Relativity Simply Explained Martin Gardner

This book contains scores of intriguing puzzles and paradoxes from Lewis Carroll, the author of Alice in Wonderland, whose interests ranged from inventing new games like Arithmetical Croquet to important problems in symbolic logic and propositional calculus. Written by Carroll expert and well-known mathematics author Martin Gardner, this tour through Carroll's inventions is both fun and informative.

Primer on how to draw valid conclusions from numerical data using logic and the philosophy of statistics rather than complex formulae. Discusses averages and scatter, investigation design, more. Problems, solutions.

Collaboration on the First Edition of Spacetime Physics began in the mid-1960s when Edwin Taylor took a junior faculty sabbatical at Princeton University where John Wheeler was a professor. The resulting text emphasized the unity of spacetime and those quantities (such as proper time, proper distance, mass) that are invariant, the same for all observers, rather than those quantities (such as space and time separations) that are relative, different for different observers. The book has become a standard introduction to relativity. The Second Edition of Spacetime Physics embodies what the authors have learned during an additional quarter century of teaching and research. They have updated the text to reflect the immense strides in physics during the same period and modernized and increased the number of exercises, for which the First Edition was famous. Enrichment boxes provide expanded coverage of intriguing topics. An enlarged final chapter on general relativity includes new material on gravity waves, black holes, and cosmology. The Second Edition of Spacetime Physics provides a new generation of readers with a deep and simple overview of the principles of relativity.

Martin Gardner's Mathematical Games columns in Scientific American inspired and entertained several generations of mathematicians and scientists. Gardner in his crystal-clear prose illuminated corners of mathematics, especially recreational mathematics, that most people had no idea existed. His playful spirit and inquisitive nature invite the reader into an exploration of beautiful mathematical ideas along with him. These columns were both a revelation and a gift when he wrote them; no one--before Gardner--had written about mathematics like this. They continue to be a marvel. This volume was originally published in 1989 and contains columns from published 1976-1978. This 1997 MAA edition contains three new columns written specifically for this volume including the resurrection of the lamented Dr. Matrix.

An ideal choice for undergraduate students of science and engineering, this book presents a thorough exploration of the basic concepts of relativity. The treatment provides more than the typical coverage of introductory texts, and it offers maximum flexibility since many sections may be used independently, in altered order, or omitted altogether. Numerous problems — most with hints and answers — make this volume ideal for supplementary reading and self-study. Nearly 300 diagrams illuminate the three-part treatment, which examines special relativity in terms of kinematics and introductory dynamics as well as general relativity. Specific topics include the speed of light, the relative character of simultaneity, the Lorentz transformation, the conservation of momentum and energy, nuclei and fundamental particles, the principle of equivalence and curved space-time, Einstein's equations, and many other topics.

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"This beautiful little book is certainly suitable for anyone who has had an introductory course in physics and even for some who have not."—Joshua N. Goldberg, Physics Today "An imaginative and convincing new presentation of Einstein's theory of general relativity. . . . The treatment is masterful, continual emphasis being placed on careful discussion and motivation, with the aim of showing how physicists think and develop their ideas."—Choice

One of the subject's clearest, most entertaining introductions offers lucid explanations of special and general theories of relativity, gravity, and spacetime, models of the universe, and more. 100 illustrations.

When scientists peer through a telescope at the distant stars in outer space or use a particle-accelerator to analyze the smallest components of matter, they discover that the same laws of physics govern the whole universe at all times and all places. Physicists call the eternal, ubiquitous constancy of the laws of physics symmetry. Symmetry is the basic underlying principle that defines the laws of nature and hence controls the universe. This all-important insight is one of the great conceptual breakthroughs in modern physics and is the basis of contemporary efforts to discover a grand unified theory to explain all the laws of physics. Nobel Laureate Leon M. Lederman and physicist Christopher T. Hill explain the supremely elegant concept of symmetry and all its profound ramifications to life on Earth and the universe at large in this eloquent, accessible popular science book. They not only clearly describe concepts normally reserved only for physicists and mathematicians, but they also instill an appreciation for the profound beauty of the universe’s inherent design. Central to the story of symmetry is an obscure, unpretentious, but extremely gifted German mathematician named Emmy Noether. Though still little known to the world, she impressed no less a scientist than Albert Einstein, who praised her "penetrating mathematical thinking." In some of her earliest work she proved that the law of the conservation of energy was connected to the idea of symmetry and thus laid the mathematical groundwork for what may be the most important concept of modern physics. Lederman and Hill reveal concepts about the universe, based on Noether’s work, that are largely unknown to the public and have wide-reaching implications in connection with the Big Bang, Einstein’s theory of relativity, quantum mechanics, and many other areas of physics. Through ingenious analogies and illustrations, they bring these astounding notions to life. This book will open your eyes to a universe you never knew existed.

