

Book Review for *“Numbers: Their Tales, Types and Treasures”* by A.S.  
Posamentier and B. Thaller

Małgorzata Marciniak

LaGuardia Community College of CUNY

Title: Numbers: their tales, types, and treasures

Authors: Alfred S. Posamentier, Bernd Thaller

Publisher: Prometheus

Publication date: August 11, 2015

Paperback: 400 pages

Price: \$19.00

ISBN: 1633880303

Reviewer: Malgorzata Marciniak

2010 AMS Subject classification: general, popular, number theory, history of mathematics across the centuries, cognitive psychology,

Keywords: number theory, prime numbers, history of mathematics, Kaprekar numbers, Armstrong numbers, amicable numbers, cognitive psychology

Review:

Professional mathematicians benefit in a variety of ways from reading popular books about mathematics. Number theory specialists who become familiar with this particular book can recommend it to all students since reading requires only elementary school mathematics. Non-specialists can read this book for a pure joy of experiencing quality exposition. Certainly, while reading this volume, everybody can observe how to write about mathematics in an engaging and enriching manner. The book is written in an interesting way and contains numerous stories and a warm, human background to accompany scientific context.

The first part of the book is devoted to cognition of numbers and its developments throughout human history, and human growth from childhood to adulthood. We learn counting as children

and surprisingly as adults we do not give it much reflection. But the concept of numbers and its historical developments is tied to the neurological processes that took place in human minds. Numbers and counting are more primitive concepts than the symbols that represent them, and the words that we use to express them. Chapter 2 of the book describes psychological dimension in terms of Piaget's mathematical cognition in children and compares it to counting styles discovered among primitive Amazonian tribes. Overall the first part of the book contains insightful discussion of the growth of cognition that allows humans to count.

The second part of the book analyzes historical and linguistic developments of numbers in Babylon, Egypt, China, and India, observing that since ancient times most humans cannot perform arithmetic calculations in a perfect manner. Instead of perfecting this rather dull activity of calculations, the human mind prefers to play with numbers and discover their properties for the joy of creativity, which was first documented on a large scale in Greece. Arranging and organizing numbers into geometrical shapes leads to philosophical discoveries of prime and composite numbers based on the fact that a number which is a product of two numbers can be represented as an area of a rectangle with sides that are whole numbers. Fibonacci numbers make a returning theme in the book, for example in Pingala's three problems from Sanskrit poetry as seen by modern combinatorics.

In the last part of the book the authors encourage the reader to make their own observations and think about math problems, including open problems. Chapter 8, in particular, contains a true treasure, a sequence of ``Pythagorean curiosities`` which can engage in mathematical research everybody from students to math professors. For example, given a Pythagorean triple generate a new one using linear transformations. A student can certainly enjoy generating a Pythagorean triple, while a professor can classify all linear transformations that can do it. The last two chapters offer a brief discussion of definitions of numbers from the point of view of logicism, formalism and intuitionism. Here the authors discuss the cardinal numbers as equivalence classes of sets and the definition by Peano axioms.

To summarize, this book stands out in comparison to similar items on the shelf. Especially the first chapters that contain cognitive considerations about numbers and the last chapters with open problems in number theory. It is self-contained and, to assist with the narrative, the authors provide various tables of numbers: prime numbers, Kaprekar numbers, Armstrong numbers, amicable numbers, and more. Highly recommended to everybody!