Challenging Problems In Geometry Dover Books On Mathematics

Well-conceived text with many special features covers functions and graphs, straight lines and conic sections, new coordinate systems, the derivative, much more. Many examples, exercises, practice problems, with answers. Advanced undergraduate/graduate-level. 1984 edition.
Exposition of fourth dimension, concepts of relativity as Flatland characters continue adventures. Topics include curved space time as a higher dimension, special relativity, and shape of space-time. Includes 141 illustrations.
Presents hundreds of extreme value problems, examples, and solutions primarily through Euclidean geometry Unified approach to the subject, with emphasis on geometric, algebraic, analytic, and combinatorial reasoning Applications to physics, engineering, and economics Ideal for use at the junior and senior undergraduate level, with wide appeal to students, teachers, professional mathematicians, and puzzle enthusiasts
Challenging Problems in GeometryCourier Corporation
Seven problem-solving techniques include inference, classification of action sequences, subgoals, contradiction, working backward, relations between problems, and mathematical representation. Also, problems from mathematics, science, and engineering with complete solutions.
"'Geometry by construction' challenges its readers to participate in the creation of mathematics. The questions span the spectrum from easy to newly published research and so are appropriate for a variety of students and teachers. From differentiation in a high school course through college classes and into summer research, any interested geometer

will find compelling material"--Back cover.

Based on Stanford University's well-known competitive exam, this excellent mathematics workbook offers students at both high school and college levels a complete set of problems, hints, and solutions. 1974 edition.

Problems that beset Archimedes, Newton, Euler, Cauchy, Gauss, Monge, Steiner, and other great mathematical minds. Features squaring the circle, pi, and similar problems. No advanced math is required. Includes 100 problems with proofs.

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.

Introduction to concepts of category theory — categories, functors, natural transformations, the Yoneda lemma, limits and colimits, adjunctions, monads — revisits a broad range of mathematical examples from the categorical perspective. 2016 edition.

Based on classical principles, this book is intended for a second course in Euclidean geometry and can be used as a refresher. Each chapter covers a different aspect of Euclidean geometry, lists relevant theorems and corollaries, and states and proves many propositions. Includes more than 200 problems, hints, and solutions. 1968 edition.

* Problem-solving tactics and practical test-taking techniques provide in-depth enrichment and preparation for various math competitions * Comprehensive introduction to trigonometric functions, their relations and functional properties, and their applications in the Euclidean plane and solid geometry * A cogent problem-solving resource for advanced high school students, undergraduates, and mathematics teachers engaged in competition training

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.

Elementary, yet authoritative and scholarly, this book offers

an excellent brief introduction to the classical theory of differential geometry. It is aimed at advanced undergraduate and graduate students who will find it not only highly readable but replete with illustrations carefully selected to help stimulate the student's visual understanding of geometry. The text features an abundance of problems, most of which are simple enough for class use, and often convey an interesting geometrical fact. A selection of more difficult problems has been included to challenge the ambitious student. Written by a noted mathematician and historian of mathematics, this volume presents the fundamental conceptions of the theory of curves and surfaces and applies them to a number of examples. Dr. Struik has enhanced the treatment with copious historical, biographical, and bibliographical references that place the theory in context and encourage the student to consult original sources and discover additional important ideas there. For this second edition, Professor Struik made some corrections and added an appendix with a sketch of the application of Cartan's method of Pfaffians to curve and surface theory. The result was to further increase the merit of this stimulating, thought-provoking text — ideal for classroom use, but also perfectly suited for self-study. In this attractive, inexpensive paperback edition, it belongs in the library of any mathematician or student of mathematics interested in differential geometry.

This classic text explores the geometry of the triangle and the circle, concentrating on extensions of Euclidean theory, and examining in detail many relatively recent theorems. 1929 edition.

This introductory volume offers strong reinforcement for its teachings, with detailed examples and numerous theorems, proofs, and exercises, plus complete answers to all odd-numbered end-of-chapter problems. 1970 edition.

Delve into the development of modern mathematics and

match wits with Euclid, Newton, Descartes, and others. Each chapter explores an individual type of challenge, with commentary and practice problems. Solutions.

Explains geometric theories and shows many examples.

