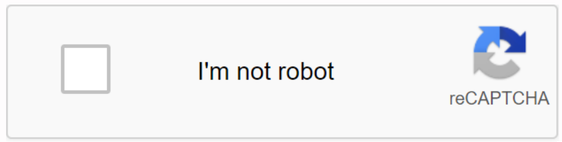
Algebra 1 teks pdf



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Chapter 111. Texas Essential Knowledge and Skills for Mathematics Subchapter C. High School Statutory Authority: The provisions of this Subchapter C issued under the Texas Education Code, 7.102(c)(4), 28.002, 28.008, and 28.025, unless otherwise stated. 111.38. Implementation of Texas Essential Knowledge and Skills for Mathematics, High School, Adopted 2012. a) The provisions of 111.39-111.45 of this subchapter are implemented by the school districts. (b) By June 30, 2015 at the latest, the Education Commissioner shall determine whether the Texas Public Schools have been provided with funds for teaching materials covering the basic knowledge and skills of mathematics as assumed in 111.39-111.45 of this Sub-Chapter. (c) If the Commissioner finds that the funds for teaching materials referred to in subsection (b) of this section have been made available, 111.39-111.45 of this sub-chapter shall be implemented from the 2015-2016 school year and shall apply to the 2015-2016 school years and the following school years. (d) If the Commissioner does not find that the funds for teaching materials referred to in subsection (b) of this section have been made available, the commissioner shall determine, by 30 June at the latest of each subsequent school year, whether funds have been made available for teaching materials. If the commissioner finds that teaching materials have been provided, the commissioner informs the State School Board and the school districts that 111.39-111.45 of this sub-chapter will be carried out for the following school year. (e) Sections 111.31-111.37 of this sub-chapter shall be replaced by the implementation of 111.38-111.45 in this section. Source: The provisions of these 111.38 adopted enter into force 10 September 2012, 37 TexReg 7109. 111.39. Algebra I, Adopted 2012 (One Credit). (a) General requirements. Students receive an award for the successful completion of this course. This course is recommended for students in grades 8 or 9. Prerequisite: Mathematics, class 8 or equivalent. b) Introduction. (1) The desire to achieve educational excellence is the driving force behind Texas' basic maths skills and skills, guided by college and career readiness standards. By embedding statistics, probability, and finances while focusing on fluid and solid understanding, Texas will take the lead in math education and prepare all Texas students for the challenges they will face in the 21st century. (2) The process standards describe how students are expected to participate in the content. The placement of process standards at the beginning of the knowledge and skills listed for each class and course is intended. The Weave the other knowledge and skills together so that students can be successful problem solvers and use mathematics efficiently and effectively in daily life. The process standards are at each level and course. If possible, students will apply mathematics to problems that arise in everyday life, in society and at work. Students use a problem-solving model that includes analyzing specific information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the adequacy of the solution. Students select appropriate tools such as real objects, manipulative, paper and pencil, as well as technology and techniques such as mental mathematics, estimation, and numerical sense to solve problems. Students effectively communicate mathematical ideas, reasoning, and their effects using multiple representations such as symbols, charts, charts, and language. Students use mathematical relationships to generate solutions and create connections and predictions. Students analyze mathematical relationships to connect and communicate mathematical ideas. Students show, explain, or justify mathematical ideas and arguments using precise mathematical language in written or oral communication. (3) In Algebra I, pupils build on the knowledge and skills of mathematics in grades 6-8, which form a basis in linear relationships, number and operation and proportionality. Students examine linear, square, and exponential functions and the associated transformations, equations, and associated solutions. Students combine functions and related solutions in both mathematical and real situations. Students use technology to collect and examine data and analyze statistical relationships. In addition, students will study grade one and two, radical expressions, sequences and laws of exponents. Students generate and solve linear systems with two equations and two variables and create new functions through transformations. (4) Statements containing the word, including reference content, which must be mastered, while those containing the expression as in the same way are intended as possible illustrative examples. (c) knowledge and skills. (1) Mathematical process standards. The student uses mathematical processes to acquire and demonstrate mathematical understanding. The pupil is expected to apply: (A) mathematics to problems arising in everyday life, in society and at work; (B) use a problem-solving model that includes the analysis of certain information, the formulation of a plan or strategy, the definition of a solution, the justification of the solution and the assessment of the problem-solving process and the adequacy of the solution; (C) selected tools, including real Manipulative, paper and pencil, and, where appropriate, technology and techniques, including mental mathematics, estimation and, where appropriate, numerical sense, to solve problems; (D) communicate mathematical ideas, reasoning and their implications using multiple representations, including symbols, diagrams, graphs and language; (E) (E) Use representations to organize, record, and communicate mathematical ideas; (F) analyze mathematical relationships to connect and communicate mathematical ideas; and (G) display, explain and justify mathematical ideas and arguments using precise mathematical language in written or oral communication. (2) Linear functions, equations and inequalities. The student applies the mathematical process standards when properties of linear functions are used to write and represent in many ways, with and without technology, linear equations, inequalities, and equation systems. The student is expected to: (A) determine the domain and range of a linear function for mathematical problems; determine appropriate domain and range values for real-world situations, both continuous and discrete; and represent domain and area using inequalities; (B) write linear equations in two variables in different forms, including $y = mx + b$, $Ax + By = C$ and $y - y1 = m(x - x1)$, given by a point and the slope and two points; (C) write linear equations into two variables containing a value table, a chart, and a verbal description; (D) Write and solve equations with direct variation; (E) write the equation of a line containing a particular point and parallel to a particular line; (F) write the equation of a line containing a particular point and perenning to a particular line; (G) write an equation of a line parallel or permeable to the X or Y axis, and determine whether the slope of the line is zero or not defined; (H) write linear inequalities into two variables that contain a value table, a chart, and a verbal description; and (I) write systems of two linear equations with a value table, a chart, and a verbal description. (3) Linear functions, equations and inequalities. The student applies the mathematical process standards when using diagrams of linear functions, key features, and related transformations to represent and solve with and without technology, equations, inequalities, and equation systems. The student is expected to: (A) determine the slope of a line that contains a table of values, a chart, two points on the line, and an equation in different shapes, including $y = mx + b$, $Ax + By = C$, and $y - y1 = m(x - x1)$; (B) calculating the rate of change of a linear function presented in tabular, graphical or algebraic form in the context of mathematical and real problems; (C) linear graphics functions at the coordinate plane and identify key-wise characteristics, including x-intercept, y-intercept, zeros, and slope, in and real problems; (D) Diagram of the set of solution of linear inequalities in two variables at the coordinate plane; (E) determine the effect on the diagram of the parent function $f(x) = x$ when f(x) is replaced by af(x), f(x) + d, f(x - c), f(bx) for certain values of a, b, c, and d; (F) diagram systems of two linear equations in two variables at the coordinate plane and determine the solutions, if they exist; (G) Estimate the solutions for systems of two linear equations with two variables in real problems; and (H) they plot the set of solutions of systems of two linear inequalities into two variables at the coordinate plane. (4) Linear functions, equations and inequalities. The student applies the mathematical process standards to formulate statistical relationships and evaluate their adequacy on the basis of real data. The student is expected to: (A) calculate the correlation coefficient between two quantitative variables using technology and interpret this amount as a measure of the strength of the linear association; (B) comparison and contrast association and causality in real problems; and (C) with and without technology write linear functions that provide an appropriate adaptation to data to estimate solutions and make predictions for real-world problems. (5) Linear functions, equations and inequalities. The student applies the mathematical process standards to solve linear equations with and without technology and to evaluate the adequacy of their solutions. The student is expected to: (A) solve linear equations in a variable, including the equations that require the application of the distribution property and for which variables are included on both sides; (B) to solve linear inequalities in a variable, including those for which the application of the distribution property is required and for which variables are included on both sides; and (C) Solving systems of two linear equations with two variables for mathematical and real problems. (6) Square functions and equations. The student applies the mathematical process standards when properties of square functions are used to write and represent square equations in many ways, with and without technology. The student is expected to: (A) determine the domain and range of square functions and represent the domain and range based on inequalities; (B) Writing equations of square functions under the vertex and another point in the graph, writing the equation in vertex form ($f(x) = a(x - h)2+ k$) and rewriting the equation of vertex shape in standard form ($f(x) = ax2+ bx + c$); and (C) write square functions when real solutions and graphics of their related equations are given. (7) Square functions and equations. The student applies the mathematical process standards when using diagrams of square functions and associated transformations to represent in many ways and to determine the solutions for equations with and without technology. It is expected that the student: (A) square graph functions at the coordinate plane and use the diagram to use key wise, if possible, including x-intercept, y-intercept, zeros, maximum value, minimum values, vertex, and the equation of the symmetry axis; (B) describe the relationship between the linear factors of square expressions and the zeros of their corresponding square functions; and (C) the impact on the diagram of the $f(x) = x2$ if f(x) is replaced by af(x), f(x) + d, f(x - c), f(bx) for specific values of a, b, c, and d. (8) square functions and equations. The student applies the mathematical process standards to solve square equations with and without technology and to evaluate the adequacy of their solutions. The student formulates statistical relationships and evaluates their adequacy on the basis of real data. The student is expected to: (A) solve square equations with real solutions by taking into account square roots, square, square, square, and square formula; and (B) write, using technology, square functions that provide a reasonable adaptation to data to estimate solutions and make predictions for real-world problems. (9) Exponential functions and equations. The student applies the mathematical process standards when properties are used to use exponential functions and related transformations to write exponential equations in a variety of ways, graphically represent them, and evaluate the adequacy of their solutions with and without technology. The student formulates statistical relationships and evaluates their adequacy on the basis of real data. The student is expected to: (A) determine the domain and range of exponential functions of the form $f(x) = abx$, and represent the domain and range based on inequalities; (B) interpret the meaning of the values of a and b in exponential functions of the form $f(x) = abx$ for real problems; (C) write exponential functions in the form $f(x) = abx$ (where b is a rational number) to describe problems arising from mathematical and real situations, including growth and decay; (D) graph-exponential functions that model growth and decay and identify key features, including y-intercept and asymptote, in mathematical and real problems; and (E) write, using technology, exponential functions that provide a reasonable adaptation to data and make predictions for real problems. (10) Number and algebraic methods. The student applies the mathematical process standards and algebraic methods to rewrite in equivalent forms and perform operations on polynomial expressions. The student is expected to add and subtract: (A) grade one and two polynomial; (B) multiply polynomial of grade one and two; (C) determine the quotient of a polynomial of grade one and the polynomial of degree two when divided by a polynomial of grade one and polynomial of degree two, if the degree of the divisor does not exceed the degree of dividend; (D) Rewrite polynomial expressions of grade one and two in equivalent form using the distribution property; (E) factor, if possible, trinomial with real in the form $ax2 + bx + c$, including perfect square trinomies of degree two; and (F) decide whether a binomial can be written as the difference of two squares, and, if possible, use the structure of a difference of two squares to rewrite the binomial. (11) Number and algebraic methods. Methods. The student applies the mathematical process standards and algebraic methods to rewrite algebraic expressions into equivalent forms. The student is expected to: (A) simplify numeric radical expressions with square roots; and (B) simplify numerical and algebraic expressions using the laws of exponents, including integral and rational exponents. (12) Number and algebraic methods. The student applies the mathematical process standards and algebraic methods to write, solve, analyze and evaluate equations, relationships and functions. The student is expected to: (A) decide whether relationships are verbal, tabular, graphically represented, and symbolically define a function; (B) evaluating functions, expressed in function notation, under certain one or more elements in their domains; (C) identify terms of arithmetic and geometric sequences when the sequences are specified in functional form using recursive processes; (D) to write a formula for the n. concept of arithmetic and geometric sequences under the value of several of their terms; and (E) solve mathematical and scientific formulas and other literal equations for a given variable. Source: The provisions of this 111.39 adopted enter into force 10 September 2012, 37 TexReg 7109. 