Tennessee Tutorials are designed specifically for the Tennessee Academic Standards to prepare students for the Tennessee Comprehensive Assessment Program (TCAP) and the TNReady 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.

Unit 1: Expressions and Equations

- **MONITORING PRECISION AND ACCURACY**
  - M3.N.Q.A.1b: Use units as a way to understand real-world problems. Use appropriate quantities in formulas, converting units as necessary.
  - M3.N.Q.A.1c: Use units as a way to understand real-world problems. Define and justify appropriate quantities within a context for the purpose of modeling.
  - M3.N.Q.A.1a: Use units as a way to understand real-world problems. Choose and interpret the scale and the origin in graphs and data displays.
  - M3.N.Q.A.1d: Use units as a way to understand real-world problems. Choose an appropriate level of accuracy when reporting quantities.
- **FORMULATING AND SIMPLIFYING ALGEBRAIC EXPRESSIONS**
  - M3.A.SSE.A.1a: Interpret expressions that represent a quantity in terms of its context. Interpret parts of an expression, such as terms, factors, and coefficients.
  - M3.A.SSE.A.1b: Interpret expressions that represent a quantity in terms of its context. Interpret complicated expressions by viewing one or more of their parts as a single entity.

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- **LITERAL EQUATIONS**
  - M3.A.CED.A.3: Rearrange formulas to isolate a quantity of interest using algebraic reasoning.

Unit 2: Exponential Functions, Equations and Inequalities

- **EXPONENTIAL FUNCTIONS**
  - M3.F.IF.B.3: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.
  - M3.F.IF.A.1b: Use function notation. Interpret statements that use function notation in terms of a context.
  - M3.F.IF.C.6a: Compare properties of functions represented algebraically, graphically, numerically in tables, or by verbal descriptions. Compare properties of two different functions. Functions may be of different types and/or represented in different ways.
  - M3.F.IF.C.5: Graph functions expressed algebraically and show key features of the graph by hand and using technology.
  - M3.N.Q.A.1c: Use units as a way to understand real-world problems. Define and justify appropriate quantities within a context for the purpose of modeling.
  - M3.N.Q.A.1b: Use units as a way to understand real-world problems. Use appropriate quantities in formulas, converting units as necessary.
  - M3.A.CED.A.1: Create equations and inequalities in one variable and use them to solve problems in a real-world context.
  - M3.A.REI.A.1: Understand solving equations as a process of reasoning and explain the reasoning. Construct a viable argument to justify a solution method.
- **SOLVING EXPONENTIAL EQUATIONS**
  - M3.A.CED.A.1: Create equations and inequalities in one variable and use them to solve problems in a real-world context.
  - M3.F.LE.A.2a: Know the relationship between exponential functions and logarithmic functions. Solve exponential equations using a variety of strategies, including logarithms.
  - M3.F.LE.A.2b: Know the relationship between exponential functions and logarithmic functions. Understand that a logarithm is the solution to = , where , , , and are numbers.
  - M3.A.CED.A.2: Create equations and inequalities in two variables to represent relationships between quantities and use them to solve problems in a real-world context. Graph equations and inequalities with two variables on coordinate axes with labels and scales, and use the graphs to make predictions.
  - M3.A.REI.A.1: Understand solving equations as a process of reasoning and explain the reasoning. Construct a viable argument to justify a solution method.
- **EXPONENTIAL GROWTH AND DECAY**

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- M3.N.Q.A.1c: Use units as a way to understand real-world problems. Define and justify appropriate quantities within a context for the purpose of modeling.
- M3.F.IF.C.6a: Compare properties of functions represented algebraically, graphically, numerically in tables, or by verbal descriptions. Compare properties of two different functions. Functions may be of different types and/or represented in different ways.
- M3.F.IF.A.1b: Use function notation. Interpret statements that use function notation in terms of a context.
- M3.N.Q.A.1b: Use units as a way to understand real-world problems. Use appropriate quantities in formulas, converting units as necessary.
- M3.F.IF.B.4: Calculate and interpret the average rate of change of a function (presented algebraically or as a table) over a specified interval. Estimate and interpret the rate of change from a graph.
- M3.F.IF.C.6b: Compare properties of functions represented algebraically, graphically, numerically in tables, or by verbal descriptions. Compare properties of the same function on two different intervals or represented in two different ways.
- M3.F.IF.B.3: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.
- M3.F.LE.A.1: Know that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or cubically.
- M3.A.CED.A.1: Create equations and inequalities in one variable and use them to solve problems in a real-world context.

