

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

**Chapter 4 : Commentary Articles No.2 by Kanji Setsuda**

"Various Arts and Tools for Studying Magic Squares"

**Section 9-2 : Simultaneous MC444: Both S-C and P-T Made by Binary Number System and "New Euler's Method"**

**0. Let's Go on Building 'Complete Euler Cubes' of Order 4.**

We want to examine and know what a wide range of magic forms we can compose by our "New Euler's Method". Let's go on building another type of Pan-Magic Cubes of order 4 by our new Greco-Latinian Method applied even to every pantriagonal of the object by the Binary Number System.

**1. How about Simultaneous MC444: both Self-complementary and Pan-triagonal?**

I once heard of some European researcher who discovered and reported about the simultaneous magic cube of order 4: both Self-Complementary and Pan-Triagonal.

Let's follow him and try to count the total numbers of them, shall we? I expect we can count them up through, since our new method could always run very fast.

I put some basic conditions and basic form at the first definition stage as follows:

**\* Basic Conditions: \***

$n1+n2+n3+n4=C$	...d1;		$n1+n17+n33+n49=C$	...d17;		$n1+n5+n9+n13=C$	...d33;
$n5+n6+n7+n8=C$	...d2;		$n2+n18+n34+n50=C$	...d18;		$n2+n6+n10+n14=C$	...d34;
$n9+n10+n11+n12=C$	...d3;		$n3+n19+n35+n51=C$	...d19;		$n3+n7+n11+n15=C$	...d35;
$n13+n14+n15+n16=C$	...d4;		$n4+n20+n36+n52=C$	...d20;		$n4+n8+n12+n16=C$	...d36;
$n17+n18+n19+n20=C$	...d5;		$n5+n21+n37+n53=C$	...d21;		$n17+n21+n25+n29=C$	...d37;
$n21+n22+n23+n24=C$	...d6;		$n6+n22+n38+n54=C$	...d22;		$n18+n22+n26+n30=C$	...d38;
$n25+n26+n27+n28=C$	...d7;		$n7+n23+n39+n55=C$	...d23;		$n19+n23+n27+n31=C$	...d39;
$n29+n30+n31+n32=C$	...d8;		$n8+n24+n40+n56=C$	...d24;		$n20+n24+n28+n32=C$	...d40;
$n33+n34+n35+n36=C$	...d9;		$n9+n25+n41+n57=C$	...d25;		$n33+n37+n41+n45=C$	...d41;
$n37+n38+n39+n40=C$	...d10;		$n10+n26+n42+n58=C$	...d26;		$n34+n38+n42+n46=C$	...d42;
$n41+n42+n43+n44=C$	...d11;		$n11+n27+n43+n59=C$	...d27;		$n35+n39+n43+n47=C$	...d43;
$n45+n46+n47+n48=C$	...d12;		$n12+n28+n44+n60=C$	...d28;		$n36+n40+n44+n48=C$	...d44;
$n49+n50+n51+n52=C$	...d13;		$n13+n29+n45+n61=C$	...d29;		$n49+n53+n57+n61=C$	...d45;
$n53+n54+n55+n56=C$	...d14;		$n14+n30+n46+n62=C$	...d30;		$n50+n54+n58+n62=C$	...d46;
$n57+n58+n59+n60=C$	...d15;		$n15+n31+n47+n63=C$	...d31;		$n51+n55+n59+n63=C$	...d47;
$n61+n62+n63+n64=C$	...d16;		$n16+n32+n48+n64=C$	...d32;		$n52+n56+n60+n64=C$	...d48;

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

**\* Complementary Conditions: \***

$n1+n64=n2+n63=n2+n62=n2+n61=$
$n5+n60=n5+n59=n5+n58=n5+n57=$
$n9+n56=n10+n55=n11+n54=n12+n53=$
$n13+n52=n14+n51=n15+n50=n16+n49=$
$n17+n48=n18+n47=n19+n46=n20+n45=$
$n21+n44=n22+n43=n23+n42=n24+n41=$
$n25+n40=n26+n39=n27+n38=n28+n37=$
$n29+n36=n30+n35=n31+n34=n32+n33=$
$n33+n32=n34+n31=n35+n30=n36+n29=$
$n37+n28=n38+n27=n39+n26=n40+n25=$
.....
..... =1 ....(cmp1)

**\* Pan-Triagonal Conditions: \***

$n1+n22+n43+n64=C$	... pd01;		$n1+n24+n43+n62=C$	... pd02;
$n1+n30+n43+n56=C$	... pd03;		$n1+n32+n43+n54=C$	... pd04;
$n2+n23+n44+n61=C$	... pd05;		$n2+n21+n44+n63=C$	... pd06;

n2+n31+n44+n53=C ... pd07;		n2+n29+n44+n55=C ... pd08;
n3+n24+n41+n62=C ... pd09;		n3+n22+n41+n64=C ... pd10;
n3+n32+n41+n54=C ... pd11;		n3+n30+n41+n56=C ... pd12;
n4+n21+n42+n63=C ... pd13;		n4+n23+n42+n61=C ... pd14;
n4+n29+n42+n55=C ... pd15;		n4+n31+n42+n53=C ... pd16;
n5+n26+n47+n52=C ... pd17;		n5+n28+n47+n50=C ... pd18;
n5+n18+n47+n60=C ... pd19;		n5+n20+n47+n58=C ... pd20;
n6+n27+n48+n49=C ... pd21;		n6+n25+n48+n51=C ... pd22;
n6+n19+n48+n57=C ... pd23;		n6+n17+n48+n59=C ... pd24;
n7+n28+n45+n50=C ... pd25;		n7+n26+n45+n52=C ... pd26;
n7+n20+n45+n58=C ... pd27;		n7+n18+n45+n60=C ... pd28;
n8+n25+n46+n51=C ... pd29;		n8+n27+n46+n49=C ... pd30;
n8+n17+n46+n59=C ... pd31;		n8+n19+n46+n57=C ... pd32;
n9+n30+n35+n56=C ... pd33;		n9+n32+n35+n54=C ... pd34;
n9+n22+n35+n64=C ... pd35;		n9+n24+n35+n62=C ... pd36;
n10+n31+n36+n53=C .. pd37;		n10+n29+n36+n55=C .. pd38;
n10+n23+n36+n61=C .. pd39;		n10+n21+n36+n63=C .. pd40;
n11+n32+n33+n54=C .. pd41;		n11+n30+n33+n56=C .. pd42;
n11+n24+n33+n62=C .. pd43;		n11+n22+n33+n64=C .. pd44;
n12+n29+n34+n55=C .. pd45;		n12+n31+n34+n53=C .. pd46;
n12+n21+n34+n63=C .. pd47;		n12+n23+n34+n61=C .. pd48;
n13+n18+n39+n60=C .. pd49;		n13+n20+n39+n58=C .. pd50;
n13+n26+n39+n52=C .. pd51;		n13+n28+n39+n50=C .. pd52;
n14+n19+n40+n57=C .. pd53;		n14+n17+n40+n59=C .. pd54;
n14+n27+n40+n49=C .. pd55;		n14+n25+n40+n51=C .. pd56;
n15+n20+n37+n58=C .. pd57;		n15+n18+n37+n60=C .. pd58;
n15+n28+n37+n50=C .. pd59;		n15+n26+n37+n52=C .. pd60;
n16+n17+n38+n59=C .. pd61;		n16+n19+n38+n57=C .. pd62;
n16+n25+n38+n51=C .. pd63;		n16+n27+n38+n49=C .. pd64;

I designed and composed 32 Latin Units for the decomposed layers of our object.

I picked up various sets of 6 units from them, combined them, calculated and tested them and composed successfully the correct answers as many as 37440.

\*\* 'Complete Euler Cubes' of Order 4 for the Simultaneous Type: \*\*

\*\* Self-Complementary and Pan-Triagonal by Binary Number System \*\*

[Latin Units]

1/ 0---1---0---1  1 0 1 0 1 0 0 1 1 0 0 1  0 1--1-0--0-1--1-0 0 1  1 0 0 1 1 0   1 0 0 1 1 0 0 1 1-0 -0-1--1-0--0 1  0 1 1 0 0 1 1 0 1  0 1 0 0  0---1---0---1	2/ 0---0---1---1  1 1 0 0 1 0 1 0 0 1 0 1  0 1--0-1--1-0--1-0 0 1  0 1 1 0 1 0   1 0 1 0 0 1 0 1 1-0 -1-0--0-1--0 1  0 1 0 1 1 0 1 0 1  1 0 0 0  0---0---1---1	3/ 0---1---0---1  1 1 0 0 1 0 1 0 0 1 0 1  1 1--0-0--1-1--0-0 0 0  0 1 1 0 1 1   0 0 1 0 0 1 1 1 1-1 -0-0--1-1--0 0  0 1 0 1 1 0 1 0 1  1 0 0 0  0---1---0---1	4/ 0---0---1---1  1 0 1 0 0 0 1 1 0 0 1 1  0 1--0-1--1-0--1-0 1 1  0 1 1 0 0 0   1 1 1 0 0 1 0 0 1-0 -1-0--0-1--0 1  0 0 1 1 0 0 1 1 1  0 0 1 0 0  0---0---1---1
5/ 0---1---0---1  1 0 1 0 0 0 1 1 0 0 1 1  1 1--0-0--1-1--0-0 1 0  0 1 1 0 0 1   0 1 1 0 0 1 1 0 1-1 -0-0--1-1--0 0  0 0 1 1 0 0 1 1 1  0 1 0 0  0---1---0---1	6/ 0---0---1---1  1 1 0 0 1 1 1 1 0 0 0 0  0 0--0-0--1-1--1-1 1 0  1 0 0 1 0 1   0 1 0 1 1 0 1 0 0-0 -0-0--1-1--1 1  1 1 1 1 0 0 0 0 1  1 0 0 0  0---0---1---1	7/ 0---1---1---0  1 1 0 0 1 1 1 0 0 0 0 1  1 0--0-0--0-1--1-1 1 0  0 0 0 1 1 1   0 0 0 1 1 1 1 0 0-0 -0-1--1-1--1 0  0 1 1 1 1 0 0 0 1  1 0 0 0  1---0---0---1	8/ 0---0---1---1  1 0 0 1 0 1 1 1 1 0 0 0  0 0--0-1--1-1--1-0 1 1  1 0 0 0 0 1   0 1 1 1 1 0 0 0 1-0 -0-0--0-1--1 1  1 1 1 0 0 0 0 1 0  1 1 1 0 0  0---0---1---1
9/ 0---1---1---0  1 0 0 1 0 1 1 0 1 0 0 1  1 0--0-1--0-1--1-0 1 1  0 0 0 0 1 1	10/ 0---0---1---1  0 1 0 1 1 1 0 0 1 1 0 0  0 1--0-1--1-0--1-0 0 1  1 1 0 0 1 0	11/ 0---0---1---1  0 1 1 0 1 1 0 1 0 0 1 0  0 1--0-0--1-0--1-1 1 0  1 1 0 1 0 0	12/ 0---1---0---1  0 1 0 1 1 1 0 0 1 1 0 0  1 1--0-0--1-1--0-0 0 0  1 1 0 0 1 1

0 0 1 1 1 1 0 0	1 0 1 1 0 0 0 1	1 1 0 1 0 0 1 0	0 0 1 1 0 0 1 1
1-0 -0-1--0-1--1-0	1-0 -1-0--0-1--0-1	0-0 -1-0--1-1--0-1	1-1 -0-0--1-1--0-0
0 1 1 0 1 0 0 1	1 1 0 0 1 1 0 0	1 0 1 1 0 1 0 0	1 1 0 0 1 1 0 0
0  1 1 0	0  1 0 1	1  0 0 1	0  1 0 1
1---0---0---1	0---0---1---1	0---0---1---1	0---1---0---1

13/

14/

15/

16/

0---1---1---0	0---0---1---1	0---1---1---0	0---1---0---1
0 1 1 0	0 0 1 1	0 0 1 1	0 0 1 1
1 1 0 0 0 0 1 1	0 1 0 1 1 0 1 0	0 1 0 0 1 0 1 1	0 1 0 1 1 0 1 0
1 1--0-0--0-0--1-1	0 1--0-1--1-0--1-0	1 1--0-1--0-0--1-0	1 1--0-0--1-1--0-0
1 0  0 1 0 1 1 0	1 1  1 1 0 0 0 0	1 1  0 1 0 0 1 0	1 0  1 1 0 0 0 1
1 0 0 1 0 1 1 0	1 1 1 1 0 0 0 0	1 0 1 1 0 1 0 0	0 1 1 1 0 0 1 0
0-0 -1-1--1-1--0-0	1-0 -1-0--0-1--0-1	1-0 -1-1--0-1--0-0	1-1 -0-0--1-1--0-0
0 0 1 1 1 1 0 0	1 0 1 0 0 1 0 1	0 0 1 0 1 1 0 1	1 0 1 0 0 1 0 1
1  0 0 1	0  0 1 1	0  0 1 1	0  0 1 1
1---0---0---1	0---0---1---1	1---0---0---1	0---1---0---1

17/

18/

19/

20/

1---0---1---0	1---0---0---1	1---1---0---0	1---0---0---1
1 1 0 0	1 1 0 0	1 1 0 0	1 0 0 1
1 0 1 0 0 1 0 1	1 0 1 1 0 1 0 0	1 0 1 0 0 1 0 1	0 0 1 1 1 1 0 0
0 0--1-1--0-0--1-1	0 0--1-0--1-1--0-1	1 0--1-0--0-1--0-1	0 0--1-1--1-1--0-0
0 1  0 0 1 1 1 0	0 0  1 0 1 1 0 1	0 0  0 0 1 1 1 1	0 1  1 0 1 0 0 1
1 0 0 0 1 1 0 1	0 1 0 0 1 0 1 1	0 0 0 0 1 1 1 1	0 1 1 0 1 0 0 1
0-0 -1-1--0-0--1-1	0-1 -0-0--1-0--1-1	0-1 -0-1--1-0--1-0	1-1 -0-0--0-0--1-1
0 1 0 1 1 0 1 0	1 1 0 1 0 0 1 0	0 1 0 1 1 0 1 0	1 1 0 0 0 0 1 1
1  1 0 0	1  1 0 0	1  1 0 0	0  1 1 0
1---0---1---0	0---1---1---0	1---1---0---0	0---1---1---0

21/

22/

23/

24/

1---0---1---0	1---1---0---0	1---1---0---0	1---0---0---1
1 0 1 0	1 0 0 1	1 0 0 1	0 1 1 0
0 0 1 1 0 0 1 1	0 0 1 0 1 1 0 1	0 0 1 1 0 0 1 1	1 0 0 1 0 1 1 0
0 0--1-1--0-0--1-1	1 0--1-1--0-1--0-0	1 0--1-0--0-1--0-1	0 1--1-0--1-0--0-1
1 1  0 0 1 1 0 0	0 1  0 0 1 0 1 1	1 0  0 0 1 1 0 1	0 0  1 1 1 1 0 0
1 1 0 0 1 1 0 0	0 0 1 0 1 1 0 1	0 1 0 0 1 1 1 0	1 1 0 0 0 0 1 1
0-0 -1-1--0-0--1-1	1-1 -0-1--0-0--1-0	0-1 -0-1--1-0--1-0	0-1 -1-0--1-0--0-1
0 0 1 1 0 0 1 1	0 1 0 0 1 0 1 1	0 0 1 1 0 0 1 1	1 0 0 1 0 1 1 0
1  0 1 0	0  1 1 0	1  0 1 0	1  0 0 1
1---0---1---0	1---1---0---0	1---1---0---0	0---1---1---0

25/

26/

27/

28/

1---1---0---0	1---0---0---1	1---1---0---0	1---0---1---0
0 1 1 0	0 0 1 1	0 0 1 1	0 1 0 1
1 0 0 0 0 1 1 1	0 0 0 1 1 1 1 0	0 0 0 0 1 1 1 1	1 1 0 0 1 1 0 0
1 1--1-0--0-0--0-1	0 1--1-1--1-0--0-0	1 1--1-1--0-0--0-0	0 0--1-1--0-0--1-1
0 0  0 1 1 1 1 0	0 1  1 1 1 0 0 0	0 1  0 1 1 0 1 0	0 1  1 0 0 1 1 0
1 0 0 0 0 1 1 1	1 1 1 0 0 0 0 1	1 0 1 0 0 1 0 1	1 0 0 1 1 0 0 1
0-1 -1-1--1-0--0-0	1-1 -1-0--0-0--0-1	1-1 -1-1--0-0--0-0	0-0 -1-1--0-0--1-1
0 0 0 1 1 1 1 0	1 0 0 0 0 1 1 1	0 0 0 0 1 1 1 1	1 1 0 0 1 1 0 0
1  0 0 1	0  0 1 1	0  0 1 1	0  1 0 1
1---1---0---0	0---1---1---0	1---1---0---0	1---0---1---0

