The University of Chicago School Mathematics Project

Advanced Algebra

Correlated to Michigan High School Mathematics Content Standards and Expectations

Quantitative Literacy and Logic
Algebra and Functions

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Michigan High School Mathematics Content Standards and Expectations

Michigan High School Content Standards and Expectations		Wright Group/McGraw-Hill *Advanced Algebra* ©2010
Strand 1: Quantitative Literacy and Logic		
Standard L1: Reasoning About Numbers, Systems, and Quantitative Situations		
L1.1 Number Systems and Number Sense		
L1.1.1	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.	SE: 420–426, 427–433, 452–458, 459–465, 466–471, 493–499, 500–504, 556–561 TE: 420–426, 427–433, 452–458, 459–465, 466–471, 493–499, 500–504, 556–561 LM: 6-8A, 6-8B, 6-9A, 6-9B, 7-1A, 7-1B, 7-2A, 7-2B, 7-3A, 7-3B, 7-7A, 7-7B, 7-8A, 7-8B, 8-7A, 8-7B RM: 111, 112, 113, 114, 118, 119, 120, 121, 122, 123, 124, 131, 132, 133, 134, 148, 149 AR: Chapter 6 Test Forms A–D, Chapter 7 Test Forms A–D
L1.1.2	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.	SE: 328–329 TE: 328–329
L1.1.3	Explain how the properties of associativity, commutativity, and distributivity, as well as identity and inverse elements, are used in arithmetic and algebraic calculations.	SE: 7, 41–42, 229, 262, 328, 423, 428–430, 518, 531, 738–739, 746 TE: 7, 41–42, 229, 262, 328–329, 423, 428–429, 518, 531, 738–739, 746
L1.1.4	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.	SE: 452–458, 459–465, 466–471, 493–499, 500–504 TE: 452–458, 459–465, 466–471, 493–499, 500–504
L1.1.5	Justify numerical relationships.	Students practice with numerical relationships throughout the *Advanced Algebra* program. Representative pages: SE: 328, 381–382, 466–469, 500–502, 531 TE: 328, 381–382, 466–469, 500–502, 531
L1.1.6	Explain the importance of the irrational numbers and in basic right triangle trigonometry, and the importance of because of its role in circle relationships.	SE: 554–555
L1.2 Representations and Relationships		

SE: Student Edition
TE: Teacher's Edition
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L1.2.1	Use mathematical symbols to represent quantitative relationships and situations.	SE: 6, 20–21, 27, 72–73, 75, 201, 329, 421, 515, 517, 529, 531–533, 537, 538–539, 596, 597–598, 601, 663, 672, 714, 871–872, 883, 885 TE: 20–21, 72, 75, 329, 514, 516, 529, 537, 596, 663, 870, 871, 883
L1.2.2	Interpret representations that reflect absolute value relationships in such contexts as error tolerance.	SE: 380–385 TE: 380–385 LM: 6-2A, 6-2B RM: 96, 97 AR: Chapter 6 Test Forms A–D
L1.2.3	Use vectors to represent quantities that have magnitude and direction, interpret direction and magnitude of a vector numerically, and calculate the sum and difference of two vectors.	See Wright Group/McGraw-Hill *Algebra*. SE: 616 TE: 616
L1.2.4	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.	Students use graphic organizers to represent data throughout the *Advanced Algebra* program. Representative pages: SE: 13, 23, 24, 35, 37, 53, 77, 84, 86, 91, 111, 116, 125, 176–181, 185, 186, 190, 192–193 TE: 13, 23, 35, 46, 107, 116, 124, 134, 156, 161, 175, 176–181, 192–193
L1.3 Counting and Probabilistic Reasoning		
L1.3.1	Describe, explain, and apply various counting techniques; relate combinations to Pascal's triangle; know when to use each technique.	SE: 866, 867, 896–900, 902 TE: 866, 867, 896–902, 903, 905 LM: 13-5A, 13-5B, 13-6A RM: 254–255 AR: Chapter 13 Test Forms A–C
L1.3.2	Define and interpret commonly used expressions of probability.	SE: 453–454, 909–916, 917–921 TE: 453–454, 909–916, 917–921 LM: 13-7A, 13-7B, 13-8A, 13-8B RM: 258, 259, 260, 261, 262, 263 AR: Chapter 13 Test Forms A–D
L1.3.3	Recognize and explain common probability misconceptions such as "hot streaks" and "being due."	TE: 909, 910, 912, 917–918, 921
Standard L2: Calculation, Algorithms, and Estimation		
L2.1 Calculation Using Real and Complex Numbers		

