CHAPTER 4

# LINEAR EQUATIONS IN TWO VARIABLES

MATHEMATICAL REASONING

1. Which equation satisfies the data given in the table?

x	−1	0	1	2
y	−3	−1	1	3

(A) $y = x − 2$ (B) $y = 2x − 1$
(C) $y = 3x − 3$ (D) $y = x + 1$

2. The graph of $y = 6$ is a line
(A) Parallel to x-axis at a distance of 6 units from the origin.
(B) Parallel to y-axis at a distance of 6 units from the origin.
(C) Making an intercept of 6 units on the x-axis.
(D) Making an intercept of 6 units on both the axes.

3. If the point (3, 4) lies on the graph of the equation $3y = ax + 7$, then the value of a is _____.

(A) $\dfrac{2}{3}$ (B) 1

(C) $\dfrac{4}{3}$ (D) $\dfrac{5}{3}$

4. How many linear equations in x and y can be satisfied by $x = 2, y = 3$?
(A) Only one   (B) Only two
(C) Infinitely many   (D) None of these

5. The graph of the linear equation $2x + 3y = 6$ is a line which meets the x-axis at the point
(A) (0, 2)   (B) (2, 0)
(C) (3, 0)   (D) (0, 3)

6. In the rectangular coordinate system given below, the shaded region is bounded by two straight lines. Which of the following is not an equation of one of the boundary lines ?

(A) $x = 0$
(B) $x = 1$
(C) $x − y = 0$
(D) $x + 2y = 2$
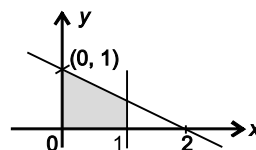
7. $ax + by + c = 0$ does not represent an equation of line, if _____.
(A) $a = c = 0, b \neq 0$
(B) $b = c = 0, a \neq 0$
(C) $a = b = 0$
(D) $c = 0, a \neq 0, b \neq 0$

8. A straight line parallel to the y-axis has equation _____.
(A) $x = a$ (B) $y = a$
(C) $y = x$ (D) $y = −x$

9. If (2, 0) is a solution of the linear equation $2x + 3y = k$, then the value of k is _____.
(A) 4   (B) 6
(C) 5   (D) 2

10. If the graph of the equation $4x + 3y = 12$ cuts the coordinate axes at A and B, then hypotenuse of right triangle AOB is of length
(A) 4 units   (B) 3 units
(C) 5 units   (D) None of these

11. Point (4, 1) lies on the line _____.
(A) $x + 2y = 5$ (B) $2x + y = -6$
(C) $x + 2y = 6$ (D) $x + y = 16$

12. The equation $x = 7$ in two variables, can be written as _____.
(A) $1 \cdot x + 1 \cdot y = 7$ (B) $1 \cdot x + 0 \cdot y = 7$
(C) $0 \cdot x + 1 \cdot y = 7$ (D) None of these

13. The point $(a, -a)$ always lies on _____.
(A) $x + y = 0$ (B) $x - y = 0$
(C) $x = -a$ (D) $y = a$

14. The equation of the line whose graph passes through the origin is _____.
(A) $4x + 2y = -1$ (B) $x + y = 1$
(C) $8x + 7y = 0$ (D) $8x - 1 = 4y$

15. If $\angle A$ and $\angle B$ are complementary angles and $m\angle A$ is x, which equation can be used to find $m\angle B$ which is denoted by y?
(A) $y = (90° + x)$ (B) $y = (90° - x)$
(C) $y = (180° - x)$ (D) $y = (x + 180°)$

EVERYDAY MATHEMATICS

16. A and B are friends. A is elder to B by 5 years. B's sister C is half the age of B while A's father D is 8 years older than twice the age of B. If the present age of D is 48 years, find the present ages of A, B and C respectively.
(A) 50 years, 25 years, 20 years
(B) 40 years, 20 years, 15 years
(C) 20 years, 15 years, 10 years
(D) 25 years, 20 years, 10 years

17. Mayank and Sujata, two students of class 9th together contributed ₹1000 to PPM relief fund.
(i) Find the linear equation satisfying the data.
(ii) If Sujata contributed ₹475, then how (₹) much Mayank contributed?

