Arizona Mathematics Standards– 3rd Grade Standards Placemat

Grade level content emphasis indicated by: ● Major Cluster; ▲ Supporting Cluster

1. ***Extend understanding of place value of multi-digit numbers to 1000 and fluently add and subtract multi-digit numbers to 1000.***

   Students generalize their understanding of place value through 1000 and the relative size of numbers in each place. They use their understanding of properties of operations to perform multi-digit addition and subtraction with multi-digit whole numbers less than or equal to 1000. They round multi-digit numbers to 10 or 100.

2. ***Develop competency in multiplication and division and strategies for multiplication and division within 100 and develop understanding of the structure of rectangular arrays and of area.***

   Students develop an understanding of the meanings of multiplication and division of whole numbers through activities and problems involving equal-sized groups, arrays, and area models as described in Table 2. Students use properties of operations to calculate products of whole numbers, using increasingly sophisticated strategies based on these properties to solve multiplication and division problems involving single-digit factors. By comparing a variety of solution strategies, students learn the relationship between multiplication and division. Students understand that rectangular arrays can be decomposed into identical rows or into identical columns. By working with arrays, students connect area to multiplication and justify using multiplication to determine the area. By the end of 3rd grade, students are fluent in multiplication and division within 100.

3. ***Develop understanding of fractions as numbers, especially unit fractions.***

   Students develop an understanding of fractions as numbers, beginning with unit fractions. Students understand that the size of a fractional part is relative to the size of the whole. Students are able to use fractions to represent numbers equal to, less than, and greater than one. They solve problems that involve comparing fractions by using visual fraction models and strategies based on recognizing equal numerators or denominators.

Operations and Algebraic Thinking (OA)

Note: Grade 3 expectations in this domain are limited to whole number multiplication through 10 x 10 and whole number division with both quotients and divisors less than or equal to 10.

● 3.OA.A Represent and solve problems involving whole number multiplication and division.

3.OA.A.1: Interpret products of whole numbers as the total number of objects in equal groups (e.g., interpret 5 x 7 as the total number of objects in 5 groups of 7 objects each).

3.OA.A.2: Interpret whole number quotients of whole numbers (e.g., interpret 56 ÷ 8 as the number of objects in each group when 56 objects are partitioned equally into 8 groups, or as a number of groups when 56 objects are partitioned into equal groups of 8 objects each). *See Table 2.*

3.OA.A.3: Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities. *See Table 2.*

3.OA.A.4: Determine the unknown whole number in a multiplication or division equation relating three whole numbers *For example, determine the unknown number that makes the equation true in each of the equations 8 x ☐ = 48, 5 = ☐ ÷ 3, 6 x 6 = ☐. See Table 2.*

● 3.OA.B Understand properties of multiplication and the relationship between multiplication and division.

3.OA.B.5: Apply properties of operations as strategies to multiply and divide. Properties include commutative and associative properties of multiplication and the distributive property. (Students do not need to use the formal terms for these properties.)

3.OA.B.6: Understand division as an unknown-factor problem (e.g., find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8).

● 3.OA.C Multiply and divide within 100.

3.OA.C.7: Fluently multiply and divide within 100. By the end of Grade 3, know from memory all multiplication products through 10 x 10 and division quotients when both the quotient and divisor are less than or equal to 10.

● 3.OA.D Solve problems involving the four operations, and identify and explain patterns in arithmetic.

3.OA.D.8: Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Utilize understanding of the Order of Operations when there are no parentheses.

3.OA.D.9: Identify patterns in the addition table and the multiplication table and explain them using properties of operations (e.g. observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends).

3.OA.D.10: When solving problems, assess the reasonableness of answers using mental computation and estimation strategies including rounding.

Number and Operations in Base Ten (NBT)

Note: A range of algorithms may be used.

▲ 3.NBT.A Use place value understanding and properties of operations to perform multi-digit arithmetic.

3.NBT.A.1: Use place value understanding to round whole numbers to the nearest 10 or 100.

