

CBSE Class-11 Mathematics
NCERT Solutions
Chapter - 6 Linear Inequalities
Exercise 6.3

Solve the following systems of inequalities graphically:

1. $x \geq 3, y \geq 2$

Ans. Given: $x \geq 3, y \geq 2$

Putting (0, 0) in $x \geq 3$,

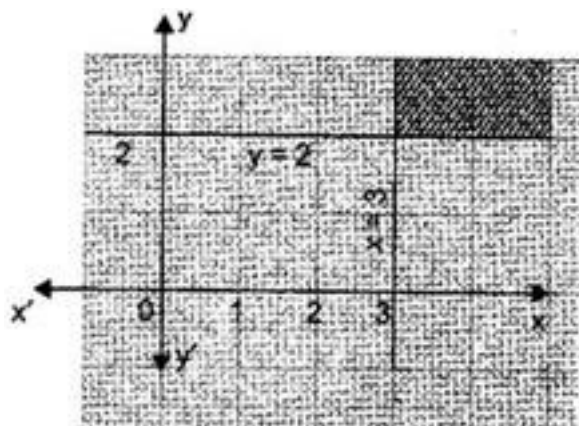
$0 \geq 3$ which is false.

\therefore Half plane of $x \geq 3$ is away from origin.

Again Putting (0, 0) in $y \geq 2$,

$0 \geq 2$ which is false.

\therefore Half plane of $y \geq 2$ is away from origin.

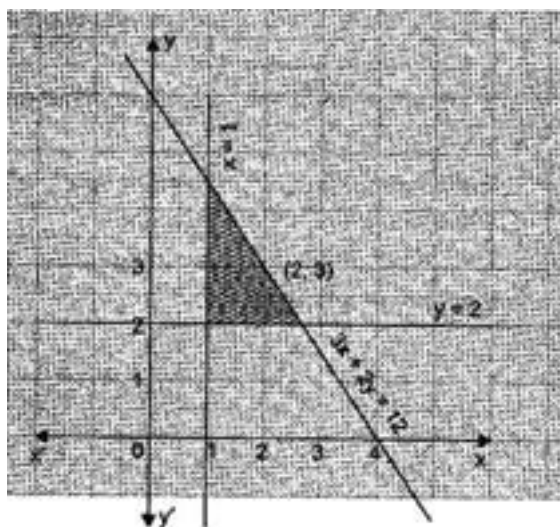


2. $3x + 2y \leq 12, x \geq 1, y \geq 2$

Ans. Given: $3x + 2y \leq 12, x \geq 1, y \geq 2$

Table of values satisfying the equation $3x + 2y = 12$

x	0	4
y	6	0



Putting $(0, 0)$ in $3x + 2y \leq 12$

$$3 \times 0 + 2 \times 0 \leq 12$$

$\Rightarrow 0 \leq 12$ which is true.

\therefore Half plane of $3x + 2y \leq 12$ is towards the origin.

Also, putting $(0, 0)$ in $x \geq 1$

$\Rightarrow 0 \geq 1$ which is false.

\therefore Half plane of $x \geq 1$ is away from origin.

Again, Again Putting $(0, 0)$ in $y \geq 2$,

$\Rightarrow 0 \geq 2$ which is false.

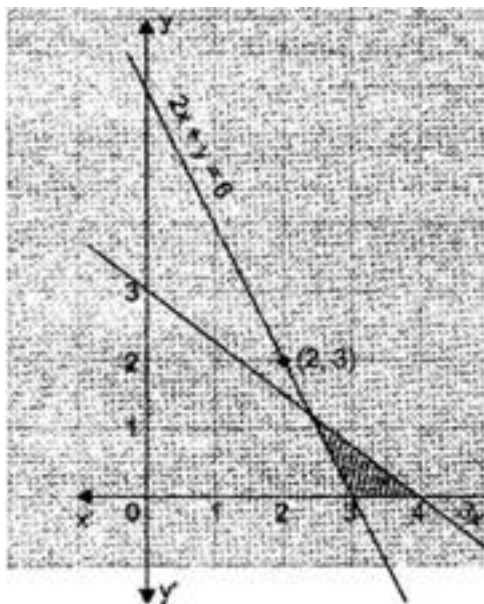
\therefore Half plane of $y \geq 2$ is away from origin.

