



ALGEBRA I Learning Objectives



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The learner will

- ☑ identify and use the arithmetic properties of subsets of integers and rational, irrational and real numbers, including closure properties for the four basic arithmetic operations where applicable.
- ☑ use properties of numbers to demonstrate whether assertions are true or false.
- ☑ understand and use such operations as taking the opposite, finding the reciprocal, taking a root and raising to a fractional power.
- ☑ understand and use the rules of exponents.
- ☑ solve equations and inequalities involving absolute values.
- ☑ simplify expressions before solving linear equations and inequalities in one variable, such as $3(2x-5) + 4(x-2) = 12$.
- ☑ solve multi-step problems, including word problems, involving linear equations and linear inequalities in one variable and provide justification for each step.
- ☑ graph a linear equation and compute the x - and y -intercepts (e.g., graph $2x + 6y = 4$).
- ☑ sketch the region defined by linear inequality (e.g., the region defined by $2x + 6y < 4$).
- ☑ verify that a point lies on a line, given an equation of the line.
- ☑ derive linear equations by using the point-slope formula.
- ☑ understand the concepts of parallel lines and perpendicular lines and how those slopes are related.
- ☑ find the equation of a line perpendicular to a given line that passes through a given point.
- ☑ solve a system of two linear equations in two variables algebraically and are able to interpret the answer graphically.
- ☑ be able to solve a system of two linear inequalities in two variables and to sketch the solution sets.
- ☑ add, subtract, multiply and divide monomials and polynomials.
- ☑ multi-step problems, including word problems, by using these techniques.
- ☑ apply basic factoring techniques to second- and simple third-degree polynomials.
- ☑ find a common factor for all terms in a polynomial, recognize the difference of two squares and recognize perfect squares of binomials.
- ☑ simplify fractions with polynomials in the numerator and denominator by factoring both and reducing them to the lowest terms.
- ☑ add, subtract, multiply and divide rational expressions and functions.
- ☑ solve both computationally and conceptually challenging problems by using these techniques.
- ☑ solve a quadratic equation by factoring or completing the square.
- ☑ apply algebraic techniques to solve rate problems, work problems and percent mixture problems.
- ☑ understand the concepts of a relation and a function
- ☑ determine whether a given relation defines a function and give pertinent information about given relations and functions.
- ☑ determine the domain of independent variables and the range of dependent variables defined by a graph, a set of ordered pairs or a symbolic expression.
- ☑ determine whether a relation defined by a graph, a set of ordered pairs or a symbolic expression is a function and justify the conclusion.
- ☑ know the quadratic formula and be familiar with its proof by completing the square.
- ☑ use the quadratic formula to find the roots of a second-degree polynomial and to solve quadratic equations.
- ☑ graph quadratic functions and know that their roots are the x -intercepts.
- ☑ use the quadratic formula or factoring techniques or both to determine whether the graph of a quadratic function will intersect the x -axis in zero, one or two points.
- ☑ apply quadratic equations to physical problems, such as the motion of an object under the force of gravity.
- ☑ use and know simple aspects of a logical argument.
- ☑ explain the difference between inductive and deductive reasoning and identify and provide examples of each.
- ☑ identify the hypothesis and conclusion in logical deduction.
- ☑ use counterexamples to show that an assertion is false and recognize that a single counterexample is sufficient to refute an assertion.
- ☑ use properties of the number system to judge the validity of results, to justify each step of a procedure and to prove or disprove statements.
- ☑ use properties of numbers to construct simple, valid arguments (direct and indirect) for, or formulate counterexamples to, claimed assertions.
- ☑ judge the validity of an argument according to whether the properties of the real number system and the order of operations have been applied correctly at each step.
- ☑ determine whether the statement is true sometimes, always, or never, given a specific algebraic statement involving linear, quadratic or absolute value expressions or equations or inequalities.
- ☑ perform addition and subtraction on matrices.



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The learner will

- ☑ multiply matrices by a scalar.
- ☑ know the definitions of the mean, median and mode of distribution of data and compute each of them in particular situations.
- ☑ organize and describe distributions of data by using a number of different methods, including frequency tables, histograms, standard line and bar graphs, stem-and-leaf displays, scatterplots and box-and-whisker plots.

RESOURCES

Prentice-Hall Mathematics Algebra I (2005 ed.)

Internet research, applications and modeling.

PASCO measurement devices, laboratory investigations and supplemental materials.