

Different Styles of Magic Squares of Orders 6, 8, 10 and 12 Using Bordered Magic Rectangles

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Abstract

*The author worked on different kinds of magic squares, such as **block-wise**, **bordered**, **block-bordered** and **block-wise bordered** magic squares. The **block-wise bordered** magic squares are very much similar to **bordered** magic squares, where the numbers are replaced by blocks of magic squares. For the first time in history of magic squares, a new concept in construction of magic squares is considered. It is based on **bordered magic rectangles**. This work brings different types and styles of magic squares in two ways. One using small blocks of **bordered magic rectangles**, and the second process is based on the algebraic formula $(a + b)^2$, $a \neq b$. Both the processes uses small blocks of **bordered magic rectangles**. This work is revised a version of author's previous work [31], and brings magic squares of orders 6, 8, 10 and 12. This work is with more quantity of magic squares then previous version. For further work on orders 14, 16 and 18 refer [31, 32, 33, 33, 34, 35, 36].*

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1 Introduction

The magic sums of order n of consecutive numbers from 1 to n^2 is given by

$$S_{n \times n} := \frac{n \times (1 + n^2)}{2}, n \geq 3. \quad (1)$$

This formula is applied to all order magic squares. Based on this formula we can easily check the possibilities of blocks of equal or unequal sums to construct **block-wise** magic squares. On the other side there are **bordered** magic squares. It is always possible to construct any order **bordered** magic squares, but the **block-wise** magic squares are not possible to construct always, for examples, magic squares of orders 10, 11, 13, 14, 17, 19, 22, 23, 26, etc. These are the cases of orders known by **p** and **2p**, where **p** is a **prime number**. These types of orders are constructed as **block-bordered** magic squares. There are four different kinds of magic squares. These four types are **block-wise**, **bordered**, **block-bordered** and **block-wise bordered** magic squares. Below are few details of author's work on these four types:

1. **Block-Wise:** Below are two examples of **block-wise** magic squares of order 12.

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

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

More details on **block-wise** magic squares from orders 12 to 45 can be seen in author's work [4, 5, 6, 7, 9, 10].

2. **Bordered:** The **bordered** magic squares are extensively studied by H. White [1]. These constructions are by use of programming developed by H. White [1]. See below two examples of orders 10 and 12.

91	86	16	84	18	14	4	98	2	92
13	26	20	80	82	69	31	71	25	88
89	23	64	62	35	68	36	38	78	12
11	24	34	49	54	43	56	67	77	90
96	29	40	44	55	50	53	61	72	5
1	79	42	58	45	52	47	59	22	100
93	74	60	51	48	57	46	41	27	8
7	73	63	39	66	33	65	37	28	94
95	76	81	21	19	32	70	30	75	6
9	15	85	17	83	87	97	3	99	10

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

More details can be seen in author's work [11, 12, 13, 14, 15, 16, 17].

3. **Block-Bordered:** The **block-bordered** magic squares are magic squares where we are unable to work with **block-wise** magic squares. These magic squares are of orders p or $2p$, where p is a prime number. For example, magic squares of orders 10, 11, 13, 14, etc. In this case we write only external border and the inner parts are constructed as **blocks**. See below two examples of orders 10 and 14:

91	86	16	84	18	14	4	98	2	92
13	47	58	19	78	39	66	27	70	88
89	22	75	50	55	30	67	42	63	12
11	82	23	54	43	74	31	62	35	90
96	51	46	79	26	59	38	71	34	5
1	48	57	20	77	40	65	28	69	100
93	21	76	49	56	29	68	41	64	8
7	81	24	53	44	73	32	61	36	94
95	52	45	80	25	60	37	72	33	6
9	15	85	17	83	87	97	3	99	10

14	8	188	10	186	12	196	7	182	16	180	18	178	184
195	33	166	27	168	41	158	35	160	49	150	43	152	2
3	28	167	34	165	36	159	42	157	44	151	50	149	194
193	170	29	164	31	162	37	156	39	154	45	148	47	4
5	163	32	169	30	155	40	161	38	147	48	153	46	192
191	57	142	51	144	65	134	59	136	73	126	67	128	6
177	52	143	58	141	60	135	66	133	68	127	74	125	20
171	146	53	140	55	138	61	132	63	130	69	124	71	26
25	139	56	145	54	131	64	137	62	123	72	129	70	172
173	81	118	75	120	89	110	83	112	97	102	91	104	24
23	76	119	82	117	84	111	90	109	92	103	98	101	174
175	122	77	116	79	114	85	108	87	106	93	100	95	22
21	115	80	121	78	107	88	113	86	99	96	105	94	176
13	189	9	187	11	185	1	190	15	181	17	179	19	183

For more details see authors work [18, 19, 10, 21, 22, 23, 23, 24].

From this work onwards, the construction of magic squares of order $2p$, where p is a **prime number** is solved, i.e, for the orders 10, 14, 22, 26 etc. It can be done two ways:

(i) Using **magic rectangles** or **bordered magic rectangles**.

(ii) Using algebraic formula like $(a + b)^2, a \neq b$.

This work is revised version of author's previous work [31], and brings magic squares of orders 6, 8, 10 and 12. This work is with much more magic squares then previous work. For further work on the orders 14, 16 and 18 refer [32, 33, 33].

2 Magic Squares of Order 6

In this section we have written three magic squares of order 6. One is bordered and one is based on **bordered magic rectangle**. See below:

1	Inder J. Taneja						111
1	35	34	33	2	6	111	
30	8	28	9	11	25	111	
24	23	15	16	20	13	111	
18	14	21	22	17	19	111	
7	26	10	27	29	12	111	
31	5	3	4	32	36	111	
111	111	111	111	111	111	111	

2	Inder J. Taneja						111
6	30	3	36	4	32	111	
35	17	22	11	24	2	111	
29	12	23	18	21	8	111	
27	26	13	20	15	10	111	
9	19	16	25	14	28	111	
5	7	34	1	33	31	111	
111	111	111	111	111	111	111	

3	Inder J. Taneja						111
24	17	22	16	14	18	111	
7	31	5	33	34	1	111	
29	27	9	12	26	8	111	
2	10	28	25	11	35	111	
36	6	32	4	3	30	111	
13	20	15	21	23	19	111	
111	111	111	111	111	111	111	

The first two are well known in the literature and the third is new. It is appearing for the first time.

3 Magic Squares of Order 8

In this section we have written 6 magic squares of order 8 using **bordered magic rectangles**. These includes of type $(a + b)^2, a \neq b$ and bordered with magic squares of order 6.

pan 260 260 260 260 260 260 260 260 260									
260	7	60	1	62	15	52	9	54	260
260	2	61	8	59	10	53	16	51	260
260	64	3	58	5	56	11	50	13	260
260	57	6	63	4	49	14	55	12	260
260	23	44	17	46	31	36	25	38	260
260	18	45	24	43	26	37	32	35	260
260	48	19	42	21	40	27	34	29	260
260	41	22	47	20	33	30	39	28	260
1	260	260	260	260	260	260	260	260	260

2	Inder Taneja https://numbers-magic.com								260
8	2	62	64	51	13	53	7	260	
5	46	44	17	50	18	20	60	260	
6	16	31	36	25	38	49	59	260	
11	22	26	37	32	35	43	54	260	
61	24	40	27	34	29	41	4	260	
56	42	33	30	39	28	23	9	260	
55	45	21	48	15	47	19	10	260	
58	63	3	1	14	52	12	57	260	
260	260	260	260	260	260	260	260	260	

