

**Exercise 7.2**

**1. Find the coordinates of the point which divides the join of  $(-1, 7)$  and  $(4, -3)$  in the ratio 2:3.**

**Ans.** Let  $x_1 = -1$ ,  $x_2 = 4$ ,  $y_1 = 7$  and  $y_2 = -3$ ,  $m_1 = 2$  and  $m_2 = 3$

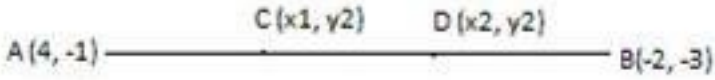
Using Section Formula to find coordinates of point which divides join of  $(-1, 7)$  and  $(4, -3)$  in the ratio 2:3, we get

$$x = \frac{m_1x_2 + m_2x_1}{m_1 + m_2} = \frac{2 \times 4 + 3 \times (-1)}{2 + 3} = \frac{8 - 3}{5} = \frac{5}{5} = 1$$

$$y = \frac{m_1y_2 + m_2y_1}{m_1 + m_2} = \frac{2 \times (-3) + 3 \times 7}{2 + 3} = \frac{-6 + 21}{5} = \frac{15}{5} = 3$$

Therefore, the coordinates of point are  $(1, 3)$  which divides join of  $(-1, 7)$  and  $(4, -3)$  in the ratio 2:3.

**2. Find the coordinates of the points of trisection of the line segment joining  $(4, -1)$  and  $(-2, -3)$ .**

**Ans.** 

BELIEVE YOURSELF

We want to find coordinates of the points of trisection of the line segment joining  $(4, -1)$  and  $(-2, -3)$ .

We are given  $AC = CD = DB$

We want to find coordinates of point C and D.

Let coordinates of point C be  $(x_1, y_1)$  and let coordinates of point D be  $(x_2, y_2)$ . Clearly, point C divides line segment AB in 1:2 and point D divides line segment AB in 2:1.

Using Section Formula to find coordinates of point C which divides join of  $(4, -1)$  and  $(-2, -3)$

in the ratio 1:2, we get

$$x_1 = \frac{1 \times (-2) + 2 \times 4}{1+2} = \frac{-2+8}{3} = \frac{6}{3} = 2$$

$$y_1 = \frac{1 \times (-3) + 2 \times (-1)}{1+2} = \frac{-3-2}{3} = \frac{-5}{3}$$

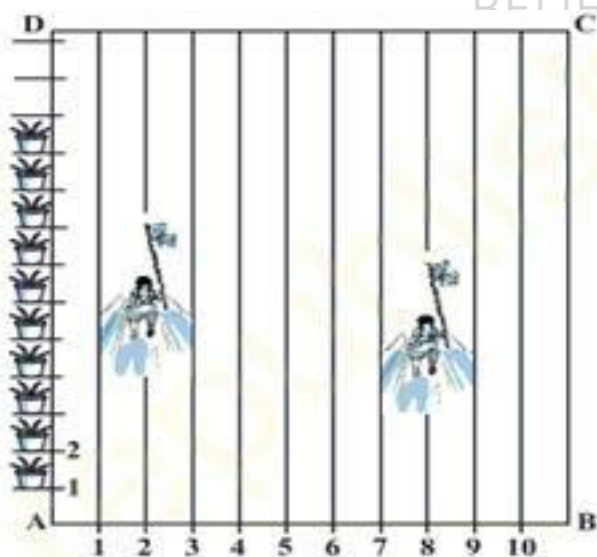
Using Section Formula to find coordinates of point D which divides join of (4, -1) and (-2, -3) in the ratio 2:1, we get

$$x_2 = \frac{2 \times (-2) + 1 \times 4}{1+2} = \frac{-4+4}{3} = \frac{0}{3} = 0$$

$$y_2 = \frac{2 \times (-3) + 1 \times (-1)}{1+2} = \frac{-6-1}{3} = \frac{-7}{3}$$

Therefore, coordinates of point C are  $(2, -\frac{5}{3})$  and coordinates of point D are  $(0, -\frac{7}{3})$

**3. To conduct sports day activities, in your rectangular shaped school ground ABCD, lines have been drawn with chalk powder at a distance of 1 m each. 100 flower pots have been placed at a distance of 1 m from each other along AD. Niharika runs 14th of the distance AD on the 2nd line and posts a green flag. Preet runs 15th of the distance AD on the eighth line and posts a red flag. What is the distance between both the flags? If Rashmi has to post a blue flag exactly halfway between the line segment joining the two flags, where should she post her flag?**



**Ans.** Niharika runs 14<sup>th</sup> of the distance AD on the 2<sup>nd</sup> line and posts a green flag.

There are 100 flower pots. It means, she stops at 25th flower pot.

