Rubik-style Magic Cubes Based on Magic Squares, **Zenodo**,
October 12, 2024, pp. 1-67, *https://doi.org/10.5281/zenodo.13922378*

Rubik-style Magic Cubes Based on Magic Squares

Inder J. Taneja[1]

For complete work acess the author's web-site links:
https://numbers-magic.com/?p=12775

Abstract

This work brings magic cubes based on magic squares constructed with sequential numbers. Each magic cube is with six magic squares representing each face with different magic square. The total work is for the orders 3 to 10. In each order, some different examples are considered. These examples are based on different types of magic squares, such as, ***single-digit bordered***, ***double-digits bordered***, ***striped***, ***cornered***, *etc. Whole work can be accessed at author's web-site at a link given above.*

Contents

[1]*Formerly, Professor of Mathematics, Universidade Federal de Santa Catarina, Florianópolis, SC, Brazil (1978-2012).*
E-mail: *ijtaneja@gmail.com;*
Web-sites: *http://inderjtaneja.com;*
Twitter: *@IJTANEJA*

1 Rubik-style Magic Cubes

This work bring **magic cubes** based on magic squares of orders 3 to 10. In each case, we constructed 6 using sequential numbers starting from 1. These six magic squares represents six faces of a cube calling as **magic cube**. The odd order magic squares are constructed in such a way that they are of **equal differences magic sums**. In each order, the differences are the orders of the magic squares. The even order magic squares are of equal sums. In each order, we brought more than one example, except for the order 3. These examples are based on different types of magic squares, such as, **single-digit bordered**, **double-digits bordered**, **striped**, **cornered**, etc. This study is also extended in another work on **universal** and/or **upside-down** magic cubes [106]. In case of **cornered** magic squares, an idea of rotation procedure is used. It is based on the script due to H. White [5] is used to bring beauty in structure of magic cubes.

For recent work on W. Rubik-style magic cubes refer W. Walkington [4]. A different kind works on magic cubes can seen in C.Boyer [1], W. Trump [2, 3] and A. Winkel [6].

1.1 Magic Cubes of Order 3

This section brings magic cube based on six magic squares of order 3. These magic squares are constructed using sequential numbers from 1 to 54.

Example 1.1. *Let's consider the following six magic squares of order 3:*

19	49	7
13	25	37
43	1	31

1

20	50	8
14	26	38
44	2	32

2

21	51	9
15	27	39
45	3	33

3

22	52	10
16	28	40
46	4	34

4

23	53	11
17	29	41
47	5	35

5

24	54	12
18	30	42
48	6	36

6

These magic squares are constructed using sequential numbers from 1 to 54. The magic squares are of equal difference magic sums. See below

$$S_{3\times3}(1) := 75, S_{3\times3}(2) := 78, S_{3\times3}(3) := 81, S_{3\times3}(4) := 84, S_{3\times3}(5) := 87 \text{ and } S_{3\times3}(6) := 90.$$

*Let's see below the structure for making a**magic cube**:*

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

1.2 Magic Cubes of Order 4

This section brings two examples of magic cube based on six magic squares of order 4. These magic squares are constructed using sequential numbers from 1 to 96. The first example is well-known **pandiagonal** magic squares of order 4. The second example is based on **magic rectangles stripes** of equal sums of order 2×4.

Example 1.2. *Let's consider the following six magic squares of order 4:*

7	92	1	94
2	93	8	91
96	3	90	5
89	6	95	4

1

15	84	9	86
10	85	16	83
88	11	82	13
81	14	87	12

2

23	76	17	78
18	77	24	75
80	19	74	21
73	22	79	20

3

31	68	25	70
26	69	32	67
72	27	66	29
65	30	71	28

4

39	60	33	62
34	61	40	59
64	35	58	37
57	38	63	36

5

47	52	41	54
42	53	48	51
56	43	50	45
49	46	55	44

6

These magic squares are constructed using sequential numbers from 1 to 96. These magic squares are of equal magic sums. See below

$$S_{4\times 4}(1) = S_{4\times 4}(2) = S_{4\times 4}(3) = S_{4\times 4}(4) = S_{4\times 4}(5) = S_{4\times 4}(6) := 194.$$

The above magic squares are ***pandiagonal****.*

Rubik-style Magic Cubes Based on Magic Squares, **Zenodo**,
October 12, 2024, pp. 1-67, *https://doi.org/10.5281/zenodo.13922378*

Let's see below the structure for making a ***magic cube****:*

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

Example 1.3. *Let's consider the following six magic squares of order 4:*

95	2	94	3
8	89	5	92
1	96	4	93
90	7	91	6

1

87	10	86	11
16	81	13	84
9	88	12	85
82	15	83	14

2

79	18	78	19
24	73	21	76
17	80	20	77
74	23	75	22

3

71	26	70	27
32	65	29	68
25	72	28	69
66	31	67	30

4

63	34	62	35
40	57	37	60
33	64	36	61
58	39	59	38

5

55	42	54	43
48	49	45	52
41	56	44	53
50	47	51	46

6

These magic squares are constructed using sequential numbers from 1 to 96. These magic squares are of equal magic sums. See below

$$S_{4\times4}(1) = S_{4\times4}(2) = S_{4\times4}(3) = S_{4\times4}(4) = S_{4\times4}(5) = S_{4\times4}(6) := 194.$$

The above magic squares are constructed using equal sums magic rectangles of order 2×4. These are known by ***stripes****.*

Let's see below the structure for making a ***magic cube****:*

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

1.3 Magic Cubes of Order 5

This section brings three examples of magic cube based on six magic squares of order 5. These magic squares are constructed using sequential numbers from 1 to 150. The first example is well-known **pandiagonal** magic squares of order 5. The second example is based on **single-digit bordered** magic squares of order 5. The third example is based on **cornered** magic squares of order 5, where magic squares of order 3 are on the superior left corner.

Example 1.4. *Let's consider the following six magic squares of order 5:*

1	37	73	109	145
103	139	25	31	67
55	61	97	133	19
127	13	49	85	91
79	115	121	7	43

1

2	38	74	110	146
104	140	26	32	68
56	62	98	134	20
128	14	50	86	92
80	116	122	8	44

2

3	39	75	111	147
105	141	27	33	69
57	63	99	135	21
129	15	51	87	93
81	117	123	9	45

3

4	40	76	112	148
106	142	28	34	70
58	64	100	136	22
130	16	52	88	94
82	118	124	10	46

4

5	41	77	113	149
107	143	29	35	71
59	65	101	137	23
131	17	53	89	95
83	119	125	11	47

5

6	42	78	114	150
108	144	30	36	72
60	66	102	138	24
132	18	54	90	96
84	120	126	12	48

6

These magic squares are constructed using sequential numbers from 1 to 96. These magic squares are of equal difference magic sums. See below

$$S_{5\times5}(1) := 365, S_{5\times5}(2) := 370, S_{5\times5}(3) := 375, S_{5\times5}(4) := 380, S_{5\times5}(5) := 385 \text{ and } S_{5\times5}(6) := 390.$$

The above magic squares are ***pandiagonal****.*

Let's see below the structure for making a ***magic cube****:*

1	37	73	109	145
103	139	25	31	67
55	61	97	133	19
127	13	49	85	91
79	115	121	7	43

3	39	75	111	147	2	38	74	110	146
105	141	27	33	69	104	140	26	32	68
57	63	99	135	21	56	62	98	134	20
129	15	51	87	93	128	14	50	86	92
81	117	123	9	45	80	116	122	8	44

5	41	77	113	149	6	42	78	114	150
107	143	29	35	71	108	144	30	36	72
59	65	101	137	23	60	66	102	138	24
131	17	53	89	95	132	18	54	90	96
83	119	125	11	47	84	120	126	12	48

4	40	76	112	148
106	142	28	34	70
58	64	100	136	22
130	16	52	88	94
82	118	124	10	46

Example 1.5. *Let's consider the following six magic squares of order 5:*

127	145	25	37	31
7	67	97	55	139
13	61	73	85	133
103	91	49	79	43
115	1	121	109	19

1

128	146	26	38	32
8	68	98	56	140
14	62	74	86	134
104	92	50	80	44
116	2	122	110	20

2

129	147	27	39	33
9	69	99	57	141
15	63	75	87	135
105	93	51	81	45
117	3	123	111	21

3

130	148	28	40	34
10	70	100	58	142
16	64	76	88	136
106	94	52	82	46
118	4	124	112	22

4

131	149	29	41	35
11	71	101	59	143
17	65	77	89	137
107	95	53	83	47
119	5	125	113	23

5

132	150	30	42	36
12	72	102	60	144
18	66	78	90	138
108	96	54	84	48
120	6	126	114	24

6

These magic squares are constructed using sequential numbers from 1 to 96. These magic squares are of *equal magic sums. See below*

$$S_{5\times5}(1) := 365, S_{5\times5}(2) := 370, S_{5\times5}(3) := 375, S_{5\times5}(4) := 380, S_{5\times5}(5) := 385 \text{ and } S_{5\times5}(6) := 390.$$

*The above magic squares are known as **single-digit bordered** magic squares. The inner blocks of order 3 are magic squares of order 3.*

*Let's see below the structure for making a **magic cube**:*

127	145	25	37	31
7	67	97	55	139
13	61	73	85	133
103	91	49	79	43
115	1	121	109	19

129	147	27	39	33	128	146	26	38	32
9	69	99	57	141	8	68	98	56	140
15	63	75	87	135	14	62	74	86	134
105	93	51	81	45	104	92	50	80	44
117	3	123	111	21	116	2	122	110	20

131	149	29	41	35	132	150	30	42	36
11	71	101	59	143	12	72	102	60	144
17	65	77	89	137	18	66	78	90	138
107	95	53	83	47	108	96	54	84	48
119	5	125	113	23	120	6	126	114	24

130	148	28	40	34
10	70	100	58	142
16	64	76	88	136
106	94	52	82	46
118	4	124	112	22

Example 1.6. *Let's consider the following six magic squares of order 5:*

91	61	67	133	13
49	73	97	145	1
79	85	55	37	109
25	31	127	43	139
121	115	19	7	103

1

92	62	68	134	14
50	74	98	146	2
80	86	56	38	110
26	32	128	44	140
122	116	20	8	104

2

93	63	69	135	15
51	75	99	147	3
81	87	57	39	111
27	33	129	45	141
123	117	21	9	105

3

94	64	70	136	16
52	76	100	148	4
82	88	58	40	112
28	34	130	46	142
124	118	22	10	106

4

95	65	71	137	17
53	77	101	149	5
83	89	59	41	113
29	35	131	47	143
125	119	23	11	107

5

96	66	72	138	18
54	78	102	150	6
84	90	60	42	114
30	36	132	48	144
126	120	24	12	108

6

These magic squares are constructed using sequential numbers from 1 to 96. These magic squares are of equal magic sums. See below

$$S_{5\times5}(1) := 365, S_{5\times5}(2) := 370, S_{5\times5}(3) := 375, S_{5\times5}(4) := 380, S_{5\times5}(5) := 385 \text{ and } S_{5\times5}(6) := 390.$$

The above magic squares are known as ***cornered*** *magic squares, where the magic squares of order 3 are on the superior of left corner.*

Let's see below the structure for making a ***magic cube****:*

					13	1	109	139	103					
					133	145	37	43	7					
					67	97	55	127	19					
					61	73	85	31	115					
					91	49	79	25	121					
123	27	81	51	93	92	62	68	134	14					
117	33	87	75	63	50	74	98	146	2					
21	129	57	99	69	80	86	56	38	110					
9	45	39	147	135	26	32	128	44	140					
105	141	111	3	15	122	116	20	8	104					
					107	11	23	119	125	18	6	114	144	108
					143	47	131	35	29	138	150	42	48	12
					113	41	59	89	83	72	102	60	132	24
					5	149	101	77	53	66	78	90	36	120
					17	137	71	65	95	96	54	84	30	126
					124	28	82	52	94					
					118	34	88	76	64					
					22	130	58	100	70					
					10	46	40	148	136					
					106	142	112	4	16					

1.4 Magic Cubes of Order 6

This section brings three examples of magic cube based on six magic squares of order 6. These magic squares are constructed using sequential numbers from 1 to 216. The first example is a general example of magic square of order 6. The second example is based on **single-digit bordered** magic squares of order 6. The third example is based on **cornered** magic squares of order 6, where magic squares of order 4 are on the superior left corner.

Example 1.7. *Let's consider the following six magic squares of order 6:*

1	215	214	213	2	6
210	8	208	9	11	205
204	203	15	16	200	13
18	14	201	202	17	199
7	206	10	207	209	12
211	5	3	4	212	216

1

19	197	196	195	20	24
192	26	190	27	29	187
186	185	33	34	182	31
36	32	183	184	35	181
25	188	28	189	191	30
193	23	21	22	194	198

2

37	179	178	177	38	42
174	44	172	45	47	169
168	167	51	52	164	49
54	50	165	166	53	163
43	170	46	171	173	48
175	41	39	40	176	180

3

55	161	160	159	56	60
156	62	154	63	65	151
150	149	69	70	146	67
72	68	147	148	71	145
61	152	64	153	155	66
157	59	57	58	158	162

4

73	143	142	141	74	78
138	80	136	81	83	133
132	131	87	88	128	85
90	86	129	130	89	127
79	134	82	135	137	84
139	77	75	76	140	144

5

91	125	124	123	92	96
120	98	118	99	101	115
114	113	105	106	110	103
108	104	111	112	107	109
97	116	100	117	119	102
121	95	93	94	122	126

6

These magic squares are constructed using sequential numbers from 1 to 216. These magic squares are of equal magic sums:

$$S_{6\times6}(1) = S_{6\times6}(2) = S_{6\times6}(3) = S_{6\times6}(4) = S_{6\times6}(5) = S_{6\times6}(6) := 651.$$

Let's see below the structure for making a ***magic cube****:*

1	215	214	213	2	6
210	8	208	9	11	205
204	203	15	16	200	13
18	14	201	202	17	199
7	206	10	207	209	12
211	5	3	4	212	216

37	179	178	177	38	42
174	44	172	45	47	169
168	167	51	52	164	49
54	50	165	166	53	163
43	170	46	171	173	48
175	41	39	40	176	180

19	197	196	195	20	24
192	26	190	27	29	187
186	185	33	34	182	31
36	32	183	184	35	181
25	188	28	189	191	30
193	23	21	22	194	198

55	161	160	159	56	60
156	62	154	63	65	151
150	149	69	70	146	67
72	68	147	148	71	145
61	152	64	153	155	66
157	59	57	58	158	162

73	143	142	141	74	78
138	80	136	81	83	133
132	131	87	88	128	85
90	86	129	130	89	127
79	134	82	135	137	84
139	77	75	76	140	144

91	125	124	123	92	96
120	98	118	99	101	115
114	113	105	106	110	103
108	104	111	112	107	109
97	116	100	117	119	102
121	95	93	94	122	126

Example 1.8. *Let’s consider the following six magic squares of order 6:*

212	210	3	216	4	6
2	17	202	11	204	215
8	12	203	18	201	209
10	206	13	200	15	207
208	199	16	205	14	9
211	7	214	1	213	5

1

194	192	21	198	22	24
20	35	184	29	186	197
26	30	185	36	183	191
28	188	31	182	33	189
190	181	34	187	32	27
193	25	196	19	195	23

2

176	174	39	180	40	42
38	53	166	47	168	179
44	48	167	54	165	173
46	170	49	164	51	171
172	163	52	169	50	45
175	43	178	37	177	41

3

158	156	57	162	58	60
56	71	148	65	150	161
62	66	149	72	147	155
64	152	67	146	69	153
154	145	70	151	68	63
157	61	160	55	159	59

4

140	138	75	144	76	78
74	89	130	83	132	143
80	84	131	90	129	137
82	134	85	128	87	135
136	127	88	133	86	81
139	79	142	73	141	77

5

122	120	93	126	94	96
92	107	112	101	114	125
98	102	113	108	111	119
100	116	103	110	105	117
118	109	106	115	104	99
121	97	124	91	123	95

6

These magic squares are constructed using sequential numbers from 1 to 216. These magic squares are of equal magic sums:

$$S_{6\times 6}(1) = S_{6\times 6}(2) = S_{6\times 6}(3) = S_{6\times 6}(4) = S_{6\times 6}(5) = S_{6\times 6}(6) := 651.$$

*The above magic squares are known as **single-digit bordered** magic squares. The inner blocks of order 4 are magic squares of order 4.*

*Let's see below the structure for making a **magic cube**:*

212	210	3	216	4	6
2	17	202	11	204	215
8	12	203	18	201	209
10	206	13	200	15	207
208	199	16	205	14	9
211	7	214	1	213	5

176	174	39	180	40	42
38	53	166	47	168	179
44	48	167	54	165	173
46	170	49	164	51	171
172	163	52	169	50	45
175	43	178	37	177	41

194	192	21	198	22	24
20	35	184	29	186	197
26	30	185	36	183	191
28	188	31	182	33	189
190	181	34	187	32	27
193	25	196	19	195	23

158	156	57	162	58	60
56	71	148	65	150	161
62	66	149	72	147	155
64	152	67	146	69	153
154	145	70	151	68	63
157	61	160	55	159	59

140	138	75	144	76	78
74	89	130	83	132	143
80	84	131	90	129	137
82	134	85	128	87	135
136	127	88	133	86	81
139	79	142	73	141	77

122	120	93	126	94	96
92	107	112	101	114	125
98	102	113	108	111	119
100	116	103	110	105	117
118	109	106	115	104	99
121	97	124	91	123	95

Example 1.9. *Let's consider the following six magic squares of order 6:*

17	202	11	204	209	8
12	203	18	201	207	10
206	13	200	15	215	2
199	16	205	14	9	208
4	3	216	210	6	212
213	214	1	7	5	211

1

35	184	29	186	191	26
30	185	36	183	189	28
188	31	182	33	197	20
181	34	187	32	27	190
22	21	198	192	24	194
195	196	19	25	23	193

2

53	166	47	168	173	44
48	167	54	165	171	46
170	49	164	51	179	38
163	52	169	50	45	172
40	39	180	174	42	176
177	178	37	43	41	175

3

71	148	65	150	155	62
66	149	72	147	153	64
152	67	146	69	161	56
145	70	151	68	63	154
58	57	162	156	60	158
159	160	55	61	59	157

4

89	130	83	132	137	80
84	131	90	129	135	82
134	85	128	87	143	74
127	88	133	86	81	136
76	75	144	138	78	140
141	142	73	79	77	139

5

107	112	101	114	119	98
102	113	108	111	117	100
116	103	110	105	125	92
109	106	115	104	99	118
94	93	126	120	96	122
123	124	91	97	95	121

6

These magic squares are constructed using sequential numbers from 1 to 216. These magic squares are of equal magic sums:

$$S_{6\times6}(1) = S_{6\times6}(2) = S_{6\times6}(3) = S_{6\times6}(4) = S_{6\times6}(5) = S_{6\times6}(6) := 651.$$

The above magic squares are known as ***cornered*** *magic squares, where the magic squares of order 4 are on the superior of left corner.*

Let's see below the structure for making a ***magic cube****:*

						8	10	2	208	212	211						
						209	207	215	9	6	5						
						204	201	15	14	210	7						
						11	18	200	205	216	1						
						202	203	13	16	3	214						
						17	12	206	199	4	213						
177	40	163	170	48	53	35	184	29	186	191	26						
178	39	52	49	167	166	30	185	36	183	189	28						
37	180	169	164	54	47	188	31	182	33	197	20						
43	174	50	51	165	168	181	34	187	32	27	190						
41	42	45	179	171	173	22	21	198	192	24	194						
175	176	172	38	46	44	195	196	19	25	23	193						
						139	77	79	73	142	141	98	100	92	118	122	121
						140	78	138	144	75	76	119	117	125	99	96	95
						136	81	86	133	88	127	114	111	105	104	120	97
						74	143	87	128	85	134	101	108	110	115	126	91
						82	135	129	90	131	84	112	113	103	106	93	124
						80	137	132	83	130	89	107	102	116	109	94	123
						159	58	145	152	66	71						
						160	57	70	67	149	148						
						55	162	151	146	72	65						
						61	156	68	69	147	150						
						59	60	63	161	153	155						
						157	158	154	56	64	62						

1.5 Magic Cubes of Order 7

This section brings three examples of magic cube based on six magic squares of order 7. These magic squares are constructed using sequential numbers from 1 to 294. The first example is well-known **pandiagonal** magic squares of order 7. The second example is based on **single-digit bordered** magic squares of order 7. The third example is based on **cornered** magic squares of order 7, where magic squares of orders 3 and 5 are on the superior left corner.

