



## Honors Algebra 2

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# Curriculum Overview

The HSD Honors Algebra 2 curriculum has not been updated in many years. Since that time, mathematics standards, learning progressions and best practices informed by research has drastically changed. This rewrite is to comply with MSIP V and to help ensure that all HSD students are receiving a high quality mathematics education.

This course builds on the work from previous courses with linear, quadratic, and exponential functions, students extend their repertoire of functions to include polynomial, rational, root, and radical functions. Students work closely with the expressions that define the functions, and continue to expand and hone their abilities to model situations and to solve equations, including solving quadratic equations over the set of complex numbers and solving exponential equations using the properties of logarithms. The Mathematical Practice Standards apply throughout each course and, together with the content standards, prescribe that students experience mathematics as a coherent, useful, and logical subject that makes use of their ability to make sense of problem situations.

The purpose of Honors Algebra 2 is to extend the base of Algebra I and be a bridge to further mathematical studies. It is a continuation of Algebra I with an introduction to imaginary numbers, radials, and extended practice in Algebra. It is a necessary class to higher mathematics and pre college testing. This subject provides the necessary mathematical tools for complex reasoning and solving problems in the sciences, technology, engineering, and many skilled trades and professions.

The curriculum contains unit assessments that are rigorous and outline clear expectations. As the curriculum is implemented and taught, the assessments will be revised. **The assessments are required**; the learning activities are suggested. Teachers are encouraged to select the learning activities which meet the needs of their students. Some of the learning activities are very sequential and, when all of them are used, a student should be able to successfully complete the unit assessment. Other activities provide a menu of suggestions, and the teacher should select from those offered or design his/her own.

The plan for professional development includes multiple opportunities for training to help ensure that the MS & HS Mathematics curricula are implemented effectively and with fidelity. Initial training will be provided during district professional development opportunities to cover content and pedagogy. Beyond initial training, ongoing professional development to familiarize teachers with specific curriculum activities and expectations. In addition to professional development days, ongoing training will be provided during Professional Learning Community (PLCs) meetings to assist with upcoming skills and nuances in learning objectives. The Mathematics District Curriculum Coach and District Coordinator will provide teachers training to familiarize them with curriculum activities and expectations. Finally, ongoing training during PLC meetings will assist teachers with upcoming skills and with nuances in the learning objectives.

COURSE TITLE: Honors Algebra 2

GRADE LEVEL: 9 – 12

CONTENT AREA: Mathematics

### Course Description:

In Honors Algebra 2, students work with real data, real-life situations, and real-world applications to realize the applications value of learning contextualized mathematics. This course incorporates investigations, experiments, discourse, error analysis, and cooperative learning. Students approach traditional and contemporary algebra topics from many different perspectives, exploring concepts informally and intuitively before seeing algebra in its abstract, symbolic representations. Students use technology such as graphing calculators and computers, to explore problems, ideas, and concepts from different viewpoints. Explorations and investigations emphasize fluency, symbol sense, algebraic manipulations, and conceptual understanding. *Honors Algebra 2* integrates algebra with geometry, statistics, data analysis, functions, probability, and trigonometry. This course prepares students for additional study of mathematics, science, and courses rich in data analysis and statistics, in high school and beyond. Algebra concepts include patterns and recursions, linear systems, rational, exponential, quadratic, piecewise, absolute value, and logarithmic functions.

### Course Rationale:

Honors Algebra 2 extends the base of Algebra 1 and provides students with a bridge to higher mathematics and pre college testing. This subject provides the necessary mathematical tools for complex reasoning and solving problems in the sciences, technology, engineering, and many skilled trades and professions.

