Cardano And The Solution Of The Cubic Mathematics

This book is an exploration of a claim made by Lagrange in the autumn of 1771 as he embarked upon his lengthy ``Reflexions sur la resolution algebrique des equations'': that there had been few advances in the algebraic solution of equations since the time of Cardano in the mid sixteenth century. That opinion has been shared by many later historians. The present study attempts to redress that view and to examine the intertwined developments in the theory of equations from Cardano to Lagrange. A similar historical exploration led Lagrange himself to insights that were to transform the entire nature and scope of algebra. Progress was not confined to any one country: at different times mathematicians in Italy, France, the Netherlands, England, Scotland, Russia, and Germany contributed to the discussion and to a gradual deepening of understanding. In particular, the national Academies of Berlin, St. Petersburg, and Paris in the eighteenth century were crucial in supporting informed mathematical communities and encouraging the wider dissemination of key ideas. This study therefore truly highlights the existence of a European mathematical heritage. The book is written in three parts. Part I offers an overview of the period from Cardano to Newton (1545 to 1707) and is arranged chronologically. Part II covers the period from Newton to Lagrange (1707 to 1771) and treats the material according to key themes. Part III is a brief account of the aftermath of the discoveries made in the 1770s. The book attempts throughout to capture the reality of mathematical discovery by inviting the reader to follow in the footsteps of the authors themselves, with as few changes as possible to the original notation and style of presentation.

The book gives a detailed account of the development of the theory of algebraic equations, from its origins in ancient times to its completion by Galois in the nineteenth century. The appropriate parts of works by Cardano, Lagrange, Vandermonde, Gauss, Abel, and Galois are reviewed and placed in their historical perspective, with the aim of conveying to the reader a sense of the way in which the theory of algebraic equations has evolved and has led to such basic mathematical notions as "group" and "field". A brief discussion of the fundamental theorems of modern Galois theory and complete proofs of the quoted results are provided, and the material is organized in such a way that the more technical details can be skipped by readers who are interested primarily in a broad survey of the theory. In this second edition, the exposition has been improved throughout and the chapter on Galois has been entirely rewritten to better reflect Galois' highly innovative contributions. The text now follows more closely Galois' memoir, resorting as sparsely as possible to anachronistic modern notions such as field extensions. The emerging picture is a surprisingly elementary approach to the solvability of equations by radicals, and yet is unexpectedly close to some of the most recent methods of Galois theory.

The discovery of infinite products by Wallis and infinite series by Newton marked the beginning of the modern mathematical era. It allowed Newton to solve the problem of finding areas under curves defined by algebraic equations, an achievement beyond the scope of the earlier methods of Torricelli, Fermat and Pascal. While Newton and his contemporaries, including Leibniz and the Bernoullis, concentrated on mathematical analysis and physics, Euler's prodigious accomplishments demonstrated that series and products could also address problems in algebra, combinatorics and number theory. In this book, Ranjan Roy describes many facets of the discovery and use of infinite series and products as worked out by their originators, including mathematicians from Asia, Europe and America. The text provides context and motivation for these discoveries, with many detailed proofs, offering a valuable perspective on modern mathematics. Mathematicians, mathematics students, physicists and engineers will all read this book with benefit and enjoyment.

Galois theory is the culmination of a centuries-long search for a solution to the classical problem of solving algebraic equations by radicals. In this book, Bewersdorff follows the historical development of the theory, emphasizing concrete examples along the way. As a result, many mathematical abstractions are now seen as the natural consequence of particular investigations. Few prerequisites are needed beyond general college mathematics, since the necessary ideas and properties of groups and fields are provided as needed.Results in Galois theory are formulated first in a concrete, elementary way, then in the modern form. Each chapter begins with a simple question that gives the reader an idea of the nature and difficulty of what lies ahead. The applications of the theory to geometric constructions, including the ancient problems of squaring the circle, duplicating the cube, and trisecting an angle, and the construction of regular n-gons are also presented. This book is suitable for undergraduates and beginning graduate students.

