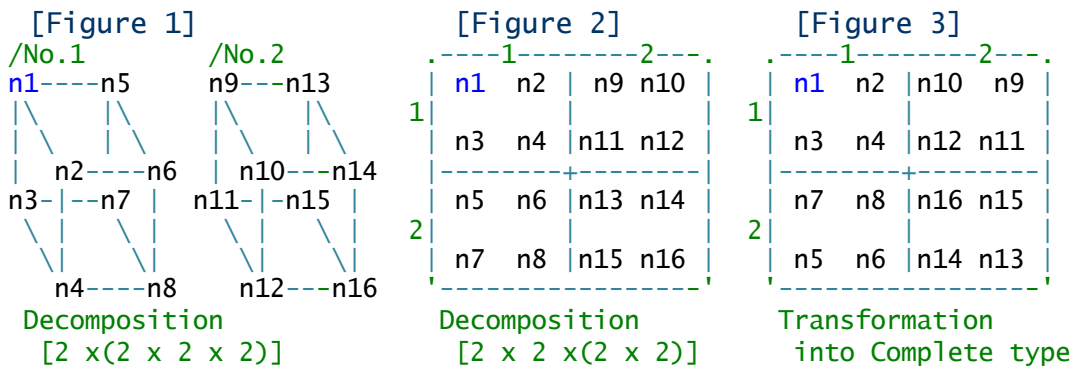


Chapter 6: Fundamental Studies of Multi-Dimensional Extra-Cubic Magic Forms and their Decomposed Ones: Kanji Setsuda

Section 2: Study of 4-Dimensional Extra-Cubic Objects of Order 2 and their Decomposed Forms

#1. Let's build 4-dimensional magic forms of order 2 in the $2 \times 2 \times 2 \times 2$ array here. Why do I intend to do so? It is because I want to know of the highest symmetry among various magic forms by increasing the dimensions up to 4. I would say I want to know what the 'master key' of various 2-dimensional magic squares of order 4 is.

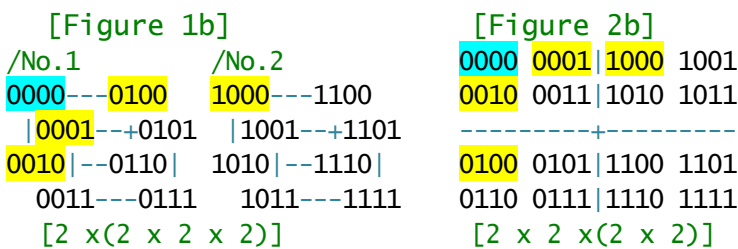
#2. The structural data of the consecutive whole numbers from 1 to 16 are stored in the 4-dimensional array of $2 \times 2 \times 2 \times 2$. No one can draw a visible picture of that, but I am afraid it might be too difficult to think of it without any kind of figures. So I tried to prepare several figures of 'Decomposed Forms' as below, so that we could understand the concept clearer.



Decomposed Figure 1 above has a pair of little cubes. Both of them stand for a single Extra-Cubic Object. Decomposed Figure 2 contains 4 sets of squares of order 2, and each of them comes from each surface of the decomposed cubes F1, though at a whole sight the total figures F2 and F3 look like the magic squares of order 4.

We should take these three figures as the Basic Forms to make everything with.

#3. We can express the same figures in a different way with Binary Notations.



The position $n(0,0,0,0)$ stands for 'n1' in the classic style; and $n(0,0,0,1)$ for n2, $n(0,0,1,0)$ for n3, $n(0,0,1,1)$ for n4, ... , $n(1,1,1,0)$ for n15, and $n(1,1,1,1)$ for n16.

$n1(0,0,0,0)$ is placed on the center or on the 'Origin' where the 4 axes should meet. Then what and where are the 'axes', do you think? Each of them is supposed to have both $n1(0,0,0,0)$ and the next position adjacent to it.

Then what and where are the 'next' positions adjacent to $n1$? No doubt, they are n2, n3 and n5. And what should be the rest one, then?

It should be n9. Because it is placed in $n(1,0,0,0)$. It is one of the numbers that are

only one digit different from $n_1(0,0,0,0)$, regardless of binary positions.

$n_2(0,0,0,1)$, $n_3(0,0,1,0)$, $n_5(0,1,0,0)$, and $n_9(1,0,0,0)$ are supposed to be the next positions to the Origin $n_1(0,0,0,0)$ in our 4-dimensional system.

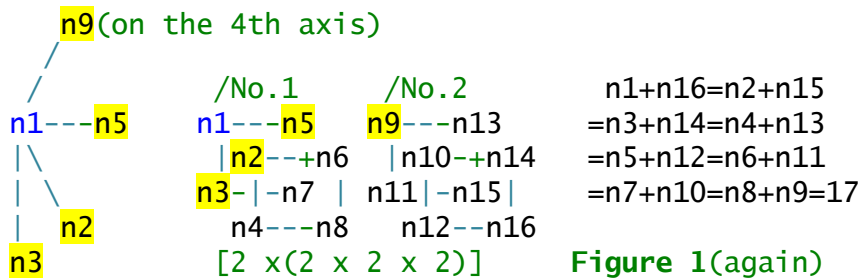


Figure 1(again)

#4. What reasonable conditions do we put to this 4-dimensional object? How do we make it for the ‘magic’ one?

Of course, we must not put such the equations as $n_1+n_2=C$, $n_1+n_3=C$, $n_1+n_5=C$, and $n_1+n_9=C$. Because we can never accept such the logical result as $n_2=n_3=n_5=n_9(=C-n_1)$. Those four different numbers can never take the same value.

So we have to imagine and realize anything else for the magic constant. ...

What about taking the constant sums of any sets of 4 entries?

At first we presuppose the constant sum of every 4 numbers on the same surfaces of little cubes. For example,

$$\begin{aligned} n_1+n_2+n_3+n_4=C, & \quad n_1+n_2+n_5+n_6=C, & \quad n_1+n_3+n_5+n_7=C, \\ n_2+n_4+n_6+n_9=C, & \quad n_3+n_4+n_7+n_8=C, & \quad n_5+n_6+n_7+n_8=C \quad \dots(\text{Figure 1/No.1}) \\ n_9+n_{10}+n_{11}+n_{12}=C, & \quad n_9+n_{10}+n_{13}+n_{14}=C, & \quad n_9+n_{11}+n_{13}+n_{15}=C, \\ n_{10}+n_{12}+n_{14}+n_{16}=C, & \quad n_{11}+n_{12}+n_{15}+n_{16}=C, & \quad n_{13}+n_{14}+n_{15}+n_{16}=C \quad \dots(/No.2) \end{aligned}$$

Twelve simultaneous equations are thus put to be solved.

But they are not enough. It does not yet look like 4-dimensional at all.

$$\begin{aligned} n_1+n_2+n_9+n_{10}=C, & \quad n_1+n_3+n_9+n_{11}=C, & \quad n_1+n_5+n_9+n_{13}=C, \\ n_2+n_4+n_{10}+n_{12}=C, & \quad n_2+n_6+n_{10}+n_{14}=C, & \quad n_3+n_4+n_{11}+n_{12}=C, \\ n_3+n_7+n_{11}+n_{15}=C, & \quad n_4+n_8+n_{12}+n_{16}=C, & \quad n_5+n_6+n_{13}+n_{14}=C, \\ n_5+n_7+n_{13}+n_{15}=C, & \quad n_6+n_8+n_{14}+n_{16}=C, & \quad n_7+n_8+n_{15}+n_{16}=C \end{aligned}$$

Twelve more equations above should be added. You can easily understand this, if you have another 3 view-forms of decomposition as below for the same object.



#5. How should we think about self-complementary pairs of this Extra-Cubic Object of order 2 and their symmetrical locations?

