X Homework - 17 (MCQs - Pair of Linear Equations in two Variables)

1) The values of x and y in $\frac{4}{x}+3y=8$ and $\frac{6}{x}-4y=-5$ are:

(a) 2, 2 (b) 3, 3 (c) 1, 1 (d) 4, 4

2) The sum of two numbers is 15 and the sum of their reciprocals is $\frac{3}{10}$. The numbers are

(a) 9, 6 (b) 12, 3 (c) 11, 4 (d) 5, 10

3) The value of α for which $\alpha x+3y=\alpha-3$ and $12x+\alpha y=\alpha$ has no solutions:

(a) -5 (b) -6 (c) 6 (d) 7

4) The value of k for which the given system of equations $3x+y=1$ and $(2k-1)x+(k-1)y=5$ has no solution is

(a) 1 (b) 2 (c) 3 (d) 4

5) For what values of p and q, the system of equations $2x+3y=7$; $(p+q+1)x+(p+2q+2)y=4(p+q)+1$ will represent coincident lines?

(a) 1, 5 (b) 3, 5 (c) 4, 3 (d) 3, 2

6) Two numbers are in the ratio 5:6. If 8 is subtracted from each of the numbers, the ratio becomes 4:5, then the numbers are:

(a) 25 and 30 (b) 40 and 48 (c) 30 and 36 (d) 45 and 54

7) In a competitive examination, 1 mark is awarded for each correct answer, while $\frac{1}{2}$ mark is deducted for every wrong answer. Jayanti answered 120 questions and got 90 marks. No. of questions she attempted correctly is:

(a) 96 (b) 98 (c) 100 (d) 105

8) For what values of a and b does the following pair of equations have an infinite no. of solutions?

$2x+3y=7$; $a(x+y)-b(x-y)=3a+b-2$

(a) 3 and 1 (b) 5 and 1 (c) 4 and 3 (d) 5 and -2

9) The values of x and y in

$$\frac{x+2y-4}{3}=\frac{x+y-3}{2}=\frac{3x+y}{11}$$ are

(a) 3 and 2 (b) 5 and 3 (c) 4 and 3 (d) 5 and -3.

10) What is the point of intersection of the line $3x+7y=12$ and x-axis?
(a) (3,0) (b) (4,0) (c) (5,0) (d) (6,0)

11) The values of x and y if $99x+101y=499$ and $101x+99y=501$ are
(a) 3 and 2 (b) 5,6 (c) -3,2 (d) -3,-2

12) A fraction becomes $\frac{1}{3}$, if 2 is added to both numerator and denominator. If 3 is added to both numerator and denominator, it becomes $\frac{2}{5}$. The fraction is
(a) $\frac{2}{7}$ (b) $\frac{3}{5}$ (c) $\frac{1}{7}$ (d) $\frac{5}{7}$

13) The length and breadth of a field if its area is $540\ m^2$ and perimeter is 96m are
(a) 36m, 15m (b) 18m, 30m (c) 9m, 60m (d) 25m, 21.6m

14) Manisha scored x marks in Mathematics and y marks in Physics. The value of x and y, if $x-y=2$ and $xy=2600$ is
(a) 52,50 (b) 68,26 (c) 51,54 (d) 36,52

15) A number consists of two digits. The sum of the digits is 12 and the unit digit when divided by the tens digit gives the result as 3. The number is (a) 63 (b) 68 (c) 93 (d) 39

16) If $\frac{x}{a}+\frac{y}{b}=2$; $ax-by=a^2-b^2$, then $\frac{x}{y}=$
(a) $\frac{a^2}{b^2}$ (b) $\frac{a}{b^2}$ (c) $\frac{a}{b}$ (d) $-\frac{a}{b}$

17) If $4x+3y=18xy$ and $2x-5y+4xy=0$, then values of x and y are:
(a) 1/2 and 1/3 (b) 1/4 and 1/3 (c) -1/2 and -1/3 (d) -1 and -3

