

Texas Essential Knowledge and Skills	<i>Write Math Answers to Open-Ended Questions in Algebra</i> New Readers Press
(6.1) Number, operation, and quantitative reasoning. The student represents and uses rational numbers in a variety of equivalent forms. The student is expected to:	
(A) compare and order non-negative rational numbers;	SE: pp. 40–43
(B) generate equivalent forms of rational numbers including whole numbers, fractions, and decimals;	SE: pp. 40–43, 61–63, 64–67, 68–71
(C) use integers to represent real-life situations;	SE: pp. 8–11
(D) write prime factorizations using exponents;	
(E) identify factors of a positive integer, common factors, and the greatest common factor of a set of positive integers; and	
(F) identify multiples of a positive integer and common multiples and the least common multiple of a set of positive integers.	
(6.2) Number, operation, and quantitative reasoning. The student adds, subtracts, multiplies, and divides to solve problems and justify solutions. The student is expected to:	
(A) model addition and subtraction situations involving fractions with objects pictures, words, and numbers;	
(B) use addition and subtraction to solve problems involving fractions and decimals;	
(C) use multiplication and division of whole numbers to solve problems including situations involving equivalent ratios and rates;	SE: pp. 8–11, 32–35, 36–39, 44–47, 48–51
(D) estimate and round to approximate reasonable results and to solve problems where exact answers are not required; and	
(E) use order of operations to simplify whole number expressions (without exponents) in problem solving situations.	SE: pp. 12–15

Texas Essential Knowledge and Skills	<i>Write Math Answers to Open-Ended Questions in Algebra</i> New Readers Press
(6.3) Patterns, relationships, and algebraic thinking. The student solves problems involving direct proportional relationships. The student is expected to:	
(A) use ratios to describe proportional situations;	SE: pp. 48–51, 52–55, 56–59
(B) represent ratios and percents with concrete models, fractions, and decimals; and	SE: pp. 40–43, 60–63, 64–67, 68–71
(C) use ratios to make predictions in proportional situations.	SE: pp. 52–55, 56–59
(6.4) Patterns, relationships, and algebraic thinking. The student uses letters as variables in mathematical expressions to describe how one quantity changes when a related quantity changes. The student is expected to:	
(A) use tables and symbols to represent and describe proportional and other relationships such as those involving conversions, arithmetic sequences (with a constant rate of change), perimeter and area; and	SE: pp. 72–75
(B) use tables of data to generate formulas representing relationships involving perimeter, area, volume of a rectangular prism, etc.	
(6.5) Patterns, relationships, and algebraic thinking. The student uses letters to represent an unknown in an equation.	
The student is expected to formulate equations from problem situations described by linear relationships.	SE: pp. 16–19, 20–23, 24–27, 28–31, 32–35, 36–39, 52–55, 72–75
(6.6) Geometry and spatial reasoning. The student uses geometric vocabulary to describe angles, polygons, and circles. The student is expected to:	
(A) use angle measurements to classify angles as acute, obtuse, or right;	
(B) identify relationships involving angles in triangles and quadrilaterals; and	
(C) describe the relationship between radius, diameter, and circumference of a circle.	

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(6.7) Geometry and spatial reasoning. The student uses coordinate geometry to identify location in two dimensions.	
The student is expected to locate and name points on a coordinate plane using ordered pairs of non-negative rational numbers.	SE: pp. 76–79
(6.8) Measurement. The student solves application problems involving estimation and measurement of length, area, time, temperature, volume, weight, and angles. The student is expected to:	
(A) estimate measurements (including circumference) and evaluate reasonableness of results;	
(B) select and use appropriate units, tools, or formulas to measure and to solve problems involving length (including perimeter), area, time, temperature, volume, and weight;	SE: pp. 52–55, 56–59
(C) measure angles; and	
(D) convert measures within the same measurement system (customary and metric) based on relationships between units.	
(6.9) Probability and statistics. The student uses experimental and theoretical probability to make predictions. The student is expected to:	
(A) construct sample spaces using lists and tree diagrams; and	
(B) find the probabilities of a simple event and its complement and describe the relationship between the two.	
(6.10) Probability and statistics. The student uses statistical representations to analyze data. The student is expected to:	
(A) select and use an appropriate representation for presenting and displaying different graphical representations of the same data including line plot, line graph, bar graph, and stem and leaf plot;	

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(B) identify mean (using concrete objects and pictorial models), median, mode, and range of a set of data;	
(C) sketch circle graphs to display data; and	
(D) solve problems by collecting, organizing, displaying, and interpreting data.	
(6.11) Underlying processes and mathematical tools. The student applies Grade 6 mathematics to solve problems connected to everyday experiences, investigations in other disciplines, and activities in and outside of school. The student is expected to:	
(A) identify and apply mathematics to everyday experiences, to activities in and outside of school, with other disciplines, and with other mathematical topics;	SE: pp. 4–7, 8–11
(B) use a problem-solving model that incorporates understanding the problem, making a plan, carrying out the plan, and evaluating the solution for reasonableness;	SE: pp. 4–79
(C) select or develop an appropriate problem-solving strategy from a variety of different types, including drawing a picture, looking for a pattern, systematic guessing and checking, acting it out, making a table, working a simpler problem, or working backwards to solve a problem; and	SE: pp. 4–7, 52–55, 56–59, 72–75, 76–79
(D) select tools such as real objects, manipulatives, paper/pencil, and technology or techniques such as mental math, estimation, and number sense to solve problems.	SE: pp. 4–7, 40–43, 48–51, 52–55, 56–59

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(6.12) Underlying processes and mathematical tools. The student communicates about Grade 6 mathematics through informal and mathematical language, representations, and models. The student is expected to:	
(A) communicate mathematical ideas using language, efficient tools, appropriate units, and graphical, numerical, physical, or algebraic mathematical models; and	SE: pp. 16–19, 48–51, 52–55, 56–59, 60–63, 68–71, 76–79
(B) evaluate the effectiveness of different representations to communicate ideas.	
(6.13) Underlying processes and mathematical tools. The student uses logical reasoning to make conjectures and verify conclusions. The student is expected to	
(A) make conjectures from patterns or sets of examples and nonexamples; and	SE: pp. 9, 11, 72–75
(B) validate his/her conclusions using mathematical properties and relationships.	SE: pp. 72–75