This book is focused on the theoretical and practical design of reinforced concrete beams, columns and frame structures. It is based on an analytical approach of designing normal reinforced concrete structural elements that are compatible with most international design rules, including for instance the European design rules – Eurocode 2 – for reinforced concrete structures. The book tries to distinguish between what belongs to the structural design philosophy of such structural elements (related to strength of materials arguments) and what belongs to the design rule aspects associated with specific characteristic data (for the material or loading parameters). A previous book, entitled Reinforced Concrete Beams, Columns and Frames – Mechanics and Design, deals with the fundamental aspects of the mechanics and design of reinforced concrete in general, both related to the Serviceability Limit State (SLS) and the Ultimate Limit State (ULS), whereas the current book deals with more advanced ULS aspects, along with instability and second-order analysis aspects. Some recent research results including the use of non-local mechanics are also presented. This book is aimed at Masters-level students, engineers, researchers and teachers in the field of reinforced concrete design. Most of the books in this area are very practical or code-oriented, whereas this book is more theoretically based, using rigorous mathematics and mechanics tools. Contents 1. Advanced Design at Ultimate Limit State (ULS). 2. Slender Compression Members – Mechanics and Design. 3. Approximate Analysis Methods. Appendix 1. Cardano's Method. Appendix 2. Steel Reinforcement Table. About the Authors Jostein Hellesland has been Professor of Structural Mechanics at the University of Oslo, Norway since January 1988. His contribution to the field of stability has been recognized and magnified by many high-quality papers in famous international journals such as Engineering Structures, Thin-Walled Structures, Journal of Constructional Steel Research and Journal of Structural Engineering. Noël Challamel is Professor in Civil Engineering at UBS, University of South Brittany in France and chairman of the EMI-ASCE Stability committee. His contributions mainly concern the dynamics, stability and inelastic behavior of structural components, with special emphasis on Continuum Damage Mechanics (more than 70 publications in International peer-reviewed journals). Charles Casandjian was formerly Associate Professor at INSA (French National Institute of Applied Sciences), Rennes, France and the chairman of the course on reinforced concrete design. He has published work on the mechanics of concrete and is also involved in creating a web experience for teaching reinforced concrete design – BA-CORTEX.

Christophe Lanos is Professor in Civil Engineering at the University of Rennes 1 in France. He has mainly published work on the mechanics of concrete, as well as other related subjects. He is also involved in creating a web experience for teaching reinforced concrete design – BA-CORTEX.

Nowadays, algebra education is subject to worldwide scrutiny. Different opinions on its goals, approaches and achievements are at the heart of debates among teachers, educators, researchers and decision makers. What should the teaching of algebra in secondary school mathematics look like? Should it focus on procedural skills or on algebraic insight? Should it stress practice or integrate technology? Do we require formal proofs and notations, or do informal representations suffice? Is algebra in school an abstract subject, or does it take its relevance from application in (daily life) contexts? What should secondary school algebra education that prepares for higher education and professional practice in the twenty-first century look like? This book addresses these questions, and aims to inform in-service and future teachers, mathematics educators and researchers on recent insights in the domain, and on specific topics and themes such as the historical development of algebra, the role of productive practice, and algebra in science and engineering in particular. The authors, all affiliated with the Freudenthal Institute for Science and Mathematics Education in the Netherlands, share a common philosophy, which acts as a ? sometimes nearly invisible ? backbone for the overall view on algebra education: the theory of realistic mathematics education. From this point of departure, different perspectives are chosen to describe the opportunities and pitfalls of today's and tomorrow's algebra education. Inspiring examples and reflections illustrate current practice and explore the unknown future of algebra education to appropriately meet students' needs.

