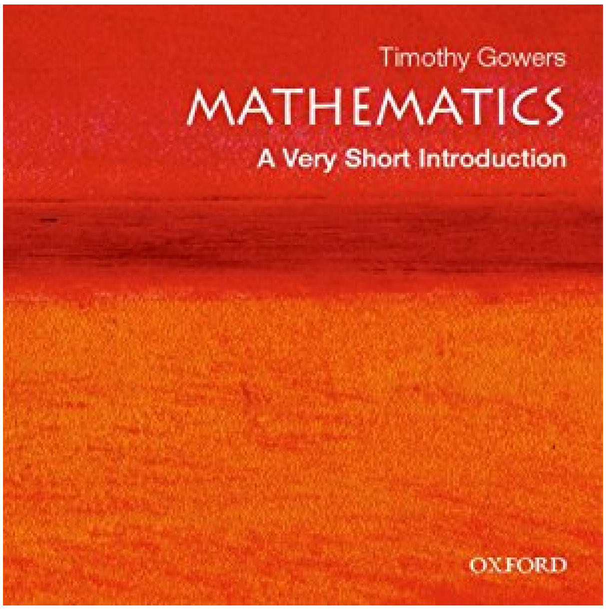
Mathematics: A Very Short Introduction



Synopsis

The aim of this audiobook is to explain, carefully but not technically, the differences between advanced, research-level mathematics, and the sort of mathematics we learn at school. The most fundamental differences are philosophical, and listeners of this audiobook will emerge with a clearer understanding of paradoxical-sounding concepts such as infinity, curved space, and imaginary numbers. The first few chapters are about general aspects of mathematical thought. These are followed by discussions of more specific topics, and the book closes with a chapter answering common sociological questions about the mathematical community (such as "Is it true that mathematicians burn out at the age of 25?").

Book Information

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Customer Reviews

The purpose of this book is not to teach you how to do math. (There are plenty of other books on the market than aim to do that.) Rather, its purpose is to help you get a better understanding of what mathematics is, how it works, why it works the way it does, and how mathematicians approach mathematical problems. The author, Timothy Gowers, is the Rouse Ball Professor of Mathematics at Cambridge University and is a recipient of the Fields Medal (the highest award given for achievement in mathematics scholarship, roughly equivalent to the Nobel Prize), so he definitely knows what he’s talking about. Perhaps more importantly, he is able to communicate his ideas well Ã¢Â Â“ I wish all math professors were as clear and cogent as he is (that would have saved me lots of headaches back when I was an undergrad struggling through calculus). The approach he takes in this book is not at all what I had expected, but I have to admit that it works quite well. His main focus is on the abstract nature of mathematics: Sure, we can and do use math for practical applications, but at its heart mathematics is not about counting or measuring things in the "real world" around us; rather, it’s about purely abstract concepts (numbers, lines, dimensions, etc.) that relate to each other according to a set of self-consistent rules. It doesn’t matter to the mathematician whether there is anything out in the real world that corresponds to these abstract concepts Ã¢Â Â“ a mathematician, using nothing but the abstract rules of mathematics, can figure out the geometrical properties of, say, a 27-dimensional shape, regardless of whether or not there are actually that many spatial dimensions in our universe. Higher dimensions, imaginary numbers, infinities, even concepts that are more familiar to the average math student, such as irrational and negative numbers, make sense only in the abstract (in the real world you will never end up with -3 apples no matter how many apples you start with or how many you give away), and so that’s how they must be approached. So, Gowers advises the math student (and also, more importantly, the math teacher) not to try to relate every mathematical concept to some real-world example, but to embrace the abstractness of mathematics and to treat it much in the same way that one might treat a game like chess. When we learn how to play a game, we don’t imagine that it will have real-world applications; we learn it simply in order to play it. So, how do we learn how to play a game? Since all games have rules, we learn the game by learning its rules. Once we’ve learned those rules, playing the game is simply a matter of consistently applying those rules. Of course, playing the game *well* requires a degree of creativity and strategic thinking, but you can’t play the game well until you have mastered the rules. Math, at least according to Gowers, is essentially the same: It’s just a matter of learning a set of rules and applying them. You’ll also need some creativity and strategic thinking to solve difficult problems, but you can’t do anything without first mastering the rules. The rules are the essence of mathematics. At its heart, mathematics is not about counting or measuring real-world objects; it’s about the application of self-consistent, abstract rules to abstract problems. (The fact that at least some aspects of mathematics do have practical, real-world applications is just a bonus.) So, I guess the central message of Gowers’s book is that the key to learning (or teaching) math is to stop trying to relate every mathematical concept to something from the real world that you can easily visualize, and focus instead on learning (or teaching) the rules of the game and how to follow them. Before reading this book, if someone had asked me for advice on how to learn (or teach) math, I almost certainly would have said that it’s best to try to relate mathematical concepts to real-world examples. After reading this book, I now understand why that might not have been such good advice after all.

Gowers’ unique book focuses on the subject matter and epistemology of mathematics: what mathematicians think about and how they establish results.For subject matter, mathematicians abstract certain features from the real world, creating simplified models that are easier to reason about. They also extend established areas to new domains, e.g. space to more than three dimensions.Regarding epistemology, mathematicians frame conjectures that are either proved from axioms, disproved by counter-example, or remain open questions. Proofs can in theory be made rigorous enough that they establish their conclusions beyond all doubt, e.g. that the square root of 2 is irrational. Finally mathematicians are sometimes content to entertain conjectures that are only approximations, e.g. the number of prime numbers less than a certain integer.

Professor Timothy Gowers starts with the need for models and ends with the usefulness and necessity of estimation. The body of the book gives the flavor, the value and the connectedness of Proofs, the calm resolutions of infinity and the impact of changes in dimension and Geometry.No. Not a problem-based course. Not a history lesson. No sexy examples. Little mention of the titans. Yet the point of doing math, its constraints and pathways, would strike anyone who reads the book. Whether high school students would get it. I'm not sure. The maturity in the words and the totality of the immersion within its few pages is sublime. In knowing that exact answers are rarely found, but knowing the boundaries of the answers and their closeness to actual mimics our own lives.This would be a must read in a non-ADHD world.Gowers also wrote the Princeton book on Math. The professor is a Fields medal winner.

These books are wonderful - a great primer on math for the non-math scholar. Highly recommend this book (and others in the series) as introductions to subjects you might not know a lot about. Kind of a good way of deciding whether to pursue the subject in more depth.

I have several friends who ask about good math books. For more sophisticated folks, I recommend Journey through Genius: The Great Theorems of Mathematics but for most, Gower's book is the one I suggest by far the most. (BTW: Check out his blog and naturally the Companion).Why? The two difficulties most non-mathy folks have are infinity (that there are many) and high dimensionality.Gowers in particular does a superb job of leading one through the understanding of a 5D "unit cube", using cartesian 5-tuple (list of 5 numbers) to discover the properties of the cube.

I regret buying a kindle version of this book. I should have purchased a PDF version. I tried to use the VoiceOver (text to speech) on the Mac and was beginning to enjoy the book when the stupid

Kindle has a bug where it thinks you are trying to copy the contents of the file.The book is good, but don’t buy any kindle version of any book on if you plan on using text to speech applicaiton.

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