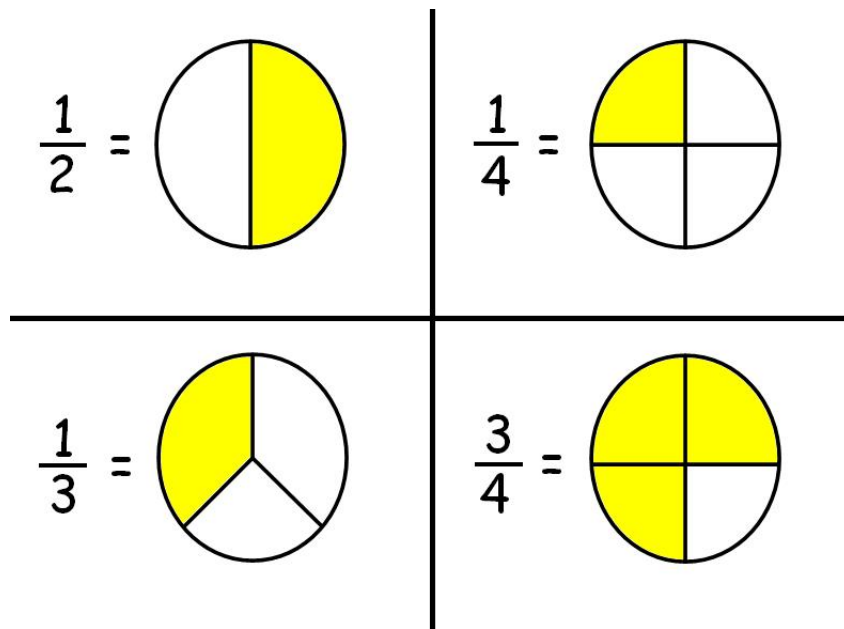


## Introduction to Fractions

A fraction is merely another way to express division. A fraction is made up of two distinct parts.

$$\frac{\text{numerator}}{\text{denominator}}$$

A fraction is technically defined as a ratio between two integers. While this may seem confusing, it basically means “an integer divided by another integer.” Fractions are generally represented as “a part” of something, meaning that most of the time it will represent a number less than one. The numerator represents how many parts while the denominator represents how many total parts.



There are two different ways to represent a value larger than one (1) when using a fraction. An Improper Fraction is a fraction where a numerator is greater than the denominator. A mixed number, on the other hand, shows a whole number paired with a fraction.

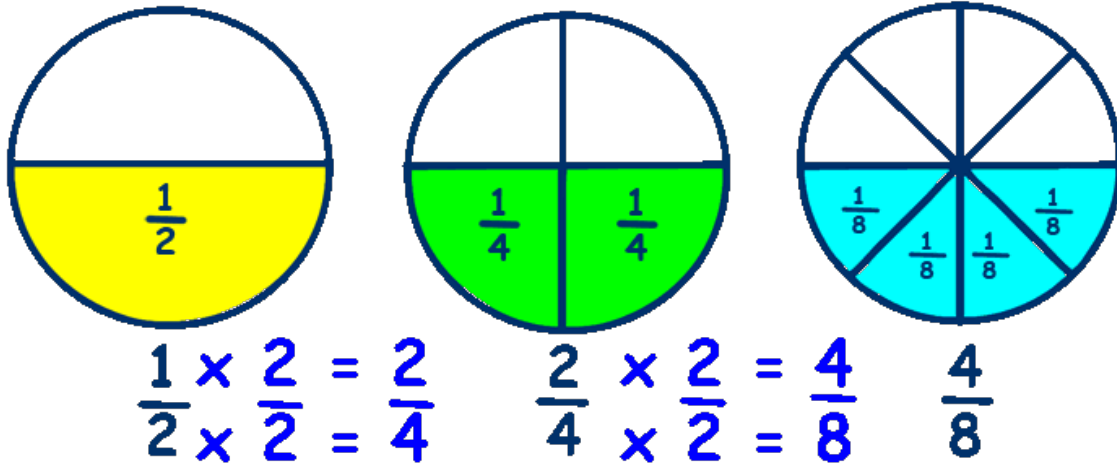
$$\frac{3}{2} = 1\frac{1}{2}$$

Improper Fraction vs Mixed Number

### ***Equivalent Fractions***

In order to understand how to manipulate fractions, we must be able to understand how to create equivalent fractions. Sometimes a fraction can have the same value (which means is the same) as another fraction but it can look different. Here is an example.

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



In this case, as we can see, each of these values is equal to the exact same amount of the circle. One out of two pieces (in the yellow) is the same value as two of the four pieces (in the green) which is yet still the same as four of the eight pieces (in the blue).

The main rule for finding equivalent fractions is as follows: **WHATEVER YOU DO TO THE TOP, YOU DO TO THE BOTTOM.**

To make an equivalent fraction, you may multiply the numerator and the denominator by the same number. You may also divide the numerator and the denominator by the same number but remember, it HAS TO BE THE SAME NUMBER!!

### ***Reducing Fractions***

Finding equivalent fractions is important, but so is reducing fractions. Generally, answers in their simplest form are accepted over unreduced answers. To reduce (or “simplify”) an answer, one must break the fraction down until neither the numerator nor the denominator can be divided by the same number.

$$\begin{array}{ccccccc}
 & \div 2 & & \div 2 & & \div 3 & \\
 & \curvearrowright & & \curvearrowright & & \curvearrowright & \\
 \frac{24}{108} & = & \frac{12}{54} & = & \frac{6}{27} & = & \frac{2}{9} \\
 & \curvearrowleft & & \curvearrowleft & & \curvearrowleft & \\
 & \div 2 & & \div 2 & & \div 3 & 
 \end{array}$$