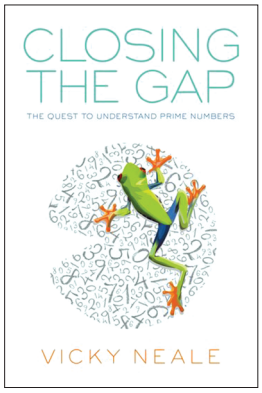
BOOKSHELF

New and Noteworthy Titles on our Bookshelf
May 2019



Closing the Gap: The Quest to Understand Prime Numbers
by Vicky Neale (Oxford University Press, 2017, 176 pages)

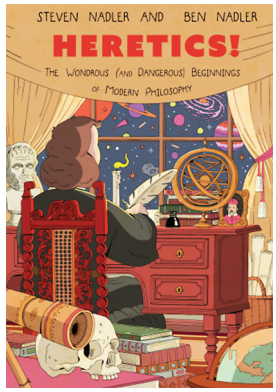
This short book chronicles some of the recent spectacular developments in the study of prime numbers. It revolves around the explosive events of 2013–2014, which were initiated by Yitang Zhang's unexpected proof that there are infinitely many pairs of primes that differ by at most 70,000,000. Subsequent refinements and generalizations evolved at a rapid pace, with dozens of authors (individually and collectively) contributing in a short amount of time.

Although this is a "popular science" book about prime numbers, a basic level of familiarity with calculus and infinite series is assumed. Later on, the Hardy–Littlewood circle method approach to Waring's Problem is discussed, and there is even a short section devoted to unpacking the meaning of the corresponding singular series—some nontrivial mathematics! However, Neale always tries to explain things in a down-to-earth and friendly manner.

Neale interweaves recent events with historical background and related results. The book features a creative structure that lends itself well to the subject matter. Apart from the introduction, the odd-numbered chapters have titles such as "June 2013" and chronicle the relevant number-theoretic events that occurred in a given month. The even-numbered chapters discuss related number-theoretic topics at a leisurely pace. Results ranging from Euclid's Theorem and the Prime Number Theorem to Szemerédi's Theorem and Lagrange's Four-Square Theorem are explored in a conversational tone and with many illustrations.

The reporting begins in earnest in Chapter 3 ("May 2013"), which introduces one of the main characters in the drama, Yitang Zhang. Later chapters discuss the contributions of other mathematicians, in particular James Maynard, Terence Tao, and the Polymath8 group. A great deal of attention is paid to the role played by Polymath projects, in which groups of mathematicians collaborate on difficult problems online and in the open via editable wikis. For instance, a good four pages of this slender volume are devoted to the question "Is Polymath the future?"

A curious undergraduate mathematics major should enjoy this book and learn a great deal. For mathematicians who do not specialize in number theory but who are curious about the flurry of recent activity in the field, this book provides an excellent entry point.



Heretics! The Wondrous (and Dangerous) Beginnings of Modern Philosophy
by Steven Nadler and Ben Nadler (Princeton University Press, 2017, 192 pages).

It might seem unusual to discuss a graphic narrative on seventeenth-century philosophy in the *Notices*. However, this is not as much of a stretch as it might at first appear. Many of the key players in the story are familiar to us because of their seminal contributions to mathematics and science. For example, Pascal, Descartes, Leibniz, and Galileo are all central characters, along with other roughly contemporary philosophers, such as Bacon, Hobbes, Locke, Spinoza, and Bruno, who are not as intimately associated with the development of modern mathematics. The authors (Steven Nadler is a professor of philosophy and Ben Nadler is an illustrator) combine their disparate backgrounds and skills to present an appealing tale that is well suited for mathematicians who are familiar with the famous names, but unfamiliar with the philosophy behind them. Although very little mathematics is discussed, this book successfully depicts how some of the seminal characters of modern mathematics fit into the larger intellectual framework of seventeenth-century intellectual discourse.

The Bookshelf is prepared monthly by Notices *Associate Editor Stephan Ramon Garcia.*

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