

Sixth Grade Math Standards and Benchmarks

Standard #1: Number and Operations

Definition: Students will understand numerical concepts and mathematical operations.

Benchmark #1-A: Understand numbers, ways of representing numbers, relationships among numbers, and number systems	Performance Objective 1	<input type="checkbox"/> Compare and order rational numbers.
	Performance Objective 2	<input type="checkbox"/> Use equivalent representations for rational numbers (e.g., integers, decimals, fractions, percents, ratios, numbers with whole-number exponents).
	Performance Objective 3	<input type="checkbox"/> Use appropriate representations of positive rational numbers in the context of real-life applications.
	Performance Objective 4	<input type="checkbox"/> Identify greatest common factor and least common multiples for a set of whole numbers.
	Performance Objective 5	<input type="checkbox"/> Identify and represent on a number line decimals, fractions, mixed numbers, and positive and negative integers.
Benchmark #1-B: Understand the meaning of operations and how they relate to each other	Performance Objective 1	<input type="checkbox"/> Calculate multiplication and division problems using contextual situations.
	Performance Objective 2	<input type="checkbox"/> Factor a whole number into a product of its primes.
	Performance Objective 3	<input type="checkbox"/> Demonstrate the relationship and equivalency among ratios and percents.
	Performance Objective 4	<input type="checkbox"/> Use proportions to solve problems.
	Performance Objective 5	<input type="checkbox"/> Explain and perform: <ul style="list-style-type: none"> <input type="checkbox"/> whole number division and express remainders as decimals or appropriately in the context of the problem <input type="checkbox"/> addition, subtraction, multiplication, and division with decimals <input type="checkbox"/> addition and subtraction with integers <input type="checkbox"/> addition, subtraction, and multiplication with fractions and mixed numerals
	Performance Objective 6	<input type="checkbox"/> Determine the least common multiple and the greatest common divisor of whole numbers and use them to solve problems with fractions.
Benchmark #1-C: Compute fluently and make reasonable estimates	Performance Objective 1	<input type="checkbox"/> Estimate quantities involving rational numbers using various estimations.
	Performance Objective 2	<input type="checkbox"/> Use estimates to check reasonableness of results and make predictions in situations involving rational numbers.
	Performance Objective 3	<input type="checkbox"/> Determine if a problem situation calls for an exact or approximate answer and perform the appropriate computation.
	Performance Objective 4	<input type="checkbox"/> Compare and order positive and negative fractions, decimals, and mixed numbers and place them on a number line
	Performance Objective 5	<input type="checkbox"/> Convert fractions to decimals and percents and use these representations in estimations, computations, and applications.
	Performance Objective 6	<input type="checkbox"/> Interpret and use ratios in different contexts.
	Performance Objective 7	<input type="checkbox"/> Compute and perform multiplication and division of fractions and decimals and apply these procedures to solving problems.

Standard #2: Algebra

Definition: Students will understand algebraic concepts and applications.

<u>Benchmark #2-A:</u> Understand patterns, relations, and functions	Performance Objective 1	<input type="checkbox"/> Solve problems involving proportional relationships.
	Performance Objective 2	<input type="checkbox"/> Graph ordered pairs in the coordinate plane
	Performance Objective 3	<input type="checkbox"/> Explain and use symbols to represent unknown quantities and variable relationships.
	Performance Objective 4	<input type="checkbox"/> Explain and use the relationships among ratios, proportions, and percents.
	Performance Objective 5	<input type="checkbox"/> Make generalizations based on observed patterns and relationships
<u>Benchmark #2-B:</u> Represent and analyze mathematical situations and structures using algebraic symbols	Performance Objective 1	<input type="checkbox"/> Solve problems involving proportional relationships.
	Performance Objective 2	<input type="checkbox"/> Use letters to represent an unknown in an equation.
	Performance Objective 3	<input type="checkbox"/> Solve one-step linear equations and inequalities in one variable with positive whole-number solutions.
	Performance Objective 4	<input type="checkbox"/> Demonstrate that a variable can represent a single quantity that changes.
	Performance Objective 5	<input type="checkbox"/> Demonstrate how changes in one variable affect other variables.
<u>Benchmark #2-C:</u> Use mathematical models to represent and understand quantitative relationships	Performance Objective 1	<input type="checkbox"/> Develop and use mathematical models to represent and justify mathematical relationships found in a variety of situations.
	Performance Objective 2	<input type="checkbox"/> Create, explain, and use mathematical models such as: <input type="checkbox"/> Venn diagrams to show the relationships between the characteristics of two or more sets <input type="checkbox"/> equations and inequalities to model numerical relationships <input type="checkbox"/> three-dimensional geometric models <input type="checkbox"/> graphs, tables, and charts to interpret and analyze data
<u>Benchmark #2-D:</u> Analyze changes in various contexts	Performance Objective 1	<input type="checkbox"/> Represent and explain changes using one-step equations with one variable.
	Performance Objective 2	<input type="checkbox"/> Solve problems that involve change using proportional relationships.
	Performance Objective 3	<input type="checkbox"/> Use ratios to predict changes in proportional situations.
	Performance Objective 4	<input type="checkbox"/> Use tables and symbols to represent and describe proportional and other relationships involving conversions, sequences, and perimeter.
	Performance Objective 5	<input type="checkbox"/> Generate formulas to represent relationships involving changes in perimeter.