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L2.1.1	Explain the meaning and uses of weighted averages.	Lesson 8-4 in Wright Group/McGraw-Hill *Advanced Algebra* may be extended to cover this standard. See: SE: 537–544 TE: 537–544
L2.1.2	Calculate fluently with numerical expressions involving exponents; use the rules of exponents; evaluate numerical expressions involving rational and negative exponents; transition easily between roots and exponents.	SE: 452–458, 459–465, 466–471, 493–499, 500–504 TE: 452–458, 459–465, 466–471, 493–499, 500–504 LM: 7-1A, 7-1B, 7-2A, 7-2B, 7-3A, 7-3B, 7-7A, 7-7B, 7-8A, 7-8B RM: 118, 119, 120, 121, 122, 123, 124, 131, 132, 133, 134, 135 AR: Chapter 7 Test Forms A–D
L2.1.3	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.	SE: 602, 603, 643–649 TE: 602, 603, 643–649 LM: 9-10A, 9-10B RM: 178, 179
L2.1.4	Know that the complex number i is one of two solutions to x2 = -1.	SE: 421 TE: 421
L2.1.5	Add, subtract, and multiply complex numbers; use conjugates to simplify quotients of complex numbers.	SE: 420–426, 427–433 TE: 420–426, 427–433 LM: 6-8A, 6-8B, 6-9A, 6-9B RM: 111, 112, 113, 114 AR: Chapter 6 Test Forms A–D
L2.2 Sequences and Iteration		
L2.2.1	Find the nth term in arithmetic, geometric, or other simple sequences.	SE: 196–197 TE: 196–197
L2.2.2	Compute sums of finite arithmetic and geometric sequences.	SE: 192, 196, 878, 879 TE: 192, 196, 878, 879
L2.2.3	Use iterative processes in such examples as computing compound interest or applying approximation procedures.	SE: 308–310, 472–478, 595–601 TE: 308–310, 472–478, 595–601 LM: 7-4A, 7-4B, 9-3A, 9-3B RM: 76, 125, 126, 158, 159
L2.3 Measurement Units, Calculations, and Scales		

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L2.3.1	Convert units of measurement within and between systems; explain how arithmetic operations on measurements affect units, and carry units through calculations correctly.	SE: 20–21, 174, 713–714 TE: 20–21, 174, 713–714
L2.3.2	Describe and interpret logarithmic relationships in such contexts as the Richter scale, the pH scale, or decibel measurements; solve applied problems.	SE: 608–614, 615–621, 622–628, 629–634, 635–642 TE: 608–614, 615–621, 622–628, 629–634, 635–642 LM: 9-5A, 9-5B, 9-6A, 9-6B, 9-7A, 9-7B, 9-8A, 9-8B, 9-9A, 9-9B RM: 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178 AR: Chapter 9 Test Forms A–D
L2.4 Understanding Error		
L2.4.1	Determine what degree of accuracy is reasonable for measurements in a given situation; express accuracy through use of significant digits, error tolerance, or percent of error; describe how errors in measurements are magnified by computation; recognize accumulated error in applied situations.	SE: 664, 666, 675–679
L2.4.2	Describe and explain round-off error, rounding, and truncating.	See Wright Group/McGraw-Hill *Transition Mathematics.* SE: 154, 157 TE: 154, 157
L2.4.3	Know the meaning of and interpret statistical significance, margin of error, and confidence level.	Lesson 13-3 in Wright Group/McGraw-Hill *Advanced Algebra* may be extended to cover this standard. See: SE: 883–888 TE: 883–888
Standard L3: Mathematical Reasoning, Logic, and Proof		
L3.1 Mathematical Reasoning		
L3.1.1	Distinguish between inductive and deductive reasoning, identifying and providing examples of each.	SE: 789
L3.1.2	Differentiate between statistical arguments (statements verified empirically using examples or data) and logical arguments based on the rules of logic.	See Wright Group/McGraw-Hill *Transition Mathematics.* SE: 738–739, 740 TE: 738–739, 740–741

