Florida Tutorials are designed specifically for the New Florida Standards for Math and English Language Arts and the Next Generation Sunshine State Standards (NGSSS) for science and social studies to prepare students for the Florida Standards Assessments and the NGSSS End-of-Course (EOC) exams.

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: Expressions, Equations, and Inequalities

- **LAWS OF EXPONENTS**
  - MA.912.NSO.1.2: Generate equivalent algebraic expressions using the properties of exponents.
  - MA.912.NSO.1.3: Generate equivalent algebraic expressions involving radicals or rational exponents using the properties of exponents.
  - MA.912.NSO.1.1: Extend previous understanding of the Laws of Exponents to include rational exponents. Apply the Laws of Exponents to evaluate numerical expressions and generate equivalent numerical expressions involving rational exponents.
- **FORMULATING AND SIMPLIFYING ALGEBRAIC EXPRESSIONS**
  - MA.912.AR.1.1: Identify and interpret parts of an equation or expression that represent a quantity in terms of a mathematical or real-world context, including viewing one or more of its parts as a single

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entity.

- MA.912.AR.2.7: Write two-variable linear inequalities to represent relationships between quantities from a graph or a written description within a mathematical or real-world context.
- MA.912.NSO.1.2: Generate equivalent algebraic expressions using the properties of exponents.

- **FORMULATING AND SOLVING EQUATIONS FROM WORD PROBLEMS**
  - MA.912.AR.1.1: Identify and interpret parts of an equation or expression that represent a quantity in terms of a mathematical or real-world context, including viewing one or more of its parts as a single entity.
  - MA.912.AR.2.5: Solve and graph mathematical and real-world problems that are modeled with linear functions. Interpret key features and determine constraints in terms of the context.
  - MA.912.AR.2.4: Given a table, equation or written description of a linear function, graph that function, and determine and interpret its key features.
  - MA.912.F.1.4: Write an algebraic expression that represents the difference quotient of a function. Calculate the numerical value of the difference quotient at a given pair of points.
- **FORMULATING AND SOLVING INEQUALITIES FROM WORD PROBLEMS**
  - MA.912.AR.2.6: Given a mathematical or real-world context, write and solve one-variable linear inequalities, including compound inequalities. Represent solutions algebraically or graphically.
  - MA.912.AR.1.1: Identify and interpret parts of an equation or expression that represent a quantity in terms of a mathematical or real-world context, including viewing one or more of its parts as a single entity.

Unit 2: Functions

- **FUNCTIONS AND RELATIONS**
  - MA.912.F.1.1: Given an equation or graph that defines a function, determine the function type. Given an input-output table, determine a function type that could represent it.
  - MA.912.AR.2.5: Solve and graph mathematical and real-world problems that are modeled with linear functions. Interpret key features and determine constraints in terms of the context.
  - MA.912.AR.9.10: Solve and graph mathematical and real-world problems that are modeled with piecewise functions. Interpret key features and determine constraints in terms of the context.
- **DOMAIN AND RANGE**
  - MA.912.DP.1.2: Interpret data distributions represented in various ways. State whether the data is numerical or categorical, whether it is univariate or bivariate and interpret the different components and quantities in the display.

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- MA.912.AR.8.3: Solve and graph mathematical and real-world problems that are modeled with rational functions. Interpret key features and determine constraints in terms of the context.
- MA.912.AR.3.8: Solve and graph mathematical and real-world problems that are modeled with quadratic functions. Interpret key features and determine constraints in terms of the context.
- MA.912.AR.4.4: Solve and graph mathematical and real-world problems that are modeled with absolute value functions. Interpret key features and determine constraints in terms of the context.
- MA.912.AR.7.2: Given a table, equation or written description of a square root or cube root function, graph that function and determine its key features.
- MA.912.AR.8.2: Given a table, equation or written description of a rational function, graph that function and determine its key features.
- MA.912.AR.7.3: Solve and graph mathematical and real-world problems that are modeled with square root or cube root functions. Interpret key features and determine constraints in terms of the context.
- MA.912.AR.5.8: Given a table, equation or written description of a logarithmic function, graph that function and determine its key features.
- MA.912.AR.5.9: Solve and graph mathematical and real-world problems that are modeled with logarithmic functions. Interpret key features and determine constraints in terms of the context.
- MA.912.AR.5.7: Solve and graph mathematical and real-world problems that are modeled with exponential functions. Interpret key features and determine domain constraints in terms of the context.
- MA.912.F.1.7: Compare key features of two functions each represented algebraically, graphically, in tables or written descriptions.

- **INVERSE FUNCTIONS**
  - MA.912.F.3.7: Represent the inverse of a function algebraically, graphically or in a table. Use composition of functions to verify that one function is the inverse of the other.
  - MA.912.F.3.6: Determine whether an inverse function exists by analyzing tables, graphs and equations.
  - MA.912.F.3.9: Solve mathematical and real-world problems involving inverse functions.

Unit 3: Systems of Equations

- **SOLVING SYSTEMS OF LINEAR EQUATIONS: GRAPHING**
  - MA.912.AR.9.3: Given a mathematical or real-world context, solve a system consisting of two-variable linear or non-linear equations algebraically or graphically.

