Ganado Unified School District Pre-Calculus/Trigonometry

PACING Guide SY 2020-2021

Resources	Arizona Mathematics Standards	Essential Question(s) (HESS Matrix)	Learning Goal(s)	Vocabulary (Content/Academic)
Chapter 0: Preparing for Pre-Calculus	**RFR.AF.1:** Interpret parameters of a function defined by an expression in the context of the situation. **RFR.AF.2:** Sketch the graph of a function that models a relationship between two quantities, identifying key features. **RFR.AF.3:** Interpret key features of graphs and tables for a function that models a relationship between two quantities in terms of the quantities. **RFR.AF.4:** Use limits to describe long-range behavior, asymptotic behavior, and points of discontinuity. **RFR.BF.1:** Model relationships between quantities that require adding, subtracting, multiplying, and/or dividing functions **RFR.BF.2:** Model relationships through composition and attend to the restrictions of the domain **RFR.BF.3:** Rewrite a function as a composition of functions **RFR.BF.4:** Determine if a function has an inverse. If so, find the inverse. If not, define a restriction on the domain that meets the requirement for invertibility and find the inverse on the restricted domain	What are the different methods in solving quadratic equations? What is a conjugate?	I will be able to: • Use set notation to denote elements, subsets, and complements. • Find the intersections and unions of sets • Perform operations with pure imaginary numbers and complex numbers • Use complex conjugates to write quotients of complex numbers in standard form • Graph quadratic functions • Solve quadratic equations	- Set - Element - Subset - Universal Set - Complement - Union - Intersection - Empty Set - Imaginary Unit - Complex Number - Standard Form - Real Part - Imaginary Part - Imaginary Number - Pure Imaginary Number - Complex Conjugates

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	RFR.BF.5: Interpret the meanings of quantities involving functions and their inverses **RFR.BF.6:** Verify by analytical methods that one function is the inverse of another			
Chapter 1: Function from a Calculus Perspective	**RFR.AF.1:** Interpret parameters of a function defined by an expression in the context of the situation. **RFR.AF.2:** Sketch the graph of a function that models a relationship between two quantities, identifying key features. **RFR.AF.3:** Interpret key features of graphs and tables for a function that models a relationship between two quantities in terms of the quantities. **RFR.AF.4:** Use limits to describe long-range behavior, asymptotic behavior, and points of discontinuity. **RFR.BF.1:** Model relationships between quantities that require adding, subtracting, multiplying, and/or dividing functions **RFR.BF.2:** Model relationships through composition and attend to the restrictions of the domain **RFR.BF.3:** Rewrite a function as a composition of functions **RFR.BF.4:** Determine if a function has an inverse. If so, find the inverse. If not, define a restriction on the domain that meets the	How will you use data to determine functional relationships between quantities?	I will be able to: • Describe subsets of real numbers • Identify and evaluate functions and state their domains • Use graphs of functions to estimate function values • Identify even and odd functions • Use limits to determine the continuity of a function • Use limits to describe the end behavior of functions • Find intervals on which functions are increasing, constant, or decreasing • Determine the average rate of change of a function • Identify, graph, and describe parent functions • Identify and graph transformations of functions • Perform operations with functions • Find composite of functions • Use the horizontal line test to determine whether a function has an inverse function. • Find inverse function algebraically and graphically	- Set-builder Notation - Interval Notation - Implied Domain - Piecewise-Defined Function - Relevant Domain - Zeros - Roots - Line Symmetry - Point Symmetry - Even Function - Odd Function - Continuous - Limit - Discontinuous - Infinite - Jump - Point - Removable and Nonremovable Discountinuities - End Behavior - Increasing - Decreasing - Constant - Maximum - Minimum - Extrema - Average Rate of Change - Secant Line - Transformations - Translation - Reflection