111.40. Algebra II, adopted 2012 (one-and-a-half-to-one loan). (a) General requirements. Students receive half to one award for the successful completion of this course. Prerequisite: Algebra I. b) Introduction. (1) The desire to achieve educational excellence is the driving force behind Texas' basic maths skills and skills, guided by college and career readiness standards. By embedding statistics, probability, and finances while focusing on fluid and solid understanding, Texas will take the lead in math education and prepare all Texas students for the challenges they will face in the 21st century. (2) The process standards describe how students are expected to participate in the content. The placement of process standards at the beginning of the knowledge and skills listed for each class and course is intended. The process standards interweave the other knowledge and skills so that students can be successful problem solvers and use mathematics efficiently and effectively in daily life. Process standards are integrated at each class level and course. If possible, students will apply mathematics to problems that arise in everyday life, in society and at work. Students use a problem-solving model that certain information, the formulation of a plan or strategy, the determination of a solution, the justification of the solution and the assessment of the problem-solving process and the adequacy of the solution. Students select appropriate tools such as real objects, manipulative, paper and pencil, as well as technology and techniques such as mental mathematics, estimation, and numerical sense to solve problems. Students communicate mathematical ideas, reasoning and their with multiple representations such as symbols, charts, charts, and language. Students use mathematical relationships to generate solutions and create connections and predictions. Students analyze mathematical relationships to connect and communicate mathematical ideas. Students show, explain, or justify mathematical ideas and arguments using precise mathematical language in written or oral communication. (3) In Algebra II, students build on the knowledge and skills of mathematics in kindergarten class 8 and algebra I. Students will expand their knowledge of square functions, exponential functions and equation systems. Students study logarithmic, square, cubic, cube root, absolute value, rational functions and their associated equations. Students combine functions with their inversions and associated equations and solutions in mathematical and real situations. In addition, students are expanding their knowledge of data analysis and numerical and algebraic methods. (4) Statements containing the word, including reference content, which must be mastered, while those containing the expression as in the same way are intended as possible illustrative examples. (c) knowledge and skills. (1) Mathematical process standards. The student uses mathematical processes to acquire and demonstrate mathematical understanding. The pupil is expected to apply: (A) mathematics to problems arising in everyday life, in society and at work; (B) use a problem-solving model that includes the analysis of certain information, the formulation of a plan or strategy, the definition of a solution, the justification of the solution and the assessment of the problem-solving process and the adequacy of the solution; (C) selected tools, including real objects, manipulative, paper and pencil, and, where appropriate, technology and techniques, including mental mathematics, estimation and, where appropriate, numerical sense, to solve problems; (D) communicate mathematical ideas, reasoning and their implications using multiple representations, including symbols, diagrams, graphs and language; (E) Create and use representations to organize, record and communicate mathematical ideas; (F) analyze mathematical relationships to connect and communicate mathematical ideas; and (G) display, explain or justify mathematical ideas and arguments using precise mathematical language in written or oral communication. (2) Attributes of functions and their inversions. The student applies mathematical processes to understand that functions have different key attributes and to understand the relationship between a function and its inveremitation. It will that the student: (A) the functions f(x)=√x, f(x)=1/x, f(x)=x3, f(x)= 3√x, f(x)=bx, f(x)=|x|, and f(x)=logb (x) where b is 2, 10 and e, and, if applicable, analyze key attributes such as domain, range, intercepts, symmetries, asymptotic behavior, and maximum and minimum specified intervals; (B) Chart and write the inversion of a function function notation such as f -1 (x); (C) describe and analyze the relationship between a function and its inverse (square and square root, logarithmic and exponential), including the restrictions on The Domain that limit its range; and (D) use the composition of two functions, including the required constraints for the range, to determine whether the functions are reversed. (3) Systems of equations and inequalities. The student uses mathematical processes to formulate systems of equations and inequalities, to use a variety of methods to solve solutions, and to analyze the adequacy of solutions. The pupil is expected to formulate: (A) equation systems, including systems consisting of three linear equations in three variables, and systems consisting of two equations, the first linear and the second square; (B) solving systems of three linear equations into three variables using Gaussian elimination, technology with matrices and substitution; (C) solving systems of two equations into two variables consisting of a linear and a square equation; (D) determine the adequacy of solutions for systems of a linear equation and a square equation in two variables; (E) formulation of systems of at least two linear inequalities in two variables; (F) solve systems with two or more linear inequalities in two variables; and (G) determine possible solutions in the solution set of systems of two or more linear inequalities in two variables. (4) Square and square root functions, equations and inequalities. The student uses mathematical processes to understand that square and square root functions, equations, and square inequalities can be used to model situations, solve problems, and make predictions. The student is expected to write: (A) the square function with three specified points in the plane; (B) write the equation of a parable using certain attributes, including vertex, focus, directrix, axis of symmetry, and opening direction; (C) determine the effect on the diagram of f(x) = √x when f(x) is replaced by af(x), f(x) + d, f(bx) and f(x - c) for specific positive and negative values of a, b, c and d; (D) transform a square function $f(x) = ax2 + bx + c$ into the form $f(x) = a(x - h)2 + k$ to identify the different attributes of f(x); (E) formulation of square and square root equations using a technology containing a data table; (F) solve square and square root equations; (G) identify external solutions of square root equations; and (H) solve square inequalities. (5) Exponentiale logarithmic functions and equations. The student uses mathematical processes to understand that exponential and logarithmic functions can be used to model situations and solve problems. The student is expected to: (A) determine the effect on the key attributes on the graphs $f(x) = bx$ and $f(x) = logb (x)$, where b is 2, 10, and e if f(x) is replaced by af(x), f(x) + d, and f(x - c) for specific positive and negative real. Is. of a, c and d; (B) compose exponential and logarithmic equations that model real situations, including exponential relationships written in recursive notation; (C) rewrite exponential equations as corresponding logarithmic equations and logarithmic equations as corresponding exponential equations; (D) to solve exponential equations of the form $y = abx$, where a real number is nonzero and b is greater than zero and is not equal to one and individual logarithmic equations with real solutions; and (E) determine the adequacy of a solution for a logarithmic equation. (6) Cubic, cube root, absolute value and rational functions, equations and inequalities. The student uses mathematical processes to understand that cubic, cube root, absolute value, and rational functions, equations, and inequalities can be used to model situations, solve problems, and make predictions. The pupil is expected to: (A) analyse the effects on the graphs of $f(x) = x3$ and f(x) = 3√x when f(x) is replaced by af(x), f(bx), f(x - c) and f(x) + d for specific positive and negative real values of a, b, c and d; (B) Solve cube root equations with real roots; (C) Analysis of the effects on the graphs of $f(x) = |x|$ when f(x) is replaced by af(x), f(x-c), and f(x) + d for specific positive and negative real values of a, b, c and d; (D) Formulating linear absolute equations; (E) solution of linear equations of the absolute value; (F) solving linear inequalities of absolute value; (G) analyse the effects on the graphs of $f(x) = 1/x$ when f(x) is replaced by af(x), f(bx), f(x-c) and f(x) + d for specific positive and negative real values of a, b, c and d; (H) formulation of rational equations that model real situations; (I) to solve rational equations that have real solutions; (J) determine the adequacy of a solution for a rational equation; (K) determine the asymptotic constraints on the scope of a rational function and represent domain and range using interval notation, inequalities, and specified notations; and (L) formulate and solve equations with inverse variation. (7) Number and algebraic methods. The student applies mathematical processes to simplify and perform expressions and solve equations. The student is expected to add, subtract, and multiply complex numbers; (B) Add, subtract, and multiply polynomial; (C) determine the quotient of a grade three polynomial and four when divided by a polynomial of grade one and degree two; (D) determine the linear factors of a polynomial function of grade three and degree four using algebraic methods; (E) linear and square determine a polynomic expression of grade three and degree four, including taking into account the sum and difference of two cubes and factoring by grouping; (F) determine the sum, difference, product and quotient of rational expressions with integral exponents of grade one and degree two; (G) Rewrite radical expressions that contain variables equivalent forms; (H) Solve equations with rational exponents; and (I) write the domain and scope of a function in interval notation, inequalities, and set the notation. (8) Data. The student uses mathematical processes to analyze data, select appropriate models, write appropriate functions, and make predictions. The student is expected to: (A) analyze data to select the corresponding model from linear, square, and exponential models; (B) Use regression methods available through technology to write a linear function, a quadratic function, and an exponential function from a particular data set; and (C) predict and make critical judgments from a given dataset using linear, square, and exponential models. Source: The provisions of this 111.40 adopted enter into force September 10, 2012, 37 TexReg 7109. 