

2003 Standards & Benchmarks 6 <sup>th</sup> Grade	2007 Standards & Benchmarks 6 <sup>th</sup> Grade
<p><b>I. MATHEMATICAL REASONING</b></p> <ol style="list-style-type: none"> <li>1. Assess the reasonableness of a solution by comparing the solution to appropriate graphical or numerical estimates or by recognizing the feasibility of a solution in a given context.</li> <li>2. Appropriately use examples and counterexamples to make and test conjectures, justify solutions and explain results.</li> <li>3. Translate a problem described verbally or by tables, diagrams or graphs, into suitable mathematical language, solve the problem mathematically and interpret the result in the original context.</li> <li>4. Support mathematical results by explaining why the steps in a solution are valid and why a particular solution method is appropriate.</li> <li>5. Determine whether or not relevant information is missing from a problem.</li> <li>6. Use accurately common logical words and phrases such as “and,” “or,” “if ... then ...,” “unique,” “only if.”</li> </ol>	<p><b>NOTE: Mathematical Reasoning is embedded throughout the 2007 standards, and not treated as a separate standard.</b></p>
<p><b>II. NUMBER SENSE, COMPUTATION AND OPERATIONS</b> <b>A. Number Sense</b></p> <ol style="list-style-type: none"> <li>1. Order and compare integers, fractions, decimals and mixed numbers with <math>&gt;</math>, <math>&lt;</math>, and <math>=</math>. Locate and compare positive and negative rational numbers on a number line.</li> <li>2. Use rounding and estimation with integers, decimals and fractions to solve real-world and mathematical problems.</li> </ol>	<p><b>NUMBER &amp; OPERATIONS – read, write, represent, &amp; compare positive rational nos. expressed as fractions, decimals, percents, and ratios...</b></p> <ol style="list-style-type: none"> <li>6.1.1.1. Locate positive rational numbers on a number line, and plot pairs of positive rational numbers on a coordinate grid.</li> <li>6.1.1.2. Compare positive rational numbers represented in various forms. Use the symbols <math>&lt;</math> and <math>&gt;</math>.</li> <li>6.1.1.3. Understand that percent represents parts out of 100 and ratios to 100.</li> <li>6.1.1.4. Determine equivalences among fractions, decimals, and percents; select among these representations to solve problems.</li> </ol>
<p><b>II. NUMBER SENSE, COMPUTATION AND OPERATIONS</b> <b>B. Calculation and Operation</b></p> <ol style="list-style-type: none"> <li>1. Determine the prime factorization of positive integers.</li> <li>2. Determine the least common multiple and the greatest common divisor of whole numbers.</li> <li>3. Use addition, subtraction, multiplication and division of multi-digit whole and decimal numbers to solve multi-step real-world and mathematical problems.</li> <li>4. Multiply and divide, without a calculator, numbers containing up to three digits by numbers containing up to two digits, such as <math>347 \div 83</math> or <math>4.91 \times 9.2</math>.</li> <li>5. Find quotients with remainders and be able to express the remainder in various ways depending on the context of the problem.</li> <li>6. Use the relationship between moving the decimal point and the operations of multiplication or division by powers of 10 to simplify calculations.</li> <li>7. Add, subtract, multiply and divide common fractions and mixed numbers as well as fractions where the common denominator equals one of the denominators.</li> <li>8. Find, represent and use percentages in real-world and mathematical problems, including percentages greater than 100% and less than 1%.</li> <li>9. Apply the correct order of operations and grouping symbols when using calculators and other technologies.</li> <li>10. Know, use and translate calculator notational conventions to mathematical notation.</li> <li>11. Understand that use of a calculator requires appropriate mathematical reasoning and does not replace the need for mental computation.</li> </ol>	<ol style="list-style-type: none"> <li>6.1.1.5. Factor whole numbers; express a whole number as a product of prime factors with exponents.</li> <li>6.1.1.6. Determine greatest common factors and least common multiples. Use common factors and common multiples to do arithmetic with fractions and find equivalent fractions.</li> <li>6.1.1.7. Convert between equivalent representations of positive rational numbers.