19. Co-ordinate Geometry: Internal and External Division of Straight Line Segment

Let us Calculate 19

1 A. Question

Find the co-ordinates of the point which divides the line segment joining two point s in the given ratio for the following:

(6, −4) and (−8, 10); in the ratio 3: 4 internally

Answer

Let the co-ordinates of the point which divides the line segment be (x, y) –

And, we know, by section formula

$$x = \frac{mx_2 + nx_1}{m + n} \text{ and } y = \frac{my_2 + ny_1}{m + n}$$

(Where, m and n are the ratios, (x_1, y_1) and (x_2, y_2) are the coordinates of the line segment.)

$$\Rightarrow x = \frac{3 \times -8 + 4 \times 6}{3 + 4}$$

$$\Rightarrow x = \frac{-24 + 24}{3 + 4}$$

⇒ x = 0

And,

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

$$\Rightarrow y = \frac{30 - 16}{7}$$

⇒ y = 2

∴ the co-ordinates of the point which divides the line segment joining two point s in the given ratio is (0, 2).

1 B. Question

Find the co-ordinates of the point which divides the line segment joining two point s in the given ratio for the following:

(5, 3) and (–7, –2); in the ratio 2: 3 internally

Answer

Let the co-ordinates of the point which divides the line segment be (x, y) –

And, we know, By section formula

$$x = \frac{mx_2 + nx_1}{m + n} \text{ and } y = \frac{my_2 + ny_1}{m + n}$$

(where, m and n are the ratios, (x_1, y_1) and (x_2, y_2) are the coordinates of the line segment.)

$$\Rightarrow x = \frac{2 \times -7 + 3 \times 5}{2 + 3}$$

$$\Rightarrow x = \frac{-14 + 15}{5}$$

$$\Rightarrow x = \frac{1}{5}$$

And,

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

$$\Rightarrow y = \frac{5}{5}$$

$\Rightarrow y = 1$

∴ The co-ordinates of the point which divides the line segment joining two point s in the given ratio is $\left(\frac{1}{5}, 1\right)$.

1 C. Question

Find the co-ordinates of the point which divides the line segment joining two point s in the given ratio for the following:

(–1, 2) and (4, –5); in the ratio 3: 2 externally

Answer

Let the co-ordinates of the point which divides the line segment be (x, y) –

And, we know, By section formula

$$x = \frac{mx_2 - nx_1}{m - n} \text{ and } y = \frac{my_2 - ny_1}{m - n}$$

(where, m and n are the ratios, (x_1, y_1) and (x_2, y_2) are the coordinates of the line segment.)

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

$$\Rightarrow x = \frac{12 + 2}{1}$$

⇒ x = 14

And,

$$y = \frac{3 \times -5 - 2 \times 2}{3 - 2}$$

$$\Rightarrow y = \frac{-15 - 4}{1}$$

⇒ y = – 19

∴ The co-ordinates of the point which divides the line segment joining two point s in the given ratio is (14, – 19).

1 D. Question

Find the co-ordinates of the point which divides the line segment joining two point s in the given ratio for the following:

(3, 2) and (6, 5); in the ratio 2: 1 externally

Answer

Let the co-ordinates of the point which divides the line segment be (x, y) –

And, we know, By section formula

$$x = \frac{mx_2 - nx_1}{m - n} \text{ and } y = \frac{my_2 - ny_1}{m - n}$$

(Where, m and n are the ratios, (x_1, y_1) and (x_2, y_2) are the coordinates of the line segment.)

$$\Rightarrow x = \frac{2 \times 6 - 1 \times 2}{2 - 1}$$

$$\Rightarrow x = \frac{12 - 2}{1}$$

⇒ x = 10

And,

$$y = \frac{2 \times 5 - 1 \times 2}{2 - 1}$$

$$\Rightarrow y = \frac{10 - 2}{1}$$

⇒ $y = 8$

∴ the co-ordinates of the point which divides the line segment joining two point s in the given ratio is (10, 8).

2. Question

Find the co-ordinates of mid-point of line segment joining two point s for the following

(i) (5, 4) and (3, –4)

(ii) (6, 0) and (0, 7)

Answer

Let the co-ordinates of mid-point be (x, y).

