SOLUTIONS

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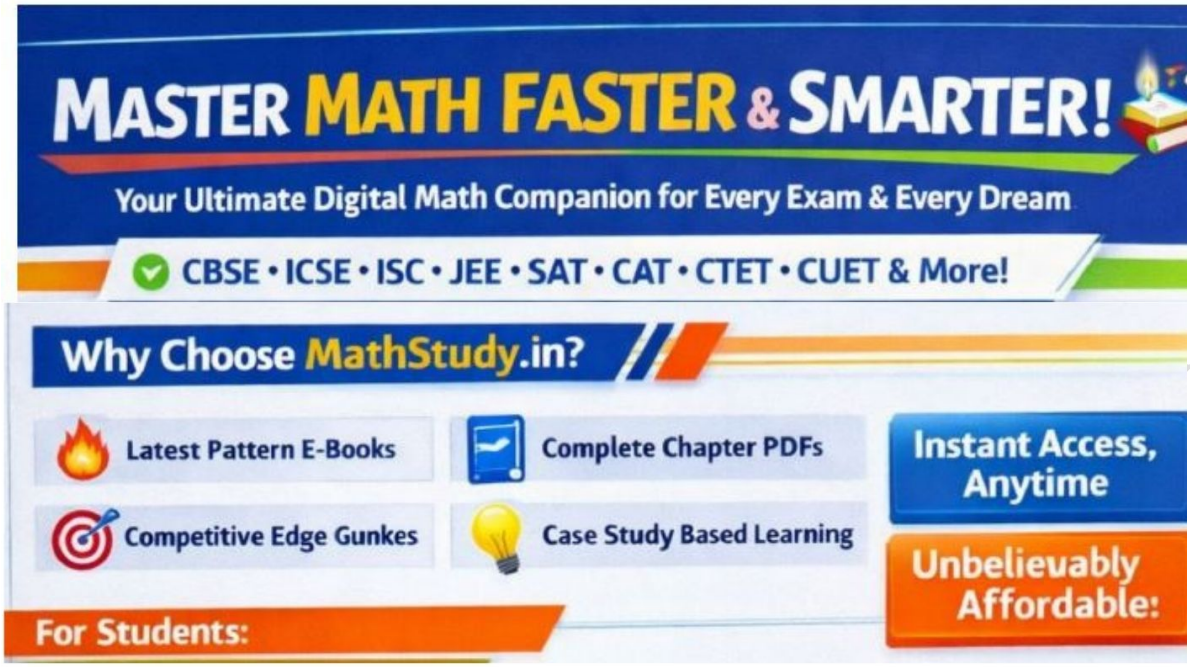

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SOLUTIONS: LINEAR EQUATIONS IN TWO VARIABLES

~~Mathematics | Class IX (2026/LINEQ/09/001)~~

Section A (Multiple Choice Questions)

1. **(c) Infinitely many solutions.** A linear equation in two variables represents a straight line on a Cartesian plane, and every point on that line is a solution.
2. **(a)** (a, a)**.** Since $y = x$, the x-coordinate and y-coordinate must be identical.
3. **(d)** $(0, 2)$**.** To find the Y-intercept, put $x = 0$: $2(0) + 3y = 6 \implies 3y = 6 \implies y = 2$.
4. **(b)** $1.x + 0.y = 7$**.** The variable y is missing, which means its coefficient is 0.
5. **(a) 4.** Substitute $x = 2, y = 0$: $2(2) + 3(0) = k \implies 4 + 0 = k \implies k = 4$.
6. **(a) Parallel to X-axis...** Equations of the form $y = k$ are horizontal lines.
7. **(c) Infinitely many.** Through a single point $(1, 2)$, an infinite number of lines can pass.
8. **(b) Remains the same.** This is a fundamental property of equality (Euclid's Axioms).

Section B (Very Short Answer Questions)

1. Rearranging $\sqrt{2}x - 4 = 3y$: $\sqrt{2}x - 3y - 4 = 0$.
   Comparing with $ax + by + c = 0$: $a = \sqrt{2}$**,** $b = -3$**,** $c = -4$.
2. $4x + 3y = 12$.
   Let $x = 0 \implies 3y = 12 \implies y = 4$. Solution: **(0, 4)**.
   Let $y = 0 \implies 4x = 12 \implies x = 3$. Solution: **(3, 0)**.
3. For $(-1, 4)$: $3(-1) + 4 = -3 + 4 = 1$. Since LHS = RHS, **it is a solution**.
   For $(0, k)$: $3(0) + k = 1 \implies \mathbf{k = 1}$.
4. A line parallel to X-axis is of the form $y = k$. Since it passes through $(-3, -4)$, the y-value must be -4. Equation: $y = -4$.

Section C (Short Answer Questions)

1. For $2x + y = 4$, points are $(0, 4), (2, 0), (1, 2)$. Plotting these gives a straight line.
   When $x = 3$: $2(3) + y = 4 \implies 6 + y = 4 \implies \mathbf{y = -2}$.
2. Let distance $= x$ and fare $= y$.
   First km fare $= 8$. Remaining distance $= (x - 1)$. Remaining fare $= 5(x - 1)$.
   Total fare: $y = 8 + 5(x - 1) \implies \mathbf{y = 5x + 3}$.
3. $2x + 1 = x - 3 \implies 2x - x = -3 - 1 \implies \mathbf{x = -4}$.
   (i) **Number line:** A point at -4 on a horizontal scale.
   (ii) **Cartesian plane:** A vertical line passing through $x = -4$ parallel to the Y-axis.

Section D (Long Answer Questions)

1. (i) Solving $x - y = 1$ and $2x + y = 8$:
   Adding equations: $3x = 9 \implies x = 3$.
   Substitute $x = 3$ in $x - y = 1 \implies 3 - y = 1 \implies y = 2$. **Intersection: (3, 2)**.
   (ii) Triangle vertices on X-axis: $y = 0$ for both. $x - 0 = 1 \implies (1, 0)$ and $2x + 0 = 8 \implies (4, 0)$.
   Base length $= 4 - 1 = 3$ units. Height (y-coordinate of intersection) $= 2$ units.
   Area $= \frac{1}{2} \times 3 \times 2 =$ **3** sq. units.

2. (i) Let contribution of Yamini be x and Fatima be y. $x + y = 100$.
   (ii) [Graph is a line passing through $(0, 100)$ and $(100, 0)$].
   (iii) If $x = 60$, then $60 + y = 100 \implies \mathbf{y = 40}$. Fatima contributed **Rs 40**.

Section E (Case Study)

1. **(b) 14 liters.** $y = 3(4) + 2 = 12 + 2 = 14$.

2. **(a) 2.** $3x - y + 2 = 0$. Here $c = 2$.

3. **(b) (0, 2).** When $x = 0, y = 2$.

4. **(a) 5 minutes.** $17 = 3x + 2 \implies 15 = 3x \implies x = 5$.

5. **(c) (2, 9).** If $x = 2, y = 3(2) + 2 = 8$. So $(2, 9)$ is not on the line.