

(DRAFT 05/20/09) Critical Algebra II TEKS, CCRS, and Performance

Texas Essential Knowledge and Skills (TEKS) for Algebra II	Texas College and Career Readiness Standards (CCRS)	Performance Expectations
<p>2A.1 Foundations for functions. The student uses properties and attributes of functions and applies functions to problem situations. The student is expected to:</p>		
<p>2A.1(A) identify the mathematical domains and ranges of functions and determine reasonable domain and range values for continuous and discrete situations; and</p>	<p>I.B.1 Perform computations with real and complex numbers. I.C.1 Use estimation to check for errors and reasonableness of solutions. II.C.1 Recognize and use algebraic (field) properties, concepts, procedures, and algorithms to solve equations, inequalities, and systems of linear equations. II.D.1 Interpret multiple representations of equations and relationships. II.D.2 Translate among multiple representations of equations and relationships. VI.C.2 Analyze data sets using graphs and summary statistics. VII.A.1 Recognize whether a relation is a function. VII.B.1 Understand and analyze features of a function.</p>	<p>Given a linear or quadratic parent function in one of the following forms—table, graph, mapping diagram, function notation, verbal description, or a set of ordered pairs—the student should be able to identify domain and range using set notation, interval notation, or a verbal description as appropriate.</p> <p>Given a contextual situation where continuous or discrete data is modeled by either a linear or quadratic function, the student should be able to determine a reasonable domain and range for the situation.</p>
<p>2A.1(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.</p> <p style="text-align: right;">Expectations</p>	<p>I.B.1 Perform computations with real and complex numbers. I.C.1 Use estimation to check for errors and reasonableness of solutions. II.C.1 Recognize and use algebraic (field) properties, concepts, procedures, and algorithms to solve equations, inequalities, and systems of linear equations. II.D.1 Interpret multiple representations of equations and relationships. II.D.2 Translate among multiple representations of equations and relationships. III.C.2 Make connections between geometry, statistics, and probability. IV.D.1 Compute and use measures of center and spread to describe data. IV.D.2 Apply probabilistic measures to practical situations to make informed decisions. VI.C.1 Make predictions and draw inferences using summary statistics. VI.C.2 Analyze data sets using graphs and summary statistics. VI.C.3 Analyze relationships between paired data using spreadsheets, graphing calculators, or statistical software. VI.C.4 Recognize reliability of statistical results. VII.A.1 Recognize whether a relation is a function. VII.A.2 Recognize and distinguish between different types of functions. VII.B.1 Understand and analyze features of a function. VII.B.2 Algebraically construct and analyze new functions. VII.C.1 Apply known function models. VII.C.2 Develop a function to model a situation.</p>	<p>Given a scatterplot, the student should be able to choose among a linear, quadratic, exponential, logarithmic, absolute value, square root, or reciprocal function to model the data.</p> <p>Given a scatterplot where a linear function is the best fit, the student should be able to interpret the slope and intercepts in terms of the situation; derive an equation using two data points; identify the limits under which the function is valid for the situation; and use the linear model to predict data points that are not already part of the scatterplot.</p>

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<p>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:</p>		
<p>2A.3(A) analyze situations and formulate systems of equations in two or more unknowns or inequalities in two unknowns to solve problems.</p>	<p>II.C.1 Recognize and use algebraic (field) properties, concepts, procedures, and algorithms to solve equations, inequalities, and systems of linear equations. II.D.1 Interpret multiple representations of equations and relationships. II.D.2 Translate among multiple representations of equations and relationships. VII.A.2 Recognize and distinguish between different types of functions. VII.B.2 Algebraically construct and analyze new functions. VII.C.1 Apply known function models. VII.C.2 Develop a function to model a situation.</p>	<p>Given a contextual situation, the student should be able to formulate a system of up to three linear equations with up to three unknowns.</p>
<p>2A.3(B) use algebraic methods, graphs, tables, or matrices, to solve systems of equations or inequalities; and</p>	<p>I.B.1 Perform computations with real and complex numbers. II.B.1 Recognize and use algebraic (field) properties, concepts, procedures, and algorithms to combine, transform, and evaluate expressions (e.g., polynomials, radicals, rational expressions). II.C.1 Recognize and use algebraic (field) properties, concepts, procedures, and algorithms to solve equations, inequalities, and systems of linear equations. II.C.2 Explain the difference between the solution set of an equation and the solution set of an inequality. II.D.1 Interpret multiple representations of equations and relationships. II.D.2 Translate among multiple representations of equations and relationships. VI.C.2 Analyze data sets using graphs and summary statistics. VII.B.2 Algebraically construct and analyze new functions.</p>	<p>Given a system of two non-linear equations, the student should be able to solve the system using graphs and tables.</p> <p>Given a system of two equations where at least one of the equations is linear, the student should be able to solve the system using graphs, tables, and algebraic methods.</p> <p>Given a system of three linear equations, the student should be able to solve the system using graphs, tables, and algebraic methods.</p>
<p>2A.3(C) interpret and determine the reasonableness of solutions to systems of equations or inequalities for given contexts.</p>	<p>I.B.1 Perform computations with real and complex numbers. I.C.1 Use estimation to check for errors and reasonableness of solutions. II.C.2 Explain the difference between the solution set of an equation and the solution set of an inequality. II.D.1 Interpret multiple representations of equations and relationships. II.D.2 Translate among multiple representations of equations and relationships. VII.C.1 Apply known function models. VII.C.2 Develop a function to model a situation.</p>	<p>Given the solutions to a system of equations, the student should be able to identify the reasonable solutions based on the situation and state them in terms of the situation.</p>

