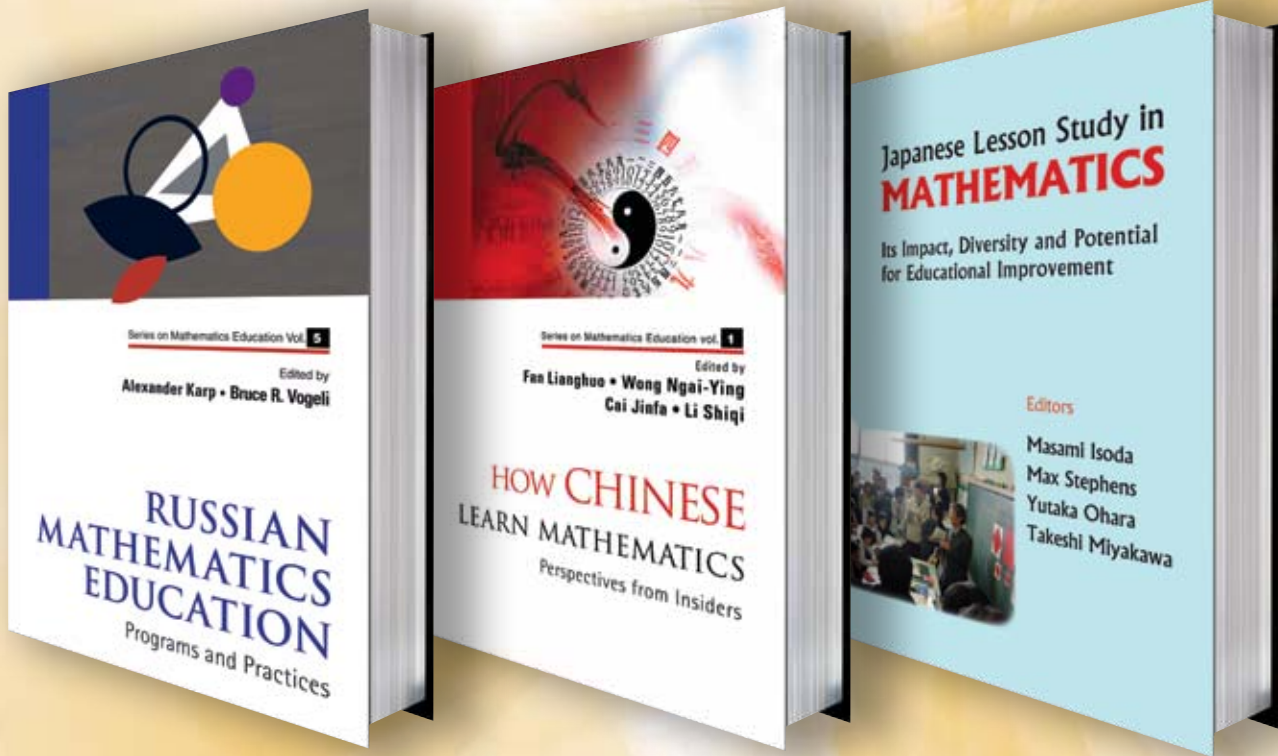


MATHEMATICS FOR HIGH SCHOOLS



SERIES ON MATHEMATICAL EDUCATION

RUSSIAN MATHEMATICS EDUCATION

Vol. 5

Programs and Practices

edited by **Bruce R Vogeli & Alexander Karp** (Columbia University, USA)

This anthology, consisting of two volumes, is intended to equip background researchers, practitioners and students of international mathematics education with intimate knowledge of mathematics education in Russia.

The second volume, entitled *Russian Mathematics Education: Programs and Practices* will examine specific Russian programs in mathematics, their impact and methodological innovations. Although Russian mathematics education is highly respected for its achievements and was once very influential internationally, it has never been explored in depth. This publication does just that.

