

Lesson 36: Add and Subtract Fractions with Unlike Denominators

Purpose of lesson: You will learn how to add and subtract fractions with **different** denominators.



When you add or subtract fractions, and the denominators are not the same, you must find a new denominator that is the same before you solve the problem.

Word to Know: Multiples of 2 are: 2, 4, 6, 8, 10 ...etc.

Multiples of 5 are: 5, 10, 15, 20, 25 ...etc. (See Glossary)

This is how it works:

- 1) You need to find a **multiple** of each denominator that is the same.
- 2) You can find a **multiple** by multiplying each denominator by numbers starting with **1** until you get to the same number for each **denominator**.

Do you wonder why this math rule is true?

When the numerator and denominator of a fraction are of equal value, the fraction equals one whole.

(1 whole = $\frac{4}{4}$, $\frac{5}{5}$, $\frac{6}{6}$ etc.)

4 5 6

So any fraction multiplied by one whole doesn't change the fraction's value.

$\frac{1}{3} = \frac{4}{12}$

These two fractions are of equal value because 1 can be multiplied by one whole:

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$\frac{4}{4} = 1$ whole; thus $\frac{1}{3} \times \frac{4}{4} = \frac{4}{12}$.



Here are some examples:

a) You want to add the fractions $\frac{1}{3}$ and $\frac{1}{4}$. This is how you set it up.

$$\begin{array}{r} \frac{1}{3} \times \frac{4}{4} = \frac{4}{12} \\ \frac{1}{3} \times \frac{4}{4} = \frac{4}{12} \end{array} \quad \text{multiples of 3 are: 3, 6, 9, 12...}$$

$$\begin{array}{r} \frac{1}{4} \times \frac{3}{3} = \frac{3}{12} \\ + \frac{1}{4} \times \frac{3}{3} = \frac{3}{12} \end{array} \quad \text{multiples of 4 are: 4, 8, 12...}$$

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b) You want to add the fractions $\frac{1}{2}$ and $\frac{2}{5}$. This is how you set it up.

$$\begin{array}{r} \frac{1}{2} \times \frac{5}{5} = \frac{5}{10} \\ \frac{1}{2} \times \frac{5}{5} = \frac{5}{10} \end{array} \quad \text{multiples of 5 are: 5, 10...}$$

$$\begin{array}{r} \frac{2}{5} \times \frac{2}{2} = \frac{4}{10} \\ + \frac{2}{5} \times \frac{2}{2} = \frac{4}{10} \end{array} \quad \text{multiples of 2 are: 2, 4, 6, 8, 10...}$$

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NOTE: Sometimes the new denominator is already in the problem!

c) You want to subtract the fractions $\frac{3}{4}$ and $\frac{7}{8}$. This is how you set it up.

$$\begin{array}{r} \frac{7}{8} = \frac{7}{8} \\ \frac{7}{8} = \frac{7}{8} \end{array}$$

$$\begin{array}{r} \frac{3}{4} \times \frac{2}{2} = \frac{6}{8} \\ - \frac{3}{4} \times \frac{2}{2} = \frac{6}{8} \end{array}$$

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d) You want to add the fractions $\frac{1}{3}$ and $\frac{1}{15}$. This is how you set it up.

$$\frac{1}{3} \times \frac{5}{5} = \frac{5}{15}$$

$$\begin{array}{r} \frac{1}{15} \\ + \frac{1}{15} \\ \hline \end{array} = \frac{2}{15}$$

$$\frac{6}{15} = \frac{2}{5}$$

Note: This answer needed to be **reduced** to lowest terms.

Now you try.

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