

Hidden Structures of Indian Magic Square *Sree Rama Cakra* or *Sri Rama Yantra* -New Insight

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A self taught Indian Mathematician, Mr. T V Padmakumar from Trivandrum , India, has recently discovered some unusual properties of Indian Magic Square called Sriramachakram (SRC) and described it as Strong Magic Squares. This will be of interest to mathematicians, especially number theorists.

Magic squares attracted famous mathematicians from time immemorial. Magic squares contain equal number of rows and columns and with n^2 cells in magic square of order n . Each cell contain a number (non repeating) and when summation of column wise and row wise provide same result. Euler and Ramanujan made valuable contributions to this field which is related to number theory.

Indians, from time immemorial contributed much to the field of magic squares also. One of such magic squares is depicted in Hindu Almanac (Panchangam) called Sriramachakra (SRC) as follows:

9	16	5	4
7	2	11	14
12	13	8	1
6	3	10	15

Each number in the square represents a character in Indian epic Ramayana. Traditionally this is used to check the fate of a person by asking a child to place a flower in one of the cells. The fate of the person will be related to the corresponding character in Ramayana . Recently a self taught number theorist Mr. T V Padmakumar of Trivandrum in India has discovered a variety of special properties of SRC . He discovered the fact that the SRC is a super set of about 384 sets of magic squares.

Since it has a number of properties not available for other known squares .SRC is called Strong Magic Squares”

He has published papers regarding his findings in International Mathematical Journals. If you add column wise or row wise or in diagonals or numbers at four vertices, we get same number 34. Similarly sum of the numbers in the four neighboring cells is also 34. In fact there is a method of constructing a magic square of order 4 with column-row sum an even number equal to or greater than 34 . The method is given as a quartet using Indian sytem of number representation called bhootha samkhya and katapayadi system.

*Ardhathil ninnonnu kurachu randil
Navam pathinnaratha, rudwigwagangal
Thithikku pathum punaronnilitham
Rasichu gehe kavi mnnanam njan*

Meaning:

One less from half in two, nine, sixteen, seven, eight, fifteen, ten, one, cells of the square and remaining according to katapayadi system and gives 2, 7, 6, 3, 8, 1, 4, 5 to be filled in the remaining cells

For example in a MS, to get 34 as sum, one less than half in cell2 and remaining according to the quartet explained above.

That is in cell(number): 2(16), 9(15), 16(14), 7(13), 8(12), 15(11), 10(10), 1(9), remaining according to katapayadi (red entries in the square)

9	16	2	7
6	3	13	12
15	10	8	1
4	5	11	14

To get 120 as the sum , the numbers to be filled are one less than half in 2, that is 2(59), 9(58), 16(57), 7(56), 8(55), 15(54), 10(53), 1(52), remaining according to katapayadi (red entries in the square)

52	59	2	7
6	3	56	55
58	53	8	1
4	5	54	57

To get 1000 as the sum

492	499	2	7
6	3	496	495
498	493	8	1
4	5	494	497

Strong Magic Squares like SRC and the method of construction of magic squares show the strong foundations Indians had in ancient period.

Following is a MS available in one of the Ramanujan Notebooks

1	10	15	8
16	7	2	9
6	13	12	3
11	4	5	14

Following MS is sculpted in Khajuraho temples (12th century)

7	12	1	14
2	13	8	11
16	3	10	5
9	6	15	4