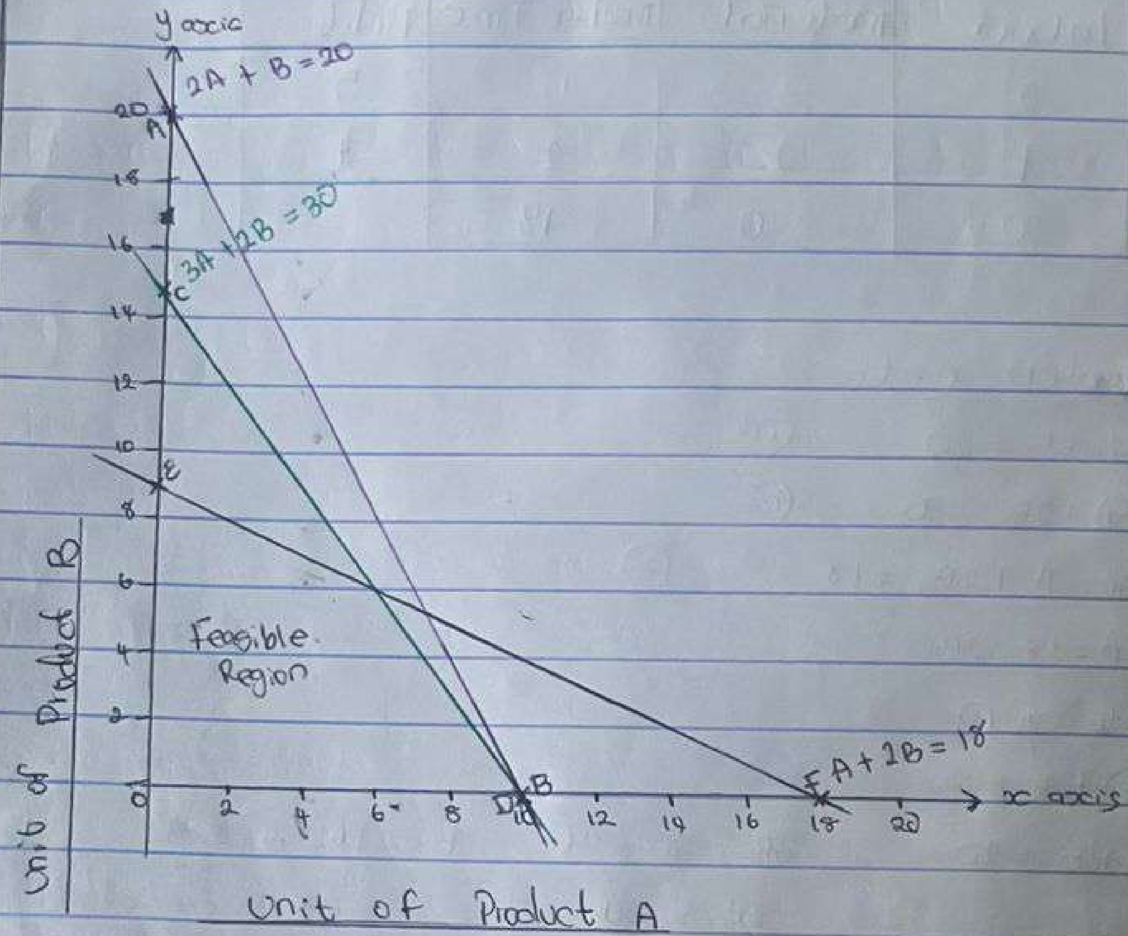
Graphical Solution for LP



The Interception points are (6, 6) for $3A + 2B = 30$ and $A + 2B = 18$ while $\left(\frac{22}{3}, \frac{16}{3}\right)$ for $2A + B = 20$ and $A + 2B = 18$

Corner Points	Coordinates (x, y)	Objective function (Z) 5A + 4B
O	(0, 0)	$Z = 5(0) + 4(0) = 0$
A	(0, 20)	$Z = 5(0) + 4(20) = 80$
B	(10, 0)	$Z = 5(10) + 4(0) = 50$
C	(0, 15)	$Z = 5(0) + 4(15) = 60$
D	(10, 0)	$Z = 5(10) + 4(0) = 50$
E	(0, 9)	$Z = 5(0) + 4(9) = 36$
F	(18, 0)	$Z = 5(18) + 4(0) = 90$

Optimal Solution: The maximum profit is $Z = 90$ achieved at the Corner point (18, 0).

