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Collection of 100 of the best submissions to a math puzzle column features problems in engineering situations, logic, number theory, and geometry. Most solutions include details of several different methods. 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

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and practice problems.

Solutions.

The primary aim of this book is to provide teachers of mathematics with all the tools they would need to conduct most effective mathematics instruction. The book guides teachers through the all-important planning process, which includes short and long-term planning as well as constructing most effective lessons, with an emphasis on motivation, classroom management, emphasizing problem-solving techniques, assessment, enriching instruction for students at all

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levels, and introducing relevant extracurricular mathematics activities.

Technology applications are woven throughout the text. A unique feature of this book is the second half, which provides 125 highly motivating enrichment units for all levels of secondary school mathematics. Many years of proven success makes this book essential for both pre-service and in-service mathematics teachers.

Can you solve the problem of "The Unfair Subway"? Marvin gets off work at random times between 3 and 5 p.m. His

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mother lives uptown, his girlfriend downtown. He takes the first subway that comes in either direction and eats dinner with the one he is delivered to. His mother complains that he never comes to see her, but he says she has a 50-50 chance. He has had dinner with her twice in the last 20 working days. Explain. Marvin's adventures in probability are one of the fifty intriguing puzzles that illustrate both elementary and advanced aspects of probability, each problem designed to challenge the mathematically inclined. From

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"The Flippant Juror" and "The Prisoner's Dilemma" to "The Cliffhanger" and "The Clumsy Chemist," they provide an ideal supplement for all who enjoy the stimulating fun of mathematics. Professor Frederick Mosteller, who teaches statistics at Harvard University, has chosen the problems for originality, general interest, or because they demonstrate valuable techniques. In addition, the problems are graded as to difficulty and many have considerable stature. Indeed, one has "enlivened the research lives of many

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excellent mathematicians."

Detailed solutions are included. There is every probability you'll need at least a few of them.

Teaching Secondary School Mathematics: Techniques And Enrichment

Second Edition

In the Spirit of the

Mathematical Olympiads

The USSR Olympiad Problem Book

Euclidean Geometry in

Mathematical Olympiads

Induction in Geometry

***Accessible but rigorous,
this outstanding text
encompasses all of the***

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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. "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.

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

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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. Volume II of a two-part series, this book features 74 problems from various branches of mathematics.

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Topics include points and lines, topology, convex polygons, theory of primes, and other subjects.

Complete solutions.

**Solving Problems in
Geometry**

**Problem Solving Through
Recreational Mathematics**

**The Stanford Mathematics
Problem Book**

**Challenging Mathematical
Problems with Elementary
Solutions**

**With "Mistakes in
Geometric Proofs"**

**Challenging Problems in
Geometry**

Based on Stanford University's well-known competitive exam, this excellent

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mathematics workbook offers students at both high school and college levels a complete set of problems, hints, and solutions. 1974 edition.

A detailed description of what the fourth dimension would be like.

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

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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. This single-volume compilation of 2 books explores the construction of geometric proofs. It offers useful criteria for determining correctness and presents examples of faulty proofs that illustrate common errors. 1963 editions. Lectures on Classical Differential Geometry

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The Equations World

Challenging Problems in Algebra

The context of natural forest
management and FSC certification in
Brazil

Advanced Calculus

Excursions in Geometry

*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*

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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

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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

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setting of normed vector spaces, and a second half which deals with the calculus of differentiable manifolds. Over 300 challenging problems in algebra, arithmetic, elementary number theory and trigonometry, selected from Mathematical Olympiads held at Moscow University. Only high school math needed. Includes complete solutions. Features 27 black-and-white illustrations. 1962 edition. Created by NASA for high school students interested in space science, this collection of worked problems covers a broad range of subjects,

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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

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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. "This accessible approach to set theory for upper-level undergraduates poses rigorous but simple arguments. Each definition is accompanied by commentary that motivates and explains new concepts. A historical introduction is followed by discussions of classes and sets, functions, natural and cardinal numbers,

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the arithmetic of ordinal numbers, and related topics. 1971 edition with new material by the author"--

Insights and Strategies

Introduction to Graph Theory

A Book of Set Theory

Challenging Math Problems

Fifty Challenging Problems in

Probability with Solutions

*Entertaining Mathematical
Puzzles*

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

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Variables provides a conceptual treatment of multivariable calculus. This book emphasizes the interplay of geometry, analysis through linear algebra, and approximation of nonlinear mappings by linear ones. The classical applications and computational methods that are responsible for much of the interest and importance of calculus are also considered. This text is organized into six chapters. Chapter I deals with linear algebra and geometry of Euclidean n -space R^n . The multivariable differential calculus is treated in Chapters II and III, while multivariable integral calculus is covered in Chapters IV and V. The last chapter is devoted to venerable problems of the calculus of variations. This publication is intended for students who have completed a

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standard introductory calculus sequence.

