BOOK REVIEWS

Edited by ANDY LIU

The Monkey and the Calculator (Le singe et la calculatrice), softcover, ISBN 2-909737-07-1, 128 pages, 48 French francs (plus mailing).

Aladdin's Sword (Le sabre d'Aladin), softcover, ISBN 2-909737-08-X, 128 pages, 48 French francs (plus mailing).

Both published in 1995 by Production et Organisation du Loisir Educatif (POLE), 31 avenue des Gobelins, 75013 Paris, France.

Reviewed by **Claude Laflamme**, *University of Calgary*.

These two delightful little pocket books each contain a selection of almost 100 puzzles from the eighth International Championship of Mathematical Puzzles. This is an annual competition in four stages and in seven categories from elementary to advanced, open to anyone and administered by FFJM, the French Federation of Mathematical Games. These books are numbers 14 and 15 respectively in a series taken from these competitions and published by POLE, and most of these books are still in print.

The first book is from the Junior High level and the second from the Grand Public competition, slightly more sophisticated. Nevertheless, no specialized knowledge is required for the competitions and appropriately the statements of these puzzles are all very elementary; but they puzzle your puzzler to the point that once you have read one of the problems, you cannot leave the book until you figure out a solution. Now this is a serious competition and a mere solution is usually not enough, the most elegant and complete one is the favourite!

These puzzles should be of interest to anyone looking for some "fun brain gymnastics" (*gymnastique intellectuelle*), or "neurobics" as I have seen somewhere in the books. I can see here a great resource for teachers trying to interest students with some challenging but elementary and accessible problems. Here is a sample from the second book, called "A Numismatic Coincidence":

> By multiplying the number of pieces in her coin collection by 1994, the clever Miss Maths arrives at a product the sum of the digits of which is exactly equal to the number of pieces in her coin collection.
>
> **How many pieces does Miss Maths have in her coin collection?**

All the problems are translated into English, a job very well done even if this means that some problems require a new answer, such as the problem asking us to fill in the blank with a number (written out in words) making the following sentence true (a hyphen doesn't count as a letter):

"This sentence has __________ letters."

There are two answers in English, and only one (and it is different) for the French version.

The problem solutions are in French only but you will not be puzzled here, even a small diagram or a few numbers and the solution jumps at you. Apart from the puzzles themselves, you will find a few advertisements for other mathematics magazines, even a puzzling one on music and mathematics, as well as for camps and Summer Schools. You will also find details regarding the competition itself.

By the way, the titles refer to some of the more puzzling puzzles in the books!

Tournament of the Towns, 1980–1984, Questions and Solutions; published in 1993, softcover, 117+ pages, Australian $18.

Tournament of the Towns, 1989–1993, Questions and Solutions; published in 1994, softcover, 209+ pages, Australian $22.

Both edited by Peter J. Taylor, Australian Mathematics Trust, University of Canberra, P. O. Box 1, Belconnen, A.C.T. 2616, Australia.

Reviewed by **Murray S. Klamkin**, *University of Alberta.*

In my previous review [1992: 172] of the first book of this series, which are the problems and solutions for 1984–1989 (and which was published first), I had given a short description of the competition and references for further information on the competition. More complete information on this is given in the prefaces of the books.

This competition, as I said before, is one of the premier mathematics competitions in the world for secondary school students and contains many wonderful challenging problems (even to professional mathematicians). In view of my previous review, I just give another sampling of these problems.

Junior Questions

1. Construct a quadrilateral given its side lengths and the length joining the midpoints of its diagonal. [1983]

2. (a) A regular $4k$-gon is cut into parallelograms. Prove that among these there are at least k rectangles.
   (b) Find the total area of the rectangles in (a) if the lengths of the sides of the $4k$-gon equal a. [1983]

3. Prove that in any set of 17 distinct natural numbers one can either find five numbers so that four of them are divisible into the other or five numbers none of which is divisible into any other. [1983]

4. Given the continued fractions

$$a = \cfrac{1}{2 + \cfrac{1}{3 + \cfrac{1}{\cdots + \cfrac{1}{99}}}} \qquad \text{and} \qquad b = \cfrac{1}{2 + \cfrac{1}{3 + \cfrac{1}{\cdots + \cfrac{1}{99 + \cfrac{1}{100}}}}},$$

prove that $|a - b| < \dfrac{1}{99! \cdot 100!}$. [1990]

5. The numerical sequence $\{x_n\}$ satisfies the condition

$$x_{n+1} = |x_n| - x_{n-1}$$

for all $n > 1$. Prove that the sequence is periodic with period 9, i.e., for any $n \geq 1$, we have $x_n = x_{n+9}$. [1990]

6. There are 16 boxers in a tournament. Each boxer can fight no more often than once a day. It is known that the boxers are of different strengths, and the stronger man always wins. Prove that a 10 day tournament can be organized so as to determine their classification (put them in order of strength). The schedule of fights for each day is fixed on the evening before and cannot be changed during the day. [1991]

Senior Questions

1. We are given 30 non-zero vectors in 3 dimensional space. Prove that among these there are two such that the angle between them is less than $45°$. [1980]

2. Prove that every real positive number may be represented as a sum of nine numbers whose decimal representation consists of the digits 0 and 7. [1981]

3. A polynomial $P(x)$ has unity as coefficient of its highest power and has the property that with natural number arguments, it can take all values of form $2m$, where m is a natural number. Prove that the polynomial is of degree 1. [1982]

4. A square is subdivided into K^2 equal small squares. We are given a broken line which passes through the centres of all the smaller squares (such a broken line may intersect itself). Find the minimum number of links in this broken line. [1982]

5. Do there exist $1,000,000$ distinct positive numbers such that the sum of any collection of these numbers is never an exact square? [1989]

6. There are 20 points in the plane and no three of them are collinear. Of these points 10 are red while the other 10 are blue. Prove that there exists a straight line such that there are 5 red points and 5 blue points on either side of this line. [1990]