3. $2x + y \geq 6, 3x + 4y \leq 12$

Ans. Given: $2x + y \geq 6, 3x + 4y \leq 12$

Table of values satisfying the equation $2x + y = 6$

x	3	0
y	0	6



Putting $(0, 0)$ in $2x + y \geq 6$,

$$2 \times 0 + 0 \geq 6$$

$\Rightarrow 0 \geq 6$ which is false.

\therefore Half plane of $3x + 2y \leq 12$ is away from the origin.

Again, Table of values satisfying the equation $3x + 4y = 12$

x	0	4
y	3	0

Putting $(0, 0)$ in $3x + 4y \leq 12$, $3 \times 0 + 4 \times 0 \leq 12$

$\Rightarrow 0 \leq 12$ which is true.

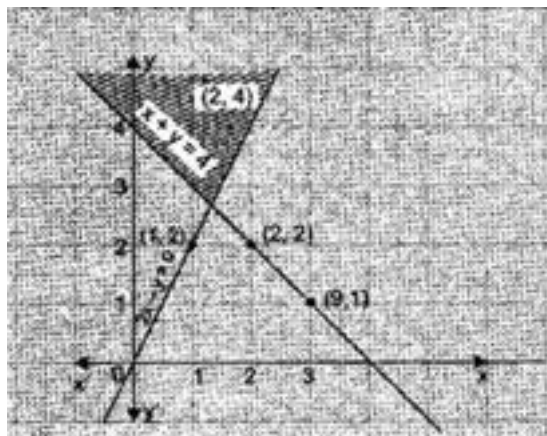
\therefore Half plane of $3x + 2y \leq 12$ is towards the origin.

4. $x + y \geq 4, 2x - y > 0$

Ans. Given: $x + y \geq 4, 2x - y > 0$

Table of values satisfying the equation $x + y = 4$

x	0	4
y	4	0



Putting $(0, 0)$ in $x + y \geq 4$,

$$0 + 0 \geq 4$$

$\Rightarrow 0 \geq 4$ which is false.

\therefore Half plane of $x + y \geq 4$ is away from the origin.

Again, Table of values satisfying the equation $2x - y = 0$

x	0	1
y	0	2

Putting $(3, 0)$ in $2x - y > 0$, $2 \times 3 - 0 > 0$

$\Rightarrow 6 > 0$ which is true.

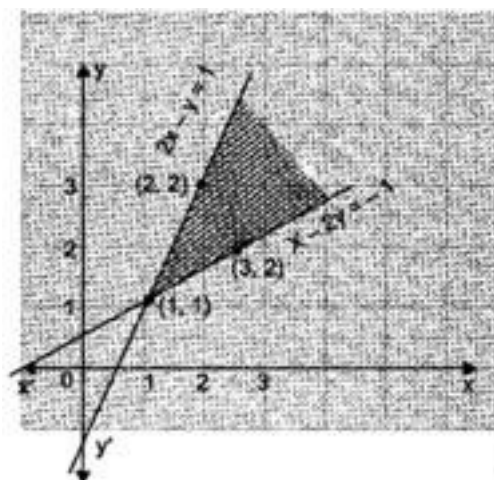
\therefore Half plane of $2x - y > 0$ is towards the origin.

5. $2x - y > 1, x - 2y < -1$

Ans. Given: $2x - y > 1, x - 2y < -1$

Table of values satisfying the equation $2x - y = 1$

x	0	2
y	-1	3



Putting $(0, 0)$ in $2x - y > 1$,

$$2 \times 0 - 0 > 1$$

$\Rightarrow 0 > 1$ which is false.

\therefore Half plane of $2x - y > 1$ is away from the origin.

Again, Table of values satisfying the equation $x - 2y = -1$

x	1	3
y	1	2

Putting $(0, 0)$ in $x - 2y < -1$

$$\Rightarrow 0 - 2 \times 0 < -1$$

$\Rightarrow 0 < -1$ which is false.

