

Part 4: "New Advanced Study of Magic Squares and Cubes"

Chapter 7: New Method of Composing High-Dimensional Extra-Cubic Objects and their Developed Forms: **Kanji Setsuda**

Section 8: Internal Relationship among the Family of 'C&C' Magic Cubes 444 and Two Types of Magic Squares 88

#1. What the New Composing Method tells about Those 3 Types of Magic Things

In the previous section we know that (1) 'Composite & Complete' Magic Cubes 444, (2) multiple type of 'C&C' Magic Squares 88 and (3) Three-type Simultaneous MS88: Composite, Self-complementary and Pan-diagonal can be made from the same 'father' Extra-Cubic Objects 2^6 and all of them should belong to a family by themselves.

But each type looks quite different from the others: One is 3-dimensional cube and the others are 2-dimensional squares. Their total counts of 'standard solutions' are 960, 5760 and 5760. Can you easily accept that they are really brother and sisters?

As far as we cannot deny that they are the offspring of the same father $ECO2^6$, we have to admit that they are brother and sisters of the same family. But what properties in common can we really find among those three types of magic things?

Let's find any mutual relationship among them and study about it here, shall we?

Types: /Properties:	'Composite & Complete' Magic Cubes of 4x4x4	Multiple Type of 'C&C' Magic Squares 8x8	3-Type Simultaneous: Composite, S-C & P-D Magic Squares 8x8
Dimensions	3	2	2
Location Type of Complementary Pairs	Complete Type	Complete Type	Self-Complementary and Pan-Diagonal
Count of Primitive Solutions	46080	46080	46080
Count of Standard Solutions	960	5760	5760

** List of Sample Solutions of Those Three Types **

1/CC4	1/C8M	1/Sm1
1-----63----- 4-----62		
48 18 45 19	1 63 4 62 36 30 33 31	1 63 4 62 18 48 19 45
60 49 6 15 57 52 7 14	60 6 57 7 25 39 28 38	60 6 57 7 43 21 42 24
21 32---43--34---24--29---42--35	13 51 16 50 48 18 45 19	13 51 16 50 30 36 31 33
13 12 51 54 16 9 50 55	56 10 53 11 21 43 24 42	56 10 53 11 39 25 38 28
36 37 30 27 33 40 31 26	29 35 32 34 64 2 61 3	37 27 40 26 54 12 55 9
56--61- -10-- 3---53--64---11 2	40 26 37 27 5 59 8 58	32 34 29 35 15 49 14 52
25 20 39 46 28 17 38 47	17 47 20 46 52 14 49 15	41 23 44 22 58 8 59 5
8 58 5 59	44 22 41 23 9 55 12 54	20 46 17 47 3 61 2 64
41-----23-----44-----22		

2/CC4	2/C8M	2/Sm1
1-----63----- 4-----62		
32 34 29 35	1 63 4 62 20 46 17 47	1 63 4 62 34 32 35 29
60 49 6 15 57 52 7 14	60 6 57 7 41 23 44 22	60 6 57 7 27 37 26 40
37 48---27--18---40--45---26--19	13 51 16 50 32 34 29 35	13 51 16 50 46 20 47 17
13 12 51 54 16 9 50 55	56 10 53 11 37 27 40 26	56 10 53 11 23 41 22 44
20 21 46 43 17 24 47 42	45 19 48 18 64 2 61 3	21 43 24 42 54 12 55 9
56--61- -10-- 3---53--64---11 2	24 42 21 43 5 59 8 58	48 18 45 19 15 49 14 52
41 36 23 30 44 33 22 31	33 31 36 30 52 14 49 15	25 39 28 38 58 8 59 5
8 58 5 59	28 38 25 39 9 55 12 54	36 30 33 31 3 61 2 64
25-----39-----28-----38		

1-----63----- 4-----62	3/CC4	3/C8M	3/Sm1
56 10 53 11	1 63 4 62 36 30 33 31	1 63 4 62 10 56 11 53	
60 41 6 23 57 44 7 22	60 6 57 7 25 39 28 38	60 6 57 7 51 13 50 16	
13 32---51--34---16--29---50--35	21 43 24 42 56 10 53 11	21 43 24 42 30 36 31 33	
21 20 43 46 24 17 42 47	48 18 45 19 13 51 16 50	48 18 45 19 39 25 38 28	
36 37 30 27 33 40 31 26	29 35 32 34 64 2 61 3	37 27 40 26 46 20 47 17	
48--61- -18-- 3---45--64---19 2	40 26 37 27 5 59 8 58	32 34 29 35 23 41 22 44	
25 12 39 54 28 9 38 55	9 55 12 54 44 22 41 23	49 15 52 14 58 8 59 5	
8 58 5 59	52 14 49 15 17 47 20 46	12 54 9 55 3 61 2 64	
49-----15-----52-----14			

1-----63----- 4-----62	4/CC4	4/C8M	4/Sm1
32 34 29 35	1 63 4 62 12 54 9 55	1 63 4 62 34 32 35 29	
60 41 6 23 57 44 7 22	60 6 57 7 49 15 52 14	60 6 57 7 27 37 26 40	
37 56---27--10---40--53---26--11	21 43 24 42 32 34 29 35	21 43 24 42 54 12 55 9	
21 20 43 46 24 17 42 47	48 18 45 19 37 27 40 26	48 18 45 19 15 49 14 52	
12 13 54 51 9 16 55 50	53 11 56 10 64 2 61 3	13 51 16 50 46 20 47 17	
48--61- -18-- 3---45--64---19 2	16 50 13 51 5 59 8 58	56 10 53 11 23 41 22 44	
49 36 15 30 52 33 14 31	33 31 36 30 44 22 41 23	25 39 28 38 58 8 59 5	
8 58 5 59	28 38 25 39 17 47 20 46	36 30 33 31 3 61 2 64	
25-----39-----28-----38			

1-----63----- 4-----62	5/CC4	5/C8M	5/Sm1
56 10 53 11	1 63 4 62 20 46 17 47	1 63 4 62 10 56 11 53	
60 25 6 39 57 28 7 38	60 6 57 7 41 23 44 22	60 6 57 7 51 13 50 16	
13 48---51--18---16--45---50--19	37 27 40 26 56 10 53 11	37 27 40 26 46 20 47 17	
37 36 27 30 40 33 26 31	32 34 29 35 13 51 16 50	32 34 29 35 23 41 22 44	
20 21 46 43 17 24 47 42	45 19 48 18 64 2 61 3	21 43 24 42 30 36 31 33	
32--61- -34-- 3---29--64---35 2	24 42 21 43 5 59 8 58	48 18 45 19 39 25 38 28	
41 12 23 54 44 9 22 55	9 55 12 54 28 38 25 39	49 15 52 14 58 8 59 5	
8 58 5 59	52 14 49 15 33 31 36 30	12 54 9 55 3 61 2 64	
49-----15-----52-----14			

1-----63----- 4-----62	6/CC4	6/C8M	6/Sm1
48 18 45 19	1 63 4 62 12 54 9 55	1 63 4 62 18 48 19 45	
60 25 6 39 57 28 7 38	60 6 57 7 49 15 52 14	60 6 57 7 43 21 42 24	
21 56---43--10---24--53---42--11	37 27 40 26 48 18 45 19	37 27 40 26 54 12 55 9	
37 36 27 30 40 33 26 31	32 34 29 35 21 43 24 42	32 34 29 35 15 49 14 52	
12 13 54 51 9 16 55 50	53 11 56 10 64 2 61 3	13 51 16 50 30 36 31 33	
32--61- -34-- 3---29--64---35 2	16 50 13 51 5 59 8 58	56 10 53 11 39 25 38 28	
49 20 15 46 52 17 14 47	17 47 20 46 28 38 25 39	41 23 44 22 58 8 59 5	
8 58 5 59	44 22 41 23 33 31 36 30	20 46 17 47 3 61 2 64	
41-----23-----44-----22			

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First of all I would like you to watch these sample solutions listed above.

Do you notice how similar those three types are to one another? Some blocks of elements are quite the same with one another. You may think you can discover any simple 'transformation method' to be applied to make one into another among them.

#2. Why is each total Count of Standard Solutions different from the others?

Before all, let me explain about a problem I want you to understand clearly.

Why is each count of 'standard solutions' different from the others? Then we cannot find any one-to-one correspondence among them at all, can we?

The same count 46080 of 'primitive solutions' looks like the only common key among those three types. It seems we can find any one-to-one correspondence there, and we need to study hard about the transformation method by this common key.

But what is the relation between the 'primitive' solutions and 'standard' ones?

It is the difference of listing style of solutions and it means no essential difference between them.

The set of 'primitive' solutions contains many duplications of each 'standard' one, caused by simple reflections and rotations, and we have to leave the only one and remove its duplications to make another smart list of 'standard' solutions.

*** Conceptual Diagrams of Reflection and Rotation ***

00/Standard

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

10/

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

01/

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

11/

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

02/

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

12/

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

03/

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

13/

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

Watch these 8 forms above. They mean the 8 different faces of the same solution.

The set of 46080 'primitive solutions' of MS88 contains every 8 forms in it, and we have to leave the only standard one and remove the other 7 duplications from it, in order to make our smart set of 5760 'standard solutions': $46080 = 8 \times 5760$

Watch the 6x8 patterns below. They mean the 48 different faces of each solution.

The set of 46080 'primitive cubes' of order 4 contains every 48 patterns in it, and we have to leave the only standard one and remove the other 47 duplications from it, in order to make our smart set of 960 'standard solutions': $46080 = 48 \times 960$

That is why each count of 'standard' solutions different from the others.

**** Set #1 of Reflected Patterns of a Magic Cube 4^3 ****

1/

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

2/

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

3/

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

4/

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

5/

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

6/

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

[Count=6]

These 6 patterns show how each solution with $n1=1$ varies its original form. It is the problem of permutation of the next numbers to $n1$ { $n2$, $n5$ and $n17$ }: $3 \times 2 \times 1 = 6$

The next 8 patterns show how the value 1 moves to the other tops of a cube. Since any cube has 8 tops, there are 8 different ways of moving.

As a consequence we should have $48 (= 6 \times 8)$ different patterns of duplication of a certain standard solution. Let me list out all of them for the last diagrams.

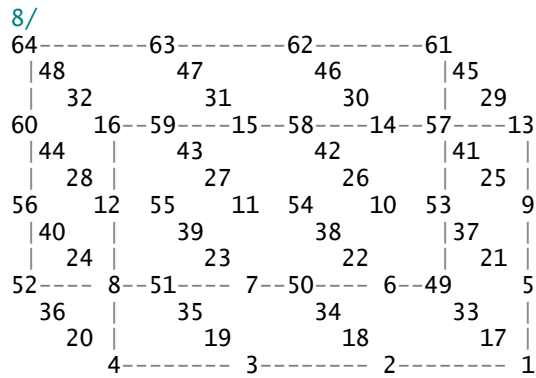
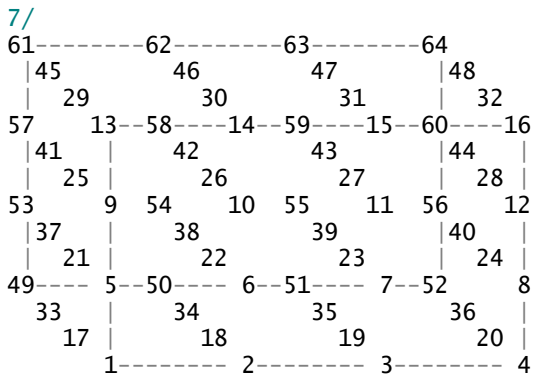
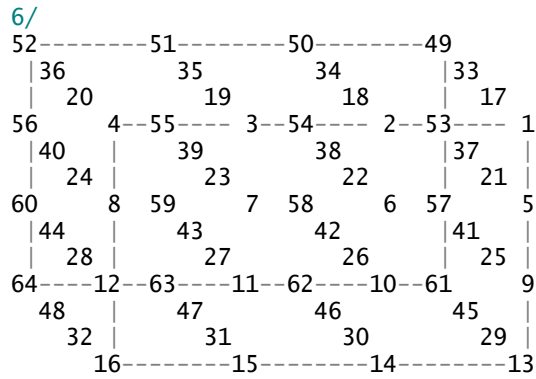
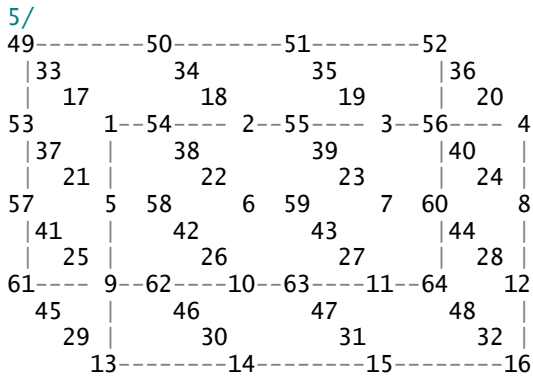
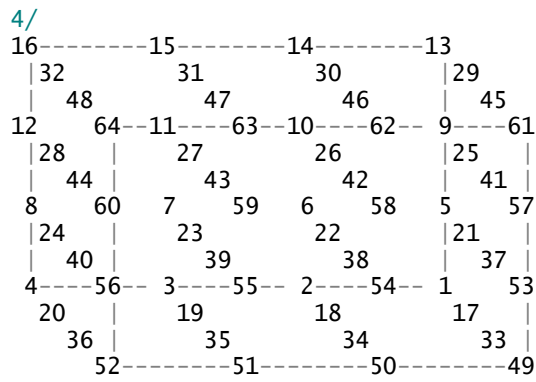
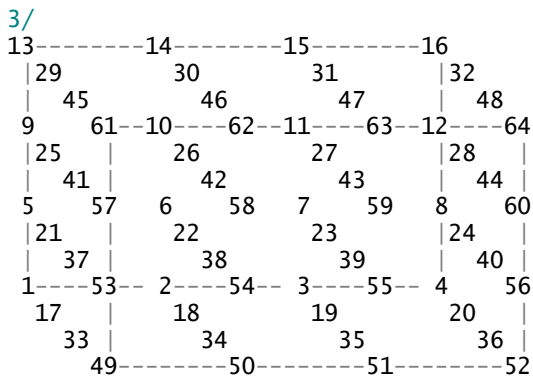
**** Set #2 of Rotated Patterns of a Magic Cube 4^3 ****

1/

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

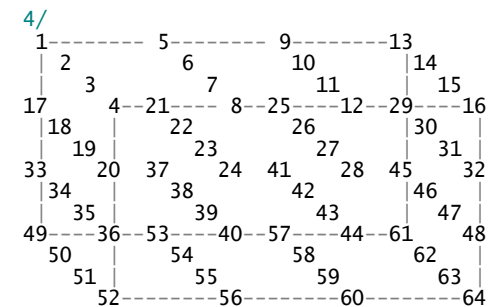
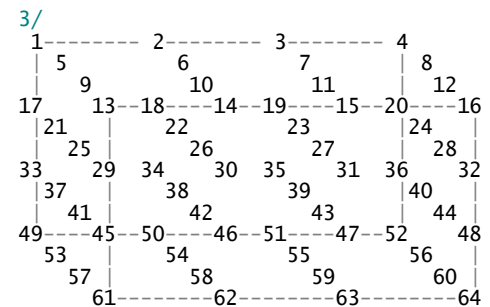
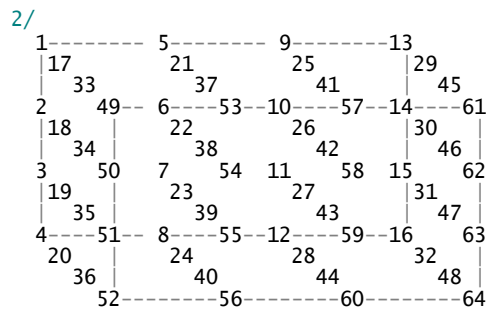
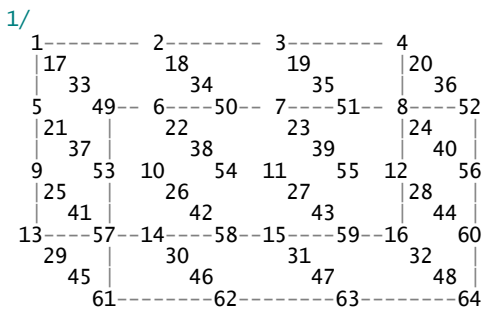
2/

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



[Count=8]

