CBSE 10th

TEEVRA EDUTECH PVT. LTD.

Coordinate Geometry
Exercise–7.2

Q.1 Find the coordinates of the point which divides the join of (− 1, 7) & (4, − 3) in the ratio 2:3.

Sol: Let P(x, y) be the required point. Using the section formula, we obtain

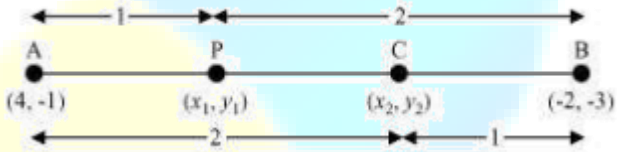
$$x = \frac{2\times 4+3\times(-1)}{2+3} = \frac{8-3}{5} = \frac{5}{5} = 1$$

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

Therefore, the point is (1, 3).

Q.2 Find the coordinates of the points of trisection of the line segment joining (4, − 1) and (− 2, − 3).

Sol: Let P (x_1, y_1) and Q (x_2, y_2) are the points of trisection of the line segment joining the given points



i.e., AP = PQ = QB

Therefore, point P divides AB internally in the ratio 1 : 2.

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

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

$$\text{Therefore, } P(x_1, y_1) = \left(2, -\frac{5}{3}\right)$$

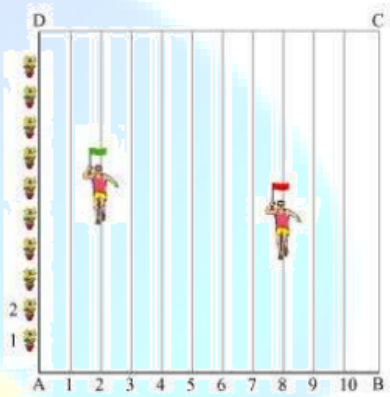
Point Q divides AB internally in the ratio 2:1.

$$x_2 = \frac{2\times(-2)+1\times 4}{2+1} = \frac{-4+4}{3} = \frac{6}{3} = 2$$

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

$$\text{Therefore, } Q(x_2, y_2) = \left(0, -\frac{7}{3}\right)$$

Q.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, as shown in the following figure. Niharika $\frac{1}{4}$th runs the distance AD on the 2nd line and posts a green flag. Preet $\frac{1}{5}$th runs the distance AD on the 8th 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?



Sol:

It can be observed that Niharika posted the green flag at of the distance AD i.e., $\left(\frac{1}{4}\times 100\right)\text{m} = 25\,\text{m}$ from the starting point of 2nd line. Therefore, the coordinates of this point G is (2, 25).

Similarly, Preet posted red flag at of the distance AD i.e., $\left(\frac{1}{5}\times 100\right)\text{m} = 20\,\text{m}$ from the starting point of 8th line. Therefore, the coordinates of this point R are (8, 20).

Distance between these flags by using distance formula = GR

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

The point at which Rashmi should post her blue flag is the mid-point of the line joining these points.

Let this point be A (x, y).

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

$$y = \frac{25+20}{2} = \frac{45}{5} = 9$$

$$\text{Hence, } A(x, y) = (5, 22.5)$$

Therefore, Rashmi should post her blue flag at 22.5m on 5th line.

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

Sol: Let the ratio in which the line segment joining $(-3, 10)$ and $(6, -8)$ is divided by point $(-1, 6)$ be $k : 1$.

$$\text{Therefore, } -1 = \frac{6k-3}{k+1}$$

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

$$7k = 2$$

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

$$\text{Therefore, the required ratio is } 2 : 7$$

Q.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.

Sol: Let the ratio in which the line segment joining A $(1, -5)$ and B $(-4, 5)$ is divided by x-axis be $k : 1$.

Therefore, the coordinates of the point of division is $\left(\frac{-4k+1}{k+1}, \frac{5k-5}{k+1}\right)$.

We know that y-coordinate of any point on x-axis is 0.

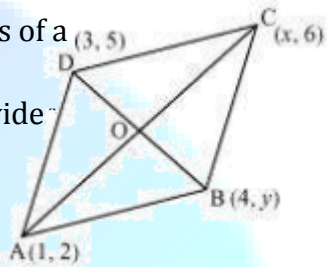
$$\therefore \frac{5k-5}{k+1}=0, k=1$$

Therefore, x-axis divides it in ratio 1 : 1.

$$\text{Division point}=\left(\frac{-4(1)+1}{1+1},\frac{5(1)-5}{1+1}\right)\left(\frac{-4+1}{2},\frac{5-5}{2}\right)=\left(\frac{-3}{2},0\right)$$

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

Sol: Let (1, 2), (4, y), (x, 6), and (3, 5) are the coordinates of A, B, C, D vertices of a parallelogram ABCD. Intersection point O of diagonal AC and BD also divide these diagonals.



