, conjecture, conjunction, contrapositive, converse, counterexample, deductive argument, deductive reasoning, disjunction, formal proof, hypothesis, if-then statement, inductive reasoning, informal proof, inverse, logically equivalent, negation, paragraph proof, postulate, proof, related conditionals, statement, theorem, truth table, truth

			transformed figure, given a geometric figure and a rotation, reflection, or translation. I will describe transformations as functions that take points in the plane as inputs and give other points as outputs. I will find translation, reflection, rotation and isometry combinations of figures. I can find the line of reflection. I can draw a translation, reflection, and rotation of a figure . I will describe each of the three rigid motions; rotation, reflection and translation. I will describe the rotation and reflections that carry it	value, two-column proof **Chapter 3** alternate exterior angles,alternate interior angles,consecutive interior angles, corresponding angles, equidistant, parallel lines ,parallel planes, point-slope form, transversal **Chapter 4** acute triangle, auxiliary line, base angles, congruence transformation, congruent polygons, coordinate proof, corollary, corresponding parts, equiangular

			onto itself given a rectangle, parallelogram, trapezoid, or regular polygon. I will explain the rigid motion that has taken place between the pre- and post-images. I will experiment with dynamic geometry software to validate that rigid motion preserves distance and angle measure. I will recognize that: a. Parallel lines have the same slope. Perpendicular lines have slopes that are opposite reciprocals. b. Perpendicular lines intersect at a 90 degree angle. Perpendicular lines have slope that are opposite reciprocals. Parallel lines are coplanar and never intersect so they must have the same	triangle, equilateral triangle, exterior angle, flow proof, included angle, isosceles triangle, obtuse triangle, reflection, remote interior angles, right triangle, rotation, scalene triangle, translation, vertex angle **Chapter 5** Altitude, centroid, circumcenter, concurrent lines, incenter, indirect proof, indirect reasoning, median, orthocenter, perpendicular bisector, point of concurrency, proof by contradiction

			slope (equidistant). I will identify the equation of a line parallel or perpendicular to a given line that passes through a given point, identify and use intercepts. I will compile a list of all the lines that are parallel and/or perpendicular within a given complex figure. I will prove that the slopes of parallel lines are equal. I will prove that the product of the slopes of perpendicular lines is -1. I will solve geometric problems using slope criteria for parallel and perpendicular lines. I will solve problems about parallel and perpendicular lines using	

			previous knowledge of transformations. I will write the equation of a line parallel or perpendicular to a given line from an equation or a graph, passing through a given point. I will graph parallel and perpendicular lines using transformations. I will use the of distance formula. I will use the of slope formula to determine parallel and perpendicular lines. I will use the definition of points, lines and planes. I will use the formulas for: distance, slope and midpoint. I will recognize: angle	

			classification, addition of segments and angles, transversals and angle relationships (parallel and perpendicular lines), interior and exterior angles of polygons, congruence and inequality, rotation, reflection, translation, classification and properties of (special) triangles and other polygons and non-polygons, basic rules for solving algebraic equations I will use a coordinate geometry to prove simple geometric theorems algebraically; prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle. I will find the point on a directed line segment between two given points	

			that partitions the segment in a given ratio. I will use coordinates to compute perimeters of polygons and areas of triangles, e.g., using the distance formula. I will construct congruent figures using points and segments. I will prove that segments are congruent I will use the of distance formula. I will use the of slope formula to determine parallel and perpendicular line. I will use the definition of points, lines and planes. I will use the formulas for: distance, slope and	

			midpoint. I will recognize: angle classification, addition of segments and angles, transversals and angle relationships (parallel and perpendicular lines), interior and exterior angles of polygons, congruence and inequality, rotation, reflection, translation, classification and properties of (special) triangles and other polygons and non-polygons, basic rules for solving algebraic equations. I will use a coordinate geometry to prove simple geometric theorems algebraically; prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle. I will find the point on a	

