

Algebra 1 Learning Targets

What follows is what a student in Algebra 1 should know and be able to do by the end of each semester. It is broken up by unit of study and also includes what portion of the textbook, *Algebra 1* by Pearson Education, Inc. (Prentice Hall) © 2009, is used in each unit. Since mathematics is cumulative in nature, many learning targets are expected to be used not only in the unit where they are introduced, but throughout the course. This list is published as a courtesy to all interested learners, and is not intended for use outside of this specific course.

First Semester:

A. **Real Number Operations and the Language of Algebra (Sections 1.1 – 1.5, 2.1 – 2.6)**

1. Perform addition, subtraction, multiplication, and division of real numbers without using a calculator
2. Translate an algebraic expression from English to algebra and from algebra to English
3. Use the factor-label method to convert units
4. Create a scatter plot on the graphing calculator
5. Use mental math to solve basic absolute value equations
6. Evaluate more complex algebraic expressions involving powers, parentheses, fractions, and absolute value
7. Identify and apply properties of real numbers (commutative, distributive, etc.)
8. Use a number line to order real numbers
9. Write inequalities to compare two real numbers
10. Find the distance between two rational numbers on a number line
11. Evaluate a function equation using an input-output table
12. Determine when a rational expression is undefined
13. Use real numbers to model a real-life situation
14. Identify the dimensions of a matrix and add and subtract matrices
15. Organize data in matrices to solve real-world problems
16. Find the probability of an event and write it as a fraction, decimal, and percent
17. Plot points on the coordinate plane and give the coordinates of a plotted point
18. Determine the quadrant of a point given the sign (and not value) of its x- and y-coordinates

B. **Solving Equations (Chapter 3)**

1. Use the table feature on the graphing calculator to solve an equation numerically
2. Algebraically solve an equation in one-variable involving fractions, decimals, the distributive property, and variables on both sides
3. Verify a solution to an equation
4. Translate verbal statements to mathematical equations and solve the equation
5. Algebraically solve equations that have no solution or an infinite number of solutions
6. Solve an equation graphically by hand (This include an exposure to graphing non-linear

functions such as parabolas, absolute values, and square roots)

7. Solve an equation graphically using the intersect feature on the graphing calculator
8. Define unknowns for a real-world problem and write an equation to solve it
9. Solve a formula for a specified variable
10. Get a linear function in “y equals” form and find the output given an input

C. Solving Inequalities (Chapter 4)

1. Solve an inequality in one variable (including multi-step and compound inequalities) and graph the solution on a number line.
2. Solve absolute value equations by representing absolute value as a distance
3. Solve absolute value equations and inequalities algebraically
4. Solve absolute value equations and inequalities graphically on the coordinate plane by hand and with the graphing calculator
5. Use inequalities to model real-life situations
6. Check solutions to inequalities algebraically and graphically

D. Graphs and Functions (Sections 5.1 – 5.6)

1. Relate a graph to a real-world situation
2. Determine whether or not a relation is a function (vertical line test)
3. Use a table to graph a function
4. Determine the domain and range of a function
5. Model and interpret a function using an equation, table, or graph interchangeably
6. Determine whether a relationship is direct or inverse variation
7. Graph direct and inverse functions by hand by making a table of values
8. Write the equations for direct and inverse relationships
9. Compare direct and inverse variation
10. Interpret the real-life meaning of a function value (e.g., If a specific function represents the population as a function of years, what does $f(6)$ represent?)

E. Writing Linear Equations (Chapter 6)

1. Calculate slope as rise/run or using the slope formula and interpret the slope as rate of change
2. Understand the difference between a line with positive slope and negative slope
3. Understand the difference between a slope of 0 and an undefined slope
4. Graph vertical and horizontal lines and determine their slopes
5. Graph a linear function by making a table of values
6. Graph a linear function by hand by finding and plotting the x- and y-intercepts
7. Determine algebraically whether a given point lies on a given line
8. Graph a linear function by hand using the slope and y-intercept
9. Put a linear equation in $y = mx + b$ (slope-intercept form)

10. Determine if two linear functions are parallel, perpendicular, or neither
11. Solve linear equations graphically by hand and by calculator (This revisits a topic done in a previous unit, but with a focus on lines and not always using a table of values to graph them. Also, this is a good time to revisit solving an equation algebraically.)
12. Interpret the real-life meaning of the x- and y-intercepts and slope of a linear function used to model a situation
13. Write the equation of a line in slope-intercept form when given the slope and a point or two points
14. Given a linear graph, identify the slope and the y-intercept to write the equation in slope-intercept form
15. Write a linear equation that models a real-life situation and interpret the meaning of the slope and intercepts. Use that linear equation to interpolate or extrapolate.
16. Write the equation of a line in slope-intercept form that is either parallel or perpendicular to a given line
17. Given the graph, write the equation of the line in either slope-intercept or point-slope form
18. Write the equations of horizontal and vertical lines.
19. Determine a line of best-fit for real-life data by hand and use it to make predictions
20. Determine the line of best-fit (regression equation) using the graphing calculator and use it to make predictions
21. Use the graphing calculator to find the correlation coefficient and explain its significance
22. Write the equation of a line in point-slope form given the slope and a point or two points
23. Write the equation of a line in standard form given the slope and a point or two points

