

# Mathematical Olympiad In China 2011 2014

## Trouble in the Barker's Class

Although not as publicly well-known as the Nobel Prizes, the Fields Medal shares the same intellectual standing and is the equivalent award in the field of mathematics. This volume presents a selected list of 22 Fields Medallists and their contributions to give a highly interesting and varied bird's eye view of mathematics over the past 60 years. The contributions relate directly to the work for which the Medals were awarded or to the medallists' more current interests. In most cases, they are preceded by the introductory speech given by another leading mathematician during the prize ceremony, a photograph and up-to-date biographical notice.

Olympiad mathematics is not a collection of techniques of solving mathematical problems but a system for advancing mathematical education. This book is based on the lecture notes of the mathematical Olympiad training courses conducted by the author in Singapore. Its scope and depth not only covers and exceeds the usual syllabus, but introduces a variety concepts and methods in modern mathematics. In each lecture, the concepts, theories and methods are taken as the core. The examples are served to explain and enrich their intension

and to indicate their applications. Besides, appropriate number of test questions is available for reader's practice and testing purpose. Their detailed solutions are also conveniently provided. The examples are not very complicated so that readers can easily understand. There are many real competition questions included which students can use to verify their abilities. These test questions are from many countries, e.g. China, Russia, USA, Singapore, etc. In particular, the reader can find many questions from China, if he is interested in understanding mathematical Olympiad in China. This book serves as a useful textbook of mathematical Olympiad courses, or as a reference book for related teachers and researchers. Errata(s). Errata. Sample Chapter(s). Lecture 1: Operations on Rational Numbers (145k). Request Inspection Copy. Contents: .: Operations on Rational Numbers; Linear Equations of Single Variable; Multiplication Formulae; Absolute Value and Its Applications; Congruence of Triangles; Similarity of Triangles; Divisions of Polynomials; Solutions to Testing Questions; and other chapters. Readership: Mathematics students, school teachers, college lecturers, university professors; mathematics enthusiasts

This book discusses the merits and potential shortcomings of Hong Kong STEM education from Grade 8 to Grade 12. Based on concurrent triangulated mixed-method methodology, which integrates both quantitative and qualitative

procedures, it describes various change models and proposes new models that are considered compatible with Western cultures.

Many mathematicians have been drawn to mathematics through their experience with math circles. The Berkeley Math Circle (BMC) started in 1998 as one of the very first math circles in the U.S. Over the last decade and a half, 100 instructors--university professors, business tycoons, high school teachers, and more--have shared their passion for mathematics by delivering over 800 BMC sessions on the UC Berkeley campus every week during the school year. This second volume of the book series is based on a dozen of these sessions, encompassing a variety of enticing and stimulating mathematical topics, some new and some continuing from Volume I: from dismantling Rubik's Cube and randomly putting it back together to solving it with the power of group theory; from raising knot-eating machines and letting Alexander the Great cut the Gordian Knot to breaking through knot theory via the Jones polynomial; from entering a seemingly hopeless infinite raffle to becoming friendly with multiplicative functions in the land of Dirichlet, Möbius, and Euler; from leading an army of jumping fleas in an old problem from the International Mathematical Olympiads to improving our own essay-writing strategies; from searching for optimal paths on a hot summer day to questioning whether Archimedes was on his way to discovering

trigonometry 2000 years ago Do some of these scenarios sound bizarre, having never before been associated with mathematics? Mathematicians love having fun while doing serious mathematics and that love is what this book intends to share with the reader. Whether at a beginner, an intermediate, or an advanced level, anyone can find a place here to be provoked to think deeply and to be inspired to create. In the interest of fostering a greater awareness and appreciation of mathematics and its connections to other disciplines and everyday life, MSRI and the AMS are publishing books in the Mathematical Circles Library series as a service to young people, their parents and teachers, and the mathematics profession. Titles in this series are co-published with the Mathematical Sciences Research Institute (MSRI).

'The reference list is excellent. This is a worthwhile (though 'niche') book that will be attractive to a particular sector of the general reading public interested in mathematical riddles and puzzles. Professional educators might well employ it in integrated learning settings. Summing Up: Recommended. All readers.'

