

A Most Incomprehensible Thing Notes Towards Very Gentle Introduction To The Mathematics Of Relativity Peter Collier

A straightforward, enjoyable guide to the mathematics of Einstein's relativity To really understand Einstein's theory of relativity – one of the cornerstones of modern physics – you have to get to grips with the underlying mathematics. This self-study guide is aimed at the general reader who is motivated to tackle that not insignificant challenge. With a user-friendly style, clear step-by-step mathematical derivations, many fully solved problems and numerous diagrams, this book provides a comprehensive introduction to a fascinating but complex subject. For those with minimal mathematical background, the first chapter gives a crash course in foundation mathematics. The reader is then taken gently by the hand and guided through a wide range of fundamental topics, including Newtonian mechanics; the Lorentz transformations; tensor calculus; the Einstein field equations; the Schwarzschild solution (which gives a good approximation of the spacetime of our Solar System); simple black holes, relativistic cosmology and gravitational waves. Special relativity helps explain a huge range of non-gravitational physical phenomena and has some strangely counter-intuitive consequences. These include time dilation, length contraction, the relativity of simultaneity, mass-energy equivalence and an absolute speed limit. General relativity, the leading theory of gravity, is at the heart of our understanding of cosmology and black holes. "I must observe that the theory of relativity resembles a building consisting of two separate stories, the special theory and the general theory. The special theory, on which the general theory rests, applies to all physical phenomena with the exception of gravitation; the general theory provides the law of gravitation and its relations to the other forces of nature." – Albert Einstein, 1919 Understand even the basics of Einstein's amazing theory and the world will never seem the same again. Contents: Preface Introduction 1 Foundation mathematics 2 Newtonian mechanics 3 Special relativity 4 Introducing the manifold 5 Scalars, vectors, one-forms and tensors 6 More on curvature 7 General relativity 8 The Newtonian limit 9 The Schwarzschild metric 10 Schwarzschild black holes 11 Cosmology 12 Gravitational waves Appendix: The Riemann curvature tensor Bibliography Acknowledgements January 2019. This third edition has been revised to make the material even more accessible to the enthusiastic general reader who seeks to understand the mathematics of relativity.

Primarily intended for the undergraduate and postgraduate students of mathematics, this textbook covers both geometry and tensor in a single volume. This book aims to provide a conceptual exposition of the fundamental results in the theory of tensors. It also illustrates the applications of tensors to differential geometry, mechanics and relativity. Organized in ten chapters, it provides the origin and nature of the tensor along with the scope of the tensor calculus. Besides this, it also discusses N-dimensional Riemannian space, characteristic peculiarity of Riemannian space, intrinsic property of surfaces, and properties and transformation of Christoffel's symbols. Besides the students of mathematics, this book will be equally useful for the postgraduate students of physics. KEY FEATURES : Contains 250 worked out examples Includes more than 350 unsolved problems Gives thorough foundation in Tensors

Around 1637, the French jurist Pierre de Fermat scribbled in the margin of his copy of the book Arithmetica what came to be known as Fermat's Last Theorem, the most famous question in mathematical history. Stating that it is impossible to split a cube into two cubes, or a fourth power into two fourth powers, or any higher power into two like powers, but not leaving behind the marvelous proof he claimed to have had, Fermat prompted three and a half centuries of mathematical inquiry which culminated only recently with the proof of the theorem by Andrew