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- MA.912.AR.9.1: Given a mathematical or real-world context, write and solve a system of two-variable linear equations algebraically or graphically.
- MA.912.AR.9.7: Given a real-world context, represent constraints as systems of linear and non-linear equations or inequalities. Interpret solutions to problems as viable or non-viable options.
- MA.912.AR.9.6: Given a real-world context, represent constraints as systems of linear equations or inequalities. Interpret solutions to problems as viable or nonviable options.

- **SOLVING SYSTEMS OF LINEAR EQUATIONS: SUBSTITUTION**
  - MA.912.AR.9.3: Given a mathematical or real-world context, solve a system consisting of two-variable linear or non-linear equations algebraically or graphically.
  - MA.912.AR.9.1: Given a mathematical or real-world context, write and solve a system of two-variable linear equations algebraically or graphically.
  - MA.912.AR.2.2: Write a linear two-variable equation to represent relationships between quantities from a graph, a written description or a table of values within a mathematical or real-world context.
  - MA.912.AR.9.7: Given a real-world context, represent constraints as systems of linear and non-linear equations or inequalities. Interpret solutions to problems as viable or non-viable options.
- **SOLVING SYSTEMS OF LINEAR EQUATIONS: ELIMINATION**
  - MA.912.AR.9.3: Given a mathematical or real-world context, solve a system consisting of two-variable linear or non-linear equations algebraically or graphically.
  - MA.912.AR.9.1: Given a mathematical or real-world context, write and solve a system of two-variable linear equations algebraically or graphically.
  - MA.912.AR.2.2: Write a linear two-variable equation to represent relationships between quantities from a graph, a written description or a table of values within a mathematical or real-world context.
  - MA.912.AR.9.7: Given a real-world context, represent constraints as systems of linear and non-linear equations or inequalities. Interpret solutions to problems as viable or non-viable options.
- **SOLVING SYSTEMS OF LINEAR INEQUALITIES**
  - MA.912.AR.9.7: Given a real-world context, represent constraints as systems of linear and non-linear equations or inequalities. Interpret solutions to problems as viable or non-viable options.
  - MA.912.AR.2.7: Write two-variable linear inequalities to represent relationships between quantities from a graph or a written description within a mathematical or real-world context.
  - MA.912.AR.9.8: Solve real-world problems involving linear programming in two variables.
  - MA.912.AR.9.4: Graph the solution set of a system of two-variable linear inequalities.
  - MA.912.AR.9.5: Graph the solution set of a system of two-variable inequalities.

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- MA.912.AR.2.8: Given a mathematical or real-world context, graph the solution set to a two-variable linear inequality.

Unit 4: Exponential Equations, Functions, and Inequalities

- **EXPONENTIAL FUNCTIONS**
  - MA.912.AR.1.1: Identify and interpret parts of an equation or expression that represent a quantity in terms of a mathematical or real-world context, including viewing one or more of its parts as a single entity.
  - MA.912.AR.5.3: Given a mathematical or real-world context, classify an exponential function as representing growth or decay.
  - MA.912.AR.5.5: Given an expression or equation representing an exponential function, reveal the constant percent rate of change per unit interval using the properties of exponents. Interpret the constant percent rate of change in terms of a real-world context.
  - MA.912.AR.5.7: Solve and graph mathematical and real-world problems that are modeled with exponential functions. Interpret key features and determine domain constraints in terms of the context.
  - MA.912.AR.5.4: Write an exponential function to represent a relationship between two quantities from a graph, a written description or a table of values within a mathematical or real-world context.
  - MA.912.AR.5.1: Solve one-variable exponential equations using the properties of exponents.
- **EXPONENTIAL GROWTH AND DECAY**
  - MA.912.AR.1.1: Identify and interpret parts of an equation or expression that represent a quantity in terms of a mathematical or real-world context, including viewing one or more of its parts as a single entity.
  - MA.912.AR.5.7: Solve and graph mathematical and real-world problems that are modeled with exponential functions. Interpret key features and determine domain constraints in terms of the context.
  - MA.912.AR.5.3: Given a mathematical or real-world context, classify an exponential function as representing growth or decay.
  - MA.912.FL.3.4: Explain the relationship between simple interest and linear growth. Explain the relationship between compound interest and exponential growth and the relationship between continuously compounded interest and exponential growth.
  - MA.912.AR.5.5: Given an expression or equation representing an exponential function, reveal the constant percent rate of change per unit interval using the properties of exponents. Interpret the constant percent rate of change in terms of a real-world context.

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- MA.912.FL.3.1: Compare simple, compound and continuously compounded interest over time.
- MA.912.DP.2.9: Fit an exponential function to bivariate numerical data that suggests an exponential association. Use the model to solve real-world problems in terms of the context of the data.
- MA.912.AR.5.2: Solve one-variable equations involving logarithms or exponential expressions. Interpret solutions as viable in terms of the context and identify any extraneous solutions.
- MA.912.FL.3.2: Solve real-world problems involving simple, compound and continuously compounded interest.
- MA.912.AR.5.4: Write an exponential function to represent a relationship between two quantities from a graph, a written description or a table of values within a mathematical or real-world context.

