North Carolina Tutorials are designed specifically for the Common Core State Standards for English language arts, the North Carolina Standard Course of Study for Math, and the North Carolina Essential Standards, to prepare students for the READY End-of-Course 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: The Number System

- **RATIONAL AND IRRATIONAL NUMBERS**
  - NC.8.NS.1: The Number System Know that there are numbers that are not rational, and approximate them by rational numbers. Understand that every number has a decimal expansion. Building upon the definition of a rational number, know that an irrational number is defined as a non-repeating, non-terminating decimal.
  - NC.8.EE.2.i: Expressions and Equations Work with radicals and integer exponents. Use square root and cube root symbols to: Represent solutions to equations of the form x = p and x = p, where p is a positive rational number.
  - NC.8.EE.2.ii: Expressions and Equations Work with radicals and integer exponents. Use square root and cube root symbols to: Evaluate square roots of perfect squares and cube roots of perfect cubes for positive numbers less than or equal to 400.
- **APPROXIMATING IRRATIONAL NUMBERS**
  - NC.8.NS.2.i: The Number System Know that there are numbers that are not rational, and approximate them by rational numbers. Use rational approximations of irrational numbers to compare the size of

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irrational numbers and locate them approximately on a number line. Estimate the value of expressions involving: Square roots and cube roots to the tenths.

- NC.8.NS.2.ii: The Number System Know that there are numbers that are not rational, and approximate them by rational numbers. Use rational approximations of irrational numbers to compare the size of irrational numbers and locate them approximately on a number line. Estimate the value of expressions involving: p to the hundredths.
- NC.8.NS.1: The Number System Know that there are numbers that are not rational, and approximate them by rational numbers. Understand that every number has a decimal expansion. Building upon the definition of a rational number, know that an irrational number is defined as a non-repeating, non-terminating decimal.

Unit 2: Exponents

- **PROPERTIES OF EXPONENTS**
  - NC.8.EE.1: Expressions and Equations Work with radicals and integer exponents. Develop and apply the properties of integer exponents to generate equivalent numerical expressions.
- **POWERS OF 10**
  - NC.8.EE.3: Expressions and Equations Work with radicals and integer exponents. Use numbers expressed in scientific notation to estimate very large or very small quantities and to express how many times as much one is than the other.
- **SCIENTIFIC NOTATION**
  - NC.8.EE.3: Expressions and Equations Work with radicals and integer exponents. Use numbers expressed in scientific notation to estimate very large or very small quantities and to express how many times as much one is than the other.
  - NC.8.EE.4: Expressions and Equations Work with radicals and integer exponents. Perform multiplication and division with numbers expressed in scientific notation to solve real-world problems, including problems where both decimal and scientific notation are used.

Unit 3: Functions

- **RELATIONS AND FUNCTIONS**
  - NC.8.F.1.ii: Functions Define, evaluate, and compare functions. Understand that a function is a rule that assigns to each input exactly one output. Recognize functions given a table of values or a set of ordered pairs.
  - NC.8.F.3: Functions Define, evaluate, and compare functions. Identify linear functions from tables, equations, and graphs.
  - NC.8.F.1.i: Functions Define, evaluate, and compare functions. Understand that a function is a rule that assigns to each input exactly one output. Recognize functions when graphed as the set of ordered pairs consisting of an input and exactly one corresponding output.
  - NC.8.F.5.i: Functions Use functions to model relationships between quantities. Qualitatively analyze the functional relationship between two quantities. Analyze a graph determining where the function is

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increasing or decreasing; linear or non-linear.