**CHOICE** Immerse yourself in the fascinating world of geometry and spatial ability — either individually or in small groups, either as challenges or play problems! Here are four reasons why you should work with this book: This book offers a very unique opportunity to enhance your spatial ability, your

mathematical competence, and your logical thinking. The authors arranged 45 problems — including more than 120 tasks — in a well-balanced order, which have been tested with a variety of populations.

In China, lots of excellent maths students take an active interest in various maths contests and the best six senior high school students will be selected to form the IMO National Team to compete in the International Mathematical Olympiad. In the past ten years China's IMO Team has achieved outstanding results — they won the first place almost every year. The authors are coaches of China's IMO National Team, whose students have won many gold medals many times in IMO. This book is part of the Mathematical Olympiad Series which discusses several aspects related to maths contests, such as algebra, number theory, combinatorics, graph theory and geometry. The book explains many basic techniques for proving inequalities such as direct comparison, method of magnifying and reducing, substitution method, construction method, and so on. Throughout its history, education in China has played a pivotal role in the nation's governance, civic society, and the social and cultural lives of its citizens. Today we see a nation grappling with how to modernize and internationalize its education system, while still retaining China's intellectual traditions and values in the face of growing educational inequalities. This book analyses the historical

and contemporary place of education in China and how the past has influenced today's trends. Recent fundamental educational reforms have been driven by the need for continuing economic development and a highly skilled workforce, at the same time fulfilling the aspirations of its citizens and their desire for the prestige education brings. Moreover, ideological education plays a key role in enlisting citizens to the national cause. Although China has ambitious plans for its education system, several problems remain, including an examination-obsessed system and highly competitive culture, which skew the social fabric and dominate family life and childhoods. This accessible analysis will be a welcome resource for students of comparative education as well as those across the social sciences interested in Chinese society.

This updated printing of the first edition of Colorado Mathematical Olympiad: the First Twenty Years and Further Explorations gives the interesting history of the competition as well as an outline of all the problems and solutions that have been created for the contest over the years. Many of the essay problems were inspired by Russian mathematical folklore and written to suit the young audience; for example, the 1989 Sugar problem was written in a pleasant Lewis Carroll-like story. Some other entertaining problems involve olde Victorian map colourings, King Authur and the knights of the round table, rooks in space, Santa Claus and his elves painting planes,

football for 23, and even the Colorado Springs subway system.

In China, the government controls a large part of resources, such as land, energy, bank savings, and so on. This book studies the efficiency and fairness of resources allocation by governmental administration in China. The book states that it is neither fair nor efficient to allocate resources by the governmental administrations. These resources should be allocated by the market. The book analyzes the resources allocation by government administration in three key areas namely education, health care, and land. A quantitative analysis is developed for describing more precisely the situation of unfairness in fiscal resources allocation. This book also describes how ordinary people address the misposition of resources by governmental administrations by migrating from the provinces with less resources to the provinces with more resources in education or health care. Thus, the book concludes that the actual allocation of resources is determined by the interactions between ordinary people and the government.

The Moscow Mathematical Olympiad has been challenging high school students with stimulating, original problems of different degrees of difficulty for over 75 years. The problems are nonstandard; solving them takes wit, thinking outside the box, and, sometimes, hours of contemplation. Some are within the reach of most mathematically competent high school students, while others are difficult even for a mathematics professor. Many mathematically inclined students have found that tackling these

problems, or even just reading their solutions, is a great way to develop mathematical insight. In 2006 the Moscow Center for Continuous Mathematical Education began publishing a collection of problems from the Moscow Mathematical Olympiads, providing for each an answer (and sometimes a hint) as well as one or more detailed solutions. This volume represents the years 1993-1999. The problems and the accompanying material are well suited for math circles. They are also appropriate for problem-solving classes and practice for regional and national mathematics competitions. In the interest of fostering a greater awareness and appreciation of mathematics and its connections to other disciplines and everyday life, MSRI and the AMS are publishing books in the Mathematical Circles Library series as a service to young people, their parents and teachers, and the mathematics profession. Titles in this series are co-published with the Mathematical Sciences Research Institute (MSRI). Vietnam has actively organized the National Competition in Mathematics and since 1962, the Vietnamese Mathematical Olympiad (VMO). On the global stage, Vietnam has also competed in the International Mathematical Olympiad (IMO) since 1974 and constantly emerged as one of the top ten. To inspire and further challenge readers, we have gathered in this book selected problems of the VMO from 1962 to 2008. A number of Selection Test problems are also included to aid in the formation and training of a national team for IMO. The book is highly useful for high school students and teachers, coaches and instructors preparing for mathematical olympiads, as well as non-experts



