Linear literal equations and simultaneous linear literal equations

Thursday, 3 January 2019 9:28 am

By the end of the lesson I would hope that you have an understanding of the concepts below which you can apply to a number of complex questions:

- Know what a linear literal equation is
- Know what a simultaneous literal equation is

RECAP

In the previous section we looked at how we can solve linear equations. These included simple examples, examples with fractions and simultaneous equations. This is a great foundation for allowing us to now move onto literal equations,

You're being SOOOOO literal

What is a literal equation?!
Basically, its an equation where solutions will be expressed in terms of pronumerals instead of numbers!
You might like to think of this, in terms of a basic linear equation, as making a certain pronumeral the subject of a formula.

Example:
Solve the following equation for x.

$qx - r = q$

$qx - r = q$

$qx = r + q$

$x = \frac{r+q}{q} = \frac{r}{q} + \frac{q}{q} = \frac{r}{q} + 1$

$\frac{1}{2} + \frac{1}{4} = \frac{2}{4} + \frac{1}{4}$

$= \frac{2+1}{4}$

$= \frac{3}{4}$

Example:
Solve the following equation for x.

$bx + c = dx - p$

$bx + c = dx - p$

$bx - dx + c = -p$

$bx - dx = -p - c$

$x(b - d) = -p - c$

$x = \frac{-p-c}{b-d}$

Solving literal simultaneous equations

This might seem challenging, but, so long as you know how to use the method of elimination, and your algebra is strong, then you're just going to follow the same process.

Remember: This is a CAS course, so you can use your calculators to check!

Example:
Solve the following simultaneous equations for x and y.

$y = ax + c$
$y = bx + d$

$y = ax + c$

$y = bx + d$

$ax + c = bx + d$

$ax - bx = d - c$

$x(a - b) = d - c$

$y = ax + c$

$y = a\left(\frac{d-c}{a-b}\right) + c$

$y = \frac{ad - ac}{a-b} + c$

$ax - bx = d - c$

$x(a-b) = d - c$

$x = \dfrac{d-c}{a-b}$

$\dfrac{\qquad}{a-b}$

$y = \dfrac{(ad - ac) + c(a-b)}{a-b}$

$y = \dfrac{ad - \cancel{ac} + \cancel{ac} - bc}{a-b}$

$y = \dfrac{ad - bc}{a-b}$

$y = ax + c$

$y = bx + d$

$-ax + y = c$ ①

$-bx + y = d$ ②

$-ax + bx = c - d$

$x(-a+b) = c - d$

$x = \dfrac{c-d}{b-a} = \dfrac{-1(d-c)}{-1(a-b)}$

$=$

$-ax + y = c$

$y = ax + c$

$y = a\left(\dfrac{d-c}{a-b}\right) + c$

$\vdots$