- **SOLVING EXPONENTIAL EQUATIONS**
  - MA.912.NSO.1.2: Generate equivalent algebraic expressions using the properties of exponents.
  - MA.912.AR.5.7: Solve and graph mathematical and real-world problems that are modeled with exponential functions. Interpret key features and determine domain constraints in terms of the context.
  - MA.912.AR.5.2: Solve one-variable equations involving logarithms or exponential expressions. Interpret solutions as viable in terms of the context and identify any extraneous solutions.
  - MA.912.AR.5.6: Given a table, equation or written description of an exponential function, graph that function and determine its key features.

Unit 5: Logarithmic Expressions, Equations, and Functions

- **LOGARITHMIC FUNCTIONS**
  - MA.912.F.3.7: Represent the inverse of a function algebraically, graphically or in a table. Use composition of functions to verify that one function is the inverse of the other.
  - MA.912.F.3.6: Determine whether an inverse function exists by analyzing tables, graphs and equations.
  - MA.912.AR.5.8: Given a table, equation or written description of a logarithmic function, graph that function and determine its key features.
  - MA.912.AR.5.6: Given a table, equation or written description of an exponential function, graph that function and determine its key features.
- **SOLVING LOGARITHMIC EQUATIONS**
  - MA.912.AR.5.2: Solve one-variable equations involving logarithms or exponential expressions. Interpret solutions as viable in terms of the context and identify any extraneous solutions.

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- MA.912.AR.5.9: Solve and graph mathematical and real-world problems that are modeled with logarithmic functions. Interpret key features and determine constraints in terms of the context.
- MA.912.AR.5.8: Given a table, equation or written description of a logarithmic function, graph that function and determine its key features.

- **EVALUATING LOGARITHMIC EXPRESSIONS**
  - MA.912.NSO.1.7: Given an algebraic logarithmic expression, generate an equivalent algebraic expression using the properties of logarithms or exponents.
  - MA.912.NSO.1.6: Given a numerical logarithmic expression, evaluate and generate equivalent numerical expressions using the properties of logarithms or exponents.
  - MA.912.AR.5.9: Solve and graph mathematical and real-world problems that are modeled with logarithmic functions. Interpret key features and determine constraints in terms of the context.
  - MA.912.AR.5.8: Given a table, equation or written description of a logarithmic function, graph that function and determine its key features.

Unit 6: Polynomials

- **ADDITION AND SUBTRACTION OF POLYNOMIALS**
  - MA.912.AR.1.6: Solve mathematical and real-world problems involving addition, subtraction, multiplication or division of polynomials.
  - MA.912.AR.1.3: Add, subtract and multiply polynomial expressions with rational number coefficients.
- **MULTIPLICATION OF POLYNOMIALS**
  - MA.912.AR.1.5: Divide polynomial expressions using long division, synthetic division or algebraic manipulation.
  - MA.912.AR.1.6: Solve mathematical and real-world problems involving addition, subtraction, multiplication or division of polynomials.
  - MA.912.AR.1.3: Add, subtract and multiply polynomial expressions with rational number coefficients.
- **DIVISION OF POLYNOMIALS**
  - MA.912.AR.1.5: Divide polynomial expressions using long division, synthetic division or algebraic manipulation.
  - MA.912.AR.1.6: Solve mathematical and real-world problems involving addition, subtraction, multiplication or division of polynomials.

Unit 7: Graphs and Representations of Quadratic Functions

- **ANALYZING GRAPHS OF QUADRATIC FUNCTIONS**

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- MA.912.AR.3.7: Given a table, equation or written description of a quadratic function, graph that function, and determine and interpret its key features.
- MA.912.F.1.1: Given an equation or graph that defines a function, determine the function type. Given an input-output table, determine a function type that could represent it.
- MA.912.AR.3.8: Solve and graph mathematical and real-world problems that are modeled with quadratic functions. Interpret key features and determine constraints in terms of the context.
- MA.912.AR.3.4: Write a quadratic function to represent the relationship between two quantities from a graph, a written description or a table of values within a mathematical or real-world context.

