High School (9-12)

Gateway High School
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Gateway School District
Curriculum Map

Curriculum Map: Mathematics

Course: Honors Algebra II
Grade(s): 9/10

Unit 1: Expressions, Equations, and Inequalities

Brief Summary of Unit
In this unit, students review basics concepts and skills of algebra studied in previous courses including real numbers, expressions, operations with real numbers, and problem solving.
Stage One—Desired Results

Established Goals: (Standards of Learning, Content Standards)

1. Graph real numbers on a number line, to compare numbers, and to find their absolute values.
2. Review the methods used to simplify numerical expressions and to evaluate algebraic expressions
3. REVIEW the rules for adding, subtracting, multiplying, dividing real numbers.
4. Solve certain equations in one variable, word problems by using an equation in one variable.

Understandings:	Essential Questions:
1. **Basic concepts of Algebra can be used to model and solve everyday real world situation.** 2. **Understand what the solution represents.** 3. **Data collection can be used in everyday real world problems.**	1. How do variables help you model real-world situations? 2. How can you use the properties of real numbers to simplify algebraic expressions. 3. How do you solve an equation or inequality?

Stage Two—Assessment Evidence
Performance Tasks:
Other Evidence: :(quizzes, tests and so on)
Stage Three—Learning Plan

Unit 2: <mark>Inequalities and Proof</mark>

Brief Summary of Unit
This unit extends basic techniques for solving equations to solving inequalities including compound inequalities with real world application. We will also address absolute value problems and a step by step logical mathematical process, known as a proof.

Stage One—Desired Results

Established Goals: (Standards of Learning, Content Standards)

1. Solve simple inequalities in one variable, conjunctions, disjunctions, word problems by using inequalities in one variable, and open sentences involving absolute values.
2. Use number lines to obtain quick solutions to certain equations and inequalities involving absolute value and axioms, definitions and theorems to prove some properties of real numbers.
3. Prove theorems about inequalities and absolute value.

Understandings:	Essential Questions:
1. **Inequalities can be used to model and solve everyday real world situation.** 2. **Understand what the solution represents.** 3. **Data collection can be used in everyday real world problems.**	1. How does representing functions graphically help you solve a system of equations? 2. How does writing equivalent equations help you solve a system of equations? 3. How are the properties of equality used in the matrix solution of a system of equations?

Stage Two—Assessment Evidence

Performance Tasks:

Other Evidence: :(quizzes, tests and so on)

Stage Three—Learning Plan

Unit 3: <mark>Linear Equations and Functions</mark>

Brief Summary of Unit
In this unit, we will deal with two equations with two variables to find solutions to open sentences with real world applications. The students will also use the slope to interpret graphs and use graphs and functions in the problem solving process.

Stage One—Desired Results

Established Goals: (Standards of Learning, Content Standards)

1. FIND solutions of open sentences in two variables, an equation of a line given its slope and a point on the line, or two points or its slope and the y-intercept, values of a functions and equations of linear functions.

2. GRAPH a linear equation in two variables, a line given its slope and a point on it, linear inequalities in two variables and systems of such inequalities, and relations.
3. SOLVE systems of linear equations in two variables and problems involving open sentences in two variables.

Understandings:	Essential Questions:
1. **How linear equations can be used to model and solve everyday real world situation.** 2. **Understand what the solution represents.** 3. **Data collection that can be used in everyday real world problems.**	1. How does representing functions graphically help you solve a system of equations? 2. How does writing equivalent equations help you solve a system of equations? 3. How are the properties of equality used in the matrix solution of a system of equations?

Stage Two—Assessment Evidence

Performance Tasks:

Other Evidence: :(quizzes, tests and so on)

Stage Three—Learning Plan

Unit 4: Products and Factors of Polynomials

Brief Summary of Unit
In this unit, we will work with and factor polynomials and applications of factoring. We will also use the tools learned early in the chapter solve polynomial equations, inequalities, and word problems.

Stage One—Desired Results

Established Goals: (Standards of Learning, Content Standards)

1. FIND GCF and LCM
2. Simplify, add and subtract polynomials and to use laws of exponents to multiply a polynomial by a monomial.
3. SOLVE polynomial equations, problems using polynomial equations, and polynomial inequalities
4. FACTOR quadratic polynomials and polynomials by using the GCF, by reorganizing special products, and by grouping terms.

Understandings:	Essential Questions:
1. **How products and factors can be used to model and solve everyday real world situation.** 2. **Understand what the solution represents.** 3. **Data collection that can be used in everyday real world problems.**	1. What does the degree of a polynomial tell you about its related polynomial function? 2. For a polynomial function, how are factors, zeros, and x-intercepts related? 3. For a polynomial equation, how are factors and roots related?

Performance Tasks:

Other Evidence: :(quizzes, tests and so on)

Stage Three—Learning Plan

Unit 5: <mark>Rational Expressions</mark>

Brief Summary of Unit

Students will use the laws of exponents to simplify, add, subtract, multiply and divide rational expressions. These rules will also be used to solve equations with fractional coefficients and fractional equations in real-world situations.

