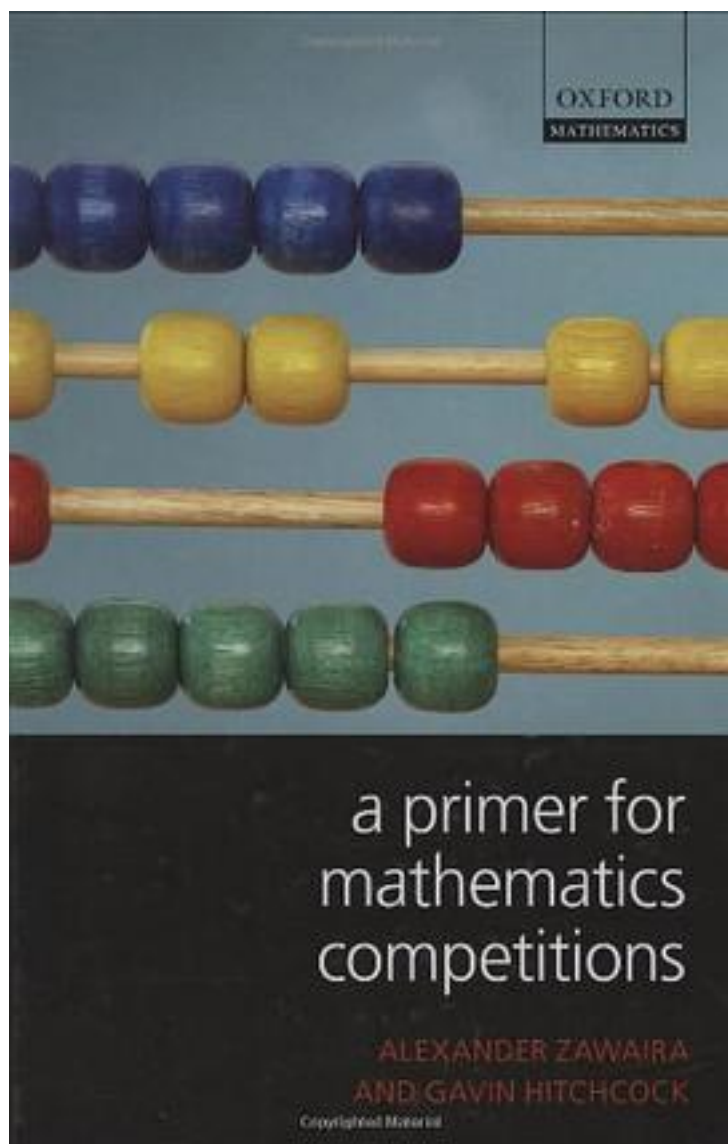


# A Primer for Mathematics Competitions



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The importance of mathematics competitions has been widely recognized for three reasons: they help to develop imaginative capacity and thinking skills whose value far transcends mathematics; they constitute the most effective way of discovering and nurturing mathematical talent; and they provide a means to combat the prevalent false image of mathematics held by high school students, as either a fearsomely difficult or a dull and uncreative subject. This book provides a comprehensive training resource for competitions from local and provincial to national Olympiad level, containing hundreds of diagrams, and graced by many light-hearted cartoons. It features a large collection of what mathematicians call "beautiful" problems - non-routine, provocative, fascinating, and challenging problems, often with elegant solutions. It features careful, systematic exposition of a selection of the most important topics encountered in mathematics competitions, assuming little prior knowledge. Geometry, trigonometry, mathematical induction, inequalities, Diophantine equations, number theory, sequences and series, the binomial theorem, and combinatorics - are all developed in a gentle but lively manner, liberally illustrated with examples, and consistently motivated by attractive "appetiser" problems, whose solution appears after the relevant theory has been expounded.

Each chapter is presented as a "toolchest" of instruments designed for cracking the problems collected at the end of the chapter. Other topics, such as algebra, co-ordinate geometry, functional equations and probability, are introduced and elucidated in the posing and solving of the large collection of miscellaneous problems in the final toolchest.

An unusual feature of this book is the attention paid throughout to the history of mathematics - the origins of the ideas, the terminology and some of the problems, and the celebration of mathematics as a multicultural, cooperative human achievement.

As a bonus the aspiring "mathlete" may encounter, in the most enjoyable way possible, many of the topics that form the core of the standard school curriculum.

## 作者介绍:

Alexander Zawaira was born in Zimbabwe in 1978. He studied Mathematics and Biochemistry at the University of Zimbabwe where Dr Gavin Hitchcock was one of his teachers. He won a Beit Trust Scholarship to study at Oxford University (England) where he obtained a PhD in Structural Biology. His research interests focus on bridging the gap between bioinformatics and "wet-lab" biochemistry by deriving and experimentally investigating hypotheses from bioinformatics analyses. He is also interested in the general application of mathematics in biology.

Gavin Hitchcock was born in Zimbabwe in 1946. He won scholarships to study mathematics at the Universities of Oxford and Keele, where he took his PhD with a thesis in general topology. He is Senior Lecturer in the Department of Mathematics, University of Zimbabwe, and his research interests are in topology and the history of mathematics. He is internationally known for his writings concerned with the communication of mathematical ideas and their history through theatre and dialogue. He spearheads the mathematical talent search and mathematical Olympiad training programmes in Zimbabwe, and is editor of Zimaths Magazine. He mounts workshops in Zimbabwe and neighbouring countries for teachers, for learners, and for parents, on such topics as "touching and seeing mathematics", "using the history of mathematics

to enliven teaching", and "creative problem solving". He also conducts seminars on creative problem solving for workers and for management in commerce and industry.

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