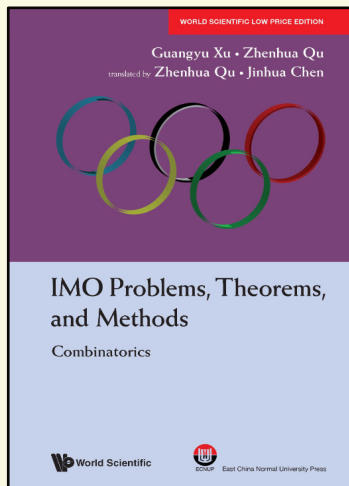


IMO Problems, Theorems, and Methods Combinatorics



By **Guangyu Xu**
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ABOUT THE BOOK

The problems in the International Mathematical Olympiad (IMO) are not only novel and interesting but also deeply rooted in profound mathematical context. The team at the International Mathematical Olympiad Research Center at East China Normal University has compiled and studied problems from past IMOs, dividing them into four volumes based on the mathematical fields involved: algebra, geometry, number theory, and combinatorics.

In the combinatorics volume, the IMO combinatorics problems are organized into six chapters: "Enumerative Combinatorics Problems," "Existence Problems," "Extremal Combinatorial Problems," "Operation and Logical Reasoning Problems," "Combinatorial Geometry Problems," and "Graph Theory Problems." Each chapter begins with an introduction to the relevant foundational knowledge and methods, followed by a reclassification and reorganization of past IMO problems. Multiple elegant solutions are provided for some of the problems, along with a statistical analysis of their difficulty.

The book concludes with a record of past IMO participation and award information, as well as an index of combinatorics problems, facilitating further study and convenient reference. This series is suitable for researchers in mathematical competitions, mathematics educators, and contestants.

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Guangyu Xu is a PhD student from School of Mathematical Sciences, East China Normal University. He completed his undergraduate studies in Mathematics and Applied Mathematics from Tsinghua University. During his doctoral studies, his research focuses on mathematics education and mathematics competitions, with a particular emphasis on combinatorial mathematics. He won a silver medal during the 29th Chinese Mathematical Olympiad and has maintained a strong passion for mathematics competitions over the years. He has also participated in the proposition and grading work for various major mathematics competitions in China multiple times.

Zhenhua Qu is an associate professor of the School of Mathematical Sciences, East China Normal University. He received his PHD from the University of Texas at Austin, USA. His research areas include algebraic geometry, number theory and mathematics education. He is actively involved in national mathematical competitions and proposed a great number of problems. He was the leader of Chinese IMO team in 2018, and deputy leader in 2021–2023.

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