Indiana Mathematics

Grade 8

Adopted 2023

Mathematics Process Standards

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

Number Sense

NS. Students continue to deepen their understanding of rational and irrational numbers by explaining the differences between them and solving real-world problems. 8.NS

1. Give examples of rational and irrational numbers, and explain the difference between them. State decimal equivalents for any number. For rational numbers, show that the decimal equivalent terminates or repeats, and convert a repeating decimal into a rational number. 8.NS.1
2. Use rational approximations of irrational numbers to compare the size of irrational numbers, plot them approximately on a number line, and estimate the value of expressions involving irrational numbers. 8.NS.2
3. Given a numeric expression with common rational number bases and integer exponents, apply the properties of exponents to generate equivalent expressions. 8.NS.3
4. Solve real-world problems with rational numbers by using multiple operations. 8.NS.4

Algebra and Functions

AF. Students understand the formal definition of a function, analyze linear functions in multiple representations, and differentiate between linear and nonlinear functions. Students also solve a system of linear equations in two unknowns. 8.AF

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1. Solve linear equations and inequalities with rational number coefficients fluently, including those whose solutions require expanding expressions using the distributive property and collecting like terms. Represent real-world problems using linear equations and inequalities in one variable and solve such problems. 8.AF.1
2. Generate linear equations in one variable with one solution, infinitely many solutions, or no solutions. Justify the classification given. 8.AF.2
3. Understand that a function assigns to each x-value (independent variable) exactly one y-value (dependent variable), and that the graph of a function is the set of ordered pairs (x,y). 8.AF.3
4. Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear, has a maximum or minimum value). Sketch a graph that exhibits the qualitative features of a function that has been verbally described. 8.AF.4
5. Interpret the equation y = mx + b as defining a linear function whose graph is a straight line; give examples of functions that are not linear. Describe similarities and differences between linear and nonlinear functions from tables, graphs, verbal descriptions, and equations. 8.AF.5
6. Construct a function to model a linear relationship between two quantities given a verbal description, table of values, or graph. Within the context of a problem, describe the meaning of m (rate of change) and b (y-intercept) in y = mx + b. 8.AF.6
7. Compare properties of two linear functions given in different forms, such as a table of values, equation, verbal description, and graph (e.g., compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed). 8.AF.7
8. Approximate the solution of a system of equations by graphing and interpreting the reasonableness of the approximation. 8.AF.8

Geometry and Measurement

GM. Students explore transformations in the coordinate plane and are also expected to understand and explain the Pythagorean Theorem, its converse, and to use this relationship to solve problems and find distance on the coordinate plane. 8.GM

1. Explore dilations, translations, rotations, and reflections on two-dimensional figures in the coordinate plane. 8.GM.1
2. Solve real-world and other mathematical problems involving volume of cones, spheres, and pyramids and surface area of spheres. 8.GM.2
3. Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and other mathematical problems in two dimensions. 8.GM.3

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. Students begin to investigate and represent bivariate data using scatter plots.They build on their experience with univariate data. Students also build

on the probability work in grade seven to examine and represent the probability and compound events. 8.DSP

1. Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantitative variables. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association. 8.DSP.1
2. Write and use equations that model linear relationships to make predictions, including interpolation and extrapolation, in real-world situations involving bivariate measurement data. Interpret the slope and y-intercept in context. 8.DSP.2
3. Represent sample spaces and find probabilities of compound events (independent and dependent) using organized lists, tables, and tree diagrams. 8.DSP.3
4. Define the probability of a compound event, just as with simple events, as the fraction of outcomes in the sample space for which the compound event occurs. Use appropriate terminology to describe independent, dependent, complementary, and mutually exclusive events. 8.DSP.4
5. For events with a large number of outcomes, understand the use of the multiplication counting principle. Develop the multiplication counting principle, and apply it to situations with a large number of outcomes. 8.DSP.5