SOLUTIONS

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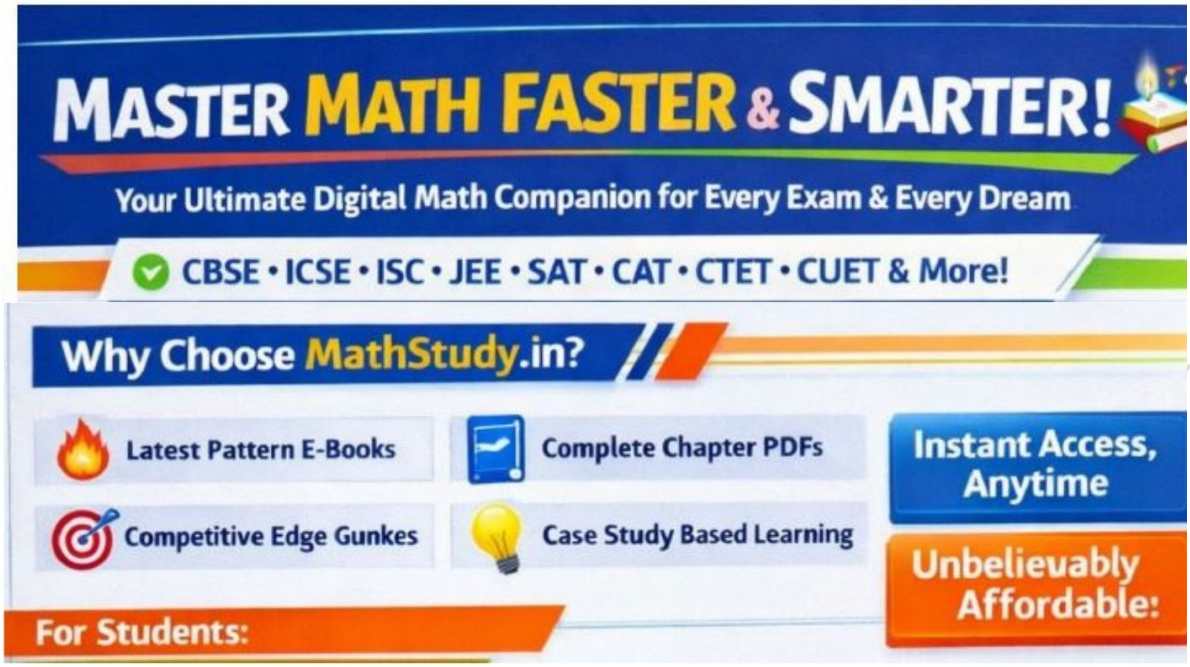

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SOLUTIONS: LINEAR EQUATIONS IN TWO VARIABLES

~~Mathematics | Class IX (2026/LINEQ/09/003)~~

Section A (Multiple Choice Questions)

1. **(c) passes through the origin.** Since the constant term is zero, $(0, 0)$ satisfies the equation $0 = 0$.

2. **(a) 2.** Substitute $x = p, y = 2p$: $3(p) - 4(2p) = -10 \implies 3p - 8p = -10 \implies -5p = -10 \implies p = 2$.

3. **(b) parallel to Y-axis.** $2x + 1 = 0 \implies x = -1/2$. A line with $x =$ constant is vertical.

4. **(d) Infinitely many.** A line consists of an infinite number of points.

5. **(c) remains exactly the same.** Multiplying by $k \neq 0$ creates an equivalent equation representing the same line.

6. **(b)** $(6, 3)$**.** Given $x = 2y$. Substitute in $x + y = 9 \implies 2y + y = 9 \implies 3y = 9 \implies y = 3$. Then $x = 2(3) = 6$.

7. **(b)** $(2, 0)$**.** Intersection with X-axis occurs when $y = 0$. $x/2 + 0 = 1 \implies x = 2$.

8. **(b)** $x/y = 5$**.** This involves the division of variables, making it non-linear (it is $x = 5y$ only if $y \neq 0$, but in standard form $ax + by + c = 0$, variables aren't in denominators).

