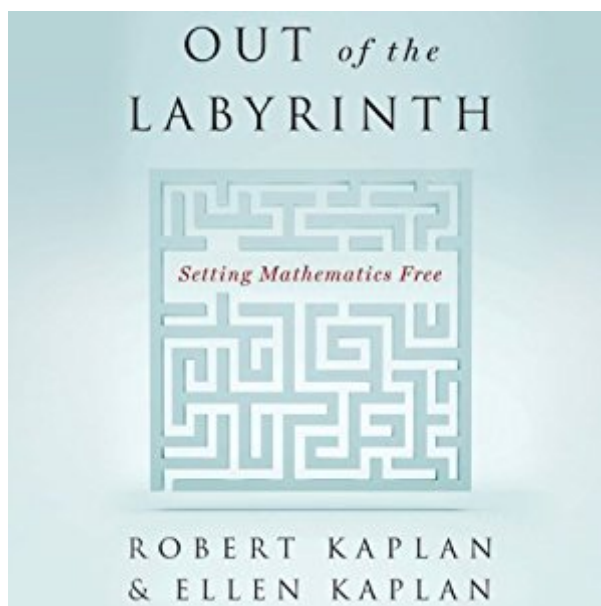


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# Out Of The Labyrinth: Setting Mathematics Free



## Synopsis

Who hasn't feared the math Minotaur in its labyrinth of abstractions? Now, in *Out of the Labyrinth*, Robert and Ellen Kaplan - the founders of The Math Circle, the popular learning program begun at Harvard in 1994 - reveal the secrets behind their highly successful approach, leading listeners out of the labyrinth and into the joyous embrace of mathematics. Written with the same wit and clarity that made Robert Kaplan's *The Nothing That Is* an international best seller, *Out of the Labyrinth* offers an engaging and practical guide for parents and educators, and a delight for anyone interested in sharing the pleasures of mathematics. The Kaplans begin by describing the state of modern math education - the lockstep acquisition of "skills", "number facts", and "mad minute" calculations. Instead, they argue, math should be taught as the highest form of intellectual play, an endeavor to be explored and enjoyed by children (or adults) of any age. One by one, they dismantle the many barriers to appreciating mathematics, from the self-defeating belief that mathematical talent is inborn, to the off-putting language of mathematics, to the question of why anyone should care. They show, for instance, that mathematical ability is not a matter of inborn genius, but of doggedness and attention. Even Einstein admitted that "I know perfectly well that I myself have no special talents. It was curiosity, obsession, and sheer perseverance that brought me to my ideas." Enhanced throughout with puzzles, practical equations, and colorful anecdotes from their own classrooms, *Out of the Labyrinth* will delight listeners with its engaging exploration of mathematics. It will allow students, parents, teachers, and others to wrestle with the accessible mysteries of math - and discover their inner math genius.

## Book Information

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## Customer Reviews

This book changed my life-no kidding. It was interesting and fun and really made me think about math differently, especially about teaching and approaching math as a puzzle to enjoy.]

The Kaplans write hugely entertaining and enlightening books on math.

I highly recommend this book. I admit I haven't personally implemented all of their ideas into the classroom, but their philosophy that mathematics (and perhaps any subject for that matter) is best learned through discovery of the concepts, with process rather than the completion of a checklist of covered facts the goal, struck a chord with me. They back up this philosophy with many anecdotes; the book has a very personal tone to it. As the Kaplans state in the book, the quote that best summarizes their philosophy is: "What you have been obliged to discover by yourself leaves a path in your mind which you can use again when the need arises." (G. C. Lichtenberg, 18th century German scientist) As a math graduate student (admittedly, not at an upper echelon school) and teaching assistant, I could relate much of what they said to my own learning and teaching experiences. Particularly in grad school, I have found that most of my authentic mathematics learning has taken place when I have played around with concepts, challenging myself to understand how mathematical structures work from their roots, rather than being told by an instructor that such and such is true. At its best, direct instruction simply states and proves and does not motivate and/or allow for exploration of the ideas to arrive at the conclusions. At its worst (not in graduate school, where proof is king), it merely states. But discovery learning, in my opinion, is better than even the best direct instruction can be. Throughout much of the book, the Kaplans don't address certain difficulties such as rigid curriculum and time restrictions that I thought would make their ideas unimplementable into a typical classroom setting. But they point out in the last chapter that even under these conditions, the Math Circle approach can work. In the first two or three weeks of such a course, the class may be behind the syllabus, but because students will have internalized the *why* rather than the *what* of the concepts during this time, the instructor can pick up the pace after that, and students will be more engaged with the course. Another important component of the Kaplans' approach is its collegial nature. Many times society views academics as a competition. This prevents students from combining their individual ideas into a stronger collective knowledge. It also discourages the more timid from