The Intersection point

advertising bud. : $A + 2B = 20$ ...... (1)

Production cap. : $A + 2B = 15$ ...... (2)

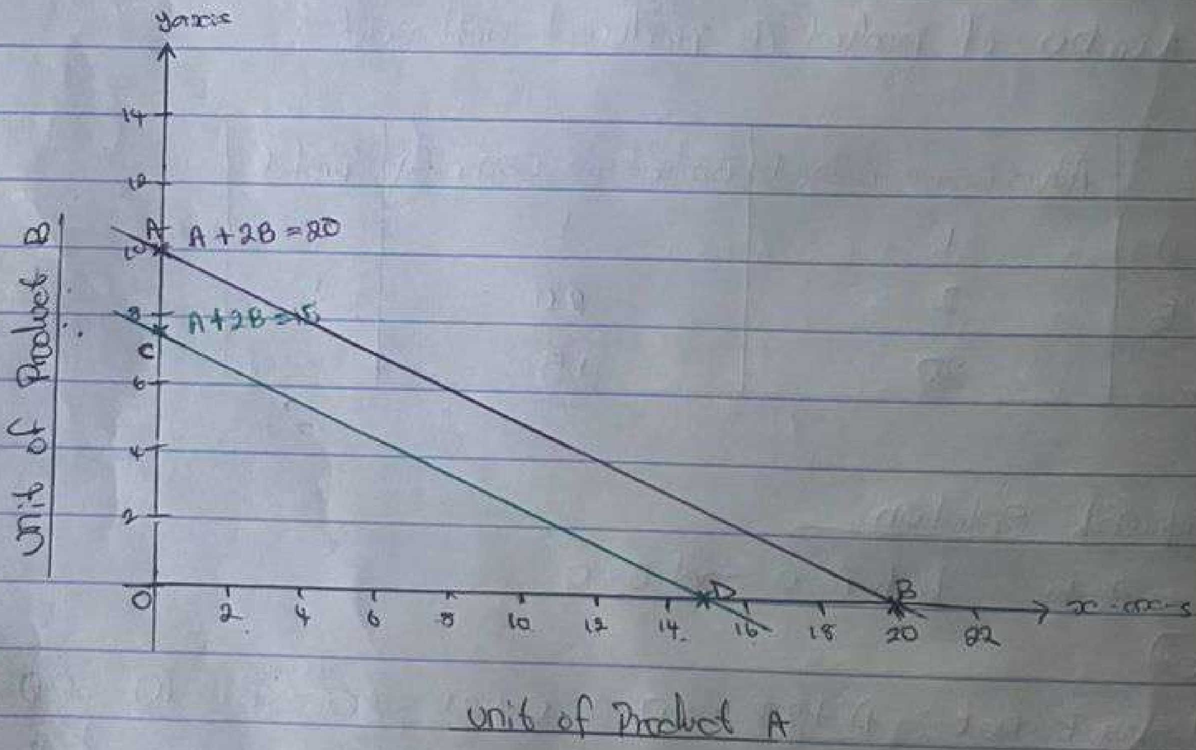
$$A = 15 - 2B$$

Put A into equation (1)

$$15 - 2B + 2B = 20$$

Both lines are parallel, There is no Intersection.