simply interested in having the edge over their opponents in mathematical competitions. In China, lots of excellent students who are good at maths takes an active part in various maths contests and the best six senior high school students will be selected to form the IMO National Team to compete in the International Mathematical Olympiad. In the past ten years China's IMO Team has achieved outstanding results — they have won the first place almost every year. The author is one of the coaches of China's IMO National Team, whose students have won many gold medals many times in IMO. This book is part of the Mathematical Olympiad Series which discusses several aspects related to maths contests, such as algebra, number theory, combinatorics, graph theory and geometry. The book elaborates on methods of discrete extremization, such as inequality control, repeated extremum, partial adjustment, exploiting symmetry, polishing transform, space estimates, etc.

Research in mathematics is much more than solving puzzles, but most people will agree that solving puzzles is not just fun: it helps focus the mind and increases one's armory of techniques for doing mathematics. *Mathematical Puzzles* makes this connection explicit by isolating important mathematical methods, then using them to solve puzzles and prove a theorem. Features A collection of the world's best mathematical puzzles Each chapter features a technique for solving mathematical puzzles, examples, and finally a genuine theorem of mathematics that features that technique in its proof Puzzles that are entertaining, mystifying, paradoxical, and

satisfying; they are not just exercises or contest problems.

This book comprises the full selected Regular Lectures from the Proceedings of the 12th International Congress on Mathematical Education (ICME-12), which was held at COEX in Seoul, Korea, from July 8th to 15th, 2012. ICME-12 brought together 4700 experts from 100 countries, working to understand all of the intellectual and attitudinal challenges in the subject of mathematics education as a multidisciplinary research and practice. These selected Regular Lectures present the work of fifty-one prominent mathematics educators from all over the globe. The Lectures cover a wide spectrum of topics, themes and issues and aim to give direction to future research towards educational improvement in the teaching and learning of mathematics education. This book is of particular interest to researchers, teachers and curriculum developers in mathematics education.

See also A SECOND STEP TO MATHEMATICAL OLYMPIAD PROBLEMS The International Mathematical Olympiad (IMO) is an annual international mathematics competition held for pre-collegiate students. It is also the oldest of the international science olympiads, and competition for places is particularly fierce. This book is an amalgamation of the first 8 of 15 booklets originally produced to guide students intending to contend for placement on their country's IMO team. The material contained in this book provides an introduction to the main mathematical topics covered in the IMO, which are: Combinatorics, Geometry and Number Theory. In addition, there is a

special emphasis on how to approach unseen questions in Mathematics, and model the writing of proofs. Full answers are given to all questions. Though *A First Step to Mathematical Olympiad Problems* is written from the perspective of a mathematician, it is written in a way that makes it easily comprehensible to adolescents. This book is also a must-read for coaches and instructors of mathematical competitions.

This problem-solving book is an introduction to the study of Diophantine equations, a class of equations in which only integer solutions are allowed. The presentation features some classical Diophantine equations, including linear, Pythagorean, and some higher degree equations, as well as exponential Diophantine equations. Many of the selected exercises and problems are original or are presented with original solutions. *An Introduction to Diophantine Equations: A Problem-Based Approach* is intended for undergraduates, advanced high school students and teachers, mathematical contest participants — including Olympiad and Putnam competitors — as well as readers interested in essential mathematics. The work uniquely presents unconventional and non-routine examples, ideas, and techniques.

Annotation. This text provides basic knowledge on how to solve combinatorial problems in mathematical competitions, and also introduces important solutions to combinatorial problems and some typical problems with often-used solutions.