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L3.1.3	Define and explain the roles of axioms (postulates), definitions, theorems, counterexamples, and proofs in the logical structure of mathematics. Identify and give examples of each.	Students practice with theorems and postulates throughout the *Advanced Algebra* program. Representative pages: SE: 169, 387, 460, 493, 760–765 TE: 169–170, 386, 459–460, 461, 493, 760–765
L3.2 Language and Laws of Logic		
L3.2.1	Know and use the terms of basic logic.	SE: 169, 460, 493, 635 TE: 169, 459–460, 461, 493
L3.2.2	Use the connectives "not," "and," "or," and "if…, then," in mathematical and everyday settings. Know the truth table of each connective and how to logically negate statements involving these connectives.	SE: 122, 363 TE: 123, 363
L3.2.3	Use the quantifiers "there exists" and "all" in mathematical and everyday settings and know how to logically negate statements involving them.	TE: 466
L3.2.4	Write the converse, inverse, and contrapositive of an "if…, then…" statement. Use the fact, in mathematical and everyday settings, that the contrapositive is logically equivalent to the original, while the inverse and converse are not.	SE: 122–123, 126 TE: 123
L3.3 Proof		
L3.3.1	Know the basic structure for the proof of an "if…, then…" statement (assuming the hypothesis and ending with the conclusion) and that proving the contrapositive is equivalent.	SE: 363 TE: 123, 363
L3.3.2	Construct proofs by contradiction. Use counterexamples, when appropriate, to disprove a statement.	SE: 568
L3.3.3	Explain the difference between a necessary and a sufficient condition within the statement of a theorem. Determine the correct conclusions based on interpreting a theorem in which necessary or sufficient conditions in the theorem or hypothesis are satisfied.	Lesson 2-5 in Wright Group/McGraw-Hill *Transition Mathematics* may be extended to cover this standard. See: SE: 98 TE: 98

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*L1.2.5	Read and interpret representations from various technological sources, such as contour or isobar diagrams.	Students use mathematical representations to solve problems throughout the *Advanced Algebra* program. Representative pages: SE: 33, 114–117, 121, 150, 176, 177, 408–410, 602–605, 772, 778–783 TE: 33, 114–117, 121, 150, 176, 177, 408–410, 602–605, 772, 778–783
*L2.1.7	Understand the mathematical bases for the differences among voting procedures.	
*L2.2.4	Compute sums of infinite geometric sequences.	Lesson 13-2 in Wright Group/McGraw-Hill *Advanced Algebra* may be extended to cover this standard. See: SE: 876–882 TE: 876–882
Strand 2: Algebra and Functions		
Standard A1: Expressions, Equations, and Inequalities		
A1.1 Construction, Interpretation, and Manipulation of Expressions		
A1.1.1	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.	SE: 7–13 TE: 7–13 LM: 1-1A, 1-1B
A1.1.2	Know the definitions and properties of exponents and roots transition fluently between them, and apply them in algebraic expressions.	SE: 452–455, 459–465, 466–471, 486–492, 493–499, 500–504 TE: 450, 452–455, 459–465, 466–471, 486–492, 493–499, 500–504 LM: 7-1A, 7-1B, 7-2A, 7-2B, 7-3A, 7-3B, 7-6A, 7-6B, 7-7A, 7-7B, 7-8A, 7-8B RM: 118, 119, 120, 121, 122, 123, 124, 129, 130, 131, 132, 133, 134 AR: Chapter 7 Test Forms A–D
A1.1.3	Factor algebraic expressions using, for example, greatest common factor, grouping, and the special product identities.	SE: 745–751 TE: 745–751 LM: 11-3A, 11-3B RM: 210 AR: 175, 177, 181, 187
A1.1.4	Add, subtract, multiply, and simplify polynomials and rational expressions.	SE: 730–737, 738–744 TE: 730–737, 738–744 LM: 11-1A, 11-1B, 11-2A, 11-2B RM: 204, 205, 206, 207, 208, 209 AR: Chapter 11 Test Forms A–D

