# Maurice-René Fréchet Biography

## Maurice-René Fréchet

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# Biography

The concept of real space is easy to understand. A point is a common example of one-dimensional real space and a line, an example of two-dimensional real space. The real world in which we live--where objects have length, width, and height--is an example of three-dimensional real space.

But conceptions beyond these three dimensions are often difficult to comprehend. Albert Einstein helped break through this barrier when he made use of four-dimensional analysis in his theory of relativity. His fourth dimension--time--suggests another level of reality beyond the immediate, apparent, and static three-dimensional world with which we are familiar.

But what does it mean to talk about space with five, six, seven, twenty, or an infinite number of dimensions? The human mind has no concrete experience from which to interpret and understand such concepts. Yet, as early as 1906, the French mathematician Maurice-René Fréchet developed methods for dealing with spaces that fall outside our concrete experiences: *ensemble abstraite*--as he called them--or abstract spaces as they are now known.

Fréchet developed the concept of abstract space by extrapolating from what we know about three-dimensional space. He generalized the point set topology that had been developed for Euclidean space by introducing a topology based on a generalized concept of a distance function in an abstract space. Such spaces later came to be called metric spaces. Fréchet also introduced many of the concepts of compactness in an abstract space.

Fréchet was born in Maligny, France, on September 2, 1878. When he was still a boy, his family moved to Paris, where he eventually attended the Lyceé Buffon and the École Normale Supérieure. In 1906, he wrote his doctoral thesis, *Surquelques points du calcul fonctionnel*, on his concept of abstract space.

Fréchet held a number of teaching positions during his lifetime, at the lyceés in Besançon and Nantes (1907-1909) and the universities of Rennes (1909-1910), Poitiers (1910-1919), Strasbourg (1920-1927), and Paris (1928-1948). He received a number of awards and honors during his lifetime and died in Paris on June 4, 1973.

Later in his life, Fréchet turned his attention to the study of probability theory and statistics, but his fame rests primarily on his early work on abstract space. That work stimulated the growth and development of topology and functional analysis.