

Algebra Need to Know 1

Algebra 1

Notation

$3x^2 + 7x + 9$ is called an expression or a polynomial or a function.

In the $3x^2$ the 3 is called the coefficient - these are the numbers in front of the letters.

The x is called the variable - these are the letters that stand for different numbers.

The 2 is called the power or indice.

In $3x^2 + 7x + 9$ the 9 is called the constant - these are just numbers with no letters attached.

$3x^2 + 7x + 9$ has 3 parts known as 3 terms.

In the number system we must know

N = Natural numbers = whole positive numbers.

Z = Integers = whole positive and negative numbers.

Q = Rational numbers = numbers which can be written as fractions.

R = Real numbers = anything.

To Add and Subtract

Only add like to like - add the numbers in front only not the powers

Note Like terms contain the same letters and have the same powers.

To Multiply

When multiplying letters that are the same add the powers

Multiply the number in front and then add the powers on the same letters.

Note If there is no number in front of a letter then the number in front is 1.

Dealing with Brackets

Step 1 Multiply everything inside the brackets by what is outside.

Step 2 Add and subtract like terms

Double Brackets

Split the first up into two and put the second down twice

Note Square means multiply by itself.

$$(2x - 3)^2 = (2x - 3)(2x - 3)$$

Long Division

Step 1 Divide the first into the first and put the answer on top.

Step 2 Multiply the top by side and put answer underneath

Step 3 Change the sign of the bottom line and add.

Algebra 2

Evaluating expressions

Put number in instead of the letters.

Here we can use the calculator to obtain our answer. You must practice with your calculator, as each one is slightly different.

Remember when using a calculator

- (i) Do not be greedy.
- (ii) Write down results as you go along.

To add and subtract fractions

A fraction has two parts, the top (called the numerator) and a bottom (called a denominator)

To add or subtract fractions find a common denominator.

Note When there is a whole number put it over 1 and then get the common denominator.

Algebra 3

Factorisation

There are 4 different ways of factorising that we are going to do here. We are nearly sure to see some of the following on the exam. This class deals with three of the four ways to factorise.

Factors by Grouping

This is when we have 2 or 4 terms – take out what's common.

Difference of two squares.

If we have two terms both squared with a minus in the middle we can use the following formula

$$x^2 - y^2 = (x + y)(x - y)$$

This can be rewritten as

$$(1^{st})^2 - (2^{nd})^2 = (1^{st} + 2^{nd})(1^{st} - 2^{nd})$$

Combinations

These are a combination of any two of the above. As a rule of thumb try to take out what's common first.

Note x^4 can be written as $(x^2)^2$

Algebra 4

This class deals with quadratic factorising.

Factorisation

Quadratic Factors

There are two very different types of quadratics but the rules for dealing with each change only slightly.

There are also two methods to do these questions one of which is longer but more foolproof than the other.

- (i) Guide number (longer method).
- (ii) Double brackets (quicker but can be harder to see).

Guide - Number

To get the guide number multiply the number in front of the x^2 by the last number (constant).

Type 1 Quadratic where the second sign is +

Want two numbers multiplied to give the guide number but added to give the coefficient of x (number in front of the x).

Type 2 Quadratic where the second sign is –

Want two numbers multiplied to give the guide number but subtracted to give the coefficient of x

Double brackets

Type 1 Quadratic where the second sign is +

Want two numbers multiplied to give the constant but added to give the middle.

These are done by trial and error so that if we do not get the right answer the first time we have to go again.

A lot of students will not write down what they are thinking and try to do the questions in their head which for harder questions ends up taking longer.

Write down what you are thinking if it is not right put a line through it and try again.

Type 2 Quadratic where the second sign is -

Want two numbers multiplied to give the constant but subtract to give the middle.

Algebra 5

This contains equations and manipulation of formulae.

To Solve Equations

Bring required letter to one side numbers to the other.

Always get rid of division first by multiplying every term by the common denominator.

When a term crosses the equals sign it changes sign.

To get rid of multiplication - divide.

Manipulation of formulae

We will always be told to have one letter on one side and therefore we must have all the other letters on the other side.

To get rid of an operation, do the opposite operation.