DOUBLY-TRUE ALPHAMETICS

LEONARD GORDON
Tucson, Arizona

Alphametics (AMs) are crypted arithmetic problems; one or two are included in almost every collection of adult puzzles. They are a regular feature in the Journal of Recreational Mathematics (JRM). Precedent for including AMs as logology is provided by Dmitri Borgmann in Language on Vacation.

The distinction between alphametics and cryptarithms (found in many pulp magazines) is that in AMs all of the numerals must represent actual words. Although cryptarithms are much older, the famous SEND + MORE = MONEY, created by H. E. Dudeney in 1924, may be the first AM. The term alphametic was coined by J.A.H. Hunter in 1955. AMs may be narrative or doubly true; SEND + MORE = MONEY is a narrative. Many narratives are known, but just like anagrams or palindromes only a few (e.g., Pi x R^2 = AREA, by Brian Barwell) are memorable. Doubly true AMs are less common but not rare. Here are a few examples. The first is by Steven Kahan; the second is by S. Sawada of Tokyo; the fourth is by Los Acertijeros of Argentina. All come from JRM, of which Kahan is AM editor. The third was found in the short-lived Games and Puzzles, published in England by George Jellis.

THREE	79322	ONE	483	ZERO	4206	TRECE	69858
NINE	6562	FIVE	7293	SEI	827	CINCO	57354
TEN	726	TEN	138	SETTE	82112	OCHO	4504
FOURTEEN	40837226	ELEVEN	363938	OTTO	6116	QUINCE	127358
FIFTEEN	4547226	NINETEEN	82831338	NOVE	9652	ONCE	4358
FIFTYONE	45471062	FORTYFIVE	745107293	TRENTA	102913		
		NINETYONE	828310483				

The variety of doubly true AMs is further illustrated by the following, by M. Feder and S. Van Kane. JRM has also published examples in Dutch, Italian and even Hebrew. Borgmann's book has others. The late R. Robinson Rowe, who contributed to **Word Ways** during the 1970s, also constructed AMs for JRM.

```
10xFIVE + 2xTEN + 2XFIFTEEN = HUNDRED
   4650      102    4641002    9328708
```

```
10xONE + 130xSEVEN + 8xTEN =THOUSAND
   738        98083     183   12759634
```

Here are two I found recently. These are about as elaborate as we can get with addition. JRM is currently publishing others.

```
2xONE + 2xTHREE + FIFTEEN + EIGHTEEN + NINETEEN +THIRTYONE = NINETYONE
  263      51733   4045336   30815336   60635336   510759263   606359263
```

```
2xTHREE + NINE + TEN + FIFTEEN + 2xTHIRTY = HUNDRED
 26877    3437   273   5452773     264821   6039879
```

