

# IDAHO MATHEMATICS PERFORMANCE STANDARDS

## I. BASIC ARITHMETIC, ESTIMATION, AND ACCURATE COMPUTATIONS.

Rationale: An understanding of numbers and how they are used is necessary in the everyday world. computational skills and procedures should be developed in context so the learner perceives them as tools for solving problems.

Standard	K	1	2	3	4	5	6	7	8	9-12
<b>01. Understand and use numbers.</b>	Demonstrate knowledge of our numeration system by counting in a variety of ways.									
	Demonstrate an understanding of the verbal, symbolic, and physical representations of a number.	Read, write, order, and compare whole numbers to 100.	Read, write, order, and compare whole numbers to 1,000.	Read, write, order, and compare whole numbers to 10,000	Read, write, order, and compare whole numbers to 1,000,000, commonly used fractions and decimals through hundredths.	Read, write, order and compare whole numbers through billions, commonly used fractions, and decimals through thousandths.	Read, write, order, and compare whole numbers, fractions, and decimals.	Read, write, order, and compare real numbers (integers, fractions, decimals) and absolute values.	Read, write, order, and compare real numbers (integers, fractions, decimals, percents, and ratios) and absolute values.	Understand and use positive and negative, fractions, decimals, percentages, and scientific notation.
		Demonstrate the knowledge of place value through 99.	Demonstrate the knowledge of place value through 999.	Demonstrate the knowledge of place value through 9,999.	Demonstrate and apply the knowledge of whole numbers and decimal place value and patterns of periods (hundredths to millions).	Demonstrate and apply the knowledge of whole numbers and decimal place value and patterns of periods (thousandths to billions).				
	Identify a penny as a value of money.	Identify and state the value of pennies, nickels, and dimes.	Determine, by counting, the value of a collection of pennies, nickels, dimes, and quarters up to \$1.00.	Determine, by counting, the value of a collection of bills and coins up to \$10.00.	Determine by counting the value of a collection of bills and coins up to \$100.00.					
				Use concrete materials to recognize and represent commonly used fractions.	Use concrete materials to recognize, represent, and compare commonly used fractions.	Explore the relationship between equivalent fractions.	Understand the use of fractions and decimals and their interrelationship.			



Standard	K	1	2	3	4	5	6	7	8	9-12
			Explore decimals using money through hundredths.		Understand decimals with money through hundredths.	Explore the relationship between decimals and simple fractions through thousandths.	Expand the use of decimals and fractions to explore the use of percents and ratios.	Expand the use of percents and ratios to solve problems.	Understand and use real numbers, both rational and irrational.	
						Show a sense of magnitudes and relative magnitudes of whole numbers, decimals, and simple fractions.	Show a sense of magnitudes and relative magnitudes of real numbers (whole numbers, fractions, and decimals).	Show a sense of magnitudes and relative magnitudes of real numbers (integers, fractions, decimals).	Show a sense of magnitudes and relative magnitudes of real numbers (integers, fractions, and decimals) using scientific notation and exponential numbers.	
			Understand and apply appropriate vocabulary.			Explore and apply number theory concept (prime, composite, multiples, and factors).	Develop and apply number theory concepts; prime, composite, GCF, LCM, and prime factorizations.	Develop and apply number theory concepts.	Develop and apply number theory concepts.	Use number theory concepts (e.g., divisibility rules, factors, multiples, primes) to solve problems.
										Use graphs, matrices and sequences to represent and solve problems.
							Explore the use of integers in real life situations.	Understand the position of rational numbers on a number line.	Understand the position of real numbers on a number line.	Understand properties of the real number system.
<b>02. Perform computations accurately.</b>	Explore the concepts of addition and subtraction using concrete objects.	Demonstrate proficiency of addition up to 10 and an understanding of subtraction from 9.	Demonstrate proficiency with addition and subtraction facts through 18.	Add and subtract whole numbers with and without regrouping through 999.	Consistently and accurately add and subtract whole numbers.	Multiply and divide whole numbers.	Consistently and accurately multiple and divide whole numbers.	Add, subtract, multiple, and divide fractions and decimals.	Consistently and accurately add, subtract, multiple, and divide rational numbers.	
					Multiply and divide whole numbers.		Add, subtract, multiply, and divide decimals.			



