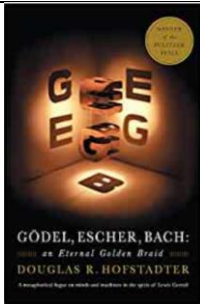


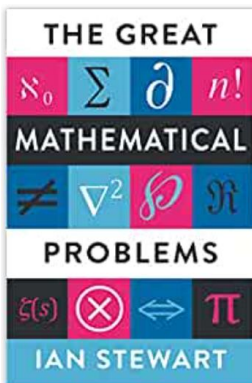


Key Stage 5



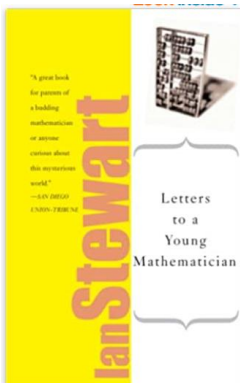
Gödel, Escher, Bach: An Eternal Golden Braid

Douglas Hofstadter's book is concerned directly with the nature of maps" or links between formal systems. However, according to Hofstadter, the formal system that underlies all mental activity transcends the system that supports it. If life can grow out of the formal chemical substrate of the cell, if consciousness can emerge out of a formal system of firing neurons, then so too will computers attain human intelligence. Gödel, Escher, Bach is a wonderful exploration of fascinating ideas at the heart of cognitive science: meaning, reduction, recursion, and much more.



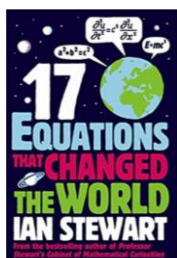
The Great Mathematical Problems

There are some mathematical problems whose significance goes beyond the ordinary - like Fermat's Last Theorem or Goldbach's Conjecture - they are the enigmas which define mathematics. The Great Mathematical Problems explains why these problems exist, why they matter, what drives mathematicians to incredible lengths to solve them and where they stand in the context of mathematics and science as a whole. It contains solved problems - like the Poincaré Conjecture, cracked by the eccentric genius Grigori Perelman, who refused academic honours and a million-dollar prize for his work, and ones which, like the Riemann Hypothesis, remain baffling after centuries. Stewart is the guide to this mysterious and exciting world, showing how modern mathematicians constantly rise to the challenges set by their predecessors, as the great mathematical problems of the past succumb to the new techniques and ideas of the present.



Letters to a Young Mathematician

Mathematician Ian Stewart tells readers what he wishes he had known when he was a student. He takes up subjects ranging from the philosophical to the practical-what mathematics is and why it's worth doing, the relationship between logic and proof, the role of beauty in mathematical thinking, the future of mathematics, how to deal with the peculiarities of the mathematical community, and many others.



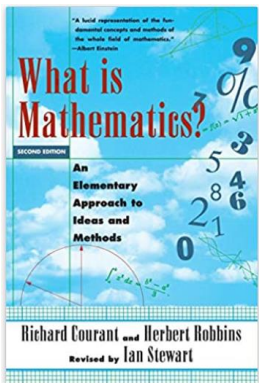
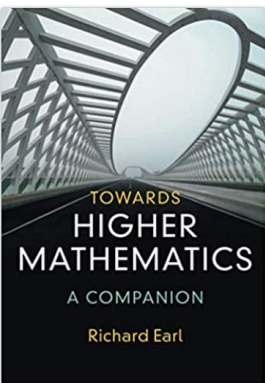
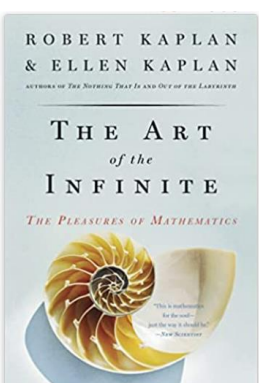
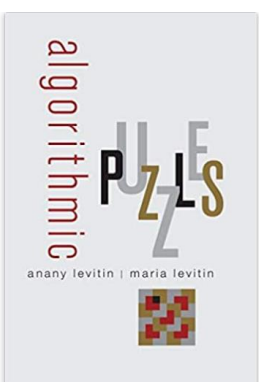
17 Equations that Changed the World