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12	54	55	9	8	58	59	5	260
53	11	10	56	57	7	6	60	260
1	63	62	4	13	51	50	16	260
64	2	3	61	52	14	15	49	260
25	39	38	28	24	42	43	21	260
40	26	27	37	41	23	22	44	260
20	46	47	17	29	35	34	32	260
45	19	18	48	36	30	31	33	260
260	260	260	260	260	260	260	260	260

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19	16	52	45	48	15	39	26	260
47	23	41	44	22	18	28	37	260
14	42	24	21	43	51	38	27	260
50	49	13	20	17	46	25	40	260
34	31	3	64	4	60	57	7	260
35	30	6	11	56	53	10	59	260
29	36	63	54	9	12	55	2	260
32	33	58	1	61	5	8	62	260
260	260	260	260	260	260	260	260	260

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34	32	27	37	36	30	25	39	260
63	53	54	7	10	60	9	4	260
1	19	13	17	47	49	50	64	260
8	45	22	41	44	23	20	57	260
3	51	43	24	21	42	14	62	260
59	15	52	48	18	16	46	6	260
61	12	11	58	55	5	56	2	260
31	33	38	28	29	35	40	26	260
260	260	260	260	260	260	260	260	260

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8	2	62	64	51	13	53	7	260
5	38	31	36	30	28	32	60	260
6	21	45	19	47	48	15	59	260
11	43	41	23	26	40	22	54	260
61	16	24	42	39	25	49	4	260
56	50	20	46	18	17	44	9	260
55	27	34	29	35	37	33	10	260
58	63	3	1	14	52	12	57	260
260	260	260	260	260	260	260	260	260

4 Magic Squares of Order 10

In this section we have written 16 magic squares of order 10. These are of three types based on **bordered magic rectangles**. These includes of type $(a + b)^2, a \neq b$ and bordered with magic squares of order 8.

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1	99	46	62	18	74	55	87	30	33	505
76	12	98	43	60	39	81	4	65	27	505
42	68	23	90	36	17	79	51	94	5	505
70	7	75	34	21	83	48	92	16	59	505
54	31	69	77	45	22	96	20	3	88	505
85	44	11	29	97	56	10	63	38	72	505
28	53	40	6	82	95	67	49	71	14	505
37	25	84	91	9	50	13	78	52	66	505
93	80	57	15	64	8	32	26	89	41	505
19	86	2	58	73	61	24	35	47	100	505
505	505	505	505	505	505	505	505	505	505	505

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94	1	11	96	30	77	21	70	72	33	505
12	16	85	89	76	63	39	59	41	25	505
91	20	81	10	22	36	52	49	65	79	505
95	13	88	6	34	44	51	50	57	67	505
93	87	14	8	69	40	53	48	61	32	505
4	83	18	97	28	37	45	56	64	73	505
9	86	15	92	26	66	47	54	35	75	505
99	17	84	2	74	58	55	46	43	27	505
3	82	19	98	78	60	62	42	38	23	505
5	100	90	7	68	24	80	31	29	71	505
505	505	505	505	505	505	505	505	505	505	505

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91	86	16	84	18	14	4	98	2	92	505
13	26	20	80	82	69	31	71	25	88	505
89	23	64	62	35	68	36	38	78	12	505
11	24	34	49	54	43	56	67	77	90	505
96	29	40	44	55	50	53	61	72	5	505
1	79	42	58	45	52	47	59	22	100	505
93	74	60	51	48	57	46	41	27	8	505
7	73	63	39	66	33	65	37	28	94	505
95	76	81	21	19	32	70	30	75	6	505
9	15	85	17	83	87	97	3	99	10	505
505	505	505	505	505	505	505	505	505	505	505

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48	59	43	57	45	55	54	41	52	51	505
14	8	9	90	6	85	96	91	94	12	505
97	28	84	79	23	77	20	18	75	4	505
86	74	71	29	68	35	31	69	27	15	505
2	80	34	38	64	39	61	67	21	99	505
13	76	65	63	37	62	40	36	25	88	505
100	19	32	72	33	66	70	30	82	1	505
3	26	17	22	78	24	81	83	73	98	505
89	93	92	11	95	16	5	10	7	87	505
53	42	58	44	56	46	47	60	49	50	505
505	505	505	505	505	505	505	505	505	505	505

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48	59	43	57	45	55	54	41	52	51	505
7	98	92	6	97	8	10	2	89	96	505
100	83	20	13	87	17	86	16	82	1	505
90	18	81	88	14	84	15	85	19	11	505
5	3	9	95	4	93	91	99	12	94	505
27	69	72	26	28	77	30	22	78	76	505
80	63	40	67	36	33	62	66	37	21	505
70	38	61	34	65	68	39	35	64	31	505
25	32	29	75	73	24	71	79	23	74	505
53	42	58	44	56	46	47	60	49	50	505
505	505	505	505	505	505	505	505	505	505	505

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96	10	6	89	8	97	98	2	92	7	505
1	13	20	16	87	83	82	17	86	100	505
11	88	81	85	14	18	19	84	15	90	505
94	91	95	12	93	4	3	99	9	5	505
76	78	21	27	33	67	66	65	34	38	505
26	71	30	75	62	40	60	41	43	57	505
77	70	31	24	56	55	47	48	52	45	505
28	32	69	73	50	46	53	54	49	51	505
22	29	72	79	39	58	42	59	61	44	505
74	23	80	25	63	37	35	36	64	68	505
505	505	505	505	505	505	505	505	505	505	505

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96	10	6	89	8	97	98	2	92	7	505
1	13	20	16	87	83	82	17	86	100	505
11	88	81	85	14	18	19	84	15	90	505
94	91	95	12	93	4	3	99	9	5	505
76	78	21	27	38	62	35	68	36	64	505
26	71	30	75	67	49	54	43	56	34	505
77	70	31	24	61	44	55	50	53	40	505
28	32	69	73	59	58	45	52	47	42	505
22	29	72	79	41	51	48	57	46	60	505
74	23	80	25	37	39	66	33	65	63	505
505	505	505	505	505	505	505	505	505	505	505

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96	10	6	89	8	97	98	2	92	7	505
1	13	20	16	87	83	86	17	82	100	505
11	88	81	85	14	18	15	84	19	90	505
94	91	95	12	93	4	3	99	9	5	505
76	78	21	27	56	49	54	48	46	50	505
26	32	69	75	33	63	37	65	66	39	505
28	29	72	73	40	59	41	44	58	61	505
77	71	30	24	67	42	60	57	43	34	505
22	70	31	79	62	38	64	36	35	68	505
74	23	80	25	45	52	47	53	55	51	505
505	505	505	505	505	505	505	505	505	505	505

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33	67	66	65	34	38	76	78	21	27	505
62	40	60	41	43	57	26	32	69	75	505
56	55	47	48	52	45	28	29	72	73	505
50	46	53	54	49	51	77	71	30	24	505
39	58	42	59	61	44	22	70	31	79	505
63	37	35	36	64	68	74	23	80	25	505
88	14	89	16	10	86	7	96	1	98	505
90	20	83	17	82	11	2	97	8	95	505
9	81	18	84	19	92	100	3	94	5	505
15	87	12	85	91	13	93	6	99	4	505
505	505	505	505	505	505	505	505	505	505	505

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38	62	36	68	35	64	76	78	21	27	505
67	49	54	43	56	34	26	32	69	75	505
61	44	55	50	53	40	28	29	72	73	505
41	58	45	52	47	60	77	71	30	24	505
59	51	48	57	46	42	22	70	31	79	505
37	39	65	33	66	63	74	23	80	25	505
88	14	89	16	10	86	7	96	1	98	505
90	20	83	17	82	11	2	97	8	95	505
9	81	18	84	19	92	100	3	94	5	505
15	87	12	85	91	13	93	6	99	4	505
505	505	505	505	505	505	505	505	505	505	505

