

Tennessee Tutorials are designed specifically for the Tennessee Academic Standards to prepare students for the Tennessee Comprehensive Assessment Program (TCAP) and the TNReady assessments.

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: Real Number System

- **LAWS OF EXPONENTS**

- A2.A.SSE.A.1a: Interpret expressions that represent a quantity in terms of its context. Interpret parts of an expression, such as terms, factors, and coefficients.
- A2.N.RN.A.1a: Extend the properties of integer exponents to rational exponents. Develop the meaning of rational exponents by applying the properties of integer exponents.
- A2.A.SSE.A.1b: Interpret expressions that represent a quantity in terms of its context. Interpret complicated expressions by viewing one or more of their parts as a single entity.
- A2.N.RN.A.1c: Extend the properties of integer exponents to rational exponents. Rewrite expressions involving radicals and rational exponents using the properties of exponents.
- A2.N.RN.A.1b: Extend the properties of integer exponents to rational exponents. Explain why  $\sqrt[n]{a}$  can be written as the root of  $a$ .

- **MONITORING PRECISION AND ACCURACY**

- A2.N.Q.A.1c: Use units as a way to understand real-world problems. Define and justify appropriate quantities within a context for the purpose of modeling.

- A2.N.Q.A.1b: Use units as a way to understand real-world problems. Use appropriate quantities in formulas, converting units as necessary.
- A2.N.Q.A.1a: Use units as a way to understand real-world problems. Choose and interpret the scale and the origin in graphs and data displays.
- A2.N.Q.A.1d: Use units as a way to understand real-world problems. Choose an appropriate level of accuracy when reporting quantities.

## Unit 2: Equations and Inequalities

- **LITERAL EQUATIONS**

- A2.A.CED.A.3: Rearrange formulas to isolate a quantity of interest using algebraic reasoning.

## Unit 3: Writing and Solving Equations and Inequalities

- **FORMULATING AND SOLVING EQUATIONS FROM WORD PROBLEMS**

- A2.A.CED.A.1: Create equations and inequalities in one variable and use them to solve problems in a real-world context.
- A2.N.Q.A.1c: Use units as a way to understand real-world problems. Define and justify appropriate quantities within a context for the purpose of modeling.

## Unit 4: Sequences

- **SEQUENCES**

- A2.F.BF.A.2: Define sequences as functions, including recursive definitions, whose domain is a subset of the integers. Write explicit and recursive formulas for arithmetic and geometric sequences in context and connect them to linear and exponential functions.

- **ARITHMETIC AND GEOMETRIC SEQUENCES**

- A2.F.BF.A.2: Define sequences as functions, including recursive definitions, whose domain is a subset of the integers. Write explicit and recursive formulas for arithmetic and geometric sequences in context and connect them to linear and exponential functions.

## Unit 5: Analyzing Linear Functions and Equations

- **GRAPHING AND ANALYZING LINEAR FUNCTIONS**

- A2.F.IF.A.1: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.
- A2.N.Q.A.1c: Use units as a way to understand real-world problems. Define and justify appropriate quantities within a context for the purpose of modeling.
- A2.F.IF.A.2: Calculate and interpret the average rate of change of a function (presented algebraically or as a table) over a specified interval. Estimate and interpret the rate of change from a graph.
- A2.F.IF.B.4: Graph functions expressed algebraically and show key features of the graph by hand and using technology.

- A2.F.IF.B.6b: Compare properties of functions represented algebraically, graphically, numerically in tables, or by verbal descriptions. Compare properties of the same function on two different intervals or represented in two different ways.
- A2.A.CED.A.2: Create equations and inequalities in two variables to represent relationships between quantities and use them to solve problems in a real-world context. Graph equations and inequalities with two variables on coordinate axes with labels and scales, and use the graphs to make predictions.