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<p>2A.4 Algebra and geometry. The student connects algebraic and geometric representations of functions. The student is expected to:</p>		
<p>2A.4(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</p>	<p>II.B.1 Recognize and use algebraic (field) properties, concepts, procedures, and algorithms to combine, transform, and evaluate expressions (e.g., polynomials, radicals, rational expressions). II.C.1 Recognize and use algebraic (field) properties, concepts, procedures, and algorithms to solve equations, inequalities, and systems of linear equations. II.D.1 Interpret multiple representations of equations and relationships. II.D.2 Translate among multiple representations of equations and relationships. III.B.1 Identify and apply transformations to figures. III.B.3 Use congruence transformations and dilations to investigate congruence, similarity, and symmetries of plane figures. VII.A.2 Recognize and distinguish between different types of functions. VII.B.1 Understand and analyze features of a function. VII.B.2 Algebraically construct and analyze new functions.</p>	<p>Given a linear function in the form $f(x)=a(x-h)+k$ or quadratic function in the form $f(x)=a(x-h)^2+k$, the student should be able to describe the effect of changes in a, h, and k using graphs, tables, and verbal descriptions.</p>
<p>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:</p>		
<p>2A.6(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;</p>	<p>I.B.1 Perform computations with real and complex numbers. I.C.1 Use estimation to check for errors and reasonableness of solutions. II.D.1 Interpret multiple representations of equations and relationships. II.D.2 Translate among multiple representations of equations and relationships. VII.B.1 Understand and analyze features of a function.</p>	<p>Given the solutions to a quadratic function, the student should be able to identify the reasonable solutions based on the situation and state them in terms of the situation.</p>
<p>2A.6(B) relate representations of quadratic functions, such as algebraic, tabular, graphical, and verbal descriptions; and</p>	<p>I.B.1 Perform computations with real and complex numbers. II.D.1 Interpret multiple representations of equations and relationships. II.D.2 Translate among multiple representations of equations and relationships. VII.A.1 Recognize whether a function is a relation. VII.B.1 Understand and analyze features of a function. VII.C.2 Develop a function to model a situation.</p>	<p>Given the algebraic representation of a quadratic function, the student should be able to generate the table, graph, and verbal description of this function.</p>

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<p>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:</p>		
<p>2A.7(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</p>	<p>I.B.1 Perform computations with real and complex numbers. II.B.1 Recognize and use algebraic (field) properties, concepts, procedures, and algorithms to combine, transform, and evaluate expressions (e.g., polynomials, radicals, rational expressions). II.C.1 Recognize and use algebraic (field) properties, concepts, procedures, and algorithms to solve equations, inequalities, and systems of linear equations. II.D.1 Interpret multiple representations of equations and relationships. II.D.2 Translate among multiple representations of equations and relationships. III.B.1 Identify and apply transformations to figures. III.B.3 Use congruence transformations and dilations to investigate congruence, similarity, and symmetries of plane figures. VII.B.1 Understand and analyze features of a function. VII.B.2 Algebraically construct and analyze new functions.</p>	<p>Given one or more of the following—vertex, maximum value, minimum value, axis of symmetry, or intercepts of the graph of a quadratic function—the student should be able to sketch the graph.</p> <p>Given a quadratic function in standard or vertex form, the student should be able to identify the vertex, maximum value, minimum value, axis of symmetry, and intercepts of the related graph.</p> <p>Given a quadratic function in standard form, the student should be able to use the method of completing the square to derive the vertex form.</p> <p>Given a quadratic function in vertex form, the student should be able to use algebraic methods to derive the standard form.</p>
<p>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:</p>		
<p>2A.8(A) analyze situations involving quadratic functions and formulate quadratic equations or inequalities to solve problems;</p>	<p>II.C.2 Explain the difference between the solution set of an equation and the solution set of an inequality. II.D.1 Interpret multiple representations of equations and relationships. II.D.2 Translate among multiple representations of equations and relationships. VII.A.2 Recognize and distinguish between different types of functions. VII.B.2 Algebraically construct and analyze new functions. VII.C.1 Apply known function models. VII.C.2 Develop a function to model a situation.</p>	<p>Given a contextual situation that can be modeled using a quadratic function, the student should be able to recognize that the quadratic model is appropriate and then formulate a quadratic equation.</p>
<p>2A.8(D) solve quadratic equations and inequalities using graphs, tables, and algebraic methods.</p>	<p>I.B.1 Perform computations with real and complex numbers. II.C.1 Recognize and use algebraic (field) properties, concepts, procedures, and algorithms to solve equations, inequalities, and systems of linear equations. II.D.1 Interpret multiple representations of equations and relationships. II.D.2 Translate among multiple representations of equations and relationships. VII.A.2 Recognize and distinguish between different types of functions. VII.B.2 Algebraically construct and analyze new functions. VII.C.1 Apply known function models. VII.C.2 Develop a function to model a situation.</p>	<p>Given a quadratic equation, with or without a related contextual situation, the student should be able to solve the equation using graphs, tables, and algebraic methods including the quadratic formula.</p>