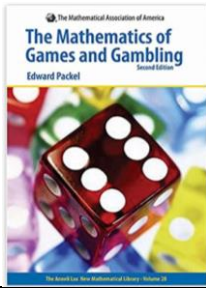
From Newton's Law of Gravity to the Black-Scholes model used by bankers to predict the markets, equations, are everywhere - and they are fundamental to everyday life. Seventeen Equations that Changed the World examines seventeen ground-breaking equations that have altered the course of human history. He explores how Pythagoras's Theorem led to GPS and Satnav; how logarithms are applied in architecture; why imaginary numbers were important in the development of the digital camera, and what is really going on with Schrödinger's cat.



Mathematical Puzzles: A Connoisseur's Collection

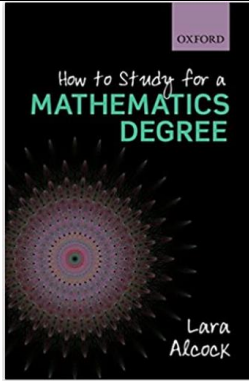
Collected over several years by Peter Winkler, of Bell Labs, dozens of elegant, intriguing challenges are presented in Mathematical Puzzles. The answers are easy to explain, but without this book, devilishly hard to find. Creative reasoning is the key to these puzzles. No involved computation or higher mathematics is necessary, but your ability to construct a mathematical proof

	<p>will be severely tested--even if you are a professional mathematician. For the truly adventurous, there is even a chapter on unsolved puzzles.</p>
	<p>What is Mathematics? For more than two thousand years a familiarity with mathematics has been regarded as an indispensable part of the intellectual equipment of every cultured person. Today, unfortunately, the traditional place of mathematics in education is in grave danger. The teaching and learning of mathematics has degenerated into the realm of rote memorization, the outcome of which leads to satisfactory formal ability but does not lead to real understanding or to greater intellectual independence. This new edition of Richard Courant's and Herbert Robbins's classic work seeks to address this problem. Its goal is to put the <i>meaning</i> back into mathematics.</p>
	<p>Towards Higher Mathematics: A Companion Containing a large and varied set of problems, this rich resource will allow students to stretch their mathematical abilities beyond the school syllabus and bridge the gap to university-level mathematics. Many proofs are provided to better equip students for the transition to university. The author covers substantial extension material using the language of sixth form mathematics, thus enabling students to understand the more complex material. Exercises are carefully chosen to introduce students to some central ideas, without building up large amounts of abstract technology. There are over 1500 carefully graded exercises, with hints included in the text, and solutions available online. Historical and contextual asides highlight each area of mathematics and show how it has developed over time.</p>
	<p>The Art of the Infinite The Art of the Infinite takes infinity, in its countless guises, as a touchstone for understanding mathematical thinking. Robert and Ellen Kaplan guide us through the "Republic of Numbers," where we meet both its upstanding citizens and its more shadowy dwellers; and transport us across the plane of geometry into the unlikely realm where parallel lines meet. The journey is enriched by deft character studies of great mathematicians (and equally colourful lesser ones). And as we go deeper into infinity, we explore the most profound mystery of mathematics: Are its principles eternal truths that we discover? Or ones that we invent?</p>
	<p>Algorithmic Puzzles While many think of algorithms as specific to computer science, at its core algorithmic thinking is defined by the use of analytical logic to solve problems. This logic extends far beyond the realm of computer science and into the wide and entertaining world of puzzles. In <i>Algorithmic Puzzles</i>, Anany and Maria Levitin use many classic brainteasers as well as newer examples from job interviews with major corporations to show readers how to apply analytical thinking to solve puzzles requiring well-defined procedures.</p>



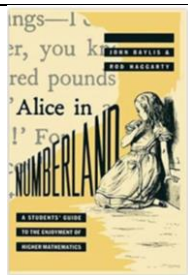
Mathematics of Games and Gambling

Most of the standard casino games (roulette, craps, blackjack, keno), some social games (backgammon, poker, bridge) and various other activities (state lotteries, horse racing) are treated in ways that bring out their mathematical aspects. The mathematics developed ranges from the predictable concepts of probability, expectation, and binomial coefficients to some less well-known ideas of elementary game theory.



