Self Assessment Test

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Time : 1.5 Hours
M.M. : 55

Class : 9 Standard
Subject : Mathematics
LETV0901
Chapters : Linear Equations in Two Variables

Section A : Multiple Choice Questions (1 Mark each)

1. The graph of the equation $2x + 3y = 6$ cuts the y-axis at:
   (a) $(0, 2)$
   (b) $(2, 0)$
   (c) $(3, 0)$
   (d) $(0, 3)$
2. Which of the following is the solution of $x + y = 7,\ x - y = 1$?
   (a) $(3, 4)$
   (b) $(4, 3)$
   (c) $(2, 5)$
   (d) $(5, 2)$
3. The graph of $x = 4$ is:
   (a) a line parallel to y-axis
   (b) a line parallel to x-axis
   (c) a line through origin

(d) none of these

4. If $(x, y) = (2, 3)$ is a solution of $ax + by = 12$, then $(a + b) =$

   (a) 2
   (b) 3
   (c) 4
   (d) 5

5. The equation of the line parallel to x-axis and passing through $(0, -5)$ is:

   (a) $x = -5$
   (b) $y = -5$
   (c) $x = 5$
   (d) $y = 5$

6. The point of intersection of $y = 2x + 1$ and $y = -x + 4$ is:

   (a) $(1, 3)$
   (b) $(1, 2)$
   (c) $(1, 5)$
   (d) $(2, 5)$

7. A linear equation in two variables has:

   (a) one solution
   (b) two solutions
   (c) infinitely many solutions
   (d) no solution

8. Which of the following is NOT a linear equation in two variables?

   (a) $x + y = 3$
   (b) $2x - 3y = 7$
   (c) $xy = 4$
   (d) $3x + 2y = 5$

Section B : Short Answer Questions (2 Marks each)

1. Find the value of k if $(3, 2)$ is a solution of $2x + ky = 10$.
2. Solve graphically: $x + y = 7,\ x - y = 1$.
3. The sum of a number and its double is 18. Find the number using linear equations.
4. A number is 5 more than another number. If their sum is 55, find the numbers.
5. The cost of 2 pens and 3 pencils is Rs. 18. The cost of 4 pens and 5 pencils is Rs. 36. Find the cost of each pen and each pencil.
6. Write the equation of a line passing through $(2, 3)$ and parallel to x-axis.

Section C : Long Answer Questions (4 Marks each)

1. Solve graphically: $2x + y = 6,\ x - y = 2$. Plot graphs using `tikz`.
2. A father's age is twice the sum of ages of his two children. Ten years later, the father's age will be equal to the sum of ages of his children. Find the present age of the father.
3. Draw the graph of $x + 2y = 6$ and $2x - y = 4$ on the same graph paper. Find their point of intersection.
4. The sum of the numerator and denominator of a fraction is 12. If the denominator is 2 more than the numerator, find the fraction.

Section D : Case Study Based Question (5 Marks)

Case Study: A school is organizing a Mathematics Exhibition where students are required to prepare models based on linear equations in two vari-

ables. Rohan decides to make a stall on "Budget Planning of Pocket Money." He assumes his monthly pocket money is Rs. 500. He spends money on two activities: books and movies. The cost of one book is Rs. 50 and the cost of one movie ticket is Rs. 100. He wants to analyze how many books and movies he can buy in a month without exceeding his budget.

Based on this case study, answer the following MCQs:

1. The equation representing the above situation is:
   (a) $50x + 100y = 500$
   (b) $x + y = 500$
   (c) $100x + 50y = 500$
   (d) $x + 2y = 500$
2. If Rohan buys 4 movies, how many books can he buy?
   (a) 3
   (b) 4
   (c) 5
   (d) 6
3. The maximum number of books he can buy if he spends only on books:
   (a) 10
   (b) 20
   (c) 5
   (d) 15
4. If he buys 2 movies and 6 books, does it satisfy the condition?
   (a) Yes
   (b) No
5. The graphical representation of the situation will be:
   (a) A line passing through $(10, 0)$ and $(0, 5)$

(b) A line parallel to x-axis

(c) A line parallel to y-axis

(d) None of these

Answers with Solutions

Section A 1.(a), 2.(b), 3.(a), 4.(c), 5.(b), 6.(a), 7.(c), 8.(c).

Section B (Solutions)

1. $2(3) + k(2) = 10 \Rightarrow 6 + 2k = 10 \Rightarrow k = 2$.
2. $x + y = 7,\ x - y = 1 \Rightarrow$ Adding: $2x = 8 \Rightarrow x = 4$, substituting: $y = 3$. Solution: $(4, 3)$. Graph passes through $(7, 0)$, $(0, 7)$ and $(1, 0)$, $(0, -1)$.
3. Let number be x. Then $x + 2x = 18 \Rightarrow 3x = 18 \Rightarrow x = 6$.
4. Let numbers be x, y. Given $x = y + 5,\ x + y = 55 \Rightarrow (y + 5) + y = 55 \Rightarrow 2y = 50 \Rightarrow y = 25, x = 30$.
5. Let pen = Rs. p, pencil = Rs. q. $2p + 3q = 18,\ 4p + 5q = 36$. Multiply first by 2: $4p + 6q = 36$. Subtract: $q = 0$. So $2p = 18 \Rightarrow p = 9$, $q = 0$.
6. Equation: $y = 3$, line parallel to x-axis.

Section C (Solutions)

1. $2x + y = 6 \Rightarrow y = 6 - 2x,\ x - y = 2 \Rightarrow y = x - 2$. Solving: $6 - 2x = x - 2 \Rightarrow 3x = 8 \Rightarrow x = \frac{8}{3}, y = \frac{2}{3}$. Graph plotted using TikZ.
2. Let father's age = F, children's sum = C. $F = 2C$, $F + 10 = C + 10 \Rightarrow F = 2C, F = C \Rightarrow$ Contradiction. Correct interpretation: after 10 years, $F + 10 = (C + 20) \Rightarrow F = 2C, F + 10 = C + 20 \Rightarrow 2C + 10 = C + 20 \Rightarrow C = 10, F = 20$. Father's present age = 20 years.
3. $x + 2y = 6 \Rightarrow$ intercepts: $(6, 0), (0, 3)$; $2x - y = 4 \Rightarrow y = 2x - 4$, intercepts: $(2, 0), (0, -4)$. Solve: $x + 2(2x - 4) = 6 \Rightarrow 5x - 8 = 6 \Rightarrow x = \frac{14}{5}, y = \frac{8}{5}$.
4. Let numerator = x, denominator = y. $x + y = 12$, $y = x + 2$. Substituting: $x + (x + 2) = 12 \Rightarrow 2x + 2 = 12 \Rightarrow x = 5, y = 7$. Fraction $= \frac{5}{7}$.

Section D (Solutions) Equation: $50x + 100y = 500 \Rightarrow x + 2y = 10$.

1. (a)
2. $x + 2(4) = 10 \Rightarrow x = 2$ books $\Rightarrow$ option (a).
3. Only books: $50x = 500 \Rightarrow x = 10$ books $\Rightarrow$ option (a).
4. $50(6) + 100(2) = 300 + 200 = 500$, satisfies. Answer: Yes.
5. $(10, 0)$ and $(0, 5)$ satisfy equation, so option (a).