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(7.1) Number, operation, and quantitative reasoning. The student represents and uses numbers in a variety of equivalent forms. The student is expected to:	
(A) compare and order integers and positive rational numbers;	SE: pp. 4–7, 40–43
(B) convert between fractions, decimals, whole numbers, and percents mentally, on paper, or with a calculator; and	SE: pp. 60–63, 64–67
(C) represent squares and roots using geometric models.	
(7.2) Number, operation, and quantitative reasoning. The student adds, subtracts, multiplies, or divides to solve problems and justify solutions. The student is expected to:	
(A) represent multiplication and division situations involving fractions and decimals with models, including concrete objects, pictures, words, and numbers;	
(B) use addition, subtraction, multiplication, and division to solve problems involving fractions and decimals;	SE: pp. 24–27, 40–43
(C) use models, such as concrete objects, pictorial models, and number lines, to add, subtract, multiply, and divide integers and connect the actions to algorithms;	SE: pp. 28–31
(D) use division to find unit rates and ratios in proportional relationships such as speed, density, price, recipes, and student-teacher ratio;	SE: pp. 44–47, 50–51, 68–71
(E) simplify numerical expressions involving order of operations and exponents;	SE: pp. 4–7, 8–11, 16–19, 36–39
(F) select and use appropriate operations to solve problems and justify the selections; and	SE: pp. 8–11, 12–15, 20–23, 24–27, 28–31, 32–35, 36–39, 76–79

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(G) determine the reasonableness of a solution to a problem.	
(7.3) Patterns, relationships, and algebraic thinking. The student solves problems involving direct proportional relationships. The student is expected to:	
(A) estimate and find solutions to application problems involving percent; and	SE: pp. 60–63, 64–67
(B) estimate and find solutions to application problems involving proportional relationships such as similarity, scaling, unit costs, and related measurement units.	SE: pp. 44–47, 52–55, 56–59
(7.4) Patterns, relationships, and algebraic thinking. The student represents a relationship in numerical, geometric, verbal, and symbolic form. The student is expected to:	
(A) generate formulas involving unit conversions, perimeter, area, circumference, volume, and scaling;	SE: pp. 8–11, 48–51
(B) graph data to demonstrate relationships in familiar concepts such as conversions, perimeter, area, circumference, volume, and scaling; and	
(C) use words and symbols to describe the relationship between the terms in an arithmetic sequence (with a constant rate of change) and their positions in the sequence.	SE: pp. 68–71, 72–75, 76–79
(7.5) Patterns, relationships, and algebraic thinking. The student uses equations to solve problems. The student is expected to:	
(A) use concrete and pictorial models to solve equations and use symbols to record the actions; and	SE: pp. 68–71
(B) formulate problem situations when given a simple equation and formulate an equation when given a problem situation.	

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(7.6) Geometry and spatial reasoning. The student compares and classifies two- and three-dimensional figures using geometric vocabulary and properties. The student is expected to:	
(A) use angle measurements to classify pairs of angles as complementary or supplementary;	
(B) use properties to classify triangles and quadrilaterals;	
(C) use properties to classify three-dimensional figures, including pyramids, cones, prisms, and cylinders; and	
(D) use critical attributes to define similarity.	SE: pp. 52–55
(7.7) Geometry and spatial reasoning. The student uses coordinate geometry to describe location on a plane. The student is expected to:	
(A) locate and name points on a coordinate plane using ordered pairs of integers; and	SE: pp. 76–79
(B) graph reflections across the horizontal and vertical axis and graph translations on a coordinate plane.	
(7.8) Geometry and spatial reasoning. The student uses geometry to model and describe the physical world. The student is expected to:	
(A) sketch three-dimensional figures when given the top, side, and front views;	
(B) make a net (two-dimensional model) of the surface area of a three-dimensional figure; and	
(C) use geometric concepts and properties to solve problems in fields such as art and architecture.	

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(7.9) Measurement. The student solves application problems involving estimation and measurement. The student is expected to:	
(A) estimate measurements and solve application problems involving length (including perimeter and circumference) and area of polygons and other shapes;	
(B) connect models for volume of prisms (triangular and rectangular) and cylinders to formulas of prisms (triangular and rectangular) and cylinders; and	
(C) estimate measurements and solve application problems involving volume of prisms (rectangular and triangular) and cylinders.	
(7.10) Probability and statistics. The student recognizes that a physical or mathematical model can be used to describe the experimental and theoretical probability of real-life events. The student is expected to:	
(A) construct sample spaces for simple or composite experiments; and	
(B) find the probability of independent events.	
(7.11) Probability and statistics. The student understands that the way a set of data is displayed influences its interpretation. The student is expected to:	
(A) select and use an appropriate representation for presenting and displaying relationships among collected data, including line plot, line graph, bar graph, stem and leaf plot, circle graph, and Venn diagrams, and justify the selection; and	
(B) make inferences and convincing arguments based on an analysis of given or collected data.	
(7.12) Probability and statistics. The student uses measures of central tendency and range to describe a set of data. The student is expected to:	
(A) describe a set of data using mean, median, mode, and range; and	

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(B) choose among mean, median, mode, or range to describe a set of data and justify the choice for a particular situation.	
(7.13) Underlying processes and mathematical tools. The student applies Grade 7 mathematics to solve problems connected to everyday experiences, investigations in other disciplines, and activities in and outside of school. The student is expected to:	
(A) identify and apply mathematics to everyday experiences, to activities in and outside of school, with other disciplines, and with other mathematical topics;	
(B) use a problem-solving model that incorporates understanding the problem, making a plan, carrying out the plan, and evaluating the solution for reasonableness;	SE: pp. 4–79
(C) select or develop an appropriate problem-solving strategy from a variety of different types, including drawing a picture, looking for a pattern, systematic guess and checking, acting it out, making a table, working a simpler problem, or working backwards to solve a problem; and	SE: pp. 68–71, 72–75, 76–79
(D) select tools such as real objects, manipulatives, paper/pencil, and technology or techniques such as mental math, estimation, and number sense to solve problems.	SE: pp. 20–23, 24–27, 28–31, 32–35, 56–59
(7.14) Underlying processes and mathematical tools. The student communicates about Grade 7 mathematics through informal and mathematical language, representations, and models. The student is expected to:	
(A) communicate mathematical ideas using language, efficient tools, appropriate units, and graphical, numerical, physical, and algebraic mathematical models; and	SE: pp. 4–7, 12–15, 16–19, 32–35, 40–43, 52–55, 56–59, 68–71, 72–75, 76–79