	(i)	(ii)
(A)	$2x + y = 1000$	575
(B)	$x + y = 1000$	525
(C)	$0 \cdot x + 1 \cdot y = 100$	575
(D)	$2x + 2y = 500$	525

18. The cost of a note book is twice the cost of a pen. If the cost of a note book is ₹ x and that of a pen is ₹ y, then a linear equation in two variables to represent the given condition is _____.

(A) $x + 2y = 0$ (B) $x - 2y = 0$
(C) $2x + y = 0$ (D) $2x - y = 0$

19. Rakesh has ₹x more than Mohan has, and together they have a total of ₹y. Which of the following options represents the amount of money that Mohan has?

(A) $₹\left(\dfrac{y - x}{2}\right)$

(B) $₹\left(y - \dfrac{x}{2}\right)$

(C) $₹\left(\dfrac{y}{2} - x\right)$

(D) $₹(2y - x)$

20. A part of monthly expenses of a family on milk is fixed which is ₹700 and remaining varies with quantity of milk taken extra at the rate of ₹25 per litre. Taking quantity of milk required extra as x litres and total expenditure on milk as ₹y, write a linear equation from the above information.
(A) $-25\,x + y = 700$
(B) $20\,x + y = 500$
(C) $20\,x + 10y = 300$
(D) $x + 25\,y = 900$

21. The equations representing the given graph is _____.
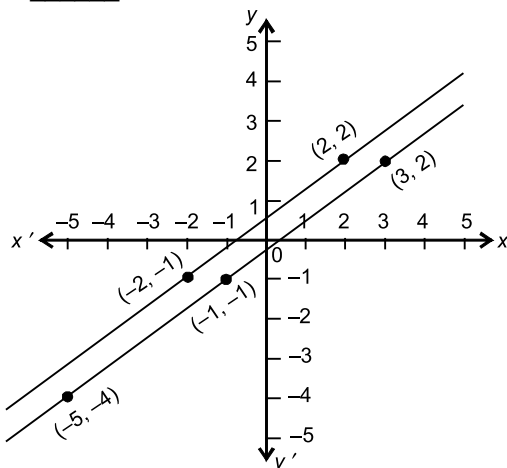
(A) $7x + 2y = 11$; $y - 2x = 3$

(B) $2x + 7y = 11$; $5x + (35y/2) = 25$

(C) $3x - 7y = 10$; $8y - 6x = 4$

(D) $3x - 4y = 1$; $8y - 6x = 4$

22. If the temperature of a liquid can be measured in kelvin units as $x°$K or in Fahrenheit units as $y°$F. The relation between the two systems of measurement of temperature is given by the linear equation.

$$y = \frac{9}{5}(x - 273) + 32$$

(i) Find the temperature of the liquid in Fahrenheit if the temperature of the liquid is 313° K.

(ii) If the temperature is 158° F, then find the temperature in Kelvin.

|	(i)	(ii)
(A)	112° F	150° K
(B)	112° F	243° K
(C)	104° F	343° K
(D)	104° F	150° K

23. Fill in the blanks.

(i) A linear equation in two variables has __P__ solutions(s).

(ii) The graph of __Q__ line has an equation of the form $x = k$.

(iii) A line parallel to x-axis cuts the y-axis at __R__ point(s).

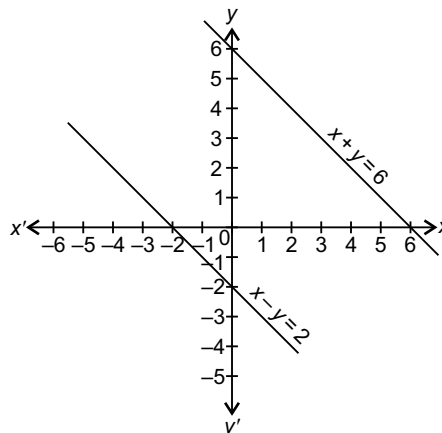(iv) Distance between the graph of equation $y = 2$ and $y = -4$ is __S__ units.

