

Addition or Subtraction of Fractions with unlike denominators

If the denominators of a fraction are different and you need to either add or subtract them, you will need to find a "common denominator". In order to do this, first look at the fraction with the larger denominator. Ask yourself if the other denominator can be divided equally into the larger denominator. If it can, then the larger denominator is your common denominator and all you have to do is convert the fraction with the smaller denominator into an equivalent fraction and then add and simplify if needed.

Example:

$$\frac{1}{3} + \frac{2}{6} \leftarrow \begin{array}{l} \text{larger denominator} \\ \text{and 3 can be divided} \\ \text{into it equally.} \\ \text{Change } \frac{1}{3} \rightarrow \frac{?}{6} \\ = \frac{2}{6} \end{array}$$

$$\text{So, } \frac{2}{6} + \frac{2}{6} = \frac{4}{6} \stackrel{\div 2}{=} \frac{2}{3} \leftarrow \text{after simplifying.}$$

or.

$$\frac{1 \times 2}{3 \times 2} + \frac{2}{6} = \frac{2 + 2}{6} = \frac{4}{6} = \frac{2}{3}$$
$$\frac{1 \times 2}{3 \times 2} + \frac{2 \times 1}{6 \times 1} = \frac{2 + 2}{6} = \frac{4}{6} = \frac{2}{3}$$

If, however, the smaller denominator does not divide equally into the larger denominator, then to find a common denominator, you must take the larger one and multiply "up" (by 2, then 3, then 4 etc.) until you find a number both denominators can be divided equally into. Then create equivalent fractions, add or subtract and simplify.

Examples:

$$1) \quad \frac{1}{4} + \frac{2}{3} =$$

↑ larger denominator.

- 3 doesn't fit equally in 4.

- multiply $4 \times 2 = 8$ (check if 3 fits equally in 8. (It doesn't)).

- multiply $4 \times 3 = 12$ (check if 3 fits equally in 12 (It does) 😊)

- 12 is the common denominator.

$$\frac{1}{4} + \frac{2}{3} = \frac{3}{12} + \frac{8}{12} = \frac{11}{12} \quad (\text{can't be reduced}).$$

The diagram shows the conversion of the fractions to a common denominator of 12. A red arrow labeled 'x3' points from the denominator 4 to 12. A blue arrow labeled 'x4' points from the denominator 3 to 12. The numerators are updated accordingly: 1 becomes 3 and 2 becomes 8. The final result is 11/12, with a note that it cannot be reduced.

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

Practice

$$1) \frac{2}{5} + \frac{1}{2} = \frac{\quad}{10}$$

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

$$3) \frac{3}{5} - \frac{1}{6} =$$

$$4) \frac{3}{8} - \frac{1}{6} =$$