- **SOLVING EXPONENTIAL INEQUALITIES**
  - M3.A.CED.A.2: Create equations and inequalities in two variables to represent relationships between quantities and use them to solve problems in a real-world context. Graph equations and inequalities with two variables on coordinate axes with labels and scales, and use the graphs to make predictions.
  - M3.N.Q.A.1c: Use units as a way to understand real-world problems. Define and justify appropriate quantities within a context for the purpose of modeling.
  - M3.N.Q.A.1b: Use units as a way to understand real-world problems. Use appropriate quantities in formulas, converting units as necessary.
  - M3.A.CED.A.1: Create equations and inequalities in one variable and use them to solve problems in a real-world context.

Unit 3: Logarithmic Functions and Expressions

- **LOGARITHMIC FUNCTIONS**
  - M3.F.IF.B.3: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.

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- M3.F.IF.C.5: Graph functions expressed algebraically and show key features of the graph by hand and using technology.
- M3.F.IF.C.6b: Compare properties of functions represented algebraically, graphically, numerically in tables, or by verbal descriptions. Compare properties of the same function on two different intervals or represented in two different ways.
- M3.F.LE.A.2a: Know the relationship between exponential functions and logarithmic functions. Solve exponential equations using a variety of strategies, including logarithms.
- M3.F.IF.C.6a: Compare properties of functions represented algebraically, graphically, numerically in tables, or by verbal descriptions. Compare properties of two different functions. Functions may be of different types and/or represented in different ways.
- M3.F.LE.A.2b: Know the relationship between exponential functions and logarithmic functions. Understand that a logarithm is the solution to = , where , , , and are numbers.

- **EVALUATING LOGARITHMIC EXPRESSIONS**
  - M3.F.LE.A.2c: Know the relationship between exponential functions and logarithmic functions. Evaluate logarithms using technology.

Unit 4: Factoring Polynomials and the Factor Theorem

- **FACTORING CUBIC POLYNOMIALS**
  - M3.F.IF.B.3: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.
  - M3.A.SSE.A.1b: Interpret expressions that represent a quantity in terms of its context. Interpret complicated expressions by viewing one or more of their parts as a single entity.
  - M3.F.IF.C.5: Graph functions expressed algebraically and show key features of the graph by hand and using technology.
  - M3.A.SSE.A.1a: Interpret expressions that represent a quantity in terms of its context. Interpret parts of an expression, such as terms, factors, and coefficients.
  - M3.A.CED.A.2: Create equations and inequalities in two variables to represent relationships between quantities and use them to solve problems in a real-world context. Graph equations and inequalities with two variables on coordinate axes with labels and scales, and use the graphs to make predictions.
- **FACTOR THEOREM AND REMAINDER THEOREM**
  - M3.A.APR.A.1: Know and apply the Factor Theorem: For a polynomial () and a number , () = 0 if and only if ( ) is a factor of ().

Unit 5: Functions

- **EVALUATING FUNCTIONS**
  - M3.F.IF.A.1a: Use function notation. Use function notation to evaluate functions for inputs in their domains, including functions of two variables.

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- M3.F.IF.A.1b: Use function notation. Interpret statements that use function notation in terms of a context.

- **INVERSE FUNCTIONS**
  - M3.F.BF.A.3b: Find the inverse of a function. Find the inverse of a function on an appropriate domain.
  - M3.F.BF.A.3a: Find the inverse of a function. Determine whether a function is one-to-one.
  - M3.F.BF.A.3c: Find the inverse of a function. Given an invertible function on an appropriate domain, identify the domain of the inverse function.

Unit 6: Polynomial Functions

- **GRAPHS OF POLYNOMIAL FUNCTIONS**
  - M3.F.BF.A.2: Identify the effect on the graph of replacing () by () + , (), (), and (+) for specific values of (both positive and negative); find the value of given graphs.
  - M3.F.IF.A.1b: Use function notation. Interpret statements that use function notation in terms of a context.
  - M3.A.APR.A.2: Identify zeros of polynomials when suitable factorizations are available and use the zeros to construct a rough graph of the function defined by the polynomial.
- **MULTIPLE REPRESENTATIONS OF FUNCTIONS**
  - M3.F.IF.B.4: Calculate and interpret the average rate of change of a function (presented algebraically or as a table) over a specified interval. Estimate and interpret the rate of change from a graph.
  - M3.F.IF.C.6b: Compare properties of functions represented algebraically, graphically, numerically in tables, or by verbal descriptions. Compare properties of the same function on two different intervals or represented in two different ways.
  - M3.F.IF.A.1b: Use function notation. Interpret statements that use function notation in terms of a context.
  - M3.F.IF.C.6a: Compare properties of functions represented algebraically, graphically, numerically in tables, or by verbal descriptions. Compare properties of two different functions. Functions may be of different types and/or represented in different ways.