Cardano, an accomplished scientist of medicine and mathematics, wrote his autobiography in 1575. It's bright, satirical, and still enjoyable to read today. Annotation copyrighted by Book News, Inc., Portland, OR

This book presents a historical and scientific analysis as historical epistemology of the science of weights and mechanics in the sixteenth century, particularly as developed by Tartaglia in his Quesiti et inventioni diverse, Book VII and Book VIII (1546; 1554). In the early 16th century mechanics was concerned mainly with what is now called statics and was referred to as the Scientia de ponderibus, generally pursued by two very different approaches. The first was usually referred to as Aristotelian, where the equilibrium of bodies was set as a balance of opposite tendencies to motion. The second, usually referred to as Archimedean, identified statics with centrobarica, the theory of centres of gravity based on symmetry considerations. In between the two traditions the Italian scholar Niccolò Fontana, better known as Tartaglia (1500?–1557), wrote the treatise Quesiti et inventioni diverse (1546). This volume consists of three main parts. In the first, a historical excursus regarding Tartaglia's lifetime, his scientific production and the Scientia de ponderibus in the Arabic-Islamic culture, and from the Middle Ages to the Renaissance, is presented. Secondly, all the propositions of Books VII and VIII, by relating them with the Problemata mechanica by the Aristotelian school and Iordani opvscvlvm de ponderositate by Jordanus de Nemore are examined within the history and historical epistemology of science. The last part is relative to the original texts and critical transcriptions into Italian and Latin and an English translation. This work gathers and re-evaluates the current thinking on this subject. It brings together contributions from two distinguished experts in the history and historical epistemology of science, within the fields of physics, mathematics and engineering. It also gives much-needed insight into the subject from historical and scientific points of view. The volume composition makes for absorbing reading for historians, epistemologists, philosophers and scientists.

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

An encyclopedic collection of key scientists and the tools and concepts they developed that transformed our understanding of the physical world. * Includes over 200 A–Z entries covering topics ranging from Gregorian reform of the calendar to Thomas Hobbes, navigation, thermometers, and the trial of Galileo * Provides a chronology of the scientific revolution from the founding of the Casa de la Contratacion, a repository of navigational and cartographic knowledge, in 1503, to the death of Antoni van Leeuwenhoek in 1727

Solution of Cubic and Quartic Equations presents the classical methods in solving cubic and quartic equations to the highest possible degree of efficiency. This book suggests a rapid and efficient method of computing the roots of an arbitrary cubic equation with real coefficients, by using specially computed 5-figure tables. The method of factorizing an arbitrary quartic equation by an appropriate use of a resolvent cubic is also discussed. Section 4 of this text gives several numerical examples that show the rapidity of the procedures suggested. This publication is valuable to mathematicians and students intending to acquire knowledge of the cubic and quartic equations.

The legendary Renaissance math duel that ushered in the modern age of algebra The Secret Formula tells the story of two Renaissance mathematicians whose jealousies, intrigues, and contentious debates led to the discovery of a formula for the solution of the cubic equation. Niccolò Tartaglia was a talented and ambitious teacher who possessed a secret formula—the key to unlocking a seemingly unsolvable, two-thousand-year-old mathematical problem. He wrote it down in the form of a poem to prevent other mathematicians from stealing it. Gerolamo Cardano was a physician, gifted scholar, and notorious gambler who would not hesitate to use flattery and even trickery to learn Tartaglia's secret. Set against the backdrop of sixteenth-century Italy, The Secret Formula provides new and compelling insights into the peculiarities of Renaissance mathematics while bringing a turbulent and culturally vibrant age to life. It was an era when mathematicians challenged each other in intellectual duels held outdoors before enthusiastic crowds. Success not only enhanced the winner's reputation, but could result in prize money and professional acclaim. After hearing of Tartaglia's spectacular victory in one such contest in Venice, Cardano invited him to Milan, determined to obtain his secret by whatever means necessary. Cardano's intrigues paid off. In 1545, he was the first to publish a general solution of the cubic equation. Tartaglia, eager to take his revenge by establishing his superiority as the most brilliant mathematician of the age, challenged Cardano to the ultimate mathematical duel. A lively and compelling account of genius, betrayal, and all-too-human failings, The Secret Formula reveals the epic rivalry behind one of the fundamental ideas of modern algebra.

