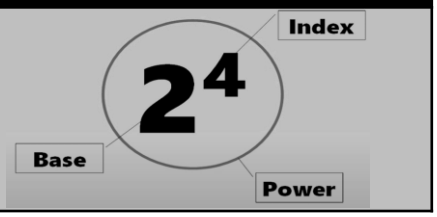
Year 8 Unit 2: Number

INDEX NOTATION

$\mathbf{a = b^n}$ ***a is the power*** ***b is the base*** ***n is the index***	

INDEX LAWS: MULTIPLICATION AND DIVISION

when the **base** is the **same**, we use the following laws when multiplying and dividing

multiplying	**add** the **powers** *e.g.* $a^m \times a^n = \boldsymbol{a^{m+n}}$
dividing	**subtract** the **powers** *e.g.* $a^m \div a^n = \boldsymbol{a^{m-n}}$
raising a power by another power	**multiply** the **powers** *e.g.* $(a^m)^n = \boldsymbol{a^{mn}}$

SQUARES AND ROOTS

index	tells us **how many times** to **use the number** in a **repeated multiplication**
root (*fractional index)*	the **inverse** of an **index**

POSITIVE INTEGER POWERS

square numbers	the **answer** when you **multiply a number by itself:** n^2 **1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144…**
cube numbers	the **answer** when you **multiply a number by itself, and then by itself again :** n^3 **1, 8, 27, 64, 125, 216, 343, 512, 729, 1000…**
powers of 10	10^n **10, 100, 1000, 10 000, 100 000…**

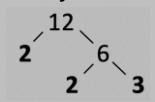
Pythagoras's Theorem

Pythagoras' theorem	a **relationship** between the **3 sides** on a **right angled triangle**
Pythagoras' theorem	$\boldsymbol{a^2 + b^2 = c^2}$ **'c'** is always the **hypotenuse**

STANDARD FORM: NOTATION

notation	allows us to write **very large** or **very small** numbers without lots of zeros **numbers written** in the form **A x 10^n** **'A'** is **between 1 and 10** **'n'** is any **integer**
'n' is positive	**large** number (≥ 1)
'n' is negative	**small** number (< 1)

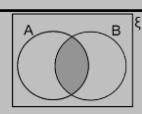
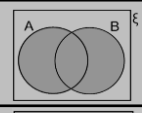
MULTIPLES, FACTORS AND PRIME NUMBERS

multiple	the result of **multiplying** a number by an integer, e.*g. the 3rd multiple of 7 is* ***21***	
lowest common multiple (LCM)	the **lowest common number** in the **multiplication tables** of two or more different numbers	
factor	a quantity which **divides equally** into a number, *e.g. factors of 8 are* ***1, 2, 4 and 8***	
highest common factor (HCF)	the **highest factor** which belongs to two or more numbers	
prime number	an integer greater than 1 that has **exactly two factors, 1 and itself** **2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31…**	
prime factor	a **factor** of a number which is also **prime**	
decomposition	to **break something down**	
product of prime factors (prime factorisation)	a set of **prime factors** which **multiply** to give a number	*e.g. prime factor tree*  12 = **2 x 2 x 3** or **2^2 x 3**
unique factorisation theorem	the fundamental theorem of arithmetic Each integer can be written as a **unique product of prime factors.** This is why 1 is not a prime number.	

SETS

set	a **collection of items** with one of each member
{ }	brackets are written at the **start and end** when **listing elements** in the set
ξ	the **universal set: everything** we are interested in
∈	'**element of a set**' or member of a set (a value in the set)
∉	'**not an** element of a set'
∅	the '**empty set**'
n(A)	the **number of** elements in a set A

VENN DIAGRAMS

Venn diagram	a diagram using circles or other shapes, to **show the relationship between sets**	
set	a **collection of items** with one of each member	
the intersection	(A ∩ B) **in A and in B**	
the union	(A ∪ B) **in A or in B or in both**	
the compliment	A' **not in A**