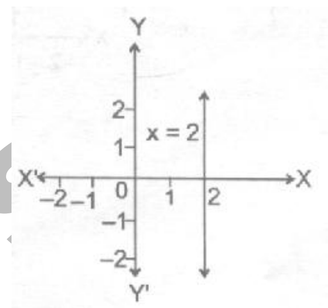
3.4 GRAPHICAL SOLUTION OF LINEAR EQUATIONS IN TWO VARIABLES

Graphs of the type (i) ax = b

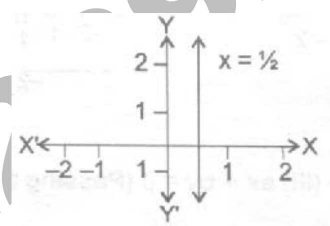
Ex.1 Draw the graph of following : (i) $x = 2$, (ii) $2x = 1$ (iii) $x + 4 = 0$ (iv) $x = 0$

Sol.

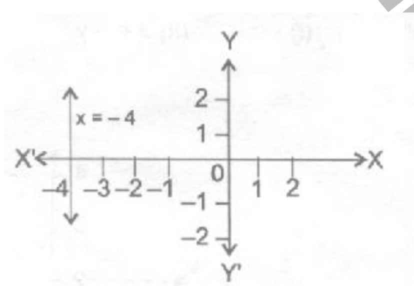
(i) $x = 2$



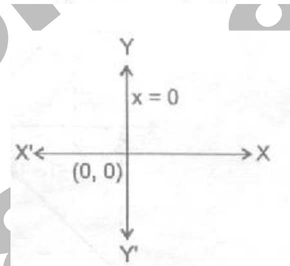
(ii) $2x = 1 \Rightarrow x = \frac{1}{2}$



(iii) $x + 4 = 0 \Rightarrow x = -4$



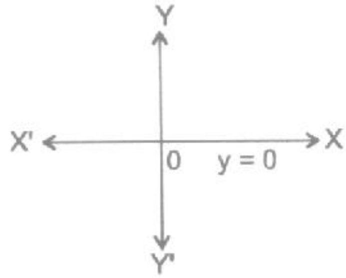
(iv) $x = 0$



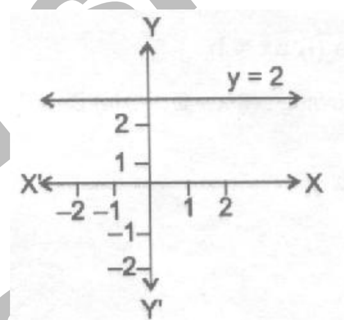
Graphs of the type (ii) ay = b.

Ex.2 Draw the graph of following : (i) y = 0, (ii) y - 2 = 0, (iii) 2y + 4 = 0

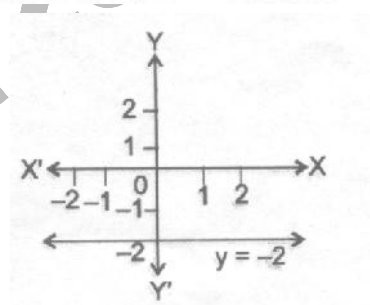
(i) y = 0



(ii) y - 2 = 0



(iii) 2y + 4 = 0 ⇒ y = - 2



Graphs of the type (iii) ax + by = 0 (Passing through origin)

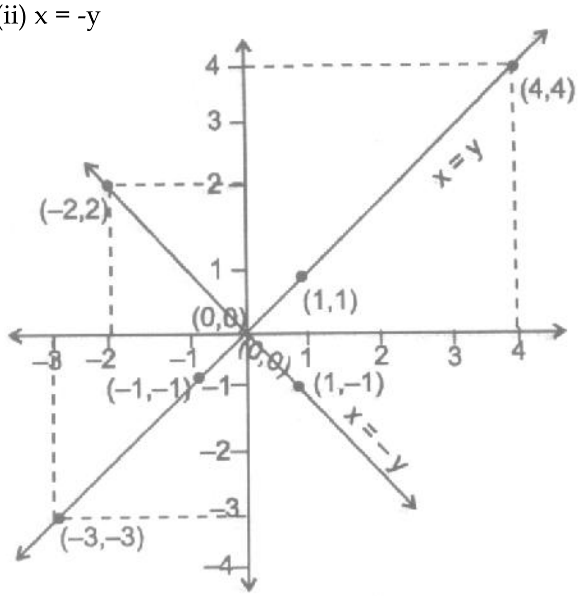
Ex.3 Draw the graph of following : (i) x = y (ii) x = -y

