

**CO-ORDINATE GEOMETRY****IMPORTANT CONCEPTS****TAKE A LOOK****1. Distance Formula:-**

The distance between two points A(x<sub>1</sub>,y<sub>1</sub>) and B (x<sub>2</sub>,y<sub>2</sub>) is given by the formula.

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

COROLLARY:- The distance of the point P(x,y) from the origin O(0,0) is give by

$$OP = \sqrt{(X-0)^2 + (Y-0)^2} \quad \text{ie } OP = \sqrt{X^2 + Y^2}$$

**2. Section Formula :-**

The co-ordinates of the point P(x,y) which divides the line segment joining A(x<sub>1</sub>,y<sub>1</sub>) and B(x<sub>2</sub>,y<sub>2</sub>) internally in the ratio m:n are given by .

$$X = \frac{mx_2 + nx_1}{m+n}$$

$$Y = \frac{my_2 + ny_1}{m+n}$$

**3. Midpoint Formula:-**

If R is the mid-point, then m<sub>1</sub>=m<sub>2</sub> and the coordinates of R are

$$R \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

**4. Co-ordinates of the centroid of triangle:-**

The co-ordinates of the centroid of a triangle whose vertices are P(x<sub>1</sub>,y<sub>1</sub>), Q(x<sub>2</sub>,y<sub>2</sub>) and R(x<sub>3</sub>,y<sub>3</sub>) are

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

**5. Area of a Triangle:-**

The area of the triangle formed by the points P(x<sub>1</sub>,y<sub>1</sub>), Q(x<sub>2</sub>,y<sub>2</sub>) and R(x<sub>3</sub>,y<sub>3</sub>) is the numerical value of the expression.

$$\text{ar } (\Delta PQR) = \frac{1}{2} \left[ x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2) \right]$$

**LEVEL- 1**

1. If the coordinates of the points P and Q are (4,-3) and (-1,7). Then find the abscissa of a point R on the line segment PQ such that  $\frac{PR}{PQ} = \frac{3}{5}$

Ans. 1

2. If P ( $\frac{a}{3}$ , 4) is the midpoint of the line segment joining the points Q ( -6 , 5 ) and R ( -2 , 3 ) , then find the value of a .

Ans . -12

3. A line intersects y –axis and x-axis at the points P and Q respectively . If ( 2 , -5) is the midpoint of PQ , then find the coordinates of P and Q respectively .

Ans. (0,-10) and (4,0)

4. If the distance between the points (4,p)&(1,0) is 5, then find the value of p

Ans.  $\pm 4$

5. If the points A(1,2), B(0,0) and C(a,b) are collinear, then find the relation between a and b

Ans.  $2a=b$ 

6. Find the coordinate of the point on x-axis which is equidistant from (2,-5) and (-2,9).

Ans. (-7,0)

7. Find the coordinates of a point A, where AB is diameter of a circle whose centre is (2, -3) and B is (1, 4)

Ans. (3, -10)

8. Find the centroid of triangle whose vertices are (3, -7), (-8, 6) and (5, 10).

Ans. (0, 3)

**LEVEL-2**

1. Point P (5, -3) is one of the two points of trisection of the line segment joining the points A (7, -2) and B (1, -5) near to A. Find the coordinates of the other point of trisection.

Ans. (3, -4)

2. Show that the point P (-4, 2) lies on the line segment joining the points A (-4, 6) and B (-4, -6).

3. If A (-2, 4), B (0, 0), C (4, 2) are the vertices of a  $\triangle ABC$ , then find the length of median through the vertex A.

Ans. 5 units

4. Find the value of x for which the distance between the points P (4, -5) and Q (12, x) is 10 units.

Ans. 1, -11

5. If the points A (4,3) and B (x,5) are on the circle with centre O(2,3) then find the value of x.

Ans. 2

6. What is the distance between the point A (c, 0) and B (0, -c)?

Ans.  $\sqrt{2} c$ 

7. For what value of p, are the points (-3, 9), (2, p) and (4, -5) collinear?

Ans.  $p = -1$ **LEVEL-3**

1. Show that the points (3, 2), (0, 5), (-3, 2) and (0, -1) are the vertices of a square.

2. Point P divides the line segment joining the points A(2,1) and B(5,-8) such that  $AP:AB=1:3$ . If P lies on the line  $2x-y+k=0$ , then find the value of k.Ans.  $k = -8$ 

3. Points P, Q, R, and S in that order are dividing a line segment joining A (2, 6) and B (7, -4) in five equal parts. Find the coordinates of point P and R?

Ans. P (3, 4), R (5, 0)

4. Find a relation between x and y if the points (2, 1), (x, y) and (7, 5) are collinear.

Ans.  $4x - 5y + 3 = 0$ 

5. If A (-4, -2), B (-3, -5), C (3, -2) and D (2, 3) are the vertices of a quadrilateral, then find the area of the quadrilateral.

Ans. 28 sq. units

6. Find the values of x for which the distance between the points P(2, -3) and Q(x, 5) is 10 units

Ans.  $x = 8$  or  $x = -4$ 

7. Find the point on y-axis which is equidistant from the points (5, -2) and (-3, 2)

Ans. (0, -2)

**LEVEL-4**1. A (6, 1), B (8, 2), C (9, 4) are the three vertices of a parallelogram ABCD. If E is the midpoint of DC, then find the area of  $\triangle ADE$ .

Ans.  $\frac{3}{4}$  sq. unit

2. In each of following , find the value of 'k' for which the points are collinear .

(a) (7, -2) , (5, 1) , (3, k)                      (b) (8, 1) , (k, -4) ,(2,-5)

Ans. (a)  $k = 4$                       (b)  $k = 3$

3. Find the area of the triangle formed by joining the mid points of the sides of the triangle whose vertices are (0, -1) , (2,1) and (0,3). Find the ratio of this area to the area of the given triangle.

Ans. 1:4

4. Find the coordinates of the points which divides the line segment joining the points (-2,0) and (0,8) in four equal parts.

Ans.  $(-\frac{3}{2}, 2)$ ,  $(-1,4)$ ,  $(-\frac{1}{2}, 6)$

5. Find the area of the quadrilateral whose vertices taken in order are (-4, -2), (-3, -5), (3, -2) and (2,3)

Ans. 28 sq. units

6. Find the area of the rhombus, if its vertices are (3,0), (4,5), (-1,4) and (-2,-1) taken in order.

Ans. 24 sq. units

### HOTS /SELF EVALUATION

1. Two opposite vertices of a square are (-1,2) and (3, 2). Find the coordinates of the other two vertices.

[Ans. (1,0) and (1,4)]

2. Find the centre of a circle passing through the points (6,-6), (3, 7) and (3, 3). [Ans.3,-2]

3. If the distance between the points (3,0) and (0,y) is 5 units and y is positive, then what is the value of y?

[Ans.4]

4. If the points (x,y) ,(-5,-2) and (3,-5) are collinear, then prove that  $3x+8y+31 = 0$ .

5. Find the ratio in which the Y-axis divides the line segment joining the points (5, -6) and (-1, -4). Also find the coordinates of the point of division.

Ans. 5:1; (0,-13/3)

6. Find k so that the point P(-4,6) lies on the line segment joining A (k,0) and B (3, -8). Also find the ratio in which P divides AB.

[ Ans. 3:7 externally; k=-1]

7. By distance formula, show that the points (1, -1), (5,2) and (9,5) are collinear.