



COORDINATE GEOMETRY



CLASS -X

INTRODUCTION

To locate the position of a point on a plane, we require a pair of coordinate axes.

The distance of a point from the y-axis is called its x-coordinate, or abscissa.

The distance of a point from the x-axis is called its y-coordinate, or ordinate.

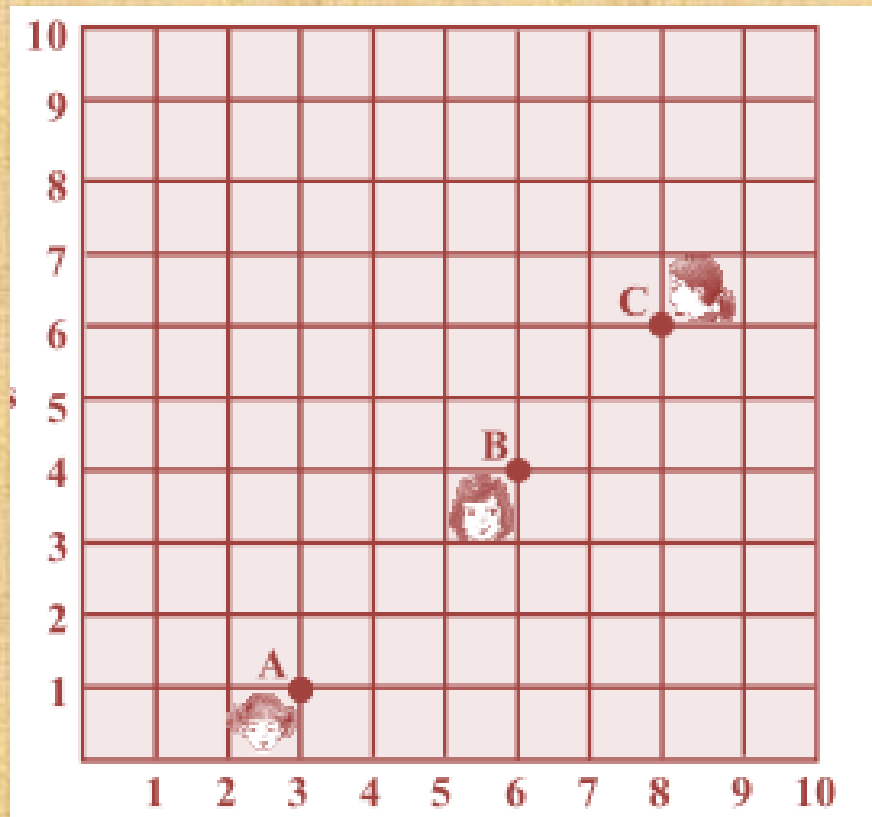
The coordinates of a point on the x-axis are of the form $(x, 0)$, and of a point on the y-axis are of the form $(0, y)$.