**** Conceptual Diagrams of All Duplications of a Magic Cube 4x3 ****



17/

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

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18/

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

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19/

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

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20/

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

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21/

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

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22/

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

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23/

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

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24/

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

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25/

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

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26/

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

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27/

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

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28/

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

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29/

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

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30/

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

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31/

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52-----36-----20-----51-----19-----35-----18-----34-----17-----33
| 36     19     34     17
| 20    19     18     17
56-----40-----24-----8-----59-----43-----7-----58-----42-----6-----57-----41-----25-----9
| 40     24     8      59     43     42     61
| 24    8      59     43     26     45
64-----48-----12-----63-----11-----62-----10-----61-----45-----29
| 48     32    16     31     30
| 32    16     31     30
16-----16-----15-----15-----14-----14-----13

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32/

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61-----45-----29-----41-----25-----57-----37-----21-----53-----17
| 45     29     41     25     37     21
| 29    13    58     9     54     50
62-----46-----30-----14-----59-----43-----10-----55-----6-----51-----35-----18-----2
| 46     30     14    59     43     23     35
| 30    14    59     43     23     35
63-----47-----31-----15-----60-----11-----56-----7-----52-----36-----20
| 47     31     15    60     44     40     36
| 31    15    60     44     24     20
64-----48-----32-----16-----12-----12-----8-----8-----4
| 48     32    16     12     24
| 32    16     12     24
16-----16-----12-----12-----8-----8-----4

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33/

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16-----12-----8-----11-----7-----10-----6-----9-----5
| 12     8      11     7      10     6     9
| 8      4     31     3     30     2     29
32-----28-----24-----20-----47-----19-----46-----18-----45-----21-----17
| 28     24    20    47     19     46     18     45
| 24    20    47     19     46     18     45
48-----44-----40-----36-----63-----35-----62-----34-----61-----57-----53
| 44     40    36     63     59     58     54
| 40    36     63     59     58     54
64-----60-----56-----52-----51-----51-----50-----49
| 60     56     52     51     50
| 56    52     51     50
16-----16-----15-----15-----14-----14-----13

```

34/

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16-----15-----12-----11-----8-----7-----6-----5-----4
| 15     14    13    28     9     24     5     20
| 14    13    28     9     24     5     20
32-----31-----30-----29-----27-----23-----19-----18-----17
| 31     30    29    27     23     19
| 30    29    44     25     40     21     36
48-----47-----46-----45-----60-----41-----56-----37-----52-----34-----33
| 47     46    45    60     41     56     37     52
| 46    45    60     41     56     37     52
64-----63-----62-----61-----59-----58-----55-----54-----51-----50
| 63     62    61    59     58     55     51
| 62    61    59     58     54     50
61-----61-----57-----57-----53-----53-----49
| 61     57     53
| 57    57     53     53
16-----16-----12-----12-----8-----8-----4

```

35/

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61-----57-----53-----49-----46-----37-----33-----30-----21-----17-----14-----10-----6-----9-----5
| 57     53     49     46     37     33     30     21
| 53     49     46     37     33     30     21
62-----58-----54-----50-----47-----38-----34-----31-----22-----18-----15-----11-----7
| 58     54     50     47     38     34     31     22
| 54     50     47     38     34     31     22
63-----59-----55-----51-----48-----39-----35-----32-----23-----19-----16-----12-----8
| 59     55     51     48     39     35     32     23
| 55     51     48     39     35     32     23
64-----60-----56-----52-----51-----48-----35-----32-----19-----16-----12-----8
| 60     56     52     51     48     35     32     19
| 56     52     51     48     35     32     19
52-----52-----36-----36-----20-----20-----4

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36/

```

52-----51-----50-----49-----46-----40-----39-----38-----23-----22-----21-----12-----11-----10
| 51     50     49     46     40     39     38     23
| 50     49     40     33     24     17     8
56-----55-----54-----53-----44-----37-----28-----27-----26-----25-----21-----12-----11-----10
| 55     54     53     44     37     28     27     26
| 54     53     44     37     28     27     26
60-----59-----58-----57-----48-----47-----46-----45-----60-----41-----56-----37-----52-----34-----33
| 59     58     57     48     47     46     45     60
| 58     57     48     41     56     37     52
64-----63-----62-----61-----59-----58-----55-----54-----51-----50
| 63     62    61    59     58     55     51
| 62    61    59     58     54     50
61-----61-----57-----57-----53-----53-----49
| 61     57     53
| 57    57     53     53
16-----16-----12-----12-----8-----8-----4

```

37/

```

61-----57-----53-----49-----46-----40-----39-----38-----23-----22-----21-----12-----11-----10
| 57     53     49     46     40     39     38     23
| 53     49     46     40     39     38     23
57-----55-----54-----53-----44-----37-----28-----27-----26-----25-----21-----12-----11-----10
| 55     54     53     44     37     28     27     26
| 54     53     44     37     28     27     26
63-----59-----55-----51-----48-----47-----46-----45-----60-----41-----56-----37-----52-----34-----33
| 59     55     51     48     47     46     45     60
| 55     51     48     41     56     37     52
64-----60-----56-----52-----51-----48-----35-----32-----19-----16-----12-----8
| 60     56     52     51     48     35     32     19
| 56     52     51     48     35     32     19
1-----1-----2-----2-----3-----3-----4

```

38/

```

52-----51-----50-----49-----46-----40-----39-----38-----23-----22-----21-----12-----11-----10
| 51     50     49     46     40     39     38     23
| 50     49     40     33     24     17     8
51-----50-----49-----48-----39-----38-----37-----28-----27-----26-----25-----21-----12-----11-----10
| 50     49     48     39     38     37     28     27     26
| 49     48     39     38     37     28     27     26
60-----59-----58-----57-----48-----47-----46-----45-----60-----41-----56-----37-----52-----34-----33
| 59     58     57     48     47     46     45     60
| 58     57     48     41     56     37     52
64-----63-----62-----61-----59-----58-----55-----54-----51-----50
| 63     62    61    59     58     55     51
| 62    61    59     58     54     50
61-----61-----57-----57-----53-----53-----49
| 61     57     53
| 57    57     53     53
16-----16-----12-----12-----8-----8-----4

```

39/

```

61-----57-----53-----49-----46-----40-----39-----38-----23-----22-----21-----12-----11-----10
| 57     53     49     46     40     39     38     23
| 53     49     46     40     39     38     23
45-----41-----37-----33-----30-----26-----25-----21-----17-----14-----18-----15-----19-----16-----12-----20
| 41     37     33     30     26     25     21     17
| 37     33     30     26     25     21     17
29-----25-----21-----17-----14-----18-----15-----19-----16-----12-----20
| 25     21     17     14     18     15     19     16
| 21     17     14     18     15     19     16
13-----9-----5-----1-----2-----3-----4
| 9      5      1      2      3      4
| 5      1      2      3      4

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40/

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52-----51-----50-----49-----46-----40-----39-----38-----23-----22-----21-----12-----11-----10
| 51     50     49     46     40     39     38     23
| 50     49     40     33     24     17     8
36-----35-----34-----33-----24-----23-----22-----21-----12-----11-----10-----9-----8
| 35     34     33     24     23     22     21     12
| 34     33     24     23     22     21     12
20-----19-----18-----17-----8-----7-----6-----5-----9-----13
| 19     18     17     8      7      6      5      9
| 18     17     8      7      6      5      9
4-----3-----2-----1-----5-----9-----13
| 3      2      1      5      9      13
| 2      1      5      9      13

```


41/

16	12	8	32	28	44	48	40	60	64
15	11	7	4	31	27	20	47	36	63
14	10	6	3	30	26	19	46	35	62
13	9	5	2	29	25	18	45	34	61
1	1	1	1	17	21	33	37	53	49

42/

16	15	14	32	31	47	48	46	63	64
12	11	10	13	28	27	29	44	45	60
8	7	6	9	24	23	25	40	41	56
4	3	2	5	20	19	21	36	37	52
1	1	1	1	17	18	34	38	54	49

43/

64	48	32	63	47	31	62	46	30	61
60	44	28	59	43	27	58	42	26	57
56	40	24	55	39	23	54	38	22	53
52	36	20	51	35	19	50	34	18	49
4	4	4	4	3	3	2	2	2	1

44/

64	48	32	60	44	28	60	44	28	52
63	47	31	59	43	27	55	39	23	51
62	46	30	58	42	26	54	38	22	50
61	45	29	57	41	25	53	37	21	49
13	13	13	9	9	9	5	5	5	1

45/

64	60	48	63	59	47	62	58	46	61
48	44	40	52	47	43	51	46	42	49
32	28	24	36	31	27	35	30	26	33
16	12	8	20	15	11	19	14	10	17
4	4	4	4	3	3	2	2	2	1

46/

64	63	48	60	59	44	60	55	40	52
48	47	46	61	58	43	57	42	27	49
32	31	30	45	42	27	41	24	19	33
16	15	14	29	26	11	25	8	4	17
13	13	13	9	9	9	5	5	5	1

47/

64	60	56	48	44	40	32	28	24	16
63	59	55	52	47	43	36	31	27	15
62	58	54	51	46	42	35	30	26	14
61	57	53	50	45	41	34	29	25	13
49	49	49	33	33	33	17	17	17	1

48/

64	63	62	48	47	46	32	31	30	16
60	59	58	61	44	43	45	28	27	12
56	55	54	57	40	39	41	24	23	9
52	51	50	53	36	35	37	20	19	5
49	49	49	33	33	33	17	17	17	1

[Count=48]

How could we select the 'standard solutions' out of the 46080 'primitive solutions'? It is the so-called 'list-forming inequality conditions' that we could use to do it.

- (1) In the case of two-dimensional magic squares of order 8, we could use the following set of conditions, for instance: $n_1 < n_8$, $n_1 < n_{57}$, $n_1 < n_{64}$ and $n_2 > n_9$;
- (2) In the case of three-dimensional magic cubes of order 4, we could use the next set of inequality conditions, for instance: $n_1 < n_4$, $n_1 < n_{13}$, $n_1 < n_{16}$, $n_1 < n_{49}$, $n_1 < n_{52}$, $n_1 < n_{61}$, $n_1 < n_{64}$ and $n_2 > n_5 > n_{17}$;

If you use these sets of inequality conditions and select under them out of the 'primitive solutions', you will surely get the smart set of 'standard solutions' you want.

#3. Planning of New Experiments to Make One into Another

Why don't we plan to do any new experiments to make one object into another among the sets of 'primitive solutions', using any simple transformation system?

Suppose if we succeeded in making one into another completely, then we could certainly believe that there is a beautiful 'one-to-one correspondence' among them.

But, what experiment can we imagine, then? How about trying to do like this?

- (1) First of all we make the 46080 'primitive solutions' of 'C&C' Magic Cubes 4x4x4,
- (2) change them into the 46080 primitive solutions of multiple type of 'C&C' Magic Squares 8x8 by any simple transformation system and (3) convert them to the 46080 primitive solutions of Three-type Simultaneous Magic Squares 8x8: Composite, Self-complementary and Pan-diagonal by any other transformation method.

Of course, you can change the order of operations like this:

- (1) First of all we make the 46080 'primitive solutions' of multiple type of 'C&C' MS88, (2) change them into the 46080 solutions of Three-type Simultaneous MS88: Composite, Self-complementary and Pan-diagonal by any transformation method and (3) convert them to the 46080 solutions of 'C&C' MC444 by any other transformation system.

When we succeeded in making all these experiments very well, we could say clearly that there is a beautiful inner relationship among them.

At first we have to know what system of transformation is really effective. We must try and err to know about it, since we have never taken anything to use before.

The next diagrams show my hypotheses adopted to realize what we have wanted.

Basic Form	Concept of Transformation
<pre> 1----- 2----- 3----- 4 17 18 19 20 5 33 6 34 7 35 8 36 21 49---22--50---23--51--+24--52 9 37 10 38 11 39 12 40 25 53 26 54 27 55 28 56 13--41--14--42---15--43---16 44 29 57 30 58 31 59 32 60 45 46 47 48 61-----62-----63-----64 </pre>	<pre> [CCMC444] -> [CCMS88Mu1t] 1 2 3 4 25 26 27 28 5 6 7 8 29 30 31 32 9 10 11 12 17 18 19 20 13 14 15 16 21 22 23 24 51 52 49 50 43 44 41 42 55 56 53 54 47 48 45 46 59 60 57 58 35 36 33 34 63 64 61 62 39 40 37 38 </pre>

* Conceptual Diagrams for Type Conversion between MS88 *

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

[CCMS88Mu1t] <-> [MS88Sm13T]

For our new experiment we want to have got all those three sets of 46080 solutions at the same time. I would like to take the next two transformation systems below.

Basic Form	Conceptual Diagrams for Conversions		
<pre> 1----- 2----- 3----- 4 17 18 19 20 5 33 6 34 7 35 8 36 21 49---22--50---23--51--+24--52 9 37 10 38 11 39 12 40 25 53 26 54 27 55 28 56 13--41--14--42---15--43---16 44 29 57 30 58 31 59 32 60 45 46 47 48 61-----62-----63-----64 </pre>	/CC4 ->	/C8M	/Sm1
	<pre> 1 2 3 4 25 26 27 28 5 6 7 8 29 30 31 32 9 10 11 12 17 18 19 20 13 14 15 16 21 22 23 24 51 52 49 50 43 44 41 42 55 56 53 54 47 48 45 46 59 60 57 58 35 36 33 34 63 64 61 62 39 40 37 38 </pre>	<pre> 1 2 3 4 18 17 20 19 5 6 7 8 22 21 24 23 9 10 11 12 26 25 28 27 13 14 15 16 30 29 32 31 53 54 55 56 38 37 40 39 49 50 51 52 34 33 36 35 61 62 63 64 46 45 48 47 57 58 59 60 42 41 44 43 </pre>	

```

/**/
/* Dictation of Rules for Transformation */
/**/
/* Converter Program #1 from 'C&C'MC444 into 'C&C'MS88 */
void cnvc4s8cc(){
  cnm[1]=nm[1];   cnm[2]=nm[2];   cnm[3]=nm[3];   cnm[4]=nm[4];
  cnm[5]=nm[25];  cnm[6]=nm[26];  cnm[7]=nm[27];  cnm[8]=nm[28];
  cnm[9]=nm[5];   cnm[10]=nm[6];  cnm[11]=nm[7];  cnm[12]=nm[8];
  cnm[13]=nm[29]; cnm[14]=nm[30]; cnm[15]=nm[31]; cnm[16]=nm[32];
  cnm[17]=nm[9];  cnm[18]=nm[10]; cnm[19]=nm[11]; cnm[20]=nm[12];
  cnm[21]=nm[17]; cnm[22]=nm[18]; cnm[23]=nm[19]; cnm[24]=nm[20];
  cnm[25]=nm[13]; cnm[26]=nm[14]; cnm[27]=nm[15]; cnm[28]=nm[16];
  cnm[29]=nm[21]; cnm[30]=nm[22]; cnm[31]=nm[23]; cnm[32]=nm[24];
  cnm[33]=nm[51]; cnm[34]=nm[52]; cnm[35]=nm[49]; cnm[36]=nm[50];
  cnm[37]=nm[43]; cnm[38]=nm[44]; cnm[39]=nm[41]; cnm[40]=nm[42];
  cnm[41]=nm[55]; cnm[42]=nm[56]; cnm[43]=nm[53]; cnm[44]=nm[54];
  cnm[45]=nm[47]; cnm[46]=nm[48]; cnm[47]=nm[45]; cnm[48]=nm[46];
  cnm[49]=nm[59]; cnm[50]=nm[60]; cnm[51]=nm[57]; cnm[52]=nm[58];
  cnm[53]=nm[35]; cnm[54]=nm[36]; cnm[55]=nm[33]; cnm[56]=nm[34];
  cnm[57]=nm[63]; cnm[58]=nm[64]; cnm[59]=nm[61]; cnm[60]=nm[62];
  cnm[61]=nm[39]; cnm[62]=nm[40]; cnm[63]=nm[37]; cnm[64]=nm[38];
}
/**/
/* Converter Program #2 from 'C&C'MC444 into MS88Sm13T */
void cnvc4s8sm(){
  cnm[1]=nm[1];   cnm[2]=nm[2];   cnm[3]=nm[3];   cnm[4]=nm[4];
  cnm[5]=nm[18];  cnm[6]=nm[17];  cnm[7]=nm[20];  cnm[8]=nm[19];
  cnm[9]=nm[5];   cnm[10]=nm[6];  cnm[11]=nm[7];  cnm[12]=nm[8];
  cnm[13]=nm[22]; cnm[14]=nm[21]; cnm[15]=nm[24]; cnm[16]=nm[23];
  cnm[17]=nm[9];  cnm[18]=nm[10]; cnm[19]=nm[11]; cnm[20]=nm[12];
  cnm[21]=nm[26]; cnm[22]=nm[25]; cnm[23]=nm[28]; cnm[24]=nm[27];
  cnm[25]=nm[13]; cnm[26]=nm[14]; cnm[27]=nm[15]; cnm[28]=nm[16];
  cnm[29]=nm[30]; cnm[30]=nm[29]; cnm[31]=nm[32]; cnm[32]=nm[31];
  cnm[33]=nm[53]; cnm[34]=nm[54]; cnm[35]=nm[55]; cnm[36]=nm[56];
  cnm[37]=nm[38]; cnm[38]=nm[37]; cnm[39]=nm[40]; cnm[40]=nm[39];
  cnm[41]=nm[49]; cnm[42]=nm[50]; cnm[43]=nm[51]; cnm[44]=nm[52];
  cnm[45]=nm[34]; cnm[46]=nm[33]; cnm[47]=nm[36]; cnm[48]=nm[35];
  cnm[49]=nm[61]; cnm[50]=nm[62]; cnm[51]=nm[63]; cnm[52]=nm[64];
  cnm[53]=nm[46]; cnm[54]=nm[45]; cnm[55]=nm[48]; cnm[56]=nm[47];
  cnm[57]=nm[57]; cnm[58]=nm[58]; cnm[59]=nm[59]; cnm[60]=nm[60];
  cnm[61]=nm[42]; cnm[62]=nm[41]; cnm[63]=nm[44]; cnm[64]=nm[43];
}
/**/

```

#4. Compositions of C&C MC4³, Multiple C&C MS8² and 3-T Simultaneous MS8²

The next list shows the result of my recent computation, though it is only a brief list selected out of all 46080x3 solutions.