In July 2009 Germany hosted the 50th International Mathematical Olympiad (IMO). For the very first time the number of participating countries exceeded 100, with 104

countries from all continents. Celebrating the 50th anniversary of the IMO provides an ideal opportunity to look back over the past five decades and to review its development to become a worldwide event. This book is a report about the 50th IMO as well as the IMO history. A lot of data about all the 50 IMOs are included. We list the most successful contestants, the results of the 50 Olympiads and the 112 countries that have ever taken part. It is impressive to see that many of the world's leading research mathematicians were among the most successful IMO participants in their youth. Six of them gave presentations at a special celebration: Bollobás, Gowers, Lovász, Smirnov, Tao and Yoccoz. This book is aimed at students in the IMO age group and all those who have interest in this worldwide leading competition for highschool students. This two-volume work introduces the theory and applications of Schur-convex functions. The second volume mainly focuses on the application of Schur-convex functions in sequences inequalities, integral inequalities, mean value inequalities for two variables, mean value inequalities for multi-variables, and in geometric inequalities. This book introduces the development of the International Mathematical Olympiad in China from 1986 to 2013, especially the questions and answers of all the previous International Mathematical Olympiad since 1986. This book is suitable for the students who want to participate in high school International Maths Olympic, tutors and fans of general mathematics. This reprint has been authorized by Harbin Institute of Technology Press in North America.

Highlighting the changing landscape of Chinese urban state schools under the pressure of recruiting a tremendous number of migrant children, this book examines the quality of state educational provisions from demographic, institutional, familial and cultural angles. Rooted in rich qualitative data from five Chinese metropolitan cities, it identifies the demographic changes in many state schools of becoming 'migrant majority' and the institutional reformation of 'interim quasi-state' schools under a low cost and inferior schooling approach. This book also digs into the 'black box' of cultural reproduction in school and family processes, revealing both a gloomy side of many migrant children's academic underachievement as a result of troubled home-school relations and a bright side that social inclusion of migrant children in state school promotes their adaptation to urban life. The author concludes that migrant children's experiences in state (and quasi-state) schools turn them into a generation of 'new urban working-class'. The monograph will be of interest to scholars, students, practitioners and policymakers who want to better understand educational equality for migrants and other marginalised groups.

The Handbook of Education in China provides both a comprehensive overview and an original interpretation of key aspects of education in the People's Republic of China. It has four parts: The Historical Background; The Contemporary Chinese System; Problems and Policies; The Special Administrative Regions: Macau and Hong Kong. The Handbook is an essential reference for those interested in Chinese education; as

well as a comprehensive textbook that provides valuable supplementary material for those studying Chinese politics, economy, culture and society more generally. The International Mathematical Olympiad (IMO) is an annual international mathematics competition held for pre-collegiate students. It is also the oldest of the international science olympiads, and competition for places is particularly fierce. This book is an amalgamation of the booklets originally produced to guide students intending to contend for placement on their country's IMO team. See also *A First Step to Mathematical Olympiad Problems* which was published in 2009. The material contained in this book provides an introduction to the main mathematical topics covered in the IMO, which are: Combinatorics, Geometry and Number Theory. In addition, there is a special emphasis on how to approach unseen questions in Mathematics, and model the writing of proofs. Full answers are given to all questions. Though *A Second Step to Mathematical Olympiad Problems* is written from the perspective of a mathematician, it is written in a way that makes it easily comprehensible to adolescents. This book is also a must-read for coaches and instructors of mathematical competitions. This is a challenging problem-solving book in Euclidean geometry, assuming nothing of the reader other than a good deal of courage. Topics covered included cyclic quadrilaterals, power of a point, homothety, triangle centers; along the way the reader will meet such classical gems as the nine-point circle, the Simson line, the symmedian and the mixtilinear incircle, as well as the theorems of Euler,

Ceva, Menelaus, and Pascal. Another part is dedicated to the use of complex numbers and barycentric coordinates, granting the reader both a traditional and computational viewpoint of the material. The final part consists of some more advanced topics, such as inversion in the plane, the cross ratio and projective transformations, and the theory of the complete quadrilateral. The exposition is friendly and relaxed, and accompanied by over 300 beautifully drawn figures. The emphasis of this book is placed squarely on the problems. Each chapter contains carefully chosen worked examples, which explain not only the solutions to the problems but also describe in close detail how one would invent the solution to begin with. The text contains a selection of 300 practice problems of varying difficulty from contests around the world, with extensive hints and selected solutions. This book is especially suitable for students preparing for national or international mathematical olympiads or for teachers looking for a text for an honor class.

