Honors Algebra 1

Instructor(s):
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Course Description:
This college preparatory course is designed for those students who excelled in their eighth grade mathematics requirement. Course work includes all concepts covered in Algebra 1 with a more in-depth analysis of the theoretical side of mathematics. Students will develop a firm foundation for further honors courses in mathematics.

2 Semesters/1 Credit

Unit 1	Linear Equations
Summary	In this unit students develop their ability to solve equations and review writing equations and expressions. They apply the Addition, Subtraction, Multiplication, and Division properties of equations to solve problems, as well as the distributive property. Students will be able to create and solve equations in one variable when presented in real-world problems. Students will also be able to use units to understand problems. A thorough understanding of properties and their use in communicating mathematical ideas will be emphasized.

Graduation Standards: (the number of the standard is referenced in the performance indicators listed in each unit.)

HS.M.1A - Applies properties of real numbers and quantitative reasoning.
HS.M.2.A - Solves polynomial, rational, radical, and transcendental equations & systems of equations.
HS.M.2B - Understands and analyzes polynomial, rational, radical, and transcendental functions.

Performance Indicators Assessed in Unit	AR.A.1 Interpret the structure of expressions. AR.A.2 Write expressions in equivalent forms to reveal information and to solve problems. AR.A.7 Create equations and/or inequalities that describe numbers or relationships. AR.A.8 Understand solving equations as a process of reasoning and explain the reasoning. AR.A.9 Solve equations and inequalities in one variable. *Supporting* QR.A.3 Reason quantitatively and use units to solve problems.

Understandings:	Students will know…	Students will be able to…

• There is an order of steps to follow when solving an equation. • The difference between simplifying an expression vs. solving an equation.	• How to identify constants, variables, and like terms. • How to recognize no solution and infinite solution equations. • That fractions are often easier to compute with (and more beneficial) than a decimal. • That PEMDAS can be reversed to isolate a variable.	• Make sense of problems and persevere in solving them. • Looks for and expresses regularity in repeated reasoning. • Look for and make use of structure.

Unit 2	Modeling Functions
Summary	In this unit students will understand concepts of functions and identify common algebraic functions based on their graphs and general equations. Students will determine a function's domain and range, increasing/decreasing intervals, relative maxima and minima, and end behavior. They will understand the basic properties of linear, quadratic, and exponential functions, and be able to identify each type graphically.

Graduation Standards: (the number of the standard is referenced in the performance indicators listed in each unit.)

HS.M.1A Applies properties of real numbers and quantitative reasoning.
HS.M.2B Understands and analyzes polynomial, rational, radical, and transcendental functions.

Performance Indicators Assessed in Unit	AR.A.12 - Understand the concept of a function and use function notation. AR.A.14 - Analyze functions using different representations. *Supporting* AR.A.13 - Interpret functions that arise in applications in terms of the context.

Understandings:	Students will know…	Students will be able to…
• How a function operates, graphically and algebraically. • There are important parts on a graph of any function (intercepts, maxima, minima, etc.). • Real world situations can be represented by different function types, and can be either discrete or continuous. • Different functions follow specific patterns.	• How to represent real-world problems graphically. • How to express a relation through mappings, tables, ordered pairs, and graphs. • How to determine domain and range. • How to distinguish between a discrete and continuous function. • Use function notation and evaluate functions.	• Make sense of problems and persevere in solving them. • Model with mathematics. • Look for and express regularity in repeated reasoning.

	- Recognize basic parent functions when transformed. - Analyze functions: state areas of increase/decrease, extrema, symmetry. - Evaluate a function for several input values to create a graph.	

Unit 3	Linear Functions
Summary	Students will learn the multiple representations of linear functions. Equations will be solved both graphically and by using algebraic methods. Linear functions will also be graphed by using key features such as: the x and y-intercepts, slope, and zeros. Students will understand slope as a rate of change and calculate slopes. Students will create algebraic models of arithmetic sequences.

Graduation Standards: (the number of the standard is referenced in the performance indicators listed in each unit.)

HS.M.1A - Applies properties of real numbers and quantitative reasoning.
HS.M.2.A - Solves polynomial, rational, radical, and transcendental equations & systems of equations.
HS.M.2B - Understands and analyzes polynomial, rational, radical, and transcendental functions.