	P	Q	R	S
(A)	Zero	Horizontal	Zero	2
(B)	Infinite	Horizontal	Two	6
(C)	Infinite	Vertical	One	6
(D)	Zero	Vertical	One	2

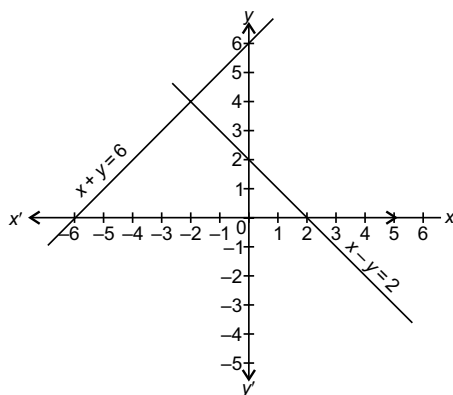**24.** Which of the following is the graph of $x + y = 6$ and $x - y = 2$?

(A)
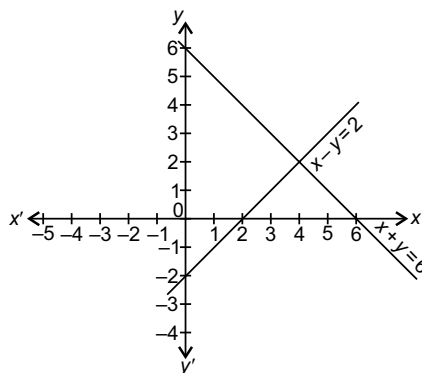
(B)

(C)

(D) None of these

25. Match the linear equations in column-I with their solutions in column-II.

Column-I   **Column-II**

(P) $4x + 3y = 24$ (i) $(2, -3)$

(Q) $\dfrac{x}{2} - \dfrac{y}{3} = 2$ (ii) $(2, 3)$

(R) $3x + 5y = 15$ (iii) $(3, 4)$

(S) $\dfrac{x-2}{3} = y - 3$ (iv) $\left(\dfrac{9}{3}, \dfrac{6}{5}\right)$

(A) (P)→(ii), (Q)→(i), (R)→(iv), (S)→(iii)
(B) (P)→(iii), (Q)→(i), (R)→(iv), (S)→(ii)
(C) (P)→(ii), (Q)→(iv), (R)→(i), (S)→(iii)
(D) (P)→(iii), (Q)→(iv), (R)→(i), (S)→(ii)

HINTS & EXPLANATIONS

④ Linear Equations in Two Variables

1. (B)   **2. (A)**

3. (D) : Since the point (3, 4) lies on the equation $3y = ax + 7$.

∴ $3 \times 4 = a \times 3 + 7$

$\Rightarrow 5 = 3a \Rightarrow a = \dfrac{5}{3}$.

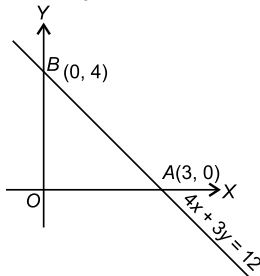**4. (C) :** Infinitely many equations in x and y can be satisfied by $x = 2$ and $y = 3$.

5. (C) : We have, $2x + 3y = 6$

Since the line meets x-axis *i.e.*, $y = 0$

∴ $2x + 3 \times 0 = 6 \Rightarrow x = 3$

∴ Required point is (3, 0)

6. (C) : $x - y = 0$ is not the equation of one of the boundary lines.

7. (C)   **8. (A)**

9. (A) : Since, (2, 0) is the solution of $2x + 3y = k$. So (2, 0) satisfies it.

∴ $2 \times 2 + 3 \times 0 = k \Rightarrow k = 4$

10. (C) : Put $x = 0$ in $4x + 3y = 12$, we get

$4 \times 0 + 3y = 12 \Rightarrow y = 4$.

