COORDINATE GEOMETRY WS 7
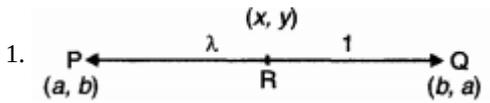
Class 10 - Mathematics

1.

According to the question, R(x, y) is a point on the line segment joining the points P(a, b) and Q(b, a)

Let point R(x + y) divides the line joining P(a,b) and Q(b,a) in the ratio $\lambda : 1$.

$\therefore x = \frac{\lambda b + a}{\lambda + 1}$

$y = \frac{\lambda a + b}{\lambda + 1}$

Adding, $x + y = \frac{\lambda b + a + \lambda a + b}{\lambda + 1}$

$= \frac{\lambda(a+b) + 1 \times (a+b)}{\lambda + 1}$

$= \frac{(\lambda + 1) \times (a+b)}{\lambda + 1} = a + b$

$\Rightarrow x + y = a + b$

Hence Proved.

2. Let the point C(4, 5) divides the join of A(2, 3) and B(7, 8) in the ratio k:1

   The point C is $\left(\frac{7k+2}{k+1}, \frac{8k+3}{k+1} \right)$

   But C is (4, 5)

   $\Rightarrow \frac{7k+2}{k+1} = 4$

   or 7k + 2 = 4k + 4

   or 3k = 2

   $\therefore k = \frac{2}{3}$

   Thus, C divides AB in the ratio 2:3

3. $\sqrt{(3-9)^2 + (k-2)^2} = 10$

   $\left[\because \text{Dist} = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2} \right]$

   or, $(-6)^2 + k^2 - 4k + 4 = 100$

   $36 + k^2 - 4k + 4 = 100$

   or, $k^2 - 4k + 40 = 100$

   $k^2 - 4k + 40 - 100 = 0$

   $k^2 - 4k - 60 = 0$

   or, $k^2 - 10k + 6k - 60 = 0$

   or, k(k-10) + 6(k-10) = 0

   or, (k - 10)(k + 6) = 0

   or, (k - 10) = 0 or, (k +6) = 0

   $\therefore$ k = 10 ,- 6

4. Since (a, b) is the mid-point of the line segment A(10, -6) and B(k, 4),

   $a = \frac{10+k}{2}$ and b = $\frac{-6+4}{2}$

   $\Rightarrow$ 2a = 10 + k and $b = \frac{-2}{2}$

   $\Rightarrow$ k = 2a - 10 and b = -1

   Now, a - 2b = 18

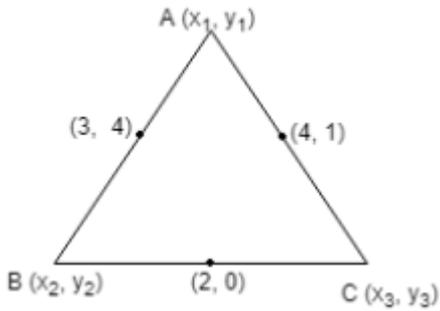 $\Rightarrow$ a - 2(-1) = 18

   $\Rightarrow$ a + 2 = 18

   $\Rightarrow$ a = 16

   Hence,

   k = 2×16 - 10 = 32 -10 = 22

   $\therefore AB = \sqrt{(22-10)^2 + (4+6)^2} = \sqrt{12^2 + 10^2} = \sqrt{144 + 100} = \sqrt{244} = 2\sqrt{61}$ units

5. Let $A(x_1, y_1)$, $B(x_2, y_2)$ and $C(x_3, y_3)$ be the vertices of a given triangle as shown in figure.

Now, (3,4) is the mid-point of AB, therefore,

$3 = \frac{x_1 + x_2}{2}$ and $4 = \frac{y_1 + y_2}{2}$

$x_1 + x_2 = 6$ and $y_1 + y_2 = 8$ ..... (i)

(2,0) is the mid-point of BC, then,

$2 = \frac{x_2 + x_3}{2}$ and $0 = \frac{y_2 + y_3}{2}$

$x_2 + x_3 = 4$ and $y_2 + y_3 = 0$ ....(ii)

(4,1) is the mid-point of AC, then,

$4 = \frac{x_1 + x_3}{2}$ and $1 = \frac{y_1 + y_3}{2}$

$x_1 + x_3 = 8$ and $y_1 + y_3 = 2$ ....(iii)

Subtracting (ii) from (iii), we get,

$x_1 - x_2 = 4$ and $y_1 - y_2 = 2$ .... (iv)

Adding (i) and (iv), we get,

$2x_1 = 10$ and $2y_1 = 10$

$x_1 = 5$ and $y_1 = 5$

From (i), we have,

$x_2 = 6 - 5 = 1$ and $y_2 = 8 - 5 = 3$

From (ii), we have,

$x_3 = 4 - 1 = 3$ and $y_3 = 0 - y_2 = 0 - 3 = -3$

Thus (5, 5), (1, 3) and (3, -3) are the vertices of triangle.

6. Let (x, y) be the coordinate of centroid

$x = \frac{x_1 + x_2 + x_3}{3}$

$= \frac{4 - 9 + 8}{3} = \frac{3}{3} = 1$

$y = \frac{y_1 + y_2 + y_3}{3}$
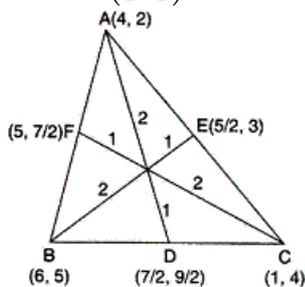
$= \frac{-8 + 7 + 13}{3} = \frac{20 - 8}{3} = 4$

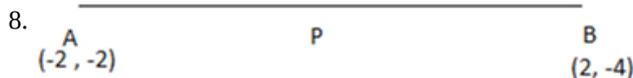Coordinate of centroid is (1, 4)

7. The median from A meets BC at D

$\therefore$ D is the mid-point of BC

$\therefore D \to \left(\frac{6+1}{2}, \frac{5+4}{2} \right)$ [Using mid-point formula]
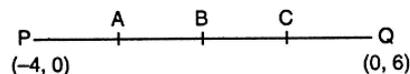
$\Rightarrow D \to \left(\frac{7}{2}, \frac{9}{2} \right)$

8.

