BREAKTHROUGH MATHS
PROBLEMS SOLVED

NICKS & TRICKS

LUKE'S GUIDE TO JUNIOR CERT HL MATHS

Topic 7 – Number Systems

Number Systems covers all the ways numbers can be shown such as fractions, decimals and percentages. Like algebra, it is a key topic to learn as it will come up in every other topic in maths! Learn the nicks and tricks below to master any form of numbers they can throw at you!

(i) Fractions
(ii) Decimals
(iii) Percentages
(iv) Ratios
(v) Scientific Notation
(vi) Number Sets

(i) FRACTIONS

Fractions are numbers like $\frac{3}{4}$, $\frac{5}{8}$ or $\frac{7}{10}$

Every fraction is made up of 2 parts:

Numerator (Top) → 3

Denominator (Bottom) → 5

Improper Fractions are fractions where the numerator is bigger than the denominator e.g: $\frac{8}{5}$, $\frac{10}{7}$ or $-\frac{8}{3}$

Mixed Fractions consist of a whole number and a fraction e.g: $3\frac{1}{3}$, $10\frac{5}{8}$ or $-7\frac{5}{6}$

If you want to find a fraction of any number, just divide the number by the denominator and multiply by the numerator e.g. If we want to find $\frac{4}{5}$ of 10:

$$10 \div 5 = 2 \rightarrow 2 \times 4 = 8$$

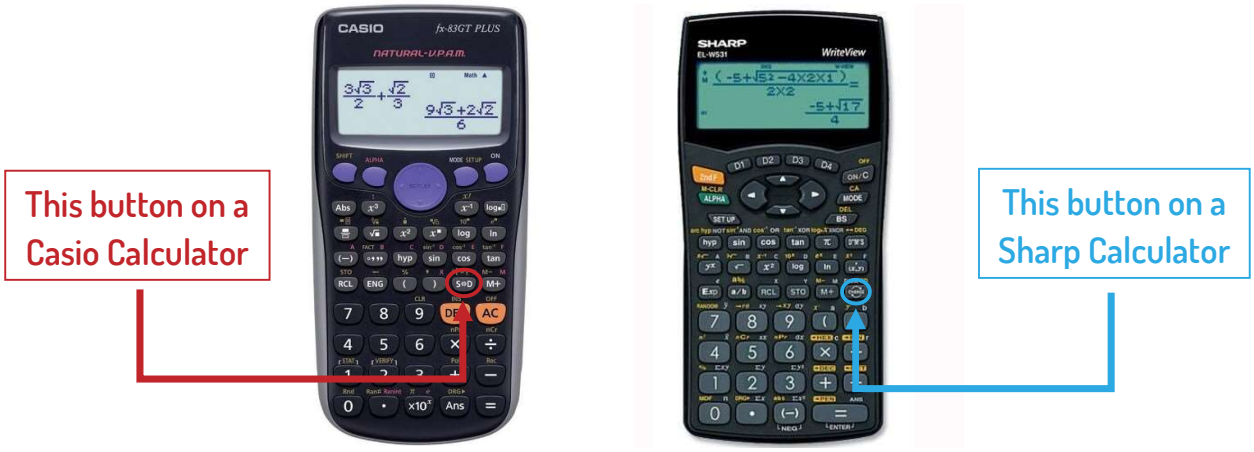
Fractions must be in simplest form! $\frac{8}{10}$ is not in simplest form because you can divide both the top and the bottom by 2 which leaves us with $\frac{4}{5}$. Now there is no number that divides into both the top and bottom, so this is the fraction in simplest form! If you're ever unsure, put the fraction into your calculator and it will give it back to you in simplest form.

(ii) DECIMALS

Decimals are numbers like 0.8, 3.734 or -27.93.

The further right the number is of a decimal point, the smaller it is.
e.g: 0.8 is 10 times as big as 0.08.

If you want to change a decimal to a fraction or the other way around, just put the number into your calculator and press:



(iii) PERCENTAGES

Percentages are numbers like 87% , 34.2% or -22.97%.

To change a percentage into a decimal, divide percentage by 100 & drop % sign
e.g: 34.2% as a decimal is $34.2 \div 100 = 0.342$.

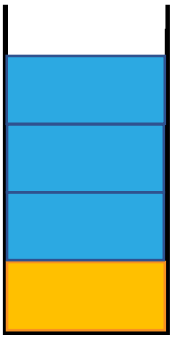
To find a percentage of any number, divide the number by 100 and multiply by the percentage e.g: 40% of $120 \rightarrow 120 \div 100 = 1.2 \times 40 = 48$

(iv) RATIOS

Ratios are used to compare 2 or more different numbers.

If you made yourself a glass of orange Mi Wadi, the ratio of Mi Wadi to Water might be 1:3 like in the picture here

This is because for every bit of Mi Wadi we have, we have 3 times as much water.



Here's a look at the things inside my pencil case:

The ratio of pens to pencils to rubbers in my pencil case is 6:4:2, but be careful! Just like fractions, ratios need to be in simplest form. Every number in this ratio can be divided by 2 so if we do that, we find out the ratio in simplest form is 3:2:1.

How To Do Ratio Questions

If I want to divide €100 between your three friends Sean, Caoimhe and Dylan in the ratio 5:3:2, follow these steps:

1) ADD the ratio together
2) MAKE fractions
3) MULTIPLY

So for this example, add 5 + 3 + 2 = 10.

Now make fractions by putting each number in the ratio over 10, so $\frac{5}{10}$, $\frac{3}{10}$ and $\frac{2}{10}$

Now multiply each of these fractions by €100 to figure out what fraction of the money each friend is getting.

Sean $\rightarrow \text{€}100 \times \frac{5}{10} = \text{€}50$ is how much Sean gets

Caoimhe $\rightarrow \text{€}100 \times \frac{3}{10} = \text{€}30$ is how much Caoimhe gets

Dylan $\rightarrow \text{€}100 \times \frac{2}{10} = \text{€}20$ is how much Dylan gets

(v) SCIENTIFIC NOTATION

Scientific notation is where we write numbers as small numbers multiplied by powers of 10 e.g: 800 would be 8×10^2 or 8532 would be 8.532×10^3.

To write any number in scientific notation:

1) Move the decimal place to the left until only 1 number is on the left of the decimal point.
2) Write down number multiplied by your 10 to the power of how many places you moved the decimal point to the left.

(vi) NUMBER SETS

There are 3 sets of numbers that it is important for you to know.

Natural Numbers $\mathbb{N}$

Natural Numbers are counting numbers 1, 2, 3, 4, 5...
The symbol for Natural Numbers is $\mathbb{N}$.

Remember:
Does NOT include 0!

Integers $\mathbb{Z}$

Integers are all positive and negative whole numbers ...-2, -1, 0, 1, 2...
The symbol for Integers is $\mathbb{Z}$.

Real Numbers $\mathbb{R}$

Real Numbers are all numbers. This includes positive numbers, negative numbers, fractions, decimals, everything!
The symbol for Real Numbers is $\mathbb{R}$.

These Number Systems will come up in every single other topic in maths, so they are VITAL to understand! I am not including a section on my predictions for the exam as all of these tend to come up every year! Study this guide and you will have a strong foundation for your maths journey!

"Maths shows us that every problem has a solution!"