Example 1.10. *Let's consider the following six magic squares of order 7:*

1	49	97	145	193	241	289
235	283	37	43	91	139	187
133	181	229	277	31	79	85
73	121	127	175	223	271	25
265	19	67	115	163	169	217
205	211	259	13	61	109	157
103	151	199	247	253	7	55

1

2	50	98	146	194	242	290
236	284	38	44	92	140	188
134	182	230	278	32	80	86
74	122	128	176	224	272	26
266	20	68	116	164	170	218
206	212	260	14	62	110	158
104	152	200	248	254	8	56

2

3	51	99	147	195	243	291
237	285	39	45	93	141	189
135	183	231	279	33	81	87
75	123	129	177	225	273	27
267	21	69	117	165	171	219
207	213	261	15	63	111	159
105	153	201	249	255	9	57

3

4	52	100	148	196	244	292
238	286	40	46	94	142	190
136	184	232	280	34	82	88
76	124	130	178	226	274	28
268	22	70	118	166	172	220
208	214	262	16	64	112	160
106	154	202	250	256	10	58

4

5	53	101	149	197	245	293
239	287	41	47	95	143	191
137	185	233	281	35	83	89
77	125	131	179	227	275	29
269	23	71	119	167	173	221
209	215	263	17	65	113	161
107	155	203	251	257	11	59

5

6	54	102	150	198	246	294
240	288	42	48	96	144	192
138	186	234	282	36	84	90
78	126	132	180	228	276	30
270	24	72	120	168	174	222
210	216	264	18	66	114	162
108	156	204	252	258	12	60

6

These magic squares are constructed using sequential numbers from 1 to 294. These magic squares are of equal difference magic sums. See below

$$S_{7\times7}(1) := 1015, S_{7\times7}(2) := 1022, S_{7\times7}(3) := 1029, S_{7\times7}(4) := 1036, S_{7\times7}(5) := 1043 \text{ and } S_{7\times7}(6) := 1050.$$

The above magic squares are ***pandiagonal****.*

Let's see below the structure for making a ***magic cube****:*

1	49	97	145	193	241	289
235	283	37	43	91	139	187
133	181	229	277	31	79	85
73	121	127	175	223	271	25
265	19	67	115	163	169	217
205	211	259	13	61	109	157
103	151	199	247	253	7	55

3	51	99	147	195	243	291	2	50	98	146	194	242	290
237	285	39	45	93	141	189	236	284	38	44	92	140	188
135	183	231	279	33	81	87	134	182	230	278	32	80	86
75	123	129	177	225	273	27	74	122	128	176	224	272	26
267	21	69	117	165	171	219	266	20	68	116	164	170	218
207	213	261	15	63	111	159	206	212	260	14	62	110	158
105	153	201	249	255	9	57	104	152	200	248	254	8	56

4	52	100	148	196	244	292	5	53	101	149	197	245	293
238	286	40	46	94	142	190	239	287	41	47	95	143	191
136	184	232	280	34	82	88	137	185	233	281	35	83	89
76	124	130	178	226	274	28	77	125	131	179	227	275	29
268	22	70	118	166	172	220	269	23	71	119	167	173	221
208	214	262	16	64	112	160	209	215	263	17	65	113	161
106	154	202	250	256	10	58	107	155	203	251	257	11	59

6	54	102	150	198	246	294
240	288	42	48	96	144	192
138	186	234	282	36	84	90
78	126	132	180	228	276	30
270	24	72	120	168	174	222
210	216	264	18	66	114	162
108	156	204	252	258	12	60

Example 1.11. *Let's consider the following six magic squares of order 7:*

247	223	235	25	19	7	259
1	199	217	97	109	103	289
13	79	139	169	127	211	277
253	85	133	145	157	205	37
241	175	163	121	151	115	49
229	187	73	193	181	91	61
31	67	55	265	271	283	43

1

248	224	236	26	20	8	260
2	200	218	98	110	104	290
14	80	140	170	128	212	278
254	86	134	146	158	206	38
242	176	164	122	152	116	50
230	188	74	194	182	92	62
32	68	56	266	272	284	44

2

249	225	237	27	21	9	261
3	201	219	99	111	105	291
15	81	141	171	129	213	279
255	87	135	147	159	207	39
243	177	165	123	153	117	51
231	189	75	195	183	93	63
33	69	57	267	273	285	45

3

250	226	238	28	22	10	262
4	202	220	100	112	106	292
16	82	142	172	130	214	280
256	88	136	148	160	208	40
244	178	166	124	154	118	52
232	190	76	196	184	94	64
34	70	58	268	274	286	46

4

251	227	239	29	23	11	263
5	203	221	101	113	107	293
17	83	143	173	131	215	281
257	89	137	149	161	209	41
245	179	167	125	155	119	53
233	191	77	197	185	95	65
35	71	59	269	275	287	47

5

252	228	240	30	24	12	264
6	204	222	102	114	108	294
18	84	144	174	132	216	282
258	90	138	150	162	210	42
246	180	168	126	156	120	54
234	192	78	198	186	96	66
36	72	60	270	276	288	48

6

These magic squares are constructed using sequential numbers from 1 to 294. These magic squares are of equal magic sums. See below

$$S_{7\times7}(1) := 1015, S_{7\times7}(2) := 1022, S_{7\times7}(3) := 1029, S_{7\times7}(4) := 1036, S_{7\times7}(5) := 1043 \text{ and } S_{7\times7}(6) := 1050.$$

The above magic squares are known as ***single-digit bordered*** *magic squares. The inner blocks of order 3 and 5 are magic squares of orders 3 and 5.*

Let's see below the structure for making a ***magic cube****:*

247	223	235	25	19	7	259
1	199	217	97	109	103	289
13	79	139	169	127	211	277
253	85	133	145	157	205	37
241	175	163	121	151	115	49
229	187	73	193	181	91	61
31	67	55	265	271	283	43

249	225	237	27	21	9	261
3	201	219	99	111	105	291
15	81	141	171	129	213	279
255	87	135	147	159	207	39
243	177	165	123	153	117	51
231	189	75	195	183	93	63
33	69	57	267	273	285	45

248	224	236	26	20	8	260
2	200	218	98	110	104	290
14	80	140	170	128	212	278
254	86	134	146	158	206	38
242	176	164	122	152	116	50
230	188	74	194	182	92	62
32	68	56	266	272	284	44

250	226	238	28	22	10	262
4	202	220	100	112	106	292
16	82	142	172	130	214	280
256	88	136	148	160	208	40
244	178	166	124	154	118	52
232	190	76	196	184	94	64
34	70	58	268	274	286	46

252	228	240	30	24	12	264
6	204	222	102	114	108	294
18	84	144	174	132	216	282
258	90	138	150	162	210	42
246	180	168	126	156	120	54
234	192	78	198	186	96	66
36	72	60	270	276	288	48

251	227	239	29	23	11	263
5	203	221	101	113	107	293
17	83	143	173	131	215	281
257	89	137	149	161	209	41
245	179	167	125	155	119	53
233	191	77	197	185	95	65
35	71	59	269	275	287	47

Example 1.12. *Let’s consider the following six magic squares of order 7:*

151	121	163	175	115	43	247
157	145	133	193	97	67	223
127	169	139	79	211	283	7
199	187	181	73	85	265	25
91	103	109	205	217	55	235
271	289	37	277	31	61	49
19	1	253	13	259	241	229

1

152	122	164	176	116	44	248
158	146	134	194	98	68	224
128	170	140	80	212	284	8
200	188	182	74	86	266	26
92	104	110	206	218	56	236
272	290	38	278	32	62	50
20	2	254	14	260	242	230

2

153	123	165	177	117	45	249
159	147	135	195	99	69	225
129	171	141	81	213	285	9
201	189	183	75	87	267	27
93	105	111	207	219	57	237
273	291	39	279	33	63	51
21	3	255	15	261	243	231

3

154	124	166	178	118	46	250
160	148	136	196	100	70	226
130	172	142	82	214	286	10
202	190	184	76	88	268	28
94	106	112	208	220	58	238
274	292	40	280	34	64	52
22	4	256	16	262	244	232

4

155	125	167	179	119	47	251
161	149	137	197	101	71	227
131	173	143	83	215	287	11
203	191	185	77	89	269	29
95	107	113	209	221	59	239
275	293	41	281	35	65	53
23	5	257	17	263	245	233

5

156	126	168	180	120	48	252
162	150	138	198	102	72	228
132	174	144	84	216	288	12
204	192	186	78	90	270	30
96	108	114	210	222	60	240
276	294	42	282	36	66	54
24	6	258	18	264	246	234

6

These magic squares are constructed using sequential numbers from 1 to 294. These magic squares are of equal magic sums. See below

$$S_{7\times7}(1) := 1015, S_{7\times7}(2) := 1022, S_{7\times7}(3) := 1029, S_{7\times7}(4) := 1036, S_{7\times7}(5) := 1043 \text{ and } S_{7\times7}(6) := 1050.$$

*The above magic squares are known as **cornered** magic squares, where the magic squares of orders 3 and 5 are on the superior of left corner.*

*Let's see below the structure for making a **magic cube**:*

							247	223	7	25	235	49	229							
							43	67	283	265	55	61	241							
							115	97	211	85	217	31	259							
							175	193	79	73	205	277	13							
							163	133	139	181	109	37	253							
							121	145	169	187	103	289	1							
							151	157	127	199	91	271	19							
21	273	93	201	129	159	153	152	122	164	176	116	44	248							
3	291	105	189	171	147	123	158	146	134	194	98	68	224							
255	39	111	183	141	135	165	128	170	140	80	212	284	8							
15	279	207	75	81	195	177	200	188	182	74	86	266	26							
261	33	219	87	213	99	117	92	104	110	206	218	56	236							
243	63	57	267	285	69	45	272	290	38	278	32	62	50							
231	51	237	27	9	225	249	20	2	254	14	260	242	230							
							233	245	263	17	257	5	23	252	228	12	30	240	54	234
							53	65	35	281	41	293	275	48	72	288	270	60	66	246
							239	59	221	209	113	107	95	120	102	216	90	222	36	264
							29	269	89	77	185	191	203	180	198	84	78	210	282	18
							11	287	215	83	143	173	131	168	138	144	186	114	42	258
							227	71	101	197	137	149	161	126	150	174	192	108	294	6
							251	47	119	179	167	125	155	156	162	132	204	96	276	24
							22	274	94	202	130	160	154							
							4	292	106	190	172	148	124							
							256	40	112	184	142	136	166							
							16	280	208	76	82	196	178							
							262	34	220	88	214	100	118							
							244	64	58	268	286	70	46							
							232	52	238	28	10	226	250							

1.6 Magic Cubes of Order 8

This section brings 6 examples of magic cube based on six magic squares of order 8. These magic squares are constructed using sequential numbers from 1 to 384. The first example is a **pandiagonal** magic square of order 8, where in each case, there are four equal sums **pandiagonal** magic squares of order 4 The second example is based on **single-digit bordered** magic squares of order 8. The third and forth examples are of striped magic squares. The fifth example is based on **double-digits bordered** magic squares. The sixth is based on **cornered** magic squares of order 8

Example 1.13. *Let's consider the following six magic squares of order 8:*

7	380	1	382	15	372	9	374
2	381	8	379	10	373	16	371
384	3	378	5	376	11	370	13
377	6	383	4	369	14	375	12
23	364	17	366	31	356	25	358
18	365	24	363	26	357	32	355
368	19	362	21	360	27	354	29
361	22	367	20	353	30	359	28

1

39	348	33	350	47	340	41	342
34	349	40	347	42	341	48	339
352	35	346	37	344	43	338	45
345	38	351	36	337	46	343	44
55	332	49	334	63	324	57	326
50	333	56	331	58	325	64	323
336	51	330	53	328	59	322	61
329	54	335	52	321	62	327	60

2

71	316	65	318	79	308	73	310
66	317	72	315	74	309	80	307
320	67	314	69	312	75	306	77
313	70	319	68	305	78	311	76
87	300	81	302	95	292	89	294
82	301	88	299	90	293	96	291
304	83	298	85	296	91	290	93
297	86	303	84	289	94	295	92

3

103	284	97	286	111	276	105	278
98	285	104	283	106	277	112	275
288	99	282	101	280	107	274	109
281	102	287	100	273	110	279	108
119	268	113	270	127	260	121	262
114	269	120	267	122	261	128	259
272	115	266	117	264	123	258	125
265	118	271	116	257	126	263	124

4

135	252	129	254	143	244	137	246
130	253	136	251	138	245	144	243
256	131	250	133	248	139	242	141
249	134	255	132	241	142	247	140
151	236	145	238	159	228	153	230
146	237	152	235	154	229	160	227
240	147	234	149	232	155	226	157
233	150	239	148	225	158	231	156

5

167	220	161	222	175	212	169	214
162	221	168	219	170	213	176	211
224	163	218	165	216	171	210	173
217	166	223	164	209	174	215	172
183	204	177	206	191	196	185	198
178	205	184	203	186	197	192	195
208	179	202	181	200	187	194	189
201	182	207	180	193	190	199	188

6

These magic squares are constructed using sequential numbers from 1 to 384. These are of equal magic sums:

$$S_{8\times 8}(1) = S_{8\times 8}(2) = S_{8\times 8}(3) = S_{8\times 8}(4) = S_{8\times 8}(5) = S_{8\times 8}(6) := 1540.$$

*Above magic squares are **pandiagonal**, where the 4 inner blocks in each case are also **pandiagonal** magic squares of order 4.*

*Let's see below the structure for making a **magic cube**:*

								7	380	1	382	15	372	9	374								
								2	381	8	379	10	373	16	371								
								384	3	378	5	376	11	370	13								
								377	6	383	4	369	14	375	12								
								23	364	17	366	31	356	25	358								
								18	365	24	363	26	357	32	355								
								368	19	362	21	360	27	354	29								
								361	22	367	20	353	30	359	28								
71	316	65	318	79	308	73	310	39	348	33	350	47	340	41	342								
66	317	72	315	74	309	80	307	34	349	40	347	42	341	48	339								
320	67	314	69	312	75	306	77	352	35	346	37	344	43	338	45								
313	70	319	68	305	78	311	76	345	38	351	36	337	46	343	44								
87	300	81	302	95	292	89	294	55	332	49	334	63	324	57	326								
82	301	88	299	90	293	96	291	50	333	56	331	58	325	64	323								
304	83	298	85	296	91	290	93	336	51	330	53	328	59	322	61								
297	86	303	84	289	94	295	92	329	54	335	52	321	62	327	60								
								103	284	97	286	111	276	105	278	135	252	129	254	143	244	137	246
								98	285	104	283	106	277	112	275	130	253	136	251	138	245	144	243
								288	99	282	101	280	107	274	109	256	131	250	133	248	139	242	141
								281	102	287	100	273	110	279	108	249	134	255	132	241	142	247	140
								119	268	113	270	127	260	121	262	151	236	145	238	159	228	153	230
								114	269	120	267	122	261	128	259	146	237	152	235	154	229	160	227
								272	115	266	117	264	123	258	125	240	147	234	149	232	155	226	157
								265	118	271	116	257	126	263	124	233	150	239	148	225	158	231	156
								167	220	161	222	175	212	169	214								
								162	221	168	219	170	213	176	211								
								224	163	218	165	216	171	210	173								
								217	166	223	164	209	174	215	172								
								183	204	177	206	191	196	185	198								
								178	205	184	203	186	197	192	195								
								208	179	202	181	200	187	194	189								
								201	182	207	180	193	190	199	188								

Example 1.14. *Let's consider the following six magic squares of order 8:*

8	2	382	384	371	13	373	7
5	366	364	17	370	18	20	380
6	16	31	356	25	358	369	379
11	22	26	357	32	355	363	374
381	24	360	27	354	29	361	4
376	362	353	30	359	28	23	9
375	365	21	368	15	367	19	10
378	383	3	1	14	372	12	377

1

40	34	350	352	339	45	341	39
37	334	332	49	338	50	52	348
38	48	63	324	57	326	337	347
43	54	58	325	64	323	331	342
349	56	328	59	322	61	329	36
344	330	321	62	327	60	55	41
343	333	53	336	47	335	51	42
346	351	35	33	46	340	44	345

2

72	66	318	320	307	77	309	71
69	302	300	81	306	82	84	316
70	80	95	292	89	294	305	315
75	86	90	293	96	291	299	310
317	88	296	91	290	93	297	68
312	298	289	94	295	92	87	73
311	301	85	304	79	303	83	74
314	319	67	65	78	308	76	313

3

104	98	286	288	275	109	277	103
101	270	268	113	274	114	116	284
102	112	127	260	121	262	273	283
107	118	122	261	128	259	267	278
285	120	264	123	258	125	265	100
280	266	257	126	263	124	119	105
279	269	117	272	111	271	115	106
282	287	99	97	110	276	108	281

4

136	130	254	256	243	141	245	135
133	238	236	145	242	146	148	252
134	144	159	228	153	230	241	251
139	150	154	229	160	227	235	246
253	152	232	155	226	157	233	132
248	234	225	158	231	156	151	137
247	237	149	240	143	239	147	138
250	255	131	129	142	244	140	249

5

168	162	222	224	211	173	213	167
165	206	204	177	210	178	180	220
166	176	191	196	185	198	209	219
171	182	186	197	192	195	203	214
221	184	200	187	194	189	201	164
216	202	193	190	199	188	183	169
215	205	181	208	175	207	179	170
218	223	163	161	174	212	172	217

6

These magic squares are constructed using sequential numbers from 1 to 384. These magic squares are of equal magic sums:

$$S_{8\times 8}(1) = S_{8\times 8}(2) = S_{8\times 8}(3) = S_{8\times 8}(4) = S_{8\times 8}(5) = S_{8\times 8}(6) := 1540.$$