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

Required coordinates of P are $\left(\frac{3 \times 2 + 4 \times -2}{3+4}, \frac{3 \times -4 + 4 \times -2}{3+4} \right)$

$= P \left(-\frac{2}{7}, -\frac{20}{7} \right)$

9. Let the given points be denoted by P and Q.

Co-ordinate of B(mid-point of PQ) are: $\left(\frac{-4+0}{2}, \frac{0+6}{2} \right)$ i.e. (–2, 3)

Co-ordinates of A (mid-point of PB) are: $\left(\frac{-4-2}{2}, \frac{0+3}{2} \right)$ i.e. $\left(-3, \frac{3}{2} \right)$

Co-ordinates of C (mid-point of BQ) are: $\left(\frac{-2+0}{2}, \frac{6+3}{2} \right)$ i.e. $\left(-1, \frac{9}{2} \right)$.

Hence, the co-ordinates of the required mid-points are $\left(-1, \frac{9}{2} \right)$, (–2, 3) and $\left(-3, \frac{3}{2} \right)$

10. According to the question, A(-3, -7), B(4, 7) and C(5, 9).

By using distance formula,

AB = $\sqrt{[4 - (-3)]^2 + [7 - (-7)]^2}$

$= \sqrt{7^2 + 14^2} = \sqrt{49 + 196} = \sqrt{245}$

$= 7\sqrt{5}$ unit

BC = $\sqrt{(5 - 4)^2 + (9 - 7)^2} = \sqrt{1^2 + 2^2}$

$= \sqrt{1 + 4} = \sqrt{5}$ unit

AC = $\sqrt{[5 - (-3)]^2 + [9 - (-7)]^2}$

$= \sqrt{8^2 + 16^2} = \sqrt{64 + 256}$

$= \sqrt{320} = 8\sqrt{5}$ units.

Here AB+BC=AC

$\therefore$ Points are collinear.

11. Let line y - x + 2 = 0 divides the joining of points (3, -1) and (8,9) in ratio k: 1 at point p.

$\therefore$ x coordinate of the point $= \frac{8k+3}{k+1}$

y coordinate of the point $= \frac{9k-1}{k+1}$

Coordinates of the point are $\left(\frac{8k+3}{k+1}, \frac{9k-1}{k+1} \right)$

Also the point lies on line y - x + 2 = 0

$\therefore \frac{9k-1}{k+1} - \frac{8k+3}{k+1} + 2 = 0$

$\Rightarrow$ 9k - 1 - 8k - 3 + 2k + 2 = 0

$\Rightarrow$ 3k - 2 = 0

$\Rightarrow$ 3k - 2 = 0

$\Rightarrow$ k = $\frac{2}{3}$

Hence, line divides in ratio 2 : 3 internally.

12. Let (x.y) be the coordinates of P, Then

$x = \frac{2 \times 5 + 3 \times 2}{2+3} = \frac{10+6}{5} = \frac{16}{5}$

$y = \frac{2 \times 2 + 3 \times (-5)}{2+3} = \frac{4-15}{5} = \frac{-11}{5}$

Thus the coordinates of P are (16/5,-11/5) and so it lies in the fourth quadrant.

13.
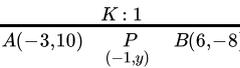
Let point P divides the line segment AB in the ratio K:1.

Applying section formula,

$(-1, y) = \left(\frac{6k-3}{k+1}, -\frac{8k+10}{k+1} \right)$

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

6k-3= - k - 1

7k = 2

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

∴ Required Ratio is 2:7

Also, y = $-\frac{8k+10}{k+1}$

$= \frac{-8\left(\frac{2}{7}\right)+10}{\frac{2}{7}+1}$

$= \frac{-16+70}{2+7}$

$= \frac{54}{9}$

∴ y = 6

14. The given points are A(1, -3) and B(4, -6)

   Then, (x_1 = 1, y_1 = -3) and (x_2 = 4, y_2 = -6)

   $\therefore AB = \sqrt{\left(x_2 - x_1\right)^2 + \left(y_2 - y_1\right)^2}$
   $= \sqrt{(4-1)^2 + (-6+3)^2} = \sqrt{(3)^2 + (-3)^2}$
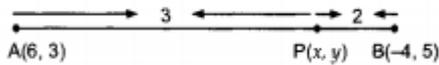 $= \sqrt{18} = 3\sqrt{2}\ units$

15. Let P (x, y) be the required point.

   P divides the line segment joining the points (6, 3) and (-4, 5) in the ratio 3 : 2 internally.

   By using section formula, we get

   $x = \frac{3 \times -4 + 2 \times 6}{3+2}$ and $y = \frac{3 \times 5 + 2 \times 3}{3+2}$

   $\Rightarrow \quad x = 0$ and $y = \frac{21}{5}$

   So, the coordinates of P are (0, 21/5).

16. Let P divide the line joining A and B

   in the ratio of r:1

   Using the section formula for the y-coordinate, we get

   $2 = \frac{-3r+5}{r+1}$

   ⇒ 2r + 2 = -3r + 5

   ⇒ 5r = 3

   $\Rightarrow r = \frac{3}{5}$

   Hence, P divides the line joining A and B in the ratio of 3:5

   Using the section formula for the x - coordinate, we get

   $x = \frac{12+60}{8} = \frac{72}{8} = 9$

17. Point P divides the line segment joining the points A(2, 1) and B(5, -8) such that $\frac{AP}{AB} = \frac{1}{3}$. If P lies on the line 2x - y + k =0,We

   have to find the value of k.

   $\frac{AP}{AB} = \frac{1}{3} \Rightarrow \frac{AP}{AP+PB} = \frac{1}{3}$

   ⇒ 3AP = AP + PB ⇒ 2 AP = PB

   $\Rightarrow \frac{AP}{PB} = \frac{1}{2} \Rightarrow AP:PB = 1:2$

   So, P divides AB in the ratio 1:2

   ∴ coordinates of P are

   $\left(\frac{1 \times 5 + 2 \times 2}{1+2}, \frac{1 \times (-8) + 2 \times 1}{1+2}\right) = \left(\frac{9}{3}, \frac{-6}{3}\right) = (3, -2)$

   Since P(3, -2) lies on 2x - y + k =0, we have

   2 × 3 -(-2) + k = 0 ⇒ 6 + 2 + k =0 ⇒ = -8.

   Hence, the required value of k is -8.