Performance Indicators Assessed in Unit	AR.A.1 Interpret the structure of expressions. AR.A.7 Create equations and/or inequalities that describe numbers or relationships. AR.A.11 Represent and solve equations and inequalities graphically. AR.A.15 Build a function that models a relationship between two quantities. ★ *Supporting* QR.A.3 Reason quantitatively and use units to solve problems.

Understandings:	Students will know…	Students will be able to…
- Direction of lines, steepness of slope, and x and y-intercepts are important to analyze when graphing linear functions. - Slope can be used to graph a line, or to write the equation of a line. - How to represent horizontal and vertical lines. - We can find an explicit formula for an arithmetic sequence similar to the slope-intercept form of a line.	- How to determine if an equation is linear by using Standard Form. - How to graph linear equations using the x & y-intercepts. - How to solve linear equations by graphing (find zeros algebraically). - How to model situations involving constant rates of change.	- Make sense of problems and persevere in solving them. - Model with mathematics. - Use appropriate tools strategically. - Look for and make use of structure. - Look for and express regularity in repeated reasoning.

● Rate of change scenarios can be modeled with linear functions.	● How to calculate slope and interpret it from a graph. ● How to write equations for arithmetic sequences. ● The difference between proportional and non-proportional relationships.	

Unit 4	Equations Linear Functions
Summary	In this unit students will be able to identify different forms and change between all forms of linear equations. Students will calculate slope algebraically and relate it to real-world situations. They will create inverse linear functions both algebraically and graphically. They will compare and contrast a linear relationship represented graphically and algebraically.

Graduation Standards: (the number of the standard is referenced in the performance indicators listed in each unit.)

HS.M.1A - Applies properties of real numbers and quantitative reasoning.
HS.M.2.A - Solves polynomial, rational, radical, and transcendental equations & systems of equations.
HS.M.2B - Understands and analyzes polynomial, rational, radical, and transcendental functions.

Performance Indicators Assessed in Unit	AR.A.1 Interpret the structure of expressions. AR.A.7 Create equations and/or inequalities that describe numbers or relationships. ★ AR.A.11 Represent and solve equations and inequalities graphically. AR.A.15 Build a function that models a relationship between two quantities. ★ AR.A.18 Interpret expressions for function in terms of the situation they model. ★ *Supporting* QR.A.3 Reason quantitatively and use units to solve problems.

Understandings:	Students will know…	Students will be able to…
● A function that is linear can be represented in multiple forms. ● In order to create a linear function you need a slope and a point, or two points. ● The relationship between an equation and its inverse.	● How to graph and write equations in slope-intercept form. ● How to create linear equations given a slope and a point, or two points using point slope and slope intercept form. ● How to change between all three forms of linear equations.	● Make sense of problems and persevere in solving them. ● Model with mathematics.

	- How to write equations of parallel and perpendicular lines. - How to find the inverse of linear functions.	

Unit 5	**Linear Inequalities**
Summary	In this unit students will develop the properties of solving inequalities. They apply the Addition, Subtraction, Multiplication and Division properties of inequalities to solve problems, and can graph their solutions on a number line. Students will be able to solve compound inequalities and graph their solutions. Students will be able to solve and apply absolute value equations and inequalities in one variable and graph their solution on a number line. Students will be able to graph inequalities on a coordinate plane.

Graduation Standards: (the number of the standard is referenced in the performance indicators listed in each unit.)

HS.M.1A - Applies properties of real numbers and quantitative reasoning.
HS.M.2.A - Solves polynomial, rational, radical, and transcendental equations & systems of equations.
HS.M.2B - Understands and analyzes polynomial, rational, radical, and transcendental functions.

Performance Indicators Assessed in Unit	AR.A.7 Create equations and/or inequalities that describe numbers or relationships. ★ AR.A.9 Solve equations and inequalities in one variable. AR.A.11 Represent and solve equations and inequalities graphically. AR.A.14 Analyze functions using different representations. *Supporting* QR.A.3 Reason quantitatively and use units to solve problems. AR.A.8 Understand solving equations as a process of reasoning and explain the reasoning.

Understandings:	**Students will know…**	**Students will be able to…**
- There is a specific order of steps to follow when solving an inequality. - How to write and graphically represent inequalities on a number line and on a coordinate plane. - The difference between "and" and "or" inequalities.	- How to solve and graph compound inequalities. - How to solve and graph inequalities. - How to solve and graph absolute value equations and inequalities. - How to create compound inequality and absolute	- Make sense of problems and persevere in solving them. - Model with mathematics. - Look for and make use of structure.