111.41. Geometry, adopted 2012 (One Credit). (a) General requirements. Students receive an award for the successful completion of this course. Prerequisite: Algebra I. b) Introduction. (1) The desire to achieve educational excellence is the driving force behind Texas' basic maths skills and skills, guided by college and career readiness standards. By embedding statistics, probability, and finances while focusing on fluid and solid understanding, Texas will take the lead in math education and prepare all Texas students for the challenges they will face in the 21st century. (2) The process standards describe how students are expected to participate in the content. The placement of process standards at the beginning of the knowledge and skills listed for each class and course is intended. The process standards interweave the other knowledge and skills so that students can be successful problem solvers and use mathematics efficiently and effectively in daily life. Process standards are integrated at each class level and course. If possible, students will apply mathematics to problems that arise in everyday life, in society and at work. Students use a problem-solving model that includes analyzing specific information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the adequacy of the solution. Students select appropriate tools such as real objects, manipulative, paper and pencil, as well as technology and techniques such as mental mathematics, estimation, and numerical sense to solve problems. The students mathematical ideas, reasoning, and their effects effectively using multiple representations such as symbols, charts, charts, and language. Students use mathematical relationships to generate solutions and create connections and predictions. Students analyze mathematical relationships to connect and communicate mathematical ideas. Students show, explain or justify mathematical ideas and arguments with precise mathematical language in written written oral communication. (3) In Geometry, students will build on the knowledge and skills of mathematics in kindergarten class 8 and algebra I to strengthen their mathematical reasoning skills in geometric contexts. Within the course, students will begin to focus on more accurate terminology, symbolic representations and the development of evidence. Students will explore concepts that cover coordinate and transformation geometry. logical arguments and constructions; Evidence and congruence; Similarity, evidence and trigonometry; two- and three-dimensional figures; Circles; and probability. Students combine prior knowledge of algebra I with geometry via the coordinate and transformation geometry strand. In the logical arguments and constructions, students are expected to create formal constructions with a straight edge and compass. Although this course is primarily Euclidean geometry, students should complete the course with the understanding that non-Euclidean geometries exist. In evidence and congruence, students will use deductive reasoning to justify, prove, and apply theorems about geometric figures. During standards, the term evidence means formal evidence that appears in a paragraph, flowchart, or two-column formats. Proportionality is the connecting component of similarity, evidence and trigonometry. Students will use their proportional reasoning skills to prove and apply theores and solve problems in this area. The two- and three-dimensional figure strand focuses on the application of formulas in multi-stage situations, as the students have developed background knowledge in two- and three-dimensional figures. Students use geometric property identification patterns to apply theorems to circles to determine relationships between specific segments and angles in circles. Due to the emphasis on probability and statistics in college and career readiness standards, standards that are likely to develop have been included in the geometry curriculum to ensure that students treat these issues appropriately before completing their post-secondary education. (4) These standards are intended to provide clarity and specificity with regard to the content of the grammar school geometry course. These standards are not intended to limit the methods used to impart this knowledge to students. Although the standards are written in a particular order, they are not necessarily meant to be taught in the given order. In the standards, the term solve problems contains both contextual and non-contextual unless expressly stated. (5) Statements containing the word including reference content, which must be mastered, while those containing the expression as in the same way are intended as possible illustrative examples. (c) knowledge and skills. (1) Mathematical process standards. The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to apply: (A) apply mathematics to problems in everyday life, in society and at work; (B) use a problem-solving model that includes the analysis of certain information, the formulation of a plan or strategy, the definition of a solution, the justification of the solution and the assessment of the problem-solving process and the adequacy of the solution; (C) selected tools, including real objects, manipulative, paper and pencil, and, where appropriate, technology and techniques, including mental mathematics, estimation and, where appropriate, numerical sense, to solve problems; (D) communicate mathematical ideas, reasoning and their implications using multiple representations, including symbols, diagrams, graphs and language; (E) Create and use representations to organize, record and communicate mathematical ideas; (F) analyze mathematical relationships to connect and communicate mathematical ideas; and (G) display, explain and justify mathematical ideas and arguments using precise mathematical language in written or oral communication. (2) Coordinate and transformation geometry. The student uses the process skills to understand the relationships between algebra and geometry, and uses the one- and two-dimensional coordinate systems to check geometric assumptions. The student is expected to: (A) determine the coordinates of a point that is a certain fractional distance less than one end of a line segment to the other in one- and two-dimensional coordinate systems, including the search for the center; (B) derive and use the distance, slope, and center formulas to verify geometric relationships, including congruence of segments and concurrency or vertical line pairs; and (C) determine an equation of a line parallel or perceittother to a particular line that passes through a particular point. (3) Coordinate and transformation geometry. The student uses the process skills to generate and describe rigid transformations (translation, reflection and rotation) and non-rigid transformations (dilations that preserve similarities and reductions and extensions that do not preserve similarities). The student is expected to describe and perform: (A) transformations of characters in a plane using coordinate notation; (B) determine the image or model of a particular two-dimensional figure under a composition of rigid transformations, a composition of non-rigid transformations and a composition of both, including dilations in which the center can be any point in the plane; (C) identify the sequence of transformations that carry a particular model on an image on and off the coordinate plane; and (D) between reflective and distinguish and distinguish in a layer figure. (4) Logical arguments and constructions. The student uses the process skills with deductive reasoning to understand geometric relationships. The student is expected to distinguish between (A) between undefined terms, definitions, postulates, conjectures and theoresands; (B) the validity of the reverse, the reversal and the validity of the a conditional statement and recognize the connection between a biconditional statement and a real conditional statement with a real inverse; (C) use a counter-example to verify that a presumption is incorrect; and (D) compare geometric relationships between Euclidean and spherical geometries, including parallel lines and the sum of angles in a triangle. (5) Logical arguments and constructions. The student uses constructions to validate assumptions about geometric figures. The student is expected to: (A) examine patterns to make assumptions about geometric relationships, including angles formed by parallel lines cut by a transversal, criteria required for triangular congruence, special segments of triangles, diagonals of squares, inner and outer angles of polygons, and special segments and angles of circles that choose from a variety of tools; (B) construct congruent segments, congruent angles, a segment bisector, an angular bisector, vertical lines, the vertical two-sector of a line segment and a line parallel to a particular line by a point that is not on a line with a compass and a straight line; (C) use the constructions of congruent segments, congruent angles, angular bisectors and vertical bisectors to make assumptions about geometric relationships; and (D) check the triangular inequality set using constructions and apply the set to solve problems. (6) Evidence and congruence. The student uses the process skills with deductive thinking to prove and apply theorems using a variety of methods such as coordinates, transformation and axiomatics, as well as formats such as two columns, paragraphs, and flowchart. The student is expected to: (A) check theorems over angles formed by the intersection of lines and line segments, including vertical angles, and angles formed by parallel lines intersected by a transversal, and demonstrate equidistance between the endpoints of a segment and points on its vertical bisector and apply these relationships to solve problems; (B) prove that two triangles are congruent by applying the side-angle, angle-side-angle, side-side, angle-angle-side and hypotenuse-leg congruence conditions; (C) apply the definition of congruence in the form of rigid transformations to identify congruent numbers and their corresponding sides and angles; (D) To review theoremes about the relationships in triangles, including the proof of the pythagoran theores, the sum of the inner angles, the base angles of peer triangles, center segments, and medians, and apply these relationships to address problems and (E) prove that a square is a parallelogram, rectangle, square, or diamond with opposite sides, opposite angles, or diagonals, and apply these relationships to solve problems. (7) Similarity, detection and trigonometry. The student uses the process skills in applying similarity to solve problems. The student is expected to: (A) apply the definition of similarity in the form of a dilation to apply similar numbers and their proportional proportional and the congruent corresponding angles; and (B) apply the angle of angle criterion to check similar triangles and apply the proportionality of the corresponding sides to solve problems. (8) Similarity, detection and trigonometry. The student uses the process skills with deductive thinking to prove and apply theorems using a variety of methods such as coordinates, transformation and axiomatics, as well as formats such as two columns, paragraphs, and flowchart. The student is expected to demonstrate: (A) theoresons of similar triangles, including the phrase of triangular proportionality, and apply these theores to solve problems; and (B) identify and apply the relationships that exist when a height is drawn to the hypotenuse of a right triangle, including the geometric mean, to solve problems. (9) Similarity, detection and trigonometry. The student uses the process skills to understand and apply relationships in right triangles. The student is expected to: (A) determine the lengths of the sides and the dimensions of the angles in a right triangle by applying the trigonometric ratios of sine, cosine and tangent to solve problems; and (B) apply the relationships in special right triangles 30 -60 -90 and 45 -45 -90 and the Pythagorean set, including Pythagorean triples, to solve problems. (10) Two-dimensional and three-dimensional figures. The student uses the process skills to recognize characteristics and dimension changes of two- and three-dimensional figures. The student is expected to: (A) identify the shapes of two-dimensional cross-sections of prisms, pyramids, cylinders, cones, and spheres, and identify three-dimensional objects created by two-dimensional shapes; and (B) determine and describe how changes in the linear dimensions of a shape affect the perimeter, surface, surface, or volume, including proportional and non-proportional dimensional changes. (11) Two-dimensional and three-dimensional figures. The student uses the process skills when applying formulas to determine measurements for two- and three-dimensional figures. The student is expected to: (A) apply the formula for the area of the regular polygons to solve problems with appropriate units of measure; (B) determine the area of the two-dimensional composite figures consisting of a combination of triangles, parallelograms, trapezoids, dragons, regular polygons or circles to solve problems with appropriate units of measurement; (C) apply the formulas for the total and side surface of three-dimensional figures, including prisms, pyramids, cones, cylinders, spheres and composite figures, to solve problems with appropriate units of measurement; and (D) the formulas for the volume Apply figures, including prisms, pyramids, cones, cylinders, spheres, and composite figures, to solve problems with appropriate units of measurement. (12) Circles. The student uses the process skills to understand geometric relationships and apply theorems and equations across circles. that the (A) Apply theoresovers over circles, including relationships between angles, radii, chords, tangents, and edges, to solve non-contextual problems; (B) apply the proportional ratio between the measure of an arc length of a circle and the circumference of the circle to solve problems; (C) the application of the proportional ratio between the size of the area of a circle and the county to solve problems; (D) describe the radian dimension of an angle as the ratio of the length of an arc intercepted by a central angle and the radius of the circle; and (E) show that the equation of a circle with center at the origin and radius r is $x2 + y2 = r2$, and determine the equation for the graph of a circle with radius r and center (h, k), $(x - h)2 + (y - k)2 =r2$. (13) Probability. The student uses the process skills to understand the probability in real situations and how independence and dependence on events can be applied. The student is expected to: (A) develop strategies to use permutations and combinations to solve contextual problems; (B) identifying probabilities based on the area used to solve contextual problems; (C) determine whether two events are independent and calculate the probability that the two events occur together with or without replacement; (D) apply conditional probability to contextual issues; and (E) Apply independence to contextual problems. Source: The provisions of these 111.41 adopted enter into force 10 September 2012, 37 TexReg 7109. 