

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 7. New Method of Composing 'Multiple' Type of Magic Squares 9x9 including 9 Little Squares 3x3 within

#1. New Method of Composing Various Types of Magic Things

As I reported in the previous sections, I recently invented a new, unique way of composing special types of magic cubes and squares of order 4, 8, and 9, using all possible 'view-forms' of high dimensional Extra-Cubic Objects developed.

Let me report about the case of ECO3⁴ here.

We know in the first section: if we use four-time loops of for(...){...} sentences and produce 'positional numbers' of the base 3, we can draw the 'view-forms' for ECO3⁴.

If you change the program a little in the order of variables {d0, d1, d2, d3}, you could have any different view-forms of the same ECO. You could draw different basic diagrams with n1=1 as many as 24 in all. Because $4P_4=4 \times 3 \times 2 \times 1=24$.

If you put any count-down type of conditions in the for(...){ } sentences, you could have another type of different view-forms of the same ECO. How many different pictures could you draw for that type, then?

We use 4 loops of for(...){...} sentences in all. And we have only two cases for each loop: whether we put the count-down condition or we don't. Therefore we could have different pictures of that type as many as 16 in all, because $2^4=16$.

Look carefully at the next samples of 'view forms'.

List 1 shows the 'Basic Diagrams' for our ECO3⁴ in four forms.

List 2 shows the 2 sets of 'view-forms' only in the style of developed MS9².

[BD]

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

N3i /

| | | |
|----------------|----------------|----------------|
| 0000 0001 0002 | 0010 0011 0012 | 0020 0021 0022 |
| 0100 0101 0102 | 0110 0111 0112 | 0120 0121 0122 |
| 0200 0201 0202 | 0210 0211 0212 | 0220 0221 0222 |
| 1000 1001 1002 | 1010 1011 1012 | 1020 1021 1022 |
| 1100 1101 1102 | 1110 1111 1112 | 1120 1121 1122 |
| 1200 1201 1202 | 1210 1211 1212 | 1220 1221 1222 |
| 2000 2001 2002 | 2010 2011 2012 | 2020 2021 2022 |
| 2100 2101 2102 | 2110 2111 2112 | 2120 2121 2122 |
| 2200 2201 2202 | 2210 2211 2212 | 2220 2221 2222 |

ED/ /D3i

| | | |
|----------------------------|---------------------|---------------------|
| 1 2 3 4 5 6 7 8 9 | 00000000 00000000 | 000111222 012012012 |
| 10 11 12 13 14 15 16 17 18 | 00000000 111111111 | 000111222 012012012 |
| 19 20 21 22 23 24 25 26 27 | 00000000 222222222 | 000111222 012012012 |
| 28 29 30 31 32 33 34 35 36 | 111111111 00000000 | 000111222 012012012 |
| 37 38 39 40 41 42 43 44 45 | 111111111 111111111 | 000111222 012012012 |
| 46 47 48 49 50 51 52 53 54 | 111111111 222222222 | 000111222 012012012 |
| 55 56 57 58 59 60 61 62 63 | 222222222 00000000 | 000111222 012012012 |
| 64 65 66 67 68 69 70 71 72 | 222222222 111111111 | 000111222 012012012 |
| 73 74 75 76 77 78 79 80 81 | 222222222 222222222 | 000111222 012012012 |

** Set #1 of Basic View-Forms(n1=1) for the Developed EC03^4 **

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

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

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

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

Set #2

1/ 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 65 66 67 68 69 70 71 72
73 74 75 76 77 78 79 80 81

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

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

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

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

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

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

8/ 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
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
81 80 79 78 77 76 75 74 73
72 71 70 69 68 67 66 65 64
63 62 61 60 59 58 57 56 55

9/ 55 56 57 58 59 60 61 62 63
64 65 66 67 68 69 70 71 72
73 74 75 76 77 78 79 80 81
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
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

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

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

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

[2]

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

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| | | | | |
|---------------------------|-----------|-----------|-----------|-----------|
| 1 54 68 78 11 34 44 58 21 | 012201120 | 021210102 | 021102210 | 021210102 |
| 72 5 46 29 79 15 22 39 62 | 201120012 | 102021210 | 210021102 | 210102021 |
| 50 64 9 16 33 74 57 26 40 | 120012201 | 210102021 | 102210021 | 102021210 |
| 80 13 30 37 63 23 6 47 70 | 201120012 | 210102021 | 210021102 | 102021210 |
| 31 75 17 27 41 55 65 7 51 | 120012201 | 021210102 | 102210021 | 021210102 |
| 12 35 76 59 19 45 52 69 2 | 012201120 | 102021210 | 021102210 | 210102021 |
| 42 56 25 8 49 66 73 18 32 | 120012201 | 102021210 | 102210021 | 210102021 |
| 20 43 60 67 3 53 36 77 10 | 012201120 | 210102021 | 021102210 | 102021210 |
| 61 24 38 48 71 4 14 28 81 | 201120012 | 021210102 | 210021102 | 021210102 |

[3]

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

3/ /D3i

| | | | | |
|---------------------------|-----------|-----------|-----------|-----------|
| 1 54 68 80 13 30 42 56 25 | 012201120 | 021210102 | 021210102 | 021102210 |
| 72 5 46 31 75 17 20 43 60 | 201120012 | 102021210 | 210102021 | 210021102 |
| 50 64 9 12 35 76 61 24 38 | 120012201 | 210102021 | 102021210 | 102210021 |
| 78 11 34 37 63 23 8 49 66 | 201120012 | 210102021 | 102021210 | 210021102 |
| 29 79 15 27 41 55 67 3 53 | 120012201 | 021210102 | 021210102 | 102210021 |
| 16 33 74 59 19 45 48 71 4 | 012201120 | 102021210 | 210102021 | 021102210 |
| 44 58 21 6 47 70 73 18 32 | 120012201 | 102021210 | 210102021 | 102210021 |
| 22 39 62 65 7 51 36 77 10 | 012201120 | 210102021 | 102021210 | 021102210 |
| 57 26 40 52 69 2 14 28 81 | 201120012 | 021210102 | 021210102 | 210021102 |

(2) Next we change each view-form directly into our object by DAM Transformation. We have to find any fine 'model' solutions and select the best one for our purpose.

