MISCELLANEOUS EXERCISES
Answers to NCERT/CBSE MATH (Class XII)textbook
Chapter 12
LINEAR PROGRAMMING

8. A fruit grower can use two types of fertilizer in his garden, brand P and brand Q. The amounts (in kg) of nitrogen, phosphoric acid, potash, and chlorine in a bag of each brand are given in the table. Tests indicate that the garden needs at least 240 kg of phosphoric acid, at least 270 kg of potash and at most 310 kg of chlorine.

If the grower wants to minimise the amount of nitrogen added to the garden, how many bags of each brand should be used? What is the minimum amount of nitrogen added in the garden?

kg per bag		
	Brand P	**Brand Q**
Nitrogen	3	3.5
Phosphoric acid	1	2
Potash	3	1.5
Chlorine	1.5	2

SOLUTION:

Let x be the number of bags of brand P and Let y be the number of bags of brand Q

$$Z = 3x + \frac{7}{2}y$$

$$x + 2y \geq 240$$

$$3x + \frac{3}{2}y \geq 270$$

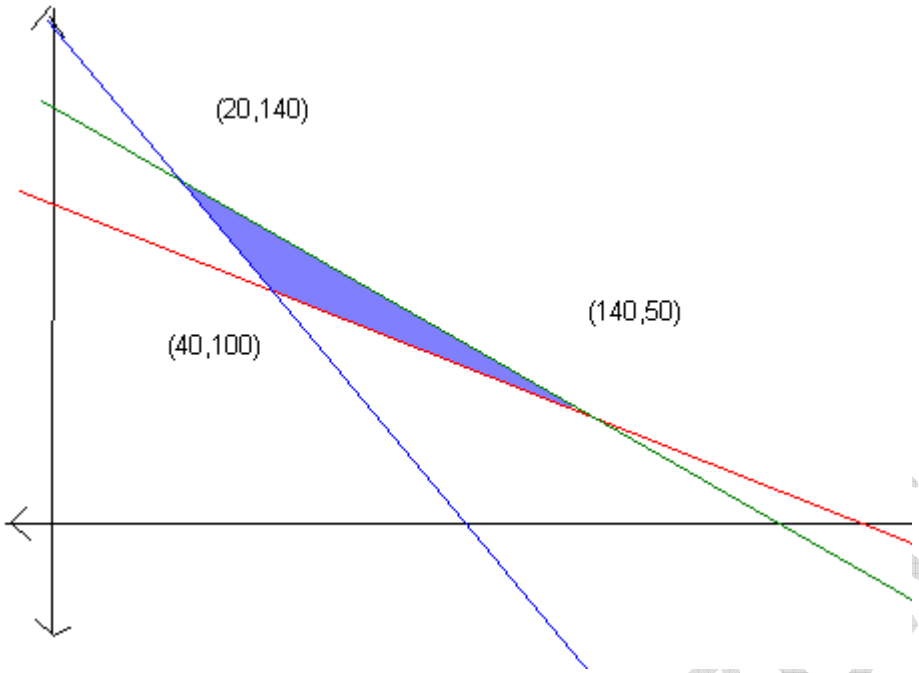
$$\frac{3}{2}x + 2y \leq 10$$

$$x \geq 0, y \geq 0$$

$$\Rightarrow 2x + y \geq 180$$

$$\Rightarrow 3x + 4y \leq 620$$

$$x \geq 0, y \geq 0$$



The shaded portion in the graph depicts the feasible region . The table below shows the corner points and the value of the objective function obtained by substituting the values of x and y into the objective function.

Point	Value of Z
(140,50)	595
(20,140)	550
(40,100)	470

From the table, the amount of nitrogen is minimum when 40 bags of Brand A and 100 bags of brand Q are mixed . This minimum amount of nitrogen is 470 kg