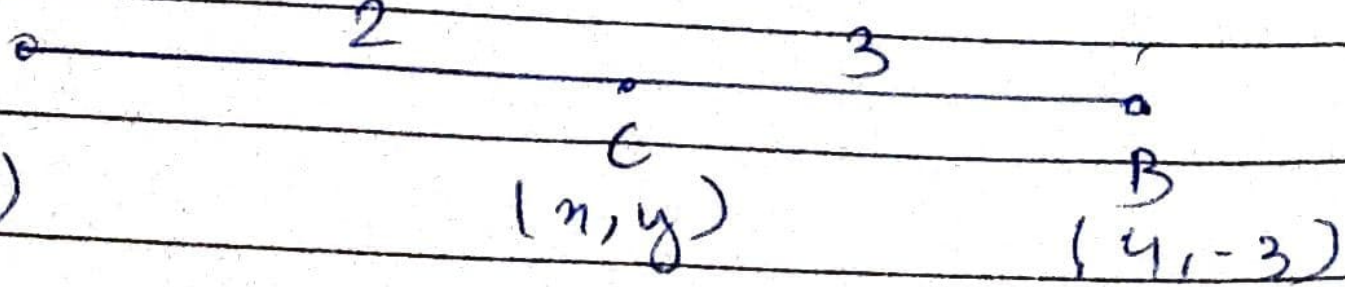
Exn-7.2

1. Let coordinates of point C be (x, y)



$$x = \frac{mx_2 + nx_1}{m+n}, \quad y = \frac{my_2 + ny_1}{m+n}$$

$$\Rightarrow x = \frac{2 \times 4 + 3 \times (-1)}{2+3}, \quad y = \frac{2 \times (-3) + 3 \times (7)}{2+3}$$

$$\Rightarrow x = \frac{8-3}{5}, \quad y = \frac{-6+21}{5}$$

$$\therefore x = 1, \quad y = 3$$

2. Lets points P and Q trisect the line joining points A B

$\therefore$ AP = PQ = QB

$$x = \frac{1 \times (-2) + 2 \times 4}{1+2} = \frac{-2+8}{3} = \frac{6}{3} = 2$$

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

$$a = \frac{2 \times (-2) + 1 \times (4)}{2+1} = \frac{-4+4}{3} = 0$$

$$b = \frac{2(-3) + 1 \times (-1)}{2+1} = \frac{-6-1}{3} = \frac{-7}{3}$$

$\therefore$ $P\left(2, \frac{5}{3}\right)$ and $Q\left(0, \frac{-7}{3}\right)$

3. The green flag is at $\frac{1}{4}$ th of total distance

$= \frac{1}{4} \times 100$

$= 25$ m in 2nd line

$\therefore$ coordinates of green flag are $(2, 25)$

Similarly, coordinates of red flag are $(8, 20)$

Distance between two flags,

$$D = \sqrt{(8-2)^2 + (20-25)^2}$$
$$= \sqrt{6^2 + (-5)^2}$$
$$= \sqrt{36 + 25}$$
$$= \sqrt{61} \text{ m}$$

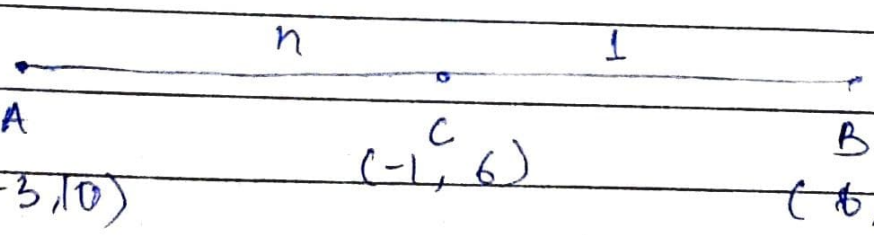
Now, blue flag is posted at midpoint of the distance of two flag.

∴ Blue flag coordinates $= \left(\frac{2+8}{2}, \frac{25+20}{2}\right)$

$= (5, 22.5)$

∴ blue flag will be posted in 5th line at distance of 22.5m.