- **REPRESENTATIONS OF QUADRATIC FUNCTIONS**
  - MA.912.AR.3.4: Write a quadratic function to represent the relationship between two quantities from a graph, a written description or a table of values within a mathematical or real-world context.
  - MA.912.AR.3.7: Given a table, equation or written description of a quadratic function, graph that function, and determine and interpret its key features.
  - MA.912.AR.1.1: Identify and interpret parts of an equation or expression that represent a quantity in terms of a mathematical or real-world context, including viewing one or more of its parts as a single entity.
  - MA.912.AR.3.8: Solve and graph mathematical and real-world problems that are modeled with quadratic functions. Interpret key features and determine constraints in terms of the context.
  - MA.912.AR.3.2: Given a mathematical or real-world context, write and solve one-variable quadratic equations over the real and complex number systems.
- **PARABOLAS**
  - MA.912.GR.7.1: Given a conic section, describe how it can result from the slicing of two cones.
  - MA.912.AR.3.4: Write a quadratic function to represent the relationship between two quantities from a graph, a written description or a table of values within a mathematical or real-world context.
  - MA.912.AR.3.8: Solve and graph mathematical and real-world problems that are modeled with quadratic functions. Interpret key features and determine constraints in terms of the context.
  - MA.912.AR.3.6: Given an expression or equation representing a quadratic function, determine the vertex and zeros and interpret them in terms of a real-world context.
  - MA.912.GR.7.5: Graph and solve mathematical and real-world problems that are modeled with an equation of a parabola. Determine and interpret key features in terms of the context.
  - MA.912.GR.7.4: Given a mathematical or real-world context, derive and create the equation of a parabola using key features.

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- **MULTIPLE REPRESENTATIONS OF FUNCTIONS**
  - MA.912.AR.1.1: Identify and interpret parts of an equation or expression that represent a quantity in terms of a mathematical or real-world context, including viewing one or more of its parts as a single entity.
  - MA.912.F.1.7: Compare key features of two functions each represented algebraically, graphically, in tables or written descriptions.
  - MA.912.F.1.1: Given an equation or graph that defines a function, determine the function type. Given an input-output table, determine a function type that could represent it.
  - MA.912.AR.2.4: Given a table, equation or written description of a linear function, graph that function, and determine and interpret its key features.
  - MA.912.AR.3.4: Write a quadratic function to represent the relationship between two quantities from a graph, a written description or a table of values within a mathematical or real-world context.
  - MA.912.AR.3.7: Given a table, equation or written description of a quadratic function, graph that function, and determine and interpret its key features.
  - MA.912.AR.5.4: Write an exponential function to represent a relationship between two quantities from a graph, a written description or a table of values within a mathematical or real-world context.
  - MA.912.AR.5.6: Given a table, equation or written description of an exponential function, graph that function and determine its key features.

Unit 8: Quadratic Equations and Inequalities

- **SOLVING QUADRATIC FUNCTIONS BY FACTORING**
  - MA.912.AR.3.8: Solve and graph mathematical and real-world problems that are modeled with quadratic functions. Interpret key features and determine constraints in terms of the context.
  - MA.912.AR.3.2: Given a mathematical or real-world context, write and solve one-variable quadratic equations over the real and complex number systems.
  - MA.912.AR.1.8: Rewrite a polynomial expression as a product of polynomials over the real or complex number system.
  - MA.912.AR.3.7: Given a table, equation or written description of a quadratic function, graph that function, and determine and interpret its key features.
  - MA.912.AR.3.5: Given the -intercepts and another point on the graph of a quadratic function, write the equation for the function.
- **COMPLETING THE SQUARE**

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- MA.912.AR.3.8: Solve and graph mathematical and real-world problems that are modeled with quadratic functions. Interpret key features and determine constraints in terms of the context.
- MA.912.AR.3.2: Given a mathematical or real-world context, write and solve one-variable quadratic equations over the real and complex number systems.
- MA.912.AR.3.7: Given a table, equation or written description of a quadratic function, graph that function, and determine and interpret its key features.

- **QUADRATIC FORMULA**
  - MA.912.AR.3.8: Solve and graph mathematical and real-world problems that are modeled with quadratic functions. Interpret key features and determine constraints in terms of the context.
  - MA.912.AR.3.2: Given a mathematical or real-world context, write and solve one-variable quadratic equations over the real and complex number systems.
  - MA.912.AR.3.7: Given a table, equation or written description of a quadratic function, graph that function, and determine and interpret its key features.
- **SOLVING QUADRATIC INEQUALITIES**
  - MA.912.AR.3.3: Given a mathematical or real-world context, write and solve one-variable quadratic inequalities over the real number system. Represent solutions algebraically or graphically.
  - MA.912.AR.3.9: Given a mathematical or real-world context, write two-variable quadratic inequalities to represent relationships between quantities from a graph or a written description.
  - MA.912.AR.3.10: Given a mathematical or real-world context, graph the solution set to a two-variable quadratic inequality.

Unit 9: Complex Numbers and Quadratic Functions

- **COMPLEX NUMBERS AND QUADRATIC FUNCTIONS**
  - MA.912.AR.1.8: Rewrite a polynomial expression as a product of polynomials over the real or complex number system.
  - MA.912.AR.3.8: Solve and graph mathematical and real-world problems that are modeled with quadratic functions. Interpret key features and determine constraints in terms of the context.
  - MA.912.AR.3.2: Given a mathematical or real-world context, write and solve one-variable quadratic equations over the real and complex number systems.
  - MA.912.F.1.1: Given an equation or graph that defines a function, determine the function type. Given an input-output table, determine a function type that could represent it.
- **COMPLEX NUMBERS**

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- MA.912.NSO.2.1: Extend previous understanding of the real number system to include the complex number system. Add, subtract, multiply and divide complex numbers.