111.42. Precalculus, Adopted 2012 (one-month-old on a loan). (a) General requirements. Students receive half to one award for the successful completion of this course. Prerequisites: Algebra I, Geometry and Algebra II. b) Introduction. (1) The desire to achieve educational excellence is the driving force behind Texas' basic maths skills and skills, guided by college and career readiness standards. By embedding statistics, probability, and finances while focusing on fluid and solid understanding, Texas will take the lead in math education and prepare all Texas students for the challenges they will face in the 21st century. (2) The process standards describe how students are expected to participate in the content. The placement of process standards at the beginning of the knowledge and skills listed for each class and course is intended. The process standards interweave the other knowledge and skills so that students can be successful problem solvers and use mathematics efficiently and effectively in daily life. The are integrated at each class level and course. If possible, students will apply mathematics to problems that arise in everyday life, in society and at work. Students use a problem-solving model that includes analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and adequacy. Includes. the solution. Students select appropriate tools such as real objects, manipulative, paper and pencil, as well as technology and techniques such as mental mathematics, estimation, and numerical sense to solve problems. Students effectively communicate mathematical ideas, reasoning, and their effects using multiple representations such as symbols, charts, charts, and language. Students use mathematical relationships to generate solutions and create connections and predictions. Students analyze mathematical relationships to connect and communicate mathematical ideas. Students show, explain, or justify mathematical ideas and arguments using precise mathematical language in written or oral communication. (3) Precalculus is the preparation for the calculation. The course approaches topics from a functional point of view and is intended to strengthen and improve conceptual understanding and mathematical reasoning in modelling and solving mathematical and real problems. Students work systematically with functions and their diverse representations. The Precalculus study deepens the mathematical understanding and fluctuation capacity of students with algebra and trigonometry and expands their ability to establish connections and apply concepts and procedures at higher levels. Students study and research mathematical ideas, develop multiple strategies for analyzing complex situations, and use technologies to create understanding, connect representations, and help solve problems. (4) Statements containing the word, including reference content, which must be mastered, while those containing the expression as in the same way are intended as possible illustrative examples. (c) knowledge and skills. (1) Mathematical process standards. The student uses mathematical processes to acquire and demonstrate mathematical understanding. The pupil is expected to apply: (A) mathematics to problems arising in everyday life, in society and at work; (B) use a problem-solving model that includes the analysis of certain information, the formulation of a plan or strategy, the definition of a solution, the justification of the solution and the assessment of the problem-solving process and the adequacy of the solution; (C) selected tools, including real objects, manipulative, paper and pencil, and, where appropriate, technology and techniques, including mental mathematics, estimation and, where appropriate, numerical sense, to solve problems; (D) communicate mathematical ideas, reasoning and their implications using multiple representations, including symbols, diagrams, graphs and language; (E) Create and use representations to create mathematical ideas organize, record and communicate; (F) analyze mathematical relationships to connect and communicate mathematical ideas; and (G) display, explain and justify mathematical ideas and arguments using precise mathematical language in written or oral communication. (2) Functions. The student uses process standards in to examine, describe, and analyze the attributes of functions. The student establishes connections between multiple representations of functions and constructs new functions algebraically. The student analyzes and uses functions to model real-world problems. It is expected that the student: (A) uses the composition of two functions to model and solve real problems; (B) demonstrate that the functional composition is not always commutative; (C) represent a particular function as a composite function of two or more functions; (D) description of the symmetry of graphs of even and odd functions; (E) designate a reverse function, if it exists, for a particular function through its domain or a subset of its domain, and to represent the inverse using multiple representations; (F) graph exponential, logarithmic, rational, polynomial, performance,trigonometric, inverse trigonometric and piecemeal defined functions, including step functions; (G) graph functions, including exponential, logarithmic, sinic, cosinusic, rational, polynomial and power functions and their transformations, including af(x), f(x) + d, f(x - c), f(bx) for specific values of a, b, c and d, in mathematical and real problems; (H) Graph arcsin x and arccos x and describe the constraints on the domain; (I) determine and analyse the main features of exponential, logarithmic, rational, polynomial, trigonometric, inverse trigonometric and piecemeal defined functions, including domain, range, symmetry, relative maximum, relative minimum, zeros, asymptotes and intervals at which the function increases or decreases; (J) analyze and describe the final behavior of functions, including exponential, logarithmic, rational, polynomiaal and power functions, using infinite notation to communicate this feature in mathematical and real problems; (K) Analyze the characteristics of rational functions and the behavior of the function around the asymptotes, including horizontal, vertical and oblique asymptotes; (L) determine different types of discontinuities in the interval (-∞, ∞) as they relate to functions, and to examine the limitations of the graph calculator, since it refers to the behavior of the function around discontinuities; (M) describe the left-sided behavior and right-sided behavior of the graph of a function around discontinuities; (N) analyze situations modeled by functions, including exponential, logarithmic, rational, polynomiaal and power-efficient functions to solve real-world problems; (O) development and uses a sinusoidal function that allows a situation in mathematical and real problems and (P) determine the values of the trigonometric functions in the special angles and relate them in mathematical and real problems. (3) Relationships and geometric considerations. The student uses the process standards in mathematics to model and establish algebraic and geometric relationships. The student is expected to graphically represent: (A) a set of parametric equations; (B) Convert parametric equations rectangular relationships and convert rectangular relationships into parametric equations; (C) use parametric equations to model and solve mathematical and real problems; (D) Graph points in the polar coordinate system and conversion between rectangular and polar coordinates; (E) chart polar equations by plotting points and using technology; (F) determine the conical section that arises when a plane intersects a double cone; (G) establish connections between the location definition of conical sections and their equations in rectangular coordinates; (H) use the properties of an ellipse to write the equation of an ellipse with center (h, k); and (I) use the properties of a hyperbole to write the equation of a center hyperbole (h, k). (4) Number and measure. The student uses process standards in mathematics to apply appropriate techniques, tools, and formulas to calculate metrics in mathematical and real problems. The student is expected to: (A) determine the relationship between the unit circle and the definition of a periodic function for evaluating trigonometric functions in mathematical and real problems; (B) describe the ratio between degree and radian dimension on the unit circle; (C) represent angles in radians or degrees based on the concept of rotation and find the measure of reference angles and angles in a standard position; (D) represent angles in radians or degrees based on the concept of rotation in mathematical and real problems, including linear and angular velocity; (E) determination of the value of trigonometric angular ratios and solving problems with trigonometric ratios in mathematical and real problems; (F) trigonometry in mathematical and real problems, including bearings; (G) Apply the law of sins to mathematical and real problems; (H) Use of the Cosine Act for mathematical and real problems; (I) Use vectors to model situations with size and direction; (J) represent the addition of vectors and the multiplication of a vector by a scalar geometrically and symbolically; and (K) apply vector addition and multiplication of a vector by a scalar in mathematical and real problems. (5) Algebraic reasoning. The student uses process standards in mathematics to evaluate expressions, describe patterns, formulate models, and solve equations and inequalities using properties, procedures, or algorithms. The student is expected to evaluate: (A) finite sums and geometric rows, if possible, in sigma notation; (B) represent arithmetic sequences and geometric sequences with recursive formulas; (C) Calculation of the n. term and the n. partial sum of a series in mathematical and real problems; (D) represent arithmetic series and geometric series with sigma notation; (E) calculate the n. term of a geometric series, the n. subtotal of a geometric series, and the sum of an infinite geometric series, if it exists; (F) Application of Binomial Binomial for the extension of $(a + b)n$ in the powers of a and b for a positive integer n, where a and b are numbered; (G) use the properties of logarithms to evaluate or transform logarithmic expressions; (H) generate and solve logarithmic equations in mathematical and real problems; (I) to generate and solve exponential equations in mathematical and real problems; (J) solving polynomial equations with real coefficients by applying a variety of techniques to mathematical and real problems; (K) solve polynomial inequalities with real coefficients by applying a variety of techniques, and to write the solution set of polynomial inequality in interval notation in mathematical and real problems; (L) solve rational inequalities with real coefficients by applying a variety of techniques, and to write the set of solutions of rational inequality in interval notation in mathematical and real problems; (M) use trigonometric identities such as reciprocate, quotient, pythagorean, cofunctions, even/odd and sum and difference identities for cosine and sine to simplify trigonometric expressions; and (N) to generate and solve trigonometric equations in mathematical and real problems. Source: The provisions of these 111.42 adopted enter into force September 10, 2012, 37 TexReg 7109. 