600pp
978-981-4322-70-6
978-981-4322-71-3(ebook)

Apr 2011
US\$128 £79
US\$166

HOW CHINESE LEARN MATHEMATICS

Vol. 1

Perspectives from Insiders

edited by **Fan Lianghuo** (Nanyang Technological University, Singapore), **Wong Ngai-Ying** (The Chinese University of Hong Kong, Hong Kong), **Cai Jinfa** (The University of Delaware, USA), & **Li Shiqi** (East China Normal University, China)

"A noteworthy feature of the book is that eleven of the chapter authors work in mainland China ... The edited collection is a significant contribution to the research literature and provides an important resource in the field."

Research in Mathematics Education

The book has been written by an international group of very active researchers and scholars who have a passion for the study of Chinese mathematics education. It aims to provide readers with a comprehensive and updated picture of the teaching and learning of mathematics involving Chinese students from various perspectives, including the ways in which Chinese students learn mathematics in classrooms, schools and homes, the influence of the cultural and social environment on Chinese students' mathematics learning, and the strengths and weaknesses of the ways in which Chinese learn mathematics.

592pp
978-981-256-014-8
978-981-270-414-6(pbk)
978-981-256-224-1(ebook)

Aug 2004
US\$172 £118
US\$87 £60
US\$224

JAPANESE LESSON STUDY IN MATHEMATICS

Its Impact, Diversity and Potential for Educational Improvement

edited by **Masami Isoda**, **Takeshi Miyakawa** (University of Tsukuba, Japan), **Max Stephens** (University of Melbourne, Australia), & **Yutaka Ohara** (Naruto University of Education, Japan)

In *Before It's Too Late: A Report to the Nation from the National Commission on Mathematics and Science Teaching for the 21st Century* (2000) in the US, the authors quote from James Stigler's conclusions from various videotape research studies of mathematics teaching: "The key to long-term improvement [in teaching] is to figure out how to generate, accumulate, and share professional knowledge". Japanese Lesson Study has proved to be one successful means.

280pp
978-981-270-453-5
978-981-270-544-0(pbk)
978-981-270-747-5(ebook)

Feb 2007
US\$142 £98
US\$62 £43
US\$185

MATHEMATICAL OLYMPIAD SERIES

A SECOND STEP TO MATHEMATICAL OLYMPIAD PROBLEMS

by **Derek Holton** (*University of Melbourne, Australia*)



This book is an amalgamation of the 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. This book 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.

Readership: School students keen to learn more of mathematics and specifically mathematics related to the IMO; coaches and instructors of mathematical competitions.

300pp Sep 2011
978-981-4327-87-9(pbk) US\$38 £24

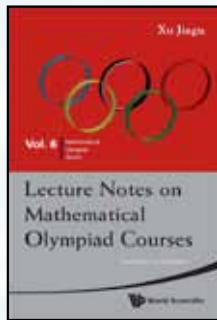
LECTURE NOTES ON MATHEMATICAL OLYMPIAD COURSES

For Junior Section (In 2 Volumes)

by **Jiagu Xu** (*Former Professor of Mathematics, Fudan University, China*)



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.



Set
192pp Dec 2009
978-981-4293-53-2(pbk) US\$40 £30

Vol. 1
978-981-4293-54-9(pbk) US\$25 £19
978-981-4293-56-3(ebook) US\$52

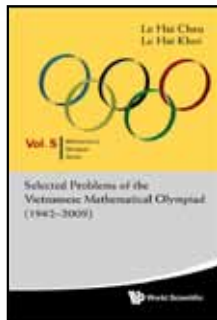
Vol. 2
978-981-4293-55-6(pbk) US\$25 £19
978-981-4293-57-0(ebook) US\$52

SELECTED PROBLEMS OF THE VIETNAMESE MATHEMATICAL OLYMPIAD (1962–2009)

by **Le Hai Chau** (*Ministry of Education and Training, Vietnam*) & **Le Hai Khoi** (*Nanyang Technological University, Singapore*)



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 problems of various degrees of difficulty of the VMO from 1962 to 2009.