An authorised reissue of the long out of print classic textbook, Advanced Calculus by the late Dr Lynn Loomis and Dr Shlomo Sternberg both of Harvard University has been a revered but hard to find textbook for the advanced calculus course for decades. This book is based on an honors course in advanced calculus that the authors gave in the 1960's. The foundational material, presented in the unstarred sections of Chapters 1 through 11, was normally covered, but different applications of this basic material were stressed from year to year, and the book therefore contains more material than was covered in any one year. It can accordingly be used (with omissions) as a text for a year's course in advanced calculus, or as a text for a three-semester introduction to analysis. The prerequisites are a good grounding in the calculus of one variable from a mathematically rigorous point of view, together with some acquaintance with linear algebra. The reader should be familiar with limit and continuity type arguments and have a certain amount of mathematical sophistication. As possible introductory texts, we mention Differential and Integral Calculus by R Courant, Calculus by T Apostol, Calculus by M Spivak, and Pure Mathematics by G Hardy. The reader should also have some experience with partial derivatives. In overall plan the book divides roughly into a first half which develops the calculus (principally the differential

calculus) in the setting of normed vector spaces, and a second half which deals with the calculus of differentiable manifolds.

Intended for first-year graduate courses in heat transfer, this volume includes topics relevant to chemical and nuclear engineering and aerospace engineering. The systematic and comprehensive treatment employs modern mathematical methods of solving problems in heat conduction and diffusion. Starting with precise coverage of heat flux as a vector, derivation of the conduction equations, integral-transform technique, and coordinate transformations, the text advances to problem characteristics peculiar to Cartesian, cylindrical, and spherical coordinates; application of Duhamel's method; solution of heat-conduction problems; and the integral method of solution of nonlinear conduction problems. Additional topics include useful transformations in the solution of nonlinear boundary value problems of heat conduction; numerical techniques such as the finite differences and the Monte Carlo method; and anisotropic solids in relation to resistivity and conductivity tensors. Illustrative examples and problems amplify the text, which is supplemented by helpful appendixes.

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.

This volume completes the English adaptation of a classical Russian textbook in elementary Euclidean geometry. The 1st volume subtitled "Book I. Planimetry" was published in 2006 (ISBN 0977985202). This 2nd volume (Book II. Stereometry) covers solid geometry, and contains a chapter on vectors, foundations, and introduction in non-Euclidean geometry added by the translator. The book intended for high-school and college students, and their teachers. Includes 317 exercises, index, and bibliography.

Both a challenge to mathematically inclined readers and a useful supplementary text for high school and college courses, One Hundred Problems in Elementary Mathematics presents an instructive, stimulating collection of problems. Many problems address such matters as numbers, equations, inequalities, points, polygons, circles, ellipses, space, polyhedra, and spheres. An equal number deal with more amusing or more practical subjects, such as a picnic ham, blood groups, rooks on a chessboard, and the doings of the ingenious Dr. Abracadabrus. Are the problems in this book really elementary? Perhaps not in the lay reader’s sense, for anyone who desires to solve these problems must know a fair amount of mathematics, up to calculus.

Nevertheless, Professor Steinhaus has given complete, detailed solutions to every one of his 100 problems, and anyone who works through the solutions will painlessly learn an astonishing amount of mathematics. A final chapter provides a true test for the most proficient readers: 13 additional unsolved problems, including some for which the author himself does not know the solutions.

Ideal for self-instruction as well as for classroom use, this text improves understanding and problem-solving skills in analysis, analytic geometry, and higher algebra. Over 1,200 problems, with hints and complete solutions. 1963 edition.

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.

Remarkable puzzlers, graded in difficulty, illustrate elementary and advanced aspects of probability. These problems were selected for originality, general interest, or because they demonstrate valuable techniques. Also includes detailed solutions.

Develops a simple non-Euclidean geometry and explores some of its practical applications through graphs, research problems, and exercises. Includes selected answers.

DIVExcellent undergraduate-level text offers coverage of real numbers, sets, metric spaces, limits, continuous functions, much more. Each chapter contains a problem set with hints and answers. 1973 edition. /div

The author presents a selection of pieces from his Scientific American "Mathematical Games" column, presenting puzzles and concepts that range from arithmetic and geometrical games to the meaning of M.C. Escher's artwork.

Among the many beautiful and nontrivial theorems in geometry found in Geometry Revisited are the

theorems of Ceva, Menelaus, Pappus, Desargues, Pascal, and Brianchon. A nice proof is given of Morley's remarkable theorem on angle trisectors. The transformational point of view is emphasized: reflections, rotations, translations, similarities, inversions, and affine and projective transformations. Many fascinating properties of circles, triangles, quadrilaterals, and conics are developed.

Created by NASA for high school students interested in space science, this collection of worked problems covers a broad range of subjects, including mathematical aspects of NASA missions, computation and measurement, algebra, geometry, probability and statistics, exponential and logarithmic functions, trigonometry, matrix algebra, conic sections, and calculus. In addition to enhancing mathematical knowledge and skills, these problems promote an appreciation of aerospace technology and offer valuable insights into the practical uses of secondary school mathematics by professional scientists and engineers. Geared toward high school students and teachers, this volume also serves as a fine review for undergraduate science and engineering majors. Numerous figures illuminate the text, and an appendix explores the advanced topic of gravitational forces and the conic section trajectories.