And, we know mid-point formula, i.e. the coordinates of mid-point of line joining (x_1, y_1) and (x_2, y_2) is

$$(x, y) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

$$\Rightarrow x = \frac{(x_1 + x_2)}{2}, y = \frac{y_1 + y_2}{2}$$

$$\Rightarrow x = \frac{5 + 3}{2}, y = \frac{4 + (-4)}{2}$$

⇒ $x = 4$ and $y = 0$

⇒ Co – ordinates of mid-point = (4, 0)

(ii) Let the co-ordinates of mid-point be (x, y).

And, since it is a mid-point –

$$\Rightarrow x = \frac{(x_1 + x_2)}{2}, y = \frac{y_1 + y_2}{2}$$

$$\Rightarrow x = \frac{6 + 0}{2}, y = \frac{0 + 7}{2}$$

$\Rightarrow x = 3 \text{ and } y = \frac{7}{2}$

$\Rightarrow$ co-ordinates of mid-point = $(3, \frac{7}{2})$

3. Question

Let us calculate the ratio in which the point (1, 3) divides the line segment joining the point s (4, 6) and (3, 5).

Answer

We know, By section formula

$$x = \frac{mx_2 - nx_1}{m - n} \text{ and } y = \frac{my_2 - ny_1}{m - n}$$

(where, m and n are the ratios(externally), (x_1, y_1) and (x_2, y_2) are the coordinates of the line segment, and (x, y) are coordinates of dividing point .)

Now taking in consideration the equation for x one only –

$$\Rightarrow 1 = \frac{m(3) - n(4)}{m - n}$$

$\Rightarrow$ m – n = 3m – 4n

$\Rightarrow$ 3n = 2m

$$\Rightarrow \frac{m}{n} = \frac{3}{2}$$

$\Rightarrow$ (1, 3) divides the line segment joining the point s (4, 6) and (3, 5) in the ratio 3: 2 externally.

4. Question

Let us calculate in what ratio is the line segment joining the point s (7, 3) and (–9, 6) divided by the y – axis.

Answer

Since it is divided by the y – axis, ∴ the coordinate of that point will be –(0, y).

We know, By section formula

$$x = \frac{mx_2 + nx_1}{m + n} \text{ and } y = \frac{my_2 + ny_1}{m + n}$$

(Where, m and n are the ratios (internally), (x_1, y_1) and (x_2, y_2) are the coordinates of the line segment, and (0, y) are coordinates of dividing point .)

Now taking in consideration the equation for x one only –

$$\Rightarrow 0 = \frac{m(-9) + n(7)}{m + n}$$

⇒ m + n = – 9m + 7n

⇒ 10m = 6n

$$\Rightarrow \frac{m}{n} = \frac{3}{5}$$

⇒ (1, 3) divides the line segment joining the point s (4, 6) and (3, 5) in the ratio 3: 5 internally.

5. Question

Prove that when the point s A (7, 3), B (9, 6), C (10, 12) and D (8, 9) are joined in order, then they will form a parallelogram.

Answer

We know that a quadrilateral is a parallelogram if the co-ordinates of mid-point s of its both the diagonals are same.

Therefore, we'll find the mid-point s of diagonal AC and BD.

Let the co-ordinates of mid-point of AC be (x_3, y3).

And, we know mid-point formula, i.e. the coordinates of mid-point of line joining (x_1, y_1) and (x_2, y_2) is

$$(x,y) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

$$\Rightarrow x_3 = \frac{(x_1 + x_2)}{2}, y_3 = \frac{y_1 + y_2}{2}$$

(Where, (x_1, y_1) and (x_2, y_2) are the coordinates of A and C

$$\Rightarrow x = \frac{7 + 10}{2}, y = \frac{3 + 12}{2}$$

$$\Rightarrow x = \frac{17}{2} \text{ and } y = \frac{15}{2}$$

⇒ Co – ordinates of mid-point of AC = $(\frac{17}{2}, \frac{15}{2})$

Now, Let the co-ordinates of mid-point of BD be (x_4, y_4).

And, since it is a mid-point –

$$\Rightarrow x_4 = \frac{(x_5 + x_6)}{2}, y_4 = \frac{y_5 + y_6}{2}$$

(Where, (x_5, y_5) and (x_6, y_6) are the coordinates of B and D.

$$\Rightarrow x = \frac{9 + 8}{2}, y = \frac{6 + 9}{2}$$

$$\Rightarrow x = \frac{17}{2} \text{ and } y = \frac{15}{2}$$

⇒ Co – ordinates of mid-point of BD = $\left(\frac{17}{2}, \frac{15}{2}\right)$

And, since these are equal –

⇒ ABCD is a parallelogram.

