Indiana Tutorials are designed specifically for the Indiana Academic Standards to prepare students for the Indiana Statewide Testing for Educational Progress-Plus (ISTEP+) End-of-Course Assessments (ECAs).

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** *Give examples of rational and irrational numbers and explain the difference between them. Understand that every number has a decimal expansion; for rational numbers, show that the decimal expansion terminates or repeats, and convert a decimal expansion that repeats into a rational number.*

- **APPROXIMATING IRRATIONAL NUMBERS**
  - **8.NS.2** *Use rational approximations of irrational numbers to compare the size of irrational numbers, plot them approximately on a number line, and estimate the value of expressions involving irrational numbers.*

2. EXPONENTS

- **PROPERTIES OF EXPONENTS**
  - **8.NS.3** *Given a numeric expression with common rational number bases and integer exponents, apply the properties of exponents to generate equivalent expressions.*

- **POWERS OF 10**
  - **8.C.2** *Solve real-world and other mathematical problems involving numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Interpret scientific notation that has been generated by technology, such as a scientific calculator, graphing calculator, or excel spreadsheet.*

- **SCIENTIFIC NOTATION**
  - **8.C.2** *Solve real-world and other mathematical problems involving numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Interpret scientific notation that has been generated by technology, such as a scientific calculator, graphing calculator, or excel spreadsheet.*

3. FUNCTIONS

- **RELATIONS AND FUNCTIONS**
  - **8.AF.3** *Understand that a function assigns to each x-value (independent variable) exactly one y-value (dependent variable),*

and that the graph of a function is the set of ordered pairs (x,y).

- **COMPARING FUNCTIONS**
  - **8.AF.6** *Construct a function to model a linear relationship between two quantities given a verbal description, table of values, or graph. Recognize in y = mx + b that m is the slope (rate of change) and b is the y-intercept of the graph, and describe the meaning of each in the context of a problem.*
  - **8.AF.7** *Compare properties of two linear functions given in different forms, such as a table of values, equation, verbal description, and graph (e.g., compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed).*

- **GRAPHS OF FUNCTIONS**
  - **8.AF.4** *Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear, has a maximum or minimum value). Sketch a graph that exhibits the qualitative features of a function that has been verbally described.*
  - **8.AF.6** *Construct a function to model a linear relationship between two quantities given a verbal description, table of values, or graph. Recognize in y = mx + b that m is the slope (rate of change) and b is the y-intercept of the graph, and describe the meaning of each in the context of a problem.*

4. LINEAR FUNCTIONS

- **SLOPE-INTERCEPT FORM**
  - **8.AF.5** *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. Describe similarities and differences between linear and nonlinear functions from tables, graphs, verbal descriptions, and equations.*
  - **8.AF.6** *Construct a function to model a linear relationship between two quantities given a verbal description, table of values, or graph. Recognize in y = mx + b that m is the slope (rate of change) and b is the y-intercept of the graph, and describe the meaning of each in the context of a problem.*
  - **8.DSP.3** *Write and use equations that model linear relationships to make predictions, including interpolation and extrapolation, in real-world situations involving bivariate measurement data; interpret the slope and y-intercept.*

- **WRITING LINEAR FUNCTIONS**
  - **8.AF.6** *Construct a function to model a linear relationship between two quantities given a verbal description, table of values, or graph. Recognize in y = mx + b that m is the slope (rate of change) and b is the y-intercept of the graph, and describe the meaning of each in the context of a problem.*
  - **8.AF.5** *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. Describe similarities and differences between linear and nonlinear functions from tables, graphs, verbal descriptions, and equations.*
  - **8.DSP.3** *Write and use equations that model linear relationships to make predictions, including interpolation and extrapolation, in real-world situations involving bivariate measurement data; interpret the slope and y-intercept.*

5. SOLVING EQUATIONS

- **SOLVING LINEAR EQUATIONS**
  - **8.AF.1** *Solve linear equations with rational number coefficients fluently, including equations whose solutions require expanding expressions using the distributive property and collecting like terms. Represent real-world problems using linear equations and inequalities in one variable and solve such problems.*
  - **8.AF.2** *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 transforming a 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.AF.6** *Construct a function to model a linear relationship between two quantities given a verbal description, table of values, or graph. Recognize in y = mx + b that m is the slope (rate of change) and b is the y-intercept of the graph, and describe the meaning of each in the context of a problem.*

- **SOLVING SYSTEMS OF LINEAR EQUATIONS**
  - **8.AF.8** *Understand that solutions to a system of two linear equations correspond to points of intersection of their graphs*

because points of intersection satisfy both equations simultaneously. Approximate the solution of a system of equations by graphing and interpreting the reasonableness of the approximation.