Therefore, the coordinates of point where she stops are (2 m, 25 m).

Preet runs 15th of the distance AD on the eighth line and posts a red flag. There are 100 flower pots. It means, she stops at 20th flower pot.

Therefore, the coordinates of point where she stops are (8, 20).

Using Distance Formula to find distance between points (2 m, 25 m) and (8 m, 20 m), we get

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

Rashmi posts a blue flag exactly halfway the line segment joining the two flags.

Using section formula to find the coordinates of this point, we get

$$x = \frac{2+8}{2} = \frac{10}{2} = 5$$

$$y = \frac{25+20}{2} = \frac{45}{2}$$

Therefore, coordinates of point, where Rashmi posts her flag are  $(5, \frac{45}{2})$ .

It means she posts her flag in 5th line after covering  $\frac{45}{2} = 22.5$  m of distance.

**4. Find the ratio in which the line segment joining the points (-3, 10) and (6, -8) is divided by (-1, 6).**

**Ans.** Let (-1, 6) divides line segment joining the points (-3, 10) and (6, -8) in k:1.

Using Section formula, we get

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

$$\Rightarrow -k - 1 = (-3 + 6k)$$

$$\Rightarrow -7k = -2$$

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

Therefore, the ratio is  $\frac{2}{7} : 1$  which is equivalent to 2:7.

Therefore,  $(-1, 6)$  divides line segment joining the points  $(-3, 10)$  and  $(6, -8)$  in 2:7.

**5. Find the ratio in which the line segment joining A (1, -5) and B (-4, 5) is divided by the x-axis. Also find the coordinates of the point of division.**

**Ans.** Let the coordinates of point of division be  $(x, 0)$  and suppose it divides line segment joining A (1, -5) and B (-4, 5) in  $k:1$ .

According to Section formula, we get

$$x = \frac{1 \times 1 + (-4) \times k}{k+1} = \frac{1-4k}{k+1} \text{ and } 0 = \frac{(-5) \times 1 + 5k}{k+1} \dots (1)$$

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

$$\Rightarrow 5 = 5k$$

$$\Rightarrow k = 1$$

Putting value of  $k$  in (1), we get

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

Therefore, point  $(\frac{-3}{2}, 0)$  on x-axis divides line segment joining A (1, -5) and B (-4, 5) in 1:1.

**6. If (1, 2), (4, y), (x, 6) and (3, 5) are the vertices of a parallelogram taken in order, find x and y.**

**Ans.** Let  $A = (1, 2)$ ,  $B = (4, y)$ ,  $C = (x, 6)$  and  $D = (3, 5)$

We know that diagonals of parallelogram bisect each other. It means that coordinates of midpoint of diagonal AC would be same as coordinates of midpoint of diagonal BD. ... (1)

Using Section formula, the coordinates of midpoint of AC are:

$$\frac{1+x}{2}, \frac{2+6}{2} = \frac{1+x}{2}, 4$$

Using Section formula, the coordinates of midpoint of BD are:

$$\frac{4+3}{2}, \frac{5+y}{2} = \frac{7}{2}, \frac{5+y}{2}$$

According to condition (1), we have

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

$$\Rightarrow (1+x) = 7$$

$$\Rightarrow x = 6$$

Again, according to condition (1), we also have

$$4 = \frac{5+y}{2}$$

$$\Rightarrow 8 = 5 + y$$

$$\Rightarrow y = 3$$

Therefore,  $x = 6$  and  $y = 3$

**7. Find the coordinates of a point A, where AB is the diameter of a circle whose centre is (2, -3) and B is (1, 4).**

**Ans.** We want to find coordinates of point A. AB is the diameter and coordinates of center

are  $(2, -3)$  and, coordinates of point B are  $(1, 4)$ .

Let coordinates of point A are  $(x, y)$ . Using section formula, we get

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

$$\Rightarrow 4 = x + 1$$

$$\Rightarrow x = 3$$

Using section formula, we get

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

$$\Rightarrow -6 = 4 + y$$

$$\Rightarrow y = -10$$

Therefore, Coordinates of point A are  $(3, -10)$ .