Take your kind look at the next list of sample solutions above with decomposition diagrams by the positional numbers of the base 3.

We want to make something like those samples above as many as 48.

The next diagram illustrates the selected 'model' solution and our concept of 'DAM Transformation'. Two thirds of elements must be changed according to the table and the rest must be kept unchanged.

** Concept of 'DAM Transformation' **

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

Let's actually compose the object according to our design by this method.
 Here you see a sample program of mine only with a few essential components.

```

/* New Method of Composing Special Magic Squares 9^2 */
/* Using All View Forms of Extra-Cubic Object of 3^4 */
/* 'SNewMS9S' Built by Kanji Setsuda */
/* on MacOS Xcode 1.5; Apr. 13, 2005 */
/**/
#include <stdio.h>
/**/
/* Global Variables */
short cnt, vc, pc, tcnt;
short nm[82];
short tv[17][4];
short td[25][4];
short tnm[385][82];
/**/
/* Sub-Procedures */
void mkfv(void), prmt(void);
void d34b(short x, short y);
void stndrd48(void);
void prsol334();
void mksol34(void);
/**/
/* Main Program */
int main(){
  short m, n;
  printf("\n** New Method of Composing Special Magic Squares 9^2 **\n");
  printf("*** Using All View-Diagrams for Extra-Cubic Object 3^4 **\n");
  for(n=0; n<82; n++){nm[n]=n;}
  vc=0; mkfv();
  pc=0; prmt();
  tcnt=vc*pc;
  /**/
  printf("\n** Standard 48 Solutions of Special MS99 made from EC03^4 **\n");
  cnt=0;
  stndrd48();
  prsol334();
  printf("\n[Count=%d/%d]\n", cnt, tcnt);
  printf(" OK! \n");
  return 0;
}
/**/
/* Sub-Procedures for EC03^4 */
void mkfv(void){
  short d0, d1, d2, d3;
  for(d0=0; d0<2; d0++){
    for(d1=0; d1<2; d1++){
      for(d2=0; d2<2; d2++){
        for(d3=0; d3<2; d3++){
          tv[vc][0]=d0; tv[vc][1]=d1; tv[vc][2]=d2; tv[vc][3]=d3;
          vc++;
        } } } }
}
/**/
void prmt(void){
  short n;
  short d0, d1, d2, d3;
  short uflg[4];
  for(n=0; n<4; n++){uflg[n]=0;}
  for(d0=0; d0<4; d0++){uflg[d0]=1;
    for(d1=0; d1<4; d1++){

```

```

    if(uf1 g[d1]==0){uf1 g[d1]=1;
    for(d2=0; d2<4; d2++){
        if(uf1 g[d2]==0){uf1 g[d2]=1;
        for(d3=0; d3<4; d3++){
            if(uf1 g[d3]==0){uf1 g[d3]=1;
            td[pc][0]=d0; td[pc][1]=d1; td[pc][2]=d2; td[pc][3]=d3;
            pc++;
            uf1 g[d3]=0; }}
            uf1 g[d2]=0; }}
            uf1 g[d1]=0; }}
            uf1 g[d0]=0; }
    }
/**/
void d34b(short x, short y){
    short d0, d1, d2, d3;
    short t0, t1, t2, t3;
    short dc;
    short s[4], cd[2][3];
    cd[0][0]=0; cd[0][1]=1; cd[0][2]=2;
    cd[1][0]=2; cd[1][1]=1; cd[1][2]=0;
    dc=0;
    for(d0=0; d0<3; d0++){
        for(d1=0; d1<3; d1++){
            for(d2=0; d2<3; d2++){
                for(d3=0; d3<3; d3++){dc++;
                s[0]=cd[tv[x][0]][d0]; s[1]=cd[tv[x][1]][d1];
                s[2]=cd[tv[x][2]][d2]; s[3]=cd[tv[x][3]][d3];
                t0=td[y][0]; t1=td[y][1]; t2=td[y][2]; t3=td[y][3];
                tnm[x*pc+y][dc]=((s[t0]*3+s[t1])*3+s[t2])*3+s[t3]+1;
                }}}
    }
}
/**/
/* Compose Standard 48 Solutions of Special MS99 made from EC03^4 */
void stndrd48(void){
    short m, n, p;
    for(m=0; m<vc; m++){
        for(n=0; n<pc; n++){d34b(m, n);
        for(p=1; p<82; p++){tnm[p]=tnm[m*pc+n][p]; }
        mksol 34();
        if((nm[1]<nm[81])&&(nm[1]<nm[9])&&(nm[1]<nm[73])&&(nm[2]<nm[10])){
            for(p=1; p<82; p++){tnm[cnt][p]=nm[p]; }
            tnm[cnt][0]=cnt+1; cnt++;
        }
    }
}
}
/**/
/* Print the List of MS Solutions by 3 Pieces */
void prsol 334(void){
    short l, ll, m, m9, n;
    for(l=0; l<cnt; l=l+3){
        printf("%27d/%28d/%28d/\n", tnm[l][0], tnm[l+1][0], tnm[l+2][0]);
        for(m=0; m<9; m++){m9=m*9;
        for(ll=l; ll<(l+3); ll++){
            printf(" ");
            for(n=0; n<9; n++){
                printf("%3d", tnm[ll][m9+n+1]); }
            printf(" ");
        }
        printf("\n");
    }
}
}
/**/
/* Make each Bai sc Diagram into each Solution of Special MS9^2 */
void mksol 34(void){

