Adding and subtracting fractions

Before we can add two fractions or subtract one fraction from another, we need to see whether the fractions have the same denominator or different denominators.

Same denominator, or like fractions

When we want to add or subtract fractions that have the same denominator, we just add or subtract the numerators, and keep the same denominator.

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

$$\frac{5}{7}-\frac{3}{7}=\frac{5-3}{7}=\frac{2}{7}$$

Different denominators, or unlike fractions

When the denominators are unequal, we have to find a common denominator before we can add or subtract the fractions.

To find a common denominator, we need to find the least common multiple (LCM) of the denominators. Then we can use the LCM as our common denominator. In fact, we call that the “least common denominator,” because it’s the smallest common denominator we can use.

Consider the fractions $3/5$ and $1/3$. The LCM of 5 and 3 is 15, so the least common denominator will be 15.

Since $15 = 3 \cdot 5$, we have to multiply 5 (the denominator of $3/5$) by 3 to get the common denominator of 15. And we have to multiply 3 (the denominator of $1/3$) by 5 to get the common denominator 15.

We aren't allowed to change the value of either of the fractions, so we have to multiply the numerator of each fraction by the same number that we multiplied by its denominator. So we have to multiply the numerator and denominator of $3/5$ by 3, and we have to multiply the numerator and denominator of $1/3$ by 5.

Problem	With a common denominator	Result
$\frac{3}{5} + \frac{1}{3}$	$\frac{3 \cdot 3}{5 \cdot 3} + \frac{1 \cdot 5}{3 \cdot 5} = \frac{9}{15} + \frac{5}{15}$	$\frac{14}{15}$
$\frac{3}{5} - \frac{1}{3}$	$\frac{3 \cdot 3}{5 \cdot 3} - \frac{1 \cdot 5}{3 \cdot 5} = \frac{9}{15} - \frac{5}{15}$	$\frac{4}{15}$