29/

30/

31/

32/

1---1---0---0	1---0---1---0	1---1---0---0	1---0---1---0
0 1 0 1	0 0 1 1	0 0 1 1	0 1 1 0
1 1 0 0 1 1 0 0	0 1 0 1 1 0 1 0	0 1 0 1 1 0 1 0	0 1 1 0 0 1 1 0
1 0--1-0--0-1--0-1	0 0--1-1--0-0--1-1	1 0--1-0--0-1--0-1	1 0--0-1--1-0--0-1
0 0  1 0 0 1 1 1	1 1  1 0 0 1 0 0	1 0  1 0 0 1 0 1	1 0  0 1 1 0 0 1
0 0 0 1 1 0 1 1	1 1 0 1 1 0 0 0	0 1 0 1 1 0 1 0	0 1 1 0 0 1 1 0
0-1 -0-1--1-0--1-0	0-0 -1-1--0-0--1-1	0-1 -0-1--1-0--1-0	0-1 -1-0--0-1--1-0
1 1 0 0 1 1 0 0	1 0 1 0 0 1 0 1	1 0 1 0 0 1 0 1	1 0 0 1 1 0 0 1
0  1 0 1	0  0 1 1	0  0 1 1	0  1 0 1
1---1---0---0	1---0---1---0	1---1---0---0	1---0---1---0

[Count of Latin Units = 32]

[Reference Table for Matching Combinations]

*	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	
1	64	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	0
2	32	64	48	48	32	32	32	32	32	48	32	32	32	32	32	16	48	32	32	32	32	32	16	32	32	32	32	32	16	16	0	32	
3	32	48	64	32	48	32	40	24	32	32	24	48	32	16	24	32	32	40	48	32	16	40	32	32	40	24	32	16	32	0	16	32	

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4| 32 48 32 64 48 32 24 40 32 32 40 16 32 48 40 32 32 24 16 32 48 24 32 32 24 40 32 16 0 32 16 32
5| 32 32 48 48 64 32 32 32 16 32 32 32 48 16 32 32 32 32 48 16 32 32 32 32 0 16 16 32 32
6| 32 32 32 32 32 64 48 48 32 32 48 32 32 16 32 32 48 32 32 16 32 32 16 16 0 32 32 32 32
7| 32 32 40 24 32 48 64 32 48 24 32 32 48 16 32 24 40 32 48 16 32 32 40 16 32 0 16 32 40 24 32 32
8| 32 32 24 40 32 48 32 64 48 40 32 32 16 48 32 40 24 32 16 48 32 32 24 16 0 32 16 32 24 40 32 32
9| 32 32 32 32 32 48 48 64 32 16 32 32 32 48 32 32 16 32 32 32 48 32 0 16 16 32 32 32 32 32
10| 32 48 32 32 16 32 24 40 32 64 40 48 32 48 40 32 32 24 16 32 16 24 0 32 24 40 32 48 32 32 16 32
11| 32 32 24 40 32 48 32 32 16 40 64 32 48 48 32 40 24 32 16 16 32 0 24 48 32 32 16 32 24 40 32 32
12| 32 32 48 16 32 32 32 32 48 32 64 32 32 48 16 32 32 32 0 32 16 32 32 32 32 48 16 32 48 16 32 32
13| 32 32 32 32 32 48 16 32 32 48 32 64 32 48 32 32 16 32 0 32 16 32 32 48 16 32 32 32 32 32 32
14| 32 32 16 48 32 32 16 48 32 48 48 32 32 64 48 48 16 16 0 32 32 16 16 32 16 48 32 32 16 48 32 32
15| 32 32 24 40 32 16 32 32 48 40 32 32 48 48 64 40 24 0 16 16 32 32 24 16 32 32 48 32 24 40 32 32
16| 32 16 32 32 48 32 24 40 32 32 40 48 32 48 40 64 0 24 16 32 16 24 32 32 24 40 32 16 32 32 48 32
17| 32 48 32 32 16 32 40 24 32 32 24 16 32 16 24 0 64 40 48 32 48 40 32 32 40 24 32 48 32 32 16 32
18| 32 32 40 24 32 48 32 32 16 24 32 32 16 16 0 24 40 64 48 48 32 32 40 48 32 32 16 32 48 32 32 32
19| 32 32 48 16 32 32 48 16 32 16 16 32 32 0 16 16 48 48 64 32 32 48 48 32 48 16 32 32 48 16 32 32
20| 32 32 32 32 32 16 48 32 32 16 32 0 32 16 32 32 48 32 64 32 48 32 32 16 48 32 32 32 32 32 32
21| 32 32 16 48 32 32 32 32 16 32 0 32 32 32 16 48 32 32 32 64 32 48 32 32 32 32 16 48 32 32
22| 32 32 40 24 32 16 32 32 48 24 0 32 16 16 32 24 40 32 48 48 32 64 40 16 32 32 48 32 40 24 32 32
23| 32 16 32 32 48 32 40 24 32 0 24 16 32 16 24 32 32 40 48 32 48 40 64 32 40 24 32 16 32 32 48 32
24| 32 32 32 32 32 16 16 0 32 48 32 32 16 32 32 16 32 32 48 32 32 16 32 64 48 48 32 32 32 32 32
25| 32 32 40 24 32 16 32 0 16 24 32 32 48 16 32 24 40 32 48 16 32 32 40 48 64 32 48 32 40 24 32 32
26| 32 32 24 40 32 16 0 32 16 40 32 32 16 48 32 40 24 32 16 48 32 32 24 48 32 64 48 32 24 40 32 32
27| 32 32 32 32 32 0 16 16 32 32 16 32 32 32 48 32 32 16 32 32 32 48 32 32 48 48 64 32 32 32 32
28| 32 32 16 16 0 32 32 32 48 32 32 32 16 48 32 32 32 16 48 32 32 32 16 32 32 32 64 48 48 32 32
29| 32 16 32 0 16 32 40 24 32 32 24 48 32 16 24 32 32 40 48 32 16 40 32 32 40 24 32 48 64 32 48 32
30| 32 16 0 32 16 32 24 40 32 32 40 16 32 48 40 32 32 24 16 32 48 24 32 32 24 40 32 48 32 64 48 32
31| 32 0 16 16 32 32 32 32 16 32 32 32 32 48 16 32 32 32 32 48 32 32 32 32 48 48 64 32 48 48 64 32
32| 0 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 64

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**\*\* List of Complete Euler Cubes of Order 4 for the Simultaneous type: \*\***  
**\*\* Both Self-complementary and Pan-triagonal by Binary Number System \*\***

[Latin Units] 1/	2/	5/	7/
0---1---0---1	0---0---1---1	0---1---0---1	0---1---1---0
1 0 1  0	1 1 0  0	1 0 1  0	1 1 0  0
1 0 0 1 1 0 0 1	1 0 1 0 0 1 0 1	0 0 1 1 0 0 1 1	1 1 1 0 0 0 0 1
0 1--1-0--0-1--1-0	0 1--0-1--1-0--1-0	1 1--0-0--1-1--0-0	1 0--0-0--0-1--1-1
0 1  1 0 0 1 1 0	0 1  0 1 1 0 1 0	1 0  0 1 1 0 0 1	1 0  0 0 0 1 1 1
1 0 0 1 1 0  0 1	1 0 1 0 0 1  0 1	0 1 1 0 0 1  1 0	0 0 0 1 1 1  1 0
1-0 -0-1--1-0--0 1	1-0 -1-0--0-1--0 1	1-1 -0-0--1-1--0 0	0-0 -0-1--1-1--1 0
0 1 1 0 0 1 1 0	0 1 0 1 1 0 1 0	0 0 1 1 0 0 1 1	0 1 1 1 0 0 1 0
1  0 1 0	1  1 1 0	1  0 1 0	1  1 1 0
0---1---0---1	0---0---1---1	0---1---0---1	1---0---0---1

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

[Latin Units] 1/	3/	4/	10/
0---1---0---1	0---1---0---1	0---0---1---1	0---0---1---1
1 0 1  0	1 1 0  0	1 0 1  0	0 1 0  1
1 0 0 1 1 0 0 1	1 0 1 0 0 1 0 1	0 0 1 1 0 0 1 1	1 1 0 0 1 1 0 0
0 1--1-0--0-1--1-0	1 1--0-0--1-1--0-0	0 1--0-1--1-0--1-0	0 1--0-1--1-0--1-0
0 1  1 0 0 1 1 0	0 0  0 1 1 0 1 1	1 1  0 1 1 0 0 0	0 1  1 1 0 0 1 0
1 0 0 1 1 0  0 1	0 0 1 0 0 1  1 1	1 1 1 0 0 1  0 0	1 0 1 1 0 0  0 1
1-0 -0-1--1-0--0 1	1-1 -0-0--1-1--0 0	1-0 -1-0--0-1--0 1	1-0 -1-0--0-1--0 1
0 1 1 0 0 1 1 0	0 1 0 1 1 0 1 0	0 0 1 1 0 0 1 1	1 1 0 0 1 1 0 0
1  0 1 0	1  1 0 0	1  0 1 0	0  1 0 1
0---1---0---1	0---1---0---1	0---0---1---1	0---0---1---1

13/	9/
0---1---1---0	0---1---1---0
0 1 1  0	1 0 0  1
1 1 0 0 0 0 1 1	0 1 1 0 1 0 0 1
1 1--0-0--0-0--1-1	1 0--0-1--0-1--1-0
1 0   0 1 0 1 1 0	1 1   0 0 0 0 1 1
1 0 0 1 0 1  1 0	0 0 1 1 1 1  0 0
0-0-1-1-1-1-0 0	1-0-0-1-0-1-1 0
0 0 1 1 1 1 0 0	0 1 1 0 1 0 0 1
1 0 0 1	0 1 1 0
1---0---0---1	1---0---0---1

[Composition]	305#
1-----52-----16-----61	
58 23 43  6	
55 8 26 41 38 21 11 60	
20 63---33-14---29-50---48-- 3	
12 46   37 31 25 35 56 18	
47 9 30 40 34 28  19 53	
62--17- -15-36---51-32--- 2 45	
5 54 44 27 24 39 57 10	
59   22 42 7	
4-----49-----13-----64	

1/ 7/ 2/ 5/ 15/ 11/ 897#
1-----55-----28-----46
61 26 40  3
58 20 29 38 35 9 8 63
23 48---33-11---14-53---60--18
24 43   34 16 13 50 59 21
44 6 15 52 49 31  22 41
47-- 5- -12-51---54-32---17 42
2 57 56 30 27 36 45 7
62   25 39 4
19-----37-----10-----64

1/ 10/ 3/ 4/ 13/ 9/ 1473#
1-----44-----24-----61
46 27 39  18
59 20 14 37 50 25 7 48
12 63---33-22---29-42---56-- 3
8 54   49 31 13 35 60 10
55 5 30 52 34 16  11 57
62-- 9- -23-36---43-32--- 2 53
17 58 40 15 28 51 45 6
47   26 38 19
4-----41-----21-----64

1/ 12/ 2/ 5/ 13/ 9/ 1617#
1-----56-----12-----61
46 27 39  18
59 20 14 37 50 25 7 48
24 63---33-10---29-54---44-- 3
8 42   49 31 13 35 60 22
43 5 30 52 34 16  23 57
62--21- -11-36---55-32--- 2 41
17 58 40 15 28 51 45 6
47   26 38 19
4-----53-----9-----64

1/ 13/ 2/ 5/ 9/ 6/ 1921#
1-----55-----28-----46
48 26 53  3
58 20 16 38 35 9 21 63
23 61---33-11---14-40---60--18
24 43   34 29 13 50 59 8
57 6 15 52 36 31  22 41
47-- 5- -25-51---54-32--- 4 42
2 44 56 30 27 49 45 7
62   12 39 17
19-----37-----10-----64

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

1/ 15/ 2/ 5/ 7/ 11/ 3889#
1-----55-----28-----46
47 12 54  17
44 20 15 38 49 9 22 63
23 62---33-25---14-39---60-- 4
24 57   34 30 13 36 59 7
58 6 29 52 35 31  8 41
61-- 5- -26-51---40-32--- 3 42
2 43 56 16 27 50 45 21
48   11 53 18
19-----37-----10-----64

1/ 16/ 3/ 4/ 13/ 9/ 4465#
1-----60-----8-----61
46 11 55  18
43 20 14 53 50 9 23 48
28 63---33-- 6---29-58---40-- 3
24 38   49 31 13 35 44 26
39 21 30 52 34 16  27 41
62--25- - 7-36---59-32--- 2 37
17 42 56 15 12 51 45 22
47   10 54 19
4-----57-----5-----64

1/ 17/ 3/ 4/ 13/ 9/ 4609#
17-----44-----24-----45
62 27 39  2
59 4 30 37 34 25 7 64
12 47---49-22---13-42---56--19
8 54   33 15 29 51 60 10
55 5 14 36 50 32  11 57
46-- 9- -23-52---43-16---18 53
1 58 40 31 28 35 61 6
63   26 38 3
20-----41-----21-----48

1/ 19/ 2/ 5/ 13/ 9/ 4753#
17-----56-----12-----45
62 27 39  2
59 4 30 37 34 25 7 64
24 47---49-10---13-54---44--19
8 42   33 15 29 51 60 22
43 5 14 36 50 32  23 57
46--21- -11-52---55-16---18 41
1 58 40 31 28 35 61 6
63   26 38 3
20-----53-----9-----48

1/ 21/ 2/ 5/ 13/ 9/ 4897#
17-----40-----28-----45
62 11 55  2
43 4 30 53 34 9 23 64
8 47---49-26---13-38---60--19
24 58   33 15 29 51 44 6
59 21 14 36 50 32  7 41
46-- 5- -27-52---39-16---18 57
1 42 56 31 12 35 61 22
63   10 54 3
20-----37-----25-----48

1/ 23/ 3/ 4/ 13/ 9/ 5201#  
 17-----60-----8-----45  
 |62 11 55 | 2  
 43 4 30 53 34 9 23 64  
 |28 47---49--6---13--58---40--19  
 24 38 | 33 15 29 51 44 26 |  
 |39 21 14 36 50 32 |27 41  
 46--25-|--7--52---59--16---18 37 |  
 1 42 56 31 12 35 61 22  
 63 | 10 54 3 |  
 20-----57-----5-----48

1/ 28/ 2/ 7/ 15/ 11/ 5345#  
 17-----39-----32-----42  
 |45 30 36 |19  
 62 24 13 34 51 25 4 47  
 | 7 44---49--27---10--37---64--22  
 8 59 | 50 12 9 54 63 5 |  
 |60 2 11 56 53 15 | 6 57  
 43--1-|--28--55---38--16---21 58 |  
 18 61 40 14 31 52 41 3  
 46 | 29 35 20 |  
 23-----33-----26-----48

1/ 29/ 3/ 10/ 13/ 9/ 5649#  
 17-----60-----8-----45  
 |42 31 35 |22  
 63 24 10 33 54 29 3 44  
 |28 47---49--6---13--58---40--19  
 4 38 | 53 15 9 51 64 26 |  
 |39 1 14 56 50 12 |27 61  
 46--25-|--7--52---59--16---18 37 |  
 21 62 36 11 32 55 41 2  
 43 | 30 34 23 |  
 20-----57-----5-----48

1/ 30/ 4/ 10/ 13/ 9/ 5793#  
 17-----36-----32-----45  
 |42 7 59 |22  
 39 24 10 57 54 5 27 44  
 | 4 47---49--30---13--34---64--19  
 28 62 | 53 15 9 51 40 2 |  
 |63 25 14 56 50 12 | 3 37  
 46--1-|--31--52---35--16---18 61 |  
 21 38 60 11 8 55 41 26  
 43 | 6 58 23 |  
 20-----33-----29-----48