● Which types of real world situations can be represented with a compound or absolute value inequality.	value statements from application problems.	

Unit 6	Systems of Linear Equations and Inequalities
Summary	In this unit students will be introduced to systems of linear equations and inequalities. They learn to solve by graphing systems of equations and inequalities, and classify the systems as consistent or inconsistent, dependent or independent. Students will also learn how to apply algebraic methods including, substitution and elimination. Students will create equations and inequalities that model real-world data and determine which method is best to solve the system.

Graduation Standards: (the number of the standard is referenced in the performance indicators listed in each unit.)

HS.M.1A - Applies properties of real numbers and quantitative reasoning.
HS.M.2.A - Solves polynomial, rational, radical, and transcendental equations & systems of equations.
HS.M.2B - Understands and analyzes polynomial, rational, radical, and transcendental functions.

Performance Indicators Assessed in Unit	● AR.A.10 Solve systems of equations. ● AR.A.11 Represent and solve equations and inequalities graphically. ● AR.A.15 Build a function that models a relationship between two quantities. ★ *Supporting:* ● AR.A.1 Interpret the structure of expressions. ● QR.A.3 Reason quantitatively and use units to solve problems.

Understandings:	Students will know…	Students will be able to…
● Solving systems of equations is a method to determine a common solution for multiple equations. ● Solving and graphing equations and inequalities can yield a visual representation of a solution. ● Which process (graphing, substitution, or elimination) is most efficient when solving a system of linear equations.	● How to solve a system of equations by graphing. ● How to solve a system of equations by substitution and elimination. ● How to create and solve a system of equations based on application problems. ● How to solve a system of inequalities by graphing.	● Make sense of problems and persevere in solving them. ● Model with mathematics. ● Use appropriate tools strategically. ● Construct viable arguments and critique the reasoning of others.

Unit 7	Simplifying Polynomials & Factoring

Summary	In this unit students will be manipulating quadratic expressions algebraically to achieve simplified and factored forms. Students will first learn about properties of exponents, polynomials and operations involving monomials and polynomials. They will then move on to factoring by using the greatest common factor. They will then learn to use this technique on 4 term expressions with grouping, and will then apply to factoring quadratic polynomials. Special patterns for factoring will be addressed as time allows.
Performance Indicators Assessed in Unit	AR.A.3 Perform arithmetic operations on polynomials. AR.A.5 (+) Use polynomial identities to solve problems. AR.A.2 Write expressions in equivalent forms to reveal information and to solve problems. ★ *Supporting:* AR.A.1 Interpret the structure of expressions.

Understandings:	Students will know…	Students will be able to…
● How factoring a quadratic function relates the solutions to the roots of functions on the graph. ● The different methods of factoring and when each is appropriate. ● If the product of two factors is zero, one of the factors is zero. ● To add or subtract polynomials only like terms can be combined. ● To multiply polynomials, each term of the polynomial is multiplied to each term of the second polynomial. ● Factoring is another way of rewriting a polynomial.	● How to find the GCF - greatest common factor. ● How to describe and identify monomials, polynomials, and degrees. ● How to add, subtract, and multiply polynomials. ● How to factor monomials out of a polynomial. ● How to solve equations by factoring.	● Make sense of problems and persevere in solving them. ● Attend to precision. ● Look for and make use of structure. ● Look for and express regularity in repeated reasoning.

Summative Assessments/Retake

- Summative assessments will count as 70% of the grade.
- Students have the opportunity to retake summative assessments.
- The student must submit a retake form to the teacher within five (5) school days of the date that the summative assessment score is reported to the student.
- The highest score a student can receive on a retake or late assessment is a 75.
- The score achieved on a retake will replace the current score (even if the score is lower).
- If a student is making up a test from an absence, that assessment will be graded up to 100.

Make-up Work

Upon their return to school from an absence, it is the student's responsibility to secure make-up work from their teacher. The due date of the missed work will be one additional class period for each day of absence from that class or at the discretion of the teacher.

Grading of Formative Assessments

- Formative assessments will count as 30% of the grade.
- Formative assessments may be scored on either a 0-100 scale or a 0-4 scale.
- The 0-4 scale will be represented in Power School as 4=100, 3=87, 2=77, and 1=67.
- The method of scoring of formative assessments will be determined by assignment.

Finals / Midterms
An end of course Final Exam will be conducted, making up 10% of the students overall grade.