Texas Tutorials are designed specifically for the Texas Essential Knowledge and Skills (TEKS) to prepare students for the State of Texas Assessment of Academic Readiness (STAAR)® end-of-course assessments.

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Math Tutorials offer targeted instruction, practice and review designed to develop computational fluency, deepen conceptual understanding, and apply mathematical practices. They automatically identify and address learning gaps down to elementary-level content, using adaptive remediation to bring students to grade-level no matter where they start. Students engage with the content in an interactive, feedback-rich environment as they progress through standards-aligned modules. By constantly honing the ability to apply their knowledge in abstract and real world scenarios, students build the depth of knowledge and higher order skills required to demonstrate their mastery when put to the test.

In each module, the Learn It and Try It make complex ideas accessible to students through focused content, modeled logic and process, multi-modal representations, and personalized feedback as students reason through increasingly challenging problems. The Review It offers a high impact summary of key concepts and relates those concepts to students' lives. The Test It assesses students' mastery of the module's concepts, providing granular performance data to students and teachers after each attempt. To help students focus on the content most relevant to them, unit-level pretests and posttests can quickly identify where students are strong and where they're still learning.

Unit 1: Systems of Equations and Inequalities

- **SOLVING SYSTEMS OF LINEAR EQUATIONS: MATRICES**
  - 3.A: The student applies mathematical processes to formulate systems of equations and inequalities, use a variety of methods to solve, and analyze reasonableness of solutions. 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;
  - 3.B: The student applies mathematical processes to formulate systems of equations and inequalities, use a variety of methods to solve, and analyze reasonableness of solutions. solve systems of three linear equations in three variables by using Gaussian elimination, technology with matrices, and substitution;
  - 1.B: The student uses mathematical processes to acquire and demonstrate mathematical understanding. use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution;

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- 1.F: The student uses mathematical processes to acquire and demonstrate mathematical understanding. analyze mathematical relationships to connect and communicate mathematical ideas; and

- **SOLVING SYSTEMS OF LINEAR INEQUALITIES**
  - 1.B: The student uses mathematical processes to acquire and demonstrate mathematical understanding. use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution;
  - 3.E: The student applies mathematical processes to formulate systems of equations and inequalities, use a variety of methods to solve, and analyze reasonableness of solutions. formulate systems of at least two linear inequalities in two variables;
  - 3.F: The student applies mathematical processes to formulate systems of equations and inequalities, use a variety of methods to solve, and analyze reasonableness of solutions. solve systems of two or more linear inequalities in two variables; and
  - 3.G: The student applies mathematical processes to formulate systems of equations and inequalities, use a variety of methods to solve, and analyze reasonableness of solutions. determine possible solutions in the solution set of systems of two or more linear inequalities in two variables.

Unit 2: Advanced Systems of Equations

- **SOLVING THREE-VARIABLE SYSTEMS OF LINEAR EQUATIONS**
  - 1.B: The student uses mathematical processes to acquire and demonstrate mathematical understanding. use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution;
  - 3.A: The student applies mathematical processes to formulate systems of equations and inequalities, use a variety of methods to solve, and analyze reasonableness of solutions. 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;
  - 3.B: The student applies mathematical processes to formulate systems of equations and inequalities, use a variety of methods to solve, and analyze reasonableness of solutions. solve systems of three linear equations in three variables by using Gaussian elimination, technology with matrices, and substitution;
- **SYSTEMS OF NONLINEAR EQUATIONS**
  - 1.C: The student uses mathematical processes to acquire and demonstrate mathematical understanding. select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems;
  - 3.A: The student applies mathematical processes to formulate systems of equations and inequalities, use a variety of methods to solve, and analyze reasonableness of solutions. formulate systems of

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equations, including systems consisting of three linear equations in three variables and systems consisting of two equations, the first linear and the second quadratic;

- 3.C: The student applies mathematical processes to formulate systems of equations and inequalities, use a variety of methods to solve, and analyze reasonableness of solutions. solve, algebraically, systems of two equations in two variables consisting of a linear equation and a quadratic equation;
- 3.D: The student applies mathematical processes to formulate systems of equations and inequalities, use a variety of methods to solve, and analyze reasonableness of solutions. determine the reasonableness of solutions to systems of a linear equation and a quadratic equation in two variables;