You can find the program list of mine at the end this article, if you want to read it.

**** Transform 'Composite and Complete' Magic Cubes of Order 4 into ****
**** 2 Types of Magic Squares of Order 8: CCMS8Multi and MS88Sm13 ****

1-----63----- 4-----62	1/CC4	1/C8M	1/Sm1
48 18 45 19	1 63 4 62 36 30 33 31	1 63 4 62 18 48 19 45	
60 49 6 15 57 52 7 14	60 6 57 7 25 39 28 38	60 6 57 7 43 21 42 24	
21 32---43---34---24--29---42--35	13 51 16 50 48 18 45 19	13 51 16 50 30 36 31 33	
13 12 51 54 16 9 50 55	56 10 53 11 21 43 24 42	56 10 53 11 39 25 38 28	
36 37 30 27 33 40 31 26	29 35 32 34 64 2 61 3	37 27 40 26 54 12 55 9	
56--61- -10-- 3---53--64---11 2	40 26 37 27 5 59 8 58	32 34 29 35 15 49 14 52	
25 20 39 46 28 17 38 47	17 47 20 46 52 14 49 15	41 23 44 22 58 8 59 5	
8 58 5 59	44 22 41 23 9 55 12 54	20 46 17 47 3 61 2 64	
41-----23-----44-----22			

1-----63-----6-----60	25/CC4	25/C8M	25/Sm1
48 18 43 21	1 63 6 60 38 28 33 31	1 63 6 60 18 48 21 43	
62 49 4 15 57 54 7 12	62 4 57 7 25 39 30 36	62 4 57 7 45 19 42 24	
19 32---45---34---24---27---42---37	11 53 16 50 48 18 43 21	11 53 16 50 28 38 31 33	
11 14 53 52 16 9 50 55	56 10 51 13 19 45 24 42	56 10 51 13 39 25 36 30	
38 35 28 29 33 40 31 26	27 37 32 34 64 2 59 5	35 29 40 26 52 14 55 9	
56--59- -10--5---51--64---13 2	40 26 35 29 3 61 8 58	32 34 27 37 15 49 12 54	
25 22 39 44 30 17 36 47	17 47 22 44 54 12 49 15	41 23 46 20 58 8 61 3	
8 58 3 61	46 20 41 23 9 55 14 52	22 44 17 47 5 59 2 64	
41-----23-----46-----20			

1-----63-----10-----56	49/CC4	49/C8M	49/Sm1
48 18 39 25	1 63 10 56 42 24 33 31	1 63 10 56 18 48 25 39	
62 49 4 15 53 58 11 8	62 4 53 11 21 43 30 36	62 4 53 11 45 19 38 28	
19 32---45---34---28---23---38---41	7 57 16 50 48 18 39 25	7 57 16 50 24 42 31 33	
7 14 57 52 16 5 50 59	60 6 51 13 19 45 28 38	60 6 51 13 43 21 36 30	
42 35 24 29 33 44 31 22	23 41 32 34 64 2 55 9	35 29 44 22 52 14 59 5	
60--55- -6--9---51--64---13 2	44 22 35 29 3 61 12 54	32 34 23 41 15 49 8 58	
21 26 43 40 30 17 36 47	17 47 26 40 58 8 49 15	37 27 46 20 54 12 61 3	
12 54 3 61	46 20 37 27 5 59 14 52	26 40 17 47 9 55 2 64	
37-----27-----46-----20			

1-----63-----18-----48	73/CC4	73/C8M	73/Sm1
56 10 39 25	1 63 18 48 50 16 33 31	1 63 18 48 10 56 25 39	
62 41 4 23 45 58 19 8	62 4 45 19 13 51 30 36	62 4 45 19 53 11 38 28	
11 32---53---34---28---15---38---49	7 57 24 42 56 10 39 25	7 57 24 42 16 50 31 33	
7 22 57 44 24 5 42 59	60 6 43 21 11 53 28 38	60 6 43 21 51 13 36 30	
50 35 16 29 33 52 31 14	15 49 32 34 64 2 47 17	35 29 52 14 44 22 59 5	
60--47- -6--17---43--64---21 2	52 14 35 29 3 61 20 46	32 34 15 49 23 41 8 58	
13 26 51 40 30 9 36 55	9 55 26 40 58 8 41 23	37 27 54 12 46 20 61 3	
20 46 3 61	54 12 37 27 5 59 22 44	26 40 9 55 17 47 2 64	
37-----27-----54-----12			

1-----63-----34-----32	97/CC4	97/C8M	97/Sm1
56 10 23 41	1 63 34 32 50 16 17 47	1 63 34 32 10 56 41 23	
62 25 4 39 29 58 35 8	62 4 29 35 13 51 46 20	62 4 29 35 53 11 22 44	
11 48---53---18---44---15---22---49	7 57 40 26 56 10 23 41	7 57 40 26 16 50 47 17	
7 38 57 28 40 5 26 59	60 6 27 37 11 53 44 22	60 6 27 37 51 13 20 46	
50 19 16 45 17 52 47 14	15 49 48 18 64 2 31 33	19 45 52 14 28 38 59 5	
60--31- -6--33---27--64---37 2	52 14 19 45 3 61 36 30	48 18 15 49 39 25 8 58	
13 42 51 24 46 9 20 55	9 55 42 24 58 8 25 39	21 43 54 12 30 36 61 3	
36 30 3 61	54 12 21 43 5 59 38 28	42 24 9 55 33 31 2 64	
21-----43-----54-----12			

1-----62-----4-----63	121/CC4	121/C8M	121/Sm1
48 19 45 18	1 62 4 63 36 31 33 30	1 62 4 63 19 48 18 45	
60 49 7 14 57 52 6 15	60 7 57 6 25 38 28 39	60 7 57 6 42 21 43 24	
21 32---42---35---24---29---43---34	13 50 16 51 48 19 45 18	13 50 16 51 31 36 30 33	
13 12 50 55 16 9 51 54	56 11 53 10 21 42 24 43	56 11 53 10 38 25 39 28	
36 37 31 26 33 40 30 27	29 34 32 35 64 3 61 2	37 26 40 27 55 12 54 9	
56--61- -11--2---53--64---10 3	40 27 37 26 5 58 8 59	32 35 29 34 14 49 15 52	
25 20 38 47 28 17 39 46	17 46 20 47 52 15 49 14	41 22 44 23 59 8 58 5	
8 59 5 58	44 23 41 22 9 54 12 55	20 47 17 46 2 61 3 64	
41-----22-----44-----23			

1-----60-----6-----63	241/CC4	241/C8M	241/Sm1
48 21 43 18	1 60 6 63 38 31 33 28	1 60 6 63 21 48 18 43	
62 49 7 12 57 54 4 15	62 7 57 4 25 36 30 39	62 7 57 4 42 19 45 24	
19 32---42---37---24---27---45---34	11 50 16 53 48 21 43 18	11 50 16 53 31 38 28 33	
11 14 50 55 16 9 53 52	56 13 51 10 19 42 24 45	56 13 51 10 36 25 39 30	
38 35 31 26 33 40 28 29	27 34 32 37 64 5 59 2	35 26 40 29 55 14 52 9	
56--59- -13--2---51--64---10 5	40 29 35 26 3 58 8 61	32 37 27 34 12 49 15 54	
25 22 36 47 30 17 39 44	17 44 22 47 54 15 49 12	41 20 46 23 61 8 58 3	
8 61 3 58	46 23 41 20 9 52 14 55	22 47 17 44 2 59 5 64	
41-----20-----46-----23			

1-----56-----10-----63	361/CC4	361/C8M	361/Sm1
48 25 39 18	1 56 10 63 42 31 33 24	1 56 10 63 25 48 18 39	
62 49 11 8 53 58 4 15	62 11 53 4 21 36 30 43	62 11 53 4 38 19 45 28	
19 32---38---41---28---23---45---34	7 50 16 57 48 25 39 18	7 50 16 57 31 42 24 33	
7 14 50 59 16 5 57 52	60 13 51 6 19 38 28 45	60 13 51 6 36 21 43 30	
42 35 31 22 33 44 24 29	23 34 32 41 64 9 55 2	35 22 44 29 59 14 52 5	
60--55- -13-- 2--51--64--- 6 9	44 29 35 22 3 54 12 61	32 41 23 34 8 49 15 58	
21 26 36 47 30 17 43 40	17 40 26 47 58 15 49 8	37 20 46 27 61 12 54 3	
12 61 3 54	46 27 37 20 5 52 14 59	26 47 17 40 2 55 9 64	
37-----20-----46-----27			

1-----48-----18-----63	481/CC4	481/C8M	481/Sm1
56 25 39 10	1 48 18 63 50 31 33 16	1 48 18 63 25 56 10 39	
62 41 19 8 45 58 4 23	62 19 45 4 13 36 30 51	62 19 45 4 38 11 53 28	
11 32---38---49---28---15---53---34	7 42 24 57 56 25 39 10	7 42 24 57 31 50 16 33	
7 22 42 59 24 5 57 44	60 21 43 6 11 38 28 53	60 21 43 6 36 13 51 30	
50 35 31 14 33 52 16 29	15 34 32 49 64 17 47 2	35 14 52 29 59 22 44 5	
60--47- -21-- 2--43--64--- 6 17	52 29 35 14 3 46 20 61	32 49 15 34 8 41 23 58	
13 26 36 55 30 9 51 40	9 40 26 55 58 23 41 8	37 12 54 27 61 20 46 3	
20 61 3 46	54 27 37 12 5 44 22 59	26 55 9 40 2 47 17 64	
37-----12-----54-----27			

1-----32-----34-----63	601/CC4	601/C8M	601/Sm1
56 41 23 10	1 32 34 63 50 47 17 16	1 32 34 63 41 56 10 23	
62 25 35 8 29 58 4 39	62 35 29 4 13 20 46 51	62 35 29 4 22 11 53 44	
11 48---22---49---44---15---53---18	7 26 40 57 56 41 23 10	7 26 40 57 47 50 16 17	
7 38 26 59 40 5 57 28	60 37 27 6 11 22 44 53	60 37 27 6 20 13 51 46	
50 19 47 14 17 52 16 45	15 18 48 49 64 33 31 2	19 14 52 45 59 38 28 5	
60--31- -37-- 2--27--64--- 6 33	52 45 19 14 3 30 36 61	48 49 15 18 8 25 39 58	
13 42 20 55 46 9 51 24	9 24 42 55 58 39 25 8	21 12 54 43 61 36 30 3	
36 61 3 30	54 43 21 12 5 28 38 59	42 55 9 24 2 31 33 64	
21-----12-----54-----43			

2-----64----- 3-----61	721/CC4	721/C8M	721/Sm1
47 17 46 20	2 64 3 61 35 29 34 32	2 64 3 61 17 47 20 46	
59 50 5 16 58 51 8 13	59 5 58 8 26 40 27 37	59 5 58 8 44 22 41 23	
22 31---44---33---23---30---41---36	14 52 15 49 47 17 46 20	14 52 15 49 29 35 32 34	
14 11 52 53 15 10 49 56	55 9 54 12 22 44 23 41	55 9 54 12 40 26 37 27	
35 38 29 28 34 39 32 25	30 36 31 33 63 1 62 4	38 28 39 25 53 11 56 10	
55--62- - 9-- 4--54--63---12 1	39 25 38 28 6 60 7 57	31 33 30 36 16 50 13 51	
26 19 40 45 27 18 37 48	18 48 19 45 51 13 50 16	42 24 43 21 57 7 60 6	
7 57 6 60	43 21 42 24 10 56 11 53	19 45 18 48 4 62 1 63	
42-----24-----43-----21			

3-----64----- 2-----61	1441/CC4	1441/C8M	1441/Sm1
46 17 47 20	3 64 2 61 34 29 35 32	3 64 2 61 17 46 20 47	
58 51 5 16 59 50 8 13	58 5 59 8 27 40 26 37	58 5 59 8 44 23 41 22	
23 30---44---33---22---31---41---36	15 52 14 49 46 17 47 20	15 52 14 49 29 34 32 35	
15 10 52 53 14 11 49 56	54 9 55 12 23 44 22 41	54 9 55 12 40 27 37 26	
34 39 29 28 35 38 32 25	31 36 30 33 62 1 63 4	39 28 38 25 53 10 56 11	
54--63- - 9-- 4--55--62---12 1	38 25 39 28 7 60 6 57	30 33 31 36 16 51 13 50	
27 18 40 45 26 19 37 48	19 48 18 45 50 13 51 16	43 24 42 21 57 6 60 7	
6 57 7 60	42 21 43 24 11 56 10 53	18 45 19 48 4 63 1 62	
43-----24-----42-----21			

4-----63----- 1-----62	2161/CC4	2161/C8M	2161/Sm1
45 18 48 19	4 63 1 62 33 30 36 31	4 63 1 62 18 45 19 48	
57 52 6 15 60 49 7 14	57 6 60 7 28 39 25 38	57 6 60 7 43 24 42 21	
24 29---43---34---21---32---42---35	16 51 13 50 45 18 48 19	16 51 13 50 30 33 31 36	
16 9 51 54 13 12 50 55	53 10 56 11 24 43 21 42	53 10 56 11 39 28 38 25	
33 40 30 27 36 37 31 26	32 35 29 34 61 2 64 3	40 27 37 26 54 9 55 12	
53--64- -10-- 3--56--61---11 2	37 26 40 27 8 59 5 58	29 34 32 35 15 52 14 49	
28 17 39 46 25 20 38 47	20 47 17 46 49 14 52 15	44 23 41 22 58 5 59 8	
5 58 8 59	41 22 44 23 12 55 9 54	17 46 20 47 3 64 2 61	
44-----23-----41-----22			

5-----64-----2-----59	2881/CC4	2881/C8M	2881/Sm1
44 17 47 22	5 64 2 59 34 27 37 32	5 64 2 59 17 44 22 47	
58 53 3 16 61 50 8 11	58 3 61 8 29 40 26 35	58 3 61 8 46 23 41 20	
23 28---46--33---20--31---41--38	15 54 12 49 44 17 47 22	15 54 12 49 27 34 32 37	
15 10 54 51 12 13 49 56	52 9 55 14 23 46 20 41	52 9 55 14 40 29 35 26	
34 39 27 30 37 36 32 25	31 38 28 33 60 1 63 6	39 30 36 25 51 10 56 13	
52--63- - 9-- 6--55--60--14 1	36 25 39 30 7 62 4 57	28 33 31 38 16 53 11 50	
29 18 40 43 26 21 35 48	21 48 18 43 50 11 53 16	45 24 42 19 57 4 62 7	
4 57 7 62	42 19 45 24 13 56 10 51	18 43 21 48 6 63 1 60	
45-----24-----42-----19			