Standard #3: Geometry

Definition: Students will understand geometric concepts and applications.

<u>Benchmark #3-A:</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, describe and classify the properties of, and the relationships between, plane and solid geometric figures: <input type="checkbox"/> measure, identify, and draw angles, perpendicular and parallel lines, rectangles, and triangles by using appropriate tools (e.g., straightedge, ruler, compass, protractor, drawing software) <input type="checkbox"/> understand that the sum of angles of any triangle is 180 degrees and the sum of the angles of any quadrilateral is 360 degrees and use this information to solve problem <input type="checkbox"/> visualize and draw two-dimensional views of three-dimensional objects made from rectangular solids.
	Performance Objective 2	<input type="checkbox"/> Classify angles as right, obtuse, or straight.
	Performance Objective 3	<input type="checkbox"/> Describe the properties of geometric figures that include regular polygons, circles, ellipses, cylinders, cones, spheres, and cubes.
	Performance Objective 4	<input type="checkbox"/> Classify polygons as regular or irregular.
	Performance Objective 5	<input type="checkbox"/> Classify triangles as scalene, isosceles, or equilateral and by angles (i.e., right, acute and obtuse).
	Performance Objective 6	<input type="checkbox"/> Identify angle, line, segment and ray and use the symbols for each.
	Performance Objective 7	<input type="checkbox"/> Describe the relationship between radius, diameter and circumference of a circle.
<u>Benchmark #3-B:</u> Specify locations and describe spatial relationships using coordinate geometry and other representational systems	Performance Objective 1	<input type="checkbox"/> Use coordinate geometry to describe location on a plane.
	Performance Objective 2	<input type="checkbox"/> Recognize skewed lines in space.
<u>Benchmark #3-C:</u> Apply transformations and use symmetry to analyze mathematical situations	Performance Objective 1	<input type="checkbox"/> Identify line of symmetry with rotation and scaling.
<u>Benchmark #3-D:</u> Use visualization, spatial reasoning, and geometric modeling to solve problems	Performance Objective 1	<input type="checkbox"/> Use appropriate technology, manipulatives, constructions, or drawings to recognize or compare geometric figures.

Standard #4: Measurement

Definition: Students will understand measurement systems and applications.

<u>Benchmark #4-A:</u> Understand measurable attributes of objects and the units, systems, and process of measurement	Performance Objective 1	<input type="checkbox"/> Perform multi-step conversions of measurement units to equivalent units within a given system (e.g., 36 inches equals 3 feet or 1 yard).
	Performance Objective 2	<input type="checkbox"/> Estimate measurement in both U.S. customary and metric units.
	Performance Objective 3	<input type="checkbox"/> Select and use units of appropriate size and type to measure angles (e.g., degrees, radians), perimeter, area, and capacity in both U.S. customary and metric systems.
	Performance Objective 4	<input type="checkbox"/> Use standard units of linear measurement to the nearest sixteenth of an inch; metric measurements to the nearest millimeter.
<u>Benchmark #4-B:</u> Apply appropriate techniques, tools, and formulas to determine measurements	Performance Objective 1	<input type="checkbox"/> Apply various measurement techniques and tools, units of measure, and degrees of accuracy to find accurate rational number representations for length, liquid, weight, perimeter, temperature, and time.
	Performance Objective 2	<input type="checkbox"/> Select and use formulas for perimeters of squares and rectangles.
	Performance Objective 3	<input type="checkbox"/> Select and use strategies to estimate measurements including angle measure and capacity.
	Performance Objective 4	<input type="checkbox"/> Select and justify the selection of measurement tools, units of measure, and degrees of accuracy appropriate to the given situation.

