BOOK REVIEWS

John Grant McLoughlin

Count Down: Six Kids Vie for Glory at the World's Toughest Math Competition
By Steve Olson, published by the Houghton Mifflin Company, New York, 2004
ISBN 0-618-25141-3, hardcover, 244 pages, US$24.
Reviewed by ***Richard Hoshino****, Dalhousie University, Halifax, NS.*

In *Count Down*, the author profiles the six students who represented the United States at the 2001 International Mathematical Olympiad. In the process, he sheds some new insight on important questions such as why Americans are so afraid of mathematics, why so few girls are involved in higher-level mathematics, and whether or not talent is innate.

Olson portrays the six students who are the members of Team USA as exceptionally well-rounded young men who share an incredible passion for learning. They are curious teenagers with a wide range of hobbies from water polo and ultimate frisbee to playing music and chess. The book does an excellent job of presenting and developing the characters of these six individuals. As a member of the Canadian delegation to the 2001 IMO, I had the privilege of meeting all six of these IMO students, and I vividly remember their well-roundedness and diversity of interests. (I am embarrassed to say that in the annual Canada vs USA game of ultimate frisbee, the Canadians lost convincingly.)

At the IMO, the students are given three problems on the first day of competition, and three problems on the following day. Appropriately, there are six main chapters in the book, with a brief chapter entitled "Interlude: An Afternoon to Rest" in the middle. Of course, this is no coincidence. In each of the six core chapters, there is a profile of one of the IMO team members, a detailed description and analysis of one of the six problems that appeared on the IMO, and a solution to the problem by that student.

The six chapters are titled Insight, Competitiveness, Talent, Creativity, Breadth, and a Sense of Wonder. In these chapters, Olson also investigates each of these characteristics and produces a fresh analysis of age-old questions such as "Is mathematical ability innate?", "Is genius inherited?", "Are Asian students inherently more talented in math?", and "Are boys better than girls in math?" He does a wonderful job of presenting the issues. His research is extensive, and he cites well-known pedagogues such as Ellen Winner, Howard Gardner, and Alfie Kohn, and uses the famous TIMSS study to compare models of mathematics teaching in America with various countries in Asia. He also produces an excellent profile of Melanie Wood, a former two-time member of the American team, and the only female ever to represent the USA at the IMO.

Count Down is more than a problem-solving book, or a simple six-chapter biography on the Olympians. Somehow, the author is able to delicately interweave the mathematics, the student profiles, the history of the Olympiad event, and a discussion of these tough issues in mathematics education. Moreover, he succeeds in every chapter! He is able to present the mathematics in a way that is not intimidating to the non-mathematical reader. In fact, he does quite a good job of presenting the six problems and explaining the meaning of each problem. Olson also presents full solutions to several of the IMO problems in a way that is accessible to a general audience. That was impressive.

This book is not perfect, but is a highly enjoyable read. In particular, I would have preferred to see a lengthier profile on the students and more insight on how they overcame personal adversity to make it to the Olympiad. Nevertheless, I found this book to be delightful, and I would recommend it to anyone interested in math contests and mathematics pedagogy, including high school students, mathematics educators, and parents of young children with an interest in mathematics.

Strange Curves, Counting Rabbits, and Other Mathematical Explorations
By Keith Ball, published by Princeton University Press, 2003
ISBN 0-691-11321-1, hardcover, 251 pages, US$29.95.
Reviewed by ***Peter G. Liljedahl****, Simon Fraser University, Burnaby, BC.*

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And so begins an enticing and wonderful journey through topics you thought you knew. At first glance, *Strange Curves* seems to be, like so many other books for recreational mathematicians, a collection of "common" topics in mathematics. A more careful perusal of the table of contents, however, will reveal that Keith Ball's treatment of these topics is anything but common. Reading the book will only further confirm this revelation. *Strange Curves* is no ordinary collection of topics.

What is even more surprising is that this book was not written for the recreational mathematician. It was written for the uninitiated, the soon-to-be recreational mathematician. It is a collection of topics that have grown out of Ball's popular lectures to high school students. These lectures, like the book, are meant to broaden students' views of what mathematics is and

to present to them the rich diversity and aesthetic elements that are so often missing from the high school mathematics curriculum. This, however, should not be a deterrent for the seasoned veterans, for, as already mentioned, the unique combination and extension of the seemingly "common" mathematical topics is not only refreshing, but also invigorating.

There are ten chapters in all, the titles of which are not always informative. These chapters are built around the following themes: code construction, Pick's Theorem, Fermat's Little Theorem and decimal expansion, fractal curves, the normal curve, estimation of $n!$, binary protocols, Fibonacci and the Golden Ratio, curve approximation, and rational and irrational numbers.

In each chapter, Ball takes a seemingly common topic and develops it in very uncommon ways, the whole time building connections across topics and across chapters. For example, in one chapter Ball discusses the coin-weighing problem:

> Suppose you are given nine coins of which eight are genuine and one counterfeit. You know that all the genuine coins weigh the same as one another and that the counterfeit coin is slightly heavier. . . . What is the smallest number of weighings [with a balance scale] needed to identify the counterfeit coin?

He extends this problem to the consideration of the real-world problem of testing for minor abnormalities in infants by testing pooled samples of blood. This then leads to a theoretical discussion of binary protocols, estimates, and entropy. In another chapter he evolves Fibonacci and the Golden Ratio into continued fractions, matrices, Newton's method, prime Lucas numbers, and Pick's Theorem. Throughout each chapter Ball poses problems for the reader to solve. The solutions to these problems are found at the end of each chapter along with a list of suggested references for further reading.

Ball has found the delicate balance between providing detail and challenging the reader, and he uses it masterfully in the writing of this book. I constantly felt comfortable with the material while at the same time stretching to make sense of it. His format of introducing a topic with an interesting (and often well-known) mathematical fact and then relating this fact to more mathematics, and his emphasis on approximations, make this an ideal book for an entry-level modeling course. The material is presented in a clear and linear fashion, with minimal details and rich problems to work on.