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(B) evaluate the effectiveness of different representations to communicate ideas.	
(7.15) Underlying processes and mathematical tools. The student uses logical reasoning to make conjectures and verify conclusions. The student is expected to:	
(A) make conjectures from patterns or sets of examples and nonexamples; and	SE: pp. 72–75, 76–79
(B) validate his/her conclusions using mathematical properties and relationships.	SE: pp. 76–79

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(8.1) Number, operation, and quantitative reasoning. The student understands that different forms of numbers are appropriate for different situations. The student is expected to:	
(A) compare and order rational numbers in various forms including integers, percents, and positive and negative fractions and decimals;	
(B) select and use appropriate forms of rational numbers to solve-real life problems including those involving proportional relationships;	
(C) approximate (mentally and with calculators) the value of irrational numbers as they arise from problem situations (such as π , $\div 2$); and	
(D) express numbers in scientific notation, including negative exponents, in appropriate problem situations.	
(8.2) Number, operation, and quantitative reasoning. The student selects and uses appropriate operations to solve problems and justify solutions. The student is expected to:	
(A) select appropriate operations to solve problems involving rational numbers and justify the selections;	SE: pp. 4–7, 8–11, 12–15, 20–23, 24–27, 28–31
(B) use appropriate operations to solve problems involving rational numbers in problem situations;	SE: pp. 4–7, 8–11, 12–15, 20–23, 24–27, 28–31, 32–35, 72–75, 76–79
(C) evaluate a solution for reasonableness; and	SE: pp. 24–27, 28–31, 56–59
(D) use multiplication by a constant factor (unit rate) to represent proportional relationships.	SE: pp. 36–39, 44–47, 48–51
(8.3) Patterns, relationships, and algebraic thinking. The student identifies proportional or non-proportional linear relationships in problem situations and solves problems. The student is expected to:	
(A) compare and contrast proportional and non-proportional linear relationships; and	

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(B) estimate and find solutions to application problems involving percents and other proportional relationships such as similarity and rates.	SE: pp. 36–39, 40–43, 44–47, 48–51
(8.4) Patterns, relationships, and algebraic thinking. The student makes connections among various representations of a numerical relationship.	
The student is expected to generate a different representation of data given another representation of data (such as a table, graph, equation, or verbal description).	SE: pp. 4–7, 8–11, 20–23, 32–35, 52–55, 56–59, 60–63, 64–67, 68–71, 72–75, 76–79
(8.5) Patterns, relationships, and algebraic thinking. The student uses graphs, tables, and algebraic representations to make predictions and solve problems. The student is expected to:	
(A) predict, find, and justify solutions to application problems using appropriate tables, graphs, and algebraic equations; and	SE: pp. 40–43, 44–47, 52–55, 56–59, 60–63, 64–67, 68–71, 72–75, 76–79
(B) find and evaluate an algebraic expression to determine any term in an arithmetic sequence (with a constant rate of change).	SE: pp. 4–7, 8–11, 32–35, 40–43, 44–47, 48–51
(8.6) Geometry and spatial reasoning. The student uses transformational geometry to develop spatial sense. The student is expected to:	
(A) generate similar figures using dilations including enlargements and reductions; and	
(B) graph dilations, reflections, and translations on a coordinate plane.	
(8.7) Geometry and spatial reasoning. The student uses geometry to model and describe the physical world. The student is expected to:	
(A) draw three-dimensional figures from different perspectives;	
(B) use geometric concepts and properties to solve problems in fields such as art and architecture;	SE: pp. 4–7
(C) use pictures or models to demonstrate the Pythagorean Theorem; and	

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(D) locate and name points on a coordinate plane using ordered pairs of rational numbers.	SE: pp. 64–67, 68–71, 72–75, 76–79
(8.8) Measurement. The student uses procedures to determine measures of three-dimensional figures. The student is expected to:	
(A) find lateral and total surface area of prisms, pyramids, and cylinders using concrete models and nets (two-dimensional models);	
(B) connect model of prisms, cylinders, pyramids, spheres, and cones to formulas for volume of these objects; and	
(C) estimate measurements and use formulas to solve application problems involving lateral and total surface area and volume.	SE: pp. 4–6
(8.9) Measurement. The student uses indirect measurement to solve problems. The student is expected to:	
(A) use the Pythagorean Theorem to solve real-life problems; and	
(B) use proportional relationships in similar two-dimensional figures or similar three-dimensional figures to find missing measurements.	
(8.10) Measurement. The student describes how changes in dimensions affect linear, area, and volume measures. The student is expected to:	
(A) describe the resulting effects on perimeter and area when dimensions of a shape are changed proportionally; and	
(B) describe the resulting effect on volume when dimensions of a solid are changed proportionally.	
(8.11) Probability and statistics. The student applies concepts of theoretical and experimental probability to make predictions. The student is expected to:	
(A) find the probabilities of dependent and independent events;	
(B) use theoretical probabilities and experimental results to make predictions and decisions; and	

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(C) select and use different models to simulate an event.	
(8.12) Probability and statistics. The student uses statistical procedures to describe data. The student is expected to:	
(A) select the appropriate measure of central tendency or range to describe a set of data and justify the choice for a particular situation;	
(B) draw conclusions and make predictions by analyzing trends in scatterplots; and	
(C) select and use an appropriate representation for presenting and displaying relationships among collected data, including line plots, line graphs, stem and leaf plots, circle graphs, bar graphs, box and whisker plots, histograms, and Venn diagrams, with and without the use of technology.	
(8.13) Probability and statistics. The student evaluates predictions and conclusions based on statistical data. The student is expected to:	
(A) evaluate methods of sampling to determine validity of an inference made from a set of data; and	
(B) recognize misuses of graphical or numerical information and evaluate predictions and conclusions based on data analysis.	
(8.14) Underlying processes and mathematical tools. The student applies Grade 8 mathematics to solve problems connected to everyday experiences, investigations in other disciplines, and activities in and outside of school. The student is expected to:	
(A) identify and apply mathematics to everyday experiences, to activities in and outside of school, with other disciplines, and with other mathematical topics;	