18) The father's age is six times his son's age. Four years hence, the age of the father will be four times his son's age. The present age, in years, of the son and the father are respectively
(a) 4 and 24 (b) 5 and 30 (c) 6 and 36 (d) 3 and 24

19) One equation of a pair of dependent linear equations is $-5x+7y=2$. The second equation can be:

(a) $10x + 14y + 4 = 0$ (b) $-10x - 14y + 4 = 0$

(c) $-10x + 14y + 4 = 0$ (d) $10x - 14y = -4$

20) A pair of linear equations which has a unique solution $x = 2, y = -3$ is

(a) $x + y = 1, 2x - 3y = -5$ (b) $2x + 5y = -11, 4x + 10y = -22$

(c) $2x - y = 1, 3x + 2y = 0$ (d) $x - 4y - 14 = 0, 5x - y - 13 = 0$

Homework-17 (Pair of Linear Equations in two Variables - answers)

1) $\frac{4}{x} + 3y = 8 \quad \rightarrow (1)$

$\frac{6}{x} - 4y = -5 \quad \rightarrow (2)$

Put $\frac{1}{x} = a$

$4a + 3y = 8 \xrightarrow{\times 4} 16a + 12y = 32 \quad \rightarrow (1)$

$6a - 4y = -5 \xrightarrow{\times 3} 18a - 12y = -15 \quad \rightarrow (2)$

$(+), \quad 34a = 17$

$a = \frac{17}{34} = \frac{1}{2} \Rightarrow x = 2$

From eq:(1), $4 \times \frac{1}{2} + 3y = 8$

$3y = 6$

$y = \frac{6}{3} = 2$

$(2, 2)$ (a)

2) Let the numbers be x and y.

ATQ, $x + y = 15 \rightarrow (1)$

$\frac{1}{x} + \frac{1}{y} = \frac{3}{10} \rightarrow (2)$

From eq:(1), $y = 15 - x \rightarrow (3)$

On substituting (3) in (2), $\frac{1}{x} + \frac{1}{15-x} = \frac{3}{10}$

$\Rightarrow \frac{15 - x + x}{x(15-x)} = \frac{3}{10}$

$\Rightarrow 10 \times 15 = 3x(15-x)$

$\Rightarrow 15x - x^2 = 50$

$\Rightarrow -x^2 + 15x - 50 = 0 \Rightarrow x^2 - 15x + 50 = 0$

$\Rightarrow (x-10)(x-5) = 0$

$x = 5, 10$

S P
-15 50
-5 -10

When $x = 5$, $y = 10$

When $x = 10$, $y = 5$

$\therefore (5, 10)$ (d)

3) $\frac{a_1}{a_2} = \frac{\alpha}{12}$; $\frac{b_1}{b_2} = \frac{3}{\alpha}$; $\frac{c_1}{c_2} = \frac{-(\alpha-3)}{-\alpha}$

For no solution, $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

$\Rightarrow \frac{\alpha}{12} = \frac{3}{\alpha} \neq \frac{\alpha-3}{\alpha}$

$\therefore \alpha^2 = 36$

$\alpha = \pm 6$

for no solution, the required value of $\alpha = -6$ (b)

4) $\frac{a_1}{a_2} = \frac{3}{2k-1}$; $\frac{b_1}{b_2} = \frac{1}{k-1}$; $\frac{c_1}{c_2} = \frac{-1}{-5}$

For no solution, $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

$\Rightarrow \frac{3}{2k-1} = \frac{1}{k-1} \neq \frac{1}{5}$

$\therefore 3k-3 = 2k-1$

$k = 2$ (b)

5) $\frac{a_1}{a_2} = \frac{2}{p+q+1}$; $\frac{b_1}{b_2} = \frac{3}{p+2q+2}$; $\frac{c_1}{c_2} = \frac{-7}{-(4(p+q)+1)}$

