

Simultaneous Equations: Multiply Both Equations

ANSWERS

1

Solve the simultaneous equations.

$$(1) \quad 3x + 4y = 10$$

$$(2) \quad 2x + 3y = 7$$

$$(1) \times 2$$

$$(3) \quad 6x + 8y = 20$$

$$(2) \times 3$$

$$(4) \quad 6x + 9y = 21$$

$$(4) - (3)$$

$$y = 1$$

$$(2) \quad 2x + 3 = 7$$

$$2x = 4$$

$$x = 2$$

$$x = 2, y = 1$$

Check in (1): $6 + 4 = 10 \checkmark$

2

Solve the simultaneous equations.

$$(1) \quad 3x + 4y = 10$$

$$(2) \quad 2x - 3y = 1$$

$$(1) \times 3$$

$$(3) \quad 9x + 12y = 30$$

$$(2) \times 4$$

$$(4) \quad 8x - 12y = 4$$

$$(3) + (4)$$

$$17x = 34$$

$$x = 2$$

$$(2) \quad 4 - 3y = 1$$

$$-3y = -3$$

$$y = 1$$

$$x = 2, y = 1$$

Check in (1): $6 + 4 = 10 \checkmark$

3

Solve the simultaneous equations.

$$(1) \quad 5x + 3y = 27$$

$$(2) \quad 2x + 5y = 26$$

$$(1) \times 2$$

$$(3) \quad 10x + 6y = 54$$

$$(2) \times 5$$

$$(4) \quad 10x + 25y = 130$$

$$(4) - (3)$$

$$19y = 76$$

$$y = 4$$

$$(2) \quad 2x + 20 = 26$$

$$2x = 6$$

$$x = 3$$

$$x = 3, y = 4$$

Check in (1): $15 + 12 = 27 \checkmark$

4

Solve the simultaneous equations.

$$(1) \quad 2x + 5y = 24$$

$$(2) \quad 3x - 4y = 13$$

$$(1) \times 4$$

$$(3) \quad 8x + 20y = 96$$

$$(2) \times 5$$

$$(4) \quad 15x - 20y = 65$$

$$(3) + (4)$$

$$23x = 161$$

$$x = 7$$

$$(2) \quad 21 - 4y = 13$$

$$-4y = -8$$

$$y = 2$$

$$x = 7, y = 2$$

Check in (1): $14 + 10 = 24 \checkmark$

5

Solve the simultaneous equations.

$$(1) \quad 4x + 3y = 11$$

$$(2) \quad 8x - 5y = -33$$

$$(1) \times 2$$

$$(3) \quad 8x + 6y = 22$$

$$(3) - (2)$$

$$11y = 55$$

$$y = 5$$

$$(1) \quad 4x + 15 = 11$$

$$4x = -4$$

$$x = -1$$

$$x = -1, y = 5$$

Check in (2): $-8 - 25 = -33 \checkmark$

6

Solve the simultaneous equations.

$$(1) \quad 4x - 5y = -5$$

$$(2) \quad 6x - 7y = -9$$

$$(1) \times 3$$

$$(3) \quad 12x - 15y = -15$$

$$(2) \times 2$$

$$(4) \quad 12x - 14y = -18$$

$$(4) - (3)$$

$$y = -3$$

$$(1) \quad 4x + 15 = -5$$

$$4x = -20$$

$$x = -5$$

$$x = -5, y = -3$$

Check in (2): $-30 + 21 = -9 \checkmark$

7

Two numbers are a and b . 3 times a plus 2 times b is 26. Twice a plus 5 times b is 32. Write two equations and solve them.

$$(1) \quad 3a + 2b = 26$$

$$(2) \quad 2a + 5b = 32$$

$$(1) \times 2$$

$$(3) \quad 6a + 4b = 52$$

$$(2) \times 3$$

$$(4) \quad 6a + 15b = 96$$

$$(4) - (3)$$

$$11b = 44$$

$$b = 4$$

$$(1) \quad 3a + 8 = 26$$

$$3a = 18$$

$$a = 6$$

$$a = 6, b = 4$$

Check in (2): $12 + 20 = 32 \checkmark$

8

Solve the simultaneous equations.

$$(1) \quad -2x + 5y = 17$$

$$(2) \quad 3x + 4y = 32$$

$$(1) \times 3$$

$$(3) \quad -6x + 15y = 51$$

$$(2) \times 2$$

$$(4) \quad 6x + 8y = 64$$

$$(3) + (4)$$

$$23y = 115$$

$$y = 5$$

$$(2) \quad 3x + 20 = 32$$

$$3x = 12$$

$$x = 4$$

$$x = 4, y = 5$$

Check in (1): $-8 + 25 = 17 \checkmark$

Simultaneous Equations: Multiply Both Equations *further practice*

ANSWERS

9

Which letter is cheaper to eliminate?
Solve the simultaneous equations.