6. Question

If the point s (3, 2), (6, 3), (x, y) and (6, 5) when joined in order and form a parallelogram, then let us calculate the point (x, y)

Answer

Let A (3, 2), B (6, 3), C (x, y) and D (6, 5) We know that a quadrilateral is a parallelogram if the co-ordinates of mid-point s of its both the diagonals are same.

Therefore, we'll use the mid-point s of diagonal AC and BD.

Let the co-ordinates of mid-point of AC be (x_3, y_3).

And, we know mid-point formula, i.e. the coordinates of mid-point of line joining (x_1, y_1) and (x_2, y_2) is

$$(x, y) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

$$\Rightarrow x_3 = \frac{(x_1 + x_2)}{2}, y_3 = \frac{y_1 + y_2}{2}$$

(Where, (x_1, y_1) and (x_2, y_2) are the coordinates of A and C

$$\Rightarrow x_3 = \frac{3 + x}{2}, y_3 = \frac{(2 + y)}{2}$$

Now, Let the co-ordinates of mid-point of BD be (x_4, y_4).

And, since it is a mid-point –

$$\Rightarrow x_4 = \frac{(x_5 + x_6)}{2}, y_4 = \frac{y_5 + y_6}{2}$$

(Where, (x_5, y_5) and (x_6, y_6) are the coordinates of B and D.

$$\Rightarrow x_4 = \frac{6 + 6}{2}, y_4 = \frac{5 + 3}{2}$$

$\Rightarrow x = 6$ and $y = 4$

$\Rightarrow$ Co – ordinates of mid-point of BD = $\left(\frac{17}{2}, \frac{15}{2}\right)$

And, since it is a parallelogram –

$\Rightarrow x_4 = x_3$ and $y_4 = y_3$

$$\Rightarrow \frac{3 + x}{2} = 6 \text{ and } \frac{2 + y}{2} = 4$$

$\Rightarrow x = 9$ and $y = 6$.

7. Question

If (x_1, y_1), (x_2, y_2), (x_3, y_3) and (x_4, y_4) point s are joined in order to form a parallelogram, then prove that $x_1 + x_3 = x_2 + x_4$ and $y_1 + y_3 = y_2 + y_4$.

Answer

$A(x_1, y_1)$, $B(x_2, y_2)$, $C(x_3, y_3)$ and $D(x_4, y_4)$

We know that a quadrilateral is a parallelogram if the co-ordinates of mid-point s of its both the diagonals are same.

Therefore, we'll find the mid-point s of diagonal AC and BD.

Let the co-ordinates of mid-point of AC be (x_0, y_0).

And, we know mid-point formula, i.e. the coordinates of mid-point of line joining (x_1, y_1) and (x_2, y_2) is

$$(x, y) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

$$\Rightarrow x_0 = \frac{(x_1 + x_3)}{2}, y_0 = \frac{y_1 + y_3}{2}$$

Similarly, let the co-ordinates of mid-point of AC be (x_5, y_5).

And, since it is a mid-point –

$$\Rightarrow x_5 = \frac{(x_2 + x_4)}{2}, y_5 = \frac{y_2 + y_4}{2}$$ Now, since ABCD is a parallelogram –

$\Rightarrow (x_0, y_0) = (x_5, y_5)$

⇒ $x_0 = x_5$ and $y_0 = y_5$

$$\Rightarrow \frac{(x_1 + x_3)}{2} = \frac{(x_2 + x_4)}{2} \text{ and } \frac{y_1 + y_3}{2} = \frac{y_2 + y_4}{2}$$

⇒$x_1 + x_3 = x_2 + x_4$ and $y_1 + y_3 = y_2 + y_4$

8. Question

The co-ordinates of vertices of A, B, C of a triangle ABC are (−1, 3), (1, −1) and (5, 1) respectively, let us calculate the length of Median AD.

Answer

To calculate, the length of Median AD, first we'll calculated the coordinates of mid-point of BC.

Let the coordinates of that mid-point be (x, y) –

And, we know mid-point formula, i.e. the coordinates of mid-point of line joining (x_1, y_1) and (x_2, y_2) is

$$(x,y) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

$$\Rightarrow x = \frac{1 + 5}{2} \text{ and } y = \frac{-1 + 1}{2}$$

⇒ x = 3 and y = 0

⇒ the coordinates of one end of median(x_1, y_1) = (– 1, 3) and of another end(x_2, y_2) = (3, 0).

