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The Art and Craft of Problem Solving Wiley Global Education Appealing to everyone from college-level majors to independent learners, *The Art and Craft of Problem Solving*, 3rd Edition introduces a problem-solving approach to mathematics, as opposed to the traditional exercises approach. The goal of *The Art and Craft of Problem Solving* is to develop strong problem solving skills, which it achieves by encouraging students to do math rather than just study it. Paul Zeitz draws upon his experience as a coach for the international mathematics Olympiad to give students an enhanced sense of mathematics and the ability to investigate and solve problems. **Problem-Solving Through Problems** Springer Science & Business Media This is a practical anthology of some of the best elementary problems in different branches of mathematics. Arranged by subject, the problems highlight the most common problem-solving techniques encountered in undergraduate mathematics. This book teaches the important principles and broad strategies for coping with the experience of solving problems. It has been found very helpful for students preparing for the Putnam exam. **Problem-Solving Strategies** Springer Science & Business Media A unique collection of competition problems from over twenty major national and international mathematical competitions for high school students. Written for trainers and participants of contests of all levels up to the highest level, this will appeal to high school teachers conducting a mathematics club who need a range of simple to complex problems and to those instructors wishing to pose a "problem of the week", thus bringing a creative atmosphere into the classrooms. Equally, this is a must-have for individuals interested in solving difficult and challenging problems. Each chapter starts with typical examples illustrating the central concepts and is followed by a number of carefully selected problems and their solutions. Most of the solutions are complete, but some merely point to the road leading to the final solution. In addition to being a valuable resource of mathematical problems and solution strategies, this is the most complete training book on the market. **Art and Craft of Mathematical Problem Solving** Presents 24 lectures (each about 30 minutes long) by Paul Zeitz, Professor of Mathematics at the University of San Francisco and author of *The art and craft of problem solving*. **Solving Mathematical Problems A Personal Perspective** OUP Oxford 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. **Mathematical Olympiad Challenges** Springer Science & Business Media A collection of problems put together by coaches of the U.S. International Mathematical Olympiad Team. **Street-Fighting Mathematics The Art of Educated Guessing and Opportunistic Problem Solving** MIT Press An antidote to mathematical rigor mortis, teaching how to guess answers without needing a proof or an exact calculation. In problem solving, as in street fighting, rules are for fools: do whatever works—don't just stand there! Yet we often fear an unjustified leap even though it may land us on a correct result. Traditional mathematics teaching is largely about solving exactly stated problems exactly, yet life often hands us partly defined problems needing only moderately accurate solutions. This engaging book is an antidote to the rigor mortis brought on by too much mathematical rigor, teaching us how to guess answers without needing a proof or an exact calculation. In *Street-Fighting Mathematics*, Sanjoy Mahajan builds, sharpens, and demonstrates tools for educated guessing and down-and-dirty, opportunistic problem solving across diverse fields of knowledge—from mathematics to management. Mahajan describes six tools: dimensional analysis, easy cases, lumping, picture proofs, successive approximation, and reasoning by analogy. Illustrating each tool with numerous examples, he carefully separates the tool—the general principle—from the particular application so that the reader can most easily grasp the tool itself to use on problems of particular interest. *Street-Fighting Mathematics* grew out of a short course taught by the author at MIT for students ranging from first-year undergraduates to graduate students ready for careers in physics, mathematics, management, electrical engineering, computer science, and biology. They benefited from an approach that avoided rigor and taught them how to use mathematics to solve real problems. *Street-Fighting Mathematics* will appear in print and online under a Creative Commons Noncommercial Share Alike license. **Discovering Mathematics The Art of Investigation** Courier Corporation The term "mathematics" usually suggests an array of familiar problems with solutions derived from well-known techniques. *Discovering Mathematics: The Art of Investigation* takes a different approach, exploring how new ideas and chance observations can be pursued, and focusing on how the process invariably leads to interesting questions that would never have otherwise arisen. With puzzles involving coins, postage stamps, and other commonplace items, students are challenged to account