

Algebra 1

RCAS Policies/Procedures:

Students will be required to follow all RCAS policies and procedures. To view the RCAS High School Student Handbook, click [handbook](#).

Course Description:

The fundamental purpose of Algebra 1 is to formalize and extend the mathematics that students learned in the middle grades. Students will deepen and extend understanding of properties and operations of the real number system; evaluating rational algebraic expressions; solving and graphing first-degree equations and inequalities; translating word problems into equations; operations with and factoring of polynomials; and solving simple quadratic equations.

Textbook:

Envision AGA Algebra 1

Required Resources:

“Limited Choice” Resources: (students will be asked to choose at least one title from this list)

Student Choice:

Will student be asked to choose additional reading material from the classroom or school library?

No

Essential Learning:

- Students will find the sum or product of two rational numbers and explain why the sum or product is rational.
- Students will find the sum or product of a rational and an irrational number and explain when the sum or product is irrational.
- Students will explain that each step in solving a linear equation follows from the equality in the previous step.
- Students will create and solve linear equations with one variable using the properties of equality.
- Student will use the properties of equality to solve linear equations with a variable on both sides.
- Students will identify whether linear equations have one solution, infinitely many solutions, or no solution.
- Students will rearrange formulas and equations to highlight a quantity of interest by isolating the variable using the same reasoning used to solve equations.
- Student will use formulas and equations to solve problems.
- Student will create and solve inequalities in one variable.
- Students will interpret solutions to inequalities within the context
- Students will identify inequalities as true or false based on the number of solutions.
- Student will use mathematical modeling to represent a problem situation and to propose a solution.
- Students will test and verify the appropriateness of their math models.
- Students will explain why the results from a mathematical model might not align exactly with the problem situation.
- Students will create and solve a system of inequalities.
- Students will interpret the solution to a compound inequality within a modeling context
- Students will solve absolute value equations and inequalities.
- Students will use absolute value equations and inequalities to solve problems.
- Students will write linear equations in two variables using slope-intercept form to represent the relationship between two quantities.
- Students will interpret the slope and the intercept of a linear model.
- Students will write and graph linear equations in point-slope form.
- Students will analyze different forms of a line to interpret the slope and y-intercept of a linear model in the context of data.
- Students will write and graph linear equations in standard form.
- Students will use linear equations in standard form to interpret both the x- and y-intercepts in the context of given data.
- Students will use mathematical modeling to represent a problem situation and to propose a solution.

- Students will test and verify the appropriateness of their math models.
- Students will explain why the results from their mathematical models might not align exactly with the problem situation.
- Students will create equations to represent lines that are parallel or perpendicular to a given line.
- Students will graph lines to show an understanding of the relationship between the slopes of parallel and perpendicular lines.
- Students will solve real-world problems with parallel or perpendicular lines
- Students will understand that a relation is a function if each element of the domain is assigned to exactly one element in the range.
- Students will determine a reasonable domain and identify constraints on the domain based on the context of a real-world problem.
- Students will write and evaluate linear functions using function notation.
- Students will graph a linear function and relate the domain of a function to its graph.
- Students will interpret functions represented by graphs, tables, verbal descriptions, and function notation in terms of a context.
- Students will graph transformations of linear functions by identifying the effect of multiplying or adding specific values of k to the input or output of a function.
- Students will interpret the key features of the graph of a linear function and use them to write the function that the graph represents.
- Students will use mathematical modeling to represent a problem situation and to propose a solution.
- Students will test and verify the appropriateness of their math models.
- Students will explain why the results from their mathematical models might not align exactly with the problem situation.
- Students will write arithmetic and geometric sequences both recursively and with an explicit formula.
- Students will use explicit formulas and recursive formulas to model real-world situations.
- Students will fit a function to linear data shown in a scatter plot and use fitted functions to solve problems in the context of the data.
- Students will interpret the slope of a trend line within the context of data.
- Students will compute and interpret the correlation coefficient for linear data.
- Students will plot and analyze residuals to assess the fit of a function.
- Students will distinguish between correlation and causation.
- Students will graph systems of linear equations in two variables to find an approximate solution.
- Students will write a system of linear equations in two variables to represent real-world problems.
- Students will use the substitution method to solve systems of equations.

- Students will represent situations as a system of equations and interpret solutions as viable/nonviable options for the situation.
- Students will solve systems of linear equations and prove that the sum of one equation and a multiple of the other produces a system with the same solutions as the original system.
- Students will represent constraints with a system of equations in a modeling context.
- Students will graph solutions to linear inequalities in two variables.
- Students will represent constraints with inequalities and interpret solutions as viable or nonviable options in a modeling context
- Students will use mathematical modeling to represent a problem situation and to propose a solution.
- Students will test and verify the appropriateness of their math models.
- Students will explain why the results from their mathematical models might not align exactly with the problem situation
- Students will graph the solution set of a system of linear inequalities in two variables.
- Students will interpret solutions of linear inequalities in a modeling context.
- Students will know and apply the properties of integer exponents and be able to use them.
- Students will extend the properties of integer exponents to rational exponents to rewrite radical expressions using rational exponents.
- Students will solve equations with rational exponents using the properties of exponents.
- Students will sketch graphs showing key features of exponential functions.
- Students will write exponential functions using tables and graphs.
- Students will compare linear and exponential functions.
- Students will construct exponential growth and decay functions given a description of a relationship.
- Students will recognize if a situation can be modeled with exponential growth or exponential decay, and interpret the parameters of the model in context.
- Students will find explicit and recursive formulas for geometric sequences.
- Students will translate between recursive and explicit formulas for geometric sequences.
- Students will construct exponential functions to represent geometric sequences
- Students will translate the graph of an exponential function vertically and horizontally, identifying the effect different values of h and k have on the graph of the function.
- Students will compare characteristics of two exponential functions represented in different ways, such as tables and graphs.