Take a look at the figures above again. Their combinations and locations seem to be quite natural and reasonable. You can make such the 8 Complementary Pairs of 17 as below and place them in their own symmetrical locations.

$$n_1+n_{16}=n_2+n_{15}=n_3+n_{14}=n_4+n_{13}=n_5+n_{12}=n_6+n_{11}=n_7+n_{10}=n_8+n_9=17 \quad \dots scc$$

Let’s assume these conditions become true for the first definition stage of our object. Then you know you don’t have to assume as many ‘Composite Conditions’ as 24, but you have to take only the following 12 equations at first.

** The 12 Essential ‘Composite Conditions’ **

$n_1+n_2+n_3+n_4=C \dots(1);$ $n_1+n_2+n_5+n_6=C \dots(2);$ $n_1+n_2+n_9+n_{10}=C \dots(3);$
 $n_1+n_3+n_5+n_7=C \dots(4);$ $n_1+n_3+n_9+n_{11}=C \dots(5);$ $n_1+n_5+n_9+n_{13}=C \dots(6);$
 $n_2+n_4+n_6+n_8=C \dots(7);$ $n_2+n_4+n_{10}+n_{12}=C \dots(8);$ $n_2+n_6+n_{10}+n_{14}=C \dots(9);$
 $n_3+n_4+n_7+n_8=C \dots(10);$ $n_3+n_4+n_{11}+n_{12}=C \dots(11);$ $n_5+n_6+n_7+n_8=C \dots(12);$

#6. Under these strict conditions, examine how you can exchange the entries of this 4-dimensional object, and know how often you can see the different solutions. You can use your computer to count them for the purpose.

If you assume $n_1 < n_{16}$ and $n_1 < n_2 < n_3 < n_5 < n_9$, then only one solution could come out. If you assume $n_1 < n_{16}$, $n_1 < n_9$, and $n_1 < n_2 < n_3 < n_5$, then you could get three solutions. And if you assume $n_1 < n_{16}$, $n_1 < n_9$, $n_1 < n_5$, $n_1 < n_3$ and $n_1 < n_2$, then you could get more solutions.

Check the solution list below. This is the first group of 24 primitive solutions of the largest 'Mother Set'. How do the four axes and the numbers next to n_1 appear?

**** New Basic Diagrams expressing Positions of Elements ****

BD/d0	/d1	SC/	CC/
1---- 2	3---- 4	1 2 3 4	1 2 4 3
9---+10	11---+12	5 6 7 8	5 6 8 7
5-- - 6	7-- - 8	9 10 11 12	13 14 16 15
13----14	15----16	13 14 15 16	9 10 12 11

***** Make the 4-Dimensional Magic Objects of Order 2 and *****

**** Transform them into Two Types of MS44: 'S-C' and 'C&C' ****

1/d0	/d1	SC/	CC/
1----15	12---- 6	1 15 12 6	1 15 6 12
8---+10	13---+ 3	14 4 7 9	14 4 9 7
14-- - 4	7-- - 9	8 10 13 3	11 5 16 2
11---- 5	2----16	11 5 2 16	8 10 3 13

2/d0	/d1	SC/	CC/
1----15	8----10	1 15 8 10	1 15 10 8
12---+ 6	13---+ 3	14 4 11 5	14 4 5 11
14-- - 4	11-- - 5	12 6 13 3	7 9 16 2
7---- 9	2----16	7 9 2 16	12 6 3 13

3/d0	/d1	SC/	CC/
1----15	14---- 4	1 15 14 4	1 15 4 14
8---+10	11---+ 5	12 6 7 9	12 6 9 7
12-- - 6	7-- - 9	8 10 11 5	13 3 16 2
13---- 3	2----16	13 3 2 16	8 10 5 11

4/d0	/d1	SC/	CC/
1----15	8----10	1 15 8 10	1 15 10 8
14---+ 4	11---+ 5	12 6 13 3	12 6 3 13
12-- - 6	13-- - 3	14 4 11 5	7 9 16 2
7---- 9	2----16	7 9 2 16	14 4 5 11

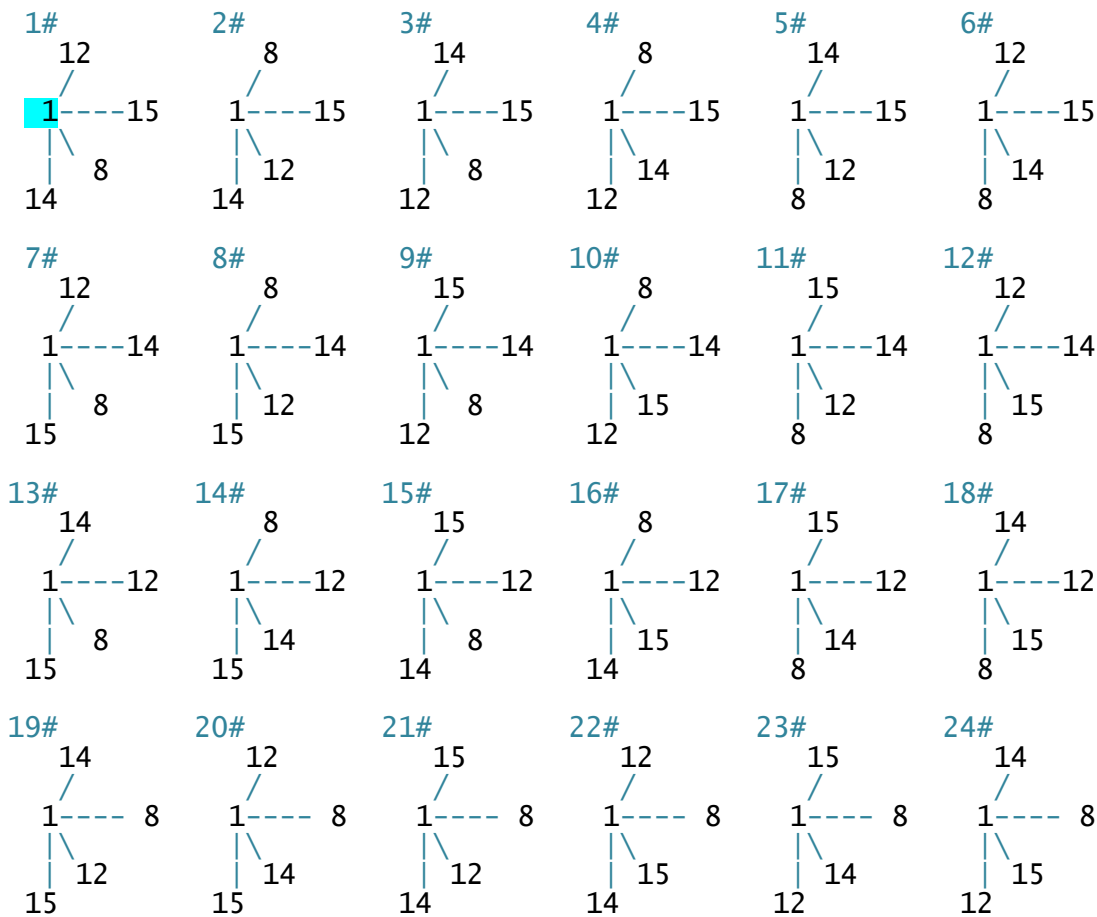
5/d0	/d1	SC/	CC/
1----15	14---- 4	1 15 14 4	1 15 4 14
12---+ 6	7---+ 9	8 10 11 5	8 10 5 11
8-- -10	11-- - 5	12 6 7 9	13 3 16 2
13---- 3	2----16	13 3 2 16	12 6 9 7