Second Semester:

F. Systems of Equations and Inequalities (Chapter 7)

1. Solve a system of linear equations
 - by graphing
 - by substitution
 - by linear combinations (also known as elimination or addition method)
2. Choose the best method to solve a linear system
3. Identify the number of solutions to a linear system algebraically and graphically (one solution, no solution, infinite solutions)
4. Use a system to model a real-life situation
5. Solve a system of linear inequalities by graphing
6. Verify if a given point is a solution to a system of equations or inequalities algebraically or graphically
7. Use a system of linear inequalities to model and solve real-life situations. (linear programming)
8. Communicate the solutions to a system of equations or inequalities graphically, algebraically and verbally

G. Exponents and Exponential Functions (Sections 8.1 – 8.5, 8.7, 8.8)

1. Evaluate and simplify exponential expressions (without a calculator)
 - using multiplication properties of exponents
 - that have negative and zero exponents
 - using division properties of exponents
2. Convert numbers from scientific notation to decimal form
3. Convert numbers from decimal form to scientific notation
4. Perform operations with numbers in scientific notation
5. Use scientific notation in problem solving (This revisits unit analysis from Unit 1.)
6. Use exponential growth models to solve real-life applications
7. Use exponential decay models to solve real-life applications
8. Graph exponential growth and decay models with and without calculator
9. Use a graphing calculator to find the best-fitting growth or decay model

H. Polynomials and Factoring (Chapter 9)

1. Identify and classify polynomials by degree and number of terms
2. Add and subtract polynomials, simplifying to standard form
3. Multiply polynomials
 - a. using FOIL
 - b. using special product patterns
4. Solve polynomial equations in factored form
5. Use factored form to sketch the graph of a quadratic (x-intercepts, vertex, and y-intercept)
6. Given solutions (zeros) of a polynomial, write an equation in both factored form and standard form
7. Factor quadratic trinomials
8. Factor a polynomial expression using greatest common factor (GCF), difference of squares, trial and error, and/or grouping
9. Solve polynomial equations by factoring
10. Apply factoring skills to write models and solve problems for real-life applications (e.g. area of a rectangle)

I. Quadratic Equations and Functions (Chapter 10)

1. Evaluate and approximate square roots
2. Simplify radicals
3. Apply the use of radicals to area and perimeter problems
4. Graph a parabola by making a table of values
5. Graph a parabola by hand by finding the x-intercepts, y-intercept, vertex, and axis of symmetry
6. Graph a parabola using the graphing calculator and interpret the vertex and intercepts in a

real-world context

7. Solve a quadratic equation by finding square roots, factoring, and/or applying the Quadratic Formula
8. Use the discriminant to determine the number of solutions to a quadratic equation and classify those solutions as rational or irrational
9. Use quadratic models to make predictions about real-world phenomena
10. Determine whether any given ordered pair is a solution to a given quadratic function or quadratic inequality
11. Choose an algebraic model (linear, exponential or quadratic) that best fits a collection of data
12. Sketch the graph of a quadratic inequality (with and without a calculator)
13. Complete the square to convert the equation of a parabola from standard form to vertex form.
14. Analyze the transformations of a parabola in vertex form to sketch the graph

J. Radical Expressions and Equations (Sections 11.1 – 11.4)

1. Determine the domain and range of a radical function from both the equation and the graph
2. Graph a radical function and state the key ordered pairs including, if applicable, the x - and y -intercepts
3. Perform key arithmetic operations (addition, subtraction, multiplication, and division) on radical expressions
4. Rationalize the denominator of a radical expression
5. Evaluate radical expressions for given values of the variable
6. Use conjugates in the process of multiplying and dividing radical expressions
7. Solve radical equations and check for extraneous solutions
8. Apply the Pythagorean Theorem to find the area and perimeter of a right triangle or to solve a real-world application problem

K. Rational Equations and Functions (Sections 12.1 – 12.3, 12.5, 12.6)

1. Recognize the graph of a rational function and identify the asymptotes
2. Simplify rational expressions (factor and cancel) and determine values of the variable, if any, for which the expression is undefined
3. Add, subtract, multiply, divide, and/or simplify rational expressions
4. Solve proportions using cross products
5. Solve rational equations by multiplying each side by an expression to clear the denominators
6. Check for extraneous solutions when solving rational equations