

Course Resources:**Algebra 2 - Course Syllabus****Algebra 2 - Course Syllabus****Description:**

Providing further insight into advanced algebraic concepts, this two-semester course serves as an extension of Algebra I. Algebra 2 develops students' ability to manipulate and use matrices in various formats to determine data relationships and also delve into function types such as polynomial, logarithmic, quadratic, exponential, and rational and periodic. High school level students will have the skills needed for state standardized tests and national exit exams upon completion of the course.

Textbook: Algebra 2 – Excel Education Systems, Inc. ©

Course objectives:

Throughout the course, you will meet the following goals:

- Identify similarities between the real and complex number system.
- Recognize all functions as mappings between domain and range sets.
- Understand that linear and quadratic functions are a subset of polynomial functions.
- Model real-world problems using polynomial and transcendental functions.
- Apply advance probabilistic methods to make decisions, and perform statistical analysis.

Contents:**Semester A**

- 1: Introduction To Algebra
- 2: Linear Equations
- 3: Functions
- 4: Systems of Linear Equations and Inequalities
- 5: Matrices

Semester B

- 6: Quadratic Functions
- 7: Exponential and Logarithmic Functions
- 8: Polynomial Functions
- 9: Rational and Radical Functions
- 10: Conic Sections

Grading Scale

- A = 90-100%
- B = 80-89%
- C = 70-79%
- D = 60-69%
- F = under 59%

Grade Weighting

- Quizzes..... 70%
- Final Exam..... 30%
- 100%

Unit	Benchmarks	Essential Questions	Learning Objectives	Instructional Strategies	Resources	Assessments
Months 1-12						

