

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.

### Unit 1: Equations and Inequalities

- **ONE-STEP EQUATIONS AND INEQUALITIES**

- AI.L.1: Represent real-world problems using linear equations and inequalities in one variable, including those with rational number coefficients and variables on both sides of the equal sign. Solve them fluently, explaining the process used and justify the choice of a solution method. (E)

- **MULTI-STEP EQUATIONS AND INEQUALITIES**

- AI.L.1: Represent real-world problems using linear equations and inequalities in one variable, including those with rational number coefficients and variables on both sides of the equal sign. Solve them fluently, explaining the process used and justify the choice of a solution method. (E)

- **LITERAL EQUATIONS**

- AI.L.4: Solve linear and quadratic equations and formulas for a specified variable to highlight a quantity of interest, using the same reasoning as in solving equations. (E)

### Unit 2: Writing Expressions and Equations

- **FORMULATING AND SOLVING EQUATIONS FROM WORD PROBLEMS**

- AI.L.1: Represent real-world problems using linear equations and inequalities in one variable, including those with rational number coefficients and variables on both sides of the equal sign. Solve them fluently, explaining the process used and justify the choice of a solution method. (E)

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### Unit 3: Functions

- **FUNCTIONS AND RELATIONS**

- AI.NF.3: Extend understanding of independent/dependent variables to encompass domain/range, as applied to relations using tables, graphs, verbal descriptions, and equations. (E)
- AI.NF.4: Evaluate functions for given elements of the domain, and interpret statements in function notation in terms of a context.

- **DOMAIN AND RANGE**

- AI.NF.3: Extend understanding of independent/dependent variables to encompass domain/range, as applied to relations using tables, graphs, verbal descriptions, and equations. (E)

### Unit 4: Graphs of Linear Equations and Inequalities

- **SLOPE**

- AI.L.2: Represent linear functions as graphs from equations (with emphasis on technology), equations from graphs, and equations from tables and other given information (e.g., from a given point on a line and the slope of the line). Find the equations of a line in a slope-intercept, point-slope, and standard forms. Recognize that different forms reveal more or less information about a given situation based on the form used.

- **GRAPHING AND ANALYZING LINEAR FUNCTIONS**

- AI.L.2: Represent linear functions as graphs from equations (with emphasis on technology), equations from graphs, and equations from tables and other given information (e.g., from a given point on a line and the slope of the line). Find the equations of a line in a slope-intercept, point-slope, and standard forms. Recognize that different forms reveal more or less information about a given situation based on the form used.
- AI.L.3: Represent real-world problems that can be modeled with a linear function using equations, graphs, and tables, including with technology. Translate fluently among these representations and interpret the slope and intercepts. (E)
- AI.NF.3: Extend understanding of independent/dependent variables to encompass domain/range, as applied to relations using tables, graphs, verbal descriptions, and equations. (E)
- AI.NF.4: Evaluate functions for given elements of the domain, and interpret statements in function notation in terms of a context.

- AI.NF.5: Describe, qualitatively, the functional relationship between two quantities by analyzing key features of a graph. Sketch a graph that exhibits given key features of a function that has been verbally described, including intercepts, where the function is increasing or decreasing, where the function is positive or negative, and any relative maximum or minimum values. Identify the independent and dependent variables. (E)
- **GRAPHS OF LINEAR INEQUALITIES**
- AI.SEI.1: Represent real-world problems using linear inequalities in two variables and solve such problems; interpret the solution set, and determine whether it is reasonable. Graph the solutions to a linear inequality in two variables as a half-plane. (E)
- **SOLVING SYSTEMS OF LINEAR INEQUALITIES**
- AI.SEI.3: Represent real-world problems using a system of two linear inequalities in two variables. Graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes with and without technology. Interpret the solution set, and determine whether it is reasonable.