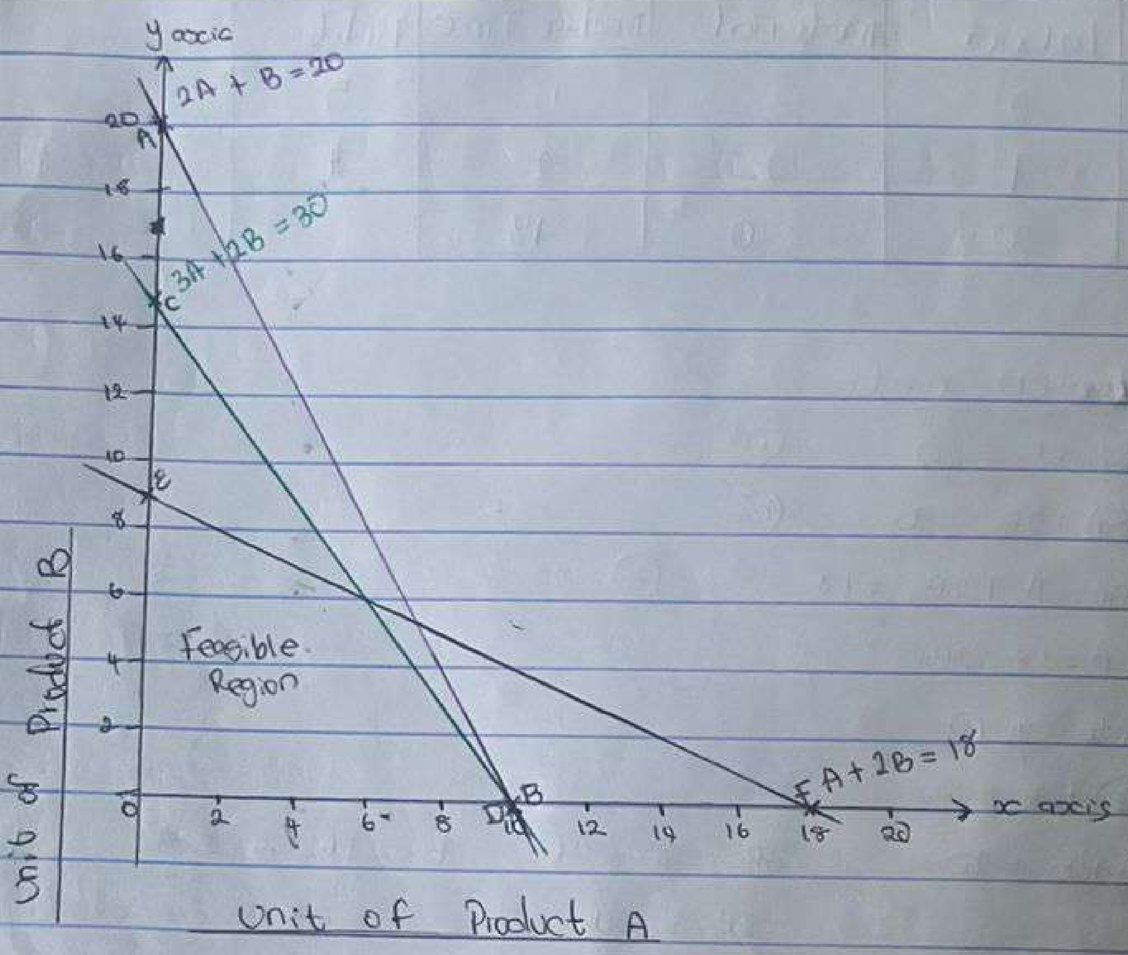
Graphical Solution For LP



Corner points	Coordinates (x, y)	objective function ($Z = 4x + 5y$)
O	$(0, 0)$	$Z = 4(0) + 5(0) = 0$
A	$(0, 10)$	$Z = 4(0) + 5(10) = 50$
B	$(20, 0)$	$Z = 4(20) + 5(0) = 80$
C	$(0, \frac{15}{2})$	$Z = 4(0) + 5(\frac{15}{2}) = \frac{75}{2}$
D	$(15, 0)$	$Z = 4(15) + 5(0) = 60$

The optimal solution : The maximum profit for revenue sales Corner point $(20, 0)$.

Graphical Solution for LP



The Interception points are (6, 6) for 3A + 2B = 30 and A + 2B = 18 while $\left(\frac{22}{3}, \frac{16}{3}\right)$ for 2A + B = 20 and A + 2B = 18

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F	(18, 0)	Z = 5(18) + 4(0) = 90

Optimal Solution: The maximum profit is Z = 90 achieved at the Corner point (18, 0).

The Intersection point

advertising bud. : $A + 2B = 20$ ...... ①

Production cap. : $A + 2B = 15$ ..... ②

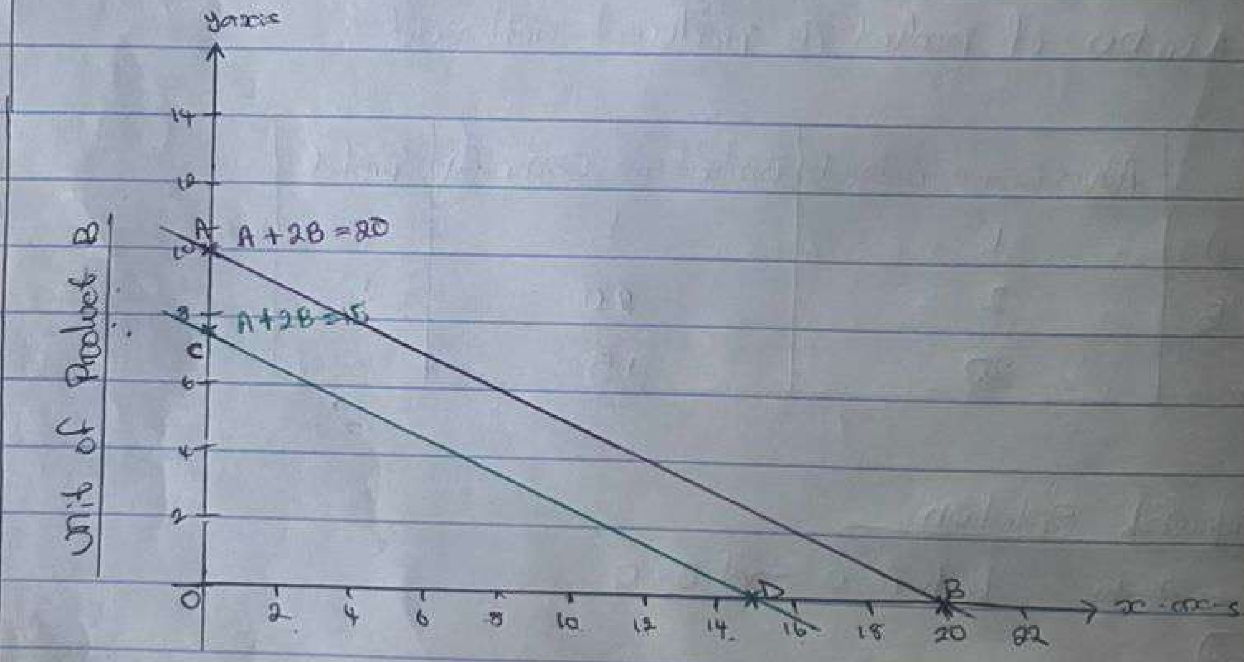
$$A = 15 - 2B$$

Put A into equation ①

$$15 - 2B + 2B = 20$$

Both lines are parallel, There is no Intersection.

