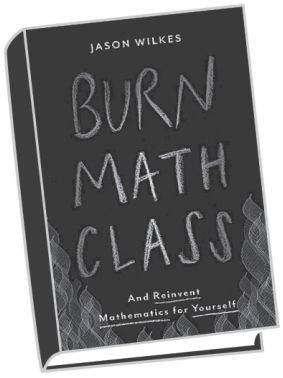
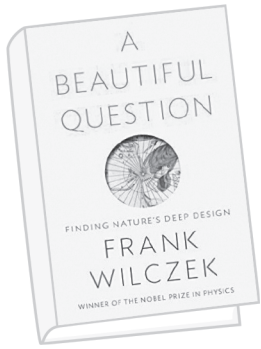
A man is known by the books he reads. —Emerson

New and Noteworthy Titles on Our Bookshelf
May 2016



Burn Math Class and Reinvent Mathematics for Yourself, by Jason Wilkes (Perseus Books, March 2016). Jason Wilkes is on a mission to liberate mathematics from its position as an arcane set of rules that must be memorized and to restore the field to its proper status as a living subject that everyone can explore, enjoy, and use. After a preface, followed by a "prefacer", the book begins in earnest with these sentences: "Forget everything you've been told about math. Forget all those silly formulas you've been told to memorize. Make a little room in your head with clean white walls and no math. Without leaving that room, let's reinvent math for ourselves." Wilkes believes people should learn mathematics by creating concepts and ideas on their own through experimentation and discovery rather than by memorizing facts handed down from authority figures. Using this approach, he takes readers from the basics of arithmetic to calculus. One of his main strategies is to replace standard terminology that doesn't capture concepts very well, such as "chain rule", and replace it with more evocative terms. In this book the chain rule is one of several types of "hammers" for taking derivatives. He tackles ideas that can be mystifying through conversational and often humorous explanations: "What does it mean for two points to be infinitely close to each other? I don't know! Let's decide. Let's write tiny to stand for a number that's infinitely small. It's not zero, but it's also smaller than any positive number.…" He tries to reveal the big ideas, as in this summary of what calculus is all about: "If we zoom in on curvy stuff, it starts to look more and more straight." But the book is not filled only with entertaining prose: once Wilkes has presented the concepts in narrative form, he translates them into mathematical equations and formulas. The writing style will no doubt have its devotees and detractors, but the author's whimsy and subversive humor are complemented by a sincere desire to get people to experience the beauty of mathematics for themselves.

A Beautiful Question: Finding Nature's Deep Design, by Frank Wilczek (Penguin Press, July 2015). Right after the "User's Manual", which substitutes for a preface for this book, Nobel laureate Frank Wilczek reveals the question referred to in the title: Does the world embody beautiful ideas? Noting that what artists do is embody ideas, he poses a closely related question: Is the world a work of art? He notes that in art one is accustomed to the idea that old styles that have been superseded by newer ones can nevertheless be enjoyed and appreciated. In the book he similarly approaches his question through the history of science, an approach that compels one to proceed from the simpler to the more complex and shows how great thinkers struggled with new ideas. A central theme of the book is the Standard Model of physics, which Wilczek suggests should instead be called the Core Theory. He presents the Core Theory as geometry, adapting for a wide audience his work in fundamental physics. In an original twist, he uses human color perception as a means for thinking about extra dimensions and for opening new ways of understanding local symmetry. While the book is really about physics, it contains much that would appeal to readers with a mathematical bent.



Elements of Mathematics: From Euclid to Gödel, by John Stillwell (Princeton University Press, May 2016). This new book by the author of *Roads to Infinity* (A K Peters, 2010) traces the history of mathematical topics that are today considered as "elementary" and shows that they were anything but at the time they were first discovered. Stillwell argues that it is the notion of infinity that leads us from the elementary to the advanced in mathematics. Stillwell has written a few articles for the *Notices,* including "The Story of the 120-Cell" (January 2001, `www.ams.org/notices/200101/fea-stillwell.pdf`) and a review of Jeremy Gray's scientific biography of Poincaré (April 2014, `www.ams.org/notices/201404/rnoti-p378.pdf`). Stillwell's earlier book *Yearning for the Impossible* (A K Peters, 2006) was reviewed by Daniel Biss in the June/July 2007 issue of the *Notices* (`www.ams.org/notices/200706/tx070600722p.pdf`).