111.43. Mathematical models with applications, adopted 2012 (One Credit). (a) General requirements. Students can receive an award for the successful completion of this course. Prerequisite: Algebra I. b) Introduction. (1) The desire to achieve educational excellence is the driving force behind Texas' basic maths skills and skills, guided by college and career readiness standards. By embedding statistics, probability, and finances while focusing on fluid and solid understanding, Texas will take the lead in math education and prepare all Texas students for the challenges they will face in the 21st century. (2) The process standards describe how students are expected to participate in the content. The placement of process standards at the beginning of the knowledge and skills listed for each class and course is intended. The process standards interweave the other knowledge and skills so that students can be successful problem solvers and use mathematics efficiently and effectively in daily life. Process standards are integrated at each class level and course. If possible, students will apply mathematics to problems that arise in everyday life, in society and at work. The students a problem-solving model that includes the analysis of certain information, the formulation of a plan or strategy, the determination of a solution, the justification of the solution and the evaluation of the problem-solving process and the adequacy of the solution. Students select appropriate tools such as real objects, manipulative, paper and pencil, as well as technology and techniques such as mental mathematics, estimation, and numerical sense to solve problems. Students Students mathematical ideas, reasoning, and their effects to communicate effectively using multiple representations such as symbols, charts, graphics, and language. Students use mathematical relationships to generate solutions and create connections and predictions. Students analyze mathematical relationships to connect and communicate mathematical ideas. Students show, explain, or justify mathematical ideas and arguments using precise mathematical language in written or oral communication. (3) Mathematical models with applications have been developed to build on the knowledge and skills of mathematics in kindergarten class 8 and algebra I. This math course provides students with a path to success in Algebra II and prepares them for various post-secondary decisions. Students learn to apply mathematics through personal finance, science, engineering, visual arts and social sciences. Students use algebraic, graphic, and geometric algebraic reasoning to recognize patterns and structures, model information, solve problems, and communicate solutions. Students select from tools such as physical objects. Manipulative; Including graphics computers, data acquisition devices and computers; and paper and pencil and methods such as algebraic techniques, geometric reasoning, patterns and mental mathematics to solve problems. (4) In mathematical models with applications, students use a mathematical modeling cycle to analyze problems, better understand problems, and improve decisions. This paragraph summarizes a basic mathematical modeling cycle. The student will present: (A): (i) identify the variables in the problem and select those that represent essential characteristics; and (ii) formulate a model by creating and selecting representations such as geometric, graphic, tabular, algebraic or statistical representations describing the relationships between the variables; (B) Calculate: Analyzing and executing operations in the relationships between the variables to draw conclusions; (C) Interpreting: interpret the results of mathematics with regard to the original problem; (D) revise: confirm the conclusions by comparing the conclusions with the problem and, if necessary, revising them; and (E) Report: Report on the conclusions and the reasons for the conclusions. (5) Statements containing the word including reference content, which must be mastered, while those containing the expression as in the same way are intended as possible illustrative examples. (c) knowledge and skills. (1) Mathematical process standards. The uses mathematical processes to acquire and demonstrate mathematical understanding. The pupil is expected to apply: (A) mathematics to problems arising in everyday life, in society and at work; (B) use a problem-solving model that provides for the analysis of certain information, the formulation of a plan or strategy, the determination of a solution, the justification of the solution and the assessment of the problem-solving process and the adequacy of the (C) selected tools, including real objects, manipulative, paper and pencil, and, where appropriate, technology and techniques, including mental mathematics, estimation and, where appropriate, numerical sense, to solve problems; (D) communicate mathematical ideas, reasoning and their implications using multiple representations, including symbols, diagrams, graphs and language; (E) Create and use representations to organize, record and communicate mathematical ideas; (F) analyze mathematical relationships to connect and communicate mathematical ideas; and (G) display, explain and justify mathematical ideas and arguments using precise mathematical language in written or oral communication. (2) Mathematical modelling in the field of personal finance. The student uses mathematical processes using graphical and numerical techniques to study patterns and analyze data related to personal funding. The student is expected to: (A) use tariffs and linear features to resolve problems related to personal financing and budgeting, including compensation and deductions; (B) to solve problems related to personal taxes; and (C) analyze data to make banking decisions, including options for online banking, current accounts, overdraft protection, handling fees, and debit card/ATM fees. (3) Mathematical modelling in the field of personal finance. The student uses mathematical processes with algebraic formulas, graphs, and payback modeling to solve problems related to loans. The student is expected to use: (A) formulas to generate tables to display a series of payments for credit write-offs resulting from funded purchases; (B) analyze personal credit options in retail purchases and compare relative pros and cons of each option; (C) Use the technology to create payback models, to examine the financing of homes and to compare the purchase of a house with the rent of a house; and (D) Use the technology to create payback models, to

investigate car financing and to compare the purchase of a vehicle with the leasing of a vehicle. (4) Mathematical modelling in the field of personal finance. The student uses mathematical processes using algebraic formulas, numerical techniques, and graphs to solve financial planning problems. The student is expected to analyse and compare: (A) coverage options and insurance rates; (B) investigate and compare investment options, including equities, bonds, pensions, certificates of deposit and pensions; and (C) types of savings options with simple and and compare the relative benefits of these options. (5) Mathematical modelling in science and technology. The student uses algebraic techniques to study patterns and analyze data on how science is concerned. The student is expected to use: (A) proportionality and reverse variation to describe physical laws such as Hook's Law, Newton's Second Movement Act, and Boyle's Law; (B) the use of exponential models available through technology to promote growth and decay in areas, including Decay; and (C) use square functions to model motion. (6) Mathematical modelling in science and technology. The student uses mathematical processes with algebra and geometry to study patterns and analyze data on how to do architecture and engineering. The student is expected to use: (A) similarity, geometric transformations, symmetry, and perspective drawings to describe mathematical patterns and structures in architecture; (B) use scaling factors with two-dimensional and three-dimensional objects to detect proportional and non-proportional changes in the area and volume applied to fields; (C) use the pythagorean theorus and special right triangle relationships to calculate distances; and (D) use trigonometric ratios to calculate distances and angular dimensions applied to fields. (7) Mathematical modelling in the visual arts. The student uses mathematical processes with algebra and geometry to study patterns and analyze data as it does for the visual arts. The student is expected to use: (A) trigonometric ratios and functions available through technology to model periodic behavior in art and music; (B) Use similarity, geometric transformations, symmetry and perspective drawings to describe mathematical patterns and structures in art and photography; (C) use geometric transformations, proportions, and periodic movements to describe mathematical patterns and structure in music; and (D) Use scaling factors with two- and three-dimensional objects to detect proportional and non-proportional changes in the area and volume applied to fields. (8) Mathematical modelling in the social sciences. The student applies mathematical processes to determine the number of elements in a finite sample space and to calculate the probability of an event. The student is expected to: (A) determine the number of ways an event can occur using combinations, permutations, and the base count principle; (B) compare theoretical and empirical probability; and (C) use experiments to determine the adequacy of a theoretical model such as binomial or geometric. (9) Mathematical modelling in the social sciences. The student uses mathematical processes and mathematical models to analyze data as it is for social sciences. The student is expected to: (A) provide information from various graphs, including line charts, bar charts, pie charts, histograms, scatter plots, scatter plots, root and leaf plots, and box and interpreted to draw conclusions from the data and to identify the strengths and weaknesses of conclusions; (B) analyze numerical data using key indicators of central tendency (mean, median and mode) and variability (range, interquartile range or IQR and standard deviation) in order to draw conclusions about normal distributions; (C) a distinction between purposes and differences between types of research, including surveys, experiments and observational studies; (D) use data from a sample to estimate the mean or population share; Analyze (E) claims based on graphs and statistics from electronic and printed media justifying the validity of the declared or implied conclusions; and (F) Use regression-related methods available through technology to model linear and exponential functions, interpret correlations, and make predictions. (10) Mathematical modelling in the social sciences. The student uses mathematical processes to design a study and use graphical, numerical, and analytical techniques to communicate the results of the study. The student is expected to: (A) formulate a meaningful question that determines the data needed to answer the question, collects the relevant data, analyzes the data, and draws reasonable conclusions; and (B) communicate the methods used, the analyses carried out and the conclusions drawn for a data analysis project by using one or more of the following elements: a written report, a visual display, an oral report or a multimedia presentation. Legal Authority: The provisions of these 111.43 issued according to the Texas Education Code, 7.102(c)(4), 28.002 and 28.025. Source: The provisions of this 111.43 adopted en the effective 10, 2012, 37 TexReg 7109; 24 August 2015, 40 TexReg 5330. 111.44. Advanced Quantitative Reasoning, Adopted 2012 (One-Half to One Credit). (a) General requirements. Students receive half to one award for the successful completion of this course. Prerequisites: Geometry and algebra II. b) Introduction. (1) The desire to achieve educational excellence is the driving force behind Texas' basic maths skills and skills, guided by college and career readiness standards. By embedding statistics, probability, and finances while focusing on fluid and solid understanding, Texas will take the lead in math education and prepare all Texas students for the challenges they will face in the 21st century. (2) The process standards describe how students are expected to participate in the content. The placement of process standards at the beginning of the knowledge and skills listed for each class and course is intended. The process standards interweave the other knowledge and skills so that students can be successful problem solvers and use mathematics efficiently and effectively in daily life. Process standards are integrated at each class level and course. If possible, students will apply mathematics to problems that arise in everyday life, in society and at work. The students a problem-solving model that includes the analysis of certain information, the formulation of a plan or strategy, the determination of a solution, the justification of the solution and the evaluation of the problem-solving process and the adequacy of the solution. Students select appropriate tools such as real objects, manipulative, paper and pencil, as well as technology and techniques such as mental mathematics, estimation, and numerical sense to solve problems. Students communicate mathematical ideas, reasoning and their with multiple representations such as symbols, charts, charts, and language. Students use mathematical relationships to generate solutions and create connections and predictions. Students analyze mathematical relationships to connect and communicate mathematical ideas. Students show, explain, or justify mathematical ideas and arguments using precise mathematical language in written or oral communication. (3) In Advanced Quantitative Reasoning, students develop and apply skills required for college, career and life. The course content consists primarily of applications of high school math concepts to prepare students to become well-educated and well-informed 21st-century citizens. Students develop and apply reasoning, planning, and communication to make decisions and solve problems in applied situations that include numerical thinking, probability, statistical analysis, finance, mathematical selection and modeling with algebra, geometry, trigonometry, and discrete mathematics. (4) Statements containing the word, including reference content, which must be mastered, while those containing the expression as in the same way are intended as possible illustrative examples. (c) knowledge and skills. (1) Mathematical process standards. The student uses mathematical processes to acquire and demonstrate mathematical understanding. The pupil is expected to apply: (A) mathematics to problems arising in everyday life, in society and at work; (B) use a problem-solving model that includes the analysis of certain information, the formulation of a plan or strategy, the definition of a solution, the justification of the solution and the assessment of the problem-solving process and the adequacy of the solution; (C) selected tools, including real objects, manipulative, paper and pencil, and, where appropriate, technology and techniques, including mental mathematics, estimation and, where appropriate, numerical sense, to solve problems; (D) communicate mathematical ideas, reasoning and their implications using multiple representations, including symbols, diagrams, graphs and language; (E) Create and use representations to organize, record and communicate mathematical ideas; (F) analyze mathematical relationships to connect and communicate mathematical ideas; and (G) display, explain and justify mathematical ideas and arguments using precise mathematical language in written or oral communication. (2) Numerical reasoning. The student applies the process standards