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46	49	54	48	56	50	76	78	21	27	505
39	66	37	65	63	33	26	71	30	75	505
61	44	59	58	41	40	28	70	31	73	505
34	57	42	43	60	67	77	29	72	24	505
68	35	64	36	38	62	22	32	69	79	505
55	52	47	53	45	51	74	23	80	25	505
88	14	89	16	10	86	7	96	1	98	505
90	20	82	17	83	11	2	97	8	95	505
9	81	19	84	18	92	100	3	94	5	505
15	87	12	85	91	13	93	6	99	4	505
505	505	505	505	505	505	505	505	505	505	505

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91	84	86	98	18	16	14	4	2	92	505
13	25	78	19	80	33	70	27	72	88	505
11	20	79	26	77	28	71	34	69	90	505
7	82	21	76	23	74	29	68	31	94	505
1	75	24	81	22	67	32	73	30	100	505
89	41	62	35	64	49	54	43	56	12	505
93	36	63	42	61	44	55	50	53	8	505
95	66	37	60	39	58	45	52	47	6	505
96	59	40	65	38	51	48	57	46	5	505
9	17	15	3	83	85	87	97	99	10	505
505	505	505	505	505	505	505	505	505	505	505

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91	84	86	98	18	16	14	4	2	92	505
13	30	72	73	27	26	76	77	23	88	505
11	71	29	28	74	75	25	24	78	90	505
7	19	81	80	22	31	69	68	34	94	505
1	82	20	21	79	70	32	33	67	100	505
89	43	57	56	46	42	60	61	39	12	505
93	58	44	45	55	59	41	40	62	8	505
95	38	64	65	35	47	53	52	50	6	505
96	63	37	36	66	54	48	49	51	5	505
9	17	15	3	83	85	87	97	99	10	505
505	505	505	505	505	505	505	505	505	505	505

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91	84	86	98	18	16	14	4	2	92	505
13	37	34	70	63	66	33	57	44	88	505
11	65	41	59	62	40	36	46	55	90	505
7	32	60	42	39	61	69	56	45	94	505
1	68	67	31	38	35	64	43	58	100	505
89	52	49	21	82	22	78	75	25	12	505
93	53	48	24	29	74	71	28	77	8	505
95	47	54	81	72	27	30	73	20	6	505
96	50	51	76	19	79	23	26	80	5	505
9	17	15	3	83	85	87	97	99	10	505
505	505	505	505	505	505	505	505	505	505	505

15 Inder J. Taneja <https://numbers-magic.com/> 505

91	84	86	98	18	16	14	4	2	92	505
13	52	50	45	55	54	48	43	57	88	505
11	81	71	72	25	28	78	27	22	90	505
7	19	37	31	35	65	67	68	82	94	505
1	26	63	40	59	62	41	38	75	100	505
89	21	69	61	42	39	60	32	80	12	505
93	77	33	70	66	36	34	64	24	8	505
95	79	30	29	76	73	23	74	20	6	505
96	49	51	56	46	47	53	58	44	5	505
9	17	15	3	83	85	87	97	99	10	505
505	505	505	505	505	505	505	505	505	505	505

16 Inder J. Taneja <https://numbers-magic.com/> 505

91	84	86	98	18	16	14	4	2	92	505
13	26	20	80	82	69	31	71	25	88	505
11	23	56	49	54	48	46	50	78	90	505
7	24	39	63	37	65	66	33	77	94	505
1	29	61	59	41	44	58	40	72	100	505
89	79	34	42	60	57	43	67	22	12	505
93	74	68	38	64	36	35	62	27	8	505
95	73	45	52	47	53	55	51	28	6	505
96	76	81	21	19	32	70	30	75	5	505
9	17	15	3	83	85	87	97	99	10	505
505	505	505	505	505	505	505	505	505	505	505

5 Magic Squares of Order 12

In this section we have written 45 magic squares of order 12. These are of three types based on **bordered magic rectangles**. These includes of type $(a + b)^2, a \neq b$ and bordered with magic squares of order 10. The first two magic squares are pandiagonal and the others are normal magic squares.

	pan	870	870	870	870	870	870	870	870	870	870	870	870
870	98	1	51	72	22	119	78	28	125	140	43	93	870
870	3	50	97	118	71	24	124	77	30	45	92	139	870
870	49	99	2	23	120	70	29	126	76	91	141	44	870
870	131	34	84	87	37	134	57	7	104	113	16	66	870
870	36	83	130	133	86	39	103	56	9	18	65	112	870
870	82	132	35	38	135	85	8	105	55	64	114	17	870
870	67	117	20	5	102	52	47	144	94	73	123	26	870
870	21	68	115	100	53	6	142	95	48	27	74	121	870
870	116	19	69	54	4	101	96	46	143	122	25	75	870
870	88	138	41	32	129	79	14	111	61	58	108	11	870
870	42	89	136	127	80	33	109	62	15	12	59	106	870
	137	40	90	81	31	128	63	13	110	107	10	60	870
1	870	870	870	870	870	870	870	870	870	870	870	870	870

	pan	870	870	870	870	870	870	870	870	870	870	870	870
870	7	140	1	142	15	132	9	134	23	124	17	126	870
870	2	141	8	139	10	133	16	131	18	125	24	123	870
870	144	3	138	5	136	11	130	13	128	19	122	21	870
870	137	6	143	4	129	14	135	12	121	22	127	20	870
870	31	116	25	118	39	108	33	110	47	100	41	102	870
870	26	117	32	115	34	109	40	107	42	101	48	99	870
870	120	27	114	29	112	35	106	37	104	43	98	45	870
870	113	30	119	28	105	38	111	36	97	46	103	44	870
870	55	92	49	94	63	84	57	86	71	76	65	78	870
870	50	93	56	91	58	85	64	83	66	77	72	75	870
870	96	51	90	53	88	59	82	61	80	67	74	69	870
	89	54	95	52	81	62	87	60	73	70	79	68	870
2	870	870	870	870	870	870	870	870	870	870	870	870	870

3	Inder J. Taneja https://numbers-magic.com/											870	
	1	143	142	141	2	6	19	125	124	123	20	24	870
	138	8	136	9	11	133	120	26	118	27	29	115	870
	132	131	15	16	128	13	114	113	33	34	110	31	870
	18	14	129	130	17	127	36	32	111	112	35	109	870
	7	134	10	135	137	12	25	116	28	117	119	30	870
	139	5	3	4	140	144	121	23	21	22	122	126	870
	55	89	88	87	56	60	37	107	106	105	38	42	870
	84	62	82	63	65	79	102	44	100	45	47	97	870
	78	77	69	70	74	67	96	95	51	52	92	49	870
	72	68	75	76	71	73	54	50	93	94	53	91	870
	61	80	64	81	83	66	43	98	46	99	101	48	870
	85	59	57	58	86	90	103	41	39	40	104	108	870
	870	870	870	870	870	870	870	870	870	870	870	870	870

4	Inder J. Taneja https://numbers-magic.com/											870	
	140	138	3	144	4	6	122	120	21	126	22	24	870
	2	17	130	11	132	143	20	35	112	29	114	125	870
	8	12	131	18	129	137	26	30	113	36	111	119	870
	10	134	13	128	15	135	28	116	31	110	33	117	870
	136	127	16	133	14	9	118	109	34	115	32	27	870
	139	7	142	1	141	5	121	25	124	19	123	23	870
	86	84	57	90	58	60	104	102	39	108	40	42	870
	56	71	76	65	78	89	38	53	94	47	96	107	870
	62	66	77	72	75	83	44	48	95	54	93	101	870
	64	80	67	74	69	81	46	98	49	92	51	99	870
	82	73	70	79	68	63	100	91	52	97	50	45	870
	85	61	88	55	87	59	103	43	106	37	105	41	870
	870	870	870	870	870	870	870	870	870	870	870	870	870

