ODM EDUCATIONAL GROUP
Changing your Tomorrow

COORDINATE GEOMETRY
PPT-7

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

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PREVIOUS KNOWLEDGE TEST

Algorithm for finding the area of a Δ when its vertices are given

Step 1 Write coordinates of the three vertices in three columns and repeat the coordinates of the first vertex.

Step 2 Draw the arrows pointing right downwards and pointing left downwards.

$$\left| \begin{array}{cccc} x_1 & x_2 & x_3 & x_1 \\ y_1 & y_2 & y_3 & y_1 \end{array} \right|$$

Step 3 We can calculate the area of the Δ as follows :

$$\text{area of } \Delta = \frac{1}{2} \left| \begin{array}{cccc} x_1 & x_2 & x_3 & x_1 \\ y_1 & y_2 & y_3 & y_1 \end{array} \right|$$

$$= \frac{1}{2} \mid \text{Sum of the products pointing right downwards} - \text{Sum of the products pointing left downwards} \mid$$

$$= \frac{1}{2} \left| (x_1 y_2 + x_2 y_3 + x_3 y_1) - (x_2 y_1 + x_3 y_2 + x_1 y_3) \right|$$

Collinearity Condition

If three points A, B and C are collinear and B lies between A and C, then,

1. AB + BC = AC. AB, BC, and AC can be calculated using the distance formula.

2.The ratio in which B divides AC, calculated using section formula for both the x and ycoordinates separately will be equal.

3.Area of a triangle formed by three collinear points is zero.

LEARNING OUTCOME

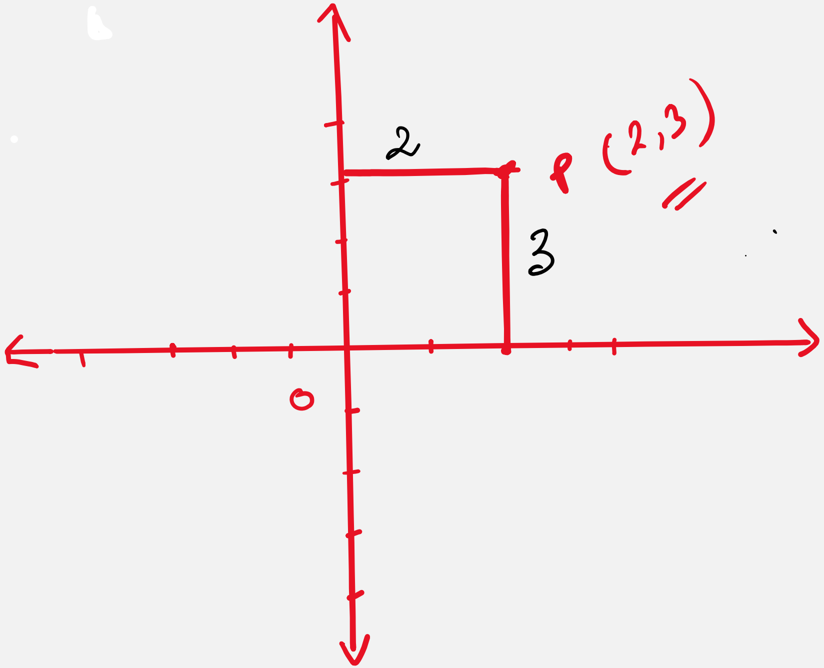
1.Students will be able to find the area of triangle when the coordinates of its vertices are given.

2. Students will be able to find the area of a quadrilateral when the coordinates of its vertices are given.

3. Students will be able to apply area of triangle to prove collinearity of three points .

4. Students will be able to apply area of triangle to find an unknown when three points are collinear.

1.Find the distance of the point from P(2,3) from the x- axis.



2. Find the distance between the points A(0,6)and B(0,-2)

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Q2. The distance between the points A(0, 6) and B(0, – 2) is

(*a*) 6 (*b*) 8 (*c*) 4 (*d*) 2

Sol. (*b*):

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$= \sqrt{(0-0)^2 + (-2-6)^2} = \sqrt{0 + (-8)^2} = \sqrt{64}$$

$$\Rightarrow \quad AB = 8 \text{ units}$$

Hence, verifies Ans (*b*).

3.AOBC is a rectangle whose vertices area(0,3), O(0,0) &B(5,0).Find the length of its diagonal

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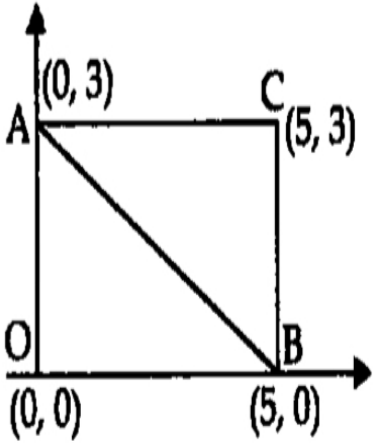
Sol. (*c*): A (0, 3) and B(5, 0)

The length of diagonal = AB

$$AB^2 = (x_2 - x_1)^2 + (y_2 - y_1)^2$$
$$= (5-0)^2 + (0-3)^2$$
$$= 25 + 9$$

$\Rightarrow$ $AB = \sqrt{34}$ verifies Ans. (*c*).



