



## Topic D

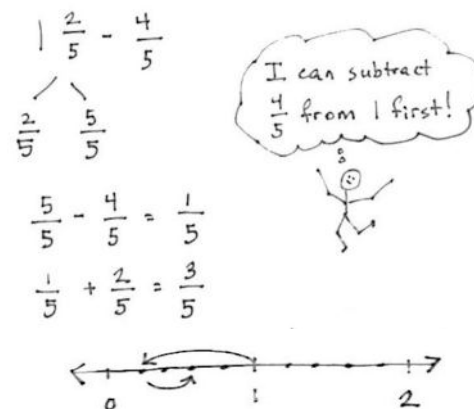
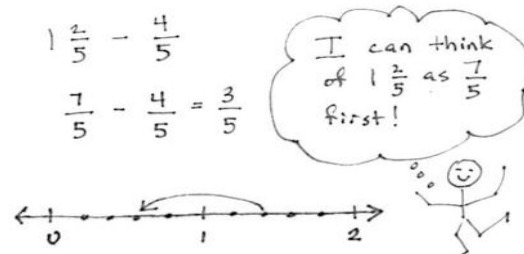
# Fraction Addition and Subtraction

## 4.NF.3ad, 4.NF.1, 4.MD.2

<b>Focus Standards:</b>	4.NF.3ad	Understand a fraction $a/b$ with $a > 1$ as a sum of fractions $1/b$ . a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. d. 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.
<b>Instructional Days:</b>	6	
<b>Coherence</b>	<b>-Links from:</b> G3–M5	Fractions as Numbers on the Number Line
	<b>-Links to:</b> G5–M3	Addition and Subtraction of Fractions

Topic D bridges students' understanding of whole number addition and subtraction to fractions. Everything that they know to be true of addition and subtraction with whole numbers now applies to fractions. Addition is finding a total by combining like units. Subtraction is finding an unknown part. Implicit in the equations  $3 + 2 = 5$  and  $2 = 5 - 3$  is the assumption that the numbers are referring to the *same* units.

In Lessons 16 and 17, students generalize familiar facts about whole number addition and subtraction to work with fractions. Just as 3 apples – 2 apples = 1 apple, students note that 3 fourths – 2 fourths = 1 fourth. Just as 6 days + 3 days = 9 days = 1 week 2 days, students note that  $\frac{6}{7} + \frac{3}{7} = \frac{9}{7} = \frac{7}{7} + \frac{2}{7} = 1\frac{2}{7}$ . In Lesson 17, students decompose a whole into a fraction having the same denominator as the subtrahend. For example,  $1 - 4$  fifths becomes 5 fifths – 4 fifths = 1 fifth, connecting with Topic B skills. They then see that, when solving  $1\frac{2}{5} - \frac{4}{5}$ , they have a choice of subtracting  $\frac{4}{5}$  from  $\frac{7}{5}$  or from 1 (as pictured to the right). Students model with tape diagrams and number lines to understand and then verify their numerical work.

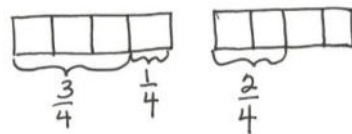


In Lesson 18, students add more than two fractions and see sums of more than one whole, such as  $\frac{2}{8} + \frac{5}{8} + \frac{7}{8} = \frac{14}{8}$ . As students move into problem solving in Lesson 19, they create tape diagrams or number lines to represent and solve fraction addition and subtraction word problems (see the example below). These problems bridge students into work with mixed numbers, which follows the Mid-Module Assessment.

Mary mixed  $\frac{3}{4}$  cup of wheat flour,  $\frac{2}{4}$  cup of rice flour, and  $\frac{1}{4}$  cup of oat flour for her bread dough. How many cups of flour did she put in her bread in all?

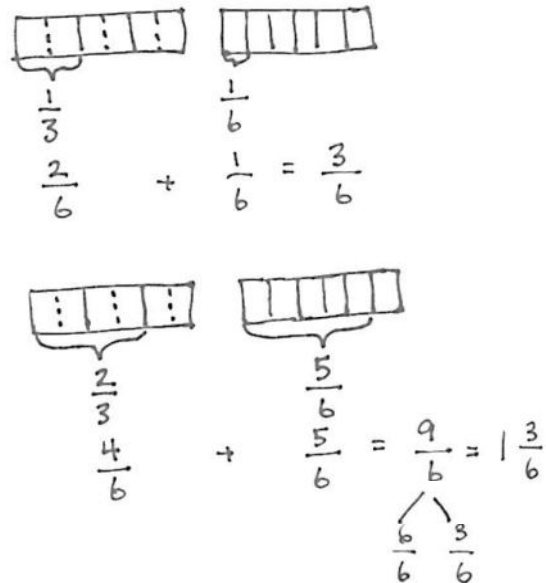
$$\frac{3}{4} + \frac{2}{4} + \frac{1}{4} = \frac{6}{4}$$

$$\frac{6}{4} = \frac{4}{4} + \frac{2}{4} = 1 + \frac{2}{4} = 1\frac{2}{4}$$



Mary used  $\frac{6}{4}$  or  $1\frac{2}{4}$  cups flour.

In Lessons 20 and 21, students add fractions with related units, where one denominator is a multiple (or factor) of the other. To add such fractions, a decomposition is necessary. Decomposing one unit into another is familiar territory: Students have had ample practice composing and decomposing in Topics A and B when working with place value units, converting units of measurement, and using the distributive property. For example, they have converted between equivalent measurement units (e.g., 100 cm = 1 m), and they have used such conversions to do arithmetic (e.g., 1 meter – 54 centimeters). With fractions, the concept is the same. To find the sum of  $\frac{1}{2}$  and  $\frac{1}{4}$ , one simply renames (converts, decomposes)  $\frac{1}{2}$  as  $\frac{2}{4}$  and adds:  $\frac{2}{4} + \frac{1}{4} = \frac{3}{4}$ . All numerical work is accompanied by visual models that allow students to use and apply their known skills and understandings. The addition of fractions with related units is also foundational to decimal work when adding tenths and hundredths in Module 6. Please note that addition of fractions with related denominators is not assessed.



**A Teaching Sequence Toward Mastery of Fraction Addition and Subtraction**

- Objective 1:** Use visual models to add and subtract two fractions with the same units.  
(Lesson 16)
- Objective 2:** Use visual models to add and subtract two fractions with the same units, including subtracting from one whole.  
(Lesson 17)
- Objective 3:** Add and subtract more than two fractions.  
(Lesson 18)
- Objective 4:** Solve word problems involving addition and subtraction of fractions.  
(Lesson 19)
- Objective 5:** Use visual models to add two fractions with related units using the denominators 2, 3, 4, 5, 6, 8, 10, and 12.  
(Lessons 20–21)