

## **Qed Beauty In Mathematical Proof Wooden Books**

Teaching Mathematics through Problem-Solving in K-12 Classrooms Geometries on Surfaces Concrete Semantics The Elements of Music The Miracle of Trees Math Goes to the Movies The Language of Mathematics The Moment of Proof Proofs without Words II Q.E.D. Mathematics and Its History Corporate Finance Workbook Perspective and Other Optical Illusions A Geometrical Picture Book Q.E.D. Archimedes A Dingo Ate My Math Book: Mathematics from Down Under Journey into Mathematics Pi of Life Sciencia Math through the Ages: A Gentle History for Teachers and Others Expanded Second Edition Simply Riemann Mathematical Reasoning Proofs Without Words An Introduction to Writing Mathematical Proofs Compact Cosmos The Mathematics of Juggling Significant Figures Journey Through Genius The Shoelace Book Symmetry Ruler and Compass 100% Mathematical Proof Mathematics for Computer Science Famous Mathematical Proofs Godel's Proof Useful Mathematical and Physical Formulae Eye Twisters Nonplussed! A Beautiful Question

### **Teaching Mathematics through Problem-Solving in K-12 Classrooms**

As much of interest to mathematicians as it is to artists, as relevant to physics as to architecture, symmetry underlies almost every aspect of nature and our experience of the world. Illustrated with old engravings and original work by the author, this book moves from church windows and mirror reflections to the deepest ideas of hidden symmetries in physics and geometry, music and the arts, left- and right-handedness.

### **Geometries on Surfaces**

The first book to present a readable explanation of Godel's theorem to both scholars and non-specialists, this is a gripping combination of science and accessibility, offering those with a taste for logic and philosophy the chance to satisfy their intellectual curiosity.

### **Concrete Semantics**

The workbook to accompany Corporate Finance: A Practical Approach, Second Edition

### **The Elements of Music**

Exploring the macrocosm from colossal galactic superclusters to quiet backwater planets, Matt Tweed offers a primer on the cosmos for anyone fascinated by the heavens. Taking a guided tour through the universe, we ride past quasars, jets, and galaxies to land on a curious world and examine an array of ideas about space and time. Tweed traces the evolution of stars and formation of planets, describing our "light bubble" and why we can't see any farther than we do. For a concise and accessible description of extra-solar planetary systems, black holes, pulsars,

nebulae, great walls, dark matter, red shifts, and much more, *The Compact Cosmos* is an indispensable guide. Data tables, lists of cosmological constants, and distances from Earth to other bodies in space form a useful appendix.

## **The Miracle of Trees**

Q.E.D. presents some of the most famous mathematical proofs in a charming book that will appeal to nonmathematicians and math experts alike. Grasp in an instant why Pythagoras's theorem must be correct. Follow the ancient Chinese proof of the volume formula for the frustrating frustum, and Archimedes' method for finding the volume of a sphere. Discover the secrets of pi and why, contrary to popular belief, squaring the circle really is possible. Study the subtle art of mathematical domino tumbling, and find out how slicing cones helped save a city and put a man on the moon.

## **Math Goes to the Movies**

Part I of this book is a practical introduction to working with the Isabelle proof assistant. It teaches you how to write functional programs and inductive definitions and how to prove properties about them in Isabelle's structured proof language. Part II is an introduction to the semantics of imperative languages with an emphasis on applications like compilers and program analysers. The distinguishing feature is that all the mathematics has been formalised in Isabelle and much of it is executable. Part I focusses on the details of proofs in Isabelle; Part II can be read even without familiarity with Isabelle's proof language, all proofs are described in detail but informally. The book teaches the reader the art of precise logical reasoning and the practical use of a proof assistant as a surgical tool for formal proofs about computer science artefacts. In this sense it represents a formal approach to computer science, not just semantics. The Isabelle formalisation, including the proofs and accompanying slides, are freely available online, and the book is suitable for graduate students, advanced undergraduate students, and researchers in theoretical computer science and logic.

## **The Language of Mathematics**

This innovative book presents the elements of music by building upon the long-known fundamentals of acoustics, proportion and relationship--a kind of musical metaphor. In combination with novel graphics and symbols, the principles behind melody, rhythm, and harmony come alive, along with those of Western musical notation.

## **The Moment of Proof**

"Eye Twisters" is all about ambigrams - words that are written or drawn so that they can be read in more than one way, back to front, upside down, turned this way and that. If you enjoy Escher's drawings, ambiguous figures, puzzles, optical illusions or mathematical recreations, you will love ambigrams. Here, over 200 of the best examples by the world's top ambigram artists are showcased, many for the first time. The history and philosophy of the form are explained, you can learn

how to make your own ambigrams and sharpen your mind on mind-bending problems (topsy-turvy Sudoku, anyone?). The result is a wholly original, magical book that all age groups will find irresistible."--Provided by publisher.

