



Algebra 2

State Standard Number	State Standard Area/Description	Unit Name	Course Topic Description
2	Algebra and Functions		
A1	Students recognize, construct, interpret, and evaluate expressions. They fluently transform symbolic expressions into equivalent forms. They determine appropriate techniques for solving each type of equation, inequality, or system of equations, apply the techniques correctly to solve, justify the steps in the solutions, and draw conclusions from the solutions. They know and apply common formulas.	Chapter 1	1-1 Expressions & Formulas (Pages 6-10) 1-3 Solving Equations Pages 20-27
A1.1	Construction, Interpretation, and Manipulation of Expressions	Chapter 1	1-1 Expresson & Formulas (Pages 6-10)
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.	Chapter 1	1-3 Solving equations (pp. 20-27)
A1.1.2	Know the definitions and properties of exponents and roots transition fluently between them, and apply them in algebraic expressions.	Chapter 5	5-1 Rules of exponents (pp. 222-228) 5-5 Roots of Real numbers (pp. 240-245) 5-6 Radical expressions (pp. 250-255) 5-7 Rational exponents (pp. 257-262)
A1.1.3	Factor algebraic expressions using, for example, greatest common factor, grouping, and the special product identities.	Chapter 5 Chapter 6	5-4 Factoring Polynomials (pp. 239-244) 6-3 Solving Quadratics Equations by Factoring (pp. 301-304)

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A1.1.4	Add, subtract, multiply, and simplify polynomials and rational expressions.	Chapter 5	5-2 Polynomials (pp. 229-232)
A1.1.5	Divide a polynomial by a monomial.	Chapter 5	55-3 Dividing Polynomials (pp. 233-238)
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.	Chapter 10	10-2 Logarithms and logarithm functions Pages 531-538
A1.1.7	Transform trigonometric expressions into equivalent forms using basic identities such as $\sin^2 \theta + \cos^2 \theta = 1$ and $\tan^2 \theta + 1 = \sec^2 \theta$		
A1.2	Solutions of Equations and Inequalities	Chapter 1 Chapter 2 Chapter 3 Chapter 9	1-3 Solving equations (pages 20-27) 1-5 Solving inequalities 2-7 Graphing inequalities 3-3 Solving systems of inequalities by graphing 9-6 Solving Rational equations & inequalities (pages 505-511)
A1.2.1	Write equations and inequalities with one or two variables to represent mathematical or applied situations, and solve.	Chapter 1 Chapter 2 Chapter 3 Chapter 9	1-3 Solving equations (pages 20-27) 1-5 Solving inequalities 2-7 Graphing inequalities 3-3 Solving systems of inequalities by graphing 9-6 Solving Rational equations & inequalities (pages 505-511)
A1.2.2	Associate a given equation with a function whose zeros are the solutions of the equation.	Chapter 7	7-1 Polynomial Functions (pages 346-352) 7-1 Polynomial Functions (pages 346-352)

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			7-5 Roots and zeros (pages 371-377)
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.	Chapter 2 Chapter 3 Chapter 6	2-2 Linear equations (pp.63-67) 3-1 Solving Systems of Equations (pp. 110-115) 3-2 Solving Systems of equations algebraically (pp. 116-121) 3-3 Solving Systems of inequalities by Graphing (pp. 123-127) 3-5 Solving systems of equations in three variables (pp. 138-144) 6-2 Solving Quadratic Functions (pp. 286-293) 6-3 Solving Quadratic equations by factoring (pp. 301-304) 6-5 The Quadratic Formula and the Discriminant (pp. 313-319)
A1.2.4	Solve absolute value equations and inequalities, and justify steps in the solution.	Chapter 1	1-4 Absolute Value Equations (pp.28-32) 1-6 Absolute value inequalities (40-46)
A1.2.5	Solve polynomial equations and equations involving rational expressions, and justify steps in the solution.	Chapter 5	5-7 Radical Equations (pp. 257-262)
A1.2.6	Solve power equations and equations including radical expressions, justify steps in the solution, and explain how extraneous solutions may arise.	Chapter 5	5-6 Radical Expressions (pp. 250-255) 5-8 Radical Equations and Inequalities (pp. 263-267)
A1.2.7	Solve exponential and logarithmic equations, and justify steps in the solution.	Chapter 5	5-8 Radical Equations and Inequalities (pages 263-267)