6/d0	/d1	SC/	CC/
1----15	12---- 6	1 15 12 6	1 15 6 12
14---+ 4	7---+ 9	8 10 13 3	8 10 3 13
8-- -10	13-- - 3	14 4 7 9	11 5 16 2
11---- 5	2----16	11 5 2 16	14 4 9 7
7/d0	/d1	SC/	CC/
1----14	12---- 7	1 14 12 7	1 14 7 12
8---+11	13---+ 2	15 4 6 9	15 4 9 6
15-- - 4	6-- - 9	8 11 13 2	10 5 16 3
10---- 5	3----16	10 5 3 16	8 11 2 13
8/d0	/d1	SC/	CC/
1----14	8----11	1 14 8 11	1 14 11 8
12---+ 7	13---+ 2	15 4 10 5	15 4 5 10
15-- - 4	10-- - 5	12 7 13 2	6 9 16 3
6---- 9	3----16	6 9 3 16	12 7 2 13
9/d0	/d1	SC/	CC/
1----14	15---- 4	1 14 15 4	1 14 4 15
8---+11	10---+ 5	12 7 6 9	12 7 9 6
12-- - 7	6-- - 9	8 11 10 5	13 2 16 3
13---- 2	3----16	13 2 3 16	8 11 5 10
10/d0	/d1	SC/	CC/
1----14	8----11	1 14 8 11	1 14 11 8
15---+ 4	10---+ 5	12 7 13 2	12 7 2 13
12-- - 7	13-- - 2	15 4 10 5	6 9 16 3
6---- 9	3----16	6 9 3 16	15 4 5 10
11/d0	/d1	SC/	CC/
1----14	15---- 4	1 14 15 4	1 14 4 15
12---+ 7	6---+ 9	8 11 10 5	8 11 5 10
8-- -11	10-- - 5	12 7 6 9	13 2 16 3
13---- 2	3----16	13 2 3 16	12 7 9 6
12/d0	/d1	SC/	CC/
1----14	12---- 7	1 14 12 7	1 14 7 12
15---+ 4	6---+ 9	8 11 13 2	8 11 2 13
8-- -11	13-- - 2	15 4 6 9	10 5 16 3
10---- 5	3----16	10 5 3 16	15 4 9 6
13/d0	/d1	SC/	CC/
1----12	14---- 7	1 12 14 7	1 12 7 14
8---+13	11---+ 2	15 6 4 9	15 6 9 4
15-- - 6	4-- - 9	8 13 11 2	10 3 16 5
10---- 3	5----16	10 3 5 16	8 13 2 11
14/d0	/d1	SC/	CC/
1----12	8----13	1 12 8 13	1 12 13 8
14---+ 7	11---+ 2	15 6 10 3	15 6 3 10
15-- - 6	10-- - 3	14 7 11 2	4 9 16 5
4---- 9	5----16	4 9 5 16	14 7 2 11
15/d0	/d1	SC/	CC/
1----12	15---- 6	1 12 15 6	1 12 6 15
8---+13	10---+ 3	14 7 4 9	14 7 9 4
14-- - 7	4-- - 9	8 13 10 3	11 2 16 5
11---- 2	5----16	11 2 5 16	8 13 3 10

16/d0	/d1	SC/	CC/
1----12	8----13	1 12 8 13	1 12 13 8
15---+ 6	10---+ 3	14 7 11 2	14 7 2 11
14-- - 7	11-- - 2	15 6 10 3	4 9 16 5
4---- 9	5----16	4 9 5 16	15 6 3 10
17/d0	/d1	SC/	CC/
1----12	15---- 6	1 12 15 6	1 12 6 15
14---+ 7	4---+ 9	8 13 10 3	8 13 3 10
8-- -13	10-- - 3	14 7 4 9	11 2 16 5
11---- 2	5----16	11 2 5 16	14 7 9 4
18/d0	/d1	SC/	CC/
1----12	14---- 7	1 12 14 7	1 12 7 14
15---+ 6	4---+ 9	8 13 11 2	8 13 2 11
8-- -13	11-- - 2	15 6 4 9	10 3 16 5
10---- 3	5----16	10 3 5 16	15 6 9 4
19/d0	/d1	SC/	CC/
1---- 8	14----11	1 8 14 11	1 8 11 14
12---+13	7---+ 2	15 10 4 5	15 10 5 4
15-- -10	4-- - 5	12 13 7 2	6 3 16 9
6---- 3	9----16	6 3 9 16	12 13 2 7
20/d0	/d1	SC/	CC/
1---- 8	12----13	1 8 12 13	1 8 13 12
14---+11	7---+ 2	15 10 6 3	15 10 3 6
15-- -10	6-- - 3	14 11 7 2	4 5 16 9
4---- 5	9----16	4 5 9 16	14 11 2 7
21/d0	/d1	SC/	CC/
1---- 8	15----10	1 8 15 10	1 8 10 15
12---+13	6---+ 3	14 11 4 5	14 11 5 4
14-- -11	4-- - 5	12 13 6 3	7 2 16 9
7---- 2	9----16	7 2 9 16	12 13 3 6
22/d0	/d1	SC/	CC/
1---- 8	12----13	1 8 12 13	1 8 13 12
15---+10	6---+ 3	14 11 7 2	14 11 2 7
14-- -11	7-- - 2	15 10 6 3	4 5 16 9
4---- 5	9----16	4 5 9 16	15 10 3 6
23/d0	/d1	SC/	CC/
1---- 8	15----10	1 8 15 10	1 8 10 15
14---+11	4---+ 5	12 13 6 3	12 13 3 6
12-- -13	6-- - 3	14 11 4 5	7 2 16 9
7---- 2	9----16	7 2 9 16	14 11 5 4
24/d0	/d1	SC/	CC/
1---- 8	14----11	1 8 14 11	1 8 11 14
15---+10	4---+ 5	12 13 7 2	12 13 2 7
12-- -13	7-- - 2	15 10 4 5	6 3 16 9
6---- 3	9----16	6 3 9 16	15 10 5 4

.

Do you notice that the four axes are exchangeable with one another? The numbers adjacent next to 1 are only 15, 14, 12 and 8. And their positions are also exchangeable with one another. They are equally free to go anywhere but only next to 1.



Say, this is the evidence of our success, isn't it? It is highly symmetrical in itself. We are now able to make the 4-dimensional magic form of order 2!

Check the solution list so that the same pattern as each other might not appear many times. If you remove all simple rotations and reflections, you could get the smaller list than the one above.

In fact they are all the same. There proved to be only one solution.

#7. Watch the last two decomposed patterns on the right hand side of each solution. They look like magic squares of order 4.

*** Basic Diagrams expressing Positions of Elements ***

BD/d0	/d1	SC/	CC/
1---- 2	3---- 4	1 2 3 4	1 2 4 3
9---+10	11---+12	5 6 7 8	5 6 8 7
5-- - 6	7-- - 8	9 10 11 12	13 14 16 15
13----14	15----16	13 14 15 16	9 10 12 11

** Transform the 4-Dimensional Magic Objects of Order 2 into Two **

** Types of MS44: 'Self-Complementary' and 'Composite & Complete' **

** List of the Fundamental Three Solutions of Each Type **

1/d0	/d1	SC/	CC/
1----15	12---- 6	1 15 12 6	1 15 6 12
8---+10	13---+ 3	14 4 7 9	14 4 9 7
14-- - 4	7-- - 9	8 10 13 3	11 5 16 2
11---- 5	2----16	11 5 2 16	8 10 3 13

2/d0 1----15 12---+ 6 14-- - 4 7---- 9	/d1 8----10 13---+ 3 11-- - 5 2----16	SC/ 1 15 8 10 14 4 11 5 12 6 13 3 7 9 2 16	CC/ 1 15 10 8 14 4 5 11 7 9 16 2 12 6 3 13
3/d0 1----15 8---+10 12-- - 6 13---- 3	/d1 14---- 4 11---+ 5 7-- - 9 2----16	SC/ 1 15 14 4 12 6 7 9 8 10 11 5 13 3 2 16	CC/ 1 15 4 14 12 6 9 7 13 3 16 2 8 10 5 11

[Count = 3]

The central decomposed square named **SC/** is made by putting all entries of ECO 2⁴ flat into a 4 x 4 form in order. It looks like a self-complementary magic square of order 4. All complementary pairs of 17 are regularly located in symmetrical positions. Yes. This is really a Self-complementary Magic Square of Order 4.