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<p>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:</p>		
<p>2A.9(F) analyze situations modeled by square root functions, formulate equations or inequalities, select a method, and solve problems; and</p>	<p>I.B.1 Perform computations with real and complex numbers. I.C.1 Use estimation to check for errors and reasonableness of solutions. II.C.1 Recognize and use algebraic (field) properties, concepts procedures, and algorithms to solve equations, inequalities, and system of linear equations. II.C.2 Explain the difference between the solution set of an equation and the solution set of an inequality. II.D.1 Interpret multiple representations of equations and relationships. II.D.2 Translate among multiple representations of equations and relationships. VII.A.2 Recognize and distinguish between different types of functions. VII.B.2 Algebraically construct and analyze new functions. VII.C.1 Apply known function models. VII.C.2 Develop a function to model a situation.</p>	<p>Given a contextual situation that is modeled by a given square root function, the student should be able to formulate appropriate equations; find solutions to the equations using graphs, tables, and algebraic methods; and answer questions that are related to the contextual situation.</p>
<p>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:</p>		
<p>2A.10(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</p>	<p>I.B.1 Perform computations with real and complex numbers. I.C.1 Use estimation to check for errors and reasonableness of solutions. II.C.1 Recognize and use algebraic (field) properties, concepts, procedures, and algorithms to solve equations, inequalities, and systems of linear equations. II.C.2 Explain the difference between the solution set of an equation and the solution set of an inequality. II.D.1 Interpret multiple representations of equations and relationships. II.D.2 Translate among multiple representations of equations and relationships. VII.A.2 Recognize and distinguish between different types of functions. VII.B.2 Algebraically construct and analyze new functions. VII.C.1 Apply known function models. VII.C.2 Develop a function to model a situation.</p>	<p>Given a contextual situation that is modeled by a given rational function, the student should be able to formulate appropriate equations; find solutions to the equations using graphs, tables, and algebraic methods; and answer questions that are related to the contextual situation.</p>

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<p>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:</p>		
<p>2A.11(A) develop the definition of logarithms by exploring and describing the relationship between exponential functions and their inverses;</p>	<p>I.B.1 Perform computations with real and complex numbers. II.B.1 Recognize and use algebraic (field) properties, concepts, procedures, and algorithms to combine, transform, and evaluate expressions (e.g., polynomials, radicals, rational expressions). II.C.1 Recognize and use algebraic (field) properties, concepts, procedures, and algorithms to solve equations, inequalities, and systems of linear equations. II.D.1 Interpret multiple representations of equations and relationships. II.D.2 Translate among multiple representations of equations and relationships. VII.A.1 Recognize whether a relation is a function. VII.A.2 Recognize and distinguish between different types of functions. VII.B.1 Understand and analyze features of a function. VII.B.2 Algebraically construct and analyze new functions.</p>	<p>Given the graph of an exponential function, the student should be able to identify its inverse.</p> <p>Given the domain of an exponential function, the student should be able to recognize that this is the range of the corresponding logarithmic function.</p> <p>Given an exponential function, the student should be able to explain restrictions on the value of a that are necessary to produce the logarithmic function.</p>
<p>2A.11(F) analyze a situation modeled by an exponential function, formulate an equation or inequality, and solve the problem.</p>	<p>I.B.1 Perform computations with real and complex numbers. I.C.1 Use estimation to check for errors and reasonableness of solutions. II.C.1 Recognize and use algebraic (field) properties, concepts, procedures, and algorithms to solve equations, inequalities, and systems of linear equations. II.C.2 Explain the difference between the solution set of an equation and the solution set of an inequality. II.D.1 Interpret multiple representations of equations and relationships. II.D.2 Translate among multiple representations of equations and relationships. VII.A.2 Recognize and distinguish between different types of functions. VII.B.2 Algebraically construct and analyze new functions. VII.C.1 Apply known function models. VII.C.2 Develop a function to model a situation.</p>	<p>Given a contextual situation that is modeled by a given exponential function, the student should be able to formulate appropriate equations; find solutions to the equations using graphs, tables, and algebraic methods; and answer questions that are related to the contextual situation.</p>

Expectations