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 $x + y \leq 6$:

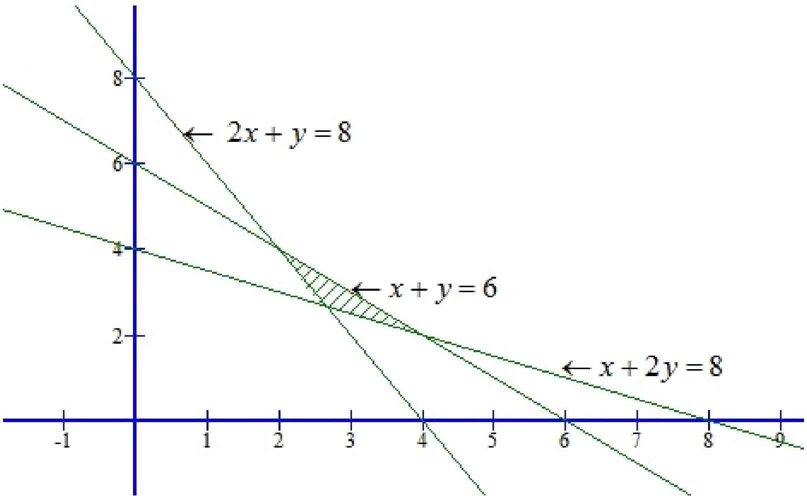
Putting $x = 0$ in $x + y = 6$, we get, $y = 6$.

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.

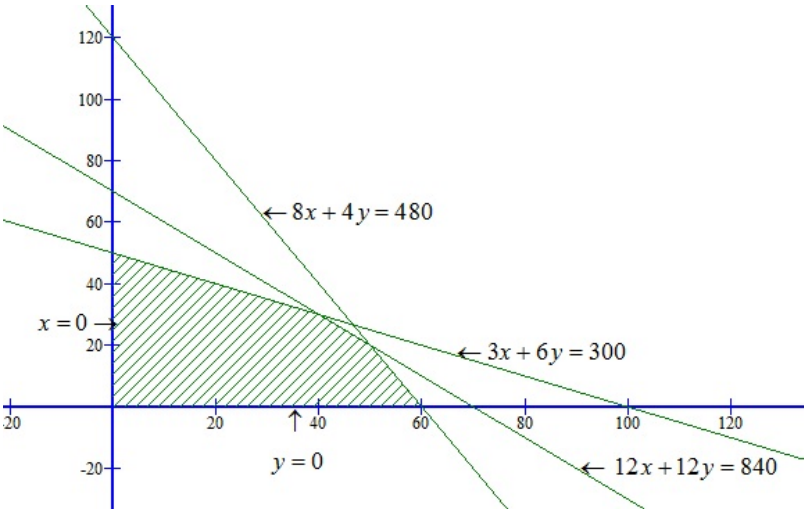
Now, putting $x=0$ and $y=0$ in $8x+4y=480$, we get $0\le 480$.

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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