

Fourth Grade Math Standards and Benchmarks

Standard #1: Number and Operations Definition: Students will understand numerical concepts and mathematical operations.		
Benchmark #1: Understand numbers, ways of representing numbers, relationships among numbers, and number systems	Performance Objective 1	<input type="checkbox"/> Exhibit an understanding of the place-value structure of the base-ten number system by reading, modeling, writing, and interpreting whole numbers up to 100,000; compare and order the numbers: <input type="checkbox"/> recognize equivalent representations for the same number and generate them by decomposing and combining numbers (e.g., $853 = 8 \times 100 + 5 \times 10 + 3$; $853 = 85 \times 10 + 3$; $853 = 900 - 50 + 3$) <input type="checkbox"/> identify the numbers less than 0 by extending the number line and using <input type="checkbox"/> negative numbers through familiar applications (e.g., temperature, money)
	Performance Objective 2	<input type="checkbox"/> Identify fractions as parts of unit wholes, as parts of groups, and as locations on number lines: <input type="checkbox"/> use visual models and other strategies to compare and order commonly used fractions <input type="checkbox"/> use models to show how whole numbers and decimals (to the hundredths place) relate to simple fractions (e.g., $\frac{1}{2}$, $\frac{5}{10}$, 0.5) <input type="checkbox"/> identify different interpretations of fractions: <input type="checkbox"/> division of whole numbers by whole numbers <input type="checkbox"/> ratio <input type="checkbox"/> equivalence <input type="checkbox"/> ordering of fractions <input type="checkbox"/> parts of a whole or parts of a set
	Performance Objective 3	<input type="checkbox"/> Add and subtract fractions with common and uncommon denominators using a variety of strategies (e.g., manipulatives, numbers, pictures): <input type="checkbox"/> recognize and generate equivalent decimal forms of commonly used fractions (e.g., halves, quarters, tenths, fifths) <input type="checkbox"/> identify the numbers less than 0 by extending the number line and using negative numbers through familiar applications (e.g., temperature, money)
	Performance Objective 4	<input type="checkbox"/> Recognize classes of numbers (e.g., odd, even, factors, multiples, square numbers) and apply these concepts in problem-solving situations.
Benchmark #2: Understand the meaning of operations and how they relate to each other	Performance Objective 1	<input type="checkbox"/> Demonstrate an understanding of and the ability to use: <input type="checkbox"/> standard algorithms for the addition and subtraction of multi-digit numbers <input type="checkbox"/> standard algorithms for multiplying a multi-digit number by a two-digit number and for dividing a multi-digit number by a one-digit number
	Performance Objective 2	<input type="checkbox"/> Select and use appropriate operations (addition, subtraction, multiplication, and division) to solve problems.
	Performance Objective 3	<input type="checkbox"/> Extend the uses of whole numbers to the addition and subtraction of simple decimals (positive numbers to two places).
	Performance Objective 4	<input type="checkbox"/> Demonstrate commutative, associative, identity, and zero properties of operations on whole numbers (e.g., $37 \times 46 = 46 \times 37$ and $(6 \times 2) \times 5 = 6 \times (2 \times 5)$).
	Performance Objective 5	<input type="checkbox"/> Demonstrate the concept of distributivity of multiplication over addition and subtraction (e.g., 7×28 is equivalent to $(7 \times 20) + (7 \times 8)$ or $(7 \times 30) - (7 \times 2)$).
Benchmark #3: Compute fluently and make reasonable estimates	Performance Objective 1	<input type="checkbox"/> Demonstrate multiplication combinations through 12×12 and related division facts, and use them to solve problems mentally and compute related problems (e.g., 4×5 is related to 40×50 , 400×5 , and 40×500).
	Performance Objective 2	<input type="checkbox"/> Add, subtract, and multiply up to two double-digits accurately and efficiently.
	Performance Objective 3	<input type="checkbox"/> Use a variety of strategies (e.g., rounding and regrouping) to estimate the results of whole number computations and judge the reasonableness of the answers.
	Performance Objective 4	<input type="checkbox"/> Use strategies to estimate computations involving fractions and decimals.

Standard #2: Algebra

Definition: Students will understand algebraic concepts and applications.

