

# All Things Algebra® ALGEBRA 2 CURRICULUM

## Unit 1: Equations & Inequalities

- Real Number System
- Properties of Real Numbers
- Order of Operations
- Evaluating Expressions
- Simplifying Expressions
- Multi-Step Equations
- Literal Equations
- Equation Word Problems
- Absolute Value Equations
- Multi-Step Inequalities (with Interval Notation)
- Compound Inequalities (with Interval Notation)
- Absolute Value Inequalities

## Unit 2: Linear Functions & Systems

- Relations & Functions (with Domain & Range)
- Function Notation & Evaluating Functions
- Writing Linear Functions
- Graphing Linear Functions
- Finding and Graphing by Intercepts
- Parallel and Perpendicular Lines
- Linear Function Word Problems
- Linear Regression
- Solving Systems (Graphing, Substitution, & Elimination)
- Solving Systems of Three-Variables
- Linear Inequalities
- Systems of Linear Inequalities
- Linear Programming

## Unit 3: Parent Functions & Transformations

- Piecewise Functions
- Greatest-Integer Functions
- Graphing Absolute Value Equations & Inequalities
- Parent Functions & Transformations
- Graphing Absolute Value Equations using Transformations (Vertex Form)
- Standard Form of a Quadratic Equation/Inequality
- Vertex Form of Quadratic Equation/Inequality
- Converting from Standard Form to Vertex Form (by Completing the Square)
- Functions Review (with Key Features – Parent Function, Domain & Range, Roots, End Behavior, Increasing & Decreasing Intervals)

## Unit 4: Solving Quadratics & Complex Solutions

- Solving Quadratics by Graphing
- Solving Quadratics by Factoring (Includes Standard Form, Factored Form, and Vertex Form)
- Solving Quadratics by Square Roots (with Simplifying Square Roots Review)
- Pure Imaginary Numbers & Powers of  $i$
- Solving Quadratics by Square Roots with Pure Imaginary Solutions
- Complex Numbers (includes Classifying & Properties)
- Operations with Complex Numbers
- Solving Quadratics by Completing the Square (includes Complex Solutions)
- Solving Quadratics by the Quadratic Formula (includes Complex Solutions)
- Quadratic Applications (Geometric & Consecutive Numbers)
- Projectile Motion
- Quadratic Regression

### Unit 5: Polynomial Functions

- Monomials & Polynomial Review (includes Exponent Rules, Classifying Polynomials, and Operations with Polynomials)
- Graphing Polynomial Functions (with Key Features – Parent Functions, End Behavior, Turning points, Increasing & Decreasing Intervals)
- Roots/Zeros of a Polynomial Function
- Multiplicity
- Factoring Polynomials (including Sum & Difference of Cubes, Four Terms)
- Solving Polynomial Equations by Factoring
- Dividing Polynomials (Long & Synthetic)
- Function Operations
- Compositions of Functions
- Cubic & Quartic Regression

### Unit 6: Radical Functions

- $n^{\text{th}}$  Roots
- Simplifying Radicals
- Add & Subtract Radicals
- Multiply Radicals
- Divide Radicals (includes Rationalizing with Monomial & Binomial Denominators)
- Rational Exponents
- Operations with Rational Exponents
- Solving Radical Equations
- Graphing Radical Functions
- Inverse Relations & Functions

### Unit 7: Exponential & Logarithmic Functions

- Graphing Exponential Functions
- Solving Exponential Equation (using Common Bases)
- Converting Exponential & Logarithmic Form
- Base 10 Logs
- Evaluating Simple Logarithms
- Change of Base Formula
- Properties of Logarithms
- Expanding & Condensing Logarithms
- Graphing Logarithmic Functions
- Solving Logarithmic Equations
- Solving Exponential Equations using Logarithms
- Base  $e$  & Natural Logarithms
- Applications of Exponential Functions (including Exponential Growth & Decay, Compound Interest)
- Modeling with Exponential/Logarithmic Functions (Choosing the Best Model – Linear, Quadratic, Cubic, Quartic, Exponential, Logarithmic)

### Unit 8: Rational Functions

- Simplifying Rational Expressions
- Multiplying & Dividing Rational Expressions
- Adding & Subtracting Rational Expressions
- Complex Fractions
- Applications of Rational Expressions
- Graphing Reciprocal Functions
- Graphing Rational Functions
- Solving Rational Equations
- Direct, Inverse, Joint, & Combined Variation

**Unit 9: Conic Sections**

- Intro to Conic Sections
- Graphing Circles
- Writing the Equations of Circles
- Graphing Ellipses
- Writing the Equations of Ellipses
- Graphing Hyperbolas
- Writing the Equations of Hyperbolas
- Graphing Parabolas
- Writing the Equations of Parabolas
- Identifying Conic Sections
- Non-Linear Systems (Solving by Graphing & Algebraically)

**Unit 10: Sequences & Series**

- Introduction to Sequences, Series, & Summation Notation
- Arithmetic Sequences
- Arithmetic Series
- Geometric Sequences
- Geometric Series (Finite and Infinite)
- Finding the Sum of a Convergent Infinite Series
- Arithmetic vs. Geometric (with Applications)

**Unit 11: Probability & Statistics**

- Permutation & Combinations
- Theoretical Probability
- Independent & Dependent Events
- Conditional Probability
- Binomial Theorem
- Binomial Probability
- Measures of Center & Variation
- Normal Distribution Curve
- Z-Scores
- Standard Normal Distribution
- Probability under the Curve

**Unit 12: Trigonometry**

- Pythagorean Theorem
- Special Right Triangles
- Six Trigonometric Functions
- Finding Angle & Side Measures (with Applications)
- Angles in Standard Position
- Converting Degrees & Radians
- Coterminal Angles
- Reference Angles
- The Unit Circle
- Law of Sines (including Ambiguous Case)
- Law of Cosines
- Area of a Triangle
- Graphing Trigonometric Functions (All Six Functions)
- Translating Trigonometric Graphs: Phase & Vertical Shifts (with Sine, Cosine, Tangent only)
- Fundamental Trigonometric Identities
- Simplifying Trigonometric Expressions
- Proving Trigonometric Identities
- Sum & Difference of Angle Identities
- Double-Angle & Half-Angle Identities
- Solving Trigonometric Equations