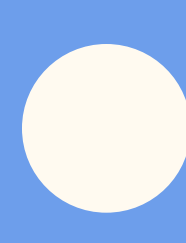


# Equivalent Fractions



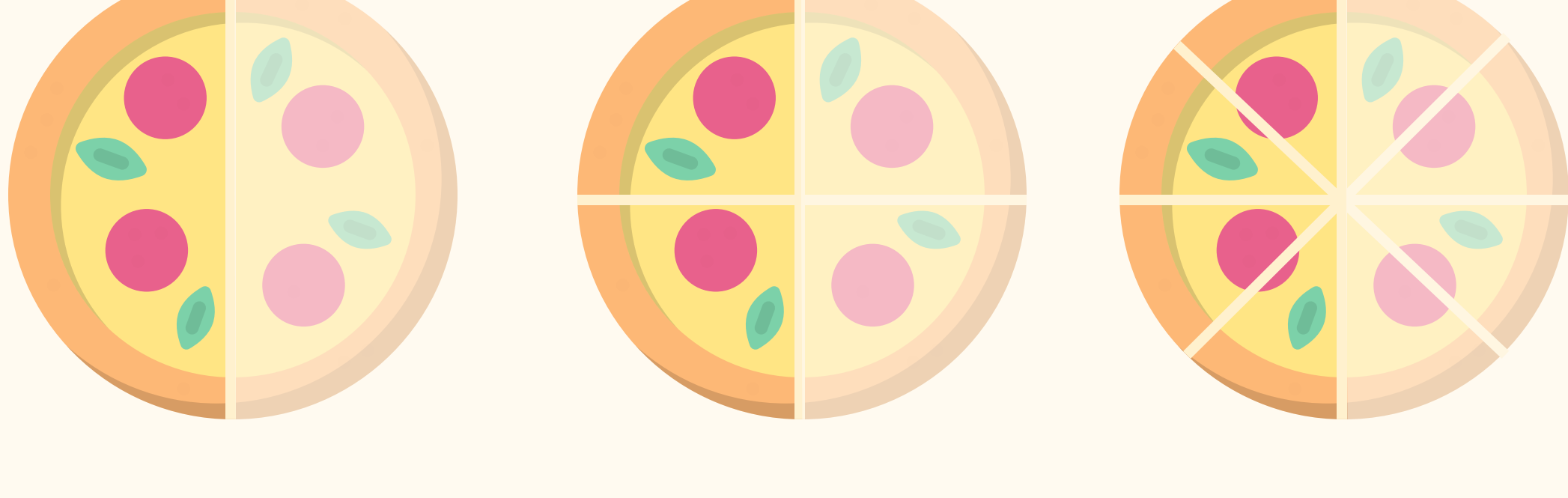
## What do you need to know?

Equivalent fractions represent the **same portion** of a whole.

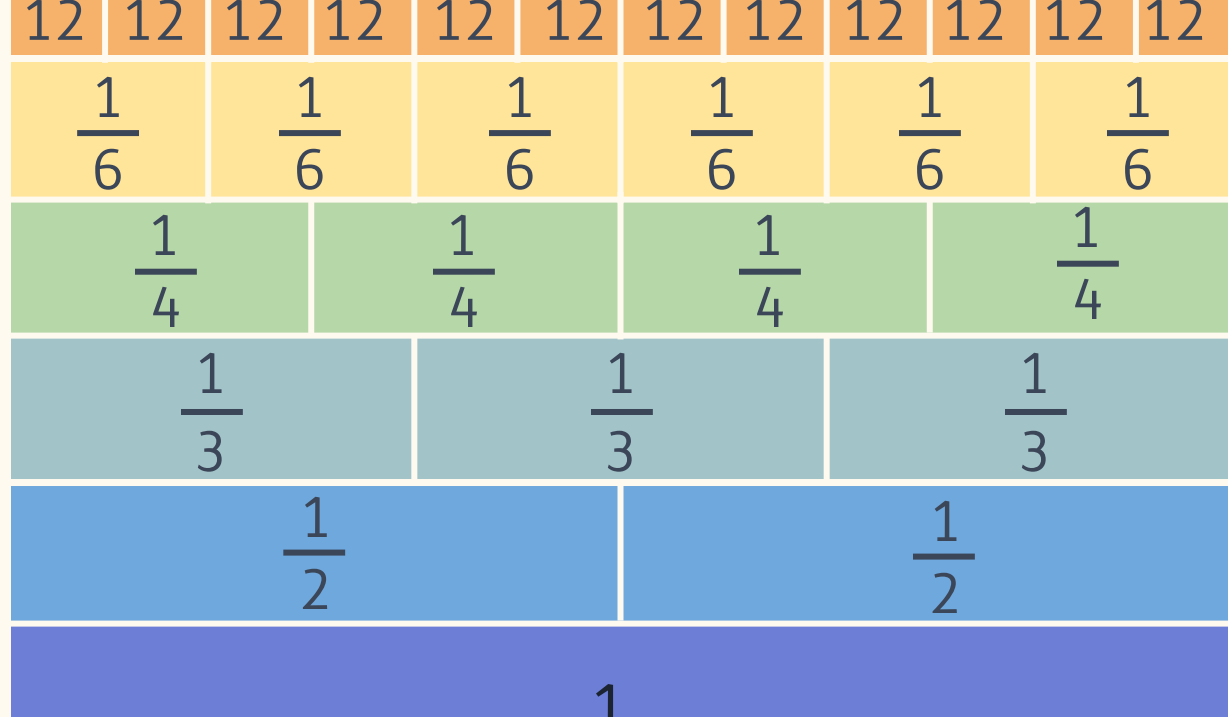
For example, if I have half a pizza, I would have eaten the same amount if I said:

