

4th Grade Mathematics						
Mathematical Practices	Number and Operations Fractions	Numbers and Operations in Base Ten	Operations and Algebraic Thinking	Measurement and Data	Geometry	Additional Skills Through Interdisciplinary Units of Study
<p>Make sense of problems and persevere in solving them.</p> <p>Reason abstractly and quantitatively.</p> <p>Construct viable arguments and critique the reasoning of others.</p> <p>Model with mathematics.</p> <p>Use appropriate tools strategically.</p> <p>Attend to precision.</p> <p>Look for and make use of structure.</p> <p>Look for and express regularity in repeated reasoning with</p>	<p><b>Extend understanding of fraction equivalence and ordering:</b></p> <p>Convert a whole or mixed number to an improper fraction. Convert an improper fraction to a whole or mixed number.</p> <p>Add and subtract fractions with like denominators.</p> <p>Write fractions in simplest form.</p> <p>Recognize and generate equivalent fractions.</p> <p>Recognize that</p>	<p><b>Generalize place value understanding for multi-digit whole numbers:</b></p> <p>Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. <i>For example, recognize that in 770, the 7 in the hundreds place has the value 700, and is 10 times greater than the 7 in the tens place, which has the value of 70.</i></p> <p>Read and write multi-digit whole</p>	<p><b>Use the four operations with whole numbers to solve problems:</b></p> <p>Interpret a multiplication equation as a comparison, e.g., interpret <math>35 = 5 \times 7</math> as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.</p> <p>Multiply or divide to solve word problems involving</p>	<p><b>Solve problems involving measurement and conversion of measurements:</b></p> <p>Know relative sizes of standard and metric measurement units within one system of units.</p> <p>Measure the length of objects and distances using customary units in both the imperial (inches, feet, yards, miles) and metric (millimeter, centimeter, meter) systems.</p> <p>Choose an appropriate customary unit of</p>	<p><b>Draw and identify lines and angles, and classify shapes by properties of their lines and angles:</b></p> <p>Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular, intersecting and parallel lines. Identify these in two-dimensional figures.</p> <p>Classify two-dimensional figures based on the presence or absence of parallel or</p>	<p>Athenian Secret – a unit of math puzzles &amp; activities, set in a backdrop of Ancient Athens</p> <p>Outreach Project – Bake Sale fund raiser to benefit S.P.C.A. – practical application of money skills</p> <p>Age of Exploration – calculating (estimating) distance traveled of a few of the explorers</p>