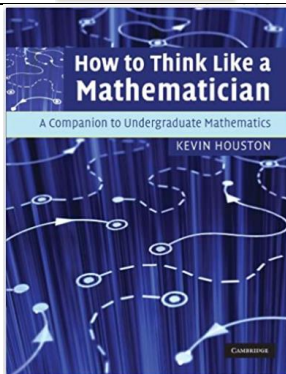
How to Study for a Mathematics Degree

Every year, thousands of students go to university to study mathematics (single honours or combined with another subject). Many of these students are extremely intelligent and hardworking, but even the best will, at some point, struggle with the demands of making the transition to advanced mathematics. Some have difficulty adjusting to independent study and to learning from lectures. Other struggles, however, are more fundamental: the mathematics shifts in focus from calculation to proof, so students are expected to interact with it in different ways. These changes need not be mysterious - mathematics education research has revealed many insights into the adjustments that are necessary - but they are not obvious, and they do need explaining.



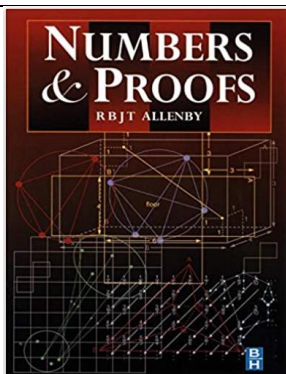
Alice in Numberland

'...quite the best one I have had the fortune to read...admirable alternative reading for a foundation course introducing university mathematics.' David Tall, The Times Higher Educational Supplement



How to Think like a Mathematician

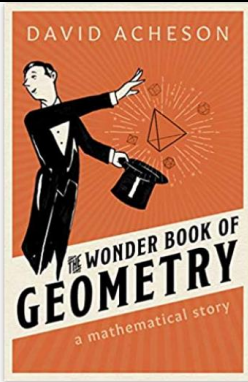
Looking for a head start in your undergraduate degree in mathematics? Maybe you've already started your degree and feel bewildered by the subject you previously loved? Don't panic! This friendly companion will ease your transition to real mathematical thinking. Working through the book you will develop an arsenal of techniques to help you unlock the meaning of definitions, theorems, and proofs, solve problems, and write mathematics effectively. All the major methods of proof - direct method, cases, induction, contradiction, and contrapositive - are featured. Concrete examples are used throughout, and you'll get plenty of practice on topics common to many courses such as divisors, Euclidean algorithms, modular arithmetic, equivalence relations, and injectivity and surjectivity of functions. The material has been tested by real students over many years, so all the essentials are covered. With over 300 exercises to help you test your progress, you'll soon learn how to think like a mathematician.



Numbers and Proofs

'Numbers and Proofs' presents a gentle introduction to the notion of proof to give the reader an understanding of how to decipher others' proofs as well as construct their own. Useful methods of proof are illustrated in the context of studying problems concerning mainly numbers (real, rational, complex and integers). An indispensable guide to all students of mathematics. Each proof is preceded by a discussion which is intended to show the reader the kind of thoughts they might have before any attempt proof is made. Established proofs which the student is in a better position to follow then follow. Presented in the author's entertaining and informal style and written to reflect the changing profile of students entering universities, this book will prove essential reading for all seeking an introduction to the notion of proof as well as giving a definitive guide to the more common forms. Stressing the importance of backing up "truths" found through experimentation, with logically sound and

