High School (9-12)

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Gateway School District
Curriculum Map

Curriculum Map: Mathematics

Course: Algebra II
Grade(s): 9-12

Unit 1: Expressions, Equations, and Inequalities

Brief Summary of Unit
This chapter summarizes and reviews basic concepts and properties of real numbers. The focus is on properties of operations, equality, and inequalities and how these properties are used in solving and graphing one-variable equations and inequalities. Students review absolute value and then solve equations and inequalities that involve absolute value. Students will also look at fundamental concepts of experimental, theoretical and geometric probability.

Stage One—Desired Results

Established Goals: (Standards of Learning, Content Standards)

1. Graph and order real numbers
2. Identify and use properties of real numbers
3. Evaluate and simplify algebraic expressions
4. Solve equations
5. Solve problems by writing equations
6. Solve and graph inequalities
7. Solve and write compound inequalities
8. Solve absolute value equations
9. Find experimental and theoretical probabilities

Understandings:	Essential Questions:
1. **The difference between simplifying an algebraic expression and solving an algebraic equation is that an equation provides a solution.** 2. **Algebraic equations and inequalities can be represented algebraically or graphically.** 3. **Writing and solving equations can be used to solve complex problems.**	1. How do variables help you model real-world situations? 2. How can use the properties of real numbers to simplify algebraic expressions? 3. How do you solve an equation or inequality?

4. **Finding probabilities can explain and solve complex problems.**	

Stage Two—Assessment Evidence

Performance Tasks:

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

Stage Three—Learning Plan

Unit 2: <mark>Functions, Equations, and Graphs</mark>

Brief Summary of Unit

Students will be introduced to relations and functions and learn about linear equations, slope and two-variable inequalities. Students then study direct variation and using linear models. Absolute value functions and graphs, and then vertical and horizontal translations, are discussed.

Stage One—Desired Results

Established Goals: (Standards of Learning, Content Standards)

1. Graph linear equations / functions
2. Write linear equations using various given information
3. Make predictions from linear models
4. Write linear equation of parallel and perpendicular lines

Understandings:	**Essential Questions:**
1. Linear equations represent and model real world situations **2. Predictions can be made about real world situations using linear relationships**	**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 3: <mark>Linear Systems</mark>

Brief Summary of Unit
Students learn to solve systems of linear equations and inequalities algebraically and graphically. They learn some of the basics of linear programming.

Stage One—Desired Results

Established Goals: (Standards of Learning, Content Standards)

1. Solve a linear system and a system of inequalities by graphing
2. Solve a linear system using the substitution method
3. Solve a linear system using the elimination method
4. Solve problems using linear programming

Understandings:	**Essential Questions:**
1. **The solution of a system of linear equations/inequalities can be found graphically or algebraically and is the point where the linear equations intersect.** 2. **Systems of linear equations/inequalities can model real world situations and solve complex 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: <mark>Quadratic Equations & Functions</mark>

Brief Summary of Unit
Students learn about the properties of parabolas and how to translate parabolas. Students are introduced to factoring quadratic expressions and solving quadratic equations using various methods (completing the square and quadratic formula). Students will learn about complex numbers.

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 X² = -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 equation related to the graph of the y?

Stage Two—Assessment Evidence

Performance Tasks:

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

Stage Three—Learning Plan

Unit 5: Polynomials and Polynomial Functions

Brief Summary of Unit

Students are introduced to polynomials and polynomial functions. Students learn how to find linear factors of polynomials, how to divide polynomials and solve polynomial equations. Also, students will apply what they have learned to solve problems involving permutations and combinations.

Stage One—Desired Results

Established Goals: (Standards of Learning, Content Standards)

1. Classify polynomials

2. Model data using polynomial functions
3. Write a polynomial in factored form and use factored form to find the zeros of a polynomial function
4. Write a polynomial function from its zeros
5. Divide polynomials using long and synthetic division
6. Solve polynomial equations by graphing and factoring
7. Count permutations and combinations

Understandings:	Essential Questions:
1. Polynomial functions can be represented graphically or algebraically. **2. Polynomial equations can be used to model and solve complex problems.** **3. Permutations and combinations can be used to solve complex 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?

Stage Two—Assessment Evidence

Performance Tasks:

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

Stage Three—Learning Plan

Unit 6: Radical Functions and Radical Exponents

Brief Summary of Unit

This chapter introduces *n*th roots of real numbers and relates them to *n*th powers and rational exponents. Students learn to perform operations on radical expressions, simplify radical expressions, and solve radical equations. Operations on functions are examined, including function composition. Inverse relations and inverse functions are discussed.

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 7 Probability and Statistics

Brief Summary of Unit

Students learn about probability distributions and conditional probability. Students learn about analyzing data, standard deviation, and creating visual representation of data.

Stage One—Desired Results

Established Goals: (Standards of Learning, Content Standards)

1. Create box-and-whisker plots
2. Create stem-and-leaf graphs
3. Create bar, line and circle graphs
4. Calculate the odds against an event occurring
5. Calculate the probability that an event occurs
6. Make and use a probability distribution
7. Find conditional probability
8. Find the measures of central tendency
9. Find the standard deviation

Understandings:	**Essential Questions:**
1. **Data depicted graphically can be easier to understand than information written** 2. **Measures of central tendency indicate how a set of data "tends" to act** 3. **Analyzing data is used in almost every profession.**	1. How do measures of central tendency help you to compare data in real-world situations?

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

Stage Three—Learning Plan