



## Mathematics Standards

### GRADE: 4

#### Domain: OPERATIONS AND ALGEBRAIC THINKING

Cluster 1: Use the four operations with whole numbers to solve problems.

#### Major Cluster

Don't ... Sort clusters from Major to Supporting, and then teach them in that order. To do so would strip the coherence of the mathematical ideas and miss the opportunity to enhance the major work of the grade with the supporting clusters.

STANDARD CODE	STANDARD
MAFS.4.OA.1.1	Interpret a multiplication equation as a comparison, e.g., interpret $35 = 5 \times 7$ 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.  <i>Cognitive Complexity:</i> Level 1: Recall
MAFS.4.OA.1.2	Multiply or divide to solve word problems involving 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.  <i>Cognitive Complexity:</i> Level 2: Basic Application of Skills & Concepts
MAFS.4.OA.1.3	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 mental computation and estimation strategies including rounding.  <i>Cognitive Complexity:</i> Level 2: Basic Application of Skills & Concepts
MAFS.4.OA.1.a	Determine whether an equation is true or false by using comparative relational thinking. <i>For example, without adding 60 and 24, determine whether the equation <math>60 + 24 = 57 + 27</math> is true or false.</i>
MAFS.4.OA.1.b	Determine the unknown whole number in an equation relating four whole numbers using comparative relational thinking. <i>For example, solve <math>76 + 9 = n + 5</math> for <math>n</math> by arguing that nine is four more than five, so the unknown number must be four greater than 76.</i>

Cluster 2: Gain familiarity with factors and multiples.

#### Supporting Cluster

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STANDARD CODE	STANDARD
MAFS.4.OA.2.4	Investigate factors and multiples. <ul style="list-style-type: none"> <li>a. Find all factor pairs for a whole number in the range 1–100.</li> <li>b. 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.</li> <li>c. Determine whether a given whole number in the range 1–100 is prime or composite.</li> </ul> <i>Cognitive Complexity:</i> Level 2: Basic Application of Skills & Concepts

Cluster 3: Generate and analyze patterns.

Additional Cluster

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STANDARD CODE	STANDARD
MAFS.4.OA.3.5	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>  <i>Cognitive Complexity:</i> Level 2: Basic Application of Skills & Concepts

**Domain: NUMBER AND OPERATIONS IN BASE TEN**

Cluster 1: Generalize place value understanding for multi-digit whole numbers.

Major Cluster

Don't ... Sort clusters from Major to Supporting, and then teach them in that order. To do so would strip the coherence of the mathematical ideas and miss the opportunity to enhance the major work of the grade with the supporting clusters.

STANDARD CODE	STANDARD
MAFS.4.NBT.1.1	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 <math>700 \div 70 = 10</math> by applying concepts of place value and division.</i>  <i>Cognitive Complexity:</i> Level 1: Recall
MAFS.4.NBT.1.2	Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using $>$ , $=$ , and $<$ symbols to record the results of comparisons.  <i>Cognitive Complexity:</i> Level 2: Basic Application of Skills & Concepts
MAFS.4.NBT.1.3	Use place value understanding to round multi-digit whole numbers to any place.  <i>Cognitive Complexity:</i> Level 1: Recall

Cluster 2: Use place value understanding and properties of operations to perform multi-digit arithmetic.

Major Cluster

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STANDARD CODE	STANDARD
MAFS.4.NBT.2.4	Fluently add and subtract multi-digit whole numbers using the standard algorithm.  <i>Cognitive Complexity:</i> Level 1: Recall
MAFS.4.NBT.2.5	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.  <i>Cognitive Complexity:</i> Level 2: Basic Application of Skills & Concepts
MAFS.4.NBT.2.6	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 and explain the calculation by using equations, rectangular arrays, and/or area models.  <i>Cognitive Complexity:</i> Level 2: Basic Application of Skills & Concepts

## Domain: NUMBER AND OPERATIONS - FRACTIONS

Cluster 1: Extend understanding of fraction equivalence and ordering.

### Major Cluster

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STANDARD CODE	STANDARD
MAFS.4.NF.1.1	Explain why a fraction $a/b$ is equivalent to a fraction $(n \times a)/(n \times b)$ by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions. <i>Cognitive Complexity:</i> Level 3: Strategic Thinking & Complex Reasoning
MAFS.4.NF.1.2	Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as $1/2$ . Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols $>$ , $=$ , or $<$ , and justify the conclusions, e.g., by using a visual fraction model. <i>Cognitive Complexity:</i> Level 2: Basic Application of Skills & Concepts

Cluster 2: Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.