4.Find the perimeter of a triangle vertices (0,4),(0,0) and (3,0).

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4.Find the perimeter of a triangle vertices (0,4),(0,0) and (3,0).

The perimeter of a triangle with vertices (0, 4), (0, 0), and (3, 0) is

(*a*) 5 (*b*) 12 (*c*) 11 (*d*) $7+\sqrt{5}$

Sol. (*b*): Perimeter of $\Delta ABC = AB + BC + AC$

Let A(0, 4), B(0, 0), C(3, 0) be the three vertices of ΔABC.

$$AB^2 = (x_2 - x_1)^2 + (y_2 - y_1)^2$$

$$= (0-0)^2 + (0-4)^2 = 0 + 16$$

$$\Rightarrow \quad AB = \sqrt{16} = 4 \text{ cm}$$

$$AC^2 = (3-0)^2 + (0-4)^2 = 9 + 16$$

$$\Rightarrow \quad AC^2 = 25$$

$$\Rightarrow \quad AC = 5 \text{ cm}$$

$$BC^2 = (3-0)^2 + (0-0)^2 = 9 + 0$$

$$\Rightarrow \quad BC^2 = 9$$

$$\Rightarrow \quad BC = 3 \text{ cm}$$

$$\therefore \quad \text{Perimeter} = 4 \text{ cm} + 5 \text{ cm} + 3 \text{ cm} = 12 \text{ cm}$$

Hence, verifies Ans. (*b*).

5. Find the area of the triangle with vertices (3,0),(7,0)and (8,4)

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The area of triangle with vertices A(3, 0), B(7, 0), and C(8, 4) is

(*a*) 14 (*b*) 28 (*c*) 8 (*d*) 6

Sol. (*c*): Area (A) of ΔABC whose vertices are A(3, 0), B(7, 0) and C(8, 4) is given by

$$\text{Area of } \Delta ABC = \frac{1}{2}[x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)]$$

$$= \frac{1}{2}[3(0-4) + 7(4-0) + 8(0-0)]$$

$$= \frac{1}{2}[-12 + 28 + 0] = \frac{1}{2}[16] = 8 \text{ sq.units}$$

Hence, verifies the Ans. (*c*).

6. Find the fourth vertex of a parallelogram ABCD whose three vertices are A(-2,3),B(6,7) & C(8,3)

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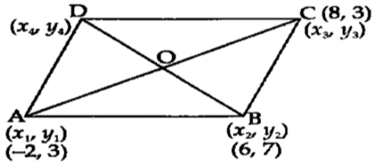
6. Find the fourth vertex of a parallelogram ABCD whose three vertices are A(-2,3),B(6,7) & C(8,3)



OR

$$\begin{bmatrix}\text{The mid point}\\ \text{of diagonal AC}\end{bmatrix} = \begin{bmatrix}\text{Mid point of}\\ \text{diagonal BD}\end{bmatrix}$$

$$\Rightarrow \quad \left(\frac{-2+8}{2}, \frac{3+3}{2}\right) = \left(\frac{x_4+6}{2}, \frac{y_4+7}{2}\right)$$

$$\Rightarrow \quad \left(\frac{6}{2}, \frac{6}{2}\right) = \left(\frac{x_4+6}{2}, \frac{y_4+7}{2}\right)$$

$$\Rightarrow \quad (3, 3) = \left(\frac{x_4+6}{2}, \frac{y_4+7}{2}\right)$$

Comparing both sides, we have

$$\frac{x_4+6}{2} = 3 \quad \text{and} \quad \frac{y_4+7}{2} = 3$$

$$\Rightarrow \quad x_4 + 6 = 6 \quad \Rightarrow \quad y_4 + 7 = 6$$

$$\Rightarrow \quad x_4 = 0 \quad \Rightarrow \quad y_4 = 6 - 7 = -1$$

$\therefore$ The fourth vertex of parallelogram is (0, – 1) verifies ans. (*b*).

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The distance of the point P(– 6, 8) from the origin is

(a) 8 (b) $2\sqrt{7}$ (c) 10 (d) 6

Sol. (c): Coordinates of origin are O(0, 0) and P(– 6, 8)

$$\therefore \quad (OP)^2 = (x_2 - x_1)^2 + (y_2 - y_1)^2$$
$$= (-6-0)^2 + (8-0)^2 = 36 + 64$$
$$OP = \sqrt{100}$$
$$\Rightarrow \quad OP = 10 \text{ units. verifies ans. } (c).$$

HOME ASSIGNMENT Ex. 7.1 Q. No 1 to Q8

AHA

1. The vertices of a ΔABC are A(4, 6), B(1, 5) and C(7, 2). A line is drawn to intersect sides AB and AC at D and E respectively, such that AD/ AB=AE/AC =1/4 · Calculate the area of the Δ ADE and compare it with the area of ΔABC.

THANKING YOU

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