BOOK REVIEWS

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The Magic Numbers of the Professor
By Owen O'Shea and Underwood Dudley, Mathematical Association of America, 2007
Reviewed by Jeff Hooper, Acadia University, Wolfville, NS

This fascinating and fun book is crammed with number curiosities and coincidences, enough to keep the reader surprised and entertained for a considerable length of time.

Narrator Owen O'Shea first meets the fictional American Richard Stein in the Commodore Hotel in Cobh, Ireland, where his editor has sent him to meet the eccentric "professor". During dinner the professor delves into Irish history in his unique way: Ireland's Patron saint, Patrick, he says, first came to Ireland in 432 A.D. Mathematically, this was a very suitable date, the professor points out, since the island of Ireland contains 4 provinces and 32 counties, and since \( 432 = 4 \cdot 3^3 \cdot 2^2 \). Not only that, but \( 432 + 1 \) and \( 432 - 1 \) are twin primes. Within the next few pages we are taken through numerical curiosities associated with the 1962 Cuban Missile Crisis, past connections between President Kennedy and the Apollo 11 moon landing, and hence into an array of curiosities among digits of numbers. For instance, the equation \( 192 + 384 = 576 \) not only includes all 9 non-zero digits exactly once, but has the property that it has the form \( n + 2n = 3n \) for the value \( n = 192 \). The professor then suggests that the reader discover the 3 other values of \( n \) for which this equation holds, before continuing with lots more curiosities, such as the equation

\[
291548736 = 8 \cdot 92 \cdot 531 \cdot 746,
\]

in which each of the 9 non-zero digits occurs on each side of the equation, and

\[
335180136^2 = 112345723568978496,
\]

a square in which each of the 9 digits occurs exactly twice. The book then follows O'Shea and Stein as they meet at various locations throughout Ireland. At each meeting, Stein continues weaving a numerical path through a variety of topics: more curiosities concerning digits, the September 11 tragedy, darts and cards, the King James Bible, the number of the beast, the US-Iraq war, Celtic Football Club, and James Joyce's Ulysses, to name only a few.

To give just a sampling, the professor describes numerous numerical connections between John Lennon and the number 9. For instance, Lennon was born on Wednesday, October 9th, at 9 Newcastle Road, Penny Lane, Liverpool (and all four words and phrases Wednesday, Newcastle, Penny Lane, and Liverpool have 9 letters). The Beatles first album, Please Please Me, hit number 1 in the charts on February 9, 1963, Lennon met Yoko Ono
for the first time on November 9, 1966, and their son Sean was born on October 9. The list of these continues even longer. There are enough such
topical numerical coincidences throughout the book to satisfy even the most
dedicated numerologist, even including new connections between Lincoln
and Kennedy.

A word of caution may be necessary. As the authors indicate in the
Introduction, this book is not meant to be read linearly, like a novel, but is
better taken in small pieces, parts of a chapter at a time. Each chapter is
filled with a plethora of curiosities of the sort described above, with several
problems and challenges for the reader mixed in. The challenges are mainly
aimed at the high school level, though there are exceptions. Solutions to
these problems are given at the end of each chapter.

For instance, among the problems one encounters the following: In a
standard game of darts, what is the smallest number that cannot be scored
with a single dart? with two darts? While examining numerous curiosities
surrounding the number 13 (including numerous 13s involved in the Apollo
13 mission), the professor serves up a number of puzzles involving Friday
the 13th. For example, can you see why two consecutive years can each
contain exactly one occurrence of Friday the 13th, yet three consecutive years
can never do so? The professor even delves into probability in a few places,
offering several challenges and seeming paradoxes. For instance, if, during
a game of bridge, a player announces 'I have an ace', the probability that
she holds a second ace is a little less than 37%; if, however, she then makes
her statement a little more specific and announces 'I have the ace of spades',
then the probability that she holds a second ace is now more than 56%! (Note
that in bridge a hand consists of 13 cards.)

The real treasure trove here, though, is the multitude of number
curiosities and patterns. Mathematical topics include triangular numbers,
Mersenne primes, Lucas numbers, probability, Smith numbers, Friedman
numbers, finite differences, Pythagorean triples, amicable pairs, perfect
numbers, and multiply perfect numbers; still, this is only a sampling.

For the reader who has not seen them, a perfect number is one which
equals the sum of its proper factors; for a multiply perfect number, the sum of
its proper factors is a multiple of itself. An amicable pair is a pair of positive
integers, each of which is the sum of the proper factors of the other. As the
reader can verify, the smallest perfect number is 6 (since \(1 + 2 + 3 = 6\)),
the smallest multiply perfect number which is not at the same time a perfect
number is 120 (its proper factors sum to \(240 = 2 \cdot 120\)), and the smallest
amicable pair is 220 and 284. The professor notes the remarkable coincidence
that 6 = \(1 \cdot 2 \cdot 3\), while 120 = \(4 \cdot 5 \cdot 6\) and 504, the sum of 220 and 284, equals
\(7 \cdot 8 \cdot 9\). The reader is left to ponder on the possible connections between
similar types of numbers and the next such product: \(10 \cdot 11 \cdot 12\).