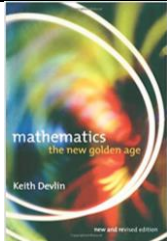
	<p>watertight arguments, it provides an ideal bridge to more complex undergraduate maths.</p>
	<p>A Concise Introduction to Pure Mathematics Accessible to all students with a sound background in high school mathematics, A Concise Introduction to Pure Mathematics, Third Edition presents some of the most fundamental and beautiful ideas in pure mathematics. It covers not only standard material but also many interesting topics not usually encountered at this level, such as the theory of solving cubic equations, the use of Euler's formula to study the five Platonic solids, the use of prime numbers to encode and decode secret information, and the theory of how to compare the sizes of two infinite sets.</p>
	<p>Why Study Mathematics? Are you considering studying mathematics at university, having fallen in love with the subject at school? Are you ready to develop a variety of practical skills that employers need? Are you keen to have a wide range of career options after you graduate? Studying any subject at degree level is an investment in the future that involves significant cost. Now more than ever, students and their parents need to weigh up the potential benefits of university courses. That's where the Why Study series comes in. This book, aimed at students, parents and teachers, explains in practical terms the range and scope of mathematics at university level and where it can lead in terms of careers or further study. It will enthuse the reader about the subject and answer the crucial questions that a college prospectus does not.</p>
	<p>Closing the Gap: The Quest to Understand Prime Numbers In 2013, a little-known mathematician in his late 50s stunned the mathematical community with a breakthrough on an age-old problem about prime numbers. Since then, there has been further dramatic progress on the problem, thanks to the efforts of a large-scale online collaborative effort of a type that would have been unthinkable in mathematics a couple of decades ago, and the insight and creativity of a young mathematician at the start of his career. Prime numbers have intrigued, inspired, and infuriated mathematicians for millennia. Every school student studies prime numbers and can appreciate their beauty, and yet mathematicians' difficulty with answering some seemingly simple questions about them reveals the depth and subtlety of prime numbers.</p>
	<p>1089 and All That David Acheson's extraordinary little book makes mathematics accessible to everyone. From very simple beginnings he takes us on a thrilling journey to some deep mathematical ideas. On the way, via Kepler and Newton, he explains what calculus really means, gives a brief history of pi, and even takes us to chaos theory and imaginary numbers. Every short chapter is carefully crafted to ensure that no one will get lost on the journey. Packed with puzzles and illustrated by world famous cartoonists, this is one of the most readable and imaginative books on mathematics ever written.</p>
	<p>The Calculus Story Calculus is the key to much of modern science and engineering. It is the mathematical method for the analysis of things that change, and since in the natural world we are surrounded by change, the development of calculus was a huge breakthrough in the history of mathematics. But it is also something of a mathematical adventure, largely because of the way infinity enters at virtually every twist and turn...</p>



The Wonder Book of Geometry

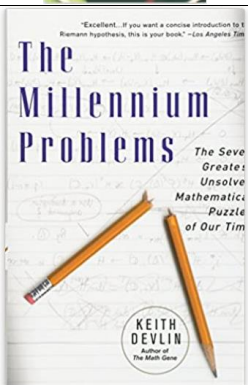
How can we be sure that Pythagoras's theorem is really *true*? Why is the 'angle in a semicircle' always 90 degrees? And how can tangents help determine the speed of a bullet?

David Acheson takes the reader on a highly illustrated tour through the history of geometry, from ancient Greece to the present day. He emphasizes throughout elegant deduction and practical applications and argues that geometry can offer the quickest route to the whole spirit of mathematics at its best. Along the way, we encounter the quirky and the unexpected, meet the great personalities involved, and uncover some of the loveliest surprises in mathematics.



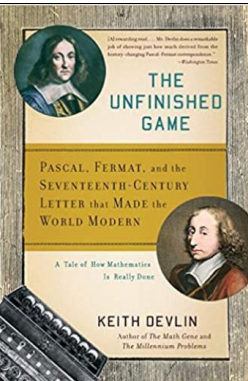
Mathematics: The New Golden Age

A modern classic by an accomplished mathematician and best-selling author has been updated to encompass and explain the recent headline-making advances in the field in non-technical terms.



