Math - Algebra 1

Idaho Department of Education Content Standards	Objective	Task Analysis	Maintenance Concepts	Essential Vocabulary	Sample Assessments	Materials / Resources
Cognitive level codes: o B: Memorize o C: Perform procedures o D: Demonstrate understanding o E: Conjecture, generalize, prove o F: Solve non-routine problems, make connections	Bloom's Equivalent o B = Knowledge o C = Comprehension o D = Comprehension o E = Application and Analysis o F = Synthesis		**These concepts should have been taught previously and are important foundational concepts that will be applied in this course. Continued facility with and understanding of the Maintenance Concepts is essential for success in the objectives for this course.**			General Resources
Standard 1: Number and Operation						
Goal 1.1: Understand numbers, ways of representing numbers, relationships among numbers, and number systems.	AI.1.1.1 Demonstrate meanings for real numbers, absolute value, integer exponents, and square roots.	• Define real numbers. • Classify real numbers as rational or irrational. • Estimate values of irrational numbers • Locate the position of a number on the number line. • Approximate the location of an irrational number on a number line. • Demonstrate the meanings of terms with integer exponents. • Define absolute value as distance from the origin on a number line. • Demonstrate that square root is the inverse operation of squaring a number.	• Compare, order, describe, and classify rational numbers to include integers, fractions, decimals, and absolute values. • Add, subtract, multiply, and divide rational numbers. • Read, write, and represent rational numbers. • Convert between standard and scientific notation. • Evaluate numerical expressions with whole number exponents. • Apply number theory concepts to include primes, composites, prime factorizations, least common multiples, and greatest common factors. • Evaluate numerical expressions using order of operations. • Estimate to predict computation results • Understand the meanings and effects of operations with fractions, decimals, and integers.	expression • equation• absolute value• base • power • exponent • radical • radicand • rationalize • distributive property • evaluate • irrational number • perfect square and cubes • principal square root • associative property of addition/multiplication • commutative property of addition/multiplication • identity property of addition/multiplication • inverse property of addition/multiplication • zero product property • rational number • real number system • square root • squaring • monomial • binomial • trinomial • polynomial • coefficient • leading coefficient • like terms • factor (noun and verb) • simplest form • term • constant• degree of polynomial • degree of a term	Graph the approximate location of the following on a number line: a. -4 b. $\sqrt{3}$ c. $-\frac{4}{5}$ d. $\frac{8}{5}$ e. $\lvert -2 \rvert$ What is the inverse operation of squaring a number and how would you use it to solve $x^2 = 25$?	http://www.algebasics.com/3way5.html
	AI.1.1.2 Demonstrate how the properties of real numbers apply to rational numbers.	• Identify commutative, associative, identity and inverse properties of addition and multiplication. • Identify distributive property. • Identify zero product property. • Justify the steps used in solving an algebra equation using real number properties- including equations with rational numbers.			Use properties of real numbers to justify each step $5(3x-4)+7x=80-x$ $15x-20+7x=80-x$ $15x+7x-20=80-x$ $22x-20=80-x$ $23x-20=80$ $23x=100$ $x=\frac{100}{23}$	http://math.com/school/subject2/lessons/S2U2L1GL.html
Goal 1.2: Understand meanings of operations and how they relate to one another.	AI.1.2.1 Judge the effects of multiplication, division, addition, subtraction, exponents, and square roots on the magnitudes of quantities.	• Determine the effect of raising rational numbers to integer exponents. • Determine the effect of taking the square root of rational numbers. • Estimate square roots between consecutive integers.			Which value is larger, $\left(\frac{1}{5}\right)^{1000}$ or $(5)^3$? Between which two integers does $\sqrt{68}$ lie?	http://www.math.com/school/subject1/lessons/S1U1L9GL.html