**8. If A and B are  $(-2, -2)$  and  $(2, -4)$  respectively, find the coordinates of P such that  $AP = \frac{3}{7} AB$  and P lies on the line segment AB.**

**Ans.** A =  $(-2, -2)$  and B =  $(2, -4)$



It is given that  $AP = \frac{3}{7} AB$

$$PB = AB - AP = AB - \frac{3}{7} AB = \frac{4}{7} AB$$

So, we have  $AP: PB = 3: 4$

Let coordinates of P be  $(x, y)$

Using Section formula to find coordinates of P, we get

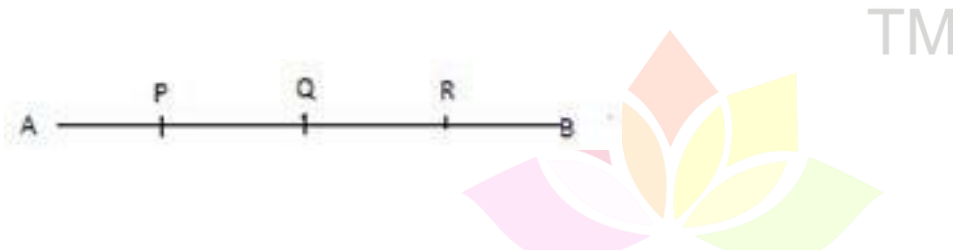
$$x = \frac{(-2) \times 4 + 2 \times 3}{3 + 4} = \frac{6 - 8}{7} = \frac{-2}{7}$$

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

Therefore, Coordinates of point P are  $\left(\frac{-2}{7}, \frac{-20}{7}\right)$ .

**9. Find the coordinates of the points which divides the line segment joining A (-2, 2) and B (2, 8) into four equal parts.**

**Ans.** A = (-2, 2) and B = (2, 8)



Let P, Q and R are the points which divide line segment AB into 4 equal parts.

Let coordinates of point  $P = (x_1, y_1)$ ,  $Q = (x_2, y_2)$  and  $R = (x_3, y_3)$ .

We know  $AP = PQ = QR = RS$ .

It means, point P divides line segment AB in 1:3.

Using Section formula to find coordinates of point P, we get

$$x_1 = \frac{(-2) \times 3 + 2 \times 1}{1 + 3} = \frac{-6 + 2}{4} = \frac{-4}{4} = -1$$

$$y_1 = \frac{2 \times 3 + 8 \times 1}{1 + 3} = \frac{6 + 8}{4} = \frac{14}{4} = \frac{7}{2}$$

Since,  $AP = PQ = QR = RS$ .

It means, point Q is the mid-point of AB.

Using Section formula to find coordinates of point Q, we get

$$x_2 = \frac{(-2) \times 1 + 2 \times 1}{1 + 1} = \frac{-2 + 2}{2} = \frac{0}{2} = 0$$

$$y_2 = \frac{2 \times 1 + 8 \times 1}{1 + 1} = \frac{2 + 8}{2} = \frac{10}{2} = 5$$

Because,  $AP = PQ = QR = RS$ .

It means, point R divides line segment AB in 3:1

Using Section formula to find coordinates of point P, we get

$$x_3 = \frac{(-2) \times 1 + 2 \times 3}{1+3} = \frac{-2+6}{4} = \frac{4}{4} = 1$$

$$y_3 = \frac{2 \times 1 + 8 \times 3}{1+3} = \frac{2+24}{4} = \frac{26}{4} = \frac{13}{2}$$

Therefore,  $P = (-1, \frac{7}{2})$ ,  $Q = (0, 5)$  and  $R = (1, \frac{13}{2})$

**10. Find the area of a rhombus if its vertices are (3, 0), (4, 5), (-1, 4) and (-2, -1) taken in order. {Hint: Area of a rhombus =  $\frac{1}{2}$  (product of its diagonals)}**

**Ans.** Let  $A = (3, 0)$ ,  $B = (4, 5)$ ,  $C = (-1, 4)$  and  $D = (-2, -1)$

Using Distance Formula to find length of diagonal AC, we get

$$AC = \sqrt{[3 - (-1)]^2 + (0 - 4)^2} = \sqrt{4^2 + (-4)^2} = \sqrt{16 + 16} = \sqrt{32} = 4\sqrt{2}$$

Using Distance Formula to find length of diagonal BD, we get

$$BD = \sqrt{[4 - (-2)]^2 + [5 - (-1)]^2} = \sqrt{6^2 + 6^2} = \sqrt{36 + 36} = \sqrt{72} = 6\sqrt{2}$$

$\therefore$  Area of rhombus =  $\frac{1}{2}$  (product of its diagonals)

$$= \frac{1}{2} \times AC \times BD = \frac{1}{2} \times 4\sqrt{2} \times 6\sqrt{2} = 24 \text{ sq. units}$$