SE: Student Edition RM: Resource Master LM: Lesson Master
TE: Teacher's Edition AR: Assessment Resources

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A1.1.5	Divide a polynomial by a monomial.	SE: 746 TE: 746
A1.1.6	Transform exponential and logarithmic expressions into equivalent forms using the properties of exponents and logarithms, including the inverse relationship between exponents and logarithms.	SE: 579, 608–614 TE: 608–614 LM: 9-5A, 9-5B
A1.2 Solutions of Equations and Inequalities		
A1.2.1	Write equations and inequalities with one or two variables to represent mathematical or applied situations, and solve.	SE: 345, 347, 799–803, 804–809, 812–815, 817–823, 831–837, 838–843 TE: 799–803, 804–809, 812–815, 817–823, 831–837, 838–843 LM: 5-7A, 5-7B, 12-1A, 12-1B, 12-2A, 12-2B, 12-3A, 12-3B, 12-4A, 12-4B, 12-6A, 12-6B, 12-7A, 12-7B RM: 221, 222, 223, 224, 226, 227, 235, 236, 237, 238 AR: Chapter 12 Test Forms A–D
A1.2.2	Associate a given equation with a function whose zeros are the solutions of the equation.	SE: 437 TE: 437
A1.2.3	Solve linear and quadratic equations and inequalities including systems of up to three linear equations with three unknowns. Justify steps in the solution, and apply the quadratic formula appropriately.	SE: 303, 314–320, 337–339, 348–349, 372, 380–385, 752 TE: 303, 314–320, 337–339, 348–349, 372, 380–385, 752 LM: 5-3A, 5-3B, 5-6A, 5-6B RM: 77, 76 AR: Chapter 5 Test Forms A–D
A1.2.4	Solve absolute value equations and inequalities, and justify steps in the solution.	SE: 380–385 TE: 380–385 LM: 6-2A, 6-2B RM: 96, 97 AR: Chapter 6 Test Forms A–D
A1.2.5	Solve polynomial equations and equations involving rational expressions, and justify steps in the solution.	SE: 728, 729, 772, 778–783 TE: 728, 729, 772, 778–783 LM: 11-8A, 11-8B RM: 217, 218, 219, 220 AR: Chapter 11 Test Forms A–D

