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Geometry and Its Types

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Perspective

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DESCRIPTION

Geometry

Along with arithmetic, geometry is one of the oldest branches of mathematics. It is concerned with spatial qualities relating to figure distance, form, size, and relative location. Geometers are mathematicians who specialize in the field of geometry.

Geometry was nearly entirely devoted to Euclidean geometry until the 19th century, which contains the essential ideas of point, line, plane, distance, angle, surface, and curve.

Several discoveries in the nineteenth century greatly expanded the scope of geometry. Gauss' Theorema Egregium ("extraordinary theorem"), which states that the Gaussian curvature of a surface is independent of any specific embedding in a Euclidean space, is one of the oldest such findings. This indicates that surfaces may be studied intrinsically, that is, as separate spaces, and has been extended into manifold theory and Riemannian geometry.

CONTEMPORARY GEOMETRY

Euclidean geometry

Geometry in the classical meaning is Euclidean geometry. It is utilized in many scientific domains, such as mechanics, astronomy, and crystallography, as well as many technical applications, such as engineering, architecture, geodesy, aerodynamics, and navigation, since it represents the space of the physical world. Euclidean topics such as points, lines, planes, angles, triangles, congruence, similarity, solid objects, circles, and analytic geometry are included in the majority of countries' compulsory school curricula.

Differential geometry

Differential geometry is a branch of mathematics that studies issues in geometry using calculus and linear algebra techniques. Physics, econometrics, and bioinformatics are just a few of the fields where it may be used.

Due to Albert Einstein's general relativity postulation that the cosmos is curved, differential geometry is particularly important in mathematical physics. Differential geometry can be intrinsic (that is, the spaces it considers are smooth manifolds whose geometric structure is governed by a Riemannian metric, which determines how distances are measured near each point) or extrinsic (that is, the spaces it considers are not smooth manifolds whose geometric structure is governed by a Riemannian metric, which determines how distances are measured near each point) (where the object under study is a part of some ambient flat Euclidean space).

Non-Euclidean geometry

The study of historical forms of geometry was not limited to Euclidean geometry. Astronomers, astrologers, and navigators have traditionally employed spherical geometry.

Topology

Topology is a branch of mathematics that studies the characteristics of continuous mappings. It is an extension of Euclidean geometry. In practice, dealing with large-scale features of spaces, such as connectedness and compactness, is typically referred to as topology.

Algebraic geometry

The field of algebraic geometry evolved from Cartesian coordinate geometry. It grew in stages, with the construction and study of projective geometry, birational geometry, algebraic varieties, and commutative algebra, among other topics. It had undergone considerable fundamental growth from the late 1950s to the mid-1970s, thanks primarily to the efforts of Jean-Pierre Serre and Alexander Grothendieck. As a result, schemes were introduced, and a larger focus was placed on topological approaches, including different cohomology theories.

Complex geometry

The nature of geometric constructions modelled on or emerging from the complex plane is studied in complex geometry. Complex geometry is a branch of mathematics that combines differential geometry, algebraic geometry, and multivariable analysis. It has applications in string theory and mirror symmetry.

Discrete geometry

Discrete geometry and convex geometry are two subjects that are closely related. It mostly deals with the relative positions of basic geometric objects like points, lines, and circles. The study of sphere packings, triangulations, and the Kneser-Poulsen conjecture are all examples. It has a lot in common with combinatorics in terms of methodology and principles.

Computational geometry

Algorithms and their implementations for manipulating geometrical objects is the subject of computational geometry. The travelling salesman issue, minimal spanning trees, hidden-line removal, and linear programming have all been important challenges in the past.

Convex geometry

Convex geometry is a branch of mathematics that studies convex forms in Euclidean space and its more abstract equivalents, frequently employing real analysis and discrete mathematics approaches. It has fundamental applications in number theory and is closely related to convex analysis, optimization, and functional analysis.