Lesson 1: Numeration & Computation

In this lesson we will review whole numbers, fractions, decimals, place value, rounding, expanded notation, multiples, factors, the Associative and Commutative Properties, how we compare numbers, and long division.

WHOLE NUMBERS start with zero and continue upwards by adding 1 to each number. This means that whole numbers do not have fractional parts or decimal extensions.

whole

1

2

3...

Each "spot" in a number has a special name, called its **PLACE**.
PLACE VALUE tells us what the digits of a number really equal.

Digits are just the symbols we use for numbers: **0 1 2 3 4 5 6 7 8 9**

Place value:

9,876,543

millions | 100 thousands | ten thousands | thousands | hundreds | tens | ones

For example:

9,876,543

can be rewritten as:

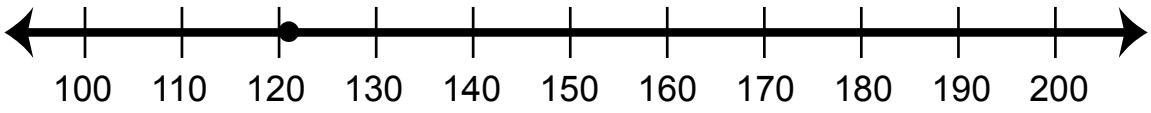
9,000,000
+ 800,000
+ 70,000
+ 6,000
+ 500
+ 40
+ 3

or:

(9 x 1,000,000)
+ (8 x 100,000)
+ (7 x 10,000)
+ (6 x 1,000)
+ (5 x 100)
+ (4 x 10)
+ (3 x 1)

We use **ROUNDING** to figure out what number our number is closest to based on a specific place value.

Let's round 121 to the nearest hundred. Is it closer to 100 or 200?



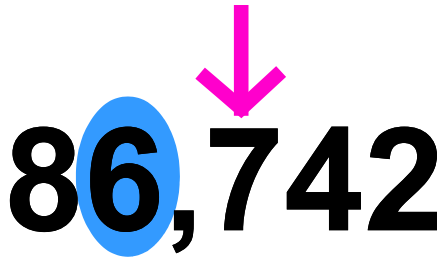
Here is a rhyme to help you remember the **ROUNDING RULES**:

5 and bigger to the right,
Round it up, day or night!

Let's round 86,742 to the nearest thousand:

86,742

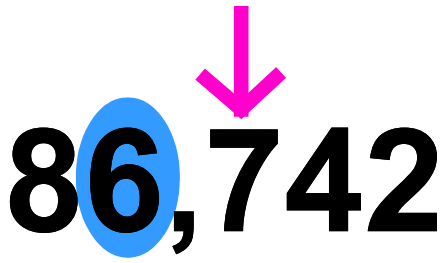
We want to round to the nearest THOUSAND.



Now we look to the RIGHT.

And say the RHYME:

5 and bigger to the right,
Round it up, day or night!



7 is bigger than 5, so we will ROUND UP in the thousands place.

87,000

86,742 becomes 87,000 when rounding the nearest thousand.

MULTIPLES have an **M** for **MANY MORE**. There are many multiples for any nonzero number you can think of. The list never ends.

Let's look at the multiples for 5:

5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 105, 110, 115, 120, 125, 130, 135, 140, 145, 150, 155, 160, 165, 170, 175, 180, 185, 190, 195, 200, 205, 210, 215, 220, 225, 230, 235…

This list will never end. There are **MANY MORE** multiples.

FACTORS have an **F** for **FINISH**. For any number you can think of, you can always FINISH finding factors.

factor x factor = product

Let's find the factors of 6:

First we'll think of pairs of numbers that multiply to give us 6:

$1 \times 6 = 6$
$2 \times 3 = 6$
$3 \times 2 = 6$
$6 \times 1 = 6$

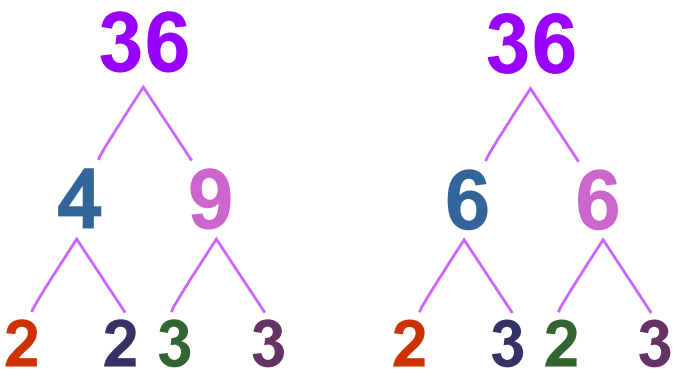
How many different numbers do we have?