<u>Benchmark #1:</u> Understand patterns, relations, and functions	Performance Objective 1	<input type="checkbox"/> Represent and analyze patterns and simple functions using words, tables, and graphs.
	Performance Objective 2	<input type="checkbox"/> Create and describe numeric and geometric patterns including multiplication and division patterns.
	Performance Objective 3	<input type="checkbox"/> Express mathematical relationships using equations.
	Performance Objective 4	<input type="checkbox"/> Use and interpret variables, mathematical symbols, and properties to write and simplify expressions and sentences: <input type="checkbox"/> use letters, boxes, or other symbols to stand for any number in simple expressions or equations (e.g., demonstrate an understanding of the concept of a variable) <input type="checkbox"/> interpret and evaluate mathematical expressions using parentheses <input type="checkbox"/> use and interpret formulas (e.g., Area = Length x Width or $A = L \times W$) to answer questions about quantities and their relationships
<u>Benchmark #2:</u> Represent and analyze mathematical situations and structures using algebraic symbols	Performance Objective 1	<input type="checkbox"/> Identify symbols and letters that represent the concept of a variable as an unknown quantity.
	Performance Objective 2	<input type="checkbox"/> Explore the uses of properties (commutative, distributive, associative) in the computation of whole numbers.
	Performance Objective 3	<input type="checkbox"/> Express mathematical relationships using equations.
	Performance Objective 4	<input type="checkbox"/> Determine the value of variables in simple equations (e.g., $80 \times 15 = 40 \times ?$).
	Performance Objective 5	<input type="checkbox"/> Develop simple formulas in exploring quantities and their relationships (e.g., $A = L \times W$).
<u>Benchmark #3:</u> Use mathematical models to represent and understand quantitative relationships	Performance Objective 1	<input type="checkbox"/> Solve problems involving proportional relationships (including unit pricing and map interpretations; e.g., one inch = five miles; therefore, five inches = $\frac{1}{5}$ miles).
	Performance Objective 2	<input type="checkbox"/> Model problem situations and use graphs, tables, pictures, and equations to draw conclusions (e.g., different patterns of change).
	Performance Objective 3	<input type="checkbox"/> Use and interpret formulas (e.g., Area = Length x Width or $A = L \times W$) to answer questions about quantities and their relationships.
<u>Benchmark #4:</u> Analyze changes in various contexts	Performance Objective 1	<input type="checkbox"/> Identify and describe situations with constant or varying rates of change and compare them.
	Performance Objective 2	<input type="checkbox"/> Determine how a change in one variable relates to a change in a second variable (e.g., data tables, input-output machines).
	Performance Objective 3	<input type="checkbox"/> Find and analyze patterns using data tables (e.g., T tables).
	Performance Objective 4	<input type="checkbox"/> Demonstrate and describe varying rates of change in relation to real-world situations (e.g., plant growth, students' heights).

Standard #3: Geometry

Definition: Students will understand geometric concepts and applications.

<u>Benchmark #1:</u> Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships	Performance Objective 1	<input type="checkbox"/> Identify, compare, and analyze attributes of two- and three-dimensional shapes and develop vocabulary to describe the attributes: 14. <input type="checkbox"/> build, draw, create, and describe geometric objects 15. <input type="checkbox"/> identify lines that are parallel or perpendicular 16. <input type="checkbox"/> identify and compare congruent and similar figures
	Performance Objective 2	<input type="checkbox"/> Classify two- and three-dimensional shapes according to their properties and develop definitions of classes like triangles and pyramids: <input type="checkbox"/> visualize, describe, and make models of geometric solids in terms of the number of faces, edges, and vertices <input type="checkbox"/> interpret two-dimensional representations of three-dimensional objects
	Performance Objective 3	<input type="checkbox"/> Make and test conjectures about geometric properties and relationships and develop logical arguments to justify conclusions.
<u>Benchmark #2:</u> Specify locations and describe spatial relationships using coordinate geometry and other representational systems	Performance Objective 1	<input type="checkbox"/> Describe location and movement using common language and geometric vocabulary.
	Performance Objective 2	<input type="checkbox"/> Use ordered pairs to graph, locate, identify points, and describe paths in the first quadrant of the coordinate plane.
	Performance Objective 3	<input type="checkbox"/> Use a variety of methods for measuring distances between locations on a grid.
<u>Benchmark #3:</u> Apply transformations and use symmetry to analyze mathematical situations	Performance Objective 1	<input type="checkbox"/> Create and describe rotational designs using language of transformational symmetry.
	Performance Objective 2	<input type="checkbox"/> Describe a motion or set of motions that will show that two shapes are congruent.
<u>Benchmark #4:</u> Use visualization, spatial reasoning, and geometric modeling to solve problems	Performance Objective 1	<input type="checkbox"/> Develop and use mental images of geometric shapes to solve problems (e.g., represent three-dimensional shapes in two dimensions).
	Performance Objective 2	<input type="checkbox"/> Use geometric models such as number lines, arrays, and computer simulations to investigate number relationships (e.g., patterns).
	Performance Objective 3	<input type="checkbox"/> Explore relationships involving perimeter and area: <input type="checkbox"/> measure area of rectangular shapes and use appropriate units <input type="checkbox"/> recognize that area can have the same perimeter but different areas and vice versa <input type="checkbox"/> use models and formulas to solve problems involving perimeter and area of rectangles and squares (e.g., arrays)

