Indiana Mathematics Content Connectors

# Algebra I

## Number Systems, Expressions, and Functions NF

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

- a Simplify square roots of non-perfect square whole numbers. AI.NF.1A

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)** AI.NF.2

- a Add, subtract, and multiply monomials and binomials. (E) AI.NF.2A

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.3

- a Identify the domain and range of a table or graph. Understand the domain is the independent variable and the range is the dependent variable. (E) AI.NF.3A

4 **Evaluate functions for given elements of the domain, and interpret statements in function notation in terms of a context.** AI.NF.4

- a Evaluate functions for given elements of the domain. AI.NF.4A

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.NF.5

- a Given the graph of a function, identify its key features (domain, range, intercept(s), increasing, and decreasing). Given the key features (domain, range, increasing, and decreasing) of a function, determine the graph that indicates the key feature. Identify independent and dependent variables of a function. (E) AI.NF.5A

## Linear Equations, Inequalities, and Functions 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)** AI.L.1

- a Write a one-variable equation or inequality given a word-problem. (E) AI.L.1A
- b Solve multi-step linear equations and inequalities in one variable. (E) AI.L.1B

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.2

- a Represent linear functions using multiple representations. Recognize equations of lines in multiple forms (slope-intercept form and standard form). Describe the attributes revealed by various forms of linear functions. AI.L.2A

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.L.3

- a Represent real-world problems that can be modeled with a linear function (in slope-intercept form) using equations, graphs, and tables. (E) AI.L.3A

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)** AI.L.4

- a Solve linear and quadratic equations, including formulas, for a specified variable limited to simple quadratic formulas (e.g., A = pi*r 2 ). AI.L.4A

## Systems of Linear Equations and Inequalities 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)** AI.SEI.1

- a Identify a two-variable linear inequality that represents a real-world problem. (E) AI.SEI.1A
- b Identify solutions to real-world linear inequalities given the graph. (E) AI.SEI.1B

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)** AI.SEI.2

- a Graph a system of linear equations that represents a real-world problem and determine the reasonableness of the solution. Identify a solution to a system of linear equations. (E) AI.SEI.2A

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

- a Identify a system of linear inequalities that represents a given real-world problem. AI.SEI.3A
- b Identify the solution set to a system of inequalities. AI.SEI.3B

## Quadratic and Exponential Equations and Functions 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)** AI.QE.1

- a Identify a function as linear or exponential given a graph, table, or real-world problem. Understand that linear functions grow by equal differences and exponential functions grow by equal factors. (E) AI.QE.1A

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 $b \neq 1$ ) with and without technology; interpret the values of a and b.** AI.QE.2

- a Represent real-world or mathematical problems of an exponential equation of the form $y = ab^x$ , and identify the a-value as the initial value (or y-intercept) and the b-value as the growth or decay factor. AI.QE.2A

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

- a Solve quadratic equations using square roots, factoring, and the quadratic formula. AI.QE.3A

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)** AI.QE.4

- a Using technology, determine if a point lies on a quadratic function. AI.QE.4A

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

- a Graph exponential and quadratic functions with the aid of technology. AI.QE.5A
- b Given a graph of an exponential and quadratic function identify key features such as zeros and extreme values. AI.QE.5B

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

- a Identify zeros of quadratic functions. Understand that quadratic equations have 2, 1, or no real solutions. AI.QE.6A

## Data Analysis & Statistics 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)** AI.DS.1
   - a Given a statistical situation, identify it as a sample survey, experiment, or an observational study. Recognize the purpose of using a random sample. AI.DS.1A

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)** AI.DS.2
   - a Select the model that represents biased or unbiased statistics and data and therefore might be misleading. (E) AI.DS.2A

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)** AI.DS.3
   - a Use the line of best fit to find points that can be used to answer questions about data. (E) AI.DS.3A
   - b Determine if the correlation coefficient, measured from 0 to 1, is a strong or weak correlation. (E) AI.DS.3B

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
   - a Given a two-way frequency table, calculate relative frequencies for rows or columns. AI.DS.4A