



Simultaneous Equations



← REVISE THIS TOPIC

1 Solve the simultaneous equations



$$4x + 3y = 18$$

$$4x + y = 14$$

[3 marks]

$$\begin{array}{r}
 4x + 3y = 18 \\
 \underline{4x + y = 14} \\
 2y = 4 \\
 y = 2
 \end{array}$$

$$\begin{array}{r}
 4x + 2 = 14 \\
 \underline{4x = 12} \\
 x = 3
 \end{array}$$

$$x = \underline{3} \qquad y = \underline{2}$$





2 Solve the simultaneous equations



$$2x + 7y = 30$$

$$2x + 2y = 10$$

[3 marks]

$$2x + 7y = 30$$

$$2x + 2y = 10$$

$$5y = 20$$

$$y = 4$$

$$2x + 2(4) = 10$$

$$2x + 8 = 10$$

$$2x = 2$$

$$x = 1$$

$$x = 1$$

$$y = 4$$

3 Solve the simultaneous equations



$$9x + 3y = 57$$

$$2x + 3y = 36$$

[3 marks]

$$9x + 3y = 57$$

$$2x + 3y = 36$$

$$7x = 21$$

$$x = 3$$

$$2(3) + 3y = 36$$

$$6 + 3y = 36$$

$$3y = 30$$

$$y = 10$$

$$x = 3$$

$$y = 10$$





4 Solve the simultaneous equations



$$20x + y = 90$$

$$9x + y = 46$$

[3 marks]

$$\begin{array}{r}
 20x + y = 90 \\
 \underline{9x + y = 46} \\
 11x = 44 \\
 x = 4
 \end{array}$$

$$\begin{array}{r}
 9(4) + y = 46 \\
 36 + y = 46 \\
 y = 10
 \end{array}$$

x = 4

y = 10

5 Solve the simultaneous equations



$$4x + 5y = 61$$

$$4x + 2y = 34$$

[3 marks]

$$\begin{array}{r}
 4x + 5y = 61 \\
 \underline{4x + 2y = 34} \\
 3y = 27 \\
 y = 9
 \end{array}$$

$$\begin{array}{r}
 4x + 2(9) = 34 \\
 4x + 18 = 34 \\
 4x = 16 \\
 x = 4
 \end{array}$$

x = 4

y = 9





6 Solve the simultaneous equations



[3 marks]

$$3x + 3y = 27$$

$$2x - 3y = 8$$

$$3x + 3y = 27$$

$$2x - 3y = 8$$

$$5x = 35$$

$$x = 7$$

$$3(7) + 3y = 27$$

$$21 + 3y = 27$$

$$3y = 6$$

$$y = 2$$

$$x = 7$$

$$y = 2$$

7 Solve the simultaneous equations



[3 marks]

$$6x - 2y = 22$$

$$4x + 2y = 18$$

$$6x - 2y = 22$$

$$4x + 2y = 18$$

$$10x = 40$$

$$x = 4$$

$$4(4) + 2y = 18$$

$$16 + 2y = 18$$

$$2y = 2$$

$$y = 1$$

$$x = 4$$

$$y = 1$$





8 Solve the simultaneous equations



$$9x + 7y = 59$$

$$3x - 7y = 1$$

[3 marks]

$$9x + 7y = 59$$

$$3x - 7y = 1$$

$$12x = 60$$

$$x = 5$$

$$9(5) + 7y = 59$$

$$45 + 7y = 59$$

$$7y = 14$$

$$y = 2$$

$$x = 5$$

$$y = 2$$

9 Solve the simultaneous equations



$$8x + 5y = 39$$

$$8x - 2y = 18$$

[3 marks]

$$8x + 5y = 39$$

$$8x - 2y = 18$$

$$7y = 21$$

$$y = 3$$

$$8x + 5(3) = 39$$

$$8x + 15 = 39$$

$$8x = 24$$

$$x = 3$$

$$x = 3$$

$$y = 3$$



Turn over ►



10

Solve the simultaneous equations



[3 marks]

$$3x - 4y = 29$$

$$x - 4y = 7$$

$$3x - 4y = 29$$

$$x - 4y = 7$$

$$2x = 22$$

$$x = 11$$

$$11 - 4y = 7$$

$$-4y = -4$$

$$y = 1$$

$$x = 11$$

$$y = 1$$

11

Solve the simultaneous equations



[3 marks]