"The IMO Compendium" is the ultimate collection of challenging high-school-level mathematics problems and is an invaluable resource not only for high-school students preparing for mathematics competitions, but for anyone who loves and appreciates mathematics. The International Mathematical Olympiad (IMO), nearing its 50th anniversary, has become the most popular and prestigious

competition for high-school students interested in mathematics. Only six students from each participating country are given the honor of participating in this competition every year. The IMO represents not only a great opportunity to tackle interesting and challenging mathematics problems, it also offers a way for high school students to measure up with students from the rest of the world. Until the first edition of this book appearing in 2006, it has been almost impossible to obtain a complete collection of the problems proposed at the IMO in book form. "The IMO Compendium" is the result of a collaboration between four former IMO participants from Yugoslavia, now Serbia and Montenegro, to rescue these problems from old and scattered manuscripts, and produce the ultimate source of IMO practice problems. This book attempts to gather all the problems and solutions appearing on the IMO through 2009. This second edition contains 143 new problems, picking up where the 1959-2004 edition has left off.

Mathematical Olympiad In China (2011-2014): Problems And Solutions World Scientific

This book is the first of its kind, as it includes both mathematics content and pedagogy. It is a professional instructional manual on how mathematical problem solving curriculum can be implemented in the classrooms. The book develops from the theoretical work of Polya and Schoenfeld, and explicates how these can



be translated to the actual implementation in schools. It represents the work of a group of researchers from the Singapore National Institute of Education, after experimenting with it in the Singapore school classrooms. This book includes a set of scheme of work, lesson plans and a choice of mathematics problems that teachers can actually use in teaching problem solving. Certain pedagogical considerations are developed and suggested in this book. In addition, the book includes an assessment framework on how mathematical problem solving can be assessed.

The International Mathematical Olympiad (IMO) is a competition for high school students. China has taken part in the IMO 21 times since 1985 and has won the top ranking for countries 14 times, with a multitude of golds for individual students. The six students China has sent every year were selected from 20 to 30 students among approximately 130 students who took part in the annual China Mathematical Competition during the winter months. This volume of comprises a collection of original problems with solutions that China used to train their Olympiad team in the years from 2009 to 2010. Mathematical Olympiad problems with solutions for the years 2002 to 2008 appear in an earlier volume, *Mathematical Olympiad in China*.

*Mathematical Olympiad Treasures* aims at building a bridge between ordinary

high school exercises and more sophisticated, intricate and abstract concepts in undergraduate mathematics. The book contains a stimulating collection of problems in the subjects of algebra, geometry, trigonometry, number theory and combinatorics. While it may be considered a sequel to "Mathematical Olympiad Challenges," the focus is on engaging a wider audience to apply techniques and strategies to real-world problems. Throughout the book students are encouraged to express their ideas, conjectures, and conclusions in writing. The goal is to help readers develop a host of new mathematical tools that will be useful beyond the classroom and in a number of disciplines.

In China, lots of excellent maths students takes an active part in various maths contests and the best six senior high school students will be selected to form the IMO National Team to compete in the International Mathematical Olympiad. In the past ten years, China's IMO Team has achieved outstanding results — they have won the first place almost every year. The author is one of the senior coaches of China's IMO National Team, he is the headmaster of Shanghai senior high school which is one of the best high schools of China. In the past decade, the students of this school have won the IMO gold medals almost every year. The author attempts to use some common characteristics of sequence and mathematical induction to fundamentally connect Math Olympiad problems to

particular branches of mathematics. In doing so, the author hopes to reveal the beauty and joy involved with math exploration and at the same time, attempts to arouse readers' interest of learning math and invigorate their courage to challenge themselves with difficult problems.

The Mathematical Olympiads for Elementary School are open mathematical Olympiads for students from 1st to 4th grade of elementary school, and they have been held every year in the city of Moscow since 1996, their first editions taking place in the facilities of the Moscow State University - Maly Mekhmat. Although initially these Olympiads were conceived for students of a study circle of elementary school, then it was extended to students in general since 2005. Being the Technological University of Russia - MIREA its main headquarters today. Likewise, these Olympiads consist of two rounds, a qualifying round and a final round, both consisting of a written exam. The problems included in this book correspond to the final round of these Olympiads, for the 1st grade of elementary school. In this workbook has been compiled all the Olympiads held during the years 2011-2020 and is especially aimed at schoolchildren between 6 and 7 years old, with the aim that any student interested in mathematics either in preparing for a competition or in simply practicing entertaining problems to improve his math skills, challenging himself to solve these interesting problems

