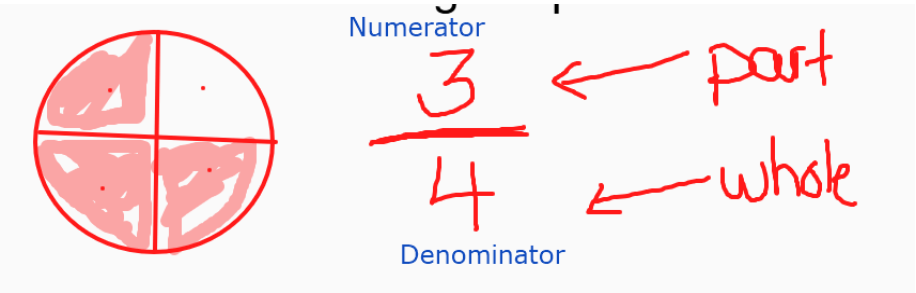
Fractions Introduction *(TM 2-20-2025)*

Also see: Kaplan book "Fractions Basics" p. 244-245

What is a Fraction?

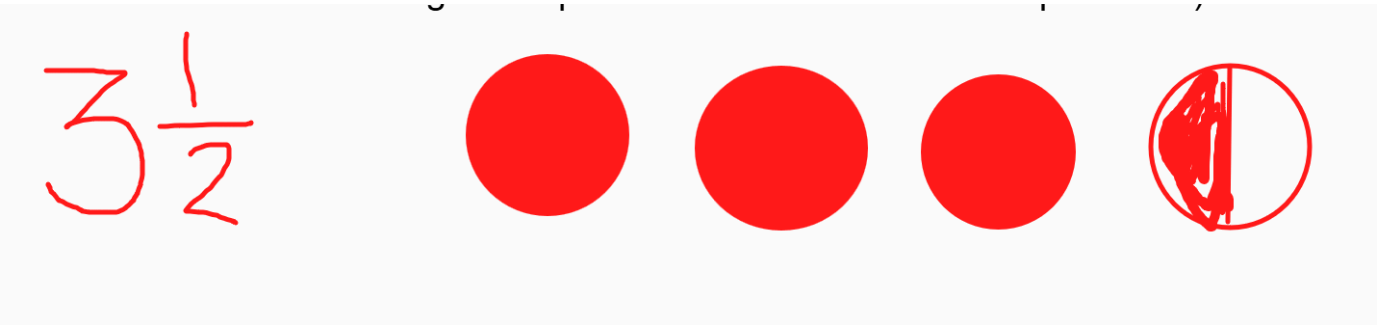
A fraction of something means it is a PART of the whole



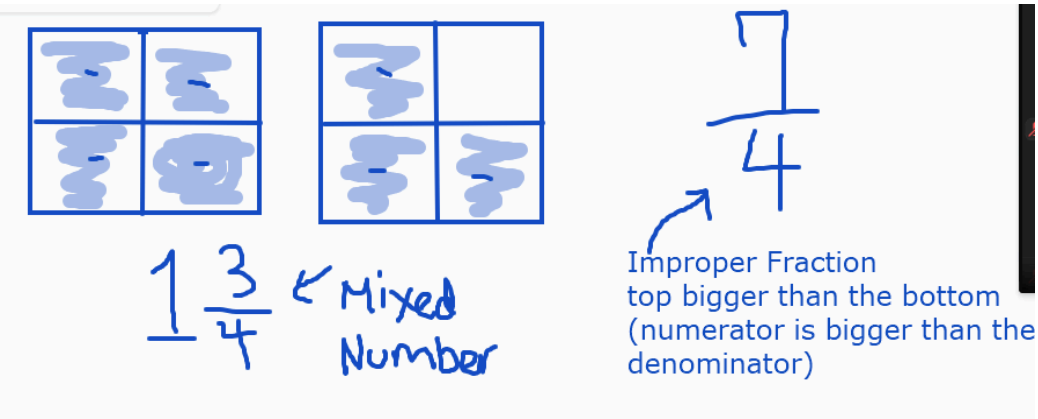
In the pizza shown here, ¾ of it is shaded red.

- The number on top shows how many parts you have and is called the **numerator.**
- The number on the bottom shows how many parts would be in the WHOLE pizza and is called the **denominator**
  (one way to remember which is which is to think "D for Down" Denominator is the one that is down on the bottom)

Mixed numbers are a whole number and a fraction like **3 ½**
(you have a whole of something and a piece of it too like in the example below)

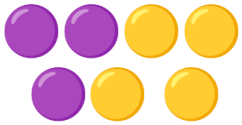


Improper fractions are when the top number is bigger than the bottom (so you have more “parts” than are needed to make a whole)



Notice that for the blue square above, you only need four pieces to make up a whole square (it was cut into 4 pieces) That’s different from the example below. Here, the WHOLE shape was cut into eight pieces (you need 8 to make a whole), so;

Fractions can also be part of a group

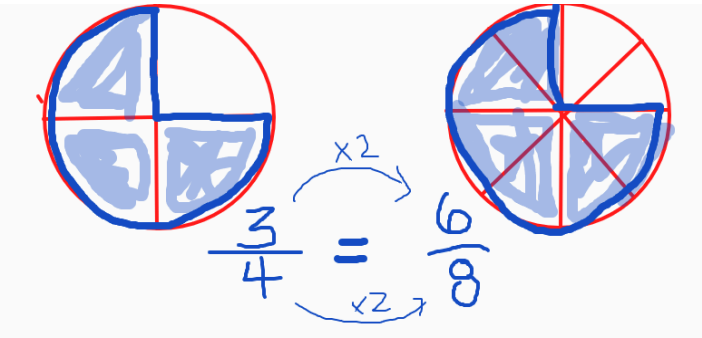


Here there are 7 total marbles in this group
What fraction are purple? 3/7

You would read that fraction as “three sevenths”
It means 3 out of the 7 seven total in the group.

