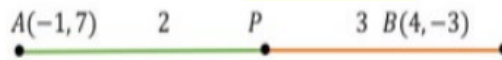


NCERT Solutions for Class 10 Maths Chapter 7 Coordinate geometry
Exercise No: 7.2

Question1:

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

Solution:



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

We know the section formula, which gives coordinates of point P, dividing the line segment joining $A(x_1, y_1)$ & $B(x_2, y_2)$ internally in the ratio $m : n$

By Section formula:

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

Substitute the values,

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

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

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

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

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

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

Hence, the co-ordinates of the required point are given by $(1, 3)$.

Question 2:

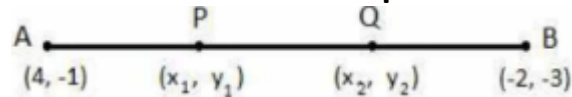
Find the coordinates of the points of trisection of the line segment joining $(4, -1)$ and $(-2, -3)$.

Solution:

Trisection means division into three equal parts.

So, we need to find two points such that they divide the line segment in three equal parts. Let $P(x_1, y_1)$ and $Q(x_1, y_1)$ are the points of trisection of the line segment joining the given points i.e. $AP = PQ = QB$

NCERT Solutions for Class 10 Maths Chapter 7 Coordinate geometry



By Section formula:

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

Therefore point P divides AB internally in ratio 1: 2

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

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

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

Point Q divides AB internally in ratio 2 : 1

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

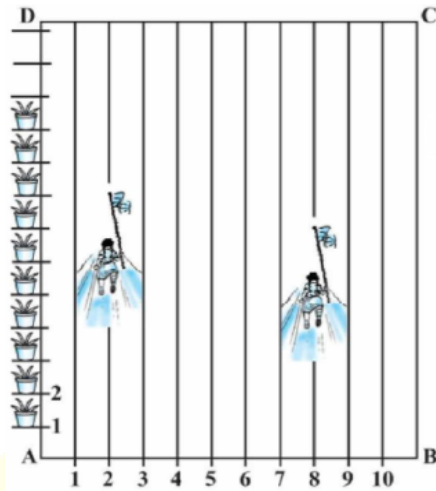
$$\begin{aligned} y_2 &= \frac{2 \times (-3) + 1 \times (-1)}{2 + 1} \\ &= \frac{-6 - 1}{3} \\ &= \frac{-7}{3} \end{aligned}$$

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

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 1 m from each other along AD, as shown in figure. Niharika runs $\frac{1}{4}$ th the distance AD on the 2nd line and posts a green flag. Preet runs $\frac{1}{5}$ th the distance AD on the eighth line and posts a red flag. What is the distance between both the flags? If

NCERT Solutions for Class 10 Maths Chapter 7 Coordinate geometry
Rashmi has to post a blue flag exactly halfway between the line segment joining the two flags, where should she post her flag?



Solution:

According to the question, it is given that Niharika posted the green flag (G) at $\frac{1}{4}$ th the distance AD i.e. $\frac{1}{4} \times 100 = 25$ m from the starting point of 2nd line.

So, coordinates of this point G are (2, 25).

Similarly, Preet posted red flag at $\frac{1}{5}$ th the distance AD i. e. $\frac{1}{5} \times 100 = 20$ m from the starting point of 8th line.

So, coordinates of this point R are (8, 20).

Now, below is the figure, which simplifies the given question by considering G as a position of green flag posted by Niharika and similarly R as a position of red flag, posted by Preet.

Now distance between these flags by using distance formula = GR

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

Since it is given that Rashmi has to post a blue flag exactly halfway between the line segment joining the two flags.

Now the point at which Rashmi should post her blue flag is the midpoint of line joining these points.

Let this point be B (x, y).

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

$$= \frac{10}{2}$$

$$= 5$$

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

NCERT Solutions for Class 10 Maths Chapter 7 Coordinate geometry

$$= \frac{45}{2}$$

$$= 22.5$$

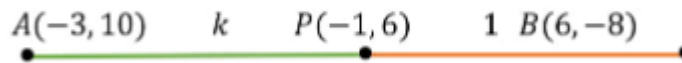
So, $B(x, y) = (5, 22.5)$

Rashmi should post her blue flag on 5th line at a distance of 22.5 m.

Question 4:

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

Solution:



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

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

We know the section formula, which gives coordinates of point P , dividing the line segment joining $A(x_1, y_1)$ & $B(x_2, y_2)$ internally in the ratio $k : 1$ $(\frac{kx_2+x_1}{k+1}, \frac{ky_2+y_1}{k+1})$,

Substitute the values,

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

But given, $x = -1$ and $y = 6$

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

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

$$7k = 2$$

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

Similarly, we can get k using y as follows:

$$6 = \frac{-8k+10}{k+1}$$

$$6k + 6 = -8k + 10$$

$$14k = 4$$

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

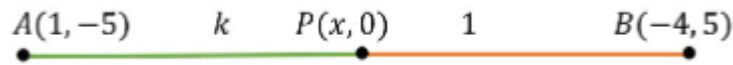
Hence, the required ratio is $2 : 7$.

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.

NCERT Solutions for Class 10 Maths Chapter 7 Coordinate geometry

Solution:



If the ratio in which P divides AB is $k : 1$, then the co-ordinates of the point P will be

$$\left(\frac{kx_2 + x_1}{k+1}, \frac{ky_2 + y_1}{k+1} \right).$$

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

By using section formula 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.

