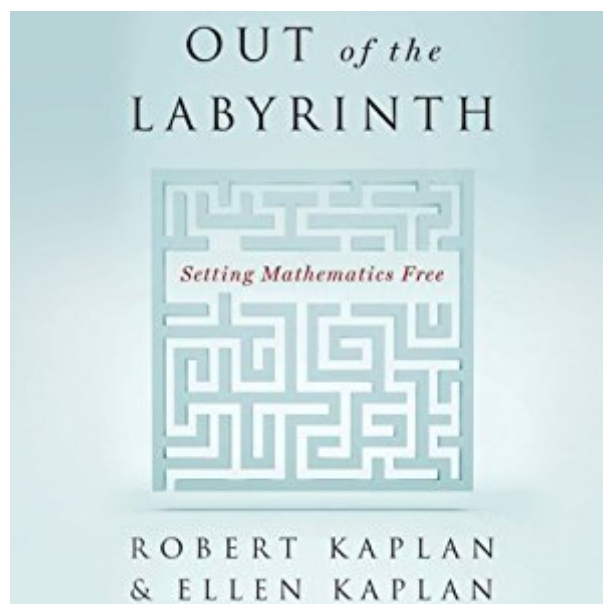


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# Out Of The Labyrinth: Setting Mathematics Free



## 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

**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.

It began with the sort of grouse session that all teachers of mathematics from Euclid on would recognize. "Why is mathematics so poorly taught? \*We\* know how rich and mind-expanding mathematics can be--why don't our students?" But then, instead of the typical sniffs and harrumphs, the conversation took an unusual turn: Robert and Ellen Kaplan resolved to found The Math Circle, an after-school program that, in their words, "teaches the enjoyment of mathematics." The Math Circle's starting premises are that mathematics is accessible to all, not the preserve of a talented few; that mathematics thrives in a setting of collegiality, engrossment, brio, and good will; and that the best way to learn mathematics is to create it oneself, by experimentation and the free play of ideas. What can follow from these simple but audacious axioms astounds the imagination. Students not only master but discover (invent?) pieces of sophisticated mathematical reasoning, with only minimal guidance from the group leader, who functions as neither authority nor drillmaster, but as moderator and scribe. Having visited The Math Circle, I can testify that the Kaplans' approach works splendidly. In one demonstration, I saw first graders unlock the summation formula for arithmetic

series in forty-five minutes. (They hit on Gauss's pairing trick, as well as several more idiosyncratic strategies.) These were ordinary students, many of whom were shaky at the outset on addition, to say nothing of multiplication--yet the problem so drew them in, the development made so much sense to them, that by the end of the session, they all were calculating with ease. What an improvement on sum charts and times tables!How do the Kaplans do it?

The Kaplans teach the enjoyment of mathematics to anyone willing to explore it with them. That is what their Math Circle, which they describe in this book, seems to be all about. They set out here to explain an approach they have developed to passing on their love of mathematics. They hope and expect more teachers will be interested to offer a similar service and that they will find their approach helpful. The book is entertaining, even inspiring, certainly plausible, and full of the humorous and serious observations of these two evidently very experienced mathematical scholars and educators. For any mathematician who is ready to pick up an invitation to pass on the enjoyment of the subject, I suppose the test of the Kaplan approach will be in the doing. In extremely brief summary, a Math Circle leader carries no kit but rather a good knowledge of mathematics, a suitable collection of teasing openers, and an ability to moderate a seminar of budding mathematicians, usually but not always young. ("You know what?", said one adult student. "I'm going to die a genius!")The Kaplans point out that not every potential student will necessarily feel interested in turning into a mathematician for a few magical hours every week. Anyone, they believe, can do what mathematicians do, but they are wary of taking students merely on the basis of parental desire or enthusiasm. They describe what they are offering as, in an important respect, a kind of communal and collegial play of the intellect. It sounds pretty friendly. I have a pleasant picture of wizards from the local Math Circle offering to escort the willing by paths of puzzlement to gardens of mathematical delight. The Math Circle appears to have been evolving for well over a decade.

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