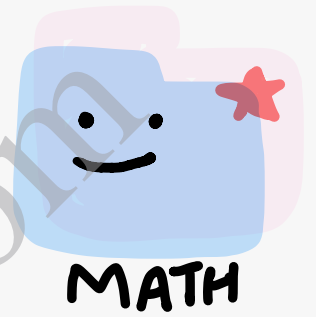


Coordinate Geometry

Ex. 7.2



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Ex: 7.2

1. Let $P(x, y)$ divide the line joining points $A(-1, 7)$ and $B(4, -3)$ in the ratio $2:3$

\therefore by section formula

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

or $x = \frac{8-3}{5}$ or $y = \frac{-6+21}{5}$

or $x = \frac{5}{5} = 1$ or $y = \frac{15}{5} = 3$

or $x = 1$ or $y = 3$

\therefore Coordinates of P are $(1, 3)$

2. Let $P(x, y)$ divide the line joining $A(4, -1)$ and $B(-2, -3)$ in the ratio $1:2$

\therefore by section formula

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

or $x = \frac{-2+8}{3}$ or $y = \frac{-3-2}{3}$

or $x = \frac{6}{3} = 2$ or $y = \frac{-5}{3}$

or $x = 2$

Coordinates of P are $(2, -\frac{5}{3})$

Let $Q(a, b)$ divide the line joining $A(4, -1)$ and $B(-2, -3)$ in the ratio $2:1$

\therefore by section formula

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

$$\text{or } a = \frac{-4+4}{3} \quad \text{or } b = \frac{-6-1}{3}$$

$$\text{or } a = \frac{0}{3} \quad \text{or } b = -\frac{7}{3}$$

$$\text{or } a = 0$$

\therefore Coordinates of Q are $(0, -\frac{7}{3})$

3. $AD = 100 \text{ m}$

$$\text{Distance covered by Niharika} = \frac{1}{4} \times 100 = 25 \text{ m}$$

$$\text{Distance covered by Preet} = \frac{1}{5} \times 100 = 20 \text{ m}$$

Let Niharika post her flag at $P(2, 25)$
and Preet at $Q(8, 20)$.

$$\begin{aligned} \text{Distance between two flags, } PQ &= \sqrt{(8-2)^2 + (20-25)^2} \\ &= \sqrt{6^2 + (-5)^2} \\ &= \sqrt{36+25} \\ &= \sqrt{61} \text{ m} \end{aligned}$$

Let Rashmi post her blue flag at point Q
Since Q is the midpoint of PQ

\therefore by midpoint formula

$$\text{Coordinates of Q are } \left(\frac{2+8}{2}, \frac{25+20}{2} \right)$$

$$\left(\frac{10}{2}, \frac{45}{2} \right)$$

$$(5, 22.5)$$

\therefore Rashmi posts her flag in 5th line at
22.5 m

4. Let $P(-1, 6)$ divide the line joining points $A(-3, 10)$ and $B(6, -8)$ in the ratio $k:1$
 \therefore by section formula

$$\text{Coordinates of } P \text{ are } \left[\frac{6k+1(-3)}{k+1}, \frac{-8k+1 \times 10}{k+1} \right]$$
$$\left(\frac{6k-3}{k+1}, \frac{-8k+10}{k+1} \right)$$

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

or $6k-3 = -k-1$

or $7k = 2$

or $k = \frac{2}{7}$

\therefore Required ratio is $\frac{2}{7} : 1$

or $2:7$

5. Let x -axis divides the line joining $A(1, -5)$ and $B(-4, 5)$ in the ratio $k:1$

\therefore by section formula

$$\text{Coordinates of } P \text{ are } \left(\frac{-4k+1}{k+1}, \frac{5k-5}{k+1} \right)$$

Since the ordinate of any point on x -axis is zero.

$$\therefore \frac{5k-5}{k+1} = 0$$

or $5k-5 = 0$

or $5k = 5$

or $k = \frac{5}{5} = 1$

or $k = 1$

∴ Required ratio is 1:1

Coordinates of point of intersection are

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

or $\left(-\frac{3}{2}, 0 \right)$

6. Let $A(1, 2)$, $B(4, y)$, $C(x, 6)$, $D(3, 5)$ be the vertices of the parallelogram.

The diagonals of a parallelogram bisect each other.