Curriculum Map - Mathematics - Algebra 2

<p>Module 1: Introduction to Algebra <i>(updated 3/17/21)</i></p>	<p>MA.9.2.1.6(A) Identify intercepts, zeros, maxima, minima and intervals of increase and decrease from the graph of a function.</p> <p>MA.9.2.1.8(A) Make qualitative statements about the rate of change of a function, based on its graph or table of values.</p> <p>MA.9.2.1.9(A) Determine how translations affect the symbolic and graphical forms of a function. Know how to use graphing technology to examine translations.</p> <p>MA.9.2.2.1(A) Represent and solve problems in various contexts using linear and quadratic functions.</p> <p>MA.9.2.2.3(A) Sketch graphs of linear, quadratic and exponential functions, and translate between graphs, tables and symbolic representations. Know how to use graphing technology to graph these functions.</p> <p>MA.9.2.4.6(A) Represent relationships in various contexts using absolute value inequalities in two variables; solve them graphically.</p>	<ul style="list-style-type: none"> • How can we use equations to solve problems? • How do you use basic skills and operands to create and solve a variety of equations and inequalities? • How do you relate subsets of the real number system? • How is the algebraic definition of Absolute value different from the Geometric definition? • What are the properties and rules of exponents? 	<ul style="list-style-type: none"> • Students will be able to solve equations using the addition, subtraction, multiplication, and division properties of equality. • Students will be able to solve one-step and multi-step algebraic equations. • Students will be able to use properties of exponents to simplify expressions. 	<p>direct instruction - textbook direct instruction - interactive video guided practice independent practice</p>	<p>1-1: Properties of Numbers 1-2: Solving Equations 1-3: Solving Inequalities 1-4: Absolute Value Equations and Inequalities 1-5: Properties of Exponents Unit 1 Summary of Terms and Formulas</p>	<p>Section Exercise Problems Unit 1 Quiz</p>
Unit	Benchmarks	Essential Questions	Learning Objectives	Instructional Strategies	Resources	Assessments
Months 1-12						
<p>Module 2: Linear Equations <i>(updated 3/16/21)</i></p>	<p>MA.9.2.2.1(A) Represent and solve problems in various contexts using linear and quadratic functions.</p> <p>MA.9.2.2.3(A) Sketch graphs of linear, quadratic and exponential functions, and translate between graphs, tables and symbolic representations. Know how to use graphing technology to graph these functions.</p> <p>MA.9.2.4.4(A) Represent relationships in various contexts using systems of linear inequalities; solve them graphically. Indicate which parts of the boundary are included in and excluded from the solution set using solid and dotted lines.</p>	<ul style="list-style-type: none"> • What are the relationships between slope, y-intercept and linear equations? • What types of relationships can be modeled by linear graphs? • What does the slope of a line mean and how can you find it? • How can you tell what a graph will look like just from looking at its equation? • What are the different forms of linear equations and when do you use them? • What information is needed to write the equation of a line? 	<ul style="list-style-type: none"> • Students will write and graph linear equations in the 2-D coordinate plane. • Students will represent linear patterns with equations and graphs. • Students will calculate slope and understand slope-intercept form, standard form (double-intercept form), and point-slope form of linear equations. • Students will problems involving direct variation 	<p>direct instruction - textbook direct instruction - interactive video guided practice independent practice</p>	<p>2-1: Introduction to Linear Equations 2-2: Slope and Intercepts 2-3: Parallel and Perpendicular Lines 2-4: Direct Variation Unit 2 Summary of Terms and Formulas</p>	<p>Section Exercise Problems Unit 2 Quiz</p>
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<p>Module 3: Functions <i>(updated 3/16/21)</i></p>	<p>MA.9.2.1.1(A) Understand the definition of a function. Use functional notation and evaluate a function at a given point in its domain.</p> <p>MA.9.2.1.2(A) Distinguish between functions and other relations defined symbolically, graphically or in tabular form.</p> <p>MA.9.2.1.3(A)</p>	<ul style="list-style-type: none"> • How do changes affect functions? • What happens when a function relies on another function? • What operations can we apply to entire functions? • What other types of 	<ul style="list-style-type: none"> • Students will be able to evaluate functions • Students will be able to write linear equations that model word problems using functions • Graph absolute value 	<p>direct instruction - textbook direct instruction - interactive video guided practice</p>	<p>3-1: Functions 3-2: Operations with Functions 3-3: The Inverse of a Function 3-4: Special Functions 3-5:</p>	<p>Section Exercise Problems Unit 3 Quiz</p>

Curriculum Map - Mathematics - Algebra 2

	<p>Find the domain of a function defined symbolically, graphically or in a real-world context.</p> <p>MA.9.2.1.4(A) Obtain information and draw conclusions from graphs of functions and other relations.</p> <p>MA.9.2.1.8(A) Make qualitative statements about the rate of change of a function, based on its graph or table of values.</p> <p>MA.9.2.1.9(A) Determine how translations affect the symbolic and graphical forms of a function. Know how to use graphing technology to examine translations.</p> <p>MA.9.2.2.3(A) Sketch graphs of linear, quadratic and exponential functions, and translate between graphs, tables and symbolic representations. Know how to use graphing technology to graph these functions.</p>	<p>functions exist?</p>	<p>functions</p> <ul style="list-style-type: none"> Analyze vertical and horizontal translations, rotations, and reflections 	<p>independent practice</p>	<p>transformations</p> <p>Unit 3 Summary of Terms and Formulas</p>	
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Unit	Benchmarks	Essential Questions	Learning Objectives	Instructional Strategies	Resources	Assessments
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Months 1-12