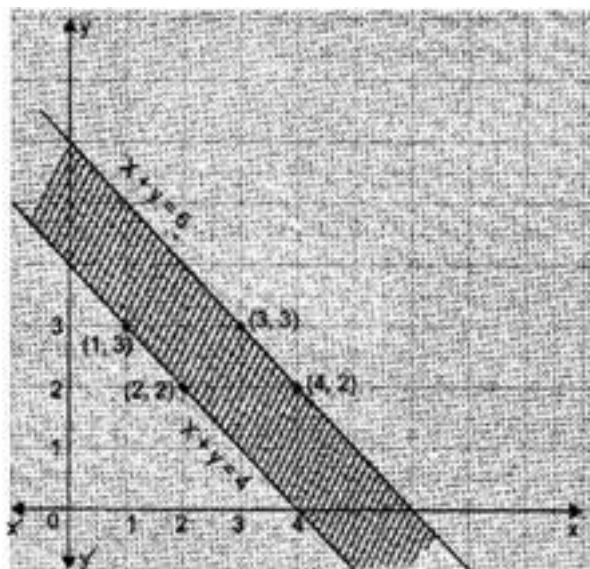
\therefore Half plane of $x - 2y < -1$ is away from the origin.

6. $x + y \leq 6, x + y \geq 4$

Ans. Given: $x + y \leq 6, x + y \geq 4$

Table of values satisfying the equation $x + y = 6$

x	0	6
y	6	0



Putting $(0, 0)$ in $x + y \leq 6$, $0 + 0 \leq 6$

$\Rightarrow 0 \leq 6$ which is true.

\therefore Half plane of $x + y \leq 6$ is towards the origin.

Again, Table of values satisfying the equation $x + y = 4$

x	0	4
y	2	0

Putting $(0, 0)$ in $x + y \geq 4$

$\Rightarrow 0 + 0 \geq 4$

$\Rightarrow 0 \geq 4$ which is false.

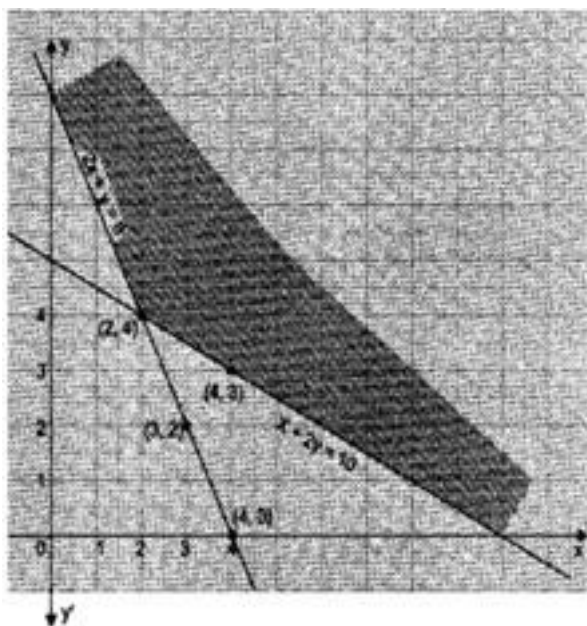
\therefore Half plane of $x + y \geq 4$ is away from the origin.

7. $2x + y \geq 8, x + 2y \geq 10$

Ans. Given: $2x + y \geq 8$, $x + 2y \geq 10$

Table of values satisfying the equation $2x + y = 8$

x	0	4
y	8	0



Putting $(0, 0)$ in $2x + y \geq 8$,

$$\Rightarrow 2 \times 0 + 0 \geq 8$$

$$\Rightarrow 0 \geq 8 \text{ which is false.}$$

\therefore Half plane of $2x + y \geq 8$ is away from the origin.

Table of values satisfying the equation $x + 2y = 10$

x	0	10
y	5	0

Putting $(0, 0)$ in $x + 2y \geq 10$

$$\Rightarrow 0 + 2 \times 0 \geq 10$$

$$\Rightarrow 0 \geq 10 \text{ which is false.}$$

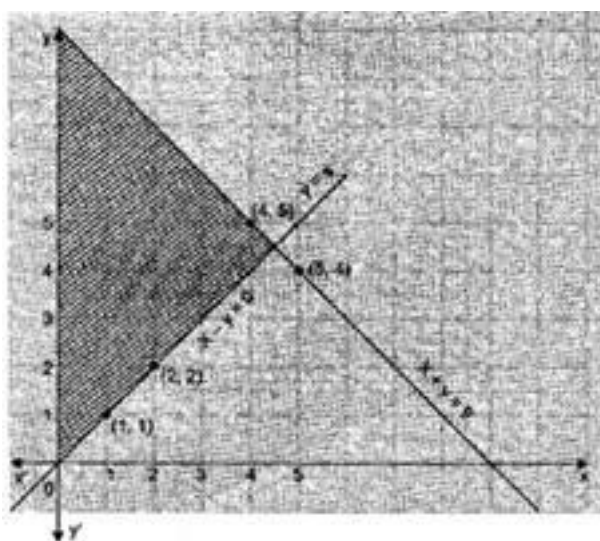
∴ Half plane of $x + 2y \geq 10$ is away from the origin.

