



Clear Creek Independent School District

Educate • Equip • Excel

Leading the Way

Mathematics
Algebra II PreAP
2011-12

Clear Creek Independent School District

Portrait of a Graduate

The Clear Creek ISD portrait of a 21st century graduate reflects the beliefs, goals, and mission of the district. The portrait is reflected by the successful integration of instruction, character development, and technology designed to build 21st century skills and equip students to demonstrate mastery of the following:

Courage – as demonstrated through:

- ☛ a personal code of ethics that is the foundation of a strong character
- ☛ the confidence to lead, venture, persevere, and address challenges
- ☛ a spirit of confidence and dignity

Collaboration – as demonstrated through:

- ☛ ethical leadership
- ☛ effective communication and creative problem-solving skills necessary to succeed in increasingly complex social and work environments
- ☛ active participation in and responsible contributions to team efforts
- ☛ supportive and cooperative interpersonal relationships
- ☛ a respectful understanding of diversity

Innovation – as demonstrated through:

- ☛ ethical decision-making and conduct
- ☛ efficient and effective use of technology to research, organize, evaluate and communicate information
- ☛ a heightened sensibility of the connections between the academic world and global issues
- ☛ a conscientious recognition of civic rights and environmental obligations
- ☛ the enthusiastic application of creativity, originality, and self-expression

Self-Direction – as demonstrated through:

- ☛ a strong work ethic
- ☛ accountability for personal and professional achievement
- ☛ a commitment to the process of learning and establishing a vision for the future
- ☛ the continuous improvement and maintenance of mental and physical health
- ☛ the development of initiative, flexibility, and adaptability in accepting responsibility for actions
- ☛ the ability to initiate change or adapt to changes in personal and professional settings



Department of Curriculum and Instruction

Department	Mathematics	PEIMS Code	03100600
Subject Area	Algebra II PreAP	Grade Level	9 - 12

COURSE DESCRIPTION

(1) Foundation concepts for high school mathematics. As presented in Grades K-8, the basic understandings of number, operation, and quantitative reasoning; patterns, relationships, and algebraic thinking; geometry; measurement; and probability and statistics are essential foundations for all work in high school mathematics. Students continue to build on this foundation as they expand their understanding through other mathematical experiences.

(2) Algebraic thinking and symbolic reasoning. Symbolic reasoning plays a critical role in algebra; symbols provide powerful ways to represent mathematical situations and to express generalizations. Students study algebraic concepts and the relationships among them to better understand the structure of algebra.

(3) Functions, equations, and their relationship. The study of functions, equations, and their relationship is central to all of mathematics. Students perceive functions and equations as means for analyzing and understanding a broad variety of relationships and as a useful tool for expressing generalizations.

(4) Relationship between algebra and geometry. Equations and functions are algebraic tools that can be used to represent geometric curves and figures; similarly, geometric figures can illustrate algebraic relationships. Students perceive the connections between algebra and geometry and use the tools of one to help solve problems in the other.

(5) Tools for algebraic thinking. Techniques for working with functions and equations are essential in understanding underlying relationships. Students use a variety of representations (concrete, pictorial, numerical, symbolic, graphical, and verbal), tools, and technology (including, but not limited to, calculators with graphing capabilities, data collection devices, and computers) to model mathematical situations to solve meaningful problems.

(6) Underlying mathematical processes. Many processes underlie all content areas in mathematics. As they do mathematics, students continually use problem-solving, language and communication, and reasoning (justification and proof) to make connections within and outside mathematics. Students also use multiple representations, technology, applications and modeling, and numerical fluency in problem-solving contexts.

COURSE GOALS

(1) The student uses properties and attributes of functions and applies functions to problem situations.

(2). 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.

(3). 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.

(4) Algebra and geometry. The student connects algebraic and geometric representations of functions.

(5) Algebra and geometry. The student knows the relationship between the geometric and algebraic descriptions of conic sections.

(6) Quadratic and square root functions. The student understands that quadratic functions can be represented in different ways and translates among their various representations.

(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.

(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.

(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 situations.

(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.

(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.