Therefore, O is the mid-point of AC and BD.

If O is the mid-point of AC, then the coordinates of O are

$$\left(\frac{1+x}{2},\frac{2+6}{2}\right)\Rightarrow\left(\frac{x+1}{2},4\right)$$

If O is the mid-point of BD, then the coordinates of O are

$$\left(\frac{4+3}{2},\frac{5+y}{2}\right)\Rightarrow\left(\frac{7}{2},\frac{5+y}{2}\right)$$

Since both the coordinates are of the same point O,

$$\therefore \frac{x+1}{2}=\frac{7}{2}\text{ and }4=\frac{5+y}{2}$$
$$\Rightarrow x+1=7\text{ and }5+y=8$$
$$\Rightarrow x=6\text{ and }y=3$$

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

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

Mid-point of AB is $(2, -3)$, which is the center of the circle.

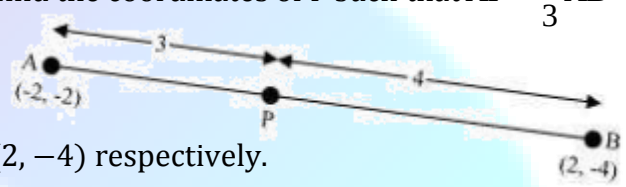
$$\therefore (2,-3)=\left(\frac{x+1}{2},\frac{y+4}{2}\right)$$

$$\Rightarrow \frac{x+1}{2}=2 \text{ and } \frac{y+4}{2}=-6$$

$$\Rightarrow x+1=4 \text{ and } y+4=-6$$

$$\Rightarrow x=3 \text{ and } y=-10$$

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



Sol: The coordinates of point A and B are $(-2, -2)$ and $(2, -4)$ respectively.

Since $AP=\frac{7}{3}AB$,

Therefore, AP: PB = 3:4

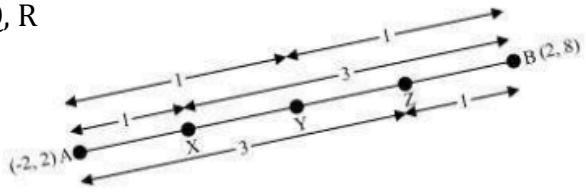
Point P divides the line segment AB in the ratio 3:4.

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

$$=\left(\frac{6-8}{7},\frac{-12-8}{7}\right)=\left(\frac{-2}{7},\frac{-20}{7}\right)$$

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

Sol: From the figure, it can be observed that points P, Q, R are dividing the line segment in a ratio 1:3, 1:1, 3:1 respectively.



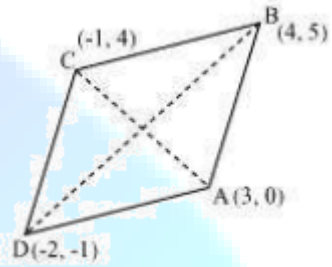
$$\text{Coordinates of P} = \left(\frac{1\times 2+3\times(-2)}{1+3}, \frac{1\times 8+3\times 2}{1+3}\right) = \left(-1, \frac{7}{2}\right)$$

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

$$\text{Coordinates of R} = \left(\frac{3\times 2+1\times(-2)}{3+1}, \frac{3\times 8+1\times 2}{3+1}\right) = \left(1, \frac{13}{2}\right)$$

Q.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)]



Sol: Let (3, 0), (4, 5), (−1, 4) and (−2, −1) are the vertices A, B, C, D of a rhombus ABCD.

$$\text{Length of diagonal AC} = \sqrt{(3-(-1))^2+(0-4)^2}$$
$$= \sqrt{16+16} = 4\sqrt{2}$$

$$\text{Length of diagonal BD} = \sqrt{(4-(-2))^2+(5-(-1))^2}$$
$$= \sqrt{36+36} = 6\sqrt{2}$$

$$\text{Therefore, area of Rhombus ABCD} = \frac{1}{2}\times 4\sqrt{2}\times 6\sqrt{2}$$
$$= 24 \text{ Squre units}$$