## Unit 6: Graphing Linear Functions and Equations

### • GRAPHING AND MANIPULATING $Y = MX + B$

- A2.A.CED.A.2: Create equations and inequalities in two variables to represent relationships between quantities and use them to solve problems in a real-world context. Graph equations and inequalities with two variables on coordinate axes with labels and scales, and use the graphs to make predictions.
- A2.F.IF.A.1: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.
- A2.F.IF.A.2: Calculate and interpret the average rate of change of a function (presented algebraically or as a table) over a specified interval. Estimate and interpret the rate of change from a graph.
- A2.F.BF.B.3: Identify the effect on the graph of replacing  $( )$  by  $( ) +$ ,  $( )$ ,  $( )$ , and  $( + )$  for specific values of  $( )$  (both positive and negative); find the value of  $( )$  given the graphs.
- A2.F.IF.B.4: Graph functions expressed algebraically and show key features of the graph by hand and using technology.

## Unit 7: Graphing Linear Inequalities

### • GRAPHS OF LINEAR INEQUALITIES

- A2.A.CED.A.2: Create equations and inequalities in two variables to represent relationships between quantities and use them to solve problems in a real-world context. Graph equations and inequalities with two variables on coordinate axes with labels and scales, and use the graphs to make predictions.

## Unit 8: Systems of Linear Equations

### • SOLVING SYSTEMS OF LINEAR EQUATIONS: GRAPHING

- A2.A.REI.B.3: Write and solve a system of linear equations in a real-world context.

### • SOLVING SYSTEMS OF LINEAR EQUATIONS: SUBSTITUTION

- A2.A.REI.B.3: Write and solve a system of linear equations in a real-world context.

### • SOLVING SYSTEMS OF LINEAR EQUATIONS: ELIMINATION

- A2.A.REI.B.3: Write and solve a system of linear equations in a real-world context.

## Unit 9: Exponential Functions

### • EXPONENTIAL FUNCTIONS

- A2.F.IF.A.1: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal

description of the relationship.

- A2.F.IF.B.5b: Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. Know and use the properties of exponents to interpret expressions for exponential functions in terms of a real-world context.
- A2.N.Q.A.1c: Use units as a way to understand real-world problems. Define and justify appropriate quantities within a context for the purpose of modeling.
- A2.F.IF.B.6b: Compare properties of functions represented algebraically, graphically, numerically in tables, or by verbal descriptions. Compare properties of the same function on two different intervals or represented in two different ways.
- A2.A.CED.A.1: Create equations and inequalities in one variable and use them to solve problems in a real-world context.
- A2.F.IF.B.4: Graph functions expressed algebraically and show key features of the graph by hand and using technology.
- A2.N.Q.A.1b: Use units as a way to understand real-world problems. Use appropriate quantities in formulas, converting units as necessary.
- **EXPONENTIAL GROWTH AND DECAY**
  - A2.F.IF.A.1: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.
  - A2.A.SSE.A.1b: Interpret expressions that represent a quantity in terms of its context. Interpret complicated expressions by viewing one or more of their parts as a single entity.
  - A2.A.SSE.A.1a: Interpret expressions that represent a quantity in terms of its context. Interpret parts of an expression, such as terms, factors, and coefficients.
  - A2.F.IF.B.5b: Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. Know and use the properties of exponents to interpret expressions for exponential functions in terms of a real-world context.
  - A2.N.Q.A.1b: Use units as a way to understand real-world problems. Use appropriate quantities in formulas, converting units as necessary.
  - A2.N.Q.A.1c: Use units as a way to understand real-world problems. Define and justify appropriate quantities within a context for the purpose of modeling.
  - A2.F.LE.A.2: Know that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or cubically.
  - A2.F.IF.B.6a: Compare properties of functions represented algebraically, graphically, numerically in tables, or by verbal descriptions. Compare properties of two different functions. Functions may be of different types and/or represented in different ways.
  - A2.A.CED.A.1: Create equations and inequalities in one variable and use them to solve problems in a real-world context.

