

## *Related Problems with Solutions*

### *Problem 1:*

#### Question 2:

One kind of cake requires 200g flour and 25g of fat, and another kind of cake requires 100g of flour and 50g of fat. Find the maximum number of cakes which can be made from 5 kg of flour and 1 kg of fat assuming that there is no shortage of the other ingredients used in making the cakes?

Answer

Let there be  $x$  cakes of first kind and  $y$  cakes of second kind. Therefore,  
 $x \geq 0$  and  $y \geq 0$

The given information can be compiled in a table as follows.

	Flour (g)	Fat (g)
<b>Cakes of first kind, <math>x</math></b>	200	25
<b>Cakes of second kind, <math>y</math></b>	100	50
<b>Availability</b>	5000	1000

$$\therefore 200x + 100y \leq 5000$$

$$\Rightarrow 2x + y \leq 50$$

$$25x + 50y \leq 1000$$

$$\Rightarrow x + 2y \leq 40$$

Total numbers of cakes,  $Z$ , that can be made are,  $Z = x + y$

The mathematical formulation of the given problem is

$$\text{Maximize } Z = x + y \dots (1)$$

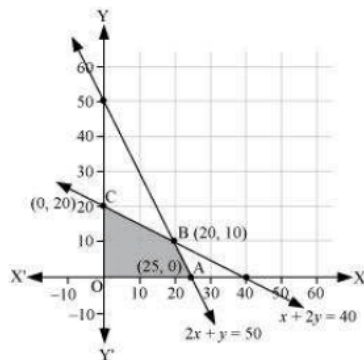
subject to the constraints,

$$2x + y \leq 50 \quad \dots(2)$$

$$x + 2y \leq 40 \quad \dots(3)$$

$$x, y \geq 0 \quad \dots(4)$$

The feasible region determined by the system of constraints is as follows.



The corner points are A (25, 0), B (20, 10), O (0, 0), and C (0, 20).

The values of  $Z$  at these corner points are as follows.

Corner point	$Z = x + y$	
A(25, 0)	25	
B(20, 10)	30	→ Maximum
C(0, 20)	20	
O(0, 0)	0	

Thus, the maximum numbers of cakes that can be made are 30 (20 of one kind and 10 of the other kind).