18. Q is the mid-point of AB
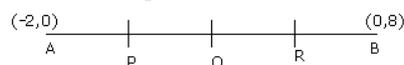
   Coordinate of $Q \left(\frac{-2+0}{2}, \frac{0+8}{2}\right) = (-1, 4)$

   Coordinate of $P \left(\frac{-2-1}{2}, \frac{0+4}{2}\right) = \left(\frac{-3}{2}, 2\right)$

   Coordinate of $R \left(\frac{0-1}{2}, \frac{4+8}{2}\right) = \left(\frac{-1}{2}, 6\right)$

19. Centre of circle is O.(3, - 1)

   This O point acts a mid point of line segment AB.

So, let the coordinates of A be (x_1, y_1) then we have

$3 = \frac{x_1+2}{2}$ (Mid point formula)

$6 = x_1 + 2$

$\Rightarrow x_1 = 4$

Also,

$-1 = \frac{y_1+6}{2}$

$\Rightarrow y_1 = -8$

So, coordinates of A are (4, - 8)

20. Let the coordinates of the required point be (x, y). Then,

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

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

$= \frac{8-3}{5} = \frac{5}{5} = 1$

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

$= \frac{(2)(-3)+(3)(7)}{2+3}$

$= \frac{-6+21}{5} = \frac{15}{5} = 3$

Hence, the required point is (1, 3).

21.
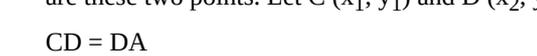
B(-2,-3)   C   D   A(4,-1)

The points of trisection means that the points which divide the line into three equal parts. From the figure, it is clear that C, and D are these two points. Let C (x_1, y_1) and D (x_2, y_2) are the points of trisection of the line segment joining the given points i.e., BC = CD = DA

Let BC = CD = DA = k, Point C divides BC and CA as: BC = kCA = CD + DA = k + k = 2k

Hence the ratio between BC and CA is: $\frac{BC}{CA} = \frac{k}{2k} = \frac{1}{2}$

Therefore, point C divides BA internally in the ratio 1:2 then by section formula we have that if a point P(x, y) divides two points P (x_1, y_1) and Q (x_2, y_2) in the ratio m:n then, the point (x, y) is given by $(x, y) = \left(\frac{mx_2 + nx_1}{m+n}, \frac{my_2 + ny_1}{m+n} \right)$

Therefore C(x, y) divides B(–2, –3) and A(4,–1) in the ratio 1:2, then

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

$C(x, y) = \left(\frac{4-4}{1+2}, \frac{-1-6}{1+2} \right)$

$C(x, y) = \left(0, \frac{-7}{3} \right)$

Point D divides the BD and DA as:DA = kBD = BC + CD = k + k = 2k

Hence the ratio between BD and DA is: $\frac{BD}{DA} = \frac{2k}{k} = \frac{2}{1}$

The point D divides the line BA in the ratio 2:1

So now applying section formula again we get,

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

$D(x, y) = \left(\frac{8-2}{3}, \frac{-2-3}{3} \right)$

$D(x, y) = \left(\frac{6}{3}, \frac{-5}{3} \right)$
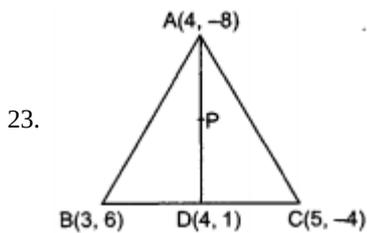
$D(x, y) = \left(2, \frac{-5}{3} \right)$

22. At mid-point of AB $= \left(\frac{\frac{x}{2}+x+1}{2} \right) = 5$

or, x = 6

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

or, y + 1 + 2y - 6 = -8

y = -1

A(4, -8)

P

B(3, 6)   D(4, 1)   C(5, -4)

23.

A(4, - 8), B(3, 6) and C(5, - 4) are vertices of ΔABC and D is the mid-point of BC

∴ Coordinate of D $= \left(\frac{3+5}{2}, \frac{6+(-4)}{2}\right) = \left(\frac{8}{2}, \frac{2}{2}\right) = (4, 1)$

$\frac{AP}{PD} = 2$ [Given]

⇒ AP : PD = 2 : 1

i.e. P divides A(4,-8) and D(4,1) in 2:1 ratio. let the coordinate of P(x,y)

here, $x_1 = 4$, $x_2 = 4$, $y_1 = -8$, $y_2 = 1$, m=2, n=1

By section formula,

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

$\Rightarrow (x,y) = \left(\frac{2 \times 4 + 1 \times 4}{2+1}, \frac{2 \times 1 + 1 \times (-8)}{2+1}\right) = \left(\frac{8+4}{3}, \frac{2+(-8)}{3}\right) = \left(\frac{12}{3}, \frac{(-6)}{3}\right) = (4, -2)$

24. B = (-2,3)

C = (0,4)

A = ?

$\left[\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right]$

$\frac{x_1+(-2)}{2} = 0$

$x_1 - 2 = 0$

$x_1 = 0 + 2$

$x_1 = 2$

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

$y_1 + 3 = 4$

$y_1 = 4 - 3$

$y_1 = 1$

A = (2,1)

25. The given points are:

P (-4, y)

A (-6, 10)

B (3, -8)

(-6, 10)   -4, y   3, -8
x1 y1   x2 y2
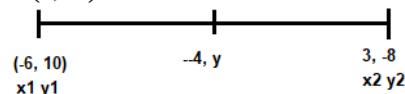
According to the questions

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

$\Rightarrow -4 = \frac{m_1 \times 3 + m_2 x - 6}{m_1 + m_2}$

$-4m_1 - 4m_2 = 3m_1 - 6m_2$

$-4m_1 - 3m_1 = -6m_2 + 4m_2$

$7m_1 = 2m_2$

$\frac{m_1}{m_2} = \frac{2}{7}$

∴ the required ratio is $m_1 : m_2 = 2 : 7$

Now Y-Coordinate of p (-4, y) is given by

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

$= \frac{2(-8) + 7 \times 10}{9}$

$= \frac{-16 + 70}{9} = \frac{54}{9} = 6$

26. The given vertices of triangle are (3, -5), (-7, 4) and (10, -2).

Let (x, y) be the coordinates of the centroid. Then

$$x = \frac{x_1 + x_2 + x_3}{3} = \frac{3 + (-7) + 10}{3}$$
$$= \frac{13 - 7}{3} = \frac{6}{3} = 2$$
$$y = \frac{y_1 + y_2 + y_3}{3} = \frac{-5 + 4 + (-2)}{3}$$
$$= \frac{-7 + 4}{3} = \frac{-3}{3} = -1$$

$\therefore$ The coordinates of the centroid are (2, –1)