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116	30	117	32	26	114	43	103	107	101	40	41	870
118	110	36	111	33	27	106	99	98	48	45	39	870
25	35	109	34	112	120	37	46	47	97	100	108	870
31	115	28	113	119	29	104	42	38	44	105	102	870
138	6	141	2	8	140	128	18	129	20	14	126	870
144	12	9	135	134	1	130	24	21	123	122	15	870
3	133	136	10	11	142	13	121	124	22	23	132	870
5	139	4	143	137	7	19	127	16	125	131	17	870
90	56	93	54	50	92	80	66	62	81	68	78	870
51	87	57	86	60	94	82	72	69	75	74	63	870
96	58	88	59	85	49	61	73	76	70	71	84	870
53	89	52	91	95	55	67	79	83	64	77	65	870
870	870	870	870	870	870	870	870	870	870	870	870	870

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28	118	119	25	5	139	138	8	24	123	122	21	870
117	27	26	120	140	6	7	137	121	22	23	124	870
13	131	130	16	9	135	134	12	20	126	127	17	870
132	14	15	129	136	10	11	133	125	19	18	128	870
1	143	142	4	29	115	114	32	33	111	110	36	870
144	2	3	141	116	30	31	113	112	34	35	109	870
49	95	94	52	41	103	102	44	45	99	98	48	870
96	50	51	93	104	42	43	101	100	46	47	97	870
69	74	75	72	37	107	106	40	57	87	86	60	870
76	71	70	73	108	38	39	105	88	58	59	85	870
64	82	83	61	65	79	78	68	53	91	90	56	870
81	63	62	84	80	66	67	77	92	54	55	89	870
870	870	870	870	870	870	870	870	870	870	870	870	870

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133	124	126	141	143	22	20	18	5	3	1	134	870
17	113	108	38	106	40	36	26	120	24	114	128	870
14	35	48	42	102	104	91	53	93	47	110	131	870
13	111	45	86	84	57	90	58	60	100	34	132	870
8	33	46	56	71	76	65	78	89	99	112	137	870
6	118	51	62	66	77	72	75	83	94	27	139	870
129	23	101	64	80	67	74	69	81	44	122	16	870
130	115	96	82	73	70	79	68	63	49	30	15	870
135	29	95	85	61	88	55	87	59	50	116	10	870
136	117	98	103	43	41	54	92	52	97	28	9	870
138	31	37	107	39	105	109	119	25	121	32	7	870
11	21	19	4	2	123	125	127	140	142	144	12	870
870	870	870	870	870	870	870	870	870	870	870	870	870

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61	72	83	64	65	79	78	68	69	75	74	82	870
8	135	6	129	2	140	128	11	132	20	18	141	870
7	120	36	114	118	111	115	35	22	21	33	138	870
136	122	48	40	108	100	39	43	103	99	23	9	870
15	116	104	91	51	53	55	96	89	41	29	130	870
142	24	38	50	58	85	88	59	95	107	121	3	870
126	26	98	93	87	60	57	86	52	47	119	19	870
12	32	101	56	94	92	90	49	54	44	113	133	870
131	28	46	105	37	45	106	102	42	97	117	14	870
144	112	109	31	27	34	30	110	123	124	25	1	870
4	10	139	16	143	5	17	134	13	125	127	137	870
84	73	62	81	80	66	67	77	76	70	71	63	870
870	870	870	870	870	870	870	870	870	870	870	870	870

9	Inder J. Taneja https://numbers-magic.com/											870
12	141	2	139	1	135	142	8	55	91	50	94	870
138	128	18	129	20	14	126	7	89	59	86	56	870
5	130	24	21	123	122	15	140	52	88	57	93	870
134	13	121	124	22	23	132	11	96	85	60	49	870
9	19	127	16	125	131	17	136	92	58	87	53	870
137	4	143	6	144	10	3	133	51	54	95	90	870
78	66	83	63	109	27	119	30	120	28	34	113	870
81	71	74	64	35	104	42	105	44	38	102	110	870
61	73	72	84	116	106	48	45	99	98	39	29	870
68	76	69	77	31	37	97	100	46	47	108	114	870
65	70	75	80	112	43	103	40	101	107	41	33	870
82	79	62	67	32	118	26	115	25	117	111	36	870
870	870	870	870	870	870	870	870	870	870	870	870	870

10	Inder J. Taneja https://numbers-magic.com/											870
9	12	132	11	141	130	45	48	96	47	105	94	870
140	119	27	21	123	5	39	83	63	57	87	106	870
1	122	31	114	23	144	37	86	67	78	59	108	870
143	19	36	109	126	2	107	55	66	79	90	38	870
138	125	110	35	20	7	50	92	69	76	53	95	870
14	128	113	32	17	131	101	89	77	68	56	44	870
3	24	116	29	121	142	93	60	80	65	85	52	870
6	120	111	34	25	139	42	54	74	71	91	103	870
135	18	30	115	127	10	99	84	72	73	61	46	870
137	28	33	112	117	8	102	64	75	70	81	43	870
129	22	118	124	26	16	104	58	82	88	62	41	870
15	133	13	134	4	136	51	97	49	98	40	100	870
870	870	870	870	870	870	870	870	870	870	870	870	870

11	Inder J. Taneja https://numbers-magic.com/											870
9	12	132	11	141	130	104	42	105	44	38	102	870
140	119	27	21	123	5	106	98	99	45	48	39	870
14	125	31	114	20	131	37	47	46	100	97	108	870
143	19	33	112	126	2	43	103	40	101	107	41	870
138	122	110	35	23	7	92	54	93	56	50	90	870
1	128	116	29	17	144	94	60	57	87	86	51	870
3	24	36	109	121	142	49	85	88	58	59	96	870
6	120	111	34	25	139	55	91	52	89	95	53	870
135	18	30	115	127	10	80	66	81	68	62	78	870
137	28	113	32	117	8	82	72	69	75	74	63	870
129	22	118	124	26	16	61	73	76	70	71	84	870
15	133	13	134	4	136	67	79	64	77	83	65	870
870	870	870	870	870	870	870	870	870	870	870	870	870

12	Inder J. Taneja https://numbers-magic.com/											870
31	115	28	119	113	29	45	48	96	47	105	94	870
118	111	36	110	33	27	39	83	63	57	87	106	870
25	34	109	35	112	120	101	86	67	78	59	44	870
116	30	117	26	32	114	107	55	75	70	90	38	870
12	138	5	134	9	137	50	64	69	76	81	95	870
1	128	130	13	19	144	37	89	77	68	56	108	870
2	18	123	22	127	143	93	60	72	73	85	52	870
139	129	122	23	16	6	42	54	74	71	91	103	870
141	20	24	121	125	4	99	84	66	79	61	46	870
142	14	21	124	131	3	102	92	80	65	53	43	870
135	126	15	132	17	10	104	58	82	88	62	41	870
8	7	140	11	136	133	51	97	49	98	40	100	870
870	870	870	870	870	870	870	870	870	870	870	870	870

