RADNOR TOWNSHIP SCHOOL DISTRICT
Course Overview
Honors Pre-Calculus (05040441)

General Information

Prerequisite: Honors Algebra 2 with a Grade of "C" or Trigonometry/Discrete Math A with a Grade of "B"or teacher recommendation

Length: Full Year

Format: meets daily for one period

Course Description

Honors Pre-Calculus is an Honors level course and receives weighted grading.

Honors level courses are intended for the motivated math student who is very good with mathematics but needs more teacher guidance to assist in the mastery of the material. The course will involve accelerated pacing and a demanding workload with some written explanations expected. Students on this level will be prepared to take AP Calculus AB.

This course prepares students to take a college level Calculus or Advanced Placement Calculus AB course. This course features accelerated pacing and a demanding workload. Emphasis is on making connections and in-depth explanations of mathematical processes that demonstrate an understanding of concepts. Real world applications are used to enhance and indicate mastery. Topics covered are linear, polynomial, rational, exponential, logarithmic, trigonometric, piecewise, quadratic, polar and inverse functions, sequences and series, law of sines and law of cosines, trigonometric identities and equations. The calculus topic of limits will also be introduced.

Course Objectives:

- To develop the ability to think mathematically.
- To enhance problem solving ability.
- To utilize technology appropriately.
- To understand algebra as a study of the structure of the real and complex number systems.
- To appreciate the usefulness of algebraic techniques.
- To continue to understand the concept of function as a unifying concept in mathematics.
- To recognize and use functions in their four different forms of representation: table, graphs, formulas and verbal descriptions.
- To develop algebraic skills and concepts as a foundation for subsequent study of mathematics.
- To reason and communicate mathematically.
- To represent situations which involve variable quantities with expressions, equations, and inequalities.

Common Assessments:

Grades will be based on quizzes and tests. In addition, teachers may use homework, group activities, and/or projects for grading purposes. All students will take departmental midyear and final exams. The Radnor High School grading system and scale will be used to determine letter grades.

Major Units of Study:

MARKING PERIOD 1 - TOPICS

Basic Algebraic Concepts

Graphs of basic functions/windows on calculator
Coordinate plane
Distance formula
Midpoint formula
Equation of circle
Graphical representations of data
Linear functions (equations, graphs, slope, applications, parallel and perpendicular
Solving equations and inequalities algebraically and graphically for linear, polynomial, rational, absolute value, radical and quadratic functions
Interval testing and its application to Domains

Functions and Relations

Definition, Domain, Range
Difference Quotient
Intervals of increase, decrease, constancy
Relative max & min, absolute max & min
Piecewise functions
Odd and even functions
Absolute Value as Piecewise

Transformations

Translations & dilations including absolute value transformations
Combinations of functions (addition, subtraction, multiplication and division) with equations, points and graphs
Composite functions including Domains from graphs and tables
Inverse functions and relations

Trigonometry Basics

Definitions
Definitions of the Trigonometric Functions
Unit Circle
Using the Definitions of the Trig Functions

MARKING PERIOD 2 - TOPICS

Trigonometry Basics (cont.)

Solving Right Triangles including the specials
Applications of Right Triangles with angles of elevation and depression
Radian Measure
Applications of Radian Measure

Linear and Angular Velocity
Arc Length
Graphs of the Sine and Cosine Functions
Graphing 1/f(x)
Graphs of the Other Circular Functions
Applications of Circular Functions
Inverse Trig Functions and Their Graphs
Inverse Trig Relations

Fundamental Identities

Verifying Trigonometric Identities
Solving Trig Equations
Sum and Difference Identities for Cosine, Sine and Tangent
Reciprocal Identities
Odd/Even Identities
Cofunction Identities
Quotient Identities

MARKING PERIOD 3 - TOPICS

Fundamental Identities (cont.)

Double-Angle Identities
Half-Angle Identities
Inverse Trigonometric Functions
Trigonometric Equations
Equations Involving Inverse Trig Functions
Oblique Triangles and the Law of Sines
The Ambiguous Case of the Law of Sines
Law of Cosines
Finding Areas (Heron's Formula and other variations of A=1/2bh)

Polynomial Functions

Quadratic (equations, graphing, applications, five methods of solving equations)
Higher Order Functions (Graphical analysis with end behavior and central behavior)
Division Algorithm
Synthetic Division
Rational Root Theorem
Remainder Theorem
Complex Numbers (addition, subtraction, multiplication, division, conjugates)
The Fundamental Theorem of Algebra

Rational Functions

Graphical Analysis including end behavior and central behavior
Long & Synthetic Division
Limits at Infinity and Discontinuites
Applications

Quadratic Relations

Parabola
Circle
Ellipse
Hyperbola
Degenerative Cases

MARKING PERIOD 4 - TOPICS

Exponential and Logarithmic Functions

Graphs of each function
Solving exponential and logarithmic equations
Properties of logarithms and exponents
Applications

Sequences and Series

Recursive & Explicit Definitions (Seq & series, summation notation, factorials)
Arithmetic & Geometric sequences and series
Partial and infinite series
Properties & Theorems of Sigma
Binomial Theorem

Polar

Graphing points from polar coordinates
Converting points and equations from polar to/from rectangular
Graphing polar equations

Materials & Texts

MATERIALS

TI-8_ Graphing Calculator & Supplemental Worksheets

TEXTS

PreCalculus with Limits/A Graphing Approach 3rd edition, Larson, et al, Houghton Mifflin 2001

Summer Assignment

N/A