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A1.2.6	Solve power equations and equations including radical expressions, justify steps in the solution, and explain how extraneous solutions may arise.	SE: 562–567, 643–649 TE: 562–567, 643–649 LM: 8-8A, 8-8B, 9-10A, 9-10B RM: 150, 151, 179, 180
A1.2.7	Solve exponential and logarithmic equations, and justify steps in the solution.	SE: 562–567, 608–614, 615–621, 622–628 TE: 562–567, 608–614, 615–621, 622–628 LM: 8-8A, 8-8B, 9-5A, 9-5B, 9-6A, 9-6B, 9-7A, 9-7B RM: 150, 151, 164, 165, 166, 167, 168, 169, 170, 171 AR: Chapter 9 Test Forms A–D
A1.2.8	Solve an equation involving several variables (with numerical or letter coefficients) for a designated variable. Justify steps in the solution.	SE: 345, 347, 799–803, 804–809, 812–815, 817–823, 831–837, 838–843 TE: 799–803, 804–809, 812–815, 817–823, 831–837, 838–843 LM: 5-7A, 5-7B, 12-1A, 12-1B, 12-2A, 12-2B, 12-3A, 12-3B, 12-4A, 12-4B, 12-6A, 12-6B, 12-7A, 12-7B RM: 221, 222, 223, 224, 226, 227, 235, 236, 237, 238 AR: Chapter 12 Test Forms A–D
A1.2.9	Know common formulas and apply appropriately in contextual situations.	SE: 8–10, 48, 52, 68, 78, 115, 196–197, 208, 467, 473, 477, 479–482, 487, 566, 583, 595, 597, 638, 641, 649, 871–872, 892–893 TE: 8–10, 48, 52, 68, 78, 115, 196–197, 208, 467, 473, 477, 479–482, 487, 566, 583, 595, 597, 638, 641, 649, 871–872, 892–893 LM: 1-1A, 1-1B, 1-7A, 1-7B RM: 16
A1.2.10	Use special values of the inverse trigonometric functions to solve trigonometric equations over specific intervals.	SE: 670–674 TE: 670–674 LM: 10-2A, 10-2B RM: 184, 185, 186 AR: Chapter 10 Test Forms A–D
Standard A2: Functions		
A2.1 Definitions, Representations, and Attributes Of Functions		
A2.1.1	Determine whether a relationship (given in contextual, symbolic, tabular, or graphical form) is a function and identify its domain and range.	SE: 14–19, 26–32, 33–39 TE: 14–19, 26–32, 33–39 LM: 1-2A, 1-2B, 1-4A, 1-4B, 1-5A, 1-5B RM: 7, 8, 11, 12, 13 AR: Chapter 1 Test Forms A–D

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A2.1.2	Read, interpret, and use function notation and evaluate a function at a value in its domain.	SE: 20–25, 26–32, 33–39 TE: 20–25, 26–32, 33–39 LM: 1-3A, 1-3B, 1-4A, 1-4B, 1-5A, 1-5B RM: 9, 10, 11, 12, 13 AR: Chapter 1 Test Forms A–D
A2.1.3	Represent functions in symbols, graphs, tables, diagrams, or words and translate among representations.	SE: 14–19, 20–25, 26–32, 33–39 TE: 14–19, 20–25, 26–32, 33–39 LM: 1-2A, 1-2B, 1-3A, 1-3B, 1-4A, 1-4B, 1-5A, 1-5B RM: 7, 8, 9, 10, 11, 12, 13 AR: Chapter 1 Test Forms A–D
A2.1.4	Recognize that functions may be defined by different expressions over different intervals of their domains; such functions are piecewise-defined.	SE: 171–175 TE: 171–175 LM: 3-4A, 3-4B RM: 42 AR: Chapter 3 Test Forms A–D
A2.1.5	Recognize that functions may be defined recursively. Compute values of and graph simple recursively defined functions.	SE: 36, 57, 158, 580 TE: 580–581
A2.1.6	Identify the zeros of a function, the intervals where the values of a function are positive or negative, and describe the behavior of a function as x approaches positive or negative infinity, given the symbolic and graphical representations.	SE: 21–25, 437, 439–440 TE: 21–25, 437 LM: 1-3B, 6-10A, 6-10B
A2.1.7	Identify and interpret the key features of a function from its graph or its formula(e).	SE: 14–19, 26–32 TE: 14–19, 26–32 LM: 1-2A, 1-2B, 1-4A, 1-4B
A2.2 Operations and Transformations		
A2.2.1	Combine functions by addition, subtraction, multiplication, and division.	SE: 21, 23 TE: 21, 23 RM: 9
A2.2.2	Apply given transformations to basic functions and represent symbolically.	Lesson 4-4 of Wright Group/McGraw-Hill *Advanced Algebra* may be extended to cover this standard. See: SE: 242 TE: 242
A2.2.3	Recognize whether a function (given in tabular or graphical form) has an inverse and recognize simple inverse pairs.	SE: 529–536 TE: 529–536 LM: 8-3A, 8-3B RM: 140