The above magic squares are known as ***single-digit bordered*** *magic squares. The inner blocks of order 4 are magic squares of order 4.*

Let's see below the structure for making a ***magic cube****:*

8	2	382	384	371	13	373	7
5	366	364	17	370	18	20	380
6	16	31	356	25	358	369	379
11	22	26	357	32	355	363	374
381	24	360	27	354	29	361	4
376	362	353	30	359	28	23	9
375	365	21	368	15	367	19	10
378	383	3	1	14	372	12	377

72	66	318	320	307	77	309	71
69	302	300	81	306	82	84	316
70	80	95	292	89	294	305	315
75	86	90	293	96	291	299	310
317	88	296	91	290	93	297	68
312	298	289	94	295	92	87	73
311	301	85	304	79	303	83	74
314	319	67	65	78	308	76	313

40	34	350	352	339	45	341	39
37	334	332	49	338	50	52	348
38	48	63	324	57	326	337	347
43	54	58	325	64	323	331	342
349	56	328	59	322	61	329	36
344	330	321	62	327	60	55	41
343	333	53	336	47	335	51	42
346	351	35	33	46	340	44	345

104	98	286	288	275	109	277	103
101	270	268	113	274	114	116	284
102	112	127	260	121	262	273	283
107	118	122	261	128	259	267	278
285	120	264	123	258	125	265	100
280	266	257	126	263	124	119	105
279	269	117	272	111	271	115	106
282	287	99	97	110	276	108	281

136	130	254	256	243	141	245	135
133	238	236	145	242	146	148	252
134	144	159	228	153	230	241	251
139	150	154	229	160	227	235	246
253	152	232	155	226	157	233	132
248	234	225	158	231	156	151	137
247	237	149	240	143	239	147	138
250	255	131	129	142	244	140	249

168	162	222	224	211	173	213	167
165	206	204	177	210	178	180	220
166	176	191	196	185	198	209	219
171	182	186	197	192	195	203	214
221	184	200	187	194	189	201	164
216	202	193	190	199	188	183	169
215	205	181	208	175	207	179	170
218	223	163	161	174	212	172	217

Example 1.15. *Let's consider the following six magic squares of order 8:*

12	374	375	9	8	378	379	5
373	11	10	376	377	7	6	380
1	383	382	4	13	371	370	16
384	2	3	381	372	14	15	369
25	359	358	28	24	362	363	21
360	26	27	357	361	23	22	364
20	366	367	17	29	355	354	32
365	19	18	368	356	30	31	353

1

44	342	343	41	40	346	347	37
341	43	42	344	345	39	38	348
33	351	350	36	45	339	338	48
352	34	35	349	340	46	47	337
57	327	326	60	56	330	331	53
328	58	59	325	329	55	54	332
52	334	335	49	61	323	322	64
333	51	50	336	324	62	63	321

2

76	310	311	73	72	314	315	69
309	75	74	312	313	71	70	316
65	319	318	68	77	307	306	80
320	66	67	317	308	78	79	305
89	295	294	92	88	298	299	85
296	90	91	293	297	87	86	300
84	302	303	81	93	291	290	96
301	83	82	304	292	94	95	289

3

108	278	279	105	104	282	283	101
277	107	106	280	281	103	102	284
97	287	286	100	109	275	274	112
288	98	99	285	276	110	111	273
121	263	262	124	120	266	267	117
264	122	123	261	265	119	118	268
116	270	271	113	125	259	258	128
269	115	114	272	260	126	127	257

4

140	246	247	137	136	250	251	133
245	139	138	248	249	135	134	252
129	255	254	132	141	243	242	144
256	130	131	253	244	142	143	241
153	231	230	156	152	234	235	149
232	154	155	229	233	151	150	236
148	238	239	145	157	227	226	160
237	147	146	240	228	158	159	225

5

172	214	215	169	168	218	219	165
213	171	170	216	217	167	166	220
161	223	222	164	173	211	210	176
224	162	163	221	212	174	175	209
185	199	198	188	184	202	203	181
200	186	187	197	201	183	182	204
180	206	207	177	189	195	194	192
205	179	178	208	196	190	191	193

6

These magic squares are constructed using sequential numbers from 1 to 384. These magic squares are of equal magic sums:

$$S_{8\times8}(1) = S_{8\times8}(2) = S_{8\times8}(3) = S_{8\times8}(4) = S_{8\times8}(5) = S_{8\times8}(6) := 1540.$$

The above magic squares are constructed using equal sums magic rectangles of order 2×4*. These rectangles are known by* ***stripes****.*

Let's see below the structure for making a ***magic cube****:*

12	374	375	9	8	378	379	5
373	11	10	376	377	7	6	380
1	383	382	4	13	371	370	16
384	2	3	381	372	14	15	369
25	359	358	28	24	362	363	21
360	26	27	357	361	23	22	364
20	366	367	17	29	355	354	32
365	19	18	368	356	30	31	353

76	310	311	73	72	314	315	69
309	75	74	312	313	71	70	316
65	319	318	68	77	307	306	80
320	66	67	317	308	78	79	305
89	295	294	92	88	298	299	85
296	90	91	293	297	87	86	300
84	302	303	81	93	291	290	96
301	83	82	304	292	94	95	289

44	341	33	352	57	328	52	333
342	43	351	34	327	58	334	51
343	42	350	35	326	59	335	50
41	344	36	349	60	325	49	336
40	345	45	340	56	329	61	324
346	39	339	46	330	55	323	62
347	38	338	47	331	54	322	63
37	348	48	337	53	332	64	321

108	278	279	105	104	282	283	101
277	107	106	280	281	103	102	284
97	287	286	100	109	275	274	112
288	98	99	285	276	110	111	273
121	263	262	124	120	266	267	117
264	122	123	261	265	119	118	268
116	270	271	113	125	259	258	128
269	115	114	272	260	126	127	257

140	245	129	256	153	232	148	237
246	139	255	130	231	154	238	147
247	138	254	131	230	155	239	146
137	248	132	253	156	229	145	240
136	249	141	244	152	233	157	228
250	135	243	142	234	151	227	158
251	134	242	143	235	150	226	159
133	252	144	241	149	236	160	225

172	213	161	224	185	200	180	205
214	171	223	162	199	186	206	179
215	170	222	163	198	187	207	178
169	216	164	221	188	197	177	208
168	217	173	212	184	201	189	196
218	167	211	174	202	183	195	190
219	166	210	175	203	182	194	191
165	220	176	209	181	204	192	193

Example 1.16. *Let's consider the following six magic squares of order 8:*

8	377	17	20	367	366	9	376
1	384	368	365	18	19	16	369
383	2	25	360	29	356	11	374
381	4	359	26	355	30	372	13
380	5	358	27	354	31	373	12
378	7	28	357	32	353	14	371
6	379	21	24	363	362	375	10
3	382	364	361	22	23	370	15

1

40	345	49	52	335	334	41	344
33	352	336	333	50	51	48	337
351	34	57	328	61	324	43	342
349	36	327	58	323	62	340	45
348	37	326	59	322	63	341	44
346	39	60	325	64	321	46	339
38	347	53	56	331	330	343	42
35	350	332	329	54	55	338	47

2

72	313	81	84	303	302	73	312
65	320	304	301	82	83	80	305
319	66	89	296	93	292	75	310
317	68	295	90	291	94	308	77
316	69	294	91	290	95	309	76
314	71	92	293	96	289	78	307
70	315	85	88	299	298	311	74
67	318	300	297	86	87	306	79

3

104	281	113	116	271	270	105	280
97	288	272	269	114	115	112	273
287	98	121	264	125	260	107	278
285	100	263	122	259	126	276	109
284	101	262	123	258	127	277	108
282	103	124	261	128	257	110	275
102	283	117	120	267	266	279	106
99	286	268	265	118	119	274	111

4

136	249	145	148	239	238	137	248
129	256	240	237	146	147	144	241
255	130	153	232	157	228	139	246
253	132	231	154	227	158	244	141
252	133	230	155	226	159	245	140
250	135	156	229	160	225	142	243
134	251	149	152	235	234	247	138
131	254	236	233	150	151	242	143

5

168	217	177	180	207	206	169	216
161	224	208	205	178	179	176	209
223	162	185	200	189	196	171	214
221	164	199	186	195	190	212	173
220	165	198	187	194	191	213	172
218	167	188	197	192	193	174	211
166	219	181	184	203	202	215	170
163	222	204	201	182	183	210	175

6

These magic squares are constructed using sequential numbers from 1 to 384. These magic squares are of equal magic sums:

$$S_{8\times8}(1) = S_{8\times8}(2) = S_{8\times8}(3) = S_{8\times8}(4) = S_{8\times8}(5) = S_{8\times8}(6) := 1540.$$

The above magic squares are known as ***striped*** *magic squares. In this case, we have two types of* ***stripes****. One magic rectangles of orders* 2×8 *and second as magic rectangles of orders* 2×4

Let's see below the structure for making a ***magic cube****:*

8	377	17	20	367	366	9	376
1	384	368	365	18	19	16	369
383	2	25	360	29	356	11	374
381	4	359	26	355	30	372	13
380	5	358	27	354	31	373	12
378	7	28	357	32	353	14	371
6	379	21	24	363	362	375	10
3	382	364	361	22	23	370	15

72	313	81	84	303	302	73	312
65	320	304	301	82	83	80	305
319	66	89	296	93	292	75	310
317	68	295	90	291	94	308	77
316	69	294	91	290	95	309	76
314	71	92	293	96	289	78	307
70	315	85	88	299	298	311	74
67	318	300	297	86	87	306	79

40	33	351	349	348	346	38	35
345	352	34	36	37	39	347	350
49	336	57	327	326	60	53	332
52	333	328	58	59	325	56	329
335	50	61	323	322	64	331	54
334	51	324	62	63	321	330	55
41	48	43	340	341	46	343	338
344	337	342	45	44	339	42	47

104	281	113	116	271	270	105	280
97	288	272	269	114	115	112	273
287	98	121	264	125	260	107	278
285	100	263	122	259	126	276	109
284	101	262	123	258	127	277	108
282	103	124	261	128	257	110	275
102	283	117	120	267	266	279	106
99	286	268	265	118	119	274	111

136	129	255	253	252	250	134	131
249	256	130	132	133	135	251	254
145	240	153	231	230	156	149	236
148	237	232	154	155	229	152	233
239	146	157	227	226	160	235	150
238	147	228	158	159	225	234	151
137	144	139	244	245	142	247	242
248	241	246	141	140	243	138	143

168	161	223	221	220	218	166	163
217	224	162	164	165	167	219	222
177	208	185	199	198	188	181	204
180	205	200	186	187	197	184	201
207	178	189	195	194	192	203	182
206	179	196	190	191	193	202	183
169	176	171	212	213	174	215	210
216	209	214	173	172	211	170	175

Example 1.17. *Let's consider the following six magic squares of order 8:*

12	377	376	4	2	384	366	19
373	8	9	381	383	1	367	18
14	371	31	356	25	358	379	6
370	15	26	357	32	355	5	380
368	17	360	27	354	29	16	369
382	3	353	30	359	28	22	363
11	374	365	364	24	23	372	7
10	375	20	21	361	362	13	378

1

44	345	344	36	34	352	334	51
341	40	41	349	351	33	335	50
46	339	63	324	57	326	347	38
338	47	58	325	64	323	37	348
336	49	328	59	322	61	48	337
350	35	321	62	327	60	54	331
43	342	333	332	56	55	340	39
42	343	52	53	329	330	45	346

2

76	313	312	68	66	320	302	83
309	72	73	317	319	65	303	82
78	307	95	292	89	294	315	70
306	79	90	293	96	291	69	316
304	81	296	91	290	93	80	305
318	67	289	94	295	92	86	299
75	310	301	300	88	87	308	71
74	311	84	85	297	298	77	314

3

108	281	280	100	98	288	270	115
277	104	105	285	287	97	271	114
110	275	127	260	121	262	283	102
274	111	122	261	128	259	101	284
272	113	264	123	258	125	112	273
286	99	257	126	263	124	118	267
107	278	269	268	120	119	276	103
106	279	116	117	265	266	109	282

4

140	249	248	132	130	256	238	147
245	136	137	253	255	129	239	146
142	243	159	228	153	230	251	134
242	143	154	229	160	227	133	252
240	145	232	155	226	157	144	241
254	131	225	158	231	156	150	235
139	246	237	236	152	151	244	135
138	247	148	149	233	234	141	250

5

172	217	216	164	162	224	206	179
213	168	169	221	223	161	207	178
174	211	191	196	185	198	219	166
210	175	186	197	192	195	165	220
208	177	200	187	194	189	176	209
222	163	193	190	199	188	182	203
171	214	205	204	184	183	212	167
170	215	180	181	201	202	173	218

6

These magic squares are constructed using sequential numbers from 1 to 384. These magic squares are of equal magic sums:

$$S_{8\times8}(1) = S_{8\times8}(2) = S_{8\times8}(3) = S_{8\times8}(4) = S_{8\times8}(5) = S_{8\times8}(6) := 1540.$$

*The above magic squares are known as **double-digits** bordered magic squares. The inner blocks of order 4 are magic squares of order 4.*

*Let's see below the structure for making a **magic cube**:*

12	377	376	4	2	384	366	19
373	8	9	381	383	1	367	18
14	371	31	356	25	358	379	6
370	15	26	357	32	355	5	380
368	17	360	27	354	29	16	369
382	3	353	30	359	28	22	363
11	374	365	364	24	23	372	7
10	375	20	21	361	362	13	378

76	313	312	68	66	320	302	83	44	345	344	36	34	352	334	51
309	72	73	317	319	65	303	82	341	40	41	349	351	33	335	50
78	307	95	292	89	294	315	70	46	339	63	324	57	326	347	38
306	79	90	293	96	291	69	316	338	47	58	325	64	323	37	348
304	81	296	91	290	93	80	305	336	49	328	59	322	61	48	337
318	67	289	94	295	92	86	299	350	35	321	62	327	60	54	331
75	310	301	300	88	87	308	71	43	342	333	332	56	55	340	39
74	311	84	85	297	298	77	314	42	343	52	53	329	330	45	346

108	281	280	100	98	288	270	115	140	249	248	132	130	256	238	147
277	104	105	285	287	97	271	114	245	136	137	253	255	129	239	146
110	275	127	260	121	262	283	102	142	243	159	228	153	230	251	134
274	111	122	261	128	259	101	284	242	143	154	229	160	227	133	252
272	113	264	123	258	125	112	273	240	145	232	155	226	157	144	241
286	99	257	126	263	124	118	267	254	131	225	158	231	156	150	235
107	278	269	268	120	119	276	103	139	246	237	236	152	151	244	135
106	279	116	117	265	266	109	282	138	247	148	149	233	234	141	250

172	217	216	164	162	224	206	179
213	168	169	221	223	161	207	178
174	211	191	196	185	198	219	166
210	175	186	197	192	195	165	220
208	177	200	187	194	189	176	209
222	163	193	190	199	188	182	203
171	214	205	204	184	183	212	167
170	215	180	181	201	202	173	218

Example 1.18. *Let's consider the following six magic squares of order 8:*

31	356	25	358	363	22	13	372
26	357	32	355	23	362	1	384
360	27	354	29	361	24	374	11
353	30	359	28	369	16	9	376
18	17	364	370	20	366	7	378
367	368	21	15	19	365	373	12
10	8	382	371	6	381	380	2
375	377	3	14	379	4	383	5

1

63	324	57	326	331	54	45	340
58	325	64	323	55	330	33	352
328	59	322	61	329	56	342	43
321	62	327	60	337	48	41	344
50	49	332	338	52	334	39	346
335	336	53	47	51	333	341	44
42	40	350	339	38	349	348	34
343	345	35	46	347	36	351	37

2

95	292	89	294	299	86	77	308
90	293	96	291	87	298	65	320
296	91	290	93	297	88	310	75
289	94	295	92	305	80	73	312
82	81	300	306	84	302	71	314
303	304	85	79	83	301	309	76
74	72	318	307	70	317	316	66
311	313	67	78	315	68	319	69

3

127	260	121	262	267	118	109	276
122	261	128	259	119	266	97	288
264	123	258	125	265	120	278	107
257	126	263	124	273	112	105	280
114	113	268	274	116	270	103	282
271	272	117	111	115	269	277	108
106	104	286	275	102	285	284	98
279	281	99	110	283	100	287	101

4

159	228	153	230	235	150	141	244
154	229	160	227	151	234	129	256
232	155	226	157	233	152	246	139
225	158	231	156	241	144	137	248
146	145	236	242	148	238	135	250
239	240	149	143	147	237	245	140
138	136	254	243	134	253	252	130
247	249	131	142	251	132	255	133

5

191	196	185	198	203	182	173	212
186	197	192	195	183	202	161	224
200	187	194	189	201	184	214	171
193	190	199	188	209	176	169	216
178	177	204	210	180	206	167	218
207	208	181	175	179	205	213	172
170	168	222	211	166	221	220	162
215	217	163	174	219	164	223	165

6

These magic squares are constructed using sequential numbers from 1 to 384. These magic squares are of equal magic sums:

$$S_{8\times8}(1) = S_{8\times8}(2) = S_{8\times8}(3) = S_{8\times8}(4) = S_{8\times8}(5) = S_{8\times8}(6) := 1540.$$

The above magic squares are known as ***cornered*** *magic squares. The corner blocks are magic squares of orders 4 and 6.*

Let's see below the structure for making a ***magic cube****:*

372	384	11	376	378	12	2	5
13	1	374	9	7	373	380	383
22	362	24	16	366	365	381	4
363	23	361	369	20	19	6	379
358	355	29	28	370	15	371	14
25	32	354	359	364	21	382	3
356	357	27	30	17	368	8	377
31	26	360	353	18	367	10	375

311	74	303	82	289	296	90	95
313	72	304	81	94	91	293	292
67	318	85	300	295	290	96	89
78	307	79	306	92	93	291	294
315	70	83	84	305	297	87	299
68	317	301	302	80	88	298	86
319	316	309	71	73	310	65	77
69	66	76	314	312	75	320	308

63	324	57	326	331	54	45	340
58	325	64	323	55	330	33	352
328	59	322	61	329	56	342	43
321	62	327	60	337	48	41	344
50	49	332	338	52	334	39	346
335	336	53	47	51	333	341	44
42	40	350	339	38	349	348	34
343	345	35	46	347	36	351	37

133	255	132	251	142	131	249	247
130	252	253	134	243	254	136	138
140	245	237	147	143	149	240	239
250	135	238	148	242	236	145	146
248	137	144	241	156	231	158	225
139	246	152	233	157	226	155	232
256	129	234	151	227	160	229	154
244	141	150	235	230	153	228	159

212	224	171	216	218	172	162	165
173	161	214	169	167	213	220	223
182	202	184	176	206	205	221	164
203	183	201	209	180	179	166	219
198	195	189	188	210	175	211	174
185	192	194	199	204	181	222	163
196	197	187	190	177	208	168	217
191	186	200	193	178	207	170	215

279	106	271	114	257	264	122	127
281	104	272	113	126	123	261	260
99	286	117	268	263	258	128	121
110	275	111	274	124	125	259	262
283	102	115	116	273	265	119	267
100	285	269	270	112	120	266	118
287	284	277	103	105	278	97	109
101	98	108	282	280	107	288	276

1.7 Magic Cubes of Order 9

This section brings three examples of magic cube based on six magic squares of order 9. These magic squares are constructed using sequential numbers from 1 to 486. The first three examples are based on inner blocks of order 3, where the third example is bimagic square of order 9. The forth example is **single-digit bordered** magic squares of order 9. The fifth example is **double-digits bordered** magic squares of order 9. The sixth example is for **cornered** magic squares of order 9.

