Mathematics

Chapter 3 –Pair of Linear Equations in Two Variables

Exercise 3.1

6. Given the linear equation 2x + 3y – 8 = 0, write another linear equation in two variables such that the geometrical representation of the pair so formed is:

(i) Intersecting lines

(ii) Parallel lines

(iii) Coincident lines

Soln:(i) Given the linear equation 2x + 3y – 8 = 0.

To find another linear equation in two variables such that the geometrical representation of the pair so formed is intersecting lines, it should satisfy below condition; $(a_1/a_2) \neq (b_1/b_2)$

Thus, another equation could be 2x – 7y + 9 = 0, such that; $(a_1/a_2) = 2/2 = 1$ and $(b_1/b_2) = 3/-7$

Clearly, you can see another equation satisfies the condition.

(ii) Given the linear equation 2x + 3y – 8 = 0.

To find another linear equation in two variables such that the geometrical representation of the pair so formed is parallel lines, it should satisfy below condition;

$(a_1/a_2) = (b_1/b_2) \neq (c_1/c_2)$

Thus, another equation could be 6x + 9y + 9 = 0, such that; $(a_1/a_2) = 2/6 = 1/3$

$(b_1/b_2) = 3/9 = 1/3$

$(c_1/c_2) = -8/9$

Clearly, you can see another equation satisfies the condition.

(iii) Given the linear equation 2x + 3y – 8 = 0.

To find another linear equation in two variables such that the geometrical representation of the pair so formed is coincident lines, it should satisfy below condition; $(a_1/a_2) = (b_1/b_2) = (c_1/c_2)$

Thus, another equation could be 4x + 6y – 16 = 0, such that $(a_1/a_2) = 2/4 = 1/2$, $(b_1/b_2) = 3/6 = 1/2$,

$(c_1/c_2) = -8/-16 = 1/2$

Clearly, you can see another equation satisfies the condition.

7. Draw the graphs of the equations x – y + 1 = 0 and 3x + 2y – 12 = 0. Determine the coordinates of the vertices of the triangle formed by these lines and the x-axis, and shade the triangular region.

Soln: Given, the equations for graphs are

x – y + 1 = 0 and 3x + 2y – 12 = 0.

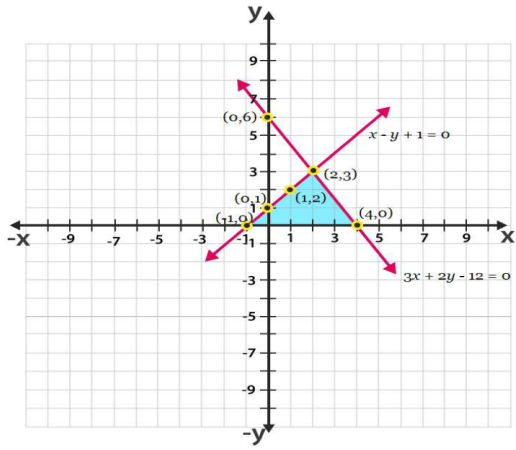
For, x – y + 1 = 0 or x = -1+y

x	0	1	2
y	1	2	3

For, 3x + 2y – 12 = 0 or x = (12-2y)/3

x	4	2	0
y	0	3	6

Hence, the graphical representation of these equations is as follows;



From the figure, it can be seen that these lines are intersecting each other at point (2, 3) and x-axis at (−1, 0) and (4, 0). Therefore, the vertices of the triangle are (2, 3), (−1, 0), and (4, 0).

Exercise 3.2

1. Solve the following pair of linear equations by the substitution method

(i) $x + y = 14$

$x - y = 4$

(ii) $s - t = 3$

$\frac{s}{3} + \frac{t}{2} = 6$

(iii) $3x - y = 3$

$9x - 3y = 9$

(iv) $0.2x + 0.3y = 1.3$

$0.4x + 0.5y = 2.3$

(v) $\sqrt{2}x + \sqrt{3}y = 0$

$\sqrt{3}x - \sqrt{8}y = 0$

(vi) $\frac{3x}{2} - \frac{5y}{3} = -2$

$\frac{x}{3} + \frac{y}{2} = \frac{13}{6}$

Soln:

(i) Given,

x + y = 14 and x – y = 4 are the two equations.

From 1st equation, we get,

x = 14 – y

Now, substitute the value of x in second equation to get,

(14 – y) – y = 4

14 – 2y = 4

2y = 10

Or y = 5

By the value of y, we can now find the exact value of x;

∵ x = 14 – y

∴ x = 14 – 5

Or x = 9

Hence, x = 9 and y = 5.

(ii) Given,

$s - t = 3$

$\frac{s}{3} + \frac{t}{2} = 6$

are the two equations.

From 1st equation, we get,

s = 3 + t _____(1)

Now, substitute the value of s in second equation to get, (3+t)/3 + (t/2) = 6

⇒ (2(3+t) + 3t)/6 = 6

⇒ (6+2t+3t)/6 = 6

⇒ (6+5t) = 36

(Contd…….)