Linear Equations in Two Variables

CHAPTER 4

TRY YOURSELF

SOLUTIONS

1. (i) We have, $2x + 3y = -5 \Rightarrow 2x + 3y + 5 = 0$
On comparing this equation with $ax + by + c = 0$, we get
$a = 2, b = 3$ and $c = 5$

(ii) We have, $3x - \frac{y}{2} - 8 = 0 \Rightarrow 6x - y - 16 = 0$
[Multiplying both sides by 2]
On comparing this equation with $ax + by + c = 0$, we get
$a = 6, b = -1, c = -16$

2. (i) $2x = -3$ can be written as $2x + 0 \cdot y + 3 = 0$

(ii) $5x = \frac{7}{2}$ can be written as $5 \cdot x + 0 \cdot y - \frac{7}{2} = 0$
or $10x + 0 \cdot y - 7 = 0$

(iii) $y = \frac{3}{2}x$ can be written as $\frac{3}{2}x - y + 0 = 0$
or $3x - 2y + 0 = 0$

3. Let cost of a ball pen = ₹ x
and cost of a fountain pen = ₹ y
Then, according to the given condition, we get
Cost of a ball pen = Half of the cost of a fountain pen – 6
$\Rightarrow \quad x = \frac{y}{2} - 6 \Rightarrow x = \frac{y - 12}{2}$
$\Rightarrow \quad 2x = y - 12 \Rightarrow 2x - y + 12 = 0,$
which is the required linear equation in two variables.

4. Let the cost of a note book be ₹ x and that of a pen be ₹ y.
Then, according to the given statement, we get
$x = 3y$ or, $1 \cdot x - 3y + 0 = 0$

5. Here, we can see that the cost of ticket neither to Agra nor to Mathura, is known.
So, let cost of ticket to Agra from Delhi be ₹ x
and cost of ticket to Mathura from Delhi be ₹ y
Then, according to the given condition, we get
$2x + 3y = 440$

6. Putting $x = -3$ and $y = -2$ in $2x - 7y + 8 = 0$, we get
L.H.S. $= 2(-3) - 7(-2) + 8 = -6 + 14 + 8 = 16 \neq$ R.H.S
So, $(-3, -2)$ is not a solution of $2x - 7y + 8 = 0$.

7. Putting $x = 2\sqrt{2}$ and $y = 3\sqrt{2}$ in $3y - 2x = 1$, we get
L.H.S. $= 3(3\sqrt{2}) - 2(2\sqrt{2}) = 9\sqrt{2} - 4\sqrt{2} = 5\sqrt{2} \neq$ R.H.S
So, $(2\sqrt{2}, 3\sqrt{2})$ is not a solution of $3y - 2x = 1$.

8. Since $x = 1, y = 1$ is a solution of $8x + 5y = k$, therefore it will satisfy the equation.
On putting $x = 1$ and $y = 1$ in this equation, we get
$8 \times 1 + 5 \times 1 = k \Rightarrow 8 + 5 = k \Rightarrow k = 13$

9. We have, $x = 2y$
Taking $x = 1$, we get $1 = 2y \Rightarrow y = \frac{1}{2}$
Taking $y = -4$, we get $x = 2(-4) \Rightarrow x = -8$
Thus, the solutions are $(1, 1/2)$ and $(-8, -4)$.

10. We have $7x - 5y = 35$
Taking $x = 0$, we get $-5y = 35 \Rightarrow y = -7$
Taking $y = 0$, we get $7x = 35 \Rightarrow x = 5$
Taking $x = 10$, we get $7(10) - 5y = 35 \Rightarrow y = 7$
Thus, the solutions are $(5, 0), (0, -7)$ and $(10, 7)$.

11. We have, $x + 2 = 0$
$\Rightarrow \quad x = -2$, for any value of y.
Thus, five solutions can be given as $(-2, 0), (-2, 1), (-2, 2), (-2, 3)$ and $(-2, 4)$.

12. Let the number of goats and hens in the herd are x and y respectively. Then,
$4x + 2y = 40$
Taking $x = 0$, we get $2y = 40 \Rightarrow y = 20$
Taking $x = 2$, we get $2y = 32 \Rightarrow y = 16$
$\therefore$ Two of its solutions are $(0, 20)$ and $(2, 16)$.

