

Adding Fractions with Different Denominators

When the fractions in an addition problem do not have the same denominators, rewrite the problem so that each fraction has the same denominator, called a **common denominator**.

To add a half dollar and a quarter, think of the half dollar as two quarters. As a fraction problem, a half dollar plus a quarter is $\frac{2}{4} + \frac{1}{4} = \frac{3}{4}$ dollar.

A common denominator is a number that can be divided evenly by all the denominators in a problem. The *smallest* number that can be divided evenly by all the denominators in a problem is called the **lowest common denominator** or **LCD**.

Sometimes the largest denominator in a problem is the LCD.

EXAMPLE $\frac{3}{5} + \frac{4}{15} =$

STEP 1 Since 5 divides evenly into 15, the LCD is 15.

STEP 2 Raise $\frac{3}{5}$ to $\frac{9}{15}$. (See page 18.)

STEP 3 Add the new fractions.

$$\begin{array}{r} \frac{3}{5} = \frac{9}{15} \\ + \frac{4}{15} = \frac{4}{15} \\ \hline \frac{13}{15} \end{array}$$

Add and reduce.

1. $\frac{3}{4} + \frac{1}{2}$ $\frac{2}{3} + \frac{5}{6}$ $\frac{7}{8} + \frac{3}{4}$ $\frac{5}{6} + \frac{1}{3}$ $\frac{5}{9} + \frac{2}{3}$

2. $\frac{3}{8} + \frac{1}{2}$ $\frac{1}{6} + \frac{3}{4}$ $\frac{2}{5} + \frac{9}{10}$ $\frac{2}{3} + \frac{1}{4}$ $\frac{3}{5} + \frac{4}{15}$

3. $\frac{3}{4} + \frac{3}{20}$ $\frac{2}{3} + \frac{1}{2}$ $\frac{5}{24} + \frac{1}{3}$ $\frac{4}{9} + \frac{7}{18}$ $\frac{7}{10} + \frac{11}{30}$

Finding a Common Denominator

Here are two ways of finding a common denominator when the largest denominator in an addition problem doesn't work.

1. Multiply the denominators together.
2. Go through the multiplication table of the largest denominator.

EXAMPLE 1 $\frac{2}{5} + \frac{3}{4} =$

STEP 1 Multiply the denominators. $5 \times 4 = 20$. 20 is the LCD.

STEP 2 Raise each fraction to 20ths as on page 18.

STEP 3 Add the new fractions.

STEP 4 Change the answer to a mixed number.

$$\begin{array}{r} \frac{2}{5} = \frac{8}{20} \\ + \frac{3}{4} = \frac{15}{20} \\ \hline \frac{23}{20} = 1\frac{3}{20} \end{array}$$

EXAMPLE 2 $\frac{2}{3} + \frac{5}{6} + \frac{3}{4} =$

STEP 1 Go through the multiplication table of the 6's.

$6 \times 1 = 6$, which cannot be divided by 4.

$6 \times 2 = 12$, which can be divided by 3 and 4.

STEP 2 Raise each fraction to 12ths.

STEP 3 Add the new fractions.

STEP 4 Change the answer to a mixed number and reduce.

$$\begin{array}{r} \frac{2}{3} = \frac{8}{12} \\ \frac{5}{6} = \frac{10}{12} \\ + \frac{3}{4} = \frac{9}{12} \\ \hline \frac{27}{12} = 2\frac{3}{12} = 2\frac{1}{4} \end{array}$$

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

$\frac{3}{4}$
 $+ \frac{1}{3}$

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

$\frac{3}{7}$
 $+ \frac{1}{3}$

$\frac{5}{6}$
 $+ \frac{2}{5}$

2. $\frac{4}{7}$
 $+ \frac{3}{4}$

$\frac{5}{6}$
 $+ \frac{2}{7}$

$\frac{3}{8}$
 $+ \frac{4}{5}$

$\frac{2}{3}$
 $+ \frac{4}{11}$

$\frac{5}{9}$
 $+ \frac{3}{5}$

$$3. \quad \begin{array}{r} \frac{5}{6} \\ + \frac{3}{4} \\ \hline \end{array} \quad \begin{array}{r} \frac{4}{9} \\ + \frac{5}{6} \\ \hline \end{array} \quad \begin{array}{r} \frac{7}{10} \\ + \frac{3}{4} \\ \hline \end{array} \quad \begin{array}{r} \frac{5}{12} \\ + \frac{5}{9} \\ \hline \end{array} \quad \begin{array}{r} \frac{3}{8} \\ + \frac{5}{6} \\ \hline \end{array}$$