Sol. (i) x – y

x	1	4	-3	0
y	1	4	-3	0

(ii) x = - y

x	1	-2	0
y	-1	2	0



Graphs of the Type (iv) ax + by + c = 0. (Making Interception x - axis, y-axis)

Ex.4 Solve the following system of linear equations graphically : x - y = 1, 2x + y = 8. Shade the area bounded by these two lines and y-axis. Also, determine this area.

Sol. (i) x - y = 1

x - y + 1

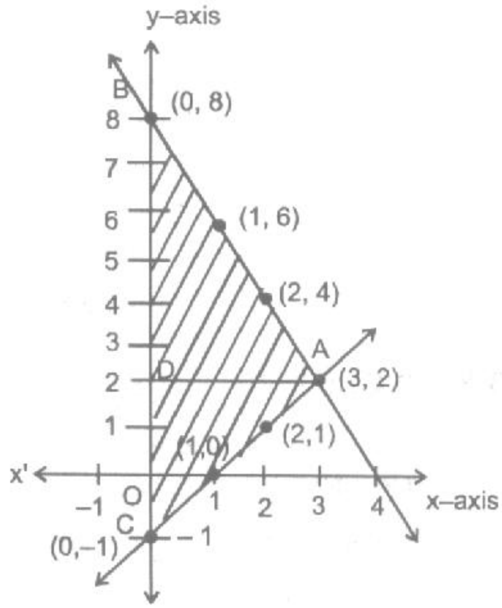
x	0	1	2
y	-1	0	1

(ii) 2x + y = 8

(ii) 2 x + y = 8

y = 8 - 2x

X	0	1	2
Y	8	6	4



Solution is x = 3 and y = 2

Area of is x = 3 and y = 2

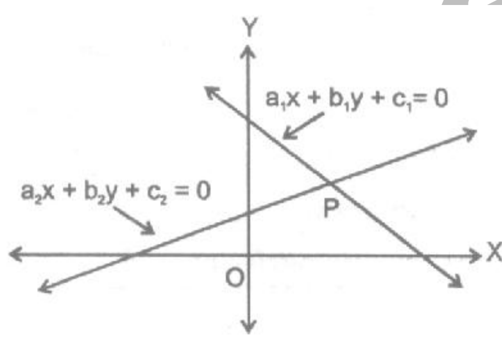
Area of $\Delta ABC = \frac{1}{2} \times BC \times AD$

$= \frac{1}{2} \times 9 \times 3 = 13.5$ Sq. unit.

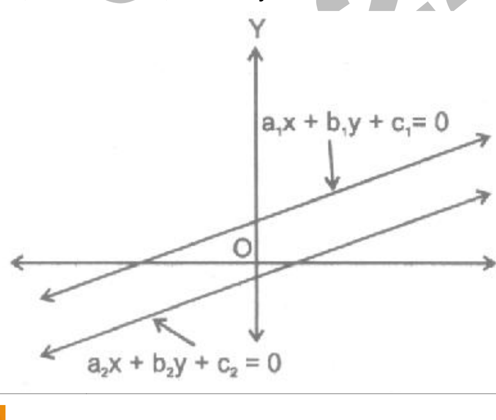
NATURE OF GRAPHICAL SOLUTION :

Let equations of two lines are $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$.

(i) Lines are consistent (**unique solution)** i.e. they meet at one point condition is $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$



(ii) Lines are inconsistent **(no solution)** i.e. they do not meet at one point condition is $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$



(iii) Lines are coincident **(infinite solution)** i.e. overlapping lines (or they are on one another) condition is

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$$