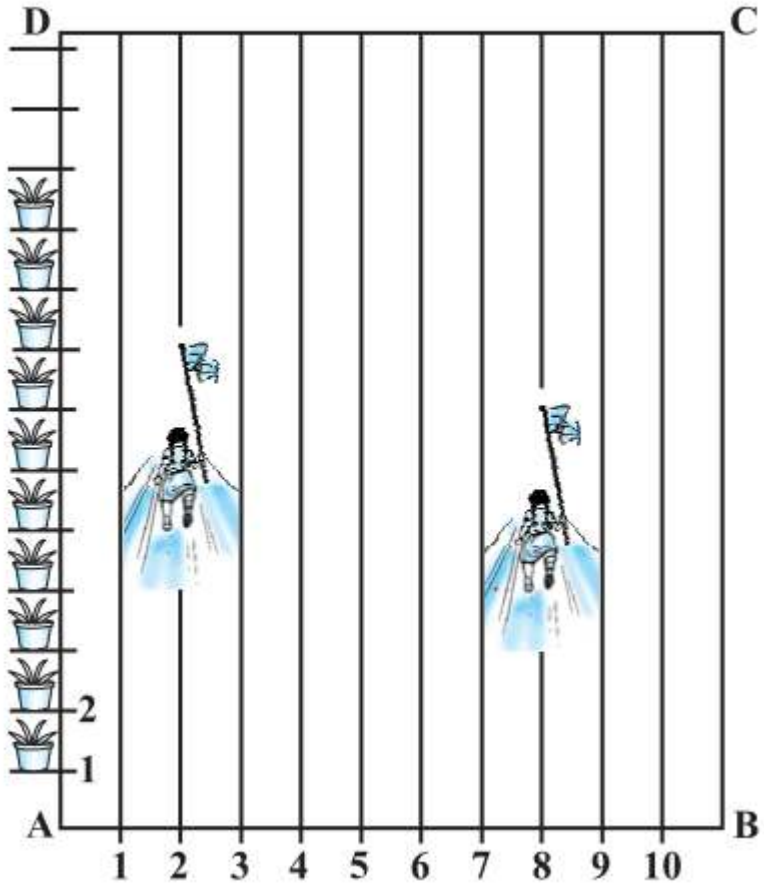
Coordinate Geometry Exercise 2

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

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

Question 3. To conduct Sports Day activities, in your rectangular shaped school ground ABCD, lines have been drawn with chalk powder at a distance of 1m each. 100 flower pots have been placed at a distance of 1m from each other along AD, as shown in below figure. Niharika runs $1/4^{th}$ of the distance AD on the 2nd line and posts a green flag. Preet runs $1/5^{th}$ 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?



Question 4. Find the ratio in which the line segment joining the points (– 3, 10) and (6, – 8) is divided by (– 1, 6).
Question 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.
Question 6. If (1, 2), (4, *y*), (*x*, 6) and (3, 5) are the vertices of a parallelogram taken in order, find *x* and *y*.
Question 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).
Question 8. If A and B are (– 2, – 2) and (2, – 4), respectively, find the coordinates of P such that AP =(3/7)AB and P lies on the line segment AB.
Question 9. Find the coordinates of the points which divide the line segment joining A(– 2, 2) and B(2, 8) into four equal parts.
Question 10. Find the area of a rhombus if its vertices are (3, 0), (4, 5), (– 1, 4) and (– 2, – 1) taken in order.

Solution 1

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

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

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

So

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

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

Therefore, the point is (1, 3).

Solution2

Let P (x1, y1) and Q (x2, y2) 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. And Q divides PQ in 2:1

Using the section formula, we obtain.

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

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

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

=2

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

=-5/3

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

=0

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

=-7/3

Solution 3

It can be observed that Niharika posted the green flag at ¼ of the distance AD i.e., (1/4)×100=25 m from the starting point of 2nd line. Therefore, the coordinates of this point G is (2, 25).