participating in discussion, for fear of appearing ignorant. (This latter fact applies to me growing up. The reality that I've found is that there is no shame in not knowing something and bringing forth one's ignorance helps others strengthen their knowledge by having to explain it, or reveals that they were taking certain things for granted without having justified them in their mind. Or, just as often, it reveals that many other people have the same gaps of knowledge or understanding and are also afraid to admit it.) It should be noted that this collegial setting does not inhibit the development of the individual; each person feels free to express their own take on the problem at hand. I will definitely be trying to implement the Math Circle philosophy into my future teaching.

I really wanted to enjoy this, and yes, there are parts that are worth reading, but it is probably best saved as a used book, to flip through parts and highlight what you want. Entire chapters were dry and mundane, filled with math that, honestly, is not suited for narration. The stuff about actual teaching and math circles is good, but wow, there were hours that I was just hitting skip 30 seconds over and over again.

I got to page 42. First of all, the authors get carried away with their own eloquence. Second, it is not clear who the reader is supposed to be: clearly it must be someone with a fair amount of mathematical knowledge, but what is that person supposed to get out of the book? There are some anecdotes on discussions by math circle participants, but then there are also discussions of math problems which seems chosen rather haphazardly. Recently there has been much attention to perseverance as a key to success, and this book anticipates that in an attempt to destroy the idea that math ability is due primarily to innate talent, but the actual examples relate to very successful adult mathematicians.

**WARNING:** This book does not provide cookie-cutter curricula, problem sets and answers. Rather, this book presents a philosophy and approach to unleash curiosity and self-exploration of complex math in students from ages 4 through adult. Full of wit and wisdom and a joy to read, even for interested parents outside of the teaching field. Written by two highly acclaimed opinion leaders in mathematics education, the book presents a convincing argument for incorporating the art of guided explorations and self-discovery into math curricula. Along the way, they also describe the classroom, organizational and practical issues they faced in founding their non-profit Math Circle in the Harvard University environs. Mathematics is our lost native language, state the authors. Math

talent is a myth, but the drudgery of most early math education fails to instill the confidence and sense of play which invites further exploration. The subtle Art of teaching is woven throughout the book as the lifelong teachers lend examples for creating an intimate model for guiding young students in their own discovery of complex math. Their approach consists of posing foundational questions to group of students -- Are there numbers between numbers? What is Area? -- then guiding a discussion down many paths "propelled by the fun of the chase." This approach may sound straightforward, but the art requires a spirit of exploration and familiarity with mathematics on the part of the teachers, highlighting some of the challenges. The authors describe after-school and in-school models for incorporating the approach, as well as observations and class notes to lend color. UPDATE: Recently the Kaplans lectured to leading teachers and educators at conferences by the American Mathematical Society and Mathematical Association of America. Let's hope this momentum continues among the important institutions laying the educational infrastructure. FULL DISCLOSURE: I have two boys, aged 8 and 6, who have attended the Kaplans' Math Circle classes for the last two years. My wife and I were careful to make sure that our boys were excited enough about the classes to trade off among other activities they love like soccer, art and gladiator battles. The boys re-register each semester and we are continually impressed with the Math Circle's ability to create an environment where the children explore more complex math than I ever thought possible. Math as Play. I'm a convert.

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