The decomposed pattern named **CC/** on the most right is transformed from the central one **SC/**. The 3rd and 4th rows are exchanged with each other. The 3rd and 4th columns are also exchanged with each other at the same time. It is made into a Pan-magic Square of order 4. This also happens to be a 'Composite and Complete' type of Pan-magic Square at the same time. It has the property that any 2 x 2 block of adjacent entries sum up to the same total. But this is neither an accident, nor an arbitrary arrangement by any means.

You can always take the two types of Magic Squares of order 4 out of the 4-dimensional object of order 2. Because each of them is one-to-one corresponding to the other two. This shows the possibility of 'Dimension Converter', doesn't it?

If you stand on the side of Magic Squares of order 4, you should have the 'smallest set' that contains 3 'initial' solutions as shown above. The magic squares of lower dimension and higher order must have the plural 'initial' solutions more than the ones of higher dimension and lower order.

Where are the four numbers next to the origin n1? Where did they go in the magic squares of order 4? There exist n2, n3, n5 and n9 on the two axes: 2 for each. Although you may not accept n5 and n9 as the next numbers to n1, they are reasonably located. Because you can easily exchange all 4 entries of the row or column that include n2 and n9 at any time you want, and also exchange n3 and n5 with each other in any transformation process.

The smallest count 3 of solutions is, therefore, determined by the permutation of 4 numbers next to 1 on the 2 axes of squares of order 4. Divide 4C_2 by 2P_2 . You can get the answer 3.

#8. You might be surprised, if I say that it proves to be true there is the conceptual 'Origin' of various magic squares of order 4. They are surely derived from the only one original concept of higher dimensions, so that the offspring from it might be quite similar to one another.

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by Kanji Setsuda; Working with MacOSX 10.8 & Xcode 4.4.1)

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<< Appendix 1: Solution List of Two Types of Magic Squares of Order 4 >>

** Comparative Pairs of Self-complementary MS44 and Composite & Complete PMS44; **

SC/ 1/CC	1 15 12 6 14 4 7 9 8 10 13 3 11 5 2 16	1 15 6 12 14 4 9 7 11 5 16 2 8 10 3 13	SC/ 2/CC	1 15 8 10 14 4 11 5 12 6 13 3 7 9 2 16	1 15 10 8 14 4 5 11 7 9 16 2 12 6 3 13	SC/ 3/CC	1 15 14 4 12 6 7 9 8 10 11 5 13 3 2 16	1 15 4 14 12 6 9 7 13 3 16 2 8 10 5 11
SC/ 4/CC	1 15 8 10 12 6 13 3 14 4 11 5 7 9 2 16	1 15 10 8 12 6 3 13 7 9 16 2 14 4 5 11	SC/ 5/CC	1 15 14 4 8 10 11 5 12 6 7 9 13 3 2 16	1 15 4 14 8 10 5 11 13 3 16 2 12 6 9 7	SC/ 6/CC	1 15 12 6 8 10 13 3 14 4 7 9 11 5 2 16	1 15 6 12 8 10 3 13 11 5 16 2 14 4 9 7
SC/ 7/CC	1 14 12 7 15 4 6 9 8 11 13 2 10 5 3 16	1 14 7 12 15 4 9 6 10 5 16 3 8 11 2 13	SC/ 8/CC	1 14 8 11 15 4 10 5 12 7 13 2 6 9 3 16	1 14 11 8 15 4 5 10 6 9 16 3 12 7 2 13	SC/ 9/CC	1 14 15 4 12 7 6 9 8 11 10 5 13 2 3 16	1 14 4 15 12 7 9 6 13 2 16 3 8 11 5 10
SC/ 10/CC	1 14 8 11 12 7 13 2 15 4 10 5 6 9 3 16	1 14 11 8 12 7 2 13 6 9 16 3 15 4 5 10	SC/ 11/CC	1 14 15 4 8 11 10 5 12 7 6 9 13 2 3 16	1 14 4 15 8 11 5 10 13 2 16 3 12 7 9 6	SC/ 12/CC	1 14 12 7 8 11 13 2 15 4 6 9 10 5 3 16	1 14 7 12 8 11 2 13 10 5 16 3 15 4 9 6
SC/ 13/CC	1 12 14 7 15 6 4 9 8 13 11 2 10 3 5 16	1 12 7 14 15 6 9 4 10 3 16 5 8 13 2 11	SC/ 14/CC	1 12 8 13 15 6 10 3 14 7 11 2 4 9 5 16	1 12 13 8 15 6 3 10 4 9 16 5 14 7 2 11	SC/ 15/CC	1 12 15 6 14 7 4 9 8 13 10 3 11 2 5 16	1 12 6 15 14 7 9 4 11 2 16 5 8 13 3 10
SC/ 16/CC	1 12 8 13 14 7 11 2 15 6 10 3 4 9 5 16	1 12 13 8 14 7 2 11 4 9 16 5 15 6 3 10	SC/ 17/CC	1 12 15 6 8 13 10 3 14 7 4 9 11 2 5 16	1 12 6 15 8 13 3 10 11 2 16 5 14 7 9 4	SC/ 18/CC	1 12 14 7 8 13 11 2 15 6 4 9 10 3 5 16	1 12 7 14 8 13 2 11 10 3 16 5 15 6 9 4
SC/ 19/CC	1 8 14 11 15 10 4 5 12 13 7 2 6 3 9 16	1 8 11 14 15 10 5 4 6 3 16 9 12 13 2 7	SC/ 20/CC	1 8 12 13 15 10 6 3 14 11 7 2 4 5 9 16	1 8 13 12 15 10 3 6 4 5 16 9 14 11 2 7	SC/ 21/CC	1 8 15 10 14 11 4 5 12 13 6 3 7 2 9 16	1 8 10 15 14 11 5 4 7 2 16 9 12 13 3 6
SC/ 22/CC	1 8 12 13 14 11 7 2 15 10 6 3 4 5 9 16	1 8 13 12 14 11 2 7 4 5 16 9 15 10 3 6	SC/ 23/CC	1 8 15 10 12 13 6 3 14 11 4 5 7 2 9 16	1 8 10 15 12 13 3 6 7 2 16 9 14 11 5 4	SC/ 24/CC	1 8 14 11 12 13 7 2 15 10 4 5 6 3 9 16	1 8 11 14 12 13 2 7 6 3 16 9 15 10 5 4
SC/ 25/CC	2 16 11 5 13 3 8 10 7 9 14 4 12 6 1 15	2 16 5 11 13 3 10 8 12 6 15 1 7 9 4 14	SC/ 26/CC	2 16 7 9 13 3 12 6 11 5 14 4 8 10 1 15	2 16 9 7 13 3 6 12 8 10 15 1 11 5 4 14	SC/ 27/CC	2 16 13 3 11 5 8 10 7 9 12 6 14 4 1 15	2 16 3 13 11 5 10 8 14 4 15 1 7 9 6 12
SC/ 28/CC	2 16 7 9 11 5 14 4 13 3 12 6 8 10 1 15	2 16 9 7 11 5 4 14 8 10 15 1 13 3 6 12	SC/ 29/CC	2 16 13 3 7 9 12 6 11 5 8 10 14 4 1 15	2 16 3 13 7 9 6 12 14 4 15 1 11 5 10 8	SC/ 30/CC	2 16 11 5 7 9 14 4 13 3 8 10 12 6 1 15	2 16 5 11 7 9 4 14 12 6 15 1 13 3 10 8
SC/ 31/CC	2 13 11 8 16 3 5 10 7 12 14 1 9 6 4 15	2 13 8 11 16 3 10 5 9 6 15 4 7 12 1 14	SC/ 32/CC	2 13 7 12 16 3 9 6 11 8 14 1 5 10 4 15	2 13 12 7 16 3 6 9 5 10 15 4 11 8 1 14	SC/ 33/CC	2 13 16 3 11 8 5 10 7 12 9 6 14 1 4 15	2 13 3 16 11 8 10 5 14 1 15 4 7 12 6 9