Standard	K	1	2	3	4	5	6	7	8	9-12	
			Add whole numbers with and without regrouping through 99.	Instantly recall basic addition and subtraction acts through 18.	Add subtract fractions with like denominators (do not require simplification).	Add and subtract fractions with like denominators and simplify as necessary.	Add and subtract fractions with unlike denominators and simplify as necessary.		Instantly recall common, equivalent fractions, decimals, and percents.		
			Add a series of one-digit addends.	Add three addends with, 1 and 2 digits.	Add and subtract decimals using money.	Add and subtract decimals through thousandths.					
				Multiply whole numbers through 10 x 10.	Instantly recall multiplication facts through 10's.	Instantly recall basic multiplication and division facts up to 10's.	Instantly recall basic multiplication and division facts from 12 x 12 Times Table.				
						Evaluate numerical expressions that include parenthesis.	Evaluate numerical expressions using the order of operations.			Use the proper order of operations. Perform operations with real numbers.	
			Explore double digit subtraction of whole numbers with regrouping through 99.				Explore the use of exponents.		Understand and use exponents.	Understand, properties of roots, exponents, and logarithms.	
				Explore the relationship between multiplication and division.			Explore multiplication and division of fractions.	Explore basic operations with integers.			
				Select and use an appropriate method of computation from mental math, paper and pencil, calculator or a combination of the 3.							
				Use appropriate vocabulary.							
<b>03. Estimate and judge reasonableness of results.</b>	Use estimation to identify a number of objects										
				Use estimation to predict computation results.							



Standard	K	1	2	3	4	5	6	7	8	9-12
	Evaluate the reasonableness of an answer.					Recognize when estimation is appropriate and understand the usefulness of an estimate as distinct from an exact answer.				
						Determine whether a given estimate is an overestimate or underestimate.				Apply number sense to every day situations.
	Use appropriate vocabulary.									



Mathematics  
Performance Matrix

Grade/Course: \_\_\_\_\_

## II. MATHEMATICAL REASONING AND PROBLEM SOLVING.

Rationale: These processes are essential to all mathematics and must be incorporated in all other mathematics standards.

Standard	K	1	2	3	4	5	6	7	8	9-12	
<b>01. Understand and use a variety of problem-solving skills.</b>	Select strategies appropriate for solving a problem.					Use a variety of strategies to compute problems drawn from real life situations.		Use a variety of strategies including common mathematical formulas to compute problems drawn from real life situations.		Use a variety of methods, including common mathematical formulas, to solve problems, drawn from daily life.	
		Select and use appropriate operations.				Solve problems using the 4 step process of problem solving (explore, plan, solve, and examine).		Recognize pertinent information for problem solving.			
				Make predictions and decisions based on information							
<b>02. Use reasoning skills to recognize problems and express them mathematically.</b>	Use concrete objects to identify and show a solution to problems.	Draw a picture and generate a number sentence from a problem-solving situation.	Generate a number sentence from a problem-solving situation.	Use a variety of methods, such as words, numbers, symbols, charts, graphs, tables, diagrams, and models, to explain mathematical reasoning and concepts.							Use logic to make mathematical proofs.
						Apply solutions and strategies to new problem situations.				Use inductive and deductive reasoning to set up a problem.	
						Formulate conjectures and discuss why they must be or seem to be true.		Formulate conjectures and justify (short of formal proof) why they must be or seem to be true.		Make and evaluate logical arguments.	
<b>03. Apply appropriate technology and models to find solutions to problems.</b>				Appropriately use a 4-function calculator to solve complex grade-level problems.		Understand the purpose and capabilities of appropriate technology use as a tool to solve problems.			Understand the purpose and capabilities of appropriate technology.		