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A1.2.8	Solve an equation involving several variables (with numerical or letter coefficients) for a designated variable. Justify steps in the solution.	Chapter 3	3-1 Solving system of equations by graphing (pages 110-115) 3-2 Solving systems of equations algebraically (pp. 116-122)
A1.2.9	Know common formulas and apply appropriately in contextual situations.	Throughout the textbook and course.	Throughout the textbook and course.
A1.2.10	Use special values of the inverse trigonometric functions to solve trigonometric equations over specific intervals.		
A2	Students understand functions, their representations, and their attributes. They perform transformations, combine and compose functions, and find inverses. Students classify functions and know the characteristics of each family. They work with functions with real coefficients fluently. Students construct or select a function to model a real-world situation in order to solve applied problems. They draw on their knowledge of families of functions to do so.	Chapter 2 Chapter 7	2-1 Relations and Functions (pages 56-62) 7-7 Operations on Functions (pages 383-389) 7-8 Inverse functions & relations (pages 390-394)
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.	Chapter 2	2-1 Relations and functions (pages 56-62)
A2.1.2	Read, interpret, and use function notation and evaluate a function at a value in its domain.	Chapter 2	2-1 Relations and functions (pages 56-62)

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A2.1.3	Represent functions in symbols, graphs, tables, diagrams, or words and translate among representations.	Chapter 2	2-1 Relations and functions (pages 56-62)
A2.1.4	Recognize that functions may be defined by different expressions over different intervals of their domains; such functions are piecewise-defined.		
A2.1.5	Recognize that functions may be defined recursively. Compute values of and graph simple recursively defined functions.	Chapter 11	11-6 Recursive and special sequences (pages 606-610)
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.	Chapter 7	7-1 Polynomial Functions (pages 346-352) 7-1 Polynomial Functions (pages 346-352) 7-5 Roots and zeros (pages 371-377)
A2.1.7	Identify and interpret the key features of a function from its graph or its formula(e).	Chapter 7	7-2 Graphing polynomial functions (pp. 353-358)
A2.2	Operations and Transformations		
A2.2.1	Combine functions by addition, subtraction, multiplication, and division.	Chapter 7	7-7 Operations on Functions (pp. 383-389)
A2.2.2	Apply given transformations to basic functions and represent symbolically.		

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A2.2.3	Recognize whether a function (given in tabular or graphical form) has an inverse and recognize simple inverse pairs.	Chapter 7	7-8 Inverse Functions and Relations (pp. 390-394)
A2.2.4	If a function has an inverse, find the expression(s) for the inverse.	Chapter 7	7-8 Inverse Functions and Relations (pp. 390-394)
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.	Chapter 7	7-7 Operations on Functions (pp. 383-389)
A2.2.6	Know and interpret the function notation for inverses and verify that two functions are inverses using composition.	Chapter 7	7-8 Inverse Functions and Relations (pp. 390-394)
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.	Chapter 8	8-6 Conic Sections (pp. 449-452)
A2.3.2	Describe the tabular pattern associated with functions having constant rate of change (linear); or variable rates of change.	Chapter 2 Chapter 9	2-1 Relations and functions (pages56-62) 2-2 Linear equations (pp.63-67) 9-4 Direct, Joint, & Inverse Variation (pp. 492-498)
A2.3.3	Write the general symbolic forms that characterize each family of functions.	Throughout the course and textbook.	Throughout the course and textbook.

