Linear Equations

Saturday, 12 January 2019 10:50 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 equation is
- Know how to solve the most common forms of linear equations

RECAP:

This work is going to a review and revision of the work which has been taught to you since about Year 8. Sadly, the most common mistakes people make with the work in Methods 1 and 2 is the around the use of algebra.

This whole section of work is an effective recap of the work with a direct reference to what will be needed for the duration of this course.

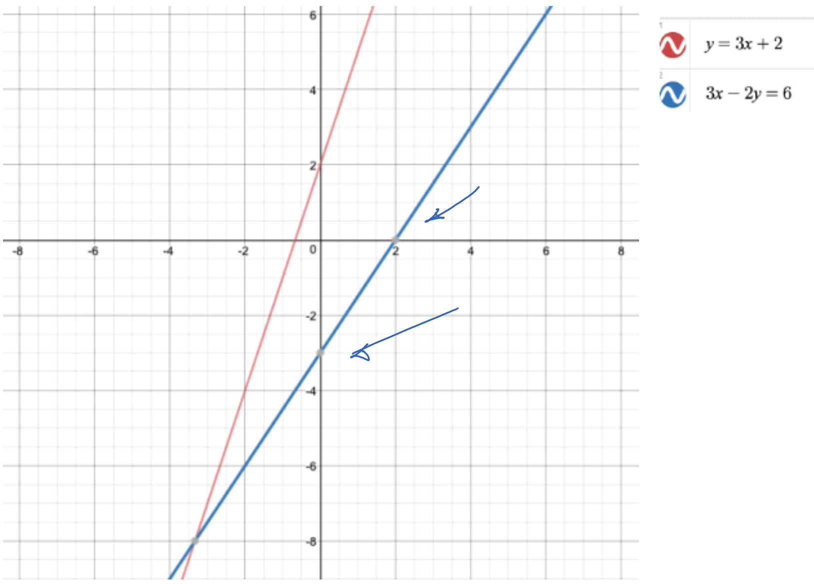
Linear equations: What are they

I think the trick is in the title lol.
Linear and line.
These are equations of straight lines.

Straight lines can have their equations expressed in two forms:

Gradient intercepts form: $y = 3x + 2$

Intercept form: $3x - 2y = 6$



$y = 3x + 2$

$y = mx + c$

$3x - 2y = 6$

$x = 0$ $\quad -2y = 6$ $\quad (0, -3)$

$y = -3$

$y = 0$ $\quad 3x = 6$ $\quad (2, 0)$

$x = 2$

Common questions to solve:

Equations in the form $ax + b = c$

Example:
Solve $4x - 3 = 17$

$4x - \cancel{3} = 17$

$4x = 17 + 3$

$4x = 20$

$\div 4 \quad x = 5$

$x^1 \quad x^2$

$4 \otimes x$

Equations with unknowns on both sides

Example:
Solve $4x + 3 = 2x + 9$

$4x + 3 = \cancel{2x} + 9$

$-2x \quad 4x + 3 - 2x = 9$

$2x + \cancel{3} = 9$

$-3 \quad 2x = 9 - 3$

$2x = 6$

$x = \underline{\underline{3}}$

Equations containing brackets

Example:
Solve $2(3x + 2) = -8$

$2(3x + 2) = -8$

$6x + 4 = -8$

$-4 \quad 6x = -8 - 4$

$6x = -12$

$x = \underline{\underline{-2}}$

Equations containing fractions

Example:
Solve $\frac{x}{5} - 2 = \frac{x}{3}$

$\frac{x}{\cancel{5}} - 2 = \frac{x}{3}$

$\frac{5}{1} \times \frac{x}{3} = \frac{5x}{3}$

$\times 5 \quad x - 10 = \frac{5x}{3}$

$\times 3 \quad 3x - 30 = 5x$

$-3x \quad -30 = 2x$

$2x = -30$

$x = \underline{\underline{-15}}$

Example:
Solve $\frac{x-3}{2} - \frac{2x-4}{3} = 5$

$\frac{(x-3)}{2} - \frac{(2x-4)}{3} = 5$

$\times 2 \quad (x-3) - \frac{2(2x-4)}{3} = 10$

$\times 3 \quad 3(x-3) - 2(2x-4) = 30$

$3x - 9 - 4x + 8 = 30$

$-x - 1 = 30$

$\times -1 \quad x + 1 = -30$

$x = \underline{\underline{-31}}$

Literal Equations

We normally expect our answers to be numerical.
This is what we have been used to throughout our Mathematical careers.

Well, now for something new!
A Literal Equation is one where the answer is in terms of letters.

I like to think of this more as "changing the subject of the formula".

Example:
Solve $bx + a = dx + c$ for x

$$bx + a = dx + c$$

$$bx - dx + a = c$$

$-a$ $$bx - dx = c - a$$

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

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

Using the CAS

I am able to use both the T-iNspire and the CASIO Classpad.
At this time, I'll focus on the Classpad as this is the calculator I currently use to teach.
Examples will follow for the Texas in due course.

Example:
Solve $bx + a = dx + c$ for x

$$x = \frac{-a}{b-d} + \frac{c}{b-d} = \frac{-a+c}{b-d}$$

$$= \frac{c-a}{b-d}$$

Example:
Solve $2(3x + 2) = -8$

$$x = -2$$