Goal 1.3: Compute fluently and make reasonable estimates.	AI.1.3.1 Perform computations with exponents, radicals, and scientific notation.	• Use order of operations and the properties of real numbers (substitution, commutative, associative, distributive, inverse, identity, multiplicative property of zero) to simplify expressions including polynomials, rational expressions, and expressions containing radicals and absolute values. • Simplify square roots containing radicands which are not perfect square numbers. • Add, subtract, and multiply square roots. • Multiply and divide numbers in scientific notation.			Simplify $(2+4)^2 \div \sqrt{4} - \lvert -1 \rvert$ Simplify to an exact value, $\sqrt{150x^3}$ Evaluate $5\sqrt{2}+3\sqrt{8}$ Evaluate $(8\times10^6)\div(2\times10^4)$	http://www.regentsprep.org/rEGENTS/math/math-topic.cfm?TopicCode=scinot http://www.purplemath.com/modules/radicals.htm http://www.purplemath.com/modules/exponent3.htm
	AI.1.3.2 Apply number sense to contextual situations and judge reasonableness of solutions.	• Use appropriate methods to estimate answers and determine if they are reasonable. • Select a suitable method of computing solutions using mental mathematics, paper and pencil, calculators, or computers.			Suppose you invested $900 for two years. You earned $67.50 in simple interest. Would .0375% be a reasonable interest rate?	http://www.onlinemathlearning.com/algebra-word-problems.html

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	AI.1.3.3 Use the properties of real numbers to simplify expressions.	• Identify properties of exponents. • Use the properties of exponents to add, subtract, and multiply polynomials, and to divide a polynomial by a monomial. • Factor polynomials using greatest common factor. • Factor quadratic expressions where the leading coefficient is 1 or -1.			Simplify $\frac{(x^2y^{-3}z^6)^4}{x^3z^{-3}}$ Simplify $(x^3+x-3)-(2x^3+x^2-6)$ Simplify $(2x-3)(x^2-x+1)$ Simplify $\frac{1}{3x}x^4-26x^2+3x$ Factor using the GCF $12x^4-6x^2+3x$ Factor x^2-5x+6	http://www.curriculum.org/tcf/teachers/projects/algebra/exponentlaws.adp
Standard 2: Concepts and Principles of Measurement						
Goal 2.1: Understand measurable attributes of objects and the units, systems, and processes of measurement.	AI.2.1.1 Make decisions about units and scales that are appropriate for a given problem.	• Choose an appropriate interval to number a graph for a given situation. • Label the axes of a graph with appropriate units. (i.e.: inches, seconds, etc.)	• Understand both metric and customary systems of measurement. • Understand relationships among units and convert from one unit to another in the same system and between systems. • Understand, select, and use units of appropriate size and type to measure angles, perimeter, area, surface area, and volume. • Use appropriate methods and units to estimate measurements. • Select and apply techniques and tools to accurately find length, area, volume, and angle measures to appropriate levels of precision. • Select and use formulas to determine the circumference and area of circles. • Select and use formulas to determine the perimeters and areas of triangles and quadrilaterals. • Develop strategies to determine the areas of irregular shapes. • Solve problems involving scale factors, rates, ratios, and proportions.	dimensional analysis • unit rate • scaling • intervals	Create a scatter plot using the following data. Label the axes with appropriate units and increments: Time (min): 0, 1, 3, 8, 10 Bacteria: 20, 40, 100, 180, 220	http://www.purplemath.com/modules/scattreg.htm
Goal 2.2: Apply appropriate techniques, tools, and formulas to determine measurements.	AI.2.2.1 Convert rates using dimensional analysis.	• Use dimensional analysis to convert rates between U.S. customary and metric systems.			A car is traveling at 30 miles per hour, convert the speed to centimeters per second.	http://alysion.org/dimensional/fun.htm
Standard 3: Concepts and Language of Algebra and Functions						
