# Multiplying Fractions

Multiplying fractions can actually be easier than adding or subtracting them! This is because unlike addition and subtraction, **you can multiply two fractions with different denominators.** To multiply two fractions, we multiply the numerators together and then the denominators together.
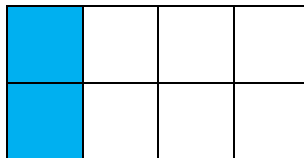
$$\frac{1}{2} \times \frac{1}{4} = \frac{1 \times 1}{2 \times 4} = \frac{1}{8}$$

First, we multiply the numerators: $1 \times 1 = 1$. Then, we multiply the denominators: $2 \times 4 = 8$.

Another way of thinking about multiplication is that we want to know what one half **of** one fourth is. Let's draw a representation of one-fourth:
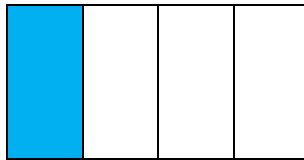
Now to determine what one-half of the one-fourth is we need to divide one fourth into two equal parts:

Now that we've divided the total fraction in half we can see what half of one fourth looks like:
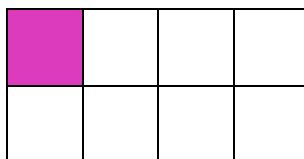
By counting the shaded rectangles, we can see that we are left with one-eighth: $\frac{1}{8}$
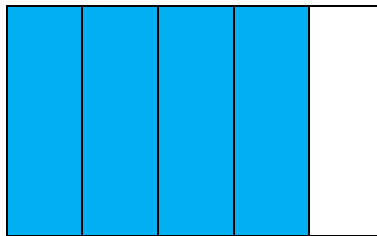
Example 1:

$$\frac{2}{3} \times \frac{4}{5}$$

First, we will start by multiplying the numerators together. 2 times 4 equals 8. Next, we will multiply our denominators together. 3 times 5 equals 15.

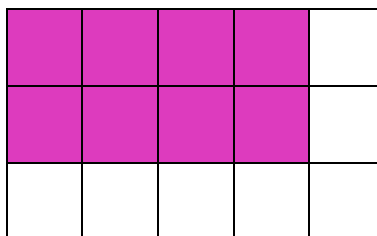$$\frac{2}{3} \times \frac{4}{5} = \frac{2 \times 4}{3 \times 5} = \frac{8}{15}$$

Let's draw a visual representation of this multiplication as well. We want to determine what two thirds of four fifths is. We will start by drawing four fifths:

Now, we can we divide the four fifths into three equal parts:
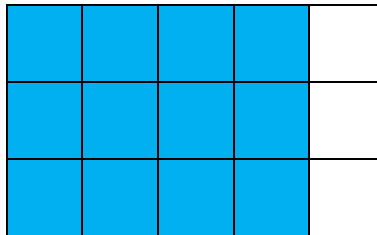
The shaded area will be two thirds of four fifths:

Notice: the whole has been divided into 15 equal parts, which represents the denominator of the final fraction.

The drawing shows us that our final answer is eight fifteenths: $\frac{8}{15}$

Example 2:

$$\frac{3}{4} \times \frac{1}{2} = ?$$

We can start by multiplying our numerators together: $3 \times 1 = 3$, then our denominators:

$$4 \times 2 = 8$$

$$\frac{3}{4} \times \frac{1}{2} = \frac{3 \times 1}{4 \times 2} = \frac{3}{8}$$

Our final answer is three eighths.

Example 3:

Multiply $\frac{3}{4} \times 4$

Let's look at this visually:

 $= \frac{3}{4}$

Now if we multiply three fourths by four, we would essentially be adding three fourths together four times. The image below represents this with three

different colours:

Notice that we have one empty space in each block. Since, each rectangle is divided into 4 equal parts, we have one fourth empty. We can fill the empty spaces with the orange fourths (there are 3).

Now we can see that $\frac{3}{4} \times 4 = 3$

It is important to note that ANY whole number can be written as a fraction with a denominator of 1. So we could have rewritten the question as $\frac{3}{4} \times \frac{4}{1}$ and we would arrive at the SAME answer (after simplifying).

> ANY whole number can be rewritten as a fraction
> with a denominator of 1
>
> $$5 = \frac{5}{1}$$

Example 4:

The cows on a farm are fed $\frac{1}{6}$ a bucket of feed each day. The chickens are fed $\frac{1}{3}$ as much food as the cows. How many buckets of feed are the chickens fed each day?

First we need to write this as an equation. The chickens are fed $\frac{1}{3}$ of the cows $\frac{1}{6}$ of a bucket. This means we have to multiply one third by one sixth:

$$\frac{1}{3} \times \frac{1}{6} = \textbf{?}$$

Now we can multiply the fractions: $1 \times 1 = 1$ and $3 \times 6 = 18$

$$\frac{1}{3} \times \frac{1}{6} = \frac{1 \times 1}{3 \times 6} = \frac{1}{18}$$

Therefore, the chickens eat $\frac{1}{18}$ of a bucket of food.