

# Challenging Problems In Geometry Dover Books On Mathematics

Solving Mathematical Problems  
 Challenging Problems in Geometry  
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 100 Great Problems of Elementary Mathematics  
 Problems and Solutions in Euclidean Geometry  
 Challenging Problems in Algebra  
 How to Solve Problems  
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 Solving Problems in Geometry  
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 Problem-Solving and Selected Topics in Euclidean Geometry  
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## KAITLIN WHITEHEAD

*Solving Mathematical Problems* Courier Corporation  
 Induction in Geometry discusses the application of the method of mathematical induction to the solution of geometric problems, some of which are quite intricate. The book contains 37 examples with detailed solutions and 40 for which only brief hints are provided. Most of the material requires only a background in high school algebra and plane geometry; chapter six assumes some knowledge of solid geometry, and the text occasionally employs formulas from trigonometry. Chapters are self-contained, so readers may omit those for which they are unprepared. To provide additional background, this volume incorporates the concise text, *The Method of Mathematical Induction*. This approach introduces this technique of mathematical proof via many examples from algebra, geometry, and trigonometry, and in greater detail than standard texts. A background in high school algebra will largely suffice; later problems require some knowledge of trigonometry. The combination of solved problems within the text and those left for readers to work on, with solutions provided at the end, makes this volume especially practical for independent study.

**Challenging Problems in Geometry** Courier Corporation  
 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.

*The Moscow Puzzles* Courier Corporation  
 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.

**My Best Mathematical and Logic Puzzles** Courier Corporation  
 Volume II of a two-part series, this book features 74 problems from various branches of mathematics. Topics include points and lines, topology, convex polygons, theory of primes, and other subjects. Complete solutions.

**100 Great Problems of Elementary Mathematics** World Scientific Publishing Company  
 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.

*Problems and Solutions in Euclidean Geometry* Springer  
 Authored by a leading name in mathematics, this engaging and clearly presented text leads the reader through the tactics involved in solving mathematical problems at the Mathematical Olympiad level. With numerous exercises and assuming only basic mathematics, this text is ideal for students of 14 years and above in pure mathematics.

*Challenging Problems in Algebra* Courier Corporation  
 Features the classical themes of geometry with plentiful applications in mathematics, education, engineering, and science. Accessible and reader-friendly, *Classical Geometry: Euclidean, Transformational, Inversive, and Projective* introduces readers to a valuable discipline that is crucial to understanding both spatial relationships and logical reasoning. Focusing on the development of geometric intuition while avoiding the axiomatic method, a problem solving approach is encouraged throughout. The book is strategically divided into three sections: Part One focuses on Euclidean geometry, which provides the foundation for the rest of the material covered throughout; Part Two discusses Euclidean transformations of the plane, as well as groups and their use in studying transformations; and Part Three covers inversive and projective geometry as natural extensions of Euclidean geometry. In addition to featuring real-world applications throughout, *Classical Geometry: Euclidean, Transformational, Inversive, and Projective* includes: Multiple entertaining and elegant geometry problems at the end of each section for every level of study Fully worked examples with exercises to facilitate comprehension and

retention Unique topical coverage, such as the theorems of Ceva and Menelaus and their applications An approach that prepares readers for the art of logical reasoning, modeling, and proofs The book is an excellent textbook for courses in introductory geometry, elementary geometry, modern geometry, and history of mathematics at the undergraduate level for mathematics majors, as well as for engineering and secondary education majors. The book is also ideal for anyone who would like to learn the various applications of elementary geometry.

**How to Solve Problems** Taylor & Francis

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.

*Fifty Challenging Problems in Probability with Solutions* Courier Corporation

This best-of compilation features 101 of the most entertaining and challenging math puzzles ever published. No advanced knowledge of mathematics is necessary, just solid thinking and puzzle-solving skills. Includes complete solutions.

**Ingenious Mathematical Problems and Methods** Courier Corporation

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.

*About Vectors* Courier Corporation

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.

*Space Mathematics* Courier Corporation

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.

**A Book of Abstract Algebra** W.H. Freeman

Concise undergraduate-level text by a prominent mathematician explores the relationship between algebra and geometry. An elementary course in plane geometry is the sole requirement. Includes answers to exercises. 1962 edition.

**The VSEPR Model of Molecular Geometry** Courier Corporation

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.

**An Introduction to Differential Geometry** Courier Corporation

An introductory textbook on the differential geometry of curves and surfaces in 3-dimensional Euclidean space, presented in its simplest, most essential form. With problems and solutions. Includes 99 illustrations.

**Vector Geometry** Tabletop Academy Press

A collection of math and logic puzzles features number games, magic squares, tricks, problems with dominoes and dice, and cross sums, in addition to other intellectual teasers.

**Induction in Geometry** Springer Science & Business Media

Praised for its "exceptionally good value" by the Journal of Recreational Mathematics, this book offers fun-filled insights into many fields of mathematics. The brainteasers include original puzzles as well as new approaches to classic conundrums. A vast assortment of challenges features domino puzzles, the game of noughts and crosses, games of encirclement, sliding movement puzzles, subtraction games, puzzles in mechanics, games with piles of matches, a road puzzle with concentric circles, "Catch the Giant," and much more. Detailed solutions show several methods by which a particular problem may be answered, why one method is preferable, and where the others fail. With numerous worked examples, the clear, step-by-step analyses cover how the problem should be approached, including hints and enumeration of possibilities and determination of probabilities, application of the theory of probability, and evaluation of contingencies and mean values. Readers are certain to improve their puzzle-solving strategies as well as their mathematical skills.

**Category Theory in Context** Courier Corporation

The noted expert selects 70 of his favorite "short" puzzles, including such mind-bogglers as The Returning Explorer, The Mutilated Chessboard, Scrambled Box Tops, and dozens more involving logic and basic math. Solutions included.

**Geometric Problems on Maxima and Minima** Courier Corporation

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.

**Advanced Euclidean Geometry** Courier Corporation

This book takes the reader on a journey through the world of college mathematics, focusing on some of the most important

concepts and results in the theories of polynomials, linear algebra, real analysis, differential equations, coordinate geometry, trigonometry, elementary number theory, combinatorics, and probability. Preliminary material provides an overview of common methods of proof: argument by contradiction, mathematical induction, pigeonhole principle, ordered sets, and invariants. Each chapter systematically presents a single subject within which problems are clustered in each section according to the specific topic. The exposition is driven by nearly 1300 problems and examples chosen from numerous sources from around the world; many original contributions come from the authors. The source, author, and historical background are cited whenever possible. Complete solutions to all problems are given at the end of the book. This second edition includes new sections on quadratic polynomials, curves in the plane, quadratic fields, combinatorics of numbers, and graph theory, and added problems or theoretical expansion of sections on polynomials, matrices, abstract algebra, limits of sequences and functions, derivatives and their applications, Stokes' theorem, analytical geometry, combinatorial geometry, and counting strategies. Using the W.L. Putnam Mathematical Competition for undergraduates as an inspiring symbol to build an appropriate math background for graduate studies in pure or applied mathematics, the reader is eased into transitioning from problem-solving at the high school level to the university and beyond, that is, to mathematical research. This work may be used as a study guide for the Putnam exam, as a text for many different problem-solving courses, and as a source of problems for standard courses in undergraduate mathematics. Putnam and Beyond is organized for independent study by undergraduate and graduate students, as well as teachers and researchers in the physical sciences who wish to expand their mathematical horizons.