Unit 10: Factoring Polynomials and the Factor Theorem

- **FACTORING SPECIAL CASES**
  - MA.912.AR.1.8: Rewrite a polynomial expression as a product of polynomials over the real or complex number system.
  - MA.912.AR.1.1: Identify and interpret parts of an equation or expression that represent a quantity in terms of a mathematical or real-world context, including viewing one or more of its parts as a single entity.
- **FACTORING CUBIC POLYNOMIALS**
  - MA.912.AR.1.8: Rewrite a polynomial expression as a product of polynomials over the real or complex number system.
- **FACTORING HIGHER-ORDER POLYNOMIALS**
  - MA.912.AR.1.1: Identify and interpret parts of an equation or expression that represent a quantity in terms of a mathematical or real-world context, including viewing one or more of its parts as a single entity.
  - MA.912.AR.1.8: Rewrite a polynomial expression as a product of polynomials over the real or complex number system.

Unit 11: Solving Higher-Order Polynomial Equations

- **FACTOR THEOREM AND REMAINDER THEOREM**
  - MA.912.AR.1.5: Divide polynomial expressions using long division, synthetic division or algebraic manipulation.
  - MA.912.AR.6.1: Given a mathematical or real-world context, when suitable factorization is possible, solve one-variable polynomial equations of degree 3 or higher over the real and complex number systems.
  - MA.912.AR.6.2: Explain and apply the Remainder Theorem to solve mathematical and real-world problems.
- **RATIONAL ROOT THEOREM**
  - MA.912.AR.1.1: Identify and interpret parts of an equation or expression that represent a quantity in terms of a mathematical or real-world context, including viewing one or more of its parts as a single entity.

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- MA.912.AR.6.1: Given a mathematical or real-world context, when suitable factorization is possible, solve one-variable polynomial equations of degree 3 or higher over the real and complex number systems.

Unit 12: Polynomial Functions and Polynomial Identities

- **GRAPHS OF POLYNOMIAL FUNCTIONS**
  - MA.912.AR.6.4: Given a table, equation or written description of a polynomial function of degree 3 or higher, graph that function and determine its key features.
  - MA.912.F.1.9: Determine whether a function is even, odd or neither when represented algebraically, graphically or in a table.
  - MA.912.AR.6.5: Sketch a rough graph of a polynomial function of degree 3 or higher using zeros, multiplicity and knowledge of end behavior.
  - MA.912.F.1.1: Given an equation or graph that defines a function, determine the function type. Given an input-output table, determine a function type that could represent it.
- **POLYNOMIAL IDENTITIES**
  - MA.912.AR.1.8: Rewrite a polynomial expression as a product of polynomials over the real or complex number system.
  - MA.912.AR.6.1: Given a mathematical or real-world context, when suitable factorization is possible, solve one-variable polynomial equations of degree 3 or higher over the real and complex number systems.
  - MA.912.AR.1.11: Apply the Binomial Theorem to create equivalent polynomial expressions.
- **POLYNOMIAL IDENTITIES AND COMPLEX NUMBERS**
  - MA.912.AR.1.8: Rewrite a polynomial expression as a product of polynomials over the real or complex number system.
  - MA.912.AR.1.1: Identify and interpret parts of an equation or expression that represent a quantity in terms of a mathematical or real-world context, including viewing one or more of its parts as a single entity.
  - MA.912.AR.6.1: Given a mathematical or real-world context, when suitable factorization is possible, solve one-variable polynomial equations of degree 3 or higher over the real and complex number systems.

Unit 13: Radical Expressions, Equations, and Functions

- **ADVANCED PROPERTIES OF SQUARE ROOT EXPRESSIONS**

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- MA.912.NSO.1.3: Generate equivalent algebraic expressions involving radicals or rational exponents using the properties of exponents.
- MA.912.AR.1.1: Identify and interpret parts of an equation or expression that represent a quantity in terms of a mathematical or real-world context, including viewing one or more of its parts as a single entity.
- MA.912.NSO.1.5: Add, subtract, multiply and divide algebraic expressions involving radicals.
- MA.912.NSO.1.4: Apply previous understanding of operations with rational numbers to add, subtract, multiply and divide numerical radicals.

- **ANALYZING GRAPHS OF SQUARE ROOT FUNCTIONS**
  - MA.912.F.2.1: Identify the effect on the graph or table of a given function after replacing () by () + , (), () and (+) for specific values of .
  - MA.912.F.2.3: Given the graph or table of () and the graph or table of () + , (), () and (+), state the type of transformation and find the value of the real number .
  - MA.912.F.2.4: Given the graph or table of values of two or more transformations of a function, state the type of transformation and find the values of the real number that defines the transformation.
  - MA.912.F.2.1: Identify the effect on the graph or table of a given function after replacing () by () + , (), () and (+) for specific values of .
  - MA.912.F.2.3: Given the graph or table of () and the graph or table of () + , (), () and (+), state the type of transformation and find the value of the real number .
  - MA.912.AR.7.2: Given a table, equation or written description of a square root or cube root function, graph that function and determine its key features.
  - MA.912.AR.7.3: Solve and graph mathematical and real-world problems that are modeled with square root or cube root functions. Interpret key features and determine constraints in terms of the context.
  - MA.912.F.3.7: Represent the inverse of a function algebraically, graphically or in a table. Use composition of functions to verify that one function is the inverse of the other.
  - MA.912.F.3.6: Determine whether an inverse function exists by analyzing tables, graphs and equations.
- **SOLVING SQUARE ROOT EQUATIONS**
  - MA.912.AR.7.1: Solve one-variable radical equations. Interpret solutions as viable in terms of context and identify any extraneous solutions.
  - MA.912.AR.7.2: Given a table, equation or written description of a square root or cube root function, graph that function and determine its key features.