Standard	K	1	2	3	4	5	6	7	8	9-12
										Use computer applications to display and manipulate data.
										Select appropriate models to represent mathematical ideas.
<b>04. Communicate results using appropriate terminology and methods.</b>										Use a variety of methods, such as words, numbers, symbols, charts, graphs, tables, diagrams, and models, to communicate mathematical information.
										Understand the nature and use of mathematical models.
										Use appropriate vocabulary to communicate mathematical information.
										Select the appropriate means to communicate mathematical information.
										Use appropriate notation.



### III. CONCEPTS AND PRINCIPLES OF MEASUREMENT.

Rationale: The first step in scientific investigation is to understand the measurable attributes of objects.

Standard	K	1	2	3	4	5	6	7	8	9-12	
<b>01. Understand and use U.S. Customary and metric measurements.</b>	Explore the use of standard and non-standard tools for measuring time, length, volume, weight, and temperature.			Select and use appropriate units and tools to make formal measurements in both systems (time, length, temperature, and perimeter).	Select and use appropriate units and tools to make formal measurements in both systems (time, length, temperature, perimeter, and area).	Select and use appropriate units and tools to make formal measurements in both systems.					
	Apply estimation of measurement to real-world and content problems using actual measuring devices.										
				Explore relationships within the U.S. Customary system.	Apply understanding of relationships within the U.S. Customary system.	Explore the differences and relationships between perimeter and area in both systems.	Recognize the differences and relationships between perimeter and area in both systems.	Recognize the differences and relationships among measures of perimeter, area, and volume (capacity) in both systems.		Determine length, area, capacity, weight, time, and temperature, with appropriate units.	
				Explore relationships within the metric system.	Apply understanding of relationships within the metric system.	Solve problems involving length, perimeter, area, weight, mass, and temperature.		Solve problems involving length, perimeter, area, volume (capacity), weight, mass, and temperature.			
						Convert unit of measurement within each system.					
		Use a calendar to explore measurement of time.	Tell time using both digital and analog clocks to the quarter hour.	Tell time using both digital and analog clocks, using 5-minute intervals.	Tell time using both digital and analog clocks, to the nearest minute.						
			Explore the relationship among units of time.		Apply understanding of relationships to solve real-world problems related to time.						
	Use appropriate vocabulary.										
<b>02. Apply concepts of rates and other derived or indirect measurements.</b>							Explore the use of rates to make indirect measurements.	Develop the use of rates to make indirect measurements.	Use rates to make indirect measurements.	Understand equivalent units, comparable units, and conversions.	



Standard	K	1	2	3	4	5	6	7	8	9-12
<b>03. Apply the concepts of ratios and proportions.</b>							Explore the use of proportions, ratios, and scales.	Develop the use of proportions, ratios, and scales.	Understand and use proportions, ratios, and scales.	Understand and use proportions, ratios, and scaling.
<b>04. Apply dimensional analysis</b>						Understand units and their relationship to one another and to real world applications.				Understand units and their relationship to one another and to real world applications.
										Understand tolerance, precision, and their applications.
										Understand that error accumulates in a computation when there is rounding at intermediate steps.



#### IV. CONCEPTS AND LANGUAGE OF ALGEBRA.

Rationale: Algebra is the language of mathematics and science. Through the use of variables and operations, algebra allows students to form abstract models from contextual information.