Introduction to vector algebra in the plane; circles and coaxial systems; mappings of the Euclidean

plane; similitudes, isometries, Moebius transformations, much more. Includes over 500 exercises.

What are the odds of finding two people who share the same birth date in a room of thirty-five? Most people would guess they're pretty low. In actuality, the probability is better than 80 percent.This is just one of many entertaining examples of mathematical curiosities presented in Mathematical Amazements and Surprises. If you've been waiting for a book that will evoke the delight and intrigue that mathematics has to offer, this is the book for you. Math educators Alfred S. Posamentier and Ingmar Lehmann have created the perfect introduction to the wonders of mathematics for the general reader, requiring only a high school background in the subject.Among the entertaining and useful tricks they teach are shortcuts in arithmetic, such as ways to determine at a glance the exact divisors of any given number. They also demonstrate how the properties of certain numbers can lead to infinite loops. What is particularly exciting is how many correct answers turn out to be counterintuitive. Exploring all these features will instill insights into the nature of numbers, improve your ability to manipulate them, and give you an appreciation for the inherent elegance of mathematics.Posamentier and Lehmann evoke the beauty of mathematics through the visual aspect of geometry. Enjoy with them the riches of

the esthetic and surprising properties to be found in triangles, quadrilaterals, and circles.As you marvel at the many unusual relationships and novelties revealed in this ingenious and delightful presentation, you'll be learning more math than you ever thought possible-and will be relishing every moment of it!Alfred S. Posamentier (New York, NY) is dean of the School of Education and professor of mathematics education at the City College of New York. He has published more than forty books in the area of mathematics and mathematics education, including The Fabulous Fibonacci Numbers, Pi: A Biography of the World's Most Mysterious Number, and Math Charmers: Tantalizing Tidbits for the Mind.Ingmar Lehmann (Berlin, Germany) is on the mathematics faculty at Humboldt University in Berlin and is the coauthor of The Fabulous Fibonacci Numbers and Pi: A Biography of the World's Most Mysterious Number.

Collection of nearly 200 unusual problems dealing with congruence and parallelism, the Pythagorean theorem, circles, area relationships, Ptolemy and the cyclic quadrilateral, collinearity and concurrency and more. Arranged in order of difficulty. Detailed solutions.

Volume I of a two-part series, this book features a broad spectrum of 100 challenging problems related to probability theory and combinatorial analysis. The problems, most of which can be solved with

elementary mathematics, range from relatively simple to extremely difficult. Suitable for students, teachers, and any lover of mathematics. Complete solutions.

"Problem-Solving and Selected Topics in Euclidean Geometry: in the Spirit of the Mathematical Olympiads" contains theorems which are of particular value for the solution of geometrical problems. Emphasis is given in the discussion of a variety of methods, which play a significant role for the solution of problems in Euclidean Geometry. Before the complete solution of every problem, a key idea is presented so that the reader will be able to provide the solution. Applications of the basic geometrical methods which include analysis, synthesis, construction and proof are given. Selected problems which have been given in mathematical olympiads or proposed in short lists in IMO's are discussed. In addition, a number of problems proposed by leading mathematicians in the subject are included here. The book also contains new problems with their solutions. The scope of the publication of the present book is to teach mathematical thinking through Geometry and to provide inspiration for both students and teachers to formulate "positive" conjectures and provide solutions.

Advanced Euclidean Geometry provides a thorough review of the essentials of high school geometry and

then expands those concepts to advanced Euclidean geometry, to give teachers more confidence in guiding student explorations and questions. The text contains hundreds of illustrations created in The Geometer's Sketchpad Dynamic Geometry® software. It is packaged with a CD-ROM containing over 100 interactive sketches using SketchpadTM (assumes that the user has access to the program).

Accessible but rigorous, this outstanding text encompasses all of the topics covered by a typical course in elementary abstract algebra. Its easy-to-read treatment offers an intuitive approach, featuring informal discussions followed by thematically arranged exercises. This second edition features additional exercises to improve student familiarity with applications. 1990 edition.

Over 300 unusual problems, ranging from easy to difficult, involving equations and inequalities, Diophantine equations, number theory, quadratic equations, logarithms, more. Detailed solutions, as well as brief answers, for all problems are provided.

The standard university-level text for decades, this volume offers exercises in construction problems, harmonic division, circle and triangle geometry, and other areas. 1952 edition, revised and enlarged by the author.

Rich selection of 100 practice problems — with hints and solutions — for students preparing for the William Lowell Putnam and other undergraduate-level

mathematical competitions. Features real numbers, differential equations, integrals, polynomials, sets, other topics. Hours of stimulating challenge for math buffs at varying degrees of proficiency. References.