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A quirky, funny, and accessible blend of science and art that delves into the heart of Einstein's theory of relativity It was a link to his 1905 paper--an early attempt at explaining his revolutionary ideas on space, time, and matter--that drew Tanya Bub into Albert Einstein's imaginative vision of the world. What particularly struck her was how Einstein interwove words and math to create clear visuals illustrating his theories. As an artist, she naturally started doodling as she worked her way through his concepts, creating drawings that intuitively demonstrated Einstein's core principles. In Reimagining Time Tanya Bub teams up with her father, the distinguished physicist Jeffrey Bub, to create a quirky and accessible take on one of science's most revolutionary discoveries. Blending original art and text, they guide readers through Einstein's theory of special relativity to expose truths about our universe: time is relative, lengths get shorter with motion, energy and mass are interchangeable, and the Universe has a speed limit.

This is, quite simply, the best and most popular puzzle book ever published in the Soviet Union. Since its first appearance in 1956 there have been eight editions as well as translations from the original Russian into Ukrainian, Estonian, Lettish, and Lithuanian. Almost a million copies of the Russian version alone have been sold. Part of the reason for the book's success is its marvelously varied assortment of brainteasers ranging from simple "catch" riddles to difficult problems (none, however, requiring advanced mathematics). Many of the puzzles will be new to Western readers, while some familiar problems have been clothed in new forms. Often the puzzles are presented in the form of charming stories that provide non-Russian readers with valuable insights into contemporary Russian life and customs. In addition, Martin Gardner, former editor of the Mathematical Games Department, Scientific American, has clarified and simplified the book to make it as easy as possible for an English-reading public to understand and enjoy. He has been careful, moreover, to retain nearly all the freshness, warmth, and humor of the original. Lavishly illustrated with over 400 clear diagrams and amusing sketches, this inexpensive edition of the first English translation will offer weeks or even months of stimulating entertainment. It belongs in the library of every puzzlist or lover of recreational mathematics.

Bestselling author and astrophysicist Mario Livio examines the lives and theories of history’s greatest mathematicians to ask how—if mathematics is an abstract construction of the human mind—it can so perfectly explain the physical world. Nobel Laureate Eugene Wigner once wondered about “the unreasonable effectiveness of mathematics” in the formulation of the laws of nature. Is God a Mathematician? investigates why mathematics is as powerful as it is. From ancient times to the present, scientists and philosophers have marveled at how such a seemingly abstract discipline could so perfectly explain the natural world. More than that—mathematics has often made predictions, for example, about subatomic particles or cosmic phenomena that were unknown at the time, but later were proven to be true. Is mathematics ultimately invented or discovered? If, as Einstein insisted, mathematics is "a product of human thought that is independent of experience," how can it so accurately describe and even predict the world around us? Physicist and author Mario Livio brilliantly explores mathematical ideas from Pythagoras to the present day as he shows us how intriguing questions and ingenious answers have led to ever deeper insights into our world. This fascinating book will interest anyone curious about the human mind, the scientific world, and the relationship between them.

Here a physicist and a professor of literature guide general readers through the ideas that revolutionized our conception of the physical universe.

A prominent popular science writer presents simple instructions for 100 illustrated experiments. Memorable, easily understood experiments illuminate principles related to astronomy, chemistry, physiology, psychology, mathematics, topology, probability, acoustics, other areas.

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Fair, witty appraisal of cranks, quacks, and quackeries of science and pseudoscience: hollow earth, Velikovsky, orgone energy, Dianetics, flying saucers, Bridey Murphy, food and medical fads, and much more.

Physics.

Examines such phenomena as black holes, wormholes, singularities, gravitational waves, and time machines, exploring the fundamental principles that control the universe.

Clear, concise exposition of both the special and general theories of relativity, intended for nonscientific readers with a knowledge of high school math. Topics include simultaneity, time dilation, length contraction, the possibility of travel to a distant star, non-Euclidean geometries, black holes, and the structure of the universe. 158 illustrations.

Written by a Nobel Prize physicist and his colleague, this compelling book uses familiar objects (trains, rulers, clocks) to illuminate the more subtle aspects of relativity. 23 illustrations. 1959 edition.

This radically reoriented and popular presentation of Einstein's Special Theory of Relativity derives its concepts from Newtonian ideas rather than by opposing them. It demonstrates that time is relative rather than absolute, that high speeds affect the nature of time, and that acceleration affects speed, time, and mass. Very little mathematics is required, and 60 illustrations augment the text.