$1 \times 6 = 6$
$2 \times 3 = 6$
$3 \times 2 = 6$
$6 \times 1 = 6$

6 has four factors: **1 6 2 3**

and we are **FINISHED!**

FACTOR TREES are another way to show factors of a number. Below are 2 factor trees we can make for 36. Notice that 36 = 2 x 2 x 3 x 3 no matter how you start the tree.



Can you make a different factor tree in the box above?

Here the last branches are **PRIME NUMBERS**. A prime number has 2 factors: 1 and the number itself.

2 can be represented as 2×1
3 can be represented as 3×1

FRACTIONS tell us the part out of the whole.

The top part of a fraction is its **NUMERATOR** and the bottom part is its **DENOMINATOR**.

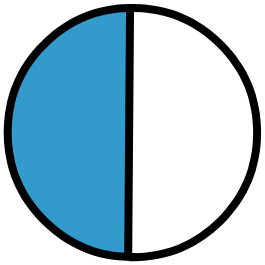
Remember, the **d**enominator is **d**own.

$$\frac{\text{NUMERATOR}}{\text{DENOMINATOR}}$$

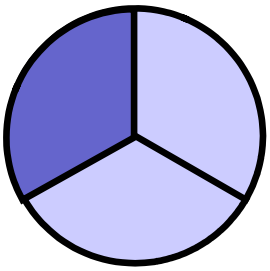
A fraction tells us:

PART
out of
WHOLE

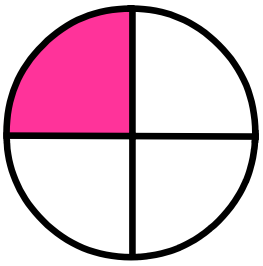
Here are some examples of fractions:

$\frac{1}{2}$ 

1 out of 2 equals one half.

$\frac{1}{3}$ 

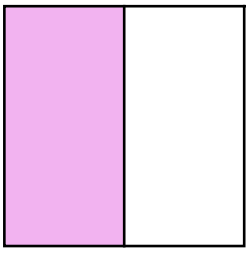
1 out of 3 equals one third.

$\frac{1}{4}$ 

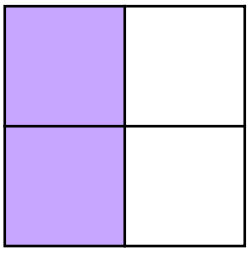
1 out of 4 equals one fourth,
or 1 quarter.

Below we see a bunch of fractions that all equal one half:

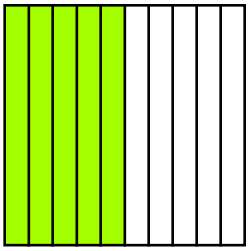
1 out of 2



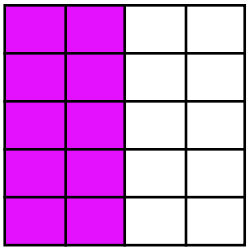
2 out of 4



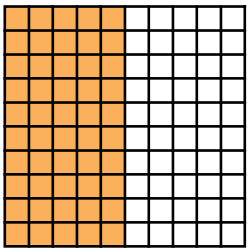
5 out of 10



10 out of 20



50 out of 100



This is 50 hundredths.

Later we will see why
hundredths
are so important.

You can find other fractions that equal your fraction by multiplying by **"ONE"**. For example:

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

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

$$\frac{2}{3} \times \frac{3}{3} = \frac{6}{9}$$

In order to **REDUCE** a fraction, you can just divide by **"ONE"**.
For example:

$$\frac{6}{9} \div 1$$

$$\frac{6}{9} \div \frac{3}{3} = \frac{6 \div 3}{9 \div 3}$$

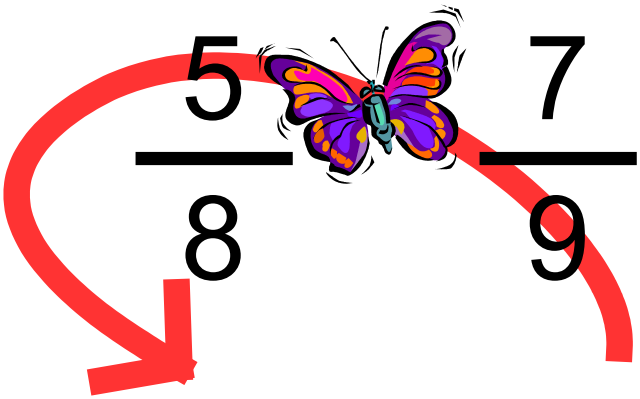
$$\frac{6}{9} \div \frac{3}{3} = \frac{2}{3}$$

