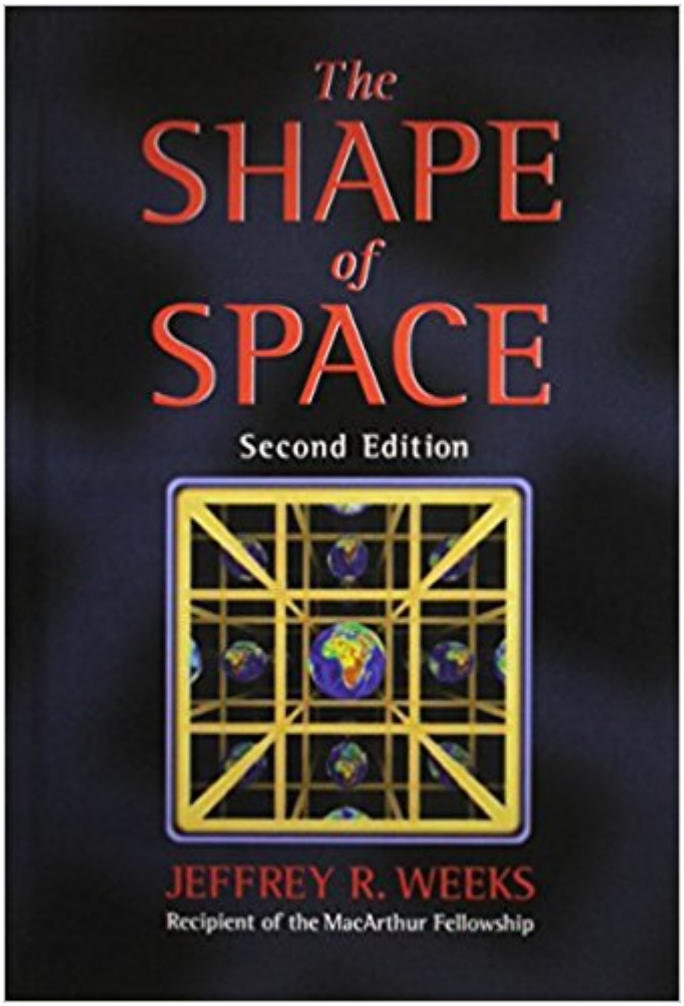
The Shape Of Space (Chapman & Hall/CRC Pure And Applied Mathematics)



Synopsis

Maintaining the standard of excellence set by the previous edition, this textbook covers the basic geometry of two- and three-dimensional spaces Written by a master expositor, leading researcher in the field, and MacArthur Fellow, it includes experiments to determine the true shape of the universe and contains illustrated examples and engaging exercises that teach mind-expanding ideas in an intuitive and informal way. Bridging the gap from geometry to the latest work in observational cosmology, the book illustrates the connection between geometry and the behavior of the physical universe and explains how radiation remaining from the big bang may reveal the actual shape of the universe.

Book Information

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Customer Reviews

The book is great, but sold it to me as a new book and it was crunched at one corner of the spine, like it had been dropped. I suggest buying it elsewhere.

I have a bachelors degree in Math.As Feynman said, what we really mean by math is careful reasoning. This book brings you the joy of careful reasoning, guided by an expert.Perhaps what turns some people off math in school is that the supreme example of careful reasoning is the mathematical PROOF. (Or perhaps it’s just that most math teachers are so poor.) A proof tends to look dull and ponderous on the outside, and a student can easily miss the beauty of the underlying

ideas. On the other hand, for your own amusement you can figure something out to your own satisfaction, without necessarily constructing a watertight proof. This book helps you do just that.Many newspapers contain Sudoku problems, often with the reassuring claim that no math is required! People who hated math in school can be seen working happily on Sudoku puzzles, for the sheer joy of exercising their ability to reason carefully. The same ability would bring them far more joy while reading this book and answering the puzzles/exercises sprinkled throughout.

thanks

fantastic

I was hoping for a more dumb-downed book. This is a textbook. If you don’t do the homework, you will get lost. It reminds me of reading Godel, Escher, Bach: "This makes sense", "I get that", "OK", then suddenly "WTF are you talking about?!?" I recommend it, but it’s heavy going. Four stars is not entirely fair because it is excellent for what it is; it’s just not what I was expecting. OK, just changed my rating to five stars.

What is the universe as a whole shaped like? Does it curve back on itself? Does it meet itself at the other side without curving? Is its Flatland analogy a plane, or a sphere, or a doughnut, or a Klein bottle? What other, stranger geometries become possible with the added dimension? And if the universe has one of these exotic shapes, how could astronomers ever know for sure?Jeffrey Weeks, a MacArthur ("genius grant") fellow and a consultant to NASA on cosmological observations, believes that there’s no reason why a liberal arts student or a high schooler shouldn’t be able to have a solid understanding of the answers to these questions, even though some of them are at the edge of research in cosmology and three-manifolds, and others have traditionally not been part of the math curriculum before graduate school.The math is presented at an elementary level, but it is genuine mathematics. Readers in the intended audience must be prepared to roll up their sleeves; there are exercises, and there are formulas, and their minds will be stretched. But there are no prerequisites other than a little first-year algebra, and the discussion stays at a vividly concrete level, with a plethora of diagrams to aid the swelling imagination. High schoolers will benefit from some guidance getting through it; it’s appropriate for undergraduate self-study.More mathematically sophisticated readers, even those who’ve taken a course in algebraic topology or differentiable manifolds, will find the book a lively read, but will still probably learn a thing or two. I,

for one, was startled to be shown a Moebius strip that was two-sided! (The trick is to embed it in a non-orientable three-space.)The payoff is in the final two chapters, which detail programs of astronomical observation that could well tell us the precise topology and geometry of the universe, and explain just how they would do it. One chapter is devoted to a technique based on correlating distances between galactic clusters, and the other to a statistical search for correlated arcs of great circles in the cosmic microwave background. Both observations will probably be completed within the next decade. It's an exciting prospect.Buyers note: I believe the characterization of this as a paperback is in error. I bought the second edition in hardcover at the same list price. In its (successful) attempt to avoid intimidation, it uses a large typeface, so it would fill out some 200 pages in a more typical math format.

But this book can also be quite serious, although it may take someone with an extensive math background to see this. The book seems aimed primarily at high-schoolers, but graduate students in topology can definitely benefit from reading it.Weeks starts out by explaining surfaces and the quotient space descriptions of the torus and klein bottle. Later chapters describe 3-manifolds, fibre bundles(!), and the 8 geometries relevant to Thurston's geometrization conjecture. The focus of the book is on applying these concepts to investigating the shape of our spatial universe. This is a particularly apt goal, given that many times in the book the reader is asked to imagine living in various kinds of spaces.He has a very good set of exercises designed to increase one's visualization powers. For example, in the chapter on 3-manifolds, he has the reader color various covering space pictures of 3-manifolds like the 3-torus, according to some specifications; this really helps one understand how covering maps work.As someone who was familiar with topology before reading the book, I can say that the book has definitely increased my understand of 3-manifolds, which is more than I can say for most topology books. In particular, I found the material on fibre bundles very enlightening.

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