Graphical Solution For LP



Unit of Product A

Corner points	Coordinates (x,y)	objective function ($Z = 4x + 5y$)
O	(0,0)	$Z = 4(0) + 5(0) = 0$
A	(0,10)	$Z = 4(0) + 5(10) = 50$
B	(20,0)	$Z = 4(20) + 5(0) = 80$
C	$(0, \frac{15}{2})$	$Z = 4(0) + 5(\frac{15}{2}) = \frac{75}{2}$
D	(15,0)	$Z = 4(15) + 5(0) = 60$

The optimal solution: The maximum profit for revenue sales Corner point (20,0).

The Interception Point

Labour hour : $3x + 4y = 12$ ..... (1)

Capital Invest. : $2x + y = 6$ .... (2)

$$y = 6 - 2x$$

Put $y = 6 - 2x$ into equation (1)

$$3x + 4y = 12$$

$$3x + 4(6 - 2x) = 12$$

$$3x + 24 - 8x = 12$$

$$-5x = 12 - 24$$

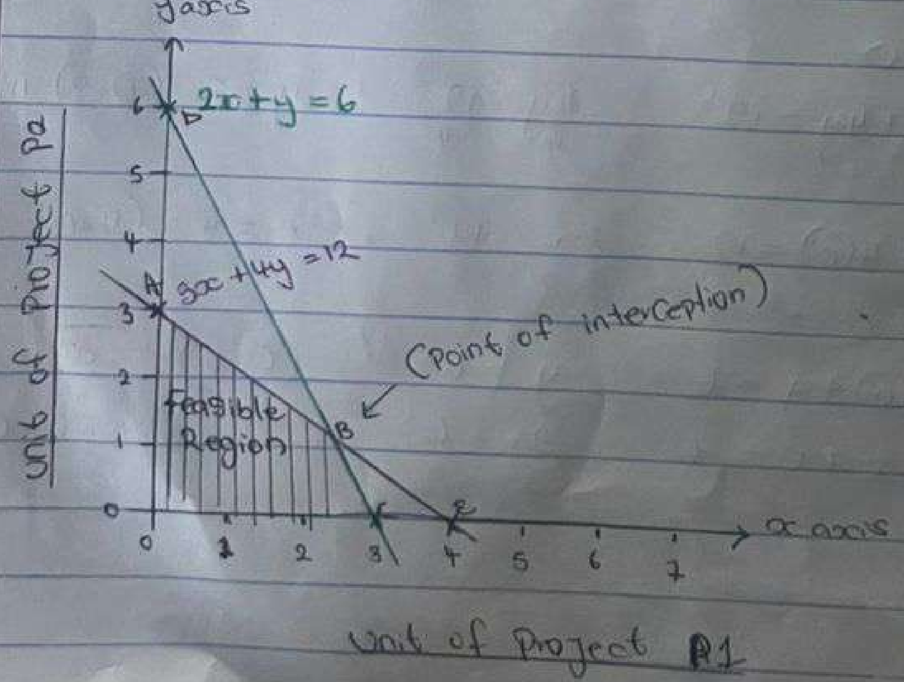
$$\frac{\cancel{-5}x}{\cancel{-5}} = \frac{-12}{-5} \quad \therefore \quad x = \frac{12}{5} \text{ or } 2.4$$