Goal 3.1: Understand patterns, relations, and functions.	AI.3.1.1 Represent linear patterns and functional relationships in a table and as a graph.	• Determine whether a relation is a function given graphs, charts, ordered pairs, mappings, or equations. • Define and interpret functions numerically, graphically, and algebraically. • Relate patterns in function tables to rate of change. • Identify domain and range for given graphs, charts, ordered pairs, and mappings. • Graph linear equations and inequalities on a coordinate plane when given a contextual situation, a table of values, two or more collinear points, the slope and intercept of the line, or an equation. • Create a table of values given a contextual situation or a linear equation.	• Represent, analyze, and generalize a variety of patterns with tables, graphs, words, and, when possible, symbolic rules. • Relate and compare different forms of representation for a relationship. • Demonstrate an initial conceptual understanding of different uses of variables. • Determine solutions for one- and two-step linear equations. • Recognize and generate equivalent forms for simple algebraic expressions. • Model and solve contextualized problems using various representations such as graphs, tables, and equations. • Identify attributes of the Cartesian coordinate system, such as quadrants, origin, and axes.	compound inequality • direct variation • inverse variation • domain • range • function • parent function • equation • function notation ($f(x)$) • inequality • intersecting line • linear • parabola • roots • zeros • parallel • perpendicular • percent of increase and decrease • point-slope form • proportion • quadratic equation in standard form • rate of change • relation • slope • slope-intercept form • solution • standard form • system of linear equations • x-intercept • y-intercept • zero product property • addition and multiplication properties of equality	If Sally works for 3 hours, she earns $17.00. When she works 4 hours she earns $21.00. Determine the rate of change and label with correct units. Graph $y \leq -3x+2$	http://www.purplemath.com/modules/graphlin.htm http://www.math.com/school/subject2/lessons/S2U4L3GL.html
	AI.3.1.2 Describe the graphs of linear and quadratic functions and discuss their appearances in terms of the basic concepts of intercepts and rate of change.	• Determine the slope, x-intercept, and y-intercept of a line given the graph of a line, contextual situations, two or more collinear points, or an equation. • Identify a quadratic function by its degree. • Identify the graphs of quadratic functions as parabolas that open up or down depending upon the leading coefficients in the equations. • Relate the solutions of quadratic functions to the points where the graphs of the functions cross the x-axes.			Identify the slope, $x-$ and $y-$ intercepts for $y=\frac{1}{3}x-6$ Describe the shape and orientation of the graph of $y=2x^2$	http://hotmath.com/hotmath_help/games/kp/kp_hotmath_sound.swf http://www.purplemath.com/modules/grphquad.htm

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Goal 3.2: Represent and analyze mathematical situations and structures using algebraic symbols.	AI.3.2.1 Represent linear patterns and relationships with an equation.	• Write linear equations and inequalities given the graph of a line, a contextual situation, two or more collinear points, a point and the slope of a line, or set of data. • Write linear equations in various forms including slope-intercept, point-slope, standard, and function notation. • Evaluate functions written in function notation.			Write the equation of a line through points $(3,-1)$ and $(2,4)$ in standard form. Given $f(x)=3x-2,$ find $f(5).$	http://www.coolmath.com/algebra/Algebra1/index.html#Algebra_1:_Lines http://www.coolmath.com/algebra/Algebra1/index.html#Algebra_1:_Functions http://www.regentsprep.org/Regents/math/ALGEBRA/AC1/EqLines.htm http://www.algebasics.com/3way11.html
	AI.3.2.2 Recognize and generate equivalent forms of algebraic expressions and solve equations, inequalities, and systems of equations.	• Model contextual situations by writing systems of linear equations containing no more than two variables. • Solve an equation involving several variables for one variable in terms of the others. • Solve multi-step linear equations and inequalities. • Solve one-variable compound inequalities. • Solve one-variable absolute value equations and inequalities. • Solve linear systems of equations and inequalities involving two variables using multiple strategies. • Solve quadratic equations (with a leading coefficient of 1 or -1) by factoring.			Given $A=\frac{1}{2}bh,$ solve for h. Graph the system of inequalities $\begin{cases} x+y\le 3 \\ y>x-3 \end{cases}$ Express $4.5+\lvert 3m-2\rvert>2$ as compound inequality, solve and graph.	http://www.purplemath.com/modules/systlin1.htm http://www.coolmath.com/algebra/Algebra1/index.html#Algebra_1:_Starting_to_Solve_Equations http://www.coolmath.com/algebra/Algebra1/index.html#Algebra_1:_Starting_to_Solve_Inequalities http://www.coolmath.com/algebra/Algebra1/index.html#Algebra_1:_Absolute_Value_Inequalities http://www.coolmath.com/algebra/Algebra1/index.html#Algebra_1:_Systems_of_Equations_(2x2s) http://www.coolmath.com/algebra/Algebra1/index.html#Algebra_1:_Word_Problems_2 http://www.regentsprep.org/Regents/math/ALGEBRA/AE4/litless.htm http://www.coolmath.com/algebra/Algebra1/index.html#Algebra_1:_Quadratics http://www.coolmath.com/algebra/Algebra1/index.html#Algebra_1:_Factoring_&_Dividing_Polynomials