13. Given, equation is $4x + 3y = 12$
For intersection with x-axis, put $y = 0$
$\Rightarrow \quad 4x = 12 \Rightarrow x = 3$
$\therefore$ Coordinates on x-axis are $(3, 0)$
For intersection with y-axis, put $x = 0$
$\Rightarrow \quad 3y = 12 \Rightarrow y = 4$
$\therefore$ Coordinates on y-axis are $(0, 4)$.

14. Since the point $(1, -1)$ lies on the graph, therefore it will satisfy the given equation.
$\therefore$ On putting $x = 1$ and $y = -1$ in the given equation, we get
$2(1) - (2a + 5)(-1) = 5$
$\Rightarrow \quad 2 + 2a + 5 = 5 \Rightarrow 2a = -2 \Rightarrow a = -2/2 = -1$

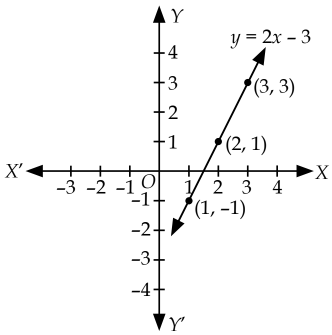
15. Since, the point $(2k + 1, k - 2)$ lies on the graph, therefore it will satisfy the given equation.
$\therefore$ On putting $x = 2k + 1$ and $y = k - 2$ in $2x + y + 5 = 0$, we get
$2(2k + 1) + (k - 2) + 5 = 0$
$\Rightarrow \quad 4k + 2 + k - 2 + 5 = 0$
$\Rightarrow \quad k = \frac{-5}{5} = -1$

16. Given linear equation can be written as
$y = 2x - 3$
When $x = 1$ then $y = -1$

When $x = 2$ then $y = 1$
When $x = 3$ then $y = 3$
Thus, we have the following table representing the solutions of $y = 2x - 3$

x	1	2	3
y	–1	1	3

Now, let us plot the points (1, –1), (2, 1) and (3, 3) on graph paper and join these points by a straight line.

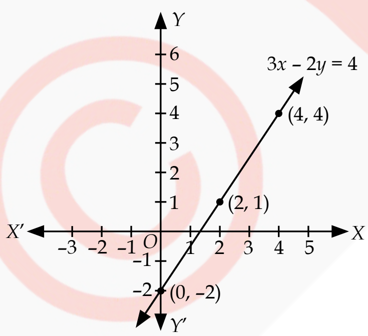


The line shown in the figure is the required graph.

17. Given linear equation can be written as $y = \frac{3x - 4}{2}$
When $x = 0$, then $y = -2$
When $x = 2$, then $y = 1$
When $x = 4$, then $y = 4$
Thus, we have the following table representing the solutions of $3x - 2y = 4$.

x	0	2	4
y	–2	1	4

Now, let us plot the points (0, –2), (2, 1) and (4, 4) on a graph paper and join these points by a straight line.



Clearly, the graph cuts x-axis at (4/3, 0) and y-axis at (0, –2).

18. Graph of $3x - y = 5$:
We have, $3x - y = 5 \Rightarrow y = 3x - 5$
Now, $x = 0 \Rightarrow y = 0 - 5 = -5$ and $x = 1 \Rightarrow y = 3 - 5 = -2$
Thus, we have the following table representing the solutions of $3x - y = 5$.

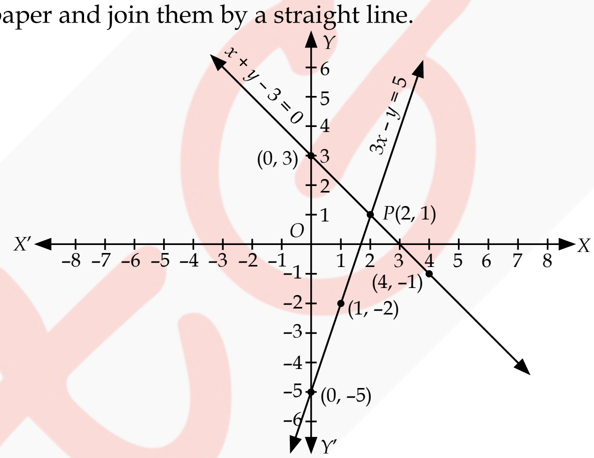
x	0	1
y	–5	–2

Now let us plot the points (0, –5) and (1, –2) on the graph paper and join them by a straight line.