- **SOLVING EQUATIONS USING ROOTS**
  - **8.NS.4** *Use square root symbols to represent solutions to equations of the form x^2 = p, where p is a positive rational number.*

6. THE PYTHAGOREAN THEOREM AND DISTANCE FORMULA

- **THE PYTHAGOREAN THEOREM**
  - **8.GM.7** *Use inductive reasoning to explain the Pythagorean relationship.*
  - **8.GM.8** *Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and other mathematical problems in two dimensions.*

- **THE CONVERSE OF THE PYTHAGOREAN THEOREM**
  - **8.GM.7** *Use inductive reasoning to explain the Pythagorean relationship.*
  - **8.GM.8** *Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and other mathematical problems in two dimensions.*

- **DISTANCE ON THE COORDINATE PLANE**
  - **8.GM.9** *Apply the Pythagorean Theorem to find the distance between two points in a coordinate plane.*

7. THREE-DIMENSIONAL GEOMETRY

- **CROSS-SECTIONS OF GEOMETRIC SOLIDS**
  - **8.GM.1** *Identify, define and describe attributes of three-dimensional geometric objects (right rectangular prisms, cylinders, cones, spheres, and pyramids). Explore the effects of slicing these objects using appropriate technology and describe the two-dimensional figure that results.*

- **VOLUME OF CYLINDERS AND CONES**
  - **8.GM.2** *Solve real-world and other mathematical problems involving volume of cones, spheres, and pyramids and surface area of spheres.*

- **SPHERES**
  - **8.GM.2** *Solve real-world and other mathematical problems involving volume of cones, spheres, and pyramids and surface area of spheres.*

8. TRANSFORMATIONS, CONGRUENCE, AND SIMILARITY

- **BASICS OF TRANSFORMATIONS**
  - **8.GM.3** *Verify experimentally the properties of rotations, reflections, and translations, including: lines are mapped to lines, and line segments to line segments of the same length; angles are mapped to angles of the same measure; and parallel lines are mapped to parallel lines.*
  - **8.GM.6** *Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.*
  - **8.GM.5** *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. Describe a sequence that exhibits the similarity between two given similar figures.*

- **TRANSFORMATIONS AND CONGRUENCE**
  - **8.GM.4** *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. Describe a sequence that exhibits the congruence between two given congruent figures.*

- **8.GM.6** *Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.*

- **TRANSFORMATIONS ON THE COORDINATE PLANE**
  - **8.GM.3** *Verify experimentally the properties of rotations, reflections, and translations, including: lines are mapped to lines, and line segments to line segments of the same length; angles are mapped to angles of the same measure; and parallel lines are mapped to parallel lines.*
  - **8.GM.6** *Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.*
  - **8.GM.5** *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. Describe a sequence that exhibits the similarity between two given similar figures.*

- **SIMILARITY AND DILATIONS**
  - **8.GM.5** *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. Describe a sequence that exhibits the similarity between two given similar figures.*
  - **8.GM.6** *Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.*
  - **8.GM.8** *Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and other mathematical problems in two dimensions.*

9. PROBABILITY AND STATISTICS

- **SCATTERPLOTS**
  - **8.DSP.1** *Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantitative variables. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.*
  - **8.DSP.2** *Know that 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 describe the model fit by judging the closeness of the data points to the line.*

- **LINEAR MODELS IN DATA**
  - **8.DSP.1** *Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantitative variables. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.*
  - **8.DSP.2** *Know that 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 describe the model fit by judging the closeness of the data points to the line.*
  - **8.DSP.3** *Write and use equations that model linear relationships to make predictions, including interpolation and extrapolation, in real-world situations involving bivariate measurement data; interpret the slope and y-intercept.*
  - **8.AF.6** *Construct a function to model a linear relationship between two quantities given a verbal description, table of values, or graph. Recognize in y = mx + b that m is the slope (rate of change) and b is the y-intercept of the graph, and describe the meaning of each in the context of a problem.*

- **PROBABILITY OF COMPOUND EVENTS**
  - **8.DSP.5** *Represent sample spaces and find probabilities of compound events (independent and dependent) using methods, such as organized lists, tables, and tree diagrams.*
  - **8.DSP.4** *Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. Understand and use appropriate terminology to describe independent, dependent, complementary, and mutually exclusive events.*