

Part 3: New Algebraic Study of Magic Squares: Kanji Setsuda
Chapter 9: Fundamental Study of Composite Magic Squares:
Section 5: 'Diamond Composite' Pan-diagonal Squares of Order 6

#0. Study about Another type of 'Composite' Pan-diagonal Squares of Order 6

In this section I like to introduce you another type of 'Composite' Pan-diagonal Squares of Order 6. You may think its concept is somewhat similar to the ordinary 'Composite' type. Let me explain them in such a comparative style as below.

#1. Definitions of both types of 'Composite' Pandiagonal Squares of order 6

**** Constant Sum of Ordinary 'Composite' Combinations of 4 Numbers: S=74 ****

$n1+n2+n7+n8=S \dots (1)$	$n13+n14+n19+n20=S \dots (13)$	$n25+n26+n31+n32=S \dots (25)$
$n2+n3+n8+n9=S \dots (2)$	$n14+n15+n20+n21=S \dots (14)$	$n26+n27+n32+n33=S \dots (26)$
$n3+n4+n9+n10=S \dots (3)$	$n15+n16+n21+n22=S \dots (15)$	$n27+n28+n33+n34=S \dots (27)$
$n4+n5+n10+n11=S \dots (4)$	$n16+n17+n22+n23=S \dots (16)$	$n28+n29+n34+n35=S \dots (28)$
$n5+n6+n11+n12=S \dots (5)$	$n17+n18+n23+n24=S \dots (17)$	$n29+n30+n35+n36=S \dots (29)$
$n6+n1+n12+n7=S \dots (6)$	$n18+n13+n24+n19=S \dots (18)$	$n30+n25+n36+n31=S \dots (30)$
$n7+n8+n13+n14=S \dots (7)$	$n19+n20+n25+n26=S \dots (19)$	$n31+n32+n1+n2=S \dots (31)$
$n8+n9+n14+n15=S \dots (8)$	$n20+n21+n26+n27=S \dots (20)$	$n32+n33+n2+n3=S \dots (32)$
$n9+n10+n15+n16=S \dots (9)$	$n21+n22+n27+n28=S \dots (21)$	$n33+n34+n3+n4=S \dots (33)$
$n10+n11+n16+n17=S \dots (10)$	$n22+n23+n28+n29=S \dots (22)$	$n34+n35+n4+n5=S \dots (34)$
$n11+n12+n17+n18=S \dots (11)$	$n23+n24+n29+n30=S \dots (23)$	$n35+n36+n5+n6=S \dots (35)$
$n12+n7+n18+n13=S \dots (12)$	$n24+n19+n30+n25=S \dots (24)$	$n36+n31+n6+n1=S \dots (36)$

**** Basic Forms for 'Composite' and for 'Diamond Composite' type ****

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**** Constant Sum of 'Diamond Composite' Combinations of 4 Numbers: D=?? ****

$n1+n8+n12+n13=D \dots (d1)$	$n2+n9+n7+n14=D \dots (d2)$	$n3+n10+n8+n15=D \dots (d3)$
$n4+n11+n9+n16=D \dots (d4)$	$n5+n12+n10+n17=D \dots (d5)$	$n6+n7+n11+n18=D \dots (d6)$
$n7+n14+n18+n19=D \dots (d7)$	$n8+n15+n13+n20=D \dots (d8)$	$n9+n16+n14+n21=D \dots (d9)$
$n10+n17+n15+n22=D \dots (d10)$	$n11+n18+n16+n23=D \dots (d11)$	$n12+n13+n17+n24=D \dots (d12)$
$n13+n20+n24+n25=D \dots (d13)$	$n14+n21+n19+n26=D \dots (d14)$	$n15+n22+n20+n27=D \dots (d15)$
$n16+n23+n21+n28=D \dots (d16)$	$n17+n24+n22+n29=D \dots (d17)$	$n18+n19+n23+n30=D \dots (d18)$
$n19+n26+n30+n31=D \dots (d19)$	$n20+n27+n25+n32=D \dots (d20)$	$n21+n28+n26+n33=D \dots (d21)$
$n22+n29+n27+n34=D \dots (d22)$	$n23+n30+n28+n35=D \dots (d23)$	$n24+n25+n29+n36=D \dots (d24)$
$n25+n32+n36+n1=D \dots (d25)$	$n26+n33+n31+n2=D \dots (d26)$	$n27+n34+n32+n3=D \dots (d27)$
$n28+n35+n33+n4=D \dots (d28)$	$n29+n36+n34+n5=D \dots (d29)$	$n30+n31+n35+n6=D \dots (d30)$
$n31+n2+n6+n7=D \dots (d31)$	$n32+n3+n1+n8=D \dots (d32)$	$n33+n4+n2+n9=D \dots (d33)$
$n34+n5+n3+n10=D \dots (d34)$	$n35+n6+n4+n11=D \dots (d35)$	$n36+n1+n5+n12=D \dots (d36)$

Every 2x2 numbers of our ordinary Composite Combinations are necessarily placed adjacent to each other on the 'net' made of rows and columns, while every 2x2 numbers of 'Diamond Composite Combinations' have to be placed adjacent to each other on the pandiagonal net. They can only be placed on every other adjacent pandiagonals, because the 'nets' are connected only with every other pandiagonals.

Net connections are made inclined of 45 degrees to the ordinary Composite type, and two kinds of independent 'net' structures are always made in a square.

Simultaneous equations must be defined as many as 36 at first for the 'Diamond Composite Conditions', whose style is also similar to that of ordinary type.

Could we build any kind of 'standard' magic square under these definitions?

Let's find and check precisely whether this kind is possible or not, shall we?

#2. Examination of the 'Amela Square'

To tell the truth, I had no experience of building that type and no idea about that, either, before I accepted a male from Mr. Miguel A. Amela in La Pampa, Argentine in the end of 2009. He sent me a nice report about this kind of 'Diamond Composite' Pandiagonal Square of order 6 with a sheet of sample demonstration.

I was really inspired by this sample solution and began to study about this type.

**** Results of Various Examinations of the 'Amela Square' of Order 6 ****

1	33	21	14	34	9	=112	<p>No Repetition of Any Number! No Row-sums are equal to Magic Constant! But 2 types of Row-sums add up to 222 = 111 x 2! 6 Column-sums are equal to Magic Constant! 2 Primary diagonals add up to Magic Constant!</p>
22	35	8	13	25	7	=110	
31	11	5	27	20	18	=112	
23	3	28	36	4	16	=110	
24	12	30	15	2	29	=112	
10	17	19	6	26	32	=110	

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Sum List of each Complementary Pair for 'Self-Complementary' Conditions:

$n1+n36 = 1+32 = 33$; $n2+n35 = 33+26 = 59$; $n3+n34 = 21+6 = 27$;
 $n4+n33 = 14+19 = 33$; $n5+n32 = 34+17 = 51$; $n6+n31 = 9+10 = 19$;
 $n7+n30 = 22+29 = 51$; $n8+n29 = 35+2 = 37$; $n9+n28 = 8+15 = 23$;
 $n10+n27 = 13+30 = 43$; $n11+n26 = 25+12 = 37$; $n12+n25 = 7+24 = 31$;
 $n13+n24 = 31+16 = 47$; $n14+n23 = 11+4 = 15$; $n15+n22 = 5+36 = 41$;
 $n16+n21 = 27+28 = 55$; $n17+n20 = 20+3 = 23$; $n18+n19 = 18+23 = 41$;

Sum List of each Complementary Pair for 'Complete' Conditions:

$n1+n22 = 1+36 = 37$; $n2+n23 = 33+4 = 37$; $n3+n24 = 21+16 = 37$;
 $n4+n19 = 14+23 = 37$; $n5+n20 = 34+3 = 37$; $n6+n21 = 9+28 = 37$;
 $n7+n28 = 22+15 = 37$; $n8+n29 = 35+2 = 37$; $n9+n30 = 8+29 = 37$;
 $n10+n25 = 13+24 = 37$; $n11+n26 = 25+12 = 37$; $n12+n27 = 7+30 = 37$;
 $n13+n34 = 31+6 = 37$; $n14+n35 = 11+26 = 37$; $n15+n36 = 5+32 = 37$;
 $n16+n31 = 27+10 = 37$; $n17+n32 = 20+17 = 37$; $n18+n33 = 18+19 = 37$;

This is certainly a 'Complete' type!

Sum List of each Pandiagonal:

$n1+n8+n15+n22+n29+n36 = 1+35+5+36+2+32 = 111$
 $n1+n12+n17+n22+n27+n32 = 1+7+20+36+30+17 = 111$
 $n2+n9+n16+n23+n30+n31 = 33+8+27+4+29+10 = 111$
 $n2+n7+n18+n23+n28+n33 = 33+22+18+4+15+19 = 111$
 $n3+n10+n17+n24+n25+n32 = 21+13+20+16+24+17 = 111$
 $n3+n8+n13+n24+n29+n34 = 21+35+31+16+2+6 = 111$
 $n4+n11+n18+n19+n26+n33 = 14+25+18+23+12+19 = 111$
 $n4+n9+n14+n19+n30+n35 = 14+8+11+23+29+26 = 111$
 $n5+n12+n13+n20+n27+n34 = 34+7+31+3+30+6 = 111$

$$\begin{aligned} n5+n10+n15+n20+n25+n36 &= 34+13+5+3+24+32 = 111 \\ n6+n7+n14+n21+n28+n35 &= 9+22+11+28+15+26 = 111 \\ n6+n11+n16+n21+n26+n31 &= 9+25+27+28+12+10 = 111 \end{aligned}$$

This is certainly a 'Complete' type of Pandiagonal Square of Order 6.

**** The Basic Form and a Real Magic Square of Order 6 ****

34	35	36	31	32	33	34	35	36	31	32	33	6	26	32	10	17	19	6	26	32	10	17	19
4	5	6	1	2	3	4	5	6	1	2	3	14	34	9	1	33	21	14	34	9	1	33	21
10	11	12	7	8	9	10	11	12	7	8	9	13	25	7	22	35	8	13	25	7	22	35	8
16	17	18	13	14	15	16	17	18	13	14	15	27	20	18	31	11	5	27	20	18	31	11	5
22	23	24	19	20	21	22	23	24	19	20	21	36	4	16	23	3	28	36	4	16	23	3	28
28	29	30	25	26	27	28	29	30	25	26	27	15	2	29	24	12	30	15	2	29	24	12	30
34	35	36	31	32	33	34	35	36	31	32	33	6	26	32	10	17	19	6	26	32	10	17	19
4	5	6	1	2	3	4	5	6	1	2	3	14	34	9	1	33	21	14	34	9	1	33	21

Sum List of Each Composite Combination of 4 Numbers:

$n1+n2+n7+n8 = 1+33+22+35 = 91;$	$n2+n3+n8+n9 = 33+21+35+8 = 97;$
$n3+n4+n9+n10 = 21+14+8+13 = 56;$	$n4+n5+n10+n11 = 14+34+13+25 = 86;$
$n5+n6+n11+n12 = 34+9+25+7 = 75;$	$n6+n1+n12+n7 = 9+1+7+22 = 39;$
$n7+n8+n13+n14 = 22+35+31+11 = 99;$	$n8+n9+n14+n15 = 35+8+11+5 = 59;$
$n9+n10+n15+n16 = 8+13+5+27 = 53;$	$n10+n11+n16+n17 = 13+25+27+20 = 85;$
$n11+n12+n17+n18 = 25+7+20+18 = 70;$	$n12+n7+n18+n13 = 7+22+18+31 = 78;$
$n13+n14+n19+n20 = 31+11+23+3 = 68;$	$n14+n15+n20+n21 = 11+5+3+28 = 47;$
$n15+n16+n21+n22 = 5+27+28+36 = 96;$	$n16+n17+n22+n23 = 27+20+36+4 = 87;$
$n17+n18+n23+n24 = 20+18+4+16 = 58;$	$n18+n13+n24+n19 = 18+31+16+23 = 88;$
$n19+n20+n25+n26 = 23+3+24+12 = 62;$...
$n25+n26+n31+n32 = 24+12+10+17 = 63;$...
$n31+n32+n1+n2 = 10+17+1+33 = 61;$...

