



RADNOR TOWNSHIP SCHOOL DISTRICT  
Course Overview  
Seminar Pre-Calculus 05040441



### **General Information**

Prerequisite: Seminar Algebra 2 or teacher recommendation  
Length: Full Year  
Format: meets daily for one period

### **Course Description**

**Seminar (Honors)** level courses are intended for the highly motivated math students and designed to challenge the most mathematically capable students. The courses will involve both rigorous pacing and workload with teacher expectations intended to challenge the student. The course will require more independent and self guided learning (with an emphasis on writing explanations) than all other courses.

This course prepares students to take the Advanced Placement Calculus AB or BC course. This course features rigorous pacing, workload and expectations. Emphasis is on making connections and in-depth explanations of mathematical processes that demonstrate an understanding of concepts. Essential to success is an ability to grasp underlying concepts through discovery as well as traditional explanations. Real world applications are used to enhance and indicate mastery. Topics covered are linear, polynomial, rational, exponential, logarithmic, trigonometric, piecewise, quadratic, polar, parametric and inverse functions, sequences and series, math induction, laws of sines and cosines, trigonometric identities and equations. The calculus topics of limits, continuity, rates of change and derivative will be included.

### **Course Objectives:**

1. To develop the ability to think mathematically.
2. To enhance problem solving ability.
3. To utilize technology appropriately.
4. To understand algebra as a study of the structure of the real and complex number systems.
5. To appreciate the usefulness of algebraic techniques.
6. To continue to understand the concept of function as a unifying concept in mathematics.
7. To recognize and use functions in their three forms of representation: tables, graphs and formulas.
8. To develop algebraic skills and concepts as a foundation for subsequent study of mathematics.
9. To reason and communicate mathematically.
10. To represent situations which involve variable quantities with expressions, equations, and inequalities.
11. To challenge and expand the inquisitive and logical minds of the accelerated mathematics students.

### **Common Assessments:**

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**

- 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

### **Trigonometry Basics**

- Definitions of basic terminology
- Definitions of the Trigonometric Functions (Right triangle and circular)
- Unit Circle
- Solving Right Triangles
- Applications of Right Triangles
- Radian Measure
- Applications of Radian Measure
- Linear and Angular Speed
- Graphs of the Sine and Cosine Functions
- Graphs of the Other Circular Functions
- Applications of Circular Functions
- Inverse Trig Functions and Their Graphs
- Solving Trig Equations
- Advanced Graphing Techniques

### **Fundamental Identities**

- Verifying Trigonometric Identities
- Sum and Difference Identities for Cosine, Sine and Tangent
- Reciprocal Identities
- Odd/Even Identities
- Cofunction Identities
- Quotient Identities
- Double-Angle Identities
- Half-Angle Identities
- Sum and Product Properties
- Linear Combination of Sine and Cosine With Equal Arguments
- Inverse Trigonometric Functions

### **MARKING PERIOD 2 - TOPICS**

#### **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

#### **Fundamental Identities (cont.)**

- 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 variations of height)

### **MARKING PERIOD 3 - TOPICS**

**Transformations**

- Translations & dilations
- Combinations of functions (addition, subtraction, multiplication and division) with equations, points and graphs
- Composite functions
- Inverse functions and relations

**Polynomial Functions**

- Quadratic (equations, graphing, applications, five methods of solving equations)
- Higher Order Functions (Graphical analysis including 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 Division
- Limits at infinite
- Limits at the vertical asymptotes
- Applications

**Exponential and Logarithmic Functions**

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

**MARKING PERIOD 4 - TOPICS****Quadratic Relations**

- Parabola
- Circle
- Ellipse
- Hyperbola
- Degenerative Cases
- Eccentricity

**Sequences and Series**

- Definitions (Seq & series, summation notation, factorials)
- Arithmetic & Geometric sequences and series
- Partial and infinite series
- Math Induction
- Sums of powers of integers
- Binomial Theorem

**Polar**

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

**Parametric Functions**

- Graphing Basics

**Limits and Continuity**

- Definition of and Properties
- Graphical
- Algebraic

**Introduction to Calculus**

- Limits and Continuity

Rates of Change  
Definition of the Derivative

***Materials & Texts***

Precalculus With Trigonometry – Foerster  
Precalculus: Graphical, Numerical, Algebraic- Demanna and Waits-Sixth Edition  
Graphing Calculator, preferably TI-84 Plus

***Summer Assignment***

None