### Unit 5: Two-Variable Linear Systems

- **SOLVING SYSTEMS OF LINEAR EQUATIONS: GUESS AND CHECK**
- AI.SEI.2: Write and graph a system of two linear equations in two variables that represents a real-world problem and solve the problem graphically and algebraically with and without technology. Interpret the solution, and determine whether the solution is reasonable. (E)
- **SOLVING SYSTEMS OF LINEAR EQUATIONS: GRAPHING**
- AI.SEI.2: Write and graph a system of two linear equations in two variables that represents a real-world problem and solve the problem graphically and algebraically with and without technology. Interpret the solution, and determine whether the solution is reasonable. (E)
- **SOLVING SYSTEMS OF LINEAR EQUATIONS: SUBSTITUTION**
- AI.SEI.2: Write and graph a system of two linear equations in two variables that represents a real-world problem and solve the problem graphically and algebraically with and without technology. Interpret the solution, and determine whether the solution is reasonable. (E)
- **SOLVING SYSTEMS OF LINEAR EQUATIONS: ELIMINATION**
- AI.SEI.2: Write and graph a system of two linear equations in two variables that represents a real-world problem and solve the problem graphically and algebraically with and without technology. Interpret the solution, and determine whether the solution is reasonable. (E)

### Unit 6: Exponential Functions

- **EXPONENTIAL FUNCTIONS**
- AI.QE.5: Graph exponential and quadratic functions with and without technology. Identify and describe key features, such as zeros, lines of symmetry, and extreme values in real-world and other mathematical problems involving quadratic functions with and without technology; interpret the results in the real-world contexts.

- AI.QE.2: Represent real-world and other mathematical problems that can be modeled with simple exponential functions using tables, graphs, and equations of the form  $y = ab^x$  (for integer values of  $x \geq 1$ , rational values of  $b > 0$  and  $b \neq 1$ ) with and without technology; interpret the values of  $a$  and  $b$ .

- **EXPONENTIAL GROWTH AND DECAY**

- AI.QE.2: Represent real-world and other mathematical problems that can be modeled with simple exponential functions using tables, graphs, and equations of the form  $y = ab^x$  (for integer values of  $x \geq 1$ , rational values of  $b > 0$  and  $b \neq 1$ ) with and without technology; interpret the values of  $a$  and  $b$ .
- AI.QE.1: Distinguish between situations that can be modeled with linear functions and exponential functions. Understand that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. Compare linear functions and exponential functions that model real-world situations using tables, graphs, and equations. (E)

## Unit 7: Polynomials

- **ADDITION AND SUBTRACTION OF POLYNOMIALS**

- AI.NF.2: Add, subtract, and multiply polynomials. Divide polynomials by monomials. Use these operations to rewrite algebraic expressions in equivalent forms, and justify them with algebraic properties. (E)

- **MULTIPLICATION OF POLYNOMIALS**

- AI.NF.2: Add, subtract, and multiply polynomials. Divide polynomials by monomials. Use these operations to rewrite algebraic expressions in equivalent forms, and justify them with algebraic properties. (E)

## Unit 8: Factoring

- **FACTORING QUADRATIC TRINOMIALS**

- AI.QE.3: Solve quadratic equations in one variable by inspection (e.g., for  $x^2 = 49$ ), finding square roots, using the quadratic formula, and factoring, as appropriate to the initial form of the equation.

- **FACTORING SPECIAL CASES**

- AI.QE.6: Describe the relationships among a solution of a quadratic equation, a zero of the function, an  $x$ -intercept of the graph, and the factors of the expression. Explain that every quadratic has two complex solutions, which may or may not be real solutions.

## Unit 9: Graphs of Quadratic Functions

- **QUADRATIC FUNCTIONS**

- AI.NF.5: Describe, qualitatively, the functional relationship between two quantities by analyzing key features of a graph. Sketch a graph that exhibits given key features of a function that has been verbally described, including intercepts, where the function is increasing or decreasing, where the function is positive or negative, and any relative maximum or minimum values. Identify the independent and dependent variables. (E)
- AI.QE.5: Graph exponential and quadratic functions with and without technology. Identify and describe key features, such as zeros, lines of symmetry, and extreme values in real-world and other

mathematical problems involving quadratic functions with and without technology; interpret the results in the real-world contexts.

