

MIDLAND ISD
ADVANCED PLACEMENT CURRICULUM STANDARDS

ALGEBRA I		
TEKS	COLLEGE BOARD	COLLEGE AND CAREER READINESS STDS
<p>(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:</p> <p>(A) describe independent and dependent quantities in functional relationships;</p> <p>(B) gather and record data and use data sets to determine functional relationships between quantities;</p> <p>(C) describe functional relationships for given problem situations and write equations or inequalities to answer questions arising from the situations;</p> <p>(D) represent relationships among quantities using concrete models, tables, graphs, diagrams, verbal descriptions, equations, and inequalities; and</p> <p>(E) interpret and make decisions, predictions, and critical judgments from functional relationships.</p> <p>(2) Foundations for functions. The student uses the properties and attributes of functions. The student is expected to:</p> <p>(A) identify and sketch the general forms of linear ($y = x$) and quadratic ($y = x^2$) parent functions;</p> <p>(B) identify mathematical domains and ranges and determine reasonable domain and range</p>	<p>Standard AI.1: Patterns of Change and Algebraic Representations</p> <p>AI.1.1 Student identifies functions based on their graphical behavior and rates of change, and student describes functions using appropriate notation and terminology.</p> <p>AI.1.2 Student uses linear functions to interpret, model, and solve situations having a constant rate of change.</p> <p>Standard AI.2: Variables, Expressions, Equations, and Functions in Linear Settings</p> <p>AI.2.1 Student represents linear patterns using expressions, equations, functions, and inequalities and interprets the meanings of these representations, recognizing which are equivalent and which are not.</p> <p>AI.2.2 Student distinguishes among the different uses of variables, parameters, constants, and equations.</p> <p>AI.2.3 Student constructs, solves, and interprets solutions of linear equations, linear inequalities, and systems of linear equations representing mathematical and real-world contexts.</p> <p>Standard AI.3: Nonlinear Expressions, Equations, and Functions</p> <p>AI.3.1 Student identifies certain nonlinear relationships and classifies them as</p>	<p>I. Numeric Reasoning</p> <p>A. Number representation</p> <ol style="list-style-type: none"> 1. Compare real numbers. 2. Define and give examples of complex numbers. <p>B. Number operations</p> <ol style="list-style-type: none"> 1. Perform computations with real and complex numbers. <p>C. Number sense and number concepts</p> <ol style="list-style-type: none"> 1. Use estimation to check for errors and reasonableness of solutions. <p>II. Algebraic Reasoning</p> <p>A. Expressions and equations</p> <ol style="list-style-type: none"> 1. Explain and differentiate between expressions and equations using words such as “solve,” “evaluate,” and “simplify.” <p>B. Manipulating expressions</p> <ol style="list-style-type: none"> 1. Recognize and use algebraic (field) properties concepts, procedures, and algorithms to combine, transform, and evaluate expressions (e.g., polynomials, radicals, rational expressions). <p>C. Solving equations, inequalities, and systems of equations</p> <ol style="list-style-type: none"> 1. Recognize and use algebraic (field) properties concepts, procedures, and algorithms to solve equations, inequalities, and systems of linear equations. 2. Explain the difference between the solution

