



# Algebra

## Concepts and Applications

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STANDARDS		PAGE REFERENCES
<b>STANDARD L1: REASONING ABOUT NUMBERS, SYSTEMS, AND QUANTITATIVE LITERACY</b>		
<b>L1.1 Number Systems and Number Sense</b>		
<b>L1.1.1</b> Know the different properties that hold in different number systems and recognize that the applicable properties change in the transition from the positive integers to all integers, to the rational numbers, and to the real numbers.	<b>Student Edition:</b> 8-13, 14-18 #27, 19-23, 26, 74 #49, 94-99, 100-103, 158 #50, 614-619, 620-623  <b>Teacher Wraparound Edition:</b> ICE 16  <b>Teacher Resources:</b> Enrichment 10, 20	
<b>L1.1.2</b> Explain why the multiplicative inverse of a number has the same sign as the number, while the additive inverse of a number has the opposite sign.	<b>Student Edition:</b> 64-69, 70-74, 154-159	
<b>L1.1.3</b> Explain how the properties of associativity, commutativity, and distributivity, as well as identity and inverse elements, are used in arithmetic and algebraic calculations.	<b>Student Edition:</b> 8-13, 14-18, 19-23, 64-69, 70-74, 75-79, 82-85, 165-169, 171-175, 176-179, 388-393, 394-398, 399-404, 405-409, 428-433  <i>Hands-On Algebra</i> 66, 388, 400	

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<p><b>L1.1.4</b> Describe the reasons for the different effects of multiplication by, or exponentiation of, a positive number by a number less than 0, a number between 0 and 1, and a number greater than 1.</p>	<p><b>Student Edition:</b> 75-79, 140-145 <i>Hands-On Algebra</i> 141 <b>Teacher Wraparound Edition:</b> OEA 79; RA 77, 142; TT 76</p>
<p><b>L1.1.5</b> Justify numerical relationships (e.g., show that the sum of even integers is even; that every integer can be written as <math>3m+k</math>, where <math>k</math> is 0, 1, or 2, and <math>m</math> is an integer; or that the sum of the first <math>n</math> positive integers is <math>n(n+1)/2</math>).</p>	<p><b>Student Edition:</b> 85 #46, 145 #48, 158 #50, 165-170, 193 #53, Introduction on 336, 340 #44, 358, 361 #45, 470 Ex 4, 568 Ex 4, 571 #36-#37 <b>Teacher Resources:</b> <i>Enrichment</i> 254, 412</p>
<p><b>L1.2 Representations and Relationships</b></p>	
<p><b>L1.2.2</b> Interpret representations that reflect absolute value relationships (e.g. <math> x - a  \leq b</math>, or <math>a \pm b</math>) in such contexts as error tolerance.</p>	<p><b>Student Edition:</b> 128-131 #33-#34, 530-534 #42-#44 <b>Teacher Resources:</b> <i>Enrichment</i> 129</p>
<p><b>L1.2.4</b> Organize and summarize a data set in a table, plot, chart, or spreadsheet; find patterns in a display of data; understand and critique data displays in the media.</p>	<p><b>Student Edition:</b> 200 Ex 6 <i>Investigation</i> 210-211</p>
<p><b>STANDARD L2: CALCULATION, ALGORITHMS, AND ESTIMATION</b></p>	
<p><b>L2.1 Calculation Using Real and Complex Numbers</b></p>	
<p><b>L2.1.1</b> Explain the meaning and uses of weighted averages (e.g., GNP, consumer price index, grade point average).</p>	<p><b>Student Edition:</b> 204-209 <b>Teacher Resources:</b> <i>Enrichment</i> 179</p>
<p><b>L2.1.2</b> Calculate fluently with numerical expressions involving exponents. Use the rules of exponents, and evaluate numerical expressions involving rational and negative exponents, and transition easily between roots and exponents.</p>	<p><b>Student Edition:</b> 336-340, 341-345, 347-351, 352-356, 366-371 <i>Math in the Workplace</i> 346 <b>Teacher Resources:</b> <i>Enrichment</i> 343, 353, 358</p>
<p><b>L2.1.3</b> Explain the exponential relationship between a number and its base 10 logarithm and use it to relate rules of logarithms to those of exponents in expressions involving numbers.</p>	<p>See Glencoe's <i>Algebra 2</i> © 2008 <b>Student Edition:</b> 528-533</p>
<p><b>L2.1.4</b> Know that the complex number <math>i</math> is one of two solutions to <math>x^2 = -1</math>.</p>	<p>See Glencoe's <i>Algebra 2</i> © 2008 <b>Student Edition:</b> 259-265</p>