Example 1.19. *Let's consider the following six magic squares of order 9:*

127	421	175	157	379	187	115	409	199
205	121	397	163	133	427	193	145	385
391	181	151	403	211	109	415	169	139
235	43	445	265	1	457	223	31	469
475	229	19	433	241	49	463	253	7
13	451	259	25	481	217	37	439	247
343	313	67	373	271	79	331	301	91
97	337	289	55	349	319	85	361	277
283	73	367	295	103	325	307	61	355

1

128	422	176	158	380	188	116	410	200
206	122	398	164	134	428	194	146	386
392	182	152	404	212	110	416	170	140
236	44	446	266	2	458	224	32	470
476	230	20	434	242	50	464	254	8
14	452	260	26	482	218	38	440	248
344	314	68	374	272	80	332	302	92
98	338	290	56	350	320	86	362	278
284	74	368	296	104	326	308	62	356

2

129	423	177	159	381	189	117	411	201
207	123	399	165	135	429	195	147	387
393	183	153	405	213	111	417	171	141
237	45	447	267	3	459	225	33	471
477	231	21	435	243	51	465	255	9
15	453	261	27	483	219	39	441	249
345	315	69	375	273	81	333	303	93
99	339	291	57	351	321	87	363	279
285	75	369	297	105	327	309	63	357

3

130	424	178	160	382	190	118	412	202
208	124	400	166	136	430	196	148	388
394	184	154	406	214	112	418	172	142
238	46	448	268	4	460	226	34	472
478	232	22	436	244	52	466	256	10
16	454	262	28	484	220	40	442	250
346	316	70	376	274	82	334	304	94
100	340	292	58	352	322	88	364	280
286	76	370	298	106	328	310	64	358

4

131	425	179	161	383	191	119	413	203
209	125	401	167	137	431	197	149	389
395	185	155	407	215	113	419	173	143
239	47	449	269	5	461	227	35	473
479	233	23	437	245	53	467	257	11
17	455	263	29	485	221	41	443	251
347	317	71	377	275	83	335	305	95
101	341	293	59	353	323	89	365	281
287	77	371	299	107	329	311	65	359

5

132	426	180	162	384	192	120	414	204
210	126	402	168	138	432	198	150	390
396	186	156	408	216	114	420	174	144
240	48	450	270	6	462	228	36	474
480	234	24	438	246	54	468	258	12
18	456	264	30	486	222	42	444	252
348	318	72	378	276	84	336	306	96
102	342	294	60	354	324	90	366	282
288	78	372	300	108	330	312	66	360

6

These magic squares are constructed using sequential numbers from 1 to 486. These magic squares are of equal difference magic sums. See below

$S_{9\times9}(1) := 1015, S_{9\times9}(2) := 1022, S_{9\times9}(3) := 1029, S_{9\times9}(4) := 1036, S_{9\times9}(5) := 1043$ ***and*** $S_{9\times9}(6) := 1050.$

*The blocks of order 3 are **semi-magic** squares of equal sums in each case.*

*Let's see below the structure for making a **magic cube**:*

127	421	175	157	379	187	115	409	199
205	121	397	163	133	427	193	145	385
391	181	151	403	211	109	415	169	139
235	43	445	265	1	457	223	31	469
475	229	19	433	241	49	463	253	7
13	451	259	25	481	217	37	439	247
343	313	67	373	271	79	331	301	91
97	337	289	55	349	319	85	361	277
283	73	367	295	103	325	307	61	355

129	423	177	159	381	189	117	411	201
207	123	399	165	135	429	195	147	387
393	183	153	405	213	111	417	171	141
237	45	447	267	3	459	225	33	471
477	231	21	435	243	51	465	255	9
15	453	261	27	483	219	39	441	249
345	315	69	375	273	81	333	303	93
99	339	291	57	351	321	87	363	279
285	75	369	297	105	327	309	63	357

128	422	176	158	380	188	116	410	200
206	122	398	164	134	428	194	146	386
392	182	152	404	212	110	416	170	140
236	44	446	266	2	458	224	32	470
476	230	20	434	242	50	464	254	8
14	452	260	26	482	218	38	440	248
344	314	68	374	272	80	332	302	92
98	338	290	56	350	320	86	362	278
284	74	368	296	104	326	308	62	356

130	424	178	160	382	190	118	412	202
208	124	400	166	136	430	196	148	388
394	184	154	406	214	112	418	172	142
238	46	448	268	4	460	226	34	472
478	232	22	436	244	52	466	256	10
16	454	262	28	484	220	40	442	250
346	316	70	376	274	82	334	304	94
100	340	292	58	352	322	88	364	280
286	76	370	298	106	328	310	64	358

131	425	179	161	383	191	119	413	203
209	125	401	167	137	431	197	149	389
395	185	155	407	215	113	419	173	143
239	47	449	269	5	461	227	35	473
479	233	23	437	245	53	467	257	11
17	455	263	29	485	221	41	443	251
347	317	71	377	275	83	335	305	95
101	341	293	59	353	323	89	365	281
287	77	371	299	107	329	311	65	359

132	426	180	162	384	192	120	414	204
210	126	402	168	138	432	198	150	390
396	186	156	408	216	114	420	174	144
240	48	450	270	6	462	228	36	474
480	234	24	438	246	54	468	258	12
18	456	264	30	486	222	42	444	252
348	318	72	378	276	84	336	306	96
102	342	294	60	354	324	90	366	282
288	78	372	300	108	330	312	66	360

Example 1.20. *Let's consider the following six magic squares of order 9:*

181	211	169	451	481	439	73	103	61
175	187	199	445	457	469	67	79	91
205	163	193	475	433	463	97	55	85
127	157	115	235	265	223	343	373	331
121	133	145	229	241	253	337	349	361
151	109	139	259	217	247	367	325	355
397	427	385	19	49	7	289	319	277
391	403	415	13	25	37	283	295	307
421	379	409	43	1	31	313	271	301

1

182	212	170	452	482	440	74	104	62
176	188	200	446	458	470	68	80	92
206	164	194	476	434	464	98	56	86
128	158	116	236	266	224	344	374	332
122	134	146	230	242	254	338	350	362
152	110	140	260	218	248	368	326	356
398	428	386	20	50	8	290	320	278
392	404	416	14	26	38	284	296	308
422	380	410	44	2	32	314	272	302

2

183	213	171	453	483	441	75	105	63
177	189	201	447	459	471	69	81	93
207	165	195	477	435	465	99	57	87
129	159	117	237	267	225	345	375	333
123	135	147	231	243	255	339	351	363
153	111	141	261	219	249	369	327	357
399	429	387	21	51	9	291	321	279
393	405	417	15	27	39	285	297	309
423	381	411	45	3	33	315	273	303

3

184	214	172	454	484	442	76	106	64
178	190	202	448	460	472	70	82	94
208	166	196	478	436	466	100	58	88
130	160	118	238	268	226	346	376	334
124	136	148	232	244	256	340	352	364
154	112	142	262	220	250	370	328	358
400	430	388	22	52	10	292	322	280
394	406	418	16	28	40	286	298	310
424	382	412	46	4	34	316	274	304

4

185	215	173	455	485	443	77	107	65
179	191	203	449	461	473	71	83	95
209	167	197	479	437	467	101	59	89
131	161	119	239	269	227	347	377	335
125	137	149	233	245	257	341	353	365
155	113	143	263	221	251	371	329	359
401	431	389	23	53	11	293	323	281
395	407	419	17	29	41	287	299	311
425	383	413	47	5	35	317	275	305

5

186	216	174	456	486	444	78	108	66
180	192	204	450	462	474	72	84	96
210	168	198	480	438	468	102	60	90
132	162	120	240	270	228	348	378	336
126	138	150	234	246	258	342	354	366
156	114	144	264	222	252	372	330	360
402	432	390	24	54	12	294	324	282
396	408	420	18	30	42	288	300	312
426	384	414	48	6	36	318	276	306

6

These magic squares are constructed using sequential numbers from 1 to 486. These magic squares are of equal magic sums. See below

$S_{9\times9}(1) := 2169, S_{9\times9}(2) := 2178, S_{9\times9}(3) := 2187, S_{9\times9}(4) := 2196, S_{9\times9}(5) := 2205$ ***and*** $S_{9\times9}(6) := 2214.$

The blocks of order 3 are magic squares with different magic sums.

Let's see below the structure for making a ***magic cube****:*

181	211	169	451	481	439	73	103	61
175	187	199	445	457	469	67	79	91
205	163	193	475	433	463	97	55	85
127	157	115	235	265	223	343	373	331
121	133	145	229	241	253	337	349	361
151	109	139	259	217	247	367	325	355
397	427	385	19	49	7	289	319	277
391	403	415	13	25	37	283	295	307
421	379	409	43	1	31	313	271	301

183	213	171	453	483	441	75	105	63
177	189	201	447	459	471	69	81	93
207	165	195	477	435	465	99	57	87
129	159	117	237	267	225	345	375	333
123	135	147	231	243	255	339	351	363
153	111	141	261	219	249	369	327	357
399	429	387	21	51	9	291	321	279
393	405	417	15	27	39	285	297	309
423	381	411	45	3	33	315	273	303

182	212	170	452	482	440	74	104	62
176	188	200	446	458	470	68	80	92
206	164	194	476	434	464	98	56	86
128	158	116	236	266	224	344	374	332
122	134	146	230	242	254	338	350	362
152	110	140	260	218	248	368	326	356
398	428	386	20	50	8	290	320	278
392	404	416	14	26	38	284	296	308
422	380	410	44	2	32	314	272	302

184	214	172	454	484	442	76	106	64
178	190	202	448	460	472	70	82	94
208	166	196	478	436	466	100	58	88
130	160	118	238	268	226	346	376	334
124	136	148	232	244	256	340	352	364
154	112	142	262	220	250	370	328	358
400	430	388	22	52	10	292	322	280
394	406	418	16	28	40	286	298	310
424	382	412	46	4	34	316	274	304

185	215	173	455	485	443	77	107	65
179	191	203	449	461	473	71	83	95
209	167	197	479	437	467	101	59	89
131	161	119	239	269	227	347	377	335
125	137	149	233	245	257	341	353	365
155	113	143	263	221	251	371	329	359
401	431	389	23	53	11	293	323	281
395	407	419	17	29	41	287	299	311
425	383	413	47	5	35	317	275	305

186	216	174	456	486	444	78	108	66
180	192	204	450	462	474	72	84	96
210	168	198	480	438	468	102	60	90
132	162	120	240	270	228	348	378	336
126	138	150	234	246	258	342	354	366
156	114	144	264	222	252	372	330	360
402	432	390	24	54	12	294	324	282
396	408	420	18	30	42	288	300	312
426	384	414	48	6	36	318	276	306

Example 1.21. *Let's consider the following six magic squares of order 9:*

1	103	133	205	235	283	355	385	469
193	223	307	325	427	457	43	73	121
367	397	445	31	61	145	163	265	295
157	25	55	289	175	259	439	361	409
277	199	247	481	349	379	127	13	97
451	337	421	115	37	85	319	187	217
79	109	49	229	313	181	415	463	331
253	301	169	403	433	373	67	151	19
391	475	343	91	139	7	241	271	211

1

2	104	134	206	236	284	356	386	470
194	224	308	326	428	458	44	74	122
368	398	446	32	62	146	164	266	296
158	26	56	290	176	260	440	362	410
278	200	248	482	350	380	128	14	98
452	338	422	116	38	86	320	188	218
80	110	50	230	314	182	416	464	332
254	302	170	404	434	374	68	152	20
392	476	344	92	140	8	242	272	212

2

3	105	135	207	237	285	357	387	471
195	225	309	327	429	459	45	75	123
369	399	447	33	63	147	165	267	297
159	27	57	291	177	261	441	363	411
279	201	249	483	351	381	129	15	99
453	339	423	117	39	87	321	189	219
81	111	51	231	315	183	417	465	333
255	303	171	405	435	375	69	153	21
393	477	345	93	141	9	243	273	213

3

4	106	136	208	238	286	358	388	472
196	226	310	328	430	460	46	76	124
370	400	448	34	64	148	166	268	298
160	28	58	292	178	262	442	364	412
280	202	250	484	352	382	130	16	100
454	340	424	118	40	88	322	190	220
82	112	52	232	316	184	418	466	334
256	304	172	406	436	376	70	154	22
394	478	346	94	142	10	244	274	214

4

5	107	137	209	239	287	359	389	473
197	227	311	329	431	461	47	77	125
371	401	449	35	65	149	167	269	299
161	29	59	293	179	263	443	365	413
281	203	251	485	353	383	131	17	101
455	341	425	119	41	89	323	191	221
83	113	53	233	317	185	419	467	335
257	305	173	407	437	377	71	155	23
395	479	347	95	143	11	245	275	215

5

6	108	138	210	240	288	360	390	474
198	228	312	330	432	462	48	78	126
372	402	450	36	66	150	168	270	300
162	30	60	294	180	264	444	366	414
282	204	252	486	354	384	132	18	102
456	342	426	120	42	90	324	192	222
84	114	54	234	318	186	420	468	336
258	306	174	408	438	378	72	156	24
396	480	348	96	144	12	246	276	216

6

These magic squares are constructed using sequential numbers from 1 to 486. These magic squares are of equal magic sums. See below

$$S_{9\times9}(1) := 1015, S_{9\times9}(2) := 1022, S_{9\times9}(3) := 1029, S_{9\times9}(4) := 1036, S_{9\times9}(5) := 1043 \text{ and } S_{9\times9}(6) := 1050.$$

The sum of nine members of block of order 3 are equal in each case. Moreover, the magic squares of order 9 are ***bimagic****.*

Let's see below the structure for making a ***magic cube****:*

1	103	133	205	235	283	355	385	469
193	223	307	325	427	457	43	73	121
367	397	445	31	61	145	163	265	295
157	25	55	289	175	259	439	361	409
277	199	247	481	349	379	127	13	97
451	337	421	115	37	85	319	187	217
79	109	49	229	313	181	415	463	331
253	301	169	403	433	373	67	151	19
391	475	343	91	139	7	241	271	211

3	105	135	207	237	285	357	387	471
195	225	309	327	429	459	45	75	123
369	399	447	33	63	147	165	267	297
159	27	57	291	177	261	441	363	411
279	201	249	483	351	381	129	15	99
453	339	423	117	39	87	321	189	219
81	111	51	231	315	183	417	465	333
255	303	171	405	435	375	69	153	21
393	477	345	93	141	9	243	273	213

2	104	134	206	236	284	356	386	470
194	224	308	326	428	458	44	74	122
368	398	446	32	62	146	164	266	296
158	26	56	290	176	260	440	362	410
278	200	248	482	350	380	128	14	98
452	338	422	116	38	86	320	188	218
80	110	50	230	314	182	416	464	332
254	302	170	404	434	374	68	152	20
392	476	344	92	140	8	242	272	212

4	106	136	208	238	286	358	388	472
196	226	310	328	430	460	46	76	124
370	400	448	34	64	148	166	268	298
160	28	58	292	178	262	442	364	412
280	202	250	484	352	382	130	16	100
454	340	424	118	40	88	322	190	220
82	112	52	232	316	184	418	466	334
256	304	172	406	436	376	70	154	22
394	478	346	94	142	10	244	274	214

5	107	137	209	239	287	359	389	473
197	227	311	329	431	461	47	77	125
371	401	449	35	65	149	167	269	299
161	29	59	293	179	263	443	365	413
281	203	251	485	353	383	131	17	101
455	341	425	119	41	89	323	191	221
83	113	53	233	317	185	419	467	335
257	305	173	407	437	377	71	155	23
395	479	347	95	143	11	245	275	215

6	108	138	210	240	288	360	390	474
198	228	312	330	432	462	48	78	126
372	402	450	36	66	150	168	270	300
162	30	60	294	180	264	444	366	414
282	204	252	486	354	384	132	18	102
456	342	426	120	42	90	324	192	222
84	114	54	234	318	186	420	468	336
258	306	174	408	438	378	72	156	24
396	480	348	96	144	12	246	276	216

Example 1.22. *Let's consider the following six magic squares of order 9:*

43	475	463	451	445	67	79	91	55
1	343	319	331	121	115	103	355	481
13	97	295	313	193	205	199	385	469
25	109	175	235	265	223	307	373	457
433	349	181	229	241	253	301	133	49
421	337	271	259	217	247	211	145	61
409	325	283	169	289	277	187	157	73
397	127	163	151	361	367	379	139	85
427	7	19	31	37	415	403	391	439

1

44	476	464	452	446	68	80	92	56
2	344	320	332	122	116	104	356	482
14	98	296	314	194	206	200	386	470
26	110	176	236	266	224	308	374	458
434	350	182	230	242	254	302	134	50
422	338	272	260	218	248	212	146	62
410	326	284	170	290	278	188	158	74
398	128	164	152	362	368	380	140	86
428	8	20	32	38	416	404	392	440

2

45	477	465	453	447	69	81	93	57
3	345	321	333	123	117	105	357	483
15	99	297	315	195	207	201	387	471
27	111	177	237	267	225	309	375	459
435	351	183	231	243	255	303	135	51
423	339	273	261	219	249	213	147	63
411	327	285	171	291	279	189	159	75
399	129	165	153	363	369	381	141	87
429	9	21	33	39	417	405	393	441

3

46	478	466	454	448	70	82	94	58
4	346	322	334	124	118	106	358	484
16	100	298	316	196	208	202	388	472
28	112	178	238	268	226	310	376	460
436	352	184	232	244	256	304	136	52
424	340	274	262	220	250	214	148	64
412	328	286	172	292	280	190	160	76
400	130	166	154	364	370	382	142	88
430	10	22	34	40	418	406	394	442

4

47	479	467	455	449	71	83	95	59
5	347	323	335	125	119	107	359	485
17	101	299	317	197	209	203	389	473
29	113	179	239	269	227	311	377	461
437	353	185	233	245	257	305	137	53
425	341	275	263	221	251	215	149	65
413	329	287	173	293	281	191	161	77
401	131	167	155	365	371	383	143	89
431	11	23	35	41	419	407	395	443

5

48	480	468	456	450	72	84	96	60
6	348	324	336	126	120	108	360	486
18	102	300	318	198	210	204	390	474
30	114	180	240	270	228	312	378	462
438	354	186	234	246	258	306	138	54
426	342	276	264	222	252	216	150	66
414	330	288	174	294	282	192	162	78
402	132	168	156	366	372	384	144	90
432	12	24	36	42	420	408	396	444

6

These magic squares are constructed using sequential numbers from 1 to 486. These magic squares are of equal magic sums. See below

$$S_{9\times9}(1) := 1015, S_{9\times9}(2) := 1022, S_{9\times9}(3) := 1029, S_{9\times9}(4) := 1036, S_{9\times9}(5) := 1043 \textit{ and } S_{9\times9}(6) := 1050.$$