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(B) use a problem-solving model that incorporates understanding the problem, making a plan, carrying out the plan, and evaluating the solution for reasonableness;	SE: pp. 4–79
(C) select or develop an appropriate problem-solving strategy from a variety of different types, including drawing a picture, looking for a pattern, systematic guessing and checking, acting it out, making a table, working a simpler problem, or working backwards to solve a problem; and	SE: pp. 44–47, 52–55, 56–59, 64–67, 68–71, 72–75, 76–79
(D) select tools such as real objects, manipulatives, paper/pencil, and technology or techniques such as mental math, estimation, and number sense to solve problems.	SE: pp. 12–15, 16–19, 32–35, 40–43, 60–63
(8.15) Underlying processes and mathematical tools. The student communicates about Grade 8 mathematics through informal and mathematical language, representations, and models. The student is expected to:	
(A) communicate mathematical ideas using language, efficient tools, appropriate units, and graphical, numerical, physical, or algebraic mathematical models; and	SE: pp. 4–7, 32–35, 40–43, 44–47, 48–51, 52–55, 60–63
(B) evaluate the effectiveness of different representations to communicate ideas.	
(8.16) Underlying processes and mathematical tools. The student uses logical reasoning to make conjectures and verify conclusions. The student is expected to:	
(A) make conjectures from patterns or sets of examples and nonexamples; and	SE: pp. 52–55, 56–59
(B) validate his/her conclusions using mathematical properties and relationships.	SE: pp. 32–35, 60–63

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(A.1) Foundations for functions. The student understands that a function represents a dependence of one quantity on another and can be described in a variety of ways. The student is expected to:	
(A) describe independent and dependent quantities in functional relationships;	SE: pp. 40–43
(B) gather and record data and use data sets to determine functional relationships between quantities;	SE: pp. 4–7, 8–11, 12–15, 40–43
(C) describe functional relationships for given problem situations and write equations or inequalities to answer questions arising from the situations;	SE: pp. 4–7, 8–11, 12–15, 20–23, 24–27, 40–43, 48–51, 68–71
(D) represent relationships among quantities using concrete models, tables, graphs, diagrams, verbal descriptions, equations, and inequalities; and	SE: pp. 4–7, 8–11, 12–15, 16–19, 20–23, 40–43, 48–51, 76–79
(E) interpret and make decisions, predictions, and critical judgments from functional relationships.	SE: pp. 68–71
(A.2) Foundations for functions. The student uses the properties and attributes of functions. The student is expected to:	
(A) identify and sketch the general forms of linear ($y = x$) and quadratic ($y = x^2$) parent functions;	SE: pp. 64–67
(B) identify mathematical domains and ranges and determine reasonable domain and range values for given situations, both continuous and discrete;	SE: pp. 40–43, 48–51
(C) interpret situations in terms of given graphs or creates situations that fit given graphs; and	SE: pp. 40–43, 44–47

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Texas Essential Knowledge and Skills Algebra I	<i>Write Math Answers to Open-Ended Questions in Algebra</i> New Readers Press
(D) collect and organize data, make and interpret scatterplots (including recognizing positive, negative, or no correlation for data approximating linear situations), and model, predict, and make decisions and critical judgments in problem situations.	SE: pp. 44–47, 68–71
(A.3) Foundations for functions. The student understands how algebra can be used to express generalizations and recognizes and uses the power of symbols to represent situations. The student is expected to:	
(A) use symbols to represent unknown and variables; and	SE: pp. 4–7, 8–11, 12–15, 16–19, 20–23, 24–27, 68–71
(B) look for patterns and represent generalizations algebraically.	SE: pp. 40–43
(A.4) Foundations for functions. The student understands the importance of the skills required to manipulate symbols in order to solve problems and uses the necessary algebraic skills required to simplify algebraic expressions and solve equations and inequalities in problem situations. The student is expected to:	
(A) find specific function values, simplify polynomial expressions, transform and solve equations, and factor as necessary in problem situations;	SE: pp. 4–7, 8–11, 12–15, 16–19, 20–23, 24–27, 68–71
(B) use the commutative, associative, and distributive properties to simplify algebraic expressions; and	SE: pp. 16–19
(C) connect equation notation with function notation, such as $y = x + 1$ and $f(x) = x + 1$.	
(A.5) Linear functions. The student understands that linear functions can be represented in different ways and translates among their various representations. The student is expected to:	
(A) determine whether or not given situations can be represented by linear functions;	SE: pp. 40–43
(B) determine the domain and range for linear functions in given situations; and	SE: pp. 40–43, 48–51

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Texas Essential Knowledge and Skills Algebra I	<i>Write Math Answers to Open-Ended Questions in Algebra</i> New Readers Press
(C) use, translate, and make connections among algebraic, tabular, graphical, or verbal descriptions of linear functions.	SE: pp. 24–27
(A.6) Linear functions. The student understands the meaning of the slope and intercepts of the graphs of linear functions and zeros of linear functions and interprets and describes the effects of changes in parameters of linear functions in real-world and mathematical situations. The student is expected to:	
(A) develop the concept of slope as rate of change and determine slopes from graphs, tables, and algebraic representations;	SE: pp. 28–31, 32–35
(B) interpret the meaning of slope and intercepts in situations using data, symbolic representations, or graphs;	SE: pp. 28–31, 32–35, 36–39
(C) investigate, describe, and predict the effects of changes in m and b on the graph of $y = mx + b$;	SE: pp. 32–35, 36–39
(D) graph and write equations of lines given characteristics such as two points, a point and a slope, or slope and y -intercept;	SE: pp. 24–27, 32–35, 36–39
(E) determine the intercepts of the graphs of linear functions and zeros of linear functions from graphs, tables, and algebraic representations;	SE: pp. 32–35
(F) interpret and predict the effects of changing slope and y -intercept in applied situations; and	
(G) relate direct variation to linear functions and solve problems involving proportional change.	SE: pp. 72–75
(A.7) Linear functions. The student formulates equations and inequalities based on linear functions, uses a variety of methods to solve them, and analyzes the solutions in terms of the situation. The student is expected to:	
(A) analyze situations involving linear functions and formulate linear equations or inequalities to solve problems;	SE: pp. 28–31, 32–35, 48–51