FORMULAS

**1.Distance
formula**

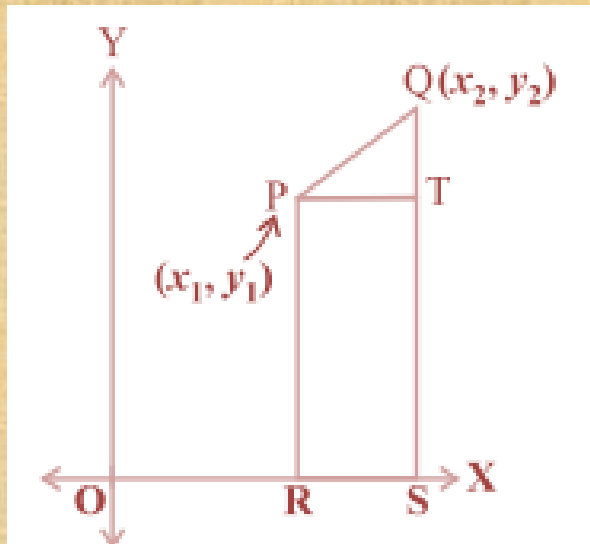
**3. Area of
a triangle**

**2.Section
formula**



DISTANCE FORMULA

The distance between the points $P(x_1, y_1)$ and $Q(x_2, y_2)$ is



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

DISTANCE FORMULA

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

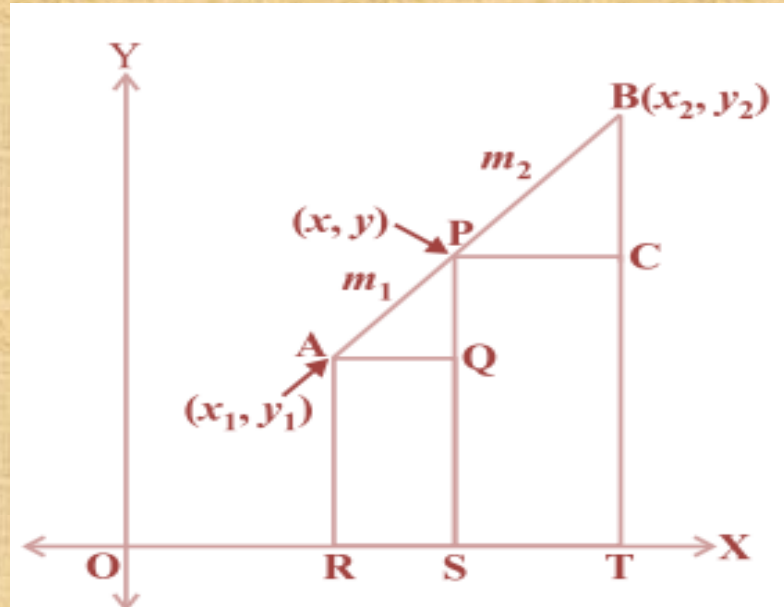


$$OP = \sqrt{x^2 + y^2}.$$

Section Formula

Consider any two points $A(x_1, y_1)$ and $B(x_2, y_2)$ and assume that $P(x, y)$ divides AB internally in the ratio $m_1 : m_2$, i.e.,

$$\frac{PA}{PB} = \frac{m_1}{m_2}$$



SECTION FORMULA

The coordinates of the point $P(x, y)$ which divides the line segment joining the points $A(x_1, y_1)$ and $B(x_2, y_2)$, internally, in the ratio $m_1 : m_2$ are

SECTION FORMULA

$$\left(\frac{m_1 x_2 + m_2 x_1}{m_1 + m_2}, \frac{m_1 y_2 + m_2 y_1}{m_1 + m_2} \right)$$



SECTION FORMULA

If the ratio in which P divides AB is $k : 1$, then the coordinates of the point P will be

$$\left(\frac{kx_2 + x_1}{k + 1}, \frac{ky_2 + y_1}{k + 1} \right).$$

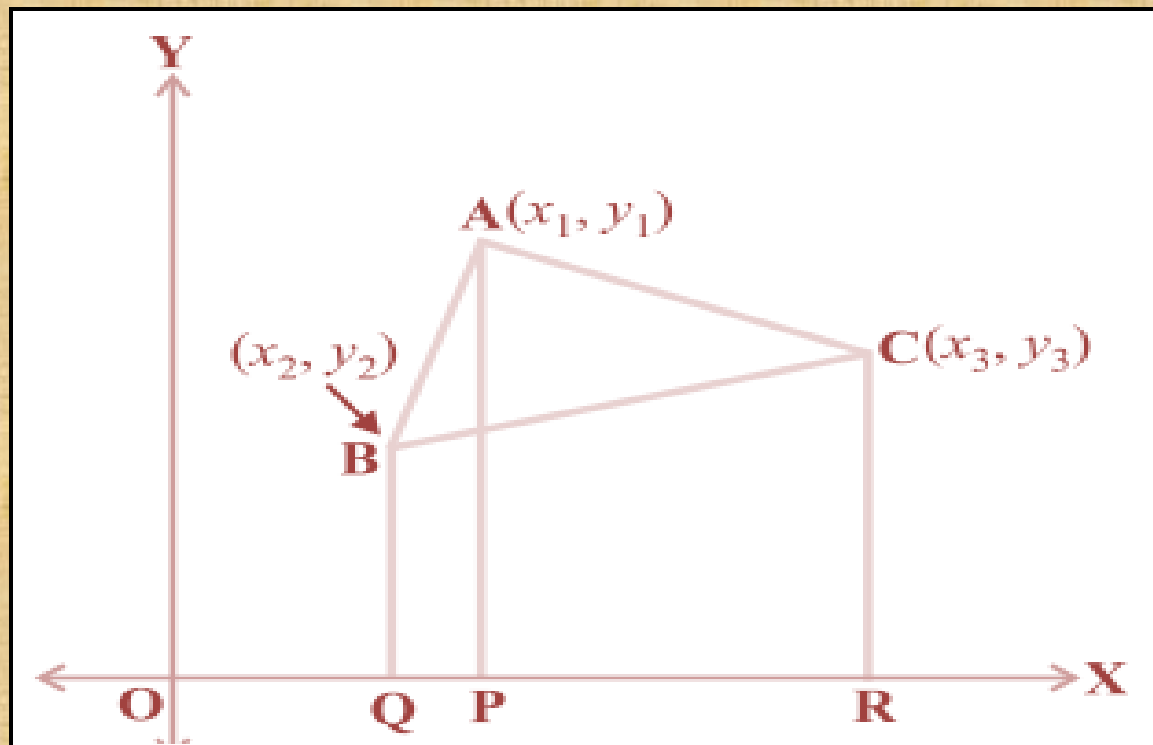
MID POINT FORMULA

The mid-point of a line segment divides the line segment in the ratio 1 : 1. Therefore, the coordinates of the mid-point P of the join of the points A(x_1 , y_1) and B(x_2 , y_2) is

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

AREA OF A TRIANGLE

Let ABC be any triangle whose vertices are $A(x_1, y_1)$, $B(x_2, y_2)$ and $C(x_3, y_3)$.



