

Einstein's Special Relativity Dummies

Simple Relativity - Understanding Einstein's Special Theory of Relativity Time Dilation - Einstein's Theory Of Relativity Explained! General Relativity Explained simply \u0026amp; visually Einstein's Special Relativity Theory | Does Time really Slow down Einstein's Theory Of Relativity Explained For Dummies Special Relativity simplified using no math. Einstein thought experiments Einstein's Theory of Relativity for Kids Albert Einstein and Theory of relativity Full Documentary HD Demystifying Relativity_ A Simple Explanation! #mystery #facts #space #science WSU: Space, Time, and Einstein with Brian Greene Theory of relativity explained in 7 mins Special Relativity: Crash Course Physics #42 If light has no mass, why is it affected by gravity? General Relativity Theory Albert Einstein for Kids Best book on General relativity | Best book on General relativity for beginners | General relativity General Relativity for babies | Chris Ferrie Special Relativity Part 1: From Galileo to Einstein General Relativity Explained in 7 Levels of Difficulty What Exactly is Spacetime? Explained in Ridiculously Simple Words

A Concise Statement

A Student's Guide to Vectors and Tensors

Relativity

Einstein For Dummies

With Modern Applications in Cosmology

Albert Einstein's Theory of Relativity

Mathematics of Relativity

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Words That Changed the World

In Search of Time

Einstein's Special Relativity Dummies

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[A Concise Statement](#) MIT Press

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.

[A Student's Guide to Vectors and Tensors](#) Cambridge University Press

A thrilling adventure story chronicling the perilous journey of the scientists who set out to prove the theory of relativity--the results of which catapulted Albert Einstein to fame and forever changed our understanding of the universe. In 1911, a relatively unknown physicist named Albert Einstein published his preliminary theory of gravity. But it hadn't been tested. To do that, he needed a photograph of starlight as it passed the sun during a total solar eclipse. So began a nearly decade-long quest by seven determined astronomers from observatories in four countries, who traveled the world during five eclipses to capture the elusive sight. Over the years, they faced thunderstorms, the ravages of a world war, lost equipment, and local superstitions. Finally, in May of 1919, British expeditions to northern Brazil and the island of Príncipe managed to photograph the stars, confirming Einstein's theory. At its heart, this is a story of frustration, faith, and ultimate victory--and of the scientists whose efforts helped build the framework for the big bang theory, catapulted Einstein to international fame, and shook the foundation of physics.

[Relativity](#) World Scientific

This primer proposes a journey from Newton's dynamics to Einstein's relativity. It constitutes a pedagogical, rigorous, and self-contained introduction to the concepts and mathematical formulation of gravitational physics. In particular, much attention is devoted to exploring and applying the basic tools of differential geometry, that is the language of general relativity. Real-world manifestations of relativity, such as time dilation, gravitational waves, and black holes, are also discussed in detail.

This book is designed for third-year bachelor or first-year master students in theoretical physics, who are already familiar with Newton's physics, possibly had an introductory course on special relativity, and who are seeking to learn general relativity on a firm basis.

[Einstein For Dummies](#) John Wiley & Sons

An astrophysicist offers an entertaining introduction to Einstein's theories, explaining how well they have held up to rigorous testing over the years, and even describing the amazing phenomena

readers would actually experience if they took a trip through a black hole.

[With Modern Applications in Cosmology](#) Simon and Schuster

One of TIME's Ten Best Nonfiction Books of the Decade "Meet the new Stephen Hawking . . . The Order of Time is a dazzling book." --The Sunday Times From the bestselling author of Seven Brief Lessons on Physics, Reality Is Not What It Seems, and Helgoland, comes a concise, elegant exploration of time. Why do we remember the past and not the future? What does it mean for time to "flow"? Do we exist in time or does time exist in us? In lyric, accessible prose, Carlo Rovelli invites us to consider questions about the nature of time that continue to puzzle physicists and philosophers alike. For most readers this is unfamiliar terrain. We all experience time, but the more scientists learn about it, the more mysterious it remains. We think of it as uniform and universal, moving steadily from past to future, measured by clocks. Rovelli tears down these assumptions one by one, revealing a strange universe where at the most fundamental level time disappears. He explains how the theory of quantum gravity attempts to understand and give meaning to the resulting extreme landscape of this timeless world. Weaving together ideas from philosophy, science and literature, he suggests that our perception of the flow of time depends on our perspective, better understood starting from the structure of our brain and emotions than from the physical universe. Already a bestseller in Italy, and written with the poetic vitality that made Seven Brief Lessons on Physics so appealing, The Order of Time offers a profoundly intelligent, culturally rich, novel appreciation of the mysteries of time.