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Texas Essential Knowledge and Skills Algebra I	<i>Write Math Answers to Open-Ended Questions in Algebra</i> New Readers Press
(B) investigate methods for solving linear equations and inequalities using concrete models, graphs, and the properties of equality, select a method, and solve the equations and inequalities; and	SE: pp. 48–51
(C) interpret and determine the reasonableness of solutions to linear equations and inequalities.	SE: pp. 48–51
(A.8) Linear functions. The student formulates systems of linear equations from problem situations, uses a variety of methods to solve them, and analyzes the solutions in terms of the situation. The student is expected to:	
(A) analyze situations and formulate systems of linear equations in two unknowns to solve problems;	SE: pp. 52–55, 56–59
(B) solve systems of linear equations using concrete models, graphs, tables, and algebraic methods; and	SE: pp. 52–55, 56–59
(C) interpret and determine the reasonableness of solutions to systems of linear equations.	SE: pp. 52–55, 56–59
(A.9) Quadratic and other nonlinear functions. The student understands that the graphs of quadratic functions are affected by the parameters of the function and can interpret and describe the effects of changes in the parameters of quadratic functions. The student is expected to:	
(A) determine the domain and range for quadratic functions in given situations;	SE: pp. 60–63
(B) investigate, describe, and predict the effects of changes in a on the graph of $y = ax^2 + c$;	SE: pp. 64–67
(C) investigate, describe, and predict the effects of changes in c on the graph of $y = ax^2 + c$; and	SE: pp. 64–67
(D) analyze graphs of quadratic functions and draw conclusions.	SE: pp. 64–67
(A.10) Quadratic and other nonlinear functions. The student understands there is more than one way to solve a quadratic equation and solves them using appropriate methods. The student is expected to:	
(A) solve quadratic equations using concrete models, tables, graphs, and algebraic methods; and	SE: pp. 60–63, 64–67

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(B) make connections among the solutions (roots) of quadratic equations, the zeros of their related functions, and the horizontal intercepts (x -intercepts) of the graph of the function.	SE: pp. 64–67
(A.11) Quadratic and other nonlinear functions. The student understands there are situations modeled by functions that are neither linear nor quadratic and models the situations. The student is expected to:	
(A) use patterns to generate the laws of exponents and apply them in problem-solving situations;	
(B) analyze data and represent situations involving inverse variation using concrete models, tables, graphs, or algebraic methods; and	SE: pp. 72–75
(C) analyze data and represent situations involving exponential growth and decay using concrete models, tables, graphs, or algebraic methods.	

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Texas Essential Knowledge and Skills Algebra II	<i>Write Math Answers to Open-Ended Questions in Algebra</i> New Readers Press
(2A.1) Foundations for functions. The student uses properties and attributes of functions and applies functions to problem situations. The student is expected to:	
(A) identify the mathematical domains and ranges of functions and determine reasonable domain and range values for continuous and discrete situations; and	SE: pp. 40–43
(B) collect and organize data, make and interpret scatterplots, fit the graph of a function to the data, interpret the results, and proceed to model, predict, and make decisions and critical judgments.	SE: pp. 44–47
(2A.2) Foundations for functions. The student understands the importance of the skills required to manipulate symbols in order to solve problems and uses the necessary algebraic skills required to simplify algebraic expressions and solve equations and inequalities in problem situations. The student is expected to:	
(A) use tools including factoring and properties of exponents to simplify expressions and to transform and solve equations; and	
(B) use complex numbers to describe the solutions of quadratic equations.	
(2A.3) Foundations for functions. The student formulates systems of equations and inequalities from problem situations, uses a variety of methods to solve them, and analyzes the solutions in terms of the situations. The student is expected to:	
(A) analyze situations and formulate systems of equations in two or more unknown or inequalities in two unknowns to solve problems;	SE: pp. 52–55, 56–59
(B) use algebraic methods, graphs, tables, or matrices, to solve problems of equations or inequalities; and	SE: pp. 52–55, 56–59
(C) interpret and determine the reasonableness of solutions to systems of equations or inequalities for given contexts.	SE: pp. 52–55, 56–59

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Texas Essential Knowledge and Skills Algebra II	<i>Write Math Answers to Open-Ended Questions in Algebra</i> New Readers Press
(2A.4) Algebra and geometry. The student connects algebraic and geometric representations of functions. The student is expected to:	
(A) identify and sketch graphs of parent functions, including linear ($f(x) = x$), quadratic ($f(x) = x^2$), exponential ($f(x) = a^x$), and logarithmic ($f(x) = \log_a x$) functions, absolute value of x ($f(x) = x $), square root of x ($f(x) = \sqrt{x}$), and reciprocal of x ($f(x) = 1/x$);	
(B) extend parent functions with parameters such as a in $f(x) = a/x$ and describe the effects of the parameter changes on the graph of parent functions; and	
(C) describe and analyze the relationship between a function and its inverse.	
(2A.5) Algebra and geometry. The student knows the relationship between the geometric and algebraic descriptions of conic sections. The student is expected to:	
(A) describe a conic section as the intersection of a plane and a cone;	
(B) sketch graphs of conic sections to relate simple parameter changes in the equation to corresponding changes in the graph;	
(C) identify symmetries from graphs of conic sections;	
(D) identify the conic section from a given equation; and	
(E) use the method of completing the square.	
(2A.6) Quadratic and square root functions. The student understands that quadratic functions can be represented in different ways and translates among their various representations. The student is expected to:	
(A) determine the reasonable domain and range values of quadratic functions, as well as interpret and determine the reasonableness of solutions to quadratic equations and inequalities;	