Standard	K	1	2	3	4	5	6	7	8	9-12	
<b>01. Use algebraic symbolism as a tool to represent mathematical relationships.</b>	Compare sets of objects using vocabulary (less than, greater than, and same as).	Represent vertical notation in horizontal form.				Explore the meaning and use of variables in simple expressions and equations.	Develop the use of variables in simple expressions and equations.	Understand and use variables in expressions, equations, and inequalities.	Understand and use variables, expressions, equations and inequalities.		
		Write a number sentence given an addition or subtraction problem.	Write a number sentence using symbols (boxes or letters) to represent an unknown number.		Translate simple word statements and story problems into algebraic equations.					Translate simple word statements and story problems into algebraic expressions and equations.	
		Compare numbers using vocabulary (less than, greater than, and equal to, more, less, same, fewer, bigger, smaller).	Compare numbers using vocabulary (less than, greater than, and equal to) and symbols (<, >, =)	Use symbols (<, >, =) to express relationships.			Use symbols (<, >, =, ≤, ≥, not equal) to express relationships.				
	Explore the relationship between addition and subtraction.	Explore the relationship between addition and subtraction and demonstrate reversal of operations.	Understand relationship between addition and subtraction and demonstrate reversal of operations.	Explore inverse (reversal) of operations with multiplication and division.							
<b>02. Evaluate algebraic expressions.</b>		Explore and use the commutative property of addition.		Explore and use the commutative property of addition and multiplication.		Explore and use the following properties as they relate to addition and multiplication: commutative, associative, identity, zero, and inverse.	Explore and use the following properties in evaluating mathematical and algebraic expressions: commutative, associative, identity, zero, inverse, and distributive.	Develop an understanding of evaluating mathematical and algebraic expressions using commutative, associative, identity, zero, inverse, distributive, and substitution properties.	Understand and use the following properties in evaluating algebraic expressions: commutative, associative, identity, zero, inverse, distributive, and substitution.	Understand and use procedures for operating on algebraic expressions.	



Standard	K	1	2	3	4	5	6	7	8	9-12
						Investigate the order of operations (parentheses only).	Explore the order of operations.	Understand and use the order of operations in evaluating basic algebraic expressions.		
									Simplify algebraic expressions.	
<b>03. Solve algebraic equations and inequalities.</b>				Solve missing addends, and missing factor problems using inverse operations.			Solve one-step equations using inverse operations with whole numbers.	Solve one-step equations using inverse operations.	Solve 1- and 2-step equations and inequalities using inverse operations.	Understand and use appropriate procedures to solve simple linear systems of equations and inequalities such as $3x - 4 = 2$ or $3x - 4 > 2$
								Explore solutions of simple 1-step equations using negative numbers.		Use appropriate procedures to simplify and solve polynomial equations and inequalities such as $x^2 + 3x = 7$
								Explore graphical representation to show simple linear equations.		
<b>04. Solve simple linear systems of equations or inequalities.</b>										Understand and use appropriate procedures to solve simple linear systems of equations and inequalities such as $x + y = 7$ or $2x + 3y = 21$



**V. CONCEPTS AND PRINCIPLES OF GEOMETRY.**

Rationale: The study of geometry helps students represent and make sense of the world by discovering relationships and developing spatial sense.

Standard	K	1	2	3	4	5	6	7	8	9-12
<b>01. Apply concepts of size, shape, and spatial relationships.</b>	Recognize, name, build, draw, compare, and sort two- and three-dimensional shapes.			Identify, compare, and analyze attributes of two- and three-dimensional shapes and develop vocabulary to describe the attributes.			Precisely describe, classify, and understand relationships among types of one-, two, and three- dimensional objects using their defining properties.			Understand scaling as it relates to size variations in one, two, and three-dimensional objects, while shape is maintained.
										Understand congruence and similarity as they apply to reflections, rotation, and translation.
							Construct and measure various angles and shapes using appropriate tools.			
						Explore the fundamental concepts, properties and relationships among points, lines, rays, angles, and shapes.	Apply fundamental concepts, properties and relationships among points, lines, angles, and shapes.	Apply fundamental concepts, properties and relationships among points, lines, planes, angles, and shapes.	Understand and apply fundamental concepts, properties and relationships among points, lines, planes, angles, and shapes.	
	Recognize and create shapes that have symmetry.			Explore congruence, similarity, and symmetry.	Explore relationships among and properties of shapes such as congruence, similarity, and symmetry.	Explore congruence, similarities, and symmetry of shapes.	Recognize and apply congruence, similarities, and symmetry of shapes.			