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<p>values for given situations, both continuous and discrete;</p> <p>(C) interpret situations in terms of given graphs or creates situations that fit given graphs; and</p> <p>(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.</p> <p>(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:</p> <p>(A) use symbols to represent unknowns and variables; and</p> <p>(B) look for patterns and represent generalizations algebraically.</p> <p>(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:</p> <p>(A) find specific function values, simplify</p>	<p>exponential relationships, quadratic relationships, or relationships of the form $y = kx$, based on rates of change in tables, symbolic forms, or graphical representations. Student recognizes that multiplying linear factors produces nonlinear relationships.</p> <p>AI.3.2 Student represents and interprets simple exponential and quadratic functions based on mathematical and real-world phenomena using tables, symbolic forms, or graphical representations and solves equations related to these functions.</p> <p>Standard AI.4: Surveys and Random Sampling</p> <p>AI.4.1 Student formulates questions that can be addressed through collection and analysis of survey data. Student explains the importance of random selection of members from the population, and designs and executes surveys. Student uses the results of a survey to communicate an answer appropriate to the question of interest. Student distinguishes between sampling error and measurement error. Student evaluates survey results reported in the media.</p> <p>AI.4.2 Student understands that results may vary from sample to population and from sample to sample. Student analyzes,</p>	<p>set of an equation and the solution set of an inequality.</p> <p>D. Representations</p> <ol style="list-style-type: none"> 1. Interpret multiple representations of equations and relationships. 2. Translate among multiple representations of equations and relationships. <p>III. Geometric Reasoning</p> <p>A. Figures and their properties</p> <ol style="list-style-type: none"> 1. Identify and represent the features of plane and space figures. 2. Make, test, and use conjectures about one-, two-, and three-dimensional figures and their properties. 3. Recognize and apply right triangle relationships including basic trigonometry. <p>B. Transformations and symmetry</p> <ol style="list-style-type: none"> 1. Identify and apply transformations to figures. 2. Identify the symmetries of a plane figure. 3. Use congruence transformations and dilations to investigate congruence, similarity, and symmetries of plane figures. <p>C. Connections between geometry and other mathematical content strands</p> <ol style="list-style-type: none"> 1. Make connections between geometry and algebra. 2. Make connections between geometry, statistics, and probability.

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<p>polynomial expressions, transform and solve equations, and factor as necessary in problem situations;</p> <p>(B) use the commutative, associative, and distributive properties to simplify algebraic expressions; and</p> <p>(C) connect equation notation with function notation, such as $y = x + 1$ and $f(x) = x + 1$.</p> <p>(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:</p> <p>(A) determine whether or not given situations can be represented by linear functions;</p> <p>(B) determine the domain and range for linear functions in given situations; and</p> <p>(C) use, translate, and make connections among algebraic, tabular, graphical, or verbal descriptions of linear functions.</p> <p>(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:</p> <p>(A) develop the concept of slope as rate of</p>	<p>summarizes, and compares results from random and nonrandom samples and from a census, using summary numbers and a variety of graphical displays to communicate findings.</p>	<p>3. Make connections between geometry and measurement.</p> <p>D. Logic and reasoning in geometry</p> <p>1. Make and validate geometric conjectures.</p> <p>2. Understand that Euclidean geometry is an axiomatic system.</p> <p>IV. Measurement Reasoning</p> <p>A. Measurement involving physical and natural attributes</p> <p>1. Select or use the appropriate type of unit for the attribute being measured.</p> <p>B. Systems of measurement</p> <p>1. Convert from one measurement system to another.</p> <p>2. Convert within a single measurement system.</p> <p>C. Measurement involving geometry and algebra</p> <p>1. Find the perimeter and area of two-dimensional figures.</p> <p>2. Determine the surface area and volume of three-dimensional figures.</p> <p>3. Determine indirect measurements of figures using scale drawings, similar figures, the Pythagorean Theorem, and basic trigonometry.</p> <p>D. Measurement involving statistics and probability</p> <p>1. Compute and use measures of center and spread to describe data.</p> <p>2. Apply probabilistic measures to practical</p>

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<p>change and determine slopes from graphs, tables, and algebraic representations; (B) interpret the meaning of slope and intercepts in situations using data, symbolic representations, or graphs; (C) investigate, describe, and predict the effects of changes in m and b on the graph of $y = mx + b$; (D) graph and write equations of lines given characteristics such as two points, a point and a slope, or a slope and y-intercept; (E) determine the intercepts of the graphs of linear functions and zeros of linear functions from graphs, tables, and algebraic representations; (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.</p> <p>(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;</p>		<p>situations to make an informed decision.</p> <p>V. Probabilistic Reasoning A. Counting principles 1. Determine the nature and the number of elements in a finite sample space. B. Computation and interpretation of probabilities 1. Compute and interpret the probability of an event and its complement. 2. Compute and interpret the probability of conditional and compound events.</p> <p>VI. Statistical Reasoning A. Data collection 1. Plan a study. B. Describe data 1. Determine types of data. 2. Select and apply appropriate visual representations of data. 3. Compute and describe summary statistics of data. 4. Describe patterns and departure from patterns in a set of data. C. Read, analyze, interpret, and draw conclusions from data 1. Make predictions and draw inferences using summary statistics. 2. Analyze data sets using graphs and summary statistics.</p>