Unit 3: Functions

- **DOMAIN AND RANGE**
  - 1.G: The student uses mathematical processes to acquire and demonstrate mathematical understanding. display, explain, or justify mathematical ideas and arguments using precise mathematical language in written or oral communication.
  - 7.I: The student applies mathematical processes to simplify and perform operations on expressions and to solve equations. write the domain and range of a function in interval notation, inequalities, and set notation.
  - 1.F: The student uses mathematical processes to acquire and demonstrate mathematical understanding. analyze mathematical relationships to connect and communicate mathematical ideas; and
- **ABSOLUTE VALUE FUNCTIONS**
  - 7.I: The student applies mathematical processes to simplify and perform operations on expressions and to solve equations. write the domain and range of a function in interval notation, inequalities, and set notation.
  - 6.D: 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. formulate absolute value linear equations;
  - 6.E: 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. solve absolute value linear equations;
  - 2.A: The student applies mathematical processes to understand that functions have distinct key attributes and understand the relationship between a function and its inverse. graph the functions ()=, ()=1/, ()=, ()= , ()= to the power, ()=, and ()= () where is 2, 10, and , and, when applicable, analyze the key attributes such as domain, range, intercepts, symmetries, asymptotic behavior, and maximum and minimum given an interval;
  - 6.C: 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. analyze the effect on the graphs of () = when () is replaced by (), (), (-), and () + for specific positive and negative real values of , , , and ;

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Unit 4: Scatterplots, Modeling, and Inverse Functions

- **SCATTERPLOTS AND MODELING**
  - 1.E: The student uses mathematical processes to acquire and demonstrate mathematical understanding. create and use representations to organize, record, and communicate mathematical ideas;
  - 8.B: The student applies mathematical processes to analyze data, select appropriate models, write corresponding functions, and make predictions. use regression methods available through technology to write a linear function, a quadratic function, and an exponential function from a given set of data; and
  - 1.C: The student uses mathematical processes to acquire and demonstrate mathematical understanding. select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems;
  - 1.D: The student uses mathematical processes to acquire and demonstrate mathematical understanding. communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate;
  - 4.E: 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. formulate quadratic and square root equations using technology given a table of data;
  - 8.C: The student applies mathematical processes to analyze data, select appropriate models, write corresponding functions, and make predictions. predict and make decisions and critical judgments from a given set of data using linear, quadratic, and exponential models.
  - 8.A: The student applies mathematical processes to analyze data, select appropriate models, write corresponding functions, and make predictions. analyze data to select the appropriate model from among linear, quadratic, and exponential models;
- **INVERSE FUNCTIONS**
  - 2.B: The student applies mathematical processes to understand that functions have distinct key attributes and understand the relationship between a function and its inverse. graph and write the inverse of a function using notation such as - ();
  - 2.C: The student applies mathematical processes to understand that functions have distinct key attributes and understand the relationship between a function and its inverse. describe 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; and
  - 1.E: The student uses mathematical processes to acquire and demonstrate mathematical understanding. create and use representations to organize, record, and communicate mathematical ideas;

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- 2.B: The student applies mathematical processes to understand that functions have distinct key attributes and understand the relationship between a function and its inverse. graph and write the inverse of a function using notation such as - ();

Unit 5: Transforming Functions

- **PARENT FUNCTIONS**
  - 1.E: The student uses mathematical processes to acquire and demonstrate mathematical understanding. create and use representations to organize, record, and communicate mathematical ideas;
  - 6.A: 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. analyze the effect on the graphs of () = and () = when () is replaced by (), (), (-), and () + for specific positive and negative real values of , , , and ;
  - 1.F: The student uses mathematical processes to acquire and demonstrate mathematical understanding. analyze mathematical relationships to connect and communicate mathematical ideas; and
  - 7.I: The student applies mathematical processes to simplify and perform operations on expressions and to solve equations. write the domain and range of a function in interval notation, inequalities, and set notation.
  - 5.A: The student applies mathematical processes to understand that exponential and logarithmic functions can be used to model situations and solve problems. determine the effects on the key attributes on the graphs of () = to the power and () = () where is 2, 10, and when () is replaced by (), () + , and f(-) for specific positive and negative real values of , , and ;
  - 2.A: The student applies mathematical processes to understand that functions have distinct key attributes and understand the relationship between a function and its inverse. graph the functions ()=, ()=1/, ()=, ()= , ()= to the power, ()=, and ()= () where is 2, 10, and , and, when applicable, analyze the key attributes such as domain, range, intercepts, symmetries, asymptotic behavior, and maximum and minimum given an interval;
  - 2.A: The student applies mathematical processes to understand that functions have distinct key attributes and understand the relationship between a function and its inverse. graph the functions ()=, ()=1/, ()=, ()= , ()= to the power, ()=, and ()= () where is 2, 10, and , and, when applicable, analyze the key attributes such as domain, range, intercepts, symmetries, asymptotic behavior, and maximum and minimum given an interval;
- **TRANSFORMATIONS OF PARENT FUNCTIONS**
  - 6.C: 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. analyze the effect on the graphs of () = when () is replaced by (), (), (-), and () + for specific positive and negative real values of , , , and ;
  - 6.G: 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,

