Arizona Mathematics Standards– 5th Grade Standards Placemat
Grade level content emphasis indicated by: ● Major Cluster; ▲ Supporting Cluster

1. *Develop competency in dividing and fluency in multiplying whole numbers through the application of understanding of place value and multiplication and division.*

   Students develop understanding of why division procedures work based on the meaning of base-ten numerals and properties of operations. They are fluent with multi-digit multiplication of whole numbers. Students are able to explain patterns associated with multiplication through application of their knowledge of place value such as explaining the pattern in the number of zeros in a product. Students apply their understanding of division to begin working with decimals. They understand and can explain the placement of the decimal point when multiplying or dividing. Students apply their understanding of addition and multiplication of whole numbers (NBT) to foundational understanding of volume (MD).

2. *Develop understanding in performing operations with decimals to hundredths and estimating by rounding.*

   Students apply their understandings of models for decimals, decimal notation, and properties of operations to add and subtract decimals to hundredths. They develop fluency in these computations and make reasonable estimates (through rounding) of their results. Students use the relationship between decimals and fractions, as well as the relationship between finite decimals and whole numbers (e.g., a finite decimal multiplied by an appropriate power of 10 is a whole number), to understand and explain why the procedures for multiplying and dividing finite decimals make sense. They compute products and quotients of decimals to hundredths.

3. *Develop understanding of multiplication of fractions and division of fractions in limited cases (unit fractions divided by whole numbers and whole numbers divided by unit fractions).*

   Students apply their understanding of fractions and fraction models to efficiently and accurately add and subtract fractions with unlike denominators. Students use their understanding of fractions; make connections to their understanding of multiplication and division, to explain the "why" of multiplying and dividing fractions. (Note: Division of fractions is limited to dividing unit fractions by whole numbers and whole numbers by unit fractions.)

Operations and Algebraic Thinking (OA)

▲ 5.OA.A Write and interpret numerical expressions.

5.OA.A.1: Use parentheses and brackets in numerical expressions, and evaluate expressions with these symbols (Order of Operations).

5.OA.A.2: Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them (e.g., express the calculation "add 8 and 7, then multiply by 2" as 2 x (8 + 7). Recognize that 3 x (18,932 + 921) is three times as large as 18,932 + 921, without having to calculate the indicated sum or product).

▲ 5.OA.B Analyze patterns and relationships.

5.OA.B.3: Generate two numerical patterns using two given rules (e.g., generate terms in the resulting sequences). Identify and explain the apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane (e.g., given the rule "add 3" and the starting number 0, and given the rule "add 6" and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence).

5.OA.B.4: Understand primes have only two factors and decompose numbers into prime factors.

Number and Operations in Base Ten (NBT)

● 5.NBT.A Understand the place value system.

5.NBT.A.1: Apply concepts of place value, multiplication, and division to understand that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.

5.NBT.A.2: Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10.

5.NBT.A.3: Read, write, and compare decimals to thousandths.
   a. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form.
   b. Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the

5.NBT.A.4: Use place value understanding to round decimals to any place.

● 5.NBT.B Perform operations with multi-digit whole numbers and with decimals to hundredths.

5.NBT.B.5: Fluently multiply multi-digit whole numbers using a standard algorithm..

5.NBT.B.6: Apply and extend understanding of division to find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors.

5.NBT.B.7: Add, subtract, multiply, and divide decimals to hundredths, connecting objects or drawings to strategies based on place value, properties of operations, and/or the relationship between operations. Relate the strategy to a written form.

Number and Operations – Fractions (NF)

● 5.NF.A Use equivalent fractions to add and subtract fractions.

5.NF.A.1: Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators (e.g., 2/3 + 5/4 = 8/12 + 15/12 = 23/12).

5.NF.A.2: Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators by using a variety of representations, equations, and visual models to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers (e.g. recognize an incorrect result 2/5 + 1/2 = 3/7, by observing that 3/7 < 1/2).

