

Maths within Science

In both your maths and science lessons you will be expected to substitute into formulae. In formulae different variables are represented by letters. Substitution simply means putting numbers where the letters are to work something out.

Discrete data can only take certain fixed values. The pH of a solution is a discrete variable. The pH of a solution can take integer values of pH from pH 0 for a very strong acid to pH 14 for a very strong alkali. Solutions with pH 7 are said to be neutral.

There are two main types of units – metric and imperial.

Metric units follow the decimal system. To convert between them you multiply or divide by multiples of 10. For example:

$$1 \text{ kg} = 1000 \text{ g}$$

$$\text{So } 3.4 \text{ kg} = 3.4 \times 1000 = 3400 \text{ g}$$

$$\text{And } 24 \text{ g} = 24 \div 1000 = 0.024 \text{ kg}$$

Speed is a compound measure

made up from a measure of length (kilometres) and a measure of time (hours).

Density is made up from a measure of mass (grams) and a measure of volume (cubic centimetres).

Continuous data can take any value in a range. An example of a continuous variable is mass, for example the mass of iron in a mixture of iron filings and sulphur powder. The iron could have a mass of 3.6 g, 4.218g, 0.24g etc. depending on the mixture concerned. In biology, a characteristic of a species that changes gradually over a range of values shows continuous variation. An example of this is height.

Equations of Motion

$$v = u + at$$

v = final velocity (m/s)
 u = initial velocity (m/s)
 a = acceleration (m/s²)
 t = time (s)

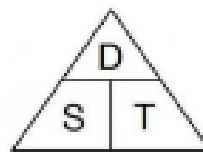
e.g. A ball is rolled along the ground for 20 seconds. Its initial velocity is 10m/s and its final velocity is 45m/s.

What is its acceleration?

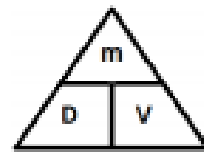
$$v = u + at$$

[Rearranging] $v - u = at$ therefore $\frac{v - u}{t} = a$

[Substituting] $a = \frac{v - u}{t} = \frac{45 - 10}{20} = 1.75 \text{ m/s}^2$



$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$



$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

Manipulating algebraic formulae allows you to rearrange formulae so that you can work out the value of different variables. This is also known as "Changing the subject of a formula."

At Stanley High School

