Tutorials are designed specifically for the Virginia Standards of Learning to prepare students for the Standards of Learning tests.

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: Rates and Proportions

- **RATIOS**
  - 7.CE.2.a: Given a proportional relationship between two quantities, create and use a ratio table to determine missing values.
- **IDENTIFYING PROPORTIONAL RELATIONSHIPS**
  - 7.CE.2.b: Write and solve a proportion that represents a proportional relationship between two quantities to find a missing value, including problems in context.
- **ANALYZING PROPORTIONAL RELATIONSHIPS**
  - 7.CE.2.c: Apply proportional reasoning to solve problems in context, including converting units of measurement, when given the conversion factor.
- **USING PROPORTIONS TO SOLVE PROBLEMS**
  - 7.CE.2.d: Estimate and determine the percentage of a given whole number, including but not limited to the use of benchmark percentages.

Unit 2: Proportional Relationships

- **UNIT RATES**

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- 7.CE.2.b: Write and solve a proportion that represents a proportional relationship between two quantities to find a missing value, including problems in context.

- **REPRESENTING PROPORTIONAL RELATIONSHIPS**
  - 7.PFA.1.b: Identify and describe a line with a slope that is positive, negative, or zero (0), given a graph.
- **MULTIPLE REPRESENTATIONS OF PROPORTIONS**
  - 7.PFA.1.a: Determine the slope, m, as the rate of change in a proportional relationship between two quantities given a table of values, graph, or contextual situation and write an equation in the form y = mx to represent the direct variation relationship. Slope may include positive or negative values (slope will be limited to positive values in a contextual situation).
  - 7.PFA.1.b: Identify and describe a line with a slope that is positive, negative, or zero (0), given a graph.
  - 7.PFA.1.d: Graph a line representing a proportional relationship between two quantities given the equation of the line in the form y = mx, where m represents the slope as rate of change. Slope may include positive or negative values.
  - 7.PFA.1.e: Make connections between and among representations of a proportional relationship between two quantities using problems in context, tables, equations, and graphs. Slope may include positive or negative values (slope will be limited to positive values in a contextual situation).

Unit 3: Square Roots and Perfect Squares

- **APPROXIMATING IRRATIONAL NUMBERS**
  - 7.NS.2.a: Use multiple strategies (e.g., benchmarks, number line, equivalency) to compare (using symbols , , =) and order (a set of no more than four) rational numbers expressed as integers, fractions (proper or improper), mixed numbers, decimals, and percents. Fractions and mixed numbers may be positive or negative. Decimals may be positive or negative and are limited to the thousandths place. Ordering may be in ascending or descending order. Justify solutions orally, in writing or with a model.
  - 7.NS.3.a: Determine the positive square root of a perfect square from 0 to 400.
- **SOLVING EQUATIONS USING ROOTS**
  - 7.NS.3.b: Describe the relationship between square roots and perfect squares.

Unit 4: Operations with Rationale Numbers

- **USING PROPERTIES ON RATIONAL NUMBERS TO SOLVE PROBLEMS**
  - 7.CE.1.a: Estimate, solve, and justify solutions to contextual problems involving addition, subtraction, multiplication, and division with rational numbers expressed as integers, fractions (proper or improper), mixed numbers, and decimals. Fractions may be positive or negative. Decimals may be positive or negative and are limited to the thousandths place.
  - 7.PFA.2.a: Use the order of operations and apply the properties of real numbers to simplify numerical expressions. Exponents are limited to 1, 2, 3, or 4 and bases are limited to positive integers. Expressions should not include braces but may include brackets and absolute value bars . Square roots are limited to perfect squares.
- **USING PROPERTIES TO ADD AND SUBTRACT RATIONAL NUMBERS**

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- 7.CE.1.a: Estimate, solve, and justify solutions to contextual problems involving addition, subtraction, multiplication, and division with rational numbers expressed as integers, fractions (proper or improper), mixed numbers, and decimals. Fractions may be positive or negative. Decimals may be positive or negative and are limited to the thousandths place.

- **MULTIPLYING RATIONAL NUMBERS**
  - 7.CE.1.a: Estimate, solve, and justify solutions to contextual problems involving addition, subtraction, multiplication, and division with rational numbers expressed as integers, fractions (proper or improper), mixed numbers, and decimals. Fractions may be positive or negative. Decimals may be positive or negative and are limited to the thousandths place.
- **DIVIDING RATIONAL NUMBERS**
  - 7.CE.1.a: Estimate, solve, and justify solutions to contextual problems involving addition, subtraction, multiplication, and division with rational numbers expressed as integers, fractions (proper or improper), mixed numbers, and decimals. Fractions may be positive or negative. Decimals may be positive or negative and are limited to the thousandths place.

Unit 5: Algebraic Expressions, Equations, and Inequalities

- **POWERS OF 10**
  - 7.NS.1.a: Investigate and describe powers of 10 with negative exponents by examining patterns.
  - 7.NS.1.b: Represent a power of 10 with a negative exponent in fraction and decimal form.
  - 7.NS.1.c: Convert between numbers greater than 0 written in scientific notation and decimals.
- **EVALUATING EXPRESSIONS**
  - 7.PFA.2.c: Simplify and generate equivalent algebraic expressions in one variable by applying the order of operations and properties of real numbers. Expressions may require combining like terms to simplify. Expressions will include only linear and numeric terms. Coefficients and numeric terms may be positive or negative rational numbers.
  - 7.PFA.2.d: Use the order of operations and apply the properties of real numbers to evaluate algebraic expressions for given replacement values of the variables. Exponents are limited to 1, 2, 3, or 4 and bases are limited to positive integers. Expressions should not include braces but may include brackets and absolute value bars . Square roots are limited to perfect squares. Limit the number of replacements to no more than three per expression. Replacement values may be positive or negative rational numbers.
- **SOLVING LINEAR INEQUALITIES**
  - 7.PFA.4.a: Apply properties of real numbers and the addition, subtraction, multiplication, and division properties of inequality to solve one- and two-step inequalities in one variable. Coefficients and numeric terms will be rational.
  - 7.PFA.4.b: Investigate and explain how the solution set of a linear inequality is affected by multiplying or dividing both sides of the inequality statement by a rational number less than zero.