## Proofs without Words II

Mel Gibson teaching Euclidean geometry, Meg Ryan and Tim Robbins acting out Zeno's paradox, Michael Jackson proving in three different ways that  $7 \times 13 = 28$ . These are just a few of the intriguing mathematical snippets that occur in hundreds of movies. Burkard Polster and Marty Ross pored through the cinematic calculus to create this thorough and entertaining survey of the quirky, fun, and beautiful mathematics to be found on the big screen. Math Goes to the Movies is based on the authors' own collection of more than 700 mathematical movies and their many years using movie clips to inject moments of fun into their courses. With more than 200 illustrations, many of them screenshots from the movies themselves, this book provides an inviting way to explore math, featuring such movies as: • Good Will Hunting • A Beautiful Mind • Stand and Deliver • Pi • Die Hard • The Mirror Has Two Faces The authors use these iconic movies to introduce and explain important and famous mathematical ideas: higher dimensions, the golden ratio, infinity, and much more. Not all math in movies makes sense, however, and Polster and Ross talk about Hollywood's most absurd blunders and outrageous mathematical scenes. Interviews with mathematical consultants to movies round out this engaging journey into the realm of cinematic mathematics. This fascinating behind-the-scenes look at movie math shows how fun and illuminating equations can be.

## Q.E.D.

How do you convey to your students, colleagues and friends some of the beauty of the kind of mathematics you are obsessed with? If you are a mathematician interested in finite or topological geometry and combinatorial designs, you could start by showing them some of the (400+) pictures in the "picture book". Pictures are what this book is all about; original pictures of everybody's favorite geometries such as configurations, projective planes and spaces, circle planes, generalized polygons, mathematical biplanes and other designs which capture much of the beauty, construction principles, particularities, substructures and interconnections of these geometries. The level of the text is suitable for advanced undergraduates and graduate students. Even if you are a mathematician who just wants some interesting reading you will enjoy the author's very original and comprehensive guided tour of small finite geometries and geometries on surfaces This guided tour includes lots of stereograms of the spatial models, games and puzzles and instructions on how to construct your own pictures and build some of the spatial models yourself.

## Mathematics and Its History

A celebrated mathematician traces the history of math through the lives and work of twenty-five pioneering mathematicians In Significant Figures, acclaimed mathematician Ian Stewart introduces the visionaries of mathematics throughout history. Delving into the lives of twenty-five great mathematicians, Stewart

examines the roles they played in creating, inventing, and discovering the mathematics we use today. Through these short biographies, we get acquainted with the history of mathematics from Archimedes to Benoit Mandelbrot, and learn about those too often left out of the cannon, such as Muhammad ibn Musa al-Khwarizmi (c. 780-850), the creator of algebra, and Augusta Ada King (1815-1852), Countess of Lovelace, the world's first computer programmer. Tracing the evolution of mathematics over the course of two millennia, Significant Figures will educate and delight aspiring mathematicians and experts alike.

## **Corporate Finance Workbook**

This textbook provides a unified and concise exploration of undergraduate mathematics by approaching the subject through its history. Readers will discover the rich tapestry of ideas behind familiar topics from the undergraduate curriculum, such as calculus, algebra, topology, and more. Featuring historical episodes ranging from the Ancient Greeks to Fermat and Descartes, this volume offers a glimpse into the broader context in which these ideas developed, revealing unexpected connections that make this ideal for a senior capstone course. The presentation of previous versions has been refined by omitting the less mainstream topics and inserting new connecting material, allowing instructors to cover the book in a one-semester course. This condensed edition prioritizes succinctness and cohesiveness, and there is a greater emphasis on visual clarity, featuring full color images and high quality 3D models. As in previous editions, a wide array of mathematical topics are covered, from geometry to computation; however, biographical sketches have been omitted. Mathematics and Its History: A Concise Edition is an essential resource for courses or reading programs on the history of mathematics. Knowledge of basic calculus, algebra, geometry, topology, and set theory is assumed. From reviews of previous editions: "Mathematics and Its History is a joy to read. The writing is clear, concise and inviting. The style is very different from a traditional text. I found myself picking it up to read at the expense of my usual late evening thriller or detective novel. The author has done a wonderful job of tying together the dominant themes of undergraduate mathematics." Richard J. Wilders, MAA, on the Third Edition "The book is presented in a lively style without unnecessary detail. It is very stimulating and will be appreciated not only by students. Much attention is paid to problems and to the development of mathematics before the end of the nineteenth century. This book brings to the non-specialist interested in mathematics many interesting results. It can be recommended for seminars and will be enjoyed by the broad mathematical community." European Mathematical Society, on the Second Edition

## **Perspective and Other Optical Illusions**

Both a reference and an introduction on the main results about topological geometries on surfaces.

