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: Introduction to Algebraic Concepts

- **MONITORING PRECISION AND ACCURACY**
  - N.Q.A.2: Define appropriate quantities for the purpose of descriptive modeling.
- **LAWS OF EXPONENTS**
  - N.RN.A.1: Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents.
  - N.RN.A.2: Rewrite expressions involving radicals and rational exponents using the properties of exponents.
  - N.RN.A.3: Simplify radicals, including algebraic radicals (e.g., cube root of 54 = 3 times the cube roots of 2, simplify v32x).
- **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: Sequences

- **SEQUENCES**
  - F.BF.A.1.a: Determine an explicit expression, a recursive process, or steps for calculation from a context.
  - F.BF.A.2: Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.
  - 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.BF.A.2: Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.

Unit 3: Linear Functions and Equations

- **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.
  - F.LE.B.5: Interpret the parameters in a linear or exponential function in terms of a context.
- **GRAPHING AND MANIPULATING Y = MX + B**
  - 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.

Unit 4: Solving Two-Variable Systems of Equations

- **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.
  - 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.
- **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 5: Exponential Functions and Equations

- **EXPONENTIAL FUNCTIONS**
  - F.IF.C.7.e: Graph exponential and logarithmic functions, showing intercepts and end behavior.
  - 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).
- **EXPONENTIAL GROWTH AND DECAY**
  - A.SSE.B.3.c: Use the properties of exponents to transform expressions for exponential functions.
  - F.IF.C.8.b: Use the properties of exponents to interpret expressions for exponential functions.
  - 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).
- **SOLVING EXPONENTIAL EQUATIONS**
  - 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.

Unit 6: Relating Exponential and Logarithmic Functions

- **INVERSE FUNCTIONS**
  - F.BF.B.4.a: Solve an equation of the form f(x) = c for a simple function f that has an inverse and write an expression for the inverse.
- **LOGARITHMIC FUNCTIONS**
  - F.IF.C.7.e: Graph exponential and logarithmic functions, showing intercepts and end behavior.

Unit 7: Logarithmic Expressions and Equations

- **EVALUATING LOGARITHMIC EXPRESSIONS**
  - A.SSE.A.2: Use the structure of an expression to identify ways to rewrite it.
  - F.LE.A.4: Understand the inverse relationship between exponents and logarithms. For exponential models, express as a logarithm the solution to ab(ct) = d where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.
- **SOLVING LOGARITHMIC EQUATIONS**
  - 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.

Unit 8: Operations with Polynomials

- **ADDITION AND SUBTRACTION OF POLYNOMIALS**

- A.APR.A.1: Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.

- **MULTIPLICATION OF POLYNOMIALS**
  - A.APR.A.1: Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.
- **DIVISION OF POLYNOMIALS**
  - A.APR.D.6: Rewrite simple rational expressions in different forms; write a(x)/b(x) in the form q(x) + r(x)/b(x), where a(x), b(x), q(x), and r(x) are polynomials with the degree of r(x) less than the degree of b(x), using inspection, long division, or, for the more complicated examples, a computer algebra system.

Unit 9: Graphs and Representations of Quadratic Functions

- **ANALYZING GRAPHS OF QUADRATIC FUNCTIONS**
  - A.APR.B.3: 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.
  - 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.C.9: Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).
- **REPRESENTATIONS OF QUADRATIC FUNCTIONS**
  - A.APR.B.3: 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.
  - 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.

Unit 10: Working with Equations and Functions

- **ARITHMETIC OPERATIONS ON FUNCTIONS**
  - 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.b: Combine standard function types using arithmetic operations.
- **SYSTEMS OF NONLINEAR EQUATIONS**
  - A.REI.C.7: Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically.

Unit 11: Solving Quadratic Equations

- **SOLVING QUADRATIC EQUATIONS BY FACTORING**
  - 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.
  - 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.
- **QUADRATIC FORMULA**
  - N.CN.C.7: Solve quadratic equations with real coefficients that have complex solutions.
  - 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**
  - N.CN.C.7: Solve quadratic equations with real coefficients that have complex solutions.

Unit 12: Factoring Polynomials

- **FACTORING SPECIAL CASES**
  - A.SSE.A.2: Use the structure of an expression to identify ways to rewrite it.
- **FACTORING CUBIC POLYNOMIALS**
  - A.SSE.A.2: Use the structure of an expression to identify ways to rewrite it.
- **FACTORING HIGHER ORDER POLYNOMIALS**
  - A.SSE.A.2: Use the structure of an expression to identify ways to rewrite it.

Unit 13: Factors and Graphs of Polynomial Functions

- **FACTOR AND REMAINDER THEOREM**
  - A.APR.B.2: Know and apply the Remainder Theorem: For a polynomial p(x) and a number a, the remainder on division by x a is p(a), so p(a) = 0 if and only if x a is a factor of p(x).
  - A.APR.B.3: 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.
- **GRAPHS OF POLYNOMIAL FUNCTIONS**

- F.IF.C.7.c: Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.

Unit 14: Polynomial Identities and Complex Numbers

- **POLYNOMIAL IDENTITIES**
  - A.SSE.A.2: Use the structure of an expression to identify ways to rewrite it.
- **COMPLEX NUMBERS**
  - N.CN.A.1: Know there is a complex number i such that i = 1, and every complex number has the form a + bi with a and b real.
- **POLYNOMIAL IDENTITIES AND COMPLEX NUMBERS**
  - N.CN.C.7: Solve quadratic equations with real coefficients that have complex solutions.
  - A.SSE.A.2: Use the structure of an expression to identify ways to rewrite it.

Unit 15: Radical Functions and Equations

- **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.
- **SOLVING SQUARE ROOT EQUATIONS**
  - A.REI.A.2: Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.

Unit 16: Rational Expressions and Equations

- **OPERATIONS WITH RATIONAL EXPRESSIONS**
  - A.APR.D.6: Rewrite simple rational expressions in different forms; write a(x)/b(x) in the form q(x) + r(x)/b(x), where a(x), b(x), q(x), and r(x) are polynomials with the degree of r(x) less than the degree of b(x), using inspection, long division, or, for the more complicated examples, a computer algebra system.
- **SOLVING RATIONAL EQUATIONS**
  - 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.
  - A.REI.A.2: Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.

Unit 17: Parent Functions and Transformations

- **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.C.7.b: Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.

- **TRANSFORMATIONS OF 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.
- **MULTIPLE TRANSFORMATIONS OF 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.

Unit 18: Statistics and Probability

- **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 AND MODELING**
  - 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.B.6.b: Informally assess the fit of a function by plotting and analyzing residuals, including with the use of technology.
- **NORMAL DISTRIBUTION**
  - S.ID.A.4: Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.
- **CONDITIONAL PROBABILITY**
  - S.ID.B.5: Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.