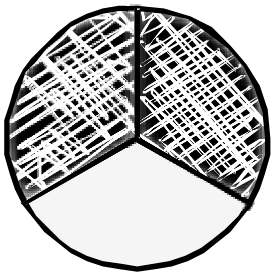
$\frac{2}{3}$ = 

One whole something (in this case a circle) is divided into 3 equal parts. The number on the bottom of a fraction is called the denominator. The top of a fraction (the 2) is called the numerator and it indicates how many "of the parts" we are interested in.

Multiplication of fractions is a matter of "multiplying top times top and multiplying bottom times bottom."

$$\frac{2}{3}\cdot\frac{5}{7}=\frac{2\cdot 5}{3\cdot 7}=\frac{10}{21}$$

$$\frac{8}{9}\cdot\frac{12}{7}=\frac{8\cdot 12}{9\cdot 7}=\frac{96}{63}=\frac{3\cdot 32}{3\cdot 21}=\frac{\cancel{3}\cdot 32}{\cancel{3}\cdot 21}=\frac{32}{21}.$$

The 3s reduce and we have the final answer of $\frac{32}{21}$. We cold have made this operation easier by noticing that the 12 and the 9 (a number on one of the tops and a number on one of the bottoms) had a common factor (the 3). This could have been reduced **before** we multiplied.

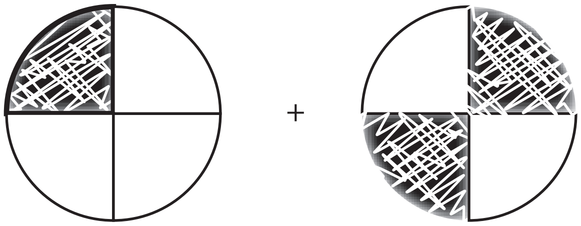
$\frac{8}{9}\cdot\frac{12}{7}=\frac{8}{\cancel{9}_{3}}\cdot\frac{\cancel{12}^{4}}{7}=\frac{32}{21}$ This method is preferable because the numbers are smaller. Arithmetic errors are less likely with smaller numbers.

This leads us to noticing: $\frac{3}{5}\cdot\frac{2}{2}=\frac{6}{10}$ for example. $\frac{3}{5}$ times $\frac{2}{2}$. $\frac{2}{2}$ is the same as one. $\frac{3}{5}$ times one is the same as it was so $\frac{6}{10}$ is the same as $\frac{3}{5}$. $\frac{6}{10}=\frac{2\cdot 3}{2\cdot 5}$. The twos reduce and we have $\frac{3}{5}$.

$\frac{3}{5}\cdot\frac{3}{3}=\frac{9}{15}$. Again, $\frac{9}{15}$ reduces to $\frac{3}{5}$. ***We can change any fraction so the denominator is different as long as we multiply both the top and bottom by the same number***.

$\frac{3}{5}\cdot\frac{?}{?}=\frac{\quad}{35}$ What do we need to use for the question mark? 7. So $\frac{21}{35}$ is the same as $\frac{3}{5}$.

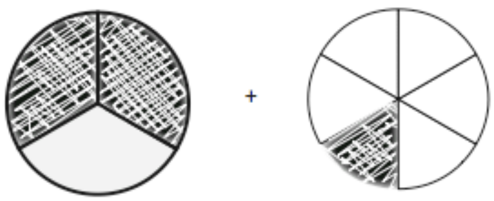
Why do we care?



When adding fractions such as these we notice that in both cases the "whole" is divided into 4 equal parts. In the first picture we are concerned about one of the four parts and in the second we are concerned about 2 of the four parts. Thus when we add them we will have three parts we are interested in AND those 3 parts are in reference to a whole that had been divided into 4 equal parts.

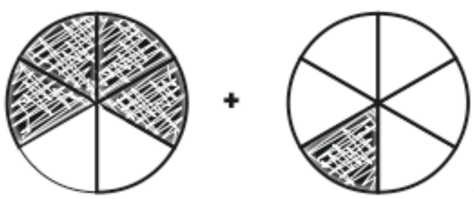
In arithmetic we have $\frac{1}{4}+\frac{2}{4}=\frac{3}{4}$.

When adding fractions, both fractions must reference the same number of parts of the whole (ie. The 4).



In this case we do not have fractions with the same "number of parts of the whole" referenced.

We have: $\frac{2}{3}+\frac{1}{6}$. We can change our situation quickly to this:



Now we have $\frac{4}{6}+\frac{1}{6}$. As before, we keep the same "parts of the whole" and we add the numerators (the 4 and the 1) to get $\frac{5}{6}$.