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- 7.PFA.4.c: Represent solutions to one- or two-step linear inequalities in one variable algebraically and graphically using a number line.
- 7.PFA.4.d: Write one- or two-step linear inequalities in one variable to represent a verbal situation, including those in context.
- 7.PFA.4.f: Solve problems in context that require the solution of a one- or two-step inequality.
- 7.PFA.4.h: Describe the differences and similarities between solving linear inequalities in one variable and linear equations in one variable.

Unit 6: Linear Equations and Functions

- **SOLVING 2-STEP EQUATIONS**
  - 7.PFA.3.b: Apply properties of real numbers and properties of equality to solve two-step linear equations in one variable. Coefficients and numeric terms will be rational.
  - 7.PFA.3.f: Solve problems in context that require the solution of a two-step linear equation.
- **MULTI-STEP EQUATIONS AND INEQUALITIES**
  - 7.PFA.3.c: Confirm algebraic solutions to linear equations in one variable.
  - 7.PFA.3.d: Write a two-step linear equation in one variable to represent a verbal situation, including those in context.
- **SLOPE**
  - 7.PFA.1.a: Determine the slope, m, as the rate of change in a proportional relationship between two quantities given a table of values, graph, or contextual situation and write an equation in the form y = mx to represent the direct variation relationship. Slope may include positive or negative values (slope will be limited to positive values in a contextual situation).
  - 7.PFA.1.b: Identify and describe a line with a slope that is positive, negative, or zero (0), given a graph.
  - 7.PFA.1.c: Graph a line representing a proportional relationship, between two quantities given an ordered pair on the line and the slope, m, as rate of change. Slope may include positive or negative values.

Unit 7: Quadrilaterals

- **PARALLELOGRAMS AND RECTANGLES**
  - 7.MG.3.a.i: parallel/perpendicular sides and diagonals;
  - 7.MG.3.a.ii: congruence of angle measures, side, and diagonal lengths; and
- **SQUARES AND RHOMBI**
  - 7.MG.3.a.i: parallel/perpendicular sides and diagonals;
  - 7.MG.3.a.ii: congruence of angle measures, side, and diagonal lengths; and

Unit 8: Geometry in Two and Three Dimensions

- **VOLUME OF CYLINDERS AND CONES**

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- 7.MG.1.a: Develop the formulas for determining the volume of right cylinders and solve problems, including those in contextual situations, using concrete objects, diagrams, and formulas.

- **AREA, VOLUME, AND SURFACE AREA**
  - 7.MG.1.b: Develop the formulas for determining the surface area of rectangular prisms and right cylinders and solve problems, including those in contextual situations, using concrete objects, two-dimensional diagrams, nets, and formulas.
- **VOLUME OF RIGHT RECTANGULAR PRISMS**
  - 7.MG.1.c: Determine if a problem in context, involving a rectangular prism or right cylinder, represents the application of volume or surface area.

Unit 9: Transformations

- **SIMILARITY AND DILATIONS**
  - 7.MG.2.a: Identify corresponding congruent angles of similar quadrilaterals and triangles, through the use of geometric markings.
  - 7.MG.2.b: Identify corresponding sides of similar quadrilaterals and triangles.
  - 7.MG.2.c: Given two similar quadrilaterals or triangles, write similarity statements using symbols.
  - 7.MG.2.d: Write proportions to express the relationships between the lengths of corresponding sides of similar quadrilaterals and triangles.
  - 7.MG.2.e: Recognize and justify if two quadrilaterals or triangles are similar using the ratios of corresponding side lengths.
  - 7.MG.2.f: Solve a proportion to determine a missing side length of similar quadrilaterals or triangles.
  - 7.MG.2.g: Given angle measures in a quadrilateral or triangle, determine unknown angle measures in a similar quadrilateral or triangle.
  - 7.MG.4.a: Given a preimage in the coordinate plane, identify the coordinates of the image of a polygon that has been dilated. Scale factors are limited to 1/4, 1/2, 2, 3, or 4. The center of the dilation will be the origin.
  - 7.MG.4.b: Sketch the image of a dilation of a polygon limited to a scale factor of 1/4, 1/2, 2, 3, or 4. The center of the dilation will be the origin.
- **SCALE DRAWINGS**
  - 7.MG.2.h: Apply proportional reasoning to solve problems in context including scale drawings. Scale factors shall have denominators no greater than 12 and decimals no less than tenths.

Unit 10: Probability and Statistics

- **CALCULATING PROBABILITY**
  - 7.PS.1.a: Determine the theoretical probability of an event.
  - 7.PS.1.b: Given the results of a statistical investigation, determine the experimental probability of an event.

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- **DOT PLOTS AND HISTOGRAMS**
  - 7.PS.2.d: Organize and represent numerical data using histograms with and without the use of technology.
  - 7.PS.2.f: Compare data represented in histograms with the same data represented in other graphs, including but not limited to line plots (dot plots), circle graphs, and stem-and-leaf plots, and justify which graphical representation best represents the data.
  - 7.PS.2.g: Analyze data represented in histograms by making observations and drawing conclusions. Determine how histograms reveal patterns in data that cannot be easily seen by looking at the corresponding given data set.

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