

Grade 4- Module 4 - Foundations for Fraction Operations

Massachusetts Learning Standards Taught in this Unit

- **4.NF.A.1** Explain why a fraction a/b is equivalent to a fraction $(n \times a)/(n \times b)$ by using visual fraction models, with attention to how the numbers and sizes of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions, including fractions greater than 1.
- **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 such as $1/2$. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols $>$, $=$, or $<$, and justify the conclusions, e.g., by using a visual fraction model.
- **3.NF.A.1** Understand a fraction $1/b$ as the quantity formed by 1 part when a whole (a single unit) is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size $1/b$.
- **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 diagrams such as number line diagrams that feature a measurement scale.
- **4.MD.B.4** Make a line plot (dot plot) representation to display a data set of measurements in fractions of a unit ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$). Solve problems involving addition and subtraction of fractions by using information presented in line plots (dot plots).
For example, from a line plot (dot plot) find and interpret the difference in length between the longest and shortest specimens in an insect collection.
- **4.NF.B.3.a** Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. (The whole can be a set of objects.)
- **4.NF.B.3.b** Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using drawings or visual fraction models.
Examples: $3/8 = 1/8 + 1/8 + 1/8$; $3/8 = 1/8 + 2/8$; $2 \frac{1}{8} = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8$.
- **4.NF.B.3.c** Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction.
- **4.NF.B.3.d** Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using drawings or visual fraction models and equations to represent the problem.
- **4.NF.B.4.a** 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 $5 \times (1/4)$, recording the conclusion by the equation $5/4 = 5 \times (1/4)$.
- **4.NF.B.4.b** Understand a multiple of a/b as a multiple of $1/b$, and use this understanding to multiply a fraction by a whole number.
For example, use a visual fraction model to express $3 \times (2/5)$ as $6 \times (1/5)$, recognizing this

product as $6/5$. (In general, $n \times (a/b) = (n \times a)/b$.)

- **3.NF.A.3.a** Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line.
- **3.NF.A.3.b** Recognize and generate simple equivalent fractions, e.g., $1/2 = 2/4$, $4/6 = 2/3$. Explain why the fractions are equivalent, e.g., by using a visual fraction model.
- **4.NF.B.4.c** 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?
- **3.NF.A.3.c** Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers.
For example, express 3 in the form $3 = 3/1$; recognize that $6/1 = 6$; locate $4/4$ and 1 at the same point of a number line diagram.
- **3.NF.A.3.d** Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols $>$, $=$, or $<$, and justify the conclusions, e.g., by using a visual fraction model.
- **3.MD.C.7.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.