```

```

short m, n;
short d[82];
for(n=1; n<82; n++){d[n]=nm[n]; }
nm[2]=d[54]; nm[3]=d[68]; nm[4]=d[72]; nm[6]=d[46]; nm[7]=d[50]; nm[8]=d[64];
nm[10]=d[78]; nm[12]=d[34]; nm[13]=d[29]; nm[14]=d[79]; nm[17]=d[33]; nm[18]=d[74];
nm[19]=d[44]; nm[20]=d[58]; nm[23]=d[39]; nm[24]=d[62]; nm[25]=d[57]; nm[27]=d[40];
nm[28]=d[80]; nm[29]=d[13]; nm[32]=d[75]; nm[33]=d[17]; nm[34]=d[12]; nm[36]=d[76];
nm[38]=d[63]; nm[39]=d[23]; nm[40]=d[27]; nm[42]=d[55]; nm[43]=d[59]; nm[44]=d[19];
nm[46]=d[6]; nm[48]=d[70]; nm[49]=d[65]; nm[50]=d[7]; nm[53]=d[69]; nm[54]=d[2];
nm[55]=d[42]; nm[57]=d[25]; nm[58]=d[20]; nm[59]=d[43]; nm[62]=d[24]; nm[63]=d[38];
nm[64]=d[8]; nm[65]=d[49]; nm[68]=d[3]; nm[69]=d[53]; nm[70]=d[48]; nm[72]=d[4];
nm[74]=d[18]; nm[75]=d[32]; nm[76]=d[36]; nm[78]=d[10]; nm[79]=d[14]; nm[80]=d[28];
}
/**/

```

This program is really short, say, shorter than any other old programs. It runs very fast, faster than any other programs I have ever written before for the same object.

You could find no old calculations already familiar to you, even no definitions with those many simultaneous equations at the first step, either. Nor you could find any kind of check procedures here.

Though it may look peculiar, it will surely give you a reasonable result.

Let me list out the result below, all 48 'standard' solutions of 'Complete Euler Squares' 9x9 including multiple little squares 3x3 within.

```

** New Method of Composing Special Magic Squares 9^2 **
** Using All View-Diagrams for Extra-Cubic Object 3^4 **
** Standard 48 Solutions of Special MS99 made from EC03^4 **

```

[1]

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

N3i /

| | | |
|----------------|----------------|----------------|
| 0000 1222 2111 | 2122 0011 1200 | 1211 2100 0022 |
| 2212 0101 1020 | 1001 2220 0112 | 0120 1012 2201 |
| 1121 2010 0202 | 0210 1102 2021 | 2002 0221 1110 |
| 2221 0110 1002 | 1010 2202 0121 | 0102 1021 2210 |
| 1100 2022 0211 | 0222 1111 2000 | 2011 0200 1122 |
| 0012 1201 2120 | 2101 0020 1212 | 1220 2112 0001 |
| 1112 2001 0220 | 0201 1120 2012 | 2020 0212 1101 |
| 0021 1210 2102 | 2110 0002 1221 | 1202 2121 0010 |
| 2200 0122 1011 | 1022 2211 0100 | 0111 1000 2222 |

1/ /D3i

| | |
|----------------------------|---|
| 1 54 68 72 5 46 50 64 9 | 012201120 021102210 021210102 021210102 |
| 78 11 34 29 79 15 16 33 74 | 201120012 210021102 102021210 210102021 |
| 44 58 21 22 39 62 57 26 40 | 120012201 102210021 210102021 102021210 |
| 80 13 30 31 75 17 12 35 76 | 201120012 210021102 210102021 102021210 |
| 37 63 23 27 41 55 59 19 45 | 120012201 102210021 021210102 021210102 |
| 6 47 70 65 7 51 52 69 2 | 012201120 021102210 102021210 210102021 |
| 42 56 25 20 43 60 61 24 38 | 120012201 102210021 102021210 210102021 |
| 8 49 66 67 3 53 48 71 4 | 012201120 021102210 210102021 102021210 |
| 73 18 32 36 77 10 14 28 81 | 201120012 210021102 021210102 021210102 |

[2]

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

N3i /

| | | |
|----------------|----------------|----------------|
| 0000 1222 2111 | 2122 0011 1200 | 1211 2100 0022 |
| 2221 0110 1002 | 1010 2202 0121 | 0102 1021 2210 |
| 1112 2001 0220 | 0201 1120 2012 | 2020 0212 1101 |
| 2212 0101 1020 | 1001 2220 0112 | 0120 1012 2201 |
| 1100 2022 0211 | 0222 1111 2000 | 2011 0200 1122 |
| 0021 1210 2102 | 2110 0002 1221 | 1202 2121 0010 |
| 1121 2010 0202 | 0210 1102 2021 | 2002 0221 1110 |
| 0012 1201 2120 | 2101 0020 1212 | 1220 2112 0001 |
| 2200 0122 1011 | 1022 2211 0100 | 0111 1000 2222 |

2/ /D3i

| | |
|----------------------------|---|
| 1 54 68 72 5 46 50 64 9 | 012201120 021102210 021210102 021210102 |
| 80 13 30 31 75 17 12 35 76 | 201120012 210021102 210102021 102021210 |
| 42 56 25 20 43 60 61 24 38 | 120012201 102210021 102021210 210102021 |
| 78 11 34 29 79 15 16 33 74 | 201120012 210021102 102021210 210102021 |
| 37 63 23 27 41 55 59 19 45 | 120012201 102210021 021210102 021210102 |
| 8 49 66 67 3 53 48 71 4 | 012201120 021102210 210102021 102021210 |
| 44 58 21 22 39 62 57 26 40 | 120012201 102210021 210102021 102021210 |
| 6 47 70 65 7 51 52 69 2 | 012201120 021102210 102021210 210102021 |
| 73 18 32 36 77 10 14 28 81 | 201120012 210021102 021210102 021210102 |

[3]