4. Let the ~~required~~ ratio be $n:1$



$$x = \frac{mx_2 + nx_1}{m+n}$$

$$\Rightarrow -1 = \frac{n \times 6 + 1 + (-3)}{n+1} \Rightarrow -n - 1 = 6n - 3$$

$$\Rightarrow 7n = 2 \Rightarrow n = \frac{2}{7}$$

$$y = \frac{my_2 + ny_1}{m+n}$$

$$\Rightarrow 6 = \frac{n(-8) + 1 \times 10}{n+1}$$

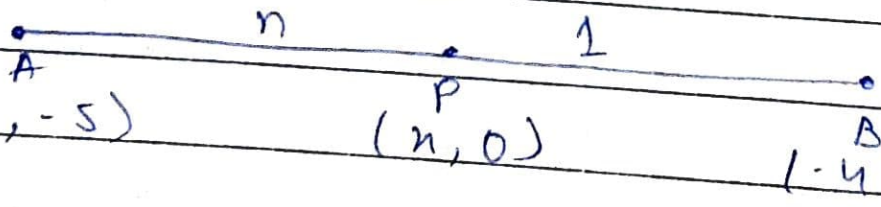
$$\Rightarrow 6n + 6 = -8n + 10$$

$$\Rightarrow 14n = 4$$

$$\Rightarrow n = \frac{4}{14} \Rightarrow n = \frac{2}{7}$$

∴ Required ratio = 2 : 7

5. Let P be $(x, 0)$ and ratio be $n : 1$



$$(x, 0) = \left(\frac{n \times -4 + 1 \times 1}{n+1}, \frac{n \times 5 + 1 \times -5}{n+1} \right)$$

$$\Rightarrow 0 = \frac{5n - 5}{n+1} \quad \text{(taking y-coordinate)}$$

$$\Rightarrow 0 = 5n - 5$$

$$\Rightarrow 5 = 5n$$

$$\Rightarrow 1 : 1 = n$$

Required ratio = 1 : 1

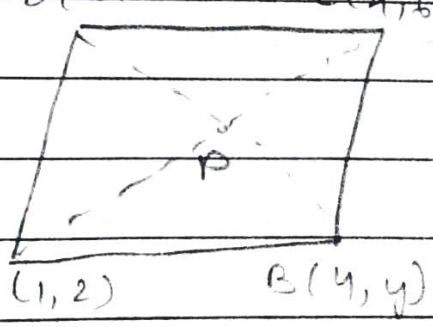
Since ratio = 1 : 1, so P is the mid point

$\therefore x = \frac{1-4}{2} = \frac{-3}{2}$

$\therefore P\left(\frac{-3}{2}, 0\right)$ is the required point

6. Mid point of AC = Mid point of BD

$\Rightarrow \frac{x+1}{2}, \frac{6+2}{2} = \frac{4+3}{2}, \frac{y+5}{2}$



$\Rightarrow \frac{x+1}{2} = \frac{7}{2}$ and $\frac{6+2}{2} = \frac{y+5}{2}$

$\Rightarrow x+1 = 7$ and $8 = y+5$

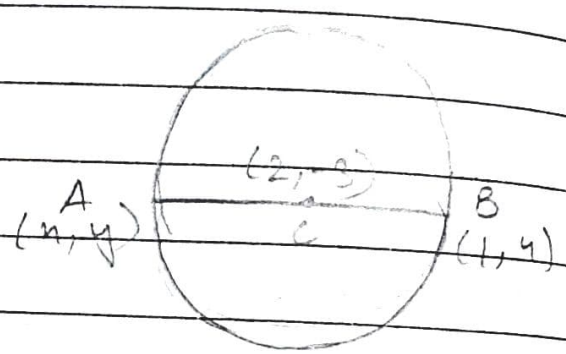
$\Rightarrow x = 6$ and $y = 3$

7. Let coordinates of A be (x, y)

Then $C(2, -3)$ is the mid point of AB (diameter)