To tell which of 2 fractions is bigger, or if they are equal, you can use the **CROSS-MULTIPLY BUTTERFLY** trick.

Which fraction below is bigger?

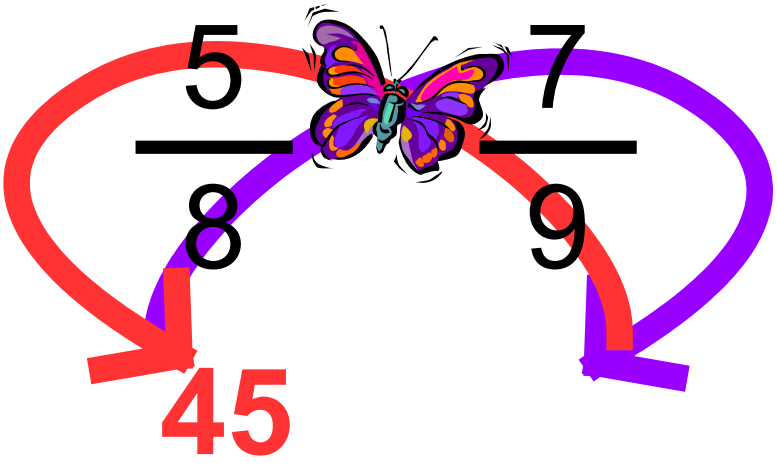
$$\frac{5}{8} \qquad \frac{7}{9}$$

We just make a butterfly and multiply. First 1 wing:

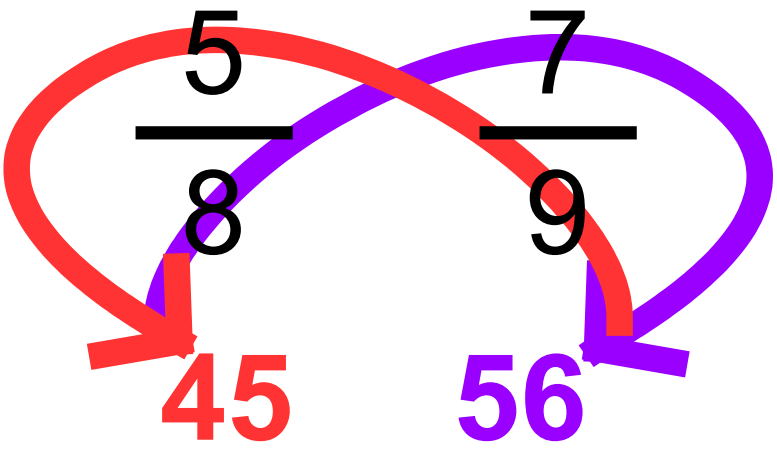


9 × 5 = 45

Then the other:



$8 \times 7 = 56$, so we have:



56 is greater than 45 so…

$\frac{7}{9}$ is bigger!

DECIMALS are another way to show parts of numbers. Look at the places values to the right of the decimal point:

Here the 4 means:

$\frac{4}{10}$

The 3 means:

$\frac{3}{100}$

The 2 means:

$\frac{2}{1000}$

You can rewrite decimals as fractions by just saying its name.

For example:

0.032 =

First say it: ***"32 thousandths"***

Now write it as a fraction:

$$\frac{32}{1000}$$

To turn a fraction into a decimal, first see if you can multiply by **"ONE"** to change the bottom to tenths, hundredths, or thousandths...

Let's convert $\frac{9}{25}$ into an equivalent decimal.

Notice that $25 \times 4 = 100$. How does this help us?

$$\frac{9}{25} \times 1$$

$$\frac{9}{25} \times \frac{4}{4} = \frac{9 \times 4}{25 \times 4}$$

$$\frac{9}{25} \times \frac{4}{4} = \frac{36}{100}$$