

Previous Year CBSE Problems with Solutions

Problem 2:

A dealer in rural area wishes to purchase a number of sewing machines. He has only ₹ 5760 to invest and has space for at most 20 items for storage. An electronic sewing machine costs him ₹ 360 and a manually operated sewing machine ₹ 240. He can sell an electronic sewing machine at a profit of ₹ 22 and a manually operated sewing machine at a profit of ₹ 18. Assuming that he can sell all the items that he can buy, how should he invest his money in order to maximise his profit? Make it as an LPP and solve graphically.

Solution:

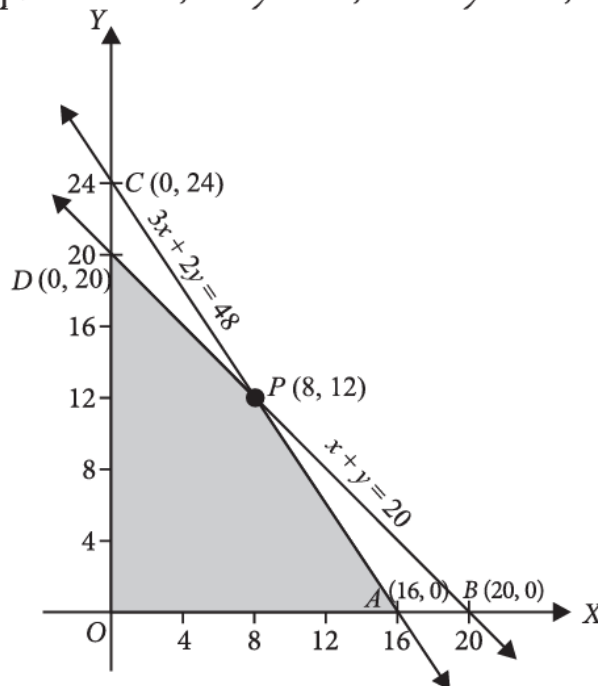
Let x be the number of electronic sewing machines and y be the number of manually operated sewing machines, the dealer sells. The given problem can be formulated as

$$\text{Maximise } Z = 22x + 18y$$

Subject to constraints

$$x + y \leq 20, 360x + 240y \leq 5760 \Rightarrow 3x + 2y \leq 48 \text{ and } x, y \geq 0$$

To solve LPP graphically, we convert the inequations into equations *i.e.*, $x + y = 20$, $3x + 2y = 48$, $x = y = 0$



The shaded region $APDO$ is the feasible region.

The corner points of the feasible region are $A(16, 0)$, $P(8, 12)$, $D(0, 20)$ and $O(0, 0)$.

Corner Points	Value of $Z = 22x + 18y$
$A(16, 0)$	352
$P(8, 12)$	392 (Maximum)
$D(0, 20)$	360
$O(0, 0)$	0

We see that the point $P(8, 12)$ is giving the maximum value of Z .

Hence, the dealer should purchase 8 electronic sewing machines and 12 manually operated sewing machines to obtain the maximum profit under the given conditions.