in mathematics to generate new insights by expanding the existing knowledge. The student creates new Understanding simispers with problems with numerical data that arise in everyday life, in society and at work. The student expands existing knowledge and skills to analyze real situations. The student is expected to: (A) use precision and accuracy in real situations related to measurement and significant numbers; (B) published ratings, weighted averages and to make informed decisions; (C) to solve problems with quantities which cannot be easily measured using proportionality; (D) solve geometric problems with indirect measurement, including similar triangles, the Pythagorean theorem, the Sines Act, the Cosine Act and the use of dynamic geometry software; (E) solving problems with large quantities with combinatorics; (F) Use arrays to efficiently manage large data collections and add, subtract, and multiply matrices to solve applied problems, including geometric transformations; (G) analyze different voting and selection processes to compare results in specific situations; and (H) select and apply an algorithm of interest to solve real problems such as problems with recursion or iteration with population growth or decline, fractals and interest rates; the validity of recorded and transmitted data by means of checksums and hashing; Sports rankings, weighted class rankings and search engine rankings; and problems planning or demroute situations with vertex edge diagrams, critical paths, Euler paths, and minimal spanning structures, and communicate with peers the application of the algorithm in precise mathematical and non-technical language. (3) Algebraic reasoning (expressions, equations and generalized relationships). The student applies the process standards in mathematics to create and analyze mathematical models of everyday situations to make informed decisions about earning, investing, spending, and lending money through appropriate, competent, and efficient use of tools, including technology. The student uses mathematical relationships to make connections and predictions. The student assesses the validity of a prediction and uses mathematical models to represent, analyze and solve dynamic real-world problems. The student is expected to: (A) collect numeric bivariate data to create a scatterplot, select a function to model the data, justify model selection, and use the model to interpret results and make predictions; (B) describe the extent to which uncorrelated variables may or may not be related, and analyse situations where correlated variables have or are not related to cause-and-effect; (C) determine or analyse an appropriate growth or decay model for problem situations, including linear, exponential and logistical functions; (D) To determine or analyse an appropriate cyclical model for problem situations that can be modelled with periodic functions; (E) provide an appropriate piecemeal model for problem situations. or analyse; (F) create, present and analyse mathematical models for different types of income calculations to determine the best option for a particular situation; (G) create, present and analyse mathematical models of expenditure, including expenditure relating to loans, in order to determine the best option for a particular situation; and (H) create, present and analyze mathematical models and corresponding representations, including formulas and amortizations for different types of loans and investments to determine the best option for a particular situation. (4) Probabilistic and statistical reasoning. The student uses the process standards in mathematics to generate new understandings of probability and statistics. The student analyzes statistical information and evaluates risks and returns to combine mathematical ideas and make informed decisions. The student applies a problem-solving model and statistical methods to design and conduct a study that addresses one or more specific questions. The student uses multiple representations to effectively communicate the results of student-generated statistical studies and the critical analysis of published statistical studies. The student is expected to: (A) use a two-page frequency table as an example range to determine whether two events are independent and to interpret the results; (B) use of the addition rule, P(A or B) = P(A) + P(B) - P(A and B), for mathematical and real problems; (C) calculation of conditional probabilities and probabilities of composite events using tree charts, venn diagrams, surface models, and formulas; (D) interpret the conditional probabilities and probabilities of composite events by analysing presentations for decision-making in problem situations; (E) Use probabilities to make and justify decisions about risks in everyday life; (F) calculation of the expected value for the analysis of mathematical fairness, profit and risk; (G) determine the validity of logical arguments containing compound conditional statements by creating truth tables; (H) identification of limitations and lack of relevant information in studies reporting statistical information, in particular when studies are reported in a condensed form; (i) to interpret and compare statistical results using appropriate technologies, with the presumption of a margin of error; (J) identify potential misuse of statistics to justify specific conclusions, including claims of a cause-and-effect relationship and not of an association, and missteps or errors in logical justifications; (K) a description of the strengths and weaknesses of sampling, data and graphs, as well as interpretations of summary statistics and other results contained in a study, including reports published in the media; (L) to identify the need and purpose of a statistical study and to determine what kind of statistical analysis can be used to answer a particular question or set of questions; (M) Determination of the for statistical analysis, selection of appropriate sampling techniques and collection of data; (N) identification of the variables to be used in a study; (O) identifying possible sources of statistical bias in a study and how distortions can affect the validity of the results; (P) Create data displays for specific data sets to examine, compare, and estimate center, shape, spread, and unusual characteristics of the data; (Q) analyse possible sources of data variability, including imaginable and uncontrolled sources; (R) Report Results Report Results statistical studies for a given audience, including the selection of an appropriate presentation format, the creation of graphical data displays and the interpretation of the results with regard to the question under investigation; (S) justify the design and completion of statistical studies, including the methods used; and (T) provide statistical results in oral and written formats using appropriate statistical and non-technical language. Source: The provisions of this 111.44 adopted enter into force September 10, 2012, 37 TexReg 7109. 111.45. Independent Study in Mathematics, Adopted 2012 (One-Half to One Credit). (a) General requirements. (1) Students receive half to one award for the successful completion of this course. Requirements: Geometry and Algebra II. (2) Students can repeat this course with different course content for up to three credits. (3) The requirements for each course must be approved by the county before the course starts. (4) If this course is used to meet the requirements of the Distinguished Achievement Program, student research/products must be presented to a group of professionals or approved by the student's mentor. b) Introduction. (1) The desire to achieve educational excellence is the driving force behind Texas' basic maths skills and skills, guided by college and career readiness standards. By embedding statistics, probability, and finances while focusing on fluid and solid understanding, Texas will take the lead in math education and prepare all Texas students for the challenges they will face in the 21st century. (2) The process standards describe how students are expected to participate in the content. The placement of process standards at the beginning of the knowledge and skills listed for each class and course is intended. The process standards interweave the other knowledge and skills so that students can be successful problem solvers and use mathematics efficiently and effectively in daily life. Process standards are integrated at each class level and course. If possible, students will apply mathematics to problems that arise in everyday life, in society and at work. Students use a problem-solving model that includes analyzing specific information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the adequacy of the solution. Students choose suitable tools such as real objects, manipulative, paper and pencil, as well as and techniques such as mental mathematics, estimation and numerical sense to solve problems. Students effectively communicate mathematical ideas, reasoning, and their effects using multiple representations such as symbols, charts, charts, and language. Students use mathematical relationships to generate solutions and create connections and predictions. Students analyse mathematical relationships in order to mathematical no ideas. Students show, explain, or justify mathematical ideas and arguments using precise mathematical language in written or oral communication. (3) In Independent Study in Mathematics, students expand their mathematical understanding of the algebra II level in a particular field or areas of mathematics such as theory of equations, number theory, non-Euclidean geometry, linear algebra, advanced survey of mathematics, or history of mathematics. (4) Statements containing the word, including reference content, which must be mastered, while those containing the expression as in the same way are intended as possible illustrative examples. (c) Knowledge and skills: mathematical process standards. The student uses mathematical processes to acquire and demonstrate mathematical understanding. The pupil is expected to apply: (1) mathematics to problems arising in everyday life, in society and at work; (2) use a problem-solving model that includes the analysis of certain information, the formulation of a plan or strategy, the definition of a solution, the justification of the solution and the assessment of the problem-solving process and the adequacy of the solution; (3) Selected tools, including real objects, manipulative, paper and pencil, and, where appropriate, technology and techniques, including mental mathematics, estimation and, where appropriate, numerical sense, to solve problems; (4) communicate mathematical ideas, reasoning and their implications using multiple representations, including symbols, diagrams, graphs and language; (5) Create and use representations to organize, record and communicate mathematical ideas; (6) Analyze mathematical relationships to connect and communicate mathematical ideas; and (7) display, explain and justify mathematical ideas and arguments using precise mathematical language in written or oral communication. Source: The provisions of this 111.45 adopted enter into force September 10, 2012, 37 TexReg 7109. 111.46. Discrete Mathematics for Problem Solving, adopted 2013 (One-Half to One Credit). (a) General requirements. Students receive half to one award for the successful completion of this course. Prerequisite: Algebra II. b) Introduction. (1) The desire to achieve educational excellence is the driving force behind Texas' basic maths skills and skills, guided by college and career readiness standards. By embedding statistics, probability, and finances while focusing on fluid and solid understanding, Texas will take the lead in math education and all Texas students will take the lead in math education, and all Texas students will be able to meet the challenges which they will face in the 21st century. (2) The process standards describe how students are expected to participate in the content. The placement of process standards at the beginning of the knowledge and skills listed for each class and course is intended. The process standards weave the other knowledge and skills so that the students can be successful problem solvers and efficient and effective in daily life. Process standards are integrated at each class level and course. If possible, students will apply mathematics to problems that arise in everyday life, in society and at work. Students use a problem-solving model that includes analyzing specific information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the adequacy of the solution. Students select appropriate tools such as real objects, manipulative, paper and pencil, as well as technology and techniques such as mental mathematics, estimation, and numerical sense to solve problems. Students effectively communicate mathematical ideas, reasoning, and their effects using multiple representations such as symbols, charts, charts, and language. Students use mathematical relationships to generate solutions and create connections and predictions. Students analyze mathematical relationships to connect and communicate mathematical ideas. Students show, explain, or justify mathematical ideas and arguments using precise mathematical language in written or oral communication. (3) Discrete Mathematics for Problem Solve introduces students to the improved efficiency of mathematical analysis and quantitative techniques through experimental and error approaches to management problems in the areas of organisation, planning, project planning, strategy and decision-making. Students will learn how mathematical topics such as graph theory, planning and scheduling, group decision-making, fair division, game theory and movement theory can be applied to management and decision-making. Students will explore past mathematicians whose work is relevant to these issues today, and read