

Revision topic: Algebra of Equations

Objectives:

- ◇ Revise how to manipulate equations safely
- ◇ Be able to make a given variable the **subject** of an equation

Key points:

Pretty much all mathematics involves manipulating equations so getting good at it is vital in all areas. An equation is a collection of symbols which say that one thing is related (normally equal) to another set of symbols, e.g.

$$\sqrt{x-3} - 5 = 4.$$

Here we're saying that $\sqrt{x-3} - 5$ equals 4. So if we **add 5 to both sides** we know that

$$\sqrt{x-3} = 9.$$

Simultaneously adding, subtracting, multiplying or dividing **both sides** of an equation by a constant (don't divide by zero!) are the main operations that are always permitted.

As long as you don't make numerical mistakes nothing you ever do is wrong. However, some things are more helpful than others.

The purpose is to get closer to a solution – normally by simplifying

Doing more complex things to both sides, like squaring and square-rooting, requires more care.

In the example above, we can square both sides and make it simpler. If $\sqrt{x-3}$ equals 9 then

$$\left(\sqrt{x-3}\right)^2 = (9)^2$$

which means that $x - 3 = 81$, then finally adding 3 we can deduce $x = 84$.

Recommended links:

Highly recommended: HELM notes on formulae

Other links: Khan academy multipart lessons (with practice examples), Mathcentre notes on formulae