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and make predictions. analyze the effect on the graphs of () = 1/ when () is replaced by (), (), (-), and () + for specific positive and negative real values of , , , and ;

- 4.C: 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. determine the effect on the graph of () = when () is replaced by (), () + , (), and (-) for specific positive and negative values of , , , and ;
- 5.A: The student applies mathematical processes to understand that exponential and logarithmic functions can be used to model situations and solve problems. determine the effects on the key attributes on the graphs of () = to the power and () = () where is 2, 10, and when () is replaced by (), () + , and f(-) for specific positive and negative real values of , , and ;
- 6.A: 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. analyze the effect on the graphs of () = and () = when () is replaced by (), (), (-), and () + for specific positive and negative real values of , , , and ;
- 6.C: 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. analyze the effect on the graphs of () = when () is replaced by (), (), (-), and () + for specific positive and negative real values of , , , and ;
- 6.G: 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. analyze the effect on the graphs of () = 1/ when () is replaced by (), (), (-), and () + for specific positive and negative real values of , , , and ;
- 6.C: 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. analyze the effect on the graphs of () = when () is replaced by (), (), (-), and () + for specific positive and negative real values of , , , and ;
- 6.G: 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. analyze the effect on the graphs of () = 1/ when () is replaced by (), (), (-), and () + for specific positive and negative real values of , , , and ;
- 4.C: 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. determine the effect on the graph of () = when () is replaced by (), () + , (), and (-) for specific positive and negative values of , , , and ;
- 5.A: The student applies mathematical processes to understand that exponential and logarithmic functions can be used to model situations and solve problems. determine the effects on the key attributes on the graphs of () = to the power and () = () where is 2, 10, and when () is replaced by (), () + , and f(-) for specific positive and negative real values of , , and ;

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- 2.A: The student applies mathematical processes to understand that functions have distinct key attributes and understand the relationship between a function and its inverse. graph the functions ()=, ()=1/, ()=, ()= , ()= to the power, ()=, and ()= () where is 2, 10, and , and, when applicable, analyze the key attributes such as domain, range, intercepts, symmetries, asymptotic behavior, and maximum and minimum given an interval;
- 6.G: 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. analyze the effect on the graphs of () = 1/ when () is replaced by (), (), (-), and () + for specific positive and negative real values of , , , and ;

- **MULTIPLE TRANSFORMATIONS OF PARENT FUNCTIONS**
  - 1.C: The student uses mathematical processes to acquire and demonstrate mathematical understanding. select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems;
  - 1.E: The student uses mathematical processes to acquire and demonstrate mathematical understanding. create and use representations to organize, record, and communicate mathematical ideas;
  - 5.A: The student applies mathematical processes to understand that exponential and logarithmic functions can be used to model situations and solve problems. determine the effects on the key attributes on the graphs of () = to the power and () = () where is 2, 10, and when () is replaced by (), () + , and f(-) for specific positive and negative real values of , , and ;
  - 6.C: 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. analyze the effect on the graphs of () = when () is replaced by (), (), (-), and () + for specific positive and negative real values of , , , and ;
  - 6.G: 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. analyze the effect on the graphs of () = 1/ when () is replaced by (), (), (-), and () + for specific positive and negative real values of , , , and ;
  - 6.C: 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. analyze the effect on the graphs of () = when () is replaced by (), (), (-), and () + for specific positive and negative real values of , , , and ;
  - 6.G: 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. analyze the effect on the graphs of () = 1/ when () is replaced by (), (), (-), and () + for specific positive and negative real values of , , , and ;
  - 2.A: The student applies mathematical processes to understand that functions have distinct key attributes and understand the relationship between a function and its inverse. graph the functions ()=,

