

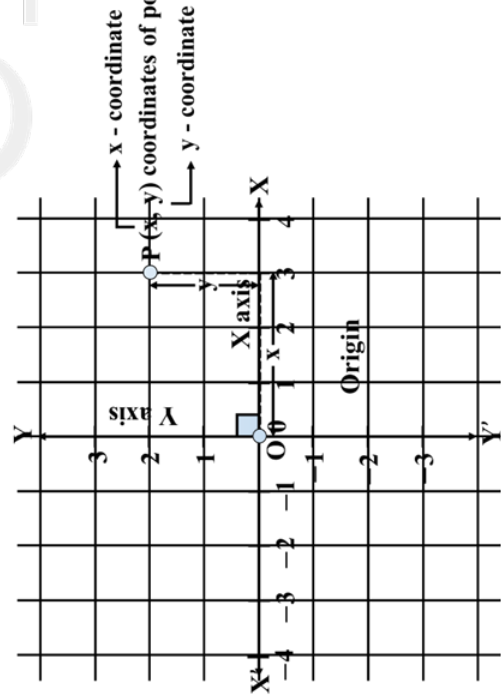
Coordinate system

A coordinate system is a system of assigning addresses for positions in the plane (2 D) or in space (3 D).

They are called Cartesian because the idea was developed by the mathematician and philosopher Rene Descartes who was also known as Cartesius.

Rectangular Coordinate system

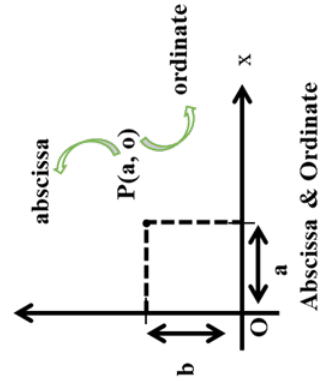
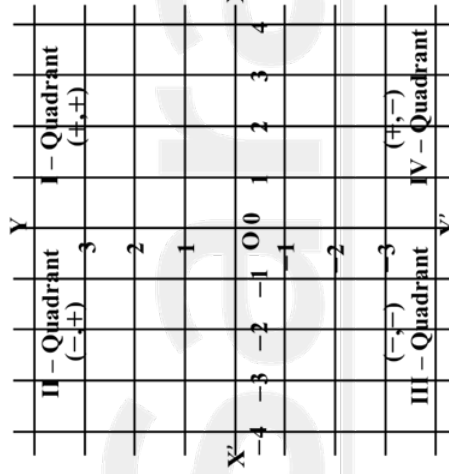
The rectangular coordinate system for the plane consists of a rectangular grid where each point in the plane is addressed by an ordered pair of numbers (x, y)



MIND MAP

Coordinate Geometry

- The horizontal line is called the x -axis, and the vertical line is called the y -axis.
- The coordinate axes divide the plane into four parts called quadrants.



The Origin

The coordinates of the origin are $(0, 0)$.

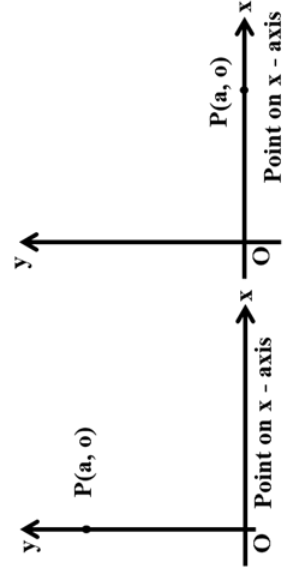
- The point of intersection of the axes is called the origin.