articles about current mathematicians who either teach and do research at major universities or work in business and industry to solve logistical problems in practice. By studying the applications of mathematics on the problems of society today, students are better prepared and gain an appreciation for the value of a career in mathematics. (4) Statements containing the word, including reference content, which must be mastered, while those containing the expression as in the same way are intended as possible illustrative examples. (c) knowledge and skills. (1) Mathematical process standards. The student uses mathematical processes to acquire and demonstrate mathematical understanding. The pupil is expected to apply: (A) mathematics to problems arising in everyday life, in society and at work; (B) use a problem-solving model that provides the analysis of information, the formulation of a plan or strategy, the definition of a solution, the justification of the solution and the assessment of the problem-solving process and the adequacy of the solution; (C) select tools, including real objects, manipulative, paper and pencil, and technology, depending on the estimation and, where appropriate, numerical sense to solve problems; (D) communicate mathematical ideas, reasoning and their implications using multiple representations, including symbols, diagrams, graphs and language; (E) Create and use representations to organize, record and communicate mathematical ideas; (F) analyze mathematical relationships to connect and communicate mathematical ideas; and (G) display, explain and justify mathematical ideas and arguments using precise mathematical language in written or oral communication. (2) Graph theory. The student applies the concept of graphs to determine possible solutions to real problems. The student is expected to: (A) explain the concept of the graphics; (B) use of graphene models for simple problems in management science; (C) determine the values of the vertices of a graph; (D) Identify Euler circuits in a diagram; (E) Solving route inspection problems by eulerizing a diagram; (F) identify solutions modeled by edge traversing in a diagram; (G) compare the results of solving the traveler seller problem (TSP) with the algorithm of the nearest neighbor and with a greedy algorithm; (H) distinguish between real problems modeled by Euler racetracks and problems modeled by Hamilton racetracks; (I) distinguish between algorithms that provide optimal solutions and those that provide near-optimal solutions; (J) use the Kruskal algorithm to find the trees that cover the minimum cost; (K) use the critical path method to determine the earliest possible completion time for a collection of tasks; and (L) explain the difference between a graph and a directed graph. (3) Planning and scheduling. The student uses heuristic algorithms to solve real problems. The student is expected to: (A) use the list processing algorithm to schedule tasks on identical processors; (B) identify situations that are appropriate for modelling or planning problems; (C) determine whether a schedule is optimal using the critical path method along with the list processing algorithm; (D) identification of situations suitable for modelling by container packaging; (E) use one of the six heuristic algorithms to solve problems with the packaging of containers; (F) To solve independent task scheduling problems using the list processing algorithm; and (G) explain the relationship between planning problems and container packaging problems. (4) Group decision. The student uses mathematical processes to apply decision schemes. The student analyzes the effects of multiple types of weighted votes applies multiple voting concepts to real-world situations. The student is expected to: (A) describe the concept of a preference plan and how to use it; (B) explain how certain decision-making systems work; (C) determine the outcome for different electoral methods, taking into account the preferences of the electorate; (D) explain how different voting systems or the order of voting can lead to different results; (E) describe the impact of different strategies on the outcome of the decision-making process; (F) the explanation of the of Arrow's Impossibility Kit; (G) relate the importance of the approval vote; (H) explain the need for a weighted vote and how it works; (I) identify electoral concepts such as Borda counting, Condorcet winners, dummy voters and coalition; and (J) calculate the Banzhaf performance index and explain its meaning. (5) Fair distribution. The student applies the adapted winning procedure and the Knaster inheritance procedure to real situations. The student is expected to: (A) use the adjusted winning method to determine a fair allocation of real estate; (B) use the adjusted winning procedure to resolve a dispute; (C) explain how a fair distribution in the Knaster inheritance procedure can be achieved; (D) Solving fair division issues with three or more players in the Knaster inheritance process; (E) explain the conditions under which the trimming procedure may be applied to indivisible products; (F) identifying situations suitable for fair sharing techniques; (G) compare the advantages of the divider and the selector in the separator-choice method; (H) discuss the rules and strategies of the separation-choice method; (I) solve problems with cake division for three players using the method of final dismantling; (J) to analyse the relative importance of the three desirable characteristics of a just division: justice, envy and pareto-optimality; and (K) fair distribution procedures that are free of envy. (6) Game (or competition theory). The student uses knowledge of the basic game theory concepts to calculate optimal strategies. The student analyzes situations and identifies the use of game strategies. The student is expected to recognize: (A) competitive game situations; (B) represent a game with a matrix; (C) identify basic game-theoretical concepts and vocabulary; (D) determine the optimal pure strategies and the value of a game with a saddle point using Minimax technology; (E) An explanation of the concept and the need for a mixed strategy; (F) calculate the optimal mixed strategy and expected value for a player in a game who has only two pure strategies; (G) Model simple two-for-two, bimatrix games of partial conflicts; (H) determine the nature and impact of the game called Prisoner Dilemma; (I) explain the game known as chicken; (J) identify examples illustrating the prevalence of prisoner dilemmas and chicken in our society; and (K) determine when a pair of strategies for two players is in balance. (7) Theory of movements. The student analyzes the theory of movements (TOM). The student uses TOM and game theory to analyze conflicts. It is expected that the (A) TOM and game theory compares and contrasts; (B) explain the rules of TOM; (C) describe what to do under a cyclical game; (D) use a game tree to analyze a two-person game; (E) to determine the effect of the approach dilemma and the chicken of TOM from the point of view of TOM and to compare this with the effect of an approximation from the point of view of game theory; (F) the use of TOM in a larger, larger, complicated game; and (G) model a conflict from literature or from a real situation as a two-for-two strict sordinal game and compare the results predicted by game theory and TOM. Legal Authority: The provisions of these 111.46 issued according to the Texas Education Code, 7.102(c)(4), 28.002 and 28.025, as this section existed before amendment by House Bill 5, 83rd Texas Legislature, Regular Session, 2013. Source: The provisions of this 111.46 adopted enter into force August 25, 2014, 38 TexReg 9027. 111.47. Statistics, adopted 2015 (Credit). (a) General requirements. Students receive an award for the successful completion of this course. Prerequisite: Algebra I. b) Introduction. (1) The desire to achieve educational excellence is the driving force behind Texas' basic maths skills and skills, guided by college and career readiness standards. By embedding statistics, probability, and finances while focusing on fluid and solid understanding, Texas will take the lead in math education and prepare all Texas students for the challenges they will face in the 21st century. (2) The process standards describe how students are expected to participate in the content. The placement of process standards at the beginning of the knowledge and skills listed for each class and course is intended. The process standards interweave the other knowledge and skills so that students can be successful problem solvers and use mathematics efficiently and effectively in daily life. Process standards are integrated at each class level and course. If possible, students will apply mathematics to problems that arise in everyday life, in society and at work. Students use a problem-solving model that includes analyzing specific information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the adequacy of the solution. Students select appropriate tools such as real objects, manipulative, paper and pencil, as well as technology and techniques such as mental mathematics, estimation, and numerical sense to solve problems. Students effectively communicate mathematical ideas, reasoning, and their effects using multiple representations such as symbols, charts, charts, and language. Students use mathematical relationships to generate solutions and create connections and predictions. Students analyze mathematical relationships to connect and communicate mathematical ideas. Students show, explain or justify Ideas and arguments with precise mathematical language in written or oral communication. (3) In statistics, pupils build on the knowledge and skills of mathematics in kindergarten class 8 and algebra I. Students will expand their knowledge of variability and statistical processes. Students will be sampled and experimented, categorical and quantitative data, probability and variables, inferences and bivariate data. Students combine data and statistical processes with real situations. In addition, students are expanding their knowledge of data analysis. (4) Statements containing the word, including reference content, which must be mastered, while those containing the expression as in the same way are intended as possible illustrative examples. (c) knowledge and skills. (1) Mathematical process standards. The student uses mathematical processes to acquire and demonstrate mathematical understanding. The pupil is expected to apply: (A) mathematics to problems arising in everyday life, in society and at work; (B) use a problem-solving model that includes the analysis of certain information, the formulation of a plan or strategy, the definition of a solution, the justification of the solution and the assessment of the problem-solving process and the adequacy of the solution; (C) selected tools, including real objects, manipulative, paper and pencil, and, where appropriate, technology and techniques, including mental mathematics, estimation and, where appropriate, numerical sense, to solve problems; (D) communicate mathematical ideas, reasoning and their implications using multiple representations, including symbols, diagrams, graphs and language; (E) Create and use representations to organize, record and communicate mathematical ideas; (F) analyze mathematical relationships to connect and communicate mathematical ideas; and (G) display, explain or justify mathematical ideas and arguments using precise mathematical language in written or oral communication. (2) Statistical sampling and experiments. The student uses mathematical processes to apply understandings of statistical studies, surveys and experiments, to design and conduct a study, and to use graphical, numerical and analytical techniques to communicate the results of the study. The student is expected to: (A) compare and contrast the benefits of different sampling methods, including sampling and convenience sampling methods; (B) distinguishing between observational studies, surveys and experiments; (C) analysis of generalisations from observational studies, surveys and experiments; (D) distinction between sample statistics and population parameters; (E) formulate a meaningful question that determines the data needed to answer the question, collect the relevant data, analyse the data and draw reasonable conclusions; (F) to communicate the methods used, the analyses carried out and the conclusions for a data analysis project using one or more of the following elements: a written a visual display, oral report or multimedia presentation; and (G) critically analyse the published results in order to obtain the adequacy of the applied study design, the sampling methods used or the statistics used. (3) Variability. The student applies the mathematical process standards when describing and modeling the variability. The student is expected to distinguish between mathematical models: (A) statistical models; (B) create a statistical model to describe the variability around the structure of a mathematical model for a particular situation; (C) distinguish between different sources of variability, including measurement, natural, induced and sample variability; and (D) Describe and model variability based on population and sample distributions. (4) Categorical and quantitative data. The student applies the mathematical process standards to present and analyze both categorical and quantitative data. The student is expected to distinguish between:a between categorical and quantitative data; (B) present and aggregate data and justify the presentation; (C) analysis of the distribution characteristics of quantitative data, including the determination of the possible presence and effects of outliers; (D) compare and contrast different graphical or visual representations under the same dataset; (E) compare and compare meaningful information from