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. A cottage industry manufactures pedestal lamps and wooden shades, each requiring the use of a grinding / cutting machine and a sprayer. It takes 2 hours on grinding / cutting machine and 3 hours on the sprayer to manufacture a pedestal lamp. It takes 1 hour on the grinding / cutting machine and 2 hours on the sprayer to manufacture a shade. On any day, the sprayer is available for at the most 20 hours and the grinding / cutting machine for at the most 12 hours. The profit from the sale of a lamp is Rs 5 and that from a shade is Rs 3. Assuming that the manufacturer can sell all the lamps and shade that he produces, how should he schedule his daily production in order to maximize his profit?

Solution:

Let the cottage industry manufacture x pedestal lamps and y wooden shades respectively

Hence,

$$x \geq 0 \text{ and } y \geq 0$$

The given information can be compiled in a table is given below

	Lamps	Shades	Availability
Grinding / Cutting Machine (h)	2	1	12
Sprayer (h)	3	2	20

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The profit on a lamp is Rs 5 and on the shades is Rs 3. Hence, the constraints are

$$2x + y \leq 12$$

$$3x + 2y \leq 20$$

$$\text{Total profit, } Z = 5x + 3y \dots\dots\dots (i)$$

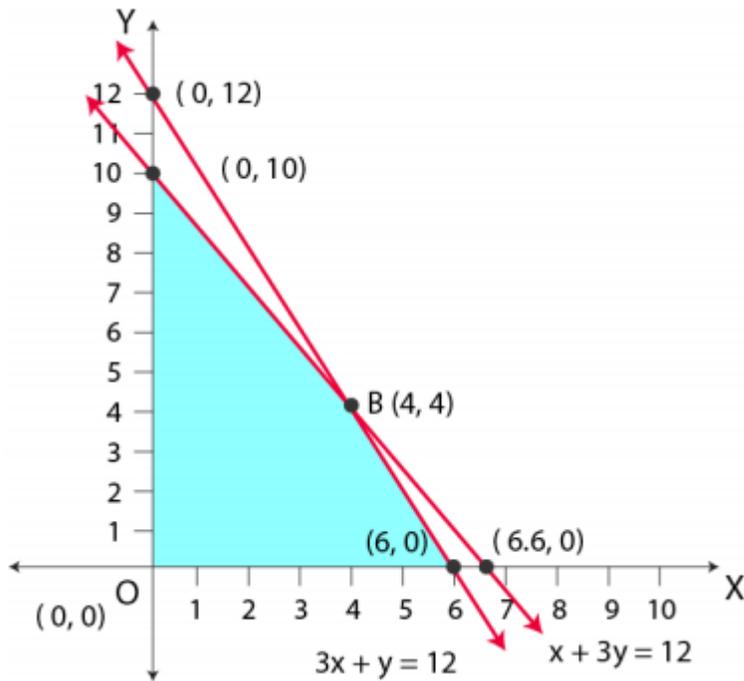
Subject to the constraints,

$$2x + y \leq 12 \dots\dots\dots (ii)$$

$$3x + 2y \leq 20 \dots\dots\dots (iii)$$

$$x, y \geq 0 \dots\dots\dots (iv)$$

The feasible region determined by the system of constraints is given below



A (6, 0), B (4, 4) and C (0, 10) are the corner points

The value of Z at these corner points are given below

Corner point	$Z = 5x + 3y$	
A (6, 0)	30	
B (4, 4)	32	Maximum
C (0, 10)	30	

The maximum value of Z is 32 at point (4, 4)

Therefore, the manufacturer should produce 4 pedestal lamps and 4 wooden shades to maximize his profits.

7. A company manufactures two types of novelty souvenirs made of plywood. Souvenirs of type A require 5 minutes each for cutting and 10 minutes each for assembling. Souvenirs of type B require 8 minutes each for cutting and 8 minutes each for assembling. There are 3 hours 20 minutes available for cutting and 4 hours for assembling. The profit is Rs 5 each for type A and Rs 6 each for type B souvenirs. How many souvenirs of each type should the company manufacture in order to maximize the profit?

Solution:

Let the company manufacture x souvenirs of type A and y souvenirs of type B respectively

Hence,

$$x \geq 0 \text{ and } y \geq 0$$