

Trigonometry/Pre-Calculus

Prerequisites: Algebra I, Algebra II, and Geometry

Level: 11th and 12th grade

Credits: 1.0 – Mathematics

Additional: This course is accepted as a math credit for h.s. graduation
This course is accepted as a math credit for college admission
This course is accepted as a math credit by the NCAA

Course Description

In this course students use their geometry and algebra skills to begin their studies of trigonometry and advanced functions. Students will be required to express understanding using qualitative, quantitative, algebraic, and graphing skills. Graphing, and interpreting graphs, is a major component to this class; having a personal graphing calculator is highly recommended.

Course Objectives!

Upon completion of this course

- Students will develop and apply functions that model real world situations.
- Students will know and apply algebraic methods to formulate and solve problems.
- Students will be able to investigate and apply their knowledge to solve problems not only in the area of mathematics, but also apply their concepts to real world situations.
- Students will be able to use technology to solve problems and interpret results.
- Students will be able to use variables and recognize patterns of numerical relationships.
- Students will apply trigonometry to problem situations involving triangles
- Students will explore periodic real-world phenomena using the sine and cosine functions.
- Students will understand the connection between trigonometric and circular functions.
- Students will use circular functions to model periodic real-world phenomena.
- Students will apply general graphing techniques to trigonometric functions.
- Students will solve trigonometric equations and verify trigonometric identities
- Students will understand the connections between trigonometric functions and polar coordinates and complex numbers.

Course Outline

- Polynomial and Rational Functions (Algebraic and Graphic)
 - Polynomial Functions
 - Quadratic Equations and Inequalities
 - Range and Domain of Polynomial Functions
 - The Remainder and Factor Theorems
 - The rational root theorem
 - Locating the zeros of a function

- Evaluating functions to find the asymptotes
- Rational Equations and Partial Fractions
- Rational equations and inequalities
- Trigonometry
 - Angles and their measure
 - Central Angles and arcs
 - Circular functions.
 - Trigonometric Functions of special angles
 - Right Triangles
 - The law of sines
 - The law of cosines
 - Area of a triangle
- Graphs and Inverses of the Trigonometric Functions
 - Graphs of the trigonometric functions
 - Amplitude, period and phase shift
 - Graphing trigonometric functions
 - Inverse trigonometric functions
 - Principal values of the inverse trigonometric functions
 - Graphing inverses of trigonometric functions
 - Simple harmonic motion
- Trigonometric Identities and equations
 - Basic trigonometric Identities
 - Verifying Trigonometric identities.
 - Sum and difference identities
 - Double-Angle and Half Angle Identities
 - Solving Trigonometric equations
 - Normal form of a linear equation
 - Distance from a point to a line.
- Exponential and logarithmic functions
 - Rational Exponents
 - Exponential functions
 - The number e
 - Logarithmic functions
 - Common Logarithms
 - Exponential and Logarithmic equations
 - Natural Logarithms
- Polar Coordinates and Complex Numbers
 - Polar Coordinates
 - Graphs of Polar Equations
 - Polar and Rectangular Coordinates
 - Polar form of a linear function
 - Simplifying complex numbers
 - Polar form of complex numbers

- Powers and roots of complex numbers
- Conics
 - The Circle
 - The Parabola
 - The Ellipse
 - The Hyperbola
 - Solving Quadratic Equations
- Vectors and Parametric Equations
 - Geometric Vectors
 - Algebraic Vectors
 - Vectors in Three-Dimensional space
 - Perpendicular vectors
 - Applications with vectors
 - Vectors and Parametric equations
 - Using parametric equations to model motion.

Teaching Methods

This class is taught mainly through mathematical inquiry, lecture, and practice. Students are given general overviews of each section, which are followed by in-class practice. Students will often work in cooperative learning groups and communicate their results, usually through whiteboarding, to their peers. Students will be using software to inquire and expand different aspects of mathematical phenomena. Daily assignments are a major part of the mathematical learning process. Students are expected to complete every assignment and give full participation in class for successful completion of this course.

Assessment

Students will be assessed with the following:

- Daily Homework
- Quizzes
- Projects
- Chapter and Semester Exams

Texts

Demana, Waits, Foley, Kennedy, and Bock. Precalculus: Graphical, Numerical, and Algebraic. Tenth Edition. Pearson, 2019.

¹National Council of Teachers of Mathematics, Curriculum and Evaluation Standards for School Mathematics, 1989 p163

Online Learning Platform

Students will register for Pearson's MathXL, which includes tutorials, practice problems, and assessments to aid in the students' mastery of trigonometry and pre-calculus.