

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. RATE, RATIO, AND PROPORTION

• UNIT RATES

- **7.C.5** Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.
- **7.C.6** Use proportional relationships to solve ratio and percent problems with multiple operations, such as the following: simple interest, tax, markups, markdowns, gratuities, commissions, fees, conversions within and across measurement systems, percent increase and decrease, and percent error.
- **7.AF.6** Decide whether two quantities are in a proportional relationship (e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin).

• IDENTIFYING PROPORTIONAL RELATIONSHIPS

- **7.AF.6** Decide whether two quantities are in a proportional relationship (e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin).
- **7.AF.9** Identify real-world and other mathematical situations that involve proportional relationships. Write equations and draw graphs to represent proportional relationships and recognize that these situations are described by a linear function in the form $y = mx$, where the unit rate, m , is the slope of the line.
- **7.C.6** Use proportional relationships to solve ratio and percent problems with multiple operations, such as the following: simple interest, tax, markups, markdowns, gratuities, commissions, fees, conversions within and across measurement systems, percent increase and decrease, and percent error.

• USING PROPORTIONS TO SOLVE PROBLEMS

- **7.C.6** Use proportional relationships to solve ratio and percent problems with multiple operations, such as the following: simple interest, tax, markups, markdowns, gratuities, commissions, fees, conversions within and across measurement systems, percent increase and decrease, and percent error.
- **7.AF.9** Identify real-world and other mathematical situations that involve proportional relationships. Write equations and draw graphs to represent proportional relationships and recognize that these situations are described by a linear function in the form $y = mx$, where the unit rate, m , is the slope of the line.

2. PROPORTIONAL REASONING AND SLOPE

• SLOPE

- **7.AF.4** Define slope as vertical change for each unit of horizontal change and recognize that a constant rate of change or constant slope describes a linear function. Identify and describe situations with constant or varying rates of change.
- **7.AF.5** Graph a line given its slope and a point on the line. Find the slope of a line given its graph.

- **ANALYZING PROPORTIONAL RELATIONSHIPS**

- **7.AF.7** Identify the unit rate or constant of proportionality in tables, graphs, equations, and verbal descriptions of proportional relationships.
- **7.AF.4** Define slope as vertical change for each unit of horizontal change and recognize that a constant rate of change or constant slope describes a linear function. Identify and describe situations with constant or varying rates of change.
- **7.C.5** Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.
- **7.AF.8** Explain what the coordinates of a point on the graph of a proportional relationship mean in terms of the situation, with special attention to the points $(0,0)$ and $(1,r)$, where r is the unit rate.

- **REPRESENTING PROPORTIONAL RELATIONSHIPS**

- **7.AF.6** Decide whether two quantities are in a proportional relationship (e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin).
- **7.AF.8** Explain what the coordinates of a point on the graph of a proportional relationship mean in terms of the situation, with special attention to the points $(0,0)$ and $(1,r)$, where r is the unit rate.
- **7.AF.9** Identify real-world and other mathematical situations that involve proportional relationships. Write equations and draw graphs to represent proportional relationships and recognize that these situations are described by a linear function in the form $y = mx$, where the unit rate, m , is the slope of the line.
- **7.AF.7** Identify the unit rate or constant of proportionality in tables, graphs, equations, and verbal descriptions of proportional relationships.
- **7.C.6** Use proportional relationships to solve ratio and percent problems with multiple operations, such as the following: simple interest, tax, markups, markdowns, gratuities, commissions, fees, conversions within and across measurement systems, percent increase and decrease, and percent error.

3. ADDITION AND SUBTRACTION OF RATIONAL NUMBERS

- **ADDING RATIONAL NUMBERS**

- **7.C.1** Understand $p + q$ as the number located a distance $|q|$ from p , in the positive or negative direction, depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.
- **7.C.7** Compute with rational numbers fluently using a standard algorithmic approach.
- **7.C.8** Solve real-world problems with rational numbers by using one or two operations.

