

5.3 Addition of Fractions and Mixed Numbers

Vocabulary

Common Denominator- A non zero number that is a *multiple* of the denominator of two or more fractions. For example, the fractions $\frac{1}{2}$ and $\frac{2}{3}$ have common denominators 6, 12, 18 and other multiples of 6.

Quick Common Denominator (QCD)- The *product* of the *denominators* of two or more fractions. For example, the QCD of $\frac{3}{4}$ and $\frac{5}{6}$ is $4 \times 6 = 24$. In general, the quick common denominator of $\frac{a}{b}$ and $\frac{c}{d}$ is $b \times d$. This is a *quick* way to get a common denominator but it doesn't always give you the *least common denominator*.

Multiplication Rule for Equivalent Fractions- To generate fractions that are equivalent to a given fraction, multiply the numerator and the denominator by the same number.

Adding Fractions

Remember, in order to add fractions the fractions MUST have common denominators.

1. Find a **common denominator** for $\frac{1}{5}$ and $\frac{2}{3}$. Remember the strategies in the previous lesson to help you find a common denominator. A quick way to find a common denominator is to multiply both denominators together to find the **quick common denominator (QCD)**. In this case, $5 \times 3 = 15$, so **15** is the **QCD**.
2. Use the **multiplication rule for equivalent fractions** to rewrite each fraction as an equivalent fraction with a denominator of 15.

$$\begin{array}{r} \frac{1}{5} = \frac{(1 \times 3)}{(5 \times 3)} = \frac{3}{15} \\ + \\ \frac{2}{3} = \frac{(2 \times 5)}{(3 \times 5)} = \frac{10}{15} \\ \hline \end{array}$$

3. Add the fractions with common(like) denominators.

$$\begin{array}{r} \frac{3}{15} \\ + \\ \frac{10}{15} \\ \hline \frac{13}{15} \end{array}$$

Adding Mixed Numbers with Common(like) Denominators

1. Add the whole number parts.
2. Add the fraction parts.
3. Rename $3\frac{10}{8}$.

$$\begin{array}{r} 2\frac{7}{8} \\ + 1\frac{3}{8} \\ \hline 3\frac{10}{8} \end{array}$$

- You start with 3 wholes and 10 eighths.
- Write a 3 to show the 3 wholes. Show $\frac{10}{8}$.
Make a group of 8 eighths:



- Trade $\frac{8}{8}$ for 1 whole. Now you have 3 wholes, plus 1 whole and 2 eighths.
So, $3\frac{10}{8} = 3 + 1\frac{2}{8} = 4\frac{2}{8}$.

Adding Mixed Numbers with Unlike Denominators

1. Find a **common denominator** for the fraction parts of the mixed numbers. Remember the strategies in the previous lesson to help you find a common denominator. A quick way to find a common denominator is to multiply both denominators together to find the **quick common denominator (QCD)**. In this case, $5 \times 3 = 15$, so **15** is the **QCD**.

$$2 \frac{1}{5} + 1 \frac{2}{3}$$

2. Rewrite the problem vertically.

$$\begin{array}{r} 2 \frac{1}{5} \\ + \\ 1 \frac{2}{3} \\ \hline \end{array}$$

3. Use the **multiplication rule for equivalent fractions** to rewrite each fraction as an equivalent fraction with a denominator of 15.

$$\begin{array}{r} 2 \frac{1}{5} = 2 \frac{(1 \times 3)}{(5 \times 3)} = 2 \frac{3}{15} \\ + \\ 1 \frac{2}{3} = 1 \frac{(2 \times 5)}{(3 \times 5)} = 1 \frac{10}{15} \\ \hline \end{array}$$

4. Add the fractions with common(like) denominators.

$$\begin{array}{r} 2 \frac{3}{15} \\ + \\ 1 \frac{10}{15} \\ \hline 3 \frac{13}{15} \end{array}$$