Sum List of Each Diamond Composite Combination of 4 Numbers:

$n1+n8+n12+n13 = 1+35+7+31 = 74;$	$n2+n9+n7+n14 = 33+8+22+11 = 74$
$n3+n10+n8+n15 = 21+13+35+5 = 74;$	$n4+n11+n9+n16 = 14+25+8+27 = 74;$
$n5+n12+n10+n17 = 34+7+13+20 = 74;$	$n6+n7+n11+n18 = 9+22+25+18 = 74;$
$n7+n14+n18+n19 = 22+11+18+23 = 74;$	$n8+n15+n13+n20 = 35+5+31+3 = 74;$
$n9+n16+n14+n21 = 8+27+11+28 = 74;$	$n10+n17+n15+n22 = 13+20+5+36 = 74;$
$n11+n18+n16+n23 = 25+18+27+4 = 74;$	$n12+n13+n17+n24 = 7+31+20+16 = 74;$
$n13+n20+n24+n25 = 31+3+16+24 = 74;$	$n14+n21+n19+n26 = 11+28+23+12 = 74;$
$n15+n22+n20+n27 = 5+36+3+30 = 74;$	$n16+n23+n21+n28 = 27+4+28+15 = 74;$
$n17+n24+n22+n29 = 20+16+36+2 = 74;$	$n18+n19+n23+n30 = 18+23+4+29 = 74;$
$n19+n26+n30+n31 = 23+12+29+10 = 74;$...
$n25+n32+n36+n1 = 24+17+32+1 = 74;$...
$n31+n2+n6+n7 = 10+33+9+22 = 74;$...

This is certainly a 'Diamond Composite' type of Pandiagonal Square of Order 6!

Decompositions by 6th Increment:

0	5	3	2	5	1	0	2	2	1	3	2
3	5	1	2	4	1	3	4	1	0	0	0
5	1	0	4	3	2	0	4	4	2	1	5
3	0	4	5	0	2	4	2	3	5	3	3
3	1	4	2	0	4	5	5	5	2	1	4
1	2	3	0	4	5	3	4	0	5	1	1

This 'Amela Square' of order 6 proves to be certainly one of the 'Complete' type of Pandiagonal Squares, though it is lack of equal row-sums to the magic constant.

We do not usually accept it as a magic square, but you may feel it is still too good to be thrown away. As I know we can neither make any Self-complementary magic square nor any Pan-diagonal one for the order 6, I could not help accepting it as a beautiful 'Semi-magic' Square. Don't you think it is natural for me to take it?

Do you remember every ordinary Composite magic squares are lack of equal pan-diagonal sums to the magic constant, while all rows and columns add up equally?

These characteristic properties are really opposite and showing contrast between them, aren't they? If we take up an ordinary Composite Semi-panmagic Square for our object to study, I say, we should also take up another type, 'Diamond Composite' Pan-diagonal Semi-magic Square for the topic of our sincere study.

#3. Algebraic study of 'Diamond Composite & Complete' Pandiagonal Squares

Add both sides of these 36 equations listed below at first.

**** Constant Sum of 'Diamond Composite' Combinations of 4 Numbers: D=?? ****

$n_1+n_8+n_{12}+n_{13}=D \dots (d_1) \mid n_2+n_9+n_7+n_{14}=D \dots (d_2) \mid n_3+n_{10}+n_8+n_{15}=D \dots (d_3)$
 $n_4+n_{11}+n_9+n_{16}=D \dots (d_4) \mid n_5+n_{12}+n_{10}+n_{17}=D \dots (d_5) \mid n_6+n_7+n_{11}+n_{18}=D \dots (d_6)$
 $n_7+n_{14}+n_{18}+n_{19}=D \dots (d_7) \mid n_8+n_{15}+n_{13}+n_{20}=D \dots (d_8) \mid n_9+n_{16}+n_{14}+n_{21}=D \dots (d_9)$
 $n_{10}+n_{17}+n_{15}+n_{22}=D \dots (d_{10}) \mid n_{11}+n_{18}+n_{16}+n_{23}=D \dots (d_{11}) \mid n_{12}+n_{13}+n_{17}+n_{24}=D \dots (d_{12})$
 $n_{13}+n_{20}+n_{24}+n_{25}=D \dots (d_{13}) \mid n_{14}+n_{21}+n_{19}+n_{26}=D \dots (d_{14}) \mid n_{15}+n_{22}+n_{20}+n_{27}=D \dots (d_{15})$
 $n_{16}+n_{23}+n_{21}+n_{28}=D \dots (d_{16}) \mid n_{17}+n_{24}+n_{22}+n_{29}=D \dots (d_{17}) \mid n_{18}+n_{19}+n_{23}+n_{30}=D \dots (d_{18})$
 $n_{19}+n_{26}+n_{30}+n_{31}=D \dots (d_{19}) \mid n_{20}+n_{27}+n_{25}+n_{32}=D \dots (d_{20}) \mid n_{21}+n_{28}+n_{26}+n_{33}=D \dots (d_{21})$
 $n_{22}+n_{29}+n_{27}+n_{34}=D \dots (d_{22}) \mid n_{23}+n_{30}+n_{28}+n_{35}=D \dots (d_{23}) \mid n_{24}+n_{25}+n_{29}+n_{36}=D \dots (d_{24})$
 $n_{25}+n_{32}+n_{36}+n_1=D \dots (d_{25}) \mid n_{26}+n_{33}+n_{31}+n_2=D \dots (d_{26}) \mid n_{27}+n_{34}+n_{32}+n_3=D \dots (d_{27})$
 $n_{28}+n_{35}+n_{33}+n_4=D \dots (d_{28}) \mid n_{29}+n_{36}+n_{34}+n_5=D \dots (d_{29}) \mid n_{30}+n_{31}+n_{35}+n_6=D \dots (d_{30})$
 $n_{31}+n_2+n_6+n_7=D \dots (d_{31}) \mid n_{32}+n_3+n_1+n_8=D \dots (d_{32}) \mid n_{33}+n_4+n_2+n_9=D \dots (d_{33})$
 $n_{34}+n_5+n_3+n_{10}=D \dots (d_{34}) \mid n_{35}+n_6+n_4+n_{11}=D \dots (d_{35}) \mid n_{36}+n_1+n_5+n_{12}=D \dots (d_{36})$

$$4*(n_1+n_2+n_3+n_4+\dots+n_{34}+n_{35}+n_{36}) = 36*D$$

$$n_1+n_2+n_3+n_4+\dots+n_{34}+n_{35}+n_{36} = 9*D$$

Each of natural numbers {1, 2, 3, 4, ..., 35, 36} is put in the left side.

$$1+2+3+4+5+6+\dots+33+34+35+36 = 9*D$$

$$(1+36)*36/2 = 9*D$$

Solve this equation: $D = 74$ (Constant Sum)

Let's find any complementary pairs whose sums are equal.

$n_1+n_8+n_{12}+n_{13}=D \dots (d_1); n_{12}+n_{13}+n_{17}+n_{24}=D \dots (d_{12}); \rightarrow n_1+n_8=n_{17}+n_{24}$
 $n_{15}+n_{22}+n_{20}+n_{27}=D \dots (d_{15}); n_{20}+n_{27}+n_{25}+n_{32}=D \dots (d_{20}); \rightarrow n_{15}+n_{22}=n_{25}+n_{32}$
 $n_{29}+n_{36}+n_{34}+n_5=D \dots (d_{29}); n_{34}+n_5+n_3+n_{10}=D \dots (d_{34}); \rightarrow n_{29}+n_{36}=n_3+n_{10}$

Add the both sides of these 3 equations, and you know:

$$n_1+n_8+n_{15}+n_{22}+n_{29}+n_{36} = n_3+n_{10}+n_{17}+n_{24}+n_{25}+n_{32}$$

Two pandiagonals add up to the common sum.

In the same way,

$n_1+n_8=n_{17}+n_{24}=n_{27}+n_{34}; n_{15}+n_{22}=n_5+n_{12}=n_{25}+n_{32}; n_{29}+n_{36}=n_3+n_{10}=n_{13}+n_{20};$
 $\rightarrow n_1+n_8+n_{15}+n_{22}+n_{29}+n_{36} = n_3+n_{10}+n_{17}+n_{24}+n_{25}+n_{32} = n_5+n_{12}+n_{13}+n_{20}+n_{27}+n_{34} \dots pd1$
 $n_1+n_{12}=n_{15}+n_{20}=n_{29}+n_{34}; n_{17}+n_{22}=n_3+n_8=n_{25}+n_{36}; n_{27}+n_{32}=n_{13}+n_{24}=n_5+n_{10};$
 $\rightarrow n_1+n_{12}+n_{17}+n_{22}+n_{27}+n_{32} = n_3+n_8+n_{13}+n_{24}+n_{29}+n_{34} = n_5+n_{10}+n_{15}+n_{20}+n_{25}+n_{36} \dots pd2$
 $n_2+n_9=n_{18}+n_{19}=n_{28}+n_{35}; n_{16}+n_{23}=n_6+n_7=n_{26}+n_{33}; n_{30}+n_{31}=n_4+n_{11}=n_{14}+n_{21};$
 $\rightarrow n_2+n_9+n_{16}+n_{23}+n_{30}+n_{31} = n_4+n_{11}+n_{18}+n_{19}+n_{26}+n_{33} = n_6+n_7+n_{14}+n_{21}+n_{28}+n_{35} \dots pd3$
 $n_2+n_7=n_{16}+n_{21}=n_{30}+n_{35}; n_{18}+n_{23}=n_4+n_9=n_{26}+n_{31}; n_{28}+n_{33}=n_6+n_{11}=n_{14}+n_{19};$
 $\rightarrow n_2+n_7+n_{18}+n_{23}+n_{28}+n_{33} = n_4+n_9+n_{14}+n_{19}+n_{30}+n_{35} = n_6+n_{11}+n_{16}+n_{21}+n_{26}+n_{31} \dots pd4$

All pandiagonals are classified into 4 groups like above.

Let's analyze the diagonal $n_1+n_8+n_{15}+n_{22}+n_{29}+n_{36}$ precisely next.

