



- 1 Solve the simultaneous equations

$$x + y = 11$$

$$x - y = 3$$

(3 marks)

We need one pair (x, y) that makes both equations true. Adding the equations makes $+y$ and $-y$ cancel, leaving an equation containing only x
Add the two equations

$$2x = 14, \text{ so } x = 7$$

$$\text{Substitute into } x + y = 11: 7 + y = 11, \text{ so } y = 4$$

Check in the second equation

$$7 - 4 = 3 \checkmark$$

$$\boxed{x = 7, y = 4}$$

- 2 Solve the simultaneous equations

$$3x + y = 17$$

$$x + y = 7$$

(3 marks)

Subtract the second equation from the first

$$2x = 10, \text{ so } x = 5$$

$$\text{Substitute into } x + y = 7: 5 + y = 7, \text{ so } y = 2$$

Check in the first equation

$$15 + 2 = 17 \checkmark$$

$$\boxed{x = 5, y = 2}$$

3 Solve the simultaneous equations

$$2x + 3y = 12$$

$$2x + y = 8$$

(3 marks)

Subtract the second equation from the first

$$2y = 4, \text{ so } y = 2$$

Substitute into $2x + y = 8$: $2x + 2 = 8$, so $2x = 6$ and $x = 3$

Check in the first equation

$$6 + 6 = 12 \checkmark$$

$$x = 3, y = 2$$

4 Solve the simultaneous equations

$$4x - y = 14$$

$$2x + y = 10$$

(3 marks)

Add the two equations to eliminate y

$$6x = 24, \text{ so } x = 4$$

Substitute into $2x + y = 10$: $8 + y = 10$, so $y = 2$

Check in the first equation

$$16 - 2 = 14 \checkmark$$

$$x = 4, y = 2$$

5 Solve the simultaneous equations

$$3x + 2y = 19$$

$$x + 4y = 13$$

(3 marks)

Multiply the first equation by 2

$$6x + 4y = 38$$

Subtract the second equation

$$5x = 25, \text{ so } x = 5$$

Substitute into $x + 4y = 13$: $5 + 4y = 13$, so $y = 2$

Check in the first equation

$$15 + 4 = 19 \checkmark$$

$$x = 5, y = 2$$

6

Solve the simultaneous equations

$$x + 2y = 4$$

$$3x + 5y = 9$$

(3 marks)

Multiply the first equation by 3

$$3x + 6y = 12$$

Subtract the second equation

$$y = 3$$

$$\text{Substitute into } x + 2y = 4: x + 6 = 4, \text{ so } x = -2$$

Check in the second equation

$$-6 + 15 = 9 \checkmark$$

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

7

Solve the simultaneous equations

$$5x + 2y = 4$$

$$3x - 4y = 18$$

(4 marks)

$$5x + 2y = 4 \quad (1)$$

$$3x - 4y = 18 \quad (2)$$

(1) $\times 2$

$$10x + 4y = 8 \quad (3)$$

(2) + (3)

$$\begin{array}{rcl} 13x & = & 26 \\ \div 13 & & \div 13 \\ x & = & 2 \end{array}$$

Put $x = 2$ into (1)

$$\begin{array}{rcl} 10 + 2y & = & 4 \\ -10 & & -10 \\ 2y & = & -6 \\ \div 2 & & \div 2 \\ y & = & -3 \end{array}$$

Check (2): $6 + 12 = 18$

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

8

Solve the simultaneous equations

$$3x + 2y = 24$$

$$2x + 5y = 27$$

(4 marks)

Multiply the first equation by 5 and the second by 2

$$15x + 10y = 120 \text{ and } 4x + 10y = 54$$

Subtract

$$11x = 66, \text{ so } x = 6$$

$$\text{Substitute into } 3x + 2y = 24: 18 + 2y = 24, \text{ so } y = 3$$

Check in the second equation

$$12 + 15 = 27 \checkmark$$

$$x = 6, y = 3$$

9

Solve the simultaneous equations

$$4x + 3y = 5$$

$$6x - 2y = 14$$

(4 marks)

