

Mathematics A Very Short Introduction Timothy Gowers

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Topology OUP Oxford

Making good decisions under conditions of uncertainty requires an appreciation of the way random chance works. In this Very Short Introduction, John Haigh provides a brief account of probability theory; explaining the philosophical approaches, discussing probability distributions, and looking its applications in science and economics.

Geometry: A Very Short Introduction Cambridge University Press

Symmetry is an immensely important concept in mathematics and throughout the sciences. In this Very Short Introduction, Ian Stewart highlights the deep implications of symmetry and its important scientific applications across the entire subject.

Big Data OUP Oxford

Born of the desire to understand the workings of motions of the heavenly bodies, trigonometry gave the ancient Greeks the ability to predict their futures. Most of what we see of the subject in school comes from these heavenly origins; 15th century astronomer Regiomontanus called it "the foot of the ladder to the stars." In this Very Short Introduction Glen Van Brummelen shows how trigonometry connects mathematics to science, and has today become an indispensable tool in predicting cyclic patterns like animal populations and ocean tides. Its historical journey through major cultures such as medieval India and the Islamic World has taken it through disciplines such as geography and even religious practice. Trigonometry has also been a major player in the most startling mathematical developments of the modern world. Its interactions with the concept of infinity led to Taylor and Fourier series, some of the most practical tools of modern science. The birth of complex numbers led to a shocking union of exponential and trigonometric functions, creating the most beautiful formulas and powerful modelling tools in science. Finally, as Van Brummelen shows, trigonometry allows us to explore the strange new worlds of non-Euclidean geometries, opening up bizarre possibilities for the shape of space itself. And indeed, one of those new geometries - spherical - takes us full circle back to ancient Greek astronomers and European navigators, who first used it to chart their ways across the heavens and the earth. ABOUT THE SERIES: The Very Short Introductions series from Oxford University Press contains hundreds of titles in almost every subject area. These pocket-sized books are the perfect way to get ahead in a new subject quickly. Our expert authors combine facts, analysis, perspective, new ideas, and enthusiasm to make interesting and challenging topics highly readable.

Algebra Oxford University Press

Review: "Mathematics is a subject we are all exposed to in our daily lives, but one which many of us fear. In this introduction, Timothy Gowers elucidates the most fundamental differences, which are primarily philosophical, between advanced mathematics and what we learn at school, so that one emerges with a clearer understanding of such paradoxical-sounding concepts as 'infinity', 'curved space', and 'imaginary numbers'. From basic ideas, through to philosophical queries, to common sociological questions about the mathematical community, this book unravels some of the mysteries of space and numbers."--BOOK JACKET.

An Introduction to the Philosophy of Mathematics Oxford University Press, USA

The study of geometry is at least 2500 years old, and it is within this field that the concept of mathematical proof - deductive reasoning from a set of axioms - first arose. To this day

geometry remains a very active area of research in mathematics. This Very Short Introduction covers the areas of mathematics falling under geometry, starting with topics such as Euclidean and non-Euclidean geometries, and ranging to curved spaces, projective geometry in Renaissance art, and geometry of space-time inside a black hole. Starting from the basics, Maciej Dunajski proceeds from concrete examples (of mathematical objects like Platonic solids, or theorems like the Pythagorean theorem) to general principles. Throughout, he outlines the role geometry plays in the broader context of science and art. Very Short Introductions: Brilliant, Sharp, Inspiring ABOUT THE SERIES: The Very Short Introductions series from Oxford University Press contains hundreds of titles in almost every subject area. These pocket-sized books are the perfect way to get ahead in a new subject quickly. Our expert authors combine facts, analysis, perspective, new ideas, and enthusiasm to make interesting and challenging topics highly readable.

The History of Mathematics: A Very Short Introduction OUP Oxford

In the 1800s mathematicians introduced a formal theory of symmetry: group theory. Now a branch of abstract algebra, this subject first arose in the theory of equations. Symmetry is an immensely important concept in mathematics and throughout the sciences, and its applications range across the entire subject. Symmetry governs the structure of crystals, innumerable types of pattern formation, how systems change their state as parameters vary; and fundamental physics is governed by symmetries in the laws of nature. It is highly visual, with applications that include animal markings, locomotion, evolutionary biology, elastic buckling, waves, the shape of the Earth, and the form of galaxies. In this Very Short Introduction, Ian Stewart demonstrates its deep implications, and shows how it plays a major role in the current search to unify relativity and quantum theory. ABOUT THE SERIES: The Very Short Introductions series from Oxford University Press contains hundreds of titles in almost every subject area. These pocket-sized books are the perfect way to get ahead in a new subject quickly. Our expert authors combine facts, analysis, perspective, new ideas, and enthusiasm to make interesting and challenging topics highly readable.

