Syllabus for Functions

This class is designed to enhance techniques learned in Advanced Algebra and further develop an understanding of advanced mathematics. This class focuses primarily on functions and an analysis of what functions are, how they are used, and how to interpret and apply them in common settings. This class deals with most of the different ways in which functions can be expressed and how they can be manipulated.

Topic: Functions and Models

Concepts: The Language of Functions

Linear Models

Linear Regression and Correlation

Exponential Functions

Exponential Models

Quadratic Models

Inverse Variation Models

Choosing a Good Model

Topic: Transformations of Graphs and Data

Concepts: Graphs of Parent Functions

The Graph Translation Theorem

Translations of Data

Symmetries of Graphs

The Graph Scale Change Theorem

Scale Changes of Data

Composition of Functions

Inverses of Functions

Topic: Polynomial Functions

Concepts: Characteristics of Polynomial Functions

Polynomial Models

Division and the Remainder Theorem

The Factor Theorem

Complex Numbers

The Fundamental Theorem of Algebra

Factoring Sums and Differences of Powers

Advanced Factoring Techniques

Topic: Roots, Powers, and Logarithms

Concepts: *n*th Root Functions

Rational Exponents

Logarithm Functions

*e* and Natural Logarithms

Properties of Logarithms

Solving Exponential Equations

Linearizing Data to Find Models

Topic: Analyzing Functions

Concepts: A Review of Basic Function Ideas

Maxima and Minima of Functions

Increasing and Decreasing Functions

End Behavior of Functions

Exponential Functions

Logarithmic Functions

Topic: Functions, Equations, and Inequalities

Concepts: Arithmetic Operations on Functions

Function Composition and Decomposition

Inverses of Functions

The Logic of Equation-Solving

Solving Equations by Chunking or Factoring

Graphs, Transformations and Solutions

The Intermediate Value Theorem

The Logic of Inequality-Solving

Solving Inequalities by Factoring

Absolute Value Equations and Inequalities

Topic: Integers and Polynomials

Concepts: Factors of Integers and Polynomials

The Quotient-Remainder Theorem

Polynomial Division and the Remainder Theorem

- Synthetic Division

Zeros of Polynomials

Prime Numbers and Prime Polynomials

Modular Arithmetic

Polynomial Representation of Integers

Topic Algebraic Fractions and Identities

Concepts: Irrational Numbers

Equivalent Rational Expressions

Multiplying Algebraic Fractions

Adding Algebraic Fractions

Graphs of Rational Functions

Solving Equations with Algebraic Fractions