

## Algebra 1

### Prerequisite: Pre-Algebra

The main goal of Algebra is to develop fluency in working with linear equations. Students will extend their experiences with tables, graphs, and equations and solve linear equations and inequalities and systems of linear equations and inequalities. Students will extend their knowledge of the number system to include irrational numbers. Students will generate equivalent expressions and use formulas. Students will simplify polynomials and begin to study quadratic relationships. Students will use technology and models to investigate and explore mathematical ideas and relationships and develop multiple strategies for analyzing complex situations. Students will analyze situations verbally, numerically, graphically, and symbolically. Students will apply mathematical skills and make meaningful connections to life's experiences.

**Standard I: Students will expand number sense to understand, perform operations, and solve problems with real numbers.**

**Objective 1: Represent real numbers as points on the number line and distinguish rational numbers from irrational numbers.**

- a. Define a rational number as a point on the number line that can be expressed as the ratio of two integers, and points that cannot be so expressed as irrational.
- b. Classify numbers as rational or irrational, knowing that rational numbers can be expressed as terminating or repeating decimals and irrational numbers can be expressed as non-terminating, non-repeating decimals.
- c. Classify  $\pi$  and square roots of non-perfect square numbers as irrational.
- d. Place rational and irrational numbers on a number line between two integers.

**Objective 2: Compute fluently and make reasonable estimates with rational and irrational numbers.**

- a. Simplify, add, subtract, multiply, and divide expressions with square roots.
- b. Evaluate and simplify numerical expressions containing rational numbers and square roots using the order of operations.
- c. Compute solutions to problems, represent answers in exact form, and determine the reasonableness of answers.
- d. Calculate the measures of the sides of a right triangle using the Pythagorean Theorem.

<p style="text-align: center;"><b>Mathematical Language and Symbols Students Should Use</b></p>
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<p>square root, <math>\sqrt{\quad}</math>, radical, rational, irrational, Pythagorean Theorem</p>
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**Standard II: Students will extend concepts of proportion to represent and analyze linear relations.**

**Objective 1: Represent and analyze the slope of a line.**

- a. Identify the slope of a line when given points, a graph, or an equation.
- b. Identify horizontal and vertical lines given the equations or slopes.
- c. Determine the effect of changes in slope or  $y$ -intercept in  $y = mx + b$ .
- d. Determine and explain the meaning of slopes and intercepts using real-world examples.

**Objective 2: Model and interpret problems having a constant rate of change using linear functions.**

- a. Write algebraic expressions or equations to generalize visual patterns, numerical patterns, relations, data sets, or scatter plots.
- b. Represent linear equations in slope-intercept form,  $y = mx + b$ , and standard form,  $Ax + By = C$ .
- c. Distinguish between linear and non-linear functions by examining a table, equation, or graph.
- d. Interpret the slope of a linear function as a rate of change in real-world situations.

**Objective 3: Represent and analyze linear relationships using algebraic equations, expressions, and graphs.**

- a. Write the equation of a line when given two points or the slope and a point on the line.
- b. Approximate the equation of a line given the graph of a line.
- c. Identify the  $x$ - and  $y$ -intercepts from an equation or graph of a line or a table of values.
- d. Graph linear relations and inequalities by plotting points, by finding  $x$ - and  $y$ -intercepts, or by using the slope and any point on the line.

<p style="text-align: center;"><b>Mathematical Language and Symbols Students Should Use</b></p>
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<p>Slope, <math>x</math>-intercept, <math>y</math>-intercept, <math>y = mx + b</math>, <math>Ax + By = C</math>, undefined slope</p>
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**Standard III: Students will develop fluency with the language and operations of algebra to analyze and represent relationships.**

**Objective 1: Simplify polynomials and the quotient of monomials.**

- a. Simplify and evaluate monomial expressions and formulas.
- b. Add and subtract polynomials.
- c. Multiply monomials by a polynomial.
- d. Multiply binomials.
- e. Simplify the quotient of monomials using positive exponents.

**Objective 2: Solve and interpret linear equations and inequalities in various situations including real-world problems.**

- a. Solve single-variable linear equations and inequalities algebraically and graphically.
- b. Solve real-world problems involving constant rates of change.
- c. Solve equations for a specified variable.
- d. Solve proportions that include algebraic first-degree expressions.

**Objective 3: Solve and interpret pairs of linear equations and inequalities.**

- a. Solve systems of two linear equations graphically and algebraically with and without technology.
- b. Determine the number of possible solutions for a system of two linear equations.
- c. Graph a system of linear inequalities and identify the solution.

**Objective 4: Factor polynomials with common monomial factors and factor simple quadratic expressions.**

- a. Find the greatest common monomial factor of a polynomial.
- b. Factor trinomials with integer coefficients of the form  $x^2 + bx + c$ .
- c. Factor the difference of two squares and perfect square trinomials.

**Objective 5: Solve quadratic equations using factoring or by taking square roots.**

- a. Solve quadratic equations that can be simplified to the form  $x^2 = a$  where  $a \geq 0$  by taking square roots.
- b. Solve quadratic equations using factoring.
- c. Write a quadratic equation when given the solutions.

<p style="text-align: center;"><b>Mathematical Language and Symbols Students Should Use</b></p>
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<p>monomial, binomial, trinomial, polynomial, literal equation, factor, difference of two squares, perfect square, quadratic</p>
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**Standard IV: Students will understand concepts from statistics and apply statistical methods to solve problems.**

**Objective 1: Summarize, display, and analyze bivariate data.**

- a. Collect, record, organize, and display a set of data with at least two variables.
- b. Determine whether the relationship between two variables is approximately linear or non-linear by examination of a scatter plot.
- c. Characterize the relationship between two linear related variables as having positive, negative, or approximately zero correlation.

**Objective 2: Estimate, interpret, and use lines fit to bivariate data.**

- a. Estimate the equation of a line of best fit to make and test conjectures.
- b. Interpret the slope and y-intercept of a line through data.
- c. Predict y-values for given x-values when appropriate using a line fitted to bivariate numerical data.

**Mathematical Language and Symbols Students Should Use**

scatter plot, positive correlation, negative correlation, no correlation, line of best fit, bivariate