27. If G (-2, 1) is the centroid of a $\triangle$ABC and two of its vertices are A(1, -6) and B(-5, 2).

Let the third vertex be C(a, b)

Then, the co-ordinates of its centroid are

$G\left(\frac{1-5+a}{3}, \frac{-6+2+b}{3}\right)$ i.e $G\left(\frac{-4+a}{3}, \frac{-4+b}{3}\right)$

But given that the centroid is G(-2, 1)

$\frac{-4+a}{3} = -2$ and $\frac{-4+b}{3} = 1$

-4 + a = -6 and -4 + b = 3

a = -2 and b = 7

Hence, the third vertex C of $\triangle$ABC is (-2, 7)

28. Let P divided the join of A(8, 2), B(-6, 9) in the ratio k:1

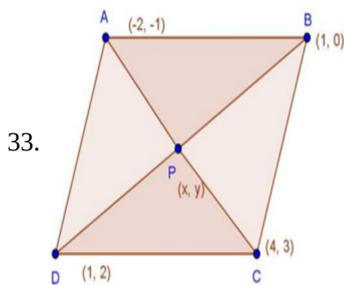By section formula, the coordinates of p are

$\left(\frac{-6k+8}{k+1}, \frac{9k+2}{k+1}\right)$

$\therefore \frac{-6k+8}{k+1} = 2$ and $\frac{9k+2}{k+1} = 5$

$\Rightarrow$ -6k + 8 = 2k + 2 and 9k + 2 = 5k + 5

-8k = -6 and 4k = 3

$k = \frac{-6}{-8} = \frac{3}{4}$ and $k = \frac{3}{4}$

$\Rightarrow k = \frac{3}{4}$ in each case

Hence, the required ratiio of $\left(\frac{3}{4} : 1\right)$ which is (3:4)

29. $\frac{XA}{XY} = \frac{2}{5} \Rightarrow \frac{XA}{AY} = \frac{2}{3}$

$\therefore$ Coords. of A are $\left(\frac{-8+18}{5}, \frac{-2-18}{5}\right)$ i.e.(2, -4)

A lies on 3x + k(y + 1) = 0

$\Rightarrow$ 6 + k(-3) $\Rightarrow$ k = 2

30. Let (-4,6) Divide AB internally in the ratio k :1

Using the section formula, we get

(-4, 6) = $\left(\frac{3k-6}{k+1}, \frac{-8k+10}{k+1}\right)$

So, -4 = $\frac{3k-6}{k+1}$

i.e., -4k - 4 = 3k - 6

i.e., 7k = 2

i.e, k : 1 = 2 : 7

31. Let the point on y-axis be P(0, y) and AP: PB = K: 1

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

Hence required ratio is 5: 1

$y = \frac{-4(5)-6}{6} = \frac{-13}{3}$

Hence point on y-axis is $\left(0, \frac{-13}{3}\right)$.

32. Given that $\frac{AR}{RB} = \frac{4}{3}$ or AR : RB = 4 : 3

Let the coordinates of R be (x, y).

Then $x = \frac{4 \times 2 + 3 \times 1}{4+3} = \frac{8+3}{7} = \frac{11}{7}$

$y = \frac{4 \times 3 + 3 \times 2}{4+3} = \frac{12+6}{7} = \frac{18}{7}$

$\therefore$ The coordinates of R are $\left(\frac{11}{7}, \frac{18}{7}\right)$

33.

Let P(x, y) be the given points.

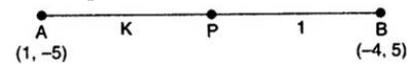We know that diagonals of a parallelogram bisect each other.

$x = \frac{-2+4}{2}$

$\Rightarrow \quad x = \frac{2}{2} = 1$

$y = \frac{-1+3}{2} = \frac{2}{2} = 1$

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

34. Let the point of division be P. Let the ratio be K : 1.

Then

$P \to \left\{ \frac{(K)(-4)+(1)(1)}{K+1}, \frac{(K)(5)+(1)(-5)}{K+1} \right\}$

$P \to \left\{ \frac{-4K+1}{K+1}, \frac{5K-5}{K+1} \right\}$

$\because$ P lies on the x-axis and we know that on the x-axis the ordinate is 0.

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

$\Rightarrow$ 5K - 5 = 0

$\Rightarrow$ 5K = 5

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

Hence, the required ratio is 1 : 1.

Putting K = 1, we get

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

$P \to \left\{ -\frac{3}{2}, 0 \right\}$

35. Mid point of P(-11, -8) and Q(8, -2)

$\left(\frac{-11+8}{2}, \frac{-8-2}{2} \right) = \left(\frac{-3}{2}, \frac{-10}{2} \right)$

$= \left(\frac{-3}{2}, -5 \right)$

36. We have,

A $\to$ (3, 2) and B $\to$ (–2, 1)

Let the co-ordinates of the third vertex C of the triangle be (x, y).

Then,

Centroid

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

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

$but \ G = \left(\frac{5}{3}, \frac{-1}{3} \right)$

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

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

but $G = \left(\frac{5}{3}, \frac{-1}{3} \right)$

$\therefore \frac{x+1}{3} = \frac{5}{3} \Rightarrow x + 1 = 5$

$\Rightarrow$ x = 5 − 1 = 4

And $\frac{y+3}{3} = \frac{-1}{3}$

$\Rightarrow$ y + 3 = -1

$\Rightarrow y = -1 - 3 = -4$

Hence, C $\rightarrow$ (4, –4)

37.

A $\underset{(2,-1)}{}$ —————— $\underset{(1:1)}{\overset{P\ (x,y)}{\bullet}}$ —————— B $\underset{(5,-6)}{}$

Coordinate of $P = \left(\frac{2+5}{2}, \frac{-1-6}{2}\right) = \left(\frac{7}{2}, \frac{-7}{2}\right)$

P lies on equation 2x + 4y + k = 0

$\therefore 2\left(\frac{7}{2}\right) + 4\left(\frac{-7}{2}\right) + k = 0$

$\Rightarrow$ 7 - 14 + k = 0

$\Rightarrow$ k = 7

38. Centroid is a point where all the three medians of the triangle intersect. So,the centroid of triangle can be found by finding the average of the x-coordinate's value and the average of the y-coordinate's value of all the vertices of the triangle

The vertices of ΔABC are (a, b), (b, c) and (c, a)

Therefore Centroid is

$\left(\frac{x_1+x_2+x_3}{3}, \frac{y_1+y_2+y_3}{3}\right)$ or $\left(\frac{a+b+c}{3}, \frac{b+c+a}{3}\right)$

But centroid is (0, 0).