1/ 31/ 5/ 7/ 15/ 11/ 5937#  
 17-----63-----8-----42  
 |45 6 60 |19  
 38 24 13 58 51 1 28 47  
 |31 44---49--3---10--61---40--22  
 32 35 | 50 12 9 54 39 29 |  
 |36 26 11 56 53 15 |30 33  
 43--25-|--4--55---62--16---21 34 |  
 18 37 64 14 7 52 41 27  
 46 | 5 59 20 |  
 23-----57-----2-----48

2/ 1/ 5/ 7/ 15/ 11/ 6241#  
 1-----31-----40-----58  
 |61 38 28 | 3  
 54 8 45 26 19 33 12 63  
 |15 60---17--35---42--29---56--6  
 16 51 | 18 44 41 22 55 13 |  
 |52 10 43 24 21 47 |14 49  
 59--9-|--36--23---30--48---5 50 |  
 2 53 32 46 39 20 57 11  
 62 | 37 27 4 |  
 7-----25-----34-----64

3/ 1/ 4/ 10/ 13/ 9/ 9281#  
 1-----52-----16-----61  
 |58 39 27 | 6  
 55 8 42 25 22 37 11 60  
 |36 63---17--14---45--50---32--3  
 12 30 | 21 47 41 19 56 34 |  
 |31 9 46 24 18 44 |35 53  
 62--33-|--15--20---51--48---2 29 |  
 5 54 28 43 40 23 57 10  
 59 | 38 26 7 |  
 4-----49-----13-----64

4/ 1/ 3/ 10/ 13/ 9/ 10721#  
 1-----28-----40-----61  
 |58 15 51 | 6  
 31 8 42 49 22 13 35 60  
 |12 63---17--38---45--26---56--3  
 36 54 | 21 47 41 19 32 10 |  
 |55 33 46 24 18 44 |11 29  
 62--9-|--39--20---27--48---2 53 |  
 5 30 52 43 16 23 57 34  
 59 | 14 50 7 |  
 4-----25-----37-----64

5/ 1/ 2/ 7/ 15/ 11/ 12161#  
 1-----55-----16-----58  
 |61 14 52 | 3  
 30 8 45 50 19 9 36 63  
 |39 60---17--11---42--53---32--6  
 40 27 | 18 44 41 22 31 37 |  
 |28 34 43 24 21 47 |38 25  
 59--33-|--12--23---54--48---5 26 |  
 2 29 56 46 15 20 57 35  
 62 | 13 51 4 |  
 7-----49-----10-----64

7/ 1/ 2/ 5/ 15/ 11/ 15201#  
 1-----55-----44-----30  
 |61 42 24 | 3  
 58 36 45 22 19 9 8 63  
 |39 32---17--11---14--53---60--34  
 40 27 | 18 16 13 50 59 37 |  
 |28 6 15 52 49 47 |38 25  
 31--5-|--12--51---54--48---33 26 |  
 2 57 56 46 43 20 29 7  
 62 | 41 23 4 |  
 35-----21-----10-----64

10/ 1/ 3/ 4/ 13/ 9/ 17505#  
 1-----28-----40-----61  
 |30 43 23 |34  
 59 36 14 21 50 41 7 32  
 |12 63---17--38---45--26---56--3  
 8 54 | 49 47 13 19 60 10 |  
 |55 5 46 52 18 16 |11 57  
 62--9-|--39--20---27--48---2 53 |  
 33 58 24 15 44 51 29 6  
 31 | 42 22 35 |  
 4-----25-----37-----64

12/ 1/ 2/ 5/ 13/ 9/ 18945#  
 1-----56-----12-----61  
 |30 43 23 |34  
 59 36 14 21 50 41 7 32  
 |40 63---17--10---45--54---28--3  
 8 26 | 49 47 13 19 60 38 |  
 |27 5 46 52 18 16 |39 57  
 62--37-|--11--20---55--48---2 25 |  
 33 58 24 15 44 51 29 6  
 31 | 42 22 35 |  
 4-----53-----9-----64

```

13/ 1/ 2/ 5/ 9/ 6/ 21985#
1-----55-----44-----30
|32          42          53          | 3
58 36    16 22    19 9    37 63
|39 61----17--11----14--24----60--34
40 27 | 18 45    13 50    59 8 |
|57 6 | 15 52    20 47    |38 25
31-- 5-|--41--51----54--48---- 4 26 |
  2 28    56 46    43 49    29 7
    62 |    12          23          33 |
    35-----21-----10-----64

```

```

14/ 1/ 2/ 5/ 13/ 9/ 31105#
1-----24-----44-----61
|30          11          55          |34
27 36    14 53    50 9    39 32
| 8 63----17--42----45--22----60-- 3
40 58 | 49 47    13 19    28 6 |
|59 37 | 46 52    18 16    | 7 25
62-- 5-|--43--20----23--48---- 2 57 |
  33 26    56 15    12 51    29 38
    31 |    10          54          35 |
    4-----21-----41-----64

```

```

15/ 1/ 2/ 5/ 7/ 11/ 32545#
1-----55-----44-----30
|31          12          54          |33
28 36    15 22    49 9    38 63
|39 62----17--41----14--23----60-- 4
40 57 | 18 46    13 20    59 7 |
|58 6 | 45 52    19 47    | 8 25
61-- 5-|--42--51----24--48---- 3 26 |
  2 27    56 16    43 50    29 37
    32 |    11          53          34 |
    35-----21-----10-----64

```

```

16/ 1/ 3/ 4/ 13/ 9/ 36001#
1-----60----- 8-----61
|30          11          55          |34
27 36    14 53    50 9    39 32
|44 63----17-- 6----45--58----24-- 3
40 22 | 49 47    13 19    28 42 |
|23 37 | 46 52    18 16    |43 25
62--41-|-- 7--20----59--48---- 2 21 |
  33 26    56 15    12 51    29 38
    31 |    10          54          35 |
    4-----57----- 5-----64

```

[Count of Compositions = 37440]

[Counts according to n1]

```

1:4680, 2:3360, 3:3216, 4:2232, 5:3090, 6:2106, 7:1998, 8:1314,
9:2574, 10:1590, 11:1482, 12: 798, 13:1392, 14: 708, 15: 636, 16: 216,
17:1512, 18: 828, 19: 756, 20: 336, 21: 702, 22: 282, 23: 246, 24: 54,
25: 666, 26: 246, 27: 210, 28: 18, 29: 192, 30: ..., 31: ..., 32: ...,
33: ..., 34: ..., 35: ..., 36: ..., 37: ..., 38: ..., 39: ..., 40: ...,

```

[Counts according to n43]

```

1: ..., 2: ..., 3: ..., 4: 48, 5: 6, 6: 54, 7: 66, 8: 174,
9: 18, 10: 66, 11: 78, 12: 186, 13: 96, 14: 204, 15: 228, 16: 408,
17: 36, 18: 84, 19: 96, 20: 204, 21: 114, 22: 222, 23: 246, 24: 426,
25: 138, 26: 246, 27: 270, 28: 450, 29: 300, 30: 480, 31: 516, 32: 780,
33: 36, 34: 84, 35: 96, 36: 300, 37: 120, 38: 324, 39: 360, 40: 744,
41: 156, 42: 360, 43: 396, 44: 780, 45: 444, 46: 828, 47: 888, 48:1476,
49: 246, 50: 570, 51: 618, 52:1134, 53: 678, 54:1194, 55:1266, 56:1998,
57: 954, 58:1470, 59:1542, 60:2274, 61:1626, 62:2358, 63:2454, 64:3426,

```

OK!

I really certified that there are Simultaneous MC444 as many as 37440.

- But now I recommend you to get the list of 4680 standard solutions with n1=1. You can surely find something beautiful, then.

```

/** 'Complete Euler Cubes' of Order 4: For the Simultaneous **/
/** Type: Both Self-Complementary and Pan-Triagonal with n1=1 **/
/** Composed by 'New Euler's Method' of Binary System **/
/** 'NEulerMC4SmIF.c' by Kanji Setsuda on Sep.19,'03; **/
/** Sep.17,'05; Jul.22,'10 with MacOSX & Xcode 3.1.2 **/
**/
#include <stdio.h>
**/
/* Global Var. */
short int cnt;
short cntr[2];
short cnt2, cnt3;
short CC;
short u1,u2,u3,u4,u5,u6;
short nm[65], uflg[65];
short d[7][72];
short df[49][2], pd[65][2];
short tlu[33][65];

```

```

short mtc[33][33];
short cn1[65], cn43[65];
/**/
/* ...(skip)... */
/**/
/* Main Program: 'Reset and Go' */
int main(){
short m,n;
printf("\n** 'Complete Euler Cubes' of Order 4 for the Simultaneous Type: **\n");
printf(" ** Self-Complementary and Pan-Triagonal: Solutions with n1=1 **\n");
printf(" ** on Jul.22, 2010 with 'New Euler's Method' of Binary System **\n");
CC=1; cnt=0;
for(n=0;n<65;n++){nm[n]=0; uflg[n]=0;}
for(m=0;m<48;m++){for(n=0;n<2;n++){df[m][n]=0;}}
for(m=0;m<64;m++){for(n=0;n<2;n++){pd[m][n]=0;}}
stp01();
prc4lu();
printf("\n ** List of Compositions:(Part) **\n",cnt);
cnt=0; cnt3=0;
cmbcmp();
printf("\n [Count of Compositions = %d]\n",cnt);
printf("\n [Counts according to n1]\n");
prcn1();
printf("\n [Counts according to n43]\n");
prcn43();
printf("\n OK!\n");
return 0;
}
/**/
/* Begin the Search */
/* Set n1=0 & n64=1 */
void stp01(){
short a,b;
for(a=0;a<1;a++){b=CC-a;
if((df[1][a]<2)&&(df[17][a]<2)&&(df[33][a]<2)){
if((pd[1][a]<2)&&(pd[2][a]<2)&&(pd[3][a]<2)&&(pd[4][a]<2)){
if((df[16][b]<2)&&(df[32][b]<2)&&(df[48][b]<2)){
if((pd[1][b]<2)&&(pd[10][b]<2)&&(pd[35][b]<2)&&(pd[44][b]<2)){
nm[1]=a; nm[64]=b;
df[1][a]++; df[17][a]++; df[33][a]++;
pd[1][a]++; pd[2][a]++; pd[3][a]++; pd[4][a]++;
df[16][b]++; df[32][b]++; df[48][b]++;
pd[1][b]++; pd[10][b]++; pd[35][b]++; pd[44][b]++;
stp02();
df[1][a]--; df[17][a]--; df[33][a]--;
pd[1][a]--; pd[2][a]--; pd[3][a]--; pd[4][a]--;
df[16][b]--; df[32][b]--; df[48][b]--;
pd[1][b]--; pd[10][b]--; pd[35][b]--; pd[44][b]--;
}}}}
}
}
/* Set n2 & n63 */
void stp02(){
short a,b;
for(a=1;a>=0;a--){b=CC-a;
if((df[1][a]<2)&&(df[18][a]<2)&&(df[34][a]<2)){
if((pd[5][a]<2)&&(pd[6][a]<2)&&(pd[7][a]<2)&&(pd[8][a]<2)){
if((df[16][b]<2)&&(df[31][b]<2)&&(df[47][b]<2)){
if((pd[6][b]<2)&&(pd[13][b]<2)&&(pd[40][b]<2)&&(pd[47][b]<2)){
nm[2]=a; nm[63]=b;
df[1][a]++; df[18][a]++; df[34][a]++;
pd[5][a]++; pd[6][a]++; pd[7][a]++; pd[8][a]++;
df[16][b]++; df[31][b]++; df[47][b]++;
pd[6][b]++; pd[13][b]++; pd[40][b]++; pd[47][b]++;
}
}
}
}
}
}
}

```



```

    stp03C);
    df[1][a]--; df[18][a]--; df[34][a]--;
    pd[5][a]--; pd[6][a]--; pd[7][a]--; pd[8][a]--;
    df[16][b]--; df[31][b]--; df[47][b]--;
    pd[6][b]--; pd[13][b]--; pd[40][b]--; pd[47][b]--;
    }}}}
}
}
/* Set n3 & n62 */
void stp03C){
    short a,b;
    for(a=0;a<2;a++){b=CC-a;
        if((df[1][a]<2)&&(df[19][a]<2)&&(df[35][a]<2)){
            if((pd[9][a]<2)&&(pd[10][a]<2)&&(pd[11][a]<2)&&(pd[12][a]<2)){
                if((df[16][b]<2)&&(df[30][b]<2)&&(df[46][b]<2)){
                    if((pd[2][b]<2)&&(pd[9][b]<2)&&(pd[36][b]<2)&&(pd[43][b]<2)){
                        nm[3]=a; nm[62]=b;
                        df[1][a]++; df[19][a]++; df[35][a]++;
                        pd[9][a]++; pd[10][a]++; pd[11][a]++; pd[12][a]++;
                        df[16][b]++; df[30][b]++; df[46][b]++;
                        pd[2][b]++; pd[9][b]++; pd[36][b]++; pd[43][b]++;
                        stp04C);
                        df[1][a]--; df[19][a]--; df[35][a]--;
                        pd[9][a]--; pd[10][a]--; pd[11][a]--; pd[12][a]--;
                        df[16][b]--; df[30][b]--; df[46][b]--;
                        pd[2][b]--; pd[9][b]--; pd[36][b]--; pd[43][b]--;
                    }}}}
        }
    }
}
/* Set n4 & n61 */
void stp04C){
    short a,b;
    for(a=1;a>=0;a--){b=CC-a;
        if((df[1][a]<2)&&(df[20][a]<2)&&(df[36][a]<2)){
            if((pd[13][a]<2)&&(pd[14][a]<2)&&(pd[15][a]<2)&&(pd[16][a]<2)){
                if((df[16][b]<2)&&(df[29][b]<2)&&(df[45][b]<2)){
                    if((pd[5][b]<2)&&(pd[14][b]<2)&&(pd[39][b]<2)&&(pd[48][b]<2)){
                        nm[4]=a; nm[61]=b; cnt2=0;
                        df[1][a]++; df[20][a]++; df[36][a]++;
                        pd[13][a]++; pd[14][a]++; pd[15][a]++; pd[16][a]++;
                        df[16][b]++; df[29][b]++; df[45][b]++;
                        pd[5][b]++; pd[14][b]++; pd[39][b]++; pd[48][b]++;
                        stp05C);
                        df[1][a]--; df[20][a]--; df[36][a]--;
                        pd[13][a]--; pd[14][a]--; pd[15][a]--; pd[16][a]--;
                        df[16][b]--; df[29][b]--; df[45][b]--;
                        pd[5][b]--; pd[14][b]--; pd[39][b]--; pd[48][b]--;
                    }}}}
        }
    }
}
/* Set n5 & n60 */
void stp05C){
    short a,b;
    for(a=1;a>=0;a--){b=CC-a;
        if((df[2][a]<2)&&(df[21][a]<2)&&(df[33][a]<2)){
            if((pd[17][a]<2)&&(pd[18][a]<2)&&(pd[19][a]<2)&&(pd[20][a]<2)){
                if((df[15][b]<2)&&(df[28][b]<2)&&(df[48][b]<2)){
                    if((pd[19][b]<2)&&(pd[28][b]<2)&&(pd[49][b]<2)&&(pd[58][b]<2)){
                        nm[5]=a; nm[60]=b;
                        df[2][a]++; df[21][a]++; df[33][a]++;
                        pd[17][a]++; pd[18][a]++; pd[19][a]++; pd[20][a]++;
                        df[15][b]++; df[28][b]++; df[48][b]++;
                        pd[19][b]++; pd[28][b]++; pd[49][b]++; pd[58][b]++;
                        stp06C);
                    }
                }
            }
        }
    }
}