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()=1/, ()=, ()= , ()= to the power, ()=, and ()= () where is 2, 10, and , and, when applicable, analyze the key attributes such as domain, range, intercepts, symmetries, asymptotic behavior, and maximum and minimum given an interval;

- 2.A: The student applies mathematical processes to understand that functions have distinct key attributes and understand the relationship between a function and its inverse. graph the functions ()=, ()=1/, ()=, ()= , ()= to the power, ()=, and ()= () where is 2, 10, and , and, when applicable, analyze the key attributes such as domain, range, intercepts, symmetries, asymptotic behavior, and maximum and minimum given an interval;
- 4.C: 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. determine the effect on the graph of () = when () is replaced by (), () + , (), and (-) for specific positive and negative values of , , , and ;
- 6.G: 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. analyze the effect on the graphs of () = 1/ when () is replaced by (), (), (-), and () + for specific positive and negative real values of , , , and ;
- 2.A: The student applies mathematical processes to understand that functions have distinct key attributes and understand the relationship between a function and its inverse. graph the functions ()=, ()=1/, ()=, ()= , ()= to the power, ()=, and ()= () where is 2, 10, and , and, when applicable, analyze the key attributes such as domain, range, intercepts, symmetries, asymptotic behavior, and maximum and minimum given an interval;
- 5.A: The student applies mathematical processes to understand that exponential and logarithmic functions can be used to model situations and solve problems. determine the effects on the key attributes on the graphs of () = to the power and () = () where is 2, 10, and when () is replaced by (), () + , and f(-) for specific positive and negative real values of , , and ;

Unit 6: Polynomials I

- **ADDITION AND SUBTRACTION OF POLYNOMIALS**
  - 1.C: The student uses mathematical processes to acquire and demonstrate mathematical understanding. select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems;
  - 7.B: The student applies mathematical processes to simplify and perform operations on expressions and to solve equations. add, subtract, and multiply polynomials;
- **MULTIPLICATION OF POLYNOMIALS**
  - 1.C: The student uses mathematical processes to acquire and demonstrate mathematical understanding. select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems;

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- 7.B: The student applies mathematical processes to simplify and perform operations on expressions and to solve equations. add, subtract, and multiply polynomials;

Unit 7: Polynomials II

- **DIVISION OF POLYNOMIALS**
  - 1.C: The student uses mathematical processes to acquire and demonstrate mathematical understanding. select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems;
  - 7.C: The student applies mathematical processes to simplify and perform operations on expressions and to solve equations. 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;
- **GRAPHS OF POLYNOMIAL FUNCTIONS**
  - 6.A: 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. analyze the effect on the graphs of () = and () = when () is replaced by (), (), (-), and () + for specific positive and negative real values of , , , and ;
  - 1.F: The student uses mathematical processes to acquire and demonstrate mathematical understanding. analyze mathematical relationships to connect and communicate mathematical ideas; and
  - 2.A: The student applies mathematical processes to understand that functions have distinct key attributes and understand the relationship between a function and its inverse. graph the functions ()=, ()=1/, ()=, ()= , ()= to the power, ()=, and ()= () where is 2, 10, and , and, when applicable, analyze the key attributes such as domain, range, intercepts, symmetries, asymptotic behavior, and maximum and minimum given an interval;
  - 6.A: 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. analyze the effect on the graphs of () = and () = when () is replaced by (), (), (-), and () + for specific positive and negative real values of , , , and ;

Unit 8: Quadratic Functions

- **REPRESENTATIONS OF QUADRATIC FUNCTIONS**
  - 4.D: 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. transform a quadratic function () = + + to the form () = (-) + to identify the different attributes of ();
  - 4.B: 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. write the equation of a parabola using given attributes, including vertex, focus, directrix, axis of symmetry, and direction of opening;

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- 4.E: 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. formulate quadratic and square root equations using technology given a table of data;
- 1.F: The student uses mathematical processes to acquire and demonstrate mathematical understanding. analyze mathematical relationships to connect and communicate mathematical ideas; and
- 4.F: 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. solve quadratic and square root equations;

