Midpoint Encyclopedia Article

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The midpoint is defined as a position midway between two extreme points. In mathematics it is the point on a line segment or curvilinear arc that divides it into two parts of equal length. In a right **triangle** the midpoint of the **hypotenuse** is equidistant from the three vertices of the triangle.

There are several ways to find the midpoint of a particular figure. Two of the most widely used are the lens method and the Mascheroni construction. The lens method is used to determine the midpoint on a line segment. First a lens using circular arcs is constructed around the line segment so that the line connecting the cusps of the lens is perpendicular to the ends of the line segment. Where the line connecting the cusps of the lens intersects the line segment is the midpoint of that line segment. The Mascheroni construction is more complex but allows one to determine the midpoint of a line segment using only a compass. In about 1797 Mascheroni proved that all constructions possible with a compass and straightedge are possible with a movable compass alone. This construction involves drawing a series of circles starting with the endpoints of the line segment as the centers of the first two circles. Drawing a series of seven circles with varying centers and radii eventually produces the midpoint of the initial line as an intersection between the last two drawn circles. It is a complex construction but allows one to determine the midpoint of the line segment with only a movable compass.

Archimedes developed a **theorem** that relates the midpoint of an arc on a **circle** to line segments drawn within the circle. Given the circle below let M be the midpoint of the arc AMB. If point C is chosen at random and point D is chosen such that the line segment MD is perpendicular to AC then the length of AD is equal to the sum of the lengths of DC and BC. AD = DC + BC This is known as Archimedes' midpoint theorem and can serve a variety of uses relating the midpoint of the arc on a circle to specific line segments within.