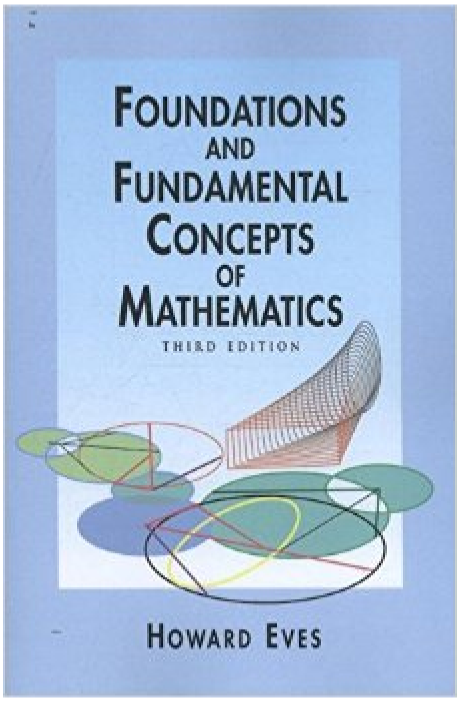
Foundations And Fundamental Concepts Of Mathematics (Dover Books On Mathematics)



Synopsis

This third edition of a popular, well-received text offers undergraduates an opportunity to obtain an overview of the historical roots and the evolution of several areas of mathematics.The selection of topics conveys not only their role in this historical development of mathematics but also their value as bases for understanding the changing nature of mathematics. Among the topics covered in this wide-ranging text are: mathematics before Euclid, Euclid's Elements, non-Euclidean geometry, algebraic structure, formal axiomatics, the real numbers system, sets, logic and philosophy and more. The emphasis on axiomatic procedures provides important background for studying and applying more advanced topics, while the inclusion of the historical roots of both algebra and geometry provides essential information for prospective teachers of school mathematics.The readable style and sets of challenging exercises from the popular earlier editions have been continued and extended in the present edition, making this a very welcome and useful version of a classic treatment of the foundations of mathematics. "A truly satisfying book." â " Dr. Bruce E. Meserve, Professor Emeritus, University of Vermont.

Book Information

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Customer Reviews

Howard Eves presents this five-star story of mathematics as two intertwined threads: one describes the growing content of mathematics and the other the changing nature of mathematics. In exploring these two elements, Eves has created a great book for the layman. I find myself returning to his book again and again.My few semesters of calculus, differential equations, and other applied math failed to formally introduce me to abstract algebras, non-Euclidian geometries, projective geometry, symbolic logic, and mathematical philosophy. I generally considered algebra and geometry to be singular nouns. Howard Eves corrected my grammar."Foundations and Fundamental Concepts" is not a traditional history of mathematics, but an investigation of the philosophical context in which new developments emerged. Eves paints a clear picture of the critical ideas and turning points in mathematics and he does so without requiring substantial mathematics by the reader. Calculus is not required.The first two chapters, titled "Mathematics Before Euclid" and "Euclid’s Elements", consider the origin of mathematics and the remarkable development of the Greek axiomatic method that dominated mathematics for nearly 2000 years.In chapter three Eves introduces non-Euclidian geometry. Mathematics is transformed from an empirical method focused on describing our real, three-dimensional world to a creative endeavor that manufactures new, abstract geometries.This discussion of geometries, as opposed to geometry, continues in chapter four.

There are several books available on the history of mathematics. Some give an account on the development of a certain area, others focus on a group of persons and some do hardly more than story telling. I was looking for one that tells the story of the development of the main ideas and the understanding of what mathematics and science in general is (or what people thought it is and should be). Howard Eves’ book is the first book I bought that gives me the answers I was looking for. Starting with pre-Euclidean fragments, going on with Euclid, Aristotle and the Pythagoreans, straight to non-Euclidean geometry it focuses on the axiomatic method of geometry. What pleased me most here is that the author really takes each epoch for serious. He quotes longer (and well chosen) passages from Euclid, Aristotle and Proclus to demonstrate their approaches. Each chapter ends with a Problems section. I was surprised to see how much these problems reveal of the epoch, its problems and thinking.The book goes on with chapters on Hilbert’s Grundlagen, Algebraic Structure etc, always showing not only the substance of these periods but also the shift in the way of thinking and the development towards rigor. The last chapter is titled Logic and Philosophy. Eves divides "contemporary" philosophies of mathematics into three schools: logistic (Russel/Whitehead), intuitionist (Brouwer) and the formalist (Hilbert).The book ends with some interesting appendices on specific problems like the first propositions of Euclid, nonstandard analysis and even GÃ¶del’s incompleteness theorem. Bibliography, solutions to selected problems and an index are carefully prepared to round up an excellent book.Should you buy this book ? Yes.

Though originally published in 1958, Howard Eves’ book was a completely new find for me. Fortunately this classic text has found extended life through Dover Publications, which is making many great older volumes available for newer generations. I am not a mathematician by vocation or training and I am usually only interested in more philosophically focused books concerning logic or meta-logical issues. But I found this book extremely enlightening, showing the interrelations of (what had previously been to my mind) unrelated historical streams of thought. In the following I will give a brief summary and point out some of, what I consider, the highlights of Eves' volume.In the first chapter Eves gives a brief but good historical overview of mathematics in ancient civilizations. He deals with the early Egyptians, Babylonians, and of course the Greeks. This approach naturally segues into an emphasis upon Euclid and his monumental Elements. Eves pays particular attention to Euclid's methodology, the material axiomatic, discussing its origin and ensuing problems.Other texts that I have read on the subject of mathematical logic tend to give quite a bit of time to Euclid's fifth (or parallel) postulate. Not until reading Eves' book have I understood why though. Euclid's fifth postulate has the appearance of being quite different from the first four; any non-mathematician can perceive this fact from a mere browsing of the first several postulates. Euclid needed this fifth statement for his geometry; and since he could never prove it as a theorem, he made it a postulate in his system. Eves notes that a good deal of mathematical history is devoted to this same exact project that Euclid failed to accomplish.

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