6-----63-----1-----60	3601/CC4	3601/C8M	3601/Sm1
43 18 48 21	6 63 1 60 33 28 38 31	6 63 1 60 18 43 21 48	
57 54 4 15 62 49 7 12	57 4 62 7 30 39 25 36	57 4 62 7 45 24 42 19	
24 27---45--34---19--32---42--37	16 53 11 50 43 18 48 21	16 53 11 50 28 33 31 38	
16 9 53 52 11 14 50 55	51 10 56 13 24 45 19 42	51 10 56 13 39 30 36 25	
33 40 28 29 38 35 31 26	32 37 27 34 59 2 64 5	40 29 35 26 52 9 55 14	
51--64- -10-- 5--56--59--13 2	35 26 40 29 8 61 3 58	27 34 32 37 15 54 12 49	
30 17 39 44 25 22 36 47	22 47 17 44 49 12 54 15	46 23 41 20 58 3 61 8	
3 58 8 61	41 20 46 23 14 55 9 52	17 44 22 47 5 64 2 59	
46-----23-----41-----20			

7-----62-----1-----60	4321/CC4	4321/C8M	4321/Sm1
42 19 48 21	7 62 1 60 33 28 39 30	7 62 1 60 19 42 21 48	
57 55 4 14 63 49 6 12	57 4 63 6 31 38 25 36	57 4 63 6 45 24 43 18	
24 26---45--35---18--32---43--37	16 53 10 51 42 19 48 21	16 53 10 51 28 33 30 39	
16 9 53 52 10 15 51 54	50 11 56 13 24 45 18 43	50 11 56 13 38 31 36 25	
33 40 28 29 39 34 30 27	32 37 26 35 58 3 64 5	40 29 34 27 52 9 54 15	
50--64- -11-- 5--56--58--13 3	34 27 40 29 8 61 2 59	26 35 32 37 14 55 12 49	
31 17 38 44 25 23 36 46	23 46 17 44 49 12 55 14	47 22 41 20 59 2 61 8	
2 59 8 61	41 20 47 22 15 54 9 52	17 44 23 46 5 64 3 58	
47-----22-----41-----20			

8-----61-----2-----59	5041/CC4	5041/C8M	5041/Sm1
41 20 47 22	8 61 2 59 34 27 40 29	8 61 2 59 20 41 22 47	
58 56 3 13 64 50 5 11	58 3 64 5 32 37 26 35	58 3 64 5 46 23 44 17	
23 25---46--36---17--31---44--38	15 54 9 52 41 20 47 22	15 54 9 52 27 34 29 40	
15 10 54 51 9 16 52 53	49 12 55 14 23 46 17 44	49 12 55 14 37 32 35 26	
34 39 27 30 40 33 29 28	31 38 25 36 57 4 63 6	39 30 33 28 51 10 53 16	
49--63- -12-- 6--55--57--14 4	33 28 39 30 7 62 1 60	25 36 31 38 13 56 11 50	
32 18 37 43 26 24 35 45	24 45 18 43 50 11 56 13	48 21 42 19 60 1 62 7	
1 60 7 62	42 19 48 21 16 53 10 51	18 43 24 45 6 63 4 57	
48-----21-----42-----19			

9-----64-----2-----55	5761/CC4	5761/C8M	5761/Sm1
40 17 47 26	9 64 2 55 34 23 41 32	9 64 2 55 17 40 26 47	
54 57 3 16 61 50 12 7	54 3 61 12 29 44 22 35	54 3 61 12 46 27 37 20	
27 24---46--33---20--31---37--42	15 58 8 49 40 17 47 26	15 58 8 49 23 34 32 41	
15 6 58 51 8 13 49 60	52 5 59 14 27 46 20 37	52 5 59 14 44 29 35 22	
34 43 23 30 41 36 32 21	31 42 24 33 56 1 63 10	43 30 36 21 51 6 60 13	
52--63- - 5--10---59--56--14 1	36 21 43 30 11 62 4 53	24 33 31 42 16 57 7 50	
29 18 44 39 22 25 35 48	25 48 18 39 50 7 57 16	45 28 38 19 53 4 62 11	
4 53 11 62	38 19 45 28 13 60 6 51	18 39 25 48 10 63 1 56	
45-----28-----38-----19			

10-----63-----1-----56	6481/CC4	6481/C8M	6481/Sm1
39 18 48 25	10 63 1 56 33 24 42 31	10 63 1 56 18 39 25 48	
53 58 4 15 62 49 11 8	53 4 62 11 30 43 21 36	53 4 62 11 45 28 38 19	
28 23---45--34---19--32---38--41	16 57 7 50 39 18 48 25	16 57 7 50 24 33 31 42	
16 5 57 52 7 14 50 59	51 6 60 13 28 45 19 38	51 6 60 13 43 30 36 21	
33 44 24 29 42 35 31 22	32 41 23 34 55 2 64 9	44 29 35 22 52 5 59 14	
51--64- - 6-- 9--60--55--13 2	35 22 44 29 12 61 3 54	23 34 32 41 15 58 8 49	
30 17 43 40 21 26 36 47	26 47 17 40 49 8 58 15	46 27 37 20 54 3 61 12	
3 54 12 61	37 20 46 27 14 59 5 52	17 40 26 47 9 64 2 55	
46-----27-----37-----20			

11-----62----- 1-----56	7201/CC4	7201/C8M	7201/Sm1
38 19 48 25	11 62 1 56 33 24 43 30	11 62 1 56 19 38 25 48	
53 59 4 14 63 49 10 8	53 4 63 10 31 42 21 36	53 4 63 10 45 28 39 18	
28 22---45---35---18---32---39---41	16 57 6 51 38 19 48 25	16 57 6 51 24 33 30 43	
16 5 57 52 6 15 51 58	50 7 60 13 28 45 18 39	50 7 60 13 42 31 36 21	
33 44 24 29 43 34 30 23	32 41 22 35 54 3 64 9	44 29 34 23 52 5 58 15	
50--64- - 7-- 9---60--54---13 3	34 23 44 29 12 61 2 55	22 35 32 41 14 59 8 49	
31 17 42 40 21 27 36 46	27 46 17 40 49 8 59 14	47 26 37 20 55 2 61 12	
2 55 12 61	37 20 47 26 15 58 5 52	17 40 27 46 9 64 3 54	
47-----26-----37-----20			

12-----61----- 2-----55	7921/CC4	7921/C8M	7921/Sm1
37 20 47 26	12 61 2 55 34 23 44 29	12 61 2 55 20 37 26 47	
54 60 3 13 64 50 9 7	54 3 64 9 32 41 22 35	54 3 64 9 46 27 40 17	
27 21---46---36---17---31---40---42	15 58 5 52 37 20 47 26	15 58 5 52 23 34 29 44	
15 6 58 51 5 16 52 57	49 8 59 14 27 46 17 40	49 8 59 14 41 32 35 22	
34 43 23 30 44 33 29 24	31 42 21 36 53 4 63 10	43 30 33 24 51 6 57 16	
49--63- - 8--10---59--53---14 4	33 24 43 30 11 62 1 56	21 36 31 42 13 60 7 50	
32 18 41 39 22 28 35 45	28 45 18 39 50 7 60 13	48 25 38 19 56 1 62 11	
1 56 11 62	38 19 48 25 16 57 6 51	18 39 28 45 10 63 4 53	
48-----25-----38-----19			

13-----60----- 1-----56	8641/CC4	8641/C8M	8641/Sm1
36 21 48 25	13 60 1 56 33 24 45 28	13 60 1 56 21 36 25 48	
51 61 6 12 63 49 10 8	51 6 63 10 31 42 19 38	51 6 63 10 43 30 39 18	
30 20---43---37---18---32---39---41	16 57 4 53 36 21 48 25	16 57 4 53 24 33 28 45	
16 3 57 54 4 15 53 58	50 7 62 11 30 43 18 39	50 7 62 11 42 31 38 19	
33 46 24 27 45 34 28 23	32 41 20 37 52 5 64 9	46 27 34 23 54 3 58 15	
50--64- - 7-- 9---62--52---11 5	34 23 46 27 14 59 2 55	20 37 32 41 12 61 8 49	
31 17 42 40 19 29 38 44	29 44 17 40 49 8 61 12	47 26 35 22 55 2 59 14	
2 55 14 59	35 22 47 26 15 58 3 54	17 40 29 44 9 64 5 52	
47-----26-----35-----22			

14-----59----- 2-----55	9361/CC4	9361/C8M	9361/Sm1
35 22 47 26	14 59 2 55 34 23 46 27	14 59 2 55 22 35 26 47	
52 62 5 11 64 50 9 7	52 5 64 9 32 41 20 37	52 5 64 9 44 29 40 17	
29 19---44---38---17---31---40---42	15 58 3 54 35 22 47 26	15 58 3 54 23 34 27 46	
15 4 58 53 3 16 54 57	49 8 61 12 29 44 17 40	49 8 61 12 41 32 37 20	
34 45 23 28 46 33 27 24	31 42 19 38 51 6 63 10	45 28 33 24 53 4 57 16	
49--63- - 8--10---61--51---12 6	33 24 45 28 13 60 1 56	19 38 31 42 11 62 7 50	
32 18 41 39 20 30 37 43	30 43 18 39 50 7 62 11	48 25 36 21 56 1 60 13	
1 56 13 60	36 21 48 25 16 57 4 53	18 39 30 43 10 63 6 51	
48-----25-----36-----21			

15-----58----- 3-----54	10081/CC4	10081/C8M	10081/Sm1
34 23 46 27	15 58 3 54 35 22 47 26	15 58 3 54 23 34 27 46	
52 63 5 10 64 51 9 6	52 5 64 9 32 41 20 37	52 5 64 9 44 29 40 17	
29 18---44---39---17---30---40---43	14 59 2 55 34 23 46 27	14 59 2 55 22 35 26 47	
14 4 59 53 2 16 55 57	49 8 61 12 29 44 17 40	49 8 61 12 41 32 37 20	
35 45 22 28 47 33 26 24	30 43 18 39 50 7 62 11	45 28 33 24 53 4 57 16	
49--62- - 8--11---61--50---12 7	33 24 45 28 13 60 1 56	18 39 30 43 10 63 6 51	
32 19 41 38 20 31 37 42	31 42 19 38 51 6 63 10	48 25 36 21 56 1 60 13	
1 56 13 60	36 21 48 25 16 57 4 53	19 38 31 42 11 62 7 50	
48-----25-----36-----21			

16-----57----- 4-----53	10801/CC4	10801/C8M	10801/Sm1
33 24 45 28	16 57 4 53 36 21 48 25	16 57 4 53 24 33 28 45	
51 64 6 9 63 52 10 5	51 6 63 10 31 42 19 38	51 6 63 10 43 30 39 18	
30 17---43---40---18---29---39---44	13 60 1 56 33 24 45 28	13 60 1 56 21 36 25 48	
13 3 60 54 1 15 56 58	50 7 62 11 30 43 18 39	50 7 62 11 42 31 38 19	
36 46 21 27 48 34 25 23	29 44 17 40 49 8 61 12	46 27 34 23 54 3 58 15	
50--61- - 7--12---62--49---11 8	34 23 46 27 14 59 2 55	17 40 29 44 9 64 5 52	
31 20 42 37 19 32 38 41	32 41 20 37 52 5 64 9	47 26 35 22 55 2 59 14	
2 55 14 59	35 22 47 26 15 58 3 54	20 37 32 41 12 61 8 49	
47-----26-----35-----22			

..(skip)..

33-----64----- 2-----31	23041/CC4	23041/C8M	23041/Sm1
24 9 55 42	33 64 2 31 18 15 49 48	33 64 2 31 9 24 42 55	
30 57 3 40 61 26 36 7	30 3 61 36 45 52 14 19	30 3 61 36 54 43 21 12	
43 16---54--17---12--47---21--50	39 58 8 25 24 9 55 42	39 58 8 25 15 18 48 49	
39 6 58 27 8 37 25 60	28 5 59 38 43 54 12 21	28 5 59 38 52 45 19 14	
18 51 15 46 49 20 48 13	47 50 16 17 32 1 63 34	51 46 20 13 27 6 60 37	
28--63- - 5--34---59--32---38 1	20 13 51 46 35 62 4 29	16 17 47 50 40 57 7 26	
45 10 52 23 14 41 19 56	41 56 10 23 26 7 57 40	53 44 22 11 29 4 62 35	
4 29 35 62	22 11 53 44 37 60 6 27	10 23 41 56 34 63 1 32	
53-----44-----22-----11			

34-----63----- 1-----32	23761/CC4	23761/C8M	23761/Sm1
23 10 56 41	34 63 1 32 17 16 50 47	34 63 1 32 10 23 41 56	
29 58 4 39 62 25 35 8	29 4 62 35 46 51 13 20	29 4 62 35 53 44 22 11	
44 15---53--18---11--48---22--49	40 57 7 26 23 10 56 41	40 57 7 26 16 17 47 50	
40 5 57 28 7 38 26 59	27 6 60 37 44 53 11 22	27 6 60 37 51 46 20 13	
17 52 16 45 50 19 47 14	48 49 15 18 31 2 64 33	52 45 19 14 28 5 59 38	
27--64- - 6--33---60--31---37 2	19 14 52 45 36 61 3 30	15 18 48 49 39 58 8 25	
46 9 51 24 13 42 20 55	42 55 9 24 25 8 58 39	54 43 21 12 30 3 61 36	
3 30 36 61	21 12 54 43 38 59 5 28	9 24 42 55 33 64 2 31	
54-----43-----21-----12			

..(skip)..

62-----35-----14-----19	43921/CC4	43921/C8M	43921/Sm1
4 29 52 45	62 35 14 19 16 17 64 33	62 35 14 19 29 4 45 52	
11 63 22 34 59 15 38 18	11 22 59 38 57 40 9 24	11 22 59 38 44 53 28 5	
53 1---44--32--- 5--49---28--48	50 47 2 31 4 29 52 45	50 47 2 31 17 16 33 64	
50 10 47 23 2 58 31 39	7 26 55 42 53 44 5 28	7 26 55 42 40 57 24 9	
16 56 17 41 64 8 33 25	49 48 1 32 3 30 51 46	56 41 8 25 23 10 39 58	
7--51- -26--46---55-- 3---42 30	8 25 56 41 54 43 6 27	1 32 49 48 34 63 18 15	
57 13 40 20 9 61 24 36	61 36 13 20 15 18 63 34	60 37 12 21 27 6 43 54	
6 27 54 43	12 21 60 37 58 39 10 23	13 20 61 36 46 51 30 3	
60-----37-----12-----21			

63-----34-----15-----18	44641/CC4	44641/C8M	44641/Sm1
4 29 52 45	63 34 15 18 16 17 64 33	63 34 15 18 29 4 45 52	
10 62 23 35 58 14 39 19	10 23 58 39 57 40 9 24	10 23 58 39 44 53 28 5	
53 1---44--32--- 5--49---28--48	51 46 3 30 4 29 52 45	51 46 3 30 17 16 33 64	
51 11 46 22 3 59 30 38	6 27 54 43 53 44 5 28	6 27 54 43 40 57 24 9	
16 56 17 41 64 8 33 25	49 48 1 32 2 31 50 47	56 41 8 25 22 11 38 59	
6--50- -27--47---54-- 2---43 31	8 25 56 41 55 42 7 26	1 32 49 48 35 62 19 14	
57 13 40 20 9 61 24 36	61 36 13 20 14 19 62 35	60 37 12 21 26 7 42 55	
7 26 55 42	12 21 60 37 59 38 11 22	13 20 61 36 47 50 31 2	
60-----37-----12-----21			

64-----33-----16-----17	45361/CC4	45361/C8M	45361/Sm1
3 30 51 46	64 33 16 17 15 18 63 34	64 33 16 17 30 3 46 51	
9 61 24 36 57 13 40 20	9 24 57 40 58 39 10 23	9 24 57 40 43 54 27 6	
54 2---43--31--- 6--50---27--47	52 45 4 29 3 30 51 46	52 45 4 29 18 15 34 63	
52 12 45 21 4 60 29 37	5 28 53 44 54 43 6 27	5 28 53 44 39 58 23 10	
15 55 18 42 63 7 34 26	50 47 2 31 1 32 49 48	55 42 7 26 21 12 37 60	
5--49- -28--48---53-- 1---44 32	7 26 55 42 56 41 8 25	2 31 50 47 36 61 20 13	
58 14 39 19 10 62 23 35	62 35 14 19 13 20 61 36	59 38 11 22 25 8 41 56	
8 25 56 41	11 22 59 38 60 37 12 21	14 19 62 35 48 49 32 1	
59-----38-----11-----22			

[Count = 46080 x 3] OK!