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Wiles. This book offers the first serious treatment of Fermat's Last Theorem since Wiles's proof. It is based on a series of lectures given by the author to celebrate Wiles's achievement, with each chapter explaining a separate area of number theory as it pertains to Fermat's Last Theorem. Together, they provide a concise history of the theorem as well as a brief discussion of Wiles's proof and its implications. Requiring little more than one year of university mathematics and some interest in formulas, this overview provides many useful tips and cites numerous references for those who desire more mathematical detail. The book's most distinctive feature is its easy-to-read, humorous style, complete with examples, anecdotes, and some of the lesser-known mathematics underlying the newly discovered proof. In the author's own words, the book deals with "serious mathematics without being too serious about it." Alf van der Poorten demystifies mathematical research, offers an intuitive approach to the subject-loosely suggesting various definitions and unexplained facts-and invites the reader to fill in the missing links in some of the mathematical claims. Entertaining, controversial, even outrageous, this book not only tells us why, in all likelihood, Fermat did not have the proof for his last theorem, it also takes us through historical attempts to crack the theorem, the prizes that were offered along the way, and the consequent motivation for the development of other areas of mathematics. Notes on Fermat's Last Theorem is invaluable for students of mathematics, and of real interest to those in the physical sciences, engineering, and computer sciences-indeed for anyone who craves a glimpse at this fascinating piece of mathematical history. An exciting introduction to modern number theory as reflected by the history of Fermat's Last Theorem This book displays the unique talents of author Alf van der Poorten in mathematical exposition for mathematicians. Here, mathematics' most famous question and the ideas underlying its recent solution are presented in a way that appeals to the imagination and leads the reader through related areas of number theory. The first book to focus on Fermat's Last Theorem since Andrew Wiles presented his celebrated proof, Notes on Fermat's Last Theorem surveys 350 years of mathematical history in an amusing and intriguing collection of tidbits, anecdotes, footnotes, exercises, references, illustrations, and more. Proving that mathematics can make for lively reading as well as intriguing thought, this thoroughly accessible treatment Helps students and professionals develop a background in number theory and provides introductions to the various fields of theory that are touched upon * Offers insight into the exciting world of mathematical research * Covers a number of areas appropriate for classroom use * Assumes only one year of university mathematics background even for the more advanced topics * Explains why Fermat surely did not have the proof to his theorem * Examines the efforts of mathematicians over the centuries to solve the problem * Shows how the pursuit of the theorem contributed to the greater development of mathematics

Tensors have numerous applications in physics and engineering. There is often a fuzzy haze surrounding the concept of tensor that puzzles many students. The old-fashioned definition is difficult to understand because it is not rigorous; the modern definitions are difficult to understand because they are rigorous but at a cost of being more abstract and less intuitive. The goal of this book is to elucidate the concepts in an intuitive way but without loss of rigor, to help students gain deeper understanding. As a result, they will not need to recite those definitions in a parrot-like manner any more. This volume answers common questions and corrects many misconceptions about tensors. A large number of illuminating illustrations helps the reader to understand the concepts more easily. This unique reference text will benefit researchers, professionals, academics, graduate students and undergraduate students.

'This is about gob-smacking science at the far end of reason ... Take it nice and easy and savour the experience of your mind being blown without recourse to hallucinogens' Nicholas Lezard, Guardian For most people, quantum theory is a byword for mysterious, impenetrable science. And yet for many years it was equally baffling for scientists themselves. In this magisterial book, Manjit Kumar gives a dramatic and superbly-written history of this

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fundamental scientific revolution, and the divisive debate at its core. Quantum theory looks at the very building blocks of our world, the particles and processes without which it could not exist. Yet for 60 years most physicists believed that quantum theory denied the very existence of reality itself. In this tour de force of science history, Manjit Kumar shows how the golden age of physics ignited the greatest intellectual debate of the twentieth century. Quantum theory is weird. In 1905, Albert Einstein suggested that light was a particle, not a wave, defying a century of experiments. Werner Heisenberg's uncertainty principle and Erwin Schrodinger's famous dead-and-alive cat are similarly strange. As Niels Bohr said, if you weren't shocked by quantum theory, you didn't really understand it. While "Quantum" sets the science in the context of the great upheavals of the modern age, Kumar's centrepiece is the conflict between Einstein and Bohr over the nature of reality and the soul of science. 'Bohr brainwashed a whole generation of physicists into believing that the problem had been solved', lamented the Nobel Prize-winning physicist Murray Gell-Mann. But in "Quantum", Kumar brings Einstein back to the centre of the quantum debate. "Quantum" is the essential read for anyone fascinated by this complex and thrilling story and by the band of brilliant men at its heart.

Introduction to General Relativity and Cosmology gives undergraduate students an overview of the fundamental ideas behind the geometric theory of gravitation and spacetime. Through pointers on how to modify and generalise Einstein's theory to enhance understanding, it provides a link between standard textbook content and current research in the field. Chapters present complicated material practically and concisely, initially dealing with the mathematical foundations of the theory of relativity, in particular differential geometry. This is followed by a discussion of the Einstein field equations and their various properties. Also given is analysis of the important Schwarzschild solutions, followed by application of general relativity to cosmology. Questions with fully worked answers are provided at the end of each chapter to aid comprehension and guide learning. This pared down textbook is specifically designed for new students looking for a workable, simple presentation of some of the key theories in modern physics and mathematics.