Texas Essential Knowledge and Skills Algebra II	<i>Write Math Answers to Open-Ended Questions in Algebra</i> New Readers Press
(B) relate representations of quadratic functions, such as algebraic, tabular, graphical, and verbal descriptions; and	SE: pp. 64–67
(C) determine a quadratic function from its roots or a graph.	
(2A.7) Quadratic and square root functions. The student interprets and describes the effects of changes in the parameters of quadratic functions in applied and mathematical situations. The student is expected to:	
(A) use characteristics of the quadratic parent function to sketch the related graphs and connect between the $y = ax^2 + bx + c$ and the $y = a(x - h)^2 + k$ symbolic representations of quadratic functions; and	SE: pp. 64–67
(B) use the parent function to investigate, describe, and predict the effects of changes in a , h , and k on the graphs of $y = a(x - h)^2 + k$ form of a function in applied and purely mathematical situations.	
(2A.8) Quadratic and square root functions. The student formulates equations and inequalities based on quadratic functions, uses a variety of methods to solve them, and analyzes the solutions in terms of the situation. The student is expected to:	
(A) analyze situations involving quadratic functions and formulate quadratic equations or inequalities to solve problems;	SE: pp. 60–63, 64–67
(B) analyze and interpret the solutions of quadratic equations using discriminants and solve quadratic equations using the quadratic formula;	
(C) compare and translate between algebraic and graphical solutions of quadratic equations; and	SE: pp. 64–67
(D) solve quadratic equations and inequalities using graphs, tables, and algebraic methods.	

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Texas Essential Knowledge and Skills Algebra II	<i>Write Math Answers to Open-Ended Questions in Algebra</i> New Readers Press
(2A.9) Quadratic and square root functions. The student formulates equations and inequalities based on square root functions, uses a variety of methods to solve them, and analyzes the solutions in terms of the situation. The student is expected to:	
(A) use the parent function to investigate, describe, and predict the effects of parameter changes on the graphs of square root functions and describe limitations on the domains and ranges;	
(B) relate representations of square root functions, such as algebraic, tabular, graphical, and verbal descriptions;	SE: pp. 68–71
(C) determine the reasonable domain and range values of square root functions, as well as interpret and determine the reasonableness of solutions to square root equations and inequalities;	
(D) determine solutions of square root equations using graphs, tables, and algebraic methods;	SE: pp. 68–71
(E) determine solutions of square root inequalities using graphs and tables;	
(F) analyze situations modeled by square root functions, formulate equations or inequalities, select a method, and solve problems; and	SE: pp. 68–71
(G) connect inverses of square root functions with quadratic functions.	
(2A.10) Rational functions. The student formulates equations and inequalities based on rational functions, uses a variety of methods to solve them, and analyzes the solutions in terms of the situation. The student is expected to:	
(A) use quotients of polynomials to describe the graphs of rational functions, predict the effects of parameter changes, describe limitations on the domains and ranges, and examine asymptotic behavior;	

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Texas Essential Knowledge and Skills Algebra II	<i>Write Math Answers to Open-Ended Questions in Algebra</i> New Readers Press
(B) analyze various representations of rational functions with respect to problem situations;	SE: pp. 76–79
(C) determine the reasonable domain and range values of rational functions, as well as interpret and determine the reasonableness of solutions to rational equations and inequalities;	
(D) determine the solutions of rational equations using graphs, tables, and algebraic methods;	SE: pp. 76–79
(E) determine solutions of rational inequalities using graphs and tables;	
(F) analyze a situation modeled by a rational function, formulate an equation or inequality composed of a linear or quadratic function, and solve the problem; and	SE: pp. 76–79
(G) use functions to model and make predictions in problem situations involving direct and inverse variation.	
(2A.11) Exponential and logarithmic functions. The student formulates equations and inequalities based on exponential and logarithmic functions, uses a variety of methods to solve them, and analyzes the solutions in terms of the situation. The student is expected to:	
(A) develop the definition of logarithms by exploring and describing the relationship between exponential functions and their inverses;	
(B) use the parent functions to investigate, describe, and predict the effects of parameter changes on the graphs of exponential and logarithmic functions, describe limitations on the domains and ranges, and examine asymptotic behavior;	

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<p style="text-align: center;">Texas Essential Knowledge and Skills Algebra II</p>	<p style="text-align: center;"><i>Write Math Answers to Open-Ended Questions in Algebra</i> New Readers Press</p>
<p>(C) determine the reasonable domain and range values of exponential and logarithmic functions, as well as interpret and determine the reasonableness of solutions to exponential and logarithmic equations and inequalities;</p>	
<p>(D) determine solutions of exponential and logarithmic equations using graphs, tables, and algebraic methods;</p>	
<p>(E) determine solutions of exponential and logarithmic inequalities using graphs and tables; and</p>	
<p>(F) analyze a situation modeled by an exponential function, formulate an equation or inequality, and solve the problem.</p>	

Texas Essential Knowledge and Skills Algebra I	<i>Write Math Answers to Open-Ended Questions in Algebra</i> New Readers Press
(A.1) Foundations for functions. The student understands that a function represents a dependence of one quantity on another and can be described in a variety of ways. The student is expected to:	
(A) describe independent and dependent quantities in functional relationships;	SE: pp. 12–15
(B) gather and record data and use data sets to determine functional relationships between quantities;	SE: pp. 20–23
(C) describe functional relationships for given problem situations and write equations or inequalities to answer questions arising from the situations;	SE: pp. 4–7, 8–11, 12–15, 16–19, 20–23, 40–43
(D) represent relationships among quantities using concrete models, tables, graphs, diagrams, verbal descriptions, equations, and inequalities; and	SE: pp. 4–7, 8–11, 12–15, 16–19, 20–23, 40–43, 76–79
(E) interpret and make decisions, predictions, and critical judgments from functional relationships.	SE: pp. 4–7, 8–11, 20–23, 40–43
(A.2) Foundations for functions. The student uses the properties and attributes of functions. The student is expected to:	
(A) identify and sketch the general forms of linear ($y = x$) and quadratic ($y = x^2$) parent functions;	
(B) identify mathematical domains and ranges and determine reasonable domain and range values for given situations, both continuous and discrete;	SE: pp. 26–29, 40–43
(C) interpret situations in terms of given graphs or creates situations that fit given graphs; and	SE: pp. 40–43

