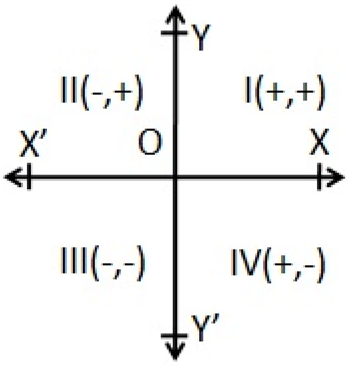
APTITUDE - CO-ORDINATE GEOMETRY

Position of a point in a plane

In coordinate geometry, points are placed on the "coordinate plane" as shown below. It has two scales - one running across the plane called the "x axis" and another right angle to it called the y axis. (These can be thought of as similar to the column and row in the paragraph above.) The point where the axes cross is called the origin and is where both x and y are zero.



On the x-axis, values to the right are positive and those to the left are negative. On the y-axis, values above the origin are positive and those below are negative. A point's location on the plane is given by two numbers; the first tells where it is on the x-axis and the second which tells where it is on the y-axis. Together, they define a single, unique position on the plane. So in the diagram above, the point A has an x value of 20 and a y value of 15. These are the coordinates of the point A, sometimes referred to as its "rectangular coordinates".

Quadrant	X	Y
I	+	+
II	-	+
III	-	-
IV	+	-

Note that the order is important; the x coordinate is always the first one of the pair.

Distance between two points

If $A(x_1,y_1)$ and $B(x_2,y_2)$ be two points, then

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

Distance of a point from the origin

The distance of a points A(x, y) from the origin O(0, 0) is given by

$$OA = \sqrt{(x^2+y^2)}$$

Area of a triangle

If $A(x_1,y_1)$, $B(x_2,y_2)$ and $C= (X_3, Y_3)$be three vertices of a ΔABC, then its area is given by:

$$\Delta = 1/2 \{x_1(y_2- Y_3)+ x_2(Y_3- Y_1) +X_3(y_1-y_2)\}$$

Condition of co linearity of three points

Three points $A(x_1,y_1)$, $B(x_2,y_2)$ and $C= (X_3, Y_3)$ are collinear if and only if ar(√ABC)= 0.

∴ A, B, C are collinear ⇒ $x_1(y_2- Y_3)+ x_2(Y_3- Y_1) +X_3(y_1-y_2) = 0$

Division of a line segment by a point

If a point p(x,y) divides the join of $A(x_1,y_1)$ and $B(x_2,y_2)$ in the ratio m:n, then

$$X= (mx_2+nx_1)/m+n \text{ and } Y =(my_2+ny_1)/m+n$$

If $A(x_1,y_1)$ and $B(x_2,y_2)$ be the end points of a line segment AB, then the co-ordinates of midpoint of AB are

$$[(x_1 + x_2)/ 2 , (y_1 + y_2)/ 2]$$

Centroid of a triangle

The point of intersection of all the medians of a triangle is called its centroid. If $A(x_1,y_1)$, $B(x_2,y_2)$ and $C= (X_3, Y_3)$ be the vertices of ABC, then the co-ordinates of its centroid are $\{ (1/3 (x_1+x_2+x_3),1/3 (y_1+y_2+Y_3)\}$

Various types of Quadrilaterals

A quadrilateral is

- A rectangle if its opposite sides is equal and diagonals are equal.
- A parallelogram but not a rectangle, if it's opposite sides are equal and the diagonals are not equal.
- A square, if all sides are equal and diagonal are equal.
- A rhombus but not a square, if all sides are equal and diagonals are not equal.

Equations of lines

- The equation of x-axis is y =0.
- The equation of y –axis is x = 0.
- The equation of a line parallel to y-axis at a distance a from it, is x= a.
- The equation of a line parallel to x-axis at a distance b from it, is y= b.
- The equation of a line passing through the points $A(x_1,y_1)$ and $B(x_2,y_2)$ is $y-y_1/ x-x_1 = y_2-y_1/x_2-x_1$. Slop of such a line is y_2-y_1/x_2-x_1.
- The equation of a line in slop intercept form is Y= mx+ c, where m is its slope.

Solved Examples

Solved Examples