<p>Module 4: Systems of Linear Equations and Inequalities</p> <p><i>(updated 3/17/21)</i></p>	<p>MA.9.2.2.1(A) Represent and solve problems in various contexts using linear and quadratic functions.</p> <p>MA.9.2.2.3(A) Sketch graphs of linear, quadratic and exponential functions, and translate between graphs, tables and symbolic representations. Know how to use graphing technology to graph these functions.</p> <p>MA.9.2.2.4(A) Express the terms in a geometric sequence recursively and by giving an explicit (closed form) formula, and express the partial sums of a geometric series recursively.</p> <p>MA.9.2.4.4(A) Represent relationships in various contexts using systems of linear inequalities; solve them graphically. Indicate which parts of the boundary are included in and excluded from the solution set using solid and dotted lines.</p> <p>MA.9.2.4.5(A) Solve linear programming problems in two variables using graphical methods.</p> <p>MA.9.2.4.6(A) Represent relationships in various contexts using absolute value inequalities in two variables; solve them graphically.</p>	<p>How are the techniques of substitution, linear combination and graphing used to solve a system of linear equations? How do we determine the best method to use when solving a linear system? How do we solve a system of linear inequalities? How can we solve real world problems that involve systems of linear equations or inequalities and additional constraints?</p>	<ul style="list-style-type: none"> Students will be able to use different methods to solve systems of linear equations and inequalities. Students will be able to graph systems of equations and inequalities Students will solve linear programming problems and identify constraints algebraically and graphically. 	<p>direct instruction - textbook direct instruction - interactive video guided practice independent practice</p>	<p>4-1: Solving Systems by Graphing or Substitution 4-2: Solving Systems by Elimination 4-3: Linear Inequalities 4-4: Systems of Linear Inequalities 4-5: Linear Programming 4-6: Parametric Equations Unit 4 Summary of Terms and Formulas</p>	<p>Section Exercise Problems Unit 4 Quiz</p>
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Months 1-12

<p>Module 5: Matrices</p> <p><i>(updated 3/16/21)</i></p>	<p>MA.9.2.2.1(A) Represent and solve problems in various contexts using linear and quadratic functions.</p>	<ul style="list-style-type: none"> How are matrices used to model and solve real-world problems? What is a matrix, element, row, or column? How do you multiply a matrix, scalar and by a matrix? What is a determinant and how is it calculated? 	<p>Students will represent real world data using matrices and will use matrix addition, subtraction, multiplication, and scalar multiplication.</p>	<p>direct instruction - textbook direct instruction - interactive video guided practice independent practice</p>	<p>5-1: Introduction to Matrices 5-2: Matrix Multiplication 5-3: The Inverse of a Matrix 5-4: Representing Information in a Matrix Unit 5 Summary of</p>	<p>Section Exercise Problems Unit 5 Quiz</p>
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Curriculum Map - Mathematics - Algebra 2

		<ul style="list-style-type: none"> • What is an inverse matrix and how is it calculated? • How can a matrix be used to solve a system of equations? • How are matrices used to represent and organize data? 			Terms Formulas	
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Months 1-12

