

Algebra IIB/Trigonometry, Form III

Course Description

The purpose of this course is to give students a strong foundation in working with functions. Students are exposed to advanced topics in Trigonometry, Algebra, Probability and Statistics.

The course begins with a review of concepts the students learned in their introduction to Algebra II in sophomore math. Students spend a significant amount of time studying functions, including domain, range, and the vertical line test. Emphasis is placed on graphing equations including: polynomial functions, root functions, rational functions, absolute value functions, greatest integer functions, trigonometric functions, conics (parabolas, circles, hyperbolas, ellipses), logarithmic functions, and exponential functions. Students also learn how to graph various transformations of each of these functions. Students study inverse functions, including inverse trigonometric functions. In each chapter, time is also spent on solving algebraic, rational, radical, trigonometric, logarithmic, and exponential equations. During the year, matrices, summation, sequences, combinations, permutations and statistics are also studied.

Graphing Calculators are required in this course. Students will become proficient with using their calculators to graph and analyze algebraic, rational, radical, trigonometric, logarithmic, and exponential equations.

Course Goals

- Students will become proficient with graphing algebraic, radical, rational, trigonometric, logarithmic, and exponential equations and transformations of equations
- Students will develop problem-solving skills by working with and solving algebraic, rational, radical, trigonometric, logarithmic, and exponential equations
- Students will be comfortable working in either degrees or radians
- Students will become proficient at using their graphing calculator to solve problems and interpret results (i.e. to realize that graphing calculators do not always provide the correct answer)
- Students will be able to solve problems graphical, analytically, or numerically
- Students will build experience with applying mathematics to real-world situations
- Students will be better prepared for the PSAT, which is usually given in October
- Students will be better prepared for the SAT and ACT

Course Objectives

- Graph fifteen basic equations and transformations of the graphs (including horizontal and vertical translations, horizontal and vertical stretches and shrinks, reflections, amplitude changes, period changes, or phase angle changes):

$$y = x \quad y = x^2 \quad y = x^3 \quad y = \frac{1}{x} \quad y = \sqrt{x} \quad y = |x| \quad y = \lceil x \rceil$$

$$y = \log_a x \quad y = a^x \quad y = \sin x \quad y = \cos x \quad y = \tan x \quad y = \sec x \quad y = \csc x \quad y = \cot x$$

- Find the domain and range of a function. Find vertical asymptotes of a function

- Understand how to use the unit circle, 30-60-90 triangle, and 45-45-90 triangle to find the sine, cosine, and tangent of 30° , 45° , and 60° angles
- Quickly find (or have memorized) the sine, cosine, and tangent of the following angles: 0° , 30° , 45° , 60° , 90° , 180° , 270° (in both degree and radian form)
- Memorize specified trigonometric identities and be able to use them to manipulate an equation or to prove that a statement is correct
- Solve equations of the following type: algebraic, rational, radical, trigonometric, logarithmic, and exponential
- Understand why division by a variable can result in the loss of a solution
- Solve inequalities and absolute value inequalities
- Graph conic sections and identify their appropriate properties (foci, directrix, major axis, minor axis, etc.)
- Understand the difference between permutations and combinations and solve basic probability problems
- Understand the basic matrix operations (addition, subtraction, scalar and matrix multiplication, determinant) and how to use matrices to solve basic systems of equations (Cramer's Rule)
- Find the inverse of a function, understand the properties of inverse functions, and know how to restrict the domain of trig functions so that they have inverses