ALBERT EINSTEIN'S THEORY OF RELATIVITY

John Wiley & Sons

Quantum Physics For Dummies, Revised Edition helps make quantum physics understandable and accessible. From what quantum physics can do for the world to understanding hydrogen atoms, readers will get complete coverage of the subject, along with numerous examples to help them tackle the tough equations. Compatible with classroom text books and courses, Quantum Physics For Dummies, Revised Edition lets students study at their own paces and helps them prepare for graduate or professional exams. Coverage includes: The Schrodinger Equation and its Applications The Foundations of Quantum Physics Vector Notation Spin Scattering Theory, Angular Momentum, and more Your plain-English guide to understanding and working with the micro world Quantum physics — also called quantum mechanics or quantum field theory — can be daunting for even the most dedicated student or enthusiast of science, math, or physics. This friendly, concise guide makes this challenging subject understandable and accessible, from atoms to particles to gases and beyond. Plus, it's packed with fully explained examples to help you tackle the tricky equations like a pro! Compatible with any classroom course — study at your own pace and prepare for graduate or professional exams Your journey begins here — understand what quantum physics is and what kinds of problems it can solve Know the basic math — from state vectors to quantum matrix manipulations, get the foundation you need to proceed Put quantum physics to work — make sense of Schrödinger's equation and handle particles bound in square wells and harmonic oscillators Solve problems in three dimensions — use the full operators to handle wave functions and eigenvectors to find the natural wave functions of a system Discover the latest research — learn the cutting-edge quantum physics theories that aim to explain the universe itself

MATHEMATICS OF RELATIVITY

Incomprehensible Books

A clear, plain-English guide to this complex scientific theory String theory is the hottest topic in physics right now, with books on the subject (pro and con) flying out of the stores. String Theory For Dummies offers an accessible introduction to this highly mathematical "theory of everything," which posits ten or more dimensions in an attempt to explain the basic nature of matter and energy. Written for both students and people interested in science, this guide explains concepts, discusses the string theory's hypotheses and predictions, and presents the math in an approachable manner. It features in-depth examples and an easy-to-understand style so that readers can understand this controversial, cutting-edge theory.

[A Textbook for Undergraduates](#) Chicago Review Press

The book presents the theory of relativity as a unified whole. By showing that the concepts of this theory are interrelated to form a unified totality David Bohm supplements some of the more specialist courses which have tended to give students a fragmentary impression of the logical and

conceptual nature of physics as a whole.

String Theory For Dummies Sourcebooks, Inc.

Fans of Chris Ferrie's ABCs of Science, Organic Chemistry for Babies, and Quantum Physics for Babies will love this introduction to Einstein's most famous theory! Help your future genius become the smartest baby in the room! It only takes a small spark to ignite a child's mind. Written by an expert, General Relativity for Babies is a colorfully simple introduction to Einstein's most famous theory. Babies (and grownups!) will learn all about black holes, gravitational waves, and more. With a tongue-in-cheek approach that adults will love, this installment of the Baby University board book series is the perfect way to introduce basic concepts to even the youngest scientists. After all, it's never too early to become a quantum physicist! If you're looking for books similar to Baby Loves Science by Ruth Spiro, quantum information for babies, or infant science books, look no further! General Relativity for Babies offers fun early learning for your little quantum physicist!

Albert Einstein and Relativity for Kids Princeton University Press

A modern classic, Einstein's Dreams is a fictional collage of stories dreamed by Albert Einstein in 1905, about time, relativity and physics. As the defiant but sensitive young genius is creating his theory of relativity, a new conception of time, he imagines many possible worlds. In one, time is circular, so that people are fated to repeat triumphs and failures over and over. In another, there is a place where time stands still, visited by lovers and parents clinging to their children. In another, time is a nightingale, sometimes trapped by a bell jar. Now translated into thirty languages, Einstein's Dreams has inspired playwrights, dancers, musicians, and painters all over the world. In poetic vignettes, it explores the connections between science and art, the process of creativity, and ultimately the fragility of human existence.