```

```

    df[2][a]--; df[21][a]--; df[33][a]--;
    pd[17][a]--; pd[18][a]--; pd[19][a]--; pd[20][a]--;
    df[15][b]--; df[28][b]--; df[48][b]--;
    pd[19][b]--; pd[28][b]--; pd[49][b]--; pd[58][b]--;
    }}}}
}
}
/* Set n6 & n59 */
void stp06(){
    short a,b;
    for(a=0;a<2;a++){b=CC-a;
        if((df[2][a]<2)&&(df[22][a]<2)&&(df[34][a]<2)){
            if((pd[21][a]<2)&&(pd[22][a]<2)&&(pd[23][a]<2)&&(pd[24][a]<2)){
                if((df[15][b]<2)&&(df[27][b]<2)&&(df[47][b]<2)){
                    if((pd[24][b]<2)&&(pd[31][b]<2)&&(pd[54][b]<2)&&(pd[61][b]<2)){
                        nm[6]=a; nm[59]=b;
                        df[2][a]++; df[22][a]++; df[34][a]++;
                        pd[21][a]++; pd[22][a]++; pd[23][a]++; pd[24][a]++;
                        df[15][b]++; df[27][b]++; df[47][b]++;
                        pd[24][b]++; pd[31][b]++; pd[54][b]++; pd[61][b]++;
                        stp07();
                        df[2][a]--; df[22][a]--; df[34][a]--;
                        pd[21][a]--; pd[22][a]--; pd[23][a]--; pd[24][a]--;
                        df[15][b]--; df[27][b]--; df[47][b]--;
                        pd[24][b]--; pd[31][b]--; pd[54][b]--; pd[61][b]--;
                    }}}}
                }
            }
        }
    }
}
/* Set n7 & n58 */
void stp07(){
    short a,b;
    for(a=1;a>=0;a--){b=CC-a;
        if((df[2][a]<2)&&(df[23][a]<2)&&(df[35][a]<2)){
            if((pd[25][a]<2)&&(pd[26][a]<2)&&(pd[27][a]<2)&&(pd[28][a]<2)){
                if((df[15][b]<2)&&(df[26][b]<2)&&(df[46][b]<2)){
                    if((pd[20][b]<2)&&(pd[27][b]<2)&&(pd[50][b]<2)&&(pd[57][b]<2)){
                        nm[7]=a; nm[58]=b;
                        df[2][a]++; df[23][a]++; df[35][a]++;
                        pd[25][a]++; pd[26][a]++; pd[27][a]++; pd[28][a]++;
                        df[15][b]++; df[26][b]++; df[46][b]++;
                        pd[20][b]++; pd[27][b]++; pd[50][b]++; pd[57][b]++;
                        stp08();
                        df[2][a]--; df[23][a]--; df[35][a]--;
                        pd[25][a]--; pd[26][a]--; pd[27][a]--; pd[28][a]--;
                        df[15][b]--; df[26][b]--; df[46][b]--;
                        pd[20][b]--; pd[27][b]--; pd[50][b]--; pd[57][b]--;
                    }}}}
                }
            }
        }
    }
}
/* Set n8 & n57 */
void stp08(){
    short a,b;
    for(a=0;a<2;a++){b=CC-a;
        if((df[2][a]<2)&&(df[24][a]<2)&&(df[36][a]<2)){
            if((pd[29][a]<2)&&(pd[30][a]<2)&&(pd[31][a]<2)&&(pd[32][a]<2)){
                if((df[15][b]<2)&&(df[25][b]<2)&&(df[45][b]<2)){
                    if((pd[23][b]<2)&&(pd[32][b]<2)&&(pd[53][b]<2)&&(pd[62][b]<2)){
                        nm[8]=a; nm[57]=b;
                        df[2][a]++; df[24][a]++; df[36][a]++;
                        pd[29][a]++; pd[30][a]++; pd[31][a]++; pd[32][a]++;
                        df[15][b]++; df[25][b]++; df[45][b]++;
                        pd[23][b]++; pd[32][b]++; pd[53][b]++; pd[62][b]++;
                        stp09();
                        df[2][a]--; df[24][a]--; df[36][a]--;
                    }
                }
            }
        }
    }
}

```

```

        pd[29][a]--; pd[30][a]--; pd[31][a]--; pd[32][a]--;
        df[15][b]--; df[25][b]--; df[45][b]--;
        pd[23][b]--; pd[32][b]--; pd[53][b]--; pd[62][b]--;
    }}}}
}
}
/**/
/* ....(Skip).... */
/**/
/* Set n31 & n34 */
void stp31(){
    short a,b;
    for(a=0;a<2;a++){b=CC-a;
        if((df[8][a]<2)&&(df[31][a]<2)&&(df[39][a]<2)){
            if((pd[7][a]<2)&&(pd[16][a]<2)&&(pd[37][a]<2)&&(pd[46][a]<2)){
                if((df[9][b]<2)&&(df[18][b]<2)&&(df[42][b]<2)){
                    if((pd[45][b]<2)&&(pd[46][b]<2)&&(pd[47][b]<2)&&(pd[48][b]<2)){
                        nm[31]=a; nm[34]=b;
                        df[8][a]++; df[31][a]++; df[39][a]++;
                        pd[7][a]++; pd[16][a]++; pd[37][a]++; pd[46][a]++;
                        df[9][b]++; df[18][b]++; df[42][b]++;
                        pd[45][b]++; pd[46][b]++; pd[47][b]++; pd[48][b]++;
                        stp32();
                        df[8][a]--; df[31][a]--; df[39][a]--;
                        pd[7][a]--; pd[16][a]--; pd[37][a]--; pd[46][a]--;
                        df[9][b]--; df[18][b]--; df[42][b]--;
                        pd[45][b]--; pd[46][b]--; pd[47][b]--; pd[48][b]--;
                    }}}}
                }
            }
        }
    }
}
/* Set n32 & n33 */
void stp32(){
    short a,b;
    for(a=1;a>=0;a--){b=CC-a;
        if((df[8][a]<2)&&(df[32][a]<2)&&(df[40][a]<2)){
            if((pd[4][a]<2)&&(pd[11][a]<2)&&(pd[34][a]<2)&&(pd[41][a]<2)){
                if((df[9][b]<2)&&(df[17][b]<2)&&(df[41][b]<2)){
                    if((pd[41][b]<2)&&(pd[42][b]<2)&&(pd[43][b]<2)&&(pd[44][b]<2)){
                        nm[32]=a; nm[33]=b;
                        df[8][a]++; df[32][a]++; df[40][a]++;
                        pd[4][a]++; pd[11][a]++; pd[34][a]++; pd[41][a]++;
                        df[9][b]++; df[17][b]++; df[41][b]++;
                        pd[41][b]++; pd[42][b]++; pd[43][b]++; pd[44][b]++;
                        recordans();
                        df[8][a]--; df[32][a]--; df[40][a]--;
                        pd[4][a]--; pd[11][a]--; pd[34][a]--; pd[41][a]--;
                        df[9][b]--; df[17][b]--; df[41][b]--;
                        pd[41][b]--; pd[42][b]--; pd[43][b]--; pd[44][b]--;
                    }}}}
                }
            }
        }
    }
}
/**/
/* Record the Answer */
void recordans(){
    short n;
    cnt++;
    tlu[cnt-1][0]=cnt;
    for(n=1;n<65;n++){tlu[cnt-1][n]=nm[n];}
}
/**/
/* ....(Skip).... */
/* Combine abd Compose */
void cmbcmp(){
    short n,d,fc,u1,mc;

```



```

    d[0][2],d[0][18],d[0][34],d[0][50]);
    printf("          |%2d %9d %9d          |%2d\n",
        d[1][2],d[1][18],d[1][34],d[1][50]);
printf("%4d %3d %5d %3d %5d %3d %5d %3d",
    d[0][5],d[0][3],d[0][21],d[0][19],d[0][37],d[0][35],d[0][53],d[0][51]);
    printf("%8d %3d %5d %3d %5d %3d %5d %3d\n",
        d[1][5],d[1][3],d[1][21],d[1][19],d[1][37],d[1][35],d[1][53],d[1][51]);
printf("          |%2d %2d---%2d--%2d---%2d--%2d---%2d--%2d",
    d[0][6],d[0][4],d[0][22],d[0][20],d[0][38],d[0][36],d[0][54],d[0][52]);
    printf("          |%2d %2d---%2d--%2d---%2d--%2d---%2d--%2d\n",
        d[1][6],d[1][4],d[1][22],d[1][20],d[1][38],d[1][36],d[1][54],d[1][52]);
printf("%4d %3d |%4d %3d %5d %3d %5d %3d |",
    d[0][9],d[0][7],d[0][25],d[0][23],d[0][41],d[0][39],d[0][57],d[0][55]);
    printf("%6d %3d |%4d %3d %5d %3d %5d %3d | \n",
        d[1][9],d[1][7],d[1][25],d[1][23],d[1][41],d[1][39],d[1][57],d[1][55]);
printf("          |%2d %3d %5d %3d %5d %3d          |%2d %3d",
    d[0][10],d[0][8],d[0][26],d[0][24],d[0][42],d[0][40],d[0][58],d[0][56]);
    printf("          |%2d %3d %5d %3d %5d %3d          |%2d %3d\n",
        d[1][10],d[1][8],d[1][26],d[1][24],d[1][42],d[1][40],d[1][58],d[1][56]);
printf("%4d--%2d-|--%2d--%2d---%2d--%2d---%2d %3d |",
    d[0][13],d[0][11],d[0][29],d[0][27],d[0][45],d[0][43],d[0][61],d[0][59]);
    printf("%6d--%2d-|--%2d--%2d---%2d--%2d---%2d %3d | \n",
        d[1][13],d[1][11],d[1][29],d[1][27],d[1][45],d[1][43],d[1][61],d[1][59]);
printf("%6d %3d %5d %3d %5d %3d %5d %3d",
    d[0][14],d[0][12],d[0][30],d[0][28],d[0][46],d[0][44],d[0][62],d[0][60]);
    printf("          %4d %3d %5d %3d %5d %3d %5d %3d\n",
        d[1][14],d[1][12],d[1][30],d[1][28],d[1][46],d[1][44],d[1][62],d[1][60]);
printf("%8d |%8d %9d %9d |",
    d[0][15],d[0][31],d[0][47],d[0][63]);
    printf("%10d |%8d %9d %9d | \n",
        d[1][15],d[1][31],d[1][47],d[1][63]);
printf("%10d-----%2d-----%2d-----%2d",
    d[0][16],d[0][32],d[0][48],d[0][64]);
    printf("%12d-----%2d-----%2d-----%2d\n",
        d[1][16],d[1][32],d[1][48],d[1][64]);
}
/**/
/* ....(Skip).... */
/* Print the Counts according to n1 */
void prcn1(){
    short d,n;
    for(n=1;n<41;n++){d=cn1[n];
        if(d>0){printf("%4d:%4d,",n,d);}
        else{printf("%4d: ...,",n);}
        if(n%8==0){printf("\n");}
    }
}
/**/
/* Print the Counts according to n43 */
void prcn43(){
    short d,n;
    for(n=1;n<65;n++){d=cn43[n];
        if(d>0){printf("%4d:%4d,",n,d);}
        else{printf("%4d: ...,",n);}
        if(n%8==0){printf("\n");}
    }
}
/**/
/* ....(Skip).... */

```

The condition  $n_1=1$  in our classical notation means  $n_1=0$  in every layer unit, because

$$0x2^5+0x2^4+0x2^3+0x2^2+0x2^1+0x2^0+1=1;$$

The next list shows the result of my recent calculation.

\*\* 'Complete Euler Cubes' of Order 4 for the Simultaneous Type: \*\*  
 \*\* Self-Complementary and Pan-Triagonal: Solutions with n1=1 \*\*

[Latin Units]

1/ 0---1---0---1  1 0 1  0 1 0 0 1 1 0 0 1  0 1--1-0--0-1--1-0 0 1  1 0 0 1 1 0   1 0 0 1 1 0  0 1 1-0 -0-1--1-0--0 1  0 1 1 0 0 1 1 0 1  0 1 0   0---1---0---1	2/ 0---0---1---1  1 1 0  0 1 0 1 0 0 1 0 1  0 1--0-1--1-0--1-0 0 1  0 1 1 0 1 0   1 0 1 0 0 1  0 1 1-0 -1-0--0-1--0 1  0 1 0 1 1 0 1 0 1  1 0 0   0---0---1---1	3/ 0---1---0---1  1 1 0  0 1 0 1 0 0 1 0 1  1 1--0-0--1-1--0-0 0 0  0 1 1 0 1 1   0 0 1 0 0 1  1 1 1-1 -0-0--1-1--0 0  0 1 0 1 1 0 1 0 1  1 0 0   0---1---0---1	4/ 0---0---1---1  1 0 1  0 0 0 1 1 0 0 1 1  0 1--0-1--1-0--1-0 1 1  0 1 1 0 0 0   1 1 1 0 0 1  0 0 1-0 -1-0--0-1--0 1  0 0 1 1 0 0 1 1 1  0 1 0   0---0---1---1
5/ 0---1---0---1  1 0 1  0 0 0 1 1 0 0 1 1  1 1--0-0--1-1--0-0 1 0  0 1 1 0 0 1   0 1 1 0 0 1  1 0 1-1 -0-0--1-1--0 0  0 0 1 1 0 0 1 1 1  0 1 0   0---1---0---1	6/ 0---0---1---1  1 1 0  0 1 1 1 1 0 0 0 0  0 0--0-0--1-1--1-1 1 0  1 0 0 1 0 1   0 1 0 1 1 0  1 0 0-0 -0-0--1-1--1 1  1 1 1 1 0 0 0 0 1  1 0 0   0---0---1---1	7/ 0---1---1---0  1 1 0  0 1 1 1 0 0 0 0 1  1 0--0-0--0-1--1-1 1 0  0 0 0 1 1 1   0 0 0 1 1 1  1 0 0-0 -0-1--1-1--1 0  0 1 1 1 1 0 0 0 1  1 0 0   1---0---0---1	8/ 0---0---1---1  1 0 0  1 0 1 1 1 1 0 0 0  0 0--0-1--1-1--1-0 1 1  1 0 0 0 0 1   0 1 1 1 1 0  0 0 1-0 -0-0--0-1--1 1  1 1 1 0 0 0 0 1 0  1 1 0   0---0---1---1
9/ 0---1---1---0  1 0 0  1 0 1 1 0 1 0 0 1  1 0--0-1--0-1--1-0 1 1  0 0 0 0 1 1   0 0 1 1 1 1  0 0 1-0 -0-1--0-1--1 0  0 1 1 0 1 0 0 1 0  1 1 0   1---0---0---1	10/ 0---0---1---1  0 1 0  1 1 1 0 0 1 1 0 0  0 1--0-1--1-0--1-0 0 1  1 1 0 0 1 0   1 0 1 1 0 0  0 1 1-0 -1-0--0-1--0 1  1 1 0 0 1 1 0 0 0  1 0 1   0---0---1---1	11/ 0---0---1---1  0 1 1  0 1 1 0 1 0 0 1 0  0 1--0-0--1-0--1-1 1 0  1 1 0 1 0 0   1 1 0 1 0 0  1 0 0-0 -1-0--1-1--0 1  1 0 1 1 0 1 0 0 1  0 0 1   0---0---1---1	12/ 0---1---0---1  0 1 0  1 1 1 0 0 1 1 0 0  1 1--0-0--1-1--0-0 0 0  1 1 0 0 1 1   0 0 1 1 0 0  1 1 1-1 -0-0--1-1--0 0  1 1 0 0 1 1 0 0 0  1 0 1   0---1---0---1
13/ 0---1---1---0  0 1 1  0 1 1 0 0 0 0 1 1  1 1--0-0--0-0--1-1 1 0  0 1 0 1 1 0   1 0 0 1 0 1  1 0 0-0 -1-1--1-1--0 0  0 0 1 1 1 1 0 0 1  0 0 1   1---0---0---1	14/ 0---0---1---1  0 0 1  1 0 1 0 1 1 0 1 0  0 1--0-1--1-0--1-0 1 1  1 1 0 0 0 0   1 1 1 1 0 0  0 0 1-0 -1-0--0-1--0 1  1 0 1 0 0 1 0 1 0  0 1 1   0---0---1---1	15/ 0---1---1---0  0 0 1  1 0 1 0 0 1 0 1 1  1 1--0-1--0-0--1-0 1 1  0 1 0 0 1 0   1 0 1 1 0 1  0 0 1-0 -1-1--0-1--0 0  0 0 1 0 1 1 0 1 0  0 1 1   1---0---0---1	16/ 0---1---0---1  0 0 1  1 0 1 0 1 1 0 1 0  1 1--0-0--1-1--0-0 1 0  1 1 0 0 0 1   0 1 1 1 0 0  1 0 1-1 -0-0--1-1--0 0  1 0 1 0 0 1 0 1 0  0 1 1   0---1---0---1