Physics: A Very Short Introduction Oxford University Press, USA

Many are familiar with the beauty and ubiquity of fractal forms within nature. Unlike the study of smooth forms such as spheres, fractal geometry describes more familiar shapes and patterns, such as the complex contours of coastlines, the outlines of clouds, and the branching of trees. In this Very Short Introduction, Kenneth Falconer looks at the roots of the 'fractal revolution' that occurred in mathematics in the 20th century, presents the 'new geometry' of fractals, explains the basic concepts, and explores the wide range of applications in science, and in aspects of economics. This is essential introductory reading for students of mathematics and science, and those interested in popular science and mathematics. ABOUT THE SERIES: The Very Short Introductions series from Oxford University Press contains hundreds of titles in almost every subject area. These pocket-sized books are the perfect way to get ahead in a new subject quickly. Our expert authors combine facts, analysis, perspective, new ideas, and enthusiasm to make interesting and challenging topics highly readable.

Fractals: A Very Short Introduction Cambridge University Press

Quantum Theory is the most revolutionary discovery in physics since Newton. This book gives a lucid, exciting, and accessible account of the surprising and counterintuitive ideas that shape our understanding of the sub-atomic world. It does not disguise the problems of interpretation that still remain unsettled 75 years after the initial discoveries. The main text makes no use of equations, but there is a Mathematical Appendix for those desiring stronger fare. Uncertainty, probabilistic physics, complementarity, the problematic character of measurement, and decoherence are among the many topics discussed. ABOUT THE SERIES: The Very Short Introductions series from Oxford University Press contains hundreds of titles in almost every subject area. These pocket-sized books are the perfect way to get ahead in a new subject quickly. Our expert authors combine facts, analysis, perspective, new ideas, and enthusiasm to make interesting and challenging topics highly readable.

Numbers: A Very Short Introduction Oxford Paperbacks

Logic is often perceived as having little to do with the rest of philosophy, and even less to do with real life. Graham Priest explores the philosophical roots of the subject, explaining how modern formal logic addresses many issues.

Mathematics: A Very Short Introduction OUP Oxford

How is a subway map different from other maps? What makes a knot knotted? What makes the Mbius strip one-sided? These are questions of topology, the mathematical study of properties preserved by twisting or stretching objects. In the 20th century topology became as

broad and fundamental as algebra and geometry, with important implications for science, especially physics. In this Very Short Introduction Richard Earl gives a sense of the more visual elements of topology (looking at surfaces) as well as covering the formal definition of continuity. Considering some of the eye-opening examples that led mathematicians to recognize a need for studying topology, he pays homage to the historical people, problems, and surprises that have propelled the growth of this field. ABOUT THE SERIES: The Very Short Introductions series from Oxford University Press contains hundreds of titles in almost every subject area. These pocket-sized books are the perfect way to get ahead in a new subject quickly. Our expert authors combine facts, analysis, perspective, new ideas, and enthusiasm to make interesting and challenging topics highly readable.

Mathematical Finance Oxford University Press, USA

Games are played everywhere: from economics to evolutionary biology, and from social interactions to online auctions. This title shows how to play such games in a rational way, and how to maximize their outcomes.

A Short Introduction to String Theory OUP Oxford

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. ABOUT THE SERIES: The Very Short Introductions series from Oxford University Press contains hundreds of titles in almost every subject area. These pocket-sized books are the perfect way to get ahead in a new subject quickly. Our expert authors combine facts, analysis, perspective, new ideas, and enthusiasm to make interesting and challenging topics highly readable.

Combinatorics Oxford University Press, USA

A concise and pedagogical introduction to string theory for graduate students featuring examples and homework problems.

Complexity Oxford University Press

How many possible sudoku puzzles are there? In the lottery, what is the chance that two winning balls have consecutive numbers? Who invented Pascal's triangle? (it was not Pascal) Combinatorics, the branch of mathematics concerned with selecting, arranging, and listing or counting collections of objects, works to answer all these questions. Dating back some 3000 years, and initially consisting mainly of the study of permutations and combinations, its scope has broadened to include topics such as graph theory, partitions of numbers, block designs, design of codes, and latin squares. In this Very Short Introduction Robin Wilson gives an overview of the field and its applications in mathematics and computer theory, considering problems from the shortest routes covering certain stops to the minimum number of colours needed to colour a map with different colours for neighbouring countries. ABOUT THE SERIES: The Very Short Introductions series from Oxford University Press contains hundreds of titles in almost every subject area. These pocket-sized books are the perfect way to get ahead in a new subject quickly. Our expert authors combine facts, analysis, perspective, new ideas, and enthusiasm to make interesting and challenging topics highly readable.

Information: A Very Short Introduction OUP Oxford

Making good decisions under conditions of uncertainty - which is the norm - requires a sound appreciation of the way random chance works. As analysis and modelling of most aspects of the world, and all measurement, are necessarily imprecise and involve uncertainties of varying degrees, the understanding and management of probabilities is central to much work in the sciences and economics. In this Very Short Introduction, John Haigh introduces the ideas of probability and different philosophical approaches to probability, and gives a brief account of the history of development of probability theory, from Galileo and Pascal to Bayes, Laplace, Poisson, and Markov. He describes the basic probability distributions, and goes on to discuss a wide range of applications in science, economics, and a variety of other contexts such as games and betting. He concludes with an intriguing discussion of coincidences and some curious paradoxes. ABOUT THE SERIES: The Very Short Introductions series from Oxford University Press contains hundreds of titles in almost every subject area. These pocket-sized books are the perfect way to get ahead in a new subject

quickly. Our expert authors combine facts, analysis, perspective, new ideas, and enthusiasm to make interesting and challenging topics highly readable.