Stage One—Desired Results

Established Goals: (Standards of Learning, Content Standards)

1. Classify exponential roots.
2. Simplify expressions involving the rules of exponents.
3. Write the nth root and simplify it.
4. Recognize expressions involving positive and negative exponents, roots.
5. Add, Subtract, Multiply and Divide radical expressions.
6. Solve radical equations by factoring

Understandings:	**Essential Questions:**
1. **Radical Equations can be represented using exponents.** 2. **Radical exponents can be used to solve complex problems.** 3. **Composite functions can be used to solve complex problems.**	1. To simplify the nth root of an expression, what must be true about the expression? 2. When you square each side of an equation, is the resulting equation equivalent to the original? 3. How are a function and its inverse related?

Stage Two—Assessment Evidence

Performance Tasks:

Other Evidence: :(quizzes, tests and so on)

Stage Three—Learning Plan

Unit 6: <mark>Quadratic Equations & Functions</mark>

Brief Summary of Unit
In this unit, students will learn several methods of solving quadratic equations and using the discriminant to determine the nature of the roots without solving the problems.

Stage One—Desired Results

Established Goals: (Standards of Learning, Content Standards)

1. The students will write equations in standard and vertex form.
2. The students will graph parabolas using an x-y chart.
3. The students will graph parabolas using the vertex formula and x/y-intercepts
4. The students will solve quadratic equations by factoring, completing the square, and using the quadratic formula.
5. The students will distribute using the FOIL method.

Understandings:	Essential Questions:
1. **The students will understand the symmetry of parabolas.** 2. **The students will understand that the vertex of a parabola represents the minimum/maximum of a function.** 3. **The students will understand that quadratic functions can represent real life situations such as the path of a projectile or the function of a company's revenues and costs.** 4. **The students will understand that complex numbers are used to solve equations like** 5. **$X^2 = -2$**	1. What are the advantages of a quadratic function in vertex form? Standard form? 2. How is any quadratic function related to the parent quadratic function $y = x^2$? 3. How are the real solutions of a quadratic education related to the graph of the related quadratic function?

Stage Two—Assessment Evidence

Performance Tasks:

Other Evidence: :(quizzes, tests and so on)

Stage Three—Learning Plan

Unit 7: <mark>Analytic Geometry</mark>

Brief Summary of Unit
In this unit, students will use the Pythagorean theorem to derive the distance formula. We will also study the properties of four conic sections (circles, parabolas, ellipses, and hyperbolas). Finally we will solve systems of three equations with three variables.

Stage One—Desired Results

Established Goals: (Standards of Learning, Content Standards)

1. Sketch and analyze graphs of polynomial functions key features include: intercepts, intervals of

increasing and decreasing, relative maxs and mins, end behavior.

Understandings:	Essential Questions:
1. **Equations can be used to model and solve real-life examples.** 2. **Functions can be used as models to represent a wide variety of real-life data sets.** 3. **Complex numbers can be used to model and solve real-life problems in electronics.** 4. **A plane intersects a double cone but does not pass through the common vertex.**	1. What is the intersection of a cone and plane parallel to a line along the side of a cone? 2. What is the graph of x^2+y^2=1? 3. What is the difference between algebraic representation of ellipses and hyperbolas.

Stage Two—Assessment Evidence

Performance Tasks:

Other Evidence: :(quizzes, tests and so on)

Stage Three—Learning Plan

Unit 8: Exponential and Logarithmic Functions

Brief Summary of Unit

In this unit, we will discuss the laws of exponents extending them to rational and irrational numbers. We will also find the composite of two given functions and find the inverse of a given function.

Stage One—Desired Results

Established Goals: (Standards of Learning, Content Standards)

1. Use the properties of exponents to interpret expressions for exponential functions
2. Evaluate exponential functions with base a and base e
3. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.
4. Graph exponential and log functions showing intercepts and end behaviors
5. Evaluate logarithmic functions with base a and natural logarithmic functions
6. Graph logarithmic functions
7. Use exponential and logarithmic functions to model and solve real-life applications.

Understandings:	Essential Questions:
1. **Exponential Functions can be used to model and solve real-life applications.** 2. **Logarithmic Functions can be used to model and solve real-life applications.**	1. Use the properties of exponents to interpret expressions for exponential functions 2. Evaluate exponential functions with base a and base e 3. Recognize situations in which a quantity grows or decays by a constant percent rate per

unit interval relative to another.
4. Graph exponential and log functions showing intercepts and end behaviors
5. Evaluate logarithmic functions with base a and natural logarithmic functions
6. Graph logarithmic functions
7. Use exponential and logarithmic functions to model and solve real-life applications.

Stage Two—Assessment Evidence

Performance Tasks:

Other Evidence: :(quizzes, tests and so on)

Stage Three—Learning Plan