MAGIC SQUARES - III

A. Venkatacharlu

Filling a 4-house-square

We may choose any of the following series:

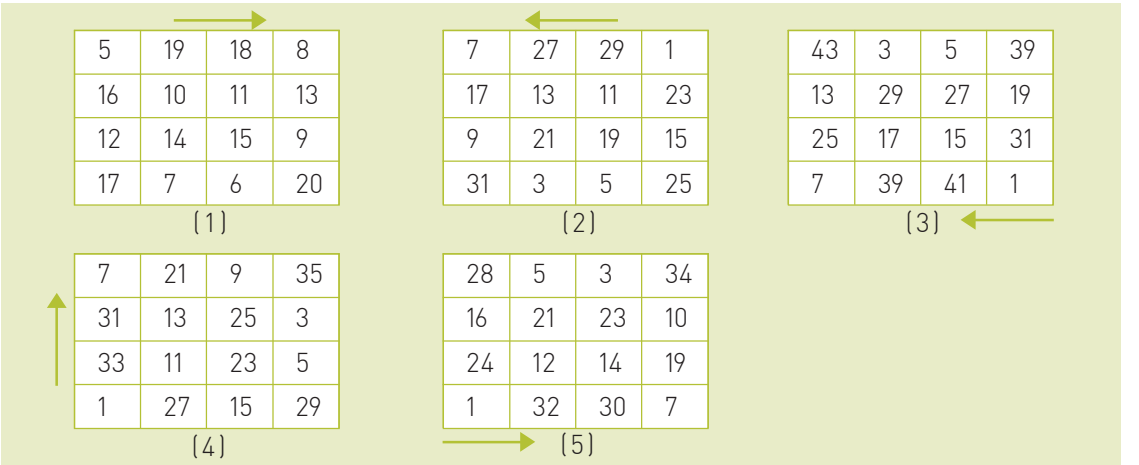
1. It may be any 16 consecutive natural numbers e.g., 5, 6,.....20.
2. It may be 16 consecutive numbers of an arithmetical series with a common difference e.g., 1, 3, 5,.....31.
3. It may be 4 sets of 4 consecutive numbers of an arithmetical series separated by equal intervals e.g., 1, 3, 5, 7; 13, 15, 17, 19; 25, 27, 29, 31; 37, 39, 41, 43.
4. It may be 2 sets of 8 consecutive numbers of a series separated by an interval of any length e.g. 1,3,5,...15; 21,23,25.....35.
5. It may be 4 sets of 4 consecutive numbers of 4 different series, the C.D. being the same in all and the difference between the first numbers of the 1st and 2nd sets being equal to the difference between the 1st numbers of the 3rd and 4th sets. The last of the 2nd and the 1st of the 3rd may be separated by any length. E.g.,1,3,5,7; 10,12,14,16; 50,52,54,56; 59,61,63,65.
6. It may be 4 sets of 4 consecutive numbers of 4 different series, the C.D. being the same in all and the 1st numbers of the 4 sets forming a different series with a different C.D. e.g., 1,3,5,7; 10,12,14,16; 19,21, 23, 25; 28,30,32,34. We have already given numbers to the houses in a 4-house-square. The 1st method has been followed in the forthcoming 4-house-squares. While filling the square follow the order given by these numbers.

How to fill up a 4-house-square

Enter the 1st, the 4th, the 13th and 16th numbers in their respective corner houses; the 6th, 7th , 10th and 11th numbers in their respective central houses. Enter the 2nd and 3rd numbers in the 15th and 14th houses, the 5th and 9th numbers in the 12th and 8th houses, the 8th and 12th numbers in the 9th and 5th houses and the 14th and 15 numbers in the 3rd and 2nd houses. (With sufficient practice this becomes automatic).

4-house-squares filled up with the series given above:

(1) Series (i) given above, starting from the left hand top corner and proceeding to the right (2) Series 2 given above, starting from the right hand top corner and proceeding to the left (3) Series 3 given above. Starting from the right bottom corner and proceeding to the left.



5	19	18	8
16	10	11	13
12	14	15	9
17	7	6	20

(1)

7	27	29	1
17	13	11	23
9	21	19	15
31	3	5	25

(2)

43	3	5	39
13	29	27	19
25	17	15	31
7	39	41	1

(3)

7	21	9	35
31	13	25	3
33	11	23	5
1	27	15	29

(4)

28	5	3	34
16	21	23	10
24	12	14	19
1	32	30	7

(5)

(4) Series 4 and starting the left bottom corner and proceeding upwards (6) Series 6 and starting from the left bottom corner and proceeding to the right. Series 5 given in algebraic symbols: a, a+d, a+2d, a+3d; a + b, a + b+ d, a+b+2d, a+b+3d; p, p + d, p+2d, p+3d; and p + b, p + b + d, p+b+2d, p+b+3d is filled in the square below:

a	p+b+2d	p + b +d	a+3d
P+3d	a +b +d	a+b+2d	p
a+b+3d	p + d	p+2d	a + b
p + b	a+2d	a + d	p+b+3d

Sum = 2a+2b+2p+6d

Note: After filling a square

(1) 1st and 4th horizontal lines may be interchanged.
(2) 1st and 2nd and 3rd and 4th lines may be interchanged.
(3) 1st and 3rd and 2nd and 4th lines may be interchanged
(4) 2nd and 3rd and 2nd and 4th lines may be interchanged.