The magic squares of order 9 are ***single-digit bordered*** *magic squares, where the inner blocks are magic squares of orders 3, 5 and 7.*

Let's see below the structure for making a ***magic cube****:*

43	475	463	451	445	67	79	91	55
1	343	319	331	121	115	103	355	481
13	97	295	313	193	205	199	385	469
25	109	175	235	265	223	307	373	457
433	349	181	229	241	253	301	133	49
421	337	271	259	217	247	211	145	61
409	325	283	169	289	277	187	157	73
397	127	163	151	361	367	379	139	85
427	7	19	31	37	415	403	391	439

45	477	465	453	447	69	81	93	57
3	345	321	333	123	117	105	357	483
15	99	297	315	195	207	201	387	471
27	111	177	237	267	225	309	375	459
435	351	183	231	243	255	303	135	51
423	339	273	261	219	249	213	147	63
411	327	285	171	291	279	189	159	75
399	129	165	153	363	369	381	141	87
429	9	21	33	39	417	405	393	441

44	476	464	452	446	68	80	92	56
2	344	320	332	122	116	104	356	482
14	98	296	314	194	206	200	386	470
26	110	176	236	266	224	308	374	458
434	350	182	230	242	254	302	134	50
422	338	272	260	218	248	212	146	62
410	326	284	170	290	278	188	158	74
398	128	164	152	362	368	380	140	86
428	8	20	32	38	416	404	392	440

46	478	466	454	448	70	82	94	58
4	346	322	334	124	118	106	358	484
16	100	298	316	196	208	202	388	472
28	112	178	238	268	226	310	376	460
436	352	184	232	244	256	304	136	52
424	340	274	262	220	250	214	148	64
412	328	286	172	292	280	190	160	76
400	130	166	154	364	370	382	142	88
430	10	22	34	40	418	406	394	442

47	479	467	455	449	71	83	95	59
5	347	323	335	125	119	107	359	485
17	101	299	317	197	209	203	389	473
29	113	179	239	269	227	311	377	461
437	353	185	233	245	257	305	137	53
425	341	275	263	221	251	215	149	65
413	329	287	173	293	281	191	161	77
401	131	167	155	365	371	383	143	89
431	11	23	35	41	419	407	395	443

48	480	468	456	450	72	84	96	60
6	348	324	336	126	120	108	360	486
18	102	300	318	198	210	204	390	474
30	114	180	240	270	228	312	378	462
438	354	186	234	246	258	306	138	54
426	342	276	264	222	252	216	150	66
414	330	288	174	294	282	192	162	78
402	132	168	156	366	372	384	144	90
432	12	24	36	42	420	408	396	444

Example 1.23. *Let's consider the following six magic squares of order 9:*

409	91	475	67	427	97	121	331	151
73	391	7	415	55	385	361	343	139
433	49	223	199	301	187	295	31	451
403	79	259	283	181	229	253	469	13
61	421	271	211	241	307	175	37	445
463	19	247	235	313	193	217	349	133
109	373	205	277	169	289	265	127	355
115	367	325	145	457	43	397	1	319
103	379	157	337	25	439	85	481	163

1

410	92	476	68	428	98	122	332	152
74	392	8	416	56	386	362	344	140
434	50	224	200	302	188	296	32	452
404	80	260	284	182	230	254	470	14
62	422	272	212	242	308	176	38	446
464	20	248	236	314	194	218	350	134
110	374	206	278	170	290	266	128	356
116	368	326	146	458	44	398	2	320
104	380	158	338	26	440	86	482	164

2

411	93	477	69	429	99	123	333	153
75	393	9	417	57	387	363	345	141
435	51	225	201	303	189	297	33	453
405	81	261	285	183	231	255	471	15
63	423	273	213	243	309	177	39	447
465	21	249	237	315	195	219	351	135
111	375	207	279	171	291	267	129	357
117	369	327	147	459	45	399	3	321
105	381	159	339	27	441	87	483	165

3

412	94	478	70	430	100	124	334	154
76	394	10	418	58	388	364	346	142
436	52	226	202	304	190	298	34	454
406	82	262	286	184	232	256	472	16
64	424	274	214	244	310	178	40	448
466	22	250	238	316	196	220	352	136
112	376	208	280	172	292	268	130	358
118	370	328	148	460	46	400	4	322
106	382	160	340	28	442	88	484	166

4

413	95	479	71	431	101	125	335	155
77	395	11	419	59	389	365	347	143
437	53	227	203	305	191	299	35	455
407	83	263	287	185	233	257	473	17
65	425	275	215	245	311	179	41	449
467	23	251	239	317	197	221	353	137
113	377	209	281	173	293	269	131	359
119	371	329	149	461	47	401	5	323
107	383	161	341	29	443	89	485	167

5

414	96	480	72	432	102	126	336	156
78	396	12	420	60	390	366	348	144
438	54	228	204	306	192	300	36	456
408	84	264	288	186	234	258	474	18
66	426	276	216	246	312	180	42	450
468	24	252	240	318	198	222	354	138
114	378	210	282	174	294	270	132	360
120	372	330	150	462	48	402	6	324
108	384	162	342	30	444	90	486	168

6

These magic squares are constructed using sequential numbers from 1 to 486. These magic squares are of equal magic sums. See below

$$S_{9\times 9}(1) := 1015, S_{9\times 9}(2) := 1022, S_{9\times 9}(3) := 1029, S_{9\times 9}(4) := 1036, S_{9\times 9}(5) := 1043 \textit{ and } S_{9\times 9}(6) := 1050.$$

*The magic squares of order 9 are **double-digits bordered** magic squares, where the inner block is a magic square of order 5.*

*Let's see below the structure for making a **magic cube**:*

409	91	475	67	427	97	121	331	151
73	391	7	415	55	385	361	343	139
433	49	223	199	301	187	295	31	451
403	79	259	283	181	229	253	469	13
61	421	271	211	241	307	175	37	445
463	19	247	235	313	193	217	349	133
109	373	205	277	169	289	265	127	355
115	367	325	145	457	43	397	1	319
103	379	157	337	25	439	85	481	163

411	93	477	69	429	99	123	333	153
75	393	9	417	57	387	363	345	141
435	51	225	201	303	189	297	33	453
405	81	261	285	183	231	255	471	15
63	423	273	213	243	309	177	39	447
465	21	249	237	315	195	219	351	135
111	375	207	279	171	291	267	129	357
117	369	327	147	459	45	399	3	321
105	381	159	339	27	441	87	483	165

410	92	476	68	428	98	122	332	152
74	392	8	416	56	386	362	344	140
434	50	224	200	302	188	296	32	452
404	80	260	284	182	230	254	470	14
62	422	272	212	242	308	176	38	446
464	20	248	236	314	194	218	350	134
110	374	206	278	170	290	266	128	356
116	368	326	146	458	44	398	2	320
104	380	158	338	26	440	86	482	164

412	94	478	70	430	100	124	334	154
76	394	10	418	58	388	364	346	142
436	52	226	202	304	190	298	34	454
406	82	262	286	184	232	256	472	16
64	424	274	214	244	310	178	40	448
466	22	250	238	316	196	220	352	136
112	376	208	280	172	292	268	130	358
118	370	328	148	460	46	400	4	322
106	382	160	340	28	442	88	484	166

413	95	479	71	431	101	125	335	155
77	395	11	419	59	389	365	347	143
437	53	227	203	305	191	299	35	455
407	83	263	287	185	233	257	473	17
65	425	275	215	245	311	179	41	449
467	23	251	239	317	197	221	353	137
113	377	209	281	173	293	269	131	359
119	371	329	149	461	47	401	5	323
107	383	161	341	29	443	89	485	167

414	96	480	72	432	102	126	336	156
78	396	12	420	60	390	366	348	144
438	54	228	204	306	192	300	36	456
408	84	264	288	186	234	258	474	18
66	426	276	216	246	312	180	42	450
468	24	252	240	318	198	222	354	138
114	378	210	282	174	294	270	132	360
120	372	330	150	462	48	402	6	324
108	384	162	342	30	444	90	486	168

Example 1.24. *Let's consider the following six magic squares of order 9:*

223	253	247	295	187	157	325	85	397
265	241	217	271	211	367	115	43	439
235	229	259	289	193	151	331	475	7
199	205	307	181	313	385	97	55	427
283	277	175	169	301	133	349	79	403
355	319	337	103	343	121	109	457	25
127	163	145	379	139	373	361	481	1
463	445	91	73	469	451	67	61	49
19	37	391	409	13	31	415	433	421

1

224	254	248	296	188	158	326	86	398
266	242	218	272	212	368	116	44	440
236	230	260	290	194	152	332	476	8
200	206	308	182	314	386	98	56	428
284	278	176	170	302	134	350	80	404
356	320	338	104	344	122	110	458	26
128	164	146	380	140	374	362	482	2
464	446	92	74	470	452	68	62	50
20	38	392	410	14	32	416	434	422

2

225	255	249	297	189	159	327	87	399
267	243	219	273	213	369	117	45	441
237	231	261	291	195	153	333	477	9
201	207	309	183	315	387	99	57	429
285	279	177	171	303	135	351	81	405
357	321	339	105	345	123	111	459	27
129	165	147	381	141	375	363	483	3
465	447	93	75	471	453	69	63	51
21	39	393	411	15	33	417	435	423

3

226	256	250	298	190	160	328	88	400
268	244	220	274	214	370	118	46	442
238	232	262	292	196	154	334	478	10
202	208	310	184	316	388	100	58	430
286	280	178	172	304	136	352	82	406
358	322	340	106	346	124	112	460	28
130	166	148	382	142	376	364	484	4
466	448	94	76	472	454	70	64	52
22	40	394	412	16	34	418	436	424

4

227	257	251	299	191	161	329	89	401
269	245	221	275	215	371	119	47	443
239	233	263	293	197	155	335	479	11
203	209	311	185	317	389	101	59	431
287	281	179	173	305	137	353	83	407
359	323	341	107	347	125	113	461	29
131	167	149	383	143	377	365	485	5
467	449	95	77	473	455	71	65	53
23	41	395	413	17	35	419	437	425

5

228	258	252	300	192	162	330	90	402
270	246	222	276	216	372	120	48	444
240	234	264	294	198	156	336	480	12
204	210	312	186	318	390	102	60	432
288	282	180	174	306	138	354	84	408
360	324	342	108	348	126	114	462	30
132	168	150	384	144	378	366	486	6
468	450	96	78	474	456	72	66	54
24	42	396	414	18	36	420	438	426

6

These magic squares are constructed using sequential numbers from 1 to 486. These magic squares are of equal magic sums. See below

$$S_{9\times9}(1) := 1015, S_{9\times9}(2) := 1022, S_{9\times9}(3) := 1029, S_{9\times9}(4) := 1036, S_{9\times9}(5) := 1043 \textit{ and } S_{9\times9}(6) := 1050.$$

*The magic squares of order 9 are **cornered** magic squares, where left superior corners are magic squares of orders 3, 5 and 7.*

*Let's see below the structure for making a **magic cube**:*

397	439	7	427	403	25	1	49	421
85	43	475	55	79	457	481	61	433
325	115	331	97	349	109	361	67	415
157	367	151	385	133	121	373	451	31
187	211	193	313	301	343	139	469	13
295	271	289	181	169	103	379	73	409
247	217	259	307	175	337	145	91	391
253	241	229	205	277	319	163	445	37
223	265	235	199	283	355	127	463	19

21	465	129	357	285	201	237	267	225	224	254	248	296	188	158	326	86	398
39	447	165	321	279	207	231	243	255	266	242	218	272	212	368	116	44	440
393	93	147	339	177	309	261	219	249	236	230	260	290	194	152	332	476	8
411	75	381	105	171	183	291	273	297	200	206	308	182	314	386	98	56	428
15	471	141	345	303	315	195	213	189	284	278	176	170	302	134	350	80	404
33	453	375	123	135	387	153	369	159	356	320	338	104	344	122	110	458	26
417	69	363	111	351	99	333	117	327	128	164	146	380	140	374	362	482	2
435	63	483	459	81	57	477	45	87	464	446	92	74	470	452	68	62	50
423	51	3	27	405	429	9	441	399	20	38	392	410	14	32	416	434	422

425	437	419	35	17	413	395	41	23	402	444	12	432	408	30	6	54	426
53	65	71	455	473	77	95	449	467	90	48	480	60	84	462	486	66	438
5	485	365	377	143	383	149	167	131	330	120	336	102	354	114	366	72	420
29	461	113	125	347	107	341	323	359	162	372	156	390	138	126	378	456	36
407	83	353	137	305	173	179	281	287	192	216	198	318	306	348	144	474	18
431	59	101	389	317	185	311	209	203	300	276	294	186	174	108	384	78	414
11	479	335	155	197	293	263	233	239	252	222	264	312	180	342	150	96	396
443	47	119	371	215	275	221	245	269	258	246	234	210	282	324	168	450	42
401	89	329	161	191	299	251	257	227	228	270	240	204	288	360	132	468	24

22	466	130	358	286	202	238	268	226
40	448	166	322	280	208	232	244	256
394	94	148	340	178	310	262	220	250
412	76	382	106	172	184	292	274	298
16	472	142	346	304	316	196	214	190
34	454	376	124	136	388	154	370	160
418	70	364	112	352	100	334	118	328
436	64	484	460	82	58	478	46	88
424	52	4	28	406	430	10	442	400

1.8 Magic Cubes of Order 10

This section brings 6 examples of magic cube based on six magic squares of order 10. These magic squares are constructed using sequential numbers from 1 to 600. First example is general magic square of order 10.

The second example is based on **single-digit bordered** magic squares. The third and forth examples are considered as **block-bordered** magic squares. The fifth example is **doube-digits bordered** magic squares. The sixth example The third and forth examples are of striped magic squares. The fifth example is based on **double-digits bordered** magic squares. The sixth example is for **cornered** magic squares, where the magic squares of of orders 4, 6 and 8 are in the corner of magic squares.

Example 1.25. *Let's consider the following six magic squares of order 10:*

1	564	585	13	599	572	36	50	28	557
43	12	37	9	554	581	598	26	580	565
570	596	23	551	587	48	575	14	2	39
595	588	10	34	21	17	42	559	566	573
38	571	16	590	45	569	4	597	553	22
19	30	562	577	8	556	583	35	594	41
574	49	558	25	20	593	567	582	31	6
552	7	591	46	563	40	29	578	15	584
27	33	44	592	576	5	560	561	589	18
586	555	579	568	32	24	11	3	47	600

1

51	514	535	63	549	522	86	100	78	507
93	62	87	59	504	531	548	76	530	515
520	546	73	501	537	98	525	64	52	89
545	538	60	84	71	67	92	509	516	523
88	521	66	540	95	519	54	547	503	72
69	80	512	527	58	506	533	85	544	91
524	99	508	75	70	543	517	532	81	56
502	57	541	96	513	90	79	528	65	534
77	83	94	542	526	55	510	511	539	68
536	505	529	518	82	74	61	53	97	550

2

101	464	485	113	499	472	136	150	128	457
143	112	137	109	454	481	498	126	480	465
470	496	123	451	487	148	475	114	102	139
495	488	110	134	121	117	142	459	466	473
138	471	116	490	145	469	104	497	453	122
119	130	462	477	108	456	483	135	494	141
474	149	458	125	120	493	467	482	131	106
452	107	491	146	463	140	129	478	115	484
127	133	144	492	476	105	460	461	489	118
486	455	479	468	132	124	111	103	147	500

3

151	414	435	163	449	422	186	200	178	407
193	162	187	159	404	431	448	176	430	415
420	446	173	401	437	198	425	164	152	189
445	438	160	184	171	167	192	409	416	423
188	421	166	440	195	419	154	447	403	172
169	180	412	427	158	406	433	185	444	191
424	199	408	175	170	443	417	432	181	156
402	157	441	196	413	190	179	428	165	434
177	183	194	442	426	155	410	411	439	168
436	405	429	418	182	174	161	153	197	450

4

201	364	385	213	399	372	236	250	228	357
243	212	237	209	354	381	398	226	380	365
370	396	223	351	387	248	375	214	202	239
395	388	210	234	221	217	242	359	366	373
238	371	216	390	245	369	204	397	353	222
219	230	362	377	208	356	383	235	394	241
374	249	358	225	220	393	367	382	231	206
352	207	391	246	363	240	229	378	215	384
227	233	244	392	376	205	360	361	389	218
386	355	379	368	232	224	211	203	247	400

5

251	314	335	263	349	322	286	300	278	307
293	262	287	259	304	331	348	276	330	315
320	346	273	301	337	298	325	264	252	289
345	338	260	284	271	267	292	309	316	323
288	321	266	340	295	319	254	347	303	272
269	280	312	327	258	306	333	285	344	291
324	299	308	275	270	343	317	332	281	256
302	257	341	296	313	290	279	328	265	334
277	283	294	342	326	255	310	311	339	268
336	305	329	318	282	274	261	253	297	350

6

These magic squares are constructed using sequential numbers from 1 to 600. These are of equal magic sums:

$$S_{10\times 10}(1)=S_{10\times 10}(2)=S_{10\times 10}(3)=S_{10\times 10}(4)=S_{10\times 10}(5)=S_{10\times 10}(6):=3005.$$

Let's see below the structure for making a ***magic cube****:*

1	564	585	13	599	572	36	50	28	557
43	12	37	9	554	581	598	26	580	565
570	596	23	551	587	48	575	14	2	39
595	588	10	34	21	17	42	559	566	573
38	571	16	590	45	569	4	597	553	22
19	30	562	577	8	556	583	35	594	41
574	49	558	25	20	593	567	582	31	6
552	7	591	46	563	40	29	578	15	584
27	33	44	592	576	5	560	561	589	18
586	555	579	568	32	24	11	3	47	600

101	464	485	113	499	472	136	150	128	457	51	514	535	63	549	522	86	100	78	507
143	112	137	109	454	481	498	126	480	465	93	62	87	59	504	531	548	76	530	515
470	496	123	451	487	148	475	114	102	139	520	546	73	501	537	98	525	64	52	89
495	488	110	134	121	117	142	459	466	473	545	538	60	84	71	67	92	509	516	523
138	471	116	490	145	469	104	497	453	122	88	521	66	540	95	519	54	547	503	72
119	130	462	477	108	456	483	135	494	141	69	80	512	527	58	506	533	85	544	91
474	149	458	125	120	493	467	482	131	106	524	99	508	75	70	543	517	532	81	56
452	107	491	146	463	140	129	478	115	484	502	57	541	96	513	90	79	528	65	534
127	133	144	492	476	105	460	461	489	118	77	83	94	542	526	55	510	511	539	68
486	455	479	468	132	124	111	103	147	500	536	505	529	518	82	74	61	53	97	550