Unit 7: Square Root Functions and Equations

- **ANALYZING GRAPHS OF SQUARE ROOT FUNCTIONS**
  - M3.F.BF.A.2: Identify the effect on the graph of replacing () by () + , (), (), and (+) for specific values of (both positive and negative); find the value of given graphs.
  - M3.A.REI.A.2: Solve radical equations in one variable and identify extraneous solutions when they exist.
  - M3.F.BF.A.3a: Find the inverse of a function. Determine whether a function is one-to-one.
  - M3.F.BF.A.3b: Find the inverse of a function. Find the inverse of a function on an appropriate domain.

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- M3.F.BF.A.3c: Find the inverse of a function. Given an invertible function on an appropriate domain, identify the domain of the inverse function.

- **SOLVING SQUARE ROOT EQUATIONS**
  - M3.A.REI.A.2: Solve radical equations in one variable and identify extraneous solutions when they exist.
  - M3.N.Q.A.1b: Use units as a way to understand real-world problems. Use appropriate quantities in formulas, converting units as necessary.
  - M3.N.Q.A.1c: Use units as a way to understand real-world problems. Define and justify appropriate quantities within a context for the purpose of modeling.

Unit 8: Parent Functions and Transformations

- **PARENT FUNCTIONS**
  - M3.F.IF.B.3: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.
  - M3.F.IF.C.5: Graph functions expressed algebraically and show key features of the graph by hand and using technology.
  - M3.F.BF.A.2: Identify the effect on the graph of replacing () by () + , (), (), and (+) for specific values of (both positive and negative); find the value of given graphs.
- **TRANSFORMATIONS OF PARENT FUNCTIONS**
  - M3.F.BF.A.2: Identify the effect on the graph of replacing () by () + , (), (), and (+) for specific values of (both positive and negative); find the value of given graphs.
  - M3.F.BF.A.2: Identify the effect on the graph of replacing () by () + , (), (), and (+) for specific values of (both positive and negative); find the value of given graphs.
  - M3.F.IF.B.3: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.
  - M3.F.IF.C.5: Graph functions expressed algebraically and show key features of the graph by hand and using technology.
  - M3.F.BF.A.2: Identify the effect on the graph of replacing () by () + , (), (), and (+) for specific values of (both positive and negative); find the value of given graphs.
- **MULTIPLE TRANSFORMATIONS OF PARENT FUNCTIONS**
  - M3.F.BF.A.2: Identify the effect on the graph of replacing () by () + , (), (), and (+) for specific values of (both positive and negative); find the value of given graphs.
  - M3.F.BF.A.2: Identify the effect on the graph of replacing () by () + , (), (), and (+) for specific values of (both positive and negative); find the value of given graphs.

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- M3.F.IF.B.3: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.
- M3.F.IF.C.5: Graph functions expressed algebraically and show key features of the graph by hand and using technology.
- M3.F.BF.A.2: Identify the effect on the graph of replacing () by () + , (), (), and (+) for specific values of (both positive and negative); find the value of given graphs.

Unit 9: Area of Circles and Sectors

- **AREA OF CIRCLES AND SECTORS**
  - M3.G.C.A.1: Use proportional relationships between the area of a circle and the area of a sector within the circle to solve problems and represent solutions in a real-world context.

Unit 10: Right Triangles

- **PYTHAGOREAN THEOREM**
  - M3.G.SRT.A.2a: Solve triangles. Know and use the Pythagorean Theorem and trigonometric ratios (sine, cosine, tangent, and their inverses) to solve right triangles in a real-world context.
- **SPECIAL RIGHT TRIANGLES**
  - M3.G.SRT.A.2b: Solve triangles. Know and use relationships within special right triangles to solve problems in a real-world context.