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

N3i /

| | | |
|----------------|----------------|----------------|
| 0000 1222 2111 | 2212 0101 1020 | 1121 2010 0202 |
| 2122 0011 1200 | 1001 2220 0112 | 0210 1102 2021 |
| 1211 2100 0022 | 0120 1012 2201 | 2002 0221 1110 |
| 2221 0110 1002 | 1100 2022 0211 | 0012 1201 2120 |
| 1010 2202 0121 | 0222 1111 2000 | 2101 0020 1212 |
| 0102 1021 2210 | 2011 0200 1122 | 1220 2112 0001 |
| 1112 2001 0220 | 0021 1210 2102 | 2200 0122 1011 |
| 0201 1120 2012 | 2110 0002 1221 | 1022 2211 0100 |
| 2020 0212 1101 | 1202 2121 0010 | 0111 1000 2222 |

3/ /D3i

| | |
|---------------------------|---|
| 1 54 68 78 11 34 44 58 21 | 012201120 021210102 021102210 021210102 |
| 72 5 46 29 79 15 22 39 62 | 201120012 102021210 210021102 210102021 |
| 50 64 9 16 33 74 57 26 40 | 120012201 210102021 102210021 102021210 |
| 80 13 30 37 63 23 6 47 70 | 201120012 210102021 210021102 102021210 |
| 31 75 17 27 41 55 65 7 51 | 120012201 021210102 102210021 021210102 |
| 12 35 76 59 19 45 52 69 2 | 012201120 102021210 021102210 210102021 |
| 42 56 25 8 49 66 73 18 32 | 120012201 102021210 102210021 210102021 |
| 20 43 60 67 3 53 36 77 10 | 012201120 210102021 021102210 102021210 |
| 61 24 38 48 71 4 14 28 81 | 201120012 021210102 210021102 021210102 |

[4]

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

N3i /

| | | |
|----------------|----------------|----------------|
| 0000 1222 2111 | 2221 0110 1002 | 1112 2001 0220 |
| 2122 0011 1200 | 1010 2202 0121 | 0201 1120 2012 |
| 1211 2100 0022 | 0102 1021 2210 | 2020 0212 1101 |
| 2212 0101 1020 | 1100 2022 0211 | 0021 1210 2102 |
| 1001 2220 0112 | 0222 1111 2000 | 2110 0002 1221 |
| 0120 1012 2201 | 2011 0200 1122 | 1202 2121 0010 |
| 1121 2010 0202 | 0012 1201 2120 | 2200 0122 1011 |
| 0210 1102 2021 | 2101 0020 1212 | 1022 2211 0100 |
| 2002 0221 1110 | 1220 2112 0001 | 0111 1000 2222 |

4/ /D3i

| | | | | |
|---------------------------|-----------|-----------|-----------|-----------|
| 1 54 68 80 13 30 42 56 25 | 012201120 | 021210102 | 021210102 | 021102210 |
| 72 5 46 31 75 17 20 43 60 | 201120012 | 102021210 | 210102021 | 210021102 |
| 50 64 9 12 35 76 61 24 38 | 120012201 | 210102021 | 102021210 | 102210021 |
| 78 11 34 37 63 23 8 49 66 | 201120012 | 210102021 | 102021210 | 210021102 |
| 29 79 15 27 41 55 67 3 53 | 120012201 | 021210102 | 021210102 | 102210021 |
| 16 33 74 59 19 45 48 71 4 | 012201120 | 102021210 | 210102021 | 021102210 |
| 44 58 21 6 47 70 73 18 32 | 120012201 | 102021210 | 210102021 | 102210021 |
| 22 39 62 65 7 51 36 77 10 | 012201120 | 210102021 | 102021210 | 021102210 |
| 57 26 40 52 69 2 14 28 81 | 201120012 | 021210102 | 021210102 | 210021102 |

[5]

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

N3i /

| | | |
|----------------|----------------|----------------|
| 0000 1222 2111 | 2212 0101 1020 | 1121 2010 0202 |
| 2221 0110 1002 | 1100 2022 0211 | 0012 1201 2120 |
| 1112 2001 0220 | 0021 1210 2102 | 2200 0122 1011 |
| 2122 0011 1200 | 1001 2220 0112 | 0210 1102 2021 |
| 1010 2202 0121 | 0222 1111 2000 | 2101 0020 1212 |
| 0201 1120 2012 | 2110 0002 1221 | 1022 2211 0100 |
| 1211 2100 0022 | 0120 1012 2201 | 2002 0221 1110 |
| 0102 1021 2210 | 2011 0200 1122 | 1220 2112 0001 |
| 2020 0212 1101 | 1202 2121 0010 | 0111 1000 2222 |

5/ /D3i

| | | | | |
|---------------------------|-----------|-----------|-----------|-----------|
| 1 54 68 78 11 34 44 58 21 | 012201120 | 021210102 | 021102210 | 021210102 |
| 80 13 30 37 63 23 6 47 70 | 201120012 | 210102021 | 210021102 | 102021210 |
| 42 56 25 8 49 66 73 18 32 | 120012201 | 102021210 | 102210021 | 210102021 |
| 72 5 46 29 79 15 22 39 62 | 201120012 | 102021210 | 210021102 | 210102021 |
| 31 75 17 27 41 55 65 7 51 | 120012201 | 021210102 | 102210021 | 021210102 |
| 20 43 60 67 3 53 36 77 10 | 012201120 | 210102021 | 021102210 | 102021210 |
| 50 64 9 16 33 74 57 26 40 | 120012201 | 210102021 | 102210021 | 102021210 |
| 12 35 76 59 19 45 52 69 2 | 012201120 | 102021210 | 021102210 | 210102021 |
| 61 24 38 48 71 4 14 28 81 | 201120012 | 021210102 | 210021102 | 021210102 |

[6]

