**Grade 4**

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| **Operations and Algebraic Thinking** | **4.OA** |

**Use the four operations with whole numbers to solve problems.**

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| **Common Core Standard** | **Components of the standard** | **Teaching Towards Construct / Level** | **Activities that Support the Standard** | **AVMR**  **Support**  **F/P/N\*** |
| 1. Interpret a multiplication equation as a comparison, e.g., interpret 35  = 5 × 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. | Interpret a multiplication equation as a comparison, e.g., interpret 35  = 5 × 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. | M/D 5 | Purple Book  A10.1 Counting by 2s, 5s, 10s, and 3s  A10.2 Repeated equal groups-visible  A10.3 Repeated equal groups-items screened and groups visible  A10.4 Repeated equal groups- groups screened and items screened  A10.5 Multiplication and Division using arrays  A10.6 Word problems  A10.7 Relational thinking using bare number problems  IA10.1 Count Around-Multiples  IA10.2 Trios for Multiples  IA10.3 Quick Draw Multiples  IA10.4 Rolling Groups  IA10.5 Lemonade Stand  IA10.6 Array Flip  IA10.7 Dueling Arrays  IA10.8 Mini Multo  IA10.9 Four’s a Winner  IA10.10 I Have… Who Has… | P |
| 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.1 | 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 | M/D 2-5 | Purple Book  A10.1 Counting by 2s, 5s, 10s, and 3s  A10.2 Repeated equal groups-visible  A10.3 Repeated equal groups-items screened and groups visible  A10.4 Repeated equal groups- groups screened and items screened  A10.5 Multiplication and Division using arrays  A10.6 Word problems  A10.7 Relational thinking using bare number problems  IA10.1 Count Around-Multiples  IA10.2 Trios for Multiples  IA10.3 Quick Draw Multiples  IA10.4 Rolling Groups  IA10.5 Lemonade Stand  IA10.6 Array Flip  IA10.7 Dueling Arrays  IA10.8 Mini Multo  IA10.9 Four’s a Winner  IA10.10 I Have… Who Has… | P |
| 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. | 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. | A/S 5  M/D 5  None  None | Purple Book  A10.1 Counting by 2s, 5s, 10s, and 3s  A10.2 Repeated equal groups-visible  A10.3 Repeated equal groups-items screened and groups visible  A10.4 Repeated equal groups- groups screened and items screened  A10.5 Multiplication and Division using arrays  A10.6 Word problems  A10.7 Relational thinking using bare number problems  IA10.1 Count Around-Multiples  IA10.2 Trios for Multiples  IA10.3 Quick Draw Multiples  IA10.4 Rolling Groups  IA10.5 Lemonade Stand  IA10.6 Array Flip  IA10.7 Dueling Arrays  IA10.8 Mini Multo  IA10.9 Four’s a Winner  IA10.10 I Have… Who Has…  None  None | P  N  N |

**\*F is Full; P is Partial; N is None**

**Gain familiarity with factors and multiples.**

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| **Common Core Standard** | **Components of the standard** | **Teaching Towards Construct / Level** | **Activities that Support the Standard** | **AVMR**  **Support**  **F/P/N\*** |
| 4. 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 prime or composite. | 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 prime or composite. | None  None  None  None | None  None  None  None | N  N  N  N |

**\*F is Full; P is Partial; N is Non**

**Generate and analyze patterns.**

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| **Common Core Standard** | **Components of the standard** | **Teaching Towards Construct / Level** | **Activities that Support the Standard** | **AVMR**  **Support**  **F/P/N\*** |
| 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. *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.* |  |  |  |  |

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| **Number and Operations in Base Ten2** | **4.NBT** |

**Generalize place value understanding for multi-digit whole numbers.**

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| **Common Core Standard** | **Components of the standard** | **Teaching Towards Construct / Level** | **Activities that Support the Standard** | **AVMR**  **Support**  **F/P/N\*** |
| 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. *For example, recognize that 700 ÷ 70 = 10 by applying concepts of place value and division.* | 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. *For example, recognize that 700 ÷ 70 = 10 by applying concepts of place value and division.* | None | \*While MR and AVMR activities support the understanding of Place Value, the standard is written with a more traditional view of Place Value. | None |
| 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. | 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. | NID 5  None | Purple Book:  A3.5 Numeral Identification  IA3.6 Make and Break Numbers  None | P  N |
| 3. Use place value understanding to round multi-digit whole numbers to any place. | Use place value understanding to round multi-digit whole numbers to any place | None | None | N |

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**Use place value understanding and properties of operations to perform multi-digit arithmetic.**