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.

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.

College Geometry
Math Problems Based on Space
Science

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Linear Algebra

The Geometry of René Descartes

Category Theory in Context

Problems and Solutions in Euclidean
Geometry

*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.
Equations are the
lifblood of*

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mathematics, science,
and technology, and this
book examines equations
of all kinds. With his
masterful ability to
convey the excitement
and elegance of
mathematics, author
Boris Pritsker explores
equations from the
simplest to the most
complex—their history,
their charm, and their
usefulness in solving
problems. The Equations
World bridges the fields
of algebra, geometry,
number theory, and
trigonometry, solving

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more than 280 problems by employing a wide spectrum of techniques. The author demystifies the subject with efficient hints, tricks, and methods that reveal the fun and satisfaction of problem solving. He also demonstrates how equations can serve as important tools for expressing a problem's data, showing the ways in which they assist in fitting parts together to solve the whole puzzle. In addition, brief historical tours

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reveal the foundations of mathematical thought by tracing the ideas and approaches developed by mathematicians over the centuries. Both recreational mathematicians and ambitious students will find this book an ample source of enlightenment and enjoyment.

Collection of nearly 200 unusual problems dealing with congruence and parallelism, the Pythagorean theorem, circles, area relationships, Ptolemy

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*and the cyclic
quadrilateral,
collinearity and
concurrency and more.
Arranged in order of
difficulty. Detailed
solutions.*

*Aimed at "the
mathematically
traumatized," this text
offers nontechnical
coverage of graph
theory, with exercises.
Discusses planar graphs,
Euler's formula,
Platonic graphs,
coloring, the genus of a
graph, Euler walks,
Hamilton walks, more.*

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1976 edition.

The Fourth Dimension
Introductory Discrete
Mathematics
Ingenious Mathematical
Problems and Methods
Advanced Calculus of
Several Variables
Mathematics for the
Nonmathematician
A Book of Abstract
Algebra

Challenging Problems in
Geometry Courier Corporation
This concise, undergraduate-level
text focuses on combinatorics,
graph theory with applications to
some standard network
optimization problems, and

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algorithms. More than 200 exercises, many with complete solutions. 1991 edition.

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.

Fascinating approach to mathematical teaching stresses use of recreational problems, puzzles, and games to teach critical thinking. Logic, number and graph theory, games of strategy, much more. Includes answers to selected problems. Free solutions manual available for download at the Dover website.

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An Introduction to the Modern
Geometry of the Triangle and the
Circle

Revised

Putnam and Beyond

A Guided Tour of the Higher
Universes

Space Mathematics

Advanced Euclidean Geometry

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,

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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

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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.

A straightedge, compass, and a little thought are all that's needed to discover the intellectual excitement of geometry. Harmonic division and Apollonian circles, inversive geometry, hexlet, Golden Section, more. 132 illustrations.

Written as a supplement to Marcel Berger's popular two-volume set, *Geometry I and II* (Universitext), this book offers a comprehensive range of exercises, problems, and full

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solutions. Each chapter corresponds directly to one in the relevant volume, from which it also provides a summary of key ideas. Where the original Geometry volumes tend toward challenging problems without hints, this book offers a wide range of material that begins at an accessible level, and includes suggestions for nearly every problem. Bountiful in illustrations and complete in its coverage of topics from affine and projective spaces, to spheres and conics, Problems in Geometry is a valuable addition to studies in geometry at many levels.

Problems that beset Archimedes, Newton, Euler, Cauchy, Gauss, Monge, Steiner, and other great mathematical minds. Features squaring the circle, π , and similar problems. No advanced math is

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required. Includes 100 problems with proofs.