Abscissa

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

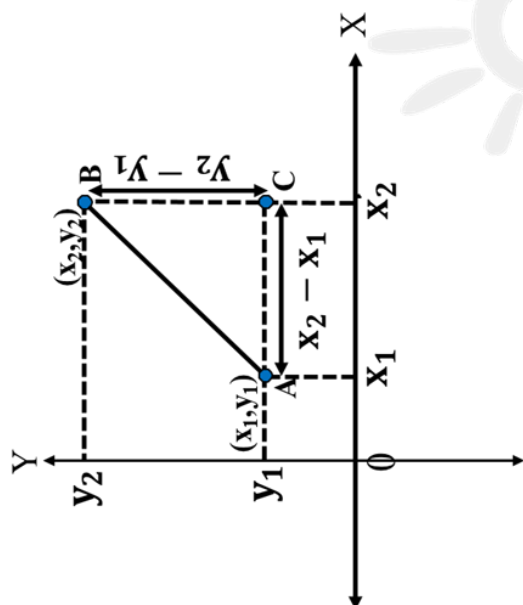
Ordinate

- the distance of the point from the x -axis is called its y -coordinate, or ordinate.
- If the abscissa of a point is x and the ordinate is y , then (x, y) are called the coordinates of the point.
- The coordinates of a point on the x -axis are of the form $(x, 0)$ and that of the point on the y -axis are $(0, y)$.



Abscissa & Ordinate

Distance Formula



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

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

Section Formula:

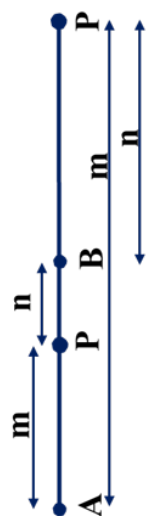
$$x = \frac{mx_2 + nx_1}{m+n}, y = \frac{my_2 + ny_1}{m+n}$$

The coordinates of point $P(x, y)$ dividing the line joining the point $A(x_1, y_1)$ and $B(x_2, y_2)$ in the ratio $m : n$

MIND MAP

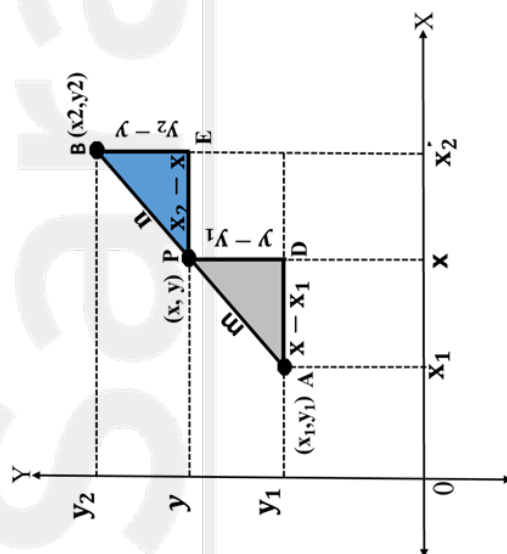
Coordinate Geometry

Internal Division



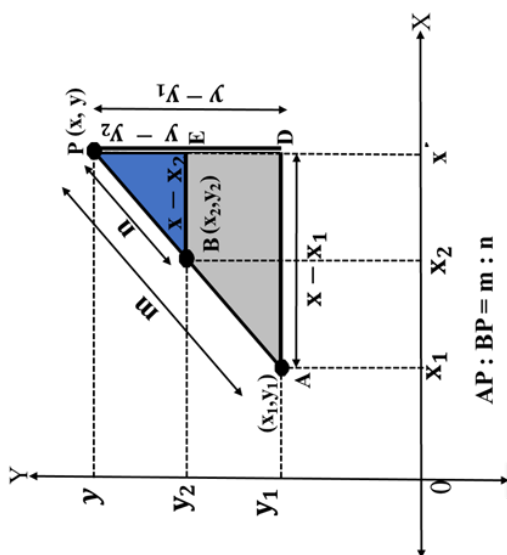
External Division

Internal Division



Internal Division

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



External Division

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

Mid point Formula:

If R is the mid-point, then

$m_1 = m_2$ and the coordinates of R are

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

Co-ordinates of the centroid of triangle:

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

Area of a Triangle

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