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.

1. THE NUMBER SYSTEM

- **RATIONAL AND IRRATIONAL NUMBERS**
  - **NC.8.NS.1** *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** *Represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number.*
  - **NC.8.EE.2.ii** *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** *Square roots and cube roots to the tenths.*
  - **NC.8.NS.2.ii** *p to the hundredths.*
  - **NC.8.NS.1** *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.*

2. EXPONENTS

- **PROPERTIES OF EXPONENTS**
  - **NC.8.EE.1** *Develop and apply the properties of integer exponents to generate equivalent numerical expressions.*

- **POWERS OF 10**
  - **NC.8.EE.3** *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** *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** *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.*

3. FUNCTIONS

- **RELATIONS AND FUNCTIONS**
  - **NC.8.F.1.ii** *Recognize functions given a table of values or a set of ordered pairs.*
  - **NC.8.F.3** *Identify linear functions from tables, equations, and graphs.*
  - **NC.8.F.1.i** *Recognize functions when graphed as the set of ordered pairs consisting of an input and exactly one corresponding output.*
  - **NC.8.F.5.i** *Analyze a graph determining where the function is increasing or decreasing; linear or non-linear.*

- **COMPARING FUNCTIONS**
  - **NC.8.F.1.ii** *Recognize functions given a table of values or a set of ordered pairs.*
  - **NC.8.F.2** *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** *Identify linear functions from tables, equations, and graphs.*

- **GRAPHS OF FUNCTIONS**
  - **NC.8.F.3** *Identify linear functions from tables, equations, and graphs.*
  - **NC.8.F.5.i** *Analyze a graph determining where the function is increasing or decreasing; linear or non-linear.*
  - **NC.8.F.4.iv** *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** *Sketch a graph that exhibits the qualitative features of a real-world function.*

4. LINEAR FUNCTIONS

- **SLOPE-INTERCEPT FORM**
  - **NC.8.F.4.i** *Understand that a linear relationship can be generalized by ?? = ???? + ??.*
  - **NC.8.F.4.ii** *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** *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** *Identify linear functions from tables, equations, and graphs.*
  - **NC.8.F.4.iii** *Construct a graph of a linear relationship given an equation in slope-intercept form.*
  - **NC.8.F.1.ii** *Recognize functions given a table of values or a set of ordered pairs.*
  - **NC.8.F.2** *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** *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** *Identify linear functions from tables, equations, and graphs.*
  - **NC.8.F.1.ii** *Recognize functions given a table of values or a set of ordered pairs.*
  - **NC.8.F.5.i** *Analyze a graph determining where the function is increasing or decreasing; linear or non-linear.*
  - **NC.8.F.2** *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** *Identify linear functions from tables, equations, and graphs.*
- **NC.8.F.4.iv** *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.*

5. SOLVING LINEAR EQUATIONS

- **SOLVING LINEAR EQUATIONS**
  - **NC.8.EE.7.i** *Recognize linear equations in one variable as having one solution, infinitely many solutions, or no solutions.*
  - **NC.8.EE.7.ii** *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** *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** *Solve real-world and mathematical problems leading to systems of linear equations by graphing the equations. Solve simple cases by inspection.*

6. SOLVING EQUATIONS AND INEQUALITIES

- **SOLVING EQUATIONS USING ROOTS**
  - **NC.8.EE.2.i** *Represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number.*
  - **NC.8.EE.2.ii** *Evaluate square roots of perfect squares and cube roots of perfect cubes for positive numbers less than or equal to 400.*

- **SOLVING LINEAR INEQUALITIES**
  - **NC.8.EE.7.ii** *Solve linear equations and inequalities including multi-step equations and inequalities with the same variable on both sides.*

7. THE PYTHAGOREAN THEOREM AND DISTANCE FORMULA

- **THE PYTHAGOREAN THEOREM**
  - **NC.8.G.6** *Explain the Pythagorean Theorem and its converse.*
  - **NC.8.G.7** *Apply the Pythagorean Theorem and its converse to solve real-world and mathematical problems.*

- **THE CONVERSE OF THE PYTHAGOREAN THEOREM**
  - **NC.8.G.6** *Explain the Pythagorean Theorem and its converse.*
  - **NC.8.G.7** *Apply the Pythagorean Theorem and its converse to solve real-world and mathematical problems.*

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

8. THREE-DIMENSIONAL GEOMETRY

- **VOLUME OF CYLINDERS AND CONES**
  - **NC.8.G.9** *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** *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.*

9. TRANSFORMATIONS

- **BASICS OF TRANSFORMATIONS**
  - **NC.8.G.3** *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** *Verify experimentally the properties of rotations, reflections, and translations that create congruent figures.*
  - **NC.8.G.2.ii** *Understand that a two-dimensional 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** *Given two congruent figures, describe a sequence that exhibits the congruence between them.*
  - **NC.8.G.4.i** *Verify experimentally the properties of dilations that create similar figures.*
  - **NC.8.G.4.ii** *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** *Given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.*

- **TRANSFORMATIONS ON THE COORDINATE PLANE**
  - **NC.8.G.3** *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** *Verify experimentally the properties of dilations that create similar figures.*
  - **NC.8.G.4.ii** *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** *Given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.*

10. CONGRUENCE AND SIMILARITY

- **TRANSFORMATIONS AND CONGRUENCE**
  - **NC.8.G.2.i** *Verify experimentally the properties of rotations, reflections, and translations that create congruent figures.*
  - **NC.8.G.2.ii** *Understand that a two-dimensional 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** *Given two congruent figures, describe a sequence that exhibits the congruence between them.*
  - **NC.8.G.3** *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** *Solve real-world and mathematical problems involving angles.*
  - **NC.8.G.3** *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** *Verify experimentally the properties of dilations that create similar figures.*
  - **NC.8.G.4.ii** *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** *Given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.*
  - **NC.8.G.6** *Explain the Pythagorean Theorem and its converse.*
  - **NC.8.G.7** *Apply the Pythagorean Theorem and its converse to solve real-world and mathematical problems.*

11. ANGLES AND ANGLE RELATIONSHIPS

- **PARALLEL LINES AND ANGLE RELATIONSHIPS**

- **NC.8.G.5.ii** *Recognize the relationships between the angles created when parallel lines are cut by a transversal.*
- **NC.8.G.5.iv** *Solve real-world and mathematical problems involving angles.*
- **NC.8.G.5.i** *Recognize relationships between interior and exterior angles of a triangle.*

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

12. DATA AND STATISTICS

- **SCATTERPLOTS**
  - **NC.8.SP.1** *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** *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** *Informally fit a straight line for a scatter plot that suggests a linear association.*
  - **NC.8.SP.2.ii** *Informally assess the model fit by judging the closeness of the data points to the line.*
  - **NC.8.SP.3** *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** *Understand that a linear relationship can be generalized by ?? = ???? + ??.*
  - **NC.8.F.4.iv** *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**
  - **NC.8.SP.4.i** *Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects.*
  - **NC.8.SP.4.ii** *Use relative frequencies calculated for rows or columns to describe possible association between the two variables.*