Proof in Geometry

The Green Book of Mathematical Problems

Problem-Solving and Selected Topics in Euclidean Geometry

Problems in Geometry

100 Great Problems of Elementary Mathematics

Management decisions on appropriate practices and policies regarding tropical forests often need to be made in spite of innumerable uncertainties and complexities. Among the uncertainties are the lack of formalization of lessons learned regarding the impacts of previous programs and projects. Beyond the challenges of generating the proper information on these impacts, there are other difficulties that relate with

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how to socialize the information and knowledge gained so that change is transformational and enduring. The main complexities lie in understanding the interactions of social-ecological systems at different scales and how they varied through time in response to policy and other processes. This volume is part of a broad research effort to develop an independent evaluation of certification impacts with stakeholder input, which focuses on FSC certification of natural tropical forests. More specifically, the evaluation program aims at building the evidence base of the empirical biophysical, social, economic, and policy effects that FSC certification of natural forest has had in Brazil as well as in other tropical countries. The contents of this volume highlight the opportunities and constraints that

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those responsible for managing natural forests for timber production have experienced in their efforts to improve their practices in Brazil. As such, the goal of the studies in this volume is to serve as the foundation to design an impact evaluation framework of the impacts of FSC certification of natural forests in a participatory manner with interested parties, from institutions and organizations, to communities and individuals.

"Fun and highly formidable math problems and puzzles from noted puzzle creator Terry Stickels." — Window on Resources Two friends wish to meet for breakfast twice a month throughout the year. In how many ways can they choose those two days so that they never meet on consecutive days? You want to

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measure 30 seconds and you have two pieces of string, each of which burns for 40 seconds. How can you accomplish this without bending, folding, or cutting the strings? A positive whole number is divisible by 3 and also by 5. When the number is divided by 7, the remainder is 5. What is the smallest number that could work? These are but a few of this book's assembly of the most challenging puzzles imaginable ? and they require no background in higher math, just good thinking skills. Terry Stickels, a well-known puzzle-maker, has compiled 101 of some of the best and most entertaining problems ever published. All of the challenges, which range from probability puzzles to dice games, have two things in common: each offers the "Aha!" moment of discovery that puzzle-solvers love, and

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they're all fun. Complete solutions for all puzzles explain every detail.

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.

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

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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

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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

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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.

Selected Problems and Theorems of
Elementary Mathematics

Famous Problems of Geometry and
How to Solve Them

With Hints and Solutions

Covers determinants, linear spaces, systems of linear equations, linear functions of a vector argument, coordinate transformations, the canonical form of the matrix of a linear operator, bilinear and quadratic forms, Euclidean spaces, unitary spaces, quadratic forms in Euclidean and unitary spaces, finite-dimensional space.

Problems with hints and answers.

Erudite and entertaining overview

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follows development of mathematics from ancient Greeks to present. Topics include logic and mathematics, the fundamental concept, differential calculus, probability theory, much more. Exercises and problems.

Playing with mathematical riddles can be an intriguing and fun-filled pastime — as popular science writer Martin Gardner proves in this entertaining collection.

Puzzlists need only an elementary knowledge of math and a will to resist looking up the answer before trying to solve a problem. Written in a light and witty style, *Entertaining Mathematical Puzzles* is a mixture of old and new riddles, grouped into sections that cover a variety of mathematical topics: money, speed, plane and solid geometry, probability, topology, tricky puzzles, and more. The probability section, for example, points out that everything we

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do, everything that happens around us, obeys the laws of probability; geometry puzzles test our ability to think pictorially and often, in more than one dimension; while topology, among the "youngest and rowdiest branches of modern geometry," offers a glimpse into a strange dimension where properties remain unchanged, no matter how a figure is twisted, stretched, or compressed. Clear and concise comments at the beginning of each section explain the nature and importance of the math needed to solve each puzzle. A carefully explained solution follows each problem. In many cases, all that is needed to solve a puzzle is the ability to think logically and clearly, to be "on the alert for surprising, off-beat angles...that strange hidden factor that everyone else had overlooked." Fully illustrated, this engaging collection will appeal to parents

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and children, amateur mathematicians, scientists, and students alike, and may, as the author writes, make the reader "want to study the subject in earnest" and explains "some of the inviting paths that wind away from the problems into lusher areas of the mathematical jungle." 65 black-and-white illustrations.