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	requirement for invertibility and find the inverse on the restricted domain **RFR.BF.5:** Interpret the meanings of quantities involving functions and their inverses **RFR.BF.6:** Verify by analytical methods that one function is the inverse of another			- Dilation - Parent Square Root - Constant Identity - Quadratic - Cubic - Reciprocal Absolute Value Step - Greatest Integer Functions - Composition - Inverse Relation - Inverse Function - One-to-one
Chapter 2: Power, Polynomials and Rational Functions	**RFR.AF.1:** Interpret parameters of a function defined by an expression in the context of the situation. **RFR.AF.2:** Sketch the graph of a function that models a relationship between two quantities, identifying key features. **RFR.AF.3:** Interpret key features of graphs and tables for a function that models a relationship between two quantities in terms of the quantities. **RFR.AF.4:** Use limits to describe long-range behavior, asymptotic behavior, and points of discontinuity. **RFR.BF.1:** Model relationships between quantities that require adding, subtracting, multiplying, and/or dividing functions **RFR.BF.2:** Model relationships through composition and attend to the restrictions of the domain **RFR.BF.3:** Rewrite a function as a composition of functions	What are the key characteristics of the graph of a power function? What are the key characteristics of the graph of a radical function? What are the key characteristics of the graph of a polynomial function? What are the key characteristics of the graph of a rational function? How do you divide polynomials using long division? How do you divide polynomials using synthetic division? How are long division and synthetic division the same?	I will be able to: • Graph and Analyze power functions • Graph and Analyze radical functions and solve radical equations • Graph polynomial functions • Model real-world data with polynomial functions • Divide polynomials using long division • Use the Remainder and Factor Theorems • Find real zeros of polynomial functions • Find complex zeros of polynomial functions • Analyze and graph rational functions • Solve rational equations • Solve polynomial inequalities • Solve rational inequalities	- Power Function - Monomial Function - Radical Function - Extraneous solutions - Polynomial Function - Leading coefficient - Leading-Term test - Turning point - Quadratic Form - Repeated Zero - Multiplicity - Synthetic Division - Depressed Polynomial - Synthetic Substitution - Rational Zero Theorem - Descartes' Rule of Signs - Fundamental Theorem of Algebra - Linear Factorization Theorem - Complex Conjugates - Rational Function - Asymptote - Vertical Asymptote - Horizontal Asymptote Oblique Asymptote - Holes

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	RFR.BF.4: Determine if a function has an inverse. If so, find the inverse. If not, define a restriction on the domain that meets the requirement for invertibility and find the inverse on the restricted domain **RFR.BF.5:** Interpret the meanings of quantities involving functions and their inverses **RFR.BF.6:** Verify by analytical methods that one function is the inverse of another			- Polynomial Inequality - Sign Chart - Rational Inequality
Chapter 3: Exponential and Logarithmic Functions	**RFR.AF.1:** Interpret parameters of a function defined by an expression in the context of the situation. **RFR.AF.2:** Sketch the graph of a function that models a relationship between two quantities, identifying key features. **RFR.AF.3:** Interpret key features of graphs and tables for a function that models a relationship between two quantities in terms of the quantities. **RFR.AF.4:** Use limits to describe long-range behavior, asymptotic behavior, and points of discontinuity. **RFR.BF.1:** Model relationships between quantities that require adding, subtracting, multiplying, and/or dividing functions **RFR.BF.2:** Model relationships through composition and attend to the restrictions of the domain **RFR.BF.3:** Rewrite a function as a composition of functions	How will you identify the domains, ranges, and end behaviors of exponential functions? How will you identify the domains, ranges, and end behaviors of logarithm functions? How will you use the properties of exponents and logarithms to solve exponential and logarithmic equations? What are some means of collecting and organizing data? How do you make and interpret a scatter plot? What is the best line of fit for a scatter plot? How will you use models to predict and make decisions and critical judgements? What is nonlinear regression? **PREPARATION FOR CALCULUS**:	I will be able to: • Evaluate, analyze, and graph exponential functions • Solve problems involving exponential growth and decay. • Evaluate expressions involving logarithms • Sketch and analyze graphs of logarithmic functions • Apply properties of logarithms. • Apply the Change of Base Formula. • Apply the One-to-One Property of Exponential Functions to solve equations. • Apply the One-to-One Property of Logarithmic Functions to solve equations. • Model data, using exponential, logarithmic, and logistic functions.	- Algebraic function - Transcendental function - Exponential function - Natural base - Continuous compound interest - Logarithmic function with base b - Logarithm - Common logarithm - Natural logarithm - Logistic growth function - Linearize

