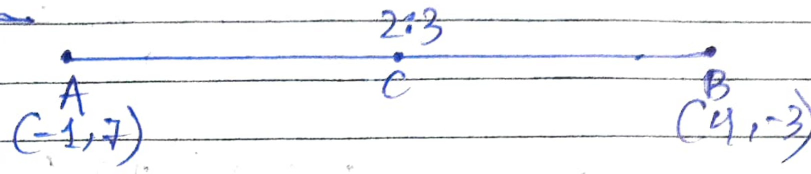
Ex - 7.2

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



x- coordinate of $C = \dfrac{mx_2 + nx_1}{m+n}$

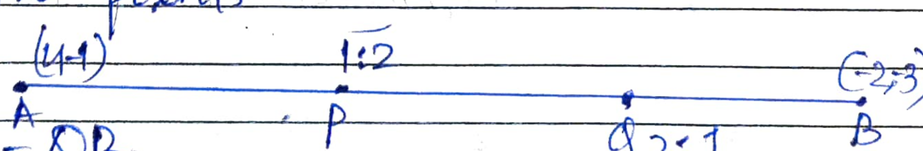
$= \dfrac{2 \times 4 + 3 \times (-1)}{2+3} = \dfrac{8-3}{5} = 1$

y - coordinate of $C = \dfrac{my_2 + ny_1}{m+n}$

$= \dfrac{2 \times (-3) + 3 \times (7)}{2+3} = \dfrac{-6+21}{5} = 3.$

The coordinates of C are $(1, 3)$

2. Let point P and Q trisect the line joining the points.



$\therefore AP = PQ = QB.$

P divides AB in the ratio $1:2$ and Q divides AB in the ratio $= 2:1$

$P(x\text{-coordinate}) = \dfrac{1 \times (-2) + 2 \times 4}{1+2}$

$= \dfrac{-2+8}{3} = \dfrac{6}{3} = 2$

$P(y\text{-coordinate}) = \dfrac{1 \times (-3) + 2 \times (-1)}{1+2}$

$= \dfrac{-3-2}{3} = \dfrac{5}{3}$

The coordinates of P are $\left(2, \frac{5}{3}\right)$

$Q(x\text{ - coordinate} = \dfrac{2 \times (-2) + 1 \times (4)}{2+1}$

$= \dfrac{-4+4}{3} = 0$

$O(y\text{-coordinate}) = \dfrac{2(-3) + 1 \times (-1)}{2+1}$

$= \dfrac{-6-1}{3} = -\dfrac{7}{3}$

The coordinates of Q are $\left(0, \frac{7}{3}\right)$

3. Taking A as (0,0), x-axis along AB and y-axis along AD, we will obtain the coordinates of the green flag and the red flag

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

$= \frac{1}{4} \times 100 = 25m$ in 2nd line.

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

Coordinates of red flag $= (8, 20)$

Distance between two flags.

$$D = \sqrt{(8-2)^2 + (20-25)^2}$$

$$= \sqrt{(6)^2 + (-5)^2} = \sqrt{36 + 25} = \sqrt{61}\ m.$$

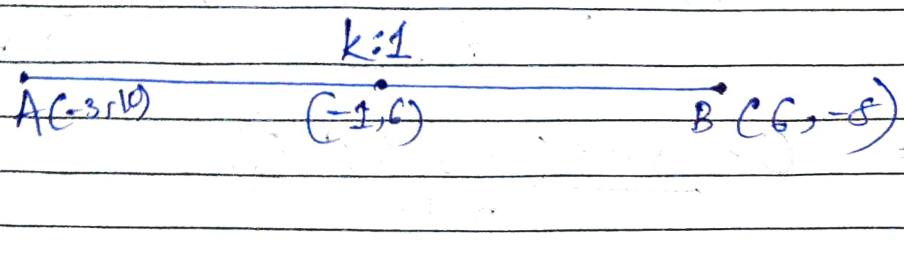
Now, blue flag is posted at the mid point of the distance between two flags.

$\therefore$ Coordinates of blue flag $= \left(\frac{2+8}{2}, \frac{25+20}{2}\right)$

$= (5, 22.5)$

Hence, the blue flag will be posted in 5th line at a distance of 22.5m.