SC/ 34/CC	SC/ 35/CC	SC/ 36/CC
2 13 7 12 2 13 12 7	2 13 16 3 2 13 3 16	2 13 11 8 2 13 8 11
11 8 14 1 11 8 1 14	7 12 9 6 7 12 6 9	7 12 14 1 7 12 1 14
16 3 9 6 5 10 15 4	11 8 5 10 14 1 15 4	16 3 5 10 9 6 15 4
5 10 4 15 16 3 6 9	14 1 4 15 11 8 10 5	9 6 4 15 16 3 10 5
SC/ 37/CC	SC/ 38/CC	SC/ 39/CC
2 11 13 8 2 11 8 13	2 11 7 14 2 11 14 7	2 11 16 5 2 11 5 16
16 5 3 10 16 5 10 3	16 5 9 4 16 5 4 9	13 8 3 10 13 8 10 3
7 14 12 1 9 4 15 6	13 8 12 1 3 10 15 6	7 14 9 4 12 1 15 6
9 4 6 15 7 14 1 12	3 10 6 15 13 8 1 12	12 1 6 15 7 14 4 9
SC/ 40/CC	SC/ 41/CC	SC/ 42/CC
2 11 7 14 2 11 14 7	2 11 16 5 2 11 5 16	2 11 13 8 2 11 8 13
13 8 12 1 13 8 1 12	7 14 9 4 7 14 4 9	7 14 12 1 7 14 1 12
16 5 9 4 3 10 15 6	13 8 3 10 12 1 15 6	16 5 3 10 9 4 15 6
3 10 6 15 16 5 4 9	12 1 6 15 13 8 10 3	9 4 6 15 16 5 10 3
SC/ 43/CC	SC/ 44/CC	SC/ 45/CC
2 7 13 12 2 7 12 13	2 7 11 14 2 7 14 11	2 7 16 9 2 7 9 16
16 9 3 6 16 9 6 3	16 9 5 4 16 9 4 5	13 12 3 6 13 12 6 3
11 14 8 1 5 4 15 10	13 12 8 1 3 6 15 10	11 14 5 4 8 1 15 10
5 4 10 15 11 14 1 8	3 6 10 15 13 12 1 8	8 1 10 15 11 14 4 5
SC/ 46/CC	SC/ 47/CC	SC/ 48/CC
2 7 11 14 2 7 14 11	2 7 16 9 2 7 9 16	2 7 13 12 2 7 12 13
13 12 8 1 13 12 1 8	11 14 5 4 11 14 4 5	11 14 8 1 11 14 1 8
16 9 5 4 3 6 15 10	13 12 3 6 8 1 15 10	16 9 3 6 5 4 15 10
3 6 10 15 16 9 4 5	8 1 10 15 13 12 6 3	5 4 10 15 16 9 6 3
SC/ 49/CC	SC/ 50/CC	SC/ 51/CC
3 16 10 5 3 16 5 10	3 16 6 9 3 16 9 6	3 16 13 2 3 16 2 13
13 2 8 11 13 2 11 8	13 2 12 7 13 2 7 12	10 5 8 11 10 5 11 8
6 9 15 4 12 7 14 1	10 5 15 4 8 11 14 1	6 9 12 7 15 4 14 1
12 7 1 14 6 9 4 15	8 11 1 14 10 5 4 15	15 4 1 14 6 9 7 12
.		
SC/ 70/CC	SC/ 71/CC	SC/ 72/CC
3 6 10 15 3 6 15 10	3 6 16 9 3 6 9 16	3 6 13 12 3 6 12 13
13 12 8 1 13 12 1 8	10 15 5 4 10 15 4 5	10 15 8 1 10 15 1 8
16 9 5 4 2 7 14 11	13 12 2 7 8 1 14 11	16 9 2 7 5 4 14 11
2 7 11 14 16 9 4 5	8 1 11 14 13 12 7 2	5 4 11 14 16 9 7 2
SC/ 73/CC	SC/ 74/CC	SC/ 75/CC
4 15 9 6 4 15 6 9	4 15 5 10 4 15 10 5	4 15 14 1 4 15 1 14
14 1 7 12 14 1 12 7	14 1 11 8 14 1 8 11	9 6 7 12 9 6 12 7
5 10 16 3 11 8 13 2	9 6 16 3 7 12 13 2	5 10 11 8 16 3 13 2
11 8 2 13 5 10 3 16	7 12 2 13 9 6 3 16	16 3 2 13 5 10 8 11
SC/ 76/CC	SC/ 77/CC	SC/ 78/CC
4 15 5 10 4 15 10 5	4 15 14 1 4 15 1 14	4 15 9 6 4 15 6 9
9 6 16 3 9 6 3 16	5 10 11 8 5 10 8 11	5 10 16 3 5 10 3 16
14 1 11 8 7 12 13 2	9 6 7 12 16 3 13 2	14 1 7 12 11 8 13 2
7 12 2 13 14 1 8 11	16 3 2 13 9 6 12 7	11 8 2 13 14 1 12 7
.		
SC/ 94/CC	SC/ 95/CC	SC/ 96/CC
4 5 9 16 4 5 16 9	4 5 15 10 4 5 10 15	4 5 14 11 4 5 11 14
14 11 7 2 14 11 2 7	9 16 6 3 9 16 3 6	9 16 7 2 9 16 2 7
15 10 6 3 1 8 13 12	14 11 1 8 7 2 13 12	15 10 1 8 6 3 13 12
1 8 12 13 15 10 3 6	7 2 12 13 14 11 8 1	6 3 12 13 15 10 8 1
SC/ 97/CC	SC/ 98/CC	SC/ 99/CC
5 16 10 3 5 16 3 10	5 16 4 9 5 16 9 4	5 16 11 2 5 16 2 11
11 2 8 13 11 2 13 8	11 2 14 7 11 2 7 14	10 3 8 13 10 3 13 8
4 9 15 6 14 7 12 1	10 3 15 6 8 13 12 1	4 9 14 7 15 6 12 1
14 7 1 12 4 9 6 15	8 13 1 12 10 3 6 15	15 6 1 12 4 9 7 14
SC/100/CC	SC/101/CC	SC/102/CC
5 16 4 9 5 16 9 4	5 16 11 2 5 16 2 11	5 16 10 3 5 16 3 10
10 3 15 6 10 3 6 15	4 9 14 7 4 9 7 14	4 9 15 6 4 9 6 15
11 2 14 7 8 13 12 1	10 3 8 13 15 6 12 1	11 2 8 13 14 7 12 1
8 13 1 12 11 2 7 14	15 6 1 12 10 3 13 8	14 7 1 12 11 2 13 8