<p>Module 6: Quadratic Functions <i>(updated 3/16/21)</i></p>	<p>MA.9.2.1.5(A) Identify the vertex, line of symmetry and intercepts of the parabola corresponding to a quadratic function, using symbolic and graphical methods, when the function is expressed in the form $f(x) = ax^2 + bx + c$, in the form $f(x) = a(x - h)^2 + k$, or in factored form.</p> <p>MA.9.2.2.1(A) Represent and solve problems in various contexts using linear and quadratic functions.</p> <p>MA.9.2.2.3(A) Sketch graphs of linear, quadratic and exponential functions, and translate between graphs, tables and symbolic representations. Know how to use graphing technology to graph these functions.</p> <p>MA.9.2.3.3(A) Factor common monomial factors from polynomials, factor quadratic polynomials, and factor the difference of two squares.</p> <p>MA.9.2.3.5(A) Check whether a given complex number is a solution of a quadratic equation by substituting it for the variable and evaluating the expression, using arithmetic with complex numbers.</p> <p>MA.9.2.4.1(A) Represent relationships in various contexts using quadratic equations and inequalities. Solve quadratic equations and inequalities by appropriate methods including factoring, completing the square, graphing and the quadratic formula. Find non-real complex roots when they exist. Recognize that a particular solution may not be applicable in the original context. Know how to use calculators, graphing utilities or other technology to solve quadratic equations and inequalities.</p> <p>MA.9.2.4.3(A) Recognize that to solve certain equations, number systems need to be extended from whole numbers to integers, from integers to rational numbers, from rational numbers to real numbers, and from real numbers to complex numbers. In particular, non-real complex numbers are needed to solve some quadratic equations with real coefficients.</p>	<p>How are the real solutions of a quadratic equation related to the graph of the related quadratic function?</p>	<ul style="list-style-type: none"> • Students will be able to solve quadratic equations by various techniques such as factoring, finding square roots, completing the square, and applying the quadratic formula. • Students will be able to solve quadratic equations that have complex number solutions. • Students will be able to determine the number of real number solutions using the discriminant. • Students will be able to graph quadratics and identify key characteristics from an equation. 	<p>direct instruction - textbook direct instruction - interactive video guided practice independent practice</p>	<p>6-1: Introduction to Quadratic Functions 6-2: Solving Quadratic Equations 6-3: Factoring Quadratic Expressions 6-4: Completing the Square 6-5: The Quadratic Formula 6-6: Quadratic Equations with Complex Solutions Unit 6 Summary of Terms and Formulas</p>	<p>Section Exercise Problems Unit 6 Quiz</p>
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Months 1-12

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<p>Module 7: Exponential and Logarithmic Functions</p> <p><i>(updated 3/17/21)</i></p>	<p>MA.9.2.1.7(A) Understand the concept of an asymptote and identify asymptotes for exponential functions and reciprocals of linear functions, using symbolic and graphical methods.</p> <p>MA.9.2.2.2(A) Represent and solve problems in various contexts using exponential functions, such as investment growth, depreciation and population growth.</p> <p>MA.9.2.2.3(A) Sketch graphs of linear, quadratic and exponential functions, and translate between graphs, tables and symbolic representations. Know how to use graphing technology to graph these functions.</p> <p>MA.9.2.3.6(A) Apply the properties of positive and negative rational exponents to generate equivalent algebraic expressions, including those involving nth roots.</p> <p>MA.9.2.4.2(A) Represent relationships in various contexts using equations involving exponential functions; solve these equations graphically or numerically. Know how to use calculators, graphing utilities or other technology to solve these equations.</p>	<ul style="list-style-type: none"> • How are exponents and logarithms related? • Where are exponential functions and logarithmic functions used? 	<ul style="list-style-type: none"> • The student will be able to Define and recognize growth and decay functions. • The student will be able to Graph exponential functions and discuss properties of these functions including domain and range, asymptotes, increasing and decreasing. • The student will be able to Define and recognize logarithmic functions. • The student will be able to State and apply laws of logarithms. • The student will be able to Solve exponential and logarithmic equations related to real-world problems. 	<p>direct instruction - textbook direct instruction - interactive video guided practice independent practice</p>	<p>7-1: Introduction to Exponential Functions 7-2: Exploring Exponential Growth Decay 7-3: Logarithmic Functions 7-4: Properties of Logarithms 7-5: Applications and Graphs Logarithms Unit 7 Summary of Terms and Formulas</p>	<p>Section Exercise Problems Unit 7 Quiz</p>
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Months 1-12

