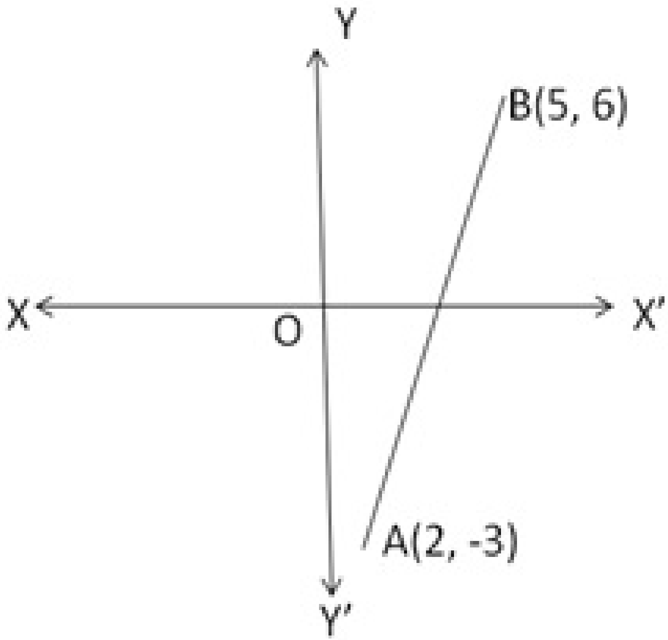
Exercise 16B

Question 17:

Let the x- axis cut the join of A(2, -3) and B(5, 6) in the ratio k : 1 at the point P

Then, by the section formula, the coordinates of P are

$$\left(\frac{5k+2}{k+1}, \frac{6k-3}{k+1}\right)$$



But P lies on the x axis so, its ordinate must be 0

$$\therefore \frac{6k-3}{k+1} = 0$$

$$\Rightarrow 6k - 3 = 0, \ k = \frac{1}{2}$$

So the required ratio is 1 : 2

Thus the x - axis divides AB in the ratio 1 : 2

Putting $k = \frac{1}{2}$ in $\frac{5k+2}{k+1}$, we get the point P as

$$P\left(\frac{5 \times \frac{1}{2} + 2}{\frac{1}{2} + 1}, 0\right) \text{ or } P(3, 0)$$

Thus, P is (3, 0) and k = 1 : 2

Question 18:
Let the y - axis cut the join A(-2, -3) and B(3, 7) at the point P in the ratio k : 1
Then, by section formula, the co-ordinates of P are

$$P\left(\frac{3k-2}{k+1}, \frac{7k-3}{k+1}\right)$$

But P lies on the y-axis so, its abscissa is 0

$$\therefore \frac{3k-2}{k+1} = 0 \Rightarrow 3k-2 = 0 \Rightarrow k = \frac{2}{3}$$

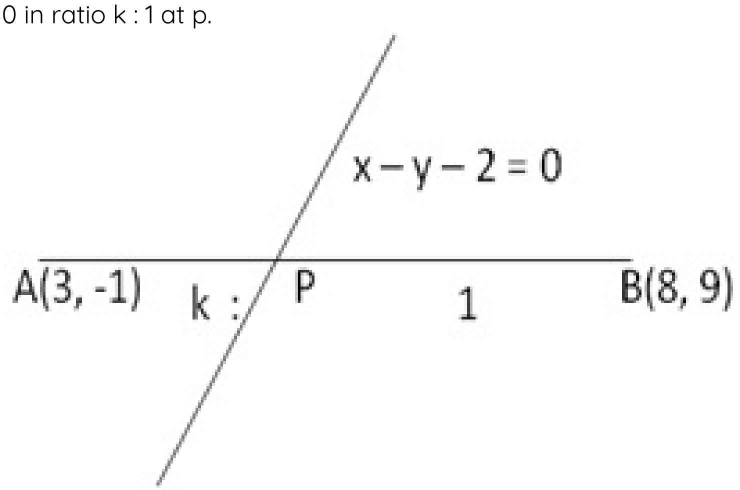
So the required ratio is 2/3 : 1 which is 2 : 3

Putting $k = \frac{2}{3}$ in $\left(0, \frac{7k-3}{k-1}\right)$ we get the point P as

$$P\left(0, \frac{7 \times \frac{2}{3} - 3}{\frac{2}{3} + 1}\right)$$

i.e., P(0, 1)
Hence the point of intersection of AB and the y - axis is P(0, 1) and P divides AB in the ratio 2 : 3

Question 19:
Let the line segment joining A(3, -1) and B(8, 9) is divided by x - y - 2 = 0 in ratio k : 1 at p.



Coordinates of P are

$$\left(\frac{k\times 8+1\times 3}{k+1}, \frac{k\times 9+1\times(-1)}{k+1}\right) \text{ or } \left(\frac{8k+3}{k+1}, \frac{9k-1}{k+1}\right)$$

P lies on the line $x - y - 2 = 0$

$$\therefore \frac{8k+3}{k+1} - \frac{9k-1}{k+1} - 2 = 0$$

Multiplying by $k+1$

$$(8k+3)-(9k-1)-2(k+1)=0$$

$$\Rightarrow 8k-9k+3+1-2k-2=0$$

$$\Rightarrow -3k+2=0 \qquad \therefore k=\frac{2}{3}$$

Thus the line x - y - 2 = 0 divides AB in the ratio 2 : 3

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