

Algebra Need to Know 2

Algebra 6

Inequalities

We deal with inequalities the same way as equalities.

When we multiply or divide by a minus the inequality sign must change sign.

We must be able to draw a number line for the different types of number sets.

Natural numbers (N) - positive whole numbers

Integers (Z) - positive and negative whole numbers

Real numbers (R) - any number.

Double inequalities

When there are two inequality signs in the question split the question into two

Left to middle

Middle to right

To solve simultaneous equations

Step 1 Look at the numbers in front of the y values.

Step 2 Multiply the top line by the number in front of the bottom y .

Step 3 Multiply the bottom line by the number in front of the top y .

Step 4 If the signs in front of both y values are different then add if they are the same change the sign of the bottom line and add.

Step 5 Get a value for x and put this value into one of the equations to get a value for y .

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Quadratic Equations

If we are asked to solve a quadratic equation we

- (i) Bring all terms to the left - hand side and equate to zero.
- (ii) Factorise the quadratic to find the two factors.
- (iii) Let each factor equal zero and solve to find the two roots.

Note A quadratic has an x^2 .

Factors are the double brackets which when multiplied out give us the quadratic

$$(x + 3)(x + 4) = x^2 + 7x + 12$$

Roots are the points on the quadratic where the quadratic cuts the x - axis.

Quadratic Formula

To solve quadratic equations of the form $ax^2 + bx + c = 0$ use the formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

where a is the number in front of the x^2 , b is the number in front of the x and c is the constant (number without an x).

- Step 1 Write out clearly what $a =$, $b =$ and $c =$
- Step 2 Write down the formula
- Step 3 Put figures into formula. Be careful with signs.
- Step 4 Work out your square root. Split the question into two.

We use this formula in two types of questions with quadratics

- (a) Where double brackets or guide number does not work.
- (b) When the question asks to find x to 'two decimal places' or 'in surd form'.

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Harder Quadratics

In these questions, which come up on a regular basis, we have to use a substitution to make the quadratic easier.

These questions may or may not need the formula.

Solve $x^2 + 5x - 6 = 0$ and hence or otherwise solve $(2t - 1)^2 + 5(2t - 1) - 6 = 0$

Note If you see 'hence or otherwise' in a question it is a good bet that if you get the answers from the first part you can use this answer to get the second part easily.

If we look at the coefficients in front of each term in both equations we see that they are the same so we can let

$$2t - 1 = x$$

We have found the values of x so it is easy to find the values of t by substitution.

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Worded Questions

Some of the questions will be written in English and you have to make mathematical equations before finding the answers.

Let the unknown number be x

When given a worded question

- (i) Read the question.
- (ii) Read the question and try to write an equation (or equations).
- (iii) Read the question and the equation you have written to see if it makes sense.
- (iv) Solve the equation you have written (whether it is right or wrong).

You must try to write out a dictionary for yourself as you come across different words and expressions. Here are some common terms

Difference means minus

Sum means add

One-third means divide by 3

Six times means multiply by 6.

Is means equals

A year ago is $x - 1$

Simple equations

Related objects.

Equations that become quadratic.

Equations that become simultaneous