13	Inder J. Taneja	https://numbers-magic.com/	870									
9	12	132	11	141	130	37	107	106	105	38	42	870
140	119	27	21	123	5	102	44	100	45	47	97	870
14	125	31	114	20	131	96	95	51	52	92	49	870
143	19	36	109	126	2	54	50	93	94	53	91	870
138	122	110	35	23	7	43	98	46	99	101	48	870
1	128	113	32	17	144	103	41	39	40	104	108	870
3	24	33	112	121	142	55	89	88	87	56	60	870
6	120	111	34	25	139	84	62	82	63	65	79	870
135	18	30	115	127	10	78	77	69	70	74	67	870
137	28	116	29	117	8	72	68	75	76	71	73	870
129	22	118	124	26	16	61	80	64	81	83	66	870
15	133	13	134	4	136	85	59	57	58	86	90	870
870	870	870	870	870	870	870	870	870	870	870	870	870

14	Inder J. Taneja	https://numbers-magic.com/	870									
9	12	132	11	141	130	42	102	39	108	40	104	870
140	119	27	21	123	5	107	53	94	47	96	38	870
14	125	31	114	20	131	101	48	95	54	93	44	870
143	19	36	109	126	2	99	98	49	92	51	46	870
138	122	110	35	23	7	45	91	52	97	50	100	870
1	128	113	32	17	144	41	43	106	37	105	103	870
3	24	33	112	121	142	60	84	57	90	58	86	870
6	120	111	34	25	139	89	71	76	65	78	56	870
135	18	30	115	127	10	83	66	77	72	75	62	870
137	28	116	29	117	8	81	80	67	74	69	64	870
129	22	118	124	26	16	63	73	70	79	68	82	870
15	133	13	134	4	136	59	61	88	55	87	85	870
870	870	870	870	870	870	870	870	870	870	870	870	870

15	Inder J. Taneja	https://numbers-magic.com/	870									
9	12	132	11	141	130	37	107	106	105	38	42	870
140	119	27	21	123	5	102	44	100	45	47	97	870
14	125	31	114	20	131	96	95	51	52	92	49	870
143	19	36	109	126	2	54	50	93	94	53	91	870
138	122	110	35	23	7	43	98	46	99	101	48	870
1	128	113	32	17	144	103	41	39	40	104	108	870
3	24	33	112	121	142	78	71	76	70	68	72	870
6	120	111	34	25	139	61	85	59	87	88	55	870
135	18	30	115	127	10	83	81	63	66	80	62	870
137	28	116	29	117	8	56	64	82	79	65	89	870
129	22	118	124	26	16	90	60	86	58	57	84	870
15	133	13	134	4	136	67	74	69	75	77	73	870
870	870	870	870	870	870	870	870	870	870	870	870	870

16	Inder J. Taneja	https://numbers-magic.com/	870									
9	12	132	11	141	130	42	102	39	108	40	104	870
140	119	27	21	123	5	107	53	94	47	96	38	870
14	125	31	114	20	131	101	48	95	54	93	44	870
143	19	36	109	126	2	99	98	49	92	51	46	870
138	122	110	35	23	7	45	91	52	97	50	100	870
1	128	113	32	17	144	41	43	106	37	105	103	870
3	24	33	112	121	142	78	71	76	70	68	72	870
6	120	111	34	25	139	61	85	59	87	88	55	870
135	18	30	115	127	10	83	81	63	66	80	62	870
137	28	116	29	117	8	56	64	82	79	65	89	870
129	22	118	124	26	16	90	60	86	58	57	84	870
15	133	13	134	4	136	67	74	69	75	77	73	870
870	870	870	870	870	870	870	870	870	870	870	870	870

17 Inder J. Taneja <https://numbers-magic.com/> 870

31	115	28	113	119	29	37	107	106	105	38	42	870
118	110	36	111	33	27	102	44	100	45	47	97	870
25	35	109	34	112	120	96	95	51	52	92	49	870
116	30	117	32	26	114	54	50	93	94	53	91	870
12	138	5	134	9	137	43	98	46	99	101	48	870
1	128	130	13	19	144	103	41	39	40	104	108	870
2	18	123	22	127	143	55	89	88	87	56	60	870
139	129	122	23	16	6	84	62	82	63	65	79	870
141	20	24	121	125	4	78	77	69	70	74	67	870
142	14	21	124	131	3	72	68	75	76	71	73	870
135	126	15	132	17	10	61	80	64	81	83	66	870
8	7	140	11	136	133	85	59	57	58	86	90	870
870	870	870	870	870	870	870	870	870	870	870	870	870

18 Inder J. Taneja <https://numbers-magic.com/> 870

31	115	28	113	119	29	42	102	39	108	40	104	870
118	110	36	111	33	27	107	53	94	47	96	38	870
25	35	109	34	112	120	101	48	95	54	93	44	870
116	30	117	32	26	114	99	98	49	92	51	46	870
12	138	5	134	9	137	45	91	52	97	50	100	870
1	128	130	13	19	144	41	43	106	37	105	103	870
2	18	123	22	127	143	60	84	57	90	58	86	870
139	129	122	23	16	6	89	71	76	65	78	56	870
141	20	24	121	125	4	83	66	77	72	75	62	870
142	14	21	124	131	3	81	80	67	74	69	64	870
135	126	15	132	17	10	63	73	70	79	68	82	870
8	7	140	11	136	133	59	61	88	55	87	85	870
870	870	870	870	870	870	870	870	870	870	870	870	870

19 Inder J. Taneja <https://numbers-magic.com/> 870

31	115	28	113	119	29	37	107	106	105	38	42	870
118	110	36	111	33	27	102	44	100	45	47	97	870
25	35	109	34	112	120	96	95	51	52	92	49	870
116	30	117	32	26	114	54	50	93	94	53	91	870
12	138	5	134	9	137	43	98	46	99	101	48	870
1	128	130	13	19	144	103	41	39	40	104	108	870
2	18	123	22	127	143	78	71	76	70	68	72	870
139	129	122	23	16	6	61	85	59	87	88	55	870
141	20	24	121	125	4	83	81	63	66	80	62	870
142	14	21	124	131	3	56	64	82	79	65	89	870
135	126	15	132	17	10	90	60	86	58	57	84	870
8	7	140	11	136	133	67	74	69	75	77	73	870
870	870	870	870	870	870	870	870	870	870	870	870	870

20 Inder J. Taneja <https://numbers-magic.com/> 870

31	115	28	113	119	29	42	102	39	108	40	104	870
118	110	36	111	33	27	107	53	94	47	96	38	870
25	35	109	34	112	120	101	48	95	54	93	44	870
116	30	117	32	26	114	99	98	49	92	51	46	870
12	138	5	134	9	137	45	91	52	97	50	100	870
1	128	130	13	19	144	41	43	106	37	105	103	870
2	18	123	22	127	143	78	71	76	70	68	72	870
139	129	122	23	16	6	61	85	59	87	88	55	870
141	20	24	121	125	4	83	81	63	66	80	62	870
142	14	21	124	131	3	56	64	82	79	65	89	870
135	126	15	132	17	10	90	60	86	58	57	84	870
8	7	140	11	136	133	67	74	69	75	77	73	870
870	870	870	870	870	870	870	870	870	870	870	870	870

21 Inder J. Taneja <https://numbers-magic.com/> 870

47	100	41	102	55	92	49	94	130	127	14	19	870
42	101	48	99	50	93	56	91	13	121	24	132	870
104	43	98	45	96	51	90	53	129	23	122	16	870
97	46	103	44	89	54	95	52	20	124	21	125	870
3	144	140	137	4	7	37	108	17	22	123	128	870
143	11	133	136	10	2	106	39	126	18	131	15	870
6	134	12	9	135	139	107	38	31	115	26	118	870
138	1	5	8	141	142	40	105	120	35	110	25	870
63	84	57	86	71	76	65	78	28	112	33	117	870
58	85	64	83	66	77	72	75	113	109	36	32	870
88	59	82	61	80	67	74	69	116	34	111	29	870
81	62	87	60	73	70	79	68	27	30	119	114	870
870	870	870	870	870	870	870	870	870	870	870	870	870

