Indiana Mathematics

Grade 7

Adopted 2023

Mathematics Process Standards

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

Number Sense

NS. Students connect earlier learning to express the prime factorization of whole numbers using exponents, understand the inverse relationship between perfect squares and square roots, and use number lines to compare and order rational and irrational numbers. 7.NS

1. Show on a number line that a number and its opposite have a sum of 0 (are additive inverses). Find and interpret sums of rational numbers in real-world contexts. 7.NS.1
2. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts. 7.NS.2
3. Use the properties of operations, particularly the distributive property, leading to products such as (–1)(–1) = 1 and the rules for multiplying signed numbers. (E) 7.NS.3
4. Explain that if p and q are integers, then –(p/q) = (–p)/q = p/(–q) for all nonzero integers. (E) 7.NS.4
5. Find the prime factorization of whole numbers and write the results using exponents. 7.NS.5
6. Apply the inverse relationship between squaring and finding the square root of a perfect square whole number. Find square roots of perfect square whole numbers. 7.NS.6

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7. Compute fluently with rational numbers using an algorithmic approach. (E) 7.NS.7

Ratios and Proportional Reasoning

RP. Students continue to use ratio and rate language, compute using unit rates, and use proportional relationships to solve real-world problems involving ratios and percents. 7.RP

1. Identify the unit rate or constant of proportionality in tables, graphs, equations, and verbal descriptions of proportional relationships. 7.RP.1
2. Use proportional relationships to solve ratio and percent problems with multiple operations (e.g., simple interest, tax, markups, markdowns, gratuities, conversions within and across measurement systems, and percent increase and decrease). (E) 7.RP.2
3. Represent real-world and other mathematical situations that involve proportional relationships. Write equations and draw graphs to represent these proportional relationships. Apply the definition of unit rate to y = mx. (E) 7.RP.3

Algebra and Functions

AF. Students use two variable equations, as well as graphs and tables, to model real-world proportional relationships and connect the constant of proportionality to the idea of slope. 7.AF

1. Apply the properties of operations (e.g., identity, inverse, commutative, associative, distributive properties) to create equivalent linear expressions, including situations that involve factoring out a common number (e.g., given 2x - 10, create an equivalent expression 2(x - 5)). Justify each step in the process. (E) 7.AF.1
2. Solve real-world problems with rational numbers by using one or two operations. (E) 7.AF.2
3. Solve equations of the form px + q = r and p(x + q) = r fluently, where p, q , and r are specific rational numbers. Represent real-world problems using equations of these forms and solve such problems.(E) 7.AF.3
4. Solve inequalities of the form px + q (> or ≥) r or px + q (< or ≤) r, where p, q, and r are specific rational numbers. Represent real-world problems using inequalities of these forms and solve such problems. Graph the solution set of the inequality and interpret it in the context of the problem. 7.AF.4
5. Define slope as vertical change for each unit of horizontal change, and apply that a constant rate of change or constant slope describes a linear function. Identify and describe situations with constant or varying rates of change. 7.AF.5
6. Graph a line given its slope and a point on the line. Find the slope of a line given its graph.(E) 7.AF.6

Geometry and Me

GM. Students use scale drawings, the area and circumference of circles, and the volume of cylinders and other three-dimensional solids to solve real-world problems. 7.GM

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1. Solve real-world and other mathematical problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing. Create a scale drawing by using proportional reasoning. 7.GM.1
2. Understand the formulas for area and circumference of a circle and use them to solve real-world and other mathematical problems; give an informal derivation of the relationship between circumference and area of a circle. 7.GM.2
3. Solve real-world and other mathematical problems involving volume of cylinders and three-dimensional objects composed of right rectangular prisms.(E) 7.GM.3

Data Analysis, Statistics, and Probability

DSP. Students make inferences about populations through sampling and learn about the importance of representative samples. 7.DSP

1. Understand that statistics can be used to gain information about a population by examining a sample of the population. Understand that conclusions and generalizations about a population from a sample are valid only if the sample is representative of that population and that random sampling tends to produce representative samples and support valid inferences. (E) 7.DSP.1
2. Find, use, and interpret measures of central tendency (mean and median) and measures of spread (range, interquartile range, and mean absolute deviation) for numerical data from random samples to draw comparative inferences about two populations.(E) 7.DSP.2
3. Make observations about the degree of visual overlap of two numerical data distributions represented in line plots or box plots. Describe how data, particularly outliers, added to a data set may affect the mean and/or median. 7.DSP.3
4. Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Understand that a probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event. Understand that a probability of 1 indicates an event certain to occur and a probability of 0 indicates an event impossible to occur. Identify probabilities of events as impossible, unlikely, equally likely, likely, or certain. (E) 7.DSP.4
5. Develop probability models that include the sample space and probabilities of outcomes to represent simple events with equally likely outcomes. Predict the approximate relative frequency of the event based on the model. Compare probabilities from the model to observed frequencies, evaluate the level of agreement, and explain possible sources of discrepancy. (E) 7.DSP.5