151	414	435	163	449	422	186	200	178	407	201	364	385	213	399	372	236	250	228	357
193	162	187	159	404	431	448	176	430	415	243	212	237	209	354	381	398	226	380	365
420	446	173	401	437	198	425	164	152	189	370	396	223	351	387	248	375	214	202	239
445	438	160	184	171	167	192	409	416	423	395	388	210	234	221	217	242	359	366	373
188	421	166	440	195	419	154	447	403	172	238	371	216	390	245	369	204	397	353	222
169	180	412	427	158	406	433	185	444	191	219	230	362	377	208	356	383	235	394	241
424	199	408	175	170	443	417	432	181	156	374	249	358	225	220	393	367	382	231	206
402	157	441	196	413	190	179	428	165	434	352	207	391	246	363	240	229	378	215	384
177	183	194	442	426	155	410	411	439	168	227	233	244	392	376	205	360	361	389	218
436	405	429	418	182	174	161	153	197	450	386	355	379	368	232	224	211	203	247	400

251	314	335	263	349	322	286	300	278	307
293	262	287	259	304	331	348	276	330	315
320	346	273	301	337	298	325	264	252	289
345	338	260	284	271	267	292	309	316	323
288	321	266	340	295	319	254	347	303	272
269	280	312	327	258	306	333	285	344	291
324	299	308	275	270	343	317	332	281	256
302	257	341	296	313	290	279	328	265	334
277	283	294	342	326	255	310	311	339	268
336	305	329	318	282	274	261	253	297	350

Example 1.26. *Let's consider the following six magic squares of order 10:*

Rubik-style Magic Cubes Based on Magic Squares, **Zenodo**,
October 12, 2024, pp. 1-67, *https://doi.org/10.5281/zenodo.13922378*

591	586	16	584	18	14	4	598	2	592
13	26	20	580	582	569	31	571	25	588
589	23	564	562	35	568	36	38	578	12
11	24	34	49	554	43	556	567	577	590
596	29	40	44	555	50	553	561	572	5
1	579	42	558	45	552	47	559	22	600
593	574	560	551	48	557	46	41	27	8
7	573	563	39	566	33	565	37	28	594
595	576	581	21	19	32	570	30	575	6
9	15	585	17	583	587	597	3	599	10

1

541	536	66	534	68	64	54	548	52	542
63	76	70	530	532	519	81	521	75	538
539	73	514	512	85	518	86	88	528	62
61	74	84	99	504	93	506	517	527	540
546	79	90	94	505	100	503	511	522	55
51	529	92	508	95	502	97	509	72	550
543	524	510	501	98	507	96	91	77	58
57	523	513	89	516	83	515	87	78	544
545	526	531	71	69	82	520	80	525	56
59	65	535	67	533	537	547	53	549	60

2

491	486	116	484	118	114	104	498	102	492
113	126	120	480	482	469	131	471	125	488
489	123	464	462	135	468	136	138	478	112
111	124	134	149	454	143	456	467	477	490
496	129	140	144	455	150	453	461	472	105
101	479	142	458	145	452	147	459	122	500
493	474	460	451	148	457	146	141	127	108
107	473	463	139	466	133	465	137	128	494
495	476	481	121	119	132	470	130	475	106
109	115	485	117	483	487	497	103	499	110

3

441	436	166	434	168	164	154	448	152	442
163	176	170	430	432	419	181	421	175	438
439	173	414	412	185	418	186	188	428	162
161	174	184	199	404	193	406	417	427	440
446	179	190	194	405	200	403	411	422	155
151	429	192	408	195	402	197	409	172	450
443	424	410	401	198	407	196	191	177	158
157	423	413	189	416	183	415	187	178	444
445	426	431	171	169	182	420	180	425	156
159	165	435	167	433	437	447	153	449	160

4

391	386	216	384	218	214	204	398	202	392
213	226	220	380	382	369	231	371	225	388
389	223	364	362	235	368	236	238	378	212
211	224	234	249	354	243	356	367	377	390
396	229	240	244	355	250	353	361	372	205
201	379	242	358	245	352	247	359	222	400
393	374	360	351	248	357	246	241	227	208
207	373	363	239	366	233	365	237	228	394
395	376	381	221	219	232	370	230	375	206
209	215	385	217	383	387	397	203	399	210

5

341	336	266	334	268	264	254	348	252	342
263	276	270	330	332	319	281	321	275	338
339	273	314	312	285	318	286	288	328	262
261	274	284	299	304	293	306	317	327	340
346	279	290	294	305	300	303	311	322	255
251	329	292	308	295	302	297	309	272	350
343	324	310	301	298	307	296	291	277	258
257	323	313	289	316	283	315	287	278	344
345	326	331	271	269	282	320	280	325	256
259	265	335	267	333	337	347	253	349	260

6

These magic squares are constructed using sequential numbers from 1 to 600. These magic squares are of equal magic sums:

$$S_{10\times10}(1)=S_{10\times10}(2)=S_{10\times10}(3)=S_{10\times10}(4)=S_{10\times10}(5)=S_{10\times10}(6):=3005.$$

The above magic squares are known as ***single-digit bordered*** *magic squares.*

Let's see below the structure for making a ***magic cube****:*

591	584	586	598	18	16	14	4	2	592
13	30	572	573	27	26	575	31	570	588
11	571	29	28	574	576	25	569	32	590
7	19	581	580	22	577	24	568	33	594
1	582	20	21	579	23	578	34	567	600
589	43	558	38	563	42	560	561	39	12
593	557	44	564	37	559	41	40	562	8
595	556	45	565	36	47	553	552	50	6
596	46	555	35	566	554	48	49	551	5
9	17	15	3	583	585	587	597	599	10

541	534	536	548	68	66	64	54	52	542
63	80	522	523	77	76	525	81	520	538
61	521	79	78	524	526	75	519	82	540
57	69	531	530	72	527	74	518	83	544
51	532	70	71	529	73	528	84	517	550
539	93	508	88	513	92	510	511	89	62
543	507	94	514	87	509	91	90	512	58
545	506	95	515	86	97	503	502	100	56
546	96	505	85	516	504	98	99	501	55
59	67	65	53	533	535	537	547	549	60

541	534	536	548	68	66	64	54	52	542
63	80	522	523	77	76	525	81	520	538
61	521	79	78	524	526	75	519	82	540
57	69	531	530	72	527	74	518	83	544
51	532	70	71	529	73	528	84	517	550
539	93	508	88	513	92	510	511	89	62
543	507	94	514	87	509	91	90	512	58
545	506	95	515	86	97	503	502	100	56
546	96	505	85	516	504	98	99	501	55
59	67	65	53	533	535	537	547	549	60

441	434	436	448	168	166	164	154	152	442
163	180	422	423	177	176	425	181	420	438
161	421	179	178	424	426	175	419	182	440
157	169	431	430	172	427	174	418	183	444
151	432	170	171	429	173	428	184	417	450
439	193	408	188	413	192	410	411	189	162
443	407	194	414	187	409	191	190	412	158
445	406	195	415	186	197	403	402	200	156
446	196	405	185	416	404	198	199	401	155
159	167	165	153	433	435	437	447	449	160

391	384	386	398	218	216	214	204	202	392
213	230	372	373	227	226	375	231	370	388
211	371	229	228	374	376	225	369	232	390
207	219	381	380	222	377	224	368	233	394
201	382	220	221	379	223	378	234	367	400
389	243	358	238	363	242	360	361	239	212
393	357	244	364	237	359	241	240	362	208
395	356	245	365	236	247	353	352	250	206
396	246	355	235	366	354	248	249	351	205
209	217	215	203	383	385	387	397	399	210

341	334	336	348	268	266	264	254	252	342
263	280	322	323	277	276	325	281	320	338
261	321	279	278	324	326	275	319	282	340
257	269	331	330	272	327	274	318	283	344
251	332	270	271	329	273	328	284	317	350
339	293	308	288	313	292	310	311	289	262
343	307	294	314	287	309	291	290	312	258
345	306	295	315	286	297	303	302	300	256
346	296	305	285	316	304	298	299	301	255
259	267	265	253	333	335	337	347	349	260

Example 1.27. *Let's consider the following six magic squares of order 10:*

591	586	16	584	18	14	4	598	2	592
13	47	558	19	578	39	566	27	570	588
589	22	575	50	555	30	567	42	563	12
11	582	23	554	43	574	31	562	35	590
596	551	46	579	26	559	38	571	34	5
1	48	557	20	577	40	565	28	569	600
593	21	576	49	556	29	568	41	564	8
7	581	24	553	44	573	32	561	36	594
595	552	45	580	25	560	37	572	33	6
9	15	585	17	583	587	597	3	599	10

1

541	536	66	534	68	64	54	548	52	542
63	97	508	69	528	89	516	77	520	538
539	72	525	100	505	80	517	92	513	62
61	532	73	504	93	524	81	512	85	540
546	501	96	529	76	509	88	521	84	55
51	98	507	70	527	90	515	78	519	550
543	71	526	99	506	79	518	91	514	58
57	531	74	503	94	523	82	511	86	544
545	502	95	530	75	510	87	522	83	56
59	65	535	67	533	537	547	53	549	60

2

491	486	116	484	118	114	104	498	102	492
113	147	458	119	478	139	466	127	470	488
489	122	475	150	455	130	467	142	463	112
111	482	123	454	143	474	131	462	135	490
496	451	146	479	126	459	138	471	134	105
101	148	457	120	477	140	465	128	469	500
493	121	476	149	456	129	468	141	464	108
107	481	124	453	144	473	132	461	136	494
495	452	145	480	125	460	137	472	133	106
109	115	485	117	483	487	497	103	499	110

3

441	436	166	434	168	164	154	448	152	442
163	197	408	169	428	189	416	177	420	438
439	172	425	200	405	180	417	192	413	162
161	432	173	404	193	424	181	412	185	440
446	401	196	429	176	409	188	421	184	155
151	198	407	170	427	190	415	178	419	450
443	171	426	199	406	179	418	191	414	158
157	431	174	403	194	423	182	411	186	444
445	402	195	430	175	410	187	422	183	156
159	165	435	167	433	437	447	153	449	160

4

391	386	216	384	218	214	204	398	202	392
213	247	358	219	378	239	366	227	370	388
389	222	375	250	355	230	367	242	363	212
211	382	223	354	243	374	231	362	235	390
396	351	246	379	226	359	238	371	234	205
201	248	357	220	377	240	365	228	369	400
393	221	376	249	356	229	368	241	364	208
207	381	224	353	244	373	232	361	236	394
395	352	245	380	225	360	237	372	233	206
209	215	385	217	383	387	397	203	399	210

5

341	336	266	334	268	264	254	348	252	342
263	297	308	269	328	289	316	277	320	338
339	272	325	300	305	280	317	292	313	262
261	332	273	304	293	324	281	312	285	340
346	301	296	329	276	309	288	321	284	255
251	298	307	270	327	290	315	278	319	350
343	271	326	299	306	279	318	291	314	258
257	331	274	303	294	323	282	311	286	344
345	302	295	330	275	310	287	322	283	256
259	265	335	267	333	337	347	253	349	260

6

These magic squares are constructed using sequential numbers from 1 to 600. These magic squares are of equal magic sums:

$$S_{10\times10}(1) = S_{10\times10}(2) = S_{10\times10}(3) = S_{10\times10}(4) = S_{10\times10}(5) = S_{10\times10}(6) := 3005.$$

The above magic squares are known as ***block-bordered*** *magic squares. The inner blocks are* ***pandiagonal*** *magic squares of order 8 divided in four* ***pandigonal*** *magic squares of order 4.*

Let's see below the structure for making a ***magic cube****:*

591	586	16	584	18	14	4	598	2	592
13	26	20	580	582	569	31	571	25	588
589	23	564	562	35	568	36	38	578	12
11	24	34	49	554	43	556	567	577	590
596	29	40	44	555	50	553	561	572	5
1	579	42	558	45	552	47	559	22	600
593	574	560	551	48	557	46	41	27	8
7	573	563	39	566	33	565	37	28	594
595	576	581	21	19	32	570	30	575	6
9	15	585	17	583	587	597	3	599	10

491	486	116	484	118	114	104	498	102	492
113	126	120	480	482	469	131	471	125	488
489	123	464	462	135	468	136	138	478	112
111	124	134	149	454	143	456	467	477	490
496	129	140	144	455	150	453	461	472	105
101	479	142	458	145	452	147	459	122	500
493	474	460	451	148	457	146	141	127	108
107	473	463	139	466	133	465	137	128	494
495	476	481	121	119	132	470	130	475	106
109	115	485	117	483	487	497	103	499	110

541	536	66	534	68	64	54	548	52	542
63	76	70	530	532	519	81	521	75	538
539	73	514	512	85	518	86	88	528	62
61	74	84	99	504	93	506	517	527	540
546	79	90	94	505	100	503	511	522	55
51	529	92	508	95	502	97	509	72	550
543	524	510	501	98	507	96	91	77	58
57	523	513	89	516	83	515	87	78	544
545	526	531	71	69	82	520	80	525	56
59	65	535	67	533	537	547	53	549	60

441	436	166	434	168	164	154	448	152	442
163	176	170	430	432	419	181	421	175	438
439	173	414	412	185	418	186	188	428	162
161	174	184	199	404	193	406	417	427	440
446	179	190	194	405	200	403	411	422	155
151	429	192	408	195	402	197	409	172	450
443	424	410	401	198	407	196	191	177	158
157	423	413	189	416	183	415	187	178	444
445	426	431	171	169	182	420	180	425	156
159	165	435	167	433	437	447	153	449	160

391	386	216	384	218	214	204	398	202	392
213	226	220	380	382	369	231	371	225	388
389	223	364	362	235	368	236	238	378	212
211	224	234	249	354	243	356	367	377	390
396	229	240	244	355	250	353	361	372	205
201	379	242	358	245	352	247	359	222	400
393	374	360	351	248	357	246	241	227	208
207	373	363	239	366	233	365	237	228	394
395	376	381	221	219	232	370	230	375	206
209	215	385	217	383	387	397	203	399	210

341	336	266	334	268	264	254	348	252	342
263	276	270	330	332	319	281	321	275	338
339	273	314	312	285	318	286	288	328	262
261	274	284	299	304	293	306	317	327	340
346	279	290	294	305	300	303	311	322	255
251	329	292	308	295	302	297	309	272	350
343	324	310	301	298	307	296	291	277	258
257	323	313	289	316	283	315	287	278	344
345	326	331	271	269	282	320	280	325	256
259	265	335	267	333	337	347	253	349	260

Example 1.28. *Let's consider the following six magic squares of order 10:*

591	584	586	598	18	16	14	4	2	592
13	30	572	573	27	26	575	31	570	588
11	571	29	28	574	576	25	569	32	590
7	19	581	580	22	577	24	568	33	594
1	582	20	21	579	23	578	34	567	600
589	43	558	38	563	42	560	561	39	12
593	557	44	564	37	559	41	40	562	8
595	556	45	565	36	47	553	552	50	6
596	46	555	35	566	554	48	49	551	5
9	17	15	3	583	585	587	597	599	10

1

541	534	536	548	68	66	64	54	52	542
63	80	522	523	77	76	525	81	520	538
61	521	79	78	524	526	75	519	82	540
57	69	531	530	72	527	74	518	83	544
51	532	70	71	529	73	528	84	517	550
539	93	508	88	513	92	510	511	89	62
543	507	94	514	87	509	91	90	512	58
545	506	95	515	86	97	503	502	100	56
546	96	505	85	516	504	98	99	501	55
59	67	65	53	533	535	537	547	549	60

2

541	534	536	548	68	66	64	54	52	542
63	80	522	523	77	76	525	81	520	538
61	521	79	78	524	526	75	519	82	540
57	69	531	530	72	527	74	518	83	544
51	532	70	71	529	73	528	84	517	550
539	93	508	88	513	92	510	511	89	62
543	507	94	514	87	509	91	90	512	58
545	506	95	515	86	97	503	502	100	56
546	96	505	85	516	504	98	99	501	55
59	67	65	53	533	535	537	547	549	60

3

441	434	436	448	168	166	164	154	152	442
163	180	422	423	177	176	425	181	420	438
161	421	179	178	424	426	175	419	182	440
157	169	431	430	172	427	174	418	183	444
151	432	170	171	429	173	428	184	417	450
439	193	408	188	413	192	410	411	189	162
443	407	194	414	187	409	191	190	412	158
445	406	195	415	186	197	403	402	200	156
446	196	405	185	416	404	198	199	401	155
159	167	165	153	433	435	437	447	449	160

4

391	384	386	398	218	216	214	204	202	392
213	230	372	373	227	226	375	231	370	388
211	371	229	228	374	376	225	369	232	390
207	219	381	380	222	377	224	368	233	394
201	382	220	221	379	223	378	234	367	400
389	243	358	238	363	242	360	361	239	212
393	357	244	364	237	359	241	240	362	208
395	356	245	365	236	247	353	352	250	206
396	246	355	235	366	354	248	249	351	205
209	217	215	203	383	385	387	397	399	210

5

341	334	336	348	268	266	264	254	252	342
263	280	322	323	277	276	325	281	320	338
261	321	279	278	324	326	275	319	282	340
257	269	331	330	272	327	274	318	283	344
251	332	270	271	329	273	328	284	317	350
339	293	308	288	313	292	310	311	289	262
343	307	294	314	287	309	291	290	312	258
345	306	295	315	286	297	303	302	300	256
346	296	305	285	316	304	298	299	301	255
259	267	265	253	333	335	337	347	349	260

6

These magic squares are constructed using sequential numbers from 1 to 600. These magic squares are of equal magic sums:

$$S_{10\times10}(1) = S_{10\times10}(2) = S_{10\times10}(3) = S_{10\times10}(4) = S_{10\times10}(5) = S_{10\times10}(6) := 3005.$$

The above magic squares are known as ***block-bordered*** *magic squares. The inner blocks are* ***striped*** *magic squares of order 8.*

Let's see below the structure for making a ***magic cube****:*

3	1	599	597	596	6	594	8	9	592
598	600	2	4	5	595	7	593	11	590
25	576	33	567	566	565	34	38	591	10
575	26	562	40	560	41	43	557	589	12
27	574	556	555	47	48	552	45	588	13
573	28	50	46	553	554	49	551	14	587
572	29	39	558	42	559	561	44	586	15
570	31	563	37	35	36	564	568	16	585
32	569	17	583	19	581	24	22	578	580
30	571	584	18	582	20	577	579	23	21

103	101	499	497	496	106	494	108	109	492	53	51	549	547	546	56	544	58	59	542
498	500	102	104	105	495	107	493	111	490	548	550	52	54	55	545	57	543	61	540
125	476	133	467	466	465	134	138	491	110	75	526	83	517	516	515	84	88	541	60
475	126	462	140	460	141	143	457	489	112	525	76	512	90	510	91	93	507	539	62
127	474	456	455	147	148	452	145	488	113	77	524	506	505	97	98	502	95	538	63
473	128	150	146	453	454	149	451	114	487	523	78	100	96	503	504	99	501	64	537
472	129	139	458	142	459	461	144	486	115	522	79	89	508	92	509	511	94	536	65
470	131	463	137	135	136	464	468	116	485	520	81	513	87	85	86	514	518	66	535
132	469	117	483	119	481	124	122	478	480	82	519	67	533	69	531	74	72	528	530
130	471	484	118	482	120	477	479	123	121	80	521	534	68	532	70	527	529	73	71