## Unit 10: Exponential Equations and Inequalities

### • SOLVING EXPONENTIAL EQUATIONS

- A2.F.LE.A.1a: Know the relationship between exponential functions and logarithmic functions. Solve exponential equations using a variety of strategies, including logarithms.
- A2.A.CED.A.2: Create equations and inequalities in two variables to represent relationships between quantities and use them to solve problems in a real-world context. Graph equations and inequalities with two variables on coordinate axes with labels and scales, and use the graphs to make predictions.
- A2.A.REI.A.1: Understand solving equations as a process of reasoning and explain the reasoning. Construct a viable argument to justify a solution method.

## Unit 11: Logarithmic Expressions, Equations, and Functions 1

### • LOGARITHMIC FUNCTIONS

- A2.F.IF.A.1: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.
- A2.F.IF.B.6b: Compare properties of functions represented algebraically, graphically, numerically in tables, or by verbal descriptions. Compare properties of the same function on two different intervals or represented in two different ways.
- A2.F.LE.A.1b: Know the relationship between exponential functions and logarithmic functions. Understand that a logarithm is the solution to  $a^x = b$ , where  $a$ ,  $b$ , and  $x$  are numbers.
- A2.F.IF.B.4: Graph functions expressed algebraically and show key features of the graph by hand and using technology.

### • EVALUATING LOGARITHMIC EXPRESSIONS

- A2.F.LE.A.1b: Know the relationship between exponential functions and logarithmic functions. Understand that a logarithm is the solution to  $a^x = b$ , where  $a$ ,  $b$ , and  $x$  are numbers.
- A2.F.LE.A.1c: Know the relationship between exponential functions and logarithmic functions. Evaluate logarithms using technology.

## Unit 12: Logarithmic Expressions, Equations, and Functions 2

### • SOLVING LOGARITHMIC EQUATIONS

- A2.A.REI.A.1: Understand solving equations as a process of reasoning and explain the reasoning. Construct a viable argument to justify a solution method.
- A2.F.LE.A.1b: Know the relationship between exponential functions and logarithmic functions. Understand that a logarithm is the solution to  $a^x = b$ , where  $a$ ,  $b$ , and  $x$  are numbers.

## Unit 13: Arithmetic with Polynomials 1

### • POLYNOMIAL BASICS

- A2.A.SSE.A.1a: Interpret expressions that represent a quantity in terms of its context. Interpret parts of an expression, such as terms, factors, and coefficients.

- A2.A.SSE.A.1b: Interpret expressions that represent a quantity in terms of its context. Interpret complicated expressions by viewing one or more of their parts as a single entity.
- **ADDITION AND SUBTRACTION OF POLYNOMIALS**
- A2.A.SSE.A.1b: Interpret expressions that represent a quantity in terms of its context. Interpret complicated expressions by viewing one or more of their parts as a single entity.

#### Unit 14: Arithmetic with Polynomials 2

- **MULTIPLICATION OF POLYNOMIALS**
- A2.A.SSE.A.1b: Interpret expressions that represent a quantity in terms of its context. Interpret complicated expressions by viewing one or more of their parts as a single entity.
- **DIVISION OF POLYNOMIALS**
- A2.A.SSE.A.1b: Interpret expressions that represent a quantity in terms of its context. Interpret complicated expressions by viewing one or more of their parts as a single entity.
- A2.A.SSE.A.1a: Interpret expressions that represent a quantity in terms of its context. Interpret parts of an expression, such as terms, factors, and coefficients.