Coordinate of $C = \left(\frac{x+1}{2}, \frac{y+4}{2}\right)$

$\Rightarrow 2 = \frac{x+1}{2} \Rightarrow x = 3$



$\Rightarrow -3 = \frac{y+4}{2} \Rightarrow y = -10$

$\therefore$ A (3, -10) is the required coordinate

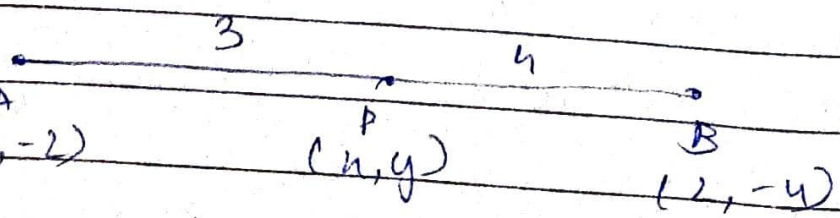
9. $AP = \frac{3}{7} AB$

$BP = AB - AP$

$= AB - \frac{3}{7} AB = \frac{7AB - 3AB}{7}$

$= \frac{4AB}{7}$

$\frac{AP}{BP} = \frac{\frac{3}{7} AB}{\frac{4}{7} AB} = 3:4$

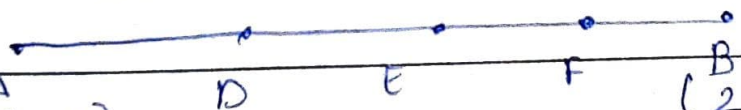


$$x = \frac{3(2) + 4(-2)}{3+4} = \frac{6-8}{7} = \frac{-2}{7}$$

$$y = \frac{3(-4) + 4(-2)}{3+4} = \frac{-12-8}{7} = \frac{-20}{7}$$

$\therefore$ coordinates of P are $\left(\frac{-2}{7}, \frac{-20}{7}\right)$

9. Let points D, E, F divide AB into four equal parts such that AD = DE = EF = FB



E is the mid point of AB

$\therefore$ coordinates of $E = \left(\frac{-2+2}{2}, \frac{2+8}{2}\right) = (0, 5)$

D is the mid point of AE

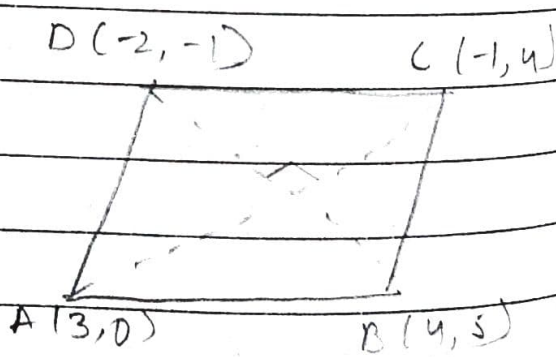
$\therefore$ $D = \left(\frac{-2+0}{2}, \frac{2+5}{2}\right) = \left(-1, \frac{7}{2}\right)$

F is the mid point of EB

$\therefore F = \left(\frac{0+2}{2}, \frac{5+8}{2}\right) = \left(1, \frac{13}{2}\right)$

$\therefore$ required points are $\left(-1, \frac{7}{2}\right)$, $(0, 5)$ and $\left(1, \frac{13}{2}\right)$

10. Let point A $(3, 0)$, B $(4, 5)$, C $(-1, 4)$ and D $(-2, -1)$



$AC = \sqrt{(-1-3)^2 + (4-0)^2}$

$= \sqrt{16+16}$

$= \sqrt{32} = 4\sqrt{2}$

$BD = \sqrt{(4+2)^2 + (5+1)^2}$

$= \sqrt{36+36} = 6\sqrt{2}$

Area of rhombus $= \frac{1}{2} \times AC \times BD$

$= \frac{1}{2} \times 4\sqrt{2} \times 6\sqrt{2}$

$= \frac{1}{2} \times 4 \times 6 \times 2$

$= 24$ square units