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(D) collect and organize data, make and interpret scatterplots (including recognizing positive, negative, or no correlation for data approximating linear situations), and model, predict, and make decisions and critical judgments in problem situations.	SE: pp. 48–51
(A.3) Foundations for functions. The student understands how algebra can be used to express generalizations and recognizes and uses the power of symbols to represent situations. The student is expected to:	
(A) use symbols to represent unknown and variables; and	SE: pp. 4–7, 8–11, 12–15, 20–23
(B) look for patterns and represent generalizations algebraically.	SE: pp. 38–39
(A.4) Foundations for functions. The student understands the importance of the skills required to manipulate symbols in order to solve problems and uses the necessary algebraic skills required to simplify algebraic expressions and solve equations and inequalities in problem situations. The student is expected to:	
(A) find specific function values, simplify polynomial expressions, transform and solve equations, and factor as necessary in problem situations;	SE: pp. 4–7, 8–11, 12–15, 36–39
(B) use the commutative, associative, and distributive properties to simplify algebraic expressions; and	SE: pp. 12–15, 36–39
(C) connect equation notation with function notation, such as $y = x + 1$ and $f(x) = x + 1$.	
(A.5) Linear functions. The student understands that linear functions can be represented in different ways and translates among their various representations. The student is expected to:	
(A) determine whether or not given situations can be represented by linear functions;	
(B) determine the domain and range for linear functions in given situations; and	SE: pp. 44–47

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(C) use, translate, and make connections among algebraic, tabular, graphical, or verbal descriptions of linear functions.	SE: pp. 20–23, 44–47
(A.6) Linear functions. The student understands the meaning of the slope and intercepts of the graphs of linear functions and zeros of linear functions and interprets and describes the effects of changes in parameters of linear functions in real-world and mathematical situations. The student is expected to:	
(A) develop the concept of slope as rate of change and determine slopes from graphs, tables, and algebraic representations;	SE: pp. 24–27, 28–31, 32–35
(B) interpret the meaning of slope and intercepts in situations using data, symbolic representations, or graphs;	SE: pp. 24–27, 28–31, 32–35
(C) investigate, describe, and predict the effects of changes in m and b on the graph of $y = mx + b$;	SE: pp. 24–27, 28–31, 32–35
(D) graph and write equations of lines given characteristics such as two points, a point and a slope, or slope and y -intercept;	SE: pp. 20–23, 24–27, 28–31, 32–35
(E) determine the intercepts of the graphs of linear functions and zeros of linear functions from graphs, tables, and algebraic representations;	SE: pp. 28–31
(F) interpret and predict the effects of changing slope and y -intercept in applied situations; and	
(G) relate direct variation to linear functions and solve problems involving proportional change.	
(A.7) Linear functions. The student formulates equations and inequalities based on linear functions, uses a variety of methods to solve them, and analyzes the solutions in terms of the situation. The student is expected to:	
(A) analyze situations involving linear functions and formulate linear equations or inequalities to solve problems;	SE: pp. 28–31, 40–43

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(B) investigate methods for solving linear equations and inequalities using concrete models, graphs, and the properties of equality, select a method, and solve the equations and inequalities; and	SE: pp. 28–31, 40–43
(C) interpret and determine the reasonableness of solutions to linear equations and inequalities.	SE: pp. 40–43
(A.8) Linear functions. The student formulates systems of linear equations from problem situations, uses a variety of methods to solve them, and analyzes the solutions in terms of the situation. The student is expected to:	
(A) analyze situations and formulate systems of linear equations in two unknowns to solve problems;	SE: pp. 52–55, 56–59
(B) solve systems of linear equations using concrete models, graphs, tables, and algebraic methods; and	SE: pp. 52–55, 56–59
(C) interpret and determine the reasonableness of solutions to systems of linear equations.	SE: pp. 52–55, 56–59
(A.9) Quadratic and other nonlinear functions. The student understands that the graphs of quadratic functions are affected by the parameters of the function and can interpret and describe the effects of changes in the parameters of quadratic functions. The student is expected to:	
(A) determine the domain and range for quadratic functions in given situations;	SE: pp. 60–63, 64–67
(B) investigate, describe, and predict the effects of changes in a on the graph of $y = ax^2 + c$;	SE: pp. 64–67
(C) investigate, describe, and predict the effects of changes in c on the graph of $y = ax^2 + c$; and	SE: pp. 64–67
(D) analyze graphs of quadratic functions and draw conclusions.	SE: pp. 64–67
(A.10) Quadratic and other nonlinear functions. The student understands there is more than one way to solve a quadratic equation and solves them using appropriate methods. The student is expected to:	
(A) solve quadratic equations using concrete models, tables, graphs, and algebraic methods; and	SE: pp. 60–63, 64–67

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(B) make connections among the solutions (roots) of quadratic equations, the zeros of their related functions, and the horizontal intercepts (x -intercepts) of the graph of the function.	SE: pp. 64–67
(A.11) Quadratic and other nonlinear functions. The student understands there are situations modeled by functions that are neither linear nor quadratic and models the situations. The student is expected to:	
(A) use patterns to generate the laws of exponents and apply them in problem-solving situations;	
(B) analyze data and represent situations involving inverse variation using concrete models, tables, graphs, or algebraic methods; and	SE: pp. 72–75
(C) analyze data and represent situations involving exponential growth and decay using concrete models, tables, graphs, or algebraic methods.	

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Texas Essential Knowledge and Skills Algebra II	<i>Write Math Answers to Open-Ended Questions in Algebra</i> New Readers Press
(2A.1) Foundations for functions. The student uses properties and attributes of functions and applies functions to problem situations. The student is expected to:	
(A) identify the mathematical domains and ranges of functions and determine reasonable domain and range values for continuous and discrete situations; and	SE: pp. 36–39
(B) collect and organize data, make and interpret scatterplots, fit the graph of a function to the data, interpret the results, and proceed to model, predict, and make decisions and critical judgments.	SE: pp. 48–51
(2A.2) Foundations for functions. The student understands the importance of the skills required to manipulate symbols in order to solve problems and uses the necessary algebraic skills required to simplify algebraic expressions and solve equations and inequalities in problem situations. The student is expected to:	
(A) use tools including factoring and properties of exponents to simplify expressions and to transform and solve equations; and	
(B) use complex numbers to describe the solutions of quadratic equations.	
(2A.3) Foundations for functions. The student formulates systems of equations and inequalities from problem situations, uses a variety of methods to solve them, and analyzes the solutions in terms of the situations. The student is expected to:	
(A) analyze situations and formulate systems of equations in two or more unknown or inequalities in two unknowns to solve problems;	SE: pp. 52–55, 56–59
(B) use algebraic methods, graphs, tables, or matrices, to solve problems of equations or inequalities; and	SE: pp. 52–55, 56–59
(C) interpret and determine the reasonableness of solutions to systems of equations or inequalities for given contexts.	SE: pp. 36–39, 52–55, 56–59

