Indiana Mathematics

Algebra I: Grades 9, 10, 11, 12

Adopted 2023

Mathematics Process Standards

1. **Make sense of problems and persevere in solving them.** HS.PS.1
2. **Reason abstractly and quantitatively.** HS.PS.2
3. **Construct viable arguments and critique the reasoning of others.** HS.PS.3
4. **Model with mathematics.** HS.PS.4
5. **Use appropriate tools strategically.** HS.PS.5
6. **Attend to precision.** HS.PS.6
7. **Look for and make use of structure.** HS.PS.7
8. **Look for and express regularity in repeated reasoning.** HS.PS.8

Number Systems, Expressions, and Functions

NF. Students simplify and manipulate algebraic expressions, equations, and functions in a variety of forms. AI.NF

1. Simplify square roots of monomial algebraic expressions, including non-perfect squares. AI.NF.1
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. AI.NF.2
3. Extend understanding of independent/dependent variables to encompass domain/range, as applied to relations using tables, graphs, verbal descriptions, and equations. AI.NF.3
4. Evaluate functions for given elements of the domain, and interpret statements in function notation in terms of a context. AI.NF.4
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. AI.NF.5

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Students represent real-world situations with linear functions and use these equations to solve problems. AI.L

Functions

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. AI.L.1
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. Reveal more or less information about a given situation based on the form used. AI.L.2
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. AI.L.3
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. AI.L.4

Systems of Linear Equations and Inequalities

SEI. Students represent real-world situations as systems of linear equations and inequalities, using those systems to solve problems. 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. AI.SEI.1
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. AI.SEI.2
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. AI.SEI.3

Quadratic and Exponential Equations and Functions

QE. Students represent real-world situations using quadratic and exponential equations and use these equations to solve problems. 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. AI.QE.1
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 > 1, rational values of b > 0 and b ≠ 1) with and without technology; interpret the values of a and b. AI.QE.2

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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.3
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. AI.QE.4
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.5
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.6

Data Analysis & Statistics

DS. Students utilize and interpret statistical claims. 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. AI.DS.1
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. AI.DS.2
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. AI.DS.3
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. AI.DS.4