- **SUBTRACTING RATIONAL NUMBERS**

- **7.C.1** Understand $p + q$ as the number located a distance $|q|$ from p , in the positive or negative direction, depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.
- **7.C.2** Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.
- **7.AF.1** Apply the properties of operations (e.g., identity, inverse, commutative, associative, distributive properties) to create equivalent linear expressions, including situations that involve factoring (e.g., given $2x - 10$, create an equivalent expression $2(x - 5)$). Justify each step in the process.
- **7.C.7** Compute with rational numbers fluently using a standard algorithmic approach.
- **7.C.8** Solve real-world problems with rational numbers by using one or two operations.

- **USING PROPERTIES TO ADD AND SUBTRACT RATIONAL NUMBERS**

- **7.C.8** Solve real-world problems with rational numbers by using one or two operations.
- **7.C.7** Compute with rational numbers fluently using a standard algorithmic approach.

4. MULTIPLICATION AND DIVISION OF RATIONAL NUMBERS

• MULTIPLYING RATIONAL NUMBERS

- **7.C.3** Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as $(-1)(-1) = 1$ and the rules for multiplying signed numbers.
- **7.C.7** Compute with rational numbers fluently using a standard algorithmic approach.
- **7.C.8** Solve real-world problems with rational numbers by using one or two operations.

• DIVIDING RATIONAL NUMBERS

- **7.C.4** Understand that integers can be divided, provided that the divisor is not zero, and that every quotient of integers (with non-zero divisor) is a rational number. Understand that if p and q are integers, then $-(p/q) = (-p)/q = p/(-q)$.
- **7.C.7** Compute with rational numbers fluently using a standard algorithmic approach.
- **7.C.8** Solve real-world problems with rational numbers by using one or two operations.

• USING PROPERTIES TO MULTIPLY AND DIVIDE RATIONAL NUMBERS

- **7.C.8** Solve real-world problems with rational numbers by using one or two operations.
- **7.C.7** Compute with rational numbers fluently using a standard algorithmic approach.
- **7.C.3** Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as $(-1)(-1) = 1$ and the rules for multiplying signed numbers.

• USING OPERATIONS ON RATIONAL NUMBERS TO SOLVE PROBLEMS

- **7.C.1** Understand $p + q$ as the number located a distance $|q|$ from p , in the positive or negative direction, depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.
- **7.C.2** Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.
- **7.C.7** Compute with rational numbers fluently using a standard algorithmic approach.
- **7.C.8** Solve real-world problems with rational numbers by using one or two operations.

5. ALGEBRAIC EXPRESSIONS, EQUATIONS, AND INEQUALITIES

• SIMPLIFYING AND REWRITING ALGEBRAIC EXPRESSIONS

- **7.AF.1** Apply the properties of operations (e.g., identity, inverse, commutative, associative, distributive properties) to create equivalent linear expressions, including situations that involve factoring (e.g., given $2x - 10$, create an equivalent expression $2(x - 5)$). Justify each step in the process.

• SOLVING MULTI-STEP PROBLEMS WITH RATIONAL NUMBERS

- **7.C.7** Compute with rational numbers fluently using a standard algorithmic approach.
- **7.C.8** Solve real-world problems with rational numbers by using one or two operations.

• SOLVING TWO-STEP EQUATIONS

- **7.AF.2** Solve equations of the form $px + q = r$ and $p(x + q) = r$ fluently, where p , q , and r are specific rational numbers. Represent real-world problems using equations of these forms and solve such problems.
- **7.AF.1** Apply the properties of operations (e.g., identity, inverse, commutative, associative, distributive properties) to create equivalent linear expressions, including situations that involve factoring (e.g., given $2x - 10$, create an equivalent expression $2(x - 5)$). Justify each step in the process.

