ALGEBRA

Algebra is the use of pronumerals to represent unknown numbers.

For example: \( x \) or \( a \)

Like terms can be added or subtracted

For example: \( 2y \) and \( 3y \) are like terms.

\[ \therefore 2y + 3y = 5y \]

Unlike terms can’t be added or subtracted.

For example \( 2y \) and \( 3y^2 \) are unlike terms.

Therefore: \( 2y + 3y^2 = 2y + 3y^2 \).

or

\[ x + a = x + a \]

MULTIPLICATION OF TERMS

The terms do not need to be “like” in order to multiply.

Like signs make “ + ”

\[
\begin{align*}
\text{Eg:} & \quad = +3 + +3 \\
& = +3 + 3 \\
& = +9
\end{align*}
\]

\[
\begin{align*}
\text{Eg:} & \quad = +3 - -3 \\
& = +3 + 3 \\
& = +9
\end{align*}
\]

Unlike signs make “ - ”

\[
\begin{align*}
\text{Eg:} & \quad = +3 - +3 \\
& = +3 - 3 \\
& = +0
\end{align*}
\]

\[
\begin{align*}
\text{Eg:} & \quad = -3b - +3b \\
& = -9b^2
\end{align*}
\]

\[
\begin{align*}
\text{Eg:} & \quad = -3b - -3b \\
& = +3 +3 \\
& = +9b^2
\end{align*}
\]

EXPANSION OF BRACKETS

Each term in the bracket is multiplied by the number outside the bracket.

\[
\begin{align*}
\text{Eg:} & \quad 5(a + 2b) \\
& = 5 \times a + 5 \times 2b \\
& = 5a + 10b
\end{align*}
\]

\[
\begin{align*}
\text{Eg:} & \quad -2(-1 + 3b) \\
& = -2 \times -1 + -2 \times 3b \\
& = +2 - 6b
\end{align*}
\]
FACTORISING

Factorising is finding the highest common factor

Eg: \(5y + 10\)  common factor is 5 (C.F)

Take the common factor out and place the remainder of each term in a bracket

Eg: 
\[
5y + 10 = 5(y+2)
\]

Eg: 
\[
=2ba + 10bd \\
=2b(a+5d)
\]

CANCELLING

Cancelling numbers or pronumerals that divide evenly on the top and bottom lines.

Eg: 
\[
\frac{10bd}{2ba}
\]

2b is common on the top and bottom.

EQUATIONS

Equations allow us to reduce complex terms to simple terms. We can then utilise these equations to solve many different problems.

Imagine a pair of scales, whereby the left hand side equals the right hand side.

If we double one side, to keep the balance, the other side must be doubled as well.

By working backwards, complex equations can be reduced to simple terms.

Eg: 
\[
5x = 10 \\
\div 5 \div 5 \\
\therefore x = 2
\]

+ and – are inverse operations.

x and ÷ are inverse operations.