- **COMPARING FUNCTIONS**
  - NC.8.F.1.ii: Functions Define, evaluate, and compare functions. Understand that a function is a rule that assigns to each input exactly one output. Recognize functions given a table of values or a set of ordered pairs.
  - NC.8.F.2: Functions Define, evaluate, and compare functions. Compare properties of two linear functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).
  - NC.8.F.3: Functions Define, evaluate, and compare functions. Identify linear functions from tables, equations, and graphs.
- **GRAPHS OF FUNCTIONS**
  - NC.8.F.3: Functions Define, evaluate, and compare functions. Identify linear functions from tables, equations, and graphs.
  - NC.8.F.5.i: Functions Use functions to model relationships between quantities. Qualitatively analyze the functional relationship between two quantities. Analyze a graph determining where the function is increasing or decreasing; linear or non-linear.
  - NC.8.F.4.iv: Functions Use functions to model relationships between quantities. Analyze functions that model linear relationships. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of the slope and y-intercept of its graph or a table of values.
  - NC.8.F.5.ii: Functions Use functions to model relationships between quantities. Qualitatively analyze the functional relationship between two quantities. Sketch a graph that exhibits the qualitative features of a real-world function.

Unit 4: Linear Functions

- **SLOPE-INTERCEPT FORM**
  - NC.8.F.4.i: Functions Use functions to model relationships between quantities. Analyze functions that model linear relationships. Understand that a linear relationship can be generalized by = + .
  - NC.8.F.4.ii: Functions Use functions to model relationships between quantities. Analyze functions that model linear relationships. Write an equation in slope-intercept form to model a linear relationship by determining the rate of change and the initial value, given at least two (x, y) values or a graph.
  - NC.8.F.4.iv: Functions Use functions to model relationships between quantities. Analyze functions that model linear relationships. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of the slope and y-intercept of its graph or a table of values.
  - NC.8.F.3: Functions Define, evaluate, and compare functions. Identify linear functions from tables, equations, and graphs.
  - NC.8.F.4.i: Functions Use functions to model relationships between quantities. Analyze functions that model linear relationships. Understand that a linear relationship can be generalized by = + .

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- NC.8.F.4.iii: Functions Use functions to model relationships between quantities. Analyze functions that model linear relationships. Construct a graph of a linear relationship given an equation in slope-intercept form.
- NC.8.F.1.ii: Functions Define, evaluate, and compare functions. Understand that a function is a rule that assigns to each input exactly one output. Recognize functions given a table of values or a set of ordered pairs.
- NC.8.F.2: Functions Define, evaluate, and compare functions. Compare properties of two linear functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).

- **WRITING LINEAR FUNCTIONS**
  - NC.8.F.4.iv: Functions Use functions to model relationships between quantities. Analyze functions that model linear relationships. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of the slope and y-intercept of its graph or a table of values.
  - NC.8.F.3: Functions Define, evaluate, and compare functions. Identify linear functions from tables, equations, and graphs.
  - NC.8.F.1.ii: Functions Define, evaluate, and compare functions. Understand that a function is a rule that assigns to each input exactly one output. Recognize functions given a table of values or a set of ordered pairs.
  - NC.8.F.5.i: Functions Use functions to model relationships between quantities. Qualitatively analyze the functional relationship between two quantities. Analyze a graph determining where the function is increasing or decreasing; linear or non-linear.
  - NC.8.F.2: Functions Define, evaluate, and compare functions. Compare properties of two linear functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).
- **MULTIPLE REPRESENTATIONS OF PROPORTIONS**
  - NC.8.F.3: Functions Define, evaluate, and compare functions. Identify linear functions from tables, equations, and graphs.
  - NC.8.F.4.iv: Functions Use functions to model relationships between quantities. Analyze functions that model linear relationships. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of the slope and y-intercept of its graph or a table of values.

Unit 5: Solving Linear Equations

- **SOLVING LINEAR EQUATIONS**
  - NC.8.EE.7.i: Expressions and Equations Analyze and solve linear equations and inequalities. Solve real-world and mathematical problems by writing and solving equations and inequalities in one variable. Recognize linear equations in one variable as having one solution, infinitely many solutions, or no solutions.
  - NC.8.EE.7.ii: Expressions and Equations Analyze and solve linear equations and inequalities. Solve real-world and mathematical problems by writing and solving equations and inequalities in one variable.