● 5.NF.B Use previous understandings of multiplication and division to multiply and divide fractions.

5.NF.B.3: Interpret a fraction as the number that results from dividing the whole number numerator by the whole number denominator (a/b = a ÷ b). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers. *For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people, each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?*

5.NF.B.4: Apply and extend previous understandings of multiplication to multiply a fraction by a whole number and a fraction by a fraction.
   a. Interpret the product (a/b) x q as a parts of a partition of q into b equal parts. *For example, use a visual fraction model to show (2/3) x 4 = 8/3, and create a story context for this equation.*

   b. Interpret the product of a fraction multiplied by a fraction (a/b) x (c/d). Use a visual fraction model and create a story context for this equation. *For example, use a visual fraction model to show (2/3) x (4/5) = 8/15, and create a story context for this equation.* In general, (a/b) x (c/d) = ac/bd.

   c. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.

5.NF.B.5: Interpret multiplication as scaling (resizing), by:
   a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.

   b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number; explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $\frac{a}{b} = \frac{n \times a}{n \times b}$ to the effect of multiplying $\frac{a}{b}$ by 1.

5.NF.B.6: Solve problems in real-world contexts involving multiplication of fractions, including mixed numbers, by using a variety of representations including equations and models.

5.NF.B.7: Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.
   a. Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. Use the relationship between multiplication and division to justify conclusions.

   b. Interpret division of a whole number by a unit fraction, and compute such quotients. *For example, create a story context for 4 ÷ (1/5), and use a visual fraction model to show the quotient.* Use the relationship between multiplication and division to justify conclusions (e.g., 4 ÷ (1/5) = 20 because 20 x (1/5) = 4).

   c. Solve problems in real-world context involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, using a variety of representations.

Measurement and Data (MD)

▲ 5.MD.A Convert like measurement units within a given measurement system.

5.MD.A.1: Convert among different-sized standard measurement units within a given measurement system, and use these conversions in solving multi-step, real-world problems.

▲ 5.MD.B Represent and interpret data.

5.MD.B.2: Make a line plot to display a data set of measurements in fractions of a unit (1/8, 1/2, 3/4). Use operations on fractions for this grade to solve problems involving information presented in line plots. *For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.*

● 5.MD.C Geometric measurement: Understand concepts of volume and relate volume to multiplication and to addition.

5.MD.C.3: Recognize volume as an attribute of solid figures and understand concepts of volume measurement.
   a. A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume.
   b. A solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units.

5.MD.C.4: Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.

5.MD.C.5: Relate volume to the operations of multiplication and addition and solve mathematical problems and problems in real-world contexts involving volume.
   a. Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes (e.g., to represent the associative property of multiplication).

   b. Understand and use the formulas $V = l \times w \times h$ and $V = B \times h$, where in this case B is the area of the base ($B = l \times w$), for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths to solve mathematical problems and problems in real-world contexts.

   c. Understand volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms, applying this technique to solve mathematical problems and problems in real-world contexts.

Geometry (G)

▲ 5.G.A Graph points on the coordinate plane to solve mathematical problems as well as problems in real-world context.

5.G.A.1: Understand and describe a coordinate system as perpendicular number lines, called axes, that intersect at the origin (0 , 0). Identify a given point in the first quadrant of the coordinate plane using an ordered pair of numbers, called coordinates. Understand that the first number (x) indicates the distance traveled on the horizontal axis, and the second number (y) indicates the distance traveled on the vertical axis.

5.G.A.2: Represent real-world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.

▲ 5.G.B Classify two-dimensional figures into categories based on their properties.

5.G.B.3: Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category.

5.G.B.4: Classify two-dimensional figures in a hierarchy based on properties.

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.

Arizona is suggesting instructional time encompass a range of at least 65%-75% for Major Clusters and a range of 25%-35% for Supporting Cluster instruction.