for the simple explanations behind perplexing mathematical phenomena. Elementary methods and solutions allow readers to concentrate on the way in which the material is explored, as well as on strategies for answers that aren't immediately obvious. The problems don't require the kind of sophistication that would put them out of reach of ordinary students, but they're sufficiently complex to capture the essential features of mathematical discovery. Complete solutions appear at the end. **The Magic of Math Solving for x and Figuring Out Why** Basic Books The world's greatest mental mathematical magician takes us on a spellbinding journey through the wonders of numbers (and more) "Arthur Benjamin . . . joyfully shows you how to make nature's numbers dance." -- Bill Nye (the science guy) *The Magic of Math* is the math book you wish you had in school. Using a delightful assortment of examples—from ice-cream scoops and poker hands to measuring mountains and making magic squares—this book revels in key mathematical fields including arithmetic, algebra, geometry, and calculus, plus Fibonacci numbers, infinity, and, of course, mathematical magic tricks. Known throughout the world as the "mathemagician," Arthur Benjamin mixes mathematics and magic to make the subject fun, attractive, and easy to understand for math fan and math-phobic alike. "A positively joyful exploration of mathematics." -- Publishers Weekly, starred review "Each [trick] is more dazzling than the last." -- Physics World **Techniques of Problem Solving** American Mathematical Soc. The purpose of this book is to teach the basic principles of problem solving, including both mathematical and nonmathematical problems. This book will help students to ... translate verbal discussions into analytical data. learn problem-solving methods for attacking collections of analytical questions or data. build a personal arsenal of internalized problem-solving techniques and solutions. become ``armed problem solvers'', ready to do battle with a variety of puzzles in different areas of life. Taking a direct and practical approach to the subject matter, Krantz's book stands apart from others like it in that it incorporates exercises throughout the text. After many solved problems are given, a ``Challenge Problem" is presented. Additional problems are included for readers to tackle at the end of each chapter. There are more than 350 problems in all. This book won the CHOICE Outstanding Academic Book Award for 1997. A Solutions Manual to most end-of-chapter exercises is available. **Euclidean Geometry in Mathematical Olympiads** American Mathematical Soc. 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. **Problem Solving 101 A Simple Book for Smart People** Penguin The fun and simple problem-solving guide that took Japan by storm Ken Watanabe originally wrote *Problem Solving 101* for Japanese schoolchildren. His goal was to help shift the focus in Japanese education from memorization to critical thinking, by adapting some of the techniques he had learned as an elite McKinsey consultant. He was amazed to discover that adults were hungry for his fun and easy guide to problem solving and decision making. The book became a surprise Japanese bestseller, with more than 370,000 in print after six months. Now American businesspeople can also use it to master some powerful skills. Watanabe uses sample scenarios to illustrate his techniques, which include logic trees and matrixes. A rock band figures out how to drive up concert attendance. An aspiring animator budgets for a new computer purchase. Students decide which high school they will attend. Illustrated with diagrams and quirky drawings, the book is simple enough for a middle-schooler to understand but sophisticated enough for business leaders to apply to their most challenging problems. **The Art of Problem Solving, Volume 1 The Basics** Aops Incorporated "...offer[s] a challenging exploration of problem solving mathematics and preparation for programs such as MATHCOUNTS and the American Mathematics Competition."--Back cover **The William Lowell Putnam Mathematical Competition Problems and Solutions 1965-1984** Cambridge University Press The Putnam Competition has since 1928 been providing a challenge to gifted college mathematics students. This book, the second of the Putnam Competition volumes, contains problems with their solutions for the years 1965-1984. Additional solutions are presented for many of the problems. Included is an essay on recollections of the first Putnam Exam by Herbert Robbins, as well as appendices listing the winning teams and students from 1965 through 1984. This volume offers the problem solver an enticing sample of challenging problems and their solutions. In 1980, the MAA published the first William Lowell Putnam Mathematical Competition book, covering the contest from 1938 to 1964. In 2002 the third of the Putnam problem books appeared, covering the years 1985 through 2000. All three of these books belong on the bookshelf of students, teachers, and all interested in problem solving. **Educative JEE Mathematics** Universities Press **An Invitation to Abstract Mathematics** Springer Nature This undergraduate