332pp Sep 2010
978-981-4289-59-7(pbk) US\$39 £24
978-981-4289-60-3(ebook) US\$51

COMBINATORIAL PROBLEMS IN MATHEMATICAL COMPETITIONS

by **Yao Zhang**
(*Hunan Normal University, China*)



This book focuses on combinatorial problems in mathematical competitions. It 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. Some enlightening and novel examples and exercises are well chosen in this book.

With this book, readers can explore, analyze and summarize the ideas and methods of solving combinatorial problems. Their mathematical culture and ability will be improved remarkably after reading this book.

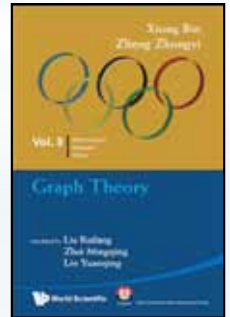
Readership: Students and teachers of high school, coaches of mathematical olympiads, undergraduates and graduates in mathematics, non-experts interested in mathematical competitions.

250pp Mar 2011
978-981-283-949-7(pbk) US\$28 £18
978-981-283-950-3(ebook) US\$36



GRAPH THEORY

by **Bin Xiong** (*East China Normal University, China*), **Zhongyi Zheng** (*High School Attached to Fudan University, China*), translated by **Ruifang Liu, Mingqing Zhai & Yuanqing Lin** (*East China Normal University, China*)



In 1736, the mathematician Euler invented graph theory while solving the Konigsberg seven-bridge problem. Over 200 years later, graph theory remains the skeleton content of discrete mathematics, which serves as a theoretical basis for computer science and network information science. This book introduces some basic knowledge and the primary methods in graph theory by many interesting problems and games.

Contents: Definition of Graph; Degree of a Vertex; Turán's Theorem; Tree; Euler's Problem; Hamilton's Problem; Planar Graph; Ramsey's Problem; Tournament.

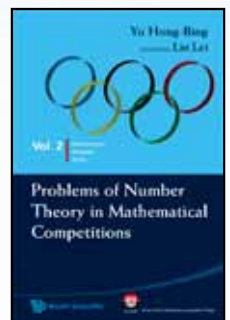
Readership: High-school mathematics students and teachers, coaches of mathematical olympiads, undergraduates and graduates in mathematics, non-experts interested in mathematical competitions.

156pp Mar 2010
978-981-4271-12-7(pbk) US\$28 £19



PROBLEMS OF NUMBER THEORY IN MATHEMATICAL COMPETITIONS

by **Hong-Bing Yu** (*Suzhou University, China*) & translated by **Lei Lin** (*East China Normal University, China*)



Number theory is an important research field of mathematics. In mathematical competitions, problems of elementary number theory occur frequently. These problems use little knowledge and have many variations. They are flexible and diverse. In this book, the author introduces some basic concepts and methods in elementary number theory via problems in mathematical competitions. Readers are encouraged to try to solve the problems by themselves before they read the given solutions of examples. Only in this way can they truly appreciate the tricks of problem-solving.

116pp Sep 2009
978-981-4271-14-1(pbk) US\$28 £19

A FIRST STEP TO MATHEMATICAL OLYMPIAD PROBLEMS

by **Derek Holton** (University of Melbourne, Australia)



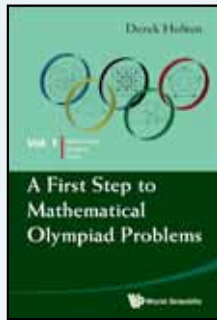
"This book continues the tradition making national and international mathematical competition problems available to a wider audience and is bound to appeal to anyone interested in mathematical problem solving. The reviewer recommends this book to all students curious about elementary mathematics and how to learn it through solving problems. Teachers would find this book to be a welcome resource for organizing their activities at a high level."