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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.	Throughout the course and textbook.	Throughout the course and textbook.
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.	Throughout the course and textbook.	Throughout the course and textbook.
A2.4.3	Using the adapted general symbolic form, draw reasonable conclusions about the situation being modeled.	Throughout the course and textbook.	Throughout the course and textbook.
A2.4.4	Use methods of linear programming to represent and solve simple real-life problems.		
A3	Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-world situations.	Throughout the course and textbook.	Throughout the course and textbook.
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.	Chapter 2	2-2 Linear equations (pp.63-67) 2-3 Slope (pp.68-74) 2-4 Writing Linear equations (pp.75-80)

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A3.1.2	Graph lines (including those of the form $x = h$ and $y = k$) given appropriate information.	Chapter 2	2-4 Writing Linear equations (pp.75-80)
A3.1.3	Relate the coefficients in a linear function to the slope and x- and y-intercepts of its graph.	Chapter 2	2-3 Slope (pp.68-74) 2-4 Writing Linear equations (pp.75-80)
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.	Chapter 2	2-4 Writing Linear equations (pp.75-80)
A3.2	Exponential and Logarithmic Functions		
A3.2.1	Write the symbolic form and sketch the graph of an exponential function given appropriate information.	Chapter 10	10-1 Exponential functions (pp. 523-530)
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.	Chapter 10	10-2 Exponential functions (pp. 523-530) 10-4 Common Logarithms (pp. 531-538) 10-5 Base e and Natural Logarithms (pp. 547-551)
A3.2.3	Apply properties of exponential and logarithmic functions.	Chapter 10	10-2 Property of Logarithms (pp. 541-546)
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.	Chapter 10	10-6 Exponential Growth and Decay (pp. 560-565)

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A.3.2.5	Relate exponential and logarithmic functions to real phenomena, including half-life and doubling time.	Chapter 10	10-6 Exponential Growth and Decay (pp. 560-565)
A3.3	Quadratic Functions		
A3.3.1	Write the symbolic form and sketch the graph of a quadratic function given appropriate information.	Chapter 6	6-1 Graphing Quadratic Functions (pp. 286-294)
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.	Chapter 6	6-2 Solving Quadratic Functions (pp. 294-299)
A3.3.3	Convert quadratic functions from standard to vertex form by completing the square.	Chapter 6	6-4 Completing the square (pp. 306-312)
A3.3.4	Relate the number of real solutions of a quadratic equation to the graph of the associated quadratic function.	Chapter 6	6-5 Quadratic Formulas & Discriminant (pp.313-319)
A3.3.5	Express quadratic functions in vertex form to identify their maxima or minima, and in factored form to identify their zeros.	Chapter 6	6-1 Graphing Quadratic Functions (pp. 286-294) 6-3 Solving Quadratic equations by factoring (pp. 301-304)
A3.4	Power Functions		

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A3.4.1	Write the symbolic form and sketch the graph of power functions.	Chapter 7	7-1 Polynomial Functions (pages 346-352)
A3.4.2	Express direct and inverse relationships as functions and recognize their characteristics.	Chapter 2 Chapter 9	2-1 Relations and functions (pages 56-62) 2-2 Linear equations (pp. 63-67) 9-4 Direct, Joint, & Inverse Variation (pp. 492-498)
A3.4.3	Analyze the graphs of power functions, noting reflectional or rotational symmetry.		
A3.5	Polynomial Functions		
A3.5.1	Write the symbolic form and sketch the graph of simple polynomial functions.	Chapter 7	7-1 Polynomial Functions (pages 346-352)
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.	Chapter 7	7-1 Polynomial Functions (pages 346-352) 7-2 Graphing polynomial functions (pp. 353-358)
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.	Chapter 7	7-1 Polynomial Functions (pages 346-352) 7-2 Graphing polynomial functions (pp. 353-358)
A3.6	Rational Functions		

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A3.6.1	Write the symbolic form and sketch the graph of simple rational functions.	Chapter 9	9-3 Graphing Rational Functions (pp. 485-491)
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.	Chapter 9	9-1 Multiplying/ Dividing Polynomial expressions (pp. 472-478) 9-3 Graphing Rational Functions (pp. 485-491)
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.	Chapter 13	13-2 Angles & Angle measure (pp. 709-716)
A3.7.2	Use the relationship between degree and radian measures to solve problems.	Chapter 13	13-2 Angles & Angle measure (pp. 709-716)
A3.7.3	Use the unit circle to determine the exact values of sine and cosine, for integer multiples of $\pi/6$ and $\pi/4$.		
A3.7.4	Graph the sine and cosine functions; analyze graphs by noting domain, range, period, amplitude, and location of maxima and minima.		
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.		