#1 NEW YORK TIMES BESTSELLER When and how did the universe begin? Why are we here? What is the nature of reality? Is the apparent "grand design" of our universe evidence of a benevolent creator who set things in motion—or does science offer another explanation? In this startling and lavishly illustrated book, Stephen Hawking and Leonard Mlodinow present the most recent scientific thinking about these and other abiding mysteries of the universe, in nontechnical language marked by brilliance and simplicity. According to quantum theory, the cosmos does not have just a single existence or history. The authors explain that we ourselves are the product of quantum fluctuations in the early universe, and show how quantum theory predicts the "multiverse"—the idea that ours is just one of many universes that appeared spontaneously out of nothing, each with different laws of nature. They conclude with a riveting assessment of M-theory, an explanation of the laws governing our universe that is currently the only viable candidate for a "theory of everything": the unified theory that Einstein was looking for, which, if confirmed, would represent the ultimate triumph of human reason.

A groundbreaking text and reference book on twenty-first-century classical physics and its applications This first-year graduate-level text and reference book covers the fundamental concepts and twenty-first-century applications of six major areas of classical physics that every masters- or PhD-level physicist should be exposed to, but often isn't: statistical physics, optics (waves of all sorts), elastodynamics, fluid mechanics, plasma physics, and special and general relativity and cosmology. Growing out of a full-year course that the eminent researchers Kip Thorne and Roger Blandford taught at Caltech for almost three decades, this book is designed to broaden the training of physicists. Its six main topical sections are also designed so they can be used in separate courses, and the book provides an invaluable reference for researchers. Presents all the major fields of classical physics except three prerequisites: classical

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mechanics, electromagnetism, and elementary thermodynamics Elucidates the interconnections between diverse fields and explains their shared concepts and tools Focuses on fundamental concepts and modern, real-world applications Takes applications from fundamental, experimental, and applied physics; astrophysics and cosmology; geophysics, oceanography, and meteorology; biophysics and chemical physics; engineering and optical science and technology; and information science and technology Emphasizes the quantum roots of classical physics and how to use quantum techniques to elucidate classical concepts or simplify classical calculations Features hundreds of color figures, some five hundred exercises, extensive cross-references, and a detailed index An online illustration package is available

A little girl and her canine assistant set out to make the most magnificent thing. But after much hard work, the end result is not what the girl had in mind. Frustrated, she quits. Her assistant suggests a long walk, and as they walk, it slowly becomes clear what the girl needs to do to succeed. A charming story that will give kids the most magnificent thing: perspective!

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In recent years the methods of modern differential geometry have become of considerable importance in theoretical physics and have found application in relativity and cosmology, high-energy physics and field theory, thermodynamics, fluid dynamics and mechanics. This textbook provides an introduction to these methods - in particular Lie derivatives, Lie groups and differential forms - and covers their extensive applications to theoretical physics. The reader is assumed to have some familiarity with advanced calculus, linear algebra and a little elementary operator theory. The advanced physics undergraduate should therefore find the presentation quite accessible. This account will prove valuable for those with backgrounds in physics and applied mathematics who desire an introduction to the subject. Having studied the book, the reader will be able to comprehend research papers that use this mathematics and follow more advanced pure-mathematical expositions.

Essential reading for scholars, poetry lovers, and anyone with an interest in Rainer Maria Rilke, German poetry, or the creative impulse, these ten letters of correspondence between Rilke and a young aspiring poet reveal elements from the inner workings of his own poetic identity. The letters coincided with an important stage of his artistic development and readers can trace many of the themes that later emerge in his best works to these messages—Rilke himself stated these letters contained part of his creative genius.