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Solve linear equations and inequalities including multi-step equations and inequalities with the same variable on both sides.

- **SOLVING SYSTEMS OF LINEAR EQUATIONS**
  - NC.8.EE.8.i: Expressions and Equations Analyze and solve pairs of simultaneous linear equations. Analyze and solve a system of two linear equations in two variables in slope-intercept form. Understand that solutions to a system of two linear equations correspond to the points of intersection of their graphs because the point of intersection satisfies both equations simultaneously.
  - NC.8.EE.8.ii: Expressions and Equations Analyze and solve pairs of simultaneous linear equations. Analyze and solve a system of two linear equations in two variables in slope-intercept form. Solve real-world and mathematical problems leading to systems of linear equations by graphing the equations. Solve simple cases by inspection.

Unit 6: Solving Equations and Inequalities

- **SOLVING EQUATIONS USING ROOTS**
  - NC.8.EE.2.i: Expressions and Equations Work with radicals and integer exponents. Use square root and cube root symbols to: Represent solutions to equations of the form x = p and x = p, where p is a positive rational number.
  - NC.8.EE.2.ii: Expressions and Equations Work with radicals and integer exponents. Use square root and cube root symbols to: Evaluate square roots of perfect squares and cube roots of perfect cubes for positive numbers less than or equal to 400.
  - NC.8.EE.2.i: Expressions and Equations Work with radicals and integer exponents. Use square root and cube root symbols to: Represent solutions to equations of the form x = p and x = p, where p is a positive rational number.
  - NC.8.EE.2.i: Expressions and Equations Work with radicals and integer exponents. Use square root and cube root symbols to: Represent solutions to equations of the form x = p and x = p, where p is a positive rational number.
  - NC.8.EE.2.i: Expressions and Equations Work with radicals and integer exponents. Use square root and cube root symbols to: Represent solutions to equations of the form x = p and x = p, where p is a positive rational number.
  - NC.8.EE.2.i: Expressions and Equations Work with radicals and integer exponents. Use square root and cube root symbols to: Represent solutions to equations of the form x = p and x = p, where p is a positive rational number.
- **SOLVING LINEAR INEQUALITIES**
  - NC.8.EE.7.ii: Expressions and Equations Analyze and solve linear equations and inequalities. Solve real-world and mathematical problems by writing and solving equations and inequalities in one variable. Solve linear equations and inequalities including multi-step equations and inequalities with the same variable on both sides.

Unit 7: The Pythagorean Theorem and Distance Formula

- **THE PYTHAGOREAN THEOREM**

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- NC.8.G.6: Geometry Understand and apply the Pythagorean Theorem. Explain the Pythagorean Theorem and its converse.
- NC.8.G.7: Geometry Understand and apply the Pythagorean Theorem. Apply the Pythagorean Theorem and its converse to solve real-world and mathematical problems.

- **THE CONVERSE OF THE PYTHAGOREAN THEOREM**
  - NC.8.G.6: Geometry Understand and apply the Pythagorean Theorem. Explain the Pythagorean Theorem and its converse.
  - NC.8.G.7: Geometry Understand and apply the Pythagorean Theorem. Apply the Pythagorean Theorem and its converse to solve real-world and mathematical problems.
- **DISTANCE ON THE COORDINATE PLANE**
  - NC.8.G.6: Geometry Understand and apply the Pythagorean Theorem. Explain the Pythagorean Theorem and its converse.
  - NC.8.G.7: Geometry Understand and apply the Pythagorean Theorem. Apply the Pythagorean Theorem and its converse to solve real-world and mathematical problems.
  - NC.8.G.8: Geometry Understand and apply the Pythagorean Theorem. Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.