22 Inder J. Taneja <https://numbers-magic.com/> 870

48	42	102	104	91	53	93	47	31	115	26	118	870
45	86	84	57	90	58	60	100	120	34	111	25	870
46	56	71	76	65	78	89	99	28	112	33	117	870
51	62	66	77	72	75	83	94	116	109	36	29	870
101	64	80	67	74	69	81	44	113	35	110	32	870
96	82	73	70	79	68	63	49	27	30	119	114	870
95	85	61	88	55	87	59	50	19	127	14	130	870
98	103	43	41	54	92	52	97	132	23	122	13	870
3	144	137	4	140	7	37	108	16	22	123	129	870
6	133	11	136	10	139	107	38	125	124	21	20	870
143	12	134	9	135	2	106	39	128	121	24	17	870
138	1	8	141	5	142	40	105	15	18	131	126	870
870	870	870	870	870	870	870	870	870	870	870	870	870

23 Inder J. Taneja <https://numbers-magic.com/> 870

52	94	95	49	48	98	99	45	27	30	119	114	870
93	51	50	96	97	47	46	100	120	35	110	25	870
41	103	102	44	53	91	90	56	28	109	36	117	870
104	42	43	101	92	54	55	89	113	112	33	32	870
65	79	78	68	64	82	83	61	116	34	111	29	870
80	66	67	77	81	63	62	84	31	115	26	118	870
60	86	87	57	76	70	71	73	15	18	131	126	870
85	59	58	88	69	75	74	72	132	23	122	13	870
3	144	137	4	140	7	37	108	16	22	123	129	870
6	136	11	133	10	139	107	38	125	124	21	20	870
143	9	134	12	135	2	106	39	128	121	24	17	870
138	1	8	141	5	142	40	105	19	127	14	130	870
870	870	870	870	870	870	870	870	870	870	870	870	870

24 Inder J. Taneja <https://numbers-magic.com/> 870

59	56	92	85	88	55	79	66	31	115	26	118	870
87	63	81	84	62	58	68	77	120	35	110	25	870
54	82	64	61	83	91	78	67	28	112	33	117	870
90	89	53	60	57	86	65	80	116	109	36	29	870
74	71	43	104	44	100	97	47	113	34	111	32	870
75	70	46	51	96	93	50	99	27	30	119	114	870
69	76	103	94	49	52	95	42	19	127	14	130	870
72	73	98	41	101	45	48	102	132	23	122	13	870
3	144	137	4	140	7	37	108	16	22	123	129	870
6	133	10	136	11	139	107	38	125	124	21	20	870
143	12	135	9	134	2	106	39	128	121	24	17	870
138	1	8	141	5	142	40	105	15	18	131	126	870
870	870	870	870	870	870	870	870	870	870	870	870	870

25	Inder J. Taneja https://numbers-magic.com/							870				
65	72	76	77	67	70	74	79	31	115	26	118	870
103	100	94	47	50	93	49	44	116	109	36	29	870
43	59	53	57	87	89	90	102	28	112	33	117	870
48	85	62	81	84	63	60	97	120	35	110	25	870
41	91	83	64	61	82	54	104	113	34	111	32	870
99	55	92	88	58	56	86	46	27	30	119	114	870
101	45	51	98	95	52	96	42	15	18	131	126	870
80	73	69	68	78	75	71	66	132	124	21	13	870
3	144	137	4	140	7	37	108	16	121	24	129	870
6	133	10	136	11	139	107	38	125	23	122	20	870
143	12	135	9	134	2	106	39	128	22	123	17	870
138	1	8	141	5	142	40	105	19	127	14	130	870
870	870	870	870	870	870	870	870	870	870	870	870	870

26	Inder J. Taneja https://numbers-magic.com/							870				
48	42	102	104	91	53	93	47	27	30	119	114	870
45	78	71	76	70	68	72	100	120	35	110	25	870
46	61	85	59	87	88	55	99	28	112	33	117	870
51	83	81	63	66	80	62	94	113	109	36	32	870
101	56	64	82	79	65	89	44	116	34	111	29	870
96	90	60	86	58	57	84	49	31	115	26	118	870
95	67	74	69	75	77	73	50	19	127	14	130	870
98	103	43	41	54	92	52	97	132	23	122	13	870
3	144	137	4	140	7	37	108	16	22	123	129	870
6	136	11	133	10	139	107	38	125	124	21	20	870
143	9	134	12	135	2	106	39	128	121	24	17	870
138	1	8	141	5	142	40	105	15	18	131	126	870
870	870	870	870	870	870	870	870	870	870	870	870	870

27	Inder J. Taneja https://numbers-magic.com/							870				
48	42	102	104	91	53	93	47	114	32	29	115	870
45	86	84	57	90	58	60	100	31	113	116	30	870
46	56	71	76	65	78	89	99	3	6	143	138	870
101	62	66	77	72	75	83	44	144	11	134	1	870
51	82	80	67	74	69	63	94	4	133	12	141	870
96	64	73	70	79	68	81	49	137	136	9	8	870
95	85	61	88	55	87	59	50	140	10	135	5	870
98	103	43	41	54	92	52	97	7	139	2	142	870
16	129	19	124	20	121	128	23	39	108	33	110	870
130	15	22	27	117	120	26	123	34	109	40	107	870
131	14	127	118	28	25	119	18	112	35	106	37	870
13	132	122	21	125	24	17	126	105	38	111	36	870
870	870	870	870	870	870	870	870	870	870	870	870	870

28	Inder J. Taneja https://numbers-magic.com/							870				
52	94	95	49	48	98	99	45	115	32	29	114	870
93	51	50	96	97	47	46	100	30	113	116	31	870
67	77	80	66	53	91	90	56	3	6	143	138	870
78	68	65	79	92	54	55	89	144	11	134	1	870
41	103	102	44	83	61	64	82	4	133	12	141	870
104	42	43	101	62	84	81	63	137	136	9	8	870
60	86	87	57	71	73	76	70	140	10	135	5	870
85	59	58	88	74	72	69	75	7	139	2	142	870
13	132	19	128	20	121	124	23	39	108	33	110	870
130	15	22	27	117	120	26	123	34	109	40	107	870
131	14	127	118	28	25	119	18	112	35	106	37	870
16	129	122	17	125	24	21	126	105	38	111	36	870
870	870	870	870	870	870	870	870	870	870	870	870	870

29 Inder J. Taneja <https://numbers-magic.com/> 870

78	67	59	88	92	85	56	55	114	32	29	115	870
79	66	54	63	81	84	62	91	31	113	116	30	870
68	77	87	82	64	61	83	58	3	143	6	138	870
65	80	90	57	53	60	89	86	137	11	134	8	870
47	97	44	100	104	43	74	71	4	133	12	141	870
99	51	96	93	50	46	75	70	144	136	9	1	870
42	94	49	52	95	103	69	76	140	10	135	5	870
102	48	101	45	41	98	72	73	7	2	139	142	870
16	129	19	20	128	121	124	23	39	108	33	110	870
130	15	22	27	117	120	26	123	34	109	40	107	870
131	14	127	118	28	25	119	18	112	35	106	37	870
13	132	122	125	17	24	21	126	105	38	111	36	870
870	870	870	870	870	870	870	870	870	870	870	870	870