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- MA.912.AR.7.3: Solve and graph mathematical and real-world problems that are modeled with square root or cube root functions. Interpret key features and determine constraints in terms of the context.

Unit 14: Rational Expressions, Equations, and Functions

- **OPERATIONS WITH RATIONAL EXPRESSIONS**
  - MA.912.AR.1.1: Identify and interpret parts of an equation or expression that represent a quantity in terms of a mathematical or real-world context, including viewing one or more of its parts as a single entity.
  - MA.912.AR.1.9: Apply previous understanding of rational number operations to add, subtract, multiply and divide rational algebraic expressions.
  - MA.912.NSO.1.2: Generate equivalent algebraic expressions using the properties of exponents.
- **ANALYZING GRAPHS OF RATIONAL FUNCTIONS**
  - MA.912.AR.8.3: Solve and graph mathematical and real-world problems that are modeled with rational functions. Interpret key features and determine constraints in terms of the context.
  - MA.912.AR.8.2: Given a table, equation or written description of a rational function, graph that function and determine its key features.
  - MA.912.F.1.1: Given an equation or graph that defines a function, determine the function type. Given an input-output table, determine a function type that could represent it.
- **SOLVING RATIONAL EQUATIONS**
  - MA.912.AR.8.1: Write and solve one-variable rational equations. Interpret solutions as viable in terms of the context and identify any extraneous solutions.
  - MA.912.AR.8.3: Solve and graph mathematical and real-world problems that are modeled with rational functions. Interpret key features and determine constraints in terms of the context.
  - MA.912.AR.8.2: Given a table, equation or written description of a rational function, graph that function and determine its key features.
- **MODELING SITUATIONS WITH RATIONAL FUNCTIONS**
  - MA.912.AR.8.1: Write and solve one-variable rational equations. Interpret solutions as viable in terms of the context and identify any extraneous solutions.
  - MA.912.AR.8.3: Solve and graph mathematical and real-world problems that are modeled with rational functions. Interpret key features and determine constraints in terms of the context.
  - MA.912.AR.1.1: Identify and interpret parts of an equation or expression that represent a quantity in terms of a mathematical or real-world context, including viewing one or more of its parts as a single entity.

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- MA.912.AR.8.2: Given a table, equation or written description of a rational function, graph that function and determine its key features.

Unit 15: Nonlinear Functions

- **LINEAR VERSUS NONLINEAR FUNCTIONS**
  - MA.912.FL.3.1: Compare simple, compound and continuously compounded interest over time.
  - MA.912.F.1.7: Compare key features of two functions each represented algebraically, graphically, in tables or written descriptions.
  - MA.912.FL.3.4: Explain the relationship between simple interest and linear growth. Explain the relationship between compound interest and exponential growth and the relationship between continuously compounded interest and exponential growth.
  - MA.912.AR.5.6: Given a table, equation or written description of an exponential function, graph that function and determine its key features.
  - MA.912.AR.2.4: Given a table, equation or written description of a linear function, graph that function, and determine and interpret its key features.
  - MA.912.F.1.1: Given an equation or graph that defines a function, determine the function type. Given an input-output table, determine a function type that could represent it.
  - MA.912.FL.3.2: Solve real-world problems involving simple, compound and continuously compounded interest.
- **ABSOLUTE VALUE FUNCTIONS**
  - MA.912.AR.1.1: Identify and interpret parts of an equation or expression that represent a quantity in terms of a mathematical or real-world context, including viewing one or more of its parts as a single entity.
  - MA.912.AR.4.4: Solve and graph mathematical and real-world problems that are modeled with absolute value functions. Interpret key features and determine constraints in terms of the context.
  - MA.912.AR.4.3: Given a table, equation or written description of an absolute value function, graph that function and determine its key features.
- **SYSTEMS OF NONLINEAR EQUATIONS**
  - MA.912.AR.9.3: Given a mathematical or real-world context, solve a system consisting of two-variable linear or non-linear equations algebraically or graphically.
  - MA.912.AR.9.7: Given a real-world context, represent constraints as systems of linear and non-linear equations or inequalities. Interpret solutions to problems as viable or non-viable options.

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- MA.912.AR.9.2: Given a mathematical or real-world context, solve a system consisting of a two-variable linear equation and a non-linear equation algebraically or graphically.