Unit 8: Three-Dimensional Geometry

- **VOLUME OF CYLINDERS AND CONES**
  - NC.8.G.9: Geometry Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres. Understand how the formulas for the volumes of cones, cylinders, and spheres are related and use the relationship to solve real-world and mathematical problems.
- **SPHERES**
  - NC.8.G.9: Geometry Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres. Understand how the formulas for the volumes of cones, cylinders, and spheres are related and use the relationship to solve real-world and mathematical problems.

Unit 9: Transformations

- **BASICS OF TRANSFORMATIONS**
  - NC.8.G.3: Geometry Understand congruence and similarity using physical models, transparencies, or geometry software. Describe the effect of dilations about the origin, translations, rotations about the origin in 90 degree increments, and reflections across the x-axis and y-axis on two-dimensional figures using coordinates.
  - NC.8.G.2.i: Geometry Understand congruence and similarity using physical models, transparencies, or geometry software. Use transformations to define congruence. Verify experimentally the properties of rotations, reflections, and translations that create congruent figures.
  - NC.8.G.2.ii: Geometry Understand congruence and similarity using physical models, transparencies, or geometry software. Use transformations to define congruence. Understand that a two-dimensional

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figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations.

- NC.8.G.2.iii: Geometry Understand congruence and similarity using physical models, transparencies, or geometry software. Use transformations to define congruence. Given two congruent figures, describe a sequence that exhibits the congruence between them.
- NC.8.G.4.i: Geometry Understand congruence and similarity using physical models, transparencies, or geometry software. Use transformations to define similarity. Verify experimentally the properties of dilations that create similar figures.
- NC.8.G.4.ii: Geometry Understand congruence and similarity using physical models, transparencies, or geometry software. Use transformations to define similarity. Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations.
- NC.8.G.4.iii: Geometry Understand congruence and similarity using physical models, transparencies, or geometry software. Use transformations to define similarity. Given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.

- **TRANSFORMATIONS ON THE COORDINATE PLANE**
  - NC.8.G.3: Geometry Understand congruence and similarity using physical models, transparencies, or geometry software. Describe the effect of dilations about the origin, translations, rotations about the origin in 90 degree increments, and reflections across the x-axis and y-axis on two-dimensional figures using coordinates.
  - NC.8.G.4.i: Geometry Understand congruence and similarity using physical models, transparencies, or geometry software. Use transformations to define similarity. Verify experimentally the properties of dilations that create similar figures.
  - NC.8.G.4.ii: Geometry Understand congruence and similarity using physical models, transparencies, or geometry software. Use transformations to define similarity. Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations.
  - NC.8.G.4.iii: Geometry Understand congruence and similarity using physical models, transparencies, or geometry software. Use transformations to define similarity. Given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.

Unit 10: Congruence and Similarity

- **TRANSFORMATIONS AND CONGRUENCE**
  - NC.8.G.2.i: Geometry Understand congruence and similarity using physical models, transparencies, or geometry software. Use transformations to define congruence. Verify experimentally the properties of rotations, reflections, and translations that create congruent figures.
  - NC.8.G.2.ii: Geometry Understand congruence and similarity using physical models, transparencies, or geometry software. Use transformations to define congruence. Understand that a two-dimensional

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figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations.

- NC.8.G.2.iii: Geometry Understand congruence and similarity using physical models, transparencies, or geometry software. Use transformations to define congruence. Given two congruent figures, describe a sequence that exhibits the congruence between them.
- NC.8.G.3: Geometry Understand congruence and similarity using physical models, transparencies, or geometry software. Describe the effect of dilations about the origin, translations, rotations about the origin in 90 degree increments, and reflections across the x-axis and y-axis on two-dimensional figures using coordinates.