[Count of Latin Units = 16]

[Reference Table for Matching Combinations]

*	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	64	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
2	32	64	48	48	32	32	32	32	32	48	32	32	32	32	32	16
3	32	48	64	32	48	32	40	24	32	32	24	48	32	16	24	32
4	32	48	32	64	48	32	24	40	32	32	40	16	32	48	40	32
5	32	32	48	48	64	32	32	32	16	32	32	32	32	32	32	48
6	32	32	32	32	32	64	48	48	32	32	48	32	32	32	16	32
7	32	32	40	24	32	48	64	32	48	24	32	32	48	16	32	24
8	32	32	24	40	32	48	32	64	48	40	32	32	16	48	32	40
9	32	32	32	32	32	32	48	48	64	32	16	32	32	32	48	32
10	32	48	32	32	16	32	24	40	32	64	40	48	32	48	40	32
11	32	32	24	40	32	48	32	32	16	40	64	32	48	48	32	40
12	32	32	48	16	32	32	32	32	32	48	32	64	32	32	32	48
13	32	32	32	32	32	32	48	16	32	32	48	32	64	32	48	32
14	32	32	16	48	32	32	16	48	32	48	48	32	32	64	48	48
15	32	32	24	40	32	16	32	32	48	40	32	32	48	48	64	40
16	32	16	32	32	48	32	24	40	32	32	40	48	32	48	40	64

\*\* List of Compositions:(Part) \*\*

[Latin Units] 1/	2/	5/	7/
0---1---0---1  1 0 1  0 1 0 0 1 1 0 0 1  0 1--1-0--0-1--1-0 0 1  1 0 0 1 1 0   1 0 0 1 1 0  0 1 1-0 -0-1--1-0--0 1  0 1 1 0 0 1 1 0   1 0 1 0   0---1---0---1	0---0---1---1  1 1 0 0  0 1 0 1 0 0 1 0 1  0 1--0-1--1-0--1-0 0 1  0 1 1 0 1 0   1 0 1 0 0 1  0 1 1-0 -1-0--0-1--0 1  0 1 0 1 1 0 1 0   1 1 0 0 0   0---0---1---1	0---1---0---1  1 0 1 0  0 0 0 1 1 0 0 1 1  1 1--0-0--1-1--0-0 1 0  0 1 1 0 0 1   0 1 1 0 0 1  1 0 1-1 -0-0--1-1--0 0  0 0 1 1 0 0 1 1   1 0 1 0 0   0---1---0---1	0---1---1---0  1 1 0 0  0 1 1 1 0 0 0 0 1  1 0--0-0--0-1--1-1 1 0  0 0 0 1 1 1   0 0 0 1 1 1  1 0 0-0 -0-1--1-1--1 0  0 1 1 1 1 0 0 0   1 1 0 0 0   1---0---0---1

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

[Latin Units] 1/	2/	7/	5/
0---1---0---1  1 0 1  0 1 0 0 1 1 0 0 1  0 1--1-0--0-1--1-0 0 1  1 0 0 1 1 0   1 0 0 1 1 0  0 1 1-0 -0-1--1-0--0 1  0 1 1 0 0 1 1 0   1 0 1 0   0---1---0---1	0---0---1---1  1 1 0 0  0 1 0 1 0 0 1 0 1  0 1--0-1--1-0--1-0 0 1  0 1 1 0 1 0   1 0 1 0 0 1  0 1 1-0 -1-0--0-1--0 1  0 1 0 1 1 0 1 0   1 1 0 0 0   0---0---1---1	0---1---1---0  1 1 0 0  0 1 1 1 0 0 0 0 1  1 0--0-0--0-1--1-1 1 0  0 0 0 1 1 1   0 0 0 1 1 1  1 0 0-0 -0-1--1-1--1 0  0 1 1 1 1 0 0 0   1 1 0 0 0   1---0---0---1	0---1---0---1  1 0 1 0  0 0 0 1 1 0 0 1 1  1 1--0-0--1-1--0-0 1 0  0 1 1 0 0 1   0 1 1 0 0 1  1 0 1-1 -0-0--1-1--0 0  0 0 1 1 0 0 1 1   1 0 1 0 0   0---1---0---1

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

[Latin Units] 1/	2/	12/	5/
0---1---0---1  1 0 1  0 1 0 0 1 1 0 0 1  0 1--1-0--0-1--1-0 0 1  1 0 0 1 1 0   1 0 0 1 1 0  0 1 1-0 -0-1--1-0--0 1  0 1 1 0 0 1 1 0   1 0 1 0   0---1---0---1	0---0---1---1  1 1 0 0  0 1 0 1 0 0 1 0 1  0 1--0-1--1-0--1-0 0 1  0 1 1 0 1 0   1 0 1 0 0 1  0 1 1-0 -1-0--0-1--0 1  0 1 0 1 1 0 1 0   1 1 0 0 0   0---0---1---1	0---1---0---1  0 1 0 1  1 1 1 0 0 1 1 0 0  1 1--0-0--1-1--0-0 0 0  1 1 0 0 1 1   0 0 1 1 0 0  1 1 1-1 -0-0--1-1--0 0  1 1 0 0 1 1 0 0   0 1 0 1   0---1---0---1	0---1---0---1  1 0 1 0  0 0 0 1 1 0 0 1 1  1 1--0-0--1-1--0-0 1 0  0 1 1 0 0 1   0 1 1 0 0 1  1 0 1-1 -0-0--1-1--0 0  0 0 1 1 0 0 1 1   1 0 1 0 0   0---1---0---1

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

[Latin Units] 1/ 0---1---0---1  1 0 1  0 1 0 0 1 1 0 0 1  0 1--1-0--0-1--1-0 0 1  1 0 0 1 1 0   1 0 0 1 1 0  0 1 1-0 -0-1--1-0--0 1  0 1 1 0 0 1 1 0  1 0 1 0  0---1---0---1	2/ 0---0---1---1  1 1 0  0 1 0 1 0 0 1 0 1  0 1--0-1--1-0--1-0 0 1  0 1 1 0 1 0   1 0 1 0 0 1  0 1 1-0 -1-0--0-1--0 1  0 1 0 1 1 0 1 0  1 1 0 0  0---0---1---1	13/ 0---1---1---0  0 1 1  0 1 1 0 0 0 0 1 1  1 1--0-0--0-0--1-1 1 0  0 1 0 1 1 0   1 0 0 1 0 1  1 0 0-0 -1-1--1-1--0 0  0 0 1 1 1 1 0 0  1 0 0 1  1---0---0---1	5/ 0---1---0---1  1 0 1  0 0 0 1 1 0 0 1 1  1 1--0-0--1-1--0-0 1 0  0 1 1 0 0 1   0 1 1 0 0 1  1 0 1-1 -0-0--1-1--0 0  0 0 1 1 0 0 1 1  1 0 1 0  0---1---0---1
--	--	---	--

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

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

1/ 3/ 4/ 10/ 13/ 9/ 77# 1-----52-----16-----61  58 23 43   6 55 8 26 41 38 21 11 60  20 63---33--14---29--50---48-- 3 12 46   37 31 25 35 56 18    47 9 30 40 34 28  19 53 62--17- --15--36---51--32--- 2 45   5 54 44 27 24 39 57 10  59   22 42 7   4-----49-----13-----64	1/ 3/ 10/ 4/ 13/ 9/ 83# 1-----52-----16-----61  54 27 39  10 59 12 22 37 42 25 7 56  20 63---33--14---29--50---48-- 3 8 46   41 31 21 35 60 18    47 5 30 44 34 24  19 57 62--17- --15--36---51--32--- 2 45   9 58 40 23 28 43 53 6  55   26 38 11   4-----49-----13-----64
--	---

1/ 3/ 13/ 4/ 9/ 10/ 89# 1-----59-----16-----54  55 26 45   4 58 12 23 37 36 18 13 63  27 62---33-- 8---22--51---48-- 9 15 40   34 30 21 41 60 19    46 5 24 44 35 31  25 50 56--17- --14--43---57--32--- 3 38   2 52 47 29 28 42 53 7  61   20 39 10   11-----49----- 6-----64	1/ 3/ 16/ 4/ 13/ 9/ 107# 1-----60----- 8-----61  54 19 47  10 51 12 22 45 42 17 15 56  28 63---33-- 6---29--58---40-- 3 16 38   41 31 21 35 52 26    39 13 30 44 34 24  27 49 62--25- -- 7--36---59--32--- 2 37   9 50 48 23 20 43 53 14  55   18 46 11   4-----57----- 5-----64
--	--

1/ 4/ 3/ 10/ 13/ 9/ 113# 1-----44-----24-----61  58 15 51   6 47 8 26 49 38 13 19 60  12 63---33--22---29--42---56-- 3 20 54   37 31 25 35 48 10    55 17 30 40 34 28  11 45 62-- 9- --23--36---43--32--- 2 53   5 46 52 27 16 39 57 18  59   14 50 7   4-----41-----21-----64	1/ 5/ 2/ 7/ 15/ 11/ 149# 1-----55-----16-----58  61 14 52   3 46 8 29 50 35 9 20 63  23 60---33--11---26--53---48-- 6 24 43   34 28 25 38 47 21    44 18 27 40 37 31  22 41 59--17- --12--39---54--32--- 5 42   2 45 56 30 15 36 57 19  62   13 51 4   7-----49-----10-----64
--	---



1/ 7/ 2/ 5/ 15/ 11/ 225#  
 1-----55-----28-----46  
 |61 26 40 | 3  
 58 20 29 38 35 9 8 63  
 |23 48---33-11---14-53---60-18  
 24 43 | 34 16 13 50 59 21 |  
 |44 6 15 52 49 31 |22 41  
 47--5-|-12-51---54-32---17 42 |  
 2 57 56 30 27 36 45 7  
 62 | 25 39 4 |  
 19-----37-----10-----64

1/ 10/ 3/ 4/ 13/ 9/ 261#  
 1-----44-----24-----61  
 |46 27 39 |18  
 59 20 14 37 50 25 7 48  
 |12 63---33-22---29-42---56--3  
 8 54 | 49 31 13 35 60 10 |  
 |55 5 30 52 34 16 |11 57  
 62--9-|-23-36---43-32---2 53 |  
 17 58 40 15 28 51 45 6  
 47 | 26 38 19 |  
 4-----41-----21-----64

1/ 12/ 2/ 5/ 13/ 9/ 297#  
 1-----56-----12-----61  
 |46 27 39 |18  
 59 20 14 37 50 25 7 48  
 |24 63---33-10---29-54---44--3  
 8 42 | 49 31 13 35 60 22 |  
 |43 5 30 52 34 16 |23 57  
 62--21-|-11-36---55-32---2 41 |  
 17 58 40 15 28 51 45 6  
 47 | 26 38 19 |  
 4-----53-----9-----64

1/ 13/ 2/ 5/ 9/ 6/ 373#  
 1-----55-----28-----46  
 |48 26 53 | 3  
 58 20 16 38 35 9 21 63  
 |23 61---33-11---14-40---60-18  
 24 43 | 34 29 13 50 59 8 |  
 |57 6 15 52 36 31 |22 41  
 47--5-|-25-51---54-32---4 42 |  
 2 44 56 30 27 49 45 7  
 62 | 12 39 17 |  
 19-----37-----10-----64

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

1/ 15/ 2/ 5/ 7/ 11/ 637#  
 1-----55-----28-----46  
 |47 12 54 |17  
 44 20 15 38 49 9 22 63  
 |23 62---33-25---14-39---60--4  
 24 57 | 34 30 13 36 59 7 |  
 |58 6 29 52 35 31 | 8 41  
 61--5-|-26-51---40-32---3 42 |  
 2 43 56 16 27 50 45 21  
 48 | 11 53 18 |  
 19-----37-----10-----64

1/ 16/ 3/ 4/ 13/ 9/ 745#  
 1-----60-----8-----61  
 |46 11 55 |18  
 43 20 14 53 50 9 23 48  
 |28 63---33-6---29-58---40--3  
 24 38 | 49 31 13 35 44 26 |  
 |39 21 30 52 34 16 |27 41  
 62--25-|-7-36---59-32---2 37 |  
 17 42 56 15 12 51 45 22  
 47 | 10 54 19 |  
 4-----57-----5-----64

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

3/ 1/ 4/ 10/ 13/ 9/ 1161#  
 1-----52-----16-----61  
 |58 39 27 | 6  
 55 8 42 25 22 37 11 60  
 |36 63---17-14---45-50---32--3  
 12 30 | 21 47 41 19 56 34 |  
 |31 9 46 24 18 44 |35 53  
 62--33-|-15-20---51-48---2 29 |  
 5 54 28 43 40 23 57 10  
 59 | 38 26 7 |  
 4-----49-----13-----64

4/ 1/ 3/ 10/ 13/ 9/ 1341#  
 1-----28-----40-----61  
 |58 15 51 | 6  
 31 8 42 49 22 13 35 60  
 |12 63---17-38---45-26---56--3  
 36 54 | 21 47 41 19 32 10 |  
 |55 33 46 24 18 44 |11 29  
 62--9-|-39-20---27-48---2 53 |  
 5 30 52 43 16 23 57 34  
 59 | 14 50 7 |  
 4-----25-----37-----64

5/ 1/ 2/ 7/ 15/ 11/ 1521#  
 1-----55-----16-----58  
 |61 14 52 | 3  
 30 8 45 50 19 9 36 63  
 |39 60---17-11---42-53---32--6  
 40 27 | 18 44 41 22 31 37 |  
 |28 34 43 24 21 47 |38 25  
 59--33-|-12-23---54-48---5 26 |  
 2 29 56 46 15 20 57 35  
 62 | 13 51 4 |  
 7-----49-----10-----64

7/ 1/ 2/ 5/ 15/ 11/ 1901#  
 1-----55-----44-----30  
 |61 42 24 | 3  
 58 36 45 22 19 9 8 63  
 |39 32---17-11---14-53---60-34  
 40 27 | 18 16 13 50 59 37 |  
 |28 6 15 52 49 47 |38 25  
 31--5-|-12-51---54-48---33 26 |  
 2 57 56 46 43 20 29 7  
 62 | 41 23 4 |  
 35-----21-----10-----64

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10/ 1/ 3/ 4/ 13/ 9/ 2081#
1-----28-----40-----61
|30      43      23      |34
59 36   14 21   50 41   7 32
|12 63----17--38----45--26----56-- 3
8 54 | 49 47   13 19   60 10 |
|55 5  46 52   18 16   |11 57
62-- 9-|--39--20----27--48---- 2 53 |
33 58   24 15   44 51   29 6
31 |      42      22      35 |
4-----25-----37-----64

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12/ 1/ 2/ 5/ 13/ 9/ 2261#
1-----56-----12-----61
|30      43      23      |34
59 36   14 21   50 41   7 32
|40 63----17--10----45--54----28-- 3
8 26 | 49 47   13 19   60 38 |
|27 5  46 52   18 16   |39 57
62--37-|--11--20----55--48---- 2 25 |
33 58   24 15   44 51   29 6
31 |      42      22      35 |
4-----53----- 9-----64

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13/ 1/ 2/ 5/ 9/ 6/ 2641#
1-----55-----44-----30
|32      42      53      | 3
58 36   16 22   19 9    37 63
|39 61----17--11----14--24----60--34
40 27 | 18 45   13 50   59 8 |
|57 6  15 52   20 47   |38 25
31-- 5-|--41--51----54--48---- 4 26 |
2 28   56 46   43 49   29 7
62 |      12      23      33 |
35-----21-----10-----64

```

```

14/ 1/ 2/ 5/ 13/ 9/ 3781#
1-----24-----44-----61
|30      11      55      |34
27 36   14 53   50 9    39 32
| 8 63----17--42----45--22----60-- 3
40 58 | 49 47   13 19   28 6 |
|59 37   46 52   18 16   | 7 25
62-- 5-|--43--20----23--48---- 2 57 |
33 26   56 15   12 51   29 38
31 |      10      54      35 |
4-----21-----41-----64

```

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15/ 1/ 2/ 5/ 7/ 11/ 3961#
1-----55-----44-----30
|31      12      54      |33
28 36   15 22   49 9    38 63
|39 62----17--41----14--23----60-- 4
40 57 | 18 46   13 20   59 7 |
|58 6  45 52   19 47   | 8 25
61-- 5-|--42--51----24--48---- 3 26 |
2 27   56 16   43 50   29 37
32 |      11      53      34 |
35-----21-----10-----64

```

```

16/ 1/ 3/ 4/ 13/ 9/ 4501#
1-----60----- 8-----61
|30      11      55      |34
27 36   14 53   50 9    39 32
|44 63----17-- 6----45--58----24-- 3
40 22 | 49 47   13 19   28 42 |
|23 37   46 52   18 16   |43 25
62--41-|-- 7--20----59--48---- 2 21 |
33 26   56 15   12 51   29 38
31 |      10      54      35 |
4-----57----- 5-----64

```

[Count of Compositions = 4680]

[Counts according to n1]

1:4680, 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: ...