4. Let ratio be $k:1$



$$x = \frac{m_1 x_2 + m_2 x_1}{m_1 + m_2}$$

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

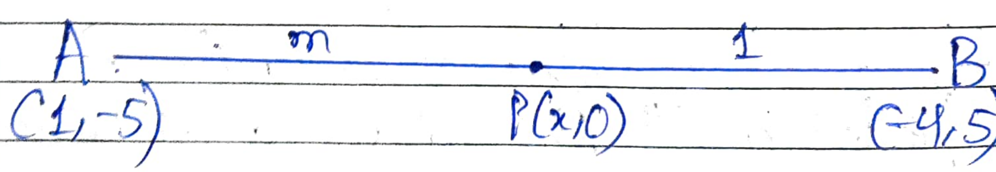
$$-k-1 = 6k - 3 \Rightarrow 7k = 2 \Rightarrow k = \frac{2}{7}$$

$$y = \frac{m_1 y_2 + m_2 y_1}{m_1 + m_2}$$

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

$$\Rightarrow 6k + 6 = -8k + 10 \Rightarrow 14k = 4 \Rightarrow k = \frac{4}{14} = \frac{2}{7}$$

5. Let $P(x, 0)$ be the point which divides the line segment joining $A(1, -5)$ and $B(-4, 5)$ in the ratio $m : 1$.



Then using section formula, we get:

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

$$0 = \frac{m \times 5 + 1 \times (-5)}{m+1}$$

$\Rightarrow 5m - 5 = 0$

$\Rightarrow m = 1$

$\Rightarrow m : 1 = 1 : 1$

Hence, the required ratio is 1:1

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

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

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

6. Mid point of AC = Mid point of BD

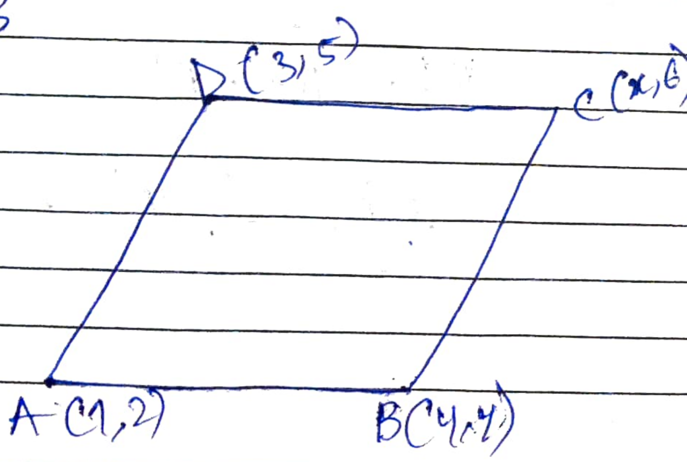
$\Rightarrow \frac{x+1}{2}, \frac{6+2}{2} = \frac{4+3}{2}, \frac{y+5}{2}$

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

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

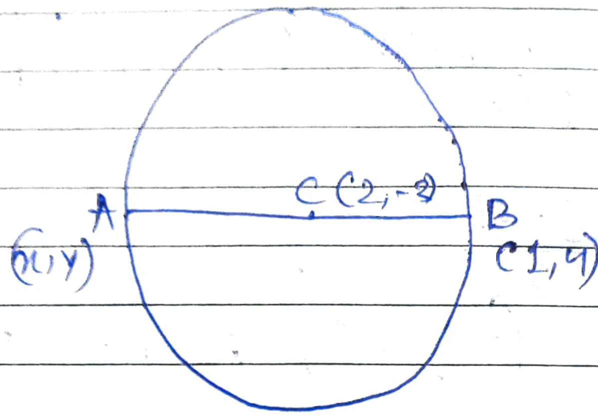
$\Rightarrow x = 7 - 1$ and $y = 8 - 5 = 3$

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



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

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



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

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

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

Hence, the coordinates of A are $(3, -10)$.

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

$BP = AB - AP$

$= \frac{AB}{1} - \frac{3}{7} AB = \frac{7AB - 3AB}{7} = \frac{4AB}{7}$

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

$A(-2,-2)$ —— $3:4$ —— $P(x,y)$ —— $B(2,-4)$

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

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

Hence, the coordinate of P are $\left(\frac{-2}{7}, \frac{-20}{7}\right)$

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

A —— D —— E —— F —— B

$A(-2,2)$ $\qquad$ $B(2,8)$

From the above fig, 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.

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

$$= \left(-1, \frac{7}{2}\right)$$

F is midpoint of CB:

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

$= \left(1, \frac{13}{2}\right)$

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

10. Let points be $A(3,0)$, $B(4,5)$, $C(-1,4)$ 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 a 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.