.
 SC/118/CC SC/119/CC SC/120/CC
 5 4 10 15 5 4 15 10 5 4 16 9 5 4 9 16 5 4 11 14 5 4 14 11
 11 14 8 1 11 14 1 8 10 15 3 6 10 15 6 3 10 15 8 1 10 15 1 8
 16 9 3 6 2 7 12 13 11 14 2 7 8 1 12 13 16 9 2 7 3 6 12 13
 2 7 13 12 16 9 6 3 8 1 13 12 11 14 7 2 3 6 13 12 16 9 7 2

 SC/121/CC SC/122/CC SC/123/CC
 6 15 9 4 6 15 4 9 6 15 3 10 6 15 10 3 6 15 12 1 6 15 1 12
 12 1 7 14 12 1 14 7 12 1 13 8 12 1 8 13 9 4 7 14 9 4 14 7
 3 10 16 5 13 8 11 2 9 4 16 5 7 14 11 2 3 10 13 8 16 5 11 2
 13 8 2 11 3 10 5 16 7 14 2 11 9 4 5 16 16 5 2 11 3 10 8 13

 SC/124/CC SC/125/CC SC/126/CC
 6 15 3 10 6 15 10 3 6 15 12 1 6 15 1 12 6 15 9 4 6 15 4 9
 9 4 16 5 9 4 5 16 3 10 13 8 3 10 8 13 3 10 16 5 3 10 5 16
 12 1 13 8 7 14 11 2 9 4 7 14 16 5 11 2 12 1 7 14 13 8 11 2
 7 14 2 11 12 1 8 13 16 5 2 11 9 4 14 7 13 8 2 11 12 1 14 7

 SC/142/CC SC/143/CC SC/144/CC
 6 3 9 16 6 3 16 9 6 3 15 10 6 3 10 15 6 3 12 13 6 3 13 12
 12 13 7 2 12 13 2 7 9 16 4 5 9 16 5 4 9 16 7 2 9 16 2 7
 15 10 4 5 1 8 11 14 12 13 1 8 7 2 11 14 15 10 1 8 4 5 11 14
 1 8 14 11 15 10 5 4 7 2 14 11 12 13 8 1 4 5 14 11 15 10 8 1

 SC/145/CC SC/146/CC SC/147/CC
 7 14 9 4 7 14 4 9 7 14 2 11 7 14 11 2 7 14 12 1 7 14 1 12
 12 1 6 15 12 1 15 6 12 1 13 8 12 1 8 13 9 4 6 15 9 4 15 6
 2 11 16 5 13 8 10 3 9 4 16 5 6 15 10 3 2 11 13 8 16 5 10 3
 13 8 3 10 2 11 5 16 6 15 3 10 9 4 5 16 16 5 3 10 2 11 8 13

 SC/148/CC SC/149/CC SC/150/CC
 7 14 2 11 7 14 11 2 7 14 12 1 7 14 1 12 7 14 9 4 7 14 4 9
 9 4 16 5 9 4 5 16 2 11 13 8 2 11 8 13 2 11 16 5 2 11 5 16
 12 1 13 8 6 15 10 3 9 4 6 15 16 5 10 3 12 1 6 15 13 8 10 3
 6 15 3 10 12 1 8 13 16 5 3 10 9 4 15 6 13 8 3 10 12 1 15 6

 SC/166/CC SC/167/CC SC/168/CC
 7 2 9 16 7 2 16 9 7 2 14 11 7 2 11 14 7 2 12 13 7 2 13 12
 12 13 6 3 12 13 3 6 9 16 4 5 9 16 5 4 9 16 6 3 9 16 3 6
 14 11 4 5 1 8 10 15 12 13 1 8 6 3 10 15 14 11 1 8 4 5 10 15
 1 8 15 10 14 11 5 4 6 3 15 10 12 13 8 1 4 5 15 10 14 11 8 1

 SC/169/CC SC/170/CC SC/171/CC
 8 13 10 3 8 13 3 10 8 13 1 12 8 13 12 1 8 13 11 2 8 13 2 11
 11 2 5 16 11 2 16 5 11 2 14 7 11 2 7 14 10 3 5 16 10 3 16 5
 1 12 15 6 14 7 9 4 10 3 15 6 5 16 9 4 1 12 14 7 15 6 9 4
 14 7 4 9 1 12 6 15 5 16 4 9 10 3 6 15 15 6 4 9 1 12 7 14

 SC/172/CC SC/173/CC SC/174/CC
 8 13 1 12 8 13 12 1 8 13 11 2 8 13 2 11 8 13 10 3 8 13 3 10
 10 3 15 6 10 3 6 15 1 12 14 7 1 12 7 14 1 12 15 6 1 12 6 15
 11 2 14 7 5 16 9 4 10 3 5 16 15 6 9 4 11 2 5 16 14 7 9 4
 5 16 4 9 11 2 7 14 15 6 4 9 10 3 16 5 14 7 4 9 11 2 16 5

 SC/190/CC SC/191/CC SC/192/CC
 8 1 10 15 8 1 15 10 8 1 13 12 8 1 12 13 8 1 11 14 8 1 14 11
 11 14 5 4 11 14 4 5 10 15 3 6 10 15 6 3 10 15 5 4 10 15 4 5
 13 12 3 6 2 7 9 16 11 14 2 7 5 4 9 16 13 12 2 7 3 6 9 16
 2 7 16 9 13 12 6 3 5 4 16 9 11 14 7 2 3 6 16 9 13 12 7 2

 SC/193/CC SC/194/CC SC/195/CC
 9 16 6 3 9 16 3 6 9 16 4 5 9 16 5 4 9 16 7 2 9 16 2 7
 7 2 12 13 7 2 13 12 7 2 14 11 7 2 11 14 6 3 12 13 6 3 13 12
 4 5 15 10 14 11 8 1 6 3 15 10 12 13 8 1 4 5 14 11 15 10 8 1
 14 11 1 8 4 5 10 15 12 13 1 8 6 3 10 15 15 10 1 8 4 5 11 14

 SC/196/CC SC/197/CC SC/198/CC
 9 16 4 5 9 16 5 4 9 16 7 2 9 16 2 7 9 16 6 3 9 16 3 6

```

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

```

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SC/358/CC SC/359/CC SC/360/CC
15 1 4 14 15 1 14 4 15 1 10 8 15 1 8 10 15 1 6 12 15 1 12 6
6 12 9 7 6 12 7 9 4 14 5 11 4 14 11 5 4 14 9 7 4 14 7 9
10 8 5 11 3 13 2 16 6 12 3 13 9 7 2 16 10 8 3 13 5 11 2 16
3 13 16 2 10 8 11 5 9 7 16 2 6 12 13 3 5 11 16 2 10 8 13 3

```

```

SC/361/CC SC/362/CC SC/363/CC
16 9 3 6 16 9 6 3 16 9 2 7 16 9 7 2 16 9 5 4 16 9 4 5
5 4 10 15 5 4 15 10 5 4 11 14 5 4 14 11 3 6 10 15 3 6 15 10
2 7 13 12 11 14 1 8 3 6 13 12 10 15 1 8 2 7 11 14 13 12 1 8
11 14 8 1 2 7 12 13 10 15 8 1 3 6 12 13 13 12 8 1 2 7 14 11

```

```

SC/364/CC SC/365/CC SC/366/CC
16 9 2 7 16 9 7 2 16 9 5 4 16 9 4 5 16 9 3 6 16 9 6 3
3 6 13 12 3 6 12 13 2 7 11 14 2 7 14 11 2 7 13 12 2 7 12 13
5 4 11 14 10 15 1 8 3 6 10 15 13 12 1 8 5 4 10 15 11 14 1 8
10 15 8 1 5 4 14 11 13 12 8 1 3 6 15 10 11 14 8 1 5 4 15 10

```