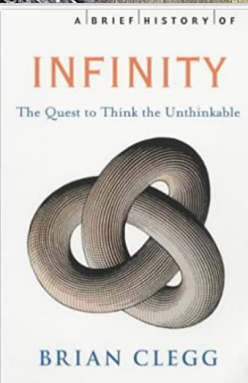
The Millennium Problems

In 2000, the Clay Foundation announced a historic competition: whoever could solve any of seven extraordinarily difficult mathematical problems, and have the solution acknowledged as correct by the experts, would receive 1 million in prize money. There was some precedent for doing this: In 1900 the mathematician David Hilbert proposed twenty-three problems that set much of the agenda for mathematics in the twentieth century. The Millennium Problems- chosen by a committee of the leading mathematicians in the world- are likely to acquire similar stature, and their solution (or lack of it) is likely to play a strong role in determining the course of mathematics in the twenty-first century. Keith Devlin, renowned expositor of mathematics and one of the authors of the Clay Institute's official description of the problems, here provides the definitive account for the mathematically interested reader.



The Unfinished Game

In the early seventeenth century, the outcome of something as simple as a dice roll was consigned to the realm of unknowable chance. Mathematicians largely agreed that it was impossible to predict the probability of an occurrence. Then, in 1654, Blaise Pascal wrote to Pierre de Fermat explaining that he had discovered how to calculate risk. The two collaborated to develop what is now known as probability theory, a concept that allows us to think rationally about decisions and events. In *The Unfinished Game*, Keith Devlin masterfully chronicles Pascal and Fermat's mathematical breakthrough, connecting a centuries-old discovery with its remarkable impact on the modern world.

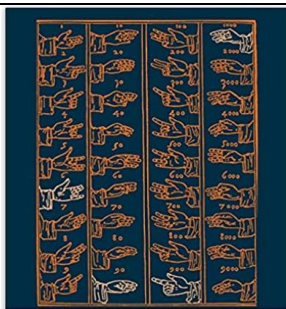


A Brief History of Infinity

'Space is big. Really big. You just won't believe how vastly, hugely, mind-bogglingly big it is. I mean, you may think it's a long way down the street to the chemist, but that's just peanuts to space.' Douglas Adams, *Hitch-hiker's Guide to the Galaxy*

We human beings have trouble with infinity - yet infinity is a surprisingly human subject. Philosophers and mathematicians have gone mad contemplating its nature and complexity - yet it is a concept routinely used by schoolchildren. Exploring the infinite is a journey into paradox. Here is a quantity that turns arithmetic on its head, making it feasible that $1 = 0$. Here is a concept that enables us to cram as many extra guests as we like into an already full hotel. Most bizarrely of all, it is quite easy to show that there must be something bigger than infinity - when it surely should be the biggest thing that could possibly be.