## **A Geometrical Picture Book**

"Proof" has been and remains one of the concepts which characterises mathematics. Covering basic propositional and predicate logic as well as

discussing axiom systems and formal proofs, the book seeks to explain what mathematicians understand by proofs and how they are communicated. The authors explore the principle techniques of direct and indirect proof including induction, existence and uniqueness proofs, proof by contradiction, constructive and non-constructive proofs, etc. Many examples from analysis and modern algebra are included. The exceptionally clear style and presentation ensures that the book will be useful and enjoyable to those studying and interested in the notion of mathematical "proof."

## Q.E.D

'Math through the Ages' is a treasure, one of the best history of math books at its level ever written. Somehow, it manages to stay true to a surprisingly sophisticated story, while respecting the needs of its audience. Its overview of the subject captures most of what one needs to know, and the 30 sketches are small gems of exposition that stimulate further exploration. --Glen van Brummelen, Quest University, President (2012-14) of the Canadian Society for History and Philosophy of Mathematics Where did math come from? Who thought up all those algebra symbols, and why? What is the story behind  $\pi$ ? negative numbers? the metric system? quadratic equations? sine and cosine? logs? The 30 independent historical sketches in Math through the Ages answer these questions and many others in an informal, easygoing style that is accessible to teachers, students, and anyone who is curious about the history of mathematical ideas. Each sketch includes Questions and Projects to help you learn more about its topic and to see how the main ideas fit into the bigger picture of history. The 30 short stories are preceded by a 58-page bird's-eye overview of the entire panorama of mathematical history, a whirlwind tour of the most important people, events, and trends that shaped the mathematics we know today. 'What to Read Next' and reading suggestions after each sketch provide starting points for readers who want to learn more. This book is ideal for a broad spectrum of audiences, including students in history of mathematics courses at the late high school or early college level, pre-service and in-service teachers, and anyone who just wants to know a little more about the origins of mathematics.

## Archimedes

This textbook is designed to help students transition from calculus-type courses that focus on computation to upper-level mathematics courses that focus on proof-writing. Using the familiar topics of real numbers, high school geometry, and calculus, students are introduced to the methods of proof-writing and pre-proof strategy planning. A supplemental workbook for instructors is available upon request from the author. The workbook includes chapter vocabulary lists, creative writing exercises, group projects, and classroom discussions.

## A Dingo Ate My Math Book: Mathematics from Down Under

Proofs without words are generally pictures or diagrams that help the reader see why a particular mathematical statement may be true, and how one could begin to go about proving it. While in some proofs without words an equation or two may

appear to help guide that process, the emphasis is clearly on providing visual clues to stimulate mathematical thought. The proofs in this collection are arranged by topic into five chapters: Geometry and algebra; Trigonometry, calculus and analytic geometry; Inequalities; Integer sums; and Sequences and series. Teachers will find that many of the proofs in this collection are well suited for classroom discussion and for helping students to think visually in mathematics.

## **Journey into Mathematics**

'Q.E.D.' presents some of the most famous mathematical proofs in a charming book that will appeal to non-mathematicians and experts alike.

## **Pi of Life**

The development of mathematical competence -- both by humans as a species over millennia and by individuals over their lifetimes -- is a fascinating aspect of human cognition. This book explores a vast range of psychological questions related to mathematical cognition, and provides fascinating insights for researchers and students of cognition and instructors of mathematics.

## **Scienica**

This treatment covers the mechanics of writing proofs, the area and circumference of circles, and complex numbers and their application to real numbers. 1998 edition.

## **Math through the Ages: A Gentle History for Teachers and Others Expanded Second Edition**

Collects six short illustrated volumes covering topics in mathematics, physics, chemistry, biology, evolution, and astronomy.