Standard #5: Data Analysis and Probability

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

Benchmark #5-A: Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them	Performance Objective 1	<input type="checkbox"/> Use statistical representations to analyze data.
	Performance Objective 2	<input type="checkbox"/> Draw and compare different graphical representations of the same data.
	Performance Objective 3	<input type="checkbox"/> Use mean, median, mode, and range to describe data.
	Performance Objective 4	<input type="checkbox"/> Sketch circle graphs to display data.
	Performance Objective 5	<input type="checkbox"/> Solve problems by collecting, organizing, displaying and interpreting data.
	Performance Objective 6	<input type="checkbox"/> Compare different samples of a population with the entire population and determine the appropriateness of using a sample.
	Performance Objective 7	<input type="checkbox"/> Conduct and explain sampling techniques such as observations, surveys, and random sampling for gathering data.
	Performance Objective 8	<input type="checkbox"/> Determine the median for a rational number data set containing an odd number of data points.
	Performance Objective 9	<input type="checkbox"/> Calculate and explain the median for a whole number data set containing an even number of data points.
	Performance Objective 10	<input type="checkbox"/> Explain advantages and disadvantages of using various display formats for a specific data set.
	Performance Objective 11	<input type="checkbox"/> Formulate and solve problems by collecting, organizing, displaying, and interpreting data.
Benchmark #5-B: Select and use appropriate statistical methods to analyze data	Performance Objective 1	<input type="checkbox"/> Choose an appropriate graphical format to organize and represent data.
	Performance Objective 2	<input type="checkbox"/> Describe the effects of missing or incorrect data.
	Performance Objective 3	<input type="checkbox"/> Compute and analyze statistical measurements for data sets: <ul style="list-style-type: none"> <input type="checkbox"/> understand how additional data added to data sets may affect the computations of central tendency <input type="checkbox"/> understand how the inclusion or exclusion of outliers affects measures of central tendency <input type="checkbox"/> know why a specific measure of central tendency provides the most useful information in a given context
	Performance Objective 4	<input type="checkbox"/> Use data samples of a population and describe the characteristics and limitations of the sample.
	Performance Objective 5	<input type="checkbox"/> Identify different ways of selecting a sample (e.g., convenience sampling, responses to a survey, random sampling) and which method makes a sample more representative for a population.
	Performance Objective 6	<input type="checkbox"/> Explain how the way a question is asked in a survey might influence the results obtained.
	Performance Objective 7	<input type="checkbox"/> Identify data that represent sampling errors and explain why the sample and the display might be biased.
	Performance Objective 8	<input type="checkbox"/> Identify claims based on statistical data and, in sample cases, evaluate the validity and usefulness of the claims.
Benchmark #5-C:	Performance Objective 1	<input type="checkbox"/> Identify claims based on statistical data and evaluate the validity of the claim

Develop and evaluate inferences and predictions that are based on data	Performance Objective 2	<input type="checkbox"/> Conduct observations, surveys, experiments and/or simulations, record the results in charts, tables, or graphs, and use the results to draw conclusions and make predictions.
	Performance Objective 3	<input type="checkbox"/> Find all possible combinations in a given set (e.g., the number of ways a set of books can be arranged on a shelf).
	Performance Objective 4	<input type="checkbox"/> Compare expected results with actual results in a simple experiment.
<u>Benchmark #5-D:</u> Understand and apply basic concepts of probability	Performance Objective 1	<input type="checkbox"/> List all possible outcomes for a compound event composed of two independent events and recognize whether an outcome is certain, impossible, likely, or unlikely.
	Performance Objective 2	<input type="checkbox"/> Determine and compare experimental (empirical) and mathematical (theoretical) probabilities (e.g., flipping two color counters).
	Performance Objective 3	<input type="checkbox"/> Determine theoretical and experimental probabilities and use them to make predictions about events.
	Performance Objective 4	<input type="checkbox"/> Represent all possible outcomes for compound events in an organized way (e.g., tables, grids, tree diagrams) and express the theoretical probability of each outcome.
	Performance Objective 5	<input type="checkbox"/> Use data to estimate the probability of future events (e.g., batting averages).
	Performance Objective 6	<input type="checkbox"/> Represent probabilities as ratios, proportions, decimals between 0 and 1, and percentages between 0 and 100 and verify that the probabilities computed are reasonable; know that if P is the probability of an event, $1 - P$ is the probability of the event not occurring.
	Performance Objective 7	<input type="checkbox"/> Describe the difference between independent and dependent events and identify situations involving independent or dependent events.