textbook promotes an active transition to higher mathematics. Problem solving is the heart and soul of this book: each problem is carefully chosen to demonstrate, elucidate, or extend a concept. More than 300 exercises engage the reader in extensive arguments and creative approaches, while exploring connections between fundamental mathematical topics. Divided into four parts, this book begins with a playful exploration of the building blocks of mathematics, such as definitions, axioms, and proofs. A study of the fundamental concepts of logic, sets, and functions follows, before focus turns to methods of proof. Having covered the core of a transition course, the author goes on to present a selection of advanced topics that offer opportunities for extension or further study. Throughout, appendices touch on historical perspectives, current trends, and open questions, showing mathematics as a vibrant and dynamic human enterprise. This second edition has been reorganized to better reflect the layout and curriculum of standard transition courses. It also features recent developments and improved appendices. An Invitation to Abstract Mathematics is ideal for those seeking a challenging and engaging transition to advanced mathematics, and will appeal to both undergraduates majoring in mathematics, as well as non-math majors interested in exploring higher-level concepts. From reviews of the first edition: Bajnok's new book truly invites students to enjoy the beauty, power, and challenge of abstract mathematics. The book can be used as a text for traditional transition or structure courses ... but since Bajnok invites all students, not just mathematics majors, to enjoy the subject, he assumes very little background knowledge. Jill Dietz, MAA Reviews The style of writing is careful, but joyously enthusiastic.... The author's clear attitude is that mathematics consists of problem solving, and that writing a proof falls into this category. Students of mathematics are, therefore, engaged in problem solving, and should be given problems to solve, rather than problems to imitate. The author attributes this approach to his Hungarian background ... and encourages students to embrace the challenge in the same way an athlete engages in vigorous practice. John Perry, zbMATH **Algorithmic Problem Solving** John Wiley & Sons An entertaining and captivating way to learn the fundamentals of using algorithms to solve problems The algorithmic

approach to solving problems in computer technology is an essential tool. With this unique book, algorithm guru Roland Backhouse shares his four decades of experience to teach the fundamental principles of using algorithms to solve problems. Using fun and well-known puzzles to gradually introduce different aspects of algorithms in mathematics and computing. Backhouse presents you with a readable, entertaining, and energetic book that will motivate and challenge you to open your mind to the algorithmic nature of problem solving. Provides a novel approach to the mathematics of problem solving focusing on the algorithmic nature of problem solving Uses popular and entertaining puzzles to teach you different aspects of using algorithms to solve mathematical and computing challenges Features a theory section that supports each of the puzzles presented throughout the book Assumes only an elementary understanding of mathematics Let Roland Backhouse and his four decades of experience show you how you can solve challenging problems with algorithms! **Putnam and Beyond** Springer 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. **Challenge and Thrill of Pre-College Mathematics** New Age International Challenge And Thrill Of Pre-College Mathematics Is An Unusual Enrichment Text For Mathematics Of Classes 9, 10, 11 And 12 For Use By Students And Teachers Who Are Not Content With The Average Level That Routine Text Dare Not Transcend In View Of Their Mass Clientele. It Covers Geometry, Algebra And Trigonometry Plus A Little Of Combinatorics. Number Theory And Probability. It Is Written Specifically For The Top Half Whose Ambition Is To Excel And Rise To The Peak Without Finding The Journey A Forced Uphill Task. The Undercurrent Of The Book Is To Motivate The Student To Enjoy The Pleasures Of A Mathematical Pursuit And Of Problem Solving. More Than 300 Worked Out Problems (Several Of Them From National And International Olympiads) Share With The Student The Strategy, The Excitement, Motivation, Modeling, Manipulation, Abstraction, Notation And Ingenuity That Together Make Mathematics. This Would Be The Starting Point For The Student, Of A Life-Long Friendship With A Sound Mathematical Way Of Thinking. There Are Two Reasons Why The Book Should Be In The Hands Of Every School Or College Student, (Whether He Belongs To A Mathematics Stream Or Not) One, If He Likes Mathematics And, Two, If He Does Not Like Mathematics- The Former, So That The Cramped Robot-Type Treatment In The Classroom Does Not Make Him Into The Latter; And The Latter So That By The Time He Is Halfway Through The Book, He Will Invite Himself Into The Former. **A Guide to Physics Problems Part 1: Mechanics, Relativity, and Electrodynamics** Springer Science & Business