For coincident lines, $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

$\Rightarrow \underset{\text{I}}{\frac{2}{p+q+1}} = \underset{\text{II}}{\frac{3}{p+2q+2}} = \underset{\text{III}}{\frac{7}{4(p+q)+1}}$

From I and II, $2p+4q+4 = 3p+3q+3$

$-p+q = -1 \rightarrow (1)$

From I and III, $8p+8q+2 = 7p+7q+7$

$p+q = 5 \rightarrow (2)$

(1)+(2), $2q = 4$

$q = \underline{2}$

From eq(1), $-p+2 = -1$

$-p = -3$

$p = \underline{3}$

$\therefore (3, 2)$ (d)

6) Let the numbers be $5x$ and $6x$.

ATQ, $\frac{5x-8}{6x-8} = \frac{4}{5}$

$\Rightarrow 25x - 40 = 24x - 32$

$\Rightarrow x = 8$ //

$\therefore$ The numbers are 40 and 48. (b)

7) Let the no. of questions she answered correct be x and that of wrong be $120-x$.

ATQ, $x - \frac{1}{2}(120-x) = 90$

$\Rightarrow 2x - 120 + x = 180$

$\Rightarrow 3x = 300$

$x = 100$ // (c)

8) $2x + 3y = 7 \rightarrow (1)$

$ax + ay - bx + by = 3a + b - 2$

$\Rightarrow (a-b)x + (a+b)y = 3a + b - 2 \rightarrow (2)$

$\frac{a_1}{a_2} = \frac{2}{a-b}$; $\frac{b_1}{b_2} = \frac{3}{a+b}$; $\frac{c_1}{c_2} = \frac{-7}{-(3a+b-2)}$

For infinite no. of solutions, $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

$\Rightarrow \underset{\text{I}}{\frac{2}{a-b}} = \underset{\text{II}}{\frac{3}{a+b}} = \underset{\text{III}}{\frac{-7}{-(3a+b-2)}}$

From I and II, $2a + 2b = 3a - 3b$

$\Rightarrow -a + 5b = 0 \rightarrow (1)$

From I and III, $6a + 2b - 4 = 7a - 7b$

$-a + 9b = 4 \rightarrow (2)$

$(2) - (2)$, $-4b = -4$

$b = 1$ //

From eq: (1), $-a + 5 = 0$

$-a = -5$

$a = 5$ //

(5, 1) (b)

9) $\frac{x+2y-4}{3} = \frac{x+y-3}{2} = \frac{3x+y}{11}$

I II III

From I and II, $2x+4y-8 = 3x+3y-9$.

$\Rightarrow -x+y = -1 \longrightarrow (1)$

From II and III, $11x+11y-33 = 6x+2y$

$\Rightarrow 5x+9y = 33 \longrightarrow (2)$

$(1)\times 5, \quad -5x+5y = -5$

$(2), \quad 5x+9y = 33$

$(+), \quad 14y = 28$

$y = \frac{28}{14} = 2$

From eq: (1), $-x+2 = -1$

$-x = -3$

$x = 3$ //

(3, 2) (a)

10) When a line cuts x-axis, $y = 0$

Then, $3x = 12$

$x = 4$

(4, 0) (b)

11) $99x+101y = 499 \longrightarrow (1)$

$101x+99y = 501 \longrightarrow (2)$

$(1)+(2), \quad 200x+200y = 1000$

$\div 200, \quad x+y = 5 \longrightarrow (3)$

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

$\div -2, \quad x-y = 1 \longrightarrow (4)$

$(3)+(4), \quad 2x = 6$

$x = 3$

$y = 2$ (a)

12) Let the fraction be $\frac{x}{y}$

ATQ, $\frac{x+2}{y+2} = \frac{1}{3} \Rightarrow 3x+6 = y+2$

$\Rightarrow 3x - y = -4 \longrightarrow (1)$

and $\frac{x+3}{y+3} = \frac{2}{5} \Rightarrow 5x+15 = 2y+6$

$\Rightarrow 5x - 2y = -9 \longrightarrow (2)$

$(1) \times 2,\ 6x - 2y = -8$

$(2),\ 5x - 2y = -9$

$(-),\ x = 1$

From eq: (1), $3 - y = -4$

$-y = -7$

$y = 7$

$\therefore$ The fraction is $\frac{1}{7}$ (c)

