

Pre-Calculus Honors

5 credits - Level Honors

Grades: 11

Prerequisite: Minimum grade of 80 in Algebra II Honors or a minimum of 90 in Algebra II, Level I

Honors Pre-Calculus serves the most able and motivated members of the student body. The course assumes that the student has a superior ability in the material taught in Honors Algebra I, Honors Geometry, and Honors Algebra II. Units of study include polynomial functions and inequalities, inverse functions, logarithms, circular functions, and trigonometry.

PROFICIENCIES

POLYNOMIAL FUNCTIONS

- identify a polynomial function, evaluate it using synthetic substitution and determine its zeros
- use synthetic division and apply the remainder and factor theorems
- graph a polynomial function and determine an equation for a polynomial graph
- write a polynomial function for a given situation and find the maximum or minimum value of the function
- use technology to approximate the real roots of a polynomial equation
- solve polynomial equations by various methods of factoring, including the use of the rational root theorem
- apply general theorems about polynomial equations

INEQUALITIES

- solve and graph linear inequalities in one variable
- solve and graph polynomial inequalities in one variable
- graph polynomial inequalities in two variables and graph the solution set of a system of inequalities

FUNCTIONS

- identify a function, determine the domain, range and zeros of a function, and graph a function
- perform operations on functions and determine the domains of the resulting functions
- reflect graphs and use symmetry to sketch graphs
- determine periodicity and amplitude from graphs, stretch and shrink graphs both vertically and horizontally, and translate graphs
- find the inverse of a function, if the inverse exists
- graph functions of two variables in a two-dimensional coordinate system and read such graphs
- form a function of one variable from a verbal description and, when appropriate, determine the minimum or maximum value of the function

EXPONENTS AND LOGARITHMS

- define and apply integral exponents
- define and apply rational exponents
- define and use exponential functions
- define and apply the natural exponential function
- define and apply logarithms
- prove and apply laws of logarithms
- solve exponential equations and to change logarithms from one base to another

TRIGONOMETRIC FUNCTIONS

- find the measure of an angle in either degrees or radians and find coterminal angles
- find the arc length and area of a sector of a circle and solve problems involving apparent size
- use the definitions of sine and cosine to find values of these functions and solve simple trigonometric equations
- use reference angles, calculators or tables and special angles to find values of the sine and cosine functions and to sketch the graphs of these functions
- find values of the tangent, cotangent, secant and cosecant functions and sketch the functions' graphs
- find values of the inverse trigonometric functions

TRIGONOMETRIC EQUATIONS AND APPLICATIONS

- solve simple trigonometric equations and apply them
- find equations of different sine and cosine curves and apply these equations
- use trigonometric functions to model periodic behavior
- simplify trigonometric expressions and prove trigonometric identities
- use trigonometric identities or technology to solve more difficult trigonometric equations

TRIANGLE TRIGONOMETRY

- use trigonometry to find unknown sides or angles of a right triangle
- find the area of a triangle given the lengths of two sides and the measure of the included angle
- use the law of sines to find unknown parts of a triangle
- use the law of cosines to find unknown parts of a triangle

TRIGONOMETRIC ADDITION FORMULAS

- derive and apply formulas for $\cos(\alpha \pm \beta)$ and for $\sin(\alpha \pm \beta)$
- derive and apply formulas for $\tan(\alpha \pm \beta)$
- derive and apply double-angle and half-angle formulas
- use identities to solve trigonometric equations

LIMITS OF FUNCTIONS

- intuitively find the limit of a function from its graph
- find the limit of functions using computational techniques
- find the derivative of a function using the formal definition (limit)