For the teacher, this is an interesting sort of reference. Not only are
there a number of mathematical problems and puzzles included, but many
of the coincidences and number properties can be used to lead students into
further interesting topics regarding numbers, or to discovering similar coin-
cidences of their own. For problem purists, however, this is not so useful as a straight problem resource: the number of true problems is not that large, and the problems themselves are embedded in the text, so one really needs to work through it to find them. But there are some nice ones in this book.

On the whole, though, this is still a fascinating and useful book. If you enjoy properties of numbers and numerical curiosities and coincidences of the sort mentioned above, this book is simply stuffed with them, and you will be busy for some time.

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*Geometric Puzzle Design*

By Stewart Coffin, A K Peters, 2007

ISBN 1-56881-312-0, softcover, 204+xvi pages, US$39.00

Reviewed by Jim Totten, Thompson Rivers University, Kamloops, BC

Stewart Coffin has a reputation as a brilliant puzzle designer. I have appreciated many of his puzzle designs over the years without knowing they were his! Not only is he a great designer of puzzles, but he is an excellent writer.

*Geometric Puzzle Design* is a great book for the puzzle collector and enthusiast, but it is also a wonderful book for someone who is (or wishes to be) a wood-working craftsman. It is very apparent in reading the book that Coffin is all of these! On every page he conveys his infectious enthusiasm for all puzzles, but for those made of wood, he has a particular fondness.

Over the years I have amassed a small collection of puzzles, some of which I have made from scrap wood according to plans obtained from various sources. Reading this book has rekindled my interest in gaining access again to a wood-working facility so that I can make many other intriguing designs. Coffin not only discusses a lot of the geometry of the puzzles in the book, but actually provides guidance for those readers who wish to create such puzzles in their own workshops. Indeed, he rarely provides a solution to any of the puzzles in the book. Rather he focusses on the design and discusses the relative difficulty levels.

While the avid puzzle solver might find this annoying, most of them would likely agree that they would prefer to solve the puzzle on their own anyway, and this provides further impetus to their either buying or creating the puzzles in question. In many cases, the puzzles are not readily available for purchase. Hence, the focus on how to create them takes on added value.

The variety of puzzles discussed in the book is truly amazing. Coffin begins with a few chapters on two-dimensional puzzles (including dissections and sliding block puzzles). Then he begins to discuss various types of three-dimensional puzzles, from burrs to polyhedral puzzles to blocks and pins.

Throughout the book, Coffin provides guidelines on the type of jigs needed by a wood-worker in order to cut many of the pieces used to build the puzzles. In addition to these guidelines interspersed through the book, he also has a chapter at the end on woodworking techniques, in which he goes so far as to discuss the type of power tools one should have, the types
of wood that should be considered for finished pieces, and the kinds of glue
that he himself prefers.

I highly recommend this book to all puzzle-lovers, but especially to
those who wish to try their hand at puzzle creation. I expect to derive a lot
of enjoyment from it in my retirement!

The Liar Paradox and the Towers of Hanoi:
The Ten Greatest Math Puzzles of All Time
By Marcel Danesi, John Wiley and Sons, Inc., 2004
Reviewed by Amar Sodhi, Sir Wilfred Grenfell College, Corner Brook, NL

If one was looking for a suitable textbook for a Mathematics is Fun
course designed for non-mathematics majors, then The Liar Paradox and the
Towers of Hanoi would certainly be worthy of consideration. Danesi has
selected his version of “The ten greatest math problems of all time” as a
conduit to discuss riddles, paradoxes, and a variety of puzzles. In doing so,
deductive and inductive reasoning and other proof techniques are introduced
in an informal and easy to understand fashion.

Danesi starts by using The Riddle of the Sphinx to demonstrate how
“insight thinking” is indeed a problem-solving strategy. Alcuin’s River-
Crossing Puzzle is used to introduce techniques in counting and the search for
patterns is explored via Fibonacci’s Rabbit Puzzle. Graph theory and topology
come to the forefront in chapters centred on Euler’s Königsberg Bridges
Puzzle and Guthrie’s Four Colour Problem. Problems from antiquity, such as
The Lo Shu Magic Square and The Cretan Labyrinth, as well as Loyd’s
relatively modern Get off the Earth Puzzle are also featured in the book.

The book contains many historical anecdotes and even more exercises.
The author’s informal style allows him to deviate freely from the chapter
topic and mention a score or more other puzzles and theorems which would
be of interest to a novice mathematician. Thus, this book is a useful addition
to the library of any educator who is looking for enrichment material to spark
the interest of an impressionable teenager.

Unfortunately, the book fails to live up to the publisher’s claim that
“die-hard puzzle mavens to math aficionados” will be enlightened, enter-
tained, and impressed by this volume. The author, who has established a
program for students with difficulties in mathematics, assumes that read-
ers of this book may also have difficulties in mathematics. An example of
Danesi’s thoroughness is when he takes pains to explain why \( n^2(n^2 + 1) \)
can be simplified to \( n^4 + n^2 \), though it is unclear why this alleged simplification
makes computations easier. Also, the exercises, for the most part, are of
either a routine or textbook nature. The historical anecdotes are both en-
lightening and interesting, but a die-hard puzzle maven or math aficionado
should find this book a light read and would probably be more entertained
and impressed with the numerous books and articles that the author has
included in his bibliography.