

Idaho Extended Standards Draft
Extended Content Indicators
Grade 9
Mathematics

Standard 1: Number and Operation - Students in Grade 9 deepen their understanding of real numbers by applying properties of rational numbers and exponents and by identifying exact and approximate roots without simplification. Students use positive and negative numbers, absolute value, fractions, decimals, percentages, and scientific notation. Students use the proper order of operations and perform operations with rational numbers. Students apply number sense to everyday situations and judge reasonableness of answers.

Extended Standard 1: Students in Grade 9 identify properties of real numbers and exponents. Students use simple positive and negative numbers, absolute value, fractions, decimals, percentages, with or without manipulatives. With or without calculators or manipulatives, students use the proper order of operations and perform operations with rational numbers. Students use number sense in everyday situations and judge reasonableness.

Topic	GR	Goals	Objectives	Essence	Extended Content Indicators
	9.M.1.1	Understand and use numbers.	9.M.1.1.1 Apply properties of rational numbers. (347.01.b)		9.M.1.1.1A Recognize the magnitude of difference between small and large percents.
			9.M.1.1.2 Use positive and negative numbers, absolute value, fractions, decimals, percentages, and scientific notation, including application in real world situations. (347.01.a)		9.M.1.1.2 A Use positive and negative numbers, fractions, decimals, percentages, and ratios in real world situations.
			9.M.1.1.3 Apply properties of exponents. (347.01.c)		9.M.1.1.3 A Recognize exponents as a representation of a very large number.
			9.M.1.1.4 Identify exact and approximate roots without simplification.		9.M.1.1.4 A
			9.M.1.1.5 Solve problems using number theory concepts (factors, multiples, primes). (347.01.d)		9.M.1.1.5 A Solve problems using repeated addition in multiplication with prime numbers, factors and multiples.
			9.M.1.1.6 Use appropriate vocabulary.		9.M.1.1.6 A Use appropriate vocabulary.

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Extended Standard 1: Students in Grade 9 identify properties of real numbers and exponents. Students use simple positive and negative numbers, absolute value, fractions, decimals, percentages, with or without manipulatives. With or without calculators or manipulatives, students use the proper order of operations and perform operations with rational numbers. Students use number sense in everyday situations and judge reasonableness.

Topic	Gr	Goal	Objectives	Essence	Extended Content Indicators
	9M.1.2	Perform computations accurately.	9.M.1.2.1 Use the order of operations and perform operations with rational numbers. (347.02.a)		9.M.1.2.1 <u>A</u> Solve single digit addition, subtraction and multiplication problems with rational numbers, using an order of operations, with or without calculator or manipulatives.

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Extended Standard 1: Students in Grade 9 identify properties of real numbers and exponents. Students use simple positive and negative numbers, absolute value, fractions, decimals, percentages, with or without manipulatives. With or without calculators or manipulatives, students use the proper order of operations and perform operations with rational numbers. Students use number sense in everyday situations and judge reasonableness.

Topic	Gr	Goal	Objectives	Essence	Alternate Content Indicators
	9.M.1.3	Estimate and judge reasonableness of results.	9.M.1.3.1 Apply number sense to everyday situations and judge reasonableness of results. (347.03.a)		9.M.1.3.1 A Identify daily activities where estimation is appropriate.
			9.M.1.3.2 Identify that error accumulates in a computation when there is rounding. (349.05.b)		9.M.1.3.2 A Explore over and under estimation through daily living activities.

Standard 2: Concepts and Principles of Measurement - Students in Grade 9 formulate and use proportions, ratios, and scaling. Students apply concepts of rates and direct and indirect measurements. Students evaluate given measurement formulas for two- and three- dimensional objects.

Extended Standard 2: Students in Grade 9 use proportions and ratios. Students apply concepts of rates. Students evaluate given measurement formulas for two- and three- dimensional objects.

Topic	Gr	Goal	Objectives	Essence	Extended Content Indicators
	9.M.2.1	Understand and use U.S. customary and metric measurements.	9.M.2.1.1 Given the formulas, find the circumference, perimeter, or area of triangles, circles, and quadrilaterals, and the volume and surface area of rectangular prisms and cylinders. (349.01.a)		9.M.2.1.1 A Compare area and perimeter of real world surfaces, e.g around the room, around the city, around a box or ball
			9.M.2.1.2 Solve problems involving circumference, perimeter, or area of triangles, circles, and rectangles.		9.M.2.1.2 A Given a formula, students solve simple problems involving perimeter or area with or without a calculator or manipulatives.

