Honors Algebra 2 introduces students to advanced functions, with a focus on developing a strong conceptual grasp of the expressions that define them. 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, polynomial functions, rational expressions and equations, radical expressions and equations, exponential and logarithmic functions, trigonometric identities and functions, modeling with functions, probability and inferential statistics, probability distributions, and sample distributions and confidence intervals.This course supports all students as they develop computational fluency, deepen conceptual understanding, and apply mathematical practice skills. 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. In these activities, additional items require Honors students to extend their understanding by answering "what if" questions, thinking abstractly about the mathematics involved, and analyzing the strengths and weaknesses of the model as a reflection of the real-world situation. 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. Honors students are required to go deeper into these investigations; for example, they may be asked to change or validate assumptions, add constraints, or extend the project. Journal activities allow students to reason abstractly and quantitatively, construct arguments, critique reasoning, and communicate precisely. Throughout the course, students are evaluated through a diversity of assessments specifically designed to prepare them for the content, form, and depth of the high-stakes assessments.

No required or optional materials.

Length: Two Semesters

Unit 1: Expressions, Equations and Inequalities

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

Unit 2: Functions and Relations

- What Is a Function?
- Graphing Functions
- Linear Functions
- Linear Equations and Inequalities
- Linear Systems
- Functions and Relations Wrap-Up

Unit 3: Quadratic Functions

- 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
- Nonlinear Systems of Equations
- Nonlinear Systems of Inequalities
- Quadratic Functions Wrap-Up

Unit 4: Transforming Functions

- Inverses
- Graphs of Inverses
- Parent Functions
- Shifting Functions
- Stretching Functions Vertically
- Transformation of Parent Functions
- Arithmetic of Functions
- Performance Task: Transforming Functions
- Transforming Functions 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

Unit 7: Rational Expressions and Functions

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

Unit 8: Radical Expressions and Functions

- Basics of Radicals
- Multiplying and Dividing Radicals
- Adding and Subtracting Radicals
- Rationalizing Denominators
- Solving Radical Functions
- 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

- Review of Graphical Analysis of Data
- Review of Numerical Analysis of Data
- Data Gathering and Inferential Statistics
- Random Variables
- Experimental Design
- Evaluating Published Reports
- Applications of Statistical Techniques

- Statistical Analysis Wrap-Up

Unit 11: Trigonometry

- Right Triangles
- Angles and Radians
- Trigonometric Ratios and the Unit Circle
- Graphs of Sine and Cosine
- Graphs of Other Functions
- Simple Transformations of Sinusoids
- General Transformations of Periodic Graphs
- Identities and Proof
- Trigonometric Identities
- Trigonometry Wrap-Up

Unit 12: Semester 2 Review and Exam