

PREFACE



David Hilbert (1862–1943) in the Preface to *Geometry and the Imagination* by Hilbert and S. Cohn-Vossen emphasized the point we wish to make in this book:

Meaning is important in mathematics and geometry is an important source of that meaning.

We believe that mathematics is a natural and deep part of human experience and that experiences of meaning in mathematics are accessible to everyone. Much of mathematics is not accessible through formal approaches except to those with specialized learning. However, using nonformal experience and geometric imagery, many levels of meaning in mathematics can be opened up in a way that most humans can experience and find intellectually challenging and stimulating.

Formalism contains the power of the meaning but not the meaning. It is necessary to bring the power back to the meaning.

A formal proof as we normally conceive of it is not the goal of mathematics — it is a tool — a means to an end. The goal is understanding. Without understanding we will never be satisfied — with understanding we want to expand that understanding and to communicate it to others. This book is based on a view of **proof as a convincing communication that answers — Why?**

Many formal aspects of mathematics have now been mechanized and this mechanization is widely available on personal computers or even smartphones, but the experience of meaning in mathematics is still a human enterprise that is necessary for creative work.