30 Inder J. Taneja <https://numbers-magic.com/> 870

74	72	67	77	76	70	65	79	114	29	32	115	870
103	93	94	47	50	100	49	44	31	116	113	30	870
41	59	53	57	87	89	90	104	3	143	6	138	870
43	85	62	81	84	63	60	102	137	11	134	8	870
48	91	83	64	61	82	54	97	4	133	12	141	870
99	55	92	88	58	56	86	46	144	136	9	1	870
101	52	51	98	95	45	96	42	140	10	135	5	870
71	73	78	68	69	75	80	66	7	2	139	142	870
16	129	23	20	128	121	124	19	39	108	33	110	870
130	15	18	27	117	120	26	127	34	109	40	107	870
131	14	123	118	28	25	119	22	112	35	106	37	870
13	132	126	125	17	24	21	122	105	38	111	36	870
870	870	870	870	870	870	870	870	870	870	870	870	870

31 Inder J. Taneja <https://numbers-magic.com/> 870

48	42	102	91	104	53	93	47	115	29	32	114	870
45	78	71	76	68	70	72	100	30	116	113	31	870
46	61	85	59	87	88	55	99	3	143	6	138	870
101	83	81	63	66	80	62	44	137	11	134	8	870
51	56	64	82	79	65	89	94	4	133	12	141	870
96	90	60	86	58	57	84	49	144	136	9	1	870
95	67	74	69	77	75	73	50	140	10	135	5	870
98	103	43	54	41	92	52	97	7	2	139	142	870
16	129	19	20	128	121	124	23	39	108	33	110	870
130	15	22	27	117	120	26	123	34	109	40	107	870
131	14	127	118	28	25	119	18	112	35	106	37	870
13	132	122	125	17	24	21	126	105	38	111	36	870
870	870	870	870	870	870	870	870	870	870	870	870	870

32 Inder J. Taneja <https://numbers-magic.com/> 870

133	124	126	141	143	22	20	18	5	3	1	134	870
17	116	23	33	118	52	99	43	92	94	55	128	870
14	34	38	107	111	98	85	61	81	63	47	131	870
13	113	42	103	32	44	58	74	71	87	101	132	870
8	117	35	110	28	56	66	73	72	79	89	137	870
6	115	109	36	30	91	62	75	70	83	54	139	870
129	26	105	40	119	50	59	67	78	86	95	16	870
130	31	108	37	114	48	88	69	76	57	97	15	870
135	121	39	106	24	96	80	77	68	65	49	10	870
136	25	104	41	120	100	82	84	64	60	45	9	870
138	27	122	112	29	90	46	102	53	51	93	7	870
11	21	19	4	2	123	125	127	140	142	144	12	870
870	870	870	870	870	870	870	870	870	870	870	870	870

33 Inder J. Taneja <https://numbers-magic.com/> 870

133	124	126	141	143	22	20	18	5	3	1	134	870
17	70	81	65	79	67	77	76	63	74	73	128	870
14	36	30	31	112	28	107	118	113	116	34	131	870
13	119	50	106	101	45	99	42	40	97	26	132	870
8	108	96	93	51	90	57	53	91	49	37	137	870
6	24	102	56	60	86	61	83	89	43	121	139	870
129	35	98	87	85	59	84	62	58	47	110	16	870
130	122	41	54	94	55	88	92	52	104	23	15	870
135	25	48	39	44	100	46	103	105	95	120	10	870
136	111	115	114	33	117	38	27	32	29	109	9	870
138	75	64	80	66	78	68	69	82	71	72	7	870
11	21	19	4	2	123	125	127	140	142	144	12	870
870	870	870	870	870	870	870	870	870	870	870	870	870

34 Inder J. Taneja <https://numbers-magic.com/> 870

133	124	126	141	143	22	20	18	5	3	1	134	870
17	70	81	65	79	67	77	76	63	74	73	128	870
14	29	120	114	28	119	30	32	24	111	118	131	870
13	122	105	42	35	109	39	108	38	104	23	132	870
8	112	40	103	110	36	106	37	107	41	33	137	870
6	27	25	31	117	26	115	113	121	34	116	139	870
129	49	91	94	48	50	99	52	44	100	98	16	870
130	102	85	62	89	58	55	84	88	59	43	15	870
135	92	60	83	56	87	90	61	57	86	53	10	870
136	47	54	51	97	95	46	93	101	45	96	9	870
138	75	64	80	66	78	68	69	82	71	72	7	870
11	21	19	4	2	123	125	127	140	142	144	12	870
870	870	870	870	870	870	870	870	870	870	870	870	870

35 Inder J. Taneja <https://numbers-magic.com/> 870

133	124	126	141	143	22	20	18	5	3	1	134	870
17	118	32	28	111	30	119	120	24	114	29	128	870
14	23	35	42	38	109	105	104	39	108	122	131	870
13	33	110	103	107	36	40	41	106	37	112	132	870
8	116	113	117	34	115	26	25	121	31	27	137	870
6	98	100	43	49	55	89	88	87	56	60	139	870
129	48	93	52	97	84	62	82	63	65	79	16	870
130	99	92	53	46	78	77	69	70	74	67	15	870
135	50	54	91	95	72	68	75	76	71	73	10	870
136	44	51	94	101	61	80	64	81	83	66	9	870
138	96	45	102	47	85	59	57	58	86	90	7	870
11	21	19	4	2	123	125	127	140	142	144	12	870
870	870	870	870	870	870	870	870	870	870	870	870	870

36 Inder J. Taneja <https://numbers-magic.com/> 870

133	124	126	141	143	22	20	18	5	3	1	134	870
17	118	32	28	111	30	119	120	24	114	29	128	870
14	23	35	42	38	109	105	104	39	108	122	131	870
13	33	110	103	107	36	40	41	106	37	112	132	870
8	116	113	117	34	115	26	25	121	31	27	137	870
6	98	100	43	49	60	84	57	90	58	86	139	870
129	48	93	52	97	89	71	76	65	78	56	16	870
130	99	92	53	46	83	66	77	72	75	62	15	870
135	50	54	91	95	81	80	67	74	69	64	10	870
136	44	51	94	101	63	73	70	79	68	82	9	870
138	96	45	102	47	59	61	88	55	87	85	7	870
11	21	19	4	2	123	125	127	140	142	144	12	870
870	870	870	870	870	870	870	870	870	870	870	870	870

37 Inder J. Taneja <https://numbers-magic.com/> 870

133	124	126	141	143	22	20	18	5	3	1	134	870
17	118	32	28	111	30	119	120	24	114	29	128	870
14	23	35	42	38	109	105	108	39	104	122	131	870
13	33	110	103	107	36	40	37	106	41	112	132	870
8	116	113	117	34	115	26	25	121	31	27	137	870
6	98	100	43	49	78	71	76	70	68	72	139	870
129	48	54	91	97	55	85	59	87	88	61	16	870
130	50	51	94	95	62	81	63	66	80	83	15	870
135	99	93	52	46	89	64	82	79	65	56	10	870
136	44	92	53	101	84	60	86	58	57	90	9	870
138	96	45	102	47	67	74	69	75	77	73	7	870
11	21	19	4	2	123	125	127	140	142	144	12	870
870	870	870	870	870	870	870	870	870	870	870	870	870

