

Classic alphametic(al) problems

I can remember these particular alphametic (ie alphabetic + arithmetic(al)) problems from childhood puzzle books, but was never able to solve them ! My wife, a sudoku virtuoso, finds them pretty easy – see if you can do better than me.

An alphametic is a peculiar type of mathematical puzzle, in which a set of words is written down in the form of an ordinary "long-hand" addition sum, and it is required that the letters of the alphabet be replaced with decimal digits so that the result is a valid arithmetic sum.

Note that, in any one puzzle, the same letter stands for the same digit throughout, and the same digit is represented by the same letter throughout.

For an example one can do no better than the first modern alphametic, published by the great puzzlist H.E. Dudeney in the July 1924 issue of *Strand Magazine*:

$$\begin{array}{r} \text{SEND} \\ \text{MORE} \\ \hline \text{MONEY} \end{array}$$
$$\begin{array}{r} \text{CROSS} \\ \text{ROADS} \\ \hline \text{DANGER} \end{array}$$
$$\begin{array}{r} \text{A} \\ \text{MERRY} \\ \hline \text{XMAS} \\ \text{TURKEY} \end{array}$$