4.2 GRAPH OF A LINEAR EQUATION

(A) in order to draw the graph of a linear equation in one variable we may follow the following algorithm.

Step I : Obtain the linear equation.

Step II: If the equation is of the form ax = b, a ≠ o, then plot the point $\left(\frac{b}{a},0\right)$ and one more point $\left(\frac{b}{a},\alpha\right)$ when α is any real number. If the equation is of the form ay = b, $a \neq 0$, then plot the point $\left(0,\frac{b}{a}\right)$ and $\left(\beta,\frac{b}{a}\right)$ where β is any real number.

Step III : Joint the points plotted in step II to obtain the required line.

NOTE :

If eq. is in form ax = b then we get a line parallel to Y-axis and if eg. is in form ay = b then we get a line parallel to X-axis.

Ex.4 Draw the graph of

(i) 2x + 5 = 0 (ii) 3y - 15 = 0

Sol. (i) Graph of 2x + 5 = 0

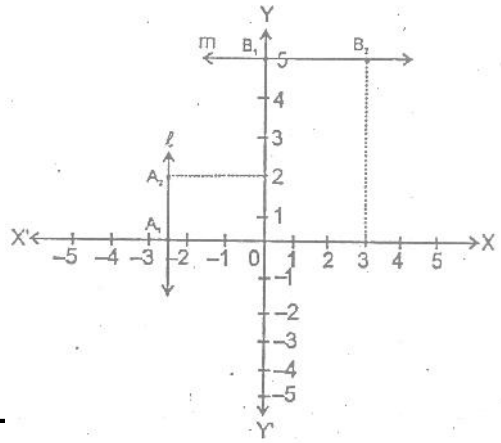
On simplifying it we get $2x = -5 \Rightarrow x = -\frac{5}{2}$

First we plot point $A_1\left(-\frac{5}{2},0\right)$ & then we plot any other point $A_2\left(-\frac{5}{2},2\right)$ on the graph paper, then we join these two points we get required line ℓ as shown in figure below.

(ii) Graph of 3y - 15 = 0

On simplifying it we get $3u = 15 \Rightarrow y = \frac{15}{3}$ f = 5.

First we plot the point B_1 (0, 5) & then we plot any other point B_2 (3, 5) on the graph paper, then we join these two points we get required line m as shown in figure.



NOTE :

A point which lies on the line is a solution of that equation. A point not lying on the line is not a solution of the equation.

(B) In order to draw the graph of a linear equation ax + by + c = 0 may follow the following algorithm.

Step I : Obtain the linear equation ax + by + c = 0.

Step II : Express y in terms of x i.e. $y = -\left(\frac{ab+c}{b}\right)$ or x in terms of y i.e. $x = -\left(\frac{by+c}{a}\right)$.

Step III : Put any two or three values for x or y and calculate the corresponding values of y or x respectively from the expression obtained in Step II. Let we get points as $(\alpha_1,\beta_1),(\alpha_2,\beta_2),(\alpha_3,\beta_3)$.

Step IV : Plot the points $(\alpha_1,\beta_1),(\alpha_2,\beta_2),(\alpha_3,\beta_3)$ on graph paper.

Step V : Joint the pints marked in step IV to obtain. The line obtained is the graph of the equation ax +by + c = 0.

Ex.5 Draw the graph of the line x – 2y = 3, from the graph find the coordinate of the point when

(i) x = - 5 (ii) y = 0

Sol. Here given equation is x - 2y = 3.

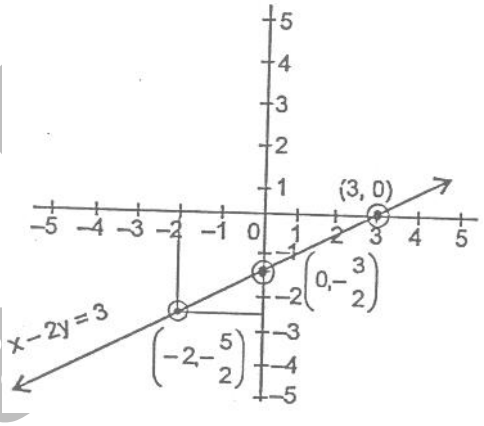
Solving it for y we get $2y = x - 3 \Rightarrow y = \frac{x-3}{2}$

Let x = 0, then $y = \frac{0-3}{2} = \frac{-3}{2}$

x = 3, then $y = \frac{3-3}{2} = 0$

x = - 2, then $y = \frac{-2-3}{2} = \frac{-5}{2}$ Hence we get

x	0	3	-2
y	$-\frac{3}{2}$	0	$-\frac{5}{2}$



Clearly when x = - 5 then y = - 4 and when y = 0 then x = 3.

Ex.6 Draw the graphs of the lines represented by the equations x + y = 4 and 2x - y = 2 in the same graph. Also find the coordinate of the point where the two lines intersect.

Sol. Given equations are

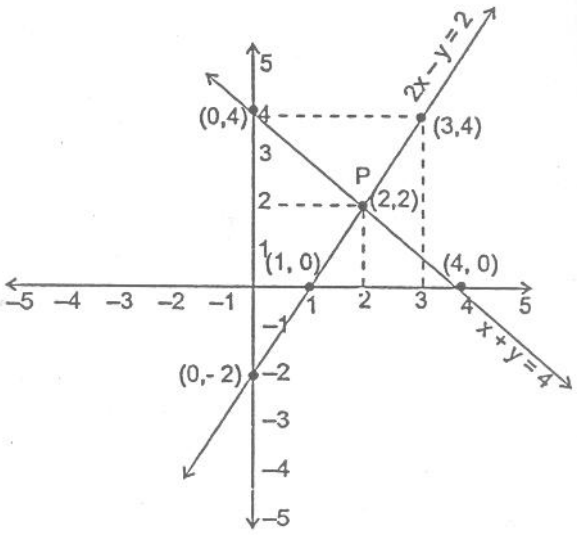
x + y = 4 .....(i) & 2x - y = 2 .....(ii)

(i) We have y = 4 - x

x	0	2	4
y	4	2	0

(ii) We have y = 2x - 2

x	1	0	3
y	0	-2	4



By drawing the lines on a graph paper, clearly we can say that P is the point of intersection where coordinates are x = 2, y = 2