Graph of $x + y - 3 = 0$:
We have, $x + y - 3 = 0 \Rightarrow y = 3 - x$
Now, $x = 0 \Rightarrow y = 3$ and $x = 4 \Rightarrow y = -1$
Thus, we have the following table representing the solutions of $x + y - 3 = 0$

x	0	4
y	3	–1

Now, let us plot the points (0, 3) and (4, – 1) on a graph paper and join them by a straight line.

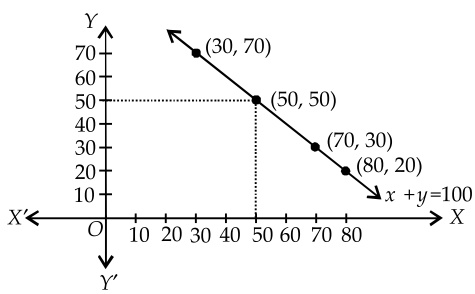


Clearly, lines represented by the equations $3x - y = 5$ and $x + y - 3 = 0$ intersect at point P whose coordinates are (2, 1).

19. Let one number be x and other be y.
Then, $x + y = 100$, which is a required linear equation.
Clearly, $x = 70$, $y = 30$; $x = 30$, $y = 70$; $x = 80$, $y = 20$ are solutions of the above equation.
Thus, we have the following table representing the solutions of $x + y = 100$.

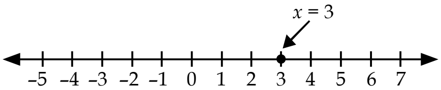
x	70	30	80
y	30	70	20

Now, let us plot the points (70, 30), (30, 70) and (80, 20) on a graph paper and join them by a straight line.

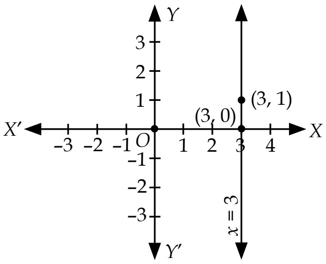


From the graph, it is clear that when $x = 50$ then $y = 50$.

20. Given equation is $3x + 4 = 7 + 2x$
$\Rightarrow \quad 3x - 2x = 7 - 4 \Rightarrow x = 3$
(i) When it is treated as an equation in one variable, then it will represent a point on the number line as shown below :



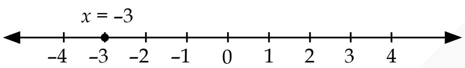
(ii) When it is treated as an equation in two variables, then it will represent a line parallel to y-axis and passing through (3, 0), (3, 1) etc. as shown below :



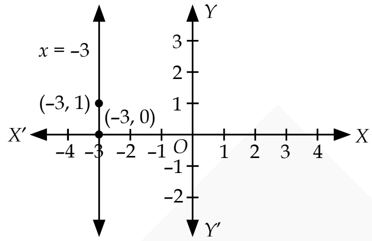
21. $5x - 2 = 3x - 8$

$\Rightarrow \quad 2x = -6 \Rightarrow x = -3$

(i) On the number line it will represent a point as shown below :



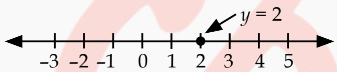
(ii) In the cartesian plane, it will represent a line parallel to y-axis and passing through (–3, 0), (–3, 1), etc. as shown in the figure.



22. Given equation is $3y + 4 = 10$

$\Rightarrow \quad 3y = 10 - 4 \Rightarrow y = 2$

(i) When, $y = 2$ is treated as an equation in one variable, then it will represent a point on the number line, as shown below :



(ii) When $y = 2$ is treated as an equation in two variables, then it will represent a line parallel to x-axis and passing through (0, 2), (–1, 2), etc, as shown below.