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

y: only (2) is multiplied

$$\begin{aligned}(1) \times 2 \\ (3) \quad 10x + 4y &= 6 \\ (3) - (2) \\ 7x &= -7 \\ x &= -1 \\ (2) \quad -3 + 4y &= 13 \\ 4y &= 16 \\ y &= 4\end{aligned}$$

Answer $x = -1, y = 4$

10

At a climbing wall, an adult session costs £ a and a junior session costs £ j .
3 adult and 4 junior sessions cost £68.
2 adult and 5 junior sessions cost £64.
Find the cost of each session.

$$\begin{aligned}(1) \quad 3a + 4j &= 68 \\ (2) \quad 2a + 5j &= 64 \\ (1) \times 2 \\ (3) \quad 6a + 8j &= 136 \\ (2) \times 3 \\ (4) \quad 6a + 15j &= 192 \\ (4) - (3) \\ 7j &= 56 \\ j &= 8 \\ (2) \quad 2a + 40 &= 64 \\ 2a &= 24 \\ a &= 12\end{aligned}$$

Answer $\text{adult } £12, \text{ junior } £8$

11

Ali solves these simultaneous equations.

$$\begin{aligned}(1) \quad 2x + 3y &= 12 \\ (2) \quad 5x + 4y &= 23\end{aligned}$$

Ali writes (1) $\times 5$: $10x + 15y = 12$.

What has Ali done wrong?

Solve the equations.

Ali has not multiplied 12 by 5.

It should be $10x + 15y = 60$

Answer $x = 3, y = 2$

12

A large parcel weighs L kg and a small parcel weighs S kg. 3 large and 2 small parcels weigh 36 kg. 5 large and 3 small parcels weigh 58 kg.
How much does each parcel weigh?

$$\begin{aligned}(1) \quad 3L + 2S &= 36 \\ (2) \quad 5L + 3S &= 58 \\ (1) \times 3 \\ (3) \quad 9L + 6S &= 108 \\ (2) \times 2 \\ (4) \quad 10L + 6S &= 116 \\ (4) - (3) \\ L &= 8 \\ (1) \quad 24 + 2S &= 36 \\ 2S &= 12 \\ S &= 6\end{aligned}$$

Answer $\text{large } 8 \text{ kg, small } 6 \text{ kg}$

13

Solve the simultaneous equations.

$$\begin{aligned}(1) \quad 6x + 4y &= 7 \\ (2) \quad 4x + 6y &= 8\end{aligned}$$

$$\begin{aligned}(1) \times 2 \\ (3) \quad 12x + 8y &= 14 \\ (2) \times 3 \\ (4) \quad 12x + 18y &= 24 \\ (4) - (3) \\ 10y &= 10 \\ y &= 1 \\ (2) \quad 4x + 6 &= 8 \\ 4x &= 2 \\ x &= \frac{1}{2}\end{aligned}$$

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

14

Solve the simultaneous equations.

$$\begin{aligned}(1) \quad 2y &= 3x - 1 \\ (2) \quad 4x + 5y &= 55\end{aligned}$$

$$\begin{aligned}\text{Rearrange (1)} \\ (3) \quad 3x - 2y &= 1 \\ (3) \times 5 \\ (4) \quad 15x - 10y &= 5 \\ (2) \times 2 \\ (5) \quad 8x + 10y &= 110 \\ (4) + (5) \\ 23x &= 115 \\ x &= 5 \\ (2) \quad 20 + 5y &= 55 \\ 5y &= 35 \\ y &= 7\end{aligned}$$

Answer $x = 5, y = 7$

15

The lines (1) and (2) cross at the point P. Find the coordinates of P.

$$\begin{aligned}(1) \quad 3x &= 4y + 1 \\ (2) \quad 5x + 6y &= 27\end{aligned}$$

$$\begin{aligned}\text{Rearrange (1)} \\ (3) \quad 3x - 4y &= 1 \\ (3) \times 3 \\ (4) \quad 9x - 12y &= 3 \\ (2) \times 2 \\ (5) \quad 10x + 12y &= 54 \\ (4) + (5) \\ 19x &= 57 \\ x &= 3 \\ (2) \quad 15 + 6y &= 27 \\ 6y &= 12 \\ y &= 2\end{aligned}$$

Answer $(3, 2)$

16

Which letter would you eliminate, and what would you multiply by?
Explain why, then solve.

$$\begin{aligned}(1) \quad 4x + 9y &= 7 \\ (2) \quad 6x - 3y &= 27\end{aligned}$$

y: 9 is a multiple of 3, so only (2) $\times 3$.

Opposite signs, so add.

$$\begin{aligned}(2) \times 3 \\ (3) \quad 18x - 9y &= 81 \\ (1) + (3) \\ 22x &= 88 \\ x &= 4 \\ (2) \quad 24 - 3y &= 27 \\ -3y &= 3 \\ y &= -1\end{aligned}$$

Answer $x = 4, y = -1$