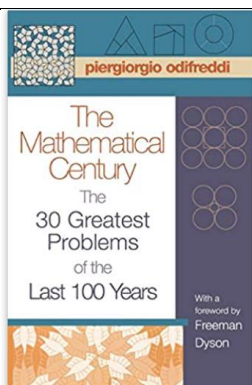
	<p>Maths 1001</p> <p>Maths 1001 provides clear and concise explanations of the most fascinating and fundamental mathematical concepts. Distilled into 1001 bite-sized mini-essays arranged thematically, this unique reference book moves steadily from the basics through to the most advanced of ideas, making it the ideal guide for novices and mathematics enthusiasts.</p>
	<p>Maths in 100 Key Breakthroughs</p> <p>Maths in 100 Key Breakthroughs presents a series of essays explaining the fundamentals of the most important maths concepts you really need to know. Richard Elwes profiles the ground-breaking and front-of-mind discoveries that have had a profound influence on our way of life and understanding. From the origins of counting some 35,000 years ago, right up to the very latest breakthroughs - such as Wiles' proof of Fermat's Last Theorem and Cook & Wolfram's Rule 110 - Maths in 100 Key Breakthroughs tells a story of discovery, invention, painstaking progress, and inspired leaps of the imagination.</p>
	<p>Applied Mathematics: A Very Short Introduction</p> <p>Mathematics is playing an increasing important role in society and the sciences, enhancing our ability to use models and handle data. While pure mathematics is mostly interested in abstract structures, applied mathematics sits at the interface between this abstract world and the world in which we live. This area of mathematics takes its nourishment from society and science and, in turn, provides a unified way to understand problems arising in diverse fields. This <i>Very Short Introduction</i> presents a compact yet comprehensive view of the field of applied mathematics, and explores its relationships with (pure) mathematics, science, and engineering. Explaining the nature of applied mathematics, Alain Goriely discusses its early achievements in physics and engineering, and its development as a separate field after World War II. Using historical examples, current applications, and challenges, Goriely illustrates the particular role that mathematics plays in the modern sciences today and its far-reaching potential.</p>
	<p>Mathematics: A Very Short Introduction</p> <p>The aim of this book is to explain, carefully but not technically, the differences between advanced, research-level mathematics, and the sort of mathematics we learn at school. The most fundamental differences are philosophical, and readers of this book will emerge with a clearer understanding of paradoxical-sounding concepts such as infinity, curved space, and imaginary numbers. The first few chapters are about general aspects of mathematical thought. These are followed by discussions of more specific topics, and the book closes with a chapter answering common sociological questions about the mathematical community (such as "Is it true that mathematicians burn out at the age of 25?")</p>



The Pleasures of Counting
T. W. KÖRNER

The Pleasures of Counting

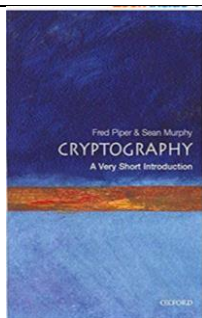
What is the connection between the outbreak of cholera in Victorian Soho, the Battle of the Atlantic, African Eve and the design of anchors? One answer is that they are all examples chosen by Dr Tom Körner to show how a little mathematics can shed light on the world around us and deepen our understanding of it. Dr Körner, an experienced author, describes a variety of topics which continue to interest professional mathematicians, like him. He does this using relatively simple terms and ideas yet confronting difficulties (which are often the starting point for new discoveries) and avoiding condescension. If you have ever wondered what it is that mathematicians do, and how they go about it, then read on. If you are a mathematician wanting to explain to others how you spend your working days (and nights), then seek inspiration here.



The Mathematical Century: The 30 Greatest Problems of the Last 100 Years

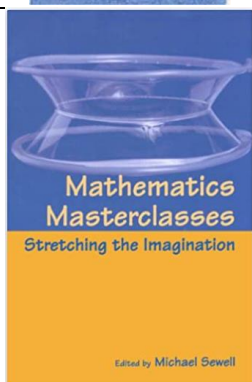
The twentieth century was a time of unprecedented development in mathematics, as well as in all sciences: more theorems were proved, and results found in a hundred years than in all of previous history. In *The Mathematical Century*, Piergiorgio Odifreddi distils this unwieldy mass of knowledge into a fascinating and authoritative overview of the subject. He concentrates on thirty highlights of pure and applied mathematics. Each tells the story of an exciting problem, from its historical origins to its modern solution, in lively prose free of technical details.

Odifreddi opens by discussing the four main philosophical foundations of mathematics of the nineteenth century and ends by describing the four most important open mathematical problems of the twenty-first century. In presenting the thirty problems at the heart of the book he devotes equal attention to pure and applied mathematics, with applications ranging from physics and computer science to biology and economics. Special attention is dedicated to the famous "23 problems" outlined by David Hilbert in his address to the International Congress of Mathematicians in 1900 as a research program for the new century, and to the work of the winners of the Fields Medal, the equivalent of a Nobel prize in mathematics.



