EWHS Course Scope & Sequence

Course Title	AP Pre-Calculus				
Course Overview	AP Precalculus prepares students for college-level math by focusing on functions and their real-world applications. It covers polynomial, rational, exponential, logarithmic, and trigonometric functions, emphasizing multiple representations, transformations, and modeling. The course also introduces vectors and matrices, helping students develop problem-solving, analytical, and communication skills as a foundation for AP Calculus and advanced mathematics.				
Unit Component	**Unit 1**	**Unit 2**	**Unit 3**	**Unit 4**	**Unit 5**
Title	Exploring Rates of Change	Polynomial and Rational Functions	Constructing Functions	Exponential Functions	Logarithmic Functions
Guiding or Essential Questions *(if applicable)*	1. How can we describe the way two quantities change in relation to each other using functions and their graphs? 2. What does the rate of change tell us about how a function behaves, and how do we compute and interpret it for different types of functions? 3. How does the shape of a graph (including concavity and slope) reflect the behavior and change	1. How can the degree, leading coefficient, and zeros of a polynomial function help us describe its graph and long-run behavior? 2. In what ways do rational functions behave differently from polynomial functions, and how can we use asymptotes and discontinuities to analyze their graphs? 3. Why is it useful to rewrite polynomials and rational	1. How do transformations—such as translations, reflections, and dilations—change the graph and equation of a parent function, and how can we describe those changes clearly? 2. What strategies can we use to interpret, evaluate, and create piecewise-defined functions, and why are piecewise functions useful for modeling real situations?	1. How do arithmetic and geometric sequences grow differently, and what do their respective rules tell us about changes over time? 2. What features distinguish exponential growth and decay from linear change, and how can we identify, write, and interpret exponential functions in context? 3. How can we use exponential functions—including	1. How does understanding inverse functions help us define and interpret logarithmic functions, and what does a logarithm tell us about an exponential relationship? 2. What properties of logarithms allow us to simplify expressions and solve exponential and logarithmic equations, and how can we justify those steps conceptually?

	of the function over intervals?	expressions in equivalent forms, and how does this help us solve and graph these functions?	3. How do we select an appropriate function type and construct a function model from observed data or contextual information, including articulating assumptions and limitations of the model?	those with the natural base *e*—and regression models to describe real-world data and make predictions?	3. In what ways can logarithmic functions be used to model real-world contexts and data, and how do we interpret the parameters of those models in practical situations?
Topic This should be the overarching theme or big idea. Brief overview of the unit.	This unit focuses on understanding how quantities change relative to one another and how these changes can be described, measured, and interpreted using functions. Students explore both average and instantaneous rates of change to build a foundation for analyzing linear and nonlinear behavior.	This unit explores how the structure of a function—its degree, factors, and coefficients—affects its graph, behavior, and real-world interpretation. Students learn to analyze and predict function behavior using both algebraic and graphical approaches.	This unit emphasizes understanding how functions can be created, transformed, and combined to model real-world situations. Students explore the relationships between function rules, graphs, and contextual interpretations.	This unit focuses on understanding exponential growth and decay, emphasizing how quantities change multiplicatively over time. Students explore how exponential functions model real-world phenomena and how their characteristics affect predictions and interpretations.	This unit emphasizes understanding logarithmic functions as the inverses of exponential functions and how they describe multiplicative relationships. Students explore how logarithms can model real-world phenomena and solve equations involving exponential growth or decay.
Length *(in weeks)*	3 weeks	4 weeks	2 weeks	3 weeks	4 weeks

Unit Component	Unit 6	Unit 7	Unit 8
Title	Exploring Sine & Cosine Functions	Working with Trigonometric Functions	Polar Functions
Guiding or Essential Questions *(if applicable)*	1. How can we use the unit circle and radian measure to define and interpret the sine and cosine functions for any angle? 2. What features—such as amplitude, period, midline, and symmetry—describe the graphs of sine and cosine functions, and how do transformations change these features? 3. In what ways can sine and cosine functions be used to model periodic phenomena, and how do we interpret their parameters in real-world contexts?	1. How can we describe and interpret the graphs and key features of the tangent, cosecant, secant, and cotangent functions, and how do these compare to sine and cosine? 2. Why do we restrict the domains of trig functions to define inverse trigonometric functions, and how can we use these inverses to solve problems involving angles and ratios? 3. What tools — including identities and algebraic techniques — can we use to solve trigonometric equations and inequalities, and how do we justify those solutions?	1. How does the polar coordinate system represent points differently from rectangular coordinates, and how do we convert between the two systems? 2. What information about shape and symmetry can we determine from the equations of polar graphs such as circles, roses, and limacons, and how do the parameters influence these features? 3. How can we analyze and describe how a polar function changes — such as determining intervals of increase/decrease or extrema — and what does that tell us about the behavior of its graph?

Topic This should be the overarching theme or big idea. Brief overview of the unit.	This unit focuses on understanding the sine and cosine functions as models of periodic behavior and how their characteristics describe repeating phenomena. Students explore how amplitude, period, and phase shifts affect the shape and interpretation of these functions.	This unit emphasizes extending the study of trigonometric functions to include all six functions, their inverses, and their applications, highlighting how these functions model relationships involving angles, ratios, and periodic behavior.	This unit focuses on understanding polar coordinates and functions as an alternative way to represent points and curves, emphasizing how equations in polar form reveal symmetry, shape, and behavior of graphs.
Length *(in weeks)*	3 weeks	3 weeks	2 weeks