Goal 3.3: Use mathematical models to represent and understand quantitative relationships.	AI.3.3.1 Develop proportional relationships to solve problems.	• Solve problems using proportions. • Solve percent application problems.			Solve $\frac{x+2}{5}=\frac{x}{7}$ 15 is 37% of what number The original price of a sweater is $18.70. It is on sale for 15% off the original price. The tax rate is 6.25%. How much will you end up paying for the sweater?	http://www.coolmath.com/algebra/Algebra1/index.html#Algebra_1:_Word_Problems_1 http://www.purplemath.com/modules/ratio.htm
Goal 3.4: Analyze change in various contexts.	AI.3.4.1 Interpret changes to the parent function $y = x$.	• Compare and contrast the graphs of $x = k$, $y = k$, $y = kx$, and $y = kx + b$ where k and b are rational numbers.				http://www.regentsprep.org/Regents/math/ALGEBRA/AC1/EqLines.htm

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Standard 4: Concepts and Principles of Geometry						
	No objectives at this course level.					
Standard 5: Data Analysis, Probability, and Statistics						
Goal 5.1: Collect, organize, and display data using a variety of formats.	No objectives at this course level.					
Goal 5.2: Select and use appropriate statistical methods to analyze data.	AI.5.2.1 Make predictions and draw conclusions based on measures of central tendency.	• Find missing data when given an expected mean. • Predict how changes in data (such as inclusions/exclusion of additional data or outliers) will affect measures of central tendency. • Identify and explain misleading uses of data.	• Analyze and interpret tables, charts, and graphs including frequency tables, scatter plots, broken line graphs, line plots, bar graphs, histogram, circle graphs, and stem-and-leaf plots. • Explain and justify conclusions drawn from tables, charts, and graphs. • Collect, organize, and display data with appropriate notation in tables, charts, and graphs, including scatter plots, broken line graphs, line plots, bar graphs, histograms, and stem-and-leaf plots. • Choose and calculate the appropriate measure of central tendency- mean, median, and mode. • Explain the significance of distribution of data, including range, frequency, gaps, and clusters. • Model situations of probability using simulations. • Recognize equally likely outcomes. • Explain that probability ranges from 0% to 100% and identify a situation as having high or low probability. • Make predictions based on experimental and theoretical probabilities.	line of best fit/trend line • positive and negative correlation • data • central tendency • frequency gap • cluster • mean • median • mode • range • scatter plot • outlier	The mean of 5 numbers is 8 and four of the numbers are 4, 10, 3, and 6. Find the fifth number.	http://www.regentsprep.org/Regents/math/ALGEBRA/AD2/measure.htm http://www.regentsprep.org/Regents/math/ALGEBRA/math-ALGEBRA.htm#Working_with_Data
	AI.5.2.2 Make predictions using linear relations, scatter plots, trend lines, charts, and tables.	• Graph scatter plots, sketch lines of best fit/trend lines, and identify positive and negative correlations. • Predict how changes in data will affect line of best fit/trend line. • Write the equation of a line of best fit/trend line.			Given the following data points $\{(1,2),(1,4),(2,1),(2,3),(5,2),(5,3),(5,4),(4,2),(4,3),(4,4),(5,3),(5,4),(6,3),(6,5),(7,5),(8,4)\}$ a. plot the points b. sketch a line of best fit/trend line c. write the eqation of your line d. identify positive or negative correlation	http://www.purplemath.com/modules/scattreg3.htm
Goal 5.3: Develop and evaluate inferences and predictions that are based on data.	No objectives at this course level.					
Goal 5.4: Understand basic concepts of probability.	No objectives at this course level.					