summary statistics using a data set; and (F) analyze categorical data, including the determination of marginal and conditional distributions, using two-sided tables. (5) Probability and random variables. The student applies the mathematical process standards to combine probability and statistics. The student is expected to: (A) determine the probabilities, including the use of a two-way table; (B) describe the relationship between theoretical and empirical probabilities on the basis of the law of large numbers; (C) create a distribution based on a technology-generated simulation or collected samples for a discrete random variable; and (D) compare statistical measures such as sample mean and standard deviation from a technology-simulated sample distribution with the theoretical sample distribution. (6) Conclusion. The student applies the mathematical process standards to draw conclusions and justify conclusions from statistical studies. The student is expected to: (A) explain how to use sample statistics and confidence levels when creating a confidence interval; (B) explain how changes in sample size, confidence level and standard deviation affect the margin of error of a confidence interval; (C) calculation of a confidence interval for the mean of a normally distributed population with a known standard deviation; (D) calculation of a confidence interval for a proportion of the population; (E) interpretation of confidence intervals for a population parameter, including confidence intervals from media or statistical reports; (F) explain how sampling statistics can be use of a hypothesis test provides evidence of a claim to a population parameter; (G) construct zero and alternative hypotheses about a population parameter; (H) explain the importance of the p-value in relation to the level of significance by proving that the null hypothesis is rejected or not rejected in the context of the situation; (i) interpret the results of a hypothesis test with technology-generated results as large sample tests for the proportion; interpret; Difference between two proportions and difference between two independent means; and (J) describe the potential impact of Type I and Type II errors. (7) Bivariate data. The student applies the mathematical process standards to analyze relationships between bivariate quantitative data. The student is expected to analyze: (A) scatter plots for patterns, linearity, outliers, and influential points; (B) transform a linear parent function to determine a line of best customization; (C) compare different linear models for the same dataset to determine the best customization, including discussions about errors; (D) compare different methods for determining the best fit, including median median and absolute value; (E) describe the relationship between influential points and lines that are most appropriate by using dynamic graphics technology; and (F) identify and interpret the adequacy of the attributes of lines that best fit into the context, including slope and y-interception. Legal Authority: The provisions of this 111.47 issued according to the Texas Education Code, 7.102(c)(4), 28.002 and 28.025. Source: The provisions of this 111.47 adopted to enter into force March 18, 2015, 40 TexReg 1371. 111.48. Algebraic Reasoning, Adopted 2015 (Credit). (a) General requirements. Students receive an award for the successful completion of this course. Prerequisite: Algebra I. b) Introduction. (1) The desire to achieve educational excellence is the driving force behind Texas' basic maths skills and skills, guided by college and career readiness standards. By embedding statistics, probability, and finances while focusing on fluid and solid understanding, Texas will take the lead in math education and prepare all Texas students for the challenges they will face in the 21st century. (2) The process standards describe how students are expected to participate in the content. The placement of process standards at the beginning of the knowledge and skills listed for each class and course is intended. The process standards interweave the other knowledge and skills so that students can be successful problem solvers and use mathematics efficiently and effectively in daily life. Process standards are integrated at each class level and course. If possible, students will apply mathematics to problems that arise in everyday life, in society and at work. Students use a problem-solving model that uses the analysis of specific information, the formulation of a plan or a the determination of a solution, the justification of the solution and the evaluation of the problem-solving process and the adequacy of the solution. Students select appropriate tools such as real objects, manipulative, paper and pencil, as well as technology and techniques such as mental mathematics, estimation, and numerical sense to solve problems. Students effectively communicate mathematical ideas, reasoning, and their implications using multiple representations such as symbols, diagrams, diagrams, and Students use mathematical relationships to generate solutions and create connections and predictions. Students analyze mathematical relationships to connect and communicate mathematical ideas. Students show, explain, or justify mathematical ideas and arguments using precise mathematical language in written or oral communication. (3) In Algebraic Reasoning, students will build on the knowledge and skills for mathematics in kindergarten class 8 and algebra I, continue with the development of mathematical reasoning related to algebraic understandings and processes, and deepen a basis for study in subsequent mathematics courses. Students expand their knowledge of functions and relationships, including linear, square, square, rational, cubic, cube-shaped, exponential, absolute value, and logarithmic functions. Students will explore these features through analysis and applications that include studies of patterns and structures, number and algebraic methods, and modeling of data using tools based on employee and college readiness, such as probes, measurement tools, and software tools, including spreadsheets. (4) Statements containing the word, including reference content, which must be mastered, while those containing the expression as in the same way are intended as possible illustrative examples. (c) knowledge and skills. (1) Mathematical process standards. The student uses mathematical processes to acquire and demonstrate mathematical understanding. The pupil is expected to apply: (A) mathematics to problems arising in everyday life, in society and at work; (B) use a problem-solving model that includes the analysis of certain information, the formulation of a plan or strategy, the definition of a solution, the justification of the solution and the assessment of the problem-solving process and the adequacy of the solution; (C) selected tools, including real objects, manipulative, paper and pencil, and, where appropriate, technology and techniques, including mental mathematics, estimation and, where appropriate, numerical sense, to solve problems; (D) communicate mathematical ideas, reasoning and their implications using multiple representations, including symbols, diagrams, graphs and language; (E) Create and use representations to organize, record and communicate mathematical ideas; (F) analyze mathematical relationships to connect and communicate mathematical ideas; and (G) display, explain and justify mathematical ideas and arguments using precise mathematical language in written or oral communication. (2) Pattern and structure. The student turns processes to connect finite differences or shared relationships with attributes of functions. The student is expected to: (A) determine the patterns that identify the relationship between a function and its common relationship or related finite differences, including linear, square, cubic, and exponential functions; (B) a function as linear, square, cubic and when a function is tabulated using finite differences or common relationships, if necessary; (C) determine the function that models a particular table of related values using finite differences and their limited domain and reach; and (D) determine a function that models real data and mathematical contexts based on finite differences such as the age of a tree and its girth, figurative numbers, average velocity, and average acceleration. (3) Pattern and structure. The student applies mathematical processes, to understand the relationships between representations of functions and combinations of functions, including the constant function, f(x) = x, f(x) = x2, f(x) = √x, f(x) = 1/x, f(x) = x3, f(x) = 3√x, f(x) = bx, f(x) = |x|, and f(x) = logb (x) functions and their inversions; and key attributes of these functions. The student is expected to compare: (A) the key attributes, including domain, range, maxima, minima, and intercepts, a set of a linear, square, and exponential function, or a set consisting of an absolute value, square square, and square root function, tabular, graphical, and symbolic. (B) compare and contrast the key attributes of a function and its inversion when it exists, including domain, range, maxima, minima, and interception, tabular, graphical, and symbolic; (C) verify that two functions are tabular and graphically around two inverses, such as situations with interest and interest rates, speed and braking distance, and Fahrenheit-Celsius conversions; (D) represent a resulting function tabularly, graphically and symbolically when functions are combined or separated with arithmetic operations, such as the combination of a 20% discount and a 6% VAT on a sale to determine h(x), total sales, f(x) = 0.8x, g(x) = 0.06 (0.8x) and h(x) = f(x) + g(x) (E) modelling a situation using functional notation; if the output of a function is the input of a second function, such as the determination of a function h(x) = g(f(x)) = 1.06 (0.8x) for the final purchase price, h(x) of an item with a price x dollar representing a discount of 20%, f(x) = 0.8x followed by a 6% VAT, g(x) = 1.06x; and (F) compare and contrast a function and possible functions that can be used to create it tabularly, graphically, and symbolically, such as a square function resulting from the multiplication of two linear functions. (4) Number and algebraic methods. The student applies mathematical processes to simplify and execute in different ways, including real situations. The student is expected to combine tabular representations with symbolic representations when adding, subtracting, and multiplying polynomial functions arising from mathematical and real situations, such as surface and volume applications; (B) Compare and contrast the results when two linear functions are added and two linear linear functions are added and two linear linear functions are which are presented in tabular, graphical and symbolic terms; (C) determine the quotient of a polynomial function of degree three and degree four when divided by a polynomial function of degree one and degree two, if it is presented tabularly and symbolically; and (D) determine the linear factors of a polynomial function of degree two and degree three, if they are represented symbolically and tabularly and, where appropriate, graphically. (5) Number and algebraic methods. The student uses mathematical processes to represent, simplify, and perform operations on matrices, and to solve equation systems using matrices. The student is expected to add and subtract: (A) matrices; (B) multiply matrices; (C) Multiply matrices by a scalar; (D) represent and solve systems of two linear equations resulting from mathematical and real situations using matrices; and (E) represent and solve systems of three linear equations resulting from mathematical and real situations using matrices and technology. (6) Number and algebraic methods. The student uses mathematical processes to estimate and determine solutions for equations that result from functions and real applications with flowing force. The student is expected to estimate an appropriate input value that results in a specific output value for a particular function, including square, rational, and exponential functions; (B) solve equations arising from questions about functions that model real applications, including linear and square functions, tabular, graphical and symbolic; and (C) approximate solutions to equations resulting from questions about exponential, logarithmic, square, and cubic functions that tabulate real applications and graphically model. (7) Modelling from data. The student uses mathematical processes to analyze and model data based on real-world situations with corresponding functions. The student is expected to represent: (A) the domain and scope of a function using interval notation, inequalities, and set (builder) notation; (B) comparison and contrast between the mathematical and reasonable range and the range of functions that models real situations, including linear, square, exponential and rational functions; (C) determine the accuracy of a prediction from a function that models a data set against actual data by comparing average rates of change and finite differences such as collecting data from a blank space and comparing the average rate of volume change or second volume differences with the key attributes of the given given period. used; (D) determine an appropriate functional model, including linear, square and exponential functions, for a set of data resulting from real situations using finite differences and average rates of change; and (E) determine whether a particular linear function is a reasonable model for a set of data resulting from a real situation. Legal authority: The provisions of these Texas Education Code, 7.102(c)(4), 28.002 and 28.025. Source: The provisions of this 111.48 adopted to enter into force May 31, 2015, 40 TexReg 3146. For more information, see rules@tea.texas.gov. rules@tea.texas.gov.