Section B (Very Short Answer Questions)

1. Given $x = \frac{5}{2}y$. Substitute in $2x + 5y = 20$:
   $2(\frac{5}{2}y) + 5y = 20 \implies 5y + 5y = 20 \implies 10y = 20 \implies y = 2$.
   Then $x = \frac{5}{2}(2) = 5$. The point is **(5, 2)**.

2. Standard form: $0.x + 1.y - 7 = 0$.
   Since y is always 7, two solutions are **(0, 7)** and **(1, 7)**.

3. Substitute $(3, 2)$ into $2x + 3y$:
   $LHS = 2(3) + 3(2) = 6 + 6 = 12$.
   Since $LHS = RHS$, **Yes**, the graph passes through $(3, 2)$.

4. $3x = 18 - 4y \implies x = \frac{18-4y}{3}$.
   When $y = 3$: $x = \frac{18-4(3)}{3} = \frac{18-12}{3} = \frac{6}{3} = \mathbf{2}$.

Section C (Short Answer Questions)

1. $3x - x = -8 - 2 \implies 2x = -10 \implies \mathbf{x = -5}$.
   In two variables, this represents a **vertical line** parallel to the Y-axis.

2. Substitute $(2, -2)$ into $2x + ky = 10$:
   $2(2) + k(-2) = 10 \implies 4 - 2k = 10 \implies -2k = 6 \implies \mathbf{k = -3}$.
   Equation: $2x - 3y = 10$. For a point in Q II, let $y = 2 \implies 2x - 6 = 10 \implies 2x = 16 \implies x = 8$ (Incorrect quadrant). Let $y = 0 \implies x = 5$ (On axis).
   Let $x = -1 \implies -2 - 3y = 10 \implies -3y = 12 \implies y = -4$ (Q III).
   To get Q II $(x < 0, y > 0)$, let $y = 2 \implies 2x - 6 = 10 \implies x = 8$ (No).

Actually, for $2x - 3y = 10$, if $y > 0$, then $2x = 10 + 3y$, so x will always be positive. Thus, no point exists in Q II.

3. $y - x = 2 \implies y = x + 2$. Table: $(-2, 0), (0, 2), (2, 4)$.
   Triangle formed by $(0, 2)$ and $(-2, 0)$ and Origin $(0, 0)$.
   Area $= \frac{1}{2} \times |\text{base}| \times |\text{height}| = \frac{1}{2} \times 2 \times 2 = \mathbf{2}$ sq. units.

Section D (Long Answer Questions)

1. (i) 2 years ago: Father $= x - 2$, Son $= y - 2$. Equation: $x - 2 = 3(y - 2)$.
   (ii) $x - 2 = 3y - 6 \implies \mathbf{x - 3y + 4 = 0}$.
   (iii) [Graph passes through $(-4, 0)$ and $(2, 2)$].
   (iv) If $y = 12$: $x - 3(12) + 4 = 0 \implies x - 36 + 4 = 0 \implies \mathbf{x = 32}$ years.

2. (i) Graph of $3x + 2y = 12$.
   (ii) Put $y = 0 \implies 3x = 12 \implies x = 4$. Point: **(4, 0)**.
   Put $x = 0 \implies 2y = 12 \implies y = 6$. Point: **(0, 6)**.
   (iii) Area $= \frac{1}{2} \times 4 \times 6 = \mathbf{12}$ sq. units.

Section E (Case Study Based Question)

1. **(b) Rs 550.** $y = 8(50) + 150 = 400 + 150 = 550$.

2. **(c) 125 units.** $1150 = 8x + 150 \implies 1000 = 8x \implies x = 125$.

3. **(c) (0, 150).** At $x = 0, y = 150$.

4. **(b) 8.** The slope represents the rate per unit.

5. **(a) 100 units.** $950 = 8x + 150 \implies 800 = 8x \implies x = 100$.