$n_1+n_8+n_{12}+n_{13}=D \dots (d_1); n_{12}+n_{13}+n_{17}+n_{24}=D \dots (d_{12}); \rightarrow n_1+n_8=n_{17}+n_{24}$

And $n_{17}+n_{24}+n_{22}+n_{29}=D \dots (d_{17});$ Therefore $n_1+n_8+n_{22}+n_{29}=D \dots A1;$

$n_8+n_{15}+n_{13}+n_{20}=D \dots (d_8); n_{13}+n_{20}+n_{24}+n_{25}=D \dots (d_{13}); \rightarrow n_8+n_{15}=n_{24}+n_{25}$

And $n_{24}+n_{25}+n_{29}+n_{36}=D \dots (d_{24});$ Therefore $n_8+n_{15}+n_{29}+n_{36}=D \dots A2;$

28	29	30	25	26	27	28	29	30	25	26	27	28	29	30	25	26	27	28	29	30	25	26	27
34	35	36	31	32	33	34	35	36	31	32	33	34	35	36	31	32	33	34	35	36	31	32	33
4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3
10	11	12	7	8	9	10	11	12	7	8	9	10	11	12	7	8	9	10	11	12	7	8	9
16	17	18	13	14	15	16	17	18	13	14	15	16	17	18	13	14	15	16	17	18	13	14	15
22	23	24	19	20	21	22	23	24	19	20	21	22	23	24	19	20	21	22	23	24	19	20	21
28	29	30	25	26	27	28	29	30	25	26	27	28	29	30	25	26	27	28	29	30	25	26	27
34	35	36	31	32	33	34	35	36	31	32	33	34	35	36	31	32	33	34	35	36	31	32	33
4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3
10	11	12	7	8	9	10	11	12	7	8	9	10	11	12	7	8	9	10	11	12	7	8	9

$n_{15}+n_{22}+n_{20}+n_{27}=D \dots (d_{15}); n_{20}+n_{27}+n_{25}+n_{32}=D \dots (d_{20}); \rightarrow n_{15}+n_{22}=n_{25}+n_{32}$

And $n_{25}+n_{32}+n_{36}+n_1=D \dots (d_{25});$ Therefore $n_{15}+n_{22}+n_{36}+n_1=D \dots A_3$

By A1 and A2 you can take: $n_1+n_{22}=n_{15}+n_{36}$

By A2 and A3 you can take: $n_1+n_{22}=n_8+n_{29}$

It means: $n_1+n_{22}=n_8+n_{29}=n_{15}+n_{36}=CS_1 \dots$ 'Complete' type of Complementary Pairs

It also means: $n_1+n_8+n_{15}+n_{22}+n_{29}+n_{36}=(n_1+n_{22})+(n_8+n_{29})+(n_{15}+n_{36})=3CS_1 \dots pd_1$

On the other hand $n_1+n_8+n_{15}+n_{22}+n_{29}+n_{36}=(n_1+n_{22})+(n_8+n_{15}+n_{29}+n_{36})=CS_1+A_2=CS_1+D$

It means: $3CS_1=CS_1+D; \rightarrow$ Therefore $2CS_1=D; \text{ Therefore } CS_1=74/2=37$

In the same way $n_2+n_9+n_{16}+n_{23}+n_{30}+n_{31}=(n_2+n_{23})+(n_9+n_{30})+(n_{16}+n_{31})=3CS_2 \dots pd_3$

$n_2+n_9+n_{16}+n_{23}+n_{30}+n_{31}=(n_2+n_{23})+(n_9+n_{16}+n_{30}+n_{31})=CS_2+D; \text{ Therefore } CS_2=37$

You can prove for all pandiagonals: $pd_1=pd_2=pd_3=pd_4=CS_1+D=CS_2+D=37+74=111$

Conclusion:

Every 'Diamond Composite' Squares 6x6 are naturally of Pandiagonal Type.

All pandiagonals consist of three 'Complete' complementary pairs in each. Therefore, every 'Diamond Composite' Squares 6x6 could be classified as the 'Complete' type of Pandiagonal Squares.

$$n_1+n_{22} = n_2+n_{23} = n_3+n_{24} = n_4+n_{19} = n_5+n_{20} = n_6+n_{21} =$$

$$n_7+n_{28} = n_8+n_{29} = n_9+n_{30} = n_{10}+n_{25} = n_{11}+n_{26} = n_{12}+n_{27} =$$

$$n_{13}+n_{34} = n_{14}+n_{35} = n_{15}+n_{36} = n_{16}+n_{31} = n_{17}+n_{32} = n_{18}+n_{33} = 37; \dots CS$$

You may well take and add them to the first definition lists.

You can also use these equations in your program by such the subtraction forms as follows.

$$n_{22}=CS-n_1; n_{23}=CS-n_2; n_{24}=CS-n_3; n_{19}=CS-n_4; n_{20}=CS-n_5; n_{21}=CS-n_6;$$

$$n_{28}=CS-n_7; n_{29}=CS-n_8; n_{30}=CS-n_9; n_{25}=CS-n_{10}; n_{26}=CS-n_{11}; n_{27}=CS-n_{12}; \dots$$

#4. Make Actual Solutions of such the 'Diamond Composite' Pandiagonal Type.

4-1. Definitions:

** Constant Sum of 'Diamond Composite' Combinations of 4 Numbers: $D=74$ **

$$n_1+ n_8+n_{12}+n_{13}=D \dots (d_1) | n_2+ n_9+ n_7+n_{14}=D \dots (d_2) | n_3+n_{10}+ n_8+n_{15}=D \dots (d_3)$$

$$n_4+n_{11}+ n_9+n_{16}=D \dots (d_4) | n_5+n_{12}+n_{10}+n_{17}=D \dots (d_5) | n_6+ n_7+n_{11}+n_{18}=D \dots (d_6)$$

$$n_7+n_{14}+n_{18}+n_{19}=D \dots (d_7) | n_8+n_{15}+n_{13}+n_{20}=D \dots (d_8) | n_9+n_{16}+n_{14}+n_{21}=D \dots (d_9)$$

$$n_{10}+n_{17}+n_{15}+n_{22}=D \dots (d_{10}) | n_{11}+n_{18}+n_{16}+n_{23}=D \dots (d_{11}) | n_{12}+n_{13}+n_{17}+n_{24}=D \dots (d_{12})$$

$$n_{13}+n_{20}+n_{24}+n_{25}=D \dots (d_{13}) | n_{14}+n_{21}+n_{19}+n_{26}=D \dots (d_{14}) | n_{15}+n_{22}+n_{20}+n_{27}=D \dots (d_{15})$$

$$n_{16}+n_{23}+n_{21}+n_{28}=D \dots (d_{16}) | n_{17}+n_{24}+n_{22}+n_{29}=D \dots (d_{17}) | n_{18}+n_{19}+n_{23}+n_{30}=D \dots (d_{18})$$

$$n_{19}+n_{26}+n_{30}+n_{31}=D \dots (d_{19}) | n_{20}+n_{27}+n_{25}+n_{32}=D \dots (d_{20}) | n_{21}+n_{28}+n_{26}+n_{33}=D \dots (d_{21})$$

$$n_{22}+n_{29}+n_{27}+n_{34}=D \dots (d_{22}) | n_{23}+n_{30}+n_{28}+n_{35}=D \dots (d_{23}) | n_{24}+n_{25}+n_{29}+n_{36}=D \dots (d_{24})$$

$$n_{25}+n_{32}+n_{36}+ n_1=D \dots (d_{25}) | n_{26}+n_{33}+n_{31}+ n_2=D \dots (d_{26}) | n_{27}+n_{34}+n_{32}+ n_3=D \dots (d_{27})$$

$$n_{28}+n_{35}+n_{33}+ n_4=D \dots (d_{28}) | n_{29}+n_{36}+n_{34}+ n_5=D \dots (d_{29}) | n_{30}+n_{31}+n_{35}+ n_6=D \dots (d_{30})$$

$$n_{31}+ n_2+ n_6+ n_7=D \dots (d_{31}) | n_{32}+ n_3+ n_1+ n_8=D \dots (d_{32}) | n_{33}+ n_4+ n_2+ n_9=D \dots (d_{33})$$

$$n_{34}+ n_5+ n_3+n_{10}=D \dots (d_{34}) | n_{35}+ n_6+ n_4+n_{11}=D \dots (d_{35}) | n_{36}+ n_1+ n_5+n_{12}=D \dots (d_{36})$$

```

** Constant sum of 'Complete' Combinations of Complementary Pairs: CS=37 **
n1+n22 = n2+n23 = n3+n24 = n4+n19 = n5+n20 = n6+n21 =
n7+n28 = n8+n29 = n9+n30 = n10+n25 = n11+n26 = n12+n27 =
n13+n34 = n14+n35 = n15+n36 = n16+n31 = n17+n32 = n18+n33 = CS;

```

You must not add such the equations for rows and columns to the first definitions:

n1+n2+n3+n4+n5+n6=111 ...Row1; n1+n7+n13+n19+n25+n31=111 ...C1m1;

If you add both of them, you would never be able to get any actual solution.

List-forming inequality conditions for our 'Standard Solutions' are set as: $N1 < n6$; $N1 < n31$; $N1 < n36$; and $N2 > N7$;

4-2. Important Part of my Program to Make our Object

```

/* Begin the Calculations */
/* Set N1 & n22=CS-N1 (CS=37) */
void stp01(){
  short i,j;
  for(i=1;i<37;i++){j=CS-i;           //(i, j) is 'Complete' complementary pair.
    if((uflg[i]==0)&&(uflg[j]==0)){   //Check if the values are used or un-used.
      nm[1]=i; nm[22]=j;           //If un-used, set them to N1 and n22.
      uflg[i]=1; uflg[j]=1;       //Set flags as 'Used'.
      stp02();                     //Call the next Procedure.
      uflg[j]=0; uflg[i]=0;}       //Reset flags as 'Un-used' and return.
    }
}
/* Set N8 & n29=CS-N8 */
void stp02(){
  short i,j;
  for(i=36;i>0;i--){j=CS-i;
    if((uflg[i]==0)&&(uflg[j]==0)){
      nm[8]=i; nm[29]=j;
      uflg[i]=1; uflg[j]=1;
      stp03();
      uflg[j]=0; uflg[i]=0;}
    }
}
/* Set N12 & n27=CS-N12 */
void stp03(){
  short i,j;
  for(i=1;i<37;i++){j=CS-i;
    if((uflg[i]==0)&&(uflg[j]==0)){
      nm[12]=i; nm[27]=j;
      uflg[i]=1; uflg[j]=1;
      stp04();
      uflg[j]=0; uflg[i]=0;}
    }
}
/* Set n13=S4N-n1-n8-n12 & n34=CS-n13 */
void stp04(){
  short i,j;
  i=S4N-nm[1]-nm[8]-nm[12];         //S4N=74
  j=S4N-nm[22]-nm[27]-nm[29];
  if((0<i)&&(i<37)&&(i+j==CS)){
    if((uflg[i]==0)&&(uflg[j]==0)){
      nm[13]=i; nm[34]=j;
      uflg[i]=1; uflg[j]=1;
      stp05();
      uflg[j]=0; uflg[i]=0;}}
}

```

```

/* Set N15 & n36=CS-N15 & n36>n1 */
void stp05(){
  short i,j;
  for(i=1;i<37;i++){j=CS-i;
    if((j>nm[1])&&(uflg[i]==0)&&(uflg[j]==0)){
      nm[15]=i; nm[36]=j;
      uflg[i]=1; uflg[j]=1;
      stp06();
      uflg[j]=0; uflg[i]=0;}
  }
}
/* Set n20=S4N-n8-n13-n15 & n5=CS-n20 */
void stp06(){
  short i,j,k,l;
  i=S4N-nm[8]-nm[13]-nm[15];
  j=S4N-nm[29]-nm[34]-nm[36];
  k=S4N-nm[15]-nm[22]-nm[27];
  l=S4N-nm[36]-nm[1]-nm[12];
  if((0<i)&&(i<37)&&(i+j==CS)){
    if((i==k)&&(j==l)){
      if((uflg[i]==0)&&(uflg[j]==0)){
        nm[20]=i; nm[5]=j;
        uflg[i]=1; uflg[j]=1;
        stp07();
        uflg[j]=0; uflg[i]=0;}}}
}
/* Level 2: */
/* Set N3 & n24=CS-N3 */
void stp07(){
  short i,j;
  for(i=1;i<37;i++){j=CS-i;
    if((uflg[i]==0)&&(uflg[j]==0)){
      nm[3]=i; nm[24]=j;
      uflg[i]=1; uflg[j]=1;
      stp08();
      uflg[j]=0; uflg[i]=0;}
  }
}
/* Set n10=S4N-n3-n8-n15 & n25=CS-n10 */
void stp08(){
  short i,j,k,l;
  i=S4N-nm[3]-nm[8]-nm[15];
  j=S4N-nm[24]-nm[29]-nm[36];
  k=S4N-nm[34]-nm[3]-nm[5];
  l=S4N-nm[13]-nm[24]-nm[20];
  if((0<i)&&(i<37)&&(i+j==CS)){
    if((i==k)&&(j==l)){
      if((uflg[i]==0)&&(uflg[j]==0)){
        nm[10]=i; nm[25]=j;
        uflg[i]=1; uflg[j]=1;
        stp09();
        uflg[j]=0; uflg[i]=0;}}}
}
/* Set n17=S4N-n5-n10-n12 & n32=CS-n17 */
void stp09(){
  short i,j,k,l;
  i=S4N-nm[5]-nm[10]-nm[12];
  j=S4N-nm[20]-nm[25]-nm[27];
  k=S4N-nm[10]-nm[15]-nm[22];
  l=S4N-nm[25]-nm[36]-nm[1];