			directed line segment between two given points that partitions the segment in a given ratio. I will use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula. I will construct congruent figures using points and segments. I will prove that segments are congruent.	
Quarter 2 **CHAPTER 6-9** **Chapter 6 Quadrilaterals** **Chapter 7**	G.CO. Congruence, Proof and Construction G.CO.7 Use the definition of congruence, in terms of rigid motions, to show that two triangles are congruent if and	1. What does it mean for two figures to be congruent? How is rigid motion used to prove congruence? How is coordinate geometry used to prove congruence?	I will use rigid motion to translate two triangles or map one figure onto another figure. I will recognize the effects of rigid motion on orientation and location of figures; that congruent figures share the same size	**Chapter 6 Quadrilaterals** base , base angle, diagonal, isosceles trapezoid, kite,

Proportions and Similarity **Chapter 8 Right Triangles and Trigonometry** **Chapter 9** **Transformation and Symmetry**	only if corresponding pairs of sides and corresponding pairs of angles are congruent. 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. 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.9. Prove theorems about lines and angles. Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior	2. What are the two types of reasoning that are used to prove statements true? How are they similar and different?	and shape regardless of orientation or location. I will 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. I will determine corresponding parts of triangles. I will identify congruence transformations. I will set up appropriate congruent statements of corresponding sides, angles, and triangles. I will explain how the criteria for triangle congruence (ASA, SAS, and	legs, mid segment of a trapezoid, parallelogram, rectangle, rhombus, square, trapezoid **Chapter 7 Proportions and Similarity** cross products, dilation, enlargement, extremes, means mid segment of a triangle, Proportion, ratio, reduction, scale, scale drawing, scale factor, scale model, similar polygons, similarity

	angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segments' 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.		SSS) follow from the definition of congruence in terms of rigid motions. I will present and support arguments using deductive reasoning to show ASA, SAS, and SSS proves congruence and that AAA and SSA does not critiquing arguments of others using definitions of rigid motion and congruence for triangles. I will describe how specific sets of corresponding parts signify congruence, such as SSS, SAS, ASA, AAS, HL whereas other sets of corresponding parts. I will recognize that: a. Vertical angles use rotation b. Alternate interior angles use rotation and translation	transformations **Chapter 8 Right Triangles and Trigonometry** angle of depression, angle of elevation, component from, cosine, direction, geometric mean, inverse cosine, inverse sine, inverse tangent, Law of Cosines, Law of Sines, magnitude, Pythagorean triple, resultant, sine, standard position, tangent, trigonometric ratio, trigonometry, vector.

			c. Corresponding angles use translation d. Perpendicular lines use reflection I will define inductive reasoning, conjecture, counterexample, deductive reasoning and proof. I will recognize the three types of proofs as two-column, flowchart, and paragraph Identify angles formed by two lines and a transversal. I will perform rigid motion on the coordinate plane to prove that: a. Alternate interior angles congruent b. Corresponding angles congruent	

			I will use a coordinate plane and rigid motions to: a. justify parallel and perpendicular lines b. show preservation of distance and angle measures I will show any point on the perpendicular bisector of a line segment to be is equidistant to the two end points of that line segment, given the perpendicular bisector. I will explain how rigid motion can be used to prove theorems. I will explain how rigid motion leads to the properties of angle relationships (vertical angles, alternate interior angles and corresponding angles).	

			I will compare and contrast inductive versus deductive reasoning. I will use geometric symbols associated with congruence, parallel, perpendicular, pre-image and post-image. I will define corresponding parts and recall symbolic representations of naming segments and angles.	
	Similarity, Proof and Trigonometry G.SRT.5 Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. G.SRT.4 Prove theorems about triangles. Theorems include: a	1. What are the triangle congruence postulates/theorems ? How do you use them to solve problems? 2. How are rigid motion and dilation used to prove similar figures? 3. How are congruent triangles	I will recognize: AA similarity postulate, SAS and SSS similarity theorems, SAS, SSS, and ASA congruence postulates I will use AAS and HL congruence theorems. I will recall cross product property, properties of proportions, pre-image,	**Chapter 9 Transformation and Symmetry** angle of rotation axis of symmetry center of rotation composition of transformation glide reflection line of reflection line of symmetry magnitude of