### Course Scope and Sequence

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|--|---|--|
| <b>Unit 1:</b><br>Equations and Inequalities<br>(Approx. 12 class periods) | <b>Unit 2:</b><br>Quadratic and Polynomial<br>Functions<br>(Approx. 12 class periods) | <b>Unit 3:</b><br>Functions and Graphs<br>(Approx. 15 class periods) |
| <b>Unit 4:</b><br>Trigonometry<br>(Approx. 7 class periods)                | <b>Unit 5:</b><br>Statistics<br>(Approx. 10 class periods)                            |  |

## Essential Terminology/Vocabulary

Inequalities, Vertex, Number Line, Open Circle, Closed Circle, Solution Region, Axis Plane, Coordinates, Linear, Non-Linear, Compound Inequalities, Less Than, Greater Than, Equal to, Dichotomy, Trichotomy, Convergence, Divergence, Absolute Value, Distance from Zero, Condense, Expand, Rational, Radicals, Binomials, Difference of Cubes, Difference of Squares, Distributive Property, Evaluate, Factoring, Factor, Distribution, LCD, GCF, Common Denominator, Undefined, Asymptote, Graphing, Exponent, Base, Function, Logistic Curve, S Curve, Exponential Equation, Exponential Growth, Exponential Decay, Inverse, Logarithm, Logarithmic Equation, Exponent Rules, Log Rules, Common Log, Natural Log,  $e$ , Euler's Notation, Like Terms, Polynomial Functions, Quadratic Function, Roots, Rules of Exponents, Radical, Special Cases Square Root, Sum of Cubes, Sum of Squares, Trinomials, Vertex,  $y$ -Intercept, Zeros, Algebraic Expression,  $A$ -value, Axis, Axis of Symmetry, Binomials, Complex Conjugate, Complex Number, Determinant, Difference of Cubes, Difference of Squares, Distributive Property, End Behavior, Evaluate, Function Values, Greatest Common Factor, Height,  $i$ , Imaginary Number, Like Terms, Long Division, Maximum, Minimum, Pure Imaginary Number, Quadratic Expressions, Quadratic Formula, Quadratic Function, Synthetic Division, General Form Quadratic, Completing the Square, Linear, Slope, Domain, Range, Vertical Shift, Horizontal Shift, Stretch, Compression, Absolute Value, Rational, Numerator, Denominator, Expression, Undefined, Asymptote, Slant, Base, Exponent, Inverse Function, Inverse Operation, Natural Logarithm, Euler, Zero Properties, Family of Functions, Parent Functions, Piecewise Functions, Domain Restriction, Trigonometry, Sine, Cosine, Tangent, Cosecant, Secant, Cotangent, Angle of Elevation, Angle of Depression, Line of Sight, Standard Position, Law of Sines, Law of Cosines, Parallel Lines, Transversal, Reciprocal Functions, Diameter, Radius, Unit Circle, Quadrant, Positive Rotation, Negative Rotation, Complementary, Supplementary, Periodic, Reference Angle, Co-angle, Opposite, Adjacent, Hypotenuse, Leg, Right Angle, Right Triangle, Symmetry, Histogram, Pie Chart, Bar Chart, Dot Plot, Scatter Plot, Box and Whisker Plot, Categorical Data, Quantitative Data, Mean, Median, Mode, Range, Variance, Interquartile Range, Standard Deviation, Regression, Permutation, Combination, Sample Space, Independent Event, Dependent Event.

## Unit Objectives:

### Unit 1: Equations and Inequalities

- Analyze functions using different representations.
- Solve and graph equations and inequalities.
- Solve general systems of equations and inequalities.
- Perform operations on polynomials.
- Use properties of rational and irrational numbers.
- Create equations that describe linear, quadratic and exponential relationships.

### Unit 2: Quadratic and Polynomial Functions

- Use complex numbers.
- Perform operations on polynomials and rational expressions.
- Use and interpret functions.

### Unit 3: Functions and Graphs

- Graph and analyze linear functions.
- Graph and analyze quadratic functions.
- Graph and analyze absolute value functions.
- Graph and analyze rational functions.
- Graph and analyze exponential functions.
- Graph and analyze logarithmic functions.
- Graph and analyze square and cube root functions.
- Graph and analyze piecewise functions.

### Unit 4: Trigonometry

- Define trigonometric ratios, and solve problems involving right triangles.
- Apply trigonometry to general triangles.
- Model periodic phenomena with trigonometric functions.

### Unit 5: Statistics

- Make inferences and justify conclusions.
- Use the rules of probability to compute probabilities of compound events.
- Develop an understanding of statistical variability.

## Proposed Course Materials and Resources:

Glencoe Algebra 2  
McGraw-Hill Education  
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