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

6/ /D3i

| | | | | |
|---------------------------|-----------|-----------|-----------|-----------|
| 1 54 68 80 13 30 42 56 25 | 012201120 | 021210102 | 021210102 | 021102210 |
| 78 11 34 37 63 23 8 49 66 | 201120012 | 210102021 | 102021210 | 210021102 |
| 44 58 21 6 47 70 73 18 32 | 120012201 | 102021210 | 210102021 | 102210021 |
| 72 5 46 31 75 17 20 43 60 | 201120012 | 102021210 | 210102021 | 210021102 |
| 29 79 15 27 41 55 67 3 53 | 120012201 | 021210102 | 021210102 | 102210021 |
| 22 39 62 65 7 51 36 77 10 | 012201120 | 210102021 | 102021210 | 021102210 |
| 50 64 9 12 35 76 61 24 38 | 120012201 | 210102021 | 102021210 | 102210021 |
| 16 33 74 59 19 45 48 71 4 | 012201120 | 102021210 | 210102021 | 021102210 |
| 57 26 40 52 69 2 14 28 81 | 201120012 | 021210102 | 021210102 | 210021102 |

[7]

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

7/ /D3i

| | | | | |
|----------------------------|-----------|-----------|-----------|-----------|
| 1 72 50 54 5 64 68 46 9 | 021102210 | 012201120 | 021210102 | 021210102 |
| 78 29 16 11 79 33 34 15 74 | 210021102 | 201120012 | 102021210 | 210102021 |
| 44 22 57 58 39 26 21 62 40 | 102210021 | 120012201 | 210102021 | 102021210 |
| 80 31 12 13 75 35 30 17 76 | 210021102 | 201120012 | 210102021 | 102021210 |
| 37 27 59 63 41 19 23 55 45 | 102210021 | 120012201 | 021210102 | 021210102 |
| 6 65 52 47 7 69 70 51 2 | 021102210 | 012201120 | 102021210 | 210102021 |
| 42 20 61 56 43 24 25 60 38 | 102210021 | 120012201 | 102021210 | 210102021 |
| 8 67 48 49 3 71 66 53 4 | 021102210 | 012201120 | 210102021 | 102021210 |
| 73 36 14 18 77 28 32 10 81 | 210021102 | 201120012 | 021210102 | 021210102 |

[8]

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

8/ /D3i

| | | | | |
|----------------------------|-----------|-----------|-----------|-----------|
| 1 72 50 54 5 64 68 46 9 | 021102210 | 012201120 | 021210102 | 021210102 |
| 80 31 12 13 75 35 30 17 76 | 210021102 | 201120012 | 210102021 | 102021210 |
| 42 20 61 56 43 24 25 60 38 | 102210021 | 120012201 | 102021210 | 210102021 |
| 78 29 16 11 79 33 34 15 74 | 210021102 | 201120012 | 102021210 | 210102021 |
| 37 27 59 63 41 19 23 55 45 | 102210021 | 120012201 | 021210102 | 021210102 |
| 8 67 48 49 3 71 66 53 4 | 021102210 | 012201120 | 210102021 | 102021210 |
| 44 22 57 58 39 26 21 62 40 | 102210021 | 120012201 | 210102021 | 102021210 |
| 6 65 52 47 7 69 70 51 2 | 021102210 | 012201120 | 102021210 | 210102021 |
| 73 36 14 18 77 28 32 10 81 | 210021102 | 201120012 | 021210102 | 021210102 |

[9]

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

9/ /D3i

| | | | | |
|---------------------------|-----------|-----------|-----------|-----------|
| 1 72 50 78 29 16 44 22 57 | 021210102 | 012201120 | 021102210 | 021210102 |
| 80 31 12 37 27 59 6 65 52 | 210102021 | 201120012 | 210021102 | 102021210 |
| 42 20 61 8 67 48 73 36 14 | 102021210 | 120012201 | 102210021 | 210102021 |
| 54 5 64 11 79 33 58 39 26 | 102021210 | 201120012 | 210021102 | 210102021 |
| 13 75 35 63 41 19 47 7 69 | 021210102 | 120012201 | 102210021 | 021210102 |
| 56 43 24 49 3 71 18 77 28 | 210102021 | 012201120 | 021102210 | 102021210 |
| 68 46 9 34 15 74 21 62 40 | 210102021 | 120012201 | 102210021 | 102021210 |
| 30 17 76 23 55 45 70 51 2 | 102021210 | 012201120 | 021102210 | 210102021 |
| 25 60 38 66 53 4 32 10 81 | 021210102 | 201120012 | 210021102 | 021210102 |

[10]

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

10/ /D3i

| | | | | |
|---------------------------|-----------|-----------|-----------|-----------|
| 1 72 50 80 31 12 42 20 61 | 021210102 | 012201120 | 021210102 | 021102210 |
| 78 29 16 37 27 59 8 67 48 | 210102021 | 201120012 | 102021210 | 210021102 |
| 44 22 57 6 65 52 73 36 14 | 102021210 | 120012201 | 210102021 | 102210021 |
| 54 5 64 13 75 35 56 43 24 | 102021210 | 201120012 | 210102021 | 210021102 |
| 11 79 33 63 41 19 49 3 71 | 021210102 | 120012201 | 021210102 | 102210021 |
| 58 39 26 47 7 69 18 77 28 | 210102021 | 012201120 | 102021210 | 021102210 |
| 68 46 9 30 17 76 25 60 38 | 210102021 | 120012201 | 102021210 | 102210021 |
| 34 15 74 23 55 45 66 53 4 | 102021210 | 012201120 | 210102021 | 021102210 |
| 21 62 40 70 51 2 32 10 81 | 021210102 | 201120012 | 021210102 | 210021102 |

[11]