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<p>(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</p> <p>(C) interpret and determine the reasonableness of solutions to linear equations and inequalities.</p> <p>(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:</p> <p>(A) analyze situations and formulate systems of linear equations in two unknowns to solve problems;</p> <p>(B) solve systems of linear equations using concrete models, graphs, tables, and algebraic methods; and</p> <p>(C) interpret and determine the reasonableness of solutions to systems of linear equations.</p> <p>(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</p>		<p>3. Analyze relationships between paired data using spreadsheets, graphing calculators, or statistical software.</p> <p>4. Recognize reliability of statistical results.</p> <p>VII. Functions</p> <p>A. Recognition and representation of functions</p> <p>1. Recognize whether a relation is a function.</p> <p>2. Recognize and distinguish between different types of functions.</p> <p>B. Analysis of functions</p> <p>1. Understand and analyze features of a function.</p> <p>2. Algebraically construct and analyze new functions.</p> <p>C. Model real world situations with functions</p> <p>1. Apply known function models.</p> <p>2. Develop a function to model a situation.</p> <p>VIII. Problem Solving and Reasoning</p> <p>A. Mathematical problem solving</p> <p>1. Analyze given information.</p> <p>2. Formulate a plan or strategy.</p> <p>3. Determine a solution.</p> <p>4. Justify the solution.</p> <p>5. Evaluate the problem-solving process.</p> <p>B. Logical reasoning</p> <p>1. Develop and evaluate convincing arguments.</p> <p>2. Use various types of reasoning.</p>

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<p>student is expected to:</p> <p>(A) determine the domain and range for quadratic functions in given situations;</p> <p>(B) investigate, describe, and predict the effects of changes in a on the graph of $y = ax^2 + c$;</p> <p>(C) investigate, describe, and predict the effects of change in c on the graph of $y = ax^2 + c$; and</p> <p>(D) analyze graphs of quadratic functions and draw conclusions.</p> <p>(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:</p> <p>(A) solve quadratic equations using concrete models, tables, graphs, and algebraic methods; and</p> <p>(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.</p> <p>(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</p>		<p>C. Real world problem solving</p> <ol style="list-style-type: none"> 1. Formulate a solution to a real world situation based on the solution to a mathematical problem. 2. Use a function to model a real world situation. 3. Evaluate the problem-solving process. <p>IX. Communication and Representation</p> <p>A. Language, terms, and symbols of mathematics</p> <ol style="list-style-type: none"> 1. Use mathematical symbols, terminology, and notation to represent given and unknown information in a problem. 2. Use mathematical language to represent and communicate the mathematical concepts in a problem. 3. Use mathematics as a language for reasoning, problem solving, making connections, and generalizing. <p>B. Interpretation of mathematical work</p> <ol style="list-style-type: none"> 1. Model and interpret mathematical ideas and concepts using multiple representations. 2. Summarize and interpret mathematical information provided orally, visually, or in written form within the given context. <p>C. Presentation and representation of mathematical work</p> <ol style="list-style-type: none"> 1. Communicate mathematical ideas, reasoning, and their implications using symbols, diagrams,

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<p>student is expected to:</p> <p>(A) use patterns to generate the laws of exponents and apply them in problem-solving situations;</p> <p>(B) analyze data and represent situations involving inverse variation using concrete models, tables, graphs, or algebraic methods; and</p> <p>(C) analyze data and represent situations involving exponential growth and decay using concrete models, tables, graphs, or algebraic methods.</p>		<p>graphs, and words.</p> <p>2. Create and use representations to organize, record, and communicate mathematical ideas.</p> <p>3. Explain, display or justify mathematical ideas and arguments using precise mathematical language in written or oral communication.</p> <p>X. Connections</p> <p>A. Connections among the strands of mathematics</p> <p>1. Connect and use multiple strands of mathematics in situations and problems.</p> <p>2. Connect mathematics to the study of other disciplines.</p> <p>B. Connections of mathematics to nature, real world situations, and everyday life</p> <p>1. Use multiple representations to demonstrate links between mathematical and real world situations.</p> <p>2. Understand and use appropriate mathematical models in the natural, physical, and social sciences.</p> <p>3. Know and understand the use of mathematics in a variety of careers and professions.</p>