∴ Coordinates of midpoint of diagonal AC
= coordinates of midpoint of diagonal BD

or $\left(\frac{1+x}{2}, \frac{2+6}{2} \right) = \left(\frac{4+3}{2}, \frac{y+5}{2} \right)$ (by midpoint formula)

or $\left(\frac{x+1}{2}, \frac{8}{2} \right) = \left(\frac{7}{2}, \frac{y+5}{2} \right)$

$$\therefore \frac{x+1}{2} = \frac{7}{2}$$

$$\frac{8}{2} = \frac{y+5}{2}$$

or $x+1 = 7$

$$8 = y+5$$

or $x = 7-1$

$$y = 8-5$$

or $x = 6$

$$y = 3$$

7. Let the coordinates of point A be (x, y) and point O $(2, 3)$ and B $(1, 4)$

Since O is the centre of the circle and AB is the diameter.

∴ $OA = OB$ (each = radius)

∴ O is the midpoint of AB.

by midpoint formula

Coordinates of O are $(\frac{x+1}{2}, \frac{y+4}{2})$

$$\therefore \frac{x+1}{2} = 2 \quad \text{and} \quad \frac{y+4}{2} = -3 \quad [\because \text{coordinates of O}(2, -3)]$$

or $x+1=4$

or $y+4=-6$

or $x=4-1$

or $y=-6-4$

or $x=3$

or $y=-10$

\therefore Coordinates of point A(3, -10)

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

or $7AP = 3AB$



or $7AP = 3(AP + BP)$

or $7AP = 3AP + 3BP$

or $7AP - 3AP = 3BP$

or $4AP = 3BP$

or $\frac{AP}{BP} = \frac{3}{4}$

or $AP : BP = 3 : 4$

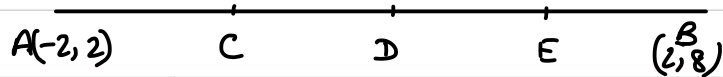
By section formula

Coordinates of P $(\frac{3 \times 2 + 4 \times (-2)}{3+4}, \frac{3(-4) + 4(-2)}{3+4})$

or $P(\frac{6-8}{7}, \frac{-12-8}{7})$

or $P(\frac{-2}{7}, \frac{-20}{7})$

9. Let points C, D, E divide the line segment joining points A and B into four equal parts.



\therefore D is the midpoint of AB ($\because AD = BD$)
by midpoint formula

$$\text{Coordinates of D } \left(\frac{-2+2}{2}, \frac{2+8}{2} \right) \text{ or } D(0, 5)$$

Since C is the midpoint of AD ($\because AC = DC$)

\therefore by midpoint formula

$$\text{Coordinates of C } \left(\frac{-2+0}{2}, \frac{2+5}{2} \right) \text{ or } C\left(-1, \frac{7}{2}\right)$$

Since E is the midpoint of BD ($\because DE = BE$)

\therefore by midpoint formula

$$\text{Coordinates of E } \left(\frac{0+2}{2}, \frac{5+8}{2} \right) \text{ or } E\left(1, \frac{13}{2}\right)$$

10. Let the vertices of rhombus be A(3, 0), B(4, 5), C(-1, 4) and D(-2, -1).

By distance formula

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

or $AC = \sqrt{(-4)^2 + 4^2}$

or $AC = \sqrt{16+16}$

or $AC = 4\sqrt{2}$

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

or $BD = \sqrt{(-6)^2 + (-6)^2}$

or $BD = \sqrt{36+36}$

or $BD = 6\sqrt{2}$

Since AC and BD are the diagonals of rhombus ABCD.

$$\therefore \text{Area of rhombus} = \frac{1}{2} \times AC \times BD \quad \left(= \frac{1}{2} \times d_1 \times d_2 \right)$$

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

$$= \frac{48}{2} \times 2$$

$$= 24 \text{ sq. units}$$

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