Standard	K	1	2	3	4	5	6	7	8	9-12
				Investigate perimeters in real-world situations.	Use concrete objects to determine perimeters of triangles, and areas and perimeters of rectangles/squares.	Determine perimeters of polygons and area of rectangles/squares in real-world situations.	Develop and apply formulas for perimeter, circumference and area to triangles, quadrilaterals, and circles.	Apply formulas for perimeter, circumference and area to triangles, quadrilaterals, and circles.	Apply formulas for perimeter, circumference and area to polygons, and circles.	
							Explore the relationship between two and three-dimensional objects.	Explore the concept of surface area and volume (capacity).	Understand the concept of surface area and volume (capacity).	
	Explore slides, flips and turns.			Predict and describe the results of sliding, flipping, and turning two-dimensional shapes.			Explore reflections, translations, and rotations on various shapes.	Explore and model the effects of reflections, translations, and rotations on various shapes.		
	Understand and apply appropriate vocabulary for position and size.	Understand appropriate vocabulary.		Use appropriate vocabulary.						
<b>02. Apply the geometry of right triangles.</b>								Explore right triangle geometry.	Investigate right triangle geometry using the Pythagorean Theorem.	Know and apply the Pythagorean theorem to solve real world problems.
										Understand the basic concepts of right triangle trigonometry (e.g., basic trigonometry ratios such as sine, cosine, and tangent.)
										Use trigonometric ratio methods to solve problems.



Standard	K	1	2	3	4	5	6	7	8	9-12
03. Apply graphing in two dimensions.	Apply ideas about direction and distance.					Identify and plot points on a coordinate plane.			Use the coordinate plane as it relates to real-world applications.	Understand concepts of the Cartesian Coordinate System.
										Understand the characteristics and uses of vectors.



## VI. DATA ANALYSIS, PROBABILITY, AND STATISTICS.

Rationale: with society's expanding use of data for prediction and decision making, it is important that students develop an understanding of the concepts and processes used in analyzing data.

Standard	K	1	2	3	4	5	6	7	8	9-12
<b>01. Understand data analysis.</b>	Interpret information from real objects and simple pictographs.	Interpret information found in simple graphs to answer questions.	Interpret information found in simple tables, graphs, and charts.	Interpret information found in tables, graphs, and charts.	Read and interpret tables, charts, and graphs.		Read and interpret tables, charts, and graphs (Line graphs, bar graphs, frequency line or line plot, and circle graph).	Read and interpret tables, charts, and graphs (scatter plots, line graphs, bar graphs, and pie charts).	Analyze and interpret tables, charts, and graphs; for instance, scatter plots, line graphs, bar graphs, and pie charts.	Read and interpret tables, charts, and graphs (e.g., scatter plots, line graphs, 3-dimensional graphs, and pie charts).
				Explain and justify conclusions drawn from tables, charts, and graphs.						
	Understand and use appropriate vocabulary.									
<b>02. Collect, organize, and display data.</b>	Create a graph using real objects or pictorial representations.	Gather and display data in graphs in order to answer a question.	Gather and display data in tables, charts, and graphs in order to answer a question.	Collect, organize, and display data in tables, charts, or graphs in order to answer a question and/or test a hypothesis.	Collect, order, and display data in appropriate notation in tables, charts, and graphs; for example, bar graphs, tally charts and pictographs, in order to answer a question and/or test a hypothesis.	Collect and display the data with appropriate notation in tables, charts, and graphs.	Collect, organize, and display the data with appropriate notation in tables, charts, and graphs (line graphs, bar graphs, frequency line or line plot, and circle graph).	Collect and display the data with appropriate notation in tables, charts, and graphs (scatter plots, line graphs, bar graphs, and pie charts).	Collect and display the data with appropriate notation in tables, charts, and graphs (scatter plots, line graphs, bar graphs, and pie charts).	Collect and organize data, and display the data in tables, charts, and graphs (e.g., scatter diagrams, frequency tables, bar graphs, or pie charts).
<b>03. Apply simple statistical measurements.</b>					Determine an average (mean) of a set of whole numbers.	Find measures of central tendency – mean, median, and mode with simple sets of data.		Understand and use the measures of central tendency – mean, median, and mode with simple sets of data.	Choose and calculate the appropriate measure of central tendency – mean, median, and mode.	Understand basic statistical concepts including mean (average), median, mode, range, and standard deviation.
						Determine the range of a set of data.		Explore the significance of range, frequency, and informal distribution.		
<b>04. Understand basic concepts of probability.</b>	Predict and perform results of simple probability experiments.	Predict, perform, and record results of simple probability experiments.							Model situations of probability using simulations.	Understand experimental and theoretical probability.
							Understand and use the language of probability.			



