Exercise 3A

Question 21:

On a graph paper, draw horizontal line X'OX and a vertical line YOY' as x-axis and y-axis respectively.

The given system of equations is
$4x - 3y + 4 = 0$, $4x + 3y - 20 = 0$

Graph of $4x - 3y + 4 = 0$:

$4x - 3y + 4 = 0 \Rightarrow y = \frac{4x + 4}{3}$ ----(1)

Thus, we have the following table for equation (1)

x	-1	2	5
y	0	4	8

On the graph paper plot the points A (-1, 0), B (2, 4) and C (5, 8)
Join AB and BC to get AC
Thus, line AC is the graph of $4x - 3y + 4 = 0$

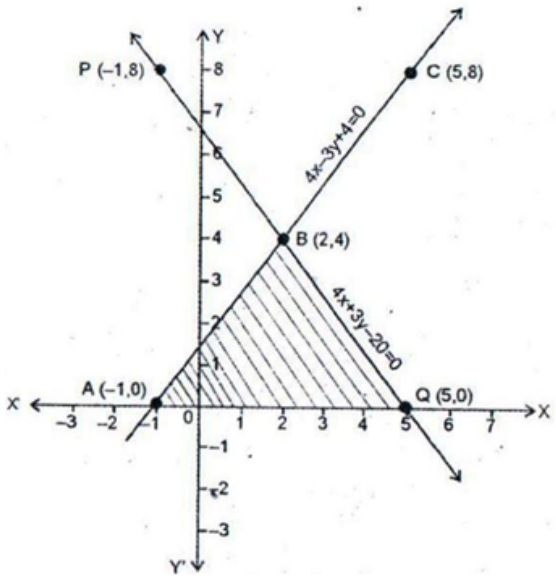
Graph of $4x + 3y - 20 = 0$

$4x + 3y = 20 \Rightarrow y = \frac{-4x + 20}{3}$ ---(2)

Thus, we have the table for following table for equation (2)

x	2	-1	5
y	4	8	0

On the same graph paper as above, plot the points P (-1, 8), Q (5, 0).
The third point B (2, 4) has been already plotted.



Joint PB and QB to get the line PQ
Thus, line PQ is the graph of the equation 4x + 3y - 20 = 0
The two graph lines intersect at B (2, 4)
∴ x = 2, y = 4 is the solution of the given system of equations

Clearly, the vertices of ΔABQ formed by these lines and the x-axis are A (-1, 0), B (2, 4) and Q (5, 0)

Consider the triangle ΔABQ:
height of the triangle = 4 units and base(AQ)= 6 units

Area of triangle ΔABQ:

$$\text{Area} = \left(\frac{1}{2} \times \text{Base} \times \text{height}\right)\text{sq.units} = \left(\frac{1}{2} \times 4 \times 6\right)\text{sq.units}$$

Area of ΔABQ = 12 sq. units

Question 22:

On a graph paper, draw horizontal line X'OX and a vertical line YOY' as x-axis and y-axis respectively.

The given system of equations is
x - y + 1 = 0, 3x + 2y - 12 = 0

Graph of x - y + 1 = 0:

x - y + 1 = 0 ⇒ y = x + 1 ---(1)
Thus, we have the following table for equation (1)

x	-1	1	2
y	0	2	3

On the graph paper plot the points A(-1, 0), B(1, 2) and C(2, 3)
Joint AB and BC to get AC
Thus, line AC is the graph of the equation x - y + 1 = 0

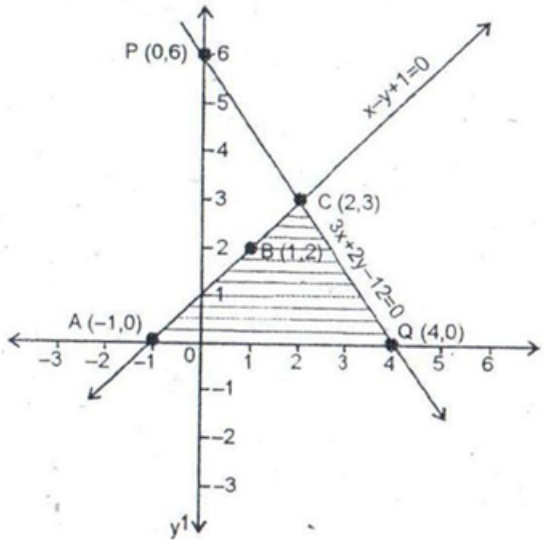
Graph of 3x + 2y - 12 = 0:

$$3x + 2y - 12 = 0 \Rightarrow y = \frac{-3x + 12}{2} \quad \text{----(2)}$$

Thus, we have the following table for equation (2)

x	0	2	4
y	6	3	0

On the same graph paper plot points P (0, 6) and Q (4, 0)
The third point C (2, 3) has been already plotted.
Join PC and CQ to get PQ.



Thus, line PQ is the graph of the equation 3x + 2y - 12 = 0
The two graph lines intersect at C (2, 3)
$\therefore$ x = 2, y = 3 is the solution of the given system of equations

Clearly, the vertices of ΔACQ formed by these lines and the x-axis are A (-1, 0), C (2, 3) and Q (4, 0)

Consider the triangle ΔACQ:
height of the triangle = 3 units and base(AQ)= 5 units

Area of triangle ΔACQ:

$$\text{Area of } \Delta ACQ = \left(\frac{1}{2} \times \text{Base} \times \text{Height}\right)$$

$$= \left(\frac{1}{2} \times 3 \times 5\right) \text{sq.units} = 7.5 \text{ sq.units}$$

********** END **********