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

$$k = 1$$

Hence, x -axis divides it in the ratio $1 : 1$.

Coordinates of point of division are given by,

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

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 .

Solution:



Let (1, 2), (4, y), (x , 6) and (3, 5) are the coordinates of A, B, C and D respectively, which are the vertices of a parallelogram ABCD.

We know that the diagonals of a parallelogram bisect each other. So, O is midpoint of AC and BD. If O is midpoint of AC, then coordinates of O are

$$\left(\frac{1+x}{2}, \frac{2+y}{2} \right)$$

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

NCERT Solutions for Class 10 Maths Chapter 7 Coordinate geometry

If O is midpoint of BD, then coordinates of O are

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

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

As both the coordinates are of same point O, we compare both the sides.

$$\text{So, } \frac{x+1}{2} = \frac{7}{2} \text{ and } 4 = \frac{5+y}{2}$$

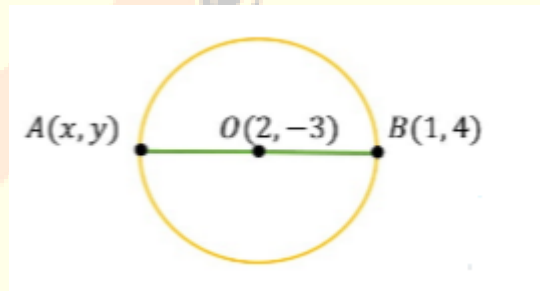
$$x + 1 = 7 \text{ and } 5 + y = 8$$

$$x = 6 \text{ and } y = 3$$

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).

Solution:



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

AB is the diameter of circle with center O (2, -3) and the coordinates of B (1, 4).

The centre O (2, -3) is the midpoint of the diameter AB.

Coordinates of midpoint of AB = coordinates of point O.

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

On comparing,

$$\frac{x+1}{2} = 2 \text{ and } \frac{y+4}{2} = -3$$

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

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

Hence, the coordinates of A are (x, y) = (3, -10).

Question 8:

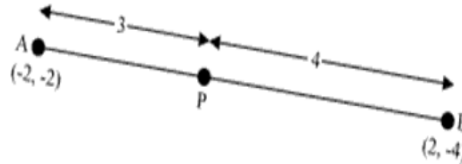
If A and B are (-2, -2) and (2, -4), respectively, find the coordinates of P such that $AP = \frac{3}{7} AB$ and P lies on the line segment AB.

NCERT Solutions for Class 10 Maths Chapter 7 Coordinate geometry

Solution:

Coordinates of the point P (x, y) which divides the line segment joining the points A (x_1, y_1) and B (x_2, y_2), internally, in the ratio $m_1 : m_2$ are

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



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

Since given that $AP = \frac{3}{7}AB$ (i)

But, $AB = AP + PB$ (ii)

Substituting (ii) in (i), we get,

$$7AP = 3(AP + PB)$$

$$4AP = 3PB$$

$$AP : PB = 3 : 4$$

Therefore, point P divides the line segment AB in a ratio 3: 4.

Using section formula,

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

Hence, the coordinates of P = $\left(\frac{3 \times 2 + 4 \times (-2)}{3+4}, \frac{3 \times (-4) + 4 \times (-2)}{3+4} \right)$

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

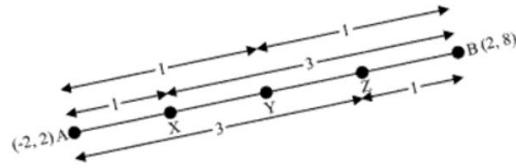
$$P = \left(\frac{-2}{7}, \frac{-20}{7} \right)$$

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.

Solution:

NCERT Solutions for Class 10 Maths Chapter 7 Coordinate geometry



It is clear from the figure that we have three points X, Y, Z dividing the line segment AB in a ratio 1: 3, 1: 1, 3: 1 respectively.

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

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

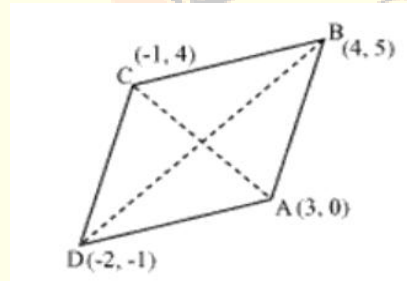
$$\text{Coordinates of Z} = \left(\frac{3 \times 2 + 1 \times (-2)}{3+1}, \frac{3 \times 8 + 1 \times 2}{3+1} \right) = \left(1, \frac{13}{2} \right)$$

Question 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)]

Solution:



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

Using distance formula: $\sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$

$$\begin{aligned} \text{The length of diagonal AC of a rhombus} &= \sqrt{[3 - (-1)]^2 + (0 - 4)^2} \\ &= \sqrt{16 + 16} \\ &= 4\sqrt{2} \end{aligned}$$

$$\begin{aligned} \text{The length of diagonal BD of a rhombus} &= \sqrt{[4 - (-2)]^2 + [5 - (-1)]^2} \\ &= \sqrt{36 + 36} \\ &= 6\sqrt{2} \end{aligned}$$

Hence, the area of rhombus ABCD = $\frac{1}{2}$ (product of two diagonals)

NCERT Solutions for Class 10 Maths Chapter 7 Coordinate geometry

$$\begin{aligned} &= \frac{1}{2} \times AC \times BD \\ &= \frac{1}{2} \times 4\sqrt{2} \times 6\sqrt{2} \\ &= 24 \text{ square units} \end{aligned}$$