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	RFR.BF.4: Determine if a function has an inverse. If so, find the inverse. If not, define a restriction on the domain that meets the requirement for invertibility and find the inverse on the restricted domain **RFR.BF.5:** Interpret the meanings of quantities involving functions and their inverses **RFR.BF.6:** Verify by analytical methods that one function is the inverse of another	Describe parent functions symbolically and graphically? Determine the domain and range of functions using graphs, tables, and symbols. Use regression to determine the appropriateness of an exponential, logarithmic, logistic, cubic, quartic, or quadratic model.		
Chapter 4: Trigonometric Functions	**RFR.ETT.1:** Model real-world situations involving trigonometry. **RFR.ETT.2:** Apply the Law of Sines and Law of Cosines to solve problems. **RFR.ETT.3:** Use trigonometry to find the area of triangles. **RFR.ETT.4:** Use special triangles to determine geometrically the values of sine, cosine, tangent for π/3, π/4 and π/6, and use the unit circle to express the values of sine, cosine, and tangent for π-x, π+x, and 2π-x in terms of their values for x, where x is any real number. **RFR.ETT.5:** Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions. **RFR.ETT.6:** Use inverse functions to solve trigonometric equations utilizing real world context; evaluate the solution and interpret them in terms of context.	How would use the unit circle to find trigonometric values? How would you find values of trigonometric functions for any angle? How would you solve triangles? What are the key characteristics of the graphs of trigonometric functions? How would you convert degree measures of angles to radians and vice versa? **PREPARATION FOR CALCULUS**: How would you analyze related rates? How would you integrate trigonometric functions between a range of values?	I will be able to: • Find the values of trigonometric functions for acute angles of right triangles. • Solve right triangles • Convert degree measures of angles to radian measures and vice versa. • Use angle measures to solve real-world problems • Find values of trigonometric functions for any angle. • Find values of trigonometric functions using the unit circle. • Graph transformations of the since and cosine functions • Use sinusoidal functions to solve problems. • Graph tangent and reciprocal trigonometric functions. • Graph damped trigonometric functions • Evaluate and graph inverse trigonometric functions • Find composition of trigonometric functions • Solve oblique triangles by using the Law of Sines or the Law of Cosines	- Trigonometric functions - Reciprocal function - Inverse trigonometric function - Angles of elevation and depression - Vertex - Initial side - Terminal side - Standard position - Radian - Coterminal angles - Linear speed - Angular speed - Sector - Quadrantal angles - Reference angle - Unit circle - Circular function - Periodic function - Period - Sinusoid - Amplitude - Frequency - Phase shift - Vertical shift - Midline - Damped trigonometric

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	RFR.AF.5: Sketch the graph of all six trigonometric functions, identifying key features.		• Find areas of oblique triangles	- Damping factor - Damped oscillation - Damped wave - Damped harmonic motion - Arcsine function - Arccosine function - Arctangent function - Oblique triangles - Law of Sines - Law of Cosines - Heron's Formula
Chapter 5: Trigonometric Identities and Equations	**RT.RTS.1:** Use the structure of a trigonometric expression to identify ways to rewrite it. **RT.RTS.2:** Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. **RT.RTS.3:** Solve trigonometric equations	Why would you use trigonometric identities to find trigonometric values? What trigonometric identities would you use to simplify/rewrite trigonometric expressions? What trigonometric identities would you use to verify trigonometric identities? What trigonometric identities would you use to solve trigonometric equations? **PREPARATION FOR CALCULUS**: How would use trigonometric identities to transform expressions into forms that are more suitable for integration and differentiation? How would you use trigonometric substitution for integration?	I will be able to: • Identify and use basic trigonometric identities to find trigonometric values • Use basic trigonometric identities to simplify and rewrite trigonometric expressions • Verify trigonometric identities • Determine whether equations are identities • Solve trigonometric equations using algebraic techniques • Solve trigonometric equations using basic identities • Use sum and difference identities to evaluate trigonometric functions • Use sum and difference identities to solve trigonometric equations • Use double-angle, power-reducing, half-angle and product-to-sum identities to evaluate trigonometric expressions and solve trigonometric equations.	- Identity - Trigonometric identity - Cofunction - Odd-Even identities - Verify an Identity - Reduction Identity
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