Ch-7 Coordinate Geometry

1. 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).
2. **Distance Formula –** the distance between two points A (x_1, y_1) and B (x_2, y_2) is given by AB = $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$.
3. The distance of a point P (x, y) from the origin O (0, 0) is given by OP = $\sqrt{x^2 + y^2}$.
4. **Section Formula –** the coordinates 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 – $\left(\frac{mx_2 + nx_1}{m+n}, \frac{my_2 + ny_1}{m+n}\right)$.
5. **Mid-Point Formula –** the coordinates of a mid-point of line segment joining the points A (x_1, y_1) and B (x_2, y_2) are – $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$.
6. **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 – $\left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$.
7. **Area of triangle –** the area of triangle with vertices A (x_1, y_1), B (x_2, y_2), and C (x_3, y_3) is
   $= \frac{1}{2}[x_1 (y_2 - y_3) + x_2 (y_3 - y_1) + x_3 (y_1 - y_2)]$
   $= \frac{1}{2}[(x_1y_2 + x_2y_3 + x_3y_1) - (x_1y_3 + x_2y_1 + x_3y_2)]$
8. **Collinear points –** 3 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 0.
   3 points A, B, C are collinear, if AB + BC = AC, i.e., sum of distances between 2 pairs of points is equal to distance between 3rd pair.
9. Some other properties –
   a. In a parallelogram, diagonals bisect each other.
   b. In a square, all four sides are equal and both diagonals are equal.
   c. In a rectangle, opposite sides are equal and both diagonals are equal.