[Counts according to n43]

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: 780,  
33: ..., 34: ..., 35: ..., 36: ..., 37: ..., 38: ..., 39: ..., 40: ...,  
41: ..., 42: ..., 43: ..., 44: ..., 45: ..., 46: ..., 47: ..., 48: 780,  
49: ..., 50: ..., 51: ..., 52: ..., 53: ..., 54: ..., 55: ..., 56: 780,  
57: ..., 58: ..., 59: ..., 60: 780, 61: ..., 62: 780, 63: 780, 64: ...

OK!

These are all Complete Euler Cubes of order 4.

When I had this verification by myself, I was much surprised. I must confess I had no idea that such a simultaneous magic cubes 444 could really exist. I could not have even imagined about that, for I was interested in the structural relationship between the Self-complementary type and Complete one (with  $n43=64$ ) for a long time and I wanted to know how to transform one into the other.

But there exists the simultaneous type: both self-complementary and pan-triagonal. I am happy I am now enlightened and able to verify the report by our new method. I wonder who discovered this fact for the first time.

### 3. How many Simultaneous MC444 are there in all including "Non-Euler Type"?

Let's compose the same thing in such an ordinary way as usual, without using New Euler's Method by binary number system. We want to know how many solutions exist in all for the Simultaneous MC444 including both Euler type and Non-Euler one.

I have to design and write the program carefully using all our knowledge and skills as hard as I can. I am glad to report here of the next result I could have got at last.

\*\* Simultaneous Magic Cubes of Order 4: Pan-Diagonal and Self-Complementary: \*\*  
 \*\* Abstract List of Standard Solutions with  $n_1=1$  &  $n_3=32, 48, 56, 60, 62$  and  $63$  \*\*

[Solutions with  $n_1=1$  &  $n_3=32$ ]

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

271/  
 1-----47-----24-----58  
 |59        20        46        | 5  
 52 8    27 42    37 17    14 63  
 |15 62----33-21----26-43----56-- 4  
 16 53 | 34 30    25 36    55 11 |  
 |54 10    29 40    35 31    |12 49  
 61-- 9-|-22-39----44-32---- 3 50 |  
   2 51    48 28    23 38    57 13  
   60 |        19        45        | 6 |  
   7-----41-----18-----64

475/  
 1-----47-----24-----58  
 |60        22        45        | 3  
 54 8    28 42    35 17    13 63  
 |15 61----33-19----26-44----56-- 6  
 16 51 | 34 29    25 38    55 12 |  
 |53 10    27 40    36 31    |14 49  
 59-- 9-|-21-39----46-32---- 4 50 |  
   2 52    48 30    23 37    57 11  
   62 |        20        43        | 5 |  
   7-----41-----18-----64

493/  
 1-----47-----24-----58  
 |61        22        44        | 3  
 54 8    29 42    35 17    12 63  
 |15 60----33-19----26-45----56-- 6  
 16 51 | 34 28    25 38    55 13 |  
 |52 10    27 40    37 31    |14 49  
 59-- 9-|-20-39----46-32---- 5 50 |  
   2 53    48 30    23 36    57 11  
   62 |        21        43        | 4 |  
   7-----41-----18-----64

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

649/  
 1-----46-----31-----52  
 |56        27        42        | 5  
 59 15    24 36    37 17    10 62  
 |14 58----33-21----20-40----63-11  
 16 53 | 35 26    18 43    61 8 |  
 |57 4    22 47    39 30    |12 49  
 54-- 2-|-25-45----44-32---- 7 51 |  
   3 55    48 28    29 41    50 6  
   60 |        23        38        | 9 |  
   13-----34-----19-----64

661/  
 1-----58-----27-----44  
 |50        28        48        | 4  
 60 22    18 35    36 10    16 63  
 |26 57----33- 9----12-45----59-19  
 23 41 | 34 25    11 51    62 13 |  
 |52 3    14 54    40 31    |24 42  
 46-- 6-|-20-53----56-32---- 8 39 |  
   2 49    55 29    30 47    43 5  
   61 |        17        37        | 15 |  
   21-----38----- 7-----64

667/  
 1-----47-----28-----54  
 |61        26        40        | 3  
 58 12    29 38    35 17    8 63  
 |15 56----33-19----22-45----60-10  
 16 51 | 34 24    21 42    59 13 |  
 |52 6    23 44    41 31    |14 49  
 55-- 5-|-20-43----46-32---- 9 50 |  
   2 57    48 30    27 36    53 7  
   62 |        25        39        | 4 |  
   11-----37-----18-----64

751/  
 1-----59-----30-----40  
 |48        22        51        | 9  
 54 26    16 36    41 5    19 63  
 |27 55----33-13---- 8-44----62-18  
 28 45 | 34 23    7 50    61 12 |  
 |53 4    15 58    42 31    |20 37  
 47-- 3-|-21-57----52-32----10 38 |  
   2 46    60 24    29 49    39 11  
   56 |        14        43        | 17 |  
   25-----35----- 6-----64

757/  
 1-----58-----31-----40  
 |48        23        50        | 9  
 55 27    16 36    41 5    18 62  
 |26 54----33-13---- 8-44----63-19  
 28 45 | 35 22    6 51    61 12 |  
 |53 4    14 59    43 30    |20 37  
 46-- 2-|-21-57----52-32----11 39 |  
   3 47    60 24    29 49    38 10  
   56 |        15        42        | 17 |  
   25-----34----- 7-----64

763/

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

```

[Count = 804]

[Solutions with n1=1 & n64=64 & n43=48]

1/

```

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

```

463/

```

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

```

619/

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

```

643/

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

```

733/

```

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

```

769/

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

```

265/

```

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

```

481/

```

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

```

631/

```

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

```

727/

```

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

```

739/

```

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

```

745/

```

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

```

[Count = 780]

[Solutions with n1=1 & n64=64 & n43=56]

1/

```

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

```

265/

```

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

```

463/

```

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

```

481/

```

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

```

619/

```

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

```

631/

```

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

```

643/

```

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

```

727/

```

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

```

733/

```

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

```

739/

```

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

```

745/

```

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

```

[Count = 780]

[Solutions with n1=1 & n64=64 & n43=60]

1/

```

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

```

265/

```

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

```

463/

```

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

```

481/

```

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

```

619/

```

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

```

631/

```

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

```

643/

```

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

```

727/

```

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

```

733/

```

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

```

739/

```

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

```

745/

```

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

```

[Count = 780]

[Solutions with n1=1 & n64=64 & n43=62]

1/

```

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

```

265/

```

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

```

463/

```

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

```

481/

```

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

```

619/

```

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

```

631/

```

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

```

643/

```

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

```

727/

```

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

```

733/

```

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

```

739/

```

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

```

745/

```

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

```

[Count = 780]

[Solutions with n1=1 & n64=64 & n43=63]

1/

```

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

```

271/

```

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

```

475/

```

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

```

493/

```

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

```

631/

```

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

```

649/

```

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

```

661/

```

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

```

667/

```

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

```

751/

```

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

```

757/

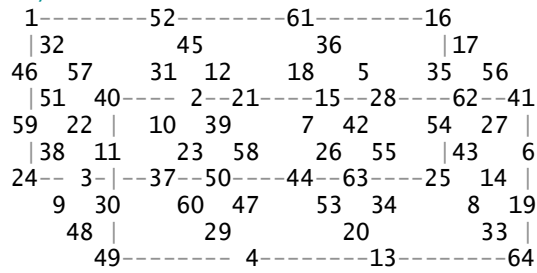
```

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

```



763/



[Count = 804]

[Counts according to n1]

1: 4728, 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: .....,

[Counts according to n43]

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: 804,  
33: ....., 34: ....., 35: ....., 36: ....., 37: ....., 38: ....., 39: ....., 40: .....,  
41: ....., 42: ....., 43: ....., 44: ....., 45: ....., 46: ....., 47: ....., 48: 780,  
49: ....., 50: ....., 51: ....., 52: ....., 53: ....., 54: ....., 55: ....., 56: 780,  
57: ....., 58: ....., 59: ....., 60: 780, 61: ....., 62: 780, 63: 804, 64: .....,

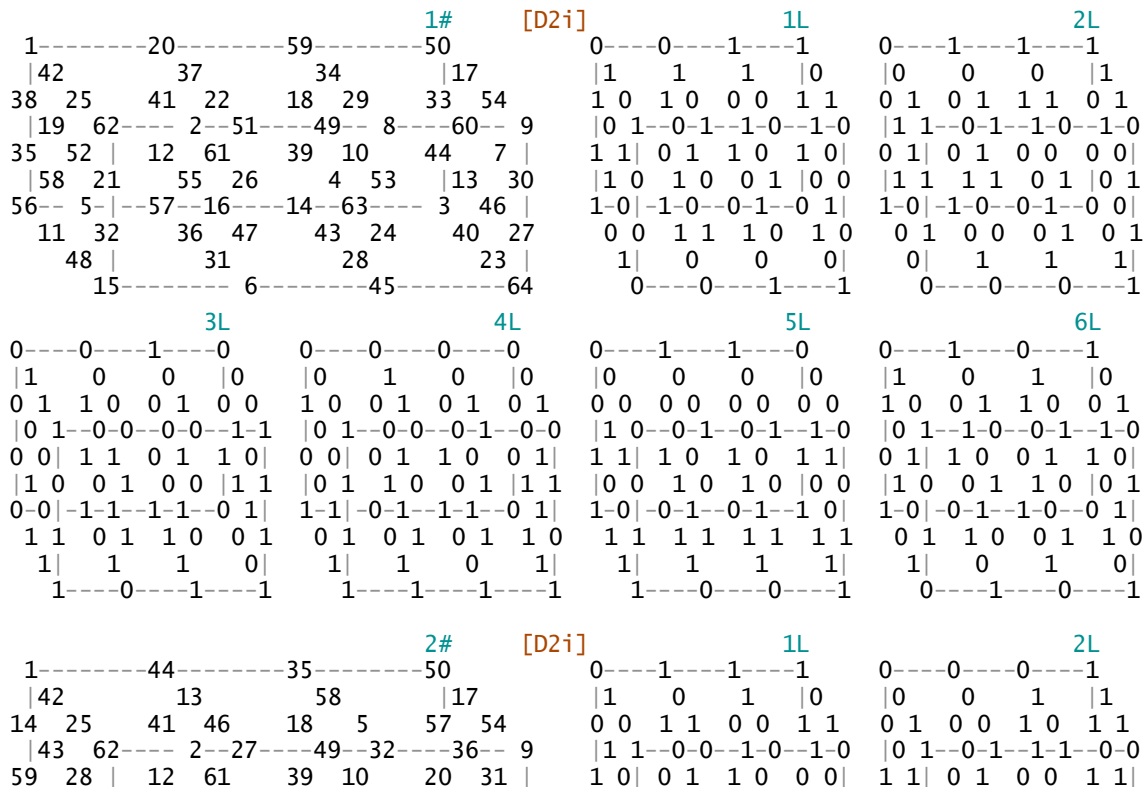
[OK!]

Compare this result with that one of Complete Euler Cubes 444, and you will know the difference between the two.

As you guess, there prove to be Non-Euler Cubes as many as 24x2=48.

The next 5 sample solutions demonstrate what Non-Euler type looks like.

\*\* List of Sample Solutions of the 'Non-Euler' Type with Decomposed Diagrams \*\*



34 45 55 26 4 53  37 6	1 1 1 0 0 1  1 0	0 0 1 1 0 1  0 0
56--29-- --33--16--38--63--3 22	1-0 -1-0--1-1--0 0	1-1 -0-0--0-1--0 1
11 8 60 47 19 24 40 51	0 0 1 1 0 0 1 1	0 0 1 0 1 1 0 1
48   7 52 23	1  0 1 0	0  0 1 1
15-----30-----21-----64	0--0--0--1	0--1--1--1
3L 4L	5L 6L	
0---1---0---0 0---0---0---0	0---1---1---0 0---1---0---1	
1 1 1 1  0  0 1 0  0	0 0 0 0  0  1 0 1  0	
1 1 1 1 0 0 1 0  0 0 0 1 0 1 0 1	0 0 0 0 0 0 0 0  1 0 0 1 1 0 0 1	
1 1--0-1--0-1--0-1  0 1--0-0--0-1--0-0	1 0--0-1--0-1--1-0  0 1--1-0--0-1--1-0	
1 1  1 1 0 1 0 1  0 0  0 1 1 0 0 1	1 1  1 0 1 0 1 1  0 1  1 0 0 1 1 0	
0 1 0 1 0 0  0 0  0 1 1 0 0 1  1 1	0 0 1 0 1 0  0 0  1 0 0 1 1 0  0 1	
0-1 -0-1--0-1--0-0  1-1 -0-1--1-1--0 1	1-0 -0-1--0-1--1-0  1-0 -0-1--1-0--0 1	
1 0 1 1 0 0 0 0 0 1 0 1 0 1 1 0	1 1 1 1 1 1 1 1 1 1 0 1 1 0 0 1 1 0	
1  0 0 0  1  1 0 1	1  1 1 1  1  0 1 0	
1---1---0---1 1---1---1---1	1---0---0---1 0---1---0---1	

1-----20-----59-----50	3# [D2i]	1L	2L
32 47 24  27	0 1 0  0	1 0 1  1	
48 35 31 12 28 39 23 44	1 1 0 0 0 1 0 1	0 0 1 0 1 0 1 0	
19 62--2--51--49--8--60--9	0 1--0-1--1-0--1-0	1 1--0-1--1-0--1-0	
25 52   22 61 29 10 54 7	0 1  0 1 0 0 1 0	1 1  1 1 1 0 1 0	
58 11 55 36 4 43  13 40	1 0 1 1 0 1  0 1	1 0 1 0 0 0  0 0	
56--5-- --57--16--14--63--3 46	1-0 -1-0--0-1--0 1	1-0 -1-0--0-1--0 0	
21 42 26 37 53 34 30 17	0 1 0 1 1 1 0 0	1 0 1 0 1 0 1 1	
38   41 18 33	1  1 0 1	0  0 1 0	
15-----6-----45-----64	0--0--1--1	0--0--0--1	
3L 4L	5L 6L		
0---0---1---0 0---0---0---0	0---1---1---0 0---1---0---1		
1 1 0  1  1 1 1  0	1 1 1 1  1	1 0 1  0	
1 0 1 1 1 0 0 1  1 0 1 0 0 1 1 0	1 1 1 1 1 1 1 1  1 0 0 1 1 0 0 1	1 0 0 1 1 0 0 1	
0 1--0-0--0-0--1-1  0 1--0-0--0-1--0-0	1 0--0-1--0-1--1-0  0 1--1-0--0-1--1-0	0 1--1-0--0-1--1-0	
1 0  0 1 1 1 0 0  0 0  1 1 1 0 1 1	0 1  0 0 0 0 0 1  0 1  1 0 0 1 1 0	0 1  1 0 0 1 1 0	
1 1 0 0 0 1  1 0  0 0 1 0 0 0  1 1	0 1 1 1 1 1  0 1  1 0 0 1 1 0  0 1	1 0 0 1 1 0  0 1	
0-0 -1-1--1-1--0 1  1-1 -0-1--1-1--0 1	1-0 -0-1--0-1--1 0  1-0 -0-1--1-0--0 1	1-0 -0-1--1-0--0 1	
0 1 1 0 0 0 1 0 1 0 0 1 1 0 1 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 1 1 0 0 1 1 0	
0  1 0 0  1  0 0 0	0  0 0 0	1  0 1 0	
1---0---1---1 1---1---1---1	1---0---0---1 0---1---0---1	0---1---0---1	