<p>Module 8: Polynomial Functions</p> <p><i>(updated 3/17/21)</i></p>	<p>MA.9.2.2.6(A) Sketch the graphs of common non-linear functions such as $f(x) = x^3$, and translations of these functions, such as $f(x) = x^2 + 4$. Know how to use graphing technology to graph these functions.</p> <p>MA.9.2.3.1(A) Evaluate polynomial and rational expressions and expressions containing radicals and absolute values at specified points in their domains.</p> <p>MA.9.2.3.2(A) Add, subtract and multiply polynomials; divide a polynomial by a polynomial of equal or lower degree.</p> <p>MA.9.2.3.3(A) Factor common monomial factors from polynomials, factor quadratic polynomials, and factor the difference of two squares.</p>	<p>What does the degree of a polynomial tell you about its related polynomial function? For a polynomial function, how are factors, zeros and x-intercepts related? What information can we find in a polynomial function to sketch and predict its graph? What happens at the extremes of the graph of a polynomial?</p>	<p>The student will be able to graph polynomial functions and discuss their properties including domain, range, zeros, relative extrema, and end behavior The student will be able to describe the relationship between the roots and the graph of a polynomial function. The student will be able to find roots of polynomials using several methods.</p>	<p>direct instruction - textbook direct instruction - interactive video guided practice independent practice</p>	<p>8-1: Polynomials 8-2: Graphs of Polynomial Functions 8-3: Products and Factors of Polynomials 8-4: Solving Polynomial Equations Unit 8 Summary of Terms and Formulas</p>	<p>Section Exercise Problems Unit 8 Quiz</p>
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Months 1-12

<p>Module 9: Rational and Radical Functions</p> <p><i>(updated 3/17/21)</i></p>	<p>MA.9.2.3.1(A) Evaluate polynomial and rational expressions and expressions containing radicals and absolute values at specified points in their domains.</p> <p>MA.9.2.3.4(A) Add, subtract, multiply, divide and simplify algebraic fractions.</p> <p>MA.9.2.3.6(A) Apply the properties of positive and negative rational exponents to generate equivalent algebraic expressions, including those</p>	<p>What are the characteristics of rational functions and how do they apply to real-life problems? What kinds of asymptotes are possible for a rational function? Are a rational expression and its simplified form equivalent?</p>	<p>Students will learn how to simplify and perform operations with rational expressions, Students will be able to graph rational functions, identify key characteristics such as asymptotes, and solve rational equations.</p>	<p>direct instruction - textbook direct instruction - interactive video guided practice independent practice</p>	<p>9-1: Types of Variation 9-2: Graphs of Rational Functions 9-3: Multiplying and Dividing Rational Expressions 9-4: Adding and Subtracting Rational</p>	<p>Section Exercise Problems Unit 9 Quiz</p>
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Curriculum Map - Mathematics - Algebra 2

	<p>algebraic expressions, including those involving nth roots.</p> <p>MA.9.2.4.3(A) Recognize that to solve certain equations, number systems need to be extended from whole numbers to integers, from integers to rational numbers, from rational numbers to real numbers, and from real numbers to complex numbers. In particular, non-real complex numbers are needed to solve some quadratic equations with real coefficients.</p>				<p>Rational Expressions 9-5: Radical Functions and Expressions 9-6: Solving Equations involving Rational and Radical Expressions Unit 9 Summary of Terms and Formulas</p>	
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<p>Module 10: Conic Sections <i>(updated 3/17/21)</i></p>	<p>MA.9.2.4.5(A) Solve linear programming problems in two variables using graphical methods.</p> <p>MA.9.2.4.7(A) Solve equations that contain radical expressions. Recognize that extraneous solutions may arise when using symbolic methods.</p>	<ul style="list-style-type: none"> • What are conic sections? • What are the formulas that define conic sections such as parabolas, circles, ellipses and hyperbolas? 	<ul style="list-style-type: none"> • Students will be able to use the distance and midpoint formulas • Students will classify, graph, and write equations of conics, and solve systems of non-linear equations. • Students will be able to graph conic sections and identify key characteristics. 	<p>direct instruction - textbook direct instruction - interactive video guided practice independent practice</p>	<p>10-1: Introduction to Conic Sections 10-2: Parabolas 10-3: Circles 10-4: Ellipses 10-5: Hyperbolas 10-6: Solving Non-Linear Systems Unit 10 Summary of Terms and Formulas</p>	<p>Section Exercise Problems Unit 10 Quiz</p>