</li> </ol> <p><b>NUMBER &amp; OPERATIONS – Concept of ratio and its relationship to fractions and multiplication &amp; division of whole nos; use ratios</b></p> <ol style="list-style-type: none"> <li>6.1.2.1. Identify and use ratios to compare quantities; understand that comparing quantities using ratios is not the same as comparing quantities using subtraction.</li> <li>6.1.2.2. Apply the relationship between ratios, equivalent fractions, and percents to solve problems in various contexts, including those involving mixtures and concentrations.</li> <li>6.1.2.3. Determine the rate for ratios of quantities with different units</li> <li>6.1.2.4. Use reasoning about multiplication and division to solve ratio and rate problems.</li> </ol> <p><b>NUMBER OPERATIONS – multiply and divide decimals, fractions, and mixed nos. and solve problems.</b></p> <ol style="list-style-type: none"> <li>6.1.3.1. Multiply and divide decimals and fractions, using efficient and generalizable procedures, including standard algorithms.</li> <li>6.1.3.2. Use the meanings of fractions, multiplication, and division, and the inverse relationship between multiplication and division to make sense of procedures for multiplying and dividing fractions.</li> <li>6.1.3.3. Calculate the percent of a number and determine what percent one number is of another number to solve problems in various contexts.</li> </ol>

	<p>6.1.3.4. Solve real world and mathematical problems requiring arithmetic with decimals, fractions, and mixed numbers.</p> <p>6.1.3.5. Estimate solutions to problems with whole numbers, fractions, and decimals and use the estimations to assess the reasonableness of computations and of results in the context of the problem.</p>
<p><b>III. PATTERNS, FUNCTIONS AND ALGEBRA</b>  <b>A. Patterns and Function</b>  1. Demonstrate understanding of the four quadrants in a rectangular coordinate system by writing and plotting ordered pairs.</p>	<p><b>ALGEBRA – recognize &amp; represent relationships between varying quantities; translate from one to another; use patterns, tables, graphs, and rules to solve problems.</b></p> <p>6.2.1.1. Understand that a variable can be used to represent a quantity that can change, often in relationship to another changing quantity. Use variables in various contexts.</p> <p>6.2.1.2. Represent the relationship between two varying quantities with function rules, graphs, and tables; translate between any two of these representations.</p>
<p><b>III. PATTERNS, FUNCTIONS AND ALGEBRA</b>  <b>B. Algebraic Thinking</b>  1. Apply the correct order of operations including addition, subtraction, multiplication, division and grouping symbols to simplify and evaluate numeric expressions</p>	<p><b>ALGEBRA – use properties of arithmetic to generate equivalent numerical expressions &amp; evaluate expressions involving + ratl nos.</b></p> <p>6.2.2.1. Apply the associative, commutative, and distributive properties and order of operations to generate equivalent expressions and to solve problems involving positive rational numbers.</p> <p><b>ALGEBRA – understand &amp; interpret equations and inequalities involving variables and positive rat'l nos; use the idea of maintaining equality to solve equations. Interpret solutions.</b></p> <p>6.2.3.1. Represent real world or mathematical situations using equations and inequalities involving variables and positive rational numbers.</p> <p>6.2.3.2. Solve equations involving positive rational numbers using number sense, properties of arithmetic, and the idea of maintaining equality on both sides of the equation. Interpret a solution in the original context and assess the reasonableness of results.</p>
<p><b>IV. DATA ANALYSIS, STATISTICS AND PROBABILITY</b>  <b>A. Data and Statistics</b>  1. Collect, organize and represent categorical and numerical data with tables and bar graphs.  2. Understand the differences and appropriate use of mean, median and mode.  3. Find the median and possible outliers.</p>	