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| **Common Core Standard** | **Components of the standard** | **Teaching Towards Construct / Level** | **Activities that Support the Standard** | **AVMR**  **Support**  **F/P/N\*** |
| 4. Fluently add and subtract multi-digit whole numbers using the standard algorithm. | Fluently add and subtract multi-digit whole numbers using the standard algorithm. | PV 5 | Purple Book:  A8.1 Forward and backward number word sequences by 10s, on and off the decade  A8.2 Adding from a decade and subtracting to a decade  A8.3 Adding to a decade and subtracting from a decade  A8.4 Incrementing and decrementing by 10s on and off the decade  A8.5 Incrementing flexibly by 10s and ones  A8.6 Adding 10s to a 2-digit number and subtracting 10s from a 2-digit number  A8.7 Adding two 2-digit numbers without and with regrouping  A8.8 Subtraction involving two 2-digit numbers without and with regrouping  A8.9 Addition and subtraction using transforming, compensating, and other strategies  A9.1 Higher decade addition and subtraction without and with bridging the decade  A9.2 Partitioning and combining involving 2-digit numbers  A9.3 Combining and partitioning involving non-canonical forms  A9.4 Addition involving two 2-digit numbers without and with regrouping  A9.5 Subtraction involving two 2-digit numbers without and with regrouping  IA8.1 Leap Frog  IA8.2 Bead String with Ten Catcher  IA8.3 Add or Subtract 11  IA8.4 Add to or Subtract from 49  IA8.5 Calculator Challenge  IA8.6 Jump to 100  IA8.7 Jump from 100  IA8.8 Target Number  IA8.9 Walk-about Sequences  IA8.10 Non-standard Measurement Plan  IA9.1 Follow the Pattern  IA9.2 Ten More or Ten Less  IA9.3 Counting by Tens  IA9.4 Add or Subtract Tens  IA9.5 Adding Tens and Ones Using Money  IA9.6 Screened Subtraction Tasks  IA9.7 Split the Subtrahend (Multiples of 10) |  |
| 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. | 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. | None  None | None  None | N  N |
| 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. | 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. | None  None | None  None | N  N |

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| **Number and Operations—Fractions3** | **4.NF** |

**Extend understanding of fraction equivalence and ordering.**

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| **Common Core Standard** | **Components of the standard** | **Teaching Towards Construct / Level** | **Activities that Support the Standard** | **AVMR**  **Support**  **F/P/N\*** |
| 1. Explain why a fraction *a*/*b* is equivalent to a fraction (*n* × *a*)/(*n* × *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. |  |  |  |  |
| 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. |  |  |  |  |

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

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| **Common Core Standard** | **Components of the standard** | **Teaching Towards Construct / Level** | **Activities that Support the Standard** | **AVMR**  **Support**  **F/P/N\*** |
| 3. Understand a fraction *a*/*b* with *a* > 1 as a sum of fractions 1/*b*.  a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.  b. 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. *Examples: 3/8 = 1/8 + 1/8 + 1/8;* *3/8 = 1/8 + 2/8 ; 2 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8.*  c. 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.  d. 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. |  |  |  |  |
| 4. Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.  a. Understand a fraction *a*/*b* as a multiple of 1/*b*. *For example, use* *a visual fraction model to represent 5/4 as the product 5 × (1/4) recording the conclusion by the equation 5/4 = 5 × (1/4).*  b. Understand a multiple of *a*/*b* as a multiple of 1/*b*, and use this understanding to multiply a fraction by a whole number. *For* *example, use a visual fraction model to express 3 × (2/5) as 6 × (1/5),* *recognizing this product as 6/5. (In general, n × (a/b) = (n × a)/b.)*  c. 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. *For example, if each person at a party will eat 3/8 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?* |  |  |  |  |

**\*F is Full; P is Partial; N is None**

**Understand decimal notation for fractions, and compare decimal fractions.**

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| **Common Core Standard** | **Components of the standard** | **Teaching Towards Construct / Level** | **Activities that Support the Standard** | **AVMR**  **Support**  **F/P/N\*** |
| 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 100.4 *For example, express 3/10 as*  *30/100, and add 3/10 + 4/100 = 34/100.* |  |  |  |  |
| 6. Use decimal notation for fractions with denominators 10 or 100. *For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram.* |  |  |  |  |
| 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. |  |  |  |  |

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| **Measurement and Data** | **4.MD** |

**Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.**

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| **Common Core Standard** | **Components of the standard** | **Teaching Towards Construct / Level** | **Activities that Support the Standard** | **AVMR**  **Support**  **F/P/N\*** |
| 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. *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), ...* |  |  |  |  |
| 2. Use the four operations to solve word problems involving distances,  intervals of time, liquid volumes, masses of 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. |  |  |  |  |
| 3. Apply the area and perimeter formulas for rectangles in real world and mathematical problems. *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.* |  |  |  |  |

**\*F is Full; P is Partial; N is None**

**Represent and interpret data.**

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| **Common Core Standard** | **Components of the standard** | **Teaching Towards Construct / Level** | **Activities that Support the Standard** | **AVMR**  **Support**  **F/P/N\*** |
| 4. Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. *For example,* *from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection....* |  |  |  |  |

**\*F is Full; P is Partial; N is None**

**Geometric measurement: understand concepts of angle and measure angles.**

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| **Common Core Standard** | **Components of the standard** | **Teaching Towards Construct / Level** | **Activities that Support the Standard** | **AVMR**  **Support**  **F/P/N\*** |
| 5. Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement:  a. 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 1/360 of a circle is called a “one-degree angle,” and can be used to measure angles.  b. An angle that turns through *n* one-degree angles is said to have an angle measure of *n* degrees.*...* |  |  |  |  |
| 6. Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure. |  |  |  |  |
| 7. 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. |  |  |  |  |

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| **Geometry** | **4.G** |

**Draw and identify lines and angles, and classify shapes by properties of their lines and angles.**

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| **Common Core Standard** | **Components of the standard** | **Teaching Towards Construct / Level** | **Activities that Support the Standard** | **AVMR**  **Support**  **F/P/N\*** |
| 1. Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.*...* |  |  |  |  |
| 2. 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. |  |  |  |  |
| 3. 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. |  |  |  |  |

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1See Glossary, Table 2.

2Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000.

3Grade 4 expectations in this domain are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.

4Students who can generate equivalent fractions can develop strategies for adding fractions with unlike denominators in general. But addition and subtraction with unlike denominators in general is not a requirement at this grade.