Equivalent fractions

Fractions that look different, but are really equal or "equivalent" like below:



The "Golden Rule" of equivalent fractions:

→ Whatever you multiply or divide on the top you need to do the SAME to the bottom to make an equivalent fraction.

$\frac{3}{4} \overset{\times 5}{=} \frac{15}{20}$ (x 5 = on 4 → 20) or $\frac{15}{20} \overset{\div 5}{=} \frac{3}{4}$ (÷ 5 = on 20 → 4)

¾ is equivalent to $^{15}/_{20}$

Four Important Fraction Operations

1) Raising to a higher term

(Finding an equivalent fraction by MULTIPLYING both the numerator and denominator by the same number)

$\frac{3}{4} = \frac{?}{20}$

How many times
Does 4 go into 20?
(think: "4 times what is 20?")

$\frac{3}{4} = \frac{?}{20}$ (x 5 = on 4 → 20)

we know it goes in 5 times

So $\frac{3}{4} \overset{\times 5}{=} \frac{15}{20}$ (x 5 = on 4 → 20)

so we need to
Multiply the top by 5 too

2) Reducing Fractions

(Finding an equivalent fraction by DIVIDING both the numerator and denominator by the same number)

$\frac{12}{14} \overset{\div 2 =}{} \frac{4}{7}$ $\overset{\div 2 =}{}$

What number goes into 12 evenly and also goes into 14 evenly?

The Divisibility Rules can help

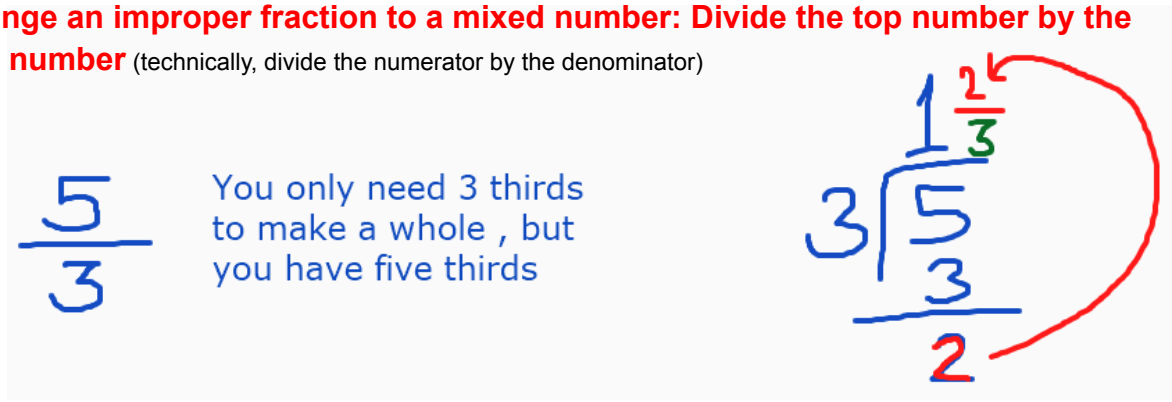
Then divide both numerator and denominator by the SAME number

If you are not sure how to tell what you can divide evenly into a number. Here are some Divisibility Rules or tips that might help you figure out where to start.

3) Changing an Improper Fraction → Mixed Number

- Remember, with an improper fraction the top is bigger than the bottom
- That means you have enough parts to make at least one whole

➔ **To change an improper fraction to a mixed number: Divide the top number by the bottom number** (technically, divide the numerator by the denominator)

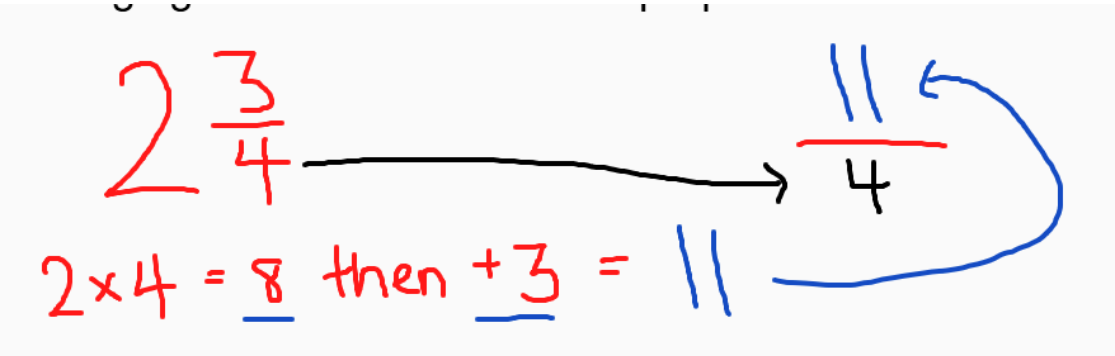


Hint to help you remember:

Think of the / between the numerator and denominator as the division sign

Whatever the remainder is (the “left over parts” – in this example, that’s the 2) would go in the numerator, and whatever you were dividing by (or whatever was the denominator in the original fraction - in this example, it’s the 3) is the denominator here, too.

4) Changing a Mixed Number → Improper Fraction



Some other vocabulary you might see

LCD – Lowest Common Denominator
Common means "the same"
They have that denominator in common

GCF – Greatest Common Factor

Multiples are numbers you get by multiplying
The multiples of 12 are 12, 24, 36, 48

Factors are the number that divide evenly (no remainder) into a number
The FACTORS of 12 are 1, 2, 3, 4, 6, 12