INDIANA DEPARTMENT of EDUCATION

2024 INDIANA CONTENT CONNECTORS

MATHEMATICS

ALGEBRA I

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Indiana Content Connectors Context and Purpose

Introduction

The Indiana Content Connectors for Algebra I are the result of a process designed to identify, evaluate, synthesize, and create high-quality learning expectations for Indiana students with significant cognitive disabilities.

The Indiana Department of Education (IDOE) convened stakeholder committees to review proposed revisions to Indiana's Alternative Standards, known as content connectors. The content connectors are designed to measure the knowledge and skills of students with the most significant cognitive disabilities and are assessed with the state's alternate assessment. The content connectors are designed to ensure that all Indiana students in this population are prepared with essential knowledge and skills needed to access employment, enrollment, or enlistment leading to service.

What are the Content Connectors and how should they be used?

The Indiana Content Connectors are designed to help educators, parents, students, and community members understand the necessary content for each grade level, and within each content area domain, to access employment, enrollment, or enlistment leading to service. These content connectors should form the basis for strong core instruction for all students at each grade level and content area. The content connectors identify the minimum academic content or skills to which Indiana students need access in order to be prepared for success after graduation, but they are not an exhaustive list.

While the Indiana Content Connectors establish key expectations for knowledge and skills and should be used as the basis for curriculum, the content connectors by themselves do not constitute a curriculum. It is the responsibility of the local school corporation to select and formally adopt curricular tools, including textbooks and any other supplementary materials, that align with Indiana Content Connectors. Additionally, corporation and school leaders should consider the appropriate instructional sequence of the content connectors as well as the length of time needed to teach each one. Every content connector has a unique place in the continuum of learning, but each content connector will not require the same amount of time and attention. A deep understanding of the vertical articulation of the standards will enable educators to make the best instructional decisions. These content connectors must also be complemented by robust, evidence-based instructional practices to support overall student development. By utilizing strategic and intentional instructional practices, other areas such as STEM and employability skills can be integrated with the content connectors.

Acknowledgments

IDOE appreciates the time, dedication, and expertise offered by Indiana's K-12 general and special educators, higher education professors, representatives from business and industry, families, and other stakeholders who contributed to the development of the Indiana Content Connectors. We wish to specially acknowledge the committee members, as well as participants in the public comment period, who dedicated many hours to the review and evaluation of these content connectors designed to prepare Indiana students for success after graduation.

Algebra I

Standards and content connectors identified as essential for mastery by the end of the course are indicated with gray shading and an "E."

Indiana Academic Standards	Content Connectors
Number Systems, Expressions, and Functions	
AI.NF.1: Simplify square roots of monomial algebraic expressions, including non-perfect squares.	**AI.NF.1a:** Simplify square roots of non-perfect square whole numbers.
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)	**AI.NF.2a:** Add, subtract, and multiply monomials and binomials. (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.3a:** 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.4: Evaluate functions for given elements of the domain, and interpret statements in function notation in terms of a context.	**AI.NF.4a:** Evaluate functions for given elements of the domain.
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.NF.5a:** 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)
Linear Equations, Inequalities, and Functions	
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)	**AI.L.1a:** Write a one-variable equation or inequality given a word-problem. (E)
	AI.L.1b: Solve multi-step linear equations and inequalities in one variable. (E)

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.2a:** 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.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.3a:** Represent real-world problems that can be modeled with a linear function (in slope-intercept form) using equations, graphs, and tables. (E)
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)	**AI.L.4a:** Solve linear and quadratic equations, including formulas, for a specified variable limited to simple quadratic formulas (e.g., $A = pi*r^2$).
Systems of Linear Equations and 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)	**AI.SEI.1a:** Identify a two-variable linear inequality that represents a real-world problem. (E)
	AI.SEI.1b: Identify solutions to real-world linear inequalities given the graph. (E)
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)	**AI.SEI.2a:** 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.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.3a:** Identify a system of linear inequalities that represents a given real-world problem.
	AI.SEI.3b: Identify the solution set to a system of inequalities.

Quadratic and Exponential Equations and 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)	**AI.QE.1a:** 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.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.2a:** 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.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.3a:** Solve quadratic equations using square roots, factoring, and the quadratic formula.
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)	**AI.QE.4a:** Using technology, determine if a point lies on a quadratic function.
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.5a:** Graph exponential and quadratic functions with the aid of technology. **AI.QE.5b:** Given a graph of an exponential and quadratic function identify key features such as zeros and extreme values.
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.6a:** Identify zeros of quadratic functions. Understand that quadratic equations have 2, 1, or no real solutions.

Data Analysis & Statistics	
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)	**AI.DS.1a:** 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.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.2a:** Select the model that represents biased or unbiased statistics and data and therefore might be misleading. (E)
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)	**AI.DS.3a:** Use the line of best fit to find points that can be used to answer questions about data. (E)
	AI.DS.3b: Determine if the correlation coefficient, measured from 0 to 1, is a strong or weak correlation. (E)
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.	**AI.DS.4a:** Given a two-way frequency table, calculate relative frequencies for rows or columns.