13) $l \times b = 540\ m^2$

$\Rightarrow b = \frac{540}{l} \longrightarrow (1)$

$2(l+b) = 96 \Rightarrow l + b = 48 \longrightarrow (2)$

On substituting (1) in (2), $l + \frac{540}{l} = 48$

$\Rightarrow l^2 + 540 = 48l$

$\Rightarrow l^2 - 48l + 540 = 0$

$\Rightarrow (l-30)(l-18) = 0$

$\therefore l = 18, 30$

S	P
-48	540
-30	-18

when $l = 30m$, $b = 18m$ (b)

14) $(x+y)^2 = (x-y)^2 + 4xy$

$= 4 + 4 \times 2600$

$= 10404$

$\therefore x + y = 102 \longrightarrow (1)$

$x - y = 2 \longrightarrow (2)$

$(1)+(2),\ 2x = 104$

$x = 52$

$y = 50$ (a)

15) $\frac{x}{12-x} = 3 \Rightarrow x = 36 - 3x$

$\Rightarrow 4x = 36$

$x = 9$

T	O
12-x	x

$\therefore$ The number is 39 (d)

16) $\frac{x}{a}+\frac{y}{b}=2 \Rightarrow bx+ay=2ab \longrightarrow (1)$
$ax-by=a^2-b^2 \longrightarrow (2)$

$(1)\times b,\ b^2x+aby=2ab^2 \longrightarrow (3)$
$(2)\times a,\ a^2x-aby=a(a^2-b^2) \longrightarrow (4)$
$(3)+(4),\ x(b^2+a^2)=2ab^2+a^3-ab^2$
$x(a^2+b^2)=ab^2+a^3$
$x(a^2+b^2)=a(b^2+a^2)$
$x=a$ //

From eq: (1), $ab+ay=2ab$
$ay=2ab-ab$
$ay=ab$
$y=b$ //

$\therefore \frac{x}{y}=\frac{a}{b}$ (c)

17) $4x+3y=18xy \xrightarrow{\div xy} \frac{4}{y}+\frac{3}{x}=18$

$2x-5y=-4xy \xrightarrow{\div xy} \frac{2}{y}-\frac{5}{x}=-4$

Let $\frac{1}{x}=a$; $\frac{1}{y}=b$

Then, $4b+3a=18 \longrightarrow (1)$
$2b-5a=-4 \longrightarrow (2)$

$(1),\ 4b+3a=18$
$(2)\times 2,\ 4b-10a=-8$
$(-)\quad 13a=26$
$a=2 \Rightarrow x=\frac{1}{2}$ //

From eq: (1), $4b+6=18$
$4b=12$
$b=3 \Rightarrow y=\frac{1}{3}$ (a) //

18) Let the present age of son = x years
Then, father's age = $6x$ years

After 4 years, Son's age = $(x+4)$ years

father's age = $(6x+4)$ years

ATQ, $6x+4 = 4(x+4)$

$6x+4 = 4x+16$

$2x = 12$

$x = 6$ (son)

Then, $6x = 36$ (father) (c)

19) $-5x + 7y = 2 \rightarrow (1)$

For dependent linear equations, $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

$(1) \times (-2)$, $10x - 14y = -4$ (d)

20) (d) $x - 4y = 14 \rightarrow (1)$

$5x - y = 13 \rightarrow (2)$

(1), $x - 4y = 14$

$(2) \times 4$, $20x - 4y = 52$

$(-)$, $-19x = -38$

$x = 2$ //

From eq: (2), $10 - y = 13$

$-y = 3$

$y = -3$ //