“Eugene Sledge became more than a legend with his memoir, *With The Old Breed*. He became a chronicler, a historian, a storyteller who turns the extremes of the war in the Pacific—the terror, the camaraderie, the banal and the extraordinary—into terms we mortals can grasp.”—Tom Hanks *NEW YORK TIMES BESTSELLER* In *The Wall Street Journal*, Victor Davis Hanson named *With the Old Breed* one of the top five books on epic twentieth-century battles. Studs Terkel interviewed the author for his definitive oral history, *The Good War*. Now E. B. Sledge’s acclaimed first-person account of fighting at Peleliu and Okinawa returns to thrill, edify, and inspire a new generation. An Alabama boy steeped in American history and enamored of such heroes as George Washington and Daniel Boone, Eugene B. Sledge became part of the war’s famous 1st Marine Division—3rd Battalion, 5th Marines. Even after intense training, he was shocked to be thrown into the battle of Peleliu, where “the world was a nightmare of flashes, explosions, and snapping bullets.” By the time Sledge hit the hell of Okinawa, he was a combat vet, still filled with fear but no longer with panic. Based on notes Sledge secretly kept in a copy of the New Testament, *With the Old Breed* captures with utter simplicity and searing honesty the experience of a soldier in the fierce Pacific Theater. Here is what saved, threatened, and changed his life. Here, too, is the story of how he learned to hate and kill—and came to love—his fellow man. “In all the literature on the Second World War, there is not a more honest, realistic or moving memoir than Eugene Sledge’s. This is the real deal,

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the real war: unvarnished, brutal, without a shred of sentimentality or false patriotism, a profound primer on what it actually was like to be in that war. It is a classic that will outlive all the armchair generals' safe accounts of—not the 'good war'—but the worst war ever.”—Ken Burns

As the Reverend John Ames approaches the hour of his own death, he writes a letter to his son chronicling three previous generations of his family, a story that stretches back to the Civil War and reveals uncomfortable secrets about the family of preachers. Reader's Guide available. Reprint.

Stimulating account of development of mathematics from arithmetic, algebra, geometry and trigonometry, to calculus, differential equations, and non-Euclidean geometries. Also describes how math is used in optics, astronomy, and other phenomena.

This book provides an introduction to the theory of relativity and the mathematics used in its processes. Three elements of the book make it stand apart from previously published books on the theory of relativity. First, the book starts at a lower mathematical level than standard books with tensor calculus of sufficient maturity to make it possible to give detailed calculations of relativistic predictions of practical experiments. Self-contained introductions are given, for example vector calculus, differential calculus and integrations. Second, in-between calculations have been included, making it possible for the non-technical reader to follow step-by-step calculations. Thirdly, the conceptual development is gradual and rigorous in order to provide the inexperienced reader with a philosophically satisfying understanding of the theory. The goal of this book is to provide the reader with a sound conceptual understanding of both the special and general theories of relativity, and gain an insight into how the mathematics of the theory can be utilized to calculate relativistic effects.

Understanding tensors is essential for any physics student dealing with phenomena where causes and effects have different directions. A horizontal electric field producing vertical polarization in dielectrics; an unbalanced car wheel wobbling in the vertical plane while spinning about a horizontal axis; an electrostatic field on Earth observed to be a magnetic field by orbiting astronauts—these are some situations where physicists employ tensors. But the true beauty of tensors lies in this fact: When coordinates are transformed from one system to another, tensors change according to the same rules as the coordinates. Tensors, therefore, allow for the convenience of coordinates while also transcending them. This makes tensors the gold standard for expressing physical relationships in physics and geometry. Undergraduate physics majors are typically introduced to tensors in special-case applications. For example, in a classical mechanics course, they meet the "inertia tensor," and in electricity and magnetism, they encounter the "polarization tensor." However, this piecemeal approach can set students up for misconceptions when they have to learn about tensors in more advanced physics and mathematics studies (e.g., while enrolled in a graduate-level general relativity course or when studying non-Euclidean geometries in a higher mathematics class). Dwight E. Neuenschwander's *Tensor Calculus for Physics* is a bottom-up approach that emphasizes motivations before providing definitions. Using a clear, step-by-step approach, the book strives to embed the logic of tensors in contexts that demonstrate why that logic is worth pursuing. It is an ideal companion for courses such as mathematical methods of physics, classical mechanics, electricity and magnetism, and

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relativity.