8. $x + y \leq 9, y > x, x \geq 0$

Ans. Given: $x + y \leq 9, y > x, x \geq 0$

Table of values satisfying the equation $x + y = 9$

x	0	9
y	9	0



Putting (0, 0) in $x + y \leq 9$, $0 + 0 \leq 9$

$\Rightarrow 0 \leq 9$ which is true.

∴ Half plane of $x + y \leq 9$ is towards the origin.

Table of values satisfying the equation $x = y$

x	3	4
y	3	4

Putting (0, 0) in $y > x$, $0 > 0$

$\Rightarrow 0 \leq 6$ which is false.

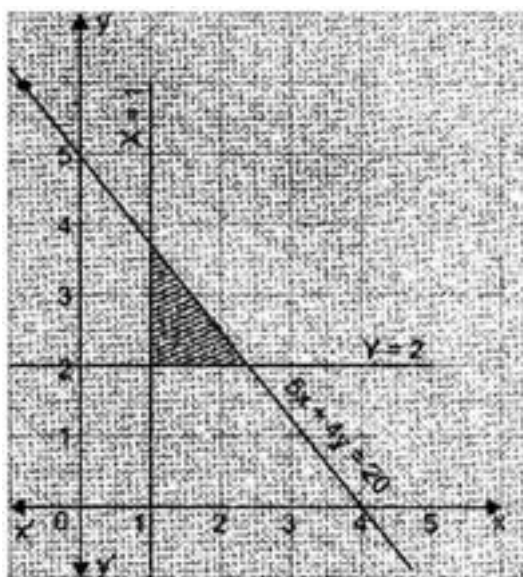
∴ Half plane of $x + y \leq 6$ is beyond the origin.

9. $5x + 4y \leq 20, x \geq 1, y \geq 2$

Ans. Given: $5x + 4y \leq 20, x \geq 1, y \geq 2$

Table of values satisfying the equation $5x + 4y = 20$

x	4	0
y	0	5



Putting $(0, 0)$ in $5x + 4y \leq 20$, $5 \times 0 + 4 \times 0 \leq 20$

$\Rightarrow 0 \leq 20$ which is true.

\therefore Half plane of $5x + 4y \leq 20$ is towards the origin.

Again, putting $(0, 0)$ in $x \geq 1$,

$0 \geq 1$ which is false.

\therefore Half plane of $x \geq 1$ away from the origin.

Again, putting $(0, 0)$ in $y \geq 2$,

$0 \geq 2$ which is false.

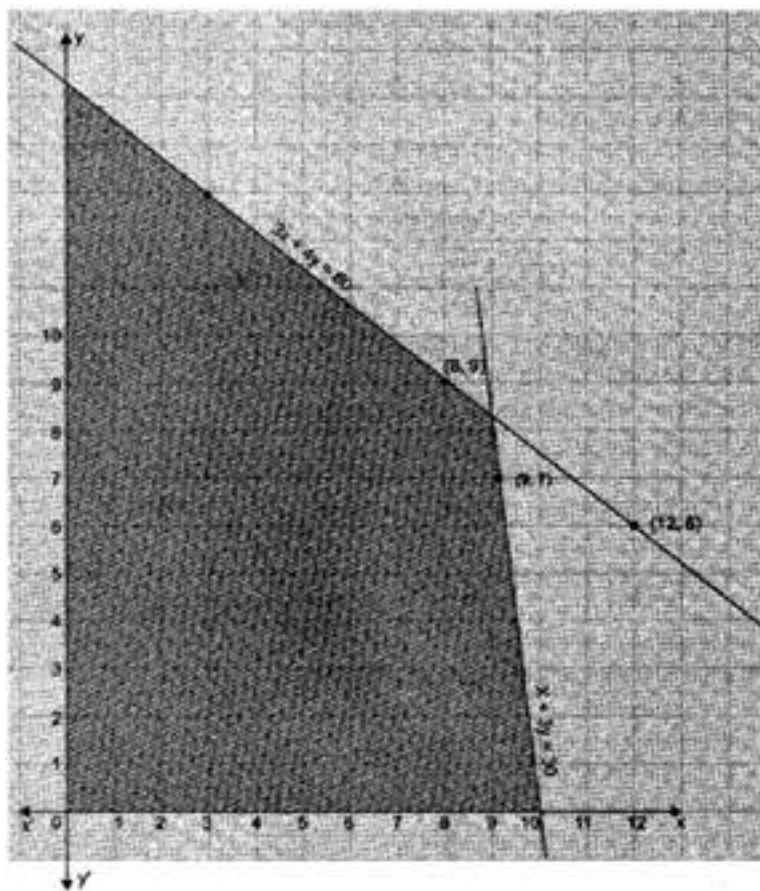
\therefore Half plane of $y \geq 2$ away from the origin.