Media In order to equip hopeful graduate students with the knowledge necessary to pass the qualifying examination, the authors have assembled and solved standard and original problems from major American universities - Boston University, University of Chicago, University of Colorado at Boulder, Columbia, University of Maryland, University of Michigan, Michigan State, Michigan Tech, MIT, Princeton, Rutgers, Stanford, Stony Brook, University of Wisconsin at Madison - and Moscow Institute of Physics and Technology. A wide range of material is covered and comparisons are made between similar problems of different schools to provide the student with enough information to feel comfortable and confident at the exam. Guide to Physics Problems is published in two volumes: this book, Part 1, covers Mechanics, Relativity and Electrodynamics; Part 2 covers Thermodynamics, Statistical Mechanics and Quantum Mechanics. Praise for A Guide to Physics Problems: Part 1: Mechanics, Relativity, and Electrodynamics: "Sidney Cahn and Boris Nadgorny have energetically collected and presented solutions to about 140 problems from the exams at many universities in the United States and one university in Russia, the Moscow Institute of Physics and Technology. Some of the problems are quite easy, others are quite tough; some are routine, others ingenious." (From the Foreword by C. N. Yang, Nobelist in Physics, 1957) "Generations of graduate students will be grateful for its existence as they prepare for this major hurdle in their careers." (R. Shankar, Yale University) "The publication of the volume should be of great help to future candidates who must pass this type of exam." (J. Robert Schrieffer, Nobelist in Physics, 1972) "I was positively impressed ... The book will be useful to students who are studying for their examinations and to faculty who are searching for appropriate problems." (M. L. Cohen, University of California at Berkeley) "If a student understands how to solve these problems, they have gone a long way toward mastering the subject matter." (Martin Olsson, University of Wisconsin at Madison) "This book will become a necessary study guide for graduate students while they prepare for their Ph.D. examination. It will become equally useful for the faculty who write the questions." (G. D. Mahan, University of Tennessee at Knoxville) **How to Count An Introduction to Combinatorics, Second Edition** CRC Press Emphasizes a Problem Solving Approach A first course in combinatorics Completely revised. How to Count: An Introduction to Combinatorics, Second Edition shows how to solve numerous classic and other interesting combinatorial problems. The authors take an easily accessible approach that introduces problems before leading into the theory involved. Although the authors present most of the topics through concrete problems, they also emphasize the importance of proofs in mathematics. New to the Second Edition This second edition incorporates 50 percent more material. It includes seven new chapters that cover occupancy problems, Stirling and Catalan numbers, graph theory, trees, Dirichlet's pigeonhole principle, Ramsey theory, and rook polynomials. This edition also contains more than 450 exercises. Ideal for both classroom teaching and self-study, this text requires only a modest amount of mathematical background. In an engaging way, it covers many combinatorial tools, such as the inclusion-exclusion principle, generating functions, recurrence relations, and Pólya's counting theorem. **The Art of Problem Solving Craft of Hard Problem by Analyse (4th Edition)** The wound is the place where the Light enters you **A Primer for Mathematics Competitions** OUP Oxford The importance of mathematics competitions has been widely recognised for three reasons: they help to develop imaginative capacity and thinking skills whose value far transcends mathematics; they constitute the most effective way of discovering and nurturing mathematical talent; and they provide a means to combat the prevalent false image of mathematics held by high school students, as either a fearsomely difficult or a dull and uncreative subject. This book provides a comprehensive training resource for competitions from local and provincial to national Olympiad level, containing hundreds of diagrams, and graced by many light-hearted cartoons. It features a large collection of what mathematicians call "beautiful" problems - non-routine, provocative, fascinating, and challenging problems, often with elegant solutions. It features careful, systematic exposition of a selection of the most important topics encountered in mathematics competitions, assuming little prior knowledge. Geometry, trigonometry, mathematical induction, inequalities, Diophantine equations, number theory, sequences and series, the binomial theorem, and combinatorics - are all developed in a gentle but lively manner, liberally illustrated with examples, and consistently motivated by attractive "appetiser" problems, whose solution appears after the relevant theory has been expounded. Each chapter is presented as a "toolchest" of instruments designed for cracking the problems collected at the end of the chapter. Other