ANSWERS

Simultaneous Equations – Past Paper Questions

11. Sara calculates that five times her age and three times her brother's age gives a total of 100.
The sum of Sara's age and her brother's age is 22.
Find Sara's age and her brother's age.

Sara $= x$ $\qquad 5x + 3y = 100$ (2)

brother $= y$ $\qquad x + y = 22$ (1)

Do (1) $\times 3$ $\qquad 3x + 3y = 66$ (3)

Do (2) − (3) $\qquad 2x = 34$

$\therefore x = 17$

Using (1) $\qquad 17 + y = 22$

$\therefore y = 5$

[4]

8. *(a)* Solve the following simultaneous equations by an algebraic method.
Show all your working.

$$3x + 4y = 19 \quad (1)$$
$$4x + 5y = 23 \quad (2)$$

Do (1) $\times 5$ $\qquad 15x + 20y = 95$ (3)

(2) $\times 4$ $\qquad 16x + 20y = 112$ (4)

(4) − (3) gives $\qquad x = 17$

So using (1) $\qquad 3 \times 17 + 4y = 19$

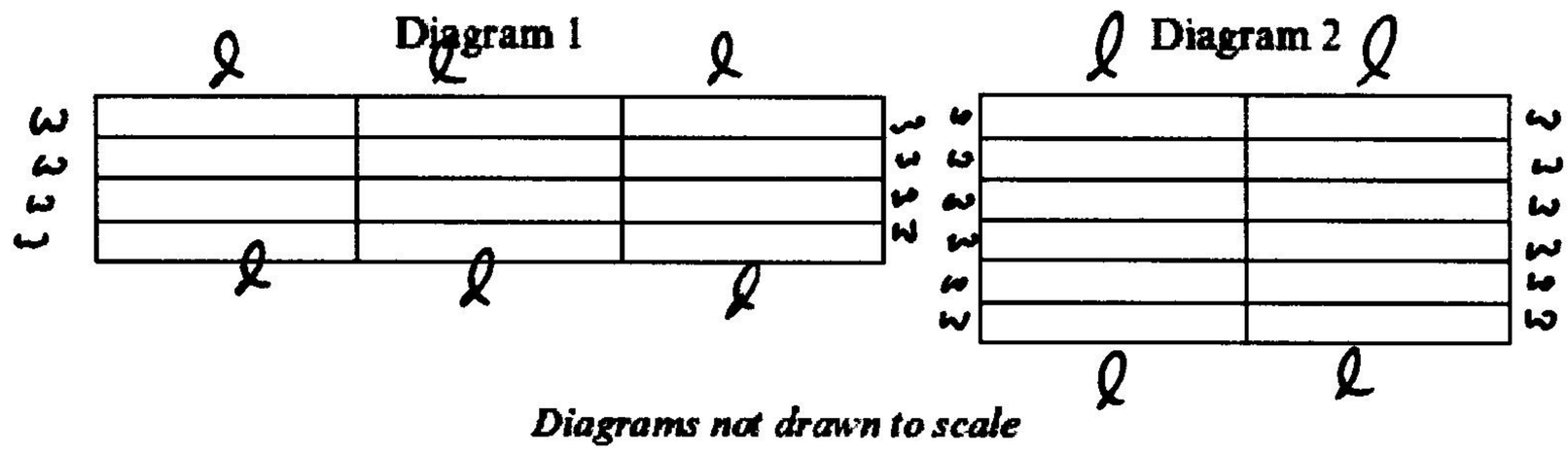
$51 + 4y = 19$

$4y = 32$

$y = 8$

[4]

11. The diagrams show how 12 small identical rectangles can be placed to form a larger rectangle in two different ways.



Diagrams not drawn to scale

The perimeter of each of these diagrams is measured.
The perimeter of diagram 1 is 55 cm.
The perimeter of diagram 2 is 50 cm.

Find the dimensions of one of the 12 small identical rectangles.

$6l + 8w = 55$ ①

$4l + 12w = 50$ ②

① × 3 $\quad 18l + 24w = 165$ ③

② × 2 $\quad 8l + 24w = 100$ ④

③ − ④ $\quad 10l = 65$

$\therefore l = 6.5$

Using ① $\quad 6 \times 6.5 + 8w = 55$

$39 + 8w = 55$

$8w = 16$

$\therefore w = 2$

[5]

9. Mr Jones buys concert tickets.
There is a seated area and a standing area in the concert hall.
He buys x tickets for the seated area and y tickets for the standing area.
Altogether he buys 24 tickets.
Tickets for the seated area cost £36 each and tickets for the standing area cost £21 each. Altogether he spends £609.
Write down a pair of simultaneous equations and solve them to find out how many tickets of each type Mr Jones buys.

$x + y = 24$ (1)

$36x + 21y = 609$ (2)

(1) × 21

$21x + 21y = 504$ (3)

(2) − (3)

$15x = 105$

$x = 7$

Using 1 $7 + y = 24$

$\therefore y = 17$

[5]

13. (a) Solve the simultaneous equations below using an algebraic method.
Show all your working. [4]

$5x + 2y = -5$ − (1)
$4x + 3y = 3$ − (2)

(1) × 3 $15x + 6y = -15$ (3)

(2) × 2 $8x + 6y = 6$ (4)

(3) − (4) ⇒ $7x = -21$

$\therefore x = -3$

Using (1) $5x - 3 + 2y = -5$

$-15 + 2y = -5$

$2y = 10$

$y = 5$

(b) **Solve the following simultaneous equations by an algebraic (not graphical) method. Show all your working.**

$$7x + 2y = 2 \quad (1)$$
$$2x - 5y = 34 \quad (2)$$

(1) × 5 $\quad 35x + 10y = 10 \quad (3)$

(2) × 2 $\quad 4x - 10y = 68 \quad (4)$

So (3) + (4) $\quad 39x = 78$

$$x = 2$$

Using (1) $\quad 7 \times 2 + 2y = 2$

$$14 + 2y = 2$$
$$2y = -12$$
$$y = -6$$

[4]