

Texas State Core Curriculum
Standards adopted 2007
Algebra II

| Strand | Description | Boardworks High School Algebra presentations |
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| | (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 | Functions and relations Domain, range and composite functions |
| | (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. | Non-linear relationships Measuring Correlation Scatter Plots Lines of best fit |
| | (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: | |

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| <p>(A) use tools including factoring and properties of exponents to simplify expressions and to transform and solve equations; and</p> | <p>Equations formulas and identities Solving linear equations Equations with parentheses and fractions Substituting into formulas Formula problems Rearranging a formula Manipulating formulas Generating formulas Solving linear inequalities Exponents Multiplying parentheses The distributive property Factoring</p> |
| <p>(B) use complex numbers to describe the solutions of quadratic equations.</p> | <p>–</p> |
| <p>(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 style="background-color: #cccccc;"> </p> |
| <p>(A) analyze situations and formulate systems of equations in two or more unknowns or inequalities in two unknowns to solve problems;</p> | <p>Inequalities in two variables Quadratic inequalities Systems of equations and graphs The elimination method for systems of equations The substitution method for systems of equations Systems of linear and quadratic equations Problems leading to systems of equations</p> |
| <p>(B) use algebraic methods, graphs, tables, or matrices, to solve systems of equations or inequalities; and</p> | <p>Systems of equations and graphs The elimination method for systems of equations The substitution method for systems of equations</p> |

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| (C) interpret and determine the reasonableness of solutions to systems of equations or inequalities for given contexts. | Systems of equations and graphs The elimination method for systems of equations The substitution method for systems of equations Inequalities in two variables |
| (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 ($f(x) = x$), | Linear Graphs |
| quadratic ($f(x) = x^2$) | Graphs of important non-linear functions Plotting and sketching graphs |
| exponential ($f(x) = a^x$) | Graphs of important non-linear functions Exponentials and logarithms |
| and logarithmic ($f(x) = \log_a x$) functions, | Exponentials and logarithms |
| absolute value of x ($f(x) = x $), | Absolute value functions |
| square root of x ($f(x) = \sqrt{x}$) | Plotting and sketching graphs |
| and reciprocal of x ($f(x) = 1/x$); | Graphs of important non-linear functions Plotting and sketching graphs |
| (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 | Plotting and sketching graphs |
| (C) describe and analyze the relationship between a function and its inverse. | Functions and relations Inverse functions |
| (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) Knowledge and skills

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| (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. | – |
| (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; | Solving quadratic equations Solving quadratic inequalities Domain, range and composite functions Plotting and sketching graphs |
| (B) relate representations of quadratic functions, such as algebraic, tabular, graphical, and verbal descriptions; and | Solving quadratic equations Graphs of quadratic functions |
| (C) determine a quadratic function from its roots (real and complex) or a graph. | Solving quadratic equations |
| (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 | Graphs of quadratic functions |
| (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. | Graphs of quadratic functions |
| (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: | |

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| (A) analyze situations involving quadratic functions and formulate quadratic equations or inequalities to solve problems; | Quadratic inequalities Quadratic equations and factoring Completing the square The quadratic formula Problems leading to quadratic equations |
| (B) analyze and interpret the solutions of quadratic equations using discriminants and solve quadratic equations using the quadratic formula; | Solving quadratic equations |
| (C) compare and translate between algebraic and graphical solutions of quadratic equations; and | Solving quadratic equations Graphs of quadratic functions |
| (D) solve quadratic equations and inequalities using graphs, tables, and algebraic methods. | Quadratic inequalities Quadratic equations and factoring Completing the square The quadratic formula Problems leading to quadratic equations |
| (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; | Domain, range and composite functions Plotting and sketching graphs |
| (B) relate representations of square root functions, such as algebraic, tabular, graphical, and verbal descriptions; | Plotting and sketching graphs |
| (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; | Domain, range and composite functions Plotting and sketching graphs |

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| (D) determine solutions of square root equations using graphs, tables, and algebraic methods; | Domain, range and composite functions Plotting and sketching graphs Manipulating radicals Manipulating formulas |
| (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 | Domain, range and composite functions Plotting and sketching graphs Manipulating radicals |
| (G) connect inverses of square root functions with quadratic functions. | Inverse functions |
| (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; | – |
| (B) analyze various representations of rational functions with respect to problem situations; | Simplifying rational functions Operations with algebraic fractions Improper fractions |
| (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; | Simplifying rational functions Operations with algebraic fractions Improper fractions |
| (D) determine the solutions of rational equations using graphs, tables, and algebraic methods; | Simplifying rational functions Operations with algebraic fractions Improper fractions |
| (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 | – |
| (G) use functions to model and make predictions in problem situations involving direct and inverse variation. | Direct proportion Inverse proportion |

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| (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; | The laws of logarithms Solving equations involving logarithms Exponentials and logarithms |
| (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; | Exponentials and logarithms Exponential growth and decay |
| (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; | The laws of logarithms Solving equations involving logarithms Exponentials and logarithms Exponential growth and decay |
| (D) determine solutions of exponential and logarithmic equations using graphs, tables, and algebraic methods; | The laws of logarithms Solving equations involving logarithms Exponentials and logarithms Exponential growth and decay |
| (E) determine solutions of exponential and logarithmic inequalities using graphs and tables; and | – |
| (F) analyze a situation modeled by an exponential function, formulate an equation or inequality, and solve the problem. | Exponential growth and decay |