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A2.3 Representations of Functions	
A2.3.1 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.	Lessons 8-1 and 8-2 in Wright Group/McGraw-Hill *Advanced Algebra* may be extended to cover this standard. See: SE: 516–521, 522–528 TE: 516–521, 522–528
A2.3.2 Describe the tabular pattern associated with functions having constant rate of change (linear); or variable rates of change.	SE: 94, 100–101, 137 TE: 94, 100–101, 137
A2.3.3 Write the general symbolic forms that characterize each family of functions.	Lessons 8-1 and 8-2 in Wright Group/McGraw-Hill *Advanced Algebra* may be extended to cover this standard. See: SE: 516–521, 522–528 TE: 516–521, 522–528
A2.4 Models of Real-world Situations Using Families of Functions	
A2.4.1 Identify the family of function best suited for modeling a given real-world situation.	Lessons 8-1 and 8-2 in Wright Group/McGraw-Hill *Advanced Algebra* may be extended to cover this standard. See: SE: 516–521, 522–528 TE: 516–521, 522–528
A2.4.2 Adapt the general symbolic form of a function to one that fits the specification of a given situation by using the information to replace arbitrary constants with numbers.	SE: 20–25, 26–32, 33–39 TE: 20–25, 26–32, 33–39 LM: 1-3A, 1-3B, 1-4A, 1-4B, 1-5A, 1-5B RM: 9, 10, 11, 12, 13 AR: Chapter 1 Test Forms A–D
A2.4.3 Using the adapted general symbolic form, draw reasonable conclusions about the situation being modeled.	SE: 20–25, 26–32, 33–39 TE: 20–25, 26–32, 33–39 LM: 1-3A, 1-3B, 1-4A, 1-4B, 1-5A, 1-5B RM: 9, 10, 11, 12, 13 AR: Chapter 1 Test Forms A–D
Standard A3: Families of Functions	
A3.1 Lines and Linear Functions	
A3.1.1 Write the symbolic forms of linear functions (standard, point-slope, and slope-intercept) given appropriate information, and convert between forms.	SE: 150–156, 163, 165, 170–175 TE: 150–156, 170–175 LM: 3-2A, 3-2B, 3-4A, 3-4B
A3.1.2 Graph lines (including those of the form x = h and y = k) given appropriate information.	SE: 163–168 TE: 163–168 LM: 3-3A

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A3.1.3	Relate the coefficients in a linear function to the slope and x- and y-intercepts of its graph.	SE: 148, 150–156, 157–162, 163–168 TE: 148, 150–156, 157–162, 163–168
A3.1.4	Find an equation of the line parallel or perpendicular to given line, through a given point; understand and use the facts that non-vertical parallel lines have equal slopes, and that non-vertical perpendicular lines have slopes that multiply to give -1.	SE: 153, 154 TE: 153
A3.2 Exponential and Logarithmic Functions		
A3.2.1	Write the symbolic form and sketch the graph of an exponential function given appropriate information.	SE: 580–586, 587–594 TE: 580–586, 587–594 LM: 9-1A, 9-1B, 9-2A, 9-2B RM: 152, 153, 154, 155, 156, 157 AR: Chapter 9 Test Forms A–D
A3.2.2	Interpret the symbolic forms and recognize the graphs of exponential and logarithmic functions; recognize the logarithmic function as the inverse of the exponential function.	SE: 580–586, 587–594, 595–601, 602–607, 608–614 TE: 580–586, 587–594, 595–601, 602–607, 608–614 LM: 9-1A, 9-1B, 9-2A, 9-2B, 9-3A, 9-3B, 9-4A, 9-4B, 9-5A, 9-5B RM: 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165 AR: Chapter 9 Test Forms A–D
A3.2.3	Apply properties of exponential and logarithmic functions.	SE: 580–586, 587–594, 595–601, 602–607, 608–614 TE: 580–586, 587–594, 595–601, 602–607, 608–614 LM: 9-1A, 9-1B, 9-2A, 9-2B, 9-3A, 9-3B, 9-4A, 9-4B, 9-5A, 9-5B RM: 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165 AR: Chapter 9 Test Forms A–D
A3.2.4	Understand and use the fact that the base of an exponential function determines whether the function increases or decreases and understand how the base affects the rate of growth or decay.	SE: 169, 580–586, 587–594, 595–601 TE: 515, 580–586, 587–594, 595–601 LM: 9-1A, 9-1B, 9-2A, 9-2B, 9-3A, 9-3B RM: 152, 153, 154, 155, 156, 157 AR: Chapter 9 Test Forms A–D