$$\frac{1}{2} \quad \text{or} \quad \frac{2}{4} \quad \text{or} \quad \frac{4}{8}$$

All these fractions are equivalent because they represent the **same amount!**



A nice way to remember and represent equivalent fractions is a fraction wall:



Here, we can see that :

$$\frac{1}{2} \stackrel{\times 2}{=} \frac{2}{4} \quad \frac{1}{2} \stackrel{\times 3}{=} \frac{3}{6} \quad \frac{1}{3} \stackrel{\times 4}{=} \frac{4}{12}$$

To work out an equivalent fraction we need to apply the **same calculation** to the **numerator** and the **denominator**. We either **multiply** or **divide**:

$$\frac{1}{3} \stackrel{\times 2}{=} \frac{2}{6} \quad \frac{5}{10} \stackrel{\div 5}{=} \frac{1}{2}$$

To simplify a fraction is to express it in its **simplest form**. When we simplify fractions, we find an **equivalent fraction** by dividing the numerator and denominator by a **common factor** of the two.

To leave the fraction in its simplest form, we divide using the **highest common factor** between the **numerator** and the **denominator**.

For example if we wanted to simplify  $\frac{9}{27}$  we would have to think of the common factors of 9 and 27.

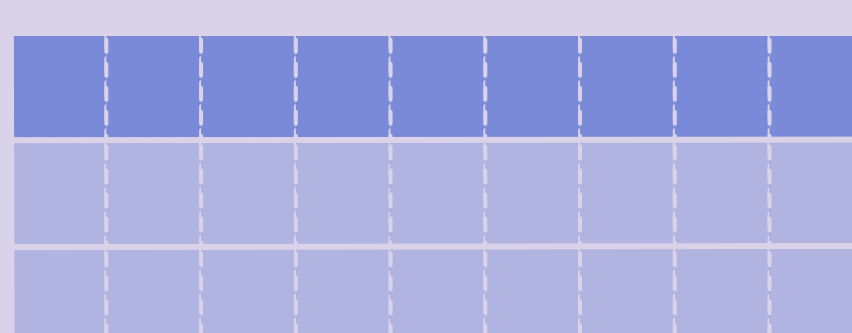
The **common factors** (numbers we can divide 9 and 27 by) are **1, 3 and 9**.