Why! They are all what we have just wanted. Though we took simple transformation systems for all, the result proves to be perfect. All the transformed solutions are really genuine magic squares of order 8: Multiple type of 'C&C' MS88 and three-type

Simultaneous MS88: 'Composite', Self-complementary and Pan-diagonal. We could neither make any wrong solutions, nor miss any correct ones.

Our success means the sure existence of 'one-to-one correspondence' among them.

#5. Making the Smart List of 'Standard Solutions' of those Three

But you may be afraid that the list of 'primitive solutions' is too long to be tested, and you may want to have a smarter list of 'standard solutions'. It is natural.

Let's try to make a reasonable list, which expresses the one-to-one correspondence only with the standard solutions. We have to use the 'list-forming inequality condition complex' now to get that kind of list form.

Will you watch the next result list of my recent computation?

```
** Transform 'Composite and Complete' Magic Cubes of Order 4 into **
** 2 Types of Magic Squares of Order 8: CCMS88Multi and MS88Sm13 **
** List of Standard Solutions **
```

1-----63----- 4-----62	1/CC4	1/C8M	1/Sm1
48 18 45 19	1 63 4 62 36 30 33 31	1 63 4 62 18 48 19 45	
60 49 6 15 57 52 7 14	60 6 57 7 25 39 28 38	60 6 57 7 43 21 42 24	
21 32---43---34---24---29---42---35	13 51 16 50 48 18 45 19	13 51 16 50 30 36 31 33	
13 12 51 54 16 9 50 55	56 10 53 11 21 43 24 42	56 10 53 11 39 25 38 28	
36 37 30 27 33 40 31 26	29 35 32 34 64 2 61 3	37 27 40 26 54 12 55 9	
56--61- -10-- 3---53--64---11 2	40 26 37 27 5 59 8 58	32 34 29 35 15 49 14 52	
25 20 39 46 28 17 38 47	17 47 20 46 52 14 49 15	41 23 44 22 58 8 59 5	
8 58 5 59	44 22 41 23 9 55 12 54	20 46 17 47 3 61 2 64	
41-----23-----44-----22			

1-----63----- 4-----62	2/CC4	2/C8M	2/Sm1
32 34 29 35	1 63 4 62 20 46 17 47	1 63 4 62 34 32 35 29	
60 49 6 15 57 52 7 14	60 6 57 7 41 23 44 22	60 6 57 7 27 37 26 40	
37 48---27---18---40---45---26---19	13 51 16 50 32 34 29 35	13 51 16 50 46 20 47 17	
13 12 51 54 16 9 50 55	56 10 53 11 37 27 40 26	56 10 53 11 23 41 22 44	
20 21 46 43 17 24 47 42	45 19 48 18 64 2 61 3	21 43 24 42 54 12 55 9	
56--61- -10-- 3---53--64---11 2	24 42 21 43 5 59 8 58	48 18 45 19 15 49 14 52	
41 36 23 30 44 33 22 31	33 31 36 30 52 14 49 15	25 39 28 38 58 8 59 5	
8 58 5 59	28 38 25 39 9 55 12 54	36 30 33 31 3 61 2 64	
25-----39-----28-----38			

1-----63----- 4-----62	3/CC4	3/C8M	3/Sm1
56 10 53 11	1 63 4 62 36 30 33 31	1 63 4 62 10 56 11 53	
60 41 6 23 57 44 7 22	60 6 57 7 25 39 28 38	60 6 57 7 51 13 50 16	
13 32---51---34---16---29---50---35	21 43 24 42 56 10 53 11	21 43 24 42 30 36 31 33	
21 20 43 46 24 17 42 47	48 18 45 19 13 51 16 50	48 18 45 19 39 25 38 28	
36 37 30 27 33 40 31 26	29 35 32 34 64 2 61 3	37 27 40 26 46 20 47 17	
48--61- -18-- 3---45--64---19 2	40 26 37 27 5 59 8 58	32 34 29 35 23 41 22 44	
25 12 39 54 28 9 38 55	9 55 12 54 44 22 41 23	49 15 52 14 58 8 59 5	
8 58 5 59	52 14 49 15 17 47 20 46	12 54 9 55 3 61 2 64	
49-----15-----52-----14			

1-----63----- 4-----62	4/CC4	4/C8M	4/Sm1
32 34 29 35	1 63 4 62 12 54 9 55	1 63 4 62 34 32 35 29	
60 41 6 23 57 44 7 22	60 6 57 7 49 15 52 14	60 6 57 7 27 37 26 40	
37 56---27---10---40---53---26---11	21 43 24 42 32 34 29 35	21 43 24 42 54 12 55 9	
21 20 43 46 24 17 42 47	48 18 45 19 37 27 40 26	48 18 45 19 15 49 14 52	
12 13 54 51 9 16 55 50	53 11 56 10 64 2 61 3	13 51 16 50 46 20 47 17	
48--61- -18-- 3---45--64---19 2	16 50 13 51 5 59 8 58	56 10 53 11 23 41 22 44	
49 36 15 30 52 33 14 31	33 31 36 30 44 22 41 23	25 39 28 38 58 8 59 5	
8 58 5 59	28 38 25 39 17 47 20 46	36 30 33 31 3 61 2 64	
25-----39-----28-----38			

1-----63----- 4-----62	5/CC4	5/C8M	5/Sm1
56 10 53 11		1 63 4 62 20 46 17 47	1 63 4 62 10 56 11 53
60 25 6 39 57 28 7 38		60 6 57 7 41 23 44 22	60 6 57 7 51 13 50 16
13 48---51--18---16--45---50--19		37 27 40 26 56 10 53 11	37 27 40 26 46 20 47 17
37 36 27 30 40 33 26 31		32 34 29 35 13 51 16 50	32 34 29 35 23 41 22 44
20 21 46 43 17 24 47 42		45 19 48 18 64 2 61 3	21 43 24 42 30 36 31 33
32--61- -34-- 3--29--64--35 2		24 42 21 43 5 59 8 58	48 18 45 19 39 25 38 28
41 12 23 54 44 9 22 55		9 55 12 54 28 38 25 39	49 15 52 14 58 8 59 5
8 58 5 59		52 14 49 15 33 31 36 30	12 54 9 55 3 61 2 64
49-----15-----52-----14			

1-----63----- 4-----62	6/CC4	6/C8M	6/Sm1
48 18 45 19		1 63 4 62 12 54 9 55	1 63 4 62 18 48 19 45
60 25 6 39 57 28 7 38		60 6 57 7 49 15 52 14	60 6 57 7 43 21 42 24
21 56---43--10---24--53---42--11		37 27 40 26 48 18 45 19	37 27 40 26 54 12 55 9
37 36 27 30 40 33 26 31		32 34 29 35 21 43 24 42	32 34 29 35 15 49 14 52
12 13 54 51 9 16 55 50		53 11 56 10 64 2 61 3	13 51 16 50 30 36 31 33
32--61- -34-- 3--29--64--35 2		16 50 13 51 5 59 8 58	56 10 53 11 39 25 38 28
49 20 15 46 52 17 14 47		17 47 20 46 28 38 25 39	41 23 44 22 58 8 59 5
8 58 5 59		44 22 41 23 33 31 36 30	20 46 17 47 3 61 2 64
41-----23-----44-----22			

1-----63----- 4-----62	7/CC4	7/C8M	7/Sm1
48 18 45 19		1 63 4 62 36 30 33 31	1 63 4 62 18 48 19 45
56 49 10 15 53 52 11 14		56 10 53 11 21 43 24 42	56 10 53 11 39 25 38 28
25 32---39--34---28--29---38--35		13 51 16 50 48 18 45 19	13 51 16 50 30 36 31 33
13 8 51 58 16 5 50 59		60 6 57 7 25 39 28 38	60 6 57 7 43 21 42 24
36 41 30 23 33 44 31 22		29 35 32 34 64 2 61 3	41 23 44 22 58 8 59 5
60--61- - 6-- 3--57--64-- 7 2		44 22 41 23 9 55 12 54	32 34 29 35 15 49 14 52
21 20 43 46 24 17 42 47		17 47 20 46 52 14 49 15	37 27 40 26 54 12 55 9
12 54 9 55		40 26 37 27 5 59 8 58	20 46 17 47 3 61 2 64
37-----27-----40-----26			

0-----0----- 0----- 0	0/CC4	13/C8M	13/Sm1
0 0 0 0 0		1 63 4 62 36 30 33 31	1 63 4 62 10 56 11 53
0 0 0 0 0 0 0 0		48 18 45 19 13 51 16 50	48 18 45 19 39 25 38 28
0 0---0--0--0--0--0--0		21 43 24 42 56 10 53 11	21 43 24 42 30 36 31 33
0 0 0 0 0 0 0 0		60 6 57 7 25 39 28 38	60 6 57 7 51 13 50 16
0 0 0 0 0 0 0 0		29 35 32 34 64 2 61 3	49 15 52 14 58 8 59 5
0--0- -0--0---0--0---0 0		52 14 49 15 17 47 20 46	32 34 29 35 23 41 22 44
0 0 0 0 0 0 0 0		9 55 12 54 44 22 41 23	37 27 40 26 46 20 47 17
0 0 0 0		40 26 37 27 5 59 8 58	12 54 9 55 3 61 2 64
0-----0----- 0----- 0			

0-----0----- 0----- 0	0/CC4	19/C8M	19/Sm1
0 0 0 0 0		1 63 4 62 20 46 17 47	1 63 4 62 10 56 11 53
0 0 0 0 0 0 0 0		32 34 29 35 13 51 16 50	32 34 29 35 23 41 22 44
0 0---0--0--0--0--0--0		37 27 40 26 56 10 53 11	37 27 40 26 46 20 47 17
0 0 0 0 0 0 0 0		60 6 57 7 41 23 44 22	60 6 57 7 51 13 50 16
0 0 0 0 0 0 0 0		45 19 48 18 64 2 61 3	49 15 52 14 58 8 59 5
0--0- -0--0---0--0---0 0		52 14 49 15 33 31 36 30	48 18 45 19 39 25 38 28
0 0 0 0 0 0 0 0		9 55 12 54 28 38 25 39	21 43 24 42 30 36 31 33
0 0 0 0		24 42 21 43 5 59 8 58	12 54 9 55 3 61 2 64
0-----0----- 0----- 0			

1-----63----- 6-----60	13/CC4	25/C8M	25/Sm1
48 18 43 21		1 63 6 60 38 28 33 31	1 63 6 60 18 48 21 43
62 49 4 15 57 54 7 12		62 4 57 7 25 39 30 36	62 4 57 7 45 19 42 24
19 32---45--34---24--27---42--37		11 53 16 50 48 18 43 21	11 53 16 50 28 38 31 33
11 14 53 52 16 9 50 55		56 10 51 13 19 45 24 42	56 10 51 13 39 25 36 30
38 35 28 29 33 40 31 26		27 37 32 34 64 2 59 5	35 29 40 26 52 14 55 9
56--59- -10-- 5--51--64--13 2		40 26 35 29 3 61 8 58	32 34 27 37 15 49 12 54
25 22 39 44 30 17 36 47		17 47 22 44 54 12 49 15	41 23 46 20 58 8 61 3
8 58 3 61		46 20 41 23 9 55 14 52	22 44 17 47 5 59 2 64
41-----23-----46-----20			

1-----63-----6-----60	19/CC4	31/C8M	31/Sm1
48 18 43 21	1 63 6 60 38 28 33 31	1 63 6 60 18 48 21 43	
56 49 10 15 51 54 13 12	56 10 51 13 19 45 24 42	56 10 51 13 39 25 36 30	
25 32---39---34---30---27---36---37	11 53 16 50 48 18 43 21	11 53 16 50 28 38 31 33	
11 8 53 58 16 3 50 61	62 4 57 7 25 39 30 36	62 4 57 7 45 19 42 24	
38 41 28 23 33 46 31 20	27 37 32 34 64 2 59 5	41 23 46 20 58 8 61 3	
62--59- - 4-- 5---57--64--- 7 2	46 20 41 23 9 55 14 52	32 34 27 37 15 49 12 54	
19 22 45 44 24 17 42 47	17 47 22 44 54 12 49 15	35 29 40 26 52 14 55 9	
14 52 9 55	40 26 35 29 3 61 8 58	22 44 17 47 5 59 2 64	
35-----29-----40-----26			

0-----0-----0-----0	0/CC4	37/C8M	37/Sm1
0 0 0 0 0	1 63 6 60 38 28 33 31	1 63 6 60 10 56 13 51	
0 0 0 0 0 0 0 0	48 18 43 21 11 53 16 50	48 18 43 21 39 25 36 30	
0 0---0--0---0--0---0--0--0	19 45 24 42 56 10 51 13	19 45 24 42 28 38 31 33	
0 0 0 0 0 0 0 0	62 4 57 7 25 39 30 36	62 4 57 7 53 11 50 16	
0 0 0 0 0 0 0 0	27 37 32 34 64 2 59 5	49 15 54 12 58 8 61 3	
0--0- -0--0---0--0---0 0	54 12 49 15 17 47 22 44	32 34 27 37 23 41 20 46	
0 0 0 0 0 0 0 0	9 55 14 52 46 20 41 23	35 29 40 26 44 22 47 17	
0 0 0 0	40 26 35 29 3 61 8 58	14 52 9 55 5 59 2 64	
0-----0-----0-----0			

0-----0-----0-----0	0/CC4	43/C8M	43/Sm1
0 0 0 0 0	1 63 6 60 22 44 17 47	1 63 6 60 10 56 13 51	
0 0 0 0 0 0 0 0	32 34 27 37 11 53 16 50	32 34 27 37 23 41 20 46	
0 0---0--0---0--0---0--0--0	35 29 40 26 56 10 51 13	35 29 40 26 44 22 47 17	
0 0 0 0 0 0 0 0	62 4 57 7 41 23 46 20	62 4 57 7 53 11 50 16	
0 0 0 0 0 0 0 0	43 21 48 18 64 2 59 5	49 15 54 12 58 8 61 3	
0--0- -0--0---0--0---0 0	54 12 49 15 33 31 38 28	48 18 43 21 39 25 36 30	
0 0 0 0 0 0 0 0	9 55 14 52 30 36 25 39	19 45 24 42 28 38 31 33	
0 0 0 0	24 42 19 45 3 61 8 58	14 52 9 55 5 59 2 64	
0-----0-----0-----0			

1-----63-----10-----56	25/CC4	49/C8M	49/Sm1
48 18 39 25	1 63 10 56 42 24 33 31	1 63 10 56 18 48 25 39	
62 49 4 15 53 58 11 8	62 4 53 11 21 43 30 36	62 4 53 11 45 19 38 28	
19 32---45---34---28---23---38---41	7 57 16 50 48 18 39 25	7 57 16 50 24 42 31 33	
7 14 57 52 16 5 50 59	60 6 51 13 19 45 28 38	60 6 51 13 43 21 36 30	
42 35 24 29 33 44 31 22	23 41 32 34 64 2 55 9	35 29 44 22 52 14 59 5	
60--55- - 6-- 9---51--64---13 2	44 22 35 29 3 61 12 54	32 34 23 41 15 49 8 58	
21 26 43 40 30 17 36 47	17 47 26 40 58 8 49 15	37 27 46 20 54 12 61 3	
12 54 3 61	46 20 37 27 5 59 14 52	26 40 17 47 9 55 2 64	
37-----27-----46-----20			

1-----63-----18-----48	37/CC4	73/C8M	73/Sm1
56 10 39 25	1 63 18 48 50 16 33 31	1 63 18 48 10 56 25 39	
62 41 4 23 45 58 19 8	62 4 45 19 13 51 30 36	62 4 45 19 53 11 38 28	
11 32---53---34---28---15---38---49	7 57 24 42 56 10 39 25	7 57 24 42 16 50 31 33	
7 22 57 44 24 5 42 59	60 6 43 21 11 53 28 38	60 6 43 21 51 13 36 30	
50 35 16 29 33 52 31 14	15 49 32 34 64 2 47 17	35 29 52 14 44 22 59 5	
60--47- - 6--17---43--64---21 2	52 14 35 29 3 61 20 46	32 34 15 49 23 41 8 58	
13 26 51 40 30 9 36 55	9 55 26 40 58 8 41 23	37 27 54 12 46 20 61 3	
20 46 3 61	54 12 37 27 5 59 22 44	26 40 9 55 17 47 2 64	
37-----27-----54-----12			