Best known as the longtime writer of the Mathematical Games column for Scientific American—which introduced generations of readers to the joys of recreational mathematics—Martin Gardner has for decades pursued a parallel career as a devastatingly effective debunker of what he once famously dubbed "fads and fallacies in the name of science." It is mainly in this latter role that he is onstage in this collection of choice essays. When You Were a Tadpole and I Was a Fish takes aim at a gallery of amusing targets, ranging from Ann Coulter's qualifications as an evolutionary biologist to the logical fallacies of precognition and extrasensory perception, from Santa Claus to The Wizard of Oz, from mutilated chessboards to the little-known "one-poem poet" Langdon Smith (the original author of this volume's title line). The writings assembled here fall naturally into seven broad categories: Science, Bogus Science, Mathematics, Logic, Literature, Religion and Philosophy, and Politics. Under each heading, Gardner displays an awesome level of erudition combined with a wicked sense of humor.

Presents a collection of word games, picture puzzles, tricky questions, and other puzzles.

The author presents a selection of pieces from his Scientific American "Mathematical Games" column, presenting puzzles and concepts that range from arithmetic and geometrical games to the meaning of M.C. Escher's artwork.

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 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)

The value of nothing is explored in rich detail as the author reaches back as far as the ancient Sumerians to find evidence that humans have long struggled with the concept of zero, from the Greeks who may or may not have known of it, to the East where it was first used, to the modern-day desktop PC, which uses it as an essential letter in its computational alphabet.

The theory of one brings the reader face to face with the stunning realization that the universe is bounded—rather than unbounded, as Einstein and others have asserted. The theory of one delivers the ocean. It is the theory that spells the end of physics. It is the monolith of 2001—a spacetime odyssey.

Exposition of fourth dimension, concepts of relativity as Flatland characters continue adventures. Topics include curved space time as a higher dimension, special relativity, and shape of space-time. Includes 141 illustrations.

"Provides (an)...accurate portrait of the essence of the disputes, both epistemological and technical, that characterize contemporary inquiry. This book will profit any reader-physicist, mathematician, philosopher, or civilian-who wants a comprehensive and intelligible survey of this pesky episode in fundamental physical theory."-CHOICE "I have no hesitation in recommending this book to anyone interested in the history, philosophy or sociology of science, and it is worth adding to the library shelf on quantum theory."-PHYSICS WORLD

A noted author defends his personal attitudes toward the fundamental issues of classical philosophy, discussing the awesome mystery surrounding science and life and explaining why he considers himself a theist

Concise treatment, based on ideas of Einstein and Minkowski, geared toward advanced undergraduates and graduate students of physics. Topics include old physics, new geometry, special relativity, curved space, and general relativity. 1950 edition.

By the year 1900, most of physics seemed to be encompassed in the two great theories of Newtonian mechanics and Maxwell's theory of electromagnetism. Unfortunately, there were inconsistencies between the two theories that seemed irreconcilable. Although many physicists struggled with the problem, it took the genius of Einstein to see that the inconsistencies were concerned not merely with mechanics and electromagnetism, but with our most elementary ideas of space and time. In the special theory of relativity, Einstein resolved these difficulties and profoundly altered our conception of the physical universe. Readers looking for a concise, well-written explanation of one of the most important theories in modern physics need search no further than this lucid undergraduate-level text. Replete with examples that make it especially suitable for self-study, the book assumes only a knowledge of algebra. Topics include classical relativity and the relativity postulate, time dilation, the twin paradox, momentum and energy, particles of zero mass, electric and magnetic fields and forces, and more.

Einstein's general theory of relativity requires a curved space for the description of the physical world. If one wishes to go beyond superficial discussions of the physical relations involved, one needs to set up precise equations for handling curved space. The well-established mathematical technique that accomplishes this is clearly described in this classic book by Nobel Laureate P.A.M. Dirac. Based on a series of lectures given by Dirac at Florida State University, and intended for the advanced undergraduate, General Theory of Relativity comprises thirty-five compact chapters that take the reader point-by-point through the necessary steps for understanding general relativity.

Perfect for those interested in physics but who are not physicists or mathematicians, this book makes relativity so simple that a child can understand it. By replacing equations with diagrams, the book allows non-specialist readers to fully understand the concepts in relativity without the slow, painful progress so often associated with a complicated scientific subject. It allows readers not only to know how relativity works, but also to intuitively understand it.

Relativity Simply ExplainedCourier Corporation

Amusing, irreverent, sophisticated and highly accessible, Einstein for Beginners is the perfect introduction to Einstein's life and thought. Reaching back as far as Babylon (for the origins of mathematics) and the Etruscans (who thought they could handle lightning), this book takes us through the revolutions in electrical communications and technology that made the theory of relativity possible. In the process, we meet scientific luminaries and personalities of imperial Germany, as well as Galileo, Faraday, and Newton; learn why moving clocks run slower than stationary ones, why nothing can go faster than the speed of light; and follow Albert's thought as he works his way toward E = mc2, the most famous equation of the twentieth century.