AREA OF A TRIANGLE

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Area of $\Delta ABC =$

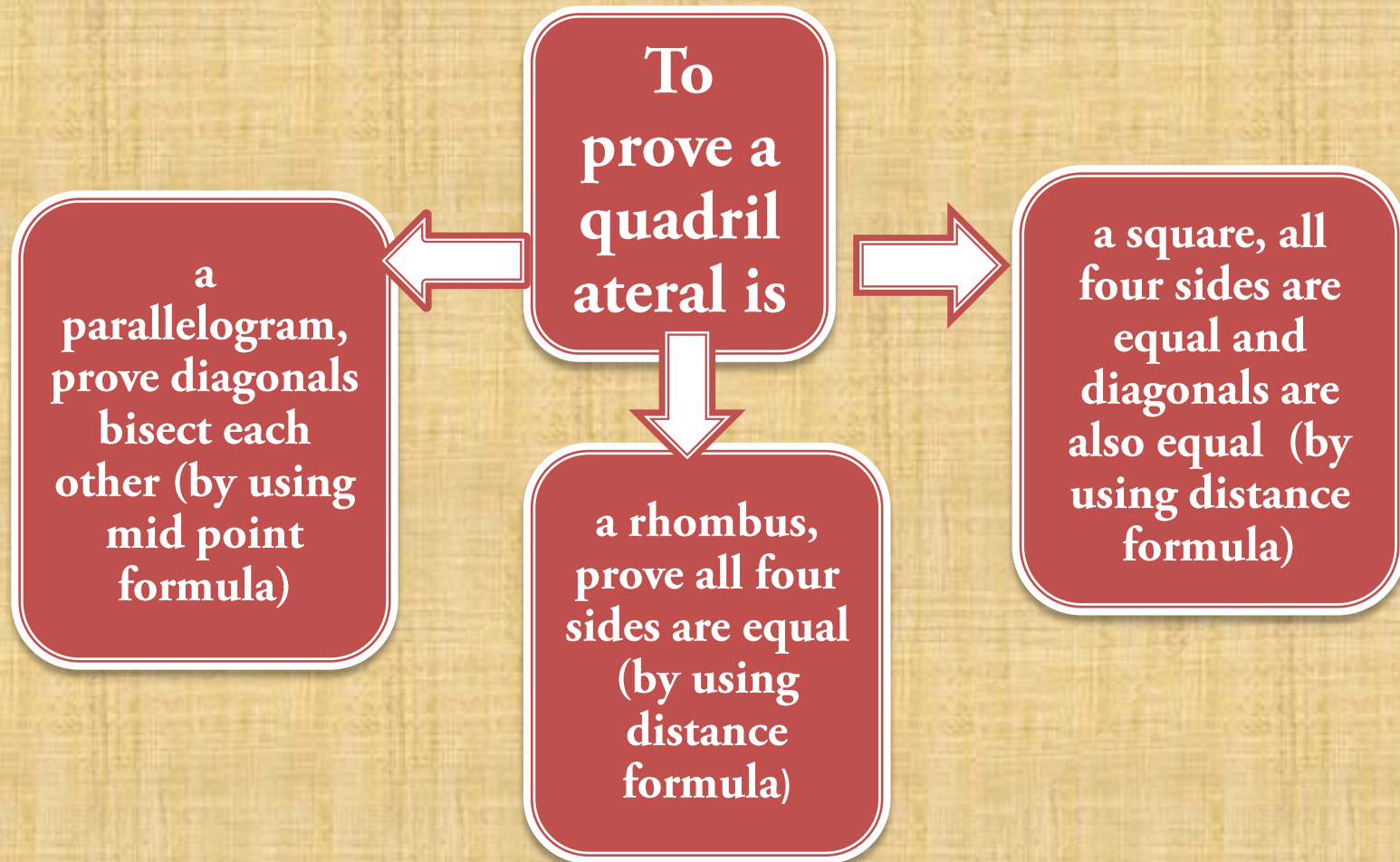
$$\frac{1}{2} [x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)]$$

Centroid of a triangle

If $A(x_1, y_1)$, $B(x_2, y_2)$ and $C(x_3, y_3)$ are the vertices of $\triangle ABC$, then the coordinates of the centroid of the triangle is given by

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

Points to remember



Points to remember

To prove a triangle is isosceles, prove any two sides are equal (by using distance formula).

To prove a triangle is equilateral, prove all three sides are equal (by using distance formula).

Points to remember

If Points A, B and C are collinear,
then area of
 $\Delta ABC = 0$

Points to remember

Area of a rhombus
= $\frac{1}{2}$ (product of
its diagonals)
[by using distance
formula]

For reference:
Ncert book for content and
images

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