Standard 2: Concepts and Principles of Measurement - Students in Grade 9 formulate and use proportions, ratios, and scaling. Students apply concepts of rates and direct and indirect measurements. Students evaluate given measurement formulas for two- and three- dimensional objects.

Extended Standard 2: Students in Grade 9 use proportions and ratios. Students apply concepts of rates. Students evaluate given measurement formulas for two- and three- dimensional objects.

Topic	Gr	Goal	Objectives	Essence	Extended Content Indicators
	9.M.2.2	Apply the concepts of rates, ratios, and proportions.	9.M.2.2.1 Use rates, ratios, proportions, and map scales in problem-solving situations. (349.03.a)		9.M.2.2.1 A Identify proportions in real world situations, ie. size, number or amount of an object or group compared to another
			9.M.2.2.2 Apply concepts of rates and direct and indirect measurements.		9.M.2.2.2 A Apply the concept of a rate to a real world situation.
			9.M.2.2.3 Construct equivalent units, comparable units, and conversions. (349.02.a)		9.M.2.2.3 A_ Identify simple equivalent units of measurements.

Standard 2: Concepts and Principles of Measurement - Students in Grade 9 formulate and use proportions, ratios, and scaling. Students apply concepts of rates and direct and indirect measurements. Students evaluate given measurement formulas for two- and three- dimensional objects.

Extended Standard 2: Students in Grade 9 use proportions and ratios. Students apply concepts of rates. Students evaluate given measurement formulas for two- and three- dimensional objects.

Topic	Gr	Goal	Objective	Essence	Extended Content Indicators
	9.M.2.3	Apply dimensional analysis.	9.M.2.3.1 Use customary and metric units and their relationship to one another and to real world applications involving length, area, capacity, weight, time, and temperature. (349.04.a)		9.M.2.3.1 A Apply simple measurement units to dimensions in real world applications involving length, area, capacity, weight, time, or temperature.

Standard 2: Concepts and Principles of Measurement - Students in Grade 9 formulate and use proportions, ratios, and scaling. Students apply concepts of rates and direct and indirect measurements. Students evaluate given measurement formulas for two- and three- dimensional objects.

Extended Standard 2: Students in Grade 9 use proportions and ratios. Students apply concepts of rates. Students evaluate given measurement formulas for two- and three- dimensional objects.

Topic	Gr	Goal	Objective	Essence	Extended Content Indicators
	9.M.2.4	Apply appropriate techniques and tools to determine measurements.	9.M.2.4.1 Determine and use appropriate units. (349.01.a)		9.M.2.4.1 A Select and use an appropriate measurement tool correctly.
			9.M.2.4.2 Approximate error in measurement situations.		9.M.2.4.2 A Identify errors in measurement situations, i.e. gallons are measured instead of cups, feet instead of inches.

Standard 3: Concepts and Language of Algebra and Functions - Students in Grade 9 use appropriate procedures for manipulating and simplifying algebraic expressions involving variables, integers, rational numbers, and for solving multi-step, first-degree equations and inequalities. Students understand the concept and applications of functions and mathematical models. Given graphs, charts, ordered pairs, mappings, or equations, students determine whether a relation is a function. Students evaluate functions written in functional notation and, given a function, students identify domain and range.

Extended Standard 3: Students in Grade 9 use procedures to solve simple algebraic expressions, involving multi-steps. Students understand the concept of a variable in equations and inequalities.

Topic	Gr	Goal	Objectives	Essence	Extended Content Indicators
	9.M.3.1	Use algebraic symbolism as a tool to represent mathematical relationships.	9.M.3.1.1 Represent mathematical relationships using variables, expressions, linear equations and inequalities. (350.01.a)		9.M.3.1.1 A Use the idea of an unknown quantity as a variable in linear equations and inequalities.

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Topic	Gr	Goal	Objective	Essence	Extended Content Indicators
	9.M.3.2	Evaluate algebraic expressions.	9.M.3.2.1 Use appropriate procedures for manipulating and simplifying algebraic expressions involving variables, integers, and rational numbers. (350.02.a)		9.M.3.2.1A Use appropriate procedures for solving simple algebraic expressions involving variables and rational numbers.