Standard #4: Measurement

Definition: Students will understand measurement systems and applications.

<u>Benchmark #1:</u> Understand measurable attributes of objects and the units, systems, and process of measurement	Performance Objective 1	<input type="checkbox"/> Select the appropriate type of unit for measuring perimeter and size of an angle.
	Performance Objective 2	<input type="checkbox"/> Understand the need for measuring with standard units and become familiar with the standard units in customary and metric system.
	Performance Objective 3	<input type="checkbox"/> Identify the inverse relationship between the size of the units and the number of units.
	Performance Objective 4	<input type="checkbox"/> Develop formulas to determine the surface areas of rectangular solids.
	Performance Objective 5	<input type="checkbox"/> Develop, understand, and use formulas to find the area of rectangles and related triangles and parallelograms.
	Performance Objective 6	<input type="checkbox"/> Carry out simple conversions within a system of measurement (e.g., hours to minutes, meters to centimeters).
<u>Benchmark #2:</u> Apply appropriate techniques, tools, and formulas to determine measurements	Performance Objective 1	<input type="checkbox"/> Estimate perimeters, areas of rectangles, triangles, and irregular shapes.
	Performance Objective 2	<input type="checkbox"/> Find the area of rectangles, related triangles, and parallelograms.
	Performance Objective 3	<input type="checkbox"/> Estimate, measure, and solve problems involving length, area, mass, time, and temperature using appropriate standard units and tools.
	Performance Objective 4	<input type="checkbox"/> Identify common measurements of turns (e.g., 360 degrees in one turn, 90 degrees in a quarter-turn).
	Performance Objective 5	<input type="checkbox"/> Compute elapsed time and make and interpret schedules.
	Performance Objective 6	<input type="checkbox"/> Use tools to measure angles (e.g., protractor, compass).

Standard #5: Data Analysis and Probability

Definition: Students will understand how to formulate questions, analyze data, and determine probabilities.

<u>Benchmark #1:</u> Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them	Performance Objective 1	<input type="checkbox"/> Organize, represent, and interpret numerical and categorical data and clearly communicate findings: 17. <input type="checkbox"/> choose and construct representations that are appropriate for the data set 18. <input type="checkbox"/> recognize the differences in representing categorical and numerical data
	Performance Objective 2	<input type="checkbox"/> Design investigations and represent data using tables and graphs (e.g., line plots, bar graphs, line graphs).
<u>Benchmark #2:</u> Select and use appropriate statistical methods to analyze data	Performance Objective 1	<input type="checkbox"/> Compare and describe related data sets.
	Performance Objective 2	<input type="checkbox"/> Use the concepts of median, mode, maximum, minimum, and range and draw conclusions about a data set.
	Performance Objective 3	<input type="checkbox"/> Use data analysis to make reasonable inferences/predictions and to develop convincing arguments from data described in a variety of formats (e.g. bar graphs, Venn diagrams, charts, tables, line graphs, and pictographs).
<u>Benchmark #3:</u> Develop and evaluate inferences and predictions that are based on data	Performance Objective 1	<input type="checkbox"/> Propose and justify conclusions and predictions based on data.
	Performance Objective 2	<input type="checkbox"/> Develop convincing arguments from data displayed in a variety of formats.
<u>Benchmark #4:</u> Understand and apply basic concepts of probability	Performance Objective 1	<input type="checkbox"/> Describe events as “likely,” “unlikely,” or “impossible” and quantify simple probability situations: <input type="checkbox"/> represent all possible outcomes for a simple probability situation in an organized way (e.g., tables, grids, tree diagrams) <input type="checkbox"/> express outcomes of experimental probability situations verbally and numerically (e.g., three out of four, $\frac{3}{4}$)
	Performance Objective 2	<input type="checkbox"/> List all the possible combinations of objects from three sets (e.g., spinners, number of outfits from three different shirts, two skirts, and two hats).