Their **highest common factor** is **9**. So we divide the numerator and denominator by **9**.

$$\frac{9}{27} \stackrel{\div 9}{=} \frac{1}{3}$$

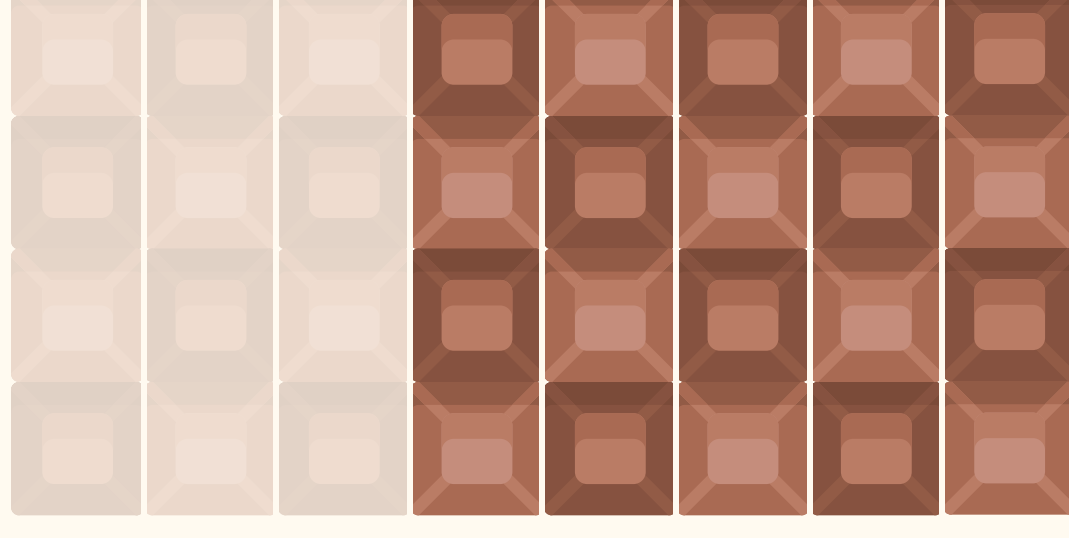
If we look at the filled lines of this bar diagram we can see the fraction  $\frac{1}{3}$  being represented. If, instead, we also take the dashed lines into account, we can see the fraction  $\frac{9}{27}$  being represented!

$\frac{9}{27}$  and  $\frac{1}{3}$  are equivalent fractions because they represent the same portion, but  $\frac{1}{3}$  is the simplest way of expressing that portion! ✓



## Let's see this in action...

There were 32 chocolates squares in a chocolate bar. I shared some of it with my friends and now there are only 20 chocolate squares left. What is this portion in its **simplest form**?



The fraction representing the amount of chocolate left is  $\frac{20}{32}$

To simplify, we need to find the **highest common factor** of 20 and 32.

20 and 32 can be divided by 2 and 4. The highest factor is 4, so we need to divide the numerator and denominator by 4 to find the simplest form.

$$\frac{20}{32} \stackrel{\div 4}{=} \frac{5}{8}$$

$\frac{20}{32}$  can be simplified to the equivalent fraction  $\frac{5}{8}$  ✓

We can see that this is correct by looking at our diagram, because there are 5 of the 8 columns of chocolate left!

## ⚠ Watch out!

Make sure you remember to apply the **same** calculation to **both** the numerator and the denominator, otherwise the fractions will not be equal!

$$\frac{3}{7} \stackrel{\times 3}{\neq} \frac{3}{21} \quad \frac{3}{7} \stackrel{\times 3}{=} \frac{9}{21} \quad \checkmark$$

## Let's take a look at a different example:

Sophia is trying to find a fraction that is equivalent to  $\frac{5}{7}$ .



Which of the following fractions is equivalent to her fraction?

- $\frac{15}{21}$
- $\frac{20}{30}$
- $\frac{21}{28}$
- $\frac{12}{28}$
- $\frac{25}{45}$

We need to find a fraction that is **equivalent** to  $\frac{5}{7}$ . It will not be a simplified fraction, because  $\frac{5}{7}$  is already the simplest form to express this amount.

We need to form another fraction by multiplying the numerator and denominator of  $\frac{5}{7}$ . Remember, in order for the fraction to be equivalent, the numerator and denominator must be multiplied by the same number!

$$\frac{5}{7} \stackrel{\times 3}{=} \frac{15}{21}$$

$\frac{15}{21}$  is the only answer that is equivalent to  $\frac{5}{7}$  and is therefore Sophia's correct answer. ✓

## 💡 Tips!

- ★ To work out **equivalent fractions**, **multiply** or **divide** the numerator and denominator by the **same number**.
- ★ Use fraction walls to help you work out and **memorise** some equivalent fractions.
- ★ **Simplify** a fraction by finding the **highest common factor** of the numerator and denominator.