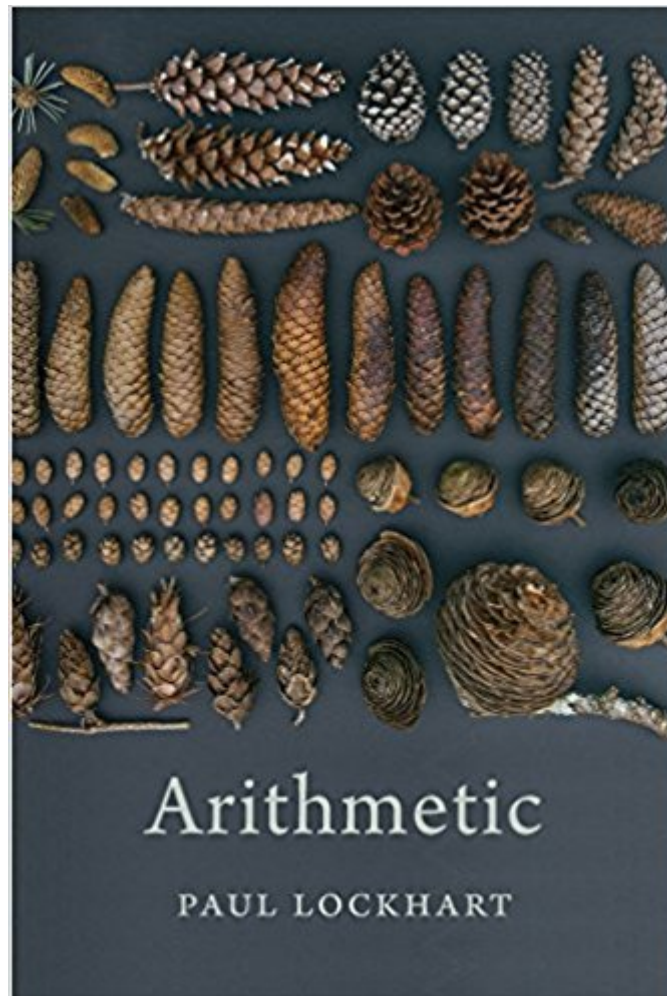




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Arithmetic



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Synopsis

Because evolution endowed humans with a complement of ten fingers, a grouping size of ten seems natural to us, perhaps even ideal. But from the perspective of mathematics, groupings of ten are arbitrary, and can have serious shortcomings. Twelve would be better for divisibility, and eight is smaller and well suited to repeated halving. Grouping by two, as in binary code, has turned out to have its own remarkable advantages. Paul Lockhart reveals arithmetic not as the rote manipulation of numbers—a practical if mundane branch of knowledge best suited for balancing a checkbook or filling out tax forms—but as a set of ideas that exhibit the fascinating and sometimes surprising behaviors usually reserved for higher branches of mathematics. The essence of arithmetic is the skillful arrangement of numerical information for ease of communication and comparison, an elegant intellectual craft that arises from our desire to count, add to, take away from, divide up, and multiply quantities of important things. Over centuries, humans devised a variety of strategies for representing and using numerical information, from beads and tally marks to adding machines and computers. Lockhart explores the philosophical and aesthetic nature of counting and of different number systems, both Western and non-Western, weighing the pluses and minuses of each. A passionate, entertaining survey of foundational ideas and methods, *Arithmetic* invites readers to experience the profound and simple beauty of its subject through the eyes of a modern research mathematician.

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Today's world is more dependent on numbers than at any time in human history, yet with the ready availability of cheap, reliable devices that handle computation, we have never had less need to master arithmetic. Our newfound freedom from the chore of hand computation makes it both possible and, Paul Lockhart argues in this wonderful new book, desirable to step back and reflect on the entire development of arithmetic over several millennia. What are numbers, how did they arise, why did our ancestors invent them, and how did they represent them? They are, after all, one of humankind's most brilliant inventions, arguably having greater impact on our lives than the wheel. Lockhart recounts their fascinating story. (Keith Devlin, mathematician, author of *The Man of Numbers* and *Finding Fibonacci*) What an exuberant, exciting invitation to take joy in the wonderful human activity of counting, and to think deeply about its many origins. Marvelously personal, quite surprising at times, and fun to read. (Barry Mazur, Gerhard Gade University Professor at Harvard University and coauthor of *Prime Numbers and the Riemann Hypothesis*)

Paul Lockhart teaches mathematics at Saint Ann's School in Brooklyn, New York.

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