10. $3x + 4y \leq 60, x + 3y \leq 30, x \geq 0, y \geq 0$

Ans. Given: $3x + 4y \leq 60, x + 3y \leq 30, x \geq 0, y \geq 0$

Table of values satisfying the equation $3x + 4y = 0$

x	8	12
y	9	6



Putting $(0, 0)$ in $3x + 4y \leq 60$, $3 \times 0 + 4 \times 0 \leq 60$

$\Rightarrow 0 \leq 60$ which is true.

\therefore Half plane of $3x + 4y \leq 60$ is towards the origin.

Table of values satisfying the equation $x + 3y = 30$

x	0	9
y	10	7

Putting $(0, 0)$ in $x + 3y \leq 30$, $0 + 3 \times 0 \leq 30$

$\Rightarrow 0 \leq 30$ which is true.

\therefore Half plane of $x + 3y \leq 30$ is towards the origin.

Again, putting $(0, 0)$ in $x \geq 0$,

$0 \geq 0$ which is true.

\therefore Half plane of $x \geq 0$ towards the origin.

Again, putting $(0, 0)$ in $y \geq 0$,

$0 \geq 0$ which is true.

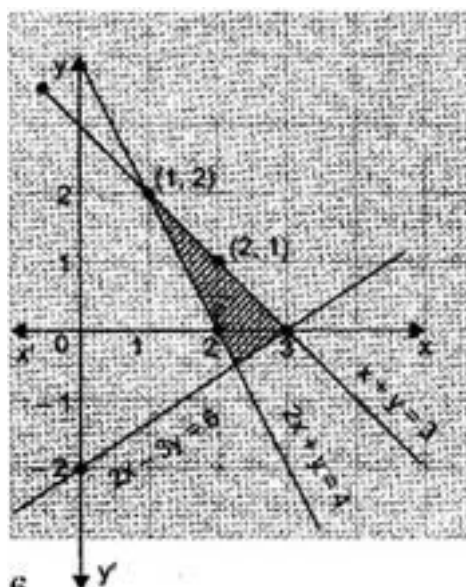
\therefore Half plane of $y \geq 0$ towards the origin.

11. $2x + y \geq 4$, $x + y \leq 3$, $2x - 3y \leq 6$

Ans. Given: $2x + y \geq 4$, $x + y \leq 3$, $2x - 3y \leq 6$

Table of values satisfying the equation $2x + y = 4$

x	2	1
y	0	2



Putting (0, 0) in $2x + y \geq 4$, $2 \times 0 + 0 \geq 4$

$\Rightarrow 0 \geq 4$ which is false.

\therefore Half plane of $2x + y \geq 4$ is away from the origin.

Table of values satisfying the equation $x + y = 3$,

x	2	1
y	1	2

Putting (0, 0) in $x + y \leq 3$ $0 + 0 \leq 3$

$\Rightarrow 0 \leq 3$ which is true.

\therefore Half plane of $x + y \leq 3$ is towards the origin.

Table of values satisfying the equation $2x - 3y \leq 6$

x	0	3
y	-2	0

Putting (0, 0) in $2x - 3y \leq 6$ $2 \times 0 + 3 \times 0 \leq 6$

$\Rightarrow 0 \leq 6$ which is true.