$\Rightarrow$ a + b + c = 0

39. Let A (-2, -3) and B (3, 7)

P (0, y) and ratio be K : 1

$\underset{A}{\overset{(-2,-3)}{}}$ —————— $\underset{K:1}{\overset{P(o,y)}{}}$ —————— $\underset{B}{\overset{(3,7)}{}}$

Coordinate of P are $\left(\frac{3k-2}{k+1}, \frac{7k-3}{k+1}\right)$

$\frac{3k-2}{k+1} = 0$

$\Rightarrow k = \frac{2}{3}$ or 2 : 3

40.

A $\underset{(3, 2)}{}$ ◄————— $\underset{1:2}{\overset{P}{}}$ —————► B $\underset{(5, 1)}{}$

Since, the line segment joining the points A (3, 2) and B (5,1) is divided at the point P in the ratio 1:2

Therefore, according to the section formula,

$x = \frac{mx_2+nx_1}{m+n} = \frac{1\times5+2\times3}{1+2} = \frac{11}{3}$

$and,\ y = \frac{my_2+ny_1}{m+n} = \frac{1\times1+2\times2}{1+2} = \frac{5}{3}$

$\implies (x,y) = \left(\frac{11}{3}, \frac{5}{3}\right)$ lies on $3x - 18y + k = 0$

Therefore, these points satisfy equation of given line.

Hence, $3 \times \frac{11}{3} - 18 \times \frac{5}{3} + k = 0$

$\Rightarrow 11 - 30 + k = 0$

$\Rightarrow$ k = 19,

Hence required value of k =19

41. The given vertices of triangle are (4, –8), (–9, 7) and (8, 13).

Let (x, y) be the coordinates of the centroid. Then

$x = \frac{x_1+x_2+x_3}{3} = \frac{4+(-9)+8}{3}$

$= \frac{12-9}{3} = \frac{3}{3} = 1$

$y = \frac{y_1+y_2+y_3}{3} = \frac{(-8)+7+13}{3}$

$= \frac{20-8}{3} = \frac{12}{3} = 4$

$\therefore$ The coordinates of the centroid are (1, 4).

42. Let P divide A and B in the ratio of r:1

P(-1, y), A(-3, 10), B(6, -8)

Using the section formula for x coordinate, we get

$-1 = \frac{6r-3}{r+1} \Rightarrow -r - 1 = 6r - 3$

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

Hence, P divides the line AB in the ratio of 2:7

Hence, using the section formula,

$y = \frac{-8r+10}{r+1}$

$\Rightarrow \therefore y = \frac{-16+70}{2+7} = \frac{54}{9} = 6 \left[\text{Substituting } r = \frac{2}{7} \right]$

43. The point lies on x-axis

Its ordinate will be = 0

Let the point P(x, 0) divides the line-segment joining the points A(3, -6) and B(5, 3) in the ratio m:n.

$\therefore 0 = \frac{my_2+ny_1}{m+n} \Rightarrow 0 = \frac{m \times 3 + n(-6)}{m+n}$

$\Rightarrow 3m - 6n = 0 \Rightarrow 3m = 6n$

$\Rightarrow \frac{m}{n} = \frac{6}{3} = \frac{2}{1}$

$\therefore$ Ratio = 2:1

44. Let the required ratio be k:1.

Then, by the section formula, the coordinates of P are

$P\left(\frac{4k-3}{k+1}, \frac{-9k+5}{k+1} \right)$

$\therefore \quad \frac{4k-3}{k+1} = 2$ and $\frac{-9k+5}{k+1} = -5$ [$\because$ P(2, 5) is given]

$\Rightarrow$ 4k - 3 = 2k + 2 and -9k + 5 = -5k - 5

$\Rightarrow$ 2k = 5 and 4k = 10

$\Rightarrow k = \frac{5}{2}$ in each case.

So, the required ratio is $\frac{5}{2} : 1$, which is 5:2

Hence, P divides AB in the ratio 5:2.

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

Using Section formula, we get

$-1 = \frac{(-3) \times 1 + 6 \times k}{k+1}$ $4 \Rightarrow -k - 1 = (-3 + 6k)$

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

46. Two vertices of a triangle are (-8, 7) and (9, 4)

Let the third vertex be (x, y)

If $A(x_1, y_1), \ B(x_2, y_2) \ and \ C(x_3, y_3)$ are the three vertices of the ΔABC, then

Coordinates of the centroid are $\left(\frac{x_1+x_2+x_3}{2}, \ \frac{y_1+y_2+y_3}{2} \right)$

Here, Centroid of the triangle is given to be (0, 0).

$\therefore \frac{x_1+x_2+x_3}{3} = 0 \Rightarrow \frac{-8+9+x}{3} = 0$

$\Rightarrow 1 + x = 0 \Rightarrow x = -1$

and $\frac{y_1+y_2+y_3}{3} = 0 \Rightarrow \frac{7+4+y}{3} = 0$

$\Rightarrow$ 11 + y = 0 $\Rightarrow$ y = -11

$\therefore$ Third vertex will be (-1, -11)

47. Let AB be the diameter and C be the centre of the circle. Let coordinates of A be (a,b).

Clearly, C will be the mid-point of AB.

$\therefore$ Coordinates of C = $\left(\frac{a+2}{2}, \ \frac{b+3}{2} \right)$ $\left[\because mid-point = \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2} \right) \right]$

$\Rightarrow (-2, 5) = \left(\frac{a+2}{2}, \frac{b+3}{2} \right)$

On comparing the coordinates of x and y from both sides, we get

$-2 = \frac{a+2}{2}$ and $5 = \frac{b+3}{2}$

$\Rightarrow a + 2 = -4$ and $b + 3 = 10$

$\Rightarrow a = -4 - 2$ and $b = 10 - 3$

$\Rightarrow a = -6$ and $b = 7$

Hence , the coordinates of other end of diameter : (a, b) = (-6,7)

48. The point given is P(4, 5)

Given A(2, 3) and B(7, 8)

Let P divides the line segment joining the points (2, 3) and (7, 8) in the ratio m : 1

The coordinates of P = $\left(\frac{mx_2+x_1}{m+1}, \ \frac{my_2+y_1}{m+1} \right)$

$\Rightarrow (4, 5) = \left(\frac{7m+2}{m+1}, \frac{8m+3}{m+1} \right)$

On comparing both the sides, we get

$\frac{7m+2}{m+1} = 4$

$\Rightarrow 7m + 2 = 4m + 4$

$\Rightarrow 7m - 4m = 4 - 2$

$\Rightarrow 3m = 2$

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

Therefore, P(4, 5) divides the line segment joining two points A and B in the ratio 2 : 3.

