1. Extend understanding of place value to multi-digit numbers and fluently add and subtract multi-digit numbers. Students generalize their understanding of place value through 1,000,000, and the relative size of numbers in each place. They use their understanding of properties of operations to perform multi-digit arithmetic with multi-digit whole numbers less than or equal to 1,000,000. They round multi-digit numbers and fluently add and subtract multi-digit whole numbers within 1,000,000.

2. Develop competency with multi-digit multiplication, and develop understanding of dividing to find quotients involving multi-digit dividends. Students apply their understanding of models for multiplication, place value, and properties of operations, in particular the distributive property, to multiply multi-digit whole numbers using strategies based on place value and the properties of operations. For example, they use models for division to multiplication to find quotients involving multi-digit dividends.

3. Develop understanding of fraction equivalence, addition, and subtraction of fractions with like denominators, and multiplication of fractions by whole numbers. Students develop understanding of fraction equivalence and operations with fractions. They recognize that two different fractions can be equal (e.g., 150/3 = 50), and they develop methods for generating and recognizing equivalent fractions. Students extend previous understandings about how fractions are built from unit fractions, composing fractions from unit fractions, decomposing fractions into unit fractions, and using the meaning of fractions and the meaning of multiplication to multiply a fraction by a whole number.

Operations and Algebraic Thinking (OA)

**4.OA.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. For example, interpret 35 as the number of objects in 5 groups, each containing 7 objects. In general, view 35 as a multiple of 5 and 7.

**4.OA.A.2** Multiply or divide within 100 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. See Table 2.

**4.OA.A.3** Solve multistep word problems using the four operations, including problems in which remainders must be interpreted. Understand the relationship between the remainders and the divisor. An important problem-solving strategy is to express answers using equations with a letter standing for the unknown quantity.

**4.OA.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.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 them 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.6** When solving problems, assess the reasonableness of answers using mental computation and estimation strategies including rounding.

Number and Operations in Base Ten (NBT)

**4.NBT.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. Students understand the value of a digit in one place is always ten times as much as it represents in the place to its left.

**4.NBT.A.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.3** Use place value understanding to round multi-digit whole numbers to any place.

**4.NBT.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.5** Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers. Students use strategies based on place value and the properties of operations. Illustrate and explain how calculations are done using equal groups, arrays, and area models.

**4.NBT.B.6** Demonstrate understanding of division by finding whole number quotients and remainders with up to four-digit dividends and one-digit divisors.

Number and Operations – Fractions (NF)

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

**4.NF.A.1** Explain why a fraction a/b is equivalent to a fraction (n x a)/(n x b) by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves represent the same size. Use this principle to understand and generate equivalent fractions.

**4.NF.A.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). For example, recognize and generate simple equivalent fractions (4/6 = 2/3), compare two fractions (3/5 > 1/3), compare a fraction and a whole number (3/4 = 1 + 3/4), and understand why 3/4 = 3/4. Compare three fractions using this principle and express the comparisons as true or false.

**4.NF.A.3** Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.

**4.NF.B.3** Understand a fraction as a/b as a sum of fractions a/1 with the same denominator (e.g., 5/3 = 1/3 + 1/3 + 1/3 + 1/3 + 1/3).

**4.NF.B.3a** Add and subtract fractions with like denominators (e.g., by using visual fraction models or equations to represent the problem).

**4.NF.B.3b** Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. For example, write 4/10 as 2/10 + 2/10; 3/10 + 1/10; and 1/10 + 2/10.

**4.NF.B.4** Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.

**4.NF.B.4a** 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 x (1/4), recording the conclusion by the equation 5/4 = 5 x (1/4).

**4.NF.B.4b** Add and subtract mixed numbers with like denominators (e.g., by using visual fraction models or equations to represent the problem). For example, by using visual fraction models, show 3/4 + 2/5 by creating an equivalent fraction with denominator 20, adding, and showing 7/20 to be the sum. Students apply their understanding of models for division to multiplication to find quotients involving multi-digit dividends.

**4.NF.B.4c** Solve word problems involving multiplication of a whole number by a fraction. 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 the answer lie?

**4.NF.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 and 100 (tenths and hundredths). For example, express 3/10 as 30/100, and 4/10 + 5/100 = 45/100. (Note: Students who can generate equivalent fractions can develop strategies for adding fractions with unlike denominators. But addition and subtraction with unlike denominators, in general, is not a requirement at this grade.)

**4.NF.C.6** Use decimal notation for fractions with denominators 10 or 100. For example, rewrite 2/10 as 0.2 and rewrite 2/100 as 0.02.

**4.NF.C.7** Compare two decimals to hundredths by reasoning about their size. Understand that comparing two decimals by looking at which decimals have the same number of two-digit decimals is sometimes misleading and that comparing two decimals with different numbers of digits should not be done without transforming one or both decimals to the same number of digits. Compare the decimals 0.23 and 0.203.

Measurement and Data (MD)

**4.MD.A Solve problems involving measurement and conversion of measurements.**

**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. A person 120 cm tall can be said to have a height of 1.2 meters; and a person 5 ft 10 in. tall can be said to have a height of 70 inches (70 in. = 5 ft 10 in).

**4.MD.A.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 a variety of representations, including line plots.

**4.MD.A.3** Apply the area and perimeter formulas for rectangles in real-world and mathematical problems (e.g., using the perimeter and area of rectangles to derive the formula for the area of a parallelogram)

Mathematical Practices

The Standards for Mathematical Practice describe ways in which students should engage with the content standards so that they 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.