#### Unit 15: Analyzing Quadratic Functions

- **ANALYZING GRAPHS OF QUADRATIC FUNCTIONS**
- A2.F.IF.A.1: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.
- A2.A.CED.A.2: Create equations and inequalities in two variables to represent relationships between quantities and use them to solve problems in a real-world context. Graph equations and inequalities with two variables on coordinate axes with labels and scales, and use the graphs to make predictions.
- A2.F.IF.B.6b: Compare properties of functions represented algebraically, graphically, numerically in tables, or by verbal descriptions. Compare properties of the same function on two different intervals or represented in two different ways.
- A2.A.APR.A.2: Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.
- A2.F.IF.B.4: Graph functions expressed algebraically and show key features of the graph by hand and using technology.

#### Unit 16: Representations of Quadratic Functions

- **MULTIPLE REPRESENTATIONS OF FUNCTIONS**
- A2.A.CED.A.2: Create equations and inequalities in two variables to represent relationships between quantities and use them to solve problems in a real-world context. Graph equations and inequalities with two variables on coordinate axes with labels and scales, and use the graphs to make predictions.
- A2.F.IF.B.6a: Compare properties of functions represented algebraically, graphically, numerically in tables, or by verbal descriptions. Compare properties of two different functions. Functions may be of different types and/or represented in different ways.

- A2.F.IF.B.6b: Compare properties of functions represented algebraically, graphically, numerically in tables, or by verbal descriptions. Compare properties of the same function on two different intervals or represented in two different ways.

### Unit 17: Solving Quadratic Equations 1

- **SOLVING QUADRATIC EQUATIONS BY FACTORING**

- A2.A.SSE.A.1b: Interpret expressions that represent a quantity in terms of its context. Interpret complicated expressions by viewing one or more of their parts as a single entity.
- A2.A.CED.A.1: Create equations and inequalities in one variable and use them to solve problems in a real-world context.
- A2.F.IF.B.5a: Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. Rewrite quadratic functions to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a real-world context.
- A2.A.CED.A.2: Create equations and inequalities in two variables to represent relationships between quantities and use them to solve problems in a real-world context. Graph equations and inequalities with two variables on coordinate axes with labels and scales, and use the graphs to make predictions.
- A2.A.REI.A.1: Understand solving equations as a process of reasoning and explain the reasoning. Construct a viable argument to justify a solution method.

### Unit 18: Solving Quadratic Equations 2

- **QUADRATIC FORMULA**

- A2.A.CED.A.1: Create equations and inequalities in one variable and use them to solve problems in a real-world context.
- A2.A.CED.A.2: Create equations and inequalities in two variables to represent relationships between quantities and use them to solve problems in a real-world context. Graph equations and inequalities with two variables on coordinate axes with labels and scales, and use the graphs to make predictions.

- **SOLVING QUADRATIC INEQUALITIES**

- A2.A.CED.A.2: Create equations and inequalities in two variables to represent relationships between quantities and use them to solve problems in a real-world context. Graph equations and inequalities with two variables on coordinate axes with labels and scales, and use the graphs to make predictions.
- A2.A.CED.A.1: Create equations and inequalities in one variable and use them to solve problems in a real-world context.

### Unit 19: Solving Quadratic Equations 3

- **COMPLETING THE SQUARE**

- A2.A.CED.A.2: Create equations and inequalities in two variables to represent relationships between quantities and use them to solve problems in a real-world context. Graph equations and inequalities with two variables on coordinate axes with labels and scales, and use the graphs to make predictions.
- A2.F.IF.B.5a: Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. Rewrite quadratic functions to show zeros, extreme

values, and symmetry of the graph, and interpret these in terms of a real-world context.

### Unit 20: Solving Quadratic Equations 4

- **COMPLEX NUMBERS AND QUADRATIC FUNCTIONS**

- A2.F.IF.A.1: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.
- A2.F.IF.B.4: Graph functions expressed algebraically and show key features of the graph by hand and using technology.
- A2.F.IF.B.5a: Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. Rewrite quadratic functions to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a real-world context.