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A.3.2.5 Relate exponential and logarithmic functions to real phenomena, including half-life and doubling time.	SE: 580–586, 587–594, 595–601, 602–607, 608–614 TE: 580–586, 587–594, 595–601, 602–607, 608–614 LM: 9-1A, 9-1B, 9-2A, 9-2B, 9-3A, 9-3B, 9-4A, 9-4B, 9-5A, 9-5B RM: 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165 AR: Chapter 9 Test Forms A–D
A3.3 Quadratic Functions	
A3.3.1 Write the symbolic form and sketch the graph of a quadratic function given appropriate information.	SE: 372–373, 386–392, 393–400 TE: 372–373, 386–392, 393–400 LM: 6-3A, 6-3B, 6-4A, 6-4B RM: 99, 100, 101 AR: Chapter 6 Test Forms A–D
A3.3.2 Identify the elements of a parabola (vertex, axis of symmetry, 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.	SE: 102–105, 385, 386–392, 394–400, 403–407 TE: 102–105, 385, 386–392, 394–400, 403–407 LM: 2-5A, 2-5B, 6-3A, 6-3B, 6-4A, 6-4B, 6-5A, 6-5B RM: 100, 101 AR: Chapter 6 Test Forms A–D
A3.3.3 Convert quadratic functions from standard to vertex form by completing the square.	SE: 393–400, 401–407 TE: 393–400, 401–407 LM: 6-4A, 6-4B, 6-5A, 6-5B RM: 102, 103, 104, 105, 106 AR: 84, 85, 87, 91
A3.3.4 Relate the number of real solutions of a quadratic equation to the graph of the associated quadratic function.	SE: 434–440 TE: 434–440 LM: 6-10A, 6-10B
A3.3.5 Express quadratic functions in vertex form to identify their maxima or minima, and in factored form to identify their zeros.	SE: 393–400, 401–407 TE: 393–400, 401–407 LM: 6-4A, 6-4B, 6-5A, 6-5B RM: 102, 103, 104, 105, 106 AR: 84, 85, 87, 91
A3.4 Power Functions	
A3.4.1 Write the symbolic form and sketch the graph of power functions.	SE: 452–458, 464 TE: 452–458, 464 LM: 7-1A, 7-1B RM: 118, 119

SE: Student Edition
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A3.4.2	Express direct and inverse relationships as functions and recognize their characteristics.	SE: 522–528, 529–536 TE: 522–528, 529–536 LM: 8-2A, 8-2B, 8-3A, 8-3B RM: 138, 139, 140, 141 AR: 121
A3.4.3	Analyze the graphs of power functions, noting reflectional or rotational symmetry.	SE: 452–458 TE: 452–458 LM: 7-1A
A3.5 Polynomial Functions		
A3.5.1	Write the symbolic form and sketch the graph of simple polynomial functions.	SE: 729, 731–738, 772–773 TE: 729, 731–738, 772–773 LM: 11-1A, 11-1B RM: 204, 205, 206
A3.5.2	Understand the effects of degree, leading coefficient, and number of real zeros on the graphs of polynomial functions of degree greater than 2.	SE: 730–737, 738–744, 752–759 TE: 730–737, 738–744, 752–759 LM: 11-1A, 11-1B, 11-2A, 11-2B, 11-4A, 11-4B RM: 204, 205, 206, 207, 208, 209, 211, 212 AR: Chapter 11 Test Forms A–D
A3.5.3	Determine the maximum possible number of zeros of a polynomial function, and understand the relationship between the x-intercepts of the graph and the factored form of the function.	SE: 745–751 TE: 745–751 LM: 11-3A, 11-3B RM: 210 AR: 176, 177, 181
A3.6 Rational Functions		
A3.6.1	Write the symbolic form and sketch the graph of simple rational functions.	SE: 148–149, 150–156, 213–214, 215–219, 393–400, 446–449, 578–579, 580–586, 602–607, 656–659 TE: 148–149, 150–156, 213–214, 215–219, 393–400, 446–449, 578–579, 580–586, 602–607, 656–659 LM: 3-1A, 3-1B, 6-4A, 9-1A, 9-1B RM: 38, 39, 152, 153 AR: Chapter 3 Test Forms A–D, Chapter 6 Test Forms A–D, Chapter 9 Test Forms A–D