Reimagining Time Courier Corporation

This book, suitable for interested post-16 school pupils or undergraduates looking for a supplement to their course text, develops our modern view of space-time and its implications in the theories of gravity and cosmology. While aspects of this topic are inevitably abstract, the book seeks to ground thinking in observational and experimental evidence where possible. In addition, some of Einstein's philosophical thoughts are explored and contrasted with our modern views. Written in an accessible yet rigorous style, Jonathan Allday, a highly accomplished writer, brings his trademark clarity and engagement to these fascinating subjects, which underpin so much of modern physics. Features: Restricted use of advanced mathematics, making the book suitable for post-16 students and undergraduates. Contains discussions of key modern developments in quantum gravity, and the latest developments in the field, including results from the Laser Interferometer Gravitational-Wave Observatory (LIGO). Accompanied by appendices on the CRC Press website featuring detailed mathematical arguments for key derivations.

The Theory that Escaped Einstein Yale University Press

A superlative, fascinating graphic account of Albert Einstein's strange world and how his legacy has been built upon since. It is now more than a century since Einstein's theories of Special and General Relativity began to revolutionise our view of the universe. Beginning near the speed of light and proceeding to explorations of space-time and curved spaces, *Introducing Relativity* plots a visually accessible course through the thought experiments that have given shape to contemporary physics. Scientists from Isaac Newton to Stephen Hawking add their unique contributions to this story, as we encounter Einstein's astounding vision of gravity as the curvature of space-time and arrive at the breathtakingly beautiful field equations. Einstein's legacy is reviewed in the most advanced frontiers of physics today - black holes, gravitational waves, the accelerating universe and string theory.

INTRODUCING RELATIVITY

CRC Press

Explains the principles of relativity, profiling leading minds such as Albert Einstein, Brian Greene, and Stephen Hawking to simplify their theories on time dilation, extra dimensions, and relative motion.

Flatland Penguin

"Outstanding Academic Title for 2014" by CHOICE Einstein Relatively Simple brings together for the first time an exceptionally clear explanation of both special and general relativity. It is for people who always wanted to understand Einstein's ideas but never thought they could. Told with humor, enthusiasm, and rare clarity, this entertaining book reveals how a former high school drop-out revolutionized our understanding of space and time. From $E=mc^2$ and everyday time travel to black holes and the big bang, Einstein Relatively Simple takes us all, regardless of our scientific backgrounds, on a mind-boggling journey through the depths of Einstein's universe. Along the way, we track Einstein through the perils and triumphs of his life — follow his thinking, his logic, and his insights — and chronicle the audacity, imagination, and sheer genius of the man recognized as the greatest scientist of the modern era. In Part I on special relativity we learn how time slows and space shrinks with motion, and how mass and energy are equivalent. Part II on general relativity reveals a cosmos where black holes trap light and stop time, where wormholes form gravitational time machines, where space itself is continually expanding, and where some 13.7 billion years ago our universe was born in the ultimate cosmic event — the Big Bang. Contents: Einstein Discovered: Special Relativity, $E = mc^2$, and Spacetime: From Unknown to Revolutionary The Great Conflict The Two Postulates A New Reality The Shrinking of Time Simultaneity and the Squeezing of Space The World's Most Famous Equation Spacetime Einstein Revealed: General Relativity, Gravity, and the Cosmos: Einstein's Dream "The Happiest Thought of My Life" The Warping of Space and Time Stitching Spacetime What is Spacetime Curvature? Einstein's Masterpiece The Universe Revealed In the Beginning Readership: Adults and young people all over the world who are curious about Einstein and how the universe works. Keywords: Einstein; Relativity; Special Relativity; General Relativity; Spacetime; Big Bang; Black Holes; Expansion of Space; Time Travel; $E=mc^2$; Universe; Cosmos; Time Dilation; Length Contraction; Wormholes; Light Postulate; Length Contraction; Gravitational Time Dilation; Time Warp; Space Warp; Relativity Postulate; Lorentz Transformation; Light Clock; Relativity of Simultaneity; Twins Paradox; Equivalence Principle; Gravity; Spacetime Curvature; Spacetime Interval; Gaussian Co-