Unit 11: Triangles and Trigonometry

- **TRIGONOMETRIC RATIOS**
  - M3.G.SRT.A.2a: Solve triangles. Know and use the Pythagorean Theorem and trigonometric ratios (sine, cosine, tangent, and their inverses) to solve right triangles in a real-world context.
  - M3.G.SRT.A.1b: Use side ratios in right triangles to define trigonometric ratios. Explain and use the relationship between the sine and cosine of complementary angles.
  - M3.G.SRT.A.1a: Use side ratios in right triangles to define trigonometric ratios. Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.
- **PROBLEM SOLVING WITH RIGHT TRIANGLES**
  - M3.G.SRT.A.1a: Use side ratios in right triangles to define trigonometric ratios. Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.
  - M3.G.SRT.A.2a: Solve triangles. Know and use the Pythagorean Theorem and trigonometric ratios (sine, cosine, tangent, and their inverses) to solve right triangles in a real-world context.
- **LAWS OF SINE AND COSINE**
  - M3.G.SRT.A.2c: Solve triangles. Use the Law of Sines and Law of Cosines to solve non-right triangles in a real-world context.

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Unit 12: Volume 1

- **VOLUME OF PRISMS AND PYRAMIDS**
  - M3.G.GMD.A.2: Use volume and surface area formulas for cylinders, cones, prisms, pyramids, and spheres to solve problems in a real-world context.
  - M3.N.Q.A.1b: Use units as a way to understand real-world problems. Use appropriate quantities in formulas, converting units as necessary.
  - M3.G.MG.A.1: Use geometric shapes, their measures, and their properties to model objects found in a real-world context for the purpose of approximating solutions to problems.
  - M3.G.GMD.A.1: Understand and explain the formulas for the volume and surface area of a cylinder, cone, prism, and pyramid.
- **VOLUME OF CYLINDERS AND CONES**
  - M3.G.GMD.A.2: Use volume and surface area formulas for cylinders, cones, prisms, pyramids, and spheres to solve problems in a real-world context.
  - M3.N.Q.A.1b: Use units as a way to understand real-world problems. Use appropriate quantities in formulas, converting units as necessary.
  - M3.G.MG.A.1: Use geometric shapes, their measures, and their properties to model objects found in a real-world context for the purpose of approximating solutions to problems.
  - M3.G.GMD.A.1: Understand and explain the formulas for the volume and surface area of a cylinder, cone, prism, and pyramid.

Unit 13: Volume 2

- **SURFACE AREA AND VOLUME OF SPHERES**
  - M3.G.GMD.A.2: Use volume and surface area formulas for cylinders, cones, prisms, pyramids, and spheres to solve problems in a real-world context.
  - M3.N.Q.A.1b: Use units as a way to understand real-world problems. Use appropriate quantities in formulas, converting units as necessary.
  - M3.G.MG.A.1: Use geometric shapes, their measures, and their properties to model objects found in a real-world context for the purpose of approximating solutions to problems.
- **MODELING SITUATIONS WITH GEOMETRY**
  - M3.N.Q.A.1b: Use units as a way to understand real-world problems. Use appropriate quantities in formulas, converting units as necessary.
  - M3.G.MG.A.1: Use geometric shapes, their measures, and their properties to model objects found in a real-world context for the purpose of approximating solutions to problems.

Unit 14: Composite Shapes

- **SURFACE AREA OF COMPOSITE SOLIDS**
  - M3.G.MG.A.1: Use geometric shapes, their measures, and their properties to model objects found in a real-world context for the purpose of approximating solutions to problems.

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- M3.G.GMD.A.1: Understand and explain the formulas for the volume and surface area of a cylinder, cone, prism, and pyramid.
- M3.G.GMD.A.2: Use volume and surface area formulas for cylinders, cones, prisms, pyramids, and spheres to solve problems in a real-world context.
- M3.N.Q.A.1b: Use units as a way to understand real-world problems. Use appropriate quantities in formulas, converting units as necessary.

- **VOLUME OF COMPOSITE SOLIDS**
  - M3.G.MG.A.1: Use geometric shapes, their measures, and their properties to model objects found in a real-world context for the purpose of approximating solutions to problems.
  - M3.G.GMD.A.2: Use volume and surface area formulas for cylinders, cones, prisms, pyramids, and spheres to solve problems in a real-world context.
  - M3.N.Q.A.1b: Use units as a way to understand real-world problems. Use appropriate quantities in formulas, converting units as necessary.
  - M3.G.GMD.A.1: Understand and explain the formulas for the volume and surface area of a cylinder, cone, prism, and pyramid.