Einstein's general theory of relativity is widely considered to be one of the most elegant and successful scientific theories ever developed, and it is increasingly being taught in a simplified form at advanced undergraduate level within both physics and mathematics departments. Due to the increasing interest in gravitational physics, in both the academic and the public sphere, driven largely by widely-publicised developments such as the recent observations of gravitational waves, general relativity is also one of the most popular scientific topics pursued through self-study. Modern General Relativity introduces the reader to the general theory of relativity using an example-based approach, before describing some of its most important applications in cosmology and astrophysics, such as gamma-ray bursts, neutron stars, black holes, and gravitational waves. With hundreds of worked examples, explanatory boxes, and end-of-chapter problems, this textbook provides a solid foundation for understanding one of the towering achievements of twentieth-century physics. One of the world's most beloved and bestselling writers takes his ultimate journey -- into the most intriguing and intractable questions that science seeks to answer. In *A Walk in the Woods*, Bill Bryson trekked the Appalachian Trail -- well, most of it. In *In A Sunburned Country*, he confronted some of the most lethal wildlife Australia has to offer. Now, in his biggest book, he confronts his greatest challenge: to understand -- and, if possible, answer -- the oldest, biggest questions we have posed about the universe and ourselves. Taking as territory everything from the Big Bang to the rise of civilization, Bryson seeks to understand how we got from there being nothing at all to there being us. To that end, he has attached himself to a host of the world's most advanced (and often obsessed) archaeologists, anthropologists, and mathematicians, travelling to their offices, laboratories, and field camps. He has read (or tried to read) their books, pestered them with questions, apprenticed himself to their powerful minds. *A Short History of Nearly Everything* is the record of this quest, and it is a sometimes profound, sometimes funny, and always supremely clear and entertaining adventure in the realms of human knowledge, as only Bill Bryson can render it. Science has never been more involving or entertaining. Refuting the accepted belief that mathematics is exact and infallible, the author examines the development of conflicting concepts of mathematics and their implications for the physical, applied, social, and computer sciences. This book provides an introduction to Einstein's general theory of relativity. A "physics-first" approach is adopted so that interesting applications come before the more difficult task of solving the Einstein equation. The book includes extensive coverage of cosmology, and is designed to allow readers to study the subject alone.

I know from my own experience that an evening spent tending my garden, after another incomprehensible day, brings a strength and calmness that no other activity can match. Is it the qualities associated with gardening, such as nurturing

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and the hard work of hands and heart, that are deficient in our culture? Much good writing has been done about the garden as a special place. ? Madeleine Wilde's woodland garden on the south slope of Seattle's Queen Anne Hill was more than a "special place." It was her Sanctuary, her prism through which she explored the world and accomplished "much good writing." For two decades, starting in the early 1990s, Madeleine's "Notes from the Garden" delighted readers of the Queen Anne & Magnolia News in Seattle. Here, in luminous prose, is the best of her work from those years, ranging from hands-on advice for gardeners and would-be gardeners to poetically charged, often wry, insights into life in the tradition of Thoreau. Madeleine, who died in 2018, has left us a book to savor from solstice to solstice. This is a book that gardeners and lovers of cooking, food and life well-lived will savor. It will also inspire fans of the personal essay and those interested in the cycle of the seasons and intentional living. The book is edited by her former publisher, Mike Dillon, illustrated with charming drawings by noted American architect and author Mark Hinshaw, features cover illustration and design by Annie Brulé, and a foreword by Madeleine's husband David Streatfield, professor emeritus in the department of Landscape Architecture at the University of Washington.

A Wall Street Journal Best Book of 2013 If you ever regretted not taking physics in college--or simply want to know how to think like a physicist--this is the book for you. In this bestselling introduction, physicist Leonard Susskind and hacker-scientist George Hrabovsky offer a first course in physics and associated math for the ardent amateur. Challenging, lucid, and concise, *The Theoretical Minimum* provides a tool kit for amateur scientists to learn physics at their own pace.

A Most Incomprehensible Thing Notes Towards a Very Gentle Introduction to the Mathematics of Relativity Incomprehensible Books

The legal system is awash with excessive and incomprehensible information. Yet many of us assume that the unrelenting torrent of information pouring into various legal programs is both inevitable and unstoppable. We have become complacent; but it does not have to be this way. *Incomprehensible!* argues that surrendering to incomprehensibility is a bad mistake. Drawing together evidence from diverse fields such as consumer protection, financial regulation, patents, chemical control, and administrative and legislative processes, this book identifies a number of important legal programs that are built on the foundational assumption that 'more information is better'. Each of these legal processes have been designed in ways that ignore the imperative of meaningful communication. To rectify this systemic problem, the law must be re-designed to pay careful attention to the problem of incomprehensibility.