```

```

if((0<i)&&(i<37)&&(i+j==CS)){
  if((i==k)&&(j==l)){
    if((uflg[i]==0)&&(uflg[j]==0)){
      nm[17]=i; nm[32]=j;
      uflg[i]=1; uflg[j]=1;
      stp10();
      uflg[j]=0; uflg[i]=0;}}}
}
/* Check D-type Sums */
void stp10(){
  short sm1,sm2,sm3,sm4;
  sm1=nm[12]+nm[13]+nm[17]+nm[24];
  sm2=nm[17]+nm[22]+nm[24]+nm[29];
  sm3=nm[27]+nm[32]+nm[34]+nm[3];
  sm4=nm[1]+nm[3]+nm[8]+nm[32];
  if((sm1==S4N)&&(sm2==S4N)&&(sm3==S4N)&&(sm4==S4N)){stp11();}
}
/* Level 3: */
/* Set N2 & n23=CS-N2 */
void stp11(){
  short i,j;
  for(i=36;i>0;i--){j=CS-i;
    if((uflg[i]==0)&&(uflg[j]==0)){
      nm[2]=i; nm[23]=j;
      uflg[i]=1; uflg[j]=1;
      stp12();
      uflg[j]=0; uflg[i]=0;}
  }
}
/* Set N7(<N2) & n28=CS-N7 */
void stp12(){
  short i,j;
  for(i=nm[2]-1;i>0;i--){j=CS-i;
    if((uflg[i]==0)&&(uflg[j]==0)){
      nm[7]=i; nm[28]=j;
      uflg[i]=1; uflg[j]=1;
      stp13();
      uflg[j]=0; uflg[i]=0;}
  }
}
/* Set N9 & n30=CS-N9 */
void stp13(){
  short i,j;
  for(i=1;i<37;i++){j=CS-i;
    if((uflg[i]==0)&&(uflg[j]==0)){
      nm[9]=i; nm[30]=j;
      uflg[i]=1; uflg[j]=1;
      stp14();
      uflg[j]=0; uflg[i]=0;}
  }
}
/* Set n14=S4N-n2-n7-n9 & n35=CS-n14 */
void stp14(){
  short i,j;
  i=S4N-nm[2]-nm[7]-nm[9];
  j=S4N-nm[23]-nm[28]-nm[30];
  if((0<i)&&(i<37)&&(i+j==CS)){
    if((uflg[i]==0)&&(uflg[j]==0)){
      nm[14]=i; nm[35]=j;
      uflg[i]=1; uflg[j]=1;

```



```

        stp15();
        uflg[j]=0; uflg[i]=0;}}
}
/* Set N16 & n31=CS-N16 & n31>n1 */
void stp15(){
    short i,j;
    for(i=1;i<37;i++){j=CS-i;
        if((j>nm[1])&&(uflg[i]==0)&&(uflg[j]==0)){
            nm[16]=i; nm[31]=j;
            uflg[i]=1; uflg[j]=1;
            stp16();
            uflg[j]=0; uflg[i]=0;}}
    }
}
/* Set n21=S4N-n9-n14-n16 & n6=CS-N21 & n6>n1 */
void stp16(){
    short i,j,k,l;
    i=S4N-nm[9]-nm[14]-nm[16];
    j=S4N-nm[30]-nm[35]-nm[31];
    k=S4N-nm[16]-nm[23]-nm[28];
    l=S4N-nm[31]-nm[2]-nm[7];
    if((0<i)&&(i<37)&&(i+j==CS)){
        if((j>nm[1])&&(i==k)&&(j==l)){
            if((uflg[i]==0)&&(uflg[j]==0)){
                nm[21]=i; nm[6]=j;
                uflg[i]=1; uflg[j]=1;
                stp17();
                uflg[j]=0; uflg[i]=0;}}}}
}
/* Level 4: */
/* Set N4 & n19=CS-N4 */
void stp17(){
    short i,j;
    for(i=36;i>0;i--){j=CS-i;
        if((uflg[i]==0)&&(uflg[j]==0)){
            nm[4]=i; nm[19]=j;
            uflg[i]=1; uflg[j]=1;
            stp18();
            uflg[j]=0; uflg[i]=0;}}
    }
}
/* Set n11=S4N-n4-n9-n16 & n26=CS-n11 */
void stp18(){
    short i,j,k,l;
    i=S4N-nm[4]-nm[9]-nm[16];
    j=S4N-nm[19]-nm[30]-nm[31];
    k=S4N-nm[35]-nm[4]-nm[6];
    l=S4N-nm[14]-nm[19]-nm[21];
    if((0<i)&&(i<37)&&(i+j==CS)){
        if((i==k)&&(j==l)){
            if((uflg[i]==0)&&(uflg[j]==0)){
                nm[11]=i; nm[26]=j;
                uflg[i]=1; uflg[j]=1;
                stp19();
                uflg[j]=0; uflg[i]=0;}}}}
}
/* Set n18=S4N-n6-n7-n11 & n33=CS-n18 */
void stp19(){
    short i,j,k,l;
    i=S4N-nm[6]-nm[7]-nm[11];

```

```

j=S4N-nm[21]-nm[28]-nm[26];
k=S4N-nm[11]-nm[16]-nm[23];
l=S4N-nm[26]-nm[31]-nm[2];
if((0<i)&&(i<37)&&(i+j==CS)){
  if((i==k)&&(j==l)){
    if((uflg[i]==0)&&(uflg[j]==0)){
      nm[18]=i; nm[33]=j;
      uflg[i]=1; uflg[j]=1;
      stp20();
      uflg[j]=0; uflg[i]=0;}}}
}
/* The Last Check: D-type Sums */
void stp20(){
  short sm1,sm2,sm3,sm4;
  sm1=nm[7]+nm[18]+nm[14]+nm[19];
  sm2=nm[18]+nm[23]+nm[19]+nm[30];
  sm3=nm[28]+nm[33]+nm[35]+nm[4];
  sm4=nm[33]+nm[4]+nm[2]+nm[9];
  if((sm1==S4N)&&(sm2==S4N)&&(sm3==S4N)&&(sm4==S4N)){answerprint();}
}
/**/

```

4-3. Result List of my recent Calculation

** 'Diamond-Composite & Complete' Pan-diagonal Semi-magic Squares 6x6 **
 ** Abstract List 1 of Standard Solutions with n1=1 **

1/ Row\PD					299665/ Row\PD					584065/ Row\PD							
1	27	8	20	33	12 =101\111	1	27	9	20	32	12 =101\111	1	28	10	20	32	12 =103\111
22	35	11	28	19	6 =121\111	22	34	11	29	19	6 =121\111	21	33	11	29	19	6 =119\111
32	14	3	24	7	21 =101\111	33	14	2	24	7	21 =101\111	34	14	2	24	7	22 =103\111
17	4	25	36	10	29 =121\111	17	5	25	36	10	28 =121\111	17	5	25	36	9	27 =119\111
9	18	31	15	2	26 =101\111	8	18	31	15	3	26 =101\111	8	18	31	16	4	26 =103\111
13	30	16	5	23	34 =121\111	13	30	16	4	23	35 =121\111	13	30	15	3	23	35 =119\111
94 128 94 128 94 128	Column	94 128 94 128 94 128	Column	94 128 94 128 94 128	Column	94 128 94 128 94 128	Column	94 128 94 128 94 128	Column	94 128 94 128 94 128	Column						
/111/111/111/111/111/111	PDSums	/111/111/111/111/111/111	PDSums	/111/111/111/111/111/111	PDSums	/111/111/111/111/111/111	PDSums	/111/111/111/111/111/111	PDSums	/111/111/111/111/111/111	PDSums						
818785/ Row\PD					1037953/ Row\PD					1183681/ Row\PD							
1	29	11	21	33	12 =107\111	1	33	13	21	32	14 =114\111	1	33	15	23	31	10 =113\111
20	32	10	28	19	6 =115\111	15	31	9	27	19	7 =108\111	19	30	5	26	21	8 =109\111
35	15	3	24	7	23 =107\111	35	17	3	25	8	26 =114\111	35	17	3	25	9	24 =113\111
16	4	25	36	8	26 =115\111	16	5	23	36	4	24 =108\111	14	6	27	36	4	22 =109\111
9	18	31	17	5	27 =107\111	10	18	30	22	6	28 =114\111	11	16	29	18	7	32 =113\111
13	30	14	2	22	34 =115\111	12	29	11	2	20	34 =108\111	12	28	13	2	20	34 =109\111
94 128 94 128 94 128	Column	89 133 89 133 89 133	Column	92 130 92 130 92 130	Column	92 130 92 130 92 130	Column	92 130 92 130 92 130	Column	92 130 92 130 92 130	Column						
/111/111/111/111/111/111	PDSums	/111/111/111/111/111/111	PDSums	/111/111/111/111/111/111	PDSums	/111/111/111/111/111/111	PDSums	/111/111/111/111/111/111	PDSums	/111/111/111/111/111/111	PDSums						
1409761/ Row\PD					1526545/ Row\PD					1669537/ Row\PD							
1	32	11	18	30	13 =105\111	1	32	12	21	29	11 =106\111	1	32	13	19	28	8 =101\111
17	29	10	31	21	9 =117\111	18	28	7	31	22	10 =116\111	20	27	7	31	25	11 =121\111
35	15	3	25	4	23 =105\111	35	17	3	24	4	23 =106\111	35	15	3	23	4	21 =101\111
19	7	24	36	5	26 =117\111	16	8	26	36	5	25 =116\111	18	9	29	36	5	24 =121\111
6	16	28	20	8	27 =105\111	6	15	27	19	9	30 =106\111	6	12	26	17	10	30 =101\111
12	33	14	2	22	34 =117\111	13	33	14	2	20	34 =116\111	14	33	16	2	22	34 =121\111
90 132 90 132 90 132	Column	89 133 89 133 89 133	Column	94 128 94 128 94 128	Column	94 128 94 128 94 128	Column	94 128 94 128 94 128	Column	94 128 94 128 94 128	Column						
/111/111/111/111/111/111	PDSums	/111/111/111/111/111/111	PDSums	/111/111/111/111/111/111	PDSums	/111/111/111/111/111/111	PDSums	/111/111/111/111/111/111	PDSums	/111/111/111/111/111/111	PDSums						
1784305/ Row\PD					1897345/ Row\PD					1995553/ Row\PD							
1	32	14	21	27	7 =102\111	1	32	15	27	26	9 =110\111	1	33	30	22	25	5 =116\111
20	26	13	31	18	12 =120\111	19	25	7	31	17	13 =112\111	27	24	8	17	16	14 =106\111
35	9	3	22	4	29 =102\111	35	16	3	23	4	29 =110\111	35	6	3	28	18	26 =116\111
16	10	30	36	5	23 =120\111	10	11	28	36	5	22 =112\111	15	12	32	36	4	7 =106\111
6	19	25	17	11	24 =102\111	6	20	24	18	12	30 =110\111	20	21	23	10	13	29 =116\111
15	33	8	2	28	34 =120\111	14	33	8	2	21	34 =112\111	9	19	11	2	31	34 =106\111
93 129 93 129 93 129	Column	85 137 85 137 85 137	Column	107 115 107 115 107 115	Column	107 115 107 115 107 115	Column	107 115 107 115 107 115	Column	107 115 107 115 107 115	Column						
/111/111/111/111/111/111	PDSums	/111/111/111/111/111/111	PDSums	/111/111/111/111/111/111	PDSums	/111/111/111/111/111/111	PDSums	/111/111/111/111/111/111	PDSums	/111/111/111/111/111/111	PDSums						