topics, such as algebra, co-ordinate geometry, functional equations and probability, are introduced and elucidated in the posing and solving of the large collection of miscellaneous problems in the final toolchest. An unusual feature of this book is the attention paid throughout to the history of mathematics - the origins of the ideas, the terminology and some of the problems, and the celebration of mathematics as a multicultural, cooperative human achievement. As a bonus the aspiring "mathlete" may encounter, in the most enjoyable way possible, many of the topics that form the core of the standard school curriculum. **The Art of Problem Solving, Volume 2 And Beyond Solutions Manual** Aops Incorporated "...offer[s] a challenging exploration of problem solving mathematics and preparation for programs such as MATHCOUNTS and the American Mathematics Competition."--Back cover **Proofs and Refutations The Logic of Mathematical Discovery** Cambridge University Press Imre Lakatos's Proofs and Refutations is an enduring classic, which has never lost its relevance. Taking the form of a dialogue between a teacher and some students, the book considers various solutions to mathematical problems and, in the process, raises important questions about the nature of mathematical discovery and methodology. Lakatos shows that mathematics grows through a process of improvement by attempts at proofs and critiques of these attempts, and his work continues to inspire mathematicians and philosophers aspiring to develop a philosophy of mathematics that accounts for both the static and the dynamic complexity of mathematical practice. With a specially commissioned Preface written by Paolo Mancosu, this book has been revived for a new generation of readers. **Polynomials** Springer Science & Business Media The book extends the high school curriculum and provides a backdrop for later study in calculus, modern algebra, numerical analysis, and complex variable theory. Exercises introduce many techniques and topics in the theory of equations, such as evolution and factorization of polynomials, solution of equations, interpolation, approximation, and congruences. The theory is not treated formally, but rather illustrated through examples. Over 300 problems drawn from journals, contests, and examinations test understanding, ingenuity, and skill. Each chapter ends with a list of hints; there are answers to many of the exercises and solutions to all of the problems. In addition, 69 "explorations" invite the reader to investigate research problems and related topics. **The Cauchy-Schwarz Master Class An Introduction to the Art of Mathematical Inequalities** Cambridge University Press This 2004 book presents a fascinating collection of problems related to the Cauchy-Schwarz inequality and coaches readers through solutions. **Problems from the Book** Amer Mathematical Society **Mathematical Circles (Russian Experience)** American Mathematical Soc. What kind of book is this? It is a book produced by a remarkable cultural circumstance in the former Soviet Union which fostered the creation of groups of students, teachers, and mathematicians called "mathematical circles". The work is predicated on the idea that studying mathematics can generate the same enthusiasm as playing a team sport - without necessarily being competitive. This book is intended for both students and teachers who love mathematics and want to study its various branches beyond the limits of school curriculum. **How to Solve Mathematical Problems** Courier 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. **Problem Solving** Infobase Publishing Praise for the previous edition: "The advice is sound and the interactive style will appeal to teens...solid and engaging..."—School Library Journal Developing and understanding different methods of tackling problems is an essential career skill. Problem Solving, Third Edition teaches readers how to become a problem solver, a valuable and highly sought person in today's complicated workforce. This new edition illustrates the difference between scientific and creative problem-solving techniques and outlines a five-step approach to dealing with dilemmas that students can apply to almost any situation. A new appendix of helpful Web sites has been added as well as true-or-false quizzes in each chapter. Chapters include: The Problem Solver in You Using Scientific Thinking to Solve Problems Using Creative Thinking to Solve Problems Obstacles to Problem Solving Identify and Define the Problem Define Goals and Objectives Generate Solutions Develop a Plan of Action Follow Through Decision Making. **Mathematical Puzzles** CRC Press Research in mathematics is much more than solving puzzles, but most people will agree that solving puzzles is not just fun: it helps focus the mind and increases one's armory of techniques for doing mathematics. Mathematical Puzzles makes this connection explicit by isolating important mathematical methods, then using them to solve puzzles and prove a theorem. Features A collection of the world's best mathematical puzzles Each chapter features a technique for solving mathematical puzzles, examples, and finally a genuine theorem of mathematics that