

Simultaneous Equations: Multiply One Equation

ANSWERS

1

Solve the simultaneous equations.

$$\begin{aligned}(1) \quad 2x + y &= 11 \\ (2) \quad 3x + 2y &= 17 \\ (1) \times 2\end{aligned}$$

$$\begin{aligned}(3) \quad 4x + 2y &= 22 \\ (3) - (2)\end{aligned}$$

$$\begin{aligned}x &= 5 \\ (1) \quad 10 + y &= 11 \\ y &= 1\end{aligned}$$

$$x = 5, y = 1$$

Check in (2): $15 + 2 = 17 \checkmark$

2

Solve the simultaneous equations.

$$\begin{aligned}(1) \quad 2x + y &= 11 \\ (2) \quad 3x - 2y &= 13 \\ (1) \times 2\end{aligned}$$

$$\begin{aligned}(3) \quad 4x + 2y &= 22 \\ (2) + (3)\end{aligned}$$

$$\begin{aligned}7x &= 35 \\ x &= 5 \\ (1) \quad 10 + y &= 11 \\ y &= 1\end{aligned}$$

$$x = 5, y = 1$$

Check in (2): $15 - 2 = 13 \checkmark$

3

Solve the simultaneous equations.

$$\begin{aligned}(1) \quad x + 4y &= 8 \\ (2) \quad 3x + 2y &= 14 \\ (2) \times 2\end{aligned}$$

$$\begin{aligned}(3) \quad 6x + 4y &= 28 \\ (3) - (1)\end{aligned}$$

$$\begin{aligned}5x &= 20 \\ x &= 4 \\ (2) \quad 12 + 2y &= 14 \\ 2y &= 2 \\ y &= 1\end{aligned}$$

$$x = 4, y = 1$$

Check in (1): $4 + 4 = 8 \checkmark$

4

Solve the simultaneous equations.

$$\begin{aligned}(1) \quad 5x + 4y &= 22 \\ (2) \quad 2x - y &= 1 \\ (2) \times 4\end{aligned}$$

$$\begin{aligned}(3) \quad 8x - 4y &= 4 \\ (1) + (3)\end{aligned}$$

$$\begin{aligned}13x &= 26 \\ x &= 2 \\ (2) \quad 4 - y &= 1 \\ -y &= -3 \\ y &= 3\end{aligned}$$

$$x = 2, y = 3$$

Check in (1): $10 + 12 = 22 \checkmark$

5

Solve the simultaneous equations.

$$\begin{aligned}(1) \quad 5x + 3y &= -3 \\ (2) \quad 2x + 3y &= 6 \\ (1) - (2)\end{aligned}$$

$$\begin{aligned}3x &= -9 \\ x &= -3 \\ (2) \quad -6 + 3y &= 6 \\ 3y &= 12 \\ y &= 4\end{aligned}$$

$$x = -3, y = 4$$

Check in (1): $-15 + 12 = -3 \checkmark$

6

Solve the simultaneous equations.

$$\begin{aligned}(1) \quad 4x - 3y &= 18 \\ (2) \quad x + y &= 1 \\ (2) \times 3\end{aligned}$$

$$\begin{aligned}(3) \quad 3x + 3y &= 3 \\ (1) + (3)\end{aligned}$$

$$\begin{aligned}7x &= 21 \\ x &= 3 \\ (2) \quad 3 + y &= 1 \\ y &= -2\end{aligned}$$

$$x = 3, y = -2$$

Check in (1): $12 + 6 = 18 \checkmark$

7

Solve the simultaneous equations.

$$\begin{aligned}(1) \quad 3x + 5y &= 7 \\ (2) \quad x + 2y &= 3 \\ (2) \times 3\end{aligned}$$

$$\begin{aligned}(3) \quad 3x + 6y &= 9 \\ (3) - (1)\end{aligned}$$

$$\begin{aligned}y &= 2 \\ (2) \quad x + 4 &= 3 \\ x &= -1\end{aligned}$$

$$x = -1, y = 2$$

Check in (1): $-3 + 10 = 7 \checkmark$

8

Solve the simultaneous equations.

$$\begin{aligned}(1) \quad 3x + 4y &= 8 \\ (2) \quad x + 2y &= 3 \\ (2) \times 2\end{aligned}$$

$$\begin{aligned}(3) \quad 2x + 4y &= 6 \\ (1) - (3)\end{aligned}$$

$$\begin{aligned}x &= 2 \\ (2) \quad 2 + 2y &= 3 \\ 2y &= 1 \\ y &= \frac{1}{2}\end{aligned}$$

$$x = 2, y = \frac{1}{2}$$

Check in (1): $6 + 2 = 8 \checkmark$

Simultaneous Equations: Multiply One Equation further practice

ANSWERS

9

Solve the simultaneous equations.

