Texas Mathematics

Algebra II

Mathematical process standards

1. The student uses mathematical processes to acquire and demonstrate mathematical understanding AII.1

A apply mathematics to problems arising in everyday life, society, and the workplace AII.1.A

B use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining the solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution AII.1.B

C select tools, including real objects, manipulatives, paper and pencil, and technology as approprate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems AII.1.C

D communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate AII.1.D

E create and use representations to organize, record, and communicate mathematical ideas AII.1.E

F analyze mathematical relationships to connect and communicate mathematical ideas AII.1.F

G display, explain, or justify mathematical ideas and arguments using precise manthematical language in written or oral communication AII.1.G

Attributes of functions and their inverses AII.2

2. The student applies mathematical processes to understand that functions have distinct key attributes and understand the relationship between a function and its inverse AII.2

A graph the functions $f(x)=\sqrt{x}$, $f(x)=1/x$, $f(x)=x^3$, $f(x)=\sqrt[3]{x}$, $f(x)=bx$, $f(x)=|x|$, and $f(x)=\log_b(x)$ where b is 2, 10, and e, and, when applicable, analyze the key attributes such as domain, range, intercepts, symmetries, asymptotic behavior, and maximum and minimum given an interval AII.2.A

B graph and write the inverse of a function using notation such as f-1 (x) AII.2.B

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lescribe and analyze the relationship between a function and its inverse quadratic and square root, logarithmic and exponential), including the

	restriction(s) on domain, which will restrict its range AII.2.C
	D use the composition of two functions, including the necessary restrictions on the domain, to determine if the functions are inverses of each other AII.2.D
Systems of equations and inequalities	**3.** The student applies mathematical processes to formulate systems of equations and inequalities, use a variety of methods to solve, and analyze reasonableness of solutions AII.3
	A formulate systems of equations, including systems consisting of three linear equations in three variables and systems consisting of two equations, the first linear and the second quadratic AII.3.A
	B solve systems of three linear equations in three variables by using Gaussian elimination, technology with matrices, and substitution AII.3.B
	C solve, algebraically, systems of two equations in two variables consisting of a linear equation and a quadratic equation AII.3.C
	D determine the reasonableness of solutions to systems of a linear equation and a quadratic equation in two variables AII.3.D
	E formulate systems of at least two linear inequalities in two variables AII.3.E
	F solve systems of two or more linear inequalities in two variables AII.3.F
	G determine possible solutions in the solution set of systems of two or more linear inequalities in two variables AII.3.G
Quadratic and square root functions, equations, and inequalities	**4.** The student applies mathematical processes to understand that quadratic and square root functions, equations, and quadratic inequalities can be used to model situations, solve problems, and make predictions AII.4
	A write the quadratic function given three specified points in the plane AII.4.A
	B write the equation of a parabola using given attributes, including vertex, focus, directrix, axis of symmetry, and direction of opening AII.4.B
	C determine the effect on the graph of $f(x) = \sqrt{x}$ 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 AII.4.C
	D transform a quadratic function $f(x) = ax^2 + bx + c$ to the form $f(x) = a(x - h)^2 + k$ to identify the different attributes of $f(x)$ AII.4.D
	E formulate quadratic and square root equations using technology given a table of data AII.4.E
	olve quadratic and square root equations AII.4.F

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	G identify extraneous solutions of square root equations AII.4.G
	H solve quadratic inequalities AII.4.H
Exponential and logarithmic functions and equations	**5.** The student applies mathematical processes to understand that exponential and logarithmic functions can be used to model situations and solve problems AII.5
	A determine the effects on the key attributes on the graphs of f(x) = b^x and f(x) = logb (x) where b is 2, 10, and e when f(x) is replaced by af(x), f(x) + d, and f(x - c) for specific positive and negative real values of a, c, and d AII.5.A
	B formulate exponential and logarithmic equations that model real-world situations, including exponential relationships written in recursive notation AII.5.B
	C rewrite exponential equations as their corresponding logarithmic equations and logarithmic equations as their corresponding exponential equations AII.5.C
	D solve exponential equations of the form y = ab^x where a is a nonzero real number and b is greater than zero and not equal to one and single logarithmic equations having real solutions AII.5.D
	E determine the reasonableness of a solution to a logarithmic equation AII.5.E
Cubic, cube root, absolute value and rational functions, equations, and inequalities	**6.** The student applies 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 AII.6
	A analyze the effect on the graphs of $f(x) = x^3$ and $f(x) = \sqrt[3]{x}$ 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 AII.6.A
	B solve cube root equations that have real roots AII.6.B
	C analyze the effect on the graphs of f(x) = |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 AII.6.C
	D formulate absolute value linear equations AII.6.D
	E solve absolute value linear equations AII.6.E
	F solve absolute value linear inequalities AII.6.F
	G analyze the effect 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 AII.6.G
	H formulate rational equations that model real-world situations AII.6.H

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	I solve rational equations that have real solutions AII.6.I
	J determine the reasonableness of a solution to a rational equation AII.6.J
	K determine the asymptotic restrictions on the domain of a rational function and represent domain and range using interval notation, inequalities, and set notation AII.6.K
	L formulate and solve equations involving inverse variation AII.6.L
Number and algebraic methods	**7.** The student applies mathematical processes to simplify and perform operations on expressions and to solve equations AII.7
	A add, subtract, and multiply complex numbers AII.7.A
	B add, subtract, and multiply polynomials AII.7.B
	C determine the quotient of a polynomial of degree three and of degree four when divided by a polynomial of degree one and of degree two AII.7.C
	D determine the linear factors of a polynomial function of degree three and of degree four using algebraic methods .7.D
	E determine linear and quadratic factors of a polynomial expression of degree three and of degree four, including factoring the sum and difference of two cubes and factoring by grouping .7.E
	F determine the sum, difference, product, and quotient of rational expressions with integral exponents of degree one and of degree two .7.F
	G rewrite radical expressions that contain variables to equivalent forms AII.7.G
	H solve equations involving rational exponents AII.7.H
	I write the domain and range of a function in interval notation, inequalities, and set notation AII.7.I
Data	**8.** The student applies mathematical processes to analyze data, select appropriate models, write corresponding functions, and make predictions AII.8
	A analyze data to select the appropriate model from among linear, quadratic, and exponential models AII.8.A
	B use regression methods available through technology to write a linear function, a quadratic function, and an exponential function from a given set of data AII.8.B
	C predict and make decisions and critical judgments from a given set of data using linear, quadratic, and exponential models AII.8.C