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<b>L2.1.5</b> Add, subtract, and multiply complex numbers. Use conjugates to simplify quotients of complex numbers.	See Glencoe's <i>Algebra 2</i> © 2008 <b>Student Edition:</b> 259-265
<b>L2.1.6</b> Recognize when exact answers aren't always possible or practical. Use appropriate algorithms to approximate solutions to equations (e.g., to approximate square roots).	<b>Student Edition:</b> 315 #39, 362-365 <b>Teacher Resources:</b> <i>Enrichment 365</i>
<b>STANDARD L3: MEASUREMENT AND PRECISION</b>	
<b>L3.1 Measurement Units, Calculations, and Scales</b>	
<b>L3.1.2</b> Describe and interpret logarithmic relationships in such contexts as the Richter scale, the pH scale, or decibel measurements (e.g., explain why a small change in the scale can represent a large change in intensity). Solve applied problems.	See Glencoe's <i>Algebra 2</i> © 2008 <b>Student Edition:</b> 509-556
<b>STANDARD A1: EXPRESSIONS, EQUATIONS, AND INEQUALITIES</b>	
<b>A1.1 Construction, Interpretation, and Manipulation of Expressions (linear, quadratic, polynomial, rational, power, exponential, and logarithmic)</b>	
<b>A1.1.1</b> Give a verbal description of an expression that is presented in symbolic form, write an algebraic expression from a verbal description, and evaluate expressions given values of the variables.	<b>Student Edition:</b> 4-7, 8-13, 64-69, 70-74, 75-79, 82-85, 94-99, 100-103, 112-116 <b>Teacher Wraparound Edition:</b> EC 7
<b>A1.1.2</b> Know the definitions and properties of exponents and roots and apply them in algebraic expressions.	<b>Student Edition:</b> 336-340, 341-343, 347-351, 352-356, 357-361, 362-365, 366-371, 388-393, 394-398, 399-404 <i>Graphing Calculator Exploration 338-339</i> <b>Teacher Wraparound Edition:</b> EC 365 <b>Teacher Resources:</b> <i>Enrichment 343, 353, 368</i>
<b>A1.1.3</b> Factor algebraic expressions using, for example, greatest common factor, grouping, and the special product identities (e.g., differences of squares and cubes).	<b>Student Edition:</b> 420-425, 428-433, 434-439, 440-444, 445-449 <i>Hands-On Algebra 428, 434-435, 440</i> <b>Teacher Wraparound Edition:</b> EC 444; FA 437