49. 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

$x = \frac{m_1 x_2 + m_2 x_1}{m_1 + m_2} = \frac{2 \times 4 + 3 \times (-1)}{2+3} = \frac{8-3}{5} = \frac{5}{5} = 1$

$y = \frac{m_1 y_2 + m_2 y_1}{m_1 + m_2} = \frac{2 \times (-3) + 3 \times 7}{2+3} = \frac{-6+21}{5} = \frac{15}{5} = 3$

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

50.
A (5, 3)   C   D   B (4, 5)

Let C divides AB in the ratio 1 : 2

$\therefore$ C $\left(\frac{1 \times 4 + 2 \times 5}{1+2}, \frac{1 \times 5 + 2 \times 3}{1+2} \right)$, i.e., C $\left(\frac{14}{3}, \frac{11}{3} \right)$

Let D divides AB in the ratio 2 : 1

$\therefore$ D $\left(\frac{2 \times 4 + 1 \times 5}{2+1}, \frac{2 \times 5 + 1 \times 3}{2+1} \right)$, i.e., D $\left(\frac{13}{3}, \frac{13}{3} \right)$

51. Let line x + y = 4 divides the line joining the points (- 1, 1) and (5, 7) at C(x,y) in the ratio k:1

By section formula,

(x,y) = $\left(\frac{mx_2 + nx_1}{m+n}, \frac{my_2 + ny_1}{m+n} \right)$

$\therefore$ Coordinate of C are $\left(\frac{5k-1}{k+1}, \frac{7k+1}{k+1} \right)$ i.e. x = $\frac{5k-1}{k+1}$ and y = $\frac{7k+1}{k+1}$

$\because$ C lies on the line x + y = 4

$\Rightarrow \frac{5k-1}{k+1} + \frac{7k+1}{k+1} = 4$

$\Rightarrow \frac{5k-1+7k+1}{k+1} = 4$

$\Rightarrow \frac{12k}{k+1} = 4$

$\Rightarrow 12k = 4(k+1)$

$\Rightarrow 3k = k + 1$

$\Rightarrow 3k - k = 1$

$\Rightarrow 2k = 1$

$\Rightarrow k = \frac{1}{2}$

Hence, the ratio is 1: 2

52. We know that the diagonals of a parallelogram bisect each other. So, coordinates of the mid-point of diagonal AC are same as the coordinates of the mid-point of diagonal BD.

$\therefore \quad \left(\frac{6+9}{2}, \frac{1+4}{2} \right) = \left(\frac{8+p}{2}, \frac{2+3}{2} \right)$

$\Rightarrow \quad \left(\frac{15}{2}, \frac{5}{2} \right) = \left(\frac{8+p}{2}, \frac{5}{2} \right)$

$\Rightarrow \quad \frac{15}{2} = \frac{8+p}{2} \Rightarrow 15 = 8 + p \Rightarrow p = 7$

53. First of all we find the coordinates of D:

D is the midpoint of BC

So, Coordinates of D are = $\left(\frac{1+(-3)}{2}, \frac{5+(-1)}{2} \right)$ = (-1, 2)

Next we find the length AD:

Length of AD = $\sqrt{(Y_2 - Y_1)^2 + (X_2 - X_1)^2}$

Length of AD = $\sqrt{(1-2)^2 + (5-(-1))^2}$

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

Length of AD = $\sqrt{37}$

54. Let the point P(x, 2) divides the line segment joining the points A(12, 5) and B(4, -3) in the ratio k:1.

Then, by section formula, $\frac{(mx_2 + nx_1)}{m+n}$, $\frac{(my_2 + ny_1)}{m+n}$

Coordinates of P are $\left(\frac{k \times 4 + 1 \times 12}{k+1}, \frac{k \times (-3) + 1 \times 5}{k+1} \right)$

$= \left(\frac{4k+12}{k+1}, \frac{-3k+5}{k+1} \right)$

Given, coordinates of P are (x, 2)

$\therefore \frac{-3k+5}{k+1} = 2$

$\Rightarrow$ -3k + 5 = 2k + 2

$\Rightarrow$ 5k = 3

$\Rightarrow k = \frac{3}{5}$

Therefore ,the ratio in which the point P(x, 2) divides the join of A(12, 5) and B(4, -3) is equal to 3:5

55. Mid-point of the line segment joining A(3, 4) and B(k, 6) = $\frac{3+k}{2}, \frac{4+6}{2}$
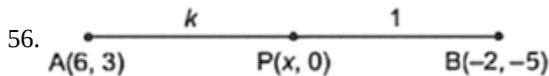
$= \frac{3+k}{2}, 5$

Then, $\frac{3+k}{2}, 5$ = (x, y)

Therefore, $\frac{3+k}{2}$ = x and 5 = y

Since x + y - 10 = 0, we have

$\frac{3+k}{2}$ + 5 - 10 = 0

i.e., 3 + k = 10

Therefore, k = 7

56.

As we know that,

at x-axis, y = 0

$\therefore$ point will be P(x, 0)

and let the ratio be k : 1

then $\left(\frac{m_1 x_2 + m_2 x_1}{m_1 + m_2}, \frac{m_1 y_2 + m_2 y_1}{m_1 + m_2} \right)$ = (x, 0)

$\Rightarrow \left(\frac{-2k+6}{k+1}, \frac{-5k+3}{k+1} \right)$ = 0

$\therefore \frac{-5k+3}{k+1}$ = 0

$\Rightarrow$ -5k + 3 = 0

$\Rightarrow$ k = $\frac{3}{5}$

So, required ratio is 3 : 5.

57. The difference between the x-coordinates of A and B is 6 - 1 =5

Similarly, the difference between the y-coordinates of A and B is 7 - 2 = 5

Hence, if the line segment joining A(1, 2) and B(6, 7) is divided into 5 equal parts by the points P, Q, R and S, then the coordinates of P, Q, R and S can be found out by increasing the x and the y coordinates of A by 1 successively.

