New Jersey Tutorials are designed specifically for the New Jersey Core Curriculum Content Standards to prepare students for the PARCC assessments, the New Jersey Biology Competency Test (NJBCT).

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: Quantities and Equations

- **MONITORING PRECISION AND ACCURACY**
  - N.Q.A.2: Define appropriate quantities for the purpose of descriptive modeling.
  - N.Q.A.1: Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
  - N.Q.A.3: Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
- **LITERAL EQUATIONS**
  - A.CED.A.4: Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.
- **AXIOMS OF EQUALITY**
  - A.REI.A.1: Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.

Unit 2: Solving Equations and Inequalities

- **ONE-STEP EQUATIONS AND INEQUALITIES**
  - A.CED.A.1: Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.
  - A.REI.B.3: Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
- **MULTI-STEP EQUATIONS AND INEQUALITIES**
  - A.CED.A.1: Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.
  - A.REI.B.3: Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

Unit 3: Writing Expressions, Equations, and Inequalities

- **FORMULATING AND SIMPLIFYING ALGEBRAIC EXPRESSIONS**
  - F.BF.A.1.a: Determine an explicit expression, a recursive process, or steps for calculation from a context.
  - A.SSE.A.1.a: Interpret parts of an expression, such as terms, factors, and coefficients.
  - A.SSE.A.1.b: Interpret complicated expressions by viewing one or more of their parts as a single entity.
- **FORMULATING AND SOLVING EQUATIONS FROM WORD PROBLEMS**
  - A.CED.A.1: Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.
  - F.BF.A.1.a: Determine an explicit expression, a recursive process, or steps for calculation from a context.
- **FORMULATING AND SOLVING INEQUALITIES FROM WORD PROBLEMS**
  - A.CED.A.1: Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.
  - A.CED.A.3: Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.

Unit 4: Functions

- **FUNCTIONS AND RELATIONS**
  - F.IF.C.7.b: Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.
  - A.REI.D.10: Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).
  - F.IF.A.1: Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an

element of its domain, then f(x) denotes the output of f corresponding to the input x. The graph of f is the graph of the equation y = f(x).

- **DOMAIN AND RANGE**
  - F.IF.A.1: Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then f(x) denotes the output of f corresponding to the input x. The graph of f is the graph of the equation y = f(x).
  - F.IF.B.5: Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.
- **EVALUATING FUNCTIONS**
  - F.IF.A.2: Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.

Unit 5: Introduction to Linear Functions

- **SLOPE**
  - F.IF.B.6: Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.
- **SLOPE-INTERCEPT FORM OF A LINEAR EQUATION**
  - A.CED.A.2: Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
  - F.IF.C.7.a: Graph linear and quadratic functions and show intercepts, maxima, and minima.
- **POINT-SLOPE FORM OF A LINEAR EQUATION**
  - A.CED.A.2: Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
  - F.IF.C.7.a: Graph linear and quadratic functions and show intercepts, maxima, and minima.
- **GRAPHING AND ANALYZING LINEAR FUNCTIONS**
  - F.LE.B.5: Interpret the parameters in a linear or exponential function in terms of a context.
  - A.REI.D.10: Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).
  - F.IF.C.7.a: Graph linear and quadratic functions and show intercepts, maxima, and minima.

Unit 6: Graphs of Linear Equations and Inequalities

- **GRAPHING AND MANIPULATING Y = MX + B**
  - A.REI.D.11: Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.

- F.IF.C.7.a: Graph linear and quadratic functions and show intercepts, maxima, and minima.

- **GRAPHS OF LINEAR INEQUALITIES**
  - A.REI.D.11: Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.
  - A.REI.D.12: Graph the solutions to a linear inequality in two variables as a half plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.

Unit 7: Two-Variable Linear Systems

- **SOLVING SYSTEMS OF LINEAR EQUATIONS: GUESS AND CHECK**
  - A.REI.C.6: Solve systems of linear equations algebraically (include using the elimination method) and graphically, focusing on pairs of linear equations in two variables.
- **SOLVING SYSTEMS OF LINEAR EQUATIONS: GRAPHING**
  - A.REI.C.6: Solve systems of linear equations algebraically (include using the elimination method) and graphically, focusing on pairs of linear equations in two variables.
- **SOLVING SYSTEMS OF LINEAR INEQUALITIES**
  - A.CED.A.3: Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.
  - A.REI.D.12: Graph the solutions to a linear inequality in two variables as a half plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.

Unit 8: Solving Two-Variable Linear Systems Algebraically

- **SOLVING SYSTEMS OF LINEAR EQUATIONS: SUBSTITUTION**
  - A.REI.C.6: Solve systems of linear equations algebraically (include using the elimination method) and graphically, focusing on pairs of linear equations in two variables.
- **SOLVING SYSTEMS OF LINEAR EQUATIONS: ELIMINATION**
  - A.REI.C.6: Solve systems of linear equations algebraically (include using the elimination method) and graphically, focusing on pairs of linear equations in two variables.