## **Simply Riemann**

Like masterpieces of art, music, and literature, great mathematical theorems are creative milestones, works of genius destined to last forever. Now William Dunham gives them the attention they deserve. Dunham places each theorem within its historical context and explores the very human and often turbulent life of the creator -- from Archimedes, the absentminded theoretician whose absorption in his work often precluded eating or bathing, to Gerolamo Cardano, the sixteenth-century mathematician whose accomplishments flourished despite a bizarre array of misadventures, to the paranoid genius of modern times, Georg Cantor. He also provides step-by-step proofs for the theorems, each easily accessible to readers with no more than a knowledge of high school mathematics. A rare combination of the historical, biographical, and mathematical, *Journey Through Genius* is a fascinating introduction to a neglected field of human creativity. "It is mathematics presented as a series of works of art; a fascinating lingering over individual examples of ingenuity and insight. It is mathematics by lightning flash." --Isaac Asimov

## **Mathematical Reasoning**

Like its predecessor, *Proofs without Words*, this book is a collection of pictures or diagrams that help the reader see why a particular mathematical statement may be true, and how one could begin to go about proving it. While in some proofs without words an equation or two may appear to help guide that process, the emphasis is clearly on providing visual clues to stimulate mathematical thought. The proofs in this collection are arranged by topic into five chapters: geometry and algebra; trigonometry, calculus and analytic geometry; inequalities; integer sums; and sequences and series. Teachers will find that many of the proofs in this collection are well suited for classroom discussion and for helping students to think visually in mathematics.

## **Proofs Without Words**

This book shows how problems can be the vehicle for learning mathematics itself, and presents a comprehensive pedagogy based on classroom discourse, assessment, critical and creative thinking.

## **An Introduction to Writing Mathematical Proofs**

The evolution of perspective in art, science and mathematics.

## **Compact Cosmos**

A respected physicist presents a survey of related discoveries, from Plato and Pythagoras up to the present, that explore how intertwined ideas about beauty and art are with scientific understandings of the cosmos.

## **The Mathematics of Juggling**

In mathematics, a proof is a deductive argument for a mathematical statement. In the argument, other previously established statements, such as theorems, can be used. In principle, a proof can be traced back to self-evident or assumed statements, known as axioms. Proofs are examples of deductive reasoning and are distinguished from inductive or empirical arguments; a proof must demonstrate that a statement is always true (occasionally by listing all possible cases and showing that it holds in each), rather than enumerate many confirmatory cases. An unproved proposition that is believed true is known as a conjecture. Proofs employ logic but usually include some amount of natural language which usually admits some ambiguity. In fact, the vast majority of proofs in written mathematics can be considered as applications of rigorous informal logic. Purely formal proofs, written in symbolic language instead of natural language, are considered in proof theory. This book contains 'solutions' to some of the most noteworthy mathematical proofs (QED).

## **Significant Figures**

A brilliant introduction to the pleasures of mathematical thinking, this book

attempts to convey to general readers the feeling of eureka--the joy of discovery--that mathematicians feel when they first encounter an elegant truth. 92 line illustrations.

## **Journey Through Genius**

A compact volume of mathematical and physical formulae presented in a concise manner for general use. Collected in this book are commonly used formulae for studies such as quadratics, calculus and trigonometry; in addition are simplified explanations of Newton's Laws of Gravity and Snell's Laws of Refraction. A glossary, a table of mathematical and physical constants, and a listing of Imperial and Metric conversions is also included.

## **The Shoelace Book**

This book covers elementary discrete mathematics for computer science and engineering. It emphasizes mathematical definitions and proofs as well as applicable methods. Topics include formal logic notation, proof methods; induction, well-ordering; sets, relations; elementary graph theory; integer congruences; asymptotic notation and growth of functions; permutations and combinations, counting principles; discrete probability. Further selected topics may also be covered, such as recursive definition and structural induction; state machines and invariants; recurrences; generating functions.

## **Symmetry**

“Jeremy Gray is one of the world’s leading historians of mathematics, and an accomplished author of popular science. In *Simply Riemann* he combines both talents to give us clear and accessible insights into the astonishing discoveries of Bernhard Riemann—a brilliant but enigmatic mathematician who laid the foundations for several major areas of today’s mathematics, and for Albert Einstein’s General Theory of Relativity. Readable, organized—and simple. Highly recommended.” —Ian Stewart, Emeritus Professor of Mathematics at Warwick University and author of *Significant Figures* Born to a poor Lutheran pastor in what is today the Federal Republic of Germany, Bernhard Riemann (1826-1866) was a child math prodigy who began studying for a degree in theology before formally committing to mathematics in 1846, at the age of 20. Though he would live for only another 20 years (he died of pleurisy during a trip to Italy), his seminal work in a number of key areas—several of which now bear his name—had a decisive impact on the shape of mathematics in the succeeding century and a half. In *Simply Riemann*, author Jeremy Gray provides a comprehensive and intellectually stimulating introduction to Riemann’s life and paradigm-defining work. Beginning with his early influences—in particular, his relationship with his renowned predecessor Carl Friedrich Gauss—Gray goes on to explore Riemann’s specific contributions to geometry, functions of a complex variable, prime numbers, and functions of a real variable, which opened the way to discovering the limits of the calculus. He shows how without Riemannian geometry, cosmology after Einstein would be unthinkable, and he illuminates the famous Riemann hypothesis, which many regard as the most important unsolved problem in mathematics today. With

admirable concision and clarity, Simply Riemann opens the door on one of the most profound and original thinkers of the 19th century—a man who pioneered the concept of a multidimensional reality and who always saw his work as another way to serve God.