This unique book offers a concise, introductory overview of general relativity and black holes, motivating students to become active participants in carrying out their own investigations. To this end, the book uses calculus and algebra, rather than tensors, to make general relativity accessible to sophomores and juniors. Five chapters introduce basic concepts, and seven projects require the reader to apply these basic concepts to real astronomical applications. "Poetic musings on a life well-lived—one that is still moving forward, always creating, always luminous. This isn't your typical autobiography. Garfunkel's history is told in flowing prose, bounding from present to past, far from a linear rags-to-riches story." —Bookreporter "It's hard

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to imagine any single word that would accurately describe this book . . . an entertaining volume that's more fun to read than a conventional memoir might have been." —The Wall Street Journal "A charming book of prose and poetry printed in a digitalized version of his handwriting . . . witty, candid, and wildly imaginative . . . A highly intelligent man trying to make sense of his extraordinary life." —Associated Press From the golden-haired, curly-headed half of Simon & Garfunkel, a memoir (of sorts)—moving, lyrical impressions, interspersed throughout a narrative, punctuated by poetry, musings, lists of resonant books loved and admired, revealing a life and the making of a musician, that show us, as well, the evolution of a man, a portrait of a life-long friendship and of a collaboration that became the most successful singing duo in the roiling age that embraced, and was defined by, their pathfinding folk-rock music. In *What Is It All but Luminous*, Art Garfunkel writes about growing up in the 1940s and '50s (son of a traveling salesman, listening as his father played Enrico Caruso records), a middle-class Jewish boy, living in a redbrick semi-attached house on Jewel Avenue in Kew Gardens, Queens. He writes of meeting Paul Simon, the kid who made Art laugh (they met at their graduation play, *Alice in Wonderland*; Paul was the White Rabbit; Art, the Cheshire Cat). Of their being twelve at the birth of rock'n'roll ("it was rhythm and blues. It was black. I was captured and so was Paul"), of a demo of their song, *Hey Schoolgirl* for seven dollars and the actual record (with Paul's father on bass) going to #40 on the charts. He writes about their becoming Simon & Garfunkel, ruling the pop charts from the age of sixteen, about not being a natural performer but more a thinker, an underground man. He writes of the hit songs; touring; about being an actor working with directors Mike Nichols ("the greatest of them all"), about choosing music over a PhD in mathematics. And he writes about his long-unfolding split with Paul, and how and why it evolved, and after; learning to perform on his own . . . and about being a husband, a father and much more.

One of the field's most respected introductory texts, *Modern Physics* provides a deep exploration of fundamental theory and experimentation. Appropriate for second-year undergraduate science and engineering students, this esteemed text presents a comprehensive introduction to the concepts and methods that form the basis of modern physics, including examinations of relativity, quantum physics, statistical physics, nuclear physics, high energy physics, astrophysics, and cosmology. A balanced pedagogical approach examines major concepts first from a historical perspective, then through a modern lens using relevant experimental evidence and discussion of recent developments in the field. The emphasis on the interrelationship of principles and methods provides continuity, creating an accessible "storyline" for students to follow. Extensive pedagogical tools aid in comprehension, encouraging students to think critically and strengthen their ability to apply conceptual knowledge to practical applications. Numerous exercises and worked examples reinforce fundamental principles.

An ideal introduction to Einstein's general theory of relativity This unique textbook provides an accessible introduction to Einstein's general theory of relativity, a subject of breathtaking beauty and supreme importance in physics. With his trademark blend of wit and incisiveness, A. Zee guides readers from the fundamentals of Newtonian mechanics to the most exciting frontiers of research today, including de Sitter and anti-de Sitter spacetimes, Kaluza-Klein theory, and brane worlds. Unlike other books on Einstein gravity, this book emphasizes the action principle and group theory as guides in constructing physical theories. Zee treats various topics in a spiral style that is easy on beginners, and includes anecdotes from the history of physics that will appeal to students and experts alike. He takes a friendly approach to the required mathematics, yet does not shy away from more advanced mathematical topics such as differential forms. The extensive discussion of black holes includes rotating and extremal black holes and Hawking radiation. The ideal textbook for undergraduate and graduate students, *Einstein Gravity in a Nutshell* also provides an essential resource for