Hence, the coordinates of P are (1 + 1, 2 + 1) = (2, 3)

The coordinates of Q are (2 + 1, 3 + 1) = (3 , 4)

The coordinates of R are (3 + 1, 4 + 1) = (4, 5)

58. Let the required ratio be k:1.

Then, by the section formula, the coordinates of P are

$P \left(\frac{9k+15}{k+1}, \frac{20k+5}{k+1} \right)$
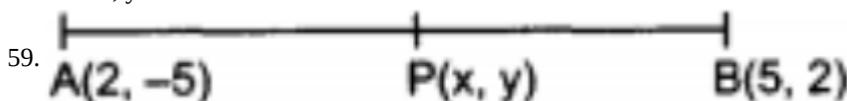
But, this point is given as P(11, y).

$\therefore \frac{9k+15}{k+1} = 11 \Rightarrow$ 9k + 15 = 11k + 11 $\Rightarrow$ 2k = 4 $\Rightarrow$ k = 2

So, the required ratio is 2:1.

Putting k = 2 in P, we get

$y = \frac{20 \times 2 + 5}{(2+1)} = \frac{45}{3} = 15$

Hence, y = 15.

59.

Let P(x,y) be the point which divides the points A(2, -5) and B(5, 2) in the ratio 2 : 3.

By Section formula,

(x,y) = $\left(\frac{mx_2 + nx_1}{m+n}, \frac{my_2 + ny_1}{m+n} \right)$

Here, x_1=2, x_2= 5, y_1=-5, y_2=2, m=2, n=3

$$\Rightarrow (x, y) = \left(\frac{2\times 5 + 3\times 2}{2+3}, \frac{2\times(2) + 3\times(-5)}{2+3}\right)$$
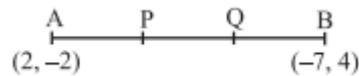$$\Rightarrow (x, y) = \left(\frac{10+6}{5}, \frac{4-15}{5}\right)$$
$$\Rightarrow (x, y) = \left(\frac{16}{5}, \frac{-11}{5}\right)$$
$i.e.\ x = \frac{16}{5}$ and $y = \frac{-11}{5}$

Hence, coordinate of $P(x, y) = (3.2, -2.2)$

Now, x-coordinate is positive and y-coordinate is negative, therefore P(x,y) lies in IV quadrant.

60. Let P and Q be the points of trisection of AB i.e., AP = PQ = QB

Therefore, P divides AB internally in the ratio 1 : 2. Therefore, the coordinates of P, by applying the section formula, are
$\left(\frac{1(-7)+2(2)}{1+2}, \frac{1(4)+2(-2)}{1+2}\right)$, i.e., $(-1, 0)$

Now, Q also divides AB internally in the ratio 2 : 1. So, the coordinates of Q are
$\left(\frac{2(-7)+1(2)}{2+1}, \frac{2(4)+1(-2)}{2+1}\right)$, i.e., $(-4, 2)$

Therefore, the coordinates of the points of trisection of the line segment joining A and B are (–1, 0) and (– 4, 2).

61. P(9a - 2, -b) divides the line segment joining A(3a + 1, -3) and B(8a, 5) in the ratio 3:1

Then, by section formula

Coordinates of $P = \left(\frac{3\times 8a + 1\times(3a+1)}{3+1}, \frac{3\times 5 + 1\times(-3)}{3+1}\right)$

$\Rightarrow (9a - 2, -b) = \left(\frac{24a+3a+1}{4}, \frac{15-3}{4}\right)$

$\Rightarrow (9a - 2, -b) = \left(\frac{27a+1}{4}, 3\right)$

$\Rightarrow 9a - 2 = \frac{27a+1}{4}$ and $-b = 3$

$\Rightarrow$ 36a - 8 = 27a + 1 and b = -3

$\Rightarrow$ 9a = 9

$\Rightarrow$ a = 1 and b = -3

62.

A (3, −1) $\overset{\overset{\text{C} \quad \text{D}}{\bullet \quad \bullet}}{\rule{3cm}{0.4pt}}$ B (6, 8)

Case I: If C and D trisect AB

then C divides AB in the ratio 1 : 2

Co-ordinates of C: x = $\frac{1\times 6 + 2\times 3}{3} = 4$

and y = $\frac{1\times 8 + 2(-1)}{3} = 2$

∴ Co-ordinates of C(4, 2)

Case II: Coordinates of D if D divides AB in the ratio 2 : 1

Co-ordinates of D: x′ = $\frac{2\times 6 + 1\times 3}{3} = 5$

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

Coordinates of D = (5, 5)

63.

Since point P trisects AB, then PA : PB = 1: 2. Here x_1= 2, x_2=5, y_1= 1, y_2 = -8, m=1, n=2

Section formula is,
$$(x, y) = \left(\frac{mx_2 + nx_1}{m+n}, \frac{my_2 + ny_1}{m+n}\right)$$
Therefore, coordinates of P are
$$\Rightarrow (x, y) = \left(\frac{1\times 5 + 2\times 2}{1+2}, \frac{1\times(-8) + 2\times 1}{1+2}\right)$$
$$\Rightarrow (x,y) = \left(\frac{5+4}{3}, \frac{-8+2}{3}\right) = \left(\frac{9}{3}, \frac{-6}{3}\right) = (3, -2)$$
Hence coordinate of P(x,y)= (3, -2) i.e. x = 3 and y = -2

Now P lies on 2x - y + k = 0

On putting values of x and y, we get

2(3) - (-2) + k = 0

6 + 2 + k = 0

$\Rightarrow$ k = -8

64. by using section formula

Cordinates of $C\left(\frac{3x+2x4}{3+4}, \frac{3y+4x5}{3+4}\right)$

$C\left(\frac{3x+8}{7}, \frac{3y+20}{7}\right)$

On comparing the X-cordinate

$\frac{3x+8}{7} = -1$

3x + 8 = -7

3x = -15

x = -5

on comparing Y-cordinates

$\frac{3y+20}{7} = 2$

3y + 20 = 14

3y = -6

y = -2

hence cordinates of B(-5,-2)

65. AD is the median of triangle ABC

∴ D is the mid-point of BC.