	line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity. G.SRT.8 Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.* 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.	similar triangles similar and different? 4. How are side lengths or angle measures found in right triangle?	and post-image. I will define ratios, extended ratios, proportions, extremes, means, scale factor, fractals, indirect measurements, geometric mean, dilation, enlargement, and reduction. I will identify similar polygons. I will write ratios and solve proportions. I will determine if polygons are similar. I will use similarity of polygons to solve for missing side lengths. I will determine scale factors. I will use scale factors to calculate a length.	symmetry order of symmetry plane symmetry rotational symmetry symmetry translation vector

			I will use similarity to find indirect measurements. I will find and use relationships in similar right triangles and drawing the altitude to the hypotenuse of a right triangle, creates three similar right triangles. I will compose dilation images of figures. I will compare and contrast similarity versus congruence. I compare and contrast the theorems/postulates for showing triangles similar and congruent.	
			I will recall parallel lines, proportions, the Pythagorean theorem, the distance formula, classification of	

			triangles. I will prove the Pythagorean theorem in multiple ways: a. using a coordinate plane and a right triangle whose sides are Pythagorean triples b. using rectangles I will use the Pythagorean theorem to find the length of one of the legs or the hypotenuse of a right triangle. I will compare and compare and contrast the Pythagorean theorem with the converse of the Pythagorean theorem; what does each reflect? I will 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. I will summarize the six trigonometric ratios I will recall right triangles, the Pythagorean theorem, hypotenuse of a right triangle, legs of a right triangle. I will define Pythagorean triples, angles of elevation, and angles of depression. I will identify angles of elevation and angles of depression. I will use the Pythagorean theorem and its converse. I will use the properties of special right triangles: 45-45-90 and 30-60-	

			90 triangles. I will use the properties of special right triangles and the Pythagorean theorem to find the length of one of the legs or the hypotenuse of a right triangle I will calculate sine, cosine, and tangent ratios to determine side lengths and angle measures in right triangles. I will write trigonometric ratios. I will solve problems involving right triangles and angles of inclination or angles of depression. I will assess and explain when each of the trigonometric ratios would	

			be used.	
3r d Quarter Chapter 10-11 **Chapter 10 Circles** **Chapter 11 Areas of Polygons and Circles**	.G.C.2 Identify and describe relationships among inscribed angles, radii, and chords. ● 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.	1. How can you prove relationships between angles and arcs of a circle. 2. When lines intersect a circle or within a circle, how do you find the measures of resulting arcs, angle and segments? 3. How do you find the equation of a circle in the coordinate plane? 4. How can relationships between angles and arcs in a circle be proven?	I will define inscribed angles, circumscribed angles, central angle, radius, diameter, chords, arcs, tangent, and point of tangency. I will review parallel, perpendicular and angle classifications. I will recognize that: a. the line tangent to a circle is perpendicular to the circles radius at the point of tangency. b. the measure of a central angle is equal to its arc .	**Chapter 10: Circles** Adjacent arc Arc length Center Central angle Chord segment circle circumference circumscribed Inscribed Common tangent compound locus concentric circles congruent arcs diameter

		5. How do perimeters and areas of similar figures compare?	c. the measure of an inscribed angle is half the measure of its arc. d. Inscribed angles on a diameter are right angles. I will find the measure of an inscribed angle. I will find the measure of an angle formed by a tangent and a chord. I will use the properties of a tangent to a circle. I will find the length of segments associated with circles. I will use congruent chords, arcs, and central angles. I will use perpendicular bisectors to chords.	External secant segment inscribed angle Intercepted arc major arc minor arc pi point of tangency radius secant - secant segment **Chapter 11** **Areas of Polygons and Circles** Apothem base of a parallelogram base of a triangle center of a regular polygon composite figure

				height of a parallelogram height of a trapezoid height of a triangle radius of a regular polygon sector of a circle
	G.C.3 Construct the inscribed and circumscribed circles of a triangle. 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.		I will differentiate between inscribed and circumscribed. I will compare and contrast inscribed circles and circumscribed circles. I will use mathematical tools to construct inscribed and circumscribed circles of a triangle. I will define similarity, proportional, radian,	