$$4. \quad \begin{array}{r} \frac{2}{3} \\ \frac{5}{8} \\ + \frac{3}{4} \\ \hline \end{array} \quad \begin{array}{r} \frac{1}{4} \\ \frac{3}{5} \\ + \frac{7}{10} \\ \hline \end{array} \quad \begin{array}{r} \frac{8}{9} \\ \frac{5}{6} \\ + \frac{3}{4} \\ \hline \end{array} \quad \begin{array}{r} \frac{5}{16} \\ \frac{5}{8} \\ + \frac{1}{2} \\ \hline \end{array} \quad \begin{array}{r} \frac{2}{9} \\ \frac{1}{2} \\ + \frac{5}{6} \\ \hline \end{array}$$

$$5. \quad \begin{array}{r} \frac{5}{6} \\ \frac{2}{5} \\ + \frac{4}{15} \\ \hline \end{array} \quad \begin{array}{r} \frac{7}{12} \\ \frac{5}{8} \\ + \frac{3}{4} \\ \hline \end{array} \quad \begin{array}{r} \frac{2}{3} \\ \frac{1}{6} \\ + \frac{11}{12} \\ \hline \end{array} \quad \begin{array}{r} \frac{7}{20} \\ \frac{3}{8} \\ + \frac{3}{10} \\ \hline \end{array} \quad \begin{array}{r} \frac{4}{9} \\ \frac{1}{6} \\ + \frac{5}{12} \\ \hline \end{array}$$

$$6. \quad \begin{array}{r} \frac{2}{3} \\ \frac{4}{9} \\ + \frac{5}{6} \\ \hline \end{array} \quad \begin{array}{r} \frac{6}{7} \\ \frac{3}{4} \\ + \frac{1}{2} \\ \hline \end{array} \quad \begin{array}{r} \frac{2}{9} \\ \frac{1}{3} \\ + \frac{1}{6} \\ \hline \end{array} \quad \begin{array}{r} \frac{5}{7} \\ \frac{4}{9} \\ + \frac{2}{3} \\ \hline \end{array} \quad \begin{array}{r} \frac{11}{16} \\ \frac{1}{3} \\ + \frac{7}{8} \\ \hline \end{array}$$

Rewrite each problem with whole numbers under whole numbers and fractions under fractions. Then add and reduce.

$$7. \quad 4\frac{3}{5} + 6\frac{3}{4} =$$

$$7\frac{5}{8} + 9\frac{2}{3} =$$

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

$$8. \quad 6\frac{5}{12} + 7\frac{3}{8} =$$

$$10\frac{2}{7} + 8\frac{1}{3} =$$

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

9. $7\frac{9}{10} + 8\frac{1}{4} =$

$3\frac{4}{9} + 12\frac{5}{6} =$

$9\frac{5}{8} + 3\frac{7}{12} =$

10. $8\frac{5}{6} + 2\frac{2}{9} =$

$3\frac{7}{8} + 11\frac{3}{5} =$

$6\frac{9}{10} + 5\frac{2}{3} =$

11. $5\frac{2}{3} + 9\frac{3}{5} + 2\frac{7}{10} =$

$3\frac{3}{8} + 8\frac{1}{6} + 7\frac{3}{4} =$

$2\frac{2}{9} + 10\frac{3}{4} + 4\frac{5}{6} =$

12. $6\frac{1}{2} + 1\frac{1}{3} + 14\frac{1}{4} =$

$7\frac{7}{8} + \frac{2}{3} + 4\frac{1}{2} =$

$9\frac{5}{12} + 11\frac{2}{3} + \frac{4}{9} =$

13. $6\frac{7}{16} + \frac{1}{2} + 8\frac{5}{8} =$

$12\frac{3}{4} + 9\frac{5}{6} + \frac{2}{3} =$

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

14. $\frac{6}{7} + 15\frac{3}{5} + 7\frac{7}{10} =$

$4\frac{5}{12} + \frac{4}{9} + 19\frac{3}{4} =$

$11\frac{7}{8} + 5\frac{3}{7} + \frac{1}{2} =$