Class 10th

MATHEMATICS
COORDINATE GEOMETRY

Distance Formula:

The distance between two points (x_1, y_1) and (x_2, y_2) in a rectangular coordinate system is equal to $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$. The distance of a point (x, y) from origin is $\sqrt{x^2 + y^2}$.

Test For Geometrical Figures:

(a) For an isosceles triangle : Prove that at least two sides are equal

(b) For an equilateral triangle : Prove that all sides are equal.

(c) For a right-angled triangle: Prove that the sum of the squares of two sides is equal to the square of the third side.

(d) For a square : Prove that all sides are equal and diagonals are equal.

(e) For a rhombus : Prove that all sides are equal and diagonals are not equal.

(f) For a rectangle : Prove that the opposite sides are equal and diagonals are also equal.

(g) For a parallelogram : Prove that the opposite sides are equal in length and diagonals are not equal.

Collinearity of three points:

Let A, B and C are given points. Point A, B and C will be collinear if the sum, of lengths of any two line-segments is equal to the length of the third line-segment.

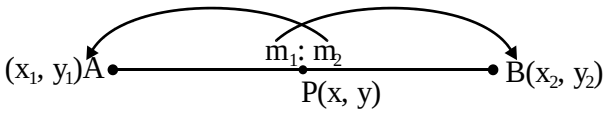
Three points A, B and C are collinear if and only if

(i) AB + BC = AC or

(ii) AB + AC = BC or

(iii) AC + BC = AB

Section Formula: Coordinates of the point, dividing the line-segment joining the points (x_1, y_1) and (x_2, y_2) internally in the ratio $m_1 : m_2$ are given by $\left(\frac{m_1x_2 + m_2x_1}{m_1 + m_2}, \frac{m_1y_2 + m_2y_1}{m_1 + m_2}\right)$



Mid-point Formula:

Coordinates of the mid-point of the line-segment joining (x_1, y_1) and (x_2, y_2) are $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Area of a Triangle : Area of $\Delta ABC = \frac{1}{2}\left|x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)\right|$

Condition of collinearity of three points:

The given points $A(x_1, y_1)$, $B(x_2, y_2)$ and $C(x_3, y_3)$ will be collinear if the area of the triangle formed by them must be zero because triangle can not be formed.

$\Rightarrow$ area of $\Delta ABC = 0$

$\Rightarrow \quad \frac{1}{2}\left|x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)\right| = 0$

$\Rightarrow \quad x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2) = 0$

is the required condition for three points to be collinear.

1. If a ray stands on a line, then the sum of the adjacent angles so formed is 180°.
2. If the sum of two adjacent angles is 180°, then their non common arms are two opposite rays.
3. The sum of all the angles round a point is equal to 360°.
4. If two lines intersect, then the vertically opposite angles are equal.
5. If a transversal intersects two lines in such a way that a pair of alternate interior angles is equal, then the two lines are parallel.
6. If a transversal intersects two lines in such a way that a pair of consecutive interior angles is supplementary, then the two lines are parallel.
7. If a line is perpendicular to one of two given parallel lines, then it is also perpendicular to the other line.
8. If two lines are parallel to the same line, they will be parallel to each other.
9. The sum of the angles of a triangle is 180°.
10. If a side of a triangle is produced, then the exterior angle so formed is equal to the sum of the two interior opposite angles.