- Students will use mathematical modeling to represent a problem situation and to propose a solution.
- Students will test and verify the appropriateness of their math models.
- Students will explain why the results from their mathematical models might not align exactly with the problem situation.
- Students will identify the parts of a polynomial.
- Students will classify polynomials by number of terms and by degree.
- Students will write a polynomial in standard form.
- Students will add or subtract two polynomials.
- Students will use the Distributive Property with polynomials, recognizing that polynomials are closed under multiplication.
- Students will multiply polynomials using a table and an area model.
- Students will determine the square of a binomial.
- Students will find the product of a sum and difference of two squares.
- Students will solve real-world problems involving the square of a binomial.
- Students will find the greatest common factor of the terms of a polynomial.
- Students will use the structure of a polynomial to rewrite it in factored form.
- Students will factor polynomials that represent real-world problems.
- Students will factor a trinomial in the form $x^2 + bx + c$ by finding two binomial factors whose product is equal to the trinomial.
- Students will identify and use patterns in the signs of the coefficients of the terms of a trinomial expression.
- Students will use mathematical modeling to represent a problem situation and to propose a solution.
- Students will test and verify the appropriateness of their math models.
- Students will explain why the results from their mathematical models might not align exactly with the problem situation.
- Students will identify the common factor of the coefficients in the terms of a trinomial expression when $a \neq 1$.
- Students will write a quadratic trinomial as a product of two binomial factors.
- Students will identify and factor a trinomial that is a perfect square or a binomial that is a difference of two squares.
- Students will factor special cases of polynomials within the context of real-world problems.
- Students will identify key features of the graph of a quadratic function using graphs, tables, and equations.
- Students will explain the effect of the value of a on the quadratic parent function
- Students will identify key features of the graph of quadratic functions written in vertex form.
- Students will graph quadratic functions in vertex form.

- Students will graph quadratic functions in standard form and show intercepts, maxima, and minima.
- Students will determine how the values of a , b , and c affect the graph of $f(x) = ax^2 + bx + c$.
- Students will identify key features of parabolas.
- Students will compare properties of quadratic functions presented in different forms (algebraically, in a table, graphically).
- Students will use quadratic functions fitted to data to model real-world situations.
- Students will use the vertical motion model to write an equation.
- Students will compare a model to a data set by analyzing and evaluating residual
- Students will use mathematical modeling to represent a problem situation and to propose a solution.
- Students will test and verify the appropriateness of their math models.
- Students will explain why the results from their mathematical models might not align exactly with the problem situation.
- Students will determine which model— linear, exponential, or quadratic—best fits a set of data.
- Students will use fitted functions to solve problems in the context of data.
- Students will use a graph to identify the x -intercepts as solutions of a quadratic equation.
- Students will use a graphing calculator to make a table of values to approximate or solve a quadratic equation.
- Students will use the Zero-Product Property and factoring to find the solutions of a quadratic equation.
- Students will apply factoring to solve real-world problems.
- Students will use the zeros of a quadratic equation to sketch a graph.
- Students will write the factored form of a quadratic function from a graph
- Students will use properties of exponents to rewrite radical expressions.
- Students will multiply radical expressions.
- Students will write a radical expression to model or represent a real-world problem.
- Students will solve quadratic equations by finding square roots.
- Students will determine reasonable solutions for real-world problems
- Students will solve a quadratic trinomial by completing the square to transform a quadratic equation into a perfect square trinomial.
- Students will use completing the square to write a quadratic equation in vertex form.
- Students will derive the quadratic formula by completing the square.
- Students will solve quadratic equations in one variable by using the quadratic formula.
- Students will use the discriminant to determine the number and type of

solutions to a quadratic equation

- Students will use mathematical modeling to represent a problem situation.
- Students will test and verify the appropriateness of their math models.
- Students will explain why the results might not exactly match the problem situation.
- Students will describe a linear-quadratic system of equations.
- Students will solve a linear-quadratic system of equations by graphing, elimination, or substitution.
- Students will represent data using dot plots, box plots, and histograms.
- Students will interpret the data displayed in dot plots, box plots, and histograms within the context of the data that it represents
- Students will use measures of center to interpret and compare data sets displayed in dot plots, box plots, and histograms.
- Students will explain and account for the effect of outliers on measures of center and variability.
- Students will use measures of variability, such as the MAD and IQR, to interpret and compare data sets.
- Students will interpret and compare differences in the shape, center, and spread of data of different data sets.
- Students will determine the relationship between the mean and median of a data set when the shape of the data is evenly spread, skewed right, or skewed left.
- Students will interpret differences in the variability or spread in the context of a data set.
- Students will calculate the standard deviation of a data set and use it to compare and interpret data sets.
- Students will organize and summarize categorical data by creating two-way frequency tables.
- Students will calculate and interpret joint and marginal frequencies, joint and marginal relative frequencies, and conditional relative frequencies, and use them to make inferences about a population.
- Students will use mathematical modeling to represent a problem situation and to propose a solution.
- Students will test and verify the appropriateness of the math model.
- Students will explain why the results from the mathematical model might not align exactly with the problem situation.

Essential Skills:

Skill #1 Create Mathematical Representations

Skill #2 Simplify, Solve, & Evaluate

Skill #3 Analyze & Interpret.