[Mathematics](#) OUP Oxford

The aim of this volume is to explain the differences between research-level mathematics and the maths taught at school. Most differences are philosophical and the first few chapters are about general aspects of mathematical thought.

Probability: A Very Short Introduction OUP Oxford

Every atom of our bodies has been part of a star. Our very own star, the Sun, is crucial to the development and sustainability of life on Earth. This Very Short Introduction presents a modern, authoritative examination of how stars live, producing all the chemical elements beyond helium, and how they die, sometimes spectacularly, to end as remnants such as black holes. Andrew King shows how understanding the stars is key to understanding the galaxies they inhabit, and thus the history of our entire Universe, as well as the existence of planets like our own. King presents a fascinating exploration of the science of stars, from the mechanisms that allow stars to form and the processes that allow them to shine, as well as the results of their inevitable death. ABOUT THE SERIES: The Very Short Introductions series from Oxford University Press contains hundreds of titles in almost every subject area. These pocket-sized books are the perfect way to get ahead in a new subject quickly. Our expert authors combine facts, analysis, perspective, new ideas, and enthusiasm to make interesting and challenging topics highly readable.

[Choice Theory: A Very Short Introduction](#) Oxford Paperbacks

Physics, the fundamental science of matter and energy, encompasses all levels of nature from the subatomic to the cosmic, and underlies much of the technology around us. Understanding the physics of our universe is an essential aspect of humanity's quest to understand our environment and our place within it. Doing physics enables us to explore the interaction between environment and human society, and can help us to work towards the future sustainability of the planet. This Very Short Introduction provides an overview of how this pervasive science came to be and how it works: who funds it, how physicists are trained and how they think, and how physics supports the technology we all use. Sidney Perkowitz presents the theories and outcomes of pure and applied physics from ideas of the Greek natural philosophers to modern quantum mechanics, cosmology, digital electronics and energy production. Considering its most consequential experiments, including recent results in elementary particles, gravitational waves and materials science, he also discusses outside the lab, the effects of physics on society, culture, and humanity's vision of its place in the universe. ABOUT THE SERIES: The Very Short Introductions series from Oxford University Press contains hundreds of titles in almost every subject area. These pocket-sized books are the perfect way to get ahead in a new subject quickly. Our expert authors combine facts, analysis, perspective, new ideas, and enthusiasm to make interesting and challenging topics highly readable.

[Logic: A Very Short Introduction](#) Oxford Paperbacks

We make choices all the time - about trivial matters, about how to spend our money, about how to spend our time, about what to do with our lives. And we are also constantly judging the decisions other people make as rational or irrational. But what kind of criteria are we applying when we say that a choice is rational? What guides our own choices, especially in cases where we don't have complete information about the outcomes? What strategies should be applied in making decisions which affect a lot of people, as in the case of government policy? This book explores what it means to be rational in all these contexts. It introduces ideas from economics, philosophy, and other areas, showing how the theory applies to decisions in everyday life, and to particular situations such as gambling and the allocation of resources. ABOUT THE SERIES: The Very Short Introductions series from Oxford University Press contains hundreds of titles in almost every subject area. These pocket-sized books are the perfect way to get ahead in a new subject quickly. Our expert authors combine facts, analysis, perspective, new ideas, and enthusiasm to make interesting and challenging topics highly readable.

[Cryptography: A Very Short Introduction](#) OUP Oxford

What is 'nothing'? What remains when you take all the matter away? Can empty space - a void - exist? This Very Short Introduction explores the science and the history of the elusive void: from Aristotle who insisted that the vacuum was impossible, via the theories of Newton and Einstein, to our very latest discoveries and why they can tell us extraordinary things about the cosmos. Frank Close tells the story of how scientists have explored the elusive void, and the rich discoveries that they have made there. He takes the reader on a lively and accessible history through ancient ideas and cultural superstitions to the frontiers of current research. He describes how scientists discovered that the vacuum is filled with fields; how Newton, Mach, and Einstein grappled with the nature of space and time; and how the mysterious 'aether' that was long ago supposed to permeate the void may now be making a comeback with the latest research into the 'Higgs field'. We now know that the vacuum is far from being empty - it seethes with virtual particles and antiparticles that erupt spontaneously into being, and it also may contain hidden dimensions that we were previously unaware of. These new discoveries may provide answers to some of cosmology's most fundamental questions: what lies outside the universe, and, if there was once nothing, then how did the universe begin? ABOUT THE SERIES: The Very Short Introductions series from Oxford University Press contains hundreds of titles in almost every subject area. These pocket-sized books are the perfect way to get ahead in a new subject quickly. Our expert authors combine facts, analysis, perspective, new ideas, and enthusiasm to make interesting and challenging topics highly readable.