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<p><b>A1.1.6</b> Use the properties of exponents and logarithms, including the inverse relationship between exponents and logarithms, to transform exponential and logarithmic expressions into equivalent forms.</p>	<p>See Glencoe's <i>Algebra 2</i> © 2008  <b>Student Edition:</b>            509-556</p>
<p><b>A1.2 Solutions of Equations and Inequalities (linear, exponential, logarithmic, quadratic, power, polynomial, and rational)</b></p>	
<p><b>A1.2.1</b> Write and solve equations and inequalities with one or two variables to represent mathematical or applied situations.</p>	<p><b>Student Edition:</b>            112-116, 117-121, 122-127, 160-164, 165-170, 171-175, 176-179, 188-193, 194-197, 198-203, 204-209, 212-217, 504-508, 509-513, 514-518, 519-523  <i>Graphing Calculator Exploration</i> 167</p>
<p><b>A1.2.2</b> Associate a given equation with a function whose zeros are the solutions of the equation.</p>	<p><b>Student Edition:</b>            468-473</p>
<p><b>A1.2.3</b> Solve linear and quadratic equations and inequalities, including systems of up to three linear equations with three unknowns. Justify steps in the solutions, and apply the quadratic formula appropriately.</p>	<p><b>Student Edition:</b>            468-473, 474-477, 478-482, 483-487, 550-553, 554-559, 560-565, 566-571, 572-577, 580-585, 586-590  <i>Graphing Calculator Exploration</i> 551  <i>Hands-On Algebra</i> 560  <i>Investigation</i> 578  <i>Math in the Workplace</i> 591</p>
<p><b>A1.2.4</b> Solve absolute value equations and inequalities (e.g., solve <math> x - 3  \leq 6</math>) and justify.</p>	<p><b>Student Edition:</b>            128-131, 145 #49-#51, 193 #64, 301 #57, 530-534  <i>Investigation</i> 540-541</p>
<p><b>A1.2.6</b> Solve power equations (e.g., <math>(x + 1)^3 = 8</math>) and equations including radical expressions (e.g., <math>\sqrt{3x - 7} = 7</math>), justify steps in the solution, and explain how extraneous solutions may arise.</p>	<p><b>Student Edition:</b>            624-629  <i>Graphing Calculator Exploration</i> 625  <b>Teacher Wraparound Edition:</b>            EC 629  <b>Teacher Resources:</b>  <i>Enrichment</i> 487</p>
<p><b>A1.2.8</b> Solve an equation involving several variables (with numerical or letter coefficients) for a designated variable. Justify steps in the solution.</p>	<p><b>Student Edition:</b>            244-249, 250-255, 290-295, 296-301, 310-315</p>

STANDARDS	PAGE REFERENCES
<b>STANDARD A2: FUNCTIONS</b>	
<b>A2.1 Definitions, Representations, and Attributes of Functions</b>	
<p><b>A2.1.1</b> Recognize whether a relationship (given in contextual, symbolic, tabular, or graphical form) is a function and identify its domain and range.</p>	<p><b>Student Edition:</b> 238-243, 244-249, 256-261, 289 #30, 425 #68, 489-493 <i>Investigation</i> 262-263</p> <p><b>Teacher Wraparound Edition:</b> EC 243; FA 258</p>
<p><b>A2.1.2</b> Read, interpret, and use function notation and evaluate a function at a value in its domain.</p>	<p><b>Student Edition:</b> 256-261</p> <p><b>Teacher Wraparound Edition:</b> EC 261; FA 258</p> <p><b>Teacher Resources:</b> <i>Enrichment</i> 264</p>
<p><b>A2.1.3</b> Represent functions in symbols, graphs, tables, diagrams, or words and translate among representations.</p>	<p><b>Student Edition:</b> 238-243, 244-249, 250-255, 256-261, 264-269, 270-275, 458-463, 489-493 <i>Graphing Calculator Exploration</i> 471 <i>Investigation</i> 262-263</p> <p><b>Teacher Wraparound Edition:</b> EC 269; FA 258</p>
<p><b>A2.1.4</b> Recognize that functions may be defined by different expressions over different intervals of their domains. Such functions are piecewise-defined (e.g., absolute value and greatest integer functions).</p>	<p><b>Student Edition:</b> 493 #32 <i>Graphing Calculator Exploration</i> 317</p> <p><b>Teacher Resources:</b> <i>Enrichment</i> 259, 552</p>
<p><b>A2.1.5</b> Recognize that functions may be defined recursively. Compute values of and graph simple recursively defined functions (e.g., <math>f(0) = 5</math>, and <math>f(n) = f(n-1) + 2</math>).</p>	<p><b>Student Edition:</b> <i>Investigation</i> 110-111</p>
<p><b>A2.1.6</b> Identify the zeros of a function and the intervals where the values of a function are positive or negative. Describe the behavior of a function as <math>x</math> approaches positive or negative infinity, given the symbolic and graphical representations.</p>	<p><b>Student Edition:</b> 468-473, 475 Ex 2</p>

