Simultaneous Equations (Substitution)

Sunday, 4 February 2018 6:03 pm

1J Simultaneous equations – substitution	Exercise 1J Page 58	1(½), 3	—
Let's start: *Give up and do the algebra*		4-5(½)	4-5(½)
Key ideas		6, 8	8, 9
Examples 27		10(½), 11	11, 12
		—	13, 14

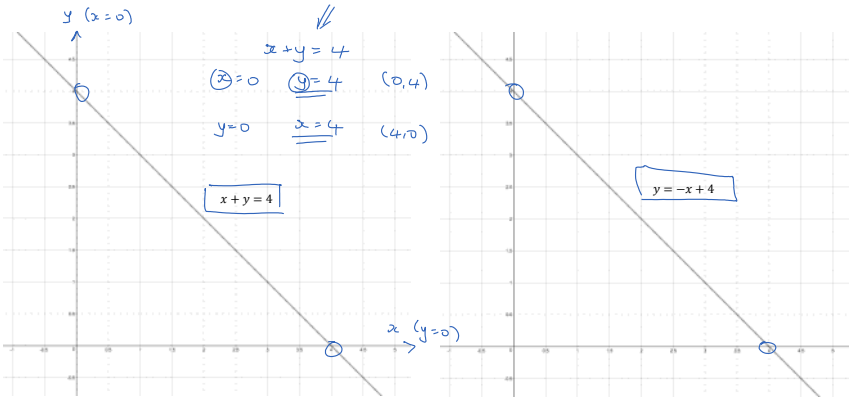
Key questions

- What are simultaneous equations
- Why would I want to solve them?
- What do they look like?
- Solving for missing letters using substitution

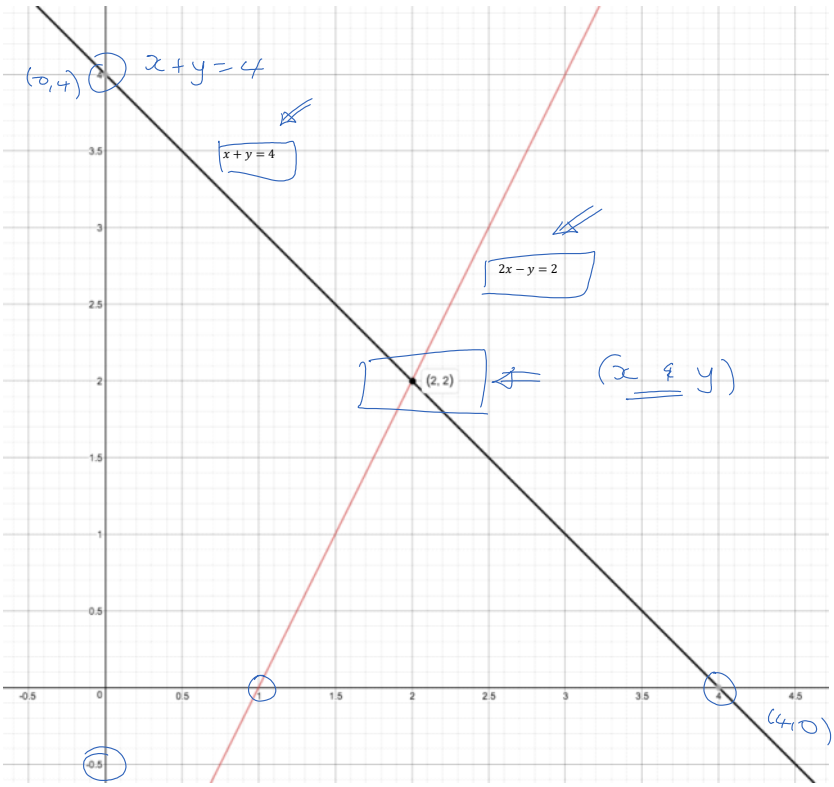
Equation: $y = 3x + 2$ ($m = 3$, y-int $= 2$) — Straight Line

$\Rightarrow 3x - y = -2$ — Intercept form

We have met lots of equations recently!
Most of them have been dealing with straight lines.
We know we can write straight lines using the gradient/intercept form or the intercept form
Both forms will give me a straight line.



Graphs don't have to hold just one equation.
Many times we are looking for where graphs cross each other as the result might be significant.



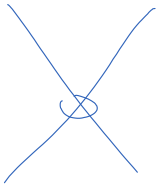
$-y = 2$

$x = 0$ $y = -2$ $(0, -2)$

$2x = 2$

$y = 0$ $x = 1$ $(1, 0)$

Simultaneous Equations



When we solve simultaneous equations we are looking for the point where two lines cross.

There are a number of ways we can do this:

- Graphically
- Algebraically
  - **Substitution**
  - Elimination
  - Matrices (Further Mathematics and Mathematical Methods)
- Using our CAS calculator :)

Solving simultaneous equations by substitution ...

Solve these pairs of simultaneous equations using the method of substitution

$2x - 3y = -8$ and $y = x + 3$

① $2x - 3y = -8$ (1 letter)

② $y = x + 3$ (2 terms)

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

$2x - 3x - 9 = -8$ $+9$

$-x = 1$

$x = -1$

12 | 14



$|2x - 3x| - 9 = -8 \quad +9$

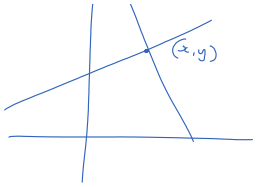
$x = 1$

$y = x + 3$

$= 1 + 3$

$= 4$

Soln $= (1, 4)$



$y = -3x + 2$ and $y = 7x - 8$

$\begin{cases} y = -3x + 2 & \text{①} \\ y = 7x - 8 & \text{②} \end{cases}$

$-3x + 2 = 7x - 8$

$+2 = 10x - 8$

$10 = 10x$

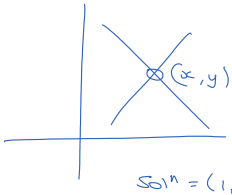
$x = 1$

(+3x) +8

$y = 7x - 8$

$y = 7 - 8$

$y = -1$



Soln $= (1, -1)$

Tricks! We don't always have to substitute for the y-value!
Sometimes it might be easier to substitute for the x-value.

E.g. $x = 3y - 2$ and $7y - 2x = 8$

(2x)

$7y - 2(3y - 2) = 8$

$7y - 6y + 4 = 8 \quad -4$

$y = 4$

$x = 3y - 2$

$x = 12 - 2$

$x = 10$

$\therefore$ Soln $= (10, 4)$