

My Top 3 Algebraic Skills

"Algebra is one of the broad areas of mathematics. Roughly speaking, algebra is the study of mathematical symbols and the rules for manipulating these symbols; it is a unifying thread of almost all of mathematics."

To be successful in high school mathematics, a mastery of several algebraic skills is required. I would like to pinpoint 3 of these skills. They are particularly relevant because applications are plentiful in a variety of different contexts.

1. Isolating a Variable

A variable is an unknown quantity represented by a letter. To isolate means to express an equation such that the variable is by itself on one side of the equal sign. Knowing when to *add*, *subtract*, *multiply* or *divide* a term on both sides of an equal sign is crucial. As long as the same operation is carried out on both sides of an equal sign, balance is maintained.

Some specific applications include:

- Isolating 'y' to graph an equation.
- Isolating 'y' to find the slope of a line.
- Re-arranging a formula in terms of a specific letter.
- Isolating a variable to solve a system of equations by substitution.
- Determining intercepts algebraically.
- Solving a variety of equations, including trigonometric, logarithmic, radical, rational and quadratic.

If you feel that your proficiency in this skill is lacking in any way, the following page may be able to help you:

<https://mathpqjq.com/isolating-a-variable-gr-10/>

2. Factoring

"Factoring is the process of finding factors; in other words, finding what to multiply together to get an expression".

There are several different types of factoring, including the most common,

- common factor,
- $ax^2 + bx + c$, where $a = 1$,
- $ax^2 + bx + c$, where $a \neq 1$, and
- difference of squares.

The important first step is recognizing the type of factoring required. Secondly, an understanding of the process to complete the factoring is needed.

Some specific applications include:

- Changing the form of a quadratic equation to complete the square.
- Adding and subtracting rational expressions.
- Determining the zeros of a polynomial function.
- Trigonometric identity applications.
- Determining non-permissible values.
- Simplifying the products and quotients of rational expressions.
- Solving a variety of different types of equations, including quadratic, trigonometric, radical, rational, and logarithmic.

If you feel uncertain about identifying the type of factoring required for a given question, or you are unsure about the factoring processes, the following pages may be of assistance:

<https://mathpqjq.com/factoring-trinomials/>

<https://mathpqjq.com/difference-of-squares-factoring/>

3. Clearing a Fraction

Sometimes we are presented with an equation in fractional form. For example,

$$\frac{x}{2} + \frac{4x}{3} = 11$$

Our task is to solve this equation for x . If we can re-write the equation in an equivalent form, without fractions, it will be much easier to use our basic algebraic solving skills.

A very important mathematical concept is embedded within this question. It is possible to multiply every term in an equation by the same number, and obtain an equivalent equation. We do not change the essence of the equation, but only its form.

To clear the fraction for the example above, we would multiply each of the 3 terms in the equation by the smallest number that all of the denominators divide evenly into; in other words, the Least Common Denominator (LCD). In this case, with denominators of 2 and 3, our LCD is 6.

$$\begin{aligned} & 6\left(\frac{x}{2} + \frac{4x}{3} = 11\right) \\ = & \quad 3x + 8x = 66 \\ = & \quad 11x = 66 \\ & \quad x = 6 \end{aligned}$$

This skill is primarily used in questions where we are asked to solve. Although there are likely fewer direct applications of this algebraic skill, as compared with the first two, due to a fairly large number of solving type questions we will encounter, this skill is very important.

If you would like to polish your skills on clearing fractions, visit

<https://mathpqjq.com/clearing-fractions/>