Chapter 4: Linear equations in two variables

Q.1: Express the following linear equations in the form axe + by + c = 0 and indicate the values of a, b and c in each case:
(i) x – y/5 – 10 = 0
(ii) -2x+3y = 6
(iii) y – 2 = 0

Solution: (i) The equation x-y/5-10 = 0 can be written as:
(1)x + (-1/5) y + (-10) = 0
Now compare the above equation with ax + by + c = 0
Thus, we get; a = 1, b = -⅕, c = -10

(ii) –2x + 3y = 6
Re-arranging the given equation, we get, –2x + 3y – 6 = 0
The equation –2x + 3y – 6 = 0 can be written as, (–2)x + 3y +(– 6) = 0

Now comparing (–2)x + 3y +(– 6) = 0 with ax + by + c = 0
We get, a = –2, b = 3, c = -6

(iii) y – 2 = 0
The equation y – 2 = 0 can be written as, 0x + 1y + (–2) = 0

Now comparing 0x + 1y + (–2) = 0with ax + by + c = 0
We get, a = 0, b = 1, c = –2

Q.2. Write four solutions for each of the following equations:

(i) 2x + y = 7
Solution: To find the four solutions of 2x + y = 7 we substitute different values for x and y
Let x = 0 Then,
2x + y = 7
(2×0)+y = 7
y = 7
(0,7)

Let x = 1
Then, 2x + y = 7
(2×1)+y = 7
2+y = 7
y = 7 – 2
y = 5
(1,5)

Let y = 1
Then, 2x + y = 7
2x+ 1 = 7
2x = 7 – 1
2x = 6
x = 3
(3,1)

Let x = 2
Then, 2x + y = 7
2(2)+y = 7
4+y = 7
y = 7 – 4
y = 3
(2,3)
The solutions are (0, 7), (1,5), (3,1), (2,3)

(ii) πx + y = 9

To find the four solutions of πx + y = 9 we substitute different values for x and y
Let x = 0
Then, πx + y = 9
(π × 0)+y = 9
y = 9
(0,9)

Let x = 1
Then, πx + y = 9
(π×1)+y = 9
π+y = 9
y = 9-π
(1,9-π)

Let y = 0 Then, πx + y = 9
πx +0 = 9
πx = 9
x =9/π
(9/π,0)

Let x = -1
Then, πx + y = 9
(π(-1))+y = 9
-π + y = 9
y = 9+π
(-1,9+π)

The solutions are (0,9), (1,9-π),(9/π,0),(-1,9+π)

Q.3: Find the value of k, if x = 2, y = 1 is a solution of the equation 2x + 3y = k.

Solution: The given equation is 2x + 3y = k

According to the question, x = 2 and y = 1.
Now, Substituting the values of x and y in the equation 2x + 3y = k,

We get,
⇒(2 x 2)+ (3 × 1) = k
⇒4+3 = k
⇒7 = k
⇒k = 7
The value of k, if x = 2, y = 1 is a solution of the equation 2x + 3y = k, is 7.

Q.4: Draw the graph of each of the following linear equations in two variables:

(i)y = 3x

Solution: To draw a graph of linear equations in two variables, let us find out the points to plot. To find out the points, we have to find the values for which x and y satisfy the given equation.

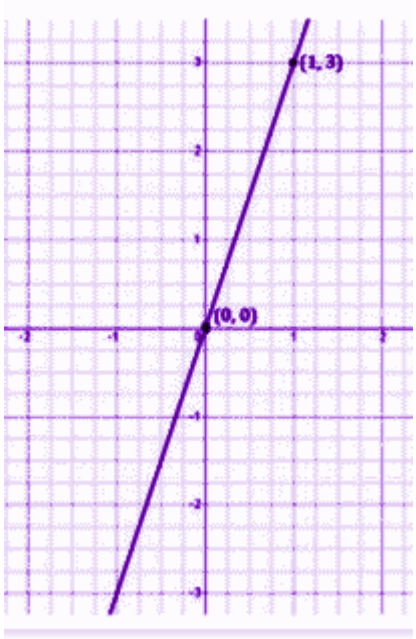
Here, y = 3x

Substituting the values for x,
When x = 0, y = 3x
y = 3(0) ⇒ y = 0

When x = 1, y = 3x
y = 3(1) ⇒ y = 3

x	y
0	0
1	3

The points to be plotted are (0, 0) and (1, 3)



