THE ROTAS SQUARE – A NUMERICAL CHALLENGE

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

R O T A S
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: R O T A S P E N.
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 R O T A S P E N 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 R O T A S P E N make 11 transposals: ASPERTON OPERANTS PARSONET PASTRONE PATERSON PRONATES PROTEANS TROPANES PATORNE*S* PATRONE*S* PORTENA*S*

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**

18	15	20	1	19	=	73*				
15	16	5	18	1	=	55*				
						128	divided by 10 (letters)	=	ALW	12.8
20	5	14	5	20	=	64*	divided by 5 (letters)	=	ALW	12.8

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:

18	15	20	1	19	=	28	=	10
15	16	5	18	1	=	28	=	10

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

20	5	14	5	2	=	19	=	10

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?