- **ANALYZING GRAPHS OF QUADRATIC FUNCTIONS**
  - 1.D: The student uses mathematical processes to acquire and demonstrate mathematical understanding. communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate;
  - 1.F: The student uses mathematical processes to acquire and demonstrate mathematical understanding. analyze mathematical relationships to connect and communicate mathematical ideas; and
  - 4.B: 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. write the equation of a parabola using given attributes, including vertex, focus, directrix, axis of symmetry, and direction of opening;
- **PARABOLAS**
  - 1.F: The student uses mathematical processes to acquire and demonstrate mathematical understanding. analyze mathematical relationships to connect and communicate mathematical ideas; and
  - 1.D: The student uses mathematical processes to acquire and demonstrate mathematical understanding. communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate;
  - 1.C: The student uses mathematical processes to acquire and demonstrate mathematical understanding. select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems;
  - 1.G: The student uses mathematical processes to acquire and demonstrate mathematical understanding. display, explain, or justify mathematical ideas and arguments using precise mathematical language in written or oral communication.
  - 4.B: 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. write the equation of a parabola using given attributes, including vertex, focus, directrix, axis of symmetry, and direction of opening;

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- 4.D: 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. transform a quadratic function () = + + to the form () = (-) + to identify the different attributes of ();

Unit 9: Solving Quadratic Equations

- **SOLVING QUADRATIC EQUATIONS BY FACTORING**
  - 1.A: The student uses mathematical processes to acquire and demonstrate mathematical understanding. apply mathematics to problems arising in everyday life, society, and the workplace;
  - 4.F: 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. solve quadratic and square root equations;
  - 4.A: 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. write the quadratic function given three specified points in the plane;
  - 1.D: The student uses mathematical processes to acquire and demonstrate mathematical understanding. communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate;
- **COMPLETING THE SQUARE**
  - 4.F: 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. solve quadratic and square root equations;
  - 4.D: 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. transform a quadratic function () = + + to the form () = (-) + to identify the different attributes of ();
  - 4.B: 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. write the equation of a parabola using given attributes, including vertex, focus, directrix, axis of symmetry, and direction of opening;
- **QUADRATIC FORMULA**
  - 1.F: The student uses mathematical processes to acquire and demonstrate mathematical understanding. analyze mathematical relationships to connect and communicate mathematical ideas; and
  - 1.A: The student uses mathematical processes to acquire and demonstrate mathematical understanding. apply mathematics to problems arising in everyday life, society, and the workplace;
  - 4.F: 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. solve quadratic and square root equations;

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- 1.G: The student uses mathematical processes to acquire and demonstrate mathematical understanding. display, explain, or justify mathematical ideas and arguments using precise mathematical language in written or oral communication.
- 4.A: 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. write the quadratic function given three specified points in the plane;
- 4.B: 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. write the equation of a parabola using given attributes, including vertex, focus, directrix, axis of symmetry, and direction of opening;

Unit 10: Quadratic Equations and Inequalities

- **COMPLEX NUMBERS AND QUADRATIC FUNCTIONS**
  - 4.F: 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. solve quadratic and square root equations;
  - 7.A: The student applies mathematical processes to simplify and perform operations on expressions and to solve equations. add, subtract, and multiply complex numbers;
  - 1.F: The student uses mathematical processes to acquire and demonstrate mathematical understanding. analyze mathematical relationships to connect and communicate mathematical ideas; and
  - 4.B: 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. write the equation of a parabola using given attributes, including vertex, focus, directrix, axis of symmetry, and direction of opening;
- **SOLVING QUADRATIC INEQUALITIES**
  - 1.D: The student uses mathematical processes to acquire and demonstrate mathematical understanding. communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate;
  - 1.E: The student uses mathematical processes to acquire and demonstrate mathematical understanding. create and use representations to organize, record, and communicate mathematical ideas;
  - 1.F: The student uses mathematical processes to acquire and demonstrate mathematical understanding. analyze mathematical relationships to connect and communicate mathematical ideas; and
  - 4.H: 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. solve quadratic inequalities.

