

Simultaneous Equations - Lesson 1

Simultaneous Equations 1 (No Multiplying)

LI

- Solve a pair of equations for 2 missing variables.

SC

- Add or subtract the equations.
- 2-step equations.

Simultaneous Equations (in N5) - 2 letters, 2 equations :

$$a x + b y = e$$

$$c x + d y = f$$

In actual questions, a, b, c, d, e and f will be numbers.

How to Solve :

- Elimination
- Substitution
- Graph

Reminders about Algebra

Coefficient (aka **multiplier**) - number attached to a letter.

$$2x + 3x =$$

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

$$17y - 9y =$$

$$17y - (-9y) =$$

Elimination involves 'getting rid' of one of the letters to work out the other one.

Detailed Strategy :

- Make sure the coefficients of one of the letters are the same.
- If the signs of that letter are the same, subtract one equation from the other .
- If the signs of that letter are different, add one equation to the other.

Example 1

Solve,

$$x + y = 59 \quad (1)$$

$$x - y = 31 \quad (2)$$

Signs of y are different, so add : (1) + (2)

$$2x = 90$$

$$\Rightarrow \underline{x = 45}$$

Substitute $x = 45$ into (2) :

$$x - y = 31$$

$$\therefore 45 - y = 31$$

$$\Rightarrow -y = -14$$

$$\Rightarrow \underline{y = 14}$$

$$\therefore \boxed{x = 45, y = 14}$$

Example 2

Solve,

$$2c - d = 5 \quad (1)$$

$$2c + 3d = -7 \quad (2)$$

Signs of c are the same (+), so subtract : $(1) - (2)$

$$-4d = 12$$

$$\Rightarrow \underline{d = -3}$$

Substitute $d = -3$ into (1) :

$$2c - d = 5$$

$$\therefore 2c - (-3) = 5$$

$$\Rightarrow 2c + 3 = 5$$

$$\Rightarrow 2c = 2$$

$$\Rightarrow \underline{c = 1}$$

$$\therefore \boxed{c = 1, d = -3}$$

Example 3

Solve,

$$w - p = 10 \quad (1)$$

$$-w + 3p = -12 \quad (2)$$

Signs of w are different, so add: $(1) + (2)$

$$2p = -2$$

$$\Rightarrow \underline{p = -1}$$

Substitute $p = -1$ into (1) :

$$w - p = 10$$

$$\therefore w - (-1) = 10$$

$$\Rightarrow w + 1 = 10$$

$$\Rightarrow \underline{w = 9}$$

$$\therefore \boxed{w = 9, p = -1}$$

Questions

Solve each of the following pairs of equations by either adding or subtracting.

a $x + y = 10$

$$2x - y = 8$$

d $x + 5y = 11$

$$2x + 5y = 1$$

g $-x - 3y = -9$

$$x - 2y = 1$$

b $2x - y = 10$

$$4x + y = 14$$

e $x - 2y = 6$

$$3x - 2y = 2$$

h $4x - y = 20$

$$3x - y = 17$$

c $3x + y = -1$

$$3x - 2y = -7$$

f $2x + 5y = 3$

$$-2x - y = -7$$

i $6x + 5y = 9$

$$x - 5y = 19$$

Answers

Solve each of the following pairs of equations by either adding or subtracting.

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$3x - 2y = 2$

h $4x - y = 20$

$3x - y = 17$

c $3x + y = -1$

$3x - 2y = -7$

f $2x + 5y = 3$

$-2x - y = -7$

i $6x + 5y = 9$

$x - 5y = 19$

a $x = 6, y = 4$

b $x = 4, y = -2$

c $x = -1, y = 2$

d $x = -10, y = \frac{21}{5}$

e $x = -2, y = -4$

f $x = 4, y = -1$

g $x = \frac{21}{5}, y = \frac{8}{5}$

h $x = 3, y = -8$

i $x = 4, y = -3$