Integers

Integers are positive whole numbers, negative whole numbers and zero.

When there is more than 1 operation, remember to use BODMAS.

When adding/subtracting, look at the symbols in the middle.

When multiplying/dividing, look at the symbols next to the numbers.

+ + = +	- - = +
+ - = -	- + = -

Indices

The **index** is the small number above the **base**.

Example: 2^4 2 is the **base**, 4 is the **index**.

2^4 can also be written as 2 x 2 x 2 x 2.

2^4 can also be written as 16, as 2 x 2 x 2 x 2 = 16. This is known as a **basic numeral**.

Reciprocals

The reciprocal is simply: 1/number.

Reciprocal: What to multiply a value by to get 1. It is also known as "Multiplicative Inverse".

Example: The reciprocal of 2 is ½ (a half).

More Examples:

Number	Reciprocal	As a decimal
5	1/5	= 0.2
8	1/8	= 0.125
1000	1/1000	= 0.001

For fractions, flip the whole fraction over

Example: The reciprocal of 3/4 is 4/3

Every number has a reciprocal except 0.

Multiplying a number by its reciprocal gets us 1.

Simplifying Expressions

How to simplify an expression:

1. Remove brackets by multiplying factors.

2. Use index laws to remove brackets in terms with indices.

3. Combine like terms by adding coefficients.

4. Combine the constants.

Variable: A symbol for a number we don't know yet. It is usually a letter like x or y.

Constant: A number on its own.

Coefficient: A number used to multiply a variable.

Variables without a number have a coefficient of 1.

Example: ax2 + bx + c

x is a **variable**, a and b are **coefficients** and c is a **constant**.

Like terms are terms whose variables (and their exponents such as the 2 in x2) are the same. In other words, terms that are "like" each other. (Note: the coefficients can be different)

Example:	−2**xy2**
6**xy2**	(1/3)**xy2**

These are all like terms because the variables are all xy2

Prime and Composite Numbers

A prime number is a number that can be divided evenly only by 1, or itself. And it must be a whole number greater than 1.

A composite number is a whole number that can be divided evenly by numbers other than 1 or itself.

Factors and Multiples

Factors and multiples are both to do with multiplication:

Factors are what we can multiply to get the number.

Multiples are what we get after multiplying the number by an integer (not a fraction).

Index Laws

1. The numbers in index form with the same base can be multiplied together by being written in factor form first.

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

2. The numbers in index form with the same base can be divided first by being written in factor form.

Divide: $a^m \div a^n = a^{m-n}$

3. Any base that has an index power of 0 is equal to 1.

Zero Law: $a^0 = 1$

4. Every number and variable inside the brackets should have its index multiplied by the power outside the brackets.

Powers: $(a^m)^n = a^{m \times n}$

5. Negative Indices: $a^{-3} = 1 \div a^3$

6. Any number or variable that does not appear to have an index really has an index of one.

7. Every number or variable inside the brackets must be raised to the power outside the brackets.

Factor Trees

A factor tree is a special diagram where you find the factors of a number, then the factors of those numbers, etc until you can't factor any more.

The ends are all the prime factors of the original number.

A prime factor is a factor that is a prime number: one of the prime numbers that, when multiplied, give the original number.

Example: The prime factors of 15 are 3 and 5 (3×5=15, and 3 and 5 are prime numbers).

There is only one (unique) set of prime factors for any number. This is called the Fundamental Theorem of Arithmetic.