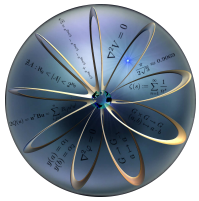

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geometry

Canonical name	Geometry
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Entry type	Topic
Classification	msc 51-00
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Synonym	Egyptian geometry
Related topic	FiniteProjectivePlane4
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Related topic	PointFreeGeometry
Related topic	ComparisonOfCommonGeometries
Related topic	DeBruijnErdHosTheorem
Related topic	MulberryFactoryShopACrowdOfPeopleWaitingForTheirTurnToBecomeModisl
Related topic	MulberryFactoryShopACrowdOfPeopleWaitingForTheirTurnToBecomeModisl
Defines	Greek geometry
Defines	Euclidean geometry

Note: This entry is very rough at the moment, and requires work. I mainly wrote it to help motivate other entries and to let others work on this entry, if it is at all feasible. Please feel free to help out, including making suggestions, deleting things, adding things, etc.

Geometry, or literally, the measurement of land, is among the oldest and largest areas of mathematics. It is as old as civilization itself — even when texts and traditions have been lost, such monuments as Stonehenge and the pyramids of Egypt and South America stand as mute to the geometrical knowledge of the ancients. Over the centuries, geometry has grown from its humble origins in land measurement to a study of the properties of space in the widest sense of the . In addition to the familiar three-dimensional space in which we move and breathe, modern geometers routinely consider spaces of more than three dimensions, even infinite-dimensional and fractional dimensional spaces, curved spaces, discrete spaces, non-commutative spaces, infinitesimal spaces, and many other of spaces.

For this reason, it is quite difficult to provide a precise definition of geometry. In this survey of geometry, we shall indicate several approaches to the subject. We start with the synthetic (or axiomatic) approach to Euclidean geometry not only because that is historically the oldest, but because it is the approach one is most likely to encounter first. After this, we move on to other approaches in roughly an of increasing mathematical sophistication.

In this survey, our goal is to give the reader an overview of the different of geometry, the concepts and techniques used, and the sort of results which are proven. In order to make this accessible to a wide audience, we have assumed the minimum of knowledge on the part of the reader necessary to understand and appreciate the topics presented in a meaningful way. Since our goal is to present the substance and flavor of the subjects discussed as opposed to giving a comprehensive and detailed account, we sometimes omit technical details in the interest of clarity. To compensate for this shortcoming, we have included to entries in which the interested reader may find more detailed and rigorous treatments of the topics discussed here as well as related topics which had to be omitted to keep the of this entry within reasonable .

0.1 http://planetmath.org/AxiomaticGeometryAxiomatic method

0.2 Analytic and Descriptive Geometry

1. Euclidean geometry of plane
2. Euclidean geometry of space
3. http://planetmath.org/node/6977Coordinate systems
4. Topics on vectors
5. Index of entries on compass and straightedge constructions

0.3 http://planetmath.org/GeometryAsTheStudyOfInvariantsUnderCertai as the study of invariants under certain transformations

0.4 Differential geometry

Differential geometry studies geometrical objects using techniques of calculus. In fact, its early history is indistiguishable from that of calculus — it is a matter of personal taste whether one chooses to regard Fermat's method of drawing tangents and finding extrema as a contribution to calculus or differential geometry; the pioneering work of Barrow and Newton on calculus was presented in a geometrical language; Halley's 1696 paper in which he announces his discovery that $\int \frac{dx}{x} = \log x + C$ is entitled quadrature of the hyperbola.

It is only later on, when calculus became more algebraic in outlook that one can begin to make a meaningful separation between the subjects of calculus and differential geometry.

Below are some main topic entries on PlanetMath on differential geometry:

1. Euclidean geometry of plane
2. Euclidean geometry of space
3. http://planetmath.org/node/6977Coordinate systems

4. Topics on vectors

5. Classical differential geometry

6. Bibliography for differential geometry

7. Fundamental concepts in differential geometry

8. Concepts in symplectic geometry

0.5 Algebraic geometry

References

[1] D. Hilbert: *Grundlagen der Geometrie*. Neunte Auflage, revidiert und ergänzt von Paul Bernays. B. G. Teubner Verlagsgesellschaft, Stuttgart (1962).