CO-ORDINATE GEOMETRY

IMPORTANT CONCEPTS
TAKE A LOOK

1. **Distance Formula**:-

   The distance between two points $A(x_1,y_1)$ and $B(x_2,y_2)$ 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 0(0,0) is give by

   $OP=\sqrt{(X-0)^2+(Y-0)^2}$ 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 $A(x_1,y_1)$ and $B(x_2,y_2)$ internally in the ratio m:n are given by .

   $$X=\frac{mx_2+nx_1}{m+n} \qquad y=\frac{my_2+ny_1}{m+n}$$

3. **Midpoint Formula:-**

   If R is the mid-point, then $m_1=m_2$ 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 $P(x_1,y_1)$, $Q(x_2,y_2)$ and $R(x_3,y_3)$ 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 fromed a by the points $P(x_1,y_1)$ $Q(x_2,y_2)$ and $R(x_3,y_3)$ is the numerical value of the expression.

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

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.± 4

5. If the point 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 ΔABC, 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 ΔADE .

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.