Similarly with the vertical lines, for change 1 in the horizontal lines 4 changes in the vertical lines can be made similarly for changes 2,3, and 4.

Similarly for change 1 in the vertical lines 4 changes in the horizontal lines can be made. These changes will give us a large number of arrangements inspite of a few overlappings.

Something Special

Suppose you want to engrave the year of construction of a building in the 2nd and 3rd houses taken together of a 4-house-square (as is seen in one building in Greece) and put it in a prominent place, here is the method.

Let us take the year 1976. We often read it as nineteen seventy-six. 19 and 76 are two far from each other to belong to one series. Therefore 19 must belong to one series of 8 numbers and 76 to another of 8 numbers, both the series being with the same C.D. Here are 4 ways of doing it with 1 as C.D.

1. 26, 25.....19; 79, 78.....72
2. 12, 13.....18, 19; 73,.....80
3. 15, 16.....22; 76,.....83
4. 23, 22.....16; 76, 75.....69

(1)

75	19	76	26
24	78	21	73
25	77	20	74
72	22	79	23

(Descending Order)

(2)

77	19	76	12
14	74	17	79
13	75	18	78
80	16	73	15

(Ascending Order)

(3)

83	19	76	18
16	78	21	81
17	77	20	82
80	22	79	15

(Ascending Order)

(4)

69	19	76	20
22	74	17	71
21	75	18	70
72	16	73	23

(Descending Order)

In the above the starting point and the direction are shown by arrows—whether the series is of ascending order or descending order can easily be found. Only natural numbers are used. With a C.D. of 2 only one series in the ascending order is possible. It is 5, 7, 9,11,15,17, 19; 70, 72, 74, 76, 78, 80, 82, 84. It must be started from right hand top corner and proceed downwards.

If a series is of descending order any C.D. can be used. Many series are possible. Only 3 are given below.

(1) 33, 31, 29, 27, 25, 23, 21, 19; 82, 80, 78, 76, 74, 72, 70, 68

C.D. is 2

(2) 40,37,.....19; 85,82,79,....64

C.D. is 3

(3) 47,43,39.....19; 88,84,.....64,60

C.D. is 4

4th house is the starting point for these and we should proceed downwards.

Using the principle involved in series 5 given before we can have many other series. Only one is given here:

14,13,12,11; 22,21,20,19; 79,78,77,76; 87,86,85,84.

87	19	76	14
12	78	21	85
13	77	20	86
84	22	79	11

Something interesting

At the end of Part I, under a similar heading, we saw interesting things. Trace similar ones in all the above 4-house-squares.

Filling up a magic square of houses each way being a multiple of four.

Let us take a 12-house –square.

Pair the 1st and last i.e., 1 and 144, and second and the last but one i.e., 2 and 143 and so on. We will have 72 pairs.

Divide the 12-house-squares into nine 4-house-squares. Fill up any one of these 4-house-squares

with the first 8 pairs taking the numbers in the ascending order
e.g.,1,2,3,4,5,6,7,8,137,138,139,140,141,142,143,144.
They can be taken in the descending order also.

1	143	142	4
140	6	7	137
8	138	139	5
141	3	2	144

Since each square gives the same total one square may be filled up in the ascending order and another in the descending order as one likes.

1	143	142	4	9	135	134	12	17	127	126	20
140	6	7	137	132	14	15	129	124	22	23	121
8	138	139	5	16	130	131	13	24	122	123	21
141	3	2	144	133	11	10	136	125	19	18	128
25	119	118	28	33	111	110	36	41	103	102	44
116	30	31	113	108	38	39	105	100	46	47	97
32	114	115	29	40	106	107	37	48	98	99	45
117	27	26	120	109	35	34	112	101	43	42	104
49	95	94	52	57	87	86	60	65	79	78	68
92	54	55	89	84	62	63	81	76	70	71	73
56	90	91	53	64	82	83	61	72	74	75	69
93	51	50	96	85	59	58	88	77	67	66	80

Sum = 870

Sum in each 4-house-square = 290

All are filled up in ascending order only.