(ii) 3 = 2x + y

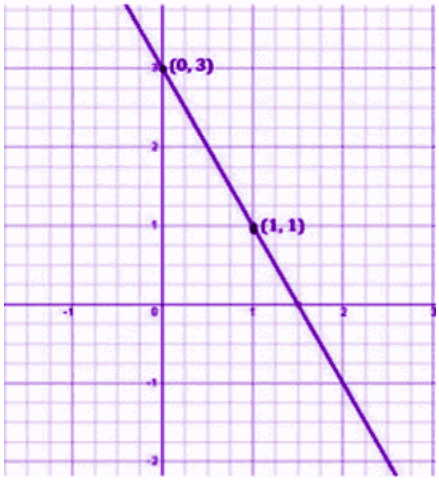
Solution: To draw a graph of linear equations in two variables, let us find out the points to plot. To find out the points, we have to find the values for which x and y satisfy the given equation.
Here, 3 = 2x + y

Substituting the values for x, When x = 0,
3 = 2x + y
⇒ 3 = 2(0) + y
⇒ 3 = 0 + y
⇒ y = 3

When x = 1,
3 = 2x + y
⇒ 3 = 2(1) + y
⇒ 3 = 2 + y
⇒ y = 3 – 2
⇒ y = 1

x	y
0	3
1	1

The points to be plotted are (0, 3) and (1, 1)



Q.5: If the point (3, 4) lies on the graph of the equation 3y = axe + 7, find the value of a.

Solution: The given equation is 3y = ax + 7
According to the question, x = 3 and y = 4
Now, Substituting the values of x and y in the equation 3y = ax + 7,

We get, (3×4) = (ax3) + 7
⇒ 12 = 3a+7
⇒ 3a = 12–7
⇒ 3a = 5
⇒ a = 5/3

The value of a, if the point (3, 4) lies on the graph of the equation 3y = axe + 7 is 5/3.

Q.6: Show that the points A (1, 2), B (– 1, – 16) and C (0, – 7) lie on the graph of the linear equation y = 9x – 7.

Solution: We have the equation, y = 9x – 7

For A (1, 2),
Substituting (x,y) = (1, 2),

We get, 2 = 9(1) – 7
2 = 9 – 7
2 = 2

For B (–1, –16), Substituting (x,y) = (–1, –16),

We get, –16 = 9(–1) – 7
-16 = – 9 – 7
-16 = – 16

For C (0, –7), Substituting (x,y) = (0, –7),

We get, – 7 = 9(0) – 7
-7 = 0 – 7
-7 = – 7
Hence, points A (1, 2), B (–1, –16) and C (0, –7) satisfy the line y = 9x – 7.
Thus, A (1, 2), B (–1, –16) and C (0, –7) are solutions of the linear equation y = 9x – 7
Therefore, the points A (1, 2), B (–1, –16), C (0, –7) lie on the graph of linear equation y = 9x – 7.

Q.7: Draw the graph of the linear equation 3x + 4y = 6. At what points, the graph cuts the X and Y-axis?

Solution: Given equation, 3x + 4y = 6.
We need at least 2 points on the graph to draw the graph of this equation,
Thus, the points the graph cuts:
(i) x-axis
Since the point is on the x-axis, we have y = 0.
Substituting y = 0 in the equation, 3x + 4y = 6,
We get, 3x + 4×0 = 6
⇒ 3x = 6
⇒ x = 2

Hence, the point at which the graph cuts x-axis = (2, 0).

(ii) y-axis
Since the point is on the y-axis, we have, x = 0.
Substituting x = 0 in the equation, 3x + 4y = 6,
We get, 3×0 + 4y = 6
⇒ 4y = 6
⇒ y = 6/4
⇒ y = 3/2
⇒ y = 1.5
Hence, the point at which the graph cuts y-axis = (0, 1.5).
Plotting the points (0, 1.5) and (2, 0) on the graph.