### Major Cluster

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STANDARD CODE	STANDARD
MAFS.4.NF.2.3	Understand a fraction $a/b$ with $a > 1$ as a sum of fractions $1/b$ .  <ol style="list-style-type: none"><li>Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.</li><li>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 model. <i>Examples:</i> <math>3/8 = 1/8 + 1/8 + 1/8</math>; <math>3/8 = 1/8 + 2/8</math>; <math>2/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8</math>.</li><li>Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction.</li><li>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.</li></ol> <i>Cognitive Complexity:</i> Level 2: Basic Application of Skills & Concepts
MAFS.4.NF.2.4	Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.  <ol style="list-style-type: none"><li>Understand a fraction <math>a/b</math> as a multiple of <math>1/b</math>. <i>For example, use a visual fraction model to represent <math>5/4</math> as the product <math>5 \times (1/4)</math>, recording the conclusion by the equation <math>5/4 = 5 \times (1/4)</math>.</i></li><li>Understand a multiple of <math>a/b</math> as a multiple of <math>1/b</math>, and use this understanding to multiply a fraction by a whole number. <i>For example, use a visual fraction model to express <math>3 \times (2/5)</math> as <math>6 \times (1/5)</math>, recognizing this product as <math>6/5</math>. (In general, <math>n \times (a/b) = (n \times a)/b</math>.)</i></li><li>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. <i>For example, if each person at a party will eat <math>3/8</math> of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?</i></li></ol> <i>Cognitive Complexity:</i> Level 2: Basic Application of Skills & Concepts

Cluster 3: Understand decimal notation for fractions, and compare decimal fractions.

**Major Cluster**

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STANDARD CODE	STANDARD
MAFS.4.NF.3.5	Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100. <i>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>.</i>  <i>Cognitive Complexity:</i> Level 1: Recall
MAFS.4.NF.3.6	Use decimal notation for fractions with denominators 10 or 100. <i>For example, rewrite 0.62 as <math>\frac{62}{100}</math>; describe a length as 0.62 meters; locate 0.62 on a number line diagram.</i>  <i>Cognitive Complexity:</i> Level 1: Recall
MAFS.4.NF.3.7	Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols $>$ , $=$ , or $<$ , and justify the conclusions, e.g., by using a visual model.  <i>Cognitive Complexity:</i> Level 2: Basic Application of Skills & Concepts

**Domain: MEASUREMENT AND DATA**

Cluster 1: Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.

**Supporting Cluster**

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STANDARD CODE	STANDARD
MAFS.4.MD.1.1	Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. 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. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ...</i>  <i>Cognitive Complexity:</i> Level 1: Recall
MAFS.4.MD.1.2	Use the four operations to solve word problems <sup>1</sup> involving distances, intervals of time, and money, including problems involving simple fractions or decimals <sup>2</sup> . Represent fractional quantities of distance and intervals of time using linear models. ( <sup>1</sup> See glossary <a href="#">Table 1</a> and <a href="#">Table 2</a> ) ( <sup>2</sup> Computational fluency with fractions and decimals is not the goal for students at this grade level.)  <i>Cognitive Complexity:</i> Level 2: Basic Application of Skills & Concepts
MAFS.4.MD.1.3	Apply the area and perimeter formulas for rectangles in real world and mathematical problems. <i>For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.</i>  <i>Cognitive Complexity:</i> Level 2: Basic Application of Skills & Concepts

Cluster 2: Represent and interpret data.

**Supporting Cluster**

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STANDARD CODE	STANDARD
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MAFS.4.MD.2.4	<p>Make a line plot to display a data set of measurements in fractions of a unit (<math>\frac{1}{2}</math>, <math>\frac{1}{4}</math>, <math>\frac{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><i>Cognitive Complexity:</i> Level 2: Basic Application of Skills &amp; Concepts</p>
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Cluster 3: Geometric measurement: understand concepts of angle and measure angles.

Additional Cluster

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STANDARD CODE	STANDARD
MAFS.4.MD.3.5	<p>Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement:</p> <ol style="list-style-type: none"> <li>An 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. An angle that turns through <math>\frac{1}{360}</math> of a circle is called a "one-degree angle," and can be used to measure angles.</li> <li>An angle that turns through <math>n</math> one-degree angles is said to have an angle measure of <math>n</math> degrees.</li> </ol> <p><i>Cognitive Complexity:</i> Level 1: Recall</p>
MAFS.4.MD.3.6	<p>Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.</p> <p><i>Cognitive Complexity:</i> Level 2: Basic Application of Skills &amp; Concepts</p>
MAFS.4.MD.3.7	<p>Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure.</p> <p><i>Cognitive Complexity:</i> Level 2: Basic Application of Skills &amp; Concepts</p>

**Domain: GEOMETRY**

Cluster 1: Draw and identify lines and angles, and classify shapes by properties of their lines and angles.

Additional Cluster

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STANDARD CODE	STANDARD
MAFS.4.G.1.1	<p>Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.</p> <p><i>Cognitive Complexity:</i> Level 1: Recall</p>
MAFS.4.G.1.2	<p>Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.</p> <p><i>Cognitive Complexity:</i> Level 2: Basic Application of Skills &amp; Concepts</p>
MAFS.4.G.1.3	<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><i>Cognitive Complexity:</i> Level 2: Basic Application of Skills &amp; Concepts</p>