Elementary Math
Vertical Progressions
Grades 2-5

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Standard 1: Algebraic Reasoning: Patterns and Relationships

2nd Grade	3rd Grade	4th Grade	5th Grade
The student will use a variety of problem-solving approaches to model, describe and extend patterns.	**The student will use a variety of problem-solving approaches to extend and create patterns.**	**The student will use a variety of problem-solving approaches to create, extend, and analyze patterns.**	**The student will use algebraic methods to describe patterns and solve problems in a variety of contexts.**
1. Describe, extend, and create patterns using symbols, shapes, or designs (e.g., repeating and growing patterns made up of sets of shapes or designs, create patterns by combining different shapes and taking them apart).	1. Describe (orally or in written form), create, extend and predict patterns in a variety of situations (e.g., 3, 6, 9, 12 . . . , use a function machine to generate input and output values for a table, show multiplication patterns on a hundreds chart, determine a rule and generate additional pairs with the same relationship).	1. Discover, describe, extend, and create a wide variety of patterns using tables, graphs, rules, and verbal models (e.g., determine the rule from a table or "function machine", extend visual and number patterns).	1. Describe rules that produce patterns found in tables, graphs, and models, and use variables (e.g., boxes, letters, pawns, number cubes, or other symbols) to solve problems or to describe general rules in algebraic expression or equation form.
2. Formulate and record generalizations about number patterns in a variety of situations (e.g., addition and subtraction patterns, even and odd numbers, build a table showing the cost of one pencil at 10 cents, 2 pencils at 20 cents).			
3. Find unknown values in open number sentences with a missing addend and use to solve everyday problems.	2. Find unknowns in simple arithmetic problems by solving open sentences (equations) and other problems involving addition, subtraction, and multiplication.	2. Find variables in simple arithmetic problems by solving open sentences (equations) and other problems involving addition, subtraction, multiplication, and division with whole numbers.	2. Use algebraic problem-solving techniques (e.g., use a balance to model an equation and show how subtracting a number from one side requires subtracting the same amount from the other side) to solve problems.
4. Recognize and apply the associative property of addition (e.g., 3 + (2 +1) = (3 + 2) + 1).	3. Recognize and apply the commutative and identity properties of multiplication using models and manipulative to develop computational skills (e.g., 3 • 5 = 5 • 3, 7 • 1 = 7).	3. Recognize and apply the associative property of multiplication (e.g., 6 • (2 • 3) = (6 • 2) • 3).	3. Recognize and apply the commutative, associative, and distributive properties to solve problems (e.g., 3 × (2 + 4) = (3 × 2) + (3 × 4).

Underlined phrases represent new or expanded knowledge from previous year

Standard 2: Number Sense and Operation

2nd Grade	3rd Grade	4th Grade	5th Grade
The student will use numbers and number relationships to acquire basic facts and will compute with whole numbers less than 100.	**The student will use numbers and number relationships to acquire basic facts. The student will estimate and compute with whole numbers.**	**The student will use numbers and number relationships to acquire basic facts. The student will estimate and compute with whole numbers and fractions.**	**The student will use numbers and number relationships to acquire basic facts. The student will estimate and compute with whole numbers, fractions, and decimals.**
1. Number Sense a. Use concrete models of hundreds, tens, and ones to develop the concepts of place value and link the concepts to the reading and writing of numbers (e.g., base-10 blocks). b. Represent a number in a variety of ways (e.g., write 15 as 8 + 7, write 25 as 2 tens + 5 ones or as 1 ten + 15 ones).	1. Number Sense a. Place Value i. Model the concept of place value through 4 digits (e.g., base-10 blocks, bundles of 10s, place value mats). ii. Read and write whole numbers up to 4 digits (e.g., expanded form, standard form).	1. Number Sense a. Place Value i. Apply the concept of place value through 6 digits (e.g., write numbers in expanded form). ii. Model, read, write and rename decimal numbers to the hundredths (e.g., money, numerals to words).	1. Number Sense a. Apply the concept of place value of whole numbers through hundred millions (9 digits) and model, read, and write decimal numbers through the thousandths.
c. Write a number sentence to compare numbers less than 1,000 (e.g., 425 > 276, 73 < 107, page 351 comes after 350, 753 is between 700 and 800). d. Demonstrate (using concrete objects, pictures, and numerical symbols) fractional parts including halves, thirds, fourths and common percents (25%, 50%, 75%, and 100%).	b. Whole Numbers and Fractions i. Compare and order whole numbers up to 4 digits. ii. Create and compare physical and pictorial models of equivalent and nonequivalent fractions including halves, thirds, fourths, eighths, tenths, twelfths, and common percents (25%, 50%, 75%, 100%) (e.g., fraction circles, pictures, egg cartons, fraction strips, number lines).	b. Whole Number, Fraction, and Decimal i. Compare and order whole numbers and decimals to the hundredths place (e.g., pictures of shaded regions of two-dimensional figures, use >, <, = symbols). ii. Use 0, 1/2, and 1 or 0, 0.5, and 1 as benchmarks and place additional fractions, decimals, and percents on a number line (e.g., 1/3, 3/4, 0.7, 0.4, 62%, 12%). iii. Compare, add, or subtract fractional parts (fractions with like denominators and decimals) using	b. Represent with models the connection between fractions and decimals, compare and order fractions and decimals, and be able to convert from one representation to the other to solve problems (e.g., use 10×10 grids, base 10 blocks).