1-----54-----25-----50	4# [D2i]	1L	2L
32 13 58  27	0 0 1  0	1 0 1  1	
14 35 31 46 28 5 57 44	0 1 0 1 0 0 1 1	0 0 1 0 1 0 1 0	
53 62--2--17--49--42--26--9	1 1--0-0--1-1--0-0	1 1--0-1--1-0--1-0	
59 18   22 61 29 10 20 41	1 0  0 1 0 0 0 1	1 1  1 1 1 0 1 0	
24 45 55 36 4 43  47 6	0 1 1 1 0 1  1 0	1 0 1 0 0 0  0 0	
56--39-- --23--16--48--63--3 12	1-1 -0-0--1-1--0 0	1-0 -1-0--0-1--0 0	
21 8 60 37 19 34 30 51	0 0 1 1 0 1 0 1	1 0 1 0 1 0 1 1	
38   7 52 33	1  0 1 1	0  0 1 0	
15-----40-----11-----64	0--1--0--1	0--0--0--1	
3L 4L	5L 6L		
0---0---1---0 0---1---0---0	0---0---0---0 0---1---0---1		
1 1 1 1  1  1 1 0  0	1 0 0 0  1	1 0 1  0	
1 0 1 1 1 0 1 1  1 0 1 1 0 1 0 0	0 1 1 0 1 0 0 1  1 0 0 1 1 0 0 1	1 0 0 1 1 0 0 1	
0 1--0-0--0-1--1-1  1 1--0-0--0-0--0-0	0 0--0-0--0-0--0-0	0 1--1-0--0-1--1-0	
1 0  0 1 1 1 0 1  0 0  1 1 1 0 0 0	1 0  0 0 0 0 1 0  1 0  1 1 1 1 1 0	0 1  1 0 0 1 1 0	
0 1 0 0 0 1  1 0  1 1 1 0 0 0  1 1	1 0 1 1 1 1  1 0  1 0 0 1 1 0  0 1	1 0 0 1 1 0  0 1	
0-0 -0-1--1-1--0 1  1-1 -1-1--1-1--0 0	1-1 -1-1--1-1--1 1  1-0 -0-1--1-0--0 1	1-0 -0-1--1-0--0 1	
0 0 1 0 0 0 1 0 1 1 0 1 0 0 1 0	0 1 1 0 1 0 0 1 0 0 1 1 0 0 1 0	0 1 1 0 0 1 1 0	
0  0 0 0  1  1 0 0	0  1 1 0	1  0 1 0	
1---0---1---1 1---1---0---1	1---1---1---1 0---1---0---1	0---1---0---1	

1-----54-----25-----50	4# [D2i]	1L	2L
32 13 58  27	0 0 1  0	1 0 1  1	
14 35 31 46 28 5 57 44	0 1 0 1 0 0 1 1	0 0 1 0 1 0 1 0	
53 62--2--17--49--42--26--9	1 1--0-0--1-1--0-0	1 1--0-1--1-0--1-0	
59 18   22 61 29 10 20 41	1 0  0 1 0 0 0 1	1 1  1 1 1 0 1 0	
24 45 55 36 4 43  47 6	0 1 1 1 0 1  1 0	1 0 1 0 0 0  0 0	
56--39-- --23--16--48--63--3 12	1-1 -0-0--1-1--0 0	1-0 -1-0--0-1--0 0	
21 8 60 37 19 34 30 51	0 0 1 1 0 1 0 1	1 0 1 0 1 0 1 1	
38   7 52 33	1  0 1 1	0  0 1 0	
15-----40-----11-----64	0--1--0--1	0--0--0--1	
3L 4L	5L 6L		
0---0---1---0 0---1---0---0	0---0---0---0 0---1---0---1		
1 1 1 1  1  1 1 0  0	1 0 0 0  1	1 0 1  0	
1 0 1 1 1 0 1 1  1 0 1 1 0 1 0 0	0 1 1 0 1 0 0 1  1 0 0 1 1 0 0 1	1 0 0 1 1 0 0 1	
0 1--0-0--0-1--1-1  1 1--0-0--0-0--0-0	0 0--0-0--0-0--0-0	0 1--1-0--0-1--1-0	
1 0  0 1 1 1 0 1  0 0  1 1 1 0 0 0	1 0  0 0 0 0 1 0  1 0  1 1 1 1 1 0	0 1  1 0 0 1 1 0	
0 1 0 0 0 1  1 0  1 1 1 0 0 0  1 1	1 0 1 1 1 1  1 0  1 0 0 1 1 0  0 1	1 0 0 1 1 0  0 1	
0-0 -0-1--1-1--0 1  1-1 -1-1--1-1--0 0	1-1 -1-1--1-1--1 1  1-0 -0-1--1-0--0 1	1-0 -0-1--1-0--0 1	
0 0 1 0 0 0 1 0 1 1 0 1 0 0 1 0	0 1 1 0 1 0 0 1 0 0 1 1 0 0 1 0	0 1 1 0 0 1 1 0	
0  0 0 0  1  1 0 0	0  1 1 0	1  0 1 0	
1---0---1---1 1---1---0---1	1---1---1---1 0---1---0---1	0---1---0---1	

1-----62-----43-----24	24# [D2i]	1L	2L
26 55 32  17	0 1 0  0	1 1 1  1	
56 53 25 6 18 19 31 52	1 1 0 0 0 0 0 1	1 1 1 0 1 1 1 1	
61 50--2--7--23--36--44--37	1 1--0-0--0-1--1-1	1 1--0-0--1-0--0-0	
3L 4L	5L 6L		
0---0---1---0 0---1---0---0	0---1---1---0 0---1---0---1		
1 1 1 1  1  1 1 0  0	1 0 0 0  1	1 0 1  0	
1 0 1 1 1 0 1 1  1 0 1 1 0 1 0 0	0 1 1 0 1 0 0 1  1 0 0 1 1 0 0 1	1 0 0 1 1 0 0 1	
0 1--0-0--0-1--1-1  1 1--0-0--0-0--0-0	0 0--0-0--0-0--0-0	0 1--1-0--0-1--1-0	
1 0  0 1 1 1 0 1  0 0  1 1 1 0 0 0	1 0  0 0 0 0 1 0  1 0  1 1 1 1 1 0	0 1  1 0 0 1 1 0	
0 1 0 0 0 1  1 0  1 1 1 0 0 0  1 1	1 0 1 1 1 1  1 0  1 0 0 1 1 0  0 1	1 0 0 1 1 0  0 1	
0-0 -0-1--1-1--0 1  1-1 -1-1--1-1--0 0	1-1 -1-1--1-1--1 1  1-0 -0-1--1-0--0 1	1-0 -0-1--1-0--0 1	
0 0 1 0 0 0 1 0 1 1 0 1 0 0 1 0	0 1 1 0 1 0 0 1 0 0 1 1 0 0 1 0	0 1 1 0 0 1 1 0	
0  0 0 0  1  1 0 0	0  1 1 0	1  0 1 0	
1---0---1---1 1---1---0---1	1---1---1---1 0---1---0---1	0---1---0---1	

...

1-----62-----43-----24	24# [D2i]	1L	2L
26 55 32  17	0 1 0  0	1 1 1  1	
56 53 25 6 18 19 31 52	1 1 0 0 0 0 0 1	1 1 1 0 1 1 1 1	
61 50--2--7--23--36--44--37	1 1--0-0--0-1--1-1	1 1--0-0--1-0--0-0	
3L 4L	5L 6L		
0---0---1---0 0---1---0---0	0---1---1---0 0---1---0---1		
1 1 1 1  1  1 1 0  0	1 0 0 0  1	1 0 1  0	
1 0 1 1 1 0 1 1  1 0 1 1 0 1 0 0	0 1 1 0 1 0 0 1  1 0 0 1 1 0 0 1	1 0 0 1 1 0 0 1	
0 1--0-0--0-1--1-1  1 1--0-0--0-0--0-0	0 0--0-0--0-0--0-0	0 1--1-0--0-1--1-0	
1 0  0 1 1 1 0 1  0 0  1 1 1 0 0 0	1 0  0 0 0 0 1 0  1 0  1 1 1 1 1 0	0 1  1 0 0 1 1 0	
0 1 0 0 0 1  1 0  1 1 1 0 0 0  1 1	1 0 1 1 1 1  1 0  1 0 0 1 1 0  0 1	1 0 0 1 1 0  0 1	
0-0 -0-1--1-1--0 1  1-1 -1-1--1-1--0 0	1-1 -1-1--1-1--1 1  1-0 -0-1--1-0--0 1	1-0 -0-1--1-0--0 1	
0 0 1 0 0 0 1 0 1 1 0 1 0 0 1 0	0 1 1 0 1 0 0 1 0 0 1 1 0 0 1 0	0 1 1 0 0 1 1 0	
0  0 0 0  1  1 0 0	0  1 1 0	1  0 1 0	
1---0---1---1 1---1---0---1	1---1---1---1 0---1---0---1	0---1---0---1	

45	8		14	49	11	38	60	35		1	0		0	1	0	1	1	1		0	0		0	1	0	0	1	0			
	30	5	27	54	16	51		57	20		0	0		0	1	0	1		1	0		1	0		1	1	0	1		1	1
28	--21	--	--29	--42	----	58	--63	----	15	4		0	--0	--	--1	--1	--1	--0	0		1	--1	--	--1	--0	--1	--1	--0	0		
13	34	46	47	59	40	12	9																								
	48		33	10	39																										
	41	-----	22	-----	3	-----	64																								

Watch the Decomposed Layers of binary numbers above. You will see various patterns in any line such as {0, 0, 0, 1}, {0, 1, 1, 1}, or even {1, 1, 1, 1} beside {0, 0, 1, 1}. They are the reasons why these are classified as Non-Euler Type.

But the count 48 of Non-Euler solutions is quite small, about one percent of 4728.

I was really surprised that all of these Simultaneous MC444 were not always Complete Euler Cubes of order 4, and am now wondering why.

(Original written on Sep.22, 2003; Revised on Feb.22, 2005;  
 Newest Printing on Jul.25, 2010 by Kanji Setsuda with MacOSX & Xcode 3.1)

E-Mail Address: jag12001@nifty.com

```

/* Simultaneous Magic Cubes of Order 4: Both Pan-Diagonal and Self-Complementary */
/** Abstract List of Standard Solutions with n1=1 & n43=32~63 **/
/* 'MC444Sml.c' by Kanji Setsuda on Jan.15, 2005 with MacOSX & Xcode 1.5 */
/* Revised on Jul.22, 2010 with MacOSX & Xcode 3.1.2 */
/**/
#include <stdio.h>
/* Global Variables */
short int cnt, cnt1;
short cnt2, cnt3;
short CC, DD, LSM;
short nd1, nd2, nd3, nd4, nd5, nd6, nd7;
short nm[65], flg[65];
short nc[7];
short d[3][65];
short ctbl[33], dtbl[33];
short cn1[65], cn43[65];
/**/
/* Sub-Routines(Functions) */
short mktbl(void), ctyp(short x), dtyp(short x);
void tblprint(void);
void stp01(void), stp02(void), stp03(void), stp04(void);
void stp05(void), stp06(void), stp07(void), stp08(void);
void stp09(void), stp10(void), stp11(void), stp12(void);
void stp13(void), stp14(void), stp15(void), stp16(void);
void stp17(void), stp18(void), stp19(void), stp20(void);
void stp21(void), stp22(void);
void printans(void), ansprint(short x);
void prcn1(void), prcn43(void);
/**/
/* Main Program: */
/* Set n1=1 & n64=64 & n43 & n22=65-n43 */
int main(){
short m, n;
printf("\n** Simultaneous Magic Cubes of Order 4: Pan-Diagonal and Self-Complementary: **\n");

```

```

printf("** Abstract List of Standard Solutions with n1=1 & n43=32,48,56,60,62 and 63 **\n");
printf(" ** Presented by Kanji Setsuda on July 22, 2010 with MacOSX & Xcode 3.1.2 **\n");
nc[0]=32; nc[1]=48; nc[2]=56; nc[3]=60; nc[4]=62; nc[5]=63;
for(m=0;m<6;m++){
    for(n=0;n<65;n++){nm[n]=0;} /* Reset the Basic Positions */
    nm[1]=1; nm[43]=nc[m]; LSM=130; /* C1: Set n1 & n43 */
    CC=nm[1]+nm[43]; DD=LSM-CC; /* Set C & D */
    for(n=0;n<33;n++){ctbl[n]=0; dtbl[n]=0;} /* Reset the Tables */
    for(n=0;n<65;n++){flg[n]=0;} /* Reset the Flags */
    n=mktbl(); /* Make the CD-Tables */
    if(n>0){tblprint(); printf("No!\n"); return 0;} /* Error Return */
    /**/
    printf("\n [Solutions with n1=1 & n64=64 & n43=%2d]\n",nm[43]);
    for(n=0;n<65;n++){flg[n]=0;} /* Reset the Flags */
    nm[64]=65-nm[1]; nm[22]=65-nm[43];
    flg[nm[1]]=1; flg[nm[22]]=1; flg[nm[43]]=1; flg[nm[64]]=1;
    cnt=0; cnt3=0; /* Reset the Counter */
    stp01(); /* Begin the Search */
    flg[nm[64]]=0; flg[nm[43]]=0; flg[nm[22]]=0; flg[nm[1]]=0;
    if(cnt3>0){ansprint(cnt3);}
    printf(" [Count = %d]\n",cnt); /* Count Report */
}
printf("\n [Counts according to n1]\n");
prcn1();
printf("\n [Counts according to n43]\n");
prcn43();
printf(" [OK!]\n");
return 0;
}
/* Make the CD-Tables */
short mktbl(){
short a,b,n,m1,m2,ans;
m1=1; m2=1; ans=0;
for(n=1;n<33;n++){
    a=n; b=CC-a;
    if((a<b)&&(flg[a]==0)&&(flg[b]==0)){
        ctbl[m1]=a; ctbl[33-m1]=b;
        flg[a]=1; flg[b]=1; m1++;
        a=66-n; b=DD-a;
        do{a--; b++;}
        while((a==b)|| (flg[a]>0)|| (flg[b]>0));
        if(a>b){dtbl[m2]=a; dtbl[33-m2]=b;
            flg[a]=1; flg[b]=1; m2++;}}
    }
    if((ctbl[16]==0)|| (dtbl[16]==0)){ans=1;}
return ans;
}
/* Print the CD-Tables */
void tblprint(){
short n;
printf("C=%d: D=%d\n",CC,DD);
for(n=1;n<17;n++){
    printf("(%d,%d)",ctbl[n],ctbl[33-n]);
    printf("{%d,%d}\n",dtbl[n],dtbl[33-n]);
}
}
/* Is it C-Type? */
short ctyp(short x){
short n,ans;
ans=1;
if((1<x)&&(x<CC)){
    for(n=1;n<33;n++){if(x==ctbl[n]){ans=0; break;}}
}
return ans;
}