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

11/ /D3i

| | | | | |
|---------------------------|-----------|-----------|-----------|-----------|
| 1 78 44 54 11 58 68 34 21 | 021102210 | 021210102 | 012201120 | 021210102 |
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| 72 29 22 5 79 39 46 15 62 | 210021102 | 102021210 | 201120012 | 210102021 |
| 31 27 65 75 41 7 17 55 51 | 102210021 | 021210102 | 120012201 | 021210102 |
| 20 67 36 43 3 77 60 53 10 | 021102210 | 210102021 | 012201120 | 102021210 |
| 50 16 57 64 33 26 9 74 40 | 102210021 | 210102021 | 120012201 | 102021210 |
| 12 59 52 35 19 69 76 45 2 | 021102210 | 102021210 | 012201120 | 210102021 |
| 61 48 14 24 71 28 38 4 81 | 210021102 | 021210102 | 201120012 | 021210102 |

[12]

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

12/ /D3i

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| 13 63 47 75 41 7 35 19 69 | 021210102 | 102210021 | 120012201 | 021210102 |
| 56 49 18 43 3 77 24 71 28 | 210102021 | 021102210 | 012201120 | 102021210 |
| 68 34 21 46 15 62 9 74 40 | 210102021 | 102210021 | 120012201 | 102021210 |
| 30 23 70 17 55 51 76 45 2 | 102021210 | 021102210 | 012201120 | 210102021 |
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13/ /D3i

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|----------------------------|-----------|-----------|-----------|-----------|
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| 80 15 28 33 73 17 10 35 78 | 201120012 | 210021102 | 210102021 | 120201012 |
| 39 61 23 25 41 57 59 21 43 | 120012201 | 102210021 | 021210102 | 201012120 |
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14/ /D3i

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| 33 73 17 25 41 57 65 9 49 | 120012201 | 021210102 | 102210021 | 201012120 |
| 10 35 78 59 21 43 54 67 2 | 012201120 | 102021210 | 021102210 | 012120201 |
| 40 56 27 8 51 64 75 16 32 | 120012201 | 102021210 | 102210021 | 012120201 |
| 20 45 58 69 1 53 34 77 12 | 012201120 | 210102021 | 021102210 | 120201012 |
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15/ /D3i

| | | | | |
|----------------------------|-----------|-----------|-----------|-----------|
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| 8 51 64 69 1 53 46 71 6 | 012201120 | 021102210 | 210102021 | 120201012 |
| 44 60 19 24 37 62 55 26 42 | 120012201 | 102210021 | 210102021 | 120201012 |
| 4 47 72 65 9 49 54 67 2 | 012201120 | 021102210 | 102021210 | 012120201 |
| 75 16 32 34 77 12 14 30 79 | 201120012 | 210021102 | 021210102 | 201012120 |

16/ /D3i

| | | | | |
|---------------------------|-----------|-----------|-----------|-----------|
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| 20 45 58 69 1 53 34 77 12 | 012201120 | 210102021 | 021102210 | 120201012 |
| 50 66 7 18 31 74 55 26 42 | 120012201 | 210102021 | 102210021 | 120201012 |
| 10 35 78 59 21 43 54 67 2 | 012201120 | 102021210 | 021102210 | 012120201 |
| 63 22 38 46 71 6 14 30 79 | 201120012 | 021210102 | 210021102 | 201012120 |

17/ /D3i
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 76 11 36 39 61 23 8 51 64 201120012 210102021 102021210 012201120
 29 81 13 25 41 57 69 1 53 120012201 021210102 021210102 120012201
 18 31 74 59 21 43 46 71 6 012201120 102021210 210102021 201120012
 44 60 19 4 47 72 75 16 32 120012201 102021210 210102021 120012201
 24 37 62 65 9 49 34 77 12 012201120 210102021 102021210 201120012
 55 26 42 54 67 2 14 30 79 201120012 021210102 021210102 012201120

18/ /D3i
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 24 37 62 65 9 49 34 77 12 012201120 210102021 102021210 201120012
 50 66 7 10 35 78 63 22 38 120012201 210102021 102021210 120012201
 18 31 74 59 21 43 46 71 6 012201120 102021210 210102021 201120012
 55 26 42 54 67 2 14 30 79 201120012 021210102 021210102 012201120

19/ /D3i
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 4 65 54 47 9 67 72 49 2 021102210 012201120 102021210 012120201
 40 20 63 56 45 22 27 58 38 102210021 120012201 102021210 012120201
 8 69 46 51 1 71 64 53 6 021102210 012201120 210102021 120201012
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 8 69 46 51 1 71 64 53 6 021102210 012201120 210102021 120201012
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 4 65 54 47 9 67 72 49 2 021102210 012201120 102021210 012120201
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21/ /D3i
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 52 5 66 11 81 31 60 37 26 102021210 201120012 210021102 012120201
 15 73 35 61 41 21 47 9 67 021210102 120012201 102210021 201012120
 56 45 22 51 1 71 16 77 30 210102021 012201120 021102210 120201012
 68 48 7 36 13 74 19 62 42 210102021 120012201 102210021 120201012
 28 17 78 23 57 43 72 49 2 102021210 012201120 021102210 012120201
 27 58 38 64 53 6 32 12 79 021210102 201120012 210021102 201012120

22/ /D3i
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 76 29 18 39 25 59 8 69 46 210102021 201120012 102021210 012201120
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 52 5 66 15 73 35 56 45 22 102021210 201120012 210102021 012201120
 11 81 31 61 41 21 51 1 71 021210102 120012201 021210102 120012201
 60 37 26 47 9 67 16 77 30 210102021 012201120 102021210 201120012
 68 48 7 28 17 78 27 58 38 210102021 120012201 102021210 120012201
 36 13 74 23 57 43 64 53 6 102021210 012201120 210102021 201120012
 19 62 42 72 49 2 32 12 79 021210102 201120012 021210102 012201120

23/ /D3i

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70 29 24 5 81 37 48 13 62 210021102 102021210 201120012 012120201
33 25 65 73 41 9 17 57 49 102210021 021210102 120012201 201012120
20 69 34 45 1 77 58 53 12 021102210 210102021 012201120 120201012
50 18 55 66 31 26 7 74 42 102210021 210102021 120012201 120201012
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24/ /D3i

