



Math Department Curriculum Guide

Algebra 2 – Honors

Course Description

Building on their work with linear, quadratic, and exponential functions, students extend their repertoire of functions to include polynomial, rational, 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. A graphing calculator is used extensively throughout the course to organize data in tables and graphs, formulate equations, and make predictions and decisions. Students in this course are expected to produce high quality projects outside of class.

Upon successful completion of this course, students will be able to:

- Understand the relationship between zeros and factors of polynomials
- Solve systems of equations
- Represent and solve equations and inequalities graphically
- Understand the concept of a function and use function notation
- Interpret functions that arise in applications in terms of the context
- Analyze functions using different representations
- Build a function that models a relationship between two quantities
- Build new functions from existing functions
- Construct and compare linear and exponential models and solve problems
- Interpret expressions for functions in terms of the situation they model

Graphing Calculator

Hanover High School students enrolled in Algebra 1, Algebra 2, Precalculus, Calculus, or Statistics should purchase a graphing calculator, preferably a TI-84 Plus or TI-84 Color. It is important for students to gain familiarity with their own calculator in order to use it as a tool during class and for homework. Furthermore, students are expected to use calculators on standardized assessments, including MCAS, PSAT, SAT, and AP, as well as college placement exams. Many of the questions on these assessments are designed in such a way that students are expected to use a graphing calculator. Although there are graphing calculator apps that can be downloaded and used on mobile devices, keep in mind that mobile devices are not allowed on the MCAS, PSAT, SAT, and AP exams. Therefore, it is important that students have access to and learn to use an assessment-approved graphing calculator. There is a limited number of graphing calculators that can be borrowed on a first come first serve basis – please contact the office for information.

Algebra 2 – Calculator Skills

- Perform operations with fractions and exponents
- Convert between decimals and fractions
- Enter equations in $y =$
- Manipulate and use the window and table
- Graph functions
- Analyze functions by using tables, graphs, and equations
- Find points of intersection, zeros, maximums and minimums
- Enter matrices to solve systems of equations



Content Standards

Number and Quantity

The Complex Number System

- A. Perform arithmetic operations with complex numbers.
- C. Use complex numbers in polynomial identities and equations.

Vector and Matrix Quantities

- A. Represent and model with vector quantities.
- C. Perform operations on matrices and use matrices in applications.

Algebra

Seeing Structure in Expressions

- A. Interpret the structure of exponential, polynomial, and rational expressions.
- B. Write expressions in equivalent forms to solve problems.

Arithmetic with Polynomials and Rational Expressions

- A. Perform arithmetic operations on polynomials.
- B. Understand the relationship between zeros and factors of polynomials.
- C. Use polynomial identities to solve problems.
- D. Rewrite rational expressions.

Creating Equations

- A. Create equations that describe numbers or relationships.

Reasoning with Equations and Inequalities

- A. Understand solving equations as a process of reasoning and explain the reasoning.
- D. Represent and solve equations and inequalities graphically.

Functions

Interpreting Functions

- B. Interpret functions that arise in applications in terms of the context (polynomial, rational, square root and cube root, trigonometric, and logarithmic functions).
- C. Analyze functions using different representations.

Building Functions

- A. Build a function that models a relationship between two quantities.
- B. Build new functions from existing functions.

Linear, Quadratic, and Exponential Models

- A. Construct and compare linear, quadratic, and exponential models and solve problems.

Trigonometric Functions

- A. Extend the domain of trigonometric functions using the unit circle.
- B. Model periodic phenomena with trigonometric functions.
- C. Prove and apply trigonometric identities.

Statistics and Probability

Interpreting Categorical and Quantitative Data

- A. Summarize, represent and interpret data on a single count or measurement variable. Use calculators, spreadsheets, and other technology as appropriate.

Making Inferences and Justifying Conclusions

- A. Understand and evaluate random processes underlying statistical experiments.
- B. Make inferences and justify conclusions from sample surveys, experiments, and observational studies.

Using Probability to Make Decisions

- B. Use probability to evaluate outcomes of decisions.



Subject: Algebra 2 - Honors

Units	Content
Unit 1: Compound Inequalities and Absolute Value Equations and Inequalities Term 1 September	<ul style="list-style-type: none"> Solving Inequalities including compound inequalities Absolute value equations Absolute value inequalities
Unit 2: Functions, Equations, and Graphs Term 1 September	<ul style="list-style-type: none"> Relations and functions (review) Linear equations (review) Direct Variation (review) Linear models Piecewise functions Absolute value equation graphs Families of absolute value functions Linear inequalities and their graphs (including absolute value inequalities) T-project
Unit 3: Linear Systems Term 1 October	<ul style="list-style-type: none"> Solve systems of equations in 2 variables graphically (review) Solve systems of equations in 2 variables algebraically (review) Solve systems of inequalities with 2 variables graphically (review) Linear programming Solve systems of equations with 3 or 4 variables by elimination
Unit 4: Quadratic Equations and Graphs Term 1 and Term 2 November and December	<ul style="list-style-type: none"> Modeling data with quadratic functions Property of parabolas Transforming parabolas Factoring quadratic expressions Solving quadratic equations by factoring Simplifying radicals Complex numbers Solving quadratic equations by completing the square Solving quadratic equations by using the quadratic formula
Mid-year Benchmark Exam	
Unit 5: Polynomials and Polynomial Functions Term 2 January	<ul style="list-style-type: none"> Polynomial functions Polynomial and linear factors Dividing polynomials Solving polynomial equations with degree greater than 2 Theorems about roots of polynomial equations The Fundamental Theorem of Algebra The Binomial Theorem



Units	Content
Unit 6: Radical Functions and Rational Exponents Term 3 February and March	<ul style="list-style-type: none"> ▪ Multiplying and dividing radical expressions ▪ Adding and subtracting radical expressions ▪ Rational exponents ▪ Solving square root and other radical equations ▪ Function operations (composition) ▪ Inverse relations and functions ▪ Graphing square root and other radical functions
Unit 7: Exponential and Logarithmic Functions Term 3 and Term 4 March and April	<ul style="list-style-type: none"> ▪ Exploring exponential models ▪ Properties of exponential functions ▪ Logarithmic functions as inverses ▪ Properties of logarithms ▪ Exponential and logarithmic equations ▪ Natural logarithms
Unit 8: Rational Functions Term 4 April and May	<ul style="list-style-type: none"> ▪ Rational functions and their graphs ▪ Rational expressions (multiply and divide) ▪ Adding and subtracting rational expressions ▪ Solving rational equations
Unit 9: Conic Sections Term 4 May and June	<ul style="list-style-type: none"> ▪ Parabolas ▪ Circles ▪ Ellipses ▪ Recognizing conics in standard form using completing the square
Final Exam	