

Coordinate Geometry System and its Types

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Perspective

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ABOUT THE STUDY

A coordinate system is a geometry system that uses one or more numbers, or coordinates, to uniquely determine the location of points or other geometric components on a manifold, such as Euclidean space. The order of the coordinates is important, and they can be recognized by their position in an ordered tuple or by a letter, as in "the x-coordinate." The coordinates are supposed to be real numbers in fundamental mathematics, although they might be complex numbers or members of a more abstract system like a commutative ring. Analytic geometry is based on the usage of a coordinate system, which allows issues in geometry to be transformed into questions regarding numbers and vice versa.

Number line

The simplest example of a coordinate system is the use of a number line to identify points on a line with real numbers. On a given line, an arbitrary point O (the origin) is picked in this system. The coordinate of a point P is the signed distance from O to P, where the signed distance is the distance regarded positive or negative depending on which side of the line P lies. A unique coordinate is assigned to each point, and each real number is the coordinate of a single point.

Cartesian coordinate system

The Cartesian coordinate system is a classic example of a coordinate system. Two perpendicular lines are chosen in the plane, and the coordinates of a point are the signed distances between them. Three mutually orthogonal planes are chosen in three dimensions, and the three coordinates of a point are the signed distances between them. Any point in n -dimensional Euclidean space may be given n coordinates using this method.

The three-dimensional system can be right-handed or left-handed depending on the orientation and order of the coordinate axes. This is only one of the numerous coordinate systems accessible.

Polar coordinate system

The polar coordinate system is another frequent planar coordinate system. The pole is picked, and the polar axis is determined by a beam emanating from that location. There is a single line across the pole whose angle with the polar axis is for a given angle (measured counter clockwise from the axis to the line). Then, for the given integer r , there is a single point on this line whose signed distance from the origin is r . There is a single point for each pair of coordinates (r, Θ) however every point is represented by numerous pairs of coordinates.

Cylindrical and spherical coordinate systems

The polar coordinate system may be extended to three dimensions using one of two ways. A z -coordinate with the same meaning as in Cartesian coordinates is added to the r and polar coordinates in the cylindrical coordinate system, yielding a triple (r, Θ, z) . Spherical coordinates go even farther by translating the pair of cylindrical coordinates (r, z) to polar coordinates (ρ, ϕ) , yielding a triple (ρ, Θ, ϕ) .

Homogeneous coordinate system

A triple (x, y, z) can be used to represent a point in the plane in homogeneous coordinates, where x/z and y/z are the point's Cartesian coordinates. Because only two coordinates are required to identify a point on the plane, this system provides an "extra" coordinate, but it is beneficial in that it may represent any point on the projective plane without using infinity. In general, a homogeneous coordinate system is one in which only the coordinate ratios, not the actual values, are relevant.