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A3.6.2	Analyze graphs of simple rational functions and understand the relationship between the zeros of the numerator and denominator and the function's intercepts, asymptotes, and domain.	SE: 148–149, 150–156, 213–214, 215–219, 393–400, 446–449, 578–579, 580–586, 602–607, 656–659 TE: 148–149, 150–156, 213–214, 215–219, 393–400, 446–449, 578–579, 580–586, 602–607, 656–659 LM: 3-1A, 3-1B, 6-4A, 9-1A, 9-1B RM: 38, 39, 152, 153 AR: Chapter 3 Test Forms A–D, Chapter 6 Test Forms A–D, Chapter 9 Test Forms A–D
A3.7 Trigonometric Functions		
A3.7.1	Use the unit circle to define sine and cosine; approximate values of sine and cosine; use sine and cosine to define the remaining trigonometric functions; explain why the trigonometric functions are periodic.	SE: 682, 683–684, 687–689 TE: 682, 683–684, 687–689
A3.7.2	Use the relationship between degree and radian measures to solve problems.	SE: 712–717 TE: 712–717 LM: 10-9A, 10-9B RM: 201, 202, 203 AR: Chapter 10 Test Forms A–D
A3.7.3	Use the unit circle to determine the exact values of sine and cosine, for integer multiples of ⁄6 and ⁄4.	SE: 682–686, 687–692 TE: 682–686, 687–692 LM: 10-4A, 10-4B, 10-5A, 10-5B RM: 189, 190, 191, 192, 193 AR: Chapter 10 Test Forms A–D
A3.7.4	Graph the sine and cosine functions; analyze graphs by noting domain, range, period, amplitude, and location of maxima and minima.	SE: 693–699 TE: 693–699 LM: 10-6A, 10-6B RM: 194, 195, 196 AR: Chapter 10 Test Forms A–D
A3.7.5	Graph transformations of basic trigonometric functions (involving changes in period, amplitude, and midline) and understand the relationship between constants in the formula and the transformed graph.	SE: 691, 698, 718 TE: 691, 696, 698, 699, 718 LM: 10-6A, 10-6B
*A1.1.7	Transform trigonometric expressions into equivalent forms using basic identities such as	SE: 714–717 TE: 714–717

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*A2.2.4 If a function has an inverse, find the expression(s) for the inverse.	SE: 524, 526–528, 533–536 TE: 524, 526–528, 533–536
*A2.2.5 Write an expression for the composition of one function with another; recognize component functions when a function is a composition of other functions.	SE: 516–522 TE: 516–522 LM: 8-1B
*A2.2.6 Know and interpret the function notation for inverses and verify that two functions are inverses using composition.	SE: 522–528, 529–536 TE: 522–528, 529–536 LM: 8-2A, 8-2B, 8-3A, 8-3B
*A2.4.4 Use methods of linear programming to represent and solve simple real-life problems.	SE: 299, 355–361 TE: 298, 299, 355–361 LM: 5-9A, 5-9B RM: 92, 93