

# Adding and Subtracting Fractions

## Key Content from This Unit:

Students apply their understanding of addition and subtraction of whole numbers to addition and subtraction of fractions with like denominators. Students can do this by composing fractions using unit fractions and decomposing fractions into unit fractions (for example,  $\frac{3}{8} = \frac{1}{8} + \frac{1}{8} + \frac{1}{8}$  or  $\frac{3}{8} = \frac{2}{8} + \frac{1}{8}$ ). It is important to use visual models and equations to represent the problem. Students also add and subtract mixed numbers with like denominators by recognizing that a mixed number is a collection of unit fractions (for example  $1\frac{1}{2} = \frac{1}{2} + \frac{1}{2} + \frac{1}{2}$ ). Students create and solve addition and subtraction word problems using visual models. They also use data in  $\frac{1}{2}$ ,  $\frac{1}{4}$ , and  $\frac{1}{8}$  increments to create and interpret visual representations of data on line plots.

## Vocabulary to Know:

**Benchmark** - standard or reference point by which something is measured)

**Common denominator** - when two or more fractions have the same denominator

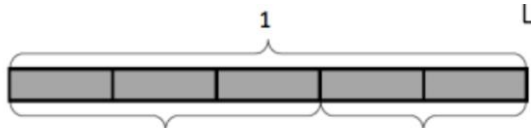
**Line plot** - display of data on a number line, using an x or another mark to show frequency

**Mixed number** - number made up of a whole number and a fraction

**Compose** - change a group of unit fractions with the same denominator to a single non-unit fraction or mixed number

**Decompose** - change a non-unit fraction or mixed number to the sum of its parts or unit fractions

**Unit fraction** - fractions with numerator 1

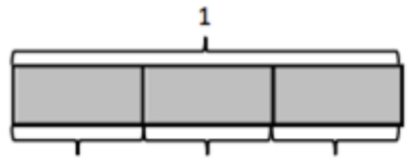


$$\frac{5}{5} = \frac{3}{5} + \frac{2}{5}$$

$$\frac{5}{5} = \left(3 \times \frac{1}{5}\right) + \left(2 \times \frac{1}{5}\right)$$

The tape diagram above shows how to break one whole into fifths, and then how those fifths can be grouped and added together to create the whole.

The tape diagram below shows a simple fraction addition problem in which each part of the tape is equal to one-third of the whole.



$$1 = \frac{1}{3} + \frac{1}{3} + \frac{1}{3}$$

## What came before this:

In the previous unit, students gained a deep understanding of equivalent fractions and used this understanding to compare fractions.

## What comes after this:

In later units, students will use the understanding of fractions to apply the same reasoning to decimal numbers, and build a solid foundation for later work with decimal operations.

## Common Core Focus:

- Decompose and compose a fraction in multiple ways, and record the decompositions using equations.
- Add and subtract mixed numbers with like denominators by replacing each mixed number with an equivalent fraction (i.e.,  $1\frac{1}{2} = \frac{3}{2}$ )
- Solve word problems involving addition and subtraction of fractions having like denominators by using fraction models
- Make a line plot to display a data set of measurements in fractions of a unit ( $\frac{1}{2}$ ,  $\frac{1}{4}$ ,  $\frac{1}{8}$ ) and solve problems using the data.

## Spotlight on the Math Practices

### **Model with Mathematics**

Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace.

In this unit, students *model with mathematics* when they:

- Apply math to solve everyday problems.
- Reflect on results and decide if they make sense.
- Represent or model the relationship between quantities (tape diagrams are a great model for this).

## How Can You Help?

- Help your child come up with their own word problem that will result in a fraction.
- Go on a measuring hunt around the house. For example, find a book that is 6 and  $\frac{1}{2}$  inches long. Find an item in your desk that is  $3\frac{3}{4}$  inches long. Plot all of the measurements on a line plot as you go. Tell statements about what the data shows you.

## KEY MATHEMATICAL MODELS of the COMMON CORE

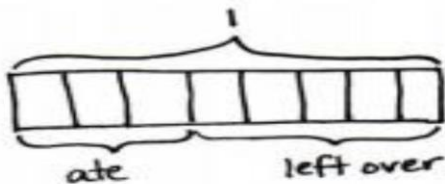
### Tape Diagram

The tape diagram is a powerful model that students can use to solve various kinds of problems. Beginning in first grade, tape diagrams are used as simple models of addition and subtraction. Now in fourth grade, we will use them to model operations on fractions as well.

Tape diagrams are also called “bar models” and consist of a simple bar drawing that students make and adjust to fit a word or computation problem. They then use the drawing to discuss and solve the problem. As students move through the grades, tape diagrams provide an essential bridge to algebra and solving for an unknown quantity. They are flexible mathematical tools that grow to fit students’ needs as elementary mathematics increases in complexity.

#### Problem:

*Mr. Salazar cut his son’s birthday cake into equal pieces. Mr. Salazar, Mrs. Salazar, and the birthday boy each ate 1 piece of cake. What fraction of the cake was left?*



#### Solution 1

$$1 - \frac{3}{8} = \frac{8}{8} - \frac{3}{8} = \frac{5}{8}$$

$\frac{5}{8}$  of the cake is left.

#### Solution 2

$$\frac{1}{8} + \frac{1}{8} + \frac{1}{8} + x = \frac{8}{8}$$

$$\frac{3}{8} + x = \frac{8}{8}$$

$$\frac{3}{8} + \frac{5}{8} = \frac{8}{8} \quad x = \frac{5}{8}$$

## Some Resources to Help at Home

- <http://www.mathlanding.org/content/who-wants-pizza> - This series of interactive activities introduces fraction concepts, notation, addition, and multiplication in a concept-building way. It includes a teacher page with implementation ideas and standards alignment.
- <http://www.mathlanding.org/content/number-line-bars-fractions> - Students use these virtual fraction bars to model fractional addition, subtraction, multiplication (of fractions by whole numbers), and division on a number line.
- <http://harcourtschool.com/activity/elab2004/gr4/16.html> - Students will use a ruler to measure fractional parts.
- <http://www.mathlanding.org/content/thinking-blocks-fractions> - This interactive Flash activity gives students an opportunity to visually model and calculate six different types of fraction applications, all in the context of solving word problems.