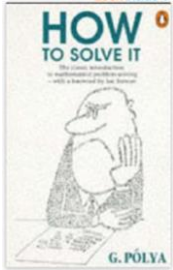
Cryptography: A Very Short Introduction

This book is a clear and informative introduction to cryptography and data protection - subjects of considerable social and political importance. It explains what algorithms do, how they are used, the risks associated with using them, and why governments should be concerned. Important areas are highlighted, such as Stream Ciphers, block ciphers, public key algorithms, digital signatures, and applications such as e-commerce. This book highlights the explosive impact of cryptography on modern society, with, for example, the evolution of the internet and the introduction of more sophisticated banking methods.



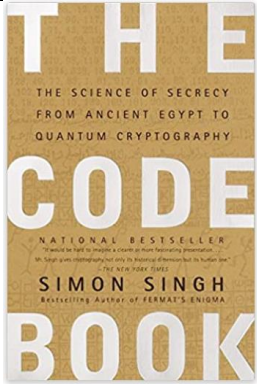
Mathematics Masterclasses: Stretching the Imagination

This book serves as a valuable resource for mathematics and science teachers at secondary school level, teenagers, and parents. It contains written versions of Royal Institution masterclasses on a wide selection of topics in pure and applied mathematics. The masterclasses are a popular program of advanced study conducted each year for mathematically talented university-bound British youth. They serve as a unique introduction to the kinds of topics found at the undergraduate level yet presented in a manner that is meant to stimulate interest and challenge young minds. Topics include chaos theory, meteorology, storage limitations of computers, population growth and decay, as well as the mechanics of dinosaurs. The book is well-illustrated, easy to read, and contains worksheets with interesting problems (and solutions). The emphasis throughout is on enjoying the challenge of mathematics.



How to Solve It

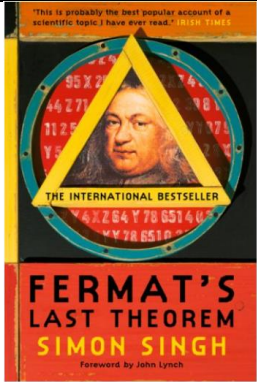
A demonstration of how the true mathematician learns to draw unexpected analogies, tackle problems from unusual angles and extract a little more conformation from the data; a collection of truly practical lessons.



The Code Book

In his first book since the bestselling Fermat's Enigma, Simon Singh offers the first sweeping history of encryption, tracing its evolution and revealing the dramatic effects codes have had on wars, nations, and individual lives. From Mary, Queen of Scots, trapped by her own code, to the Navajo Code Talkers who helped the Allies win World War II, to the incredible (and incredibly simple) logistical breakthrough that made Internet commerce secure, The Code Book tells the story of the most powerful intellectual weapon ever known: secrecy.

Throughout the text are clear technical and mathematical explanations, and portraits of the remarkable personalities who wrote and broke the world's most difficult codes. Accessible, compelling, and remarkably far-reaching, this book will forever alter your view of history and what drives it. It will also make you wonder how private that e-mail you just sent really is.

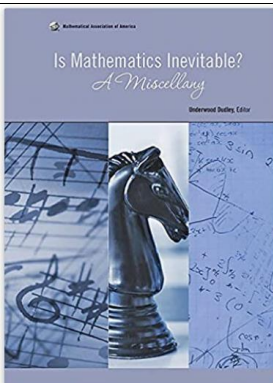


Fermat's Last Theorem

'I have a truly marvellous demonstration of this proposition which this margin is too narrow to contain.'

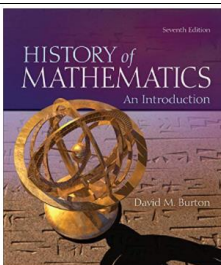
It was with these words, written in the 1630s, that Pierre de Fermat intrigued and infuriated the mathematics community. For over 350 years, proving Fermat's Last Theorem was the most notorious unsolved mathematical problem, a puzzle whose basics most children could grasp but whose solution eluded the greatest minds in the world. In 1993, after years of secret toil, Englishman Andrew Wiles announced to an astounded audience that he had cracked Fermat's Last Theorem. He had no idea of the nightmare that lay ahead.