$$2x + 8y = 50$$

$$2x - 3y = 17$$

$$2x + 8y = 50$$

$$2x - 3y = 17$$

$$11y = 33$$

$$y = 3$$

$$2x + 8(3) = 50$$

$$2x + 24 = 50$$

$$2x = 26$$

$$x = 13$$

$$x = 13$$

$$y = 3$$





12

Solve the simultaneous equations



[3 marks]

$$3x + 7y = 43$$

$$x + 2y = 13 \quad \times 3$$

$$3x + 7y = 43$$

$$3x + 6y = 39$$

$$y = 4$$

$$x + 2(4) = 13$$

$$x + 8 = 13$$

$$x = 5$$

$$x = 5$$

$$y = 4$$

13

Solve the simultaneous equations



[3 marks]

$$9x + 4y = 57$$

$$4x + 2y = 26 \quad \times 2$$

$$9x + 4y = 57$$

$$8x + 4y = 52$$

$$x = 5$$

$$4(5) + 2y = 26$$

$$20 + 2y = 26$$

$$2y = 6$$

$$y = 3$$

$$x = 5$$

$$y = 3$$





14

Solve the simultaneous equations



[3 marks]

$$13x + 5y = 51$$

$$2x + y = 9 \quad \times 5$$

$$\begin{array}{r}
 13x + 5y = 51 \\
 10x + 5y = 45 \\
 \hline
 3x = 6 \\
 x = 2
 \end{array}$$

$$\begin{array}{r}
 2(2) + y = 9 \\
 4 + y = 9 \\
 y = 5
 \end{array}$$

$$x = 2$$

$$y = 5$$

15

Solve the simultaneous equations



[3 marks]

$$8x + 3y = 73$$

$$4x - 5y = 17 \quad \times 2$$

$$\begin{array}{r}
 8x + 3y = 73 \\
 8x - 10y = 34 \\
 \hline
 13y = 39 \\
 y = 3
 \end{array}$$

$$8x + 3(3) = 73$$

$$8x + 9 = 73$$

$$8x = 64$$

$$x = 8$$

$$x = 8$$

$$y = 3$$





16

Solve the simultaneous equations



$$3x + 6y = 48$$

$$4x - 3y = 9 \quad \times 2$$

[3 marks]

$$3x + 6y = 48$$

$$8x - 6y = 18$$

$$11x = 66$$

$$x = 6$$

$$3(6) + 6y = 48$$

$$18 + 6y = 48$$

$$6y = 30$$

$$y = 5$$

$$x = 6$$

$$y = 5$$

17

Solve the simultaneous equations



$$4x + 3y = 33 \quad \times 3$$

$$3x + 2y = 24 \quad \times 4$$

[3 marks]

$$12x + 9y = 99$$

$$12x + 8y = 96$$

$$y = 3$$

$$4x + 3(3) = 33$$

$$4x + 9 = 33$$

$$4x = 24$$

$$x = 6$$

$$x = 6$$

$$y = 3$$

Turn over ►





18

Solve the simultaneous equations



[3 marks]

$$\begin{array}{l} 5x + 3y = 38 \quad \times 2 \\ 2x - 5y = 9 \quad \times 5 \end{array}$$

$$\begin{array}{r} 10x + 6y = 76 \\ 10x - 25y = 45 \\ \hline 31y = 31 \\ y = 1 \end{array}$$

$$\begin{array}{l} 5x + 3(1) = 38 \\ 5x + 3 = 38 \\ 5x = 35 \\ x = 7 \end{array}$$

x = 7

y = 1

19

Solve the simultaneous equations



[3 marks]

$$\begin{array}{l} 8x - 5y = 49 \quad \times 2 \\ 3x - 2y = 18 \quad \times 5 \end{array}$$

$$\begin{array}{r} 16x - 10y = 98 \\ 15x - 10y = 90 \\ \hline x = 8 \end{array}$$

$$\begin{array}{l} 3(8) - 2y = 18 \\ 24 - 2y = 18 \\ -2y = -6 \\ y = 3 \end{array}$$

x = 8

y = 3





20

Solve the simultaneous equations



$$8x + 5y = 29$$

$$2x + 5y = 26$$

[3 marks]