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professional physicists and is accessible to anyone familiar with classical mechanics and electromagnetism. It features numerous exercises as well as detailed appendices covering a multitude of topics not readily found elsewhere. Provides an accessible introduction to Einstein's general theory of relativity Guides readers from Newtonian mechanics to the frontiers of modern research Emphasizes symmetry and the Einstein-Hilbert action Covers topics not found in standard textbooks on Einstein gravity Includes interesting historical asides Features numerous exercises and detailed appendices Ideal for students, physicists, and scientifically minded lay readers Solutions manual (available only to teachers)

"What is the meaning of being?" This is the central question of Martin Heidegger's profoundly important work, in which the great philosopher seeks to explain the basic problems of existence. A central influence on later philosophy, literature, art, and criticism—as well as existentialism and much of postmodern thought—Being and Time forever changed the intellectual map of the modern world. As Richard Rorty wrote in the New York Times Book Review, "You cannot read most of the important thinkers of recent times without taking Heidegger's thought into account." This first paperback edition of John Macquarrie and Edward Robinson's definitive translation also features a new foreword by Heidegger scholar Taylor Carman.

A bestselling modern classic—both poignant and funny—about a boy with autism who sets out to solve the murder of a neighbor's dog and discovers unexpected truths about himself and the world. Nominated as one of America's best-loved novels by PBS's The Great American Read Christopher John Francis Boone knows all the countries of the world and their capitals and every prime number up to 7,057. He relates well to animals but has no understanding of human emotions. He cannot stand to be touched. And he detests the color yellow. This improbable story of Christopher's quest to investigate the suspicious death of a neighborhood dog makes for one of the most captivating, unusual, and widely heralded novels in recent years.

NEW YORK TIMES BESTSELLER • From the Pulitzer Prize–winning critic comes an impassioned critique of America's retreat from reason We live in a time when the very idea of objective truth is mocked and discounted by the occupants of the White House. Discredited conspiracy theories and ideologies have resurfaced, proven science is once more up for debate, and Russian propaganda floods our screens. The wisdom of the crowd has usurped research and expertise, and we are each left clinging to the beliefs that best confirm our biases. How did truth become an endangered species in contemporary America? This decline began decades ago, and in *The Death of Truth*, former New York Times critic Michiko Kakutani takes a penetrating look at the cultural forces that contributed to this gathering storm. In social media and literature, television, academia, and politics, Kakutani identifies the trends—originating on both the right and the left—that have combined to elevate subjectivity over factuality, science, and common values. And she returns us to the words of the great critics of authoritarianism, writers like George Orwell and Hannah Arendt, whose work is newly and eerily relevant. With remarkable erudition and insight, Kakutani offers a provocative diagnosis of our current condition and points toward a new path for our truth-challenged times.

Living in a "perfect" world without social ills, a boy approaches the time when he will receive a life assignment from the Elders, but his selection leads him to a mysterious man known as the Giver, who reveals the dark secrets behind the utopian facade.

Special edition slipcase edition of John Green's *Paper Towns*, with pop-up paper town. From the bestselling author of *The Fault in our Stars*. Quentin Jacobsen has always loved Margo Roth Spiegelman, for Margo (and her adventures) are the stuff of legend at their high school. So when she one day climbs through his

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window and summons him on an all-night road trip of revenge he cannot help but follow. But the next day Margo doesn't come to school and a week later she is still missing. Q soon learns that there are clues in her disappearance . . . and they are for him. But as he gets deeper into the mystery - culminating in another awesome road trip across America - he becomes less sure of who and what he is looking for. Masterfully written by John Green, this is a thoughtful, insightful and hilarious coming-of-age story.

Increasingly astronomers recognize that if the cosmos had not unfolded exactly as it did, humanity would not, could not, exist. Yet these researchers--along with countless ordinary folks--resist belief in the biblical Creator. Why? They say a loving God would have made a better home for us, one without trouble and tragedy. In *Why the Universe Is the Way It Is*, Hugh Ross draws from his depth of study in both science and Scripture to explain how the universe's design fulfills several distinct purposes. He also reveals God's surpassing love and ultimate purposes for each individual. *Why the Universe Is the Way It Is* will interest anyone who wonders where and how the universe came to be, what or who is responsible for it, why we are here, or how and when the universe ends. Far from leaving the reader at this philosophical jumping-off point, Ross builds toward answering the big question of human destiny and the specific question of each reader's personal destiny.

Writing for the general reader or student, Wald has completely revised and updated this highly regarded work to include recent developments in black hole physics and cosmology. Nature called the first edition "a very readable and accurate account of modern relativity physics for the layman within the unavoidable constraint of almost no mathematics. . . . A well written, entertaining and authoritative book."