Unit 15: Statistics

- **ANALYZING STATISTICAL SAMPLES**
  - M3.S.IC.A.2: Identify potential sources of bias in statistical studies.
  - M3.S.IC.A.3: Distinguish between a statistic and a parameter. Evaluate reports based on data and recognize when poor conclusions are drawn from well-collected data.
  - M3.S.CP.B.4: Use the Law of Large Numbers to assess the validity of a statistical claim.
- **EXPERIMENTAL AND OBSERVATIONAL DESIGN**
  - M3.S.IC.A.2: Identify potential sources of bias in statistical studies.
  - M3.S.IC.A.1: Recognize the purposes of and differences among sample surveys, experiments, and observational studies.
- **NORMAL DISTRIBUTION**
  - M3.S.ID.A.5: Compute, interpret, and compare -scores for normally distributed data in a real-world context.
  - M3.S.ID.A.4: Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages using the Empirical Rule.
  - M3.S.ID.A.5: Compute, interpret, and compare -scores for normally distributed data in a real-world context.
  - M3.S.ID.A.5: Compute, interpret, and compare -scores for normally distributed data in a real-world context.

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- M3.S.ID.A.5: Compute, interpret, and compare -scores for normally distributed data in a real-world context.
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- M3.S.ID.A.5: Compute, interpret, and compare -scores for normally distributed data in a real-world context.
- M3.S.ID.A.5: Compute, interpret, and compare -scores for normally distributed data in a real-world context.

Unit 16: Data Analysis

- **DATA ANALYSIS**
  - M3.S.ID.A.1: Use measures of center to solve real-world and mathematical problems.
  - M3.S.ID.A.3: Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points.
  - M3.S.ID.A.2: Use statistics appropriate to the shape of the data distribution to compare center (mean, median, and/or mode) and spread (range, interquartile range, and standard deviation) of two or more different data sets.
- **CONCLUSIONS IN DATA**
  - M3.S.IC.A.3: Distinguish between a statistic and a parameter. Evaluate reports based on data and recognize when poor conclusions are drawn from well-collected data.

Unit 17: Scatterplots and Regression

- **SCATTERPLOTS**
  - M3.S.ID.B.6: Represent data from two quantitative variables on a scatter plot, and describe how the variables are related. Fit a function to the data; use functions fitted to data to solve problems in the context of the data.
- **SCATTERPLOTS AND MODELING**
  - M3.S.ID.B.6: Represent data from two quantitative variables on a scatter plot, and describe how the variables are related. Fit a function to the data; use functions fitted to data to solve problems in the context of the data.

Unit 18: Probability

- **INTRODUCTION TO PROBABILITY**
  - M3.S.CP.A.2: Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. Categorize events as independent or dependent.
  - M3.S.CP.A.1b: Use set notation to represent contextual situations. Flexibly move between visual models (Venn diagrams, frequency tables, etc.) and set notation.
  - M3.S.CP.A.1a: Use set notation to represent contextual situations. Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as

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unions, intersections, or complements of other events (or, and, not).

- M3.S.CP.A.1a: Use set notation to represent contextual situations. Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events (or, and, not).
- M3.S.CP.C.6b: Understand and apply the Addition Rule. Apply the Addition Rule to solve problems and interpret the answer in terms of the given context.
- M3.S.CP.C.6a: Understand and apply the Addition Rule. Explain the Addition Rule, (or) = () + () (and) in terms of visual models (Venn diagrams, frequency tables, etc.).

- **CONDITIONAL PROBABILITY**
  - M3.S.CP.C.5: Find the conditional probability of given as the fraction of s outcomes that also belong to and interpret the answer in terms of the given context.
  - M3.S.CP.A.2: Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. Categorize events as independent or dependent.
  - M3.S.CP.A.1a: Use set notation to represent contextual situations. Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events (or, and, not).
- **GEOMETRIC PROBABILITIES**
  - M3.S.CP.D.7: Calculate probabilities using geometric figures.
- **COMBINATIONS AND PERMUTATIONS**
  - M3.S.CP.B.3a: Apply statistical counting techniques. Use the Fundamental Counting Principle to compute probabilities of compound events and solve problems.
  - M3.S.CP.B.3b: Apply statistical counting techniques. Use permutations and combinations to compute probabilities of compound events and solve problems.

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