

Algebra II High School

COURSE DESCRIPTION: This course builds upon algebraic concepts covered in Algebra. Students extend their knowledge and understanding by solving open-ended problems and thinking critically. Topics include functions and their graphs, quadratic functions, inverse functions, advanced polynomial functions, and conic sections. Students are introduced to rational, radical, exponential, and logarithmic functions; sequences and series; data analysis; and matrices.

PREREQUISITES: Successful completion of Algebra I and Geometry

COURSE LENGTH: Two Semesters

REQUIRED TEXT: No required textbook for this course.

MATERIALS LIST:

Algebra II: A Reference Guide and Problem Sets

NOTE: List subject to change

COURSE OUTLINE:

Semester 1

Unit 1: Numbers, Expressions, and Equations

- Semester Introduction
- Foundations for Unit 1
- Sets of Numbers
- Number Lines and Absolute Value
- Number Properties
- Evaluating Expressions
- Solving Equations
- Solving Absolute Value Equations
- Applications: Formulas

Unit 2: Linear Equations and Systems

- Foundations for Unit 2
- Graphs of Lines
- Forms of Linear Equations
- Writing Equations of Lines
- Applications: Linear Equations
- Systems of Linear Equations
- Applications: Linear Systems

Unit 3: Functions

- Foundations for Unit 3
- Function Basics
- Function Equations
- Absolute Value Functions
- Piecewise Functions
- Step Functions
- Function Operations
- Function Inverses

Unit 4: Inequalities

- Foundations for Unit 4
- Inequalities in One Variable
- Compound Inequalities
- Absolute Value Inequalities
- Inequalities in Two Variables
- Systems of Linear Inequalities

Unit 5: Polynomials and Power Functions

- Foundations for Unit 5
- Working with Polynomials
- Multiplying Polynomials
- Factoring Patterns
- Solving Polynomial Equations
- Power Functions

Unit 6: Rational Equations

- Foundations for Unit 6

- Dividing Monomials and Polynomials
- Operations with Rational Expressions
- Compound Fractions
- Solving Rational Equations
- Reciprocal Power Functions
- Graphing Rational Functions

Unit 7: Radicals and Complex Numbers

- Foundations for Unit 7

Semester 2

Unit 1: Solving and Graphing Polynomials

- Semester Introduction
- Foundations for Unit 1
- Polynomial Long Division
- Synthetic Division
- The Polynomial Remainder Theorem
- Factors and Rational Roots
- Graphing Polynomials
- Factoring Polynomials Completely

Unit 2: Exponents and Logarithms

- Foundations for Unit 2
- Exponential Expressions and Equations
- Graphing Exponential Functions
- Applications: Growth and Decay
- Logarithms
- Using Logs to Solve Exponential Equations
- Solving Logarithmic Equations
- Graphing Logarithmic Functions
- Applications: Logarithms

Unit 3: Sequences and Series

- Foundations for Unit 3
- Sequences and Patterns
- Arithmetic Sequences
- Geometric Sequences

- Applications: Sequences
- Series and Sigma Notation
- Arithmetic Series
- Geometric Series
- Applications: Series
- Technology: Sequences and Series

Unit 4: Counting and Probability

- Foundations for Unit 4
- Counting Principles
- Permutations and Factorials
- Combinations
- Basic Probability
- Probability with and Without Replacement
- Independent and Dependent Events
- Mutually Exclusive Events
- Binomial probability
- Making Predictions

Unit 5: Statistics

- Foundations for Unit 5
- Measures of Center
- Variability
- Samples
- Graphs of Univariate Data
- Frequency Distributions
- The Normal Distribution
- Lines of Best Fit

Unit 6: Vectors and Matrices

- Foundations for Unit 6
- Matrices and Vectors
- Operations with Matrices
- Matrix Multiplication
- Transforming Points and Figures
- Determinants and Cramer's Rule

Unit 7: Conic Sections

Students learn about conic sections that are points or lines and curved conic sections, including circles, ellipses, hyperbolas, and parabolas. They learn how to graph conic sections, how to use algebraic reasoning to create equations of conics when given descriptions or graphs, and how to solve real-world problems.

- Foundations for Unit 7
- Introduction to Conic Sections
- Circles
- Ellipses
- Hyperbolas
- Parabolas

Unit 8: Semester Review and Test

- Semester Review
- Semester Test