Zentralblatt MATH

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.

Contents: Jugs and Stamps: How to Solve Problems; Combinatorics I; Graph Theory; Number Theory 1; Geometry 1; Proof; Geometry 2; Some IMO Problems.

292pp Jul 2009
978-981-4273-87-9(pbk) US\$35 £26

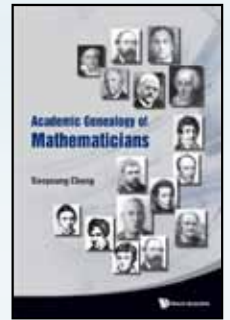


ACADEMIC GENEALOGY OF MATHEMATICIANS

by **Sooyoung Chang**

(Pohang University of Science & Technology, South Korea)

As modern mathematics has been developed by mathematicians over the past several hundred years, it is interesting to trace the academic genealogy of mathematicians — especially since all mathematicians learnt mathematics from their teachers. In this book, 750 mathematicians are listed along with the detailed descriptions of 464 famous mathematicians of the 19th and 20th centuries. In addition, interesting life stories and mathematical achievements are included with photographs.



Contents: German School; French School; Russian School; British School; Polish School; Hungarian School; Finish School; Swedish School; Norwegian School; Italian School; Dutch School; Belgian School; Austrian School; Japanese School; Korean School; American School; Australian School; Czech School.

Readership: Mathematicians, physicists, engineers and students.

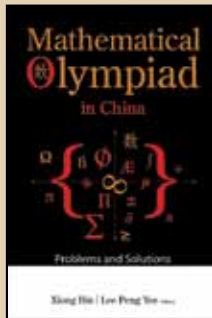
524pp Oct 2010
978-981-4282-29-1 US\$108 £75

MATHEMATICAL OLYMPIAD IN CHINA

Problems and Solutions

edited by **Xiong Bin** (East China Normal University, China) & **Lee Peng Yee** (Nanyang Technological University, Singapore)

The International Mathematical Olympiad (IMO) is a competition for high school students. China has taken part in IMO twenty times since 1985 and has won the top ranking for countries thirteen times, with a multitude of golds for individual students. The 6 students China sent every year were selected from 20 to 30 students among approximately 130 students who take part in the 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 2003 to 2006.



276pp Jun 2007
978-981-270-789-5(pbk) US\$33 £18
978-981-270-979-0(ebook) US\$43

MATHEMATICAL OLYMPIAD IN CHINA (2007–2008)

Problems and Solutions

edited by **Xiong Bin** (East China Normal University, China) & **Lee Peng Yee** (Nanyang Technological University, Singapore)

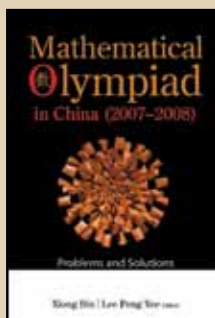
"This book continues the tradition making national and international mathematical competition problems available to a wider audience and is bound to appeal to anyone interested in mathematical problem solving. The reviewer recommends this book to all students curious about elementary mathematics and how to learn it through solving problems. Teachers would find this book to be a welcome resource for organizing their activities at a high level."

Zentralblatt MATH

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.

Readership: Mathematics students, school teachers, college lecturers, university professors; mathematics enthusiasts.

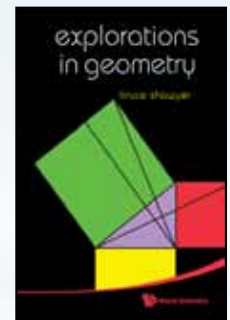
220pp May 2009
978-981-4261-14-2(pbk) US\$29 £22
978-981-4261-15-9(ebook) US\$38



EXPLORATIONS IN GEOMETRY

by **Bruce Sawyer** (Memorial University of Newfoundland, Canada)

This book covers the basic topics in geometry (including trigonometry) that are accessible and valuable to senior high school and university students. It also includes materials that are very useful for problem solving in mathematical competitions, from relatively easy to advanced levels, including the International Mathematical Olympiad.



