Ganado Unified School District #20
(Pre-Calculus – 11th/12th Grade)

PACING Guide SY 2018-2019

Timeline & Resources	AZ College and Career Readiness Standard	Essential Question (HESS Matrix)	Learning Goal	Vocabulary (Content/Academic)
Quarter 1	HS.A-CED.4. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For example, rearrange Ohm's law V = IR to highlight resistance R.*	How can a missing side of a triangle be found?	The students will be able to use the Pythagorean theorem to find a missing side of a triangle.	Hypotenuse leg
	HS.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.*	Are all three sides of a triangle the appropriate length?	The students will use to Pythagorean Theorem to determine if all three sides are appropriate for a right triangle.	
	HS.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.	What are ratios associated with right triangles from 0° to 90°?	The students will identify ratios using appropriate sides.	Opposite Adjacent Hypotenuse Sine Cosine Tangent Cosecant Secant Cotangent
	HS.G-SRT.8. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.	How can a missing side/angle of a right triangle be found using	The students can find missing sides of right triangles?	Sine inverse Cosine inverse Tangent inverse

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		measurements of sides/angles?		Arc sine Arc cosine Arc tangent
	HS.F-TF.1. Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.	How is radian measure related to degree measure? How can an angle measure be converted between degree and radian measure?	The students will align angle measurements in both degree and radian mode.	Unit circle Arc Initial side Terminal side
	HS.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).	How can a missing angle be found in an oblique triangle? How can a missing side be found in an oblique triangle?	The students will find missing parts of oblique triangles using limited information.	Oblique triangle Law of Sines Law of Cosines
	HS.G-SRT.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.	How can the area of a triangle be found using an angle measurement?	The students will be able to find the area of various triangles in real-world applications.	
Quarter 2	HS.F-TF.2. Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.	How are degree measure and radian measure related? What unique components make the unit circle?	The students will become angle measures within the unit circle.	Initial side Terminal side Radius Sine Cosine Positive angles Negative angles
	HS.F-TF.3. Use special triangles to determine geometrically the values of sine, cosine, tangent for $\pi/3$, $\pi/4$ and $\pi/6$, and use the unit circle to express the values of sine,	What is the significant of the relationship between the two special	The students will be familiar in with exact values that will be used throughout trigonometry.	x-axis y-axis coordinate plane coterminal

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	cosine, and tangent for π-x, π+x, and 2π-x in terms of their values for x, where x is any real number.	right triangles and the unit circle?		
	HS.F-TF.8. Prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ and use it find sin(θ), cos(θ), or tan(θ) given sin(θ), cos(θ), or tan(θ) and the quadrant of the angle.	How are the basic identities for the Second Definition of Trigonometry formed using the using unit circle? How can the signs of the trigonometric functions be determined in the four quadrants of the coordinate plane?	The students will be able to memorize trigonometric identities and us them to find other identities.	Reciprocal identity Ratio identity Pythagorean identity Quadrants
	HS.G-SRT.7. Explain and use the relationship between the sine and cosine of complementary angles.	How are exact values for the sine and cosine function related to one another?	The students will be able to recall exact values of all angle measures using complementary angles.	Complementary
	HS.N-VM.3. Solve problems involving velocity and other quantities that can be represented by vectors.	How can speed and measurement of a circular object be found using specific information?	The students will be able to find speed and distance in real-world applications.	Linear velocity Angular velocity Omega Time Distance

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Quarter 3	HS.F-IF.1. Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If *f* is a function and *x* is an element of its domain, then *f*(*x*) denotes the output of *f* corresponding to the input *x*. The graph of *f* is the graph of the equation *y* = *f*(*x*).	How can the six trigonometric functions be represented graphically?	The students will be able to use a table and exact values to find the appropriate domain values.	Domain Range
	HS.F-IF.7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.	What do the components of a trigonometric function represent?	The students will be able to input functions in a graphing calculator and identity components essential to the function.	Period Amplitude Vertical translation Phase Shift
	HS.F-IF.4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.*	What are the key features in graphs of trigonometric functions? How graphs be constructed?		

	HS.F-TF.4. Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions.	Are the exact values of positive and negative angles similar or different?	The students can explain functions such as y=sin (-x),y=cos (-x),& y=tan (-x).	
	HS.F-TF.5. Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.	How do components of trigonometric functions form graphs?		
Quarter 4	HS.F-TF.8. Prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ and use it find sin(θ), cos(θ), or tan(θ) given sin(θ), cos(θ), or tan(θ) and the quadrant of the angle.	What other identities can be formed from the basic Pythagorean identity?	The students will be able to find exact values of angle measures other than 0°, 30°, 45°, 60°, & 90°.	Verify Identity
	HS.F-TF.9. Prove the addition and subtraction formulas for sine, cosine, and tangent and use them to solve problems.	How are the sum and difference formulas useful in real-world applications?	The students will be able to find exact values of angle measures other than 0°, 30°, 45°, 60°, & 90° using both addition and subtraction.	Sum Difference
	HS.A-APR.7. Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions.	How are ratios combined together?	The students will be able to use appropriate rules of adding, subtracting, multiplying, and dividing rational expressions.	
	HS.A-SSE.2. Use the structure of an expression to identify ways to rewrite it. *For example, see* $x^4 - y^4$ *as* $(x^2)^2 - (y^2)^2$, *thus recognizing it as a difference of squares that can be factored as* $(x^2 - y^2)(x^2 + y^2)$.	How can polynomials be rewritten?	The students can simplify the rational expressions by rewriting polynomials in equivalent forms.	Trinomials Polynomials Sum of squares Difference of squares FOIL method
	HS.A-REI.2. Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.	How can rational expressions be combined?		Addition Subtraction Multiplication Division rule

				Reciprocal
	HS.A-REI.3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.	How are numerical values of variables in linear equations found?	The students will be able to solve for unknown angle measures in equations with trigonometric functions.	
	HS.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*, $|v|$, $\|v\|$, v).	How are vectors used in real-worlds situations?	The students will be able to use real-world situations using vectors.	Vector Magnitude Force