



CHAPTER 4: SIMULTANEOUS EQUATIONS



Paper 2

Solution to Question 14

$$x + 2y - 2 = 0 \quad \dots\dots (1)$$

$$y^2 + 6x + 20 = 0 \quad \dots\dots (2)$$

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

Substitute (3) into (2).

$$y^2 + 6(2 - 2y) + 20 = 0$$

$$y^2 + 12 - 12y + 20 = 0$$

$$y^2 - 12y + 32 = 0$$

$$(y - 4)(y - 8) = 0$$

$$y = 4 \text{ or } y = 8$$

From (3): When $y = 4$, $x = 2 - 2(4)$
 $= -6$

When $y = 8$, $x = 2 - 2(8)$
 $= -14$

Hence, $(-6, 4)$ and $(-14, 8)$ are the solutions to the simultaneous equations.

Given $(2m, n - 1)$ is the point of intersection. Therefore,

$$(2m, n - 1) = (-6, 4)$$

$$2m = -6 \quad \text{and} \quad n - 1 = 4$$

$$m = -3 \quad \quad \quad n = 5$$

or

$$(2m, n - 1) = (-14, 8)$$

$$2m = -14 \quad \text{and} \quad n - 1 = 8$$

$$m = -7 \quad \quad \quad n = 9$$

Thus, $m = -3, n = 5$ or $m = -7, n = 9$.

Solution to Question 17

$$\begin{aligned}\text{Area of land planted with corn} &= 640 \text{ m}^2 \\ 30x - (30 - y)(x - 20) &= 640 \\ 30x - (30x - 600 - xy + 20y) &= 640 \\ 30x - 30x + 600 + xy - 20y &= 640 \\ xy - 20y &= 40 \quad \dots\dots (1)\end{aligned}$$

$$\begin{aligned}\text{Perimeter of land planted with tapioca} &= 48 \text{ m} \\ 2(30 - y) + 2(x - 20) &= 48 \\ 60 - 2y + 2x - 40 &= 48 \\ 2x - 2y &= 28 \\ x - y &= 14 \\ x &= 14 + y \quad \dots\dots (2)\end{aligned}$$

Substitute (2) into (1).

$$\begin{aligned}(14 + y)y - 20y &= 40 \\ 14y + y^2 - 20y - 40 &= 0 \\ y^2 - 6y - 40 &= 0 \\ (y - 10)(y + 4) &= 0 \\ y = 10 \text{ or } y = -4\end{aligned}$$

Dimension of width is positive, $y > 0$. Hence, $y = 10$.

$$\begin{aligned}\text{From (2): } x &= 14 + 10 \\ &= 24\end{aligned}$$

$$\begin{aligned}\text{Area of land planted with tapioca} &= (30 - y)(x - 20) \\ &= (30 - 10)(24 - 20) \\ &= 20(4) \\ &= 80 \text{ m}^2\end{aligned}$$