**THE POINTS**

**1.1 Point**

The point is a primitive concept and is considered the simplest geometric entitiy. To locate a point in the Cartesian plane two coordinates are required. Conventionally, the first of the two numbers identifies a shift on the x axis, while the second shift on the y axis. The point O, the origin, has coordinates (0, 0). The points are always marked with a capital letter.

**1.2 The midpoint of two points**

Let A and B two points in the Cartesian plane. The midpoint between A and B is a point, generally called M, which divides the segment between A and B into two equal segments. The problem to be solved is, therefore, how to determine the coordinates of M knowing the coordinates of the point A and the point B. Supposing to have a point A of coordinates (xA, yA) and a point B of coordinates (xB, yB), we need to determine the coordinates (xM, yM) of their midpoint M.

Apply the formula: xM = (xA + xB) / 2 and yM = (yA + yB) / 2

**1.3 Definition of centre of gravity of a polygon.**

Suppose we have a convex polygon (that has not "recesses") cut out of a rigid material and have a very thin column fixed to the ground. The centre of gravity of the polygon is the only point that should be "leaned" on the column so that the polygon remains in equilibrium on it. Consider then the points of which we must find the middle point as the vertices of a polygon: if there are three points, it will be a triangle, if there are 4, a quadrilateral and so on. The theorem is the following one. The midpoint of the vertices of a convex polygon corresponds to the centre of gravity of the polygon.

**1.4 Distance between two points**

For distance between two points A and B is defined as the length of the segment having as ends A and B. We can determine the distance between two points using the Pythagorean theorem. Suppose of having to determine the distance between the point of coordinates (xA, yA) and the point B of coordinates (xB, yB). Draw in the Cartesian plane the points A and B and the line segment connecting them. From point A we draw a horizontal line and then a vertical line from point B. H is the meeting point between these two lines. The AHB is a right triangle and then we can apply the Pythagorean theorem (in its algebraic version): AB = sqrt (AH + HB ^ 2 ^ 2) but which: AH = xB - xA and HB = yB - yA therefore AB = sqrt (AH ^ 2 + ^ 2 HB) = sqrt ((xB - xA) ^ 2 + (yB - yA) ^ 2)