Unit 11: Factoring Polynomials

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- **FACTORING CUBIC POLYNOMIALS**
  - 7.D: The student applies mathematical processes to simplify and perform operations on expressions and to solve equations. determine the linear factors of a polynomial function of degree three and of degree four using algebraic methods;
  - 7.E: The student applies mathematical processes to simplify and perform operations on expressions and to solve equations. 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;
- **FACTORING HIGHER-ORDER POLYNOMIALS**
  - 7.D: The student applies mathematical processes to simplify and perform operations on expressions and to solve equations. determine the linear factors of a polynomial function of degree three and of degree four using algebraic methods;
  - 7.E: The student applies mathematical processes to simplify and perform operations on expressions and to solve equations. 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;

Unit 12: Solving Higher-Order Polynomial Equations

- **FACTOR THEOREM AND REMAINDER THEOREM**
  - 7.D: The student applies mathematical processes to simplify and perform operations on expressions and to solve equations. determine the linear factors of a polynomial function of degree three and of degree four using algebraic methods;
  - 7.E: The student applies mathematical processes to simplify and perform operations on expressions and to solve equations. 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;
- **RATIONAL ROOT THEOREM**
  - 1.D: The student uses mathematical processes to acquire and demonstrate mathematical understanding. communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate;
  - 7.D: The student applies mathematical processes to simplify and perform operations on expressions and to solve equations. determine the linear factors of a polynomial function of degree three and of degree four using algebraic methods;
  - 7.E: The student applies mathematical processes to simplify and perform operations on expressions and to solve equations. 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;

Unit 13: Rational Expressions, Equations, and Functions

- **OPERATIONS WITH RATIONAL EXPRESSIONS**

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- 7.F: The student applies mathematical processes to simplify and perform operations on expressions and to solve equations. determine the sum, difference, product, and quotient of rational expressions with integral exponents of degree one and of degree two;

- **SOLVING RATIONAL EQUATIONS**
  - 2.A: The student applies mathematical processes to understand that functions have distinct key attributes and understand the relationship between a function and its inverse. graph the functions ()=, ()=1/, ()=, ()= , ()= to the power, ()=, and ()= () where is 2, 10, and , and, when applicable, analyze the key attributes such as domain, range, intercepts, symmetries, asymptotic behavior, and maximum and minimum given an interval;
  - 6.I: 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. solve rational equations that have real solutions;
  - 6.J: 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. determine the reasonableness of a solution to a rational equation;

Unit 14: Rational Functions

- **ANALYZING GRAPHS OF RATIONAL FUNCTIONS**
  - 2.A: The student applies mathematical processes to understand that functions have distinct key attributes and understand the relationship between a function and its inverse. graph the functions ()=, ()=1/, ()=, ()= , ()= to the power, ()=, and ()= () where is 2, 10, and , and, when applicable, analyze the key attributes such as domain, range, intercepts, symmetries, asymptotic behavior, and maximum and minimum given an interval;
  - 6.G: 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. analyze the effect on the graphs of () = 1/ when () is replaced by (), (), (-), and () + for specific positive and negative real values of , , , and ;
  - 6.K: 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. determine the asymptotic restrictions on the domain of a rational function and represent domain and range using interval notation, inequalities, and set notation; and
  - 2.A: The student applies mathematical processes to understand that functions have distinct key attributes and understand the relationship between a function and its inverse. graph the functions ()=, ()=1/, ()=, ()= , ()= to the power, ()=, and ()= () where is 2, 10, and , and, when applicable, analyze the key attributes such as domain, range, intercepts, symmetries, asymptotic behavior, and maximum and minimum given an interval;
  - 6.G: 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. analyze the effect on the graphs of () = 1/ when () is replaced by (), (), (-), and () + for specific positive and negative real values of , , , and ;

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- **MODELING SITUATIONS WITH RATIONAL FUNCTIONS**
  - 1.A: The student uses mathematical processes to acquire and demonstrate mathematical understanding. apply mathematics to problems arising in everyday life, society, and the workplace;
  - 6.H: 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. formulate rational equations that model real-world situations;
  - 6.I: 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. solve rational equations that have real solutions;
  - 6.J: 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. determine the reasonableness of a solution to a rational equation;
- **MODELING SITUATIONS WITH DIRECT AND INVERSE VARIATION**
  - 1.B: The student uses mathematical processes to acquire and demonstrate mathematical understanding. use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution;
  - 1.A: The student uses mathematical processes to acquire and demonstrate mathematical understanding. apply mathematics to problems arising in everyday life, society, and the workplace;
  - 6.L: 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. formulate and solve equations involving inverse variation.
  - 6.H: 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. formulate rational equations that model real-world situations;
  - 6.I: 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. solve rational equations that have real solutions;
  - 6.J: 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. determine the reasonableness of a solution to a rational equation;