Novel interpretation of the relationship between space, time, gravitation, and their cosmological implications; based on author's discovery of a value in gravitation overlooked by both Newton and Einstein. 1982 edition.

INSTANT NEW YORK TIMES BESTSELLER "One of the most important books I've ever read—an indispensable guide to thinking clearly about the world." – Bill Gates "Hans Rosling tells the story of 'the secret silent miracle of human progress' as only he can. But *Factfulness* does much more than that. It also explains why progress is so often secret and silent and teaches readers how to see it clearly." —Melinda Gates "*Factfulness* by Hans Rosling, an outstanding international public health expert, is a hopeful book about the potential for human progress when we work off facts rather than our inherent biases." - Former U.S. President Barack Obama *Factfulness*: The stress-reducing habit of only carrying opinions for which you have strong supporting facts. When asked simple questions about global trends—what percentage of the world's population live in poverty; why the world's population is increasing; how many girls finish school—we systematically get the answers wrong. So wrong that a chimpanzee choosing answers at random will consistently outguess teachers, journalists,

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Nobel laureates, and investment bankers. In *Factfulness*, Professor of International Health and global TED phenomenon Hans Rosling, together with his two long-time collaborators, Anna and Ola, offers a radical new explanation of why this happens. They reveal the ten instincts that distort our perspective—from our tendency to divide the world into two camps (usually some version of us and them) to the way we consume media (where fear rules) to how we perceive progress (believing that most things are getting worse). Our problem is that we don't know what we don't know, and even our guesses are informed by unconscious and predictable biases. It turns out that the world, for all its imperfections, is in a much better state than we might think. That doesn't mean there aren't real concerns. But when we worry about everything all the time instead of embracing a worldview based on facts, we can lose our ability to focus on the things that threaten us most. Inspiring and revelatory, filled with lively anecdotes and moving stories, *Factfulness* is an urgent and essential book that will change the way you see the world and empower you to respond to the crises and opportunities of the future. --- "This book is my last battle in my life-long mission to fight devastating ignorance...Previously I armed myself with huge data sets, eye-opening software, an energetic learning style and a Swedish bayonet for sword-swallowing. It wasn't enough. But I hope this book will be." Hans Rosling, February 2017.

From the bestselling author of *The Theoretical Minimum*, a DIY introduction to the math and science of quantum physics First he taught you classical mechanics. Now, physicist Leonard Susskind has teamed up with data engineer Art Friedman to present the theory and associated mathematics of the strange world of quantum mechanics. In this follow-up to *The Theoretical Minimum*, Susskind and Friedman provide a lively introduction to this famously difficult field, which attempts to understand the behavior of sub-atomic objects through mathematical abstractions. Unlike other popularizations that shy away from quantum mechanics' weirdness, *Quantum Mechanics* embraces the utter strangeness of quantum logic. The authors offer crystal-clear explanations of the principles of quantum states, uncertainty and time dependence, entanglement, and particle and wave states, among other topics, and each chapter includes exercises to ensure mastery of each area. Like *The Theoretical Minimum*, this volume runs parallel to Susskind's eponymous Stanford University-hosted continuing education course. An approachable yet rigorous introduction to a famously difficult topic, *Quantum Mechanics* provides a tool kit for amateur scientists to learn physics at their own pace.

This book takes the reader from the preliminary ideas of the Special Theory of Relativity (STR) to the doorsteps of the General Theory of Relativity (GTR). The first part explains the main concepts in a layman's language, including STR, the Lorentz transformation, relativistic mechanics. Thereafter the concept of tensors is built up in detail, especially Maxwell's stress tensor with illustrative examples, culminating in the energy-momentum conservation in electromagnetic fields.

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Mathematical structure of Minkowski's space-time is constructed and explained graphically. The equation of motion is formulated and then illustrated by the example of relativistic rocket. The principle of covariance is explained with the covariant equations of classical electrodynamics. Finally, the book constructs the energy tensor which constitutes the source term in Einstein's field equation, which clears the passage to the GTR. In the book, the concepts of tensors are developed carefully and a large number of numerical examples taken from atomic and nuclear physics. The graphs of important equations are included. This is suitable for studies in classical electrodynamics, modern physics, and relativity.

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