

# Dehn, Max | Encyclopedia.com

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(*b* Hamburg, Germany, 13 November 1878; *d.* Black Mountain, [North Carolina](#), 27 June (1952))

*mathematics.*

Dehn studied at Göttingen under the direction of [David Hilbert](#) and received his doctorate in 1900. He then taught at several schools, served in the army, and was a professor of pure and applied mathematics at Frankfurt University from 1921 to 1935, when the Nazi regime forced him to leave. In 1940 he emigrated to the [United States](#), where he taught at the University of Idaho, Illinois Institute of Technology, St. Johns College (Annapolis), and, from 1945 to 1952, at Black Mountain College, [North Carolina](#). He was a member of the Norwegian Academy of Science, the Strassburger Naturforschung Gesellschaft, and the Indian Mathematical Association.

Dehn was an intuitive geometer. Stimulated by Hilbert's work on the axiomatization of geometry, Dehn showed in his dissertation that without assuming the Archimedean postulate, Legendre's theorem that the sum of the angles of a triangle is not greater than two right angles is unprovable, whereas a generalization of Legendre's theorem on the identity of the sums of angles in different triangles is provable. Following this work, Dehn solved the third of the twentythree unsolved problems that Hilbert had presented in his famous address to the International Congress of Mathematicians in 1900. This problem concerned the congruence of polyhedra, the geometric properties of which Dehn spent much time studying.

In 1907 Dehn and P. Heegaard contributed a report to the *Encyklopädie der mathematischen Wissenschaften* on the topic of analysis situs (now called topology or algebraic topology), which had become prominent as a result of the works of Poincaré. The article was one of the early systematic expositions of this subject. In 1910 Dehn proved an important theorem concerning topological manifolds that became known as Dehn's lemma. In 1928, however, Kneser showed that the proof contained a serious gap; a correct proof was finally given by C. D. Papakyriakopoulos in 1957.

Following Poincaré, Dehn became interested in the groups that are generated in attempts to characterize topological structures. He formulated the central problems of what was to become an important mathematical field: the word, the transformation, and the isomorphism problems. In the case of fundamental groups these have direct topological significance.

Besides his numerous contributions to the field of fundamental groups, Dehn wrote papers on statics, on the algebraic structures derived from differently axiomatized projective planes, and on the history of mathematics. He supervised the work of eight doctoral candidates in Germany and three in the [United States](#).

## BIBLIOGRAPHY

A bibliography of Dehn's works may be found in Wilhelm Magnus and Ruth Moufang, "Max Dehn zum Gedächtnis," in *Mathematische Annalen*, **127** (1954), 215–227. See also C. D. Papakyriakopoulos, "Some Problems on 3 Dimensional Manifolds," in *Bulletin of the American Mathematical Society*, **64** (1958), 317–335.

C. S. Fisher