Now, we know the length = $\sqrt{((x_2 - x_1)^2 + (y_2 - y_1)^2)}$

⇒ Length of median = $\sqrt{((3 - (-1))^2 + (0 - 3)^2)}$

⇒ Length of median = $\sqrt{(16 + 9)}$

⇒ Length of median = $\sqrt{25}$

⇒ Length of median = 5

9. Question

The co-ordinates of vertices of triangle are (2, −4), (6, −2) and (−4, 2) respectively. Let us find the length of three medians of triangle.

Answer

The co-ordinates of vertices of a triangle ABC are A(2, – 4), B(6, −2) and C (– 4, 2) respectively.

To calculate, the length of Median AD, first we'll calculated the coordinates of mid-point (d) of BC.

Let the coordinates of that mid-point be (x, y) –

And, we know mid-point formula, i.e. the coordinates of mid-point of line joining (x_1, y_1) and (x_2, y_2) is

$$(x, y) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

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

⇒ x = 1 and y = 0

⇒ the coordinates of one end of median(x_1, y_1) = (2, – 4) and of another end(x_2, y_2) = (1, 0).

Now, we know the length = $\sqrt{((x_2 - x_1)^2 + (y_2 - y_1)^2)}$

⇒ Length of median = $\sqrt{((1 - (2))^2 + (0 - (-4))^2)}$

⇒ Length of median = $\sqrt{(1 + 16)}$

⇒ Length of median = $\sqrt{17}$

Now, to calculate, the length of Median BE, first we'll calculated the coordinates of mid-point (E) of AC.

Let the coordinates of that mid-point be (x, y) –

$$\Rightarrow x = \frac{2 + (-4)}{2} \text{ and } y = \frac{-4 + (2)}{2}$$

⇒ x = – 1 and y = – 1

⇒ The coordinates of one end of median(x_1, y_1) = (6, – 2) and of another end(x_2, y_2) = (– 1, – 1).

Now, we know the length = $\sqrt{((x_2 - x_1)^2 + (y_2 - y_1)^2)}$

⇒ Length of median = $\sqrt{((-1 - (6))^2 + (-1 - (-2))^2)}$

⇒ Length of median = $\sqrt{(49 + 1)}$

⇒ Length of median = $\sqrt{50}$

And, now To calculate, the length of Median CG, first we'll calculated the coordinates of mid-point (G) of AB.

Let the coordinates of that mid-point be (x, y) –

$\Rightarrow x = \frac{2 + 6}{2}$ and $y = \frac{-4 + (-2)}{2}$

$\Rightarrow$ x = 4 and y = – 3

$\Rightarrow$ The coordinates of one end of median(x_1, y_1) = (– 4, 2) and of another end(x_2, y_2) = (4, – 3).

Now, we know the length = $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2})$

$\Rightarrow$ Length of median = $\sqrt{(4-(-4))^2 + (-3-(2))^2}$

$\Rightarrow$ Length of median = $\sqrt{64 + 25}$

$\Rightarrow$ Length of median = $\sqrt{89}$

10. Question

The co-ordinates of mid-point s of sides of a triangle are (4, 3), (−2, 7) and (0, 11). Let us calculate the co-ordinates of its vertices.

Answer

Let $A(x_1, y_1)$, $B(x_2, y_2)$, $C(x_3, y_3)$ be the vertices of triangle and D(4, 3) be the mid-point of AB, E(−2, 7) be the mid-point of BC and F(0, 11) be the mid-point of AC.

And, we know mid-point formula, i.e. the coordinates of mid-point of line joining (x_1, y_1) and (x_2, y_2) is

$$(x,y) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

$$\Rightarrow 4 = \frac{x_1 + x_2}{2},$$

$$3 = \frac{y_1 + y_2}{2},$$

$$-2 = \frac{x_2 + x_3}{2},$$

$$7 = \frac{y_2 + y_3}{2},$$

$$0 = \frac{x_1 + x_3}{2},$$

$$11 = \frac{y_1 + y_3}{2}$$

$\Rightarrow x_1 + x_2 = 8$, ………(1)

$y_1 + y_2 = 6$, ………(2)

$x_2 + x_3 = -4$, ……..(3)

$y_2 + y_3 = 14$, …….(4)

$x_1 + x_3 = 0$, ……..(5)

$y_1 + y_3 = 22$ ………(6)

Now, adding (1) and (3), we get –

$x_1 + 2x_2 + x_3 = 4$…..(7)

