

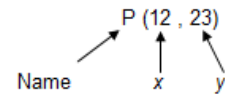
## 2.1 COORDINATE GEOMETRY

A system of geometry where the position of **points** on the **plane** is described using an **ordered pair of numbers** (X,Y).

Recall that a plane is a flat surface that goes on forever in both directions. If we were to place a point on the plane, coordinate geometry gives us a way to describe exactly where it is by using two numbers.

### Ordered Pair

The coordinates are written as an "ordered pair" as shown below. The letter P is simply the name of the point and is used to distinguish it from others.



### History

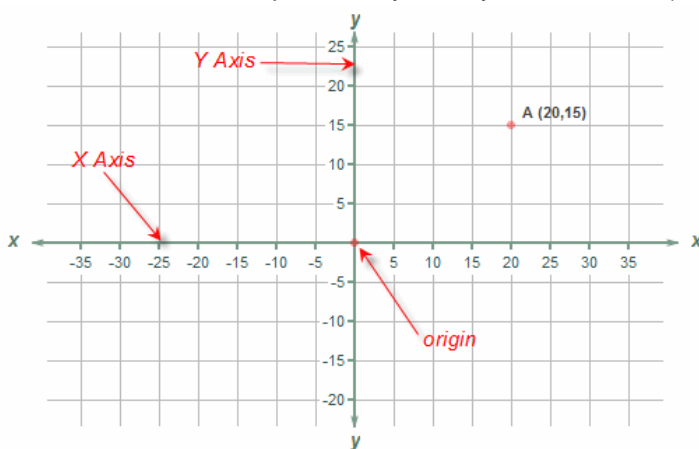
The method of describing the location of points in this way was proposed by the French mathematician **René Descartes (1596 - 1650)**. (Pronounced "day CART"). He proposed further that curves and lines could be described by equations using this technique, thus being the first to link algebra and geometry. In honor of his work, the coordinates of a point are often referred to as its Cartesian coordinates, and the coordinate plane as the Cartesian Coordinate Plane.

### The Coordinate Plane & Elements

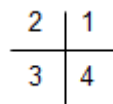
In coordinate geometry, **points** are placed on the "coordinate plane" as shown below.

It has two scales - one running across the plane called the "**x axis**" and another a right angles to it called the **y axis**.

The point where the axes cross is called the **origin** and is where both x and y are zero. **Axis** is a line, used as a reference to determine position, symmetry and rotation. (Plural: 'axes' pronounced "AXE-ease")



### Quadrants



The two axes divide the plane into four areas called quadrants. The first quadrant, by convention, is the top right, and then they go around counter-clockwise. In the diagram above they are labelled Quadrant 1,2 etc. It is conventional to label them with numerals but we talk about them as "first, second, third, and fourth quadrant". They are also sometimes labelled with Roman numerals: I, II, III and IV.

The **abscissa** is another name for the x (horizontal) coordinate of a point. Pronounced "ab-SISS-ah" (the 'c;' is silent). Not used very much. Most commonly, the term "x-coordinate" is used.

The **ordinate** is another name for the y (vertical) coordinate of a point. Pronounced "ORD-inet". Not used very much. Most commonly, the term "y-coordinate" is used.

### Things you can do in Coordinate Geometry

If you know the coordinates of a group of points you can:

- Determine the distance between them
- Find the midpoint, slope and equation of a line segment
- Determine if lines are parallel or perpendicular
- Find the area and perimeter of a polygon defined by the points
- Transform a shape by moving, rotating and reflecting it.
- Define the equations of curves, circles and ellipses.