- **SIMILARITY AND DILATIONS**
  - NC.8.G.5.iv: Geometry Analyze angle relationships. Use informal arguments to analyze angle relationships. Solve real-world and mathematical problems involving angles.
  - NC.8.G.3: Geometry Understand congruence and similarity using physical models, transparencies, or geometry software. Describe the effect of dilations about the origin, translations, rotations about the origin in 90 degree increments, and reflections across the x-axis and y-axis on two-dimensional figures using coordinates.
  - NC.8.G.4.i: Geometry Understand congruence and similarity using physical models, transparencies, or geometry software. Use transformations to define similarity. Verify experimentally the properties of dilations that create similar figures.
  - NC.8.G.4.ii: Geometry Understand congruence and similarity using physical models, transparencies, or geometry software. Use transformations to define similarity. Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations.
  - NC.8.G.4.iii: Geometry Understand congruence and similarity using physical models, transparencies, or geometry software. Use transformations to define similarity. Given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.
  - NC.8.G.6: Geometry Understand and apply the Pythagorean Theorem. Explain the Pythagorean Theorem and its converse.
  - NC.8.G.7: Geometry Understand and apply the Pythagorean Theorem. Apply the Pythagorean Theorem and its converse to solve real-world and mathematical problems.

Unit 11: Angles and Angle Relationships

- **PARALLEL LINES AND ANGLE RELATIONSHIPS**
  - NC.8.G.5.ii: Geometry Analyze angle relationships. Use informal arguments to analyze angle relationships. Recognize the relationships between the angles created when parallel lines are cut by a transversal.
  - NC.8.G.5.iv: Geometry Analyze angle relationships. Use informal arguments to analyze angle relationships. Solve real-world and mathematical problems involving angles.

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- NC.8.G.5.i: Geometry Analyze angle relationships. Use informal arguments to analyze angle relationships. Recognize relationships between interior and exterior angles of a triangle.

- **ANGLE RELATIONSHIPS IN TRIANGLES**
  - NC.8.G.5.ii: Geometry Analyze angle relationships. Use informal arguments to analyze angle relationships. Recognize the relationships between the angles created when parallel lines are cut by a transversal.
  - NC.8.G.5.iv: Geometry Analyze angle relationships. Use informal arguments to analyze angle relationships. Solve real-world and mathematical problems involving angles.
  - NC.8.G.5.iii: Geometry Analyze angle relationships. Use informal arguments to analyze angle relationships. Recognize the angle-angle criterion for similarity of triangles.

Unit 12: Data and Statistics

- **SCATTERPLOTS**
  - NC.8.SP.1: Statistics and Probability Investigate patterns of association in bivariate data. Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Investigate and describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.
- **LINEAR MODELS IN DATA**
  - NC.8.SP.1: Statistics and Probability Investigate patterns of association in bivariate data. Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Investigate and describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.
  - NC.8.SP.2.i: Statistics and Probability Investigate patterns of association in bivariate data. Model the relationship between bivariate quantitative data to: Informally fit a straight line for a scatter plot that suggests a linear association.
  - NC.8.SP.2.ii: Statistics and Probability Investigate patterns of association in bivariate data. Model the relationship between bivariate quantitative data to: Informally assess the model fit by judging the closeness of the data points to the line.
  - NC.8.SP.3: Statistics and Probability Investigate patterns of association in bivariate data. Use the equation of a linear model to solve problems in the context of bivariate quantitative data, interpreting the slope and y-intercept.
  - NC.8.F.4.i: Functions Use functions to model relationships between quantities. Analyze functions that model linear relationships. Understand that a linear relationship can be generalized by = + .
  - NC.8.F.4.iv: Functions Use functions to model relationships between quantities. Analyze functions that model linear relationships. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of the slope and y-intercept of its graph or a table of values.
- **FREQUENCY TABLES**

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- NC.8.SP.4.i: Statistics and Probability Investigate patterns of association in bivariate data. Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects.
- NC.8.SP.4.ii: Statistics and Probability Investigate patterns of association in bivariate data. Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Use relative frequencies calculated for rows or columns to describe possible association between the two variables.

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