Contents: Basic Euclidean Geometry; Trigonometry; Concurrency and Collinearity; Circumcircle, Inradius and Semiperimeter Formulae; Conic Sections; Constructions; The Broken Chord Theorem; Cleavers and Splitters; Remarkable Bisections; Miscellaneous Problems; Problems with Solutions.

Readership: High School and university undergraduate students.

320pp Mar 2010
978-981-4295-85-7 US\$61 £42

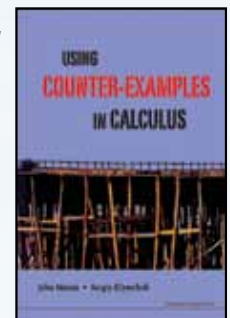
USING COUNTER-EXAMPLES IN CALCULUS

by **John Mason** (Open University in Milton Keynes, UK) & **Sergiy Klymchuk** (Auckland University of Technology, New Zealand)

"I would encourage calculus teachers/lecturers to read this book. It has to generate ideas that will improve our teaching of the subject."

Derek Holton
Emeritus Professor, University of Otago
Honorary Professor, University of Melbourne

This book makes accessible to calculus students in high school, college and university a range of counter-examples to "conjectures" that many students erroneously make. In addition, it urges readers to construct their own examples by tinkering with the ones shown here in order to enrich the example spaces to which they have access, and to deepen their appreciation of conspectus and conditions applying to theorems.



116pp May 2009
978-1-84816-359-1 US\$65 £45
978-1-84816-360-7(pbk) US\$32 £22

SERIES ON MATHEMATICAL EDUCATION

RUSSIAN MATHEMATICS EDUCATION

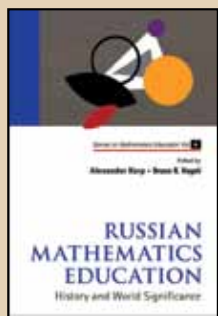
History and World Significance

edited by **Alexander Karp & Bruce R Vogeli** (Columbia University, USA)

Volume I, entitled *Russian Mathematics Education: History and World Significance*, consists of several chapters written by distinguished authorities from Russia, the United States and other nations. It examines the history of mathematics education in Russia and its relevance to mathematics education throughout the world.

Readership: Mathematics education scholars and professors, teachers and investigators concerned with Russian mathematics education and its achievements.

400pp Mar 2010
978-981-4277-05-1 US\$88 £61
978-981-4277-06-8(ebook) US\$114



Vol. 4

LESSON STUDY

Challenges in Mathematics Education

edited by **Maitree Inprasitha** (Khon Kaen University, Thailand), **Masami Isoda** (University of Tsukuba, Japan), **Ban-Har Yeap** (National Institute of Education, Singapore), & **Patsy Wang-Iverson** (The Gabriella and Paul Rosenbaum Foundation, USA)

Classroom Innovations through Lesson Study is an APEC EDNET (Asia-Pacific Economic Cooperation Education Network) project that aims to improve the quality of education in the area of mathematics. This book includes challenges of lesson study in the world, for example, in Japan and Singapore.

Lesson study is one of the best ways to improve the quality of teaching. It is the model approach for improvement of teacher education in the world, and mathematics is the most appropriate subject for sharing the results of lesson study. This book focuses on teacher education and mathematics education, and on curriculum implementation and reforms.

Readership: Mathematics educators of teacher training colleges, mathematics teachers, prospective teachers (elementary and secondary school) and undergraduate students in mathematics.