- **ANALYZING GRAPHS OF QUADRATIC FUNCTIONS**

- AI.NF.3: Extend understanding of independent/dependent variables to encompass domain/range, as applied to relations using tables, graphs, verbal descriptions, and equations. (E)
- AI.NF.5: Describe, qualitatively, the functional relationship between two quantities by analyzing key features of a graph. Sketch a graph that exhibits given key features of a function that has been verbally described, including intercepts, where the function is increasing or decreasing, where the function is positive or negative, and any relative maximum or minimum values. Identify the independent and dependent variables. (E)
- AI.QE.5: Graph exponential and quadratic functions with and without technology. Identify and describe key features, such as zeros, lines of symmetry, and extreme values in real-world and other mathematical problems involving quadratic functions with and without technology; interpret the results in the real-world contexts.
- AI.QE.6: Describe the relationships among a solution of a quadratic equation, a zero of the function, an x-intercept of the graph, and the factors of the expression. Explain that every quadratic has two complex solutions, which may or may not be real solutions.

- **REPRESENTATIONS OF QUADRATIC FUNCTIONS**

- AI.QE.6: Describe the relationships among a solution of a quadratic equation, a zero of the function, an x-intercept of the graph, and the factors of the expression. Explain that every quadratic has two complex solutions, which may or may not be real solutions.

## Unit 10: Solving Quadratic Equations

- **SOLVING QUADRATIC EQUATIONS WITH FACTORING**

- AI.QE.3: Solve quadratic equations in one variable by inspection (e.g., for  $x^2 = 49$ ), finding square roots, using the quadratic formula, and factoring, as appropriate to the initial form of the equation.
- AI.QE.4: Represent real-world problems using quadratic equations in one or two variables and solve such problems with technology. Interpret the solution(s), and determine whether they are reasonable. (E)

- **QUADRATIC FORMULA**

- AI.QE.3: Solve quadratic equations in one variable by inspection (e.g., for  $x^2 = 49$ ), finding square roots, using the quadratic formula, and factoring, as appropriate to the initial form of the equation.
- AI.QE.6: Describe the relationships among a solution of a quadratic equation, a zero of the function, an x-intercept of the graph, and the factors of the expression. Explain that every quadratic has two complex solutions, which may or may not be real solutions.
- AI.QE.4: Represent real-world problems using quadratic equations in one or two variables and solve such problems with technology. Interpret the solution(s), and determine whether they are reasonable. (E)

- **SIMPLIFYING SQUARE ROOTS**

- AI.NF.1: Simplify square roots of monomial algebraic expressions, including non-perfect squares.

### Unit 11: Working with Functions

- **LINEAR VS. NONLINEAR FUNCTIONS**

- AI.QE.1: Distinguish between situations that can be modeled with linear functions and exponential functions. Understand that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. Compare linear functions and exponential functions that model real-world situations using tables, graphs, and equations. (E)

- **MULTIPLE REPRESENTATIONS OF FUNCTIONS**

- AI.QE.2: Represent real-world and other mathematical problems that can be modeled with simple exponential functions using tables, graphs, and equations of the form  $y = ab^x$  (for integer values of  $x$   $\geq 1$ , rational values of  $b > 0$  and  $b \neq 1$ ) with and without technology; interpret the values of  $a$  and  $b$ .
- AI.QE.4: Represent real-world problems using quadratic equations in one or two variables and solve such problems with technology. Interpret the solution(s), and determine whether they are reasonable. (E)

### Unit 12: Statistical Design and Analysis

- **ANALYZING STATISTICAL SAMPLES**

- AI.DS.1: Interpret statistics as a process for making inferences about a population based on a random sample from that population. Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each. (E)

- **CONCLUSIONS IN DATA**

- AI.DS.2: Understand that statistics and data are non-neutral and designed to serve a particular interest. Analyze the possibilities for whose interest might be served and how the representations might be misleading. (E)

### Unit 13: Statistics

- **FREQUENCY TABLES**

- AI.DS.4: Summarize bivariate categorical data in two-way frequency tables. Interpret relative frequencies in the contexts of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in data.

- **SCATTERPLOTS**

- AI.DS.3: Use technology to find a linear function that models a relationship between two quantitative variables to make predictions and interpret the slope and y-intercept. Using technology, compute and interpret the correlation coefficient. (E)

- **SCATTERPLOTS AND MODELING**

- AI.DS.3: Use technology to find a linear function that models a relationship between two quantitative variables to make predictions and interpret the slope and y-intercept. Using technology, compute and

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interpret the correlation coefficient. (E)

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