features that technique in its proof Puzzles that are entertaining, mystifying, paradoxical, and satisfying; they are not just exercises or contest problems. **Problems in Real Analysis Advanced Calculus on the Real Axis** Springer Science & Business Media Problems in Real Analysis: Advanced Calculus on the Real Axis features a comprehensive collection of challenging problems in mathematical analysis that aim to promote creative, non-standard techniques for solving problems. This self-contained text offers a host of new mathematical tools and strategies which develop a connection between analysis and other mathematical disciplines, such as physics and engineering. A broad view of mathematics is presented throughout; the text is excellent for the classroom or self-study. It is intended for undergraduate and graduate students in mathematics, as well as for researchers engaged in the interplay between applied analysis, mathematical physics, and numerical analysis. **Problem Solving** Infobase Publishing Developing and understanding different methods of tackling problems is an essential career skill. Problem Solving, Second Edition teaches readers how to become a problem solver, a valuable and highly sought person in today's complicated workforce. This book illustrates the difference between scientific and creative problem-solving techniques and outlines a five-step approach to dealing with dilemmas that students can apply to almost any situation. **Problem Solving and Word Problem Smarts!** Enslow Publishers, Inc. Are you having trouble with math word problems or problem solving? Do you wish someone

could explain how to approach word problems in a clear, simple way? From the different types of word problems to effective problem solving strategies, this book takes a step-by-step approach to teaching problem solving. This book is designed for students to use alone or with a tutor or parent, provides clear lessons with easy-to-learn techniques and plenty of examples. Whether you are looking to learn this information for the first time, on your own or with a tutor, or you would like to review some math skills, this book will be a great choice. **Mathematics for the Nonmathematician** Courier Corporation Erudite and entertaining overview 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. **How to Solve Problems Elements of a Theory of Problems and Problem Solving** W.H. Freeman Examples help explain the seven basic mathematical problem-solving methods, including inference, classification of action sequences, working backward, and contradiction **Introduction to Counting and Probability** Aops Incorporated **Mathematics Its Content, Methods and Meaning** Courier Corporation Major survey offers comprehensive, coherent discussions of analytic geometry, algebra, differential equations, calculus of variations, functions of a complex variable, prime numbers, linear and non-Euclidean geometry, topology, functional analysis, more. 1963 edition. **Because Without Cause Non-causal Explanation in Science and Mathematics** Oxford University Press Not all scientific explanations work by describing causal connections between events or the world's overall causal structure. Some mathematical proofs explain why the theorems being proved hold. In this book, Marc Lange proposes philosophical accounts of many kinds of non-causal explanations in science and mathematics. These topics have been unjustly neglected in the philosophy of science and mathematics. One important kind of non-causal scientific explanation is termed explanation by constraint. These explanations work by providing information about what makes certain facts especially inevitable - more necessary than the ordinary laws of nature connecting causes to their effects. Facts explained in this way transcend the hurly-burly of cause and effect. Many physicists have regarded the laws of kinematics, the great conservation laws, the coordinate transformations, and the parallelogram of forces as having explanations by constraint. This book presents an original account of explanations by constraint, concentrating on a variety of examples from classical physics and special relativity. This book also offers original accounts of several other varieties of non-causal scientific explanation. Dimensional explanations work by showing how some law of nature arises merely from the dimensional relations among the quantities involved. Really statistical explanations include explanations that appeal to regression toward the mean and other canonical manifestations of chance. Lange provides an original account of what makes certain mathematical proofs but not others explain what they prove. Mathematical explanation connects to a host of other important mathematical ideas, including coincidences in mathematics, the significance of giving multiple proofs of the same result, and natural properties in mathematics. Introducing many examples drawn from actual science and mathematics, with extended discussions of examples from Lagrange, Desargues, Thomson, Sylvester, Maxwell, Rayleigh, Einstein, and Feynman, Because Without Cause's proposals and examples should set the agenda for future work on non-causal explanation.