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THE FIRST RESOURCE FOR MATHEMATICS

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Expanding mathematical toolbox. Interweaving topics, problems, and solutions. (English)

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This is a collection of mathematical theory and exercises organized in chapters, each one devoted to a different topic (geometrical constructions, Euclidean vectors, inequalities, trigonometry, etc.). The format of each chapter is a general introduction about the topic including some theory followed by a, usually short, problem formulation, and an extensive discussion of the solution which may include more theory and proofs, triggering new exercises etc. Emphasis is on the interaction of topics that are usually treated separately in classical text books. The assumed mathematical knowledge of the reader is at the level of secondary schools or beginning university.

The problems can look astonishingly difficult at first sight, baffling the reader. Applying straightforward methods, is usually not the way to solve them. The proposed solution may illustrate some clever trick that makes the problem easy to solve. So the problem formulation is supposed to trigger curiosity and stimulate to look for the appropriate key to crack it. The diversity of the topics and the kind of problems, gives it the allure of a puzzle book. Thinking outside the box and recognizing patterns is often more important than the mathematical prerequisites. The latter are provided anyway, including proofs, either in the solution or in the appendix. There are also excursions beyond the exercises, like for example a short introduction to non-Euclidean geometry.

So this is an unusual mixture of theory and exercises. The latter are certainly not of the drilling type, some even reach the level of mathematical Olympiads. Most problems have some geometrical aspect, even the algebraic ones, because these problems are easier to understand by a general public. This implies that calculus and analysis are more in the background. It is an excellent book to prepare for mathematics Olympiads, and teachers may find here inspiration for their lessons.

Reviewer: Adhemar Bultheel (Leuven)

MSC:

00A09 Popularization of mathematics
51-01 Introductory exposition (textbooks, tutorial papers, etc.) pertaining to geometry

Keywords:

geometry; algebraic geometry; trigonometry; Euclidean vector space; puzzles; math Olympiad; inequalities

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