Standard 3: Concepts and Language of Algebra and Functions - Students in Grade 9 use appropriate procedures for manipulating and simplifying algebraic expressions involving variables, integers, rational numbers, and for solving multi-step, first-degree equations and inequalities. Students understand the concept and applications of functions and mathematical models. Given graphs, charts, ordered pairs, mappings, or equations, students determine whether a relation is a function. Students evaluate functions written in functional notation and, given a function, students identify domain and range.

Extended Standard 3: Students in Grade 9 use procedures to solve simple algebraic expressions, involving multi-steps. Students understand the concept of a variable in equations and inequalities.

Topic	Gr	Goal	Objective	Essence	Extended Content Indicators
	9.M.3.3	Solve algebraic equations and inequalities.	9.M.3.3.1 Use appropriate procedures to solve multi-step, first-degree equations and inequalities; such as $3(2x - 5) = 5x + 7$ or $3(2x - 5) > 5x + 7$. (350.03.a)		9.M.3.3.1A Use appropriate procedures to solve multi-step equations and inequalities; such as $(1+2) = (5-3)$ or $(2+2)$ does not equal $(2+3)$
			9.M.3.3.2 Differentiate between linear and non-linear equations and graphs.		9.M.3.3.2A Match a math problem with a pictorial representation.

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Topic	Gr	Goal	Objective	Essence	Extended Content Indicators
	9.M.3.4	Understand the concept of functions.	9.M.3.4.1 Use appropriate procedures to solve linear systems of equations involving two variables; such as $x + y = 7$ and $2x + 3y = 21$. (350.04.a)		9.M.3.4.1.A Use appropriate procedures to solve a simple linear equation involving two variables; such as $x + y = 7$

Standard 3: Concepts and Language of Algebra and Functions - Students in Grade 9 use appropriate procedures for manipulating and simplifying algebraic expressions involving variables, integers, rational numbers, and for solving multi-step, first-degree equations and inequalities. Students understand the concept and applications of functions and mathematical models. Given graphs, charts, ordered pairs, mappings, or equations, students determine whether a relation is a function. Students evaluate functions written in functional notation and, given a function, students identify domain and range.

Extended Standard 3: Students in Grade 9 use procedures to solve simple algebraic expressions, involving multi-steps. Students understand the concept of a variable in equations and inequalities.

Topic	Gr	Goal	Objective	Essence	Extended Content Indicators
	9.M.3.5	Understand the concept of functions.	9.M.3.5.1 Given graphs, charts, ordered pairs, mappings, or equations, determine whether a relation is a function.		9.M.3.5.1.A
			9.M.3.5.2 Evaluate functions written in functional notation.		9.M.3.5.2 A
			9.M.3.5.3 Given a function, identify domain and range.		9.M.3.5.3 A

Standard 3: Concepts and Language of Algebra and Functions - Students in Grade 9 use appropriate procedures for manipulating and simplifying algebraic expressions involving variables, integers, rational numbers, and for solving multi-step, first-degree equations and inequalities. Students understand the concept and applications of functions and mathematical models. Given graphs, charts, ordered pairs, mappings, or equations, students determine whether a relation is a function. Students evaluate functions written in functional notation and, given a function, students identify domain and range.

Extended Standard 3: Students in Grade 9 use procedures to solve simple algebraic expressions, involving multi-steps. Students understand the concept of a variable in equations and inequalities.

Topic	Gr	Goal	Objective	Essence	Extended Content Indicators
	9.M.3.6	Apply functions to a variety of problems.	9.M.3.6.1 Model and solve real-world phenomena using multi-step, first degree, single variable equations and inequalities, linear equations, and two-variable linear systems of equations. (353.01.a)		9.M.3.6.1A
			9.M.3.6.2 Use graphs and sequences to represent and solve problems. (347.02.b)		9.M.3.6.2 A

Standard 4: Concepts and Principles of Geometry - Students in Grade 9 represent linear relationships using tables, graphs, and mathematical symbols. Students interpret attributes of linear relationships such as slope, rate of change, and intercepts.

Extended Standard 4: Students in Grade 9 represent and interpret simple tables and graphs. Students identify attributes of linear relationships such as slope, rate of change, or intercepts.