$$8x + 5y = 29$$

$$2x + 5y = 26$$

$$6x = 3$$

$$x = \frac{3}{6}$$

$$2(\frac{1}{2}) + 5y = 26$$

$$1 + 5y = 26$$

$$5y = 25$$

$$y = 5$$

$$x = 0.5$$

$$x = 0.5$$

$$y = 5$$

21

Solve the simultaneous equations



$$6x + 3y = 33$$

$$6x - 5y = 57$$

[3 marks]

$$6x + 3y = 33$$

$$6x - 5y = 57$$

$$8y = -24$$

$$y = -3$$

$$6x + 3(-3) = 33$$

$$6x - 9 = 33$$

$$6x = 42$$

$$x = 7$$

$$x = 7$$

$$y = -3$$

12



Turn over ►



22

Solve the simultaneous equations



[3 marks]

$$5x + 8y = -1$$

$$3x - 8y = 25$$

$$5x + 8y = -1$$

$$3x - 8y = 25$$

$$8x = 24$$

$$x = 3$$

$$5(3) + 8y = -1$$

$$15 + 8y = -1$$

$$8y = -16$$

$$y = -2$$

$$x = 3$$

$$y = -2$$

23

Solve the simultaneous equations

$$3x + 6y = 12$$

$$3x + 4y = 7$$

[3 marks]

$$3x + 6y = 12$$

$$3x + 4y = 7$$

$$2y = 5$$

$$y = 2.5$$

$$3x + 4(2.5) = 7$$

$$3x + 10 = 7$$

$$3x = -3$$

$$x = -1$$

$$x = -1$$

$$y = 2.5$$





24

Solve the simultaneous equations

$$\begin{aligned} 6x + 3y &= 21 && \times 5 \\ 4x + 5y &= 2 && \times 3 \end{aligned}$$

[3 marks]

$$30x + 15y = 105$$

$$12x + 15y = 6$$

$$18x = 99$$

$$x = \frac{99}{18}$$

$$x = \frac{11}{2}$$

$$x = 5.5$$

$$x = 5.5$$

$$4(5.5) + 5y = 2$$

$$22 + 5y = 2$$

$$5y = -20$$

$$y = -4$$

$$y = -4$$

25

Solve the simultaneous equations

$$\begin{aligned} 3x + 5y &= 10 && \times 5 \\ 5x - 7y &= 9 && \times 3 \end{aligned}$$

[3 marks]

$$15x + 25y = 50$$

$$15x - 21y = 27$$

$$46y = 23$$

$$y = \frac{23}{46}$$

$$y = 0.5$$

$$x = 2.5$$

$$y = 0.5$$





26

Solve the simultaneous equations

$$\begin{aligned}
 10x + 3y &= 22 && \times 5 \\
 4x + 5y &= 43 && \times 3
 \end{aligned}$$

[3 marks]

$$50x + 15y = 110$$

$$12x + 15y = 129$$

$$38x = -19$$

$$x = -\frac{19}{38}$$

$$x = -0.5$$

$$4(-0.5) + 5y = 43$$

$$-2 + 5y = 43$$

$$5y = 45$$

$$y = 9$$

$$x = -0.5$$

$$y = 9$$

27

Solve the simultaneous equations

$$\begin{aligned}
 5x + 2y &= 4 \\
 4x + y &= 3 && \times 2
 \end{aligned}$$

[3 marks]

$$5x + 2y = 4$$

$$8x + 2y = 6$$

$$-3x = -2$$

$$3x = 2$$

$$x = \frac{2}{3}$$

$$4\left(\frac{2}{3}\right) + y = 3$$

$$\frac{8}{3} + y = 3$$

$$y = 3 - \frac{8}{3}$$

$$y = \frac{9}{3} - \frac{8}{3}$$

$$y = \frac{1}{3}$$

$$x = \frac{2}{3}$$

$$y = \frac{1}{3}$$





28

Solve the simultaneous equations

$$2x - 3y = 9$$

$$6x + y = 2 \quad \times 3$$

[3 marks]

$$\begin{array}{r} 2x - 3y = 9 \\ 18x + 3y = 6 \\ \hline \end{array}$$

$$20x = 15$$

$$x = \frac{15}{20}$$

$$x = \frac{3}{4}$$

$$x = 0.75$$

$$x = 0.75$$

$$2(0.75) - 3y = 9$$

$$1.5 - 3y = 9$$

$$-3y = 7.5$$

$$y = -2.5$$

$$y = -2.5$$

29

Solve the simultaneous equations

$$3x + 2y = 3 \quad \times 3$$

$$4x + 6y = 5$$

[3 marks]

