Arizona Mathematics

Grade 4

Adopted 2016

Operations and Algebraic Thinking

A. Use the four operations with whole numbers to solve problems. 4.OA.A

1. Represent verbal statements of multiplicative comparisons as multiplication equations. Interpret a multiplication equation as a comparison (e.g., 35 is the number of objects in 5 groups, each containing 7 objects, and is also the number of objects in 7 groups, each containing 5 objects). 4.OA.A.1
2. Multiply or divide within 1000 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). 4.OA.A.2
3. Solve multi-step word problems using the four operations, including problems in which remainders must be interpreted. Understand how the remainder is a fraction of the divisor. Represent these problems using equations with a letter standing for the unknown quantity. 4.OA.A.3

B. Gain familiarity with factors and multiples. 4.OA.B

4. Find all factor pairs for a whole number in the range 1 to 100 and understand that a whole number is a multiple of each of its factors. 4.OA.B.4

C. Generate and analyze patterns. 4.OA.C

5. Generate a number pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself and explain the pattern informally (e.g., 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). 4.OA.C.5
6. When solving problems, assess the reasonableness of answers using mental computation and estimation strategies including rounding. 4.OA.C.6

Number and Operations in Base Ten

A. Generalize place value understanding for multi-digit whole numbers. 4.NBT.A

1. Apply concepts of place value, multiplication, and division to understand that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. 4.NBT.A.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. 4.NBT.A.2
3. Use place value understanding to round multi-digit whole numbers to any place. 4.NBT.A.3

B. Use place value understanding and properties of operations to perform multi-digit arithmetic. 4.NBT.B

4. Fluently add and subtract multi-digit whole numbers using a standard algorithm. 4.NBT.B.4
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. 4.NBT.B.5
6. Demonstrate understanding of division by finding whole-number quotients and remainders with up to four-digit dividends and one-digit divisors. 4.NBT.B.6

Number and Operations – Fractions

A. Extend understanding of fraction equivalence and ordering. 4.NF.A

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 understand and generate equivalent fractions. 4.NF.A.1
2. Compare two fractions with different numerators and different denominators (e.g., by creating common denominators or numerators and by comparing to a benchmark fraction). 4.NF.A.2
    a. Understand that comparisons are valid only when the two fractions refer to the same size whole. 4.NF.A.2.A
    b. Record the results of comparisons with symbols >, =, or <, and justify the conclusions. 4.NF.A.2.B

B. Apply and extend previous understanding of multiplication to multiply a whole number by a fraction. 4.NF.B

3. Understand a fraction a/b with a > 1 as a sum of unit fractions (1/b). 4.NF.B.3
   a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. 4.NF.B.3.A
   b. Decompose a fraction into a sum of fractions with the same denominator in more than one way (e.g., 3/8 = 1/8 + 1/8 + 1/8; 3/8 = 2/8 + 1/8; 2 1/8 = 1 + 1 + 1/8 + or 2 1/8 = 8/8 + 8/8 + 1/8). 4.NF.B.3.B
   c. Add and subtract mixed numbers with like denominators (e.g., by using properties of operations and the relationship between addition and subtraction and/or by replacing each mixed number with an equivalent fraction). 4.NF.B.3.C
   d. Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators. 4.NF.B.3.D
4. Build fractions from unit fractions. 4.NF.B.4
   a. Understand a fraction a/b as a multiple of a unit fraction 1/b. In general, a/b = a × 1/b. 4.NF.B.4.A
   b. Understand a multiple of a/b as a multiple of a unit fraction 1/b, and use this understanding to multiply a whole number by a fraction. In general, n × a/b = n × a/b. 4.NF.B.4.B
   c. Solve word problems involving multiplication of a whole number by a fraction. 4.NF.B.4.C

C. Understand decimal notation for fractions, and compare decimal fractions. 4.NF.C

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 (tenths) and 100 (hundredths). 4.NF.C.5
6. Use decimal notation for fractions with denominators 10 (tenths) or 100 (hundredths), and locate these decimals on a number line. 4.NF.C.6
7. Compare two decimals to hundredths by reasoning about their size. Understand that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <. 4.NF.C.7

Measurement and Data

A. Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit. 4.MD.A

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 and in a smaller unit in terms of a larger unit. 4.MD.A.1
2. Use the four operations to solve word problems and problems in real-world context involving distances, intervals of time (hr, min, sec), liquid volumes, masses of objects, and money, including decimals and problems involving fractions with like denominators, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using a variety of representations, including number lines that feature a measurement scale. 4.MD.A.2
3. Apply the area and perimeter formulas for rectangles in mathematical problems and problems in real-world contexts including problems with unknown side lengths. 4.MD.A.3

B. Represent and interpret data. 4.MD.B

4. Make a line plot to display a data set of measurements in fractions of a unit (½, ¼, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. 4.MD.B.4

C. Geometric measurement: Understand concepts of angle and measure angles. 4.MD.C

5. Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement: 4.MD.C.5
   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. 4.MD.C.5.A
   b. An angle that turns through n one-degree angles is said to have an angle measure of n degrees. 4.MD.C.5.B
6. Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure. 4.MD.C.6
7. Understand angle measures 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 within mathematical problems as well as problems in real-world contexts. 4.MD.C.7

Geometry

A. Draw and identify lines and angles, and classify shapes by properties of their lines and angles. 4.G.A

1. Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures. 4.G.A.1
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 (e.g., understand right triangles as a category, and identify right triangles). 4.G.A.2
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. 4.G.A.3

Standards for Mathematical Practice

1. **Make sense of problems and persevere in solving them.** 4.MP.1
2. **Reason abstractly and quantitatively.** 4.MP.2
3. **Construct viable arguments and critique the reasoning of others.** 4.MP.3
4. **Model with mathematics.** 4.MP.4
5. **Use appropriate tools strategically.** 4.MP.5
6. **Attend to precision.** 4.MP.6
7. **Look for and make use of structure.** 4.MP.7
8. **Look for and express regularity in repeated reasoning.** 4.MP.8