```

```

}
/* Is it D-Type? */
short dtyp(short x){
    short n,ans;
    ans=1;
    if((1<x)&&(x<65)){
        for(n=1;n<33;n++){if(x==dtbl[n]){ans=0; break;}}
    }
    return ans;
}
/*
C: (n1,n43),(n3,n41),(n6,n48),(n8,n46),(n9,n35),(n11,n33),(n14,n40),(n16,n38),
(n18,n60),(n20,n58),(n21,n63),(n23,n61),(n26,n52),(n28,n50),(n29,n55),(n31,n53)
D: (n2,n44),(n4,n42),(n5,n47),(n7,n45),(n10,n36),(n12,n34),(n13,n39),(n15,n37),
(n17,n59),(n19,n57),(n22,n64),(n24,n62),(n25,n51),(n27,n49),(n30,n56),(n32,n54)
*/
/* Begin the Search */
/* Set n4 & n42 & n61 & n23 */
void stp01(){
    short a,b,c,d;
    for(nd1=1;nd1<33;nd1++){
        a=dtbl[nd1]; b=DD-a; c=65-a; d=65-b;
        if((flg[a]==0)&&(flg[b]==0)&&(flg[c]==0)&&(flg[d]==0)){
            flg[a]=1; flg[b]=1; flg[c]=1; flg[d]=1;
            nm[4]=a; nm[42]=b; nm[61]=c; nm[23]=d; cnt2=0;
            stp02();
            flg[d]=0; flg[c]=0; flg[b]=0; flg[a]=0;}
    }
}
/* Set n13(<n4) & n39 & n52 & n26 */
void stp02(){
    short a,b,c,d;
    for(nd2=nd1+1;nd2<33;nd2++){
        a=dtbl[nd2]; b=DD-a; c=65-a; d=65-b;
        if((flg[a]==0)&&(flg[b]==0)&&(flg[c]==0)&&(flg[d]==0)){
            flg[a]=1; flg[b]=1; flg[c]=1; flg[d]=1;
            nm[13]=a; nm[39]=b; nm[52]=c; nm[26]=d;
            stp03();
            flg[d]=0; flg[c]=0; flg[b]=0; flg[a]=0;}
    }
}
/* Set n49(<n13) & n27 & n16 & n38 */
void stp03(){
    short a,b,c,d;
    for(nd3=nd2+1;nd3<33;nd3++){
        a=dtbl[nd3]; b=DD-a; c=65-a; d=65-b;
        if((flg[a]==0)&&(flg[b]==0)&&(flg[c]==0)&&(flg[d]==0)){
            flg[a]=1; flg[b]=1; flg[c]=1; flg[d]=1;
            nm[49]=a; nm[27]=b; nm[16]=c; nm[38]=d;
            stp04();
            flg[d]=0; flg[c]=0; flg[b]=0; flg[a]=0;}
    }
}
/* Search Level 1: */
/* Set n2 & n44 & n63 & n21 */
void stp04(){
    short a,b,c,d;
    for(nd4=1;nd4<33;nd4++){
        a=dtbl[nd4]; b=DD-a; c=65-a; d=65-b;
        if((flg[a]==0)&&(flg[b]==0)&&(flg[c]==0)&&(flg[d]==0)){
            flg[a]=1; flg[b]=1; flg[c]=1; flg[d]=1;
            nm[2]=a; nm[44]=b; nm[63]=c; nm[21]=d;
            stp05();
            flg[d]=0; flg[c]=0; flg[b]=0; flg[a]=0;}
    }
}

```

```

}
}
/* Set n3=130-n1-n2-n4 & n41 & n62 & n24 */
void stp05(){
short a,b,c,d;
a=LSM-nm[1]-nm[2]-nm[4];
if(ctyp(a)==0){b=CC-a; c=65-a; d=65-b;
if((flg[a]==0)&&(flg[b]==0)&&(flg[c]==0)&&(flg[d]==0)){
flg[a]=1; flg[b]=1; flg[c]=1; flg[d]=1;
nm[3]=a; nm[41]=b; nm[62]=c; nm[24]=d;
stp06();
flg[d]=0; flg[c]=0; flg[b]=0; flg[a]=0;}}
}
/* Set n5 & n47 & n60 & n18 */
void stp06(){
short a,b,c,d;
for(nd5=1;nd5<33;nd5++){
a=dtbl[nd5]; b=DD-a; c=65-a; d=65-b;
if((flg[a]==0)&&(flg[b]==0)&&(flg[c]==0)&&(flg[d]==0)){
flg[a]=1; flg[b]=1; flg[c]=1; flg[d]=1;
nm[5]=a; nm[47]=b; nm[60]=c; nm[18]=d;
stp07();
flg[d]=0; flg[c]=0; flg[b]=0; flg[a]=0;}}
}
}
/* Set n9=130-n1-n5-n13 & n35 & n56 & n30 */
void stp07(){
short a,b,c,d;
a=LSM-nm[1]-nm[5]-nm[13];
if(ctyp(a)==0){b=CC-a; c=65-a; d=65-b;
if((flg[a]==0)&&(flg[b]==0)&&(flg[c]==0)&&(flg[d]==0)){
flg[a]=1; flg[b]=1; flg[c]=1; flg[d]=1;
nm[9]=a; nm[35]=b; nm[56]=c; nm[30]=d;
stp08();
flg[d]=0; flg[c]=0; flg[b]=0; flg[a]=0;}}
}
}
/* Set n17 & n59 & n48 & n6 */
void stp08(){
short a,b,c,d;
for(nd6=1;nd6<33;nd6++){
a=dtbl[nd6]; b=DD-a; c=65-a; d=65-b;
if((flg[a]==0)&&(flg[b]==0)&&(flg[c]==0)&&(flg[d]==0)){
flg[a]=1; flg[b]=1; flg[c]=1; flg[d]=1;
nm[17]=a; nm[59]=b; nm[48]=c; nm[6]=d;
stp09();
flg[d]=0; flg[c]=0; flg[b]=0; flg[a]=0;}}
}
}
/* Set n33=130-n1-n17-n49 & n11 & n32 & n54 */
void stp09(){
short a,b,c,d;
a=LSM-nm[1]-nm[17]-nm[49];
if(ctyp(a)==0){b=CC-a; c=65-a; d=65-b;
if((flg[a]==0)&&(flg[b]==0)&&(flg[c]==0)&&(flg[d]==0)){
flg[a]=1; flg[b]=1; flg[c]=1; flg[d]=1;
nm[33]=a; nm[11]=b; nm[32]=c; nm[54]=d;
stp10();
flg[d]=0; flg[c]=0; flg[b]=0; flg[a]=0;}}
}
}
/* Search Level 2: */
/* Set n8 & n46 & n57 & n19 */
void stp10(){
short a,b,c,d;
for(nd7=1;nd7<33;nd7++){

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a=ctbl[nd7]; b=CC-a; c=65-a; d=65-b;
if((flg[a]==0)&&(flg[b]==0)&&(flg[c]==0)&&(flg[d]==0)){
    flg[a]=1; flg[b]=1; flg[c]=1; flg[d]=1;
    nm[8]=a; nm[46]=b; nm[57]=c; nm[19]=d;
    stp11();
    flg[d]=0; flg[c]=0; flg[b]=0; flg[a]=0;}
}
}
/* Set n7=130-n5-n6-n8 & n45 & n58 & n20 */
void stp11(){
    short a,b,c,d;
    a=LSM-nm[5]-nm[6]-nm[8];
    if(dtyp(a)==0){b=DD-a; c=65-a; d=65-b;
        if((flg[a]==0)&&(flg[b]==0)&&(flg[c]==0)&&(flg[d]==0)){
            flg[a]=1; flg[b]=1; flg[c]=1; flg[d]=1;
            nm[7]=a; nm[45]=b; nm[58]=c; nm[20]=d;
            stp12();
            flg[d]=0; flg[c]=0; flg[b]=0; flg[a]=0;}}
}
/* Set n12=130-n4-n8-n16 & n34 & n53 & n31 */
void stp12(){
    short a,b,c,d;
    a=LSM-nm[4]-nm[8]-nm[16];
    if(dtyp(a)==0){b=DD-a; c=65-a; d=65-b;
        if((flg[a]==0)&&(flg[b]==0)&&(flg[c]==0)&&(flg[d]==0)){
            flg[a]=1; flg[b]=1; flg[c]=1; flg[d]=1;
            nm[12]=a; nm[34]=b; nm[53]=c; nm[31]=d;
            stp13();
            flg[d]=0; flg[c]=0; flg[b]=0; flg[a]=0;}}
}
/* Set n10=130-n9-n11-n12 & n36 & n55 & n29 */
void stp13(){
    short a,b,c,d;
    a=LSM-nm[9]-nm[11]-nm[12];
    if(dtyp(a)==0){b=DD-a; c=65-a; d=65-b;
        if((flg[a]==0)&&(flg[b]==0)&&(flg[c]==0)&&(flg[d]==0)){
            flg[a]=1; flg[b]=1; flg[c]=1; flg[d]=1;
            nm[10]=a; nm[36]=b; nm[55]=c; nm[29]=d;
            stp14();
            flg[d]=0; flg[c]=0; flg[b]=0; flg[a]=0;}}
}
/* Check (n4+n20+n36+n52=130) */
void stp14(){
    if(nm[4]+nm[20]+nm[36]+nm[52]==LSM){stp15();}
}
/* Set n14=130-n2-n6-n10 & n40 & n51 & n25 */
void stp15(){
    short a,b,c,d;
    a=LSM-nm[2]-nm[6]-nm[10];
    if(ctyp(a)==0){b=CC-a; c=65-a; d=65-b;
        if((flg[a]==0)&&(flg[b]==0)&&(flg[c]==0)&&(flg[d]==0)){
            flg[a]=1; flg[b]=1; flg[c]=1; flg[d]=1;
            nm[14]=a; nm[40]=b; nm[51]=c; nm[25]=d;
            stp16();
            flg[d]=0; flg[c]=0; flg[b]=0; flg[a]=0;}}
}
/* Check (n14+n30+n46+n62=130) */
void stp16(){
    if(nm[14]+nm[30]+nm[46]+nm[62]==LSM){stp17();}
}
/* Set n15=130-n13-n14-n16 & n37 & n50 & n28 */
void stp17(){
    short a,b,c,d;
    a=LSM-nm[13]-nm[14]-nm[16];

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b=LSM-nm[3]-nm[7]-nm[11];
if((a==b)&&(dtyp(a)==0)){b=DD-a; c=65-a; d=65-b;
    if((f1g[a]==0)&&(f1g[b]==0)&&(f1g[c]==0)&&(f1g[d]==0)){
        f1g[a]=1; f1g[b]=1; f1g[c]=1; f1g[d]=1;
        nm[15]=a; nm[37]=b; nm[50]=c; nm[28]=d;
        stp18C);
        f1g[d]=0; f1g[c]=0; f1g[b]=0; f1g[a]=0;}}
}
/* Check (n15+n31+n47+n63=130) */
void stp18C){
    if(nm[15]+nm[31]+nm[47]+nm[63]==LSM){stp19C);}
}
/* Pandiagonal Checks 1 */
void stp19C){
    short sm1, sm2, sm3;
    sm1=nm[1]+nm[24]+nm[43]+nm[62];
    sm2=nm[1]+nm[30]+nm[43]+nm[56];
    sm3=nm[1]+nm[32]+nm[43]+nm[54];
    if((sm1==LSM)&&(sm2==LSM)&&(sm3==LSM)){stp20C);}
}
/* Pandiagonal Checks 2 */
void stp20C){
    short sm1, sm2, sm3;
    sm1=nm[2]+nm[23]+nm[44]+nm[61];
    sm2=nm[2]+nm[31]+nm[44]+nm[53];
    sm3=nm[2]+nm[29]+nm[44]+nm[55];
    if((sm1==LSM)&&(sm2==LSM)&&(sm3==LSM)){stp21C);}
}
/* Pandiagonal Checks 3 */
void stp21C){
    short sm1, sm2, sm3;
    sm1=nm[3]+nm[22]+nm[41]+nm[64];
    sm2=nm[3]+nm[32]+nm[41]+nm[54];
    sm3=nm[3]+nm[30]+nm[41]+nm[56];
    if((sm1==LSM)&&(sm2==LSM)&&(sm3==LSM)){stp22C);}
}
/* Pandiagonal Checks 4 */
void stp22C){
    short sm1, sm2, sm3;
    sm1=nm[4]+nm[21]+nm[42]+nm[63];
    sm2=nm[4]+nm[29]+nm[42]+nm[55];
    sm3=nm[4]+nm[31]+nm[42]+nm[53];
    if((sm1==LSM)&&(sm2==LSM)&&(sm3==LSM)){printansC);}
}
/**/
/* Print the Result */
void printansC){
    short n;
    cnt++; cnt2++;
    cn1[nm[1]]++; cn43[nm[43]]++;
    if(cnt2==1){d[cnt3][0]=cnt;
        for(n=1; n<65; n++){d[cnt3][n]=nm[n];}
        cnt3++; if(cnt3==2){ansprint(cnt3); cnt3=0;}
    }
}
/**/
/* Print the Result */
void ansprint(short x){
    printf("%4d/", d[0][0]);
    if(x>1){printf("%41d/\n", d[1][0]);}
    else{printf("\n");}
    printf("%4d-----%2d-----%2d-----%2d", d[0][1], d[0][17], d[0][33], d[0][49]);
    if(x>1){printf("%12d-----%2d-----%2d-----%2d\n",
        d[1][1], d[1][17], d[1][33], d[1][49]);}
}

```



```

    else{printf("\n");}
printf("    %2d %9d %9d          %2d",d[0][2],d[0][18],d[0][34],d[0][50]);
if(x>1){printf("          %2d %9d %9d          %2d\n",d[1][2],d[1][18],d[1][34],d[1][50]);}
    else{printf("\n");}
printf("%4d %3d %5d %3d %5d %3d %5d %3d",
    d[0][5],d[0][3],d[0][21],d[0][19],d[0][37],d[0][35],d[0][53],d[0][51]);
if(x>1){printf("%8d %3d %5d %3d %5d %3d %5d %3d\n",
    d[1][5],d[1][3],d[1][21],d[1][19],d[1][37],d[1][35],d[1][53],d[1][51]);}
    else{printf("\n");}
printf("    %2d %3d---%2d--%2d---%2d--%2d---%2d--%2d",
    d[0][6],d[0][4],d[0][22],d[0][20],d[0][38],d[0][36],d[0][54],d[0][52]);
if(x>1){printf("          %2d %3d---%2d--%2d---%2d--%2d---%2d--%2d\n",
    d[1][6],d[1][4],d[1][22],d[1][20],d[1][38],d[1][36],d[1][54],d[1][52]);}
    else{printf("\n");}
printf("%4d %3d %4d %3d %5d %3d %5d %3d |",
    d[0][9],d[0][7],d[0][25],d[0][23],d[0][41],d[0][39],d[0][57],d[0][55]);
if(x>1){printf("%6d %3d %4d %3d %5d %3d %5d %3d | \n",
    d[1][9],d[1][7],d[1][25],d[1][23],d[1][41],d[1][39],d[1][57],d[1][55]);}
    else{printf("\n");}
printf("    %2d %3d %5d %3d %5d %3d    %2d %3d",
    d[0][10],d[0][8],d[0][26],d[0][24],d[0][42],d[0][40],d[0][58],d[0][56]);
if(x>1){printf("          %2d %3d %5d %3d %5d %3d    %2d %3d\n",
    d[1][10],d[1][8],d[1][26],d[1][24],d[1][42],d[1][40],d[1][58],d[1][56]);}
    else{printf("\n");}
printf("%4d--%2d-|-%2d--%2d---%2d--%2d---%2d %3d |",
    d[0][13],d[0][11],d[0][29],d[0][27],d[0][45],d[0][43],d[0][61],d[0][59]);
if(x>1){printf("%6d--%2d-|-%2d--%2d---%2d--%2d---%2d %3d | \n",
    d[1][13],d[1][11],d[1][29],d[1][27],d[1][45],d[1][43],d[1][61],d[1][59]);}
    else{printf("\n");}
printf("    %4d %3d %5d %3d %5d %3d %5d %3d",
    d[0][14],d[0][12],d[0][30],d[0][28],d[0][46],d[0][44],d[0][62],d[0][60]);
if(x>1){printf("%8d %3d %5d %3d %5d %3d %5d %3d\n",
    d[1][14],d[1][12],d[1][30],d[1][28],d[1][46],d[1][44],d[1][62],d[1][60]);}
    else{printf("\n");}
printf("    %4d %8d %9d %9d |",d[0][15],d[0][31],d[0][47],d[0][63]);
if(x>1){printf("%10d %8d %9d %9d | \n",d[1][15],d[1][31],d[1][47],d[1][63]);}
    else{printf("\n");}
printf("    %4d-----%2d-----%2d-----%2d",d[0][16],d[0][32],d[0][48],d[0][64]);
if(x>1){printf("%12d-----%2d-----%2d-----%2d\n",
    d[1][16],d[1][32],d[1][48],d[1][64]);}
    else{printf("\n");}
}
/**/
/* Print the Counts according to n1 */
void prcn1(){
short d,n;
for(n=1;n<36;n++){d=cn1[n];
if(d>0){printf("%4d:%5d,",n,d);}
else{printf("%4d: . . . .",n);}
if(n%7==0){printf("\n");}
}
}
/**/
/* Print the Counts according to n43 */
void prcn43(){
short d,n;
for(n=1;n<65;n++){d=cn43[n];
if(d>0){printf("%4d:%4d,",n,d);}
else{printf("%4d: . . . .",n);}
if(n%8==0){printf("\n");}
}
}
/**/

```