2170945/ Row\PD				2248849/ Row\PD				2319841/ Row\PD												
1	33	18	27	24	20	=123\111	1	33	19	12	23	6	= 94\111	1	32	19	24	22	9	=107\111
12	23	8	30	11	15	= 99\111	24	22	9	30	27	16	=128\111	25	21	7	31	14	17	=115\111
35	21	3	28	5	31	=123\111	35	8	3	26	5	17	= 94\111	35	10	3	29	4	26	=107\111
10	13	17	36	4	19	= 99\111	25	14	31	36	4	18	=128\111	13	15	28	36	5	18	=115\111
7	26	22	25	14	29	=123\111	7	10	21	13	15	28	= 94\111	6	23	20	12	16	30	=107\111
9	32	6	2	16	34	= 99\111	11	32	20	2	29	34	=128\111	8	33	11	2	27	34	=115\111
74 148	74 148	74 148	CoTumn	103 119	103 119	103 119	CoTumn	88 134	88 134	88 134	CoTumn									
/111/111/111/111/111/111/	/111/111/111/111/111/111/	/111/111/111/111/111/111/	PDSums	/111/111/111/111/111/111/	/111/111/111/111/111/111/	/111/111/111/111/111/111/	PDSums	/111/111/111/111/111/111/	/111/111/111/111/111/111/	/111/111/111/111/111/111/	PDSums									
2401057/ Row\PD				2462833/ Row\PD				2510065/ Row\PD												
1	33	22	27	21	11	=115\111	1	35	24	14	22	5	=101\111	1	34	22	25	21	10	=113\111
23	20	5	29	12	18	=107\111	26	19	4	25	27	20	=121\111	23	18	6	29	13	20	=109\111
35	13	3	30	6	28	=115\111	34	9	6	29	7	16	=101\111	35	11	5	30	4	28	=113\111
10	16	26	36	4	15	=107\111	23	15	32	36	2	13	=121\111	12	16	27	36	3	15	=109\111
8	25	19	14	17	32	=115\111	12	10	17	11	18	33	=101\111	8	24	17	14	19	31	=113\111
7	31	9	2	24	34	=107\111	8	30	21	3	28	31	=121\111	7	33	9	2	26	32	=109\111
84 138	84 138	84 138	CoTumn	104 118	104 118	104 118	CoTumn	86 136	86 136	86 136	CoTumn									
/111/111/111/111/111/111/	/111/111/111/111/111/111/	/111/111/111/111/111/111/	PDSums	/111/111/111/111/111/111/	/111/111/111/111/111/111/	/111/111/111/111/111/111/	PDSums	/111/111/111/111/111/111/	/111/111/111/111/111/111/	/111/111/111/111/111/111/	PDSums									
2613745/ Row\PD				2693953/ Row\PD				2773297/ Row\PD												
1	32	23	24	18	8	=106\111	1	33	25	27	17	13	=116\111	1	33	27	17	16	7	=101\111
25	17	7	31	15	21	=116\111	19	16	8	30	11	22	=106\111	25	15	5	29	24	23	=121\111
35	10	3	28	4	26	=106\111	35	14	3	28	5	31	=116\111	35	11	3	28	6	18	=101\111
13	19	29	36	5	14	=116\111	10	20	24	36	4	12	=106\111	20	21	30	36	4	10	=121\111
6	22	16	12	20	30	=106\111	7	26	15	18	21	29	=116\111	8	13	14	12	22	32	=101\111
9	33	11	2	27	34	=116\111	9	32	6	2	23	34	=106\111	9	31	19	2	26	34	=121\111
89 133	89 133	89 133	CoTumn	81 141	81 141	81 141	CoTumn	98 124	98 124	98 124	CoTumn									
/111/111/111/111/111/111/	/111/111/111/111/111/111/	/111/111/111/111/111/111/	PDSums	/111/111/111/111/111/111/	/111/111/111/111/111/111/	/111/111/111/111/111/111/	PDSums	/111/111/111/111/111/111/	/111/111/111/111/111/111/	/111/111/111/111/111/111/	PDSums									
2833921/ Row\PD				2899585/ Row\PD				2946241/ Row\PD												
1	32	26	19	15	8	=101\111	1	32	26	27	15	9	=110\111	1	32	27	21	14	7	=102\111
25	14	7	31	20	24	=121\111	19	13	7	31	17	25	=112\111	20	12	13	31	18	26	=120\111
35	10	3	28	4	21	=101\111	35	16	4	23	3	29	=110\111	35	9	4	22	3	29	=102\111
18	22	29	36	5	11	=121\111	10	22	28	36	5	11	=112\111	16	23	30	36	5	10	=120\111
6	17	13	12	23	30	=101\111	6	20	12	18	24	30	=110\111	6	19	11	17	25	24	=102\111
9	33	16	2	27	34	=121\111	14	34	8	2	21	33	=112\111	15	34	8	2	28	33	=120\111
94 128	94 128	94 128	CoTumn	85 137	85 137	85 137	CoTumn	93 129	93 129	93 129	CoTumn									
/111/111/111/111/111/111/	/111/111/111/111/111/111/	/111/111/111/111/111/111/	PDSums	/111/111/111/111/111/111/	/111/111/111/111/111/111/	/111/111/111/111/111/111/	PDSums	/111/111/111/111/111/111/	/111/111/111/111/111/111/	/111/111/111/111/111/111/	PDSums									
3051649/ Row\PD				3092689/ Row\PD				3140929/ Row\PD												
1	32	29	21	12	13	=108\111	1	33	31	19	11	13	=108\111	1	32	30	18	11	13	=105\111
20	11	7	31	18	27	=114\111	16	10	8	30	22	28	=114\111	17	9	10	31	21	29	=117\111
35	15	3	28	4	23	=108\111	35	17	3	25	5	23	=108\111	35	15	4	25	3	23	=105\111
16	25	24	36	5	8	=114\111	18	26	24	36	4	6	=114\111	19	26	24	36	5	7	=117\111
6	19	10	17	26	30	=108\111	7	15	9	21	27	29	=108\111	6	16	8	20	28	27	=105\111
9	33	14	2	22	34	=114\111	12	32	14	2	20	34	=114\111	12	34	14	2	22	33	=117\111
87 135	87 135	87 135	CoTumn	89 133	89 133	89 133	CoTumn	90 132	90 132	90 132	CoTumn									
/111/111/111/111/111/111/	/111/111/111/111/111/111/	/111/111/111/111/111/111/	PDSums	/111/111/111/111/111/111/	/111/111/111/111/111/111/	/111/111/111/111/111/111/	PDSums	/111/111/111/111/111/111/	/111/111/111/111/111/111/	/111/111/111/111/111/111/	PDSums									
3182689/ Row\PD				3214945/ Row\PD				3229489/ Row\PD												
1	27	32	20	9	12	=101\111	1	27	34	20	9	12	=103\111	1	29	33	21	11	12	=107\111
22	8	11	31	19	30	=121\111	22	7	11	29	19	31	=119\111	20	6	10	28	19	32	=115\111
35	14	3	24	4	21	=101\111	35	14	4	24	5	21	=103\111	35	15	7	24	3	23	=107\111
17	28	25	36	10	5	=121\111	17	28	25	36	10	3	=119\111	16	26	25	36	8	4	=115\111
6	18	7	15	29	26	=101\111	8	18	6	15	30	26	=103\111	9	18	5	17	31	27	=107\111
13	33	16	2	23	34	=121\111	13	32	16	2	23	33	=119\111	13	34	14	2	22	30	=115\111
94 128	94 128	94 128	CoTumn	96 126	96 126	96 126	CoTumn	94 128	94 128	94 128	CoTumn									
/111/111/111/111/111/111/	/111/111/111/111/111/111/	/111/111/111/111/111/111/	PDSums	/111/111/111/111/111/111/	/111/111/111/111/111/111/	/111/111/111/111/111/111/	PDSums	/111/111/111/111/111/111/	/111/111/111/111/111/111/	/111/111/111/111/111/111/	PDSums									

[Count = 3274560] OK!

Calculated and listed by Kanji Setsuda on January 16, 2010

The solution counts when $n1=1$ are 3274560, just the same with the counts Miguel (Mr. Amela) reported to me in his mail. I must report here I could just verify it.

I tried to count all the standard solutions when $n1 \geq 1$, and got it at last.