### Unit 21: Factoring Polynomials 1

- **FACTORING SPECIAL CASES**

- A2.A.SSE.A.1b: Interpret expressions that represent a quantity in terms of its context. Interpret complicated expressions by viewing one or more of their parts as a single entity.
- A2.A.SSE.A.1a: Interpret expressions that represent a quantity in terms of its context. Interpret parts of an expression, such as terms, factors, and coefficients.
- A2.F.IF.B.5a: Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. Rewrite quadratic functions to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a real-world context.

### Unit 22: Factoring Polynomials 2

- **FACTORING CUBIC POLYNOMIALS**

- A2.A.SSE.A.1b: Interpret expressions that represent a quantity in terms of its context. Interpret complicated expressions by viewing one or more of their parts as a single entity.
- A2.A.SSE.A.1a: Interpret expressions that represent a quantity in terms of its context. Interpret parts of an expression, such as terms, factors, and coefficients.
- A2.A.CED.A.2: Create equations and inequalities in two variables to represent relationships between quantities and use them to solve problems in a real-world context. Graph equations and inequalities with two variables on coordinate axes with labels and scales, and use the graphs to make predictions.

### Unit 23: Factoring Theorems

- **FACTOR THEOREM AND REMAINDER THEOREM**

- A2.A.APR.A.1: Know and apply the Factor Theorem: For a polynomial  $(x - c)$  and a number  $k$ ,  $(x - c) \mid (x - c)k + r$  if and only if  $(x - c)$  is a factor of  $(x - c)k + r$ .

### Unit 24: Polynomial Functions and Complex Numbers

- **GRAPHS OF POLYNOMIAL FUNCTIONS**



- A2.F.IF.A.1: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.
- A2.F.IF.B.4: Graph functions expressed algebraically and show key features of the graph by hand and using technology.
- A2.A.APR.A.2: Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.

### Unit 25: Polynomial Identities 1

- **POLYNOMIAL IDENTITIES**

- A2.A.SSE.A.1b: Interpret expressions that represent a quantity in terms of its context. Interpret complicated expressions by viewing one or more of their parts as a single entity.
- A2.A.SSE.A.1a: Interpret expressions that represent a quantity in terms of its context. Interpret parts of an expression, such as terms, factors, and coefficients.

### Unit 26: Polynomial Identities 2

- **POLYNOMIAL IDENTITIES AND COMPLEX NUMBERS**

- A2.F.IF.B.5a: Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. Rewrite quadratic functions to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a real-world context.

### Unit 27: Analyzing Radical Equations and Functions

- **ANALYZING GRAPHS OF SQUARE ROOT FUNCTIONS**

- A2.A.CED.A.2: Create equations and inequalities in two variables to represent relationships between quantities and use them to solve problems in a real-world context. Graph equations and inequalities with two variables on coordinate axes with labels and scales, and use the graphs to make predictions.
- A2.F.IF.B.6a: Compare properties of functions represented algebraically, graphically, numerically in tables, or by verbal descriptions. Compare properties of two different functions. Functions may be of different types and/or represented in different ways.
- A2.F.BF.B.3: Identify the effect on the graph of replacing  $f(x)$  by  $f(x) + k$ ,  $f(x) - k$ ,  $f(kx)$ , and  $f(x + k)$  for specific values of  $k$  (both positive and negative); find the value of  $k$  given the graphs.
- A2.F.IF.B.4: Graph functions expressed algebraically and show key features of the graph by hand and using technology.
- A2.F.IF.B.6b: Compare properties of functions represented algebraically, graphically, numerically in tables, or by verbal descriptions. Compare properties of the same function on two different intervals or represented in two different ways.
- A2.A.REI.A.2: Solve radical equations in one variable, and identify extraneous solutions when they exist.
- A2.F.BF.B.4b: Find the inverse of a function. Find the inverse of a function on an appropriate domain.

- A2.F.BF.B.4a: Find the inverse of a function. Determine whether a function is one-to-one.
- A2.F.IF.A.1: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.
- A2.F.BF.B.4c: Find the inverse of a function. Given an invertible function on an appropriate domain, identify the domain of the inverse function.