300pp Mar 2011
978-981-283-540-6 US\$111 £76
978-981-283-541-3(pbk) US\$65 £45
978-981-283-542-0(ebook) US\$144

Vol. 3

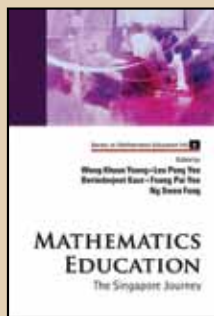
MATHEMATICS EDUCATION

The Singapore Journey

edited by **Wong Khoo Yoong, Lee Peng Yee, Berinderjeet Kaur, Foong Pui Yee, & Ng Swee Fong** (Nanyang Technological University, Singapore)

"This book provides a comprehensive view of the landscape and terrain of Singapore's journey towards excellence. This would provide many countries with directions for emulating Singapore's success in mathematics education ... this book is indeed a significant contribution that has added to the knowledge of research and practice of mathematics education in the world at large."

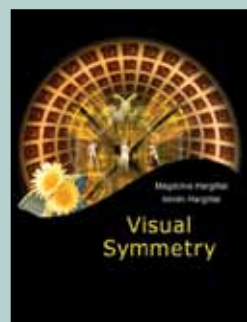
Journal of Science and Mathematics Education in Southeast Asia



Vol. 2

This comprehensive book is a state-of-the-art review of research and practices of mathematics education in Singapore. It traces the fascinating journey from the original development of the Singapore mathematics curriculum in the 1950s to the present day, and reports on diverse findings about the Singapore experience that are not readily available in print. All of the authors are active mathematics educators or senior mathematics teachers in Singapore, thus adding authenticity and distinctiveness to the stories covered in this book. The issues they so earnestly explore in this book will undoubtedly be of interest to graduate students, mathematics educators, and the international mathematics education community.

564pp Feb 2009
978-981-283-375-4 US\$107 £74
978-981-283-376-1(ebook) US\$139



VISUAL SYMMETRY

by **Magdolna Hargittai & István Hargittai** (Budapest University of Technology and Economics, Hungary)

"It is a remarkable work of 'Visual Symmetry', a true pleasure for our eyes and a full appreciation of the beauty and significance of symmetry, whether natural or created by human imagination and creativity. This book is for readers of all age groups and be kept as a cherished moment to which they will frequently return."

George A Olah
 Nobel Laureate in Chemistry

The authors, world-renowned scientists, have already produced a dozen books on symmetry for professionals as well as lay persons, for grownups as well as children, in English, Russian, German, Hungarian, and Swedish languages. They provide this attractive account of symmetry in few words and many — as many as 650 — images in full color from the most diverse corners of our globe. An encounter with this book will open up a whole new experience for the reader, who will never look at the world with the same eyes as before.

224pp Apr 2009
978-981-283-531-4 US\$48 £36
978-981-283-532-1(ebook) US\$62

A MATHEMATICAL BRIDGE

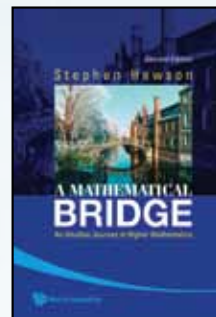
An Intuitive Journey in Higher Mathematics

Second Edition

by **Stephen Hewson** (Cambridge University, UK)

"This nice book helps to bridge the gap between the high school and college mathematics and is warmly recommended to the readers starting the first year university-level mathematics."

Zentralblatt MATH



Although higher mathematics is beautiful, natural and interconnected, to the uninitiated it can feel like an arbitrary mass of disconnected technical definitions, symbols, theorems and methods. An intellectual gulf needs to be crossed before a true, deep appreciation of mathematics can develop. This book bridges this mathematical gap. It focuses on the process of discovery as much as the content, leading the reader to a clear, intuitive understanding of how and why mathematics exists in the way it does.