Now for the meat of this article: here are doubly true AMs in fifteen languages. Those in Farsi are transliterated, while those in Japanese are Romanized. These are a small portion of ones I found by computer. Although not as elegant as the above, this format was chosen because it works for all these languages. For some, this is the only format that works. All have unique solutions in base 10. An AM in base 10 is said to be ideal if it uses all ten digits. Some of the ones below are not ideal.

```
Croatian: 2xJEDAN + 3xSEST = 2xDESET    CETIRI + 2xOSAM = 2xDESET
           75809     6562    85652      162030    5947    86962

          TRI + 3xPET = 3xSEST
          870    928    1218

Dutch: 3xZES + 2xTWAALF = 6xZEVEN   3xZEVEN + ELF = 4xACHT
        568     170034     56962     13034   326    9857

       3xTIEN + SEVENTIG = 2xVIFJTIG
        7584    18984752    9503752

English: 3xSIX + 2xTWELVE = 6xSEVEN   2xTEN + TWENTY = 5xEIGHT
          896     241701     81015     367   326731    65493

         2xONE + TWENTY = 2xELEVEN
          951    261528    131715

Farsi: DOH + 2xPANJ = 2xSHISH   3xPANJ + 3xDAH = 5xNOH
       730    9845     10210     1390     235    975

       2xSHISH + 3xDAH = 6xHAFT
        16716     906    6025

Finnish: 2xYKSI + 7xKAKSI = 4xNELJÄ   11xKAKSI + KOLME = 5xVIISI
          1420     47420     83695     31385    32690    75585

         7xYKSI + VIISI = 2xKUUSI
          9350    10050    37750

French: 2xTROIS + 3xTRENTE = 6xSEIZE   3xSIX + TRENTE = 3xSEIZE
         14397    148218     78908      954   271821    91561

German: 2xSIEBEN + 2xELF = 3xZWÖLF   2xZWEI + 2xNEUNZEHN = 3xVIERZEHN
         126765    630    84930       9753    65269506     43519506

Hungarian: 3xKETTO + 2xHET = 5xNEGY
            15338     753    9504

Italian: 2xTRE + 3xTRENTA = 6xSEDICI   3xDUE + 3xOTTO = 5xSEI
          621    621564     310989      329    1001    798

         2xUNO + 3xSETTANTA = 2xCENTOSEI
          857    61004504     91507613

Japanese: SHICHI + 3xJÜROKU = 5xJÜICHI   3xROKU + 2xJÜROKU = 2xNIJÜGO
          832932    410576     412932     9526    389526     403815

Polish: 3xDWA + 2xTRZY = 2xSZESC   2xCZTERY + SZESC = 2xSIEDEM
         736     9408    10512      287645    38632    306961
```

Portuguese: 3xDOIS + OITO = 2xSETE   3xDOIS + 3xOITO = 5xSEIS
             3517   5145   7848   5486   4824   6186

           NOVE + 2xDEZOITO = 3xQUINZE
           4823   1358768   907453

Rumanian: 3xCINCI + SASE = 3xSAPTE   3xSASE + SAPTE = 5xCINCI
           48948   5052   50632   5750   57320   14914

          3xCINCI + NOVÄ = 4xSASE
           10310   3426   8589

Spanish: CUATRO + 2xCINCO = 2xSIETE   3xOCHO + 2xQUINCE = 6xNUEVE
         160732   14512   94878   6916   243897   84757

         2xNUEVE + 2xONCE = 5xOCHO
          13595   8175   8708

Swedish: 3xTVÅ + ÅTTA = 2xSJU   ETT + 2xFYRA = 3xTRE
          231   1227   960   488   1097   894

         2xNITTON + TRETTIO = 4xSJUTTON
          839968   9159936   2709968

THE DEEPER MEANING OF LIFF

*If you are beguiled by highly-specialized words like Ucalegon
(a neighbor whose house is on fire) or qualtagh (the first
person you see on leaving home at the start of the day),
then you should read the book with the title given above,
published by Harmony Books in 1993 for $16. Authors Douglas
Adams and John Lloyd operate on a simple premise: place-
names, "which spend their time...loafing about on signposts",
ought to be enlisted as ordinary words to express various
presently-unnamed societal activities. For instance, an **Esher**
is a push tap in a public washroom that irrigates a man's
trousers, causing a **Botley**, or water stain on his trouser
crotch, visible upon exiting the lavatory. A Botley should
not be confused with a **Wimbledon**, the last drop that, no
matter how much you shake it, goes down your trouser leg,
causing a trouser stain known as a **Piddletrenthide**. As these
examples show, the authors are British and have selected
their placenames accordingly. (The United States is represent-
ed by such concepts as a **Chicago**, the foul-smelling wind
that precedes the arrival of a subway train.) Don't confuse
a **Kettering**, the marks left on your buttocks after sunbathing
in a wicker chair, with **Plumgarths**, the corrugations on
the ankles caused by wearing tight socks. And logologists
are not neglected: a **Nossob** is a word that looks like another
word spelled backwards, but isn't. There are about a thou-
sand examples, which must be taken in small doses to avoid
literary indigestion.*