1-----63-----34-----32	49/CC4	97/C8M	97/Sm1
56 10 23 41	1 63 34 32 50 16 17 47	1 63 34 32 10 56 41 23	
62 25 4 39 29 58 35 8	62 4 29 35 13 51 46 20	62 4 29 35 53 11 22 44	
11 48---53---18---44---15---22---49	7 57 40 26 56 10 23 41	7 57 40 26 16 50 47 17	
7 38 57 28 40 5 26 59	60 6 27 37 11 53 44 22	60 6 27 37 51 13 20 46	
50 19 16 45 17 52 47 14	15 49 48 18 64 2 31 33	19 45 52 14 28 38 59 5	
60--31- - 6--33---27--64---37 2	52 14 19 45 3 61 36 30	48 18 15 49 39 25 8 58	
13 42 51 24 46 9 20 55	9 55 42 24 58 8 25 39	21 43 54 12 30 36 61 3	
36 30 3 61	54 12 21 43 5 59 38 28	42 24 9 55 33 31 2 64	
21-----43-----54-----12			

1-----62----- 4-----63	61/CC4	121/C8M	121/Sm1
48 19 45 18	1 62 4 63 36 31 33 30	1 62 4 63 19 48 18 45	
60 49 7 14 57 52 6 15	60 7 57 6 25 38 28 39	60 7 57 6 42 21 43 24	
21 32---42---35---24---29---43---34	13 50 16 51 48 19 45 18	13 50 16 51 31 36 30 33	
13 12 50 55 16 9 51 54	56 11 53 10 21 42 24 43	56 11 53 10 38 25 39 28	
36 37 31 26 33 40 30 27	29 34 32 35 64 3 61 2	37 26 40 27 55 12 54 9	
56--61- -11-- 2---53--64---10 3	40 27 37 26 5 58 8 59	32 35 29 34 14 49 15 52	
25 20 38 47 28 17 39 46	17 46 20 47 52 15 49 14	41 22 44 23 59 8 58 5	
8 59 5 58	44 23 41 22 9 54 12 55	20 47 17 46 2 61 3 64	
41-----22-----44-----23			

2-----64----- 3-----61	121/CC4	361/C8M	361/Sm1
47 17 46 20	2 64 3 61 35 29 34 32	2 64 3 61 17 47 20 46	
59 50 5 16 58 51 8 13	59 5 58 8 26 40 27 37	59 5 58 8 44 22 41 23	
22 31---44---33---23---30---41---36	14 52 15 49 47 17 46 20	14 52 15 49 29 35 32 34	
14 11 52 53 15 10 49 56	55 9 54 12 22 44 23 41	55 9 54 12 40 26 37 27	
35 38 29 28 34 39 32 25	30 36 31 33 63 1 62 4	38 28 39 25 53 11 56 10	
55--62- - 9-- 4---54--63---12 1	39 25 38 28 6 60 7 57	31 33 30 36 16 50 13 51	
26 19 40 45 27 18 37 48	18 48 19 45 51 13 50 16	42 24 43 21 57 7 60 6	
7 57 6 60	43 21 42 24 10 56 11 53	19 45 18 48 4 62 1 63	
42-----24-----43-----21			

3-----64----- 2-----61	241/CC4	721/C8M	721/Sm1
46 17 47 20	3 64 2 61 34 29 35 32	3 64 2 61 17 46 20 47	
58 51 5 16 59 50 8 13	58 5 59 8 27 40 26 37	58 5 59 8 44 23 41 22	
23 30---44---33---22---31---41---36	15 52 14 49 46 17 47 20	15 52 14 49 29 34 32 35	
15 10 52 53 14 11 49 56	54 9 55 12 23 44 22 41	54 9 55 12 40 27 37 26	
34 39 29 28 35 38 32 25	31 36 30 33 62 1 63 4	39 28 38 25 53 10 56 11	
54--63- - 9-- 4---55--62---12 1	38 25 39 28 7 60 6 57	30 33 31 36 16 51 13 50	
27 18 40 45 26 19 37 48	19 48 18 45 50 13 51 16	43 24 42 21 57 6 60 7	
6 57 7 60	42 21 43 24 11 56 10 53	18 45 19 48 4 63 1 62	
43-----24-----42-----21			

4-----63----- 1-----62	337/CC4	1081/C8M	1081/Sm1
45 18 48 19	4 63 1 62 33 30 36 31	4 63 1 62 18 45 19 48	
57 52 6 15 60 49 7 14	57 6 60 7 28 39 25 38	57 6 60 7 43 24 42 21	
24 29---43---34---21---32---42---35	16 51 13 50 45 18 48 19	16 51 13 50 30 33 31 36	
16 9 51 54 13 12 50 55	53 10 56 11 24 43 21 42	53 10 56 11 39 28 38 25	
33 40 30 27 36 37 31 26	32 35 29 34 61 2 64 3	40 27 37 26 54 9 55 12	
53--64- -10-- 3---56--61---11 2	37 26 40 27 8 59 5 58	29 34 32 35 15 52 14 49	
28 17 39 46 25 20 38 47	20 47 17 46 49 14 52 15	44 23 41 22 58 5 59 8	
5 58 8 59	41 22 44 23 12 55 9 54	17 46 20 47 3 64 2 61	
44-----23-----41-----22			

5-----64----- 2-----59	433/CC4	1441/C8M	1441/Sm1
44 17 47 22	5 64 2 59 34 27 37 32	5 64 2 59 17 44 22 47	
58 53 3 16 61 50 8 11	58 3 61 8 29 40 26 35	58 3 61 8 46 23 41 20	
23 28---46---33---20---31---41---38	15 54 12 49 44 17 47 22	15 54 12 49 27 34 32 37	
15 10 54 51 12 13 49 56	52 9 55 14 23 46 20 41	52 9 55 14 40 29 35 26	
34 39 27 30 37 36 32 25	31 38 28 33 60 1 63 6	39 30 36 25 51 10 56 13	
52--63- - 9-- 6---55--60---14 1	36 25 39 30 7 62 4 57	28 33 31 38 16 53 11 50	
29 18 40 43 26 21 35 48	21 48 18 43 50 11 53 16	45 24 42 19 57 4 62 7	
4 57 7 62	42 19 45 24 13 56 10 51	18 43 21 48 6 63 1 60	
45-----24-----42-----19			

6-----63----- 1-----60	505/CC4	1801/C8M	1765/Sm1
43 18 48 21	6 63 1 60 33 28 38 31	6 63 1 60 18 43 21 48	
57 54 4 15 62 49 7 12	57 4 62 7 30 39 25 36	57 4 62 7 45 24 42 19	
24 27---45---34---19---32---42---37	16 53 11 50 43 18 48 21	16 53 11 50 28 33 31 38	
16 9 53 52 11 14 50 55	51 10 56 13 24 45 19 42	51 10 56 13 39 30 36 25	
33 40 28 29 38 35 31 26	32 37 27 34 59 2 64 5	40 29 35 26 52 9 55 14	
51--64- -10-- 5---56--59---13 2	35 26 40 29 8 61 3 58	27 34 32 37 15 54 12 49	
30 17 39 44 25 22 36 47	22 47 17 44 49 12 54 15	46 23 41 20 58 3 61 8	
3 58 8 61	41 20 46 23 14 55 9 52	17 44 22 47 5 64 2 59	
46-----23-----41-----20			

7-----62-----1-----60	577/CC4	2161/C8M	2089/Sm1
42 19 48 21	7 62 1 60 33 28 39 30	7 62 1 60 19 42 21 48	
57 55 4 14 63 49 6 12	57 4 63 6 31 38 25 36	57 4 63 6 45 24 43 18	
24 26---45---35---18---32---43---37	16 53 10 51 42 19 48 21	16 53 10 51 28 33 30 39	
16 9 53 52 10 15 51 54	50 11 56 13 24 45 18 43	50 11 56 13 38 31 36 25	
33 40 28 29 39 34 30 27	32 37 26 35 58 3 64 5	40 29 34 27 52 9 54 15	
50--64- -11--5---56--58---13 3	34 27 40 29 8 61 2 59	26 35 32 37 14 55 12 49	
31 17 38 44 25 23 36 46	23 46 17 44 49 12 55 14	47 22 41 20 59 2 61 8	
2 59 8 61	41 20 47 22 15 54 9 52	17 44 23 46 5 64 3 58	
47-----22-----41-----20			

8-----61-----2-----59	631/CC4	2521/C8M	2413/Sm1
41 20 47 22	8 61 2 59 34 27 40 29	8 61 2 59 20 41 22 47	
58 56 3 13 64 50 5 11	58 3 64 5 32 37 26 35	58 3 64 5 46 23 44 17	
23 25---46---36---17---31---44---38	15 54 9 52 41 20 47 22	15 54 9 52 27 34 29 40	
15 10 54 51 9 16 52 53	49 12 55 14 23 46 17 44	49 12 55 14 37 32 35 26	
34 39 27 30 40 33 29 28	31 38 25 36 57 4 63 6	39 30 33 28 51 10 53 16	
49--63- -12--6---55--57---14 4	33 28 39 30 7 62 1 60	25 36 31 38 13 56 11 50	
32 18 37 43 26 24 35 45	24 45 18 43 50 11 56 13	48 21 42 19 60 1 62 7	
1 60 7 62	42 19 48 21 16 53 10 51	18 43 24 45 6 63 4 57	
48-----21-----42-----19			

9-----64-----2-----55	685/CC4	2881/C8M	2737/Sm1
40 17 47 26	9 64 2 55 34 23 41 32	9 64 2 55 17 40 26 47	
54 57 3 16 61 50 12 7	54 3 61 12 29 44 22 35	54 3 61 12 46 27 37 20	
27 24---46---33---20---31---37---42	15 58 8 49 40 17 47 26	15 58 8 49 23 34 32 41	
15 6 58 51 8 13 49 60	52 5 59 14 27 46 20 37	52 5 59 14 44 29 35 22	
34 43 23 30 41 36 32 21	31 42 24 33 56 1 63 10	43 30 36 21 51 6 60 13	
52--63- -5--10---59--56---14 1	36 21 43 30 11 62 4 53	24 33 31 42 16 57 7 50	
29 18 44 39 22 25 35 48	25 48 18 39 50 7 57 16	45 28 38 19 53 4 62 11	
4 53 11 62	38 19 45 28 13 60 6 51	18 39 25 48 10 63 1 56	
45-----28-----38-----19			

10-----63-----1-----56	733/CC4	3169/C8M	2989/Sm1
39 18 48 25	10 63 1 56 33 24 42 31	10 63 1 56 18 39 25 48	
53 58 4 15 62 49 11 8	53 4 62 11 30 43 21 36	53 4 62 11 45 28 38 19	
28 23---45---34---19---32---38---41	16 57 7 50 39 18 48 25	16 57 7 50 24 33 31 42	
16 5 57 52 7 14 50 59	51 6 60 13 28 45 19 38	51 6 60 13 43 30 36 21	
33 44 24 29 42 35 31 22	32 41 23 34 55 2 64 9	44 29 35 22 52 5 59 14	
51--64- -6--9---60--55---13 2	35 22 44 29 12 61 3 54	23 34 32 41 15 58 8 49	
30 17 43 40 21 26 36 47	26 47 17 40 49 8 58 15	46 27 37 20 54 3 61 12	
3 54 12 61	37 20 46 27 14 59 5 52	17 40 26 47 9 64 2 55	
46-----27-----37-----20			

11-----62-----1-----56	781/CC4	3457/C8M	3241/Sm1
38 19 48 25	11 62 1 56 33 24 43 30	11 62 1 56 19 38 25 48	
53 59 4 14 63 49 10 8	53 4 63 10 31 42 21 36	53 4 63 10 45 28 39 18	
28 22---45---35---18---32---39---41	16 57 6 51 38 19 48 25	16 57 6 51 24 33 30 43	
16 5 57 52 6 15 51 58	50 7 60 13 28 45 18 39	50 7 60 13 42 31 36 21	
33 44 24 29 43 34 30 23	32 41 22 35 54 3 64 9	44 29 34 23 52 5 58 15	
50--64- -7--9---60--54---13 3	34 23 44 29 12 61 2 55	22 35 32 41 14 59 8 49	
31 17 42 40 21 27 36 46	27 46 17 40 49 8 59 14	47 26 37 20 55 2 61 12	
2 55 12 61	37 20 47 26 15 58 5 52	17 40 27 46 9 64 3 54	
47-----26-----37-----20			

12-----61-----2-----55	811/CC4	3745/C8M	3493/Sm1
37 20 47 26	12 61 2 55 34 23 44 29	12 61 2 55 20 37 26 47	
54 60 3 13 64 50 9 7	54 3 64 9 32 41 22 35	54 3 64 9 46 27 40 17	
27 21---46---36---17---31---40---42	15 58 5 52 37 20 47 26	15 58 5 52 23 34 29 44	
15 6 58 51 5 16 52 57	49 8 59 14 27 46 17 40	49 8 59 14 41 32 35 22	
34 43 23 30 44 33 29 24	31 42 21 36 53 4 63 10	43 30 33 24 51 6 57 16	
49--63- -8--10---59--53---14 4	33 24 43 30 11 62 1 56	21 36 31 42 13 60 7 50	
32 18 41 39 22 28 35 45	28 45 18 39 50 7 60 13	48 25 38 19 56 1 62 11	
1 56 11 62	38 19 48 25 16 57 6 51	18 39 28 45 10 63 4 53	
48-----25-----38-----19			

0-----0-----0-----0	0/CC4	4033/C8M	3745/Sm1
0 0 0 0		13 60 1 56 33 24 45 28	13 60 1 56 21 36 25 48
0 0 0 0 0 0 0 0		51 6 63 10 31 42 19 38	51 6 63 10 43 30 39 18
0 0---0---0---0---0---0---0		16 57 4 53 36 21 48 25	16 57 4 53 24 33 28 45
0 0 0 0 0 0 0 0		50 7 62 11 30 43 18 39	50 7 62 11 42 31 38 19
0 0 0 0 0 0 0 0		32 41 20 37 52 5 64 9	46 27 34 23 54 3 58 15
0--0- -0--0---0--0---0 0		34 23 46 27 14 59 2 55	20 37 32 41 12 61 8 49
0 0 0 0 0 0 0 0		29 44 17 40 49 8 61 12	47 26 35 22 55 2 59 14
0 0 0		35 22 47 26 15 58 3 54	17 40 29 44 9 64 5 52
0-----0-----0-----0			

.. (skip) ..

0-----0-----0-----0	0/CC4	0/C8M	4553/Sm1
0 0 0 0		0 0 0 0 0 0 0 0	16 51 46 17 6 57 40 27
0 0 0 0 0 0 0 0		0 0 0 0 0 0 0 0	50 13 20 47 60 7 26 37
0 0---0---0---0---0---0---0		0 0 0 0 0 0 0 0	31 36 61 2 21 42 55 12
0 0 0 0 0 0 0 0		0 0 0 0 0 0 0 0	33 30 3 64 43 24 9 54
0 0 0 0 0 0 0 0		0 0 0 0 0 0 0 0	11 56 41 22 1 62 35 32
0--0- -0--0---0--0---0 0		0 0 0 0 0 0 0 0	53 10 23 44 63 4 29 34
0 0 0 0 0 0 0 0		0 0 0 0 0 0 0 0	28 39 58 5 18 45 52 15
0 0 0		0 0 0 0 0 0 0 0	38 25 8 59 48 19 14 49
0-----0-----0-----0			

0-----0-----0-----0	0/CC4	5121/C8M	4557/Sm1
0 0 0 0		16 51 46 17 45 18 15 52	16 51 46 17 6 57 40 27
0 0 0 0 0 0 0 0		33 30 3 64 4 63 34 29	33 30 3 64 43 24 9 54
0 0---0---0---0---0---0---0		28 39 58 5 57 6 27 40	28 39 58 5 18 45 52 15
0 0 0 0 0 0 0 0		53 10 23 44 24 43 54 9	53 10 23 44 63 4 29 34
0 0 0 0 0 0 0 0		20 47 50 13 49 14 19 48	31 36 61 2 21 42 55 12
0--0- -0--0---0--0---0 0		61 2 31 36 32 35 62 1	50 13 20 47 60 7 26 37
0 0 0 0 0 0 0 0		8 59 38 25 37 26 7 60	11 56 41 22 1 62 35 32
0 0 0		41 22 11 56 12 55 42 21	38 25 8 59 48 19 14 49
0-----0-----0-----0			

0-----0-----0-----0	0/CC4	5125/C8M	0/Sm1
0 0 0 0		16 50 7 57 39 25 48 18	0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0		33 31 42 24 10 56 1 63	0 0 0 0 0 0 0 0
0 0---0---0---0---0---0---0		28 38 19 45 51 13 60 6	0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0		53 11 62 4 30 36 21 43	0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0		26 40 17 47 49 15 58 8	0 0 0 0 0 0 0 0
0--0- -0--0---0--0---0 0		55 9 64 2 32 34 23 41	0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0		14 52 5 59 37 27 46 20	0 0 0 0 0 0 0 0
0 0 0		35 29 44 22 12 54 3 61	0 0 0 0 0 0 0 0
0-----0-----0-----0			

.. (skip) ..

