Alaska Tutorials are designed specifically for Alaska Standards and prepare students for the PEAKS exams in English and Mathematics.

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**
  - **8.NS.1** *Classify real numbers as either rational (the ratio of two integers, a terminating decimal number, or a repeating decimal number) or irrational.*

- **APPROXIMATING IRRATIONAL NUMBERS**
  - **8.NS.2** *Order real numbers, using approximations of irrational numbers, locating them on a number line.*
  - **8.EE.2** *Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.*

2. EXPONENTS

- **PROPERTIES OF EXPONENTS**
  - **8.EE.1** *Apply the properties (product, quotient, power, zero, negative exponents, and rational exponents) of integer exponents to generate equivalent numerical expressions.*

- **POWERS OF 10**
  - **8.EE.3** *Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other.*
  - **8.EE.4** *Perform operations with numbers expressed in scientific notation, including problems where both standard notation and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities. Interpret scientific notation that has been generated by technology.*

- **SCIENTIFIC NOTATION**
  - **8.EE.3** *Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other.*
  - **8.EE.4** *Perform operations with numbers expressed in scientific notation, including problems where both standard notation and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities. Interpret scientific notation that has been generated by technology.*

3. PROPORTIONAL REASONING AND SLOPE

- **SLOPE**
  - **8.EE.6** *Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b.*
  - **8.F.4** *Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.*
  - **8.F.5** *Given a verbal description between two quantities, sketch a graph. Conversely, given a graph, describe a possible real-world example.*
  - **8.F.3** *Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear.*

- **MULTIPLE REPRESENTATIONS OF PROPORTIONS**
  - **8.EE.5** *Graph linear equations such as $y = mx + b$, interpreting m as the slope or rate of change of the graph and b as the y-intercept or starting value. Compare two different proportional relationships represented in different ways.*
  - **8.F.4** *Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.*
  - **8.F.5** *Given a verbal description between two quantities, sketch a graph. Conversely, given a graph, describe a possible real-world example.*

4. FUNCTIONS

- **RELATIONS AND FUNCTIONS**
  - **8.F.1** *Understand that a function is a rule that assigns to each input (the domain) exactly one output (the range). The graph of a function is the set of ordered pairs consisting of an input and the corresponding output. For example, use the vertical line test to determine functions and non-functions.*

- **COMPARING FUNCTIONS**
  - **8.F.2** *Compare properties of two functions, each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).*
  - **8.F.4** *Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.*

- **GRAPHS OF FUNCTIONS**
  - **8.F.4** *Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.*
  - **8.F.5** *Given a verbal description between two quantities, sketch a graph. Conversely, given a graph, describe a possible real-world example.*

5. LINEAR FUNCTIONS

- **SLOPE-INTERCEPT FORM**
  - **8.EE.6** *Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b.*
  - **8.F.3** *Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of*

functions that are not linear.

- **8.F.4** *Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.*

WRITING LINEAR FUNCTIONS

- **8.F.4** *Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.*
- **8.F.3** *Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear.*

6. SOLVING EQUATIONS

SOLVING LINEAR EQUATIONS

- **8.EE.7.a** *Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers).*
- **8.EE.7.b** *Solve linear equations with rational coefficients, including equations whose solutions require expanding expressions using the distributive property and combining like terms.*
- **8.EE.8.b** *Solve systems of two linear equations in two variables and estimate solutions by graphing the equations. Simple cases may be done by inspection.*
- **8.EE.8.c** *Solve real-world and mathematical problems leading to two linear equations in two variables.*

SOLVING SYSTEMS OF LINEAR EQUATIONS

- **8.EE.8.a** *Show that the solution to a system of two linear equations in two variables is the intersection of the graphs of those equations because points of intersection satisfy both equations simultaneously.*
- **8.EE.8.b** *Solve systems of two linear equations in two variables and estimate solutions by graphing the equations. Simple cases may be done by inspection.*
- **8.EE.8.c** *Solve real-world and mathematical problems leading to two linear equations in two variables.*

SOLVING EQUATIONS USING ROOTS

- **8.EE.2** *Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.*

7. THE PYTHAGOREAN THEOREM AND DISTANCE FORMULA

THE PYTHAGOREAN THEOREM

- **8.G.6** *Explain the Pythagorean Theorem and its converse.*
- **8.G.7** *Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.*

THE CONVERSE OF THE PYTHAGOREAN THEOREM

- **8.G.6** *Explain the Pythagorean Theorem and its converse.*
- **8.G.7** *Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.*

DISTANCE ON THE COORDINATE PLANE

- **8.G.6** *Explain the Pythagorean Theorem and its converse.*
- **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**
  - **8.G.9** *Identify and apply the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.*

- **SPHERES**
  - **8.G.9** *Identify and apply the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.*

9. ROTATIONS, REFLECTIONS, AND TRANSLATIONS

- **BASICS OF TRANSFORMATIONS**
  - **8.G.1.b** *Angles are taken to angles of the same measure.*
  - **8.G.3** *Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.*
  - **8.G.4** *Demonstrate understanding of similarity, by applying a sequence of translations, reflections, rotations, and dilations on two-dimensional figures. Describe a sequence that exhibits the similarity between them.*
  - **8.G.1.a** *Lines are taken to lines, and line segments to line segments of the same length.*
  - **8.G.1.c** *Parallel lines are taken to parallel lines.*

- **TRANSFORMATIONS AND CONGRUENCE**
  - **8.G.2** *Demonstrate understanding of congruence by applying a sequence of translations, reflections, and rotations on two-dimensional figures. Given two congruent figures, describe a sequence that exhibits the congruence between them.*
  - **8.G.3** *Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.*

10. CONGRUENCE AND SIMILARITY TRANSFORMATIONS

- **TRANSFORMATIONS ON THE COORDINATE PLANE**
  - **8.G.3** *Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.*
  - **8.G.4** *Demonstrate understanding of similarity, by applying a sequence of translations, reflections, rotations, and dilations on two-dimensional figures. Describe a sequence that exhibits the similarity between them.*

- **SIMILARITY AND DILATIONS**
  - **8.G.3** *Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.*
  - **8.G.4** *Demonstrate understanding of similarity, by applying a sequence of translations, reflections, rotations, and dilations on two-dimensional figures. Describe a sequence that exhibits the similarity between them.*
  - **8.G.6** *Explain the Pythagorean Theorem and its converse.*
  - **8.G.7** *Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.*

11. ANGLES AND ANGLE RELATIONSHIPS

- **PARALLEL LINES AND ANGLE RELATIONSHIPS**
  - **8.G.5.c** *angles created when parallel lines are cut be a transversal (e.g., alternate interior angles), and*

- **ANGLE RELATIONSHIPS IN TRIANGLES**
  - **8.G.5.a** *the angle sum of triangles (sum of the interior angles of a triangle is 180^{o}),*
  - **8.G.5.b** *measures of exterior angles of triangles,*
  - **8.G.5.c** *angles created when parallel lines are cut be a transversal (e.g., alternate interior angles), and*
  - **8.G.5.d** *angle-angle criterion for similarity of triangles.*

12. PROBABILITY AND STATISTICS

- **SCATTERPLOTS**
  - **8.SP.1** *Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.*
  - **8.SP.2** *Explain why straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.*

- **LINEAR MODELS IN DATA**
  - **8.SP.1** *Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.*
  - **8.SP.2** *Explain why straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.*
  - **8.SP.3** *Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and y-intercept.*
  - **8.F.4** *Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.*

- **FREQUENCY TABLES**
  - **8.SP.4** *Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects and use relative frequencies to describe possible association between the two variables.*