$$\begin{array}{r} 9x + 6y = 9 \\ 4x + 6y = 5 \\ \hline \end{array}$$

$$5x = 4$$

$$x = \frac{4}{5}$$

$$x = 0.8$$

$$x = 0.8$$

$$3(0.8) + 2y = 3$$

$$2.4 + 2y = 3$$

$$2y = 0.6$$

$$y = 0.3$$

$$y = 0.3$$





30 Solve the simultaneous equations

$$3x - 3y = 27$$

$$4x + y = 3.5 \quad \times 3$$

[3 marks]

$$3x - 3y = 27$$

$$12x + 3y = 10.5$$

$$15x = 37.5$$

$$x = \frac{37.5}{15}$$

$$x = \frac{37.5}{15}$$

$$x = 2.5$$

$$x = 2.5$$

$$4(2.5) + y = 3.5$$

$$10 + y = 3.5$$

$$y = -6.5$$

$$y = -6.5$$

31 Solve the simultaneous equations

$$5x - 2y = 1.1 \quad \times 3$$

$$4x - 3y = 2 \quad \times 2$$

[3 marks]

$$15x - 6y = 3.3$$

$$8x - 6y = 4$$

$$7x = -0.7$$

$$x = -\frac{0.7}{7}$$

$$x = -\frac{7}{70}$$

$$x = -0.1$$

$$x = -0.1$$

$$5(-0.1) - 2y = 1.1$$

$$-0.5 - 2y = 1.1$$

$$-2y = 1.6$$

$$y = -0.8$$

$$y = -0.8$$





32

A shop sells pencils and rulers.

The cost of 5 pencils and 2 rulers is £0.99

The cost of 1 pencil and 10 rulers is £1.35

Work out the cost of 1 pencil and the cost of 1 ruler.

[3 marks]

$$\begin{array}{r}
 5p + 2r = 99 \quad \times 5 \\
 \hline
 p + 10r = 135 \\
 25p + 10r = 495 \\
 \hline
 p + 10r = 135 \\
 \hline
 24p = 360 \\
 p = 15
 \end{array}
 \qquad
 \begin{array}{r}
 15 + 10r = 135 \\
 10r = 120 \\
 r = 12
 \end{array}$$

Cost of 1 pencil = 15p Cost of 1 ruler = 12p

33

A machine makes hats and gloves but only makes one item at a time.

The time taken to make a hat is 2 minutes longer than the time taken to make a glove.

The machine makes 4 hats and 6 gloves in 13 minutes.

Work out how long the machine would take to make 1 hat and 1 glove. [4 marks]

$$\begin{array}{r}
 4h + 6g = 13 \\
 \hline
 h - g = 2 \quad \times 6 \\
 4h + 6g = 13 \\
 \hline
 6h - 6g = 12 \\
 \hline
 10h = 25 \\
 h = 2.5
 \end{array}
 \qquad
 \begin{array}{r}
 2.5 - g = 2 \\
 -g = -0.5 \\
 g = 0.5 \\
 h + g = 2.5 + 0.5 \\
 = 3
 \end{array}$$

Answer 3 minutes

13

Turn over ►





34

A cinema has adult tickets and child tickets.

The price of each ticket type is fixed.

a c

 Tom buys 3 adult tickets and 4 child tickets costing a total of £35.50

Lily buys 2 adult tickets and 3 child tickets costing a total of £25.00

Carolyn buys 1 adult tickets and 2 child tickets.

Work out how much Carolyn paid for the tickets.

[4 marks]

$$\begin{array}{r}
 \times 3 \quad 3a + 4c = 35.50 \\
 \times 4 \quad 2a + 3c = 25.00 \\
 \hline
 9a + 12c = 106.50 \\
 8a + 12c = 100.00 \\
 \hline
 a = 6.50
 \end{array}
 \qquad
 \begin{array}{r}
 2(6.50) + 3c = 25.00 \\
 13.00 + 3c = 25.00 \\
 3c = 12.00 \\
 c = 4.00
 \end{array}$$

$$\begin{aligned}
 a + 2c &= 6.50 + 2(4.00) \\
 &= 14.50 \text{ p} \\
 &= \pounds 14.50
 \end{aligned}$$

Answer £ 14.50