MATHEMATICAL IDEAS & CONCEPTS:

- **Continue to interpret, model, and represent multiplicative comparison**
- **Continue to use the four operations with whole numbers to solve problems, including multi-step problems and problems involving measurement and conversions**
- **Continue to generalize place value understanding for multi-digit whole numbers**
- **Continue to understand fraction equivalence**
- **Build fractions from unit fractions and extend understanding of operations of whole numbers** *new this quarter*
- **Continue to classify shapes by properties**

ESSENTIAL QUESTIONS:

1. *How can I model and represent comparison situations?*
2. *How can I use place value and properties of operations to work with whole numbers?*
3. *How can I use equivalency to compare fractions?*
4. *How can I use visual models to represent operations with fractions?*
5. *How is the presence or absence of an attribute important when classifying two-dimensional figures?*

STANDARDS:

Aligned to Essential Questions; Big Idea/Concept Standard (★) with supporting standards (➔) connected below

Notes in gray font are from the AR Mathematics standards; RPS instructional pacing notes are in red font

EQ 1: How can I model and represent comparison situations?

★ **4.OA.A.2** *Q2 Focus: Modeling and representing comparison situations*

- **Multiply or divide to solve word problems involving multiplicative comparison**
- **Use drawings and** *equations* **with a letter for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison** *Working with situations with the product as the unknown # x # = ?*

➔ **4.OA.A.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*

➔ **4.MD.A.1** *new this quarter*

- **Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec; yd, ft, in; gal, qt, pt, c**
- **Within a single system of measurement, express measurements in the form of 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), and (3, 36)**

This standard provides a new context for the comparison problems. Pose problems that are only* ***metric to metric* *or* ***customary to customary*** *relationship comparisons with the product as the unknown.*

EQ 2: How can I use place value and properties of operations to work with whole numbers?

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

★ **4.OA.A.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**
  Students should begin to be flexible when deciding to use the distributive property or the associative property to help solve the problem.
- **Assess the reasonableness of answers using mental computation and estimation strategies including rounding**

➔ **4.MD.A.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.*

★ **4.NBT.B.4 Add and subtract multi-digit** *whole numbers* **with** *computational fluency* **using a standard** *algorithm* *Fluency is the end of year expectation; students should be exposed to a variety of base-ten strategies prior to expectation of fluent use of a base-ten strategy/recording system.*

Notes 4.NBT.B.4:

- *Computational fluency is defined as a student's ability to efficiently and accurately solve a problem with some degree of flexibility with their strategies.*
- *A standard algorithm can be viewed as, but should not be limited to, the traditional recording system.*
- *A standard algorithm denotes any valid base-ten strategy.*

★ **4.NBT.B.5** *Note: 4.NBT.B.5 Properties of operations need to be referenced.*

- **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 area models**

★ **4.NBT.B.6** *Note: 4.NBT.B.6 Properties of operations need to be referenced.*

- **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 the relationship between multiplication and division**
- **Illustrate and explain the calculation by using** *equations*, *rectangular arrays*, **and area models**
  Students need to explore different ways to break the dividend and divisor to make problem solving easier (note: the dividend can be decomposed both multiplicatively and additively; the divisor can only be decomposed multiplicatively)

➔ **4.NBT.A.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 or 700 =10x70 by applying concepts of** *place value* **and division.**

When performing operations with fractions at this grade level, the use of visual models to represent fractions is considered a proficient practice.
End of year expectation includes using visual fraction models and/or equations.

EQ 3: How can I use equivalency to compare fractions?

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

★ **4.NF.A.1**

- **By using** *visual fraction models*, **explain why a** *fraction a*/*b* **is equivalent to a** *fraction* (*n* × *a*)/(*n* × *b*) **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. For example:* **1/5 is equivalent to (2x1) / (2x5)**

➔ **4.NF.A.2** *new this quarter*

- **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 ½)**
- **Recognize that comparisons are valid only when the two** *fractions* **refer to the same whole. Record the results of comparisons with symbols (>, =, <), and justify the conclusions (e.g., by using a** *visual fraction model***)**

➔ **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 and 100.** *For example:* **Express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100.** *new this quarter*
Note: 4.NF.C.5 Students who can generate equivalent fractions can develop strategies for adding fractions with unlike denominators in general. However, addition and subtraction with unlike denominators in general is not a requirement at this grade.

➔ **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:** *Formal assessment begins Q3* *Note: 4.MD.C.5 Use the degree symbol (e.g., 360°).*

- **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**
- **An angle that turns through** *n* **one-degree angles is said to have an angle measure of** *n* **degree.**

When performing operations with fractions at this grade level, the use of visual models to represent fractions is considered a proficient practice.
End of year expectation includes using visual fraction models and/or equations.

EQ 4: How can I use visual models to represent operations with fractions?

Note: Grade 4 expectations in this domain are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.
Q2 Focus: Explore operations with fractions using visual models

★ **4.NF.B.3 Understand a *fraction a/b* with *a* > 1 as a *sum* of *fractions* 1/*b* (e.g., 3/8=1/8+1/8+1/8):** *new this quarter*

- **Understand addition and subtraction of *fractions* as joining and separating parts referring to the same whole**
- **Decompose a *fraction* into a *sum* of *fractions* with the same *denominator* in more than one way, recording each decomposition by an equation and justify decompositions (e.g., by using a *visual fraction model*) (e.g., 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)**
- **Add and subtract mixed numbers with like *denominators* (e.g., by using properties of operations and the relationship between addition and subtraction and by replacing each number with an equivalent *fraction*)**
- **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)**

Note: 4.NF.B.3 Converting a mixed number to an improper fraction should not be viewed as a separate technique to be learned by rote memorization, but simply a case of fraction addition (e.g., 7 1/5 =7 + 1/5 = 35/5 + 1/5 = 36/5).

➔ **4.MD.B.4** *new this quarter*

- **Make a *line plot* to display a data set of measurements in *fractions* of a unit (e.g., 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.**

★ **4.NF.B.4 Apply and extend previous understandings of multiplication to multiply a *fraction* by a whole number:** *new this quarter*

Note: 4.NF.B.4 Emphasis should be placed on the relationship of how the unit fraction relates to the multiple of the fraction.

- **Understand a *fraction a/b* as a multiple of 1/b (e.g., 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))**
- **Understand a multiple of a/b as a multiple of 1/b, and use this understanding to multiply a *fraction* by a whole number [e.g., 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)]**
- **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?**

EQ 5: How is the presence or absence of an attribute important when classifying two-dimensional figures?

★ **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:** *Formal assessment begins Q3* *Note: 4.MD.C.5 Use the degree symbol (e.g., 360°).*

- **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**
- **An angle that turns through *n* one-degree angles is said to have an angle measure of *n* degree .**

➔ **4.MD.C.7** *new this quarter*

- **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**
  For example: **Use an equation with a symbol for the unknown angle measure.**

★ **4.G.A.2**
Q2 explores classification ideas based on presence or absence of parallel or perpendicular lines and general angle ideas. Specific measurement of angles begins in Q3.

- **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**

Additional Standards:

➔ **4.MD.A.2** *Note: 4.MD.A.2 This is a standard that may be addressed throughout the year focusing on different context.*

- **Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money including the ability to make change; 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.**