CO-ORDINATE GEOMETRY

The coordinates of a point on x-axis are of the form $(x, 0)$ and a point on y-axis are of the form $(0, y)$.

Section Formula

The co-ordinates of the point which divides the join of points $A(x_1, y_1)$ and $B(x_2, y_2)$ internally in the ratio $m : n$ are

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

Distance Formula

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

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

Mid Point Formula

The coordinates of the mid point of line segment joining the points $A(x_1, y_1)$ and $B(x_2, y_2)$ are

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

The distance of a point $P(x, y)$ from the origin $O(0, 0)$ is given by

$$OP = \sqrt{x^2 + y^2}$$

Centroid Formula

The coordinates of centroid of the triangle formed by the points $A(x_1, y_1)$, $B(x_2, y_2)$ and $C(x_3, y_3)$ are

$$\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}$$

Area of Triangle

The area of a triangle with vertices $A(x_1, y_1)$, $B(x_2, y_2)$ and $C(x_3, y_3)$ is

$$\frac{1}{2}[x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)]$$

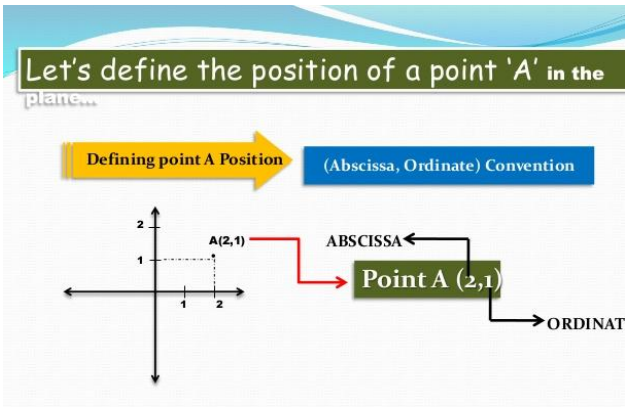
$$\frac{1}{2}[(x_1y_2 + x_2y_3 + x_3y_1) - (x_1y_3 + x_2y_1 + x_3y_2)]$$

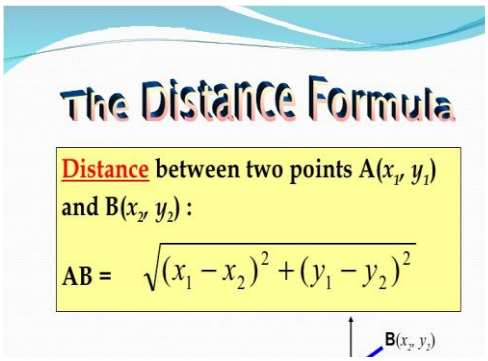
Collinear Points

Three points $A(x_1, y_1)$, $B(x_2, y_2)$ and $C(x_3, y_3)$ are collinear if area of triangle formed by these points is zero.

- In a parallelogram, diagonals bisect each other.
- In a square all four sides are equal and both diagonals are equal.
- In a rectangle opposite sides and both diagonals are equal.

Three points A, B, C are collinear if $AB + BC = AC$ i.e., sum of distances between two pairs of points is equal to distance between third pair.





1. Find a point on the y-axis equidistant from (-5, 2) and (9, -2).

2. Find the distance between the points (-8/5, 2) and (2/5, 2).

3. In triangle ABC, D and E are mid-points of the sides BC and AC respectively. Find the length of DE. Prove that DE = 1/2AB.

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

5. Find the area of quadrilateral ABCD whose vertices are A (1, 0), B (5, 3), C (2, 7), D (-2, 4).

6. Points P, Q, R and S divide a line segment joining A (2, 6) and B (7, -4) in five equal parts. Find the coordinates of P and R.

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

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

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