38 Inder J. Taneja <https://numbers-magic.com/> 870

133	124	126	141	143	22	20	18	5	3	1	134	870
17	55	89	88	87	56	60	98	100	43	49	128	870
14	84	62	82	63	65	79	48	54	91	97	131	870
13	78	77	69	70	74	67	50	51	94	95	132	870
8	72	68	75	76	71	73	99	93	52	46	137	870
6	61	80	64	81	83	66	44	92	53	101	139	870
129	85	59	57	58	86	90	96	45	102	47	16	870
130	110	36	111	38	32	108	29	118	23	120	15	870
135	112	42	105	39	104	33	24	119	30	117	10	870
136	31	103	40	106	41	114	122	25	116	27	9	870
138	37	109	34	107	113	35	115	28	121	26	7	870
11	21	19	4	2	123	125	127	140	142	144	12	870
870	870	870	870	870	870	870	870	870	870	870	870	870

39 Inder J. Taneja <https://numbers-magic.com/> 870

133	124	126	141	143	22	20	18	5	3	1	134	870
17	60	84	58	90	57	86	98	100	43	49	128	870
14	89	71	76	65	78	56	48	54	91	97	131	870
13	83	66	77	72	75	62	50	51	94	95	132	870
8	63	80	67	74	69	82	99	93	52	46	137	870
6	81	73	70	79	68	64	44	92	53	101	139	870
129	59	61	87	55	88	85	96	45	102	47	16	870
130	110	36	111	38	32	108	29	118	23	120	15	870
135	112	42	105	39	104	33	24	119	30	117	10	870
136	31	103	40	106	41	114	122	25	116	27	9	870
138	37	109	34	107	113	35	115	28	121	26	7	870
11	21	19	4	2	123	125	127	140	142	144	12	870
870	870	870	870	870	870	870	870	870	870	870	870	870

40 Inder J. Taneja <https://numbers-magic.com/> 870

133	124	126	141	143	22	20	18	5	3	1	134	870
17	68	71	76	70	78	72	98	100	43	49	128	870
14	61	88	59	87	85	55	48	93	52	97	131	870
13	83	66	81	80	63	62	50	92	53	95	132	870
8	56	79	64	65	82	89	99	51	94	46	137	870
6	90	57	86	58	60	84	44	54	91	101	139	870
129	77	74	69	75	67	73	96	45	102	47	16	870
130	110	36	111	38	32	108	29	118	23	120	15	870
135	112	42	104	39	105	33	24	119	30	117	10	870
136	31	103	41	106	40	114	122	25	116	27	9	870
138	37	109	34	107	113	35	115	28	121	26	7	870
11	21	19	4	2	123	125	127	140	142	144	12	870
870	870	870	870	870	870	870	870	870	870	870	870	870

41 Inder J. Taneja <https://numbers-magic.com/> 870

133	124	126	141	143	22	20	18	5	3	1	134	870
17	113	108	38	106	40	36	26	120	24	114	128	870
14	35	69	80	41	100	61	88	49	92	110	131	870
13	111	44	97	72	77	52	89	64	85	34	132	870
8	33	104	45	76	65	96	53	84	57	112	137	870
6	118	73	68	101	48	81	60	93	56	27	139	870
129	23	70	79	42	99	62	87	50	91	122	16	870
130	115	43	98	71	78	51	90	63	86	30	15	870
135	29	103	46	75	66	95	54	83	58	116	10	870
136	117	74	67	102	47	82	59	94	55	28	9	870
138	31	37	107	39	105	109	119	25	121	32	7	870
11	21	19	4	2	123	125	127	140	142	144	12	870
870	870	870	870	870	870	870	870	870	870	870	870	870

42 Inder J. Taneja <https://numbers-magic.com/> 870

133	124	126	141	143	22	20	18	5	3	1	134	870
17	113	106	108	120	40	38	36	26	24	114	128	870
14	35	52	94	95	49	48	98	99	45	110	131	870
13	33	93	51	50	96	97	47	46	100	112	132	870
8	29	41	103	102	44	53	91	90	56	116	137	870
6	23	104	42	43	101	92	54	55	89	122	139	870
129	111	65	79	78	68	64	82	83	61	34	16	870
130	115	80	66	67	77	81	63	62	84	30	15	870
135	117	60	86	87	57	69	75	74	72	28	10	870
136	118	85	59	58	88	76	70	71	73	27	9	870
138	31	39	37	25	105	107	109	119	121	32	7	870
11	21	19	4	2	123	125	127	140	142	144	12	870
870	870	870	870	870	870	870	870	870	870	870	870	870

43 Inder J. Taneja <https://numbers-magic.com/> 870

133	124	126	141	143	22	20	18	5	3	1	134	870
17	113	106	108	120	40	38	36	26	24	114	128	870
14	35	59	56	92	85	88	55	79	66	110	131	870
13	33	87	63	81	84	62	58	68	77	112	132	870
8	29	54	82	64	61	83	91	78	67	116	137	870
6	23	90	89	53	60	57	86	65	80	122	139	870
129	111	74	71	43	104	44	100	97	47	34	16	870
130	115	75	70	46	51	96	93	50	99	30	15	870
135	117	69	76	103	94	49	52	95	42	28	10	870
136	118	72	73	98	41	101	45	48	102	27	9	870
138	31	39	37	25	105	107	109	119	121	32	7	870
11	21	19	4	2	123	125	127	140	142	144	12	870
870	870	870	870	870	870	870	870	870	870	870	870	870

44 Inder J. Taneja <https://numbers-magic.com/> 870

133	124	126	141	143	22	20	18	5	3	1	134	870
17	113	106	108	120	40	38	36	26	24	114	128	870
14	35	74	72	67	77	76	70	65	79	110	131	870
13	33	103	93	94	47	50	100	49	44	112	132	870
8	29	41	59	53	57	87	89	90	104	116	137	870
6	23	48	85	62	81	84	63	60	97	122	139	870
129	111	43	91	83	64	61	82	54	102	34	16	870
130	115	99	55	92	88	58	56	86	46	30	15	870
135	117	101	52	51	98	95	45	96	42	28	10	870
136	118	71	73	78	68	69	75	80	66	27	9	870
138	31	39	37	25	105	107	109	119	121	32	7	870
11	21	19	4	2	123	125	127	140	142	144	12	870
870	870	870	870	870	870	870	870	870	870	870	870	870

45	Inder J. Taneja https://numbers-magic.com/										870	
133	124	126	141	143	22	20	18	5	3	1	134	870
17	113	106	108	120	40	38	36	26	24	114	128	870
14	35	48	42	102	104	91	53	93	47	110	131	870
13	33	45	78	71	76	70	68	72	100	112	132	870
8	29	46	61	85	59	87	88	55	99	116	137	870
6	23	51	83	81	63	66	80	62	94	122	139	870
129	111	101	56	64	82	79	65	89	44	34	16	870
130	115	96	90	60	86	58	57	84	49	30	15	870
135	117	95	67	74	69	75	77	73	50	28	10	870
136	118	98	103	43	41	54	92	52	97	27	9	870
138	31	39	37	25	105	107	109	119	121	32	7	870
11	21	19	4	2	123	125	127	140	142	144	12	870
870	870	870	870	870	870	870	870	870	870	870	870	870

6 Author's Contribution to Magic Squares and Recreation Numbers

For author's contribution to **magic squares** and **recreation numbers** please see the links below:

- **Inder J. Taneja**, Magic Squares, <https://inderjtaneja.com/2019/06/27/publications-magic-squares/>
- **Inder J. Taneja**, Recreation of Numbers, <https://inderjtaneja.com/2019/06/27/publications-recreation-of-numbers/>

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The **bordered magic rectangles** are constructed based on the software produced by H. White [1]. The magic rectangles are considered based on N. Mitsutoshi ideas (personal communications). The author thanks to both of them for their valuable help.

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