The Long Awaited Sequel To

HAVE SOME SUMS TO SOLVE

AT LAST!!

ENCODED TOTALS SECOND ADDITION

STEVEN KAHAN

Foreword by MARTIN GARDNER

ROUTLEDGE

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ENCODED
  TOTALS
  SECOND
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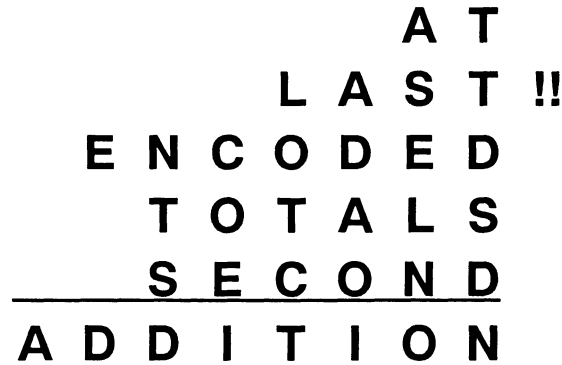

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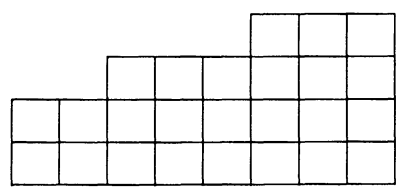

dedication

For my wife, Susan, and for my children, David and Sara. This incredible trio has taught me the true meanings of four common words – friendship, trust, respect, and love.

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      YES
   THEY'RE
TERRIFIC
TEACHERS
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Sincere gratitude is hereby expressed to Stuart Cohen, its president, who graciously allowed me to reprint these, as well as some expository material from the preface of my first collection of alphametics, HAVE SOME SUMS TO SOLVE. Information concerning both *JRM* and *HSSTS* can be obtained by writing to Baywood at the above address.

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foreword

Alphametics or cryptarithms—mathematicians have yet to settle on the favored term—is a branch of recreational number theory that is closely related to cryptograms. In solving a cryptogram, one combines a knowledge of language with shrewd reasoning; in solving an alphametic, one combines a knowledge of elementary number theory with shrewd reasoning. In both cases, there is great intellectual satisfaction that comes with "cracking the code" and finding the solution.

Curiously, the technique of solving an alphametic models in many ways the process by which laws of science (nature's puzzles) are discovered. When testing a conjecture, a scientist searches for supporting physical evidence. As such evidence accumulates, a point is reached at which the scientist suddenly becomes certain that his conjecture will be confirmed. There are similar turning points in solving an alphametic. At some juncture in the testing process, everything starts to drop neatly into place, and one has the pleasure of knowing that a solution is near at hand. In science, of course, the solution is never absolutely certain, and it is here that the analogy breaks down. When you solve an alphametic, you *know* that the solution is the correct one.

Computer programs are available for solving alphametics, but surely they steal the exhilaration from the whole process. What satisfaction can one get from solving, say, a chess problem by giving it to a computer that will crack it in a matter of seconds? Using a desk calculator to cut the time spent in solving an alphametic is quite a different thing, but a computer program seems to sabotage the mission. The whole enjoyment in solving an alphametic is to do so by hand.

Although mathematics journals and puzzle magazines often include alphametics, not many books have been devoted entirely to the topic. I know of only three in English: Maxey Brooke's *One Hundred and Fifty Problems in Crypt-Arithmetic* (1963); *Cryptarithms* (1976), by Josephine and Richard Andre; and Steven Kahan's previous book, *Have Some Sums To Solve* (1978). For fifteen years, Kahan has edited the alphametics section of the *Journal of Recreational Mathematics*. This new book, like his earlier one, includes a few choice problems selected from that admirable quarterly, but for the most part presents previously unpublished material. To make the book even more interesting, Kahan has interspersed his alphametics with short paragraphs about fascinating facts in number theory.

Another aspect of alphametic play is the actual construction of good problems. Optimally, one attempts to use each available digit, to code the numbers with words that make sense, and to create a puzzle that can be uniquely solved by logical reasoning as opposed to mere trial-and-error. This, of course, is not always possible—you have only to try making one to discover how difficult the task can be. Few can equal Kahan in the ability to devise such elegant alphametics.

At Last!! Encoded Totals Second Addition is a superb collection sure to delight every alphametic buff. I suspect it will also introduce many a reader to a flourishing subset of recreational mathematics that he or she may not have known about before.

Martin Gardner

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