Unit 16: Parent Functions and Transformations

- **PARENT FUNCTIONS**
  - MA.912.F.2.5: Given a table, equation or graph that represents a function, create a corresponding table, equation or graph of the transformed function defined by adding a real number to the - or -values or multiplying the - or -values by a real number.
  - MA.912.F.2.2: Identify the effect on the graph of a given function of two or more transformations defined by adding a real number to the - or -values or multiplying the - or -values by a real number.
  - MA.912.F.2.3: Given the graph or table of () and the graph or table of () + , (), () and (+), state the type of transformation and find the value of the real number .
  - MA.912.AR.7.2: Given a table, equation or written description of a square root or cube root function, graph that function and determine its key features.
  - MA.912.F.1.1: Given an equation or graph that defines a function, determine the function type. Given an input-output table, determine a function type that could represent it.
  - MA.912.F.2.5: Given a table, equation or graph that represents a function, create a corresponding table, equation or graph of the transformed function defined by adding a real number to the - or -values or multiplying the - or -values by a real number.
  - MA.912.F.2.2: Identify the effect on the graph of a given function of two or more transformations defined by adding a real number to the - or -values or multiplying the - or -values by a real number.
  - MA.912.F.2.3: Given the graph or table of () and the graph or table of () + , (), () and (+), state the type of transformation and find the value of the real number .
  - MA.912.AR.5.6: Given a table, equation or written description of an exponential function, graph that function and determine its key features.
- **TRANSFORMATIONS OF PARENT FUNCTIONS**
  - MA.912.F.2.1: Identify the effect on the graph or table of a given function after replacing () by () + , (), () and (+) for specific values of .
  - MA.912.F.2.5: Given a table, equation or graph that represents a function, create a corresponding table, equation or graph of the transformed function defined by adding a real number to the - or -values or multiplying the - or -values by a real number.
  - MA.912.F.2.2: Identify the effect on the graph of a given function of two or more transformations defined by adding a real number to the - or -values or multiplying the - or -values by a real number.

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- MA.912.F.2.3: Given the graph or table of () and the graph or table of () + , (), () and (+), state the type of transformation and find the value of the real number .
- MA.912.F.2.4: Given the graph or table of values of two or more transformations of a function, state the type of transformation and find the values of the real number that defines the transformation.
- MA.912.F.2.1: Identify the effect on the graph or table of a given function after replacing () by () + , (), () and (+) for specific values of .
- MA.912.F.2.5: Given a table, equation or graph that represents a function, create a corresponding table, equation or graph of the transformed function defined by adding a real number to the - or -values or multiplying the - or -values by a real number.
- MA.912.F.2.2: Identify the effect on the graph of a given function of two or more transformations defined by adding a real number to the - or -values or multiplying the - or -values by a real number.
- MA.912.F.2.3: Given the graph or table of () and the graph or table of () + , (), () and (+), state the type of transformation and find the value of the real number .
- MA.912.F.2.1: Identify the effect on the graph or table of a given function after replacing () by () + , (), () and (+) for specific values of .
- MA.912.F.2.5: Given a table, equation or graph that represents a function, create a corresponding table, equation or graph of the transformed function defined by adding a real number to the - or -values or multiplying the - or -values by a real number.
- MA.912.F.2.2: Identify the effect on the graph of a given function of two or more transformations defined by adding a real number to the - or -values or multiplying the - or -values by a real number.
- MA.912.F.2.3: Given the graph or table of () and the graph or table of () + , (), () and (+), state the type of transformation and find the value of the real number .
- MA.912.F.2.1: Identify the effect on the graph or table of a given function after replacing () by () + , (), () and (+) for specific values of .
- MA.912.F.2.5: Given a table, equation or graph that represents a function, create a corresponding table, equation or graph of the transformed function defined by adding a real number to the - or -values or multiplying the - or -values by a real number.
- MA.912.F.2.2: Identify the effect on the graph of a given function of two or more transformations defined by adding a real number to the - or -values or multiplying the - or -values by a real number.
- MA.912.F.2.3: Given the graph or table of () and the graph or table of () + , (), () and (+), state the type of transformation and find the value of the real number .
- MA.912.F.2.1: Identify the effect on the graph or table of a given function after replacing () by () + , (), () and (+) for specific values of .

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- MA.912.F.2.5: Given a table, equation or graph that represents a function, create a corresponding table, equation or graph of the transformed function defined by adding a real number to the - or -values or multiplying the - or -values by a real number.
- MA.912.F.2.2: Identify the effect on the graph of a given function of two or more transformations defined by adding a real number to the - or -values or multiplying the - or -values by a real number.
- MA.912.F.2.3: Given the graph or table of () and the graph or table of () + , (), () and (+), state the type of transformation and find the value of the real number .