An examination of the evolution of one of the cornerstones of modern mathematics.

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.

Sara Confalonieri presents an overview of Cardano's mathematical treatises and, in particular, discusses the writings that deal with cubic equations. The author gives an insight into the latest of Cardano's algebraic works, the De Regula Aliza (1570), which displays the attempts to overcome the difficulties entailed by the casus irreducibilis. Notably some of Cardano's strategies in this treatise are thoroughly analyzed. Far from offering an ultimate account of De Regula Aliza, by one of the most outstanding scholars of the 16th century, the present work is a first step towards a better understanding.

From ancient Babylon to the last great unsolved problems, Ian Stewart brings us his definitive history of mathematics. In his famous straightforward style, Professor Stewart explains each major development--from the first number systems to chaos theory--and considers how each affected society and changed everyday life forever. Maintaining a personal touch, he introduces all of the outstanding mathematicians of history, from the key Babylonians, Greeks and Egyptians, via Newton and Descartes, to Fermat, Babbage and Godel, and demystifies math's key concepts without recourse to complicated formulae. Written to provide a captivating historic narrative for the non-mathematician, Taming the Infinite is packed with fascinating nuggets and quirky asides, and contains 100 illustrations and diagrams to illuminate and aid understanding of a subject many dread, but which has made our world what it is today.

This textbook is an introduction to algebra via examples. The book moves from properties of integers, through other examples, to the beginnings of group theory. Applications to public key codes and to error correcting codes are emphasised. These applications, together with sections on logic and finite state machines, make the text suitable for students of computer science as well as mathematics students. Attention is paid to historical development of the mathematical ideas. This second edition contains new material on mathematical reasoning skills and a new chapter on polynomials has been added. The book was developed from first-level courses taught in the UK and USA. These courses proved successful in developing not only a theoretical understanding but also algorithmic skills. This book can be used at a wide range of levels: it is suitable for first- or second-level university students, and could be used as enrichment material for upper-level school students.

From a review of the second edition: "This book covers many interesting topics not usually covered in a present day undergraduate course, as well as certain basic topics such as the development of the calculus and the solution of polynomial equations. The fact that the topics are introduced in their historical contexts will enable students to better appreciate and understand the mathematical ideas involved...If one constructs a list of topics central to a history course, then they would closely resemble those chosen here." (David Parrott, Australian Mathematical Society) This book offers a collection of historical essays detailing a large variety of mathematical disciplines and issues; it's accessible to a broad audience. This third edition includes new chapters on simple groups and new sections on alternating groups and the Poincare conjecture. Many more exercises have been added as well as commentary that helps place the exercises in context.

This book takes the reader on a journey from familiar high school mathematics to undergraduate algebra and number theory. The journey starts with the basic idea that new number systems arise from solving different equations, leading to (abstract) algebra. Along this journey, the reader will be exposed to important ideas of mathematics, and will learn a little about how mathematics is really done. Starting at an elementary level, the book gradually eases the reader into the complexities of higher mathematics; in particular, the formal structure of mathematical writing (definitions, theorems and proofs) is introduced in simple terms. The book covers a range of topics, from the very foundations (numbers, set theory) to basic abstract algebra (groups, rings, fields), driven throughout by the need to understand concrete equations and problems, such as determining which numbers are sums of squares. Some topics usually reserved for a more advanced audience, such as Eisenstein integers or quadratic reciprocity, are lucidly presented in an accessible way. The book also introduces the reader to open source software for computations, to enhance understanding of the material and nurture basic programming skills. For the more adventurous, a number of Outlooks included in the text offer a glimpse of possible mathematical excursions. This book supports readers in transition from high school to university mathematics, and will also benefit university students keen to explore the beginnings of algebraic number theory. It can be read either on its own or as a supporting text for first courses in algebra or number theory, and can also be used for a topics course on Diophantine equations.