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(2A.4) Algebra and geometry. The student connects algebraic and geometric representations of functions. The student is expected to:	
(A) identify and sketch graphs of parent functions, including linear ($f(x) = x$), quadratic ($f(x) = x^2$), exponential ($f(x) = a^x$), and logarithmic ($f(x) = \log_a x$) functions, absolute value of x ($f(x) = x $), square root of x ($f(x) = \sqrt{x}$), and reciprocal of x ($f(x) = 1/x$);	
(B) extend parent functions with parameters such as a in $f(x) = a/x$ and describe the effects of the parameter changes on the graph of parent functions; and	
(C) describe and analyze the relationship between a function and its inverse.	
(2A.5) Algebra and geometry. The student knows the relationship between the geometric and algebraic descriptions of conic sections. The student is expected to:	
(A) describe a conic section as the intersection of a plane and a cone;	
(B) sketch graphs of conic sections to relate simple parameter changes in the equation to corresponding changes in the graph;	
(C) identify symmetries from graphs of conic sections;	
(D) identify the conic section from a given equation; and	
(E) use the method of completing the square.	
(2A.6) Quadratic and square root functions. The student understands that quadratic functions can be represented in different ways and translates among their various representations. The student is expected to:	
(A) determine the reasonable domain and range values of quadratic functions, as well as interpret and determine the reasonableness of solutions to quadratic equations and inequalities;	SE: pp. 64–67

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(B) relate representations of quadratic functions, such as algebraic, tabular, graphical, and verbal descriptions; and	SE: pp. 60–63, 64–67
(C) determine a quadratic function from its roots or a graph.	SE: pp. 60–63, 64–67
(2A.7) Quadratic and square root functions. The student interprets and describes the effects of changes in the parameters of quadratic functions in applied and mathematical situations. The student is expected to:	
(A) use characteristics of the quadratic parent function to sketch the related graphs and connect between the $y = ax^2 + bx + c$ and the $y = a(x - h)^2 + k$ symbolic representations of quadratic functions; and	SE: pp. 64–67
(B) use the parent function to investigate, describe, and predict the effects of changes in a , h , and k on the graphs of $y = a(x - h)^2 + k$ form of a function in applied and purely mathematical situations.	
(2A.8) Quadratic and square root functions. The student formulates equations and inequalities based on quadratic functions, uses a variety of methods to solve them, and analyzes the solutions in terms of the situation. The student is expected to:	
(A) analyze situations involving quadratic functions and formulate quadratic equations or inequalities to solve problems;	SE: pp. 60–63, 64–67
(B) analyze and interpret the solutions of quadratic equations using discriminants and solve quadratic equations using the quadratic formula;	
(C) compare and translate between algebraic and graphical solutions of quadratic equations; and	SE: pp. 64–67
(D) solve quadratic equations and inequalities using graphs, tables, and algebraic methods.	SE: pp. 60–63, 64–67

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(2A.9) Quadratic and square root functions. The student formulates equations and inequalities based on square root functions, uses a variety of methods to solve them, and analyzes the solutions in terms of the situation. The student is expected to:	
(A) use the parent function to investigate, describe, and predict the effects of parameter changes on the graphs of square root functions and describe limitations on the domains and ranges;	
(B) relate representations of square root functions, such as algebraic, tabular, graphical, and verbal descriptions;	SE: pp. 68–71
(C) determine the reasonable domain and range values of square root functions, as well as interpret and determine the reasonableness of solutions to square root equations and inequalities;	SE: pp. 68–71
(D) determine solutions of square root equations using graphs, tables, and algebraic methods;	SE: pp. 68–71
(E) determine solutions of square root inequalities using graphs and tables;	
(F) analyze situations modeled by square root functions, formulate equations or inequalities, select a method, and solve problems; and	SE: pp. 68–71
(G) connect inverses of square root functions with quadratic functions.	
(2A.10) Rational functions. The student formulates equations and inequalities based on rational functions, uses a variety of methods to solve them, and analyzes the solutions in terms of the situation. The student is expected to:	
(A) use quotients of polynomials to describe the graphs of rational functions, predict the effects of parameter changes, describe limitations on the domains and ranges, and examine asymptotic behavior;	

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(B) analyze various representations of rational functions with respect to problem situations;	SE: pp. 76–79
(C) determine the reasonable domain and range values of rational functions, as well as interpret and determine the reasonableness of solutions to rational equations and inequalities;	
(D) determine the solutions of rational equations using graphs, tables, and algebraic methods;	SE: pp. 76–79
(E) determine solutions of rational inequalities using graphs and tables;	
(F) analyze a situation modeled by a rational function, formulate an equation or inequality composed of a linear or quadratic function, and solve the problem; and	SE: pp. 76–79
(G) use functions to model and make predictions in problem situations involving direct and inverse variation.	
(2A.11) Exponential and logarithmic functions. The student formulates equations and inequalities based on exponential and logarithmic functions, uses a variety of methods to solve them, and analyzes the solutions in terms of the situation. The student is expected to:	
(A) develop the definition of logarithms by exploring and describing the relationship between exponential functions and their inverses;	
(B) use the parent functions to investigate, describe, and predict the effects of parameter changes on the graphs of exponential and logarithmic functions, describe limitations on the domains and ranges, and examine asymptotic behavior;	

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<p>(C) determine the reasonable domain and range values of exponential and logarithmic functions, as well as interpret and determine the reasonableness of solutions to exponential and logarithmic equations and inequalities;</p>	
<p>(D) determine solutions of exponential and logarithmic equations using graphs, tables, and algebraic methods;</p>	
<p>(E) determine solutions of exponential and logarithmic inequalities using graphs and tables; and</p>	
<p>(F) analyze a situation modeled by an exponential function, formulate an equation or inequality, and solve the problem.</p>	