Formula Manipulation

The subject of a formula is the variable by itself.

What is the subject of the following:

$y = mx + b$ y

$v_f = v_0 + at$ V_f

To change the subject of an equation the golden rule is to

Do to one side what you do to the other

You can add or subtract the same quantity to or from each side

$v_f = v_0 + at$, make the subject v_0

$-at \quad -at$

$V_f - at = V_0$

$v_0 = V_f - at$

$y = mx + b$, make the subject b

$-mx \quad -mx$

$y - mx = b$

You can multiply or divide both sides by the same quantity

$E_p = mgh$, make the subject g

$\div m \quad \div m$

$\frac{E_p}{m} = gh$

$\div h \quad \div h$

$\frac{E_p}{mh} = g$

$\frac{t}{5.3} = mb$, make the subject t

$\times 5.3 \quad \times 5.3$

$t = 5.3mb$

Often a combination of these approaches is required, in these cases it is usually easier to add or subtract first and then multiply and divide.

$v = v_0 + at$, make the subject t

$-v_0 \quad -v_0$

$v - v_0 = at$

$\div a \quad \div a$

$\frac{v - v_0}{a} = t$

Remove fractions by multiplying all terms by the denominator

$\frac{a}{b} = m + h$, make the subject a

$\times b \quad \times b$

$a = mb + hb$

or

$a = b(m+h)$

$\frac{h}{m} = 2y + z$, make the subject h

$h = 2my + mz$

or

$h = m(2y + z)$

$h = \frac{m}{x}$, make the subject x

$xh = m$

$x = \frac{m}{h}$

$h = \frac{m}{x} + k$, make the subject x

$-k \quad -k$

$h - k = \frac{m}{x} \rightarrow x(h-k) = m$

$x = \frac{m}{h-k}$

You can square root both sides to remove a square, in this case you need to consider the positive and negative roots.

$E_k = \frac{1}{2}mv^2$, make the subject v

$2E_K = mv^2$

$\frac{2E_K}{m} = v^2 \rightarrow \pm\sqrt{\frac{2E_K}{m}} = v$

You can square both sides to remove a square root.

$m = \sqrt{k} + v$, make the subject k

$-v \quad -v$

$m - v = \sqrt{k} \rightarrow (m-v)^2 = k$