

Home Connection

In third grade, students added and subtracted fractions with like denominators when the total was less than or equal to 1. This chapter introduces fourth graders to adding and subtracting both proper and improper fractions.

Adding and Subtraction with Like Denominators

Similar to how whole numbers count like objects, fractions can count like units. These units are equal sized parts of a whole number, such as sevenths or fifths. To add or subtract fractions, the unit, or denominator, must be the same. We can easily add $\frac{5}{7}$ and $\frac{2}{7}$. An analogy that might be helpful for students to understand why finding common denominators is important is we can add 5 feet and 2 feet, but not 5 feet and 2 yards.

Addition and Subtraction with Unlike Denominators

Students will learn to add fractions in which one denominator is a simple multiple of the other. For example, $\frac{3}{4}$ and $\frac{1}{2}$ have unlike denominators, but they are considered “related fractions”. Students can see that 2 is a factor of 4 and 4 is multiple of 2. To add these related fractions, we must find an equivalent fraction for one of the fractions. In this chapter, each time a student is asked to add or subtract unlike denominators, the denominators will always be related in some way.

Example: $\frac{3}{4} + \frac{1}{2}$

We want to change our smaller denominator to our larger denominator. We see that 2 can change to a 4 by multiplying by 2. What is done to the denominator, must also be done to the numerator, so we will multiply our 1 by 2 as well.

Now we have: $\frac{3}{4} + \frac{2}{4} = \frac{5}{4} = 1\frac{1}{4}$

Adding Mixed Numbers

There are two methods to add mixed numbers.

Method 1: Students can start by adding the first mixed number and whole number of the second mixed number. Next, they add the remaining fractional part of the second number.

$$3\frac{1}{2} + 1\frac{5}{8}$$
$$3\frac{1}{2} \xrightarrow{+1} 4\frac{1}{2}$$
$$4\frac{1}{2} = 4\frac{4}{8}$$
$$4\frac{4}{8} \xrightarrow{+\frac{5}{8}} 4\frac{9}{8} = 5\frac{1}{8}$$

Method 2: Add the whole number parts and the fraction parts separately.

$$\begin{aligned}
 3 + \frac{1}{2} + 1 + \frac{5}{8} &= 3 + 1 + \frac{1}{2} + \frac{5}{8} \\
 &= 4 + \frac{4}{8} + \frac{5}{8} \\
 &= 4\frac{9}{8} = 5\frac{1}{8}
 \end{aligned}$$

Subtracting Mixed Numbers

To subtract a fraction from a mixed number when the fraction part of the mixed number is less than the fraction being subtracted, students will regroup 1 whole to a fraction in order to have enough parts from which to subtract.

For example:

$$2\frac{1}{6} - \frac{2}{3}$$

As $\frac{2}{3}$ is greater than $\frac{1}{6}$, we can think of 2 as 1 and $\frac{6}{6}$

and then add the sixths together:

$\frac{2}{3}$ is converted to $\frac{4}{6}$ and now it is possible to

subtract the fractional part.

$$1\frac{7}{6} - \frac{4}{6} = 1\frac{1}{2}$$

$$\begin{array}{r}
 2\frac{1}{6} - \frac{2}{3} = 1\frac{7}{6} - \frac{4}{6} \\
 \diagdown \quad | \\
 1\frac{6}{6}
 \end{array}$$

A similar process is followed when subtracting one mixed number from another:

$$3\frac{3}{8} - 1\frac{3}{4} =$$

Students can subtract the whole number first, and then the fraction, using concepts they have already learned in previous lessons.

$$3\frac{3}{8} \xrightarrow{-1} 2\frac{3}{8}$$

Convert the remaining part of the fraction to be subtracted, $\frac{3}{4}$ to eighths: $\frac{3}{4} = \frac{6}{8}$

Now subtract $\frac{6}{8}$ from $2\frac{3}{8}$. Since $\frac{6}{8}$ is greater than $\frac{3}{8}$, we can think of $2\frac{3}{8}$ as $1 + \frac{8}{8} + \frac{3}{8}$ or $1\frac{11}{8}$.

Solve:

$$\begin{array}{r}
 2\frac{3}{8} - \frac{6}{8} = 1\frac{11}{8} - \frac{6}{8} \\
 \diagdown \quad | \\
 1\frac{8}{8} \quad = 1\frac{5}{8}
 \end{array}$$

Students may also find that it is easier to convert mixed numbers to improper fractions, subtract, and then simplify.

What Can We Do At Home?

Activity

▲ Decomposing Fractions

Have students find different ways to decompose fractions.

For example, $\frac{7}{8}$ can be decomposed to:

- $\frac{6}{8} + \frac{1}{8}$
- $\frac{5}{8} + \frac{2}{8}$
- $\frac{4}{8} + \frac{3}{8}$
- $\frac{5}{8} + \frac{1}{8} + \frac{1}{8}$
- $\frac{2}{8} + \frac{2}{8} + \frac{3}{8}$