Put $x = \frac{12}{5}$ in equation $y = 6 - 2x$

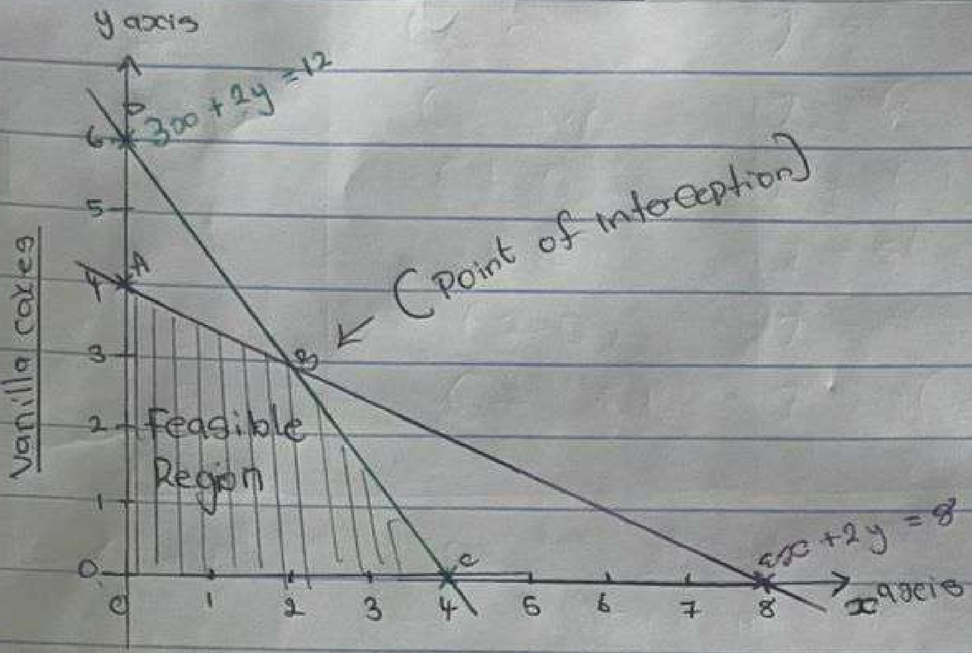
$$y = 6 - 2\left(\frac{12}{5}\right)$$

$$= 6 - \frac{24}{5} \quad \therefore \quad \frac{6}{5} \quad \therefore \; y \; \frac{6}{5} \Rightarrow \left(\frac{12}{5}, \frac{6}{5}\right)$$

Graphical Solution for LP



Graphical Solution For LP



Chocolate cakes

Corner Point	Coordinates (x,y)	Objective Function (Z = 5x + 3y)
O	(0,0)	Z = 5(0) + 3(0) = 0
A	(0,4)	Z = 5(0) + 3(4) = 12
B	(2,3)	Z = 5(2) + 3(3) = 19
C	(4,0)	Z = 5(4) + 3(0) = 20
D	(0,6)	Z = 5(0) + 3(6) = 18
E	(8,0)	Z = 5(8) + 3(0) = 40

The optimal solution is to produce 8 chocolate cakes (x = 8) and 0 vanilla cakes (y = 0), which g generates a ~~profit~~ maximum profit of N40

The Interception point

Fuel: $3x + 4y = 18$ ..... ①

Driver time: $2x + y = 10$ ..... ②

$$y = 10 - 2x$$

Put $y = 10 - 2x$ into equation ①

$$3x + 4(10 - 2x) = 18$$

$$3x + 40 - 8x = 18$$

$$3x - 8x = 18 - 40$$

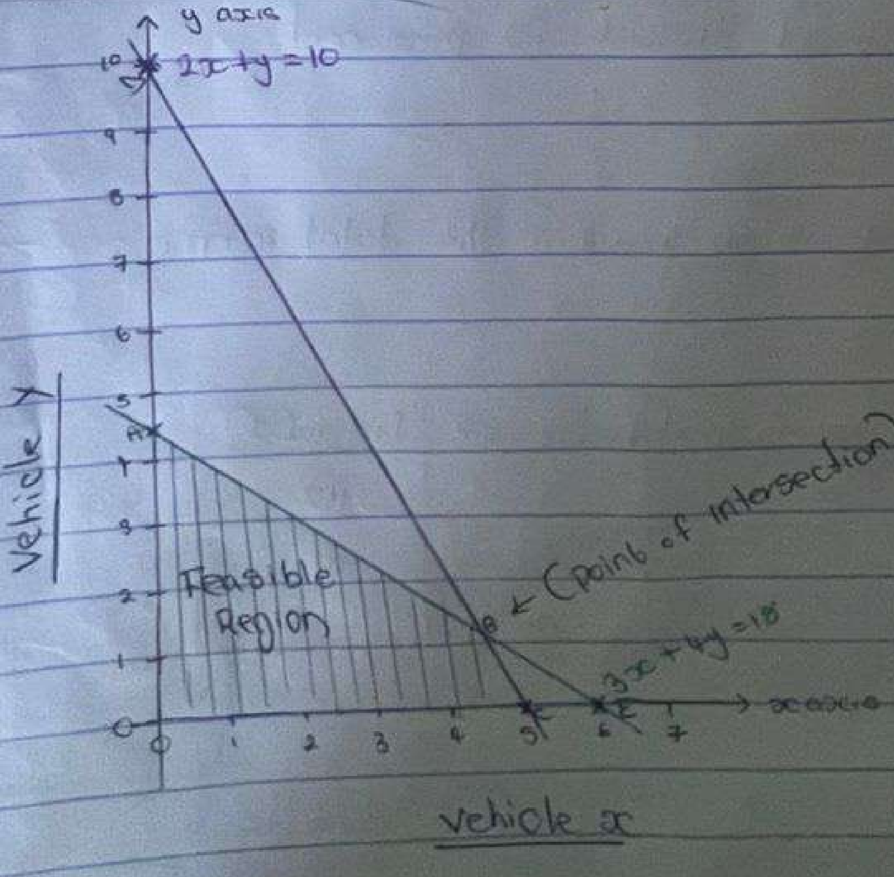
$$\frac{-5x}{-5} = \frac{-22}{-5} \quad \therefore \quad x = \frac{22}{5} \text{ or } 4.4$$