Now, subtracting (5) from (7), we get –

$2x_2 = 4$

$\Rightarrow x_2 = 2$

Now, putting this in (3), we get –

$2 + x_3 = -4$

$\Rightarrow x_3 = -6$

Now, putting this in (5), we get –

$x_1 - 6 = 0$

$x_1 = 6$

And now, adding (2) and (4), we get –

$y_1 + 2y_2 + y_3 = 20$…..(8)

Now, subtracting (6) from (8), we get –

$2y_2 = -2$

$\Rightarrow y_2 = -2$

Now, putting this in (4), we get –

$-2 + y_3 = 14$

$\Rightarrow y_3 = 16$

Now, putting this in (6), we get –

$y_1 + 16 = 22$

$y_1 = 6$

∴, $A(x_1, y_1) = (6, 7)$, $B(x_2, y_2) = (2, -1)$, $C(x_3, y_3) = (-6, 15)$

11 A. Question

The mid-point of line segment joining two point s $(\ell, 2m)$, and $(-\ell + 2m, 2\ell - 2m)$ is

A. (ℓ, m)

B. $(2, -m)$

C. $(m, -\ell)$

D. (m, ℓ)

Answer

Let the coordinates of that mid-point be (x, y) –

And, we know mid-point formula, i.e. the coordinates of mid-point of line joining (x_1, y_1) and (x_2, y_2) is

$$(x, y) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

$$\Rightarrow x = \frac{l + (-l + 2m)}{2} \text{ and } y = \frac{2m + (2l - 2m)}{2}$$

$$\Rightarrow x = m \text{ and } y = l$$

11 B. Question

The abscissa at the point P which divides the line segment joining two point s A(1, 5), B(−4, 7) internally in the ratio 2: 3 is

A. −1

B. 11

C. 1

D. −11

Answer

Let the co-ordinates of the point which divides the line segment be (x, y) –

We know, abscissa is x – coordinate of any point .

We know, By section formula

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

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

⇒ x = – 1

11 C. Question

The co-ordinates of end point s of a diameter of a circle are (7, 9) and (–1, –3). The co-ordinates of centre of circle is

A. (3, 3)

B. (4, 6)

C. (3, –3)

D. (4, –6)

Answer

Since, centre of circle will be the mid-point of diameter.

And, we know mid-point formula, i.e. the coordinates of mid-point of line joining (x_1, y_1) and (x_2, y_2) is

$$(x,y) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

$$\Rightarrow x = \frac{7 + (-1)}{2} \text{ and } y = \frac{9 + (-3)}{2}$$

⇒x = 3 and y = 3

11 D. Question

A point which divides the line segment joining two point s (2, –5) and (–3, –2) externally in the ratio 4: 3. The ordinate of point is

A. –18

B. –7

C. 18

D. 7

Answer

Let the co-ordinates of the point which divides the line segment be (x, y) –

We know, ordinate is y – coordinate of any point .

And, we know, By section formula

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

$$\Rightarrow y = \frac{4(-2) - 3(-5)}{4 - 3}$$

⇒ y = 7

11 E. Question

If the point s P(1, 2), Q(4, 6), R(5, 7) and S(x, y) are the vertices of a parallelogram PQRS, then

A. x = 2, y = 4

B. x = 3, y = 4

C. x = 2, y = 3

D. x = 2, y = 5

Answer

P(1, 2), Q(4, 6), R(5, 7) and S(x, y) We know that a quadrilateral is a parallelogram if the co-ordinates of mid-point s of its both the diagonals are same.

Therefore, we'll use the mid-point s of diagonal PR and QS.

Let the co-ordinates of mid-point of PR be (x_3, y_3).

And, we know mid-point formula, i.e. the coordinates of mid-point of line joining (x_1, y_1) and (x_2, y_2) is

$$(x, y) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

$$\Rightarrow x_3 = \frac{(x_1 + x_2)}{2}, y_3 = \frac{y_1 + y_2}{2}$$

(where, (x_1, y_1) and (x_2, y_2) are the coordinates of P and R

$$\Rightarrow x_3 = \frac{1 + 5}{2}, y_3 = \frac{(2 + 7)}{2}$$

$$\Rightarrow x_3 = 3, y_3 = \frac{9}{2}$$

Now, Let the co-ordinates of mid-point of QS be (x_4, y_4).