```

SC/367/CC SC/368/CC SC/369/CC
16 5 3 10 16 5 10 3 16 5 2 11 16 5 11 2 16 5 9 4 16 5 4 9
9 4 6 15 9 4 15 6 9 4 7 14 9 4 14 7 3 10 6 15 3 10 15 6
2 11 13 8 7 14 1 12 3 10 13 8 6 15 1 12 2 11 7 14 13 8 1 12
7 14 12 1 2 11 8 13 6 15 12 1 3 10 8 13 13 8 12 1 2 11 14 7

```

```

SC/370/CC SC/371/CC SC/372/CC
16 5 2 11 16 5 11 2 16 5 9 4 16 5 4 9 16 5 3 10 16 5 10 3
3 10 13 8 3 10 8 13 2 11 7 14 2 11 14 7 2 11 13 8 2 11 8 13
9 4 7 14 6 15 1 12 3 10 6 15 13 8 1 12 9 4 6 15 7 14 1 12
6 15 12 1 9 4 14 7 13 8 12 1 3 10 15 6 7 14 12 1 9 4 15 6

```

```

SC/373/CC SC/374/CC SC/375/CC
16 3 5 10 16 3 10 5 16 3 2 13 16 3 13 2 16 3 9 6 16 3 6 9
9 6 4 15 9 6 15 4 9 6 7 12 9 6 12 7 5 10 4 15 5 10 15 4
2 13 11 8 7 12 1 14 5 10 11 8 4 15 1 14 2 13 7 12 11 8 1 14
7 12 14 1 2 13 8 11 4 15 14 1 5 10 8 11 11 8 14 1 2 13 12 7

```

```

SC/376/CC SC/377/CC SC/378/CC
16 3 2 13 16 3 13 2 16 3 9 6 16 3 6 9 16 3 5 10 16 3 10 5
5 10 11 8 5 10 8 11 2 13 7 12 2 13 12 7 2 13 11 8 2 13 8 11
9 6 7 12 4 15 1 14 5 10 4 15 11 8 1 14 9 6 4 15 7 12 1 14
4 15 14 1 9 6 12 7 11 8 14 1 5 10 15 4 7 12 14 1 9 6 15 4

```

```

SC/379/CC SC/380/CC SC/381/CC
16 2 5 11 16 2 11 5 16 2 3 13 16 2 13 3 16 2 9 7 16 2 7 9
9 7 4 14 9 7 14 4 9 7 6 12 9 7 12 6 5 11 4 14 5 11 14 4
3 13 10 8 6 12 1 15 5 11 10 8 4 14 1 15 3 13 6 12 10 8 1 15
6 12 15 1 3 13 8 10 4 14 15 1 5 11 8 10 10 8 15 1 3 13 12 6

```

```

SC/382/CC SC/383/CC SC/384/CC
16 2 3 13 16 2 13 3 16 2 9 7 16 2 7 9 16 2 5 11 16 2 11 5
5 11 10 8 5 11 8 10 3 13 6 12 3 13 12 6 3 13 10 8 3 13 8 10
9 7 6 12 4 14 1 15 5 11 4 14 10 8 1 15 9 7 4 14 6 12 1 15
4 14 15 1 9 7 12 6 10 8 15 1 5 11 14 4 6 12 15 1 9 7 14 4

```

[Count = 384] [OK!]

** Recompiled and Listed by Kanji Setsuda on
 March 2, 2015 with MacOSX 10.10.2 & Xcode 6.1.1 **

<< Appendix 2: Program List >>

```

//
/** Compose the 4-Dimensional Magic Objects of Order 2 and **
/** Transform them into Two Types of MS44: 'S-C' and 'C&C' **
/** File: 'EC024A384.c' Dictated by Kanji Setsuda **
/** on Jan.14, 2006; Revised on March 3, 2013; **

```

```

/** Recompiled on March 2, 2015 **
/** with MacOSX 10.10.2 & Xcode 6.1.1 **
//
/** Basic Diagrams expressing Positions of Elements ***
// BD/d0          /d1          SC/          CC/
// 1---- 2      3---- 4      1 2 3 4      1 2 4 3
// | 9--+-10    | 11--+-12    5 6 7 8      5 6 8 7
// 5--|- 6 |    7--|- 8 |      9 10 11 12    13 14 16 15
// 13----14     15----16     13 14 15 16     9 10 12 11
//
/** Definition of Self-complementary Pairs **
// n1+n16=n2+n15=n3+n14=n4+n13=n5+n12=n6+n11=n7+n10=n8+n9=17 ...scc
//
/** The 12 Essential 'Composite Conditions' **
// n1+n2+n3+n4=C ... (1);    n1+n2+n5+n6=C ... (2);    n1+n2+n9+n10=C ... (3);
// n1+n3+n5+n7=C ... (4);    n1+n3+n9+n11=C ... (5);    n1+n5+n9+n13=C ... (6);
// n2+n4+n6+n8=C ... (7);    n2+n4+n10+n12=C ... (8);    n2+n6+n10+n14=C ... (9);
// n3+n4+n7+n8=C ... (10);   n3+n4+n11+n12=C ... (11);   n5+n6+n7+n8=C ... (12);
//
#include <stdio.h>
//
/** Variables *
short int cnt;
short CC, LSM, cnt2;
short nm[17], uflg[17];
short t[384][17];
//
/** Sub-Routines *
void stp01(void), stp02(void), stp03(void);
void stp04(void), stp05(void), stp06(void);
void stp07(void), stp08(void), stp09(void);
void stp10(void), stp11(void), stp12(void);
void ansreocrd(void);
void pr4f24(void), pr3scms2(void);
//
/** Main Program *
int main(){
short n;
printf("\n");
printf("*** Compose the 4-Dimensional Magic Objects of Order 2 and **\n");
printf("*** Transform them into Two Types of MS44: 'S-C' and 'C&C' **\n");
for(n=0;n<17;n++){nm[n]=0; uflg[n]=0;}
CC=17; LSM=34; cnt=0;
stp01();    /** Begin the Calculation *
pr4f24();    /** Print the Answer in 4 Forms *
printf("\n");
printf("*** Another List: Three Comparative Pairs of Solutions **\n");
pr3scms2();    /** Print the 3 Answers only in 2 Forms *
printf(" [Count = %d] [OK!]\n",cnt);
printf("\n");
printf("*** Recompiled and Listed by Kanji Setsuda on\n");
printf(" March 2, 2015 with MacOSX 10.10.2 & Xcode 6.1.1 **\n");
printf("\n");
return 0;
}
//
/** Calculations *
/** Set n1 & n16 *
void stp01(){
short a,b;
for(a=1;a<17;a++){b=CC-a;
if((uflg[a]==0)&&(uflg[b]==0)){
nm[1]=a; nm[16]=b;
uflg[a]=1; uflg[b]=1;
stp02();
}
}
}

```