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<b>A2.1.7</b> Identify and interpret the key features of a function from its graph or its formula(e), (e.g., slope, intercept(s), asymptote(s), maximum and minimum value(s), symmetry, and average rate of change over an interval).	<b>Student Edition:</b> 284-289, 296-301, 302-307, 310-315, 316-321, 322-327, 458-463, 468-473 <i>Graphing Calculator Exploration</i> 317, 471
<b>A2.2 Operations and Transformations</b>	
<b>A2.2.1</b> Combine functions by addition, subtraction, multiplication, and division.	See Glencoe's <i>Algebra 2</i> © 2008 <b>Student Edition:</b> 384-390
<b>A2.2.2</b> Apply given transformations (e.g., vertical or horizontal shifts, stretching or shrinking, or reflections about the $x$ - and $y$ -axes) to basic functions and represent symbolically.	<b>Student Edition:</b> 69 #61-#62, 77 Ex 9, 78 #13, 79 #49 <b>Teacher Resources:</b> <i>Enrichment</i> 482
<b>A2.2.3</b> Recognize whether a function (given in tabular or graphical form) has an inverse and recognize simple inverse pairs (e.g., $f(x) = x^3$ and $g(x) = x^{1/3}$ ).	See Glencoe's <i>Algebra 2</i> © 2008 <b>Student Edition:</b> 391-396
<b>A2.3 Families of Functions (linear, quadratic, polynomial, power, exponential, and logarithmic)</b>	
<b>A2.3.1</b> Identify a function as a member of a family of functions based on its symbolic or graphical representation. Recognize that different families of functions have different asymptotic behavior at infinity and describe these behaviors.	<b>Student Edition:</b> 316-321, 464-467 <i>Graphing Calculator Exploration</i> 317
<b>A2.3.2</b> Describe the tabular pattern associated with functions having constant rate of change (linear) or variable rates of change.	<b>Student Edition:</b> 250-255, 264-269, 270-275, 284-289, 458-463
<b>A2.4 Lines and Linear Functions</b>	
<b>A2.4.1</b> Write the symbolic forms of linear functions (standard [i.e., $Ax + By = C$ , where $B \neq 0$ ], point-slope, and slope-intercept) given appropriate information and convert between forms.	<b>Student Edition:</b> 290-295, 296-301, 322-327 <i>Investigation</i> 308-309 <b>Teacher Wraparound Edition:</b> EC 301; FA 300; RA 293, 299 <b>Teacher Resources:</b> <i>Enrichment</i> 308