Put x into $y = 10 - 2x$

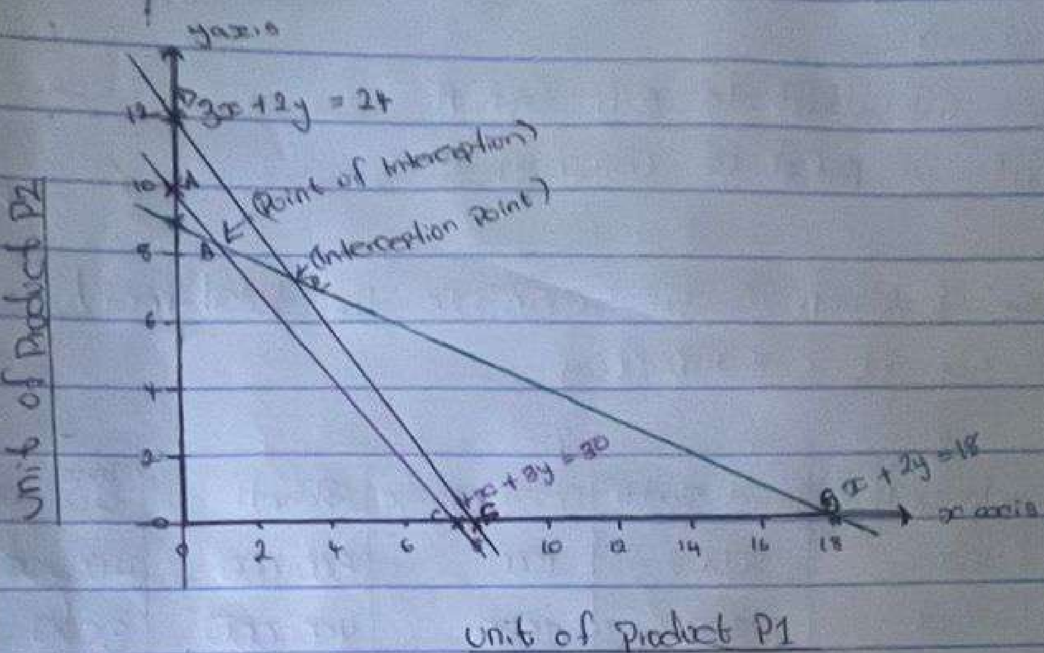
$$y = 10 - 2\left(\frac{22}{5}\right) \quad \Rightarrow \left(\frac{22}{5}, \frac{6}{5}\right) / (4.4, 1.2)$$

$$y = \frac{6}{5} \text{ or } 1.2$$

Graphical Solution For LP



Graphical Solution For LP



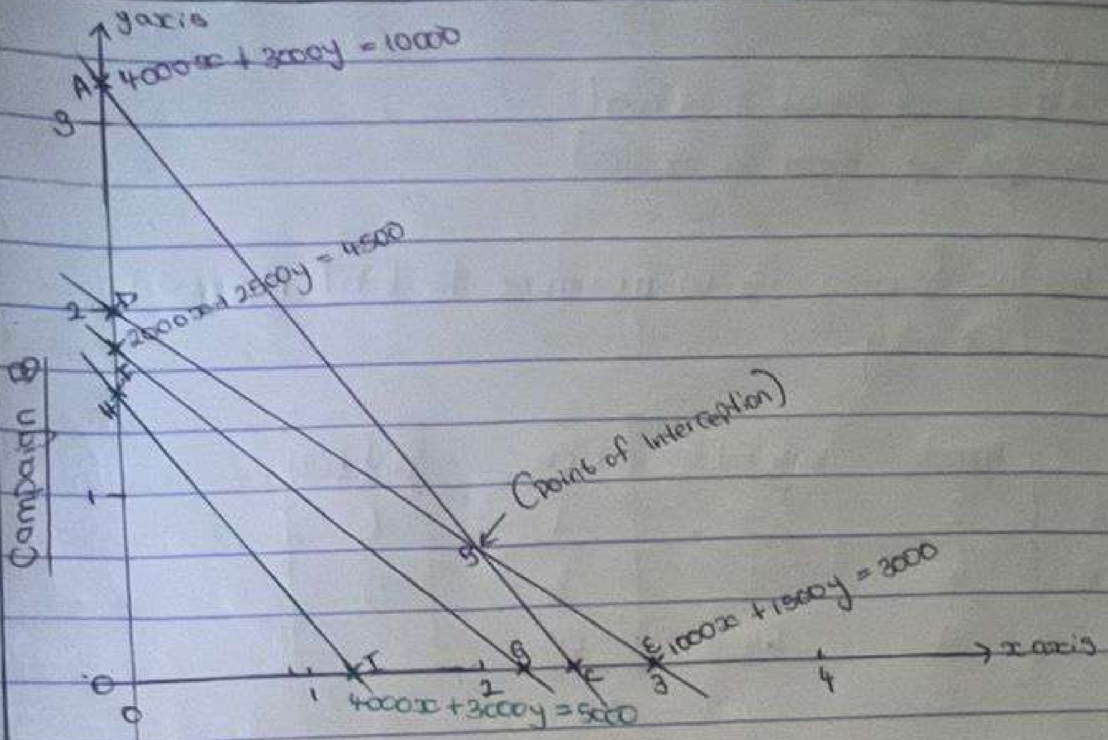
The Interception points are $\left(\frac{6}{5}, \frac{42}{5}\right)$ for line $4x+3y=30$ and $x + 2y = 18$, while $\left(3, \frac{15}{2}\right)$ for line $3x+2y=24$ and $x+2y=18$