			and sector. I will recall an intercepted arc, inscribed angle, central angle, opposite arc and radius. I will recognize that: a. angles can be represented in radian units a. radian is the measure of the central angle of a circle created when the radius of the circle is equal in length to the arc create by the central angle b. the radian measure of an angle is the constant of proportionality	
	G.GPE.1 Derive the equation of a circle of given center and radius using the Pythagorean Theorem.		I will review center of a circle, radius, diameter, Pythagorean Theorem, the equation of a circle theorem, the coordinate plane, parabolas, and quadratic	

	G.C.1 Prove that all circles are similar.		functions. I will recognize the standard form of an equation of a circle. I will use coordinate geometry to draw a circle in order to: a. Write an equation for a circle given radius and center. b. Write the equation for a circle given endpoints of the diameter. I will complete the square to find the center and radius of a circle given by an equation. I will graph a circle on the coordinate plane given the equation of the circle. I will prove that all circles are similar.	

			I will compare the radii, circumference and area of circles that are not congruent. I will be able to describe the relationship between the radius or diameter and the circumference. I will actualize that the ratio of circumferences and the ratio of areas of similar circles are related to the ratio of the corresponding measures.	
Quarter 4 **Chapter 12 Extending Surface Area and Volume** **Chapter 13 Probability**	G.GMD.3 Use volume formulas for cylinders, pyramid, cones, and spheres to solve problems.	1. What are the three types of measurement? How do you know which measurement to calculate? What are the units of measure associated with each type of	I will identify base shapes of cylinders, pyramids, cones, and spheres. I will recognize that volume is the space a figure occupies. I will understand perimeter	**Chapter 12 Extending Surface Area and Volume** Altitude axis base edges composite solid congruent solid cross section

and Measurement		measurement? 2. What is similar and different between measuring area and volume? When do you use each? 3. How can the intersection of a solid and a plane be determined?	and area. I will define bases, base area, height and slant height. I will find missing parts of each formula including slant height, altitude, diagonals of prism, edge length and radius. I will calculate volume of a cylinder, pyramid, cone, and sphere. I will make connections between two-dimensional and three-dimensional figures, such as; rectangles to pyramids and prisms or circles to cones, cylinders, and spheres. I will make connections between one-dimension and perimeter, two-dimensions and area, and three-dimensions and volume.	Euclidean geometry great circle isometric view lateral area Right solid Similar solids Slant height spherical geometry topographic map Lateral edge lateral face non-Euclidean geometry oblique cone oblique solid regular pyramid right cone Cylinder Pyramid Cones Sphere Volume Surface area Slant height Altitude Diagonal Prism Lateral area

			I will interpret the units of perimeter being raised to the first power as one-dimensional area being raised to the second power as two-dimensional, and volume being raised to the third power as three-dimensional. I will connect experiences between 2-D and 3-D shapes. I will appropriately use units to indicate the dimensional measure referenced.	
	G.MG.1 Use geometric shapes, their measures, and their properties to estimate when problem-solving (e.g., modeling a tree trunk or a human torso as a cylinder).		I will classify polyhedra by prism or pyramid. I will define surface area, lateral area, volume, lateral faces, bases, altitude or height, vertex, edges, slant height. I will find the surface area of	

			prisms, cylinders, pyramids, and cones. I will find the lateral area of prisms, cylinders, pyramids, and cones. I will calculate a combination of surface areas and lateral areas for complex figures (that is, figures that contain more than one prism, pyramid, cylinder, or cone). I will find missing parts of each formula including slant height, altitude, diagonals of prism, edge length and radius. I will explain the differences and similarities between lateral area and surface area. I will explain the differences and similarities between finding the area for prisms	

			and cylinders versus pyramids and cones. I will describe how prisms and pyramids are different from cylinders and cones. I will appropriately use and use appropriate formulas for calculating the surface and lateral areas of figures.	