
Preface

The International Mathematical Olympiad (IMO) exists for more than 50 years and has already created a very rich legacy and firmly established itself as the most prestigious mathematical competition in which a high-school student could aspire to participate. Apart from the opportunity to tackle interesting and very challenging mathematical problems, the IMO represents a great opportunity for high-school students to see how they measure up against students from the rest of the world. Perhaps even more importantly, it is an opportunity to make friends and socialize with students who have similar interests, possibly even to become acquainted with their future colleagues on this first leg of their journey into the world of professional and scientific mathematics. Above all, however pleasing or disappointing the final score may be, preparing for an IMO and participating in one is an adventure that will undoubtedly linger in one's memory for the rest of one's life. It is to the high-school-aged aspiring mathematician and IMO participant that we devote this entire book.

The goal of this book is to include all problems ever shortlisted for the IMOs in a single volume. Up to this point, only scattered manuscripts traded among different teams have been available, and a number of manuscripts were lost for many years or unavailable to many.

In this book, all manuscripts have been collected into a single compendium of mathematics problems of the kind that usually appear on the IMOs. Therefore, we believe that this book will be the definitive and authoritative source for high-school students preparing for the IMO, and we suspect that it will be of particular benefit in countries lacking adequate preparation literature. A high-school student could spend an enjoyable year going through the numerous problems and novel ideas presented in the solutions and emerge ready to tackle even the most difficult problems on an IMO. In addition, the skill acquired in the process of successfully attacking difficult mathematics problems will prove to be invaluable in a serious and prosperous career in mathematics.

However, we must caution our aspiring IMO participant on the use of this book. Any book of problems, no matter how large, quickly depletes itself if the reader merely glances at a problem and then five minutes later, having determined that the problem seems unsolvable, glances at the solution.

The authors therefore propose the following plan for working through the book. Each problem is to be attempted at least half an hour before the reader looks at the solution. The reader is strongly encouraged to keep trying to solve the problem without looking at the solution as long as he or she is coming up with fresh ideas and possibilities for solving the problem. Only after all venues seem to have been exhausted is the reader to look at the solution, and then only in order to study it in close detail, carefully noting any previously unseen ideas or methods used. To condense the subject matter of this already very large book, most solutions have been streamlined, omitting obvious derivations and algebraic manipulations. Thus, reading the solutions requires a certain mathematical maturity, and in any case, the solutions, especially in geometry, are intended to be followed through with pencil and paper, the reader filling in all the omitted details. We highly recommend that the reader mark such unsolved problems and return to them in a few months to see whether they can be solved this time without looking at the solutions. We believe this to be the most efficient and systematic way (as with any book of problems) to raise one's level of skill and mathematical maturity.

We now leave our reader with final words of encouragement to persist in this journey even when the difficulties seem insurmountable and a sincere wish to the reader for all mathematical success one can hope to aspire to.

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Over the previous years we have created the website: www.imomath.com. There you can find the most current information regarding the book, the list of detected errors with corrections, and the results from the previous olympiads. This site also contains problems from other competitions and olympiads, and a collection of training materials for students preparing for competitions.

We are aware that this book may still contain errors. If you find any, please notify us at imomath@gmail.com. If you have any questions, comments, or suggestions regarding both our book and our website, please do not hesitate to write to us at the above email address. We would be more than happy to hear from you.

The IMO Compendium

A Collection of Problems Suggested for The
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Second Edition

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