3 76 44 70 29 24 50 18 55 021210102 021102210 012201120 201012120
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52 11 60 5 81 37 66 31 26 102021210 210021102 201120012 012120201
15 61 47 73 41 9 35 21 67 021210102 102210021 120012201 201012120
56 51 16 45 1 77 22 71 30 210102021 021102210 012201120 120201012
68 36 19 48 13 62 7 74 42 210102021 102210021 120012201 120201012
28 23 72 17 57 49 78 43 2 102021210 021102210 012201120 012120201
27 64 32 58 53 12 38 6 79 021210102 210021102 201120012 201012120

25/

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

26/

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

27/

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

28/

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

29/

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

30/

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

31/

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

32/

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

33/

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

34/

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

35/

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

36/

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

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

** Moni tor of Soluti on Correspondence **

?: 0

1: 1 1 1 1 1 1 1 1 1 1 1
13: 1 1 1 1 1 1 1 1 1 1 1
25: 1 1 1 1 1 1 1 1 1 1 1
37: 1 1 1 1 1 1 1 1 1 1 1

[Count=48/384] OK!

The result means our success. The count 48 of 'standard' solutions here is logically equivalent to the count 384 of 'primitive' ones, because $384 = 48 \times 8$.

Each solution is really a 'Complete Euler' type of magic square of order 9 including 9 little squares 3×3 within. It is always found in the old list of solutions I got before.

We could make no other types of solutions. We could make neither duplications nor drop-offs of any solution at all.

It is amazing we could make all directly from the basic view-forms of $ECO3^4$ by this simple method. But why? What makes it always possible?

#3. Discussion

(1) Why could we make all objects directly from all the possible view-forms of ECO3⁴ developed by this unique, simplest method?

It is the 'prototype squares' of order 9 that we really made unconsciously, under the name of composing all the possible 'view forms' of developed ECO3⁴. I think it is the true reason why we could successfully use and apply 'DAM Transformation' to those compositions.

(2) What does it mean by the counts 48? We could draw 48 different view forms in all for the developed ECO, and we could also make the 'standard' solutions of 'Complete Euler' type of MS99 including multiple little squares 3x3 within as many as 48. Does this mean only an accidental agreement? No, it doesn't.

Imagine there exists essentially the only one solution in the 4-dimensional world, where Divine Being enjoys the original form of ECO as it is. But it appears here in our world in different images as many as 48, and we could only enjoy them as they are. That is implied by the existence of 48 different view forms for the same developed ECO. Every object solution must be the 'phenomena' of the original One, I think.

(3) We did not yet define any simultaneous equations beforehand, either. We did only make possible 'view-forms' of developed ECO and transform them directly into objects. Why did we need no definitions at all at the beginning?

Does it really mean any definitions are of no use or totally meaningless?

But, think. Did we really start our composition without any kinds of premises at all?

It isn't true. In fact we used the four-time loops of for(...) {...} sentences to produce positional numbers of the base 3 by calculations, didn't we?

Yes. The secret key is the positional number system of the base N.

Remember our solutions are all 'Complete Euler Squares' of order 9. Every row and column of every solution has the same number pattern of {0, 0, 0, 1, 1, 1, 2, 2, 2} in any layer of decompositions. Each primary diagonal has also the same combination of numbers. Every little square of 3 by 3 has the same {0, 1, 2} in any layer, too.

It means they are the mathematical basis of the same 'magic constant'.

$$(0+1+2) \times 3^3 + (0+1+2) \times 3^2 + (0+1+2) \times 3^1 + (0+1+2) \times 3^0 \\ = (0+1+2) \times (27+9+3+1) = 3 \times 40 = 120$$

$$(0+0+0+1+1+1+2+2+2) \times (3^3+3^2+3^1+3^0) = 9 \times (27+9+3+1) = 9 \times 40 = 360$$

The sum 120 here is logically equivalent to 123 in our classical notation. The sum 360 here is also equivalent to 369 in our classical notation.

Yes. We have done everything to compose 'Complete Euler Squares' of order 9 for our objects. Under the premise of using generator program of positional numbers of the base 3 we actually made the 'Complete Euler Squares' by drawing all possible view-forms of ECO, and by making them into our objects by 'DAM Transformation'.

Positional Number System of the Base N is the true reason for our success.

As you guess, you can only make your objects by this method of composition as far as they are 'Complete Euler' type of magic squares. You can make no other than 'CES'. On top of that you can only make what are essentially any developed forms of Extra-Cubic Object. In other words what you can make here by this method is only 'Complete Euler Squares' of order 9 including multiple little squares 3x3 within.

Though it may look as a limited application, it can surely make special, important magic squares, those 'most precious 48 jewels'.

I am so excited to know that there is a great relationship among those 'positional

number system of the base N', 'Complete Euler Squares', 'High Dimensional Extra-Cubic Objects', 'prototype squares' and 'DAM Transformation', all of which are the special topics that I have long studied very hard. Say, everything points at the same thing. This 'great relationship' might be one of the 'great puzzles' or 'great mysteries' revealed to us by our Creator God.

My philosophical mind is getting more curious and would hardly stop and sleep.

#4. How about Magic Squares 16^2

Let's think a little about the case of $ECO2^8$ here. Because $2^8 = 16^2$.

When we use the 8-time loops of `for(...){...}` sentences and produce binary numbers, we can draw 40320 different view-forms of the developed ECO with $n1=1$, because $8P_8 = 40320$. With a little modifications we can also draw another type of 256 pictures, because $2^8 = 256$.

If you combine these two sets of view-forms one by one, you can draw all the possible view-forms as many as 10321920, because $40320 \times 256 = 10321920$.

It means we can get the same counts of object solutions, directly from those view-forms by 'DAM Transformation', or get the 1290240 standard solutions of them.

But what type of object solutions can we get? What is the 'model solution' like?

Now I know nothing yet, but I can only guess it must be a special type of magic squares 16×16 . It must have the smallest solution set, theoretically speaking.

