Algebra II introduces students to advanced functions, with a focus on developing a strong conceptual grasp of the expressions that define those functions. Students learn through discovery and application, developing the skills they need to break down complex challenges and demonstrate their knowledge in new situations.

Course topics include quadratic equations and functions; polynomial functions; rational expressions and functions; radical expressions and functions; exponential and logarithmic functions; modeling with functions; graphing and modeling data; inferential statistics; confidence intervals; and matrices.

This course supports all students as they develop computational fluency and deepen conceptual understanding. Students begin each lesson by discovering new concepts through guided instruction, then confirm their understanding in an interactive, feedback-rich environment. Modeling activities equip students with tools for analyzing a variety of real-world scenarios and mathematical ideas. Journaling activities allow students to reason abstractly and quantitatively, construct arguments, critique reasoning, and communicate precisely. Performance tasks prepare students to synthesize their knowledge in novel, real-world scenarios and require that they make sense of multifaceted problems and persevere in solving them.

This course is built to state standards.

Length: Two Semesters

Unit 1: Expressions, Equations and Inequalities

- Algebraic Expressions
- Solving Linear Equations
- Solving Absolute Value Equations
- Solving Inequalities
- Literal Equations and Formulas
- Expressions, Equations, and Inequalities Wrap-Up

Unit 2: Functions and Relations

- Functions
- Graphing Functions
- Transforming Functions
- Combining Functions
- Inverse Functions
- Functions and Relations Wrap-Up

Unit 3: Quadratic Functions

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- Factoring x2 + bx + c
- Factoring ax2 + bx + c
- Special Cases
- Solving Quadratic Equations
- Completing the Square
- The Quadratic Formula
- Graphs of Quadratic Functions
- Imaginary Numbers
- Quadratic Functions Wrap-Up

Unit 4: Systems of Equations and Inequalities

- Linear Systems of Equations
- Nonlinear Systems of Equations
- Linear Systems of Inequalities
- Systems of Equations and Inequalities Wrap-Up

Unit 5: Polynomial Functions

- Polynomial Basics
- Polynomial Functions
- Synthetic Division
- Factoring Polynomials Completely
- Solving Polynomial Equations
- Graphing Polynomial Functions
- Polynomial Identities
- Binomial Theorem
- Transformations of Polynomial Functions
- Polynomial Functions Wrap-Up

Unit 6: Semester 1 Exam

- Semester 1 Exam

Unit 7: Rational Expressions and Functions

- Proportions
- Rational Expressions
- Simplifying Rational Expressions
- Multiplying and Dividing Rational Expressions
- Adding and Subtracting Rational Expressions
- Inverse Variation
- Writing Rational Functions
- Solving Rational Equations
- Vertical Asymptotes
- Graphing Rational Functions
- Rational Expressions and Functions Wrap-Up

Unit 8: Radical Expressions and Functions

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- Basics of Radicals
- Multiplying and Dividing Radicals
- Adding and Subtracting Radicals
- Rationalizing Denominators
- Solving Radical Equations
- Applications of Radical Equations
- Rational Exponents
- Review of Complex Numbers
- Performance Task: The Skid Distance Problem
- Radical Expressions and Functions Wrap-Up

Unit 9: Exponential and Logarithmic Functions

- Geometric Sequences
- Exponential Functions
- Examples and Applications of Exponential Functions
- Graphs of Exponential Functions
- Logarithmic Functions
- Graphs of Logarithmic Functions
- Properties of Exponents and Logarithms
- Solving Exponential Equations
- Solving Logarithmic Equations
- Applications of Logarithms
- Comparing and Analyzing Function Types
- Exponential and Logarithmic Functions Wrap-Up

Unit 10: Statistical Analysis

- Using Data to Make Inferences
- Using Probability to Make Decisions
- Simulation and Modeling with Data
- The Normal Distribution
- Margin of Error and Confidence Intervals
- Statistical Analysis Wrap-Up

Unit 11: Trigonometry

- Right Triangle Trigonometry
- Angles and Radians
- Trigonometric Ratios and the Unit Circle
- Trigonometric Ratios for Any Angle
- Graphs of Trigonometric Functions
- Transformations of Sinusoids
- Trigonometry Wrap-Up

Unit 12: Semester 2 Review and Exam

- Semester 2 Review and Exam

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