153	151	449	447	446	156	444	158	159	442	203	201	399	397	396	206	394	208	209	392
448	450	152	154	155	445	157	443	161	440	398	400	202	204	205	395	207	393	211	390
175	426	183	417	416	415	184	188	441	160	225	376	233	367	366	365	234	238	391	210
425	176	412	190	410	191	193	407	439	162	375	226	362	240	360	241	243	357	389	212
177	424	406	405	197	198	402	195	438	163	227	374	356	355	247	248	352	245	388	213
423	178	200	196	403	404	199	401	164	437	373	228	250	246	353	354	249	351	214	387
422	179	189	408	192	409	411	194	436	165	372	229	239	358	242	359	361	244	386	215
420	181	413	187	185	186	414	418	166	435	370	231	363	237	235	236	364	368	216	385
182	419	167	433	169	431	174	172	428	430	232	369	217	383	219	381	224	222	378	380
180	421	434	168	432	170	427	429	173	171	230	371	384	218	382	220	377	379	223	221

253	251	349	347	346	256	344	258	259	342
348	350	252	254	255	345	257	343	261	340
275	326	283	317	316	315	284	288	341	260
325	276	312	290	310	291	293	307	339	262
277	324	306	305	297	298	302	295	338	263
323	278	300	296	303	304	299	301	264	337
322	279	289	308	292	309	311	294	336	265
320	281	313	287	285	286	314	318	266	335
282	319	267	333	269	331	274	272	328	330
280	321	334	268	332	270	327	329	273	271

Example 1.29. *Let's consider the following six magic squares of order 10:*

3	1	599	597	596	6	594	8	9	592
598	600	2	4	5	595	7	593	11	590
25	576	33	567	566	565	34	38	591	10
575	26	562	40	560	41	43	557	589	12
27	574	556	555	47	48	552	45	588	13
573	28	50	46	553	554	49	551	14	587
572	29	39	558	42	559	561	44	586	15
570	31	563	37	35	36	564	568	16	585
32	569	17	583	19	581	24	22	578	580
30	571	584	18	582	20	577	579	23	21

1

53	51	549	547	546	56	544	58	59	542
548	550	52	54	55	545	57	543	61	540
75	526	83	517	516	515	84	88	541	60
525	76	512	90	510	91	93	507	539	62
77	524	506	505	97	98	502	95	538	63
523	78	100	96	503	504	99	501	64	537
522	79	89	508	92	509	511	94	536	65
520	81	513	87	85	86	514	518	66	535
82	519	67	533	69	531	74	72	528	530
80	521	534	68	532	70	527	529	73	71

2

103	101	499	497	496	106	494	108	109	492
498	500	102	104	105	495	107	493	111	490
125	476	133	467	466	465	134	138	491	110
475	126	462	140	460	141	143	457	489	112
127	474	456	455	147	148	452	145	488	113
473	128	150	146	453	454	149	451	114	487
472	129	139	458	142	459	461	144	486	115
470	131	463	137	135	136	464	468	116	485
132	469	117	483	119	481	124	122	478	480
130	471	484	118	482	120	477	479	123	121

3

153	151	449	447	446	156	444	158	159	442
448	450	152	154	155	445	157	443	161	440
175	426	183	417	416	415	184	188	441	160
425	176	412	190	410	191	193	407	439	162
177	424	406	405	197	198	402	195	438	163
423	178	200	196	403	404	199	401	164	437
422	179	189	408	192	409	411	194	436	165
420	181	413	187	185	186	414	418	166	435
182	419	167	433	169	431	174	172	428	430
180	421	434	168	432	170	427	429	173	171

4

203	201	399	397	396	206	394	208	209	392
398	400	202	204	205	395	207	393	211	390
225	376	233	367	366	365	234	238	391	210
375	226	362	240	360	241	243	357	389	212
227	374	356	355	247	248	352	245	388	213
373	228	250	246	353	354	249	351	214	387
372	229	239	358	242	359	361	244	386	215
370	231	363	237	235	236	364	368	216	385
232	369	217	383	219	381	224	222	378	380
230	371	384	218	382	220	377	379	223	221

5

253	251	349	347	346	256	344	258	259	342
348	350	252	254	255	345	257	343	261	340
275	326	283	317	316	315	284	288	341	260
325	276	312	290	310	291	293	307	339	262
277	324	306	305	297	298	302	295	338	263
323	278	300	296	303	304	299	301	264	337
322	279	289	308	292	309	311	294	336	265
320	281	313	287	285	286	314	318	266	335
282	319	267	333	269	331	274	272	328	330
280	321	334	268	332	270	327	329	273	271

6

These magic squares are constructed using sequential numbers from 1 to 600. These magic squares are of equal magic sums:

$$S_{10\times10}(1) = S_{10\times10}(2) = S_{10\times10}(3) = S_{10\times10}(4) = S_{10\times10}(5) = S_{10\times10}(6) := 3005.$$

*The above magic squares are known as **double-digits** bordered magic squares.*

*Let's see below the structure for making a **magic cube**:*

591	586	16	584	18	14	4	598	2	592
13	47	558	19	578	39	566	27	570	588
589	22	575	50	555	30	567	42	563	12
11	582	23	554	43	574	31	562	35	590
596	551	46	579	26	559	38	571	34	5
1	48	557	20	577	40	565	28	569	600
593	21	576	49	556	29	568	41	564	8
7	581	24	553	44	573	32	561	36	594
595	552	45	580	25	560	37	572	33	6
9	15	585	17	583	587	597	3	599	10

491	486	116	484	118	114	104	498	102	492
113	147	458	119	478	139	466	127	470	488
489	122	475	150	455	130	467	142	463	112
111	482	123	454	143	474	131	462	135	490
496	451	146	479	126	459	138	471	134	105
101	148	457	120	477	140	465	128	469	500
493	121	476	149	456	129	468	141	464	108
107	481	124	453	144	473	132	461	136	494
495	452	145	480	125	460	137	472	133	106
109	115	485	117	483	487	497	103	499	110

541	536	66	534	68	64	54	548	52	542
63	97	508	69	528	89	516	77	520	538
539	72	525	100	505	80	517	92	513	62
61	532	73	504	93	524	81	512	85	540
546	501	96	529	76	509	88	521	84	55
51	98	507	70	527	90	515	78	519	550
543	71	526	99	506	79	518	91	514	58
57	531	74	503	94	523	82	511	86	544
545	502	95	530	75	510	87	522	83	56
59	65	535	67	533	537	547	53	549	60

441	436	166	434	168	164	154	448	152	442
163	197	408	169	428	189	416	177	420	438
439	172	425	200	405	180	417	192	413	162
161	432	173	404	193	424	181	412	185	440
446	401	196	429	176	409	188	421	184	155
151	198	407	170	427	190	415	178	419	450
443	171	426	199	406	179	418	191	414	158
157	431	174	403	194	423	182	411	186	444
445	402	195	430	175	410	187	422	183	156
159	165	435	167	433	437	447	153	449	160

391	386	216	384	218	214	204	398	202	392
213	247	358	219	378	239	366	227	370	388
389	222	375	250	355	230	367	242	363	212
211	382	223	354	243	374	231	362	235	390
396	351	246	379	226	359	238	371	234	205
201	248	357	220	377	240	365	228	369	400
393	221	376	249	356	229	368	241	364	208
207	381	224	353	244	373	232	361	236	394
395	352	245	380	225	360	237	372	233	206
209	215	385	217	383	387	397	203	399	210

341	336	266	334	268	264	254	348	252	342
263	297	308	269	328	289	316	277	320	338
339	272	325	300	305	280	317	292	313	262
261	332	273	304	293	324	281	312	285	340
346	301	296	329	276	309	288	321	284	255
251	298	307	270	327	290	315	278	319	350
343	271	326	299	306	279	318	291	314	258
257	331	274	303	294	323	282	311	286	344
345	302	295	330	275	310	287	322	283	256
259	265	335	267	333	337	347	253	349	260

Example 1.30. *Let's consider the following six magic squares of order 10:*

49	554	43	556	561	40	31	570	18	583
44	555	50	553	41	560	19	582	5	596
558	45	552	47	559	42	572	29	594	7
551	48	557	46	567	34	27	574	599	2
36	35	562	568	38	564	25	576	595	6
565	566	39	33	37	563	571	30	10	591
28	26	580	569	24	579	578	20	588	13
573	575	21	32	577	22	581	23	8	593
15	584	12	590	9	598	597	585	1	14
586	17	589	11	592	3	4	16	587	600

1

99	504	93	506	511	90	81	520	68	533
94	505	100	503	91	510	69	532	55	546
508	95	502	97	509	92	522	79	544	57
501	98	507	96	517	84	77	524	549	52
86	85	512	518	88	514	75	526	545	56
515	516	89	83	87	513	521	80	60	541
78	76	530	519	74	529	528	70	538	63
523	525	71	82	527	72	531	73	58	543
65	534	62	540	59	548	547	535	51	64
536	67	539	61	542	53	54	66	537	550

2

149	454	143	456	461	140	131	470	118	483
144	455	150	453	141	460	119	482	105	496
458	145	452	147	459	142	472	129	494	107
451	148	457	146	467	134	127	474	499	102
136	135	462	468	138	464	125	476	495	106
465	466	139	133	137	463	471	130	110	491
128	126	480	469	124	479	478	120	488	113
473	475	121	132	477	122	481	123	108	493
115	484	112	490	109	498	497	485	101	114
486	117	489	111	492	103	104	116	487	500

3

199	404	193	406	411	190	181	420	168	433
194	405	200	403	191	410	169	432	155	446
408	195	402	197	409	192	422	179	444	157
401	198	407	196	417	184	177	424	449	152
186	185	412	418	188	414	175	426	445	156
415	416	189	183	187	413	421	180	160	441
178	176	430	419	174	429	428	170	438	163
423	425	171	182	427	172	431	173	158	443
165	434	162	440	159	448	447	435	151	164
436	167	439	161	442	153	154	166	437	450

4

249	354	243	356	361	240	231	370	218	383
244	355	250	353	241	360	219	382	205	396
358	245	352	247	359	242	372	229	394	207
351	248	357	246	367	234	227	374	399	202
236	235	362	368	238	364	225	376	395	206
365	366	239	233	237	363	371	230	210	391
228	226	380	369	224	379	378	220	388	213
373	375	221	232	377	222	381	223	208	393
215	384	212	390	209	398	397	385	201	214
386	217	389	211	392	203	204	216	387	400

5

299	304	293	306	311	290	281	320	268	333
294	305	300	303	291	310	269	332	255	346
308	295	302	297	309	292	322	279	344	257
301	298	307	296	317	284	277	324	349	252
286	285	312	318	288	314	275	326	345	256
315	316	289	283	287	313	321	280	260	341
278	276	330	319	274	329	328	270	338	263
323	325	271	282	327	272	331	273	258	343
265	334	262	340	259	348	347	335	251	264
336	267	339	261	342	253	254	266	337	350

6

These magic squares are constructed using sequential numbers from 1 to 384. These magic squares are of equal magic sums:

$$S_{10\times10}(1) = S_{10\times10}(2) = S_{10\times10}(3) = S_{10\times10}(4) = S_{10\times10}(5) = S_{10\times10}(6) := 3005.$$

The above magic squares are known as ***cornered*** *magic squares. The corner blocks are magic squares of orders 4, 6 and 8.*

Let's see below the structure for making a ***magic cube****:*

583	596	7	2	6	591	13	593	14	600
18	5	594	599	595	10	588	8	1	587
570	582	29	574	576	30	20	23	585	16
31	19	572	27	25	571	578	581	597	4
40	560	42	34	564	563	579	22	598	3
561	41	559	567	38	37	24	577	9	592
556	553	47	46	568	33	569	32	590	11
43	50	552	557	562	39	580	21	12	589
554	555	45	48	35	566	26	575	584	17
49	44	558	551	36	565	28	573	15	586

486	115	473	128	465	136	451	458	144	149
117	484	475	126	466	135	148	145	455	454
489	112	121	480	139	462	457	452	150	143
111	490	132	469	133	468	146	147	453	456
492	109	477	124	137	138	467	459	141	461
103	498	122	479	463	464	134	142	460	140
104	497	481	478	471	125	127	472	119	131
116	485	123	120	130	476	474	129	482	470
487	101	108	488	110	495	499	494	105	118
500	114	493	113	491	106	102	107	496	483

99	504	93	506	511	90	81	520	68	533
94	505	100	503	91	510	69	532	55	546
508	95	502	97	509	92	522	79	544	57
501	98	507	96	517	84	77	524	549	52
86	85	512	518	88	514	75	526	545	56
515	516	89	83	87	513	521	80	60	541
78	76	530	519	74	529	528	70	538	63
523	525	71	82	527	72	531	73	58	543
65	534	62	540	59	548	547	535	51	64
536	67	539	61	542	53	54	66	537	550

400	387	216	204	203	392	211	389	217	386
214	201	385	397	398	209	390	212	384	215
393	208	223	381	222	377	232	221	375	373
213	388	220	378	379	224	369	380	226	228
391	210	230	371	363	237	233	239	366	365
206	395	376	225	364	238	368	362	235	236
202	399	374	227	234	367	246	357	248	351
207	394	229	372	242	359	247	352	245	358
396	205	382	219	360	241	353	250	355	244
383	218	370	231	240	361	356	243	354	249

333	346	257	252	256	341	263	343	264	350
268	255	344	349	345	260	338	258	251	337
320	332	279	324	326	280	270	273	335	266
281	269	322	277	275	321	328	331	347	254
290	310	292	284	314	313	329	272	348	253
311	291	309	317	288	287	274	327	259	342
306	303	297	296	318	283	319	282	340	261
293	300	302	307	312	289	330	271	262	339
304	305	295	298	285	316	276	325	334	267
299	294	308	301	286	315	278	323	265	336

436	165	423	178	415	186	401	408	194	199
167	434	425	176	416	185	198	195	405	404
439	162	171	430	189	412	407	402	200	193
161	440	182	419	183	418	196	197	403	406
442	159	427	174	187	188	417	409	191	411
153	448	172	429	413	414	184	192	410	190
154	447	431	428	421	175	177	422	169	181
166	435	173	170	180	426	424	179	432	420
437	151	158	438	160	445	449	444	155	168
450	164	443	163	441	156	152	157	446	433

2 Author's Contributions to Magic Squares

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

- **Inder J. Taneja**, Magic Squares,
  1. *https://inderjtaneja.wordpress.com/2019/06/27/publications-magic-squares/*
  2. *https://numbers-magic.com/?p=668*
- **Inder J. Taneja**, Recreation of Numbers,
  1. *https://inderjtaneja.wordpress.com/2019/06/27/publications-recreation-of-numbers/*
  2. *https://numbers-magic.com/?p=671*

References

[1] **C. Boyer**, Multimagic Squares, *http://www.multimagie.com*.

[2] **W. Trump**, Perfect Magic Cubes, *https://shorturl.at/lyL3R*

[3] **W. Trump**, New Discoveries in the History of Magic Cubes, *https://shorturl.at/qXwCh*

[4] **W. Walkington** Magic Box Cubes, Rubik's Cubes and Twisty Puzzles, *https://shorturl.at/EaQRy*

[5] **H. White**, Bordered Magic Squares - *http://budshaw.ca/Download.html*

[6] **A. Winkel**, The Magic Encyclopedia, *http://magichypercubes.com/Encyclopedia/*

• Block-Wise Magic Squares

[7] **Inder J. Taneja**, Block-Wise Constructions of Magic and Bimagic Squares of Orders 8 to 108, May 15, 2019, pp. 1-43, **Zenodo**, *http://doi.org/10.5281/zenodo.2843326*.

[8] **Inder J. Taneja**, Block-Wise Equal Sums Pandiagonal Magic Squares of Order 4k, **Zenodo**, January 31, 2019, pp. 1-17, *http://doi.org/10.5281/zenodo.2554288*.

[9] **Inder J. Taneja**, Magic Rectangles in Construction of Block-Wise Pandiagonal Magic Squares, **Zenodo**, January 31, 2019, pp. 1-49, *http://doi.org/10.5281/zenodo.2554520*.

[10] **Inder J. Taneja**, Block-Wise Equal Sums Magic Squares of Orders $3k$ and $6k$, **Zenodo**, February 1, 2019, pp. 1-55, *http://doi.org/10.5281/zenodo.2554895*.

[11] **Inder J. Taneja**, Block-Wise Unequal Sums Magic Squares, **Zenodo**, February 1, 2019, pp. 1-52, *http://doi.org/10.5281/zenodo.2555260*.

[12] **Inder J. Taneja**, Block-Wise Magic and Bimagic Squares of Orders 12 to 36, **Zenodo**, February 1, 2019, pp. 1-53, *http://doi.org/10.5281/zenodo.2555343*.

[13] **Inder J. Taneja**, Block-Wise Magic and Bimagic Squares of Orders 39 to 45, **Zenodo**, February 2, 2019, pp. 1-73, *http://doi.org/10.5281/zenodo.2555889*.

• Bordered Magic Squares

[14] **Inder J. Taneja**, Nested Magic Squares With Perfect Square Sums, Pythagorean Triples, and Borders Differences, **Zenodo**, June 14, 2019, pp. 1-59, *http://doi.org/10.5281/zenodo.3246586*.

[15] **Inder J. Taneja**, Symmetric Properties of Nested Magic Squares, **Zenodo**, June 29, 2019, pp. 1-55, *http://doi.org/10.5281/zenodo.3262170*.

[16] **Inder J. Taneja**, General Sum Symmetric and Positive Entries Nested Magic Squares, **Zenodo**, July 04, 2019, pp. 1-55, *http://doi.org/10.5281/zenodo.3268877*.

[17] **Inder J. Taneja**, Bordered Magic Squares With Order Square Magic Sums, **Zenodo**, January 20, 2020, pp. 1-26, *http://doi.org/10.5281/zenodo.3613690*.

[18] **Inder J. Taneja**, Fractional and Decimal Type Bordered Magic Squares With Magic Sum 2020. **Zenodo**, January 20, 2020, pp.1-25. *http://doi.org/10.5281/zenodo.3613698*.

[19] **Inder J. Taneja**, Fractional and Decimal Type Bordered Magic Squares With Magic Sum 2021, **Zenodo**, December 16, 2020, pp. 1-33, *http://doi.org/10.5281/zenodo.4327333*.

[20] **Inder J. Taneja**, Inder J. Taneja, Block-Wise and Block-Bordered Magic Squares With Magic Sum 2022, **Zenodo**, December 28, 2021, pp. 1-38, *https://doi.org/10.5281/zenodo.5807789*

• Block-Bordered Magic Squares

[21] **Inder J. Taneja**, Block-Bordered Magic Squares of Prime and Double Prime Numbers - I, **Zenodo**, August 18, 2020, pp. 1-81, *http://doi.org/10.5281/zenodo.3990291*.

[22] **Inder J. Taneja**, Block-Bordered Magic Squares of Prime and Double Prime Numbers - II, **Zenodo**, August 18, 2020, pp. 1-90, *http://doi.org/10.5281/zenodo.3990293*.

[23] **Inder J. Taneja**, Block-Bordered Magic Squares of Prime and Double Prime Numbers - III, **Zenodo**, September 01, 2020, pp. 1-93, *http://doi.org/10.5281/zenodo.4011213*.