0-----0-----0-----0	0/CC4	5545/C8M	0/Sm1
0 0 0 0		22 59 2 47 34 15 54 27	0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0		44 5 64 17 32 49 12 37	0 0 0 0 0 0 0 0
0 0---0---0---0---0---0---0		23 58 3 46 35 14 55 26	0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0		41 8 61 20 29 52 9 40	0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0		31 50 11 38 43 6 63 18	0 0 0 0 0 0 0 0
0--0- -0--0---0--0---0 0		33 16 53 28 21 60 1 48	0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0		30 51 10 39 42 7 62 19	0 0 0 0 0 0 0 0
0 0 0		36 13 56 25 24 57 4 45	0 0 0 0 0 0 0 0
0-----0-----0-----0			

0-----0-----0-----0	0/CC4	5617/C8M	0/Sm1
0 0 0 0		23 58 3 46 35 14 55 26	0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0		44 5 64 17 32 49 12 37	0 0 0 0 0 0 0 0
0 0---0---0---0---0---0---0		22 59 2 47 34 15 54 27	0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0		41 8 61 20 29 52 9 40	0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0		30 51 10 39 42 7 62 19	0 0 0 0 0 0 0 0
0--0- -0--0---0--0---0 0		33 16 53 28 21 60 1 48	0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0		31 50 11 38 43 6 63 18	0 0 0 0 0 0 0 0
0 0 0		36 13 56 25 24 57 4 45	0 0 0 0 0 0 0 0
0-----0-----0-----0			

#6. Discussion

We now know there are beautiful one-to-one correspondences among the three sets of primitive solutions: (1) 'C&C' magic cubes 4^3 , (2) Multiple 'C&C' magic squares 8^2 , (3) three-type Simultaneous MS 8^2 : Composite, Self-complementary and Pan-diagonal. We also certified we could make all these magic things at the same time only with those simple transformation methods. What does it mean? What makes it possible?

In this section right here, we have not yet made any 'view forms' of ECO 2^6 , which is the main theme of this Chapter 7. But we could reach to the relationship among those three magic things only by our ordinary method of composition and transformation.

All of these three seem to be the different faces of the same body. In other words they surely seem to be 'brother' and 'sisters' of a family, don't they?

I myself think that their true 'Origin', or you might say, 'father' must be the very Extra-Cubic Object of order 2^6 , which we have intensively studied in this chapter.

I believe that there exists a noble family whose father hides himself in the six-dimensional world and it is realized by his three children in this world where we live.

Do you think I am too inclined to be metaphysical?

(Written in Japanese on October 11, 2006, in English on February 6, 2007
by Kanji Setsuda working on MacOSX(10.4) and Xcode 2.2)

E-Mail Address <jag12001@nifty.com>

```
/** Transform 'Composite and Complete' Magic Cubes of Order 4 into **/  
/** 2 Types of Magic Squares of Order 8: CCMS88Multi and MS88Sml3 **/  
/** 'MC4CC2TMS8.c' built by Kanji Setsuda **/  
/** on Jan.12, 2005; Oct. 8, 2006; **/  
/** Working on MacOSX and Xcode 2.2 **/  
/**/  
#include <stdio.h>  
/**/  
/* Global Var. */  
long int cnt, cnt0, cnt1, cnt2, cnt3;  
short CC, LSM;  
short nm[65], uflg[65];  
short cnm[65];  
short p[4][65];  
/**/  
/* Functions(Sub-Routines) */  
void stp01(void), stp02(void), stp03(void), stp04(void);  
void stp05(void), stp06(void), stp07(void), stp08(void);  
void stp09(void), stp10(void), stp11(void), stp12(void);  
void stp13(void), stp14(void), stp15(void), stp16(void);  
void stp17(void), stp18(void), stp19(void), stp20(void);  
void stp21(void), stp22(void), stp23(void), stp24(void);  
void stp25(void), stp26(void), stp27(void), stp28(void);  
void stp29(void), stp30(void), stp31(void), stp32(void);  
/**/  
void ansprint(void), solprint(void);  
void pr3sol(void);  
/**/  
/* Main Program */  
int main(){  
    short n;  
    printf("\n** Transform 'Composite and Complete' Magic Cubes of Order 4 into **\n");  
    printf("** 2 Types of Magic Squares of Order 8: CCMS88Multi and MS88Sml3 **\n");  
    LSM=130; CC=65; cnt=0; cnt0=0; cnt1=0; cnt2=0;  
    for(n=0;n<65;n++){nm[n]=0; uflg[n]=0;}
```

```

    stp01(); /* Begin the Calculations */
    printf("\n [Count = %d] OK!\n",cnt);
    return 0;
}
/**/
/* Begin the Calculations */
/* Define Level 1: */
/* Set N1 & n43 */
void stp01(){
    short a,b;
    for(a=1;a<65;a++){b=CC-a;
        if((uflg[a]==0)&&(uflg[b]==0)){
            nm[1]=a; nm[43]=b;
            uflg[a]=1; uflg[b]=1;
            stp02();
            uflg[b]=0; uflg[a]=0;}
    }
}
/* Set N2 & n44 */
void stp02(){
    short a,b;
    for(a=64;a>0;a--){b=CC-a;
        if((uflg[a]==0)&&(uflg[b]==0)){
            nm[2]=a; nm[44]=b;
            uflg[a]=1; uflg[b]=1; cnt3=0;
            stp03();
            uflg[b]=0; uflg[a]=0;}
    }
}
/* Set N4 & n42 */
void stp03(){
    short a,b;
    for(a=64;a>0;a--){b=CC-a;
        if((uflg[a]==0)&&(uflg[b]==0)){
            nm[4]=a; nm[42]=b;
            uflg[a]=1; uflg[b]=1;
            stp04();
            uflg[b]=0; uflg[a]=0;}
    }
}
/* Set n3=130-n1-n2-n4 & n41 */
void stp04(){
    short a,b;
    a=LSM-nm[1]-nm[2]-nm[4];
    if((0<a)&&(a<65)){
        b=LSM-nm[43]-nm[44]-nm[42];
        if(a+b==CC){
            if((uflg[a]==0)&&(uflg[b]==0)){
                nm[3]=a; nm[41]=b;
                uflg[a]=1; uflg[b]=1;
                stp05();
                uflg[b]=0; uflg[a]=0;}}}}
}
/* Set N5 & n47 */
void stp05(){
    short a,b;
    for(a=64;a>0;a--){b=CC-a;
        if((uflg[a]==0)&&(uflg[b]==0)){
            nm[5]=a; nm[47]=b;
            uflg[a]=1; uflg[b]=1;
            stp06();
            uflg[b]=0; uflg[a]=0;}
    }
}
}

```

```

/* Set n6=130-n1-n2-n5 & n48 */
void stp06(){
short a,b;
a=LSM-nm[1]-nm[2]-nm[5];
if((0<a)&&(a<65)){
b=LSM-nm[43]-nm[44]-nm[47];
if(a+b==CC){
if((uflg[a]==0)&&(uflg[b]==0)){
nm[6]=a; nm[48]=b;
uflg[a]=1; uflg[b]=1;
stp07();
uflg[b]=0; uflg[a]=0;}}}
}
/* Set n7=130-n2-n3-n6 & n45 */
void stp07(){
short a,b;
a=LSM-nm[2]-nm[3]-nm[6];
if((0<a)&&(a<65)){
b=LSM-nm[44]-nm[41]-nm[48];
if(a+b==CC){
if((uflg[a]==0)&&(uflg[b]==0)){
nm[7]=a; nm[45]=b;
uflg[a]=1; uflg[b]=1;
stp08();
uflg[b]=0; uflg[a]=0;}}}
}
/* Set n8=130-n3-n4-n7 & n46 */
void stp08(){
short a,b,c,d;
a=LSM-nm[3]-nm[4]-nm[7];
if((0<a)&&(a<65)){
b=LSM-nm[41]-nm[42]-nm[45];
if(a+b==CC){
c=LSM-nm[4]-nm[1]-nm[5];
d=LSM-nm[42]-nm[43]-nm[47];
if((a==c)&&(b==d)){
if((uflg[a]==0)&&(uflg[b]==0)){
nm[8]=a; nm[46]=b;
uflg[a]=1; uflg[b]=1;
stp09();
uflg[b]=0; uflg[a]=0;}}}}
}
}
/* Define Level 2: */
/* Set N13 & n39 */
void stp09(){
short a,b;
for(a=64;a>0;a--){b=CC-a;
if((uflg[a]==0)&&(uflg[b]==0)){
nm[13]=a; nm[39]=b;
uflg[a]=1; uflg[b]=1;
stp10();
uflg[b]=0; uflg[a]=0;}}
}
}
/* Set n9=130-n1-n5-n13 & n35 */
void stp10(){
short a,b;
a=LSM-nm[1]-nm[5]-nm[13];
if((0<a)&&(a<65)){
b=LSM-nm[43]-nm[47]-nm[39];
if(a+b==CC){
if((uflg[a]==0)&&(uflg[b]==0)){
nm[9]=a; nm[35]=b;
uflg[a]=1; uflg[b]=1;
}
}
}
}

```

```

        stp11();
        uflg[b]=0; uflg[a]=0;}}}
}
/* Set n10=130-n5-n6-n9 & n36 */
void stp11(){
short a,b;
a=LSM-nm[5]-nm[6]-nm[9];
if((0<a)&&(a<65)){
b=LSM-nm[47]-nm[48]-nm[35];
if(a+b==CC){
if((uflg[a]==0)&&(uflg[b]==0)){
nm[10]=a; nm[36]=b;
uflg[a]=1; uflg[b]=1;
stp12();
uflg[b]=0; uflg[a]=0;}}}
}
/* Set n11=130-n6-n7-n10 & n33 */
void stp12(){
short a,b;
a=LSM-nm[6]-nm[7]-nm[10];
if((0<a)&&(a<65)){
b=LSM-nm[48]-nm[45]-nm[36];
if(a+b==CC){
if((uflg[a]==0)&&(uflg[b]==0)){
nm[11]=a; nm[33]=b;
uflg[a]=1; uflg[b]=1;
stp13();
uflg[b]=0; uflg[a]=0;}}}
}
/* Set n12=130-n7-n8-n11 & n34 */
void stp13(){
short a,b,c,d;
a=LSM-nm[7]-nm[8]-nm[11];
if((0<a)&&(a<65)){
b=LSM-nm[45]-nm[46]-nm[33];
if(a+b==CC){
c=LSM-nm[8]-nm[5]-nm[9];
d=LSM-nm[46]-nm[47]-nm[35];
if((a==c)&&(b==d)){
if((uflg[a]==0)&&(uflg[b]==0)){
nm[12]=a; nm[34]=b;
uflg[a]=1; uflg[b]=1;
stp14();
uflg[b]=0; uflg[a]=0;}}}}}
}
/* Set n14=130-n9-n10-n13 & n40 */
void stp14(){
short a,b,c,d;
a=LSM-nm[9]-nm[10]-nm[13];
if((0<a)&&(a<65)){
b=LSM-nm[35]-nm[36]-nm[39];
if(a+b==CC){
c=LSM-nm[13]-nm[1]-nm[2];
d=LSM-nm[39]-nm[43]-nm[44];
if((a==c)&&(b==d)){
if((uflg[a]==0)&&(uflg[b]==0)){
nm[14]=a; nm[40]=b;
uflg[a]=1; uflg[b]=1;
stp15();
uflg[b]=0; uflg[a]=0;}}}}}
}
/* Set n15=130-n10-n11-n14 & n37 */
void stp15(){
short a,b,c,d;

```

```

a=LSM-nm[10]-nm[11]-nm[14];
if((0<a)&&(a<65)){
  b=LSM-nm[36]-nm[33]-nm[40];
  if(a+b==CC){
    c=LSM-nm[14]-nm[2]-nm[3];
    d=LSM-nm[40]-nm[44]-nm[41];
    if((a==c)&&(b==d)){
      if((uflg[a]==0)&&(uflg[b]==0)){
        nm[15]=a; nm[37]=b;
        uflg[a]=1; uflg[b]=1;
        stp16C);
        uflg[b]=0; uflg[a]=0;}}}}
}
/* Set n16=130-n11-n12-n15 & n38 */
void stp16C){
  short a,b,c,d;
  a=LSM-nm[11]-nm[12]-nm[15];
  if((0<a)&&(a<65)){
    b=LSM-nm[33]-nm[34]-nm[37];
    if(a+b==CC){
      c=LSM-nm[15]-nm[3]-nm[4];
      d=LSM-nm[34]-nm[35]-nm[39];
      if((a==c)&&(b==d)){
        if((uflg[a]==0)&&(uflg[b]==0)){
          nm[16]=a; nm[38]=b;
          uflg[a]=1; uflg[b]=1;
          stp17C);
          uflg[b]=0; uflg[a]=0;}}}}
}
/* Define Level 3: */
/* Set n17 & n59 */
void stp17C){
  short a,b;
  for(a=64;a>0;a--){b=CC-a;
    if((uflg[a]==0)&&(uflg[b]==0)){
      nm[17]=a; nm[59]=b;
      uflg[a]=1; uflg[b]=1;
      stp18C);
      uflg[b]=0; uflg[a]=0;}}
}
}
/* Set n49=130-n1-n17-n33 & n27 */
void stp18C){
  short a,b;
  a=LSM-nm[1]-nm[17]-nm[33];
  if((0<a)&&(a<65)){
    b=LSM-nm[43]-nm[59]-nm[11];
    if(a+b==CC){
      if((uflg[a]==0)&&(uflg[b]==0)){
        nm[49]=a; nm[27]=b;
        uflg[a]=1; uflg[b]=1;
        stp19C);
        uflg[b]=0; uflg[a]=0;}}}}
}
/* Set n18=130-n1-n2-n17 & n60 */
void stp19C){
  short a,b,c,d;
  a=LSM-nm[1]-nm[2]-nm[17];
  if((0<a)&&(a<65)){
    b=LSM-nm[43]-nm[44]-nm[59];
    if(a+b==CC){
      c=LSM-nm[17]-nm[33]-nm[34];
      d=LSM-nm[59]-nm[11]-nm[12];
      if((a==c)&&(b==d)){

```

```

        if((uflg[a]==0)&&(uflg[b]==0)){
            nm[18]=a; nm[60]=b;
            uflg[a]=1; uflg[b]=1;
            stp20();
            uflg[b]=0; uflg[a]=0;}}}}
    }
    /* Set n19=130-n2-n3-n18 & n57 */
    void stp20(){
        short a,b,c,d;
        a=LSM-nm[2]-nm[3]-nm[18];
        if((0<a)&&(a<65)){
            b=LSM-nm[44]-nm[41]-nm[60];
            if(a+b==CC){
                c=LSM-nm[18]-nm[34]-nm[35];
                d=LSM-nm[60]-nm[12]-nm[9];
                if((a==c)&&(b==d)){
                    if((uflg[a]==0)&&(uflg[b]==0)){
                        nm[19]=a; nm[57]=b;
                        uflg[a]=1; uflg[b]=1;
                        stp21();
                        uflg[b]=0; uflg[a]=0;}}}}
        }
    }
    /* Set n20=130-n3-n4-n19 & n58 */
    void stp21(){
        short a,b,c,d;
        a=LSM-nm[3]-nm[4]-nm[19];
        if((0<a)&&(a<65)){
            b=LSM-nm[41]-nm[42]-nm[57];
            if(a+b==CC){
                c=LSM-nm[19]-nm[35]-nm[36];
                d=LSM-nm[10]-nm[11]-nm[59];
                if((a==c)&&(b==d)){
                    if((uflg[a]==0)&&(uflg[b]==0)){
                        nm[20]=a; nm[58]=b;
                        uflg[a]=1; uflg[b]=1;
                        stp22();
                        uflg[b]=0; uflg[a]=0;}}}}
        }
    }
    /* Set n21=130-n1-n5-n17 & n63 */
    void stp22(){
        short a,b,c,d;
        a=LSM-nm[1]-nm[5]-nm[17];
        if((0<a)&&(a<65)){
            b=LSM-nm[43]-nm[47]-nm[59];
            if(a+b==CC){
                c=LSM-nm[17]-nm[33]-nm[37];
                d=LSM-nm[59]-nm[11]-nm[15];
                if((a==c)&&(b==d)){
                    if((uflg[a]==0)&&(uflg[b]==0)){
                        nm[21]=a; nm[63]=b;
                        uflg[a]=1; uflg[b]=1;
                        stp23();
                        uflg[b]=0; uflg[a]=0;}}}}
        }
    }
    /* Set n25=130-n5-n9-n21 & n51 */
    void stp23(){
        short a,b,c,d;
        a=LSM-nm[5]-nm[9]-nm[21];
        if((0<a)&&(a<65)){
            b=LSM-nm[47]-nm[35]-nm[63];
            if(a+b==CC){
                c=LSM-nm[21]-nm[37]-nm[41];
                d=LSM-nm[63]-nm[15]-nm[3];
                if((a==c)&&(b==d)){