∴ Its coordinates are $(\frac{7}{2}, \frac{9}{2})$

$P \to \left(\frac{(2)\left(\frac{7}{2}\right)+(1)(4)}{2+1}, \frac{(2)\left(\frac{9}{2}\right)+(1)(2)}{2+1}\right)$ [Using section formula]

$\Rightarrow P \to \left(\frac{11}{3}, \frac{11}{3}\right)$

$E \to \left(\frac{4+1}{2}, \frac{2+4}{2}\right)$

$\Rightarrow E \to \left(\frac{5}{2}, 3\right)$

66. According to the question, A(5, -6) and B(-7, 5).

Let P and Q be the point of trisection of AB i.e. $AP = PQ = QB$

(5, -6)   (-7, 5)

P divides AB internally in the ratio of 1:2, by applying section formula, we get the coordinates of P.
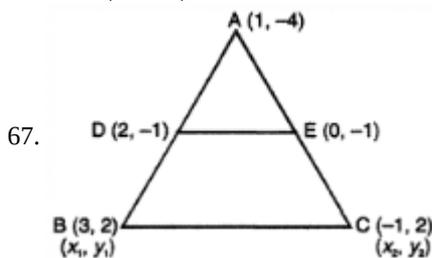
$= \left(\frac{1(-7)+2(5)}{1+2}\right), \left(\frac{1(5)+2(-6)}{1+2}\right)$

$\therefore P\left(1, \frac{-7}{3}\right)$

Q also divides AB internally in the ratio of 2:1, by applying section formula, we get the coordinates of Q.

$= \left(\frac{2(-7)+1(5)}{2+1}\right), \left(\frac{2(5)+1(-6)}{2+1}\right)$

$\therefore Q\left(-3, \frac{4}{3}\right)$

67.

Let Co-ordinates of B are (x_1, y_1)

$2 = \frac{1+x_1}{2} \therefore x_1 = 3$

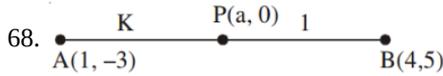$-1 = \frac{-4+y_1}{2} \therefore y_1 = 2$

∴ The coordinate of B is $(x_1, y_1) = (3, 2)$.

Let the coordinates of C are (x_2, y_2)

$0 = \frac{1+x_2}{2} \Rightarrow x_2 = -1$

$-1 = \frac{-4+y_2}{2} \Rightarrow y_2 = 2$

So, coordinates of mid - point of BC are $= \left(\frac{3-1}{2}, \frac{2+2}{2}\right) = (1, 2)$

68.

A(1, −3)   K   P(a, 0)   1   B(4,5)

Let P(a, 0) be the point which divides the line segment joining A(1, -3) and B(4,5) in ratio K: 1

Using section formula we get,

$(a, 0) = \left(\frac{K \times 4 + 1 \times 1}{K+1}, \frac{K \times 5 + 1 \times -3}{K+1}\right)$

$(a, 0) = \left(\frac{4K+1}{K+1}, \frac{5K-3}{K+1}\right)$

$a = \frac{4K+1}{K+1}$ and $0 = \frac{5K-3}{K+1}$

$\Rightarrow \frac{5K-3}{K+1} = 0$ [taking y-coordinate]

$\Rightarrow$ 5K-3=0

$\Rightarrow$ K $= \frac{3}{5}$

The required ratio is 3: 5.

Put the value of k in x-coordinate, we get,

$a = \frac{4\left(\frac{3}{5}\right)+1}{\left(\frac{3}{5}\right)+1}$

$a = \frac{\frac{12+5}{5}}{\frac{3+5}{5}} = \frac{\frac{17}{5}}{\frac{8}{5}} = \frac{17}{5} \times \frac{5}{8} = \frac{17}{8}$

Hence, point P is $(\frac{17}{8}, 0)$.

69. According to the question, A(3, 5) and B (-3, -2)

Let the point C divide AB in the ratio $\lambda : 1$.

A(3, 5)   C   B(−3, −2)

By using section formula, $\left(\frac{mx_2+nx_1}{m+n}, \frac{my_2+ny_1}{m+n}\right)$

The coordinates of C are

$\left(\frac{-3\lambda+3}{\lambda+1}, \frac{-2\lambda+5}{\lambda+1}\right)$

But, the coordinates of C are given as $\left(\frac{3}{5}, \frac{11}{5}\right)$

$\therefore \quad \frac{-3\lambda+3}{\lambda+1} = \frac{3}{5}$ and $\frac{-2\lambda+5}{\lambda+1} = \frac{11}{5}$

$\Rightarrow \quad -15\lambda + 15 = 3\lambda + 3$ and $-10\lambda + 25 = 11\lambda + 11$

$\Rightarrow \quad 18\lambda = 12$ and $21\lambda = 14$

$\Rightarrow \quad \lambda = \frac{2}{3}$

Hence, the point C divides AB in the ratio 2 : 3.

70. Let A (3, 0), B (4, 5), C (-1, 4) and D (-2, -1)

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

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

Area of rhombus $= \frac{1}{2} d_1 \times d_2$

$= \frac{1}{2} AC \times BD$

$= \frac{1}{2} \times 4\sqrt{2} \times 6\sqrt{2} = 24$ Sq. unit.

71. Let (-4, 6) divide AB internally in the ratio k:1. Using the section formula, we get

$(-4, 6) = \left(\frac{3k-6}{k+1}, \frac{-8k+10}{k+1}\right)$

So, $-4 = \frac{3k-6}{k+1}$

i.e., -4k - 4 = 3k - 6

i.e., 7k = 2

i.e., k:1 = 2:7

The same can be checked for the y-coordinate also.

Therefore, the ratio in which the point (-4,6) divides the line segment AB is 2: 7.

72. 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 $\left(\frac{-2}{7}, \frac{-20}{7}\right)$.

73. Given (7, -1) and (-3, -4)

    So $x_1 = 7$, $y_1 = -1$

    $x_2 = -3$, $y_2 = -4$

    Using section formula

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

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

    $x = \frac{15}{5} = 3$

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

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

    $y = \frac{-8-3}{5} = \frac{-11}{5}$

    So coordinates of intersection point $(3, \frac{-11}{5})$

74. The required point is on x-axis

    Its ordinate will be 0

    Let the point be (x, 0) and let this point divides the join of the points (2, 3) and (3, -2) in the ratio m : n

    $\therefore y = \frac{my_2 + ny_1}{m+n}$

    $0 = \frac{m(-2) + n\times 3}{m+n}$

    $\Rightarrow \frac{-2m+3n}{m+n} = 0 \Rightarrow -2m + 3n = 0$

    $\Rightarrow 3n = 2m$

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

    $\therefore$ Ratio is 3:2

75. Given A(7, -1) and B(-3, -4)

    So $x_1 = 7$, $y_1 = -1$

    $x_2 = -3$, $y_2 = -4$

    Using section formula

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

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

    $x = \frac{15}{5} = 3$

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

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

    $y = \frac{-8-3}{5} = \frac{-11}{5}$

    So coordinates of intersection point $(3, \frac{-11}{5})$