Put $y = 0$ in $4x + 3y = 12$, we get

$4x + 3 \times 0 = 12 \Rightarrow x = 3$.

So, $OB = 4$ units and $OA = 3$ units.

Now, in ΔAOB, by pythagoras theorem

$AB^2 = OB^2 + OA^2 \Rightarrow AB^2 = 4^2 + 3^2$

$\Rightarrow AB^2 = 16 + 9 \Rightarrow AB = \sqrt{25} = 5$

Hence, hypotenuse = 5 units.

11. (C)   **12. (B)**

13. (A) : In $x + y = 0$ put $x = a$, we get

$a + y = 0 \Rightarrow y = -a$

So, $(a, -a)$ always satisfy $x + y = 0$.

14. (C) : (A) The point (0, 0) satisfy the equation

$8x + 7y = 0$

So, $8x + 7y = 0$ is the equation of line whose graph passes through the origin.

15. (B) : We have given, $\angle A + \angle B = 90°$

$\Rightarrow x + y = 90° \Rightarrow y = (90° - x)$

16. (D) : Let the present ages of A, B, C and D are x, y, z and t respectively.

Since, present age of $D = t = 48$ years.

According to question,

$x = y + 5$ ... (i)

$z = \dfrac{1}{2}y$ ... (ii)

$t = 2y + 8$ ... (iii)

From (iii), $48 = 2y + 8$

$\Rightarrow 2y = 40 \Rightarrow y = 20$ years

From (ii), $z = \dfrac{1}{2} \times 20 = 10$ years

From (i), $x = 20 + 5 = 25$ years

So, present ages of A, B and C are 25 years, 20 years and 10 years respectively.

17. (B) : (i) Let Mayank contributed ₹ x and Sujata contributed ₹ y.

According to question,

$x + y = 1000$ ... (1)

(ii) Now, if Sujata contributed ₹ 475 then $y = 475$

From (1), $x + 475 = 1000 \Rightarrow x = 525$

So, Mayank contributed ₹ 525.

18. (B) : According to question,

$2 \times$ Cost of pen = Cost of note book

$\Rightarrow 2y = x \Rightarrow x - 2y = 0$.

19. (A) : Amount of money Rakesh has

$= x +$ Amount of money Mohan has ... (i)

Also, $y =$ Total Amount of money

$\Rightarrow y =$ Amount of money with Rakesh

           + Amount of money with Mohan

$\Rightarrow y = x +$ Amount of money with Mohan

           + Amount of money with Mohan (From (i))

$\Rightarrow$ Amount of money Mohan has $= ₹\dfrac{(y - x)}{2}$.

20. (A) : Since, x litres is the extra quantity of milk and y be total expenditure on milk.

∴ Required linear equation is

$700 + 25x = y \Rightarrow y - 25x = 700$

or $-25x + y = 700$

21. (D)

22. (C) : (i) Putting $x = 313°$K, in given equation, we get

$y = \dfrac{9}{5}(313 - 273) + 32 = \dfrac{9}{5}(40) + 32 = 72 + 32 = 104°$ F

(ii) Putting, $y = 158°$ F in given equation, we get,

$158 = \dfrac{9}{5}(x - 273) + 32$

$\Rightarrow 158 - 32 = \dfrac{9}{5}(x - 273) \Rightarrow 126 = \dfrac{9}{5}(x - 273)$

$\Rightarrow 126 \times \dfrac{5}{9} = x - 273 \Rightarrow x = 343°$ K.

23. (C)

24. (A) : Putting $x = 0$ in $x + y = 6$, we get $y = 6$. Putting $y = 0$ in $x + y = 6$, we get $x = 6$

So the equation $x + y = 6$ passes through (0, 6) and (6, 0).

Also, putting $x = 0$ in $x - y = 2$, we get $y = -2$.

Putting $y = 0$ in $x - y = 2$, we get $x = 2$

So, the equation $x - y = 2$ passes through (0, -2) and (2, 0).

Hence, option (A) shows the graphs of $x + y = 6$ and $x - y = 2$.

25. (B)