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Ordinates; Geodesic; Momenenergy; The Einstein Equation; Schwarzschild Geometry; Bending of Starlight; Frame Dragging; Cosmic Microwave Background; Geometry of Universe; Flat Universe; Critical Density; Dark Matter; Dark Energy; Future of Universe Key Features: Einstein Relatively Simple is the definitive book on Einstein's theories for the lay reader — one that is fun to read, comprehensive, and most important, understandable Einstein's ideas are explained in everyday language The book devotes eight chapters to special and a full eight chapters to general relativity. Most popular science books give general relativity only a brief mention or ignore it altogether Reviews: "This general relativity theory changed our views on the origin and on the ending (if any) of the universe ... all topics that tickle the imagination of a general public and Egdall, bringing the reader to the point beyond general relativity, does not miss the opportunity to end his guided tour with a sparkling firework of these issues ... it is an entertaining introduction for the layman, that brings the reader a very long way." The European Mathematical Society "He covers the main topics of special and general relativity in a refreshing, personal way. This is a well-crafted, well-documented text with extensive endnotes, in which a bibliography is embedded. He introduces readers to his own unique entry into this very populous genre. Valuable for inquisitive nonscientists." CHOICE "I'm crazy about it. It's the best presentation of relativity for non-scientists that I've seen." Art Hobson Professor Emeritus of Physics University of Arkansas "The writing is jovial and energetic and holds the reader's attention. This book is a nice introduction to modern physics, with a great biography of Einstein included. This book is recommended for a lay reader with basic algebra skills; high school and beginning college physics students would find it easily accessible." Zentralblatt MATH

THE ORDER OF TIME

Courier Corporation

Flatland : A Romance of Many Dimensions is an 1884 science fiction novella by the English schoolmaster Edwin Abbott Abbott. As a satire, Flatland offered pointed observations on the social hierarchy of Victorian culture. However, the novella's more enduring contribution is its examination of dimensions; in a foreword to one of the many publications of the novella, noted science writer Isaac Asimov described Flatland as "The best introduction one can find into the manner of perceiving dimensions." As such, the novella is still popular amongst mathematics, physics and computer science students.

EINSTEIN'S 1912 MANUSCRIPT ON THE SPECIAL THEORY OF RELATIVITY

Diamond Pocket Books Pvt Ltd

Einstein For Dummies John Wiley & Sons

[A Light-Speed Tour of Einstein's Theory of Relativity](#) John Wiley & Sons

The theory which is sketched in the following pages forms the most wide-going generalization conceivable of what is at present known as "the theory of Relativity," this latter theory I differentiate from the former "Special Relativity theory," and suppose it to be known. The generalization of the Relativity theory has been made much easier through the form given to the special Relativity theory by Minkowski, which mathematician was the first to recognize clearly the formal equivalence of the space like and time-like co-ordinates, and who made use of it in the building up of the theory. The mathematical apparatus useful for the general relativity theory, lay already complete in the "Absolute Differential Calculus", which were based on the researches of Gauss, Riemann and Christoffel on the non-Euclidean manifold, and which have been shaped into a system by Ricci and Levi-Civita, and already applied to the problems of theoretical physics. I have in part B of this communication developed in the simplest and clearest manner, all the supposed mathematical auxiliaries, not known to Physicists, which will be useful for our purpose, so that, a study of the mathematical literature is not necessary for an understanding of this paper. Finally in this place I thank my friend Grossmann, by whose help I was not only spared the study of the mathematical literature pertinent to this subject, but who also aided me in the researches on the field equations of gravitation.

THE SPECIAL THEORY OF RELATIVITY

Psychology Press

The Nobel Prize winner offers "an ideal introduction to the theories of special and general relativity" in clear, comprehensible language (Nature). A renowned mathematician and philosopher, and as well as recipient of the Nobel Prize in Literature, Bertrand Russell was acclaimed for his ability to address complex subjects in accessible ways. In this classic reference book, Russell delves into physics and relativity, helping everyday readers grasp the genius and implications of Albert Einstein's theory. When originally published in 1925, The ABC of Relativity brought science to a more general audience—and it continues to do so in the twenty-first century. "A mind of dazzling brilliance." —The New York Times

PROVING EINSTEIN RIGHT

Courier Corporation

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.

Einstein's Masterwork Cambridge University Press

Spacetime and Geometry is an introductory textbook on general relativity, specifically aimed at students. Using a lucid style, Carroll first covers the foundations of the theory and mathematical formalism, providing an approachable introduction to what can often be an intimidating subject. Three major applications of general relativity are then discussed: black holes, perturbation theory and gravitational waves, and cosmology. Students will learn the origin of how spacetime curves (the Einstein equation) and how matter moves through it (the geodesic equation). They will learn what black holes really are, how gravitational waves are generated and detected, and the modern view of the expansion of the universe. A brief introduction to quantum field theory in curved spacetime is also included. A student familiar with this book will be ready to tackle research-level problems in gravitational physics.