Unit 15: Radical Expressions, Equations, and Functions

- **ADVANCED PROPERTIES OF SQUARE ROOT EXPRESSIONS**
  - 7.G: The student applies mathematical processes to simplify and perform operations on expressions and to solve equations. rewrite radical expressions that contain variables to equivalent forms;
  - 1.G: The student uses mathematical processes to acquire and demonstrate mathematical understanding. display, explain, or justify mathematical ideas and arguments using precise mathematical language in written or oral communication.

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- **SOLVING SQUARE ROOT EQUATIONS**
  - 4.F: 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. solve quadratic and square root equations;
  - 4.G: 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. identify extraneous solutions of square root equations; and
  - 1.D: The student uses mathematical processes to acquire and demonstrate mathematical understanding. communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate;
  - 2.A: The student applies mathematical processes to understand that functions have distinct key attributes and understand the relationship between a function and its inverse. graph the functions ()=, ()=1/, ()=, ()= , ()= to the power, ()=, and ()= () where is 2, 10, and , and, when applicable, analyze the key attributes such as domain, range, intercepts, symmetries, asymptotic behavior, and maximum and minimum given an interval;
  - 2.A: The student applies mathematical processes to understand that functions have distinct key attributes and understand the relationship between a function and its inverse. graph the functions ()=, ()=1/, ()=, ()= , ()= to the power, ()=, and ()= () where is 2, 10, and , and, when applicable, analyze the key attributes such as domain, range, intercepts, symmetries, asymptotic behavior, and maximum and minimum given an interval;
  - 4.C: 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. determine the effect on the graph of () = when () is replaced by (), () + , (), and (-) for specific positive and negative values of , , , and ;
- **ANALYZING GRAPHS OF SQUARE ROOT FUNCTIONS**
  - 4.C: 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. determine the effect on the graph of () = when () is replaced by (), () + , (), and (-) for specific positive and negative values of , , , and ;
  - 2.A: The student applies mathematical processes to understand that functions have distinct key attributes and understand the relationship between a function and its inverse. graph the functions ()=, ()=1/, ()=, ()= , ()= to the power, ()=, and ()= () where is 2, 10, and , and, when applicable, analyze the key attributes such as domain, range, intercepts, symmetries, asymptotic behavior, and maximum and minimum given an interval;
  - 2.B: The student applies mathematical processes to understand that functions have distinct key attributes and understand the relationship between a function and its inverse. graph and write the inverse of a function using notation such as - ();
  - 2.C: The student applies mathematical processes to understand that functions have distinct key attributes and understand the relationship between a function and its inverse. describe and analyze

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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; and

- 2.A: The student applies mathematical processes to understand that functions have distinct key attributes and understand the relationship between a function and its inverse. graph the functions ()=, ()=1/, ()=, ()= , ()= to the power, ()=, and ()= () where is 2, 10, and , and, when applicable, analyze the key attributes such as domain, range, intercepts, symmetries, asymptotic behavior, and maximum and minimum given an interval;
- 7.I: The student applies mathematical processes to simplify and perform operations on expressions and to solve equations. write the domain and range of a function in interval notation, inequalities, and set notation.

Unit 16: Exponential Functions and Equations

- **EXPONENTIAL FUNCTIONS**
  - 2.A: The student applies mathematical processes to understand that functions have distinct key attributes and understand the relationship between a function and its inverse. graph the functions ()=, ()=1/, ()=, ()= , ()= to the power, ()=, and ()= () where is 2, 10, and , and, when applicable, analyze the key attributes such as domain, range, intercepts, symmetries, asymptotic behavior, and maximum and minimum given an interval;
  - 1.F: The student uses mathematical processes to acquire and demonstrate mathematical understanding. analyze mathematical relationships to connect and communicate mathematical ideas; and
  - 1.D: The student uses mathematical processes to acquire and demonstrate mathematical understanding. communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate;
  - 1.B: The student uses mathematical processes to acquire and demonstrate mathematical understanding. use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution;
  - 2.A: The student applies mathematical processes to understand that functions have distinct key attributes and understand the relationship between a function and its inverse. graph the functions ()=, ()=1/, ()=, ()= , ()= to the power, ()=, and ()= () where is 2, 10, and , and, when applicable, analyze the key attributes such as domain, range, intercepts, symmetries, asymptotic behavior, and maximum and minimum given an interval;
  - 5.B: The student applies mathematical processes to understand that exponential and logarithmic functions can be used to model situations and solve problems. formulate exponential and logarithmic equations that model real-world situations, including exponential relationships written in recursive notation;
  - 5.D: The student applies mathematical processes to understand that exponential and logarithmic functions can be used to model situations and solve problems. solve exponential equations of the

