

Algebra Introduction

Variables or Pronumerals

The first and biggest thing to understand is what a *variable* is in algebra. Say I have the following equation:

$$x + 7 = 9$$

If you read this new equation out aloud, you should say something like: “x plus seven equals nine”. ‘x’ is what we call a *variable*, or *pronumeral*. Variables are used to *represent* numbers.

Coefficients of variables

A coefficient is the number in front of a variable. Look at the following expression:

$$5x$$

The number in front of the ‘x’ is its coefficient: 5. What about:

$$-4x + 3y$$

The coefficient of ‘x’ is ‘-4’ and the coefficient of y is ‘3’.

Addition and Subtraction

$$3x + 4x$$

I can read this equation as “Three lots of x plus four lots of x”. What happens when I have 3 of something, and I add another 4 of the same thing? Simple – I end up with 7 of that thing. So in this case, I can rewrite this expression:

$$\begin{aligned} &\Rightarrow 3x + 4x \\ &= 7x \end{aligned}$$

What about if I have something like:

$$6x + 3y$$

Can I add these two together? The answer is NO. I can only add together variables that are the same. ‘x’ and ‘y’ are *different* variables, so I can’t add them together.

Multiplying and dividing variables

Say I wanted to multiply ‘x’ by ‘y’. I’d write this as:

$$xy$$

When you’re multiplying variables together, often the multiplication symbol isn’t written. The last expression is exactly the same as:

$$x \times y$$

except it doesn’t have the multiplication symbol.

You can also divide variables by other variables:

$$\frac{x}{y} \text{ or } \frac{x}{y} \text{ or } x/y \text{ or } x \div y$$

Expressions, equations and terms

A term is part of an equation which has one or more variables or pronumerals in it, but no ‘+’ signs or ‘-’ signs in it. For instance:

- $\frac{42x^2y^3}{\sqrt{43xy}}$ is also a *term* because it has the two pronumerals x and y in it, but no ‘+’ or ‘-’ signs in it.
- $(4x + 3y)$ is *not* a term because it has a ‘+’ sign in it. In fact, it is made up of *two* terms, ‘4x’ and ‘3y’.

An *expression* is a group of terms connected by ‘+’ or ‘-’ signs. There can be as many terms as you want, as long as there is at least 1. For instance,

$$3x^2 + 2x - 15.5$$

is an expression, because it contains three terms, which are joined together by a ‘+’ and a ‘-’ sign.

An *equation* is made up of two expressions with an ‘=’ sign between them. One expression is on the left of the ‘=’ sign, and the other expression is on the right of the ‘=’ sign. Here’s one example of an equation:

$$3x + 4 = 5x - 2$$