CO-ORDINATE GEOMETRY

BASIC CONCEPTS

1. **Distance Formula**:-

The distance between two points $A(x_1,y_1)$and B $(x_2,y_2)$is given by the formula.

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

COROLLARY:-The distance of the point P(x,y) from the origin 0(0,0) is given 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 .

$$x = \frac{mx_2+nx_1}{m+n} \quad y = \frac{my_2+ny_1}{m+n}$$

3. **Mid point Formula:-**

If R is the mid-point, then $m_1=m_2$ and the coordinates of R are

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

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

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

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

The are a of the triangle formed 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-I

1. Find the distance between the points P (7, 5) and Q (2, 5).

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

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

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

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

6. Find the rational number which the y-axis divides the segment joining(-3, 6)and(12,-3).

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

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

LEVEL-II

1. 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.

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

3. 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.

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

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

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

7. 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.

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

LEVEL-III

1. Find the ratio in which theline2x+3y=10dividesthe line segment joining the points (1, 2) and (2, 3).

2.Prove that (4,-1),(6,0),(7,2) & (5,1) are the vertices of a rhombus is it a square?

3. Find the area of the triangle formed by joining the midpoints 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.

4. Determine the ratio in which the point P (a,-2) divides the line joining of points (-4, 3) and B (2, -4).Also find the value of a.

5. If the point C (-1, 2) divides internally the line segment joining A (2, 5) and in the ratio 3:4. Find the Co-ordinates of B.

6.Show that points (1,1),(4,4),(4,8)and (1,5) are the vertices of a parallelogram.

7. Find the value of p, for which the points (-1, 3), (2, p) & (5,-1) are collinear

8. If the points (-1, 3), (1,-1) and (5, 1) are the vertices of a triangle. Find the length of the median through the first vertex.

SELF EVALUATION

1. Find the Centre of a circle passing through the points (6,-6), (3, 7) and (3, 3).
2. If the distance between the points (3, 0) and (0, y) is 5unitsand y is positive, what is the value o f y?
3. If the points(x, y), (-5,-2) and (3,-5) are collinear, then prove that 3x+8y+31=0.
4. 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.
5. By distance formula, show that the points (1,-1), (5, 2) and (9, 5) are collinear.
6. Show that the three points (a, a), (-a, -a) & (-a√3, a√3) are the vertices of an equilateral triangle.

Board Questions

Q: 1) Find the value of k, if the point P (2, 4) is equidistant from the points (5, k) and (k, 7).
(CBSE: 2012)

Q: 2)If the point A(0,2)is equidistant from the points B(3,p) and C(p,5),find p. Also find the length of AB.
(CBSE: 2014)

Q:3) Find the ratio in which the point P(x, 2) divides the line- segments joining the points A (12, 5) and B (4,-3).Also, find the value of x.
(CBSE: 2014)

Q:4) If the points A (-2, 1),B (a,b) and C(4,-1) are collinear and a-b=1.Find the value of a and b.
(CBSE: 2014)

Q: 5) In what ratio does the point (-4, 6) divides the line segment joining the points A (-6, 10) &B (3,-8)
(CBSE: 2012)

ASKED QUESTIONS

Q.1.Mr. Gopal aged 70 lives in his house at (4, 5).he goes to shop which is located at (5, 2) and then to a park located at (3, 6) .Find the distance travelled by Mr. Gopal.
In what way will you take your grandfather to the park? What are the values you exhibit when you accompany your grandfather?
Ans= values
Care for the aged. Time management, Responsibility

Q.2. Thecoordinatesof houses of Sonu and Monu are(7, 3)and (4, 3)respectively. Coordinate of their school is(2, 2).If both leave their houses at the same time in the morning and also reach school in the same time.
(i)) Then who travel faster, and
(ii) Which value is depicted in the question?

Ans. (i)Sonu
(ii)Punctuality

ANSWER KEY

LEVEL-I

1. 5
2. -12
3. (0,-10) and (4,0)
4. ±4
5. 2a=b
6. ¼
7. (3,-10)
8. (0,3)

LEVEL-II

1. 5 units
2. 1, -11
3. 2
4. $\sqrt{2c}$
5. -1
6. Proof
7. K=-8
8. 4x - 5y - 3=0

LEVEL-III

1. 2:3

2. Proof

3. 1:4

4. a=2/7

5. B(-5,-2)
6. Proof
7. p=1
8. 5

SELF EVALUATION

1. (24,5)
2. 4
3. Proof
4. 5:1, (0,-13/3)
5. Proof
6. Proof

BOARD QUESTIONS

1. K=3
2. P=1, AB=$\sqrt{10}$
3. 3:5, x=9
4. a=1, b=0
5. 2/7