In 'Fermat's Last Theorem' Simon Singh has crafted a remarkable tale of intellectual endeavour spanning three centuries, and a moving testament to the obsession, sacrifice, and extraordinary determination of Andrew Wiles: one man against all the odds.



Is Mathematics Inevitable? A Miscellany

This is a collection of gems from the literature of mathematics that shine as brightly today as when they first appeared in print - they deserve to be seen and admired. The selections include two opposing views on the purpose of mathematics, the strong law of small numbers, the treatment of calculus in the 1771 Encyclopaedia Britannica, several proofs that the number of legs on a horse is infinite, a deserved refutation of the ridiculous Euler-Diderot anecdote, the real story of π and the Indiana legislature, the reason why Theodorus stopped proving that square roots were irrational when he got to the square root of 17, an excerpt from Mathematics Made Difficult, a glimpse into the mind of a calculating prodigy, and much more. There will be something here for anyone interested in mathematics.



The History of Mathematics

The History of Mathematics: An Introduction, Seventh Edition, is written for the one- or two-semester math history course taken by juniors or seniors and covers the history behind the topics typically covered in an undergraduate math curriculum or in elementary schools or high schools. Elegantly written in David Burton's imitable prose, this classic text provides rich historical context to the mathematics that undergrad math and math education majors encounter every day. Burton illuminates...

	<p>Unknown Quantity – A Real and Imaginary History of Algebra</p> <p>'Here is the story of algebra.' With this deceptively simple introduction, <i>Unknown Quantity</i> opens, thirty-eight centuries ago, at the time of Abraham and Isaac. In stylish and accessible prose, Derbyshire shows how the invention of algebra was more than the beginning of a specific discipline of mathematics; it was also the birth of a new way of thinking that altered, forever, the ways in which we see and understand our world.</p>
	<p>Incompleteness – The Proof and Paradox of Kurt Gödel</p> <p>Probing the life and work of Kurt Gödel, <i>Incompleteness</i> indelibly portrays the tortured genius whose vision rocked the stability of mathematical reasoning-- and brought him to the edge of madness.</p>
	<p>Hilbert's Challenge</p> <p>David Hilbert was arguably the leading mathematician of his generation. He was among the few mathematicians who could reshape mathematics and was able to because he brought together an impressive technical power and mastery of detail with a vision of where the subject was going and how it should get there. This was the unique combination which he brought to the setting of his famous 23 Problems. Few problems in mathematics have the status of those posed by David Hilbert in 1900. Mathematicians have made their reputations by solving individual ones such as Fermat's last theorem, and several remain unsolved including the Riemann hypotheses, which has eluded all the great minds of this century. A hundred years on, it is timely to take a fresh look at the problems, the man who set them, and the reasons for their lasting impact on the mathematics of the twentieth century. In this fascinating new book, Jeremy Gray and David Rowe consider what has made this the pre-eminent collection of problems in mathematics, what they tell us about what drives mathematicians, and the nature of reputation, influence, and power in the world of modern mathematics. The book is written in a clear and lively manner and will appeal both to the general reader with an interest in mathematics and to mathematicians themselves.</p>
	<p>Great Feuds in Mathematics</p> <p>Those who think that mathematicians are cold, mechanical proving machines will do well to read Hellman's book on conflicts in mathematics. The main characters are as excitable and touchy as the next man. But Hellman's stories also show how scientific fights bring out sharper formulations and better arguments.</p>
	<p>Alan Turing</p> <p>Alan Turing was the mathematician whose cipher-cracking transformed the Second World War. Taken on by British Intelligence in 1938, as a shy young Cambridge don, he combined brilliant logic with a flair for engineering. In 1940 his machines were breaking the Enigma-enciphered messages of Nazi Germany's air force. He then headed the penetration of the super-secure U-boat communications. But his vision went far beyond this achievement. Before the war he had invented the concept of the universal machine, and in 1945 he turned this into the first design for a digital computer.</p>