Kendall Park Learning Center

Course Title: Pre-Calculus & Trigonometry – Advanced Credit

Course Length: Six Weeks (120 Hrs.)

This is a Pre-Calculus course containing core topics intended to prepare students for the first two semesters of Calculus. Our principle objectives are to provide students with the best possible understanding of Algebra and Trigonometry and to show how Algebra and Trigonometry can be used to model real-life problems. We believe that students must learn the value of algebraic, numerical, graphical, and verbal methods of representation and learn to choose the one most appropriate for solving the particular problem under consideration. In addition, we believe students need to master algebraic techniques and to carry that capability to their study of Calculus. Finally, students will be expected to use a graphing utility to visualize and solve problems.

Prerequisites:

Precalculus -Advanced Credit is a course offered to students who have successfully completed Algebra II with grade B+ or higher/ Advanced Algebra II with B or higher

Requirements:

Students must complete the 120 hours and finish the course with an A- average to receive full credit.

The Real Numbers	• Identify the properties of real numbers • Describe a set of numbers using interval notation • Apply the properties of radical and rational exponents
Polynomials	• Express polynomials in expanded form using special products • Factor polynomials
Fractional Expressions	• Simplify fractional expressions
Linear Equations	• Solve linear equations and inequalities
Coordinate Plane	• Apply the distance and midpoint formula.
Functions and Graphs	• Identify the domain and range of a function • Find the equation of linear functions • Identify and classify the slope of a linear function • Find the line of best fit using a graphing calculator • Describe the behavior of graphs including increasing, decreasing and constant intervals
Solving Equations Algebraically and Graphically	• Solve equations graphically • Solve equations algebraically • Solve absolute value and radical equations

Functions	• Add, subtract, multiple and divide functions • Find the inverse of a relation • Determine if a function is one-to-one • Algebraically verify that two functions are inverses of each other
Polynomial Functions	• Compare quadratic and higher degree functions. • Identify maximum and minimum points on a graph. • Identify end and intermediate behavior. • Find the real zeros of a polynomial • Find linear factors using long and synthetic division. • Identify characteristics of a graph by applying upper/lower bound tests and Descartes Rule of signs. • Solve problems involving area and volume. • Simplify expressions involving complex numbers. • Find complex zeros of a polynomial.
Exponential and Logarithmic Functions	• Recognize power and exponential functions. • Solve exponential growth and decay problems. • Graph exponential and logarithmic functions. • Solve logarithmic and exponential equations. • Apply product, quotient and power rules to logarithms. • Use graphing calculator to solve advanced logarithmic and exponential equations.
Rational Functions	• Identify rational functions. • Find vertical and horizontal asymptotes. • Determine end value behavior • Sketch graphs using end behavior, asymptotes, intercepts and intermediate behavior. • Find slant asymptotes. • Solve rational equations and inequalities. • Use rational functions to solve real-world problems.
Trigonometry	• Find compliments and supplements in degrees and radians • Find co-terminal angles • Convert from degrees to radians • Find arc length and area of a sector • Define and find the 6 basic trigonometric functions • Find trigonometric values of the special angles in 1^{st} quadrant • Solve angle of elevation + depression problems • Extend trigonometric functions to 2^{nd} through 4^{th} quadrant • Find reference angles and missing trigonometric values given a point or trigonometric value • Graph the 6 trigonometric functions over [0, 2pi] • Graph and analyze trigonometric functions for amplitude, period, frequency, phase shift and vertical shift

Analytic Trigonometry	• Simplify trigonometric expressions. • Factor trigonometric expressions. • Confirm trigonometric identities. • Solve trigonometric equations. • Solve multi-angle equations. • Apply sum and differences identities. • Apply co-function identities. • Apply multiple-angle identities. • Apply double angle Identities. • Apply half angle identities.
Additional Applications of Trigonometry	• Use Law of Sines to solve triangles. • Use Law of Cosines to solve triangles. • Write the trigonometric form of a complex number. • Multiply and divide complex numbers • Apply DeMoivre's Theorem to the nth root.
Conics	• Determine the equation and characteristics of parabolas • Determine the equation and characteristics of ellipses • Determine the equation and characteristics of hyperbola. • Determine the equation and characteristics of circles.
Systems of Equations	• Solve systems of equations by substitution and elimination.
Discrete Algebra	• Recognize finite and infinite sequences. • Use sum notation for finite and infinite series. • Apply principal of Mathematical Induction. • Develop Pascal's Triangle. • Apply the Binomial Theorem to expand binomials.

Materials Used: Pre Calculus with Limits (a graphing approach-third edition) Larson, Hostetler, Edwards

New Jersey Department of Education Core Curriculum Standards for Mathematics.
www.state.nj.us/njded/cccs