Multiply the first equation by 2 and the second by 3

$$8x + 6y = 10 \text{ and } 18x - 6y = 42$$

Add

$$26x = 52, \text{ so } x = 2$$

$$\text{Substitute into } 4x + 3y = 5: 8 + 3y = 5, \text{ so } 3y = -3 \text{ and } y = -1$$

Check in the second equation

$$12 + 2 = 14 \checkmark$$

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

10

Solve the simultaneous equations

$$3x - 2y = 13$$

$$5x - 3y = 21$$

(4 marks)

$$3x - 2y = 13 \quad (1)$$

$$5x - 3y = 21 \quad (2)$$

 $(1) \times 5$

$$15x - 10y = 65 \quad (3)$$

 $(2) \times 3$

$$15x - 9y = 63 \quad (4)$$

 $(3) - (4)$

$$-y = 2$$

$$y = -2$$

Put $y = -2$ into (1)

$$3x + 4 = 13$$

$$\begin{array}{rcl} -4 & 3x & = 9 \end{array} \quad -4$$

$$\begin{array}{rcl} \div 3 & x & = 3 \end{array} \quad \div 3$$

Check (2): $15 + 6 = 21$

$$\boxed{x = 3, y = -2}$$

11 Solve the simultaneous equations

$$2x + 3y = 4$$

$$4x + 5y = 7$$

(4 marks)

$$2x + 3y = 4 \quad (1)$$

$$4x + 5y = 7 \quad (2)$$

$(1) \times 2$

$$4x + 6y = 8 \quad (3)$$

$(3) - (2)$

$$y = 1$$

Put $y = 1$ into (1)

$$\begin{array}{rcl} 2x + 3 & = & 4 \\ -3 & & -3 \\ \hline 2x & = & 1 \\ \div 2 & & \div 2 \\ x & = & 0.5 \end{array}$$

Check (2): $2 + 5 = 7$

$$\boxed{x = 0.5, y = 1}$$

12 Solve the simultaneous equations

$$6x + 5y = 10$$

$$4x - 3y = 13$$

(4 marks)

Multiply the first equation by 3 and the second by 5

$$18x + 15y = 30 \text{ and } 20x - 15y = 65$$

Add

$$38x = 95, \text{ so } x = \frac{95}{38} = 2.5$$

Substitute into $6x + 5y = 10$: $15 + 5y = 10$, so $5y = -5$ and $y = -1$

Check in the second equation

$$10 + 3 = 13 \quad \checkmark$$

$$\boxed{x = 2.5, y = -1}$$

13

A theatre sells adult tickets and child tickets.

2 adult tickets and 3 child tickets cost £36.50

3 adult tickets and 2 child tickets cost £38.50

Work out the cost of one adult ticket and the cost of one child ticket.

(5 marks)

$$2a + 3c = 36.5 \quad (1)$$

$$3a + 2c = 38.5 \quad (2)$$

$$(1) \times 3$$

$$6a + 9c = 109.5 \quad (3)$$

$$(2) \times 2$$

$$6a + 4c = 77 \quad (4)$$

$$(3) - (4)$$

$$5c = 32.5$$

$$\div 5 \quad c = 6.5 \quad \div 5$$

Put $c = 6.5$ into (1)

$$2a + 19.5 = 36.5$$

$$-19.5 \quad 2a = 17 \quad -19.5$$

$$\div 2 \quad a = 8.5 \quad \div 2$$

Check (2): $25.5 + 13 = 38.5$

Adult £8.50, child £6.50

14

A cafe sells teas and coffees.

3 teas and 2 coffees cost £7.80

2 teas and 3 coffees cost £8.20

Work out the cost of one tea and the cost of one coffee.

(5 marks)

Let t be the cost of a tea and c the cost of a coffee, in pounds: $3t + 2c = 7.80$ and $2t + 3c = 8.20$

Multiply the first equation by 3 and the second by 2

$$9t + 6c = 23.40 \text{ and } 4t + 6c = 16.40$$

Subtract

$$5t = 7.00, \text{ so } t = 1.40$$

Substitute into $3t + 2c = 7.80$: $4.20 + 2c = 7.80$, so $2c = 3.60$

and $c = 1.80$

Check in the second equation

$$2 \times 1.40 + 3 \times 1.80 = 2.80 + 5.40 = £8.20 \checkmark$$