## **Ruler and Compass**

Award-winning author Keith Devlin reveals the vital role mathematics plays in our eternal quest to understand who we are and the world we live in. More than just the study of numbers, mathematics provides us with the eyes to recognize and describe the hidden patterns of life.

## **100% Mathematical Proof**

Math—the application of reasonable logic to reasonable assumptions—usually produces reasonable results. But sometimes math generates astonishing paradoxes—conclusions that seem completely unreasonable or just plain impossible but that are nevertheless demonstrably true. Did you know that a losing sports team can become a winning one by adding worse players than its opponents? Or that the thirteenth of the month is more likely to be a Friday than any other day? Or that cones can roll unaided uphill? In *Nonplussed!*—a delightfully eclectic collection of paradoxes from many different areas of math—popular-math writer Julian Havil reveals the math that shows the truth of these and many other unbelievable ideas. *Nonplussed!* pays special attention to problems from probability and statistics, areas where intuition can easily be wrong. These problems include the vagaries of tennis scoring, what can be deduced from tossing a needle, and disadvantageous games that form winning combinations. Other chapters address everything from the historically important Torricelli's Trumpet to the mind-warping implications of objects that live on high dimensions. Readers learn about the colorful history and people associated with many of these problems in addition to their mathematical proofs. *Nonplussed!* will appeal to anyone with a calculus background who enjoys popular math books or puzzles.

## **Mathematics for Computer Science**

An introduction to geometry without measurements.

## **Famous Mathematical Proofs**

Blending classic wisdom with over 100 pop culture references, Singh whimsically switches the lens in this book from the traditional society teaching math to a new and bold math teaching society. With charming buoyancy and intimacy, he takes us on an emotional and surprising journey through the deepest goldmine of mathematics—our personal happiness.

## **Godel's Proof**

This book offers a fascinating and entertaining look at the mathematics behind the many patterns by which shoes are laced. Burkhard Polster, who lists mathematical

juggling, magic and origami among his talents, uses formulas and detailed illustrations to answer questions such as the shortest and strongest lacings in several categories. An accessible mix of combinatorics and elementary calculus yields the author's conclusions.

## **Useful Mathematical and Physical Formulae**

This book looks carefully at Archimedes' fundamental advances in the fields of geometry, mechanics, and hydrostatics.

## **Eye Twisters**

A Dingo Ate My Math Book presents ingenious, unusual, and beautiful nuggets of mathematics with a distinctly Australian flavor. It focuses, for example, on Australians' love of sports and gambling, and on Melbourne's iconic, mathematically inspired architecture. Written in a playful and humorous style, the book offers mathematical entertainment as well as a glimpse of Australian culture for the mathematically curious of all ages. This collection of engaging stories was extracted from the Maths Masters column that ran from 2007 to 2014 in Australia's Age newspaper. The maths masters in question are Burkard Polster and Marty Ross, two (immigrant) Aussie mathematicians, who each week would write about math in the news, providing a new look at old favorites, mathematical history, quirks of school mathematics—whatever took their fancy. All articles were written for a very general audience, with the intention of being as inviting as possible and assuming a minimum of mathematical background.

## **Nonplussed!**

As a juggler the author likes to finish his performances with a stunt that combines props and techniques from a variety of juggling disciplines. Imagine him idling on a giraffe unicycle, while balancing a spinning basketball on a mouth stick, and toss-juggling a sword, a toilet plunger, and a rubber chicken. As a mathematician he is also interested in the treasure trove of beautiful mathematics used to model the different activities in a juggler's repertoire. In this book he provides an intellectually stimulating collection of mostly self-contained mathematical essays that introduce the reader to many elegant results and techniques from a wide range of mathematical disciplines such as combinatorics, graph theory, knot theory, mechanics, differential equations, control theory, and robotics. "The Mathematics of Juggling" is the first comprehensive account summarizing and expanding the results in the literature on juggling tricks and skills, as well as the mathematics behind these tricks and skills. Anybody who is not put off by the word "mathematics" in the title of this book should have a good time reading it.

## **A Beautiful Question**

A charming pocket guide to the most majestic of Earth's life forms.

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