

Simultaneous Equations

$$\text{(a)} \quad \begin{aligned} x + y &= 11 & \textcircled{1} \\ 3x - 2y &= 18 & \textcircled{2} \end{aligned}$$

$$\textcircled{1} \times 3$$

$$3x + 3y = 33 \quad \textcircled{3}$$

$$3x - 2y = 18 \quad \textcircled{2}$$

$$5y = 15$$

$$\underline{y = 3}$$

$$\textcircled{3} - \textcircled{2}$$

$$3x + 3x$$

$$\sqrt{3x - 3x = 0}$$

Sub $y = 3$ into $\textcircled{1}$

$$x + 3 = 11$$

$$x = 11 - 3$$

$$\underline{x = 8}$$

$$\text{Pt } \underline{\underline{(8, 3)}}$$

$$\text{(b)} \quad 3p - 2q = 4 \quad \textcircled{1} \times 3$$

$$7p - 3q = 1 \quad \textcircled{2} \times 2$$

$$9p - 6q = 12 \quad \textcircled{3}$$

$$14p - 6q = 2 \quad \textcircled{4}$$

$$\underline{-5p = 10}$$

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

$$\textcircled{3} - \textcircled{4}$$

$$-6q + -6q = -12q$$

$$\sqrt{-6q - -6q = 0}$$

Sub $p = -2$ into $\textcircled{1}$

$$3 \times (-2) - 2q = 4$$

$$-6 - 2q = 4$$

$$-2q = 10$$

$$\underline{q = 5}$$

$$\text{Pt } \underline{\underline{(-2, 5)}}$$

$$(c) \begin{aligned} 2x + 5y + 9 &= 0 & \text{-rearrange} & \quad 2x + 5y = -9 \quad (1) \\ 5x - 3y &= 24 \quad (2) \end{aligned}$$

$$\begin{aligned} (1) \times 5 \\ (2) \times 2 \end{aligned}$$

$$\begin{aligned} 10x + 25y &= -45 \quad (3) \\ 10x - 6y &= 48 \quad (4) \\ \hline 31y &= - \\ \underline{y} &= -3 \end{aligned}$$

$$\begin{aligned} (3) - (4) \\ \sqrt{10x - 10x} &= 0 \\ 10x + 10x & \end{aligned}$$

Sub into (1).

$$\begin{aligned} 2x + 5(-3) &= -9 \\ 2x + (-15) &= -9 \\ 2x - 15 &= -9 \\ 2x &= -9 + 15 \\ 2x &= 6 \\ \underline{x} &= 3 \end{aligned}$$

Q2

$$\begin{aligned} 4T + 6C &= 108 \quad (1) \\ 8T + 3C &= 108 \quad (2) \end{aligned}$$

$$(2) \times 2$$

$$\begin{aligned} 16T + 6C &= 216 \quad (3) \\ 4T + 6C &= 108 \quad (1) \\ \hline 12T &= 108 \\ \underline{T} &= 9 \text{ kg (tea)} \end{aligned}$$

$$\begin{aligned} (3) - (1) \\ \sqrt{6C - 6C} &= 0 \\ 6C + 6C & \end{aligned}$$

Sub T into (1)

$$\begin{aligned} 4 \times 9 + 6C &= 108 \\ 36 + 6C &= 108 \\ 6C &= 72 \end{aligned}$$

$$\underline{C} = 12 \text{ kg (coffee)}$$

$$\begin{array}{r} \textcircled{1} \times 2 \\ \textcircled{2} \times 5 \end{array}$$

$$\begin{array}{r} 5I + 40m = 30 \\ 2I + 100m = 54 \end{array}$$

$$\begin{array}{r} 10I + 80m = 60 \textcircled{3} \\ 10I + 500m = 270 \textcircled{4} \\ \hline +/420m = +210 \end{array}$$

$$\begin{array}{r} \textcircled{3} \textcircled{4} \\ \hline 10I - 10I = 0 \\ 10I + 10I = 20I \end{array}$$

$$m = \frac{210}{420}$$

$$m = \frac{1}{2} \text{ (0.5)}$$

Sub m into $\textcircled{1}$ for I

$$5I + 40 \times \frac{1}{2} = 30$$

$$5I + 20 = 30$$

$$5I = 10$$

$$I = 2$$

3 items + 70 mules =

$$3 \times 2 + 70 \times 0.5 = 6 + 35 \Rightarrow \underline{\underline{41}}$$

$$4. \quad 5x - y = 10$$

• To find where a graph cuts x axis
let $y = 0$

• To find where a graph cuts y axis
let $x = 0$.