3.NBT.A.2: Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

3.NBT.A.3: Multiply one-digit whole numbers by multiples of 10 in the range 10 to 90 using strategies based on place value and the properties of operations (e.g., 9 x 80, 5 x 60).

Number and Operations – Fractions (NF)

Note: Grade 3 expectations are limited to fractions with denominators: 2,3,4,6,8.

● 3.NF.A Understand fractions as numbers.

3.NF.A.1: Understand a fraction (1/b) as the quantity formed by one part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size 1/b.

3.NF.A.2: Understand a fraction as a number on the number line; represent fractions on a number line diagram.

a. Represent a fraction 1/b on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Understand that each part has size 1/b and that the end point of the part based at 0 locates the number 1/b on the number line.

b. Represent a fraction a/b on a number line diagram by marking off a lengths 1/b from 0. Understand that the resulting interval has size a/b and that its endpoint locates the number a/b on the number line including values greater than 1.

c. Understand a fraction 1/b as a special type of fraction that can be referred to as a unit fraction (e.g. 1/2, 1/4).

3.NF.A.3: Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size.

a. Understand two fractions as equivalent if they have the same relative size compared to 1 whole.

b. Recognize and generate simple equivalent fractions. Explain why the fractions are equivalent.

c. Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers.

d. Compare two fractions with the same numerator or the same denominator by reasoning about their size. Understand that comparisons are valid only when the two fractions refer to the same whole. Record results of comparisons with the symbols >, =, or <, and justify conclusions.

Measurement and Data (MD)

▲ 3.MD.A Solve problems involving measurement.

3.MD.A.1a: Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes (e.g., representing the problem on a number line diagram).

3.MD.A.1b: Solve word problems involving money through $20.00, using symbols $, ".", ¢.

3.MD.A.2: Measure and estimate liquid volumes and masses of objects using metric units. (Excludes compound units such as cm^3 and finding the geometric volume of a container.) Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units. Excludes multiplicative comparison problems (problems involving notions of "times as much"). *See Table 2.*

▲ 3.MD.B Represent and interpret data.

3.MD.B.3: Create a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. *See Table 1.*

3.MD.B.4: Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch to the nearest quarter-inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters.

● 3.MD.C Geometric measurement: Understand concepts of area and perimeter.

3.MD.C.5: Understand area as an attribute of plane figures and understand concepts of area measurement.

a. A square with side length 1 unit, called "a unit square," is said to have "one square unit" of area, and can be used to measure area.

b. A plane figure which can be covered without gaps or overlaps by *n* unit squares is said to have an area of *n* square units.

3.MD.C.6: Measure areas by counting unit squares (e.g., square cm, square m, square in, square ft, and improvised units).

3.MD.C.7: Relate area to the operations of multiplication and addition.

a. Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths.

b. Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real-world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning.

c. Use tiling to show that the area of a rectangle with whole-number side lengths a and b + c is the sum of a × b and a × c. Use area models to represent the distributive property in mathematical reasoning.

d. Understand that rectilinear figures can be decomposed into non-overlapping rectangles and that the sum of the areas of these rectangles is identical to the area of the original rectilinear figure. Apply this technique to solve problems in real-world contexts.

3.MD.C.8: Solve real-world and mathematical problems involving perimeters of plane figures and areas of rectangles, including finding the perimeter given the side lengths, finding an unknown side length. Represent rectangles with the same perimeter and different areas or with the same area and different perimeters.

Geometry (G)

▲ 3.G.A Reason with shapes and their attributes.

3.G.A.1: Understand that shapes in different categories (e.g., rhombuses, rectangles, and others)may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples quadrilaterals that do not belong to any of these subcategories.

3.G.A.2: Partition shapes into *b* parts with equal areas. Express the area of each part as a unit fraction 1/*b* of the whole. (Grade 3 expectations are limited to fractions with denominators *b* = 2,3,4,6,8.)

Mathematical Practices

The Standards for Mathematical Practice complement the content standards so that students increasingly engage with the subject matter as they grow in mathematical maturity and expertise throughout the elementary, middle, and high school years.

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