** Basic View-Diagram for Extra-Cubic Object of Order 2^8 **

```

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

65--66   67 68   69 70   71 72   73 74   75 76   77 78   79 80
|81--+82   83 84   85 86   87 88   89 90   91 92   93 94   95 96
97-|98 | 99 100 101 102 103 104 105 106 107 108 109 110 111 112
113-114   115 116   117 118   119 120   121 122   123 124   125 126   127 128

129-130   131 132   133 134   135 136   137 138   139 140   141 142   143 144
|145+146   147 148   149 150   151 152   153 154   155 156   157 158   159 160
161|162| 163 164   165 166   167 168   169 170   171 172   173 174   175 176
177-178   179 180   181 182   183 184   185 186   187 188   189 190   191 192

193 194   195 196   197 198   199 200   201 202   203 204   205 206   207 208
209 210   211 212   213 214   215 216   217 218   219 220   221 222   223 224
225 226   227 228   229 230   231 232   233 234   235 236   237 238   239 240
241 242   243 244   245 246   247 248   249 250   251 252   253 254   255 256

```

** Basic Diagram for Magic Squares of Order 16^2 **

```

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
65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80
81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96
97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112
113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128
129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144
145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160
161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176
177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192
193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208
209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224
225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240
241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256

```

#5. Additional Report of the Case of Magic Cubes 4³

We now know how effective the multiple loops of for(...){...} sentences are and how powerful the positional number system of the base N is.

How about the case of any ordinary cubes and squares in 2- or 3-dimensions?

Can you guess what pictures you can draw for them by those multiple loops?

As I could not imagine it exactly, I made some experiments and examined them. Let me report of the result here.

I wrote a test program for magic cubes of order 4³, and made my computer draw all the possible 'view-forms' of them.

I used triple loops of for(...){...} sentences and produced positional numbers of the Base 4 with a little modifications on the controller variables {d0, d1, d2} and using count-down type of condition controller.

The next lists show the two sets of 'view-forms' of the MC444.

You can combine these two sets one by one.

We could draw 48 pictures in all, because 6x8=48.

But each of them demonstrates only a simple 'reflection' or 'rotation' of the same pattern. They express the same solution and must be classified and counted as one.

** Set #1 of Basic View-Diagrams for Magic Cube 4³ **

1/

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

2/

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

3/

| | | | |
|----|----|----|----|
| 1 | 5 | 9 | 17 |
| 2 | 6 | 43 | 18 |
| 3 | 7 | 11 | 19 |
| 4 | 8 | 12 | 20 |
| 5 | 13 | 14 | 15 |
| 6 | 21 | 22 | 23 |
| 7 | 25 | 26 | 27 |
| 8 | 28 | 29 | 30 |
| 9 | 33 | 34 | 35 |
| 10 | 37 | 38 | 39 |
| 11 | 41 | 42 | 43 |
| 12 | 49 | 50 | 51 |
| 13 | 53 | 54 | 55 |
| 14 | 57 | 58 | 59 |
| 15 | 61 | 62 | 63 |
| 16 | 64 | 65 | 66 |

4/

| | | | |
|----|----|----|----|
| 1 | 2 | 3 | 4 |
| 2 | 6 | 43 | 8 |
| 3 | 10 | 11 | 12 |
| 4 | 14 | 15 | 16 |
| 5 | 17 | 18 | 19 |
| 6 | 21 | 22 | 23 |
| 7 | 25 | 26 | 27 |
| 8 | 29 | 30 | 31 |
| 9 | 33 | 34 | 35 |
| 10 | 37 | 38 | 39 |
| 11 | 41 | 42 | 43 |
| 12 | 45 | 46 | 47 |
| 13 | 49 | 50 | 51 |
| 14 | 53 | 54 | 55 |
| 15 | 57 | 58 | 59 |
| 16 | 61 | 62 | 63 |
| 17 | 64 | 65 | 66 |

5/

| | | | |
|----|----|----|----|
| 1 | 5 | 9 | 13 |
| 2 | 6 | 10 | 14 |
| 3 | 7 | 11 | 15 |
| 4 | 8 | 12 | 16 |
| 5 | 17 | 18 | 19 |
| 6 | 21 | 22 | 23 |
| 7 | 25 | 26 | 27 |
| 8 | 29 | 30 | 31 |
| 9 | 33 | 34 | 35 |
| 10 | 37 | 38 | 39 |
| 11 | 41 | 42 | 43 |
| 12 | 45 | 46 | 47 |
| 13 | 49 | 50 | 51 |
| 14 | 53 | 54 | 55 |
| 15 | 57 | 58 | 59 |
| 16 | 61 | 62 | 63 |
| 17 | 64 | 65 | 66 |

6/

| | | | |
|----|----|----|----|
| 1 | 2 | 3 | 4 |
| 2 | 6 | 10 | 14 |
| 3 | 18 | 11 | 15 |
| 4 | 21 | 12 | 16 |
| 5 | 25 | 13 | 17 |
| 6 | 29 | 14 | 18 |
| 7 | 33 | 15 | 19 |
| 8 | 37 | 16 | 20 |
| 9 | 41 | 17 | 21 |
| 10 | 45 | 18 | 22 |
| 11 | 49 | 19 | 23 |
| 12 | 53 | 20 | 24 |
| 13 | 57 | 21 | 25 |
| 14 | 61 | 22 | 26 |
| 15 | 64 | 23 | 27 |
| 16 | 65 | 24 | 28 |
| 17 | 66 | 25 | 29 |

** Set #2 of Basic View-Diagrams for Magic Cube 4³ **

1/

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

2/

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

3/

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

4/

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

5/

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

6/

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

7/

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

8/

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

What we could draw here is only what we already know well, and it tells us nothing new, though it might be useful for us to illustrate 48 'primitive' solutions for the same 'standard' one.

(Written in English on MacOS X & Xcode 1.5; May 19, 2005; Kanji Setsuda)

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