• SOLVING LINEAR INEQUALITIES

- **7.AF.3** Solve inequalities of the form $px + q (> \text{ or } \geq) r$ or $px + q (< \text{ or } \leq) r$, where p , q , and r are specific rational numbers. Represent real-world problems using inequalities of these forms and solve such problems. Graph the solution set of the

6. DRAWING, CONSTRUCTING, AND EXPLORING GEOMETRIC FIGURES

• SCALE DRAWINGS

- **7.GM.3** Solve real-world and other mathematical problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing. Create a scale drawing by using proportional reasoning.
- **7.GM.2** Identify and describe similarity relationships of polygons including the angle-angle criterion for similar triangles, and solve problems involving similarity.

• GEOMETRIC DRAWINGS

- **7.GM.1** Draw triangles (freehand, with ruler and protractor, and using technology) with given conditions from three measures of angles or sides, and notice when the conditions determine a unique triangle, more than one triangle, or no triangle.

7. GEOMETRY IN TWO AND THREE DIMENSIONS

• CIRCLES

- **7.GM.5** Understand the formulas for area and circumference of a circle and use them to solve real-world and other mathematical problems; give an informal derivation of the relationship between circumference and area of a circle.

• ANGLE RELATIONSHIPS

- **7.GM.4** Solve real-world and other mathematical problems that involve vertical, adjacent, complementary, and supplementary angles.

• AREA, VOLUME, AND SURFACE AREA

- **7.GM.6** Solve real-world and other mathematical problems involving volume of cylinders and three-dimensional objects composed of right rectangular prisms.

8. STATISTICS AND SAMPLING

• POPULATIONS AND SAMPLES

- **7.DSP.1** Understand that statistics can be used to gain information about a population by examining a sample of the population and generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.
- **7.DSP.2** Use data from a random sample to draw inferences about a population. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions.
- **7.DSP.3** Find, use, and interpret measures of center (mean and median) and measures of spread (range, interquartile range, and mean absolute deviation) for numerical data from random samples to draw comparative inferences about two populations.
- **7.DSP.4** Make observations about the degree of visual overlap of two numerical data distributions represented in line plots or box plots. Describe how data, particularly outliers, added to a data set may affect the mean and/or median.

• COMPARING DATA SETS VISUALLY

- **7.DSP.3** Find, use, and interpret measures of center (mean and median) and measures of spread (range, interquartile range, and mean absolute deviation) for numerical data from random samples to draw comparative inferences about two populations.
- **7.DSP.4** Make observations about the degree of visual overlap of two numerical data distributions represented in line plots or box plots. Describe how data, particularly outliers, added to a data set may affect the mean and/or median.

• USING STATISTICAL MEASURES TO COMPARE DATA SETS

- **7.DSP.3** Find, use, and interpret measures of center (mean and median) and measures of spread (range, interquartile range, and mean absolute deviation) for numerical data from random samples to draw comparative inferences about two populations.

- **7.DSP.4** Make observations about the degree of visual overlap of two numerical data distributions represented in line plots or box plots. Describe how data, particularly outliers, added to a data set may affect the mean and/or median.

9. PROBABILITY

● PROBABILITY

- **7.DSP.5** Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Understand that a probability near 0 indicates an unlikely event, a probability around $\frac{1}{2}$ indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event. Understand that a probability of 1 indicates an event certain to occur and a probability of 0 indicates an event impossible to occur.
- **7.DSP.6** Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its relative frequency from a large sample.
- **7.DSP.7** Develop probability models that include the sample space and probabilities of outcomes to represent simple events with equally likely outcomes. Predict the approximate relative frequency of the event based on the model. Compare probabilities from the model to observed frequencies; evaluate the level of agreement and explain possible sources of discrepancy.
- **7.DSP.1** Understand that statistics can be used to gain information about a population by examining a sample of the population and generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.
- **7.DSP.2** Use data from a random sample to draw inferences about a population. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions.

● CALCULATING PROBABILITY

- **7.DSP.7** Develop probability models that include the sample space and probabilities of outcomes to represent simple events with equally likely outcomes. Predict the approximate relative frequency of the event based on the model. Compare probabilities from the model to observed frequencies; evaluate the level of agreement and explain possible sources of discrepancy.
- **7.DSP.6** Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its relative frequency from a large sample.