## Unit 28: Solving Radical Equations and Functions

### • SOLVING SQUARE ROOT EQUATIONS

- A2.A.REI.A.2: Solve radical equations in one variable, and identify extraneous solutions when they exist.
- A2.A.REI.A.1: Understand solving equations as a process of reasoning and explain the reasoning. Construct a viable argument to justify a solution method.
- A2.A.CED.A.2: Create equations and inequalities in two variables to represent relationships between quantities and use them to solve problems in a real-world context. Graph equations and inequalities with two variables on coordinate axes with labels and scales, and use the graphs to make predictions.
- A2.N.Q.A.1b: Use units as a way to understand real-world problems. Use appropriate quantities in formulas, converting units as necessary.
- A2.F.BF.B.3: Identify the effect on the graph of replacing  $( )$  by  $( ) +$ ,  $( )$ ,  $( )$ , and  $( + )$  for specific values of  $( )$  (both positive and negative); find the value of  $( )$  given the graphs.
- A2.A.CED.A.1: Create equations and inequalities in one variable and use them to solve problems in a real-world context.

## Unit 29: Functions

### • INVERSE FUNCTIONS

- A2.F.BF.B.4b: Find the inverse of a function. Find the inverse of a function on an appropriate domain.
- A2.F.BF.B.4a: Find the inverse of a function. Determine whether a function is one-to-one.
- A2.F.BF.B.4c: Find the inverse of a function. Given an invertible function on an appropriate domain, identify the domain of the inverse function.

### • LINEAR VERSUS NONLINEAR FUNCTIONS

- A2.F.IF.B.6a: Compare properties of functions represented algebraically, graphically, numerically in tables, or by verbal descriptions. Compare properties of two different functions. Functions may be of different types and/or represented in different ways.
- A2.F.IF.A.2: Calculate and interpret the average rate of change of a function (presented algebraically or as a table) over a specified interval. Estimate and interpret the rate of change from a graph.

### • ARITHMETIC OPERATIONS ON FUNCTIONS

- A2.F.BF.A.1a: Build a function that describes a relationship between two quantities. Combine standard function types using arithmetic operations.

### Unit 30: Parent Functions

#### • PARENT FUNCTIONS

- A2.F.IF.A.1: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.
- A2.F.BF.B.3: Identify the effect on the graph of replacing  $f(x)$  by  $f(x) + k$ ,  $f(x) - k$ ,  $f(kx)$ , and  $f\left(\frac{x}{k}\right)$  for specific values of  $k$  (both positive and negative); find the value of  $k$  given the graphs.
- A2.F.IF.B.6a: Compare properties of functions represented algebraically, graphically, numerically in tables, or by verbal descriptions. Compare properties of two different functions. Functions may be of different types and/or represented in different ways.
- A2.F.IF.B.4: Graph functions expressed algebraically and show key features of the graph by hand and using technology.

### Unit 31: Single Transformations of Parent Functions

#### • TRANSFORMATIONS OF PARENT FUNCTIONS

- A2.A.CED.A.2: Create equations and inequalities in two variables to represent relationships between quantities and use them to solve problems in a real-world context. Graph equations and inequalities with two variables on coordinate axes with labels and scales, and use the graphs to make predictions.
- A2.F.IF.B.4: Graph functions expressed algebraically and show key features of the graph by hand and using technology.
- A2.F.BF.B.3: Identify the effect on the graph of replacing  $f(x)$  by  $f(x) + k$ ,  $f(x) - k$ ,  $f(kx)$ , and  $f\left(\frac{x}{k}\right)$  for specific values of  $k$  (both positive and negative); find the value of  $k$  given the graphs.
- A2.F.IF.A.1: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.