Topic	Gr	Goal	Objective	Essence	Extended Content Indicators
	9.M.4.1	Apply concepts of size, shape, and spatial relationships.	9.M.4.1.1 Recognize congruency and similarity of two-dimensional figures. (351.01.a)		9.M.4.1.1.A Arrange shapes to show congruence, similarities, and line symmetry of shapes.
			9.M.4.1.2 Recognize similarity as it relates to size variations in two- dimensional objects. (351.01.b)		9.M.4.1.2.A Compare similarities as it relates to size variations in two- dimensional objects.

Standard 4: concepts and Principles of Geometry - Students in Grade 9 represent linear relationships using tables, graphs, and mathematical symbols. Students interpret attributes of linear relationships such as slope, rate of change, and intercepts.

Extended Standard 4: Students in Grade 9 represent and interpret simple tables and graphs. Students identify attributes of linear relationships such as slope, rate of change, or intercepts.

Topic	Gr	Goal	Objective	Essence	Extended Content Indicators
	9.M.4.2	Apply the geometry of right triangles.	9.M.4.2.1 Given the Pythagorean Theorem, calculate a missing side length of a right triangle where the legs and hypotenuse are natural numbers. (351.02.c)		9. M.4.2.1.A Given the Pythagorean Theorem, identify the hypotenuse.

Standard 4: Concepts and Principles of Geometry - Students in Grade 9 represent linear relationships using tables, graphs, and mathematical symbols. Students interpret attributes of linear relationships such as slope, rate of change, and intercepts.

Extended Standard 4: Students in Grade 9 represent and interpret simple tables and graphs. Students identify attributes of linear relationships such as slope, rate of change, or intercepts.

Topic	Gr	Goal	Objective	Essence	Extended Content Indicators
	9.M.4.3	Apply graphing in two dimensions.	9.M.4.3.1 Identify attributes of the Cartesian Coordinate System, such as quadrants, origin, and axes. (351.03.a)		9.M.4.3.1.A Locate quadrants, origin or axes on the Cartesian Coordinate System.
			9.M.4.3.2 Graph scatter plots and identify informal trend lines (e.g. eyeball fit lines).		9.M.4.3.2.A Identify the trend with a given scatter plot.
			9.M.4.3.2 Identify positive and negative correlations.		9.M.4.3.3.A Identify positive or negative slope lines in the first quadrant of a grid.

Standard 4: Concepts and Principles of Geometry - Students in Grade 9 represent linear relationships using tables, graphs, and mathematical symbols. Students interpret attributes of linear relationships such as slope, rate of change, and intercepts.

Extended Standard 4: Students in Grade 9 represent and interpret simple tables and graphs. Students identify attributes of linear relationships such as slope, rate of change, or intercepts.

Topic	Gr	Goal	Objective	Essence	Extended Content Indicators
	9.M.4.4	Represent and graph linear relationships.	9.M.4.4.1 Create graphs and equations for linear relationships.		9.M.4.4.1.A Create a graph and plot 2 ordered pairs.
			9.M.4.4.2 Represent linear relationships using tables, graphs, and mathematical symbols.		9.M.4.4.2.A Interpret a simple table or graph.
			9.M.4.4.3 Interpret attributes of linear relationships such as slope, rate of change, and intercepts.		9.M.4.4.3.A Identify an attribute of a slope or rate of change.

Standard 5: Data Analysis, Probability, and Statistics - Students in Grade 9 interpret and use basic statistical concepts including mean, median, mode, range, and distribution of data, including outliers. Students make predictions and draw conclusions based on statistical measures and students make predictions based on randomness, chance, equally likely events, and probability. Students find probabilities based on dependent, independent, and compound events and students make predictions based on randomness, chance, equally likely events, and probability.

Extended Standard 5: Students in Grade 9 identify basic statistical concepts including mean, median, mode, range or distribution of data. Students make predications and draw conclusions based on chance, equally likely events, and simple probability.

Topic	Gr	Goal	Objective	Essence	Extended Content Indicators
	9.M.5.1	Represent data with a variety of formats.	9.M.5.1.1 Analyze and interpret tables, charts, and graphs, including scatter plots, broken line graphs, and box-and-whisker plots. (352.01.a)		9.M.5.1.1.A Read and interpret tables, charts, and graphs, including line graphs, bar graphs, frequency tables, or circle graphs.

