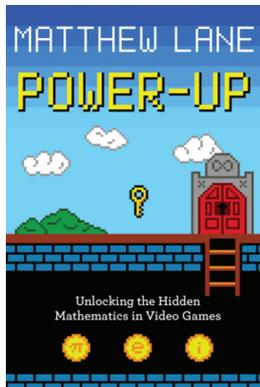




## New and Noteworthy Titles on our Bookshelf June/July 2019



Princeton, 2017, 264 pages

**Power-Up:**  
*Unlocking the Hidden Mathematics  
in Video Games*  
by Matthew Lane

This book consists of nine chapters, the first eight of which cover aspects of video games that prompt lively mathematical digressions. A good calculus student with some patience should be able to follow most of the mathematics. The final chapter (“The Value of Games”) discusses

the complex relationship between mathematics, education, and society, often quoting from enlightening sources.

The games discussed vary from old favorites such as *Pac-Man* and *Minesweeper*, to newer games such as *Assassin’s Creed* and *The Sims*. Although some familiarity with the games might make the reading experience more enjoyable, it is not a prerequisite. The relevant game mechanics are explained with plenty of illustrations, many of which are in color.

The mathematics involved is mostly of the Cartesian geometry, calculus, and probability sort, although deeper topics such as the uncountability of real numbers occasionally arise. These topics are not explored in great detail, but rather sprinkled throughout the book to suggest added riches just below the surface.

How exactly does math enter a discussion about video games? Here are a few examples. What is the best way to gather power-up items that are spread throughout an open “sandbox”-style game? This leads to a discussion of the traveling salesman problem, complexity theory, and the  $P$  versus  $NP$  problem. Why do quiz-type games seem to repeat the same questions so often? This prompts a discussion of probability and the birthday paradox. In a similar manner, software developers’ attempts to rank game features by user satisfaction ratings lead to an account of voting theory and Arrow’s Impossibility Theorem.

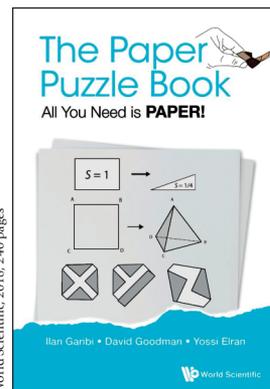
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Although the mathematics surveyed is mostly elementary, the algebraic details are often messy. Fortunately, addendum sections attached to some of the chapters contain the more onerous calculations, a few of which stretch on for several pages. The gory details are worked out in full detail and with plenty of explanations. This approach permits the main text to proceed in a conversational and elegant fashion.

This book is suitable for any mathematically inclined reader who enjoys video games. For example, this might be a wonderful book to give to a high-school calculus student with a passion for video games.



World Scientific, 2018, 240 pages

**The Paper Puzzle Book:**

*All You Need is Paper!*

by Ilan Garibi, David Goodman, Yossi Eiran

This book contains almost one hundred clever paper-based puzzles, tricks, and gags in the spirit of Martin Gardner, whom the authors cite as an inspiration. Those who delight in puzzles will find this book fascinating and enjoyable. Illustrations appear on almost every page, and the book is easy to follow.

The puzzles are loosely organized according to themes such as “just folding,” “strips of paper,” and “flexagons.” Hints are occasionally provided, and complete solutions appear at the end of each chapter. The puzzles often require paper of specific dimensions; each puzzle is accompanied by an icon that denotes those requirements. The puzzles are assigned a difficulty level from one to four stars. Some are relatively easy, although even the simplest require a bit of thought, visualization, and experimentation. For example, one instructs the reader to “fold an equilateral triangle from a square sheet of paper.” Another wants one to take a paper strip in proportion 1:7 and fold it into a cube of size 1:1:1. The harder problems are true brain benders of the most pleasant sort.

Although the problems are implicitly infused with mathematics, the book is accessible to almost anyone who has taken trigonometry and knows about square roots. It could even be enjoyed by a motivated middle-school student.