*** 'Diamond-Composite & Complete' Pan-diagonal Semi-magic Squares 6x6 ***

**** Abstract List 2 of All Standard Solutions with Check-Sums ****

1/ Row\PD					3274561/ Row\PD					6390657/ Row\PD							
1	27	8	20	33	12 =101\111	2	27	7	20	33	12 =101\111	3	27	7	20	32	12 =101\111
22	35	11	28	19	6 =121\111	22	36	11	28	19	5 =121\111	22	36	11	29	19	4 =121\111
32	14	3	24	7	21 =101\111	31	14	3	24	8	21 =101\111	31	14	2	24	9	21 =101\111
17	4	25	36	10	29 =121\111	17	4	25	35	10	30 =121\111	17	5	25	34	10	30 =121\111
9	18	31	15	2	26 =101\111	9	18	32	15	1	26 =101\111	8	18	33	15	1	26 =101\111
13	30	16	5	23	34 =121\111	13	29	16	6	23	34 =121\111	13	28	16	6	23	35 =121\111
94 128 94 128 94 128	CoTumn	94 128 94 128 94 128	CoTumn	94 128 94 128 94 128	CoTumn												
/111/111/111/111/111/111/	PDSums	/111/111/111/111/111/111/	PDSums	/111/111/111/111/111/111/	PDSums												
9340609/ Row\PD					12024881/ Row\PD					14511985/ Row\PD							
4	28	7	20	32	12 =103\111	5	29	7	21	33	12 =107\111	6	33	8	21	32	14 =114\111
21	36	11	29	19	3 =119\111	20	36	10	28	19	2 =115\111	15	36	9	27	19	2 =108\111
31	14	2	24	10	22 =103\111	31	15	3	24	11	23 =107\111	30	17	3	25	13	26 =114\111
17	5	25	33	9	30 =119\111	16	4	25	32	8	30 =115\111	16	5	23	31	4	29 =108\111
8	18	34	16	1	26 =103\111	9	18	35	17	1	27 =107\111	10	18	35	22	1	28 =114\111
13	27	15	6	23	35 =119\111	13	26	14	6	22	34 =115\111	12	24	11	7	20	34 =108\111
94 128 94 128 94 128	CoTumn	94 128 94 128 94 128	CoTumn	89 133 89 133 89 133	CoTumn												
/111/111/111/111/111/111/	PDSums	/111/111/111/111/111/111/	PDSums	/111/111/111/111/111/111/	PDSums												
16760465/ Row\PD					18715249/ Row\PD					20467173/ Row\PD							
7	33	9	23	31	10 =113\111	8	32	4	18	30	13 =105\111	9	32	4	21	29	11 =106\111
19	36	5	26	21	2 =109\111	17	36	10	31	21	2 =117\111	18	36	7	31	22	2 =116\111
29	17	3	25	15	24 =113\111	28	15	3	25	11	23 =105\111	27	17	3	24	12	23 =106\111
14	6	27	30	4	28 =109\111	19	7	24	29	5	33 =117\111	16	8	26	28	5	33 =116\111
11	16	35	18	1	32 =113\111	6	16	35	20	1	27 =105\111	6	15	35	19	1	30 =106\111
12	22	13	8	20	34 =109\111	12	26	14	9	22	34 =117\111	13	25	14	10	20	34 =116\111
92 130 92 130 92 130	CoTumn	90 132 90 132 90 132	CoTumn	89 133 89 133 89 133	CoTumn												
/111/111/111/111/111/111/	PDSums	/111/111/111/111/111/111/	PDSums	/111/111/111/111/111/111/	PDSums												
22026841/ Row\PD					23343741/ Row\PD					24486305/ Row\PD							
10	32	4	15	28	12 =101\111	11	32	4	9	27	19 =102\111	12	32	4	16	26	20 =110\111
16	36	7	31	29	2 =121\111	8	36	13	31	30	2 =120\111	8	36	7	31	28	2 =112\111
26	19	3	23	13	17 =101\111	25	21	3	22	14	17 =102\111	24	27	3	23	15	18 =110\111
22	9	25	27	5	33 =121\111	28	10	18	26	5	33 =120\111	21	11	17	25	5	33 =112\111
6	8	35	21	1	30 =101\111	6	7	35	29	1	24 =102\111	6	9	35	29	1	30 =110\111
14	24	20	11	18	34 =121\111	15	23	20	12	16	34 =120\111	14	22	19	13	10	34 =112\111
94 128 94 128 94 128	CoTumn	93 129 93 129 93 129	CoTumn	85 137 85 137 85 137	CoTumn												
/111/111/111/111/111/111/	PDSums	/111/111/111/111/111/111/	PDSums	/111/111/111/111/111/111/	PDSums												
25484117/ Row\PD					26312097/ Row\PD					27000889/ Row\PD							
13	32	18	4	25	15 =107\111	14	29	5	31	24	20 =123\111	15	29	5	26	23	17 =115\111
6	36	28	17	26	2 =115\111	9	36	10	30	12	2 = 99\111	4	36	10	30	25	2 =107\111
23	8	3	16	30	27 =107\111	22	26	3	21	18	33 =123\111	21	31	3	13	19	28 =115\111
33	12	22	24	5	19 =115\111	6	13	17	23	8	32 = 99\111	11	14	20	22	8	32 =107\111
20	11	35	31	1	9 =107\111	7	25	35	28	1	27 =123\111	7	12	35	33	1	27 =115\111
21	7	10	14	29	34 =115\111	16	19	4	15	11	34 = 99\111	24	18	9	16	6	34 =107\111
116 106 116 106 116 106	CoTumn	74 148 74 148 74 148	CoTumn	82 140 82 140 82 140	CoTumn												
/111/111/111/111/111/111/	PDSums	/111/111/111/111/111/111/	PDSums	/111/111/111/111/111/111/	PDSums												
27580953/ Row\PD					28026913/ Row\PD					28385057/ Row\PD							
16	14	4	7	22	25 = 88\111	17	14	6	32	21	25 =115\111	18	16	7	9	22	29 =101\111
9	36	24	31	32	2 =134\111	9	36	24	29	7	2 =107\111	2	36	23	25	32	3 =121\111
20	27	3	11	19	8 = 88\111	19	27	3	11	22	33 =115\111	17	33	6	10	24	11 =101\111
30	15	12	21	23	33 =134\111	5	16	12	20	23	31 =107\111	28	15	8	19	21	30 =121\111
6	5	35	28	1	13 = 88\111	8	30	35	28	1	13 =115\111	12	5	34	35	1	14 =101\111
26	18	29	17	10	34 =134\111	26	15	4	18	10	34 =107\111	27	13	26	20	4	31 =121\111
107 115 107 115 107 115	CoTumn	84 138 84 138 84 138	CoTumn	104 118 104 118 104 118	CoTumn												
/111/111/111/111/111/111/	PDSums	/111/111/111/111/111/111/	PDSums	/111/111/111/111/111/111/	PDSums												
28665041/ Row\PD					28894081/ Row\PD					29072353/ Row\PD							
19	14	4	31	21	24 =113\111	20	15	4	30	18	25 =112\111	21	18	5	29	17	26 =116\111
9	36	26	29	7	2 =109\111	8	36	24	31	9	2 =110\111	6	36	23	30	9	2 =106\111
17	25	5	10	22	34 =113\111	16	27	3	11	23	32 =112\111	15	27	3	13	25	33 =116\111
6	16	13	18	23	33 =109\111	7	19	12	17	22	33 =110\111	8	20	11	16	19	32 =106\111
8	30	35	28	1	11 =113\111	6	28	35	29	1	13 =112\111	7	28	35	31	1	14 =116\111
27	15	3	20	12	32 =109\111	26	14	5	21	10	34 =110\111	24	12	4	22	10	34 =106\111

86 136 86 136 86 136 CoTumn	83 139 83 139 83 139 CoTumn	81 141 81 141 81 141 CoTumn
/111/111/111/111/111/111 PDSums	/111/111/111/111/111/111 PDSums	/111/111/111/111/111/111 PDSums
29211289/ Row\PD	29308393/ Row\PD	29377121/ Row\PD
22 20 6 9 16 25 =98\111	23 12 4 19 15 28 =101\111	24 14 5 18 15 30 =106\111
5 36 19 29 33 2 =124\111	5 36 27 31 20 2 =121\111	3 36 26 29 20 2 =116\111
14 30 3 13 27 11 =98\111	13 30 3 8 26 21 =101\111	12 31 4 10 28 21 =106\111
28 21 12 15 17 31 =124\111	18 22 9 14 25 33 =121\111	19 22 7 13 23 32 =116\111
8 4 35 32 1 18 =98\111	6 17 35 32 1 10 =101\111	8 17 35 34 1 11 =106\111
24 10 26 23 7 34 =124\111	29 11 16 24 7 34 =121\111	27 9 16 25 6 33 =116\111
101 121 101 121 101 121 CoTumn	94 128 94 128 94 128 CoTumn	93 129 93 129 93 129 CoTumn
/111/111/111/111/111/111 PDSums	/111/111/111/111/111/111 PDSums	/111/111/111/111/111/111 PDSums
29422325/ Row\PD	29448369/ Row\PD	29461485/ Row\PD
25 16 8 19 17 27 =112\111	26 14 7 19 16 27 =109\111	27 14 2 19 16 29 =107\111
3 36 33 23 13 2 =110\111	2 36 24 22 25 4 =113\111	3 33 26 32 20 1 =115\111
11 22 7 9 32 31 =112\111	8 34 9 6 32 20 =109\111	13 31 7 9 25 22 =107\111
18 20 10 12 21 29 =110\111	18 21 10 11 23 30 =113\111	18 21 8 10 23 35 =115\111
14 24 35 34 1 4 =112\111	15 12 33 35 1 13 =109\111	5 17 36 34 4 11 =107\111
28 5 6 26 15 30 =110\111	31 5 17 29 3 28 =113\111	28 12 15 24 6 30 =115\111
99 123 99 123 99 123 CoTumn	100 122 100 122 100 122 CoTumn	94 128 94 128 94 128 CoTumn
/111/111/111/111/111/111 PDSums	/111/111/111/111/111/111 PDSums	/111/111/111/111/111/111 PDSums
29467897/ Row\PD	29470053/ Row\PD	
28 11 12 20 15 31 =117\111	29 11 17 14 12 30 =113\111	
3 32 27 23 19 1 =105\111	1 24 34 27 21 2 =109\111	
13 33 7 8 35 21 =117\111	19 28 6 5 33 22 =113\111	
17 22 6 9 26 25 =105\111	23 25 7 8 26 20 =109\111	
14 18 36 34 5 10 =117\111	10 16 35 36 13 3 =113\111	
29 2 16 24 4 30 =105\111	32 4 15 18 9 31 =109\111	
104 118 104 118 104 118 CoTumn	114 108 114 108 114 108 CoTumn	[Count = 29471040] OK!
/111/111/111/111/111/111 PDSums	/111/111/111/111/111/111 PDSums	

I was much surprised at the vast count, but it must be true, because it agrees with the result of next calculation: $3274560 \times 2 \times 6 \times 6 / 8 = 29471040$

The next list shows my collection of 'still too good solutions to be thrown away'.

** 'Diamond-Composite & Complete' Pan-diagonal Semi-Magic Squares 6x6 **
 ** Abstract List 3 of Standard Solutions with Check-Sums **

1/ Row\PD	289/ Row\PD	1009/ Row\PD
1 33 21 14 34 9 =112\111	1 33 24 14 31 9 =112\111	1 34 19 17 35 4 =110\111
22 35 8 13 25 7 =110\111	22 32 8 16 25 7 =110\111	25 31 7 15 24 10 =112\111
31 11 5 27 20 18 =112\111	34 11 2 27 20 18 =112\111	32 8 9 26 14 21 =110\111
23 3 28 36 4 16 =110\111	23 6 28 36 4 13 =110\111	20 2 33 36 3 18 =112\111
24 12 30 15 2 29 =112\111	21 12 30 15 5 29 =112\111	22 13 27 12 6 30 =110\111
10 17 19 6 26 32 =110\111	10 17 19 3 26 35 =110\111	11 23 16 5 29 28 =112\111
111 111 111 111 111 111 CoTumn	111 111 111 111 111 111 CoTumn	111 111 111 111 111 111 CoTumn
/111/111/111/111/111/111 PDSums	/111/111/111/111/111/111 PDSums	/111/111/111/111/111/111 PDSums
1585/ Row\PD	1729/ Row\PD	2017/ Row\PD
1 34 19 17 35 4 =110\111	1 34 20 18 35 4 =112\111	1 34 23 17 31 4 =110\111
27 30 8 14 21 12 =112\111	27 29 6 14 22 12 =110\111	25 28 7 18 24 10 =112\111
31 5 11 28 13 22 =110\111	32 7 11 28 13 21 =112\111	35 8 5 26 15 21 =110\111
20 2 33 36 3 18 =112\111	19 2 33 36 3 17 =110\111	20 6 33 36 3 14 =112\111
23 16 25 10 7 29 =110\111	23 15 25 10 8 31 =112\111	19 13 27 12 9 30 =110\111
9 24 15 6 32 26 =112\111	9 24 16 5 30 26 =110\111	11 22 16 2 29 32 =112\111
111 111 111 111 111 111 CoTumn	111 111 111 111 111 111 CoTumn	111 111 111 111 111 111 CoTumn
/111/111/111/111/111/111 PDSums	/111/111/111/111/111/111 PDSums	/111/111/111/111/111/111 PDSums
2593/ Row\PD	3169/ Row\PD	3457/ Row\PD
1 34 24 17 30 4 =110\111	1 35 26 16 28 5 =111\111	1 34 19 17 35 4 =110\111
27 26 8 18 21 12 =112\111	27 25 4 17 24 14 =111\111	27 24 8 6 21 26 =112\111
35 5 6 28 14 22 =110\111	34 8 6 30 15 18 =111\111	23 5 25 28 7 22 =110\111
20 7 33 36 3 13 =112\111	21 9 32 36 2 11 =111\111	20 2 33 36 3 18 =112\111
19 16 25 10 11 29 =110\111	20 13 23 10 12 33 =111\111	31 16 11 10 13 29 =110\111
9 23 15 2 32 31 =112\111	7 22 19 3 29 31 =111\111	9 30 15 14 32 12 =112\111
111 111 111 111 111 111 CoTumn	110 112 110 112 110 112 CoTumn	111 111 111 111 111 111 CoTumn
/111/111/111/111/111/111 PDSums	/111/111/111/111/111/111 PDSums	/111/111/111/111/111/111 PDSums