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		physical or pictorial models. (e.g., egg cartons, fraction strips, circles, and squares).	
		iv. *Explore and connect negative numbers using real world situations (e.g. owing money, temperature, measuring elevations above and below sea level).	c. Identify and compare integers using real world situations. (e.g., owing money, temperature, or measuring elevations above and below sea level).
			d. *Identify and apply factors, multiples, prime, and composite numbers in a variety of problem-solving situations (e.g., build rectangular arrays for numbers 1–100 and classify as prime or composite, use common factors to add fractions).
2. Number Operations a. Demonstrate fluency (i.e., memorize and apply) with basic addition facts to make a maximum sum of 18 and the associated subtraction facts (e.g., 15+3=18 and 18-3=15). b. Use strategies to estimation and solve sums and differences (e.g., compose, decompose and regroup numbers, use knowledge of 10 to estimate quantities and sums [two numbers less than 10 cannot add up to more than 20].) c. Solve two-digit addition and subtraction problems with and without regrouping using a variety of techniques. d. Use concrete models to develop	2. Number Operations a. Estimate and find the sum or difference (with and without regrouping) of 3- and 4-digit numbers using a variety of strategies to solve application problems. b. Multiplication Concepts and Fact Families i. Use physical models and a variety of multiplication algorithms to find the product of multiplication problems with one-digit multipliers. ii. Demonstrate fluency (memorize and apply) with basic multiplication facts up to 10 × 10 and the associated division facts (e.g., 5 × 6 = 30 and 30 4 6 = 5). iii. Estimate the product of 2-digit by	2. Number Operation a. Estimate and find the product of up to three-digit by three-digit using a variety of strategies to solve application problems. a. Division Concepts and Fact Families i. Demonstrate fluency (memorize and apply) with basic division facts up to144 ÷ 12 and the associated multiplication facts (e.g., 44 ÷ 12 = 12 and 12 x 12 = 144). ii. Estimate the quotient with one- and two-digit divisors and a two- or three-digit dividend to solve application problems. Find the quotient (with and without remainders) with 1-digit divisors and a 2- or 3-digit dividend to solve	2. Number Operations a. Estimate, add, or subtract decimal numbers with same and different place values to solve problems (e.g., 3.72 + 1.4, $4.56 − $2.12). b. Estimate, add, or subtract fractions (including mixed numbers) to solve problems using a variety of methods (e.g., use fraction strips, use area models, find a common denominator). c. Estimate and find the quotient (with and without remainders) with two-digit divisors and a two- or three-digit dividend to solve application problem

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understanding of multiplication as repeated addition and division as successive subtraction.	2-digit numbers by rounding to the nearest multiple of 10 to solve application problems.	application problems	

Standard 3: Geometry

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The student will use geometric properties and relationships to recognize and describe shapes.	**The student will use geometric properties and relationships to recognize and describe shapes.**	**The student will use geometric properties and relationships to analyze shapes.**	**The student will apply geometric properties and relationships.**
1. Identify symmetric and congruent shapes and figures. 2. Investigate and predict the results of putting together and taking apart two-dimensional shapes.	1 Identify and compare attributes of two- and three-dimensional shapes and develop vocabulary to describe the attributes (e.g., count the edges and faces of a cube, the radius is half of a circle, lines of symmetry). 2 Analyze the effects of combining and subdividing two- and three-dimensional figures (e.g., folding paper, tiling, nets, and rearranging pieces of solids). 3 Make and use coordinate systems to specify locations and shapes on a grid with ordered pairs and to describe paths from one point to another point on a grid.	3. Identify, draw, and construct models of regular and irregular polygons including triangles, quadrilaterals, pentagons, hexagons, heptagons, and octagons to solve problems. 4. Describe the effects on two-dimensional objects when they slide (translate), flip (reflect), and turn (rotate) (e.g., tessellations).	1. Compare and contrast the basic characteristics of circle and polygons (triangles, quadrilaterals, pentagons, hexagons, heptagons, octagons).
		1. Identify, draw, and construct models of intersecting, parallel, and perpendicular lines.	
		2. Identify and compare angles equal to, less than, or greater than 90 degrees (e.g., use right angles to determine the approximate size of other angles).	2. Classify angles (e.g., acute, right, obtuse, straight).

