
Zbl 727.52001

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Geometric etudes in combinatorial mathematics. With over 300 illustrations, index, and introductions by Paul Erdős, Branko Grünbaum and Cicil Rousseau. (In English)

Colorado Springs, CO: Center for Excellence in Mathematical Education. xii, 236 p. (1991). [ISBN 0-940263-02-5]

This is a popular book written for talented high school students. Also a mathematician can get much pleasure in recalling some well known theorems and problems on tilings, graphs, and most of all on convex figures. Very many exercises with solutions are built into the text. This gives some extra pleasure to the reader and enables to draw him into an active study.

The following fragment of the introduction by Branko Grünbaum is worth mentioning: "Mathematics in general, and geometry in particular, are fields in which the small amount of formal instruction given in schools is not sufficient to bring latent talents to full development. Individual work and effort are necessary.... The present book is an appealing step in the direction of providing useful supplementary reading and practice material."

Chapter 1. Tiling a checker rectangle (64 pages), concerns tilings with trominoes, tetrominoes and polyominoes.

Chapter 2. Proofs of existence (25 pages), says mainly on the Bolzano- Weierstrass theorem and on the isoperimetric problem.

Chapter 3. Graphs (46 pages), deals with the Ramsey number, planar graphs and, surprisingly, with the Jordan theorem.

Chapter 4. Ideas and combinatorial geometry (90 pages), concerns combinatorial aspects of convexity. Most attention is paid to figures of constant width, to the Borsuk's partition problem, to the Hadwiger's covering problem, and to the theorems of Helly and Szökefalvi-Nagy.

In many places the book is similar to some fragments of earlier books coauthored by the first author and scientific articles of the second author listed in the Bibliography. Particularly we have in mind the book of *I. M. Yaglom* and the first author [Convex figures (1961; Zbl 098.35501)] and the book of the first author and *I. Ts. Gohberg* [Results and problems in combinatorial geometry (1985; Zbl 567.52007)].

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Classification:
52-01 Textbooks (convex and discrete geometry)
52A10 Convex sets in 2 dimensions (including convex curves)
52A35 Helly-type theorems (convex geometry)
52A37 Other problems of combinatorial convexity
52C20 Tilings in 2 dimensions (discrete geometry)
00A07 Problem books
05C99 Graph theory
05B50 Polyominoes

Keywords:
Helly's theorem; illumination; tilings; graphs; convex figures; trominoes; tetrominoes; polyominoes; Ramsey number; constant width; Borsuk's partition problem; Hadwiger's covering problem; Bibliography