<p><b>IV. DATA ANALYSIS, STATISTICS AND PROBABILITY</b>  <b>B. Probability</b>  1. Generate and display data in graphs and tables to estimate experimental probabilities.  2. Represent all possible outcomes for a probability problem with tables, grids and tree diagrams to calculate probabilities and draw conclusions from the results.</p>	<p><b>DATA ANALYSIS &amp; PROBABILITY – use probabilities to solve real world &amp; mathematical problems; represent probabilities using fractions, decimals, &amp; percent.</b></p> <p>6.4.1.1. Determine the sample space (set of possible outcomes) for a given experiment and determine which members of the sample space are related to certain events. Sample space may be determined by the use of tree diagrams, tables, or pictorial representations.</p> <p>6.4.1.2. Determine the probability of an event using the ratio between the size of the event and the size of the sample space; represent probabilities as percents, fractions, and decimals between 0 and 1 inclusive. Understand that probabilities measure likelihood.</p> <p>6.4.1.3. Perform experiments for situations in which the probabilities are known, compare the resulting relative frequencies with the known probabilities; know that there may be differences.</p> <p>6.4.1.4. Calculate experimental probabilities from experiments; represent them as percents, fractions, and decimals between 0 and 1 inclusive. Use experimental probabilities to make predictions when actual probabilities are unknown.</p>

<p><b>V. SPATIAL SENSE, GEOMETRY AND MEASUREMENT</b>  <b>A. Spatial Sense</b></p> <ol style="list-style-type: none"> <li>1. Create models of three-dimensional geometric shapes from two-dimensional representations.</li> <li>2. Predict the position and orientation of simple geometric shapes under transformations such as reflections, rotations and translations.</li> <li>3. Identify symmetries in three-dimensional shapes.</li> </ol>	
<p><b>V. SPATIAL SENSE, GEOMETRY AND MEASUREMENT</b>  <b>B. Geometry</b></p> <ol style="list-style-type: none"> <li>1. Use facts about angles including the relationship between complementary angles, supplementary angles and the angles within triangles to solve real-world and mathematical problems.</li> <li>2. Classify triangles as equilateral, isosceles or scalene, and right, acute or obtuse.</li> <li>3. Find the area and circumference of a circle given the radius or diameter using common approximations of pi where appropriate.</li> <li>4. Measure, identify, and draw perpendicular and parallel lines, angles and rectangles by using appropriate tools such as straightedge, ruler, compass, protractor or software.</li> </ol>	<p><b>GEOMETRY &amp; MEASUREMENT – calculate perimeter, area, surface area, &amp; volume of 2- and 3-dimensional figures to solve problems.</b></p> <p>6.3.1.1. Calculate the surface area and volume of prisms and use appropriate units, such as <math>\text{cm}^2</math> and <math>\text{cm}^3</math>. Justify the formulas used. Justification may involve decomposition, nets, or other models.</p> <p>6.3.1.2. Calculate the area of quadrilaterals. Quadrilaterals include squares, rectangles, rhombuses, parallelograms, trapezoids, and kites. When formulas are used, be able to explain why they are valid.</p> <p>6.3.1.3. Estimate the perimeter and area of irregular figures on a grid when they cannot be decomposed into common figures and use correct units, such as <math>\text{cm}</math> and <math>\text{cm}^2</math></p> <p><b>GEOMETRY &amp; MEASUREMENT – understand &amp; use relationships between angles in geometric figures.</b></p> <p>6.3.2.1. Solve problems using the relationships between the angles formed by intersecting lines.</p> <p>6.3.2.2. Determine missing angle measures in a triangle using the fact that the sum of the interior angles of a triangle is <math>180^\circ</math>. Use models of triangles to illustrate this fact.</p> <p>6.3.2.3. Develop and use formulas for the sums of the interior angles of polygons by decomposing them into triangles.</p>
<p><b>V. SPATIAL SENSE, GEOMETRY AND MEASUREMENT</b>  <b>C. Measurement</b></p> <ol style="list-style-type: none"> <li>1. Solve problems requiring conversion of units within the U.S. customary system, and within the metric system.</li> <li>2. Express measures of time and distance as fractions, mixed numbers and decimals to solve real-world and mathematical problems.</li> <li>3. Find the area and perimeter of rectangles, squares, triangles and parallelograms by measuring, using a grid or using a formula.</li> </ol>	<p><b>GEOMETRY &amp; MEASUREMENT – choose appropriate units of measurement &amp; use ratios to convert within measurement systems to solve problems.</b></p> <p>6.3.3.1. Solve problems in various contexts involving conversion of weights, capacities, geometric measurements, and times within measurement systems using appropriate units.</p> <p>6.3.3.2. Estimate weights, capacities, and geometric measurements using benchmarks in measurement systems with appropriate units.</p>