Standard 4: Measurement

2nd Grade	3rd Grade	4th Grade	5th Grade
The student will use appropriate units of measure in a variety of situations.	**The student will use appropriate units of measure to solve problems.**	**The student will solve problems using appropriate units of measure in a variety of situations.**	**The student use appropriate units of measure to solve problems in a variety of contexts.**
1. Linear Measurement a. Measure objects using standard units (e.g., measure length to the nearest foot, inch, and half inch). b. Select and use appropriate units of measurement in problem solving and everyday situations.	1. Measurement	1. Measurement	1. Measurement
			a. Compare, estimate, and determine the measurement of angles
	a. Choose an appropriate measurement instrument and measure the length of objects to the nearest inch or half-inch and the weight of objects to the nearest pound or ounce. b. *Choose an appropriate measurement instrument and measure the length of objects to the nearest meter or centimeter and the weight of objects to the nearest gram or kilogram. d. *Develop and use strategies to choose an appropriate unit and measurement instrument to estimate measurements (e.g., use parts of the body as benchmarks for measuring length).	a. Estimate the measures of a variety of objects using customary units. b. Establish benchmarks for metric units and estimate the measures of a variety of objects (e.g., mass: the mass of a raisin is about 1 gram, length: the width of a finger is about 1 centimeter). c. Select appropriate customary and metric units of measure and measurement instruments to solve application problems involving length, weight, mass, area, and volume.	c. Convert basic measurements of volume, mass and distance within the same system for metric and customary units (e.g., inches to feet, hours to minutes, centimeters to meters).
	c. Develop and use the concept of perimeter of different shapes to solve problems.	d. Develop and use the concept of area of different shapes using grids to solve problems.	b. Develop and use the formula for perimeter and area of a square and rectangle to solve application problems.

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2. Time a. Tell time on digital and analog clocks on the quarter-hour. b. Solve problems involving number of days in a week, month, or year and problems involving weeks in a month and year.	2. Time and Temperature a. Solve simple addition problems with time (e.g., 15 minutes added to 1:10 p.m.). b. Tell time on a digital and analog clock to the nearest 5 minutes. c. Read a thermometer and solve for temperature change.	2. Time and Temperature a. Solve elapsed time problems. b. Read thermometers using different intervals (intervals of 1, 2, or 5) and solve for temperature change.	
3. Money a. Identify and count money up to a twenty-dollar bill. b. Recognize and write different amounts of money using dollar and cent notation.	3. Money: Determine the correct amount of change when a purchase is made with a five-dollar bill.	3. Money: Determine the correct amount of change when a purchase is made with a twenty-dollar bill.	2. Money: Solve a variety of problems involving money.

Standard 5: Data Analysis

2nd Grade	3rd Grade	4th Grade	5th Grade
The student will demonstrate an understanding of data collection, display, and interpretation.	**The student will demonstrate an understanding of collection, display, and interpretation of data and probability.**	**The student will demonstrate an understanding of collection, display, and interpretation of data and probability.**	**The student will use data analysis, statistics and probability to interpret data in a variety of contexts.**
1. Data Analysis	1. Data Analysis	1. Data Analysis	1. Data Analysis
a. Collect, sort, organize, and display data in charts, bar graphs, and tables (e.g., collect data on teeth lost and display results in a chart). b. Summarize and interpret data in charts, bar graphs, and tables.	a. *Pose questions, collect, record, and interpret data to help answer questions (e.g., which was the most popular booth at our carnival?). b. Read graphs and charts, identify the main idea, draw conclusions, and make predictions based on the data (e.g., predict how many children will	a. Read and interpret data displays such as tallies, tables, charts, and graphs and use the observations to pose and answer questions (e.g., choose a table in social studies of population data and write problems). b. Collect, organize and record data in	a. Compare and translate displays of data and justify the selection of the type of table or graph (e.g., charts, tables, bar graphs, pictographs, line graphs, circle graphs, Venn diagrams). b. *Formulate questions, design investigations, consider samples, and collect, organize, and analyze data using

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	bring their lunch based on a menu). c. Construct bar graphs, frequency tables, line graphs (plots), and pictographs with labels and a title from a set of data.	tables and graphs (e.g., line graphs (plots), bar graphs, pictographs).	observation, measurement, surveys, or experiments (e.g., how far can 5th graders throw a softball based on where it first hits the ground?).
	2. Probability: Describe the probability (more, less, or equally likely) of chance events.	2. Probability: Predict the probability of outcomes of simple experiments using words such as certain, equally likely, impossible (e.g., coins, number cubes, spinners).	2. Probability a. Determine the probability of events occurring in familiar contexts or experiments and express probabilities as fractions from zero to one (e.g., find the fractional probability of an event given a biased spinner). b. Use the fundamental counting principle on sets with up to four items to determine the number of possible combinations (e.g. create a tree diagrams to see possible combinations).
		3. Central Tendency: Determine the median (middle), and the mode (most often) of a set of data.	3. Central Tendency: Determine the range (spread), mode (most often), and median (middle) of a set of data.