Similarly, Preet posted red flag at 1/5 of the distance AD i.e.,(1/5)×100=20 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

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

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). Now from mid-point section formula

$$x = \frac{2+8}{2}, y = \frac{25+20}{2}$$

$$x = \frac{10}{2}, y = \frac{45}{2} = 22.5$$

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

Solution 4

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

Then from section formula

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

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

Solving this

k=2/7

Therefore, the required ratio is 2:7

Solution 5

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

Using the section formula, we obtain.

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

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

$x = \frac{-4k+1}{k+1}$

$y = \frac{5k-1}{k+1}$

Now we know that point lies on x-axis so y=0

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

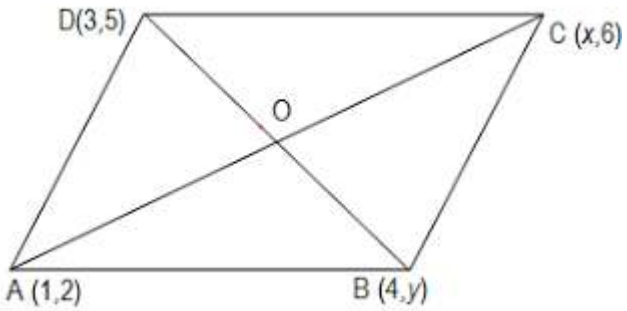
Or k=1

Then

$x = \frac{-4k+1}{k+1} = -3/2$

So coordinates are (-3/2,0)

Solution 6



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 divides 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

(1+x)/2, (2+6)/2
⇨ (1+x)/2 ,4

If O is the mid-point of BD, then the coordinates of O are
(3+4)/2, (5+y)/2
⇨ 7/2, (5+y)/2
Since both the coordinates are of the same point O,
So
(1+x)/2= 7/2
⇨ x=6

(5+y)/2= 4
⇨ y=3

Solution 7
Let the coordinates of point A be (x, y).
Mid-point of AB is (2, −3), which is the center of the circle.

So
(2, -3) = [(x+1)/2, (y+4)/2]

Or
(x+1)/2= 2
x=3

(y+4)/2=-3
y=-10

Therefore, coordinates are (3, -10)

Solution 8
The coordinates of point A and B are (−2, −2) and (2, −4) respectively.
Since AP = (3/7) AB
Therefore, AP: PB = 3:4
So P divides the line into the ration 3:4

$$x = \frac{m_1x_2+m_2x_1}{m_1+m_2} = -2/7$$

$$y = \frac{m_1y_2+m_2y_1}{m_1+m_2} = -20/7$$

Solution 9

Let P, Q, R are the point dividing line AB into four equal parts
it can be observed that points P, Q, R are dividing the line segment
in a ratio 1:3, 1:1, 3:1 respectively.

Now coordinates of Point P will be given

$= \left(\frac{1\times2+3\times(-2)}{1+3}, \frac{1\times8+3\times2}{1+3}\right)$

= (-1,7/2)

Now coordinates of Point Q will be given

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

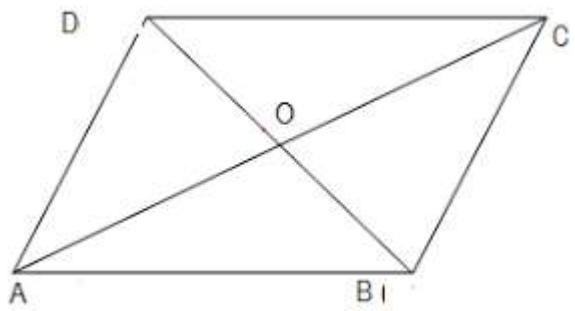
= (0,5)

Now coordinates of Point R will be given

$= \left(\frac{3\times2+1\times(-2)}{3+1}, \frac{3\times8+1\times2}{3+1}\right)$

= (1,13/2)

Solution 10



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

Now we know that Area of rhombus is given by

$A=(1/2)\ d_1 \times d_2$

Where d_1 and d_2 are diagonal of the rhombus

So here we just need to find the diagonals and then area can be calculated easily

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

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

So Area will be

$A= (1/2)\times6\sqrt{2}\times4\sqrt{2}=24$