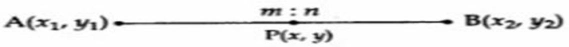
COORDINATE GEOMETRY
PPT-5

SUBJECT : MATHEMATICS
CHAPTER NUMBER: 07
CHAPTER NAME : COORDINATE GEOMETRY

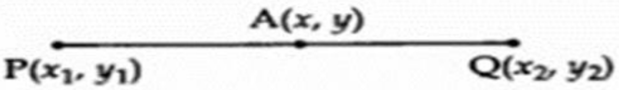
PREVIOUS KNOWLEDGE TEST

1. The coordinates of the point which divides the line segment joiningthe points A(x_1, y_1) and B(x_2, y_2) internally in the ratio m : n are:



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

2.The mid-point of the line segment joining the points P (x_1, y_1) and Q $((x_2, y_2)$



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

LEARNING OUTCOME

1. Students will be able to apply section formula to solve on problems based on finding section ratio and section point.
2. Students will be able to apply section formula to solve on problems based on finding points of trisection.
3. Students will be able to apply section formula to solve on problems based on finding the unknown vertex of a geometrical figure..

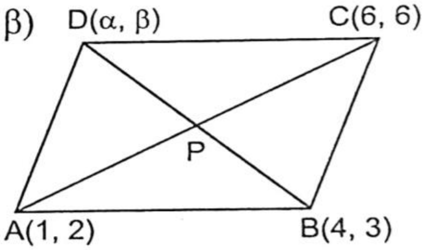
Problem solving on section formula;

https://youtu.be/fNF3u2rTccY(10.50)

1.The consecutive vertices of a parallelogram are A(1,2),B(1,0) and C(4,0).Find the fourth vertex D

1.The consecutive vertices of a parallelogram are A(1,2),B(1,0) and C(4,0).Find the fourth vertex D

Sol. Let coordinates of D be (α, β)



$\because$ diagonal of parallelogram bisect each other.

$\therefore$ P is mid-point of AC and BD.

$$\Rightarrow \left(\frac{\alpha+4}{2}, \frac{\beta+3}{2}\right) = \left(\frac{1+6}{2}, \frac{2+6}{2}\right)$$

$$\Rightarrow \quad \frac{\alpha+4}{2} = \frac{7}{2}; \frac{\beta+3}{2} = \frac{8}{2}$$

$$\Rightarrow \quad \alpha + 4 = 7; \beta + 3 = 8$$

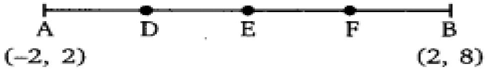
$$\Rightarrow \quad \alpha = 3; \beta = 5$$

$\therefore$ Coordinates of D are (3, 5).

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

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

let points D, E and F divide AB into four equal parts such that AD = DE = EF = FB



From the above figure, E is the mid-point of AB.

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

D is the mid-point of AE.

$$\therefore \text{Coordinates of D} = \left(\frac{-2+0}{2}, \frac{2+5}{2}\right) = \left(-1, \frac{7}{2}\right)$$

F is the mid-point of EB.

$$\therefore \text{Coordinates of F} = \left(\frac{0+2}{2}, \frac{5+8}{2}\right) = \left(1, \frac{13}{2}\right)$$

Hence, the required points are $\left(-1, \frac{7}{2}\right)$, $(0, 5)$ and $\left(1, \frac{13}{2}\right)$.

3. 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

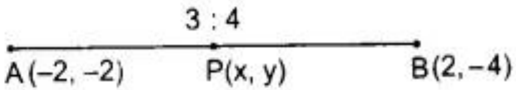
3. If A and B are (– 2, – 2) and (2, – 4), respectively, find the coordinates of P such that AP = 3/7 AB and P lies on the line segment AB

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

$$BP = AB - AP$$

$$= \frac{AB}{1} - \frac{3}{7}AB = \frac{7AB - 3AB}{7} = \frac{4AB}{7}$$

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



$$x = \frac{3(2)+4(-2)}{3+4} = \frac{6-8}{7} = -\frac{2}{7}$$

$$y = \frac{3(-4)+4(-2)}{3+4} = \frac{-12-8}{7} = -\frac{20}{7}$$

Hence, the coordinates of P are $\left(-\frac{2}{7}, -\frac{20}{7}\right)$.

4.Prove that the points (4,5), (7,5), (6,3) & (3,2) are the vertices of a parallelogram. Is it a rectangle.

4.Prove that the points (4,5), (7,5), (6,3) & (3,2) are the vertices of a parallelogram. Is it a rectangle.

Solution. Let $A(4,5)$, $B(7,6)$, $C(6,3)$ and $D(3,2)$ be the vertices of a quadrilateral $ABCD$.

$$\text{Midpoint of diagonal } AC = \left(\frac{4+6}{2}, \frac{5+3}{2}\right) = (5,4)$$

$$\text{Midpoint of diagonal } BD = \left(\frac{7+3}{2}, \frac{6+2}{2}\right) = (5, 4)$$

$\Rightarrow$ The diagonals AC and BD bisect each other.

Hence, the quadrilateral $ABCD$ is a parallelogram.

Also, $$AC = \sqrt{(6-4)^2 + (3-5)^2} = \sqrt{4+4} = 2\sqrt{2}$$

$$BD = \sqrt{(3-7)^2 + (2-6)^2} = \sqrt{16+16} = 4\sqrt{2}$$

$\Rightarrow$ Diagonal $AC \neq$ Diagonal BD

Hence, parallelogram $ABCD$ is not a rectangle.

5. Determine the ratio in which the line $3x + y - 9 = 0$ divides the line segment joining the points A (1, 3) and B (2, 7).

5. Determine the ratio in which the line 3x + y – 9 = 0 divides the line segment joining the points A (1, 3) and B (2, 7).

Solution. Let the line $3x+y-9=0$ divide the line segment AB in joining the points $A(1, 3)$ and $B(2, 7)$ in the ratio $k : 1$. Then the coordinates of the point of intersection P will be

$$\left(\frac{2k+1}{k+1}, \frac{7k+3}{k+1}\right)$$

As the point P lies on the line $3x+y-9=0$, so

$$3\left(\frac{2k+1}{k+1}\right)+\left(\frac{7k+3}{k+1}\right)-9=0$$

$\Rightarrow$ $(6k+3)+(7k+3)-(9k+9)=0$ $\Rightarrow$ $4k=3$ $\Rightarrow$ $k=\frac{3}{4}$

Hence, the required ratio is $\frac{3}{4} : 1$ or $3 : 4$.

HOME ASSIGNMENT Ex. 7.2 Q. No 8 to Q10

AHA

1. Find the center of a circle passing through the points (6, – 6), (3, – 7) and (3, 3).
2. The two opposite vertices of a square are (–1, 2) and (3, 2). Find the coordinates of the other two vertices.

THANKING YOU

ODM EDUCATIONAL GROUP