Mathematics Department

College Algebra

College Algebra is designed for seniors who have successfully completed Algebra II or Integrated Algebra. The course aims to begin with an extensive review of algebra and geometry concepts in preparation for college entrance exams such as the Scholastic Aptitude Test (SAT) and American College Testing (ACT) standardized tests in the fall. The course will then continue with the further development skills necessary for college mathematics and prepare students for college placement tests Some topics include solving equations and inequalities, simplifying radicals, factoring polynomials, solving quadratic equations, applying rules of exponents, exploring families of functions, and simplifying rational and logarithmic expressions. Successful completion of this course will be measured through teacher-generated assessments, projects, and assignments. This course can be counted in partial fulfillment of the state-mandated fifteen (15) credits of mathematics.

Developed By: Jessica Mabel
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Scope and Sequence

The Scope and Sequence for this course references components from a combination of units in the Algebra 1 and Algebra 2 Curricula, with a specific focus on preparation for college courses and entrance exams.

Month	College Algebra
September	**Unit 1: Linear (Alg1 Units 1 & 4))** - Solve linear equations using add/sub/mult/division - Solve a formula for one of its variables - Use ratios, rates, and proportions to solve real-life problems - Percents - Solve absolute value equations - Solve and graph inequalities using addition/subtraction/multiplication/division - Solve compound inequalities - Solve absolute value inequalities - Identify linear functions and linear equations - Find x- and y-intercepts to graph lines and interpret their meanings in real-world situations - Find rates of change and slopes

	- Graph linear equations using a t-chart, x and y intercepts, slope-intercept form, standard form, point-slope form, - Graph horizontal and vertical lines - Write linear equations in slope-intercept form, standard form, and point slope form given two points and a point and a slope - Identify, graph, and write equations of parallel and perpendicular lines. - Solve systems of equations by graphing, elimination, and substitution - Graph and solve linear inequalities in two variables - Graph and solve systems of linear inequalities in two variables - Use linear models (equations and graphs) in real life problems
October	**Unit 2: Quadratics (Alg 1 Unit 8; Alg 2 Unit 1)** - Find the GCF of a group of monomials - Factor quadratic trinomials by using the greatest common factor - Factor quadratic trinomials by grouping - Factor perfect-square trinomials and the difference of two squares - Identify quadratic functions - Identify the axis of symmetry, zeros, domain and range, and maximum/minimum of quadratic functions - Graph a quadratic equation in standard form and vertex form - Graph and transform quadratic equations
November	**Unit 2: Quadratics (Cont)** - Solve quadratic equations by graphing, factoring, and square roots - Solve quadratic equations by completing the square and the quadratic formula - Determine the number of solutions by using the discriminant - Solve systems of equations in two variables in which one equations and the other is quadratic - Use quadratic models (equations and graphs) in real life problems
December	**Unit 3: Functions: Composites and Inverse (Alg 1 Unit 3; Alg 2 Unit 3)** - Decide whether relations between two variables are functions - Use function notation and evaluate functions - Find the domain given the equations of a function - Use functions to model and solve real life problems - Find domains and ranges of functions given a graph - Use the vertical line test for functions - Determine intervals on which functions are increasing or decreasing - Identify even and odd functions - Recognize graphs of common functions (NEW)

January	**Unit 3: Functions: Composites and Inverses (Cont)** - Use vertical and horizontal shifts and reflections to sketch graphs of functions - Add, subtract, multiply, and divide functions - Find compositions of one function with another functions - Use combinations of functions to model and solve real life problems - Determine if a function has an inverse function (NEW) - Find inverse functions **Unit 4: Polynomials (Alg 1 Units 6-7; Alg 2 Units 2-3)** - Use properties of exponents to evaluate and simplify expressions using powers - Determine the end behavior of polynomial functions - Define, graph, and use polynomial functions - Add and subtract Polynomials - Multiply and divide polynomials
February	**Unit 4: Polynomials (Cont)** - Factor cubic polynomials and solve cubic equations - Factor polynomials and solve polynomials of gree greater than three - Use polynomials equations and functions to model finding a maximum or minimum value in real-life situations - Use polynomial models (graphs and equations) in real life problems **Unit 5: Powers, Roots, and Radicals (Alg 1 Unit 6; Alg 2 Unit 3)** - Evaluate nth roots of real numbers - Rewrite roots as exponents - Rewrite rational exponents as roots

March	**Unit 5: Powers, Roots, and Radicals (Cont)**
	- Use properties of radicals and rational exponents
	  - Multiply and dividing
	  - Power of a power
	  - Power of a product or quotient
	  - Negative exponents
	  - Power of zero
	- Solve equations that contain radicals or rational exponents
	- Determine if solutions are extraneous
	- Graph square root and cube root functions
	- Determine the domain and range of square root and cube root functions

April	**Unit 6: Functions: Exponential and Logarithmic (Alg 1 Unit 9; Alg 2 Unit 4)** - Determine whether a function is a polynomial function or exponential functions - Determine whether an exponential functions is a growth or decay - Graph exponential growth functions - Graph exponential decay functions

	- Determine the domain and change of exponential functions - Determine the end behavior or exponential functions - Determine the x and y intercepts of exponential functions - Use exponential functions to model and solve real life problems - Recognize and evaluate exponential functions with base e - Graph exponential functions with base e
May	**Unit 6: Functions: Exponential and Logarithmic (Cont)** - Evaluate logarithmic functions - Recognize and evaluate natural and common logs - Rewrite logarithmic form into exponential form - Rewrite exponential form into logarithmic form - Use the product, quotient, and power properties of logarithms - Graph logarithmic functions - Determine the domain and range of logarithmic functions - Solve exponential and log equations
June	**Unit 7: Rationals (Alg 2 Unit 5)** - Recognize and evaluate rational expressions - Simplify and multiply rational expressions - Divide rational expressions - Simplify complex fractions - Add and subtract rational expressions - Solve rational equations - Graph rational functions - Determine horizontal and vertical asymptotes **Final Review**