

Simultaneous Equations

1)

Solve algebraically the system of equations

$$3x + 2y = 17$$

$$2x + 5y = 4.$$

3

$$\begin{array}{r} 3x + 2y = 17 \quad \times 2 \\ 2x + 5y = 4 \quad \times 3 \end{array}$$

$$\begin{array}{r} 6x + 4y = 34 \\ 6x + 15y = 12 \quad \checkmark \\ \hline -11y = 22 \\ y = -2 \quad \checkmark \end{array}$$

find x

$$2x + 5y = 4$$

$$2x + 5 \times (-2) = 4$$

$$2x - 10 = 4$$

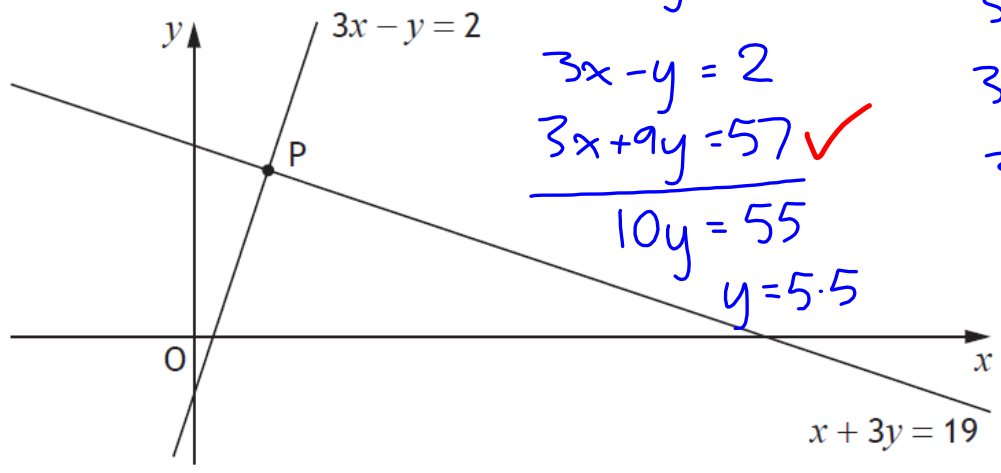
$$2x = 14$$

$$x = 7 \quad \checkmark$$

2)

The graph below shows two straight lines with the equations:

- $3x - y = 2$
- $x + 3y = 19$



$$\begin{array}{r} 3x - y = 2 \\ x + 3y = 19 \times 3 \\ \hline 3x - y = 2 \\ 3x + 9y = 57 \checkmark \\ \hline 10y = 55 \\ y = 5.5 \end{array}$$

find x

$$\begin{array}{r} 3x - y = 2 \\ 3x - 5.5 = 2 \\ 3x = 7.5 \\ x = 2.5 \checkmark \end{array}$$

The lines intersect at the point P.

Find, **algebraically**, the coordinates of P.

So $P(2.5, 5.5) \checkmark$

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3)

Joan buys gold and silver charms to make bracelets.

2 gold charms and 5 silver charms cost £125.

$$2g + 5s = 125 \quad \checkmark$$

(a) Let g pounds be the cost of one gold charm and s pounds be the cost of one silver charm.

Write down an equation in terms of g and s to illustrate the above information.

$$4g + 3s = 145 \quad \checkmark$$

4 gold charms and 3 silver charms cost £145.

(b) Write down another equation in terms of g and s to illustrate this information.

(c) Hence calculate the cost of each type of charm.

$$\begin{array}{r} 2g + 5s = 125 \quad \times 2 \\ 4g + 3s = 145 \\ \hline 4g + 10s = 250 \quad \checkmark \\ 4g + 3s = 145 \\ \hline 7s = 105 \\ s = 15 \quad \checkmark \end{array}$$

find g

$$\begin{array}{l} 2g + 5s = 125 \\ 2g + 5 \times 15 = 125 \\ 2g + 75 = 125 \\ 2g = 50 \\ g = 25 \end{array}$$

One gold charm costs £25
One silver charm costs £15

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4)

Solve algebraically the system of equations

$$2x - 3y = -5$$

$$y = 2x - 1$$

Alternative method.

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Use substitution

$$y = 2x - 1$$

$$2x - 3y = -5$$

$$2x - 3(2x - 1) = -5$$

$$2x - 6x + 3 = -5$$

$$-4x + 3 = -5$$

$$-4x = -8$$

$$x = 2$$

find y

$$y = 2x - 1$$

$$= 2 \times 2 - 1$$

$$= 4 - 1$$

$$= 3$$