(recommended even to elementary school children in upper grades with little or no experience in Math Olympiads and who require comprehensive preparation before a competition); or it could even be used for a self-evaluation in this competition, trying the student to solve the greatest number of problems in each exam in a maximum time of 1 hour. It can also be useful for teachers, parents, and study circles in mathematics. The book has been carefully crafted so that the student can work on the same book without the need for additional sheets. What will allow the student to have an orderly record of the problems already solved. Each exam includes a set of 8 problems from different school math topics. To be able to face these problems successfully, no greater knowledge is required than that covered in the school curriculum; however, many of these problems require an ingenious approach to be tackled successfully. Students are encouraged to keep trying to solve each problem as a personal challenge, as many times as necessary; and to parents who continue to support their children in their disciplined preparation. Once an answer is obtained, you can check it against the answers given at the end of the book.

This new volume of the Mathematical Olympiad Series focuses on the topic of geometry. Basic and advanced theorems commonly seen in Mathematical Olympiad are introduced and illustrated with plenty of examples. Special techniques in solving

various types of geometrical problems are also introduced, while the authors elaborate extensively on how to acquire an insight and develop strategies in tackling difficult geometrical problems. This book is suitable for any reader with elementary geometrical knowledge at the lower secondary level. Each chapter includes sufficient scaffolding and is comprehensive enough for the purpose of self-study. Readers who complete the chapters on the basic theorems and techniques would acquire a good foundation in geometry and may attempt to solve many geometrical problems in various mathematical competitions. Meanwhile, experienced contestants in Mathematical Olympiad competitions will find a large collection of problems pitched at competitions at the international level, with opportunities to practise and sharpen their problem-solving skills in geometry.

Though Asian Indians are typically thought of as a "model minority", not much is known about the school experiences of their children. Positive stereotyping of these immigrants and their children often masks educational needs and issues, creates class divides within the Indian-American community, and triggers stress for many Asian Indian students. This volume examines second generation (America-born) and 1.5 generation (foreign-born) Asian Indians as they try to balance peer culture, home life and academics. It explores how, through the acculturation process, these children either take advantage of this positive stereotype or refute their stereotyped ethnic image and move to downward mobility. Focusing on migrant experiences of the Indian

diasporas in the United States, this volume brings attention to highly motivated Asian Indian students who are overlooked because of their cultural dispositions and outlooks on schooling, and those students who are more likely to underachieve. It highlights the assimilation of Asian Indian students in mainstream society and their understandings of Americanization, social inequality, diversity and multiculturalism.

The International Mathematical Olympiad (IMO) is a competition for high school students. China has taken part in the IMO 21 times since 1985 and has won the top ranking for countries 14 times, with a multitude of golds for individual students. The six students China has sent every year were selected from 20 to 30 students among approximately 130 students who took part in the annual China Mathematical Competition during the winter months. This volume comprises a collection of original problems with solutions that China used to train their Olympiad team in the years from 2006 to 2008. Mathematical Olympiad problems with solutions for the years 2002-2006 appear in an earlier volume, *Mathematical Olympiad in China*.

Our collected work contains mathematics education research papers. Comparative studies of school textbooks cover content selection, compilation style, representation method, design of examples and exercises, mathematics investigation, the use of information technology, and composite difficulty level, to name a few. Other papers included are about representation of basic mathematical thought in school textbooks, a study on the compilation features of elementary school textbooks, and a survey of the

effect of using new elementary school textbooks.

The International Mathematical Olympiad (IMO) is a very important competition for high school students. China has taken part in the IMO 31 times since 1985 and has won the top ranking for countries 19 times, with a multitude of gold medals for individual students. The six students China has sent every year were selected from 60 students among approximately 300 students who took part in the annual China Mathematical Competition during the winter months. This book includes the problems and solutions of the most important mathematical competitions from 2010 to 2014 in China, such as China Mathematical Competition, China Mathematical Olympiad, China Girls' Mathematical Olympiad. These problems are almost exclusively created by the experts who are engaged in mathematical competition teaching and researching. Some of the solutions are from national training team and national team members, their wonderful solutions being the feature of this book. This book is useful to mathematics fans, middle school students engaged in mathematical competition, coaches in mathematics teaching and teachers setting up math elective courses.

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