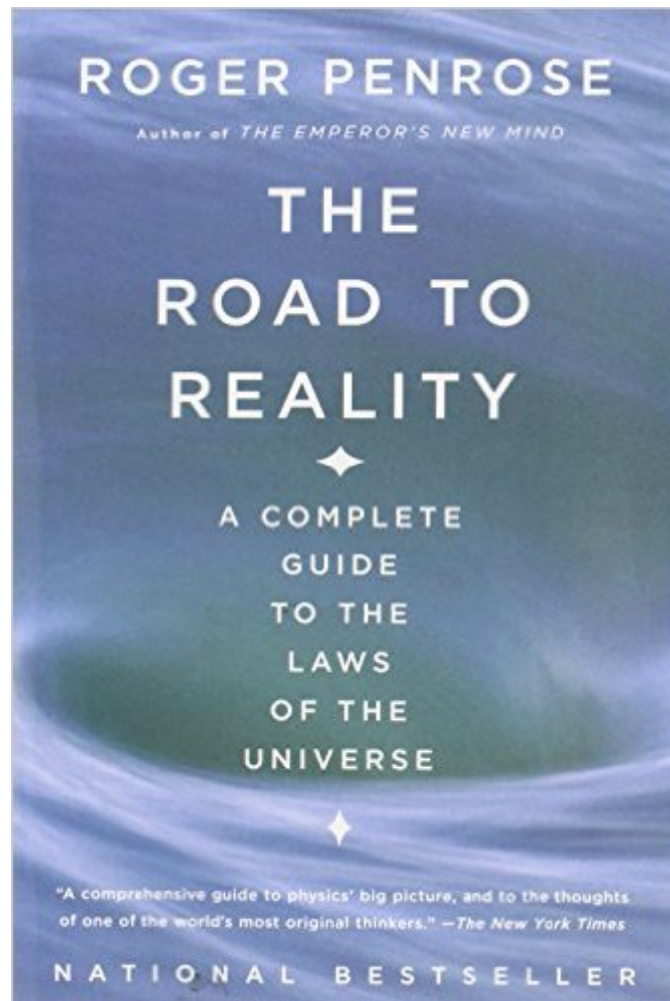


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# The Road To Reality: A Complete Guide To The Laws Of The Universe



## Synopsis

Roger Penrose, one of the most accomplished scientists of our time, presents the only comprehensive and comprehensible account of the physics of the universe. From the very first attempts by the Greeks to grapple with the complexities of our known world to the latest application of infinity in physics, *The Road to Reality* carefully explores the movement of the smallest atomic particles and reaches into the vastness of intergalactic space. Here, Penrose examines the mathematical foundations of the physical universe, exposing the underlying beauty of physics and giving us one the most important works in modern science writing.

## Book Information

Paperback: 1136 pages

Publisher: Vintage; Reprint edition (January 9, 2007)

Language: English

ISBN-10: 0679776311

ISBN-13: 978-0679776314

Product Dimensions: 6.1 x 1.2 x 9.3 inches

Shipping Weight: 2.4 pounds (View shipping rates and policies)

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Best Sellers Rank: #40,864 in Books (See Top 100 in Books) #13 in Â Books > Science & Math > Physics > Mathematical Physics #43 in Â Books > Textbooks > Science & Mathematics > Astronomy & Astrophysics #70 in Â Books > Science & Math > Astronomy & Space Science > Cosmology

## Customer Reviews

Let me confess at the outset that I have a PhD in theoretical physics that I gained in 1969. The subject matter was quantum electrodynamics. However, I have worked my entire life in the computer industry. Despite this, I have always kept a background interest in physics. I've retained quite a lot of my original mathematical knowledge but have obviously become relatively rusty. Over the years, I've enjoyed reading several of Roger Penrose's books and found all of them provocative. I bought this book because I thought it would quickly explain to me the latest ideas involved in reconciling relativity and quantum mechanics and lead me to the most recent ideas in dealing with gravity waves, for example. The book started with a disarming claim to be able to teach a non-mathematician sufficient of the maths to be able to follow the arguments being set out. It even invited the reader to skip the detail of the maths where this became an obstacle. With my

background, I therefore settled down for an engaging read. Boy, was I in for a surprise! The alarm bells began to ring when early on, I passed through the explanations of calculus. Although I obviously had no difficulty in understanding Penrose, I could easily see that a neophyte would not be able to pick up the subject with the limited explanations given. Soon, at around 300 pages in, I crashed into a personal lack of knowledge and, sure enough, Roger Penrose's explanations left me floundering. As a result, I had to put the book to one side and fill in the gaps in my knowledge from other sources. Eventually, I was able to return to the book. However, this became a recurring process - I found that, on several occasions, I had to put the book to one side and educate/re-educate myself from the texts of others.

The first half of this extremely challenging book takes the reader through huge swathes of mathematical territory - hyperbolic geometry, complex numbers, complex calculus, Riemann surfaces,  $n$ -manifolds and many more topics are covered. These chapters don't just convey a general impression of each subject in laymans English, but make heavy use of formulae and mathematical notation, effectively letting the maths do the talking where a more 'pop' science book would be breaking out the strained analogies. Although Penrose takes care to provide the reader with all groundwork necessary to understanding these subjects, this is still fundamentally difficult and unintuitive stuff and non-mathematicians will find that each page requires heavy concentration; skipping or skimming any part of these chapters renders later chapters unintelligible. Still, careful reading reaps huge rewards - the ideas these chapters cover are deep and beautiful. The big payoff comes in the second half of the book, where the topics covered in the first half are applied to our current understanding of the nature of our universe. Classical physics, relativity, various aspects of quantum mechanics, string theory and twistor theory (and more besides) are covered, and the first half of the book is revealed as a primer necessary to fully understanding this material. It's worth repeating - this is a very, very heavyweight book for non-mathematicians. As someone with only a strong laymans knowledge of maths, I found most of the book very difficult indeed. I often had to read each chapter three or four times with a break in between each reading for the material to sink in.

It's a delicate balance for book: Encyclopedic vs well focused on a unifying theme! Penrose succeeds admirably. It's not boring! Books like this are few and far between. Indeed, there are precious few authors who manage to successfully guide beginning students into serious scientific topics; and even fewer who can see the big picture, and do it all. And then keeping our attention

through more than 1000 pages! Penrose's book is inspiring, informative, exciting; and at the same time it's honest about what math and physics are. It is modest when modesty is called for. You are not cheated. You do get the equations (not just hand waving!), but you are gently prepared in advance, so you will want the mathematical formulae. Penrose's book is likely to help high school students getting started in science; and to inspire and inform us all. There is something for everyone: for the beginning student in math or in physics, for the educated layman/woman (perhaps the students' parents), for graduate students, for teachers, for scientists, for researchers; and the list goes on. It is one of the very few books of this scope that is not intimidating. Not in the least! I can't begin to do justice to this terrific book. Get it, and judge for yourself. I will also not give away the ending, other than saying that the title of the book is a good hint. And you will be able to form your own take, and your own ideas on the conclusion. Like with all good and subtle endings, they can be understood and appreciated at several levels. I came across Penrose's book in my bookstore by accident, and I was at first apprehensive: The more than 1000 pages, and the 3.3 pounds are enough to intimidate anyone. But when I started to read, I found myself unable to put it down.

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