$$\begin{aligned}(1) \quad 5x + 3y &= 21 \\ (2) \quad 2x + y &= 8\end{aligned}$$

$$\begin{aligned}(2) \times 3 \\ (3) \quad 6x + 3y &= 24 \\ (3) - (1)\end{aligned}$$

$$\begin{aligned}x &= 3 \\ (2) \quad 6 + y &= 8 \\ y &= 2\end{aligned}$$

$$\text{Answer } x = 3, y = 2$$

10

Solve the simultaneous equations.

$$\begin{aligned}(1) \quad 3a - 2b &= 16 \\ (2) \quad a + 3b &= -2\end{aligned}$$

$$\begin{aligned}(2) \times 3 \\ (3) \quad 3a + 9b &= -6 \\ (3) - (1)\end{aligned}$$

$$\begin{aligned}11b &= -22 \\ b &= -2 \\ (2) \quad a - 6 &= -2 \\ a &= 4\end{aligned}$$

$$\text{Answer } a = 4, b = -2$$

11

At a pottery café, 3 mugs and 1 plate cost £33. 1 mug and 2 plates cost £26. Find the cost of a mug and the cost of a plate.

Let m = mug, p = plate (£)

$$\begin{aligned}(1) \quad 3m + p &= 33 \\ (2) \quad m + 2p &= 26\end{aligned}$$

$$\begin{aligned}(1) \times 2 \\ (3) \quad 6m + 2p &= 66 \\ (3) - (2)\end{aligned}$$

$$\begin{aligned}5m &= 40 \\ m &= 8 \\ (1) \quad 24 + p &= 33 \\ p &= 9\end{aligned}$$

$$\text{Answer } a \text{ mug } £8, a \text{ plate } £9$$

12

Solve the simultaneous equations.

$$\begin{aligned}(1) \quad x + 3y &= 2 \\ (2) \quad 4x - 2y &= 1\end{aligned}$$

$$\begin{aligned}(1) \times 4 \\ (3) \quad 4x + 12y &= 8 \\ (3) - (2)\end{aligned}$$

$$\begin{aligned}10y &= 7 \\ y &= \frac{7}{10} \\ (1) \quad x + \frac{3}{2} &= 2 \\ x &= \frac{1}{2}\end{aligned}$$

$$\text{Answer } x = \frac{1}{2}, y = \frac{1}{2}$$

13

Ria solves these simultaneous equations.

$$\begin{aligned}(1) \quad 3x + 2y &= 13 \\ (2) \quad x + y &= 5\end{aligned}$$

Ria writes (2) $\times 2$: $2x + 2y = 10$.

What has Ria done wrong?

Solve the equations.

She did not multiply the 5: every term, so $2x + 2y = 10$. Then (1) - (3): $x = 3$

$$\text{Answer } x = 3, y = 2$$

14

At a bakery, 4 flapjacks and 1 brownie weigh 330 g. 3 flapjacks and 2 brownies weigh 360 g. Find the weight of a flapjack and of a brownie.

Let f = flapjack, b = brownie (g)

$$\begin{aligned}(1) \quad 4f + b &= 330 \\ (2) \quad 3f + 2b &= 360\end{aligned}$$

$$\begin{aligned}(1) \times 2 \\ (3) \quad 8f + 2b &= 660 \\ (3) - (2)\end{aligned}$$

$$\begin{aligned}5f &= 300 \\ f &= 60 \\ (1) \quad 240 + b &= 330 \\ b &= 90\end{aligned}$$

$$\text{Answer } \text{flapjack } 60 \text{ g, brownie } 90 \text{ g}$$

15

Write a pair of simultaneous equations that you would solve by multiplying the second equation, not the first. Their solution must be $x = 1, y = 2$.

For example. (2) $\times 4$ gives

$$4x + 4y = 12. \text{ Check: } 3 + 8 = 11 \text{ and } 1 + 2 = 3$$

$$\text{Answer } 3x + 4y = 11, x + y = 3$$

16

Sam and Jo solve

$$\begin{aligned}(1) \quad 2x + 5y &= 17 \\ (2) \quad 4x + 3y &= 13\end{aligned}$$

Sam eliminates y : he multiplies (1) by 3 and (2) by 5. Jo eliminates x : she multiplies (1) by 2.

Who has less work? Explain.

Solve the equations Jo's way.

Jo multiplies once: $4x + 10y = 34$, then (3) - (2): $7y = 21$. Sam multiplies twice.

$$\text{Answer } \text{Jo: } x = 1, y = 3$$