672pp Jan 2009
978-981-283-407-2 US\$110 £61
978-981-283-408-9(pbk) US\$65 £36

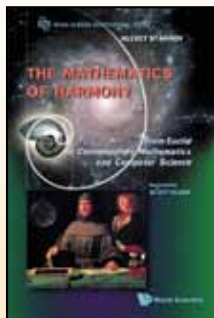
Series on Knots and Everything – Vol. 22

THE MATHEMATICS OF HARMONY From Euclid to Contemporary Mathematics and Computer Science

by **Alexey Stakhov** assisted by **Scott Olsen**
(Central Florida Community College, USA)

This volume is a result of the author's four decades of research in the field of Fibonacci numbers and the Golden Section and their applications. It provides a broad introduction to the fascinating and beautiful subject of the "Mathematics of Harmony," a new interdisciplinary direction of modern science.

The book is intended for a wide audience including mathematics teachers of high schools, students of colleges and universities and scientists in the field of mathematics, theoretical physics and computer science. The book may be used as an advanced textbook by graduate students and even ambitious undergraduates in mathematics and computer science.



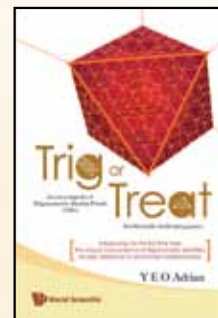
748pp Sep 2009
978-981-277-582-5 US\$160 £110
978-981-277-583-2(ebook) US\$208

TRIG OR TREAT An Encyclopedia of Trigonometric Identity Proofs (TIPs) with Intellectually Challenging Games

by **Y E O Adrian** (M.A., Ph.D, Cambridge University, UK)

This encyclopedia contains trigonometric identity proofs for some three hundred identities. The book is presented in the form of mathematical games for the reader's enjoyment and includes a concordance of trigonometric identities, enabling easy reference.

Contents: The Basics of Trigonometry; Pythagoras' Theorem; Compound Angles, Double Angles and Half Angles; Angles in a Triangle; Sum and Difference of sin and cos; Practical Trig; Numerical Values of Special Angles — Graphs of sin, cos and tan for 0°–360°; **Appendices:** The Concordance of Trigonometric Identities; The Encyclopedia of Trigonometric Games or Trigonometric Identity Proofs (TIPs).



416pp Oct 2007
978-981-277-618-1 US\$69 £47
978-981-277-619-8(pbk) US\$44 £30
978-981-277-620-4(ebook) US\$90



ORIGAMICS Mathematical Explorations Through Paper Folding

by **Kazuo Haga** (University of Tsukuba, Japan), editor and translator **Josefina C Fonacier** (University of Philippines, Philippines) & **Masami Isoda** (University of Tsukuba, Japan)

"This book is lavishly illustrated and easy to follow. Origamics is a great reference for anyone looking for fresh and interesting ways to incorporate discovery into Euclidean geometry classes and will appeal to geometry and paper folding fans of all types."

Mathematical Reviews

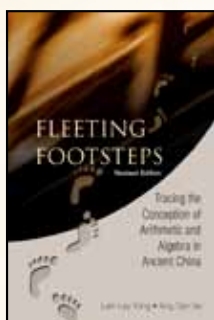
In this unique and original book, origami is an object of mathematical exploration. The activities in this book differ from ordinary origami in that no figures of objects result. Rather, they lead the reader to study the effects of the folding and seek patterns.

152pp Sep 2008
978-981-283-489-8 US\$61 £42
978-981-283-490-4(pbk) US\$36 £25
978-981-283-491-1(ebook) US\$79

FLEETING FOOTSTEPS Tracing the Conception of Arithmetic and Algebra in Ancient China

Revised Edition
by **Lam Lay Yong** (Former Professor of Mathematics, National University of Singapore, Singapore) & **Ang Tian Se** (Universiti Tunku Abdul Rahman, Malaysia)

"This book not only stimulates the reader's interest in this centuries-old issue concerning the origins of the decimal place-value system, but also provides an excellent introduction to one of the important ancient Chinese mathematical texts for English readers, along with full translation of *The Mathematical Classic of Sun Zi ... Fleeting Footsteps* should be read by anyone interested in the history of Chinese mathematics or in the origins of number systems."