And, since it is a mid-point –

$$\Rightarrow x_4 = \frac{(x_5 + x_6)}{2}, y_4 = \frac{y_5 + y_6}{2}$$

(where, (x_5, y_5) and (x_6, y_6) are the coordinates of Q and S.

$$\Rightarrow x_4 = \frac{4 + x}{2}, y_4 = \frac{6 + y}{2}$$

And, since it is a parallelogram –

$\Rightarrow x_4 = x_3$ and $y_4 = y_3$

$$\Rightarrow \frac{4 + x}{2} = 3 \text{ and } \frac{6 + y}{2} = \frac{9}{2}$$

$\Rightarrow$ x = 2 and y = 3.

12 A. Question

C is the centre of a circle and AB is the diameter; the co-ordinates of A and C are (6, –7) and (5, –2). Let us calculate the co-ordinates of B.

Answer

Since, centre of circle will be the mid-point of diameter.

Now, Let the coordinates of point B be (x, y) –

$$\Rightarrow 5 = \frac{6 + (x)}{2} \text{ and } -2 = \frac{-7 + (y)}{2}$$

$\Rightarrow$x = 10 – 6, and y = – 4 + 7

$\Rightarrow$ x = 4, and y = 3.

∴ coordinates of point B = (4, 3)

12 B. Question

The point s P and Q lie on 1st and 3rd quadrant respectively. The distances of the two points from x – axis and y – axis are 6 units and 4 units respectively. Let us write the co-ordinates of mid-point of line segment PQ.

Answer

The coordinates of point P will be –(6, 4), because it lies in 1st quadrant. And point Q will be (– 6, – 4), because it's in 3rd quadrant.

Let the co-ordinates of mid-point of PR be (x, y).

And, since it is a mid-point –

$$\Rightarrow x = \frac{(x_1 + x_2)}{2}, y = \frac{y_1 + y_2}{2}$$

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

⇒ x = 0 and y = 0

⇒ The mid-point is actually the origin(0, 0).

12 C. Question

The point s A and B lie on 2nd and 4th quadrant respectively and distance of each point from x – axis and y – axis are 8 units and 6 units respectively. Let us write the co – ordinate of mid-point of line segment AB.

Answer

The coordinates of point A will be –(– 8, 6), because it lies in 2nd quadrant. And point B will be (8, – 6), because it's in 4th quadrant.

Let the co-ordinates of mid-point of PR be (x, y).

And, since it is a mid-point –

$$\Rightarrow x = \frac{(x_1 + x_2)}{2}, y = \frac{y_1 + y_2}{2}$$

$$\Rightarrow x = \frac{-8 + 8}{2}, \text{and } y = \frac{6 - 6}{2}$$

⇒ x = 0 and y = 0

⇒ The mid-point is actually the origin(0, 0).

12 D. Question

The point P lies on the line segment AB and AP = PB; the co-ordinates of A and B are (3, –4) and (–5, 2) respectively. Let us write the co-ordinates of point ?

Answer

Since, AP = BP ⇒ P is a mid-point .

And, since it is a mid-point –

$$\Rightarrow x = \frac{(x_1 + x_2)}{2}, y = \frac{y_1 + y_2}{2}$$

$$\Rightarrow x = \frac{3 - 5}{2}, \text{and } y = \frac{-4 + 2}{2}$$

⇒ x = – 1 and y = – 1

⇒ co-ordinates of P = (– 1, – 1).

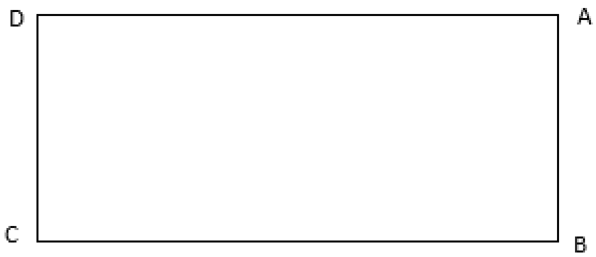
12 E. Question

The sides of rectangle ABCD are parallel to the co-ordinates axes. Co – ordinate of B and D are (7, 3) and (2, 6). Let us write the co – ordinate of A and C and mid-point of diagonal AC.

Answer

Since, the sides are parallel to the co-ordinates axes –

⇒ the next coordinate can be determined by adding the distance between the two point s.



Or, the other co-ordinates can easily be found by interchanging abscissa of one with other and ordinate of one with another, which will make it –

C(2, 3), since its abscissa should be same as D and ordinate as B.

Similarly, A(7, 6), since its abscissa should be same as B and ordinate as D.