The Great ArtOr, The Rules of AlgebraThe Secret FormulaHow a Mathematical Duel Inflamed Renaissance Italy and Uncovered the Cubic EquationPrinceton University Press

This book's unique approach to the teaching of mathematics lies in its use of history to provide a framework for understanding algebra and related fields. With Algebra in Context, students will soon discover why mathematics is such a crucial part not only of civilization but also of everyday life. Even those who have avoided mathematics for years will find the historical stories both inviting and gripping. The book's lessons begin with the creation and spread of number systems, from the mathematical development of early civilizations in Babylonia, Greece, China, Rome, Egypt, and Central America to the advancement of mathematics over time and the roles of famous figures such as Descartes and Leonardo of Pisa (Fibonacci). Before long, it becomes clear that the simple origins of algebra evolved into modern problem solving. Along the way, the language of mathematics becomes familiar, and students are gradually introduced to more challenging problems. Paced perfectly, Amy Shell-Gellasch and J. B. Thoo's chapters ease students from topic to topic until they reach the twenty-first century. By the end of Algebra in Context, students using this textbook will be comfortable with most algebra concepts, including • Different number bases • Algebraic notation • Methods of arithmetic calculation • Real numbers • Complex numbers • Divisors • Prime factorization • Variation • Factoring • Solving linear equations • False position • Solving quadratic equations • Solving cubic equations • nth roots • Set theory • One-to-one correspondence • Infinite sets • Figurate numbers • Logarithms • Exponential growth • Interest calculations

Niels Henrik Abel was first published in 1957. Minnesota Archive Editions uses digital technology to make long-unavailable books once again accessible, and are published unaltered from the original University of Minnesota Press editions. Few men are more famous in the world of modern mathematics than Niels Henrik Abel, whose concepts and results are familiar to all present-day mathematicians. This volume, the first biography of Abel published in English, presents the story of the brilliant young Norwegian whose scientific achievements were not fully recognized until after his untimely death. It is also a case history of our perennial problem of how to detect genius and ease its path. Abel was born in 1802 in Finnoy, a little island on the coast of Norway. His father was a minister and politician of national importance, but his family descended from prominence to moral dissolution. Abel's studies were financed by his professors, aware of his extraordinary abilities. He was granted a fellowship to travel and study on the continent, and the year and a half which he then spent in Germany, Italy, and France was a most happy period in his life. When Abel returned to Norway, he could only obtain a temporary position, and in his last years he was harassed by grave difficulties. He managed, however, to write inspired mathematical articles which made a reputation for him among the mathematicians of Europe. Just as the security he longed for seemed within his grasp, he died of tuberculosis at the age of twenty-six. Abel's life has been the subject of several books, published in the Scandinavian countries, France, and Germany, but, in preparing this biography, Mr. Ore made use of much new material obtained from private letters, official documents, and newspaper files in various European sources.

`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.

Cardano, next to Vesalius the greatest physician of his day, was also a devoted and skilled gambler who played for personal pleasure and profit. His mathematical genius enabled him to devise simple rules of probability for his own benefit and for his gambling contemporaries. These he collected in his Book on Games of Chance and embellished them with essays on the tricks of cheats and kibitzers, as well as on psychological rules of play. In this biography of a stormy Renaissance personality, Cardano's gambling studies are deciphered for the first time, and a translation of the Book on Games of Chance is appended. Originally published in 1953. The Princeton Legacy Library uses the latest print-on-demand technology to again make available previously out-of-print books from the distinguished backlist of Princeton University Press. These editions preserve the original texts of these important books while presenting them in durable paperback and hardcover editions. The goal of the Princeton Legacy Library is to vastly increase access to the rich scholarly heritage found in the thousands of books published by Princeton University Press since its founding in 1905.

This book comprises five parts. The first three contain ten historical essays on important topics: number theory, calculus/analysis, and proof, respectively. Part four deals with several historically oriented courses, and Part five provides biographies of five mathematicians who played major roles in the historical events described in the first four parts of the work. Excursions in the History of Mathematics was written with several goals in mind: to arouse mathematics teachers' interest in the history of their subject; to encourage mathematics teachers with at least some knowledge of the history of mathematics to offer courses with a strong historical component; and to provide an historical perspective on a number of basic topics taught in mathematics courses.

