Honors Precalculus Essential Standards

HPC Unit 1 - Exploring Rates of Change and Building Functions

I can build new functions from old functions using transformations, function operations, and compositions.

I can describe key features and behaviors of any function.

HPC Unit 2 - Polynomial and Rational Functions: They're Just Like Integers and Rational Numbers!

I can build, rewrite, and graph polynomial and rational functions and describe their key features and behaviors.

HPC Unit 3 - Exponential Functions: Functions that Want to Grow Very Quickly

I can build, rewrite, and graph exponential functions and describe their key features and behaviors.

HPC Unit 4 - Logarithmic Functions: A Study of Inverses

I can determine an inverse function of a given function, restricting the domain if necessary.

I can build, rewrite, and graph logarithmic functions and describe their key features and behaviors.

HPC Unit 5 - Working with Sinusoidal Functions: The Building Blocks of Trigonometry

I can graph sinusoidal functions and describe their key features and behaviors.

HPC Unit 6 - Playing with All Trigonometric Functions

I can rewrite trigonometric functions and expressions in order to graph, solve equations, and evaluate expressions.

Unit 7 - Polar, Parametric, and Implicitly Defined Functions

I can graph and analyze parametric, polar, and implicitly defined functions.

Unit 8 - An Exploration of Calculus: Looking to the Future

I can use average rates of change to approximate change at an instant.

Honors Precalculus Learning Objectives

HPC Unit 1 - Exploring Rates of Change and Building Functions

I Can...

LO1: Describe how the input and output values of a function vary together by comparing function values.
LO2: Construct a graph representing two quantities that vary with respect to each other in a contextual scenario.
LO3: Compare the rates of change at two points using average rates of change near the points.
LO4: Describe how two quantities vary together at different points and over different intervals of a function.
LO5: Determine the average rates of change for sequences and functions, including linear, quadratic, and other function types.
LO6: Determine the change in the average rates of change for linear, quadratic, and other function types.
LO7: Construct a function that is an additive and/or multiplicative transformation of another function.
LO8: Evaluate the composition of two or more functions for given values.
LO9: Construct a representation of the composition of two or more functions.
LO10: Rewrite a given function as a composition of two or more functions.
LO11: Determine if a function is even or odd.
LO12: Identify an appropriate function type to construct a function model for a given scenario.
LO13: Describe assumptions and restrictions related to building a function model.
LO14: Apply a function model to answer questions about a data set or contextual scenario.

HPC Unit 2 - Polynomial and Rational Functions: They're Just Like Integers and Rational Numbers!

I Can…

LO1: Identify key characteristics of polynomial functions related to rates of change.
LO2: Identify key characteristics of a polynomial function related to its zeros when suitable factorizations are available or with technology.
LO3: Describe end behaviors of polynomial functions.
LO4: Describe end behaviors of rational functions.
LO5: Determine the zeros of rational functions.
LO6: Determine vertical asymptotes (infinite nonremovable discontinuities) of graphs of rational functions.
LO7: Determine holes (removable discontinuities) in graphs of rational functions.
LO8: Rewrite polynomial and rational expressions in equivalent forms.
LO9: Determine the quotient of two polynomial functions using long division.
LO10: Rewrite the repeated product of binomials using the binomial theorem.
LO11: Construct a linear, quadratic, cubic, quartic, polynomial of degree n, or related piecewise-defined function model.
LO12: Construct a rational function model based on a context.

HPC Unit 3 - Exponential Functions: Functions that Want to Grow Very Quickly

I Can...

LO1: Express arithmetic sequences found in mathematical and contextual scenarios as functions of the whole numbers.
LO2: Express geometric sequences found in mathematical and contextual scenarios as functions of the whole numbers.
LO3: Construct functions of the real numbers that are comparable to arithmetic and geometric sequences.
LO4: Describe similarities and differences between linear and exponential functions
LO5: Identify key characteristics of exponential functions.
LO6: Rewrite exponential expressions in equivalent forms.
LO7: Construct a model for situations involving proportional output values over equal-length input-value intervals.
LO8: Apply exponential models to answer questions about a data set or contextual scenario.
LO9: Construct linear, quadratic, and exponential models based on a data set.
LO10: Validate a model constructed from a data set.

HPC Unit 4 - Logarithmic Functions: A Study of Inverses

I Can...

LO1: Determine the input-output pairs of the inverse of a function.
LO2: Determine the inverse of a function on an invertible domain.
LO3: Evaluate logarithmic expressions.
LO4: Construct representations of the inverse of an exponential function with an initial value of 1.
LO5: Identify key characteristics of logarithmic functions.
LO6: Rewrite logarithmic expressions in equivalent forms.
LO7: Solve exponential and logarithmic equations and inequalities.
LO8: Construct the inverse function for exponential and logarithmic functions.
LO9: Construct a logarithmic function model.
LO10: Determine if an exponential model is appropriate by examining a semi-log plot of a data set.
LO11: Construct the linearization of exponential data.

HPC Unit 5 - Working with Sinusoidal Functions: The Building Blocks of Trigonometry

I Can...

LO1: Construct graphs of periodic relationships based on verbal representations.
LO2: Describe key characteristics of a periodic function based on a verbal representation.
LO3: Determine the sine, cosine, and tangent of an angle using the unit circle.
LO4: Determine coordinates of points on a circle centered at the origin.
LO5: Construct representations of the sine and cosine functions using the unit circle.
LO6: Identify key characteristics of the sine and cosine functions.
LO7: Identify the amplitude, vertical shift, period, and phase shift of a sinusoidal function.
LO8: Construct sinusoidal function models of periodic phenomena.

HPC Unit 6 - Playing with All Trigonometric Functions

I Can...

LO1: Construct representations of the tangent function using the unit circle.
LO2: Describe key characteristics of the tangent function.
LO3: Describe additive and multiplicative transformations involving the tangent function.
LO4: Construct analytical and graphical representations of the inverse of the sine, cosine, and tangent functions over a restricted domain.
LO5: Solve equations and inequalities involving trigonometric functions.
LO6: Identify key characteristics of functions that involve quotients of the sine and cosine functions.
LO7: Rewrite trigonometric expressions in equivalent forms with the Pythagorean identity.
LO8: Rewrite trigonometric expressions in equivalent forms with sine and cosine sum identities.
LO9: Solve equations using equivalent analytic representations of trigonometric functions.

Unit 7 - Polar, Parametric, and Implicitly Defined Functions

I Can…

LO1: Determine the location of a point in the plane using both rectangular and polar coordinates.
LO2: Construct graphs of polar functions.
LO3: Describe characteristics of the graph of a polar function.
LO4: Construct a graph or table of values for a parametric function represented analytically.
LO5: Identify key characteristics of a parametric planar motion function that are related to position.
LO6: Identify key characteristics of a parametric planar motion function that are related to direction and rate of change.
LO7: Express motion around a circle or along a line segment parametrically.
LO8: Construct a graph of an equation involving two variables.
LO9: Determine how the two quantities related in an implicitly defined function vary together.

Unit 8 - An Exploration of Calculus: Looking to the Future

I Can…

LO1: Evaluate limits analytically and graphically.
LO2: Determine the Instantaneous Rate of Change of a function at a specific point or for all points on a function.