```

```

        if((uflg[a]==0)&&(uflg[b]==0)){
            nm[25]=a; nm[51]=b;
            uflg[a]=1; uflg[b]=1;
            stp24();
            uflg[b]=0; uflg[a]=0;}}}}
    }
/* Set n29=130-n9-n13-n25 & n55 */
void stp24(){
    short a,b,c,d;
    a=LSM-nm[9]-nm[13]-nm[25];
    if((0<a)&&(a<65)){
        b=LSM-nm[35]-nm[39]-nm[51];
        if(a+b==CC){
            c=LSM-nm[25]-nm[41]-nm[45];
            d=LSM-nm[39]-nm[43]-nm[59];
            if((a==c)&&(b==d)){
                if((uflg[a]==0)&&(uflg[b]==0)){
                    nm[29]=a; nm[55]=b;
                    uflg[a]=1; uflg[b]=1;
                    stp25();
                    uflg[b]=0; uflg[a]=0;}}}}
    }
/* Define Level 4: */
/* Set n22=130-n2-n6-n18 & n64 */
void stp25(){
    short a,b,c,d;
    a=LSM-nm[2]-nm[6]-nm[18];
    if((0<a)&&(a<65)){
        b=LSM-nm[44]-nm[48]-nm[60];
        if(a+b==CC){
            c=LSM-nm[5]-nm[6]-nm[21];
            d=LSM-nm[17]-nm[18]-nm[21];
            if((a==c)&&(a==d)){
                if((uflg[a]==0)&&(uflg[b]==0)){
                    nm[22]=a; nm[64]=b;
                    uflg[a]=1; uflg[b]=1;
                    stp26();
                    uflg[b]=0; uflg[a]=0;}}}}
    }
/* Set n23=130-n3-n7-n19 & n61 */
void stp26(){
    short a,b,c,d;
    a=LSM-nm[3]-nm[7]-nm[19];
    if((0<a)&&(a<65)){
        b=LSM-nm[41]-nm[45]-nm[57];
        if(a+b==CC){
            c=LSM-nm[6]-nm[7]-nm[22];
            d=LSM-nm[18]-nm[19]-nm[22];
            if((a==c)&&(a==d)){
                if((uflg[a]==0)&&(uflg[b]==0)){
                    nm[23]=a; nm[61]=b;
                    uflg[a]=1; uflg[b]=1;
                    stp27();
                    uflg[b]=0; uflg[a]=0;}}}}
    }
/* Set n24=130-n4-n8-n20 & n62 */
void stp27(){
    short a,b,c,d,e;
    a=LSM-nm[4]-nm[8]-nm[20];
    if((0<a)&&(a<65)){
        b=LSM-nm[42]-nm[46]-nm[58];
        if(a+b==CC){
            c=LSM-nm[7]-nm[8]-nm[23];
            d=LSM-nm[19]-nm[20]-nm[23];

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    e=LSM-nm[20]-nm[36]-nm[40];
    if((a==c)&&(a==d)&&(a==e)){
        if((uflg[a]==0)&&(uflg[b]==0)){
            nm[24]=a; nm[62]=b;
            uflg[a]=1; uflg[b]=1;
            stp28C);
            uflg[b]=0; uflg[a]=0;}}}}
}
/* Set n26=130-n6-n10-n22 & n52 */
void stp28C){
    short a,b,c,d,e;
    a=LSM-nm[6]-nm[10]-nm[22];
    if((0<a)&&(a<65)){
        b=LSM-nm[48]-nm[36]-nm[64];
        if(a+b==CC){
            c=LSM-nm[9]-nm[10]-nm[25];
            d=LSM-nm[21]-nm[22]-nm[25];
            e=LSM-nm[22]-nm[38]-nm[42];
            if((a==c)&&(a==d)&&(a==e)){
                if((uflg[a]==0)&&(uflg[b]==0)){
                    nm[26]=a; nm[52]=b;
                    uflg[a]=1; uflg[b]=1;
                    stp29C);
                    uflg[b]=0; uflg[a]=0;}}}}
}
/* Set n28=130-n8-n12-n24 & n50 */
void stp29C){
    short a,b,c,d,e;
    a=LSM-nm[8]-nm[12]-nm[24];
    if((0<a)&&(a<65)){
        b=LSM-nm[46]-nm[34]-nm[62];
        if(a+b==CC){
            c=LSM-nm[11]-nm[12]-nm[27];
            d=LSM-nm[23]-nm[24]-nm[27];
            e=LSM-nm[27]-nm[43]-nm[44];
            if((a==c)&&(a==d)&&(a==e)){
                if((uflg[a]==0)&&(uflg[b]==0)){
                    nm[28]=a; nm[50]=b;
                    uflg[a]=1; uflg[b]=1;
                    stp30C);
                    uflg[b]=0; uflg[a]=0;}}}}
}
/* Set n30=130-n10-n14-n26 & n56 */
void stp30C){
    short a,b,c,d,e;
    a=LSM-nm[10]-nm[14]-nm[26];
    if((0<a)&&(a<65)){
        b=LSM-nm[36]-nm[40]-nm[52];
        if(a+b==CC){
            c=LSM-nm[13]-nm[14]-nm[29];
            d=LSM-nm[25]-nm[26]-nm[29];
            e=LSM-nm[29]-nm[45]-nm[46];
            if((a==c)&&(a==d)&&(a==e)){
                if((uflg[a]==0)&&(uflg[b]==0)){
                    nm[30]=a; nm[56]=b;
                    uflg[a]=1; uflg[b]=1;
                    stp31C);
                    uflg[b]=0; uflg[a]=0;}}}}
}
/* Set n31=130-n11-n15-n27 & n53 */
void stp31C){
    short a,b,c,d,e;
    a=LSM-nm[11]-nm[15]-nm[27];
    if((0<a)&&(a<65)){

```



```

b=LSM-nm[33]-nm[37]-nm[49];
if(a+b==CC){
c=LSM-nm[14]-nm[15]-nm[30];
d=LSM-nm[26]-nm[27]-nm[30];
e=LSM-nm[27]-nm[43]-nm[47];
if((a==c)&&(a==d)&&(a==e)){
if((uflg[a]==0)&&(uflg[b]==0)){
nm[31]=a; nm[53]=b;
uflg[a]=1; uflg[b]=1;
stp32();
uflg[b]=0; uflg[a]=0;}}}}
}
/* Set n32=130-n12-n16-n28 & n54 */
void stp32(){
short a,b,c,d,e;
a=LSM-nm[12]-nm[16]-nm[28];
if((0<a)&&(a<65)){
b=LSM-nm[34]-nm[38]-nm[50];
if(a+b==CC){
c=LSM-nm[15]-nm[16]-nm[31];
d=LSM-nm[27]-nm[28]-nm[31];
e=LSM-nm[48]-nm[29]-nm[45];
if((a==c)&&(a==d)&&(a==e)){
if((uflg[a]==0)&&(uflg[b]==0)){
nm[32]=a; nm[54]=b;
uflg[a]=1; uflg[b]=1;
ansprint();
//solprint(); /* for listing 'standard solutions' */
uflg[b]=0; uflg[a]=0;}}}}
}
/**/
/* Print the Answers of CCMC444 Family */
void ansprint(){
short m,n;
cnt++; cnt3++;
if(cnt3==1){
for(m=0;m<3;m++){for(n=0;n<65;n++){p[m][n]=0;}}
for(m=0;m<3;m++){
cntr[m]=cnt;
for(n=1;n<65;n++){p[m][n]=nm[n];}
}
pr3sol();
}
}
/**/
/* Print the Standard Solutions of CCMC444 Family */
void solprint(){
short m,n;
cnt++;
for(m=0;m<3;m++){cntr[m]=0;}
for(m=0;m<3;m++){for(n=0;n<65;n++){p[m][n]=0;}}
if((nm[1]<nm[4])&&(nm[1]<nm[13])&&(nm[1]<nm[16])&&(nm[1]<nm[49])){
if((nm[1]<nm[52])&&(nm[1]<nm[61])&&(nm[1]<nm[64])){
if((nm[2]>nm[5])&&(nm[5]>nm[17])){
cnt0++; cntr[0]=cnt0;
for(n=1;n<65;n++){p[0][n]=nm[n];}}}}
if((nm[1]<nm[28])&&(nm[1]<nm[63])&&(nm[1]<nm[38])&&(nm[5]<nm[2])){
cnt1++; cntr[1]=cnt1;
for(n=1;n<65;n++){p[1][n]=nm[n];}}
if((nm[1]<nm[19])&&(nm[1]<nm[57])&&(nm[1]<nm[43])&&(nm[5]<nm[2])){
cnt2++; cntr[2]=cnt2;
for(n=1;n<65;n++){p[2][n]=nm[n];}}
pr3sol();
}
}

```

```

/**/
/* Print the Solution Set of 'C&C'MC4, CCMS8Multi and MS88SmL3 */
void pr3sol(){
printf("\n%3d-----%2d-----%2d-----%2d ",
p[0][1],p[0][2],p[0][3],p[0][4]);
if(cntr[0]<100){printf("%4d/CC4%19d/C8M",cntr[0],cntr[1]);}
else if((100<=cntr[0])&&(cntr[0]<1000)){printf("%5d/CC4%18d/C8M",cntr[0],cntr[1]);}
else{printf("%6d/CC4%17d/C8M",cntr[0],cntr[1]);}
printf("%22d/SmL\n",cntr[2]);
printf(" l%2d %2d %2d l%2d ",
p[0][17],p[0][18],p[0][19],p[0][20]);
printf("%4d%3d%3d%3d%3d%3d%3d",
p[1][1],p[1][2],p[1][3],p[1][4],p[1][25],p[1][26],p[1][27],p[1][28]);
printf("%5d%3d%3d%3d%3d%3d%3d\n",
p[2][1],p[2][2],p[2][3],p[2][4],p[2][18],p[2][17],p[2][20],p[2][19]);
printf(" %2d %2d %2d %2d %2d %2d %2d %2d ",
p[0][5],p[0][33],p[0][6],p[0][34],p[0][7],p[0][35],p[0][8],p[0][36]);
printf("%4d%3d%3d%3d%3d%3d%3d",
p[1][5],p[1][6],p[1][7],p[1][8],p[1][29],p[1][30],p[1][31],p[1][32]);
printf("%5d%3d%3d%3d%3d%3d%3d\n",
p[2][5],p[2][6],p[2][7],p[2][8],p[2][22],p[2][21],p[2][24],p[2][23]);
printf(" l%2d %2d--%2d--%2d--%2d--%2d--%2d--%2d ",
p[0][21],p[0][49],p[0][22],p[0][50],p[0][23],p[0][51],p[0][24],p[0][52]);
printf("%4d%3d%3d%3d%3d%3d%3d",
p[1][9],p[1][10],p[1][11],p[1][12],p[1][17],p[1][18],p[1][19],p[1][20]);
printf("%5d%3d%3d%3d%3d%3d%3d\n",
p[2][9],p[2][10],p[2][11],p[2][12],p[2][26],p[2][25],p[2][28],p[2][27]);
printf(" %2d %2d l %2d %2d %2d %2d %2d %2d l ",
p[0][9],p[0][37],p[0][10],p[0][38],p[0][11],p[0][39],p[0][12],p[0][40]);
printf("%4d%3d%3d%3d%3d%3d%3d",
p[1][13],p[1][14],p[1][15],p[1][16],p[1][21],p[1][22],p[1][23],p[1][24]);
printf("%5d%3d%3d%3d%3d%3d%3d\n",
p[2][13],p[2][14],p[2][15],p[2][16],p[2][30],p[2][29],p[2][32],p[2][31]);
printf(" l%2d %2d %2d %2d %2d %2d l%2d %2d ",
p[0][25],p[0][53],p[0][26],p[0][54],p[0][27],p[0][55],p[0][28],p[0][56]);
printf("%4d%3d%3d%3d%3d%3d%3d",
p[1][51],p[1][52],p[1][49],p[1][50],p[1][43],p[1][44],p[1][41],p[1][42]);
printf("%5d%3d%3d%3d%3d%3d%3d\n",
p[2][53],p[2][54],p[2][55],p[2][56],p[2][38],p[2][37],p[2][40],p[2][39]);
printf(" %2d--%2d-l-%2d--%2d--%2d--%2d--%2d %2d l ",
p[0][13],p[0][41],p[0][14],p[0][42],p[0][15],p[0][43],p[0][16],p[0][44]);
printf("%4d%3d%3d%3d%3d%3d%3d",
p[1][55],p[1][56],p[1][53],p[1][54],p[1][47],p[1][48],p[1][45],p[1][46]);
printf("%5d%3d%3d%3d%3d%3d%3d\n",
p[2][49],p[2][50],p[2][51],p[2][52],p[2][34],p[2][33],p[2][36],p[2][35]);
printf(" %2d %2d %2d %2d %2d %2d %2d %2d ",
p[0][29],p[0][57],p[0][30],p[0][58],p[0][31],p[0][59],p[0][32],p[0][60]);
printf("%4d%3d%3d%3d%3d%3d%3d",
p[1][59],p[1][60],p[1][57],p[1][58],p[1][35],p[1][36],p[1][33],p[1][34]);
printf("%5d%3d%3d%3d%3d%3d%3d\n",
p[2][61],p[2][62],p[2][63],p[2][64],p[2][46],p[2][45],p[2][48],p[2][47]);
printf(" %2d l %2d %2d %2d l ",
p[0][45],p[0][46],p[0][47],p[0][48]);
printf("%4d%3d%3d%3d%3d%3d%3d",
p[1][63],p[1][64],p[1][61],p[1][62],p[1][39],p[1][40],p[1][37],p[1][38]);
printf("%5d%3d%3d%3d%3d%3d%3d\n",
p[2][57],p[2][58],p[2][59],p[2][60],p[2][42],p[2][41],p[2][44],p[2][43]);
printf(" %2d-----%2d-----%2d-----%2d\n",
p[0][61],p[0][62],p[0][63],p[0][64]);
}

```

```

}
/**/
/* Conceptual Diagrams for Dimensional Conversion *
1----- 2----- 3----- 4   /CC4 ->           0/C8M           0/Sml
|17      18      19      |20      1  2  3  4 25 26 27 28      1  2  3  4 18 17 20 19
5 33    6 34    7 35    8 36      5  6  7  8 29 30 31 32      5  6  7  8 22 21 24 23
|21 49---22--50---23--51---24--52      9 10 11 12 17 18 19 20      9 10 11 12 26 25 28 27
9 37 | 10 38   11 39   12 40 | 13 14 15 16 21 22 23 24      13 14 15 16 30 29 32 31
|25 53   26 54   27 55 |28 56      51 52 49 50 43 44 41 42      53 54 55 56 38 37 40 39
13--41-|-14--42---15--43---16 44 | 55 56 53 54 47 48 45 46      49 50 51 52 34 33 36 35
 29 57   30 58   31 59   32 60      59 60 57 58 35 36 33 34      61 62 63 64 46 45 48 47
   45 |    46      47      48 | 63 64 61 62 39 40 37 38      57 58 59 60 42 41 44 43
     61-----62-----63-----64
*/
/**/
/* You might be confused that you can find no rules of transformation here */
/* in this program. It is not true that I forgot to write those rules. */
/* I implanted them in the last printing procedure. That will be all right. */
/**/

```