Images are ubiquitous. Their formation is one of natures universalities. Water droplets in suspension act in concert to produce rainbows. A partially filled wine glass can be made to form the image of a chandelier at aboring dinner party. The bottom of a water glass, too, can be made to produce an optical image, wildly distorted perhaps, but nevertheless recognizable as an optical image. Primitive folklore abounds with images. Perseus used his highly polished shield as a rear view mirror to lop off Medusa's head without turning hirnself into stone. Narcissus, displaying incrediblY poor taste, fell in love with his own reflection in a pool of water, causing poor Echo to pine away to a me re echo and providing yet another term for the psychoanalytic lexicon. Strepsiades, according to Aristophanes, proposed using a "burning stone" to melt a summons off the bailiff's wax tablet. And the castaways in Jules Vernes' MYsterious Is~nd made a burning glass by freezing water in a watch crystal. Everyone from the Baron Münchhausen to Tom Swift has gotten into the optics act with incredible but eminently useful optical devices. Indeed, Mother Nature herself has had a hand in evolving image-making de vices. Any reasonably symmetrie glob of transparent material, such as an ag gregate of cells, is capable of forming an image. It is not difficult to imag ine the specialization of such an aggregate into a blastula-like structure with an anterior window and light sensitive neurons at its posterior region.

Galois theory is the culmination of a centuries-long search for a solution to the classical problem of solving algebraic equations by radicals. In this book, Bewersdorff follows the historical development of the theory, emphasizing concrete examples along the way. As a result, many mathematical abstractions are now seen as the natural consequence of particular investigations. Few prerequisites are needed beyond general college mathematics, since the necessary ideas and properties of groups and fields are provided as needed. Results in Galois theory are formulated first in a concrete, elementary way, then in the modern form. Each chapter begins with a simple question that gives the reader an idea of the nature and difficulty of what lies ahead. The applications of the theory to geometric constructions, including the ancient problems of squaring the circle, duplicating the cube, and trisecting the angle, and the construction of regular n n-gons are also presented. This new edition contains an additional chapter as well as twenty facsimiles of milestones of classical algebra. It is suitable for undergraduates and graduate students, as well as teachers and mathematicians seeking a historical and stimulating perspective on the field.

The world around us is saturated with numbers. They are a fundamental pillar of our modern society, and accepted and used with hardly a second thought. But how did this state of affairs come to be? In this book, Leo Corry tells the story behind the idea of number from the early days of the Pythagoreans, up until the turn of the twentieth century. He presents an overview of how numbers were handled and conceived in classical Greek mathematics, in the mathematics of Islam, in European mathematics of the middle ages and the Renaissance, during the scientific revolution, all the way through to the mathematics of the 18th to the early 20th century. Focusing on both foundational debates and practical use numbers, and showing how the story of numbers is intimately linked to that of the idea of equation, this book provides a valuable insight to numbers for undergraduate students, teachers, engineers, professional mathematicians, and anyone with an interest in the history of mathematics.

Profiles more than 150 mathematicians from around the world who made important contributions to their field, including Rene Descartes, Emily Noether and Bernhard Riemann.

The seventeen equations that form the basis for life as we know it Most people are familiar with history's great equations: Newton's Law of Gravity, for instance, or Einstein's theory of relativity. But the way these mathematical breakthroughs have contributed to human progress is seldom appreciated. In In Pursuit of the Unknown, celebrated mathematician Ian Stewart untangles the roots of our most important mathematical statements to show that equations have long been a driving force behind nearly every aspect of our lives. Using seventeen of our most crucial equations--including the Wave Equation that allowed engineers to measure a building's response to earthquakes, saving countless lives, and the Black-Scholes model, used by bankers to track the price of financial derivatives over time--Stewart illustrates that many of the advances we now take for granted were made possible by mathematical discoveries. An approachable, lively, and informative guide to the mathematical building blocks of modern life, In Pursuit of the Unknown is a penetrating exploration of how we have also used equations to make sense of, and in turn influence, our world.