Corner points	Coordinates (x,y)	Objective function ($Z = 10x + 12y$)
O	$(0,0)$	$Z = 10(0) + 12(0) = 0$
A	$(0,10)$	$Z = 10(0) + 12(10) = 120$
B	$\left(\frac{6}{5}, \frac{42}{5}\right)$	$Z = 10\left(\frac{6}{5}\right) + 12\left(\frac{42}{5}\right) = 112.8$
C	$\left(\frac{15}{2}, 0\right)$	$Z = 10\left(\frac{15}{2}\right) + 12(0) = 75$
D	$(0,12)$	$Z = 10(0) + 12(12) = 144$
E	$\left(3, \frac{15}{2}\right)$	$Z = 10(3) + 12\left(\frac{15}{2}\right) = 120$
F	$(8,0)$	$Z = 10(8) + 12(0) = 80$
G	$(18,0)$	$Z = 10(18) + 12(0) = 180$

~~The optimal solution to maximize Revenue from Products P1 and P2 is to increase the unit of~~

Optimal solution : The maximum profit / revenue is Z = \$180 achieved at the Corner Points (18,0)

Graphical Solution For LP



Campaign A

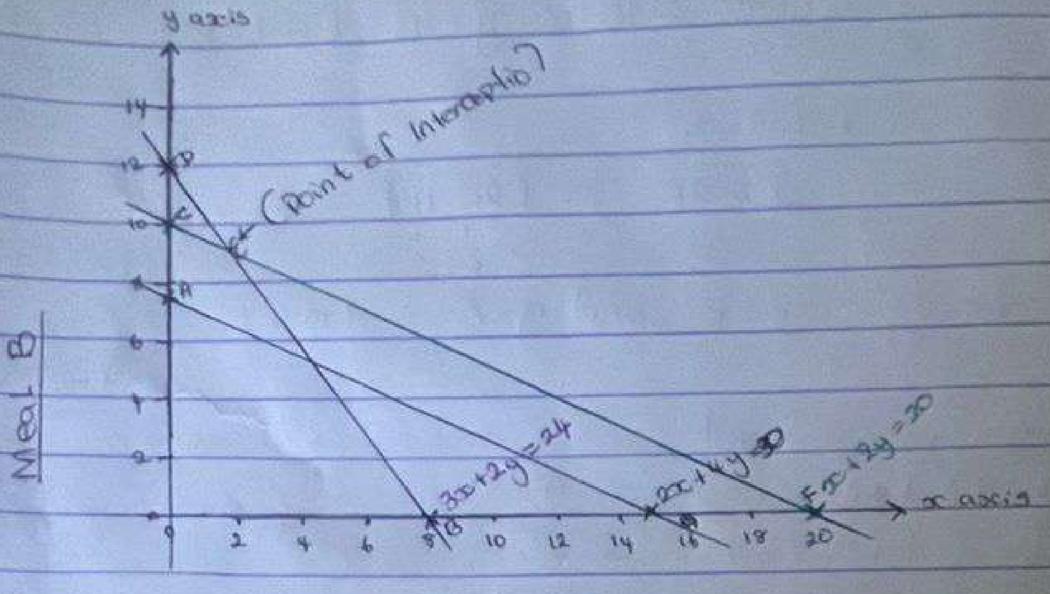
The Interception point is $\left(2, \frac{2}{3}\right)$ for Line Total Budget

$4000x + 3000y = 10000$ and social media line $1000x + 1500y = 3000$.

Corner points	Coordinates (x+y)	Objective function ($Z = 500000x + 400000y$)
O	$(0, 0)$	$Z = 500000(0) + 400000(0) = 0$
A	$(0, \frac{10}{3})$	$Z = 500000(0) + 400000(\frac{10}{3}) = 1,333,333$
B	$(2, \frac{2}{3})$	$Z = 500000(2) + 400000(\frac{2}{3}) = 1,266,666$
C	$(\frac{5}{2}, 0)$	$Z = 500000(\frac{5}{2}) + 400000(0) = 1,250,000$
D	$(0, 2)$	$Z = 500000(0) + 400000(2) = 800000$
E	$(3, 0)$	$Z = 500000(3) + 400000(0) = 1,500,000$
F	$(0, \frac{9}{5})$	$Z = 500000(0) + 400000(\frac{9}{5}) = 750000$
G	$(\frac{9}{4}, 0)$	$Z = 500000(\frac{9}{4}) + 400000(0) = 1,125,000$
H	$(0, \frac{5}{3})$	$Z = 500000(0) + 400000(\frac{5}{3}) = 666,666$
I	$(\frac{5}{4}, 0)$	$Z = 500000(\frac{5}{4}) + 400000(0) = 625,000$