Unit 9: Exponential and Logarithmic Functions

- **EXPONENTIAL FUNCTIONS**
  - A.SSE.B.3.c: Use the properties of exponents to transform expressions for exponential functions.
  - F.IF.C.7.e: Graph exponential and logarithmic functions, showing intercepts and end behavior.
- **EXPONENTIAL GROWTH AND DECAY**

- F.LE.A.2: Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).
- F.LE.B.5: Interpret the parameters in a linear or exponential function in terms of a context.
- F.LE.A.1.c: Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.
- F.LE.A.3: Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.

- **LOGARITHMIC FUNCTIONS**
  - F.IF.C.7.e: Graph exponential and logarithmic functions, showing intercepts and end behavior.

Unit 10: Sequences

- **SEQUENCES**
  - F.IF.A.3: Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers.
- **ARITHMETIC AND GEOMETRIC SEQUENCES**
  - F.IF.A.3: Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers.

Unit 11: Factoring

- **FACTORING QUADRATIC TRINOMIALS**
  - A.SSE.B.3.a: Factor a quadratic expression to reveal the zeros of the function it defines.
- **FACTORING SPECIAL CASES**
  - A.SSE.B.3.a: Factor a quadratic expression to reveal the zeros of the function it defines.

Unit 12: Graphs of Quadratic Functions

- **ANALYZING GRAPHS OF QUADRATIC FUNCTIONS**
  - A.REI.D.11: Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.
  - F.IF.C.7.a: Graph linear and quadratic functions and show intercepts, maxima, and minima.
- **REPRESENTATIONS OF QUADRATIC FUNCTIONS**
  - F.IF.C.8.a: Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.

Unit 13: Solving Quadratic Equations

- **SOLVING QUADRATIC EQUATIONS WITH FACTORING**

- A.REI.B.4.b: Solve quadratic equations by inspection (e.g., for x = 49), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as a bi for real numbers a and b.

- **COMPLETING THE SQUARE**
  - A.REI.B.4.b: Solve quadratic equations by inspection (e.g., for x = 49), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as a bi for real numbers a and b.
  - A.REI.B.4.a: Use the method of completing the square to transform any quadratic equation in x into an equation of the form (x - p) = q that has the same solutions. Derive the quadratic formula from this form.
  - A.SSE.B.3.b: Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.
- **QUADRATIC FORMULA**
  - A.REI.B.4.b: Solve quadratic equations by inspection (e.g., for x = 49), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as a bi for real numbers a and b.
- **COMPLEX NUMBERS AND QUADRATIC FUNCTIONS**
  - A.REI.B.4.b: Solve quadratic equations by inspection (e.g., for x = 49), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as a bi for real numbers a and b.

Unit 14: Parent Functions and Transformations

- **LINEAR AND EXPONENTIAL PARENT FUNCTIONS**
  - F.IF.B.4: 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.
  - F.IF.B.5: Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.
  - F.LE.A.1.a: Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.
- **QUADRATIC PARENT FUNCTION**
  - F.IF.B.4: 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.

- **TRANSFORMATIONS OF THE LINEAR AND EXPONENTIAL PARENT FUNCTIONS**
  - F.BF.B.3: Identify the effect on the graph of replacing f(x) by f(x) + k, kf(x), f(kx), and f(x + k) for specific values of k(both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology.
  - F.LE.A.2: Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).
  - F.LE.B.5: Interpret the parameters in a linear or exponential function in terms of a context.
- **TRANSFORMATIONS OF THE QUADRATIC PARENT FUNCTION**
  - F.BF.B.3: Identify the effect on the graph of replacing f(x) by f(x) + k, kf(x), f(kx), and f(x + k) for specific values of k(both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology.

Unit 15: Working with Functions

- **LINEAR VS. NONLINEAR**
  - F.LE.A.1.a: Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.
  - F.LE.A.1.b: Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.
  - F.LE.A.1.c: Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.
- **ABSOLUTE VALUE FUNCTIONS**
  - F.IF.C.7.b: Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.
- **MULTIPLE REPRESENTATIONS OF FUNCTIONS**
  - F.IF.C.9: Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).
- **ANALYZING GRAPHS OF SQUARE ROOT FUNCTIONS**
  - F.IF.C.7.b: Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.

Unit 16: Statistics and Data

- **DATA ANALYSIS**
  - S.ID.A.1: Represent data with plots on the real number line (dot plots, histograms, and box plots).
  - S.ID.A.2: Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.

- S.ID.A.3: Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).

- **SCATTERPLOTS**
  - S.ID.B.6.a: Fit a function to the data (including with the use of technology); use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear and exponential models.
  - S.ID.C.7: Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.
  - S.ID.C.9: Distinguish between correlation and causation.
- **SCATTERPLOTS AND MODELING**
  - S.ID.B.6.b: Informally assess the fit of a function by plotting and analyzing residuals, including with the use of technology.
  - S.ID.B.6.c: Fit a linear function for a scatter plot that suggests a linear association.
  - S.ID.C.8: Compute (using technology) and interpret the correlation coefficient of a linear fit.