MAA Online Book Review

This book provides considerable evidence to show that the Hindu–Arabic numeral system, despite its commonly accepted name, has its origins in the Chinese rod numeral system. This system was widely used in China from antiquity till the 16th century.

268pp Apr 2004
978-981-238-696-0 US\$79 £54
978-981-256-725-3(ebook) US\$103

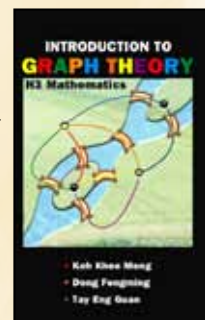
INTRODUCTION TO GRAPH THEORY H3 Mathematics

by **Koh Khee Meng** (National University of Singapore, Singapore), **Dong Fengming**, & **Tay Eng Guan** (Nanyang Technological University, Singapore)

Graph theory is an area in discrete mathematics which studies configurations (called graphs) involving a set of vertices interconnected by edges. This book is intended as a general introduction to graph theory and, in particular, as a resource book for junior college students and teachers reading and teaching the subject at H3 Level in the new Singapore mathematics curriculum for junior college.

Contents: Fundamental Concepts and Basic Results; Graph Isomorphisms, Subgraphs, the Complement of a Graph; Bipartite Graphs and Trees; Vertex-Colourings of Graphs; Matchings in Bipartite Graphs; Eulerian Multigraphs and Hamiltonian Graphs; Digraphs and Tournaments.

244pp Mar 2007
978-981-270-525-9 US\$111 £76
978-981-270-386-6(pbk) US\$69 £47



YOU FAILED YOUR MATH TEST, COMRADE EINSTEIN Adventures and Misadventures of Young Mathematicians

edited by **M Shifman** (William I Fine Theoretical Physics Institute, University of Minnesota, USA)

This groundbreaking work features two essays written by the renowned mathematician Ilan Vardi. The first essay presents a thorough analysis of contrived problems suggested to "undesirable" applicants to the Department of Mathematics of Moscow University. His second essay gives an in-depth discussion of solutions to the Year 2000 International Mathematical Olympiad, with emphasis on the comparison of the olympiad problems to those given at the Moscow University entrance examinations.

232pp Apr 2005
978-981-256-358-3 US\$104 £72
978-981-256-279-1(pbk) US\$53 £29
978-981-270-116-9(ebook) US\$135



50 MATH AND SCIENCE GAMES FOR LEADERSHIP

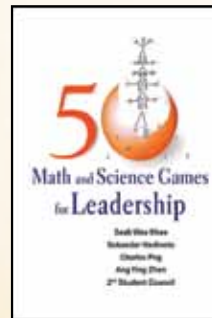
by **Seah Wee Khee, Sukandar Hadinoto, Charles Png, Ang Ying Zhen** (NUS High School of Mathematics and Science, Singapore), & **the 2nd Student Council of NUS High School**

"The games presented in the book are well structured and organized in such a systematic way, including graphical illustrations, that any one interested in conducting leadership training can do so without difficulty. There are also variations and opportunities for reflection after each game, which is indeed necessary for any learning to take place. The authors of the book must be congratulated for their imaginative talent in creating such entertaining games that promote both social interaction and development of leadership skills at the same time."

Angeline Khoo

Associate Professor

Psychological Studies Academic Group,
National Institute of Education



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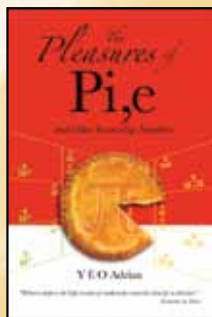
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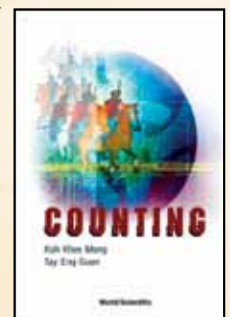
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