THE ROTAS SQUARE – A NUMERICAL CHALLENGE

SUSAN THORPE
Great Missenden, Buckinghamshire, England
thorpeds@hotmail.com

The history of the discovery, and significance, of the Rotas square has been documented in detail in Word Ways, particularly by Dmitri A Borgmann (WW November 1979 page 195). I do not intend to delve into that aspect of the Square here.

ROTAS
O P E R A
T E N E T
A R E P O
S A T O R

ROTAS and SATOR are reversals as are OPERA and AREPO. The middle word TENET is a palindrome. The letters of each word of the 5 x 5 square read across, row by row, to make a palindromic sequence.

I decided to turn my attention to looking at the ROTAS square from an altogether new angle, specifically a numerical one. Thus I discovered that it had some exciting properties which, when taken together, might (or not!) make it unique.

1. There are 8 different letters to be found in the Rotas square: ROTASPE. The total of these 8 letters, assigning a = b = 2…z = 26 is 108 (18 + 15 + 20 + 1 + 19 + 16 + 5 + 14). This total divided by the number of letters = 108 / 8 = 13.5, the average letter weight. An average letter weight (ALW) of 13.5 (halfway through the alphabet) means that ROTASPE is a balanced set of letters. The same result also applies when the 8 letters are assigned z = 1, y = 2…a = 26.

The letters ROTASPE make 11 transposals: ASPERTON OPERANTS PARSONET PASTRONE PATERSON PRONATES PROTEANS TROPANAS PATORNE PATRONES PORTENAS

2. The ALW of the first 2 rows, ROTAS and OPERA, combined (and also of AREPO and SATOR combined) is equal to the ALW of the middle row, TENET: 12.8

\[
\begin{array}{cccccc}
18 & 15 & 20 & 1 & 19 & = & 73^* \\
15 & 16 & 5 & 18 & 1 & = & 55^* \\
& & & & & = & 128 \text{ divided by 10 (letters) } = \text{ ALW } 12.8 \\
20 & 5 & 14 & 5 & 20 & = & 64^* \text{ divided by 5 (letters) } = \text{ ALW } 12.8
\end{array}
\]

3. Summing the digits of ROTAS produces the same total as summing the digits of OPERA...28. Continue summing the digits so that adding the digits 2 and 8 makes 10:

\[
\begin{array}{cccccc}
18 & 15 & 20 & 1 & 19 & = & 28 & = & 10 \\
15 & 16 & 5 & 18 & 1 & = & 28 & = & 10
\end{array}
\]

Summing the digits of the middle row TENET ultimately also makes 10:

\[
\begin{array}{cccccc}
20 & 5 & 14 & 5 & 2 & = & 19 & = & 10
\end{array}
\]

4. The number totals of the 5 words (see* above) are respectively, 73, 55, 64, 55, 73.

Summing these pairs of digits also produces 10 in each case: 7 + 3 = 10, 5 + 5 = 10, 6 + 4 = 10

Can the reader find any other 5 x 5 palindromic square which matches all these criteria?