PROCESS SKILLS:

The student is expected to:

- 1) identify the mathematical domains and ranges of functions and determine reasonable domain and range values for continuous and discrete situations;
- 2) 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;
- 3) use tools including factoring and properties of exponents to simplify expressions and to transform and solve equations;
- 4) use complex numbers to describe the solutions of quadratic equations;
- 5) analyze situations and formulate systems of equations in two or more unknowns or inequalities in two unknowns to solve problems;
- 6) use algebraic methods, graphs, tables, or matrices, to solve systems of equations or inequalities;
- 7) interpret and determine the reasonableness of solutions to systems of equations or inequalities for given contexts;
- 8) 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 ($f(x) = 1/x$);
- 9) 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;
- 10) describe and analyze the relationship between a function and its inverse;
- 11) describe a conic section as the intersection of a plane and a cone;
- 12) sketch graphs of conic sections to relate simple parameter changes in the equation to corresponding changes in the graph;
- 13) identify symmetries from graphs of conic sections;
- 14) identify the conic section from a given equation;
- 15) use the method of completing the square;
- 16) 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;
- 17) relate representations of quadratic functions, such as algebraic, tabular, graphical, and verbal descriptions;
- 18) determine a quadratic function from its roots (real and complex) or a graph;
- 19) use characteristics of the quadratic parent function to sketch the related graphs and connect between the $y = a^2 + bx + c$ and the $y = a(x - h)^2 + k$ symbolic representations of quadratic functions;
- 20) 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;
- 21) analyze situations involving quadratic functions and formulate quadratic equations or inequalities to solve problems;
- 22) analyze and interpret the solutions of quadratic equations using discriminates and solve quadratic equations using the quadratic formula;
- 23) compare and translate between algebraic and graphical solutions of quadratic equations;
- 24) solve quadratic equations and inequalities using graphs, tables, and algebraic methods;
- 25) 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;
- 26) relate representations of square root functions, such as algebraic, tabular, graphical, and verbal descriptions;

- 27) 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;
- 28) determine solutions of square root equations using graphs, tables, and algebraic methods;
- 29) determine solutions of square root inequalities using graphs and tables;
- 30) analyze situations modeled by square root functions, formulate equations or inequalities, select a method, and solve problems;
- 31) connect inverses of square root functions with quadratic functions;
- 32) 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;
- 33) analyze various representations of rational functions with respect to problem situations;
- 34) 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;
- 35) determine the solutions of rational equations using graphs, tables, and algebraic methods;
- 36) determine solutions of rational inequalities using graphs and tables;
- 37) analyze a situation modeled by a rational function, formulate an equation or inequality composed of a linear or quadratic function, and solve the problem;
- 38) use functions to model and make predictions in problem situations involving direct and inverse variation.;
- 39) develop the definition of logarithms by exploring and describing the relationship between exponential functions and their inverses;
- 40) 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;
- 41) 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;
- 42) determine solutions of exponential and logarithmic equations using graphs, tables, and algebraic methods;
- 43) determine solutions of exponential and logarithmic inequalities using graphs and tables; and
- 44) analyze a situation modeled by an exponential function, formulate an equation or inequality, and solve the problem.

The Framework for the Clear Creek ISD curriculum document template was formed through the collaboration of members of the Department of Curriculum and Instruction with input from classroom teachers. It is based upon the “Backwards by Design” approach reflected in the research and work of Wiggins, G., McTigue, J. & Tomlinson, C., 1998, 2003, 2006, 2009.

Year-At-A-Glance	Department	Mathematics	PEIMS Code	03100600
	Subject Area	Algebra II PreAP	Grade Level	9-12

1 st Nine Weeks	August Unit 01: Parent Functions Introduction
	September Unit 01: Parent Functions Introduction Unit 02: Linear equations and inequalities Unit 03: Systems of Equations and Inequalities
	October Unit 03.5: Matrices First Nine Weeks Exam Unit 04: Quadratic and Absolute Value Functions
2 nd Nine Weeks	November Unit 05: Solve Quadratics
	December Unit 05: Solve Quadratics Unit 06: Rational Exponents, Radical Functions and Inverse Functions First Semester Exam
	January Unit 06: Rational Exponents, Radical Functions and Inverse Functions Unit 07: Logarithmic and Exponential Functions and Inverse Functions
3 rd Nine Weeks	February Unit 07: Logarithmic and Exponential Functions and Inverse Functions Grade 10 and Exit Level TAKS Benchmark Unit 8: Rational Functions, Equations and Inequalities
	March Unit 8: Rational Functions, Equations and Inequalities Unit 9: Conics STAAR Benchmark (Grade 9 students only) Third Nine Weeks Test for Grade 10 and 11 students
	April Unit 10 Polynomials For TAKS students (Grade 10 and 11): TAKS review and TAKS test For STAAR students (Grade 9): STAAR review
4 th Nine Weeks	May For STAAR students (Grade 9) STAAR Review and Algebra 2 EOC test May 16 Algebra 2 EOC Test Unit 11: Sequences and Series Final Exam