Lucid coverage of the major theories of abstract algebra, with helpful illustrations and exercises included throughout. Unabridged, corrected republication of the work originally published 1971. Bibliography. Index. Includes 24 tables and figures.

The quadratic formula for the solution of quadratic equations was discovered independently by scholars in many ancient cultures and is familiar to everyone. Less well known are formulas for solutions of cubic and quartic equations whose discovery was the high point of 16th century mathematics. Their study forms the heart of this book, as part of the broader theme that a polynomial's coefficients can be used to obtain detailed information on its roots. The book is designed for self-study, with many results presented as exercises and some supplemented by outlines for solution. The intended audience includes in-service and prospective secondary mathematics teachers, high school students eager to go beyond the standard curriculum, undergraduates who desire an in-depth look at a topic they may have unwittingly skipped over, and the mathematically curious who wish to do some work to unlock the mysteries of this beautiful subject.

" A global survey of the history of mathematics, this newly corrected and updated collection of 32 highly readable essays features contributions by such distinguished educators as Carl Boyer and Morris Kline. Fascinating articles explore studies by Fibonacci, Descartes, Cardano, Kepler, Galileo, Pascal, Newton, Euler, and others. Suitable for readers with no background in math"--

'Vector Calculus' helps students foster computational skills and intuitive understanding with a careful balance of theory, applications, and optional materials. This new edition offers revised coverage in several areas as well as a large number of new exercises and expansion of historical notes.

Presenting a look at the human mind's capacity while criticizing artificial intelligence, the author makes suggestions about classical and quantum physics and the role of microtubules

The History of Mathematics: A Source-Based Approach is a comprehensive history of the development of mathematics. This, the first volume of the two-volume set, takes readers from the beginning of counting in prehistory to 1600 and the threshold of the discovery of calculus. It is notable for the extensive engagement with original—primary and secondary—source material. The coverage is worldwide, and embraces developments, including education, in Egypt, Mesopotamia, Greece, China, India, the Islamic world and Europe. The emphasis on astronomy and its historical relationship to mathematics is new, and the presentation of every topic is informed by the most recent scholarship in the field. The two-volume set was designed as a textbook for the authors' acclaimed year-long course at the Open University. It is, in addition to being an innovative and insightful textbook, an invaluable resource for students and scholars of the history of mathematics. The authors, each among the most distinguished mathematical historians in the world, have produced over fifty books and earned scholarly and expository prizes from the major mathematical societies of the English-speaking world.

A comprehensive presentation of abstract algebra and an in-depth treatment of the applications of algebraic techniques and the relationship of algebra to other disciplines, such as number theory, combinatorics, geometry, topology, differential equations, and Markov chains.

From its history as an elegant but abstract area of mathematics, algebraic number theory now takes its place as a useful and accessible study with important real-world practicality. Unique among algebraic number theory texts, this important work offers a wealth of applications to cryptography, including factoring, primality-testing, and public-key cryptosystems. A follow-up to Dr. Mollin's popular Fundamental Number Theory with Applications, Algebraic Number Theory provides a global approach to the subject that selectively avoids local theory. Instead, it carefully leads the student through each topic from the level of the algebraic integer, to the arithmetic of number fields, to ideal theory, and closes with reciprocity laws. In each chapter the author includes a section on a cryptographic application of the ideas presented, effectively demonstrating the pragmatic side of theory. In this way Algebraic Number Theory provides a comprehensible yet thorough treatment of the material. Written for upper-level undergraduate and graduate courses in algebraic number theory, this one-of-a-kind text brings the subject matter to life with historical background and real-world practicality. It easily serves as the basis for a range of courses, from bare-bones algebraic number theory, to a course rich with cryptography applications, to a course using the basic theory to prove Fermat's Last Theorem for regular primes. Its offering of over 430 exercises with odd-numbered solutions provided in the back of the book and, even-numbered solutions available a separate manual makes this the ideal text for both students and instructors.