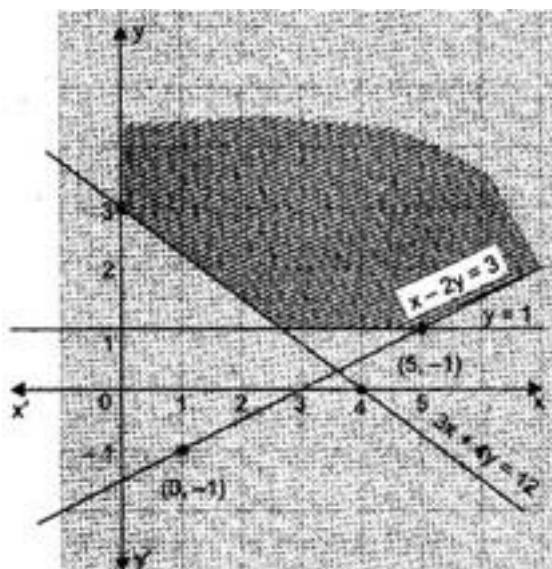
\therefore Half plane of $2x - 3y \leq 6$ is towards the origin.

12. $x - 2y \leq 3, 3x + 4y \geq 12, x \geq 0, y \geq 1$

Ans. Given: $x - 2y \leq 3, 3x + 4y \geq 12, x \geq 0, y \geq 1$

Table of values satisfying the equation $x - 2y = 3$

x	1	5
y	-1	1



Putting (0, 0) in $x - 2y \leq 3$ $0 - 2 \times 0 \leq 3$

$\Rightarrow 0 \leq 3$ which is true.

\therefore Half plane of $x - 2y \leq 3$ is towards the origin.

Table of values satisfying the equation $3x + 4y \geq 12$

x	4	0
y	0	3

Putting (0, 0) in $3x + 4y \geq 12$, $3 \times 0 + 4 \times 0 \geq 12$

$\Rightarrow 0 \geq 12$ which is false.

\therefore Half plane of $3x + 4y \geq 12$ is away from the origin.

Again, putting (0, 0) in $x \geq 0$,

$0 \geq 0$ which is true.

\therefore Half plane of $x \geq 0$ towards the origin.

Again, putting (0, 0) in $y \geq 1$,

$0 \geq 1$ which is false.

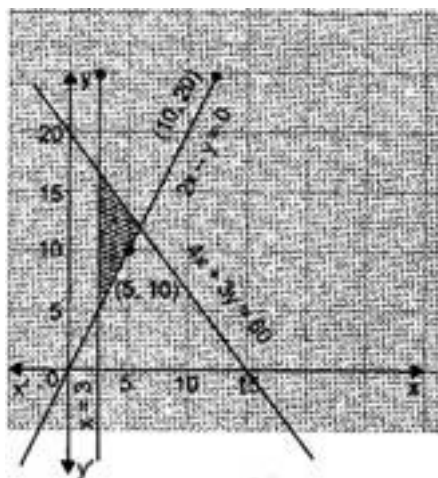
\therefore Half plane of $y \geq 0$ away from the origin.

13. $4x + 3y \leq 60, y \geq 2x, x \geq 3, x, y \geq 0$

Ans. Given: $4x + 3y \leq 60, y \geq 2x, x \geq 3, x, y \geq 0$

Table of values satisfying the equation $4x + 3y = 60$

x	15	0
y	0	20



Putting $(0, 0)$ in $4x + 3y \leq 60$ $4 \times 0 + 3 \times 0 \leq 60$

$\Rightarrow 0 \leq 60$ which is true.

\therefore Half plane of $4x + 3y \leq 60$ is towards the origin.

Table of values satisfying the equation $2x - y = 0$

x	5	10
y	10	20

Putting $(10, 0)$ in $2x - y \leq 0$, $2 \times 10 - 0 \leq 0$

$\Rightarrow 20 \leq 0$ which is false.

\therefore Half plane of $2x - y \leq 0$ is away from the origin.

Again, putting $(0, 0)$ in $x \geq 3$,

$0 \geq 3$ which is false.