<p>operations and algebraic thinking.</p>	<p>comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols <math>&gt;</math>, <math>=</math>, or <math>&lt;</math>, and justify the conclusions, e.g., by using a visual fraction model.</p> <p>Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators (by creating an equivalent fraction), or by comparing to a benchmark fraction such as <math>1/2</math>.</p> <p>Order a set of fractions with different numerators and different denominators by creating equivalent fractions or by</p>	<p>numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on the value of the digits in each place, using <math>&gt;</math>, <math>=</math>, and <math>&lt;</math> symbols to record the results of comparisons; order a set of multi-digit whole numbers.</p> <p>Use place value understanding to round multi-digit whole numbers to any place.</p> <p>Use rounding to estimate answers to computation problems.</p> <p><b>Use place value understanding and properties</b></p>	<p>multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.</p> <p>Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using</p>	<p>measurement to measure the length of an object or distance.</p> <p>Measure to the nearest specified fractional part of a unit (e.g. to the nearest <math>1/4</math> inch).</p> <p>Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. <i>For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in.</i></p> <p>Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of</p>	<p>perpendicular lines, or the presence or absence of angles of a specified size. Recognize right , acute and obtuse triangles as a category, and identify and construct right , obtuse and acute triangles. Identify and construct equilateral, isosceles and scalene triangles.</p> <p>Differentiate between two- and three-dimensional figures or objects.</p> <p>Name and classify three-dimensional objects based on their characteristics (e.g., number of faces, bases, vertices, edges)</p> <p>Identify, draw</p>
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	<p>comparing to a benchmark.</p> <p>Find a fractional part of a whole number or a set.</p> <p><b>Build fractions from unit fractions:</b></p> <p>Understand a fraction <math>a/b</math> with <math>a &gt; 1</math> as a sum of fractions <math>1/b</math>.</p> <p>Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.</p> <p>Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction</p>	<p><b>to perform multi-digit arithmetic:</b></p> <p>Fluently add and subtract multi-digit whole numbers using the standard algorithm. Find the sum for a column of addends.</p> <p>Regroup a minuend containing zeros.</p> <p>Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. Multiply a</p>	<p>mental computation and estimation strategies including rounding.</p> <p><b>Gain familiarity with factors and multiples:</b></p> <p>Recall the multiples of a given whole number. Find all factor pairs for a whole number in the range 1–100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1–100 is odd or even,</p>	<p>objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.</p> <p>Apply the area and perimeter formulas for rectangles in real world and mathematical problems.</p> <p><b>Represent and interpret data:</b></p> <p>Make a line plot to display a data set of measurements in fractions of a</p>	<p>and construct congruent and similar shapes. Classify the movement of geometric shapes.</p> <p>Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.</p> <p>Find the volume of rectangular prisms in various units.</p>	
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	<p>model. <i>Examples:</i>  <math>3/8 = 1/8 + 1/8 + 1/8</math>; <math>3/8 = 1/8 + 2/8</math>  <math>; 2 1/8 = 1 + 1 + 1/8</math>  <math>= 8/8 + 8/8 + 1/8</math>.</p> <p>Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction (i.e. an improper fraction).</p> <p>Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem.</p> <p>Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.</p>	<p>multi-digit factor by a two-digit factor using the standard algorithm.</p> <p>Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate the calculation by using equations, rectangular arrays, and/or area models.</p> <p>Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using the standard ("long</p>	<p>prime or composite.</p> <p><b>Generate and analyze patterns:</b></p> <p>Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. <i>For example, given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.</i></p> <p>Identify the rule for a number</p>	<p>unit (<math>1/2</math>, <math>1/4</math>, <math>1/8</math>). Solve problems involving addition and subtraction of fractions by using information presented in line plots. <i>For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.</i></p> <p><b>Geometric measurement: understand concepts of angle and measure angles:</b></p> <p>Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement.</p> <p>Demonstrate an</p>		
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	<p>Understand a fraction <math>a/b</math> as a multiple of <math>1/b</math>. For example, use a visual fraction model to represent <math>5/4</math> as the product <math>5 \times (1/4)</math>.</p> <p>Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem.</p> <p><b>Understand decimal notation for fractions, and compare decimal fractions:</b></p> <p>Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective</p>	<p>division”) algorithm.</p> <p>Use division to find the <i>mean</i> average of a set of numbers.</p>	<p>pattern and continue it.</p>	<p>angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle.</p> <p>Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.</p>		
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	<p>denominators 10 and 100. For example, express <math>\frac{3}{10}</math> as <math>\frac{30}{100}</math>, and add <math>\frac{3}{10} + \frac{4}{100} = \frac{34}{100}</math>.</p> <p>Use decimal notation for fractions with denominators 10 or 100. For example, rewrite 0.62 as <math>\frac{62}{100}</math>; locate 0.62 on a number line diagram.</p> <p>Compare two decimals to hundredths by reasoning about their size, or by relating them to amounts of money. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols <math>&gt;</math>, <math>=</math>, or <math>&lt;</math>, and justify the conclusions, e.g., by using a visual model.</p>					
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## 4<sup>th</sup> Grade Math Vocabulary:

**Operations & Algebraic Thinking:** variable, inequality, equivalent, differences, factor, equation, product, comparison, expression, similarity, inequality, relationship, similarity, comparison, differences, factor, equation, variable, extraneous, equivalent

**Number & Operations in Base Ten:** comparison, equation, relationship, equivalent, inequality, factor, rounding, regroup, variable, similarity, size, inverse operation, gram, calculate, compare, composite number, million, decimal number, simplify, relative, addend, product, symmetry, centimeter, differences, polyhedron, extraneous, estimation

**Number & Operations - Fractions:** proper fraction, percent, consecutive, common fraction, ordinal number, factor, multiples, improper fraction, mixed number, fraction, compare, dividend, denominator, remainder, divisor, quotient, more than, numerator, less than, equivalent

**Units & Coordinates:** y-axis, line graph, customary units, non-standard units, x-axis, coordinates, coordinate, system, data, unit conversion, unit

**Length:** meter, length, width, kilometer, measurement, inch, yard, centimeter, metric, foot

**Problem Solving:** probability, predict, array, survey, chance, likely, unlikely, certainty, data collection, tendency

**Quantity/Size:** volume, liter, ounce, pint, kilogram, weight, mass, quart, gallon, balance

**Time/Temperature:** Celsius, Fahrenheit, measurement, minute, second, event, degree, time, temperature, hour

**Interpretation:** mean, median, mode, range, likelihood, ordered pairs, statistics, interpret, graph, data

**Presentation:** tree diagram, pie chart, diagram, data, circle graph, Venn diagram, tally, bar graph, frequency table, measure

**Angles:** congruent, acute angle, obtuse angle, rotate, straight angle, degrees, angle, right angle, triangle, perpendicular

**Classification:** similarity, translation, congruent, reflection, rectangular, symmetry, closed figure, open figure, rotation, transformation

**Lines:** intersection, perpendicular, length, line segment, circumference, point, distance, grid, side, line of symmetry

**Measurement:** square unit, area, capacity, degrees, distance, grid, radii, height, diameter, length

**Polygons:** polygon, pentagon, quadrilateral, hexagon, rhombus, pentagon, parallelogram, plane figure, octagon, polyhedron