/111/111/111/111/111/111 PDSums							/111/111/111/111/111/111 PDSums							/111/111/111/111/111/111 PDSums						
3889/ Row\PD							4177/ Row\PD							4609/ Row\PD						
1	34	19	17	35	4	=110\111	1	35	20	16	34	5	=111\111	1	34	20	18	35	4	=112\111
27	23	8	7	21	26	=112\111	27	22	4	9	24	25	=111\111	25	21	7	6	23	28	=110\111
24	5	25	28	6	22	=110\111	26	8	23	30	6	18	=111\111	24	8	27	26	5	22	=112\111
20	2	33	36	3	18	=112\111	21	3	32	36	2	17	=111\111	19	2	33	36	3	17	=110\111
30	16	11	10	14	29	=110\111	28	13	12	10	15	33	=111\111	31	14	9	12	16	30	=112\111
9	31	15	13	32	12	=112\111	7	31	19	11	29	14	=111\111	11	32	15	13	29	10	=110\111
111 111 111 111 111 111 CoLumn							110 112 110 112 110 112 CoLumn							111 111 111 111 111 111 CoLumn						
/111/111/111/111/111/111 PDSums							/111/111/111/111/111/111 PDSums							/111/111/111/111/111/111 PDSums						
4897/ Row\PD							5185/ Row\PD							5473/ Row\PD						
1	33	21	14	34	9	=112\111	1	35	28	16	26	5	=111\111	1	34	31	17	23	4	=110\111
22	17	8	6	25	32	=110\111	27	14	4	17	24	25	=111\111	27	12	8	18	21	26	=112\111
24	11	30	27	2	18	=112\111	34	8	15	30	6	18	=111\111	35	5	13	28	7	22	=110\111
23	3	28	36	4	16	=110\111	21	11	32	36	2	9	=111\111	20	14	33	36	3	6	=112\111
31	12	5	15	20	29	=112\111	20	13	12	10	23	33	=111\111	19	16	11	10	25	29	=110\111
10	35	19	13	26	7	=110\111	7	31	19	3	29	22	=111\111	9	30	15	2	32	24	=112\111
111 111 111 111 111 111 CoLumn							110 112 110 112 110 112 CoLumn							111 111 111 111 111 111 CoLumn						
/111/111/111/111/111/111 PDSums							/111/111/111/111/111/111 PDSums							/111/111/111/111/111/111 PDSums						
6049/ Row\PD							6625/ Row\PD													
1	34	32	17	22	4	=110\111	1	33	31	14	24	9	=112\111							
25	10	7	18	24	28	=112\111	22	7	8	16	25	32	=110\111							
35	8	14	26	6	21	=110\111	34	11	20	27	2	18	=112\111							
20	15	33	36	3	5	=112\111	23	13	28	36	4	6	=110\111							
19	13	9	12	27	30	=110\111	21	12	5	15	30	29	=112\111							
11	31	16	2	29	23	=112\111	10	35	19	3	26	17	=110\111							
111 111 111 111 111 111 CoLumn							111 111 111 111 111 111 CoLumn							[Count = 6912] OK!						
/111/111/111/111/111/111 PDSums							/111/111/111/111/111/111 PDSums													

#5. New Solution List for Ordinary Composite Type in the same style

Let's have the new solution list for the ordinary Composite type in the same style with our 'Diamond' Composite one. What can you find there?

** Ordinary 'Composite' Type of Semi-Panmagic Squares 6x6: **

** List 1 of Standard Solutions with Check-Sums **

1/ Row\PD							1969/ Row\PD							3057/ Row\PD						
1	36	4	33	7	30	=111\ 64	1	35	2	36	3	34	=111\ 60	1	34	2	36	3	35	=111\ 60
35	2	32	5	29	8	=111\158	33	5	32	4	31	6	=111\162	33	6	32	4	31	5	=111\162
3	34	6	31	9	28	=111\ 64	7	29	8	30	9	28	=111\ 60	7	28	8	30	9	29	=111\ 60
27	10	24	13	21	16	=111\158	27	11	26	10	25	12	=111\162	27	12	26	10	25	11	=111\162
19	18	22	15	25	12	=111\ 64	19	17	20	18	21	16	=111\ 60	19	16	20	18	21	17	=111\ 60
26	11	23	14	20	17	=111\158	24	14	23	13	22	15	=111\162	24	15	23	13	22	14	=111\162
111 111 111 111 111 111 CoLumn							111 111 111 111 111 111 CoLumn							111 111 111 111 111 111 CoLumn						
/ 64/158/ 64/158/ 64/158 PDSums							/ 60/162/ 60/162/ 60/162 PDSums							/ 60/162/ 60/162/ 60/162 PDSums						
3537/ Row\PD							4337/ Row\PD							4817/ Row\PD						
1	33	3	35	15	24	=111\ 62	1	32	3	35	7	33	=111\ 94	1	31	3	35	8	33	=111\ 96
32	8	30	6	18	17	=111\160	24	17	22	14	18	16	=111\128	24	18	22	14	17	16	=111\126
5	29	7	31	19	20	=111\ 62	13	20	15	23	19	21	=111\ 94	13	19	15	23	20	21	=111\ 96
36	4	34	2	22	13	=111\160	36	5	34	2	30	4	=111\128	36	6	34	2	29	4	=111\126
9	25	11	27	23	16	=111\ 62	25	8	27	11	31	9	=111\ 94	25	7	27	11	32	9	=111\ 96
28	12	26	10	14	21	=111\160	12	29	10	26	6	28	=111\128	12	30	10	26	5	28	=111\126
111 111 111 111 111 111 CoLumn							111 111 111 111 111 111 CoLumn							111 111 111 111 111 111 CoLumn						
/ 62/160/ 62/160/ 62/160 PDSums							/ 94/128/ 94/128/ 94/128 PDSums							/ 96/126/ 96/126/ 96/126 PDSums						
5009/ Row\PD							5393/ Row\PD							5425/ Row\PD						
1	30	4	36	7	33	=111\ 64	1	29	4	36	8	33	=111\ 74	1	28	5	36	9	32	=111\ 62
27	16	24	10	21	13	=111\158	25	19	22	12	18	15	=111\148	24	21	20	13	16	17	=111\160
3	28	6	34	9	31	=111\ 64	3	27	6	34	10	31	=111\ 74	3	26	7	34	11	30	=111\ 62
35	8	32	2	29	5	=111\158	35	9	32	2	28	5	=111\148	35	10	31	2	27	6	=111\160
19	12	22	18	25	15	=111\ 64	23	7	26	14	30	11	=111\ 74	15	14	19	22	23	18	=111\ 62
26	17	23	11	20	14	=111\158	24	20	21	13	17	16	=111\148	33	12	29	4	25	8	=111\160
111 111 111 111 111 111 CoLumn							111 111 111 111 111 111 CoLumn							111 111 111 111 111 111 CoLumn						
/ 64/158/ 64/158/ 64/158 PDSums							/ 74/148/ 74/148/ 74/148 PDSums							/ 62/160/ 62/160/ 62/160 PDSums						

5713/ Row\PD							5905/ Row\PD							7297/ Row\PD						
1	27	7	35	8	33	=111\104	2	36	4	34	5	30	=111\ 94	2	35	5	32	8	29	=111\ 64
24	22	18	14	17	16	=111\118	35	1	33	3	32	7	=111\128	34	3	31	6	28	9	=111\158
13	15	19	23	20	21	=111\104	14	24	16	22	17	18	=111\ 94	10	27	13	24	16	21	=111\ 64
36	10	30	2	29	4	=111\118	23	13	21	15	20	19	=111\128	36	1	33	4	30	7	=111\158
25	3	31	11	32	9	=111\104	26	12	28	10	29	6	=111\ 94	11	26	14	23	17	20	=111\ 64
12	34	6	26	5	28	=111\118	11	25	9	27	8	31	=111\128	18	19	15	22	12	25	=111\158
111 111 111 111 111 111	Co\umn	111 111 111 111 111 111	Co\umn	111 111 111 111 111 111	Co\umn															
/104/118/104/118/104/118/	PDSums	/ 94/128/ 94/128/ 94/128/	PDSums	/ 64/158/ 64/158/ 64/158/	PDSums															
8961/ Row\PD							9969/ Row\PD							10233/ Row\PD						
2	34	1	36	3	35	=111\ 60	2	32	5	35	8	29	=111\ 64	2	31	6	35	10	27	=111\ 62
32	6	33	4	31	5	=111\162	18	22	15	19	12	25	=111\158	22	19	18	15	14	23	=111\160
8	28	7	30	9	29	=111\ 60	10	24	13	27	16	21	=111\ 64	4	29	8	33	12	25	=111\ 62
26	12	27	10	25	11	=111\162	36	4	33	1	30	7	=111\158	36	5	32	1	28	9	=111\160
20	16	19	18	21	17	=111\ 60	11	23	14	26	17	20	=111\ 64	13	20	17	24	21	16	=111\ 62
23	15	24	13	22	14	=111\162	34	6	31	3	28	9	=111\158	34	7	30	3	26	11	=111\160
111 111 111 111 111 111	Co\umn	111 111 111 111 111 111	Co\umn	111 111 111 111 111 111	Co\umn															
/ 60/162/ 60/162/ 60/162/	PDSums	/ 64/158/ 64/158/ 64/158/	PDSums	/ 62/160/ 62/160/ 62/160/	PDSums															
10485/ Row\PD							10653/ Row\PD							11073/ Row\PD						
2	30	4	36	5	34	=111\ 94	2	29	4	36	6	34	=111\ 96	2	28	5	36	6	34	=111\ 98
23	19	21	13	20	15	=111\128	23	20	21	13	19	15	=111\126	23	21	20	13	19	15	=111\124
14	18	16	24	17	22	=111\ 94	14	17	16	24	18	22	=111\ 96	14	16	17	24	18	22	=111\ 98
35	7	33	1	32	3	=111\128	35	8	33	1	31	3	=111\126	35	9	32	1	31	3	=111\124
26	6	28	12	29	10	=111\ 94	26	5	28	12	30	10	=111\ 96	26	4	29	12	30	10	=111\ 98
11	31	9	25	8	27	=111\128	11	32	9	25	7	27	=111\126	11	33	8	25	7	27	=111\124
111 111 111 111 111 111	Co\umn	111 111 111 111 111 111	Co\umn	111 111 111 111 111 111	Co\umn															
/ 94/128/ 94/128/ 94/128/	PDSums	/ 96/126/ 96/126/ 96/126/	PDSums	/ 98/124/ 98/124/ 98/124/	PDSums															
11253/ Row\PD							11505/ Row\PD							11985/ Row\PD						
2	27	6	35	10	31	=111\ 62	3	36	1	35	2	34	=111\ 60	3	35	1	33	7	32	=111\ 94
22	23	18	15	14	19	=111\160	31	4	33	5	32	6	=111\162	34	2	36	4	30	5	=111\128
4	25	8	33	12	29	=111\ 62	9	30	7	29	8	28	=111\ 60	15	23	13	21	19	20	=111\ 94
36	9	32	1	28	5	=111\160	25	10	27	11	26	12	=111\162	22	14	24	16	18	17	=111\128
13	16	17	24	21	20	=111\ 62	21	18	19	17	20	16	=111\ 60	27	11	25	9	31	8	=111\ 94
34	11	30	3	26	7	=111\160	22	13	24	14	23	15	=111\162	10	26	12	28	6	29	=111\128
111 111 111 111 111 111	Co\umn	111 111 111 111 111 111	Co\umn	111 111 111 111 111 111	Co\umn															
/ 62/160/ 62/160/ 62/160/	PDSums	/ 60/162/ 60/162/ 60/162/	PDSums	/ 94/128/ 94/128/ 94/128/	PDSums															
17105/ Row\PD							22225/ Row\PD							27121/ Row\PD						
4	36	2	34	5	30	=111\ 94	5	36	2	34	4	30	=111\ 94	6	36	2	34	4	29	=111\ 96
33	1	35	3	32	7	=111\128	32	1	35	3	33	7	=111\128	31	1	35	3	33	8	=111\126
16	24	14	22	17	18	=111\ 94	17	24	14	22	16	18	=111\ 94	18	24	14	22	16	17	=111\ 96
21	13	23	15	20	19	=111\128	20	13	23	15	21	19	=111\128	19	13	23	15	21	20	=111\126
28	12	26	10	29	6	=111\ 94	29	12	26	10	28	6	=111\ 94	30	12	26	10	28	5	=111\ 96
9	25	11	27	8	31	=111\128	8	25	11	27	9	31	=111\128	7	25	11	27	9	32	=111\126
111 111 111 111 111 111	Co\umn	111 111 111 111 111 111	Co\umn	111 111 111 111 111 111	Co\umn															
/ 94/128/ 94/128/ 94/128/	PDSums	/ 94/128/ 94/128/ 94/128/	PDSums	/ 96/126/ 96/126/ 96/126/	PDSums															
31745/ Row\PD							35249/ Row\PD							38625/ Row\PD						
7	36	1	33	4	30	=111\ 64	8	36	1	33	4	29	=111\ 74	9	36	1	32	5	28	=111\ 62
29	2	35	5	32	8	=111\158	28	2	35	5	32	9	=111\148	27	2	35	6	31	10	=111\160
9	34	3	31	6	28	=111\ 64	10	34	3	31	6	27	=111\ 74	11	34	3	30	7	26	=111\ 62
21	10	27	13	24	16	=111\158	18	12	25	15	22	19	=111\148	25	4	33	8	29	12	=111\160
25	18	19	15	22	12	=111\ 64	30	14	23	11	26	7	=111\ 74	23	22	15	18	19	14	=111\ 62
20	11	26	14	23	17	=111\158	17	13	24	16	21	20	=111\148	16	13	24	17	20	21	=111\160
111 111 111 111 111 111	Co\umn	111 111 111 111 111 111	Co\umn	111 111 111 111 111 111	Co\umn															
/ 64/158/ 64/158/ 64/158/	PDSums	/ 74/148/ 74/148/ 74/148/	PDSums	/ 62/160/ 62/160/ 62/160/	PDSums															
41809/ Row\PD							44305/ Row\PD							46801/ Row\PD						
10	36	2	34	11	18	=111\ 64	11	36	2	34	10	18	=111\ 64	12	36	2	34	10	17	=111\ 66
27	1	35	3	26	19	=111\158	26	1	35	3	27	19	=111\158	25	1	35	3	27	20	=111\156
13	33	5	31	14	15	=111\ 64	14	33	5	31	13	15	=111\ 64	15	33	5	31	13	14	=111\ 66
24	4	32	6	23	22	=111\158	23	4	32	6	24	22	=111\158	22	4	32	6	24	23	=111\156
16	30	8	28	17	12	=111\ 64	17	30	8	28	16	12	=111\ 64	18	30	8	28	16	11	=111\ 66
21	7	29	9	20	25	=111\158	20	7	29	9	21	25	=111\158	19	7	29	9	21	26	=111\156
111 111 111 111 111 111	Co\umn	111 111 111 111 111 111	Co\umn	111 111 111 111 111 111	Co\umn															