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form = to the power where is a nonzero real number and is greater than zero and not equal to one and single logarithmic equations having real solutions; and

- **SOLVING EXPONENTIAL EQUATIONS**
  - 2.C: The student applies mathematical processes to understand that functions have distinct key attributes and understand the relationship between a function and its inverse. describe 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; and
  - 5.C: The student applies mathematical processes to understand that exponential and logarithmic functions can be used to model situations and solve problems. rewrite exponential equations as their corresponding logarithmic equations and logarithmic equations as their corresponding exponential equations;
  - 5.D: The student applies mathematical processes to understand that exponential and logarithmic functions can be used to model situations and solve problems. solve exponential equations of the form = to the power where is a nonzero real number and is greater than zero and not equal to one and single logarithmic equations having real solutions; and
  - 2.A: The student applies mathematical processes to understand that functions have distinct key attributes and understand the relationship between a function and its inverse. graph the functions ()=, ()=1/, ()=, ()= , ()= to the power, ()=, and ()= () where is 2, 10, and , and, when applicable, analyze the key attributes such as domain, range, intercepts, symmetries, asymptotic behavior, and maximum and minimum given an interval;
  - 5.D: The student applies mathematical processes to understand that exponential and logarithmic functions can be used to model situations and solve problems. solve exponential equations of the form = to the power where is a nonzero real number and is greater than zero and not equal to one and single logarithmic equations having real solutions; and

Unit 17: Logarithmic Expressions, Functions, and Equations

- **LOGARITHMIC FUNCTIONS**
  - 2.B: The student applies mathematical processes to understand that functions have distinct key attributes and understand the relationship between a function and its inverse. graph and write the inverse of a function using notation such as - ();
  - 2.C: The student applies mathematical processes to understand that functions have distinct key attributes and understand the relationship between a function and its inverse. describe 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; and
  - 5.C: The student applies mathematical processes to understand that exponential and logarithmic functions can be used to model situations and solve problems. rewrite exponential equations as their corresponding logarithmic equations and logarithmic equations as their corresponding exponential equations;
  - 2.A: The student applies mathematical processes to understand that functions have distinct key attributes and understand the relationship between a function and its inverse. graph the functions ()=,

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()=1/, ()=, ()= , ()= to the power, ()=, and ()= () where is 2, 10, and , and, when applicable, analyze the key attributes such as domain, range, intercepts, symmetries, asymptotic behavior, and maximum and minimum given an interval;

- **EVALUATING LOGARITHMIC EXPRESSIONS**
  - 2.B: The student applies mathematical processes to understand that functions have distinct key attributes and understand the relationship between a function and its inverse. graph and write the inverse of a function using notation such as - ();
  - 1.C: The student uses mathematical processes to acquire and demonstrate mathematical understanding. select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems;
- **SOLVING LOGARITHMIC EQUATIONS**
  - 5.D: The student applies mathematical processes to understand that exponential and logarithmic functions can be used to model situations and solve problems. solve exponential equations of the form = to the power where is a nonzero real number and is greater than zero and not equal to one and single logarithmic equations having real solutions; and
  - 5.E: The student applies mathematical processes to understand that exponential and logarithmic functions can be used to model situations and solve problems. determine the reasonableness of a solution to a logarithmic equation.
  - 5.D: The student applies mathematical processes to understand that exponential and logarithmic functions can be used to model situations and solve problems. solve exponential equations of the form = to the power where is a nonzero real number and is greater than zero and not equal to one and single logarithmic equations having real solutions; and
  - 5.D: The student applies mathematical processes to understand that exponential and logarithmic functions can be used to model situations and solve problems. solve exponential equations of the form = to the power where is a nonzero real number and is greater than zero and not equal to one and single logarithmic equations having real solutions; and

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