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<p><b>A2.4.2</b> Graph lines (including those of the form <math>x = h</math> and <math>y = k</math>) given appropriate information.</p>	<p><b>Student Edition:</b> 250-255, 310-315, 316-321 <i>Graphing Calculator Exploration</i> 317</p> <p><b>Teacher Wraparound Edition:</b> EC 321</p>
<p><b>A2.4.3</b> Relate the coefficients in a linear function to the slope and <math>x</math>- and <math>y</math>-intercepts of its graph.</p>	<p><b>Student Edition:</b> 310-315</p> <p><b>Teacher Wraparound Edition:</b> EC 315</p>
<p><b>A2.4.4</b> Find an equation of the line parallel or perpendicular to given line through a given point. Understand and use the facts that nonvertical parallel lines have equal slopes and that nonvertical perpendicular lines have slopes that multiply to give <math>-1</math>.</p>	<p><b>Student Edition:</b> 322-327 <i>Hands-On Algebra</i> 324</p> <p><b>Teacher Wraparound Edition:</b> EC 327</p>
<p><b>A2.5 Exponential and Logarithmic Functions</b></p>	
<p><b>A2.5.1</b> Write the symbolic form and sketch the graph of an exponential function given appropriate information (e.g., given an initial value of 4 and a rate of growth of 1.5, write <math>f(x) = 4(1.5)^x</math>).</p>	<p><b>Student Edition:</b> 489-493 <i>Graphing Calculator Exploration</i> 491</p>
<p><b>A2.5.4</b> Understand and use the fact that the base of an exponential function determines whether the function increases or decreases and how base affects the rate of growth or decay.</p>	<p><b>Student Edition:</b> 489-493 <i>Investigation</i> 494-495</p> <p><b>Teacher Resources:</b> <i>Enrichment</i> 507</p>
<p><b>A2.5.5</b> Relate exponential and logarithmic functions to real phenomena, including half-life and doubling time.</p>	<p><b>Student Edition:</b> Does not include logarithms 489-493 <i>Investigation</i> 494-495</p> <p><b>Teacher Resources:</b> <i>Enrichment</i> 507</p>
<p><b>A2.6 Quadratic Functions</b></p>	
<p><b>A2.6.1</b> Write the symbolic form and sketch the graph of a quadratic function given appropriate information (e.g., vertex, intercepts, etc.).</p>	<p><b>Student Edition:</b> 458-463, 464-467, 468-473 <i>Graphing Calculator Exploration</i> 471</p>

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<b>A2.6.2</b> Identify the elements of a parabola (vertex, axis of symmetry, and direction of opening) given its symbolic form or its graph and relate these elements to the coefficient(s) of the symbolic form of the function.	<b>Student Edition:</b> 458-463, 464-467 <b>Teacher Wraparound Edition:</b> RA 461
<b>A2.6.3</b> Convert quadratic functions from standard to vertex form by completing the square.	<b>Student Edition:</b> 478-482 <i>Hands-On Algebra</i> 478-479
<b>A2.6.4</b> Relate the number of real solutions of a quadratic equation to the graph of the associated quadratic function.	<b>Student Edition:</b> 468-473, 475 Ex 2, 477 #35 <i>Graphing Calculator Exploration</i> 471
<b>A2.6.5</b> Express quadratic functions in vertex form to identify their maxima or minima and in factored form to identify their zeros.	<b>Student Edition:</b> 458-463
<b>A2.7 Power Functions (including roots, cubics, quartics, etc.)</b>	
<b>A2.7.1</b> Write the symbolic form and sketch the graph of power functions.	The following page references are power functions with a power of 2. <b>Student Edition:</b> 464 Ex 1, 466 #1, #4, #5, #10, #17, #18 Also see Glencoe's <i>Advanced Mathematical Concepts: Precalculus with Applications</i> © 2006 <b>Student Edition:</b> 704
<b>A2.7.2</b> Express direct and inverse relationships as functions (e.g., $y = kx^n$ and $y = kx^{-n}$ , $n > 0$ ) and recognize their characteristics (e.g., in $y = x^3$ , note that doubling $x$ results in multiplying $y$ by a factor of 8).	<b>Student Edition:</b> 264-275
<b>A2.7.3</b> Analyze the graphs of power functions, noting reflectional or rotational symmetry.	Reflectional symmetry is found on page <b>Student Edition:</b> 459
<b>A2.8 Polynomial Functions</b>	
<b>A2.8.1</b> Write the symbolic form and sketch the graph of simple polynomial functions.	<b>Teacher Resources:</b> <i>Enrichment</i> 487
<b>A2.8.2</b> Understand the effects of degree, leading coefficient, and number of real zeros on the graphs of polynomial functions of degree greater than 2.	See Glencoe's <i>Algebra 2</i> © 2008 <b>Student Edition:</b> 339-345, 473-478