- **MULTIPLE TRANSFORMATIONS OF PARENT FUNCTIONS**
  - MA.912.F.2.1: Identify the effect on the graph or table of a given function after replacing () by () + , (), () and (+) for specific values of .
  - MA.912.F.2.5: Given a table, equation or graph that represents a function, create a corresponding table, equation or graph of the transformed function defined by adding a real number to the - or -values or multiplying the - or -values by a real number.
  - MA.912.F.2.2: Identify the effect on the graph of a given function of two or more transformations defined by adding a real number to the - or -values or multiplying the - or -values by a real number.
  - MA.912.F.2.3: Given the graph or table of () and the graph or table of () + , (), () and (+), state the type of transformation and find the value of the real number .
  - MA.912.F.2.4: Given the graph or table of values of two or more transformations of a function, state the type of transformation and find the values of the real number that defines the transformation.
  - MA.912.F.2.1: Identify the effect on the graph or table of a given function after replacing () by () + , (), () and (+) for specific values of .
  - MA.912.F.2.5: Given a table, equation or graph that represents a function, create a corresponding table, equation or graph of the transformed function defined by adding a real number to the - or -values or multiplying the - or -values by a real number.
  - MA.912.F.2.2: Identify the effect on the graph of a given function of two or more transformations defined by adding a real number to the - or -values or multiplying the - or -values by a real number.
  - MA.912.F.2.3: Given the graph or table of () and the graph or table of () + , (), () and (+), state the type of transformation and find the value of the real number .
  - MA.912.F.2.1: Identify the effect on the graph or table of a given function after replacing () by () + , (), () and (+) for specific values of .
  - MA.912.F.2.5: Given a table, equation or graph that represents a function, create a corresponding table, equation or graph of the transformed function defined by adding a real number to the - or -values or multiplying the - or -values by a real number.

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- MA.912.F.2.2: Identify the effect on the graph of a given function of two or more transformations defined by adding a real number to the - or -values or multiplying the - or -values by a real number.
- MA.912.F.2.3: Given the graph or table of () and the graph or table of () + , (), () and (+), state the type of transformation and find the value of the real number .
- MA.912.F.2.1: Identify the effect on the graph or table of a given function after replacing () by () + , (), () and (+) for specific values of .
- MA.912.F.2.5: Given a table, equation or graph that represents a function, create a corresponding table, equation or graph of the transformed function defined by adding a real number to the - or -values or multiplying the - or -values by a real number.
- MA.912.F.2.2: Identify the effect on the graph of a given function of two or more transformations defined by adding a real number to the - or -values or multiplying the - or -values by a real number.
- MA.912.F.2.3: Given the graph or table of () and the graph or table of () + , (), () and (+), state the type of transformation and find the value of the real number .
- MA.912.F.2.1: Identify the effect on the graph or table of a given function after replacing () by () + , (), () and (+) for specific values of .
- MA.912.F.2.5: Given a table, equation or graph that represents a function, create a corresponding table, equation or graph of the transformed function defined by adding a real number to the - or -values or multiplying the - or -values by a real number.
- MA.912.F.2.2: Identify the effect on the graph of a given function of two or more transformations defined by adding a real number to the - or -values or multiplying the - or -values by a real number.
- MA.912.F.2.3: Given the graph or table of () and the graph or table of () + , (), () and (+), state the type of transformation and find the value of the real number .

Unit 17: Scatterplots and Modeling

- **SCATTERPLOTS**
  - MA.912.DP.2.5: Given a scatter plot that represents bivariate numerical data, assess the fit of a given linear function by plotting and analyzing residuals.
  - MA.912.DP.2.8: Fit a quadratic function to bivariate numerical data that suggests a quadratic association and interpret any intercepts or the vertex of the model. Use the model to solve real-world problems in terms of the context of the data.
  - MA.912.DP.2.9: Fit an exponential function to bivariate numerical data that suggests an exponential association. Use the model to solve real-world problems in terms of the context of the data.
  - MA.912.DP.2.6: Given a scatter plot with a line of fit and residuals, determine the strength and direction of the correlation. Interpret strength and direction within a real-world context.

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- MA.912.DP.2.4: Fit a linear function to bivariate numerical data that suggests a linear association and interpret the slope and intercept of the model. Use the model to solve real-world problems in terms of the context of the data.

- **SCATTERPLOTS AND MODELING**
  - MA.912.DP.1.2: Interpret data distributions represented in various ways. State whether the data is numerical or categorical, whether it is univariate or bivariate and interpret the different components and quantities in the display.
  - MA.912.DP.2.8: Fit a quadratic function to bivariate numerical data that suggests a quadratic association and interpret any intercepts or the vertex of the model. Use the model to solve real-world problems in terms of the context of the data.
  - MA.912.DP.2.9: Fit an exponential function to bivariate numerical data that suggests an exponential association. Use the model to solve real-world problems in terms of the context of the data.
  - MA.912.DP.2.5: Given a scatter plot that represents bivariate numerical data, assess the fit of a given linear function by plotting and analyzing residuals.
  - MA.912.DP.2.7: Compute the correlation coefficient of a linear model using technology. Interpret the strength and direction of the correlation coefficient.
  - MA.912.DP.2.6: Given a scatter plot with a line of fit and residuals, determine the strength and direction of the correlation. Interpret strength and direction within a real-world context.
  - MA.912.AR.5.3: Given a mathematical or real-world context, classify an exponential function as representing growth or decay.

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