```

        uflg[b]=0; uflg[a]=0;}
    }
}
/** Set n2 & n15 *
void stp02(){
    short a,b;
    for(a=16;a>0;a--){b=CC-a;
        if((uflg[a]==0)&&(uflg[b]==0)){
            nm[2]=a; nm[15]=b;
            uflg[a]=1; uflg[b]=1;
            stp03();
            uflg[b]=0; uflg[a]=0;}
        }
}
/** Set n5 & n12 *
void stp03(){
    short a,b;
    for(a=16;a>0;a--){b=CC-a;
        if((uflg[a]==0)&&(uflg[b]==0)){
            nm[5]=a; nm[12]=b;
            uflg[a]=1; uflg[b]=1;
            stp04();
            uflg[b]=0; uflg[a]=0;}
        }
}
/** Set n6=LSM-n1-n2-n5 & n11 *
void stp04(){
    short a,b;
    a=LSM-nm[1]-nm[2]-nm[5];
    if((0<a)&&(a<17)){b=CC-a;
        if((uflg[a]==0)&&(uflg[b]==0)){
            nm[6]=a; nm[11]=b;
            uflg[a]=1; uflg[b]=1;
            stp05();
            uflg[b]=0; uflg[a]=0;}}
}
/** Set n3 & n14 *
void stp05(){
    short a,b;
    for(a=16;a>0;a--){b=CC-a;
        if((uflg[a]==0)&&(uflg[b]==0)){
            nm[3]=a; nm[14]=b;
            uflg[a]=1; uflg[b]=1;
            stp06();
            uflg[b]=0; uflg[a]=0;}
        }
}
/** Set n4=LSM-n1-n2-n3 & n13 *
void stp06(){
    short a,b;
    a=LSM-nm[1]-nm[2]-nm[3];
    if((0<a)&&(a<17)){b=CC-a;
        if((uflg[a]==0)&&(uflg[b]==0)){
            nm[4]=a; nm[13]=b;
            uflg[a]=1; uflg[b]=1;
            stp07();
            uflg[b]=0; uflg[a]=0;}}
}
/** Set n7=LSM-n1-n3-n5 & n10 *
void stp07(){
    short a,b;
    a=LSM-nm[1]-nm[3]-nm[5];
    if((0<a)&&(a<17)){b=CC-a;
        if((0<b)&&(uflg[a]==0)&&(uflg[b]==0)){
            nm[7]=a; nm[10]=b;

```

```

        uflg[a]=1; uflg[b]=1;
        stp08();
        uflg[b]=0; uflg[a]=0;}}
}
/* Set n8=LSM-n2-n4-n6 && n9 *
void stp08(){
short a,b,c;
a=LSM-nm[2]-nm[4]-nm[6];
b=LSM-nm[3]-nm[4]-nm[7];
c=LSM-nm[5]-nm[6]-nm[7];
if((0<a)&&(a<17)&&(a==b)&&(a==c)){b=CC-a;
    if((uflg[a]==0)&&(uflg[b]==0)){
        nm[8]=a; nm[9]=b;
        uflg[a]=1; uflg[b]=1; cnt2=0;
        stp09();
        uflg[b]=0; uflg[a]=0;}}
}
/* Check some Line-sums *
void stp09(){
short sm1,sm2,sm3;
sm1=nm[1]+nm[2]+nm[9]+nm[10];
sm2=nm[1]+nm[3]+nm[9]+nm[11];
sm3=nm[1]+nm[5]+nm[9]+nm[13];
if((sm1==LSM)&&(sm2==LSM)&&(sm3==LSM)){stp10();}
}
/* Check some Line-sums *
void stp10(){
short sm1,sm2,sm3;
sm1=nm[2]+nm[4]+nm[10]+nm[12];
sm2=nm[2]+nm[6]+nm[10]+nm[14];
sm3=nm[3]+nm[4]+nm[11]+nm[12];
if((sm1==LSM)&&(sm2==LSM)&&(sm3==LSM)){ansrecrd();}
}
//
void ansrecrd(void){
short n;
t[cnt][0]=cnt+1;
for(n=1;n<17;n++){t[cnt][n]=nm[n];}
cnt++;
}
//
/* Print the Answer of Order 2^4 in 4 Forms *
void pr4f24(void){
short m,n;
short tn[17];
for(m=0;m<24;m++){
    for(n=0;n<17;n++){tn[n]=t[m][n];}
    printf("%3d/d0          /d1          SC/          CC^n",tn[0]);
    printf("%4d----%2d%7d----%2d          ",tn[1],tn[2],tn[3],tn[4]);
    printf("          %3d%3d%3d%3d %3d%3d%3d%3d\n",
        tn[1],tn[2],tn[3],tn[4],tn[1],tn[2],tn[4],tn[3]);
    printf("          | %2d---%2d          | %2d---%2d",tn[9],tn[10],tn[11],tn[12]);
    printf("          %3d%3d%3d%3d %3d%3d%3d%3d\n",
        tn[5],tn[6],tn[7],tn[8],tn[5],tn[6],tn[8],tn[7]);
    printf("%4d--l-%2d          l%4d--l-%2d          l",tn[5],tn[6],tn[7],tn[8]);
    printf("          %3d%3d%3d%3d %3d%3d%3d%3d\n",
        tn[9],tn[10],tn[11],tn[12],tn[13],tn[14],tn[16],tn[15]);
    printf("%7d----%2d%7d----%2d",tn[13],tn[14],tn[15],tn[16]);
    printf("          %3d%3d%3d%3d %3d%3d%3d%3d\n",
        tn[13],tn[14],tn[15],tn[16],tn[9],tn[10],tn[12],tn[11]);
}
}
//
/* Print the Solutions of Order 2^4 in 2 Forms Transformed *
void pr3scms2(void){

```

```

short m,n,p;
short tn[3][17];
for(m=0;m<cnt;m=m+3){
for(p=0;p<3;p++){for(n=0;n<17;n++){tn[p][n]=t[m+p][n];}}
printf("          SC/%3d/CC          SC/%3d/CC          SC/%3d/CC\n",
        tn[0][0],tn[1][0],tn[2][0]);
printf("%3d%3d%3d%3d%5d%3d%3d%3d%6d%3d%3d%3d%5d%3d%3d%3d%6d%3d%3d%3d%5d%3d%3d%3d\n",
        tn[0][1],tn[0][2],tn[0][3],tn[0][4],tn[0][1],tn[0][2],tn[0][4],tn[0][3],
        tn[1][1],tn[1][2],tn[1][3],tn[1][4],tn[1][1],tn[1][2],tn[1][4],tn[1][3],
        tn[2][1],tn[2][2],tn[2][3],tn[2][4],tn[2][1],tn[2][2],tn[2][4],tn[2][3]);
printf("%3d%3d%3d%3d%5d%3d%3d%3d%6d%3d%3d%3d%5d%3d%3d%3d%6d%3d%3d%3d%5d%3d%3d%3d\n",
        tn[0][5],tn[0][6],tn[0][7],tn[0][8],tn[0][5],tn[0][6],tn[0][8],tn[0][7],
        tn[1][5],tn[1][6],tn[1][7],tn[1][8],tn[1][5],tn[1][6],tn[1][8],tn[1][7],
        tn[2][5],tn[2][6],tn[2][7],tn[2][8],tn[2][5],tn[2][6],tn[2][8],tn[2][7]);
printf("%3d%3d%3d%3d%5d%3d%3d%3d%6d%3d%3d%3d%5d%3d%3d%3d%6d%3d%3d%3d%5d%3d%3d%3d\n",
        tn[0][9],tn[0][10],tn[0][11],tn[0][12],tn[0][13],tn[0][14],tn[0][16],tn[0][15],
        tn[1][9],tn[1][10],tn[1][11],tn[1][12],tn[1][13],tn[1][14],tn[1][16],tn[1][15],
        tn[2][9],tn[2][10],tn[2][11],tn[2][12],tn[2][13],tn[2][14],tn[2][16],tn[2][15]);
printf("%3d%3d%3d%3d%5d%3d%3d%3d%6d%3d%3d%3d%5d%3d%3d%3d%6d%3d%3d%3d%5d%3d%3d%3d\n",
        tn[0][13],tn[0][14],tn[0][15],tn[0][16],tn[0][9],tn[0][10],tn[0][12],tn[0][11],
        tn[1][13],tn[1][14],tn[1][15],tn[1][16],tn[1][9],tn[1][10],tn[1][12],tn[1][11],
        tn[2][13],tn[2][14],tn[2][15],tn[2][16],tn[2][9],tn[2][10],tn[2][12],tn[2][11]);
}
}
//

```