Standard 5: Data Analysis, Probability, and Statistics - Students in Grade 9 interpret and use basic statistical concepts including mean, median, mode, range, and distribution of data, including outliers. Students make predictions and draw conclusions based on statistical measures and students make predictions based on randomness, chance, equally likely events, and probability. Students find probabilities based on dependent, independent, and compound events and students make predictions based on randomness, chance, equally likely events, and probability.

Extended Standard 5: Students in Grade 9 identify basic statistical concepts including mean, median, mode, range or distribution of data. Students make predications and draw conclusions based on chance, equally likely events, and simple probability.

Topic	Gr	Goal	Objective	Essence	Extended Content Indicators
	9.M.5.2	Collect, organize, and display data.	9.M.5.2.1 Collect, organize, and display data in tables, charts, and graphs. (352.02.a)		9.M.5.2.1A Collect, organize, and display data in tables, charts, or graphs.

Standard 5: Data Analysis, Probability, and Statistics - Students in Grade 9 interpret and use basic statistical concepts including mean, median, mode, range, and distribution of data, including outliers. Students make predictions and draw conclusions based on statistical measures and students make predictions based on randomness, chance, equally likely events, and probability. Students find probabilities based on dependent, independent, and compound events and students make predictions based on randomness, chance, equally likely events, and probability.

Extended Standard 5: Students in Grade 9 identify basic statistical concepts including mean, median, mode, range or distribution of data. Students make predications and draw conclusions based on chance, equally likely events, and simple probability.

Topic	Gr	Goal	Objective	Essence	Extended Content Indicators
	9.M.5.3	Apply simple statistical measurements.	9.M.5.3.1 Interpret and use basic statistical concepts, including mean, median, mode, range, and distribution of data, including outliers. (352.03.a)		9.M.5.3.1.A Find the mean, median, mode or range of a simple set of data.
			9.M.5.3.2 Make predictions and draw conclusions based on statistical measures. (352.05.a)		9.M.5.3.2.A Make predictions and draw conclusions based on a simple set of data and its statistical measures.

Standard 5: Data Analysis, Probability, and Statistics - Students in Grade 9 interpret and use basic statistical concepts including mean, median, mode, range, and distribution of data, including outliers. Students make predictions and draw conclusions based on statistical measures and students make predictions based on randomness, chance, equally likely events, and probability. Students find probabilities based on dependent, independent, and compound events and students make predictions based on randomness, chance, equally likely events, and probability.

Extended Standard 5: Students in Grade 9 identify basic statistical concepts including mean, median, mode, range or distribution of data. Students make predications and draw conclusions based on chance, equally likely events, and simple probability.

Topic	Gr	Goal	Objective	Essence	Extended Content Indicators
	9.M.5.4	Understand basic concepts of probability.	9.M.5.4.1 Find probabilities based on dependent, independent, and compound events.		9.M.5.4.1.A Find probability based on an independent event (Lottery).
			9.M.5.4.2 Contrast experimental and theoretical probability. (352.04.a)		9.M.5.4.2.A Recognize the difference between experimental (large number of trials) and theoretical (mathematical formula) probability.

Standard 5: Data Analysis, Probability, and Statistics - Students in Grade 9 interpret and use basic statistical concepts including mean, median, mode, range, and distribution of data, including outliers. Students make predictions and draw conclusions based on statistical measures and students make predictions based on randomness, chance, equally likely events, and probability. Students find probabilities based on dependent, independent, and compound events and students make predictions based on randomness, chance, equally likely events, and probability.

Extended Standard 5: Students in Grade 9 identify basic statistical concepts including mean, median, mode, range or distribution of data. Students make predications and draw conclusions based on chance, equally likely events, and simple probability.

Topic	Gr	Goal	Objective	Essence	Extended Content Indicators
	9.M.5.5	Make predictions or decisions based on data.	9.M.5.5.1 Make predictions based on randomness, chance, equally likely events, and probability. (352.04.c)		9.M.5.5.1.A Make predictions based on randomness, chance, equally likely events, or probability.
			9.M.5.5.2 Use appropriate tools/technology to conduct simulations and employ graphical models to make predictions or decisions based on data. (352.05.a)		9.M.5.5.2.A Conduct statistical experiments and use tables, charts, or graphs to make predictions or decisions based on data.
			9.M.5.5.3 Design, conduct, and interpret results of statistical experiments. (352.05.b)		9.M.5.5.3.A Conduct and interpret results of statistical experiments.