• Block-Wise and Block-Bordered Magic Squares

[24] **Inder J. Taneja**, Block-Wise and Block-Bordered Magic and Bimagic Squares With Magic Sums 21, 21^2 and 2021. **Zenodo**, December 16, 2020, pp. 1-118, *http://doi.org/10.5281/zenodo.4380343*.

[25] **Inder J. Taneja**, Block-Wise and Block-Bordered Magic and Bimagic Squares of Orders 10 to 47. **Zenodo**, January 14, 2021, pp. 1-185, *http://doi.org/10.5281/zenodo.4437783*.

[26] **Inder J. Taneja**, Bordered and Block-Wise Bordered Magic Squares: Odd Order Multiples, **Zenodo**, Feburary 10, 2021, pp. 1-75, *http://doi.org/10.5281/zenodo.4527739*

[27] **Inder J. Taneja**, Bordered and Block-Wise Bordered Magic Squares: Even Order Multiples, **Zenodo**, Feburary 10, 2021, pp. 1-96, *http://doi.org/10.5281/zenodo.4527746*

• Bordered Magic Squares Multiples of Even Order Magic Squares

[28] **Inder J. Taneja**, Block-Wise Bordered and Pandiagonal Magic Squares Multiples of 4, **Zenodo**, August 31, 2021, pp. 1-148, *https://doi.org/10.5281/zenodo.5347897*.

[29] **Inder J. Taneja**, Bordered Magic Squares Multiples of 6, **Zenodo**, July 25, 2023, pp. 1-32, *https://doi.org/10.5281/zenodo.8184983*.

[30] **Inder J. Taneja**, Bordered and Pandiagonal Magic Squares Multiples of 8, **Zenodo**, July 26, 2023, pp. 1-58, *https://doi.org/10.5281/zenodo.8187791*.

[31] **Inder J. Taneja**, Bordered Magic Squares Multiples of 10, **Zenodo**, July 26, pp. 1-40, *https://doi.org/10.5281/zenodo.8187888*.

[32] **Inder J. Taneja**, Bordered and Pandiagonal Magic Squares Multiples of 12, **Zenodo**, July 27, 2023, pp. 1-31, *https://doi.org/10.5281/zenodo.8188293*.

[33] **Inder J. Taneja**, Bordered Magic Squares Multiples of 14, **Zenodo**, July 27, pp. 1-33, *https://doi.org/10.5281/zenodo.8188395*.

[34] **Inder J. Taneja**, Bordered and Pandiagonal Magic Squares Multiples of 16, **Zenodo**, July 27, pp. 1-30, *https://doi.org/10.5281/zenodo.8190884*.

[35] **Inder J. Taneja**, Bordered Magic Squares Multiples of 18, **Zenodo**, July 28, pp. 1-31, *https://doi.org/10.5281/zenodo.8191223*.

[36] **Inder J. Taneja**, Bordered and Pandiagonal Magic Squares Multiples of 20, **Zenodo**, July 28, pp. 1-45, *https://doi.org/10.5281/zenodo.8191426*.

• Bordered Magic Squares Multiples of Odd Order Magic Squares

[37] **Inder J. Taneja**, Block-Wise Bordered and Pandiagonal Magic Squares Multiples of 3, **Zenodo**, May 05, pp. 1-29, 2023, *https://doi.org/10.5281/zenodo.7898383*.

[38] **Inder J. Taneja**, Bordered and Pandiagonal Magic Squares Multiples of 5, **Zenodo**, July 23, 2023, pp. 1-36, *https://doi.org/10.5281/zenodo.8175759*.

[39] **Inder J. Taneja**, Bordered and Pandiagonal Magic Squares Multiples of 7, **Zenodo**, July 23, pp. 1-34, 2023, *https://doi.org/10.5281/zenodo.8176061*.

[40] **Inder J. Taneja**, Bordered Magic Squares Multiples of 9, **Zenodo**, July 23, 2023, pp. 1-28, *https://doi.org/10.5281/zenodo.8176357*.

[41] **Inder J. Taneja**, Bordered Magic Squares Multiples of 11, **Zenodo**, July 24, pp. 1-34, 2023, *https://doi.org/10.5281/zenodo.8176475*.

[42] **Inder J. Taneja**, Bordered Magic Squares Multiples of 13, **Zenodo**, July 24, pp. 1-32, 2023, *https://doi.org/10.5281/zenodo.8178879*.

[43] **Inder J. Taneja**, Bordered Magic Squares Multiples of 15, **Zenodo**, July 24, pp. 1-35, 2023, *https://doi.org/10.5281/zenodo.8178935*.

[44] **Inder J. Taneja**, Bordered Magic Squares Multiples of 17, **Zenodo**, July 25, pp. 1-26, 2023, *https://doi.org/10.5281/zenodo.8180706*.

[45] **Inder J. Taneja**, Bordered Magic Squares Multiples of 19, **Zenodo**, July 25, pp. 1-31, 2023, *https://doi.org/10.5281/zenodo.8180919*.

• Magic Squares With Bordered Magic Rectangles

[46] **Inder J. Taneja**, Different Styles of Magic Squares of Orders 6, 8, 10 and 12 Using Bordered Magic Rectangles, **Zenodo**, November 14, 2022, pp. 1-26, *https://doi.org/10.5281/zenodo.7319985*.

[47] **Inder J. Taneja**, Different Styles of Magic Squares of Order 14 Using Bordered Magic Rectangles, **Zenodo**, November 14, 2022, pp. 1-40, *https://doi.org/10.5281/zenodo.7319787*.

[48] **Inder J. Taneja**, Different Styles of Magic Squares of Order 16 Using Bordered Magic Rectangles, **Zenodo**, November 14, 2022, pp. 1-63, *https://doi.org/10.5281/zenodo.7320116*.

[49] **Inder J. Taneja**, Different Styles of Magic Squares of Order 18 Using Bordered Magic Rectangles, **Zenodo**, November 14, 2022, pp. 1-85, *https://doi.org/10.5281/zenodo.7320131*.

[50] **Inder J. Taneja**, Different Styles of Magic Squares of Order 20 Using Bordered Magic Rectangles, **Zenodo**, November 14, 2022, pp. 1-88, *https://doi.org/10.5281/zenodo.7320877*.

[51] **Inder J. Taneja**, Few Examples of Magic Squares of Even Orders 6 to 18 Using Bordered Magic Rectangles, **Zenodo**, October 19, 2022, pp. 1-30, *https://doi.org/10.5281/zenodo.7225854*.

[52] **Inder J. Taneja**, Few Examples of Magic Squares of Even Orders 20 to 30 Using Bordered Magic Rectangles, **Zenodo**, October 19, 2022, pp. 1-100, *https://doi.org/10.5281/zenodo.7225886*.

[53] **Inder J. Taneja**, Single Crossed Bordered Magic Rectangles and Magic Squares of Order 40, **Zenodo**, January 24, 2023, pp. 1-76, *https://doi.org/10.5281/zenodo.7565946*

[54] **Inder J. Taneja**, Double Crossed Bordered Magic Rectangles and Magic Squares of Order 40, **Zenodo**, January 30, 2023, pp. 1-102, *https://doi.org/10.5281/zenodo.7585787*

[55] **Inder J. Taneja**, Magic Squares of Order 42 Using Bordered Magic Rectangles: A Systematic Procedure, **Zenodo**, March 03, 2023, pp. 1-92, *https://doi.org/10.5281/zenodo.7695834*.

[56] **Inder J. Taneja**, Single-Cross Bordered Magic Rectangles and Magic Squares of Order 42, **Zenodo**, March 03, 2023, pp. 1-69, *https://doi.org/10.5281/zenodo.7695939*

[57] **Inder J. Taneja**, Double-Cross Bordered Magic Rectangles and Magic Squares of Order 42, **Zenodo**, March 03, 2023, pp. 1-59, *https://doi.org/10.5281/zenodo.7696070*.

[58] **Inder J. Taneja**, Closed Double-Cross Bordered Magic Rectangles and Magic Squares of Order 42, **Zenodo**, March 03, 2023, pp. 1-28, *https://doi.org/10.5281/zenodo.7696181*.

[59] **Inder J. Taneja**, 8000+ Magic Squares of Order 22 in Different Styles, Models and Designs, **Zenodo**, April 08, pp. 1-135, *https://doi.org/10.5281/zenodo.7809478*.

• Figured Magic Squares and Bordered Magic Rectangles

[60] **Inder J. Taneja**, Figured Magic Squares of Orders 6, 10, 12, 14 and 16 Using Bordered Magic Rectangles: A Systematic Procedure, **Zenodo**, November 29, 2022, pp. 1-31, *https://doi.org/10.5281/zenodo.7377674*.

[61] **Inder J. Taneja**, Figured Magic Squares of Orders 18 and 20 Using Bordered Magic Rectangles: A Systematic Procedure, **Zenodo**, November 29, 2022, pp. 1-87, *https://doi.org/10.5281/zenodo.7377689*.

[62] **Inder J. Taneja**, Figured Magic Squares of Order 22 Using Bordered Magic Rectangles: A Systematic Procedure, **Zenodo**, November 29, 2022, pp. 1-61, *https://doi.org/10.5281/zenodo.7377706*.

[63] **Inder J. Taneja**, Figured Magic Squares of Order 24 Using Bordered Magic Rectangles: A Systematic Procedure, **Zenodo**, November 29, 2022, pp. 1-104, *https://doi.org/10.5281/zenodo.7377779*.

[64] **Inder J. Taneja**, Figured Magic Squares of Order 26 Using Bordered Magic Rectangles: A Systematic Procedure, **Zenodo**, November 29, 2022, pp. 1-88, *https://doi.org/10.5281/zenodo.7377794*.

[65] **Inder J. Taneja**, Figured Magic Squares of Order 28 Using Bordered Magic Rectangles: A Systematic Procedure, **Zenodo**, December 02, 2022, pp. 1-179, *https://doi.org/10.5281/zenodo.7390666*.

[66] **Inder J. Taneja**, Figured Magic Squares of Order 30 Using Bordered Magic Rectangles: A Systematic Procedure, **Zenodo**, December 02, 2022, pp. 1-179, *https://doi.org/10.5281/zenodo.7390705*.

[67] **Inder J. Taneja**, Figured Magic Squares of Order 32 Using Bordered Magic Rectangles: A Systematic Procedure, **Zenodo**, December 22, 2022, pp. 1-310, *https://doi.org/10.5281/zenodo.7472891*.

[68] **Inder J. Taneja**, Figured Magic Squares of Order 34 Using Bordered Magic Rectangles: A Systematic Procedure, **Zenodo**, December 27, 2022, pp. 1-193, *https://doi.org/10.5281/zenodo.7486540*.

[69] **Inder J. Taneja**, Figured Magic Squares of Order 36 Using Bordered Magic Rectangles: A Systematic Procedure, **Zenodo**, December 27, 2022, pp. 1-140, *https://doi.org/10.5281/zenodo.7486548*.

[70] **Inder J. Taneja**, Figured Magic Squares of Order 38 Using Bordered Magic Rectangles: A Systematic Procedure, **Zenodo**, January 03, 2023, pp. 1-133, *https://doi.org/110.5281/zenodo.7500188*.

[71] **Inder J. Taneja**, Figured Magic Squares of Order 40 Using Bordered Magic Rectangles: A Systematic Procedure, **Zenodo**, January 03, 2023, pp. 1-157, *https://doi.org/10.5281/zenodo.7500192*.

• Double Digits Bordered Magic Squares

[72] **Inder J. Taneja**, Two Digits Bordered Magic Squares Multiples of 4: Orders 8 to 24, **Zenodo**, April, 26, 2023, pp. 1-43, *https://doi.org/10.5281/zenodo.7866956*.

[73] **Inder J. Taneja**, Two Digits Bordered Magic Squares of Orders 28 and 32, **Zenodo**, April, 26, 2023, pp. 1-36, *https://doi.org/10.5281/zenodo.7866981*.

[74] **Inder J. Taneja**, Two Digits Bordered Magic Squares of Orders 10, 14, 18 and 22, **Zenodo**, April, 30, 2023, pp. 1-43, *https://doi.org/10.5281/zenodo.7880931*.

[75] **Inder J. Taneja**, Two Digits Bordered Magic Squares of Orders 26 and 30, **Zenodo**, April, 30, 2023, pp. 1-45, *https://doi.org/10.5281/zenodo.7880937*.

[76] **Inder J. Taneja**, Two Digits Bordered Magic Squares of Orders 36 and 40, **Zenodo**, May, 04, 2023, pp. 1-41, *https://doi.org/10.5281/zenodo.7896709*.

[77] **Inder J. Taneja**, Two digits Bordered Magic Squares of Orders 34 and 38, **Zenodo**, May 10, 2023, pp. 1-45, *https://doi.org/10.5281/zenodo.7922571*.

• Odd Order Magic Squares

[78] **Inder J. Taneja**, Odd Order Magic Squares: Orders 3 to 15, **Zenodo**, June 15, 2023, pp. 1-43, *https://doi.org/10.5281/zenodo.8043030*.

[79] **Inder J. Taneja**, Magic Squares of Orders 17 and 19, **Zenodo**, June 15, 2023, pp. 1-38, *https://doi.org/10.5281/zenodo.8043105*.

[80] **Inder J. Taneja**,Magic Squares of Orders 21 and 23, **Zenodo**, June 15, 2023, pp. 1-43, *https://doi.org/10.5281/zenodo.8043198*.

[81] **Inder J. Taneja**,Magic Squares of Order 25, **Zenodo**, June 15, 2023, pp. 1-27, *https://doi.org/10.5281/zenodo.8043228*.

[82] **Inder J. Taneja**,Magic Squares of Order 27, **Zenodo**, August 06, 2023, pp. 1-32, *https://doi.org/10.5281/zenodo.8218291*.

[83] **Inder J. Taneja**,Magic Squares of Order 29, **Zenodo**, August 06, 2023, pp. 1-30, *https://doi.org/10.5281/zenodo.8218771*.

[84] **Inder J. Taneja**,Magic Squares of Order 31, **Zenodo**, August 06, 2023, pp. 1-35, *https://doi.org/10.5281/zenodo.8219053*.

[85] **Inder J. Taneja**, Double Digits Even and Odd Orders Bordered Magic Squares - Summary, *https://numbers-magic.com/?p=9406*.

[86] **Inder J. Taneja**, New Concepts in Magic Squares: Double Digits Bordered Magic Squares of Orders 7 to 108, **Zenodo**, August 09, 2023, pp. 1-30, *https://doi.org/10.5281/zenodo.8230214*.

• Cornered Magic Squares

[87] **Inder J. Taneja**, Cornered Magic Squares of Order 6, **Zenodo**, May 23, 2023, pp. 1-23, *https://doi.org/10.5281/zenodo.7960679*.

[88] **Inder J. Taneja**, Cornered Magic Squares of Orders 5 to 13, **Zenodo**, June 03, 2023, pp. 1-71, *https://doi.org/10.5281/zenodo.8000467*.

[89] **Inder J. Taneja**, Cornered Magic Squares of Orders 14 to 24, **Zenodo**, June 03, 2023, pp. 1-39, *https://doi.org/10.5281/zenodo.8000471*.

[90] **Inder J. Taneja**, New Concepts in Magic Squares: Cornered Magic Squares of Orders 5 to 81, **Zenodo**, August 09, 2023, pp. 1-27, *https://doi.org/10.5281/zenodo.8231157*.

• Magic Sequares with Cornered Magic Rectangles

[91] **Inder J. Taneja**, Different Types of Magic Rectangles, **Zenodo**, September 04, 2023, pp. 1-26, *https://doi.org/10.5281/zenodo.8316719*.

[92] **Inder J. Taneja**, Different Types of Magic Rectangles in Construction of Magic Squares of Orders 14 and 18, **Zenodo**, September 10, 2023, pp. 1-32, *https://doi.org/10.5281/zenodo.8331709*.

[93] **Inder J. Taneja**, Different Types of Magic Rectangles in Construction of Magic Squares of Order 22, **Zenodo**, September 10, 2023, pp. 1-36, *https://doi.org/10.5281/zenodo.8331743*.

[94] **Inder J. Taneja**, Different Types of Magic Rectangles in Construction of Magic Squares of Order 26, **Zenodo**, September 10, 2023, pp. 1-39, *https://doi.org/10.5281/zenodo.8331750*.

[95] **Inder J. Taneja**, Different Types of Magic Rectangles in Construction of Magic Squares of Order 30, **Zenodo**, September 10, 2023, pp. 1-44, *https://doi.org/10.5281/zenodo.8331755*.

[96] **Inder J. Taneja**, Different Types of Magic Rectangles in Construction of Magic Squares of Order 34, **Zenodo**, September 10, 2023, pp. 1-49, *https://doi.org/10.5281/zenodo.8331759*.

[97] **Inder J. Taneja**, Cornered Magic Squares in Construction of Magic Squares of Orders 16, 20, 24 and 28, **Zenodo**, September 10, 2023, pp. 1-35, *https://doi.org/10.5281/zenodo.8332156*.

• Striped Magic Squares

[98] **Inder J. Taneja**, Striped Magic Squares of Even Orders 6, 8, 10, 12 and 14, **Zenodo**, November 10, 2023, pp. 1-34, *https://doi.org/10.5281/zenodo.10107355*.
Site Link: *https://numbers-magic.com/?p=10587*.

[99] **Inder J. Taneja**, Inder J. Taneja, Striped Magic Squares of 12 – Revised, **Zenodo**, September 07, 2024, pp. 1-30, *https://doi.org/10.5281/zenodo.13725031*.
Site Link: *https://numbers-magic.com/?p=11781*.

[100] **Inder J. Taneja**, Striped Magic Squares of 16 - Revised, **Zenodo**, September 07, 2024, pp. 1-39, *https://doi.org/10.5281/zenodo.13720366*.
Site Link: *https://numbers-magic.com/?p=12447*.

[101] **Inder J. Taneja**, Striped Magic Squares of 18, **Zenodo**, June 13, 2024, pp. 1-34, *https://doi.org/10.5281/zenodo.11629567*.
Site Link: *https://numbers-magic.com/?p=11911*.

[102] **Inder J. Taneja**, Striped Magic Squares of 20, **Zenodo**, August 24, 2024, pp. 1-34,

https://doi.org/10.5281/zenodo.11629567.
Site Link: *https://numbers-magic.com/?p=12326*.

• Creative Magic Squares

[103] **Inder J. Taneja**, Creative Magic Squares: Area Representations, **Zenodo**, June 22, pp. 1-45, 2021, *http://doi.org/10.5281/zenodo.5009224*.

[104] **Inder J. Taneja**, Creative Magic Squares: Area Representations with Fraction Numbers Entries (Version 2), **Zenodo**, August 16, 2021, 1-77, *https://doi.org/10.5281/zenodo.5209502*.

• Magic Cubes

[105] **Inder J. Taneja**, Rubik-style Magic Cubes Based on Magic Squares, **Zenodo**, October 12, 2024, pp. 1-67, *https://doi.org/10.5281/zenodo.13922378*.
Site Link: *https://numbers-magic.com/?p=12775*.

[106] **Inder J. Taneja**, Rubik-style Universal and Upside-down Magic Cubes**Zenodo**, October 12, 2024, pp. 1-45, *https://doi.org/10.5281/zenodo.13922383*.
Site Link: *https://numbers-magic.com/?p=12875*.

——————————————————-