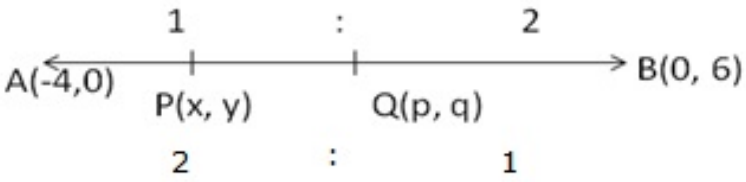
Exercise 16B

Question 4:
Let P(x, y) and Q(p, q) be the point of trisection of line segment A(-4, 0) and B(0, 6)
Then P(x, y) divides AB in the ratio 1 : 2



Here m = 1 and n = 2
$(x_1 = -4, y_1 = 0)$ and $(x_2 = 0, y_2 = 6)$

$$\therefore x = \frac{[1\times 0 + 2\times(-4)]}{(1+2)} = \frac{-8}{3}$$

$$y = \frac{[1\times(6) + 2\times 0]}{(1+2)} = \frac{6}{3} = 2$$

$$\therefore P\left(\frac{-8}{3}, 2\right) \text{ is the 1st point of trisection AB}$$

Also Q(p, q) divides AB in the ratio 2 : 1
Here m = 2 and n = 1

$$\therefore p = \frac{[2\times 0 + 1\times(-4)]}{(2+1)} = \frac{-4}{3}$$

$$\text{and } q = \frac{[2\times 6 + 1\times 0]}{(2+1)} = \frac{12}{3} = 4$$

$$\therefore Q\left(\frac{-4}{3}, 4\right) \text{ is the 2nd point of trisection of AB}$$

Hence, $P\left(\frac{-8}{3}, 2\right)$ and $Q\left(\frac{-4}{3}, 4\right)$ are required points of trisection of AB

Question 5:
Point P divides the join of A(3, -4) and B(1,2) in the ratio 1 : 2.
Coordinates of P are:

$$\left(\frac{1\times1+2\times3}{1+2}, \frac{1\times2+2\times(-4)}{1+2}\right) \text{ or } \left(\frac{7}{3}, \frac{-6}{3}\right) \text{ or } \left(\frac{7}{3}, -2\right)$$

Also the point P is $(p, -2) \Rightarrow P = \frac{7}{3}$

Further Q is the midpoint of PB when

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

$\therefore$ Coordinates of Q are $\left(\frac{\frac{7}{3}+1}{2}, \frac{-2+2}{2}\right)$ or $\left(\frac{5}{3}, 0\right)$

Also, Q is $\left(\frac{5}{3}, q\right) \Rightarrow q = 0$

hence, $p = \frac{7}{3}$ and $q = 0$

Question 6:
Let (x, y) be the coordinates of a point P which divides the line joining A(4, -5) and B(4, 5) such that AP : AB = 2 : 5

Now, $\frac{AP}{AB} = \frac{2}{5}$ or $\frac{AP}{AP+PB} = \frac{2}{5}$ $\because AB = AP + PB$

or $5AP = 2AP + 2PB$

$\Rightarrow 3AP = 2PB$

$\therefore \frac{AP}{PB} = \frac{2}{3}$

$\therefore$ Coordinates of point P are given by

$$x = \frac{2\times4+3\times4}{2+3} = \frac{8+12}{5} = \frac{20}{5} = 4$$

$$y = \frac{2\times5+3\times(-5)}{2+3} = \frac{10-15}{5} = \frac{-5}{5} = -1$$

Coordinates of P are (4, -1)

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