Smarandache Concatenated Magic Squares

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Abstract:

In this article, I present the results of investigation of Smarandache Concatenate Magic Squares formed from the magic squares, and report some conjectures.

Key words:

Magic Square, Smarandache Concatenate Magic Squares, Smarandache Prime - Concatenate Magic Squares.

1) Introduction:

A magic square consists of the distinct positive integers , 1 ,2 ,..., n , such that the sum of the n numbers in any horizontal , vertical , or main diagonal line is always the same constant, for more details see [1],[2],and [3].

2) Smarandache Concatenated Magic Squares (SCMS):

SCMS is formed from concatenation of numbers in magic squares such that the sum of the n numbers in any horizontal, vertical, line is always the same constant, but not necessary main diagonal the same constant.

3) Examples:

Consider the following magic square (4x4), figure .1

14	24	25	11
19	17	16	22
15	21	20	18
26	12	13	23

Figure .1

Then we can formed many *Smarandache Concatenated Magic Squares,*

such as in figure.2 (concatenation the numbers in magic squares horizontally)

1424	2425	2511	1114
1917	1716	1622	2219
1521	2120	2018	1815
2612	1213	1323	2326

Figure .2

Or as in figure.3 (concatenation the numbers in magic squares vertically)

1419	2417	2516	1122
1915	1721	1620	2218
1526	2112	2013	1823
2614	1224	1325	2311

Figure .3

or many concatenation digits such as in figure .4,5 and 6 .

142425	242511	251114	111424
191716	171622	162219	221917
152120	212018	201815	181521
261213	121323	132326	232612

Figure .4

14242511	24251114	25111424	11142425
19171622	17162219	16221917	22191716
15212018	21201815	20181521	18152120
26121323	12132326	13232612	23261213

Figure .5

1424251114	2425111424	2511142425	1114242511
1917162219	1716221917	1622191716	2219171622
1521201815	2120181521	2018152120	1815212018
2612132326	1213232612	1323261213	2326121323

Figure .6

4) Conjectures:

1) There are infinitely many *Smarandache Concatenated Magic Squares* formed from one magic square.
2) The sum of the n numbers in any horizontal, vertical, line is always the same constant , and follow concatenated pattern,

for example the concatenate pattern in figures 1,2,3,4,5and 6 , follow concatenate pattern which is : 74, 7474,747474 ,74747474,7474747474 ..., and so on .

5) Smarandache Prime - Concatenate Magic Squares: is formed from concatenation of only primes numbers in magic squares [see , JRM,30:1,p297] such that the sum of the n numbers in any horizontal, vertical, line is always the same constant, but not necessary main diagonal the same constant.

Example : this example found in [JRM,30:1,p297]

101	029	083
053	071	089
059	113	041

Figure .7

Then we can form the following Smarandache Prime - Concatenate Magic Squares , Figure.8 and 9 .

101029	029083	083101
053071	071089	089053
059113	113041	041059

Figure .8

101029083	029083101	083101029
053071089	071089053	089053071
059113041	113041059	041059113

Figure .9

The sum of the n numbers in any horizontal, vertical, line is always the same constant , and follow concatenated pattern,
for example the concatenate pattern in figures 7,8, and 9 , follow concatenate pattern which is : 213, 213213,213213213 ..., and so on .

6) Conjectures:

There are infinitely many *Smarandache Prime - Concatenated Magic Squares* formed from only prime's magic squares.

7) Open Question:
1) Are there *Smarandache Prime – Back Concatenated Magic Squares?*
2) Are there *Smarandache Back Concatenated Magic Squares?*

References:

1) http://www.Magic-squares.de.
2) http://www.mathworld.wolfram.com
3) http://www.mathforum.org
4) Ashbacher.C, Smarandache Magic (problem number 2466),Journal of Recreational Mathematics,30:1,p.297,2002.