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<p><b>A2.8.3</b> Determine the maximum possible number of zeroes of a polynomial function and understand the relationship between the x-intercepts of the graph and the factored form of the function.</p>	<p>See Glencoe's <i>Algebra 2</i> © 2008  <b>Student Edition:</b>  362-368</p>
<b>STANDARD A3: MATHEMATICAL MODELING</b>	
<p><b>A3.1 Models of Real-world Situations Using Families of Functions (linear, quadratic, exponential and power)</b>  <i>Example: An initial population of 300 people grows at 2% per year. What will the population be in 10 years?</i></p>	
<p><b>A3.1.1</b> Identify the family of function best suited for modeling a given real-world situation [e.g., quadratic functions for motion of an object under the force of gravity or exponential functions for compound interest. <i>In the example above, recognize that the appropriate general function is exponential (<math>P = P_0a^t</math>)</i>].</p>	<p><b>Student Edition:</b>  253 Ex 8, 255 #40, 266 Ex 4, 273 Ex 3, 298 Ex 6, 300 #46-#47, 315 #39, 463 #43, 467 #27-#28, 472 #25, 473 #26, 477 #32-#34, 489-493  <i>Investigation</i> 262-263, 494-495  <b>Teacher Wraparound Edition:</b>  RA 492  <b>Teacher Resources:</b>  <i>Enrichment</i> 493</p>
<p><b>A3.1.2</b> Adapt the general symbolic form of a function to one that fits the specifications of a given situation by using the information to replace arbitrary constants with numbers. <i>In the example above, substitute the given values <math>P_0 = 300</math> and <math>a = 1.02</math> to obtain <math>P = 300(1.02)^t</math>.</i></p>	<p><b>Student Edition:</b>  253 Ex 8, 255 #40, 266 Ex 4, 273 Ex 3, 298 Ex 6, 300 #46-#47, 315 #39, 460 Ex 4, 481 #35, 482 #40 &amp; #43, 490 Ex 4, 492-493 #22-#24  <i>Investigation</i> 262-263, 494-495</p>
<p><b>A3.1.3</b> Using the adapted general symbolic form, draw reasonable conclusions about the situation being modeled. <i>In the example above, the exact solution is 365.698, but for this problem, an appropriate approximation is 365.</i></p>	<p><b>Student Edition:</b>  315 #39, 480 Ex 3, 484 Ex 3, 486 #27, 493 #24</p>

STANDARDS	PAGE REFERENCES
<b>STANDARD S2: BIVARIATE DATA-EXAMINING RELATIONSHIPS</b>	
<b>S2.1 Scatterplots and Correlation</b>	
<p><b>S2.1.1</b> Construct a scatterplot for a bivariate data set with appropriate labels and scales.</p>	<p><b>Student Edition:</b> 302-307 <i>Investigation</i> 308-309 <b>Teacher Wraparound Edition:</b> RA 304 <b>Teacher Resources:</b> <i>Enrichment</i> 308</p>
<p><b>S2.1.2</b> Given a scatterplot, identify patterns, clusters, and outliers. Recognize no correlation, weak correlation, and strong correlation.</p>	<p><b>Student Edition:</b> 302-307</p>
<p><b>S2.1.3</b> Estimate and interpret Pearson’s correlation coefficient for a scatterplot of a bivariate data set. Recognize that correlation measures the strength of linear association.</p>	<p>See Glencoe’s <i>Algebra 2</i> © 2008 <b>Student Edition:</b> 92-93</p>
<p><b>S2.1.4</b> Differentiate between correlation and causation. Know that a strong correlation does not imply a cause-and-effect relationship. Recognize the role of lurking variables in correlation.</p>	<p>This standard can be met during teacher/class discussion.</p>
<b>S2.2 Linear Regression</b>	
<p><b>S2.2.1</b> For bivariate data that appear to form a linear pattern, find the least squares regression line by estimating visually and by calculating the equation of the regression line. Interpret the slope of the equation for a regression line.</p>	<p><b>Student Edition:</b> <i>Investigation</i> 308-309 (without the least squares terminology)</p>
<p><b>S2.2.2</b> Use the equation of the least squares regression line to make appropriate predictions.</p>	<p>This standard can be met during teacher/class discussion.</p>