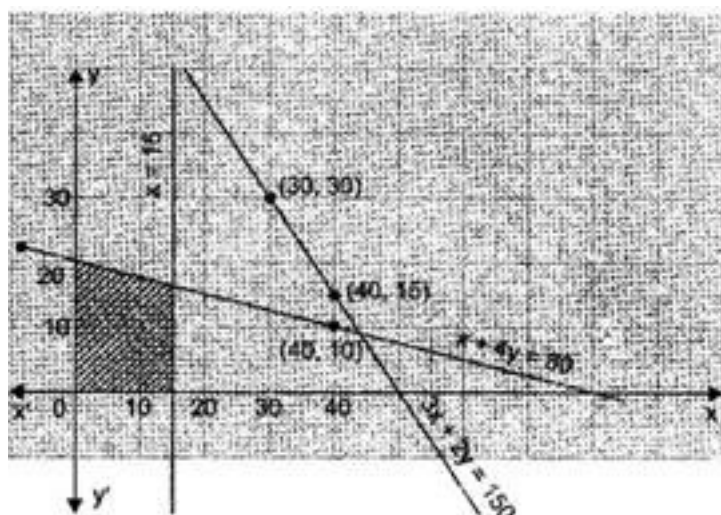
\therefore Half plane of $x \geq 3$ away from the origin.

14. $3x + 2y \leq 150, x + 4y \leq 80, x \leq 15, y \geq 0, x \geq 0$

Ans. Given: $3x + 2y \leq 150, x + 4y \leq 80, x \leq 15, y \geq 0, x \geq 0$

Table of values satisfying the equation $3x + 2y = 150$

x	30	40
y	30	15



Putting $(0, 0)$ in $3x + 2y \leq 150$ $3 \times 0 + 2 \times 0 \leq 150$

$\Rightarrow 0 \leq 150$ which is true.

\therefore Half plane of $3x + 2y \leq 150$ is towards the origin.

Table of values satisfying the equation $x + 4y = 80$

x	0	40
y	20	10

Putting $(0, 0)$ in $x + 4y \leq 80$ $0 + 4 \times 0 \leq 80$

$\Rightarrow 0 \leq 80$ which is true.

∴ Half plane of $x + 4y \leq 80$ is towards the origin.

Again, putting (0, 0) in $x \leq 15$,

$0 \leq 15$ which is true.

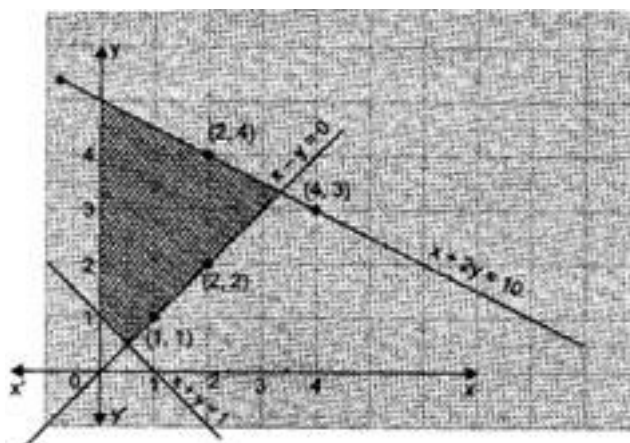
∴ Half plane of $x \leq 15$ towards the origin.

15. $x + 2y \leq 10, x + y \geq 1, x - y \leq 0, x \geq 0, y \geq 0$

Ans. Given: $x + 2y \leq 10, x + y \geq 1, x - y \leq 0, x \geq 0, y \geq 0$

Table of values satisfying the equation $x + 2y = 10$

x	2	4
y	4	3



Putting (0, 0) in $x + 2y \leq 10$ $0 + 2 \times 0 \leq 10$

$\Rightarrow 0 \leq 10$ which is true.

∴ Half plane of $x + 2y \leq 10$ is towards the origin.

Table of values satisfying the equation $x + y = 1$

x	0	1
y	1	0

Putting (0, 0) in $x + y \geq 1$ $0 + 0 \geq 1$

$\Rightarrow 0 \geq 1$ which is false.

\therefore Half plane of $x + y \geq 1$ is away from the origin.

Table of values satisfying the equation $x - y = 0$

x	1	2
y	1	2

Putting (2, 0) in $x - y \leq 0$ $2 - 0 \leq 0$

$\Rightarrow 2 \leq 0$ which is false.

\therefore Half plane of $x - y \leq 0$ is away from the origin.