Unit 1: Number

Number

Number Problems

A Factorial is the result of multiplying a sequence of descending integers.

4! = 4 x 3 x 2 x 1

Estimation

To estimate you need to be confident with rounding and significant figures.

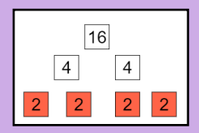
Estimate 0.456 x 145 by rounding to 1 significant figure.

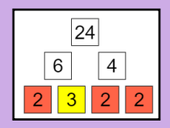
0.5 x 100 = 50

HCF and LCM

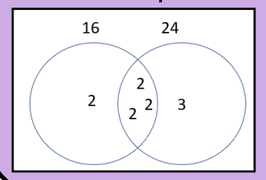
Find the HCF and LCM of 16 and 24

Step 1: Express each number as a product of its prime factors.





Put the prime factors into Venn diagram



HFC = product of the intersection: 2 x 2 x 2 = 8

LCM = product of all the numbers 2 x 2 x 2 x 2 x 3 =48

Standard Form

Writing numbers in standard form

Numbers in standard form always have to be bigger than 0 and smaller than 10

Example: Write 124, 500, 000 in standard form

$$1.245 \times 10^8$$

Example: Write 0.005678 in standard form

$$5.678 \times 10^{-3}$$

Multiplying and Dividing in Standard Form

$(2.1 \times 10^3) \times (3 \times 10^4)$

Multiply the numbers and add the indices together

2.1 x 3 = 6.3 3+4 =7

$$6.3 \times 10^7$$

$(9 \times 10^3) \div (3 \times 10^4)$

Divide the numbers together and subtract the indices

9/3 = 3 3—4 = -1

$$3 \times 10^{-1}$$

Adding and Subtracting in Standard Form

You have to change them back into normal numbers.

$$2.1 \times 10^4 + 3.2 \times 10^2 =$$
$$21000 + 320$$
$$= 21320$$
$$= 2.132 \times 10^4$$

Indices

Basic Rules of Indices

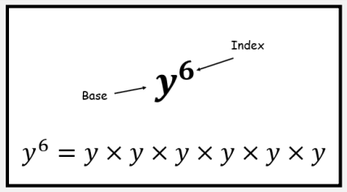
$$a^m \times a^n = a^{m+n}$$

$$\frac{a^5}{a^3} = a^2$$

$$(a^2)^3 = a^6$$

$$a^1 = a$$

$$a^0 = 1$$



Fractional Rules of Indices

$$x^{\frac{1}{2}} = \sqrt{x}$$

$$x^{\frac{1}{3}} = \sqrt[3]{x}$$

$$x^{\frac{1}{4}} = \sqrt[4]{x}$$

If a^{-b} then we write as $\frac{1}{a^b}$

$$8^{\frac{2}{3}} = \left(8^{\frac{1}{3}}\right)^2 = 2^2 = 4$$

Surds

A surd is an irrational number. It doesn't terminate (stop) or repeat.

A surd is written with a square root sign: $\sqrt{2}$

Simplifying a surd

Simplify $\sqrt{200}$

Step 1: Find two factors of 200 one must be the biggest square number you can find!

$$\sqrt{100} \times \sqrt{2}$$

The root 100 simplifies to 10 and the multiplication sign disappears (Like in algebra) so you are left with:

$$10\sqrt{2}$$

Multiplying Surds

To multiply surds you just multiply the numbed under the square root sign together

$$\sqrt{3} \times \sqrt{7} = \sqrt{21}$$

For more complicated examples you must multiply the numbers first and then the surds

$$2\sqrt{3} \times 4\sqrt{7} = 8\sqrt{21}$$

Rationalising the denominator

$$\frac{4+\sqrt{5}}{\sqrt{5}}$$

To rationalise the denominator you have to remove the surd from the denominator.

You do this by multiplying numerator and denominator by the surd

$$\frac{4+\sqrt{5}}{\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}}$$

$$= \frac{4\sqrt{5}+5}{5}$$