/ 64/158/ 64/158/ 64/158/ PDSums						/ 64/158/ 64/158/ 64/158/ PDSums						/ 66/156/ 66/156/ 66/156/ PDSums					
49057/ Row\PD						50737/ Row\PD						51985/ Row\PD					
13	36	2	34	4	22 =111\ 62	14	36	2	34	4	21 =111\ 64	15	35	1	33	3	24 =111\ 62
24	1	35	3	33	15 =111\160	23	1	35	3	33	16 =111\158	22	2	36	4	34	13 =111\160
17	32	6	30	8	18 =111\ 62	18	32	6	30	8	17 =111\ 64	19	31	5	29	7	20 =111\ 62
20	5	31	7	29	19 =111\160	19	5	31	7	29	20 =111\158	14	10	28	12	26	21 =111\160
21	28	10	26	12	14 =111\ 62	22	28	10	26	12	13 =111\ 64	23	27	9	25	11	16 =111\ 62
16	9	27	11	25	23 =111\160	15	9	27	11	25	24 =111\158	18	6	32	8	30	17 =111\160
111 111 111 111 111 111	Column	111 111 111 111 111 111	Column	111 111 111 111 111 111	Column												
/ 62/160/ 62/160/ 62/160/	PDSums	/ 64/158/ 64/158/ 64/158/	PDSums	/ 62/160/ 62/160/ 62/160/	PDSums												
52657/ Row\PD						52945/ Row\PD											
16	35	1	33	3	23 =111\ 64	17	32	5	8	29	20 =111\ 94						
21	2	36	4	34	14 =111\158	24	1	36	25	12	13 =111\128						
20	31	5	29	7	19 =111\ 64	14	35	2	11	26	23 =111\ 94						
13	10	28	12	26	22 =111\158	22	3	34	27	10	15 =111\128						
24	27	9	25	11	15 =111\ 64	16	33	4	9	28	21 =111\ 94						
17	6	32	8	30	18 =111\158	18	7	30	31	6	19 =111\128						
111 111 111 111 111 111	Column	111 111 111 111 111 111	Column	111 111 111 111 111 111	Column												
/ 64/158/ 64/158/ 64/158/	PDSums	/ 94/128/ 94/128/ 94/128/	PDSums	[Count = 53136] OK!													

Do you see the opposite properties between the Ordinary Composite type and the Diamond Composite one? They make a beautiful contrast, indeed.

The next list also shows my collection of 'too good solutions to be thrown away'.

**** Ordinary 'Composite' Type of Semi-Panmagic Squares 6x6: ****
**** List 2 of Standard Solutions with Check-Sums ****

1/ Row\PD						577/ Row\PD						1153/ Row\PD					
1	36	5	32	9	28 =111\110	2	35	6	31	10	27 =111\110	3	35	7	32	9	25 =111\110
33	4	29	8	25	12 =111\112	34	3	30	7	26	11 =111\112	34	2	30	5	28	12 =111\112
15	22	19	18	23	14 =111\110	13	24	17	20	21	16 =111\110	15	23	19	20	21	13 =111\110
24	13	20	17	16	21 =111\112	22	15	18	19	14	23 =111\112	22	14	18	17	16	24 =111\112
27	10	31	6	35	2 =111\110	28	9	32	5	36	1 =111\110	27	11	31	8	33	1 =111\110
11	26	7	30	3	34 =111\112	12	25	8	29	4	33 =111\112	10	26	6	29	4	36 =111\112
111 111 111 111 111 111	Column	111 111 111 111 111 111	Column	111 111 111 111 111 111	Column												
/110/112/110/112/110/112/	PDSums	/110/112/110/112/110/112/	PDSums	/110/112/110/112/110/112/	PDSums												
1665/ Row\PD						2177/ Row\PD						2689/ Row\PD					
4	36	5	30	10	26 =111\110	5	36	4	30	10	26 =111\110	6	36	4	29	10	26 =111\112
33	1	32	7	27	11 =111\112	32	1	33	7	27	11 =111\112	31	1	33	8	27	11 =111\110
16	24	17	18	22	14 =111\110	17	24	16	18	22	14 =111\110	18	24	16	17	22	14 =111\112
21	13	20	19	15	23 =111\112	20	13	21	19	15	23 =111\112	19	13	21	20	15	23 =111\110
28	12	29	6	34	2 =111\110	29	12	28	6	34	2 =111\110	30	12	28	5	34	2 =111\112
9	25	8	31	3	35 =111\112	8	25	9	31	3	35 =111\112	7	25	9	32	3	35 =111\110
111 111 111 111 111 111	Column	111 111 111 111 111 111	Column	111 111 111 111 111 111	Column												
/110/112/110/112/110/112/	PDSums	/110/112/110/112/110/112/	PDSums	/112/110/112/110/112/110/	PDSums												
3201/ Row\PD						3457/ Row\PD						3713/ Row\PD					
7	35	3	32	9	25 =111\110	8	35	3	31	9	25 =111\112	9	36	1	32	5	28 =111\110
30	2	34	5	28	12 =111\112	29	2	34	6	28	12 =111\110	25	4	33	8	29	12 =111\112
19	23	15	20	21	13 =111\110	20	23	15	19	21	13 =111\112	23	22	15	18	19	14 =111\110
6	26	10	29	4	36 =111\112	5	26	10	30	4	36 =111\110	3	26	11	30	7	34 =111\112
31	11	27	8	33	1 =111\110	32	11	27	7	33	1 =111\112	35	10	27	6	31	2 =111\110
18	14	22	17	16	24 =111\112	17	14	22	18	16	24 =111\110	16	13	24	17	20	21 =111\112
111 111 111 111 111 111	Column	111 111 111 111 111 111	Column	111 111 111 111 111 111	Column												
/110/112/110/112/110/112/	PDSums	/112/110/112/110/112/110/	PDSums	/110/112/110/112/110/112/	PDSums												
3969/ Row\PD						4225/ Row\PD						4417/ Row\PD					
10	36	4	30	5	26 =111\110	11	34	3	30	7	26 =111\110	12	34	2	30	5	28 =111\110
27	1	33	7	32	11 =111\112	27	2	35	6	31	10 =111\112	25	3	35	7	32	9 =111\112
22	24	16	18	17	14 =111\110	23	22	15	18	19	14 =111\110	24	22	14	18	17	16 =111\110
3	25	9	31	8	35 =111\112	1	28	9	32	5	36 =111\112	1	27	11	31	8	33 =111\112
34	12	28	6	29	2 =111\110	33	12	25	8	29	4 =111\110	36	10	26	6	29	4 =111\110
15	13	21	19	20	23 =111\112	16	13	24	17	20	21 =111\112	13	15	23	19	20	21 =111\112
111 111 111 111 111 111	Column	111 111 111 111 111 111	Column	111 111 111 111 111 111	Column												
/110/112/110/112/110/112/	PDSums	/110/112/110/112/110/112/	PDSums	/110/112/110/112/110/112/	PDSums												

4609/ Row\PD						4801/ Row\PD						4993/ Row\PD								
13	36	4	10	26	22	=111\110	14	36	4	10	26	21	=111\112	15	35	3	9	25	24	=111\110
24	1	33	27	11	15	=111\112	23	1	33	27	11	16	=111\110	22	2	34	28	12	13	=111\112
17	32	8	6	30	18	=111\110	18	32	8	6	30	17	=111\112	19	31	7	5	29	20	=111\110
20	5	29	31	7	19	=111\112	19	5	29	31	7	20	=111\110	14	10	26	36	4	21	=111\112
21	28	12	2	34	14	=111\110	22	28	12	2	34	13	=111\112	23	27	11	1	33	16	=111\110
16	9	25	35	3	23	=111\112	15	9	25	35	3	24	=111\110	18	6	30	32	8	17	=111\112
111 111 111 111 111 111 Co\umn						111 111 111 111 111 111 Co\umn						111 111 111 111 111 111 Co\umn								
/110/112/110/112/110/112 PDSums						/112/110/112/110/112/110 PDSums						/110/112/110/112/110/112 PDSums								
5057/ Row\PD						5121/ Row\PD														
16	35	3	9	25	23	=111\112	17	32	5	8	29	20	=111\110							
21	2	34	28	12	14	=111\110	24	1	36	25	12	13	=111\112							
20	31	7	5	29	19	=111\112	16	33	4	9	28	21	=111\110							
13	10	26	36	4	22	=111\110	14	11	26	35	2	23	=111\112							
24	27	11	1	33	15	=111\112	22	27	10	3	34	15	=111\110							
17	6	30	32	8	18	=111\110	18	7	30	31	6	19	=111\112							
111 111 111 111 111 111 Co\umn						111 111 111 111 111 111 Co\umn						[Count = 5184] OK!								
/112/110/112/110/112/110 PDSums						/110/112/110/112/110/112 PDSums														

** Listed by Kanji Setsuda on January 16, 2010 with MacOSX and Xcode3.1.2 **

I was deeply impressed with so many counts of those 'still too good solutions to be thrown away'. They do not seem to come out by accident, but they should come out to exist necessarily as they are, I suppose.

#6. Conclusion

What we have made here is the 'Diamond Composite