Standard	K	1	2	3	4	5	6	7	8	9-12
										Know that probability ranges from 0% to 100%. Understand randomness and chance.
										Distinguish between independent and dependent events.
								Recognize equally likely outcomes.		
<b>05. Make predictions or decisions based on data.</b>	Make predictions or decisions based on probable results or past experiences.			Make predictions based on simple experimental probabilities.			Make predictions based on simple experimental and theoretical probabilities.	Make predictions based on experimental and theoretical probabilities.	Use appropriate technology to employ simulation techniques, curve fitting, correlation, and graphical models to make predictions or decisions based on data.	
				Understand and use appropriate vocabulary.						
										Analyze the effect of biased data on statistical predictions.
									Conduct statistical experiments and interpret results using tables, charts, or graphs.	Design, conduct, and interpret results of statistical experiments.



## VII. FUNCTIONS AND MATHEMATICAL MODELS.

Rationale: One of the central themes of mathematics is the study of patterns, relationships, and functions. Exploring patterns helps students develop mathematical power.

Standard	K	1	2	3	4	5	6	7	8	9-12
<b>01. Understand the concept of functions.</b>	Replicate and extend patterns and identify the rule (function) that creates the pattern.	Extend patterns and identify the rule (function) that creates the pattern.				Extend patterns and identify a rule (function) that generates the pattern using whole numbers and decimals.	Extend patterns and identify a rule (function) that generates the pattern using whole numbers, decimals, and fractions.	Extend patterns and identify a rule (function) that generates the pattern using real numbers.		
	Sort and classify objects by attributes.	Sort and classify objects by more than one attribute.		Discover, describe, and extend patterns by using manipulatives and pictorial representations.						
						Use mathematical models to show change in real context.	Use functional relationships to explain how a change in one quantity results in a change in another.		Solve problems that involve varying quantities with variables, expressions, equations, inequalities, and absolute values.	
	Understand and use appropriate vocabulary.									
<b>02. Represent equations, inequalities, and functions in a variety of formats.</b>								Represent a simple set of data in a table, as a graph, and as a mathematical relationship.	Represent a set of data in a table, as a graph, and as a mathematical relationship.	Represent a set of data in a table, as a graph, and as a mathematical relationship.
										Model real-world phenomena using polynomial, rational, and basic exponential functions, noting restricted domains.
<b>03. Apply functions to a variety of problems.</b>						Use patterns to represent and solve simple problems.	Use patterns and functions to represent and solve simple problems.	Use patterns and functions to represent and solve problems.		



Standard	K	1	2	3	4	5	6	7	8	9-12
04. Communi- cate results using appropriate terminology and methods.		Use a variety of methods, such as words, numbers, symbols, charts, graphs, tables, diagrams, and models to communicate mathematical information.								
		Use appropriate vocabulary to communicate mathematical information.								
										Use appropriate notation.