The optimal solution occurs at corner point $(3, 0)$ with a maximum ~~Reach~~ Total reach of $Z = 1,500,000$ people

Graphical Solution FOR LP



The point of Interception is $(2,9)$ Line $3x+2y=24$ and Line $x+2y=20$

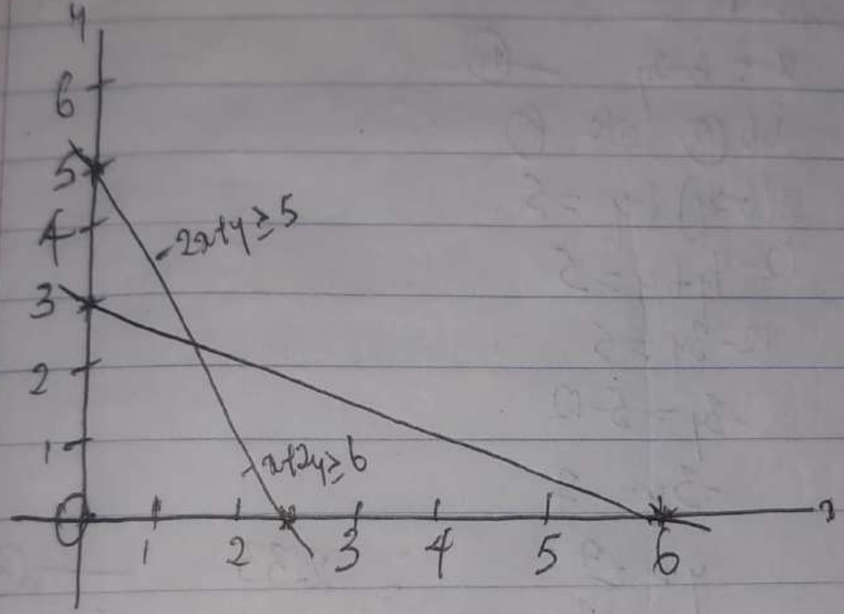
Corner points	Coordinates (x,y)	Objective Function $Z=6x+5y$
O	$(0,0)$	$Z=6(0)+5(0)=0$
A	$(0,\frac{15}{2})$	$Z=6(0)+5(15/2)=37.5$
B	$(8,0)$	$Z=6(8)+5(0)=48$
C	$(0,10)$	$Z=6(0)+5(10)=50$
D	$(0,12)$	$Z=6(0)+5(12)=60$
E	$(2,9)$	$Z=6(2)+5(9)=57$
F	$(20,0)$	$Z=6(20)+5(0)=120$
G	$(15,0)$	$Z=6(15)+5(0)=90$

The optimal solution occurs at $(20,0)$, meal A (x): 20 and meal B (y): 0

The solution maximizes the total revenue which

$Z=\$(20)+\$(0)=\$120$

4. $x = ?$, $y = 0$
$2x = 5$
$x = 2.5$ Extreme point $(2.5, 0)$



~~Feasible~~ region Extreme points

$O(0,0)$
$A-(0,3)$ $B-(6,0)$
$C-(0,5)$ $D-(2.5,0)$
$E-?$

Feasible region $x=0$, $y=0$
$x+2y \geq 6$ — (i) $\Rightarrow$ $0 \geq 6$
$2x+y \geq 5$ — (ii) $\Rightarrow$ $0 \geq 5$

$2(0)+3y=12$

$3y=12 \Rightarrow y=\frac{12}{3}$

$y=4$ Extreme point $(0,4)$

If $x=?$, $y=0$

$2x+3(0)=12$

$2x=12, \Rightarrow x \Rightarrow 6$ Extreme point $(6,0)$

$x+2y \le 8$

If $x=0$, $y=?$

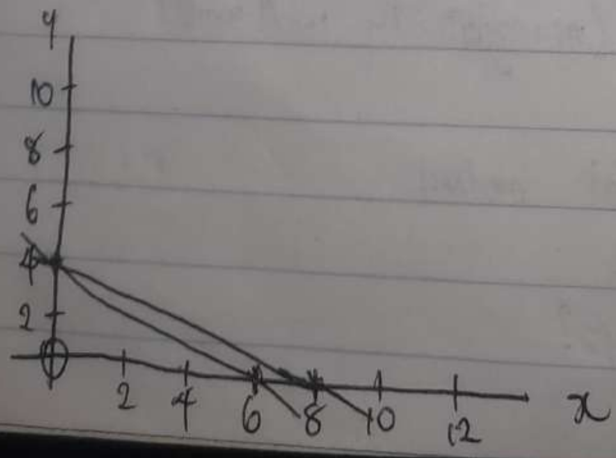
$2y=8 \Rightarrow y=8/2=4$

Extreme point $(0,4)$

If $x=?$, $y=0$

$x+2(0)=8$

$x=8$ ∴ Extreme point $(8,0)$



Feasible region

$2x+3y \le 10$ — (1)

$0 \le 12$

$x+2y \le 8$ — (2)

$0 \le 8$