### Unit 32: Multiple Transformations of Parent Functions

#### • MULTIPLE TRANSFORMATIONS OF PARENT FUNCTIONS

- A2.F.IF.A.1: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.
- A2.F.BF.B.3: Identify the effect on the graph of replacing  $f(x)$  by  $f(x) + k$ ,  $f(x) - k$ ,  $f(kx)$ , and  $f\left(\frac{x}{k}\right)$  for specific values of  $k$  (both positive and negative); find the value of  $k$  given the graphs.
- A2.F.IF.B.4: Graph functions expressed algebraically and show key features of the graph by hand and using technology.

### Unit 33: Advanced Systems of Equations

#### • SOLVING THREE-VARIABLE SYSTEMS OF LINEAR EQUATIONS

- A2.A.REI.B.3: Write and solve a system of linear equations in a real-world context.

- **SYSTEMS OF NONLINEAR EQUATIONS**

- A2.A.REI.B.4: Solve a system consisting of a linear equation and a quadratic equation in two variables algebraically, graphically, and using technology.

### Unit 34: Statistics and Scatterplots

- **DATA ANALYSIS**

- A2.S.ID.A.1: Use statistics appropriate to the shape of the data distribution to compare center (mean, median, and/or mode) and spread (range, standard deviation) of two or more different data sets.

- **SCATTERPLOTS**

- A2.S.ID.B.4: Represent data from two quantitative variables on a scatter plot, and describe how the variables are related. Fit a function to the data; use functions fitted to data to solve problems in the context of the data.

- **SCATTERPLOTS AND MODELING**

- A2.S.ID.B.4: Represent data from two quantitative variables on a scatter plot, and describe how the variables are related. Fit a function to the data; use functions fitted to data to solve problems in the context of the data.

### Unit 35: Statistical Design and Analysis

- **ANALYZING STATISTICAL SAMPLES**

- A2.S.IC.A.3: Distinguish between a statistic and a parameter; Evaluate reports based on data and recognize when poor conclusions are drawn from well-collected data.
- A2.S.CP.B.3: Use the Law of Large Numbers to assess the validity of a statistical claim.
- A2.S.IC.A.2: Identify potential sources of bias in statistical studies.

- **EXPERIMENTAL AND OBSERVATIONAL DESIGN**

- A2.S.IC.A.1: Recognize the purposes of and differences among sample surveys, experiments, and observational studies.

- **NORMAL DISTRIBUTION**

- A2.S.ID.A.2: Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages using the Empirical Rule.
- A2.S.ID.A.3: Compute, interpret, and compare  $z$ -scores for normally distributed data in a real-world context.

### Unit 36: Probability

- **INTRODUCTION TO PROBABILITY**

- A2.S.CP.A.1: Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. Categorize events as independent or dependent.
- A2.S.CP.C.4: Find the conditional probability of given as the fraction of  $s$  outcomes that also belong to and interpret the answer in terms of the given context.

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- **CONDITIONAL PROBABILITY**

- A2.S.CP.A.1: Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. Categorize events as independent or dependent.
- A2.S.CP.C.4: Find the conditional probability of given as the fraction of s outcomes that also belong to and interpret the answer in terms of the given context.

- **COMBINATIONS AND PERMUTATIONS**

- A2.S.CP.B.2b: Apply statistical counting techniques. Use permutations and combinations to compute probabilities of compound events and solve problems.
- A2.S.CP.B.2a: Apply statistical counting techniques. Use the Fundamental Counting Principle to compute probabilities of compound events and solve problems.

### Unit 37: Test-Taking Strategies

- **STUDY HABITS**
- **BEING PREPARED AND GETTING STARTED**
- **WORDING IN TEST QUESTIONS**
- **WORDING IN ANSWER CHOICES**
- **QUESTIONS WITH PASSAGES AND VISUAL DATA**
- **ESSAY AND SHORT ANSWER QUESTIONS**
- **WORD PROBLEMS**