Linear Inequations Ex 15.6 Q6(i)

We have,
$2x+y \geq 8,\ \ x+2y \geq 8,$ and $x+y \leq 6$

Converting the inequations into equations, we obtain,
$2x+y=8,\ \ x+2y=8,$ and $x+y=6$

Region represented by $2x+y \geq 8$
Putting $x=0$ in $2x+y=8,$ we get $y=8.$
Putting $y=0$ in $2x+y=8,$ we get $x=\frac{8}{2}=4$

$\therefore$ The line $2x+y=8$ meets the coordinate axes at $(0,8)$ and $(4,0)$. Join these points by a thick line.

Now, putting $x=0$ and $y=0$ in $2x+y \geq 8,$ we get $0 \geq 8$ This is not possible.
$\therefore$ We find that $(0,0)$ is not satisfies the inequation $2x+y \geq 8.$
So, the portion not containing the origin is represented by the given inequation.

Region represented by $x+2y \geq 8$
Putting $x=0$ in $x+2y=8,$ we get $y=\frac{8}{2}=4$
Putting $y=0$ in $x+2y=8,$ we get $x=8.$

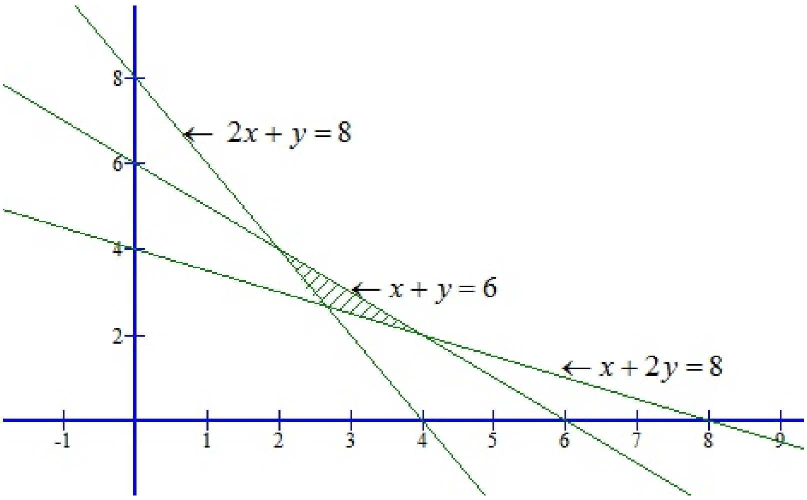
$\therefore$ The line $x+2y=8$ meets the coordinate axes at $(0,4)$ and $(8,0)$. Joining these points by a thick line.
Now, putting $x=0$ and $y=0$ in $x+2y \geq 8,$ we get, $0 \geq 8,$ This is not possible.

$\therefore$ we find that $(0,0)$ is not satisfies the inequation $x+2y \geq 8.$ so the portion not containing the origin is represented by the given inequation.

Region represented by $x+y \leq 6$:
Putting $x=0$ in $x+y=6,$ we get, $y=6.$
Putting $y=0$ in $x+y=6,$ we get, $x=6.$

$\therefore$ The line $x+y=6$ meets the coordinate axes at $(0,6)$ and $(6,0)$. Joining these points by a thick line.
Now, putting $x=0$ and $y=0$ in $x+y \leq 6,$ we get $0 \leq 6$

Therefore, $(0,0)$ satisfies $x+y \leq 6.$ so the portion containing the origin is represented by the given inequation. The common region of the above three regions represents the solution set of the given inequations as shown below:



Linear Inequations Ex 15.6 Q6(ii)

We have,
$12x + 12y \le 840$, $3x + 6y \le 300$, $8x + 4y \le 480$, $x \ge 0$ and $y \ge 0$

Converting the inequations into equations, we obtain,
$12x + 12y = 840$, $3x + 6y = 300$, $8x + 4y = 480$, $x = 0$ and $y = 0$

Region represented by $12x + 12y \le 840$:
Putting $x = 0$ in $12x + 12y = 840$, we get $y = \frac{840}{12} = 70$
Putting $y = 0$ in $12x + 12y \le 840$, we get $x = \frac{840}{12} = 70$

$\therefore$ The line $12x + 12y = 840$, meets the coordinate axes at $(0,70)$ and $(70,0)$. Join these points by a thick line.

Now, putting $x = 0$ and $y = 0$ in $12x + 12y \le 840$, we get $0 \le 840$

Therefore, $(0,0)$ satisfies the inequality $12x + 12y \le 840$. so, the portion containing the origin represents the solution set of the inequation $12x + 12y \le 840$
Region represented by $3x + 6y \le 300$:
Putting $x = 0$ in $3x + 6y \le 300$, we get $y = \frac{300}{6} = 50$
Putting $y = 0$ in $x = \frac{300}{3} = 100$.
$\therefore$ The line $3x + 6y = 300$ meets the coordinate axes at $(0,50)$ and $(100,0)$. Joining these points by a thick line.

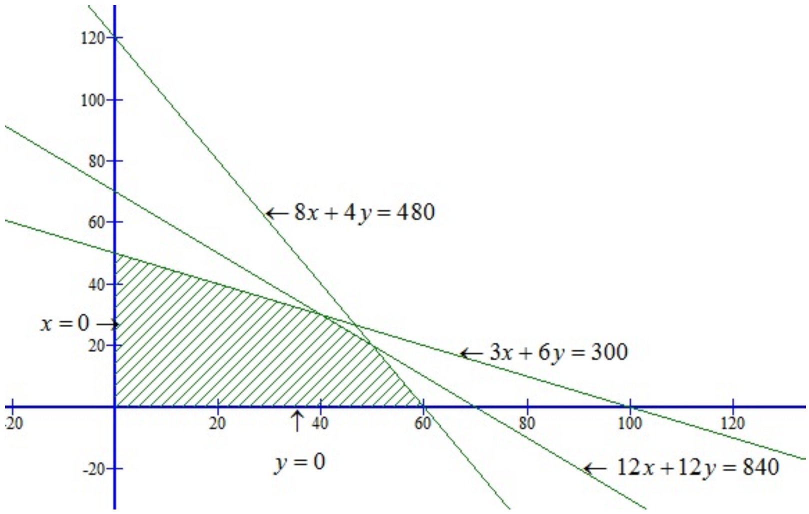
Now, putting $x = 0$ and $y = 0$ in $3x + 6y \le 300$, we get, $0 \le 300$

Therefore $(0,0)$ satisfies the inequality $3x + 6y \le 300$. so, the portion containing the origin represents the solution set of the inequation $3x + 6y \le 300$.

Region represented by $8x + 4y \le 480$:
Putting $x = 0$ in $8x + 4y = 480$, we get, $y = \frac{480}{4} = 120$
Putting $y = 0$ in $8x + 4y = 480$, we get, $y = \frac{480}{8} = 60$.
$\therefore$ The line $8x + 4y = 480$ meets the coordinate axes at $(0,120)$ and $(60,0)$. Join these points by a thick line.
Now, putting $x = 0$ and $y = 0$ in $8x + 4y = 480$, we get $0 \le 480$.
Therefore, $(0,0)$ satisfies the inequality $8x + 4y \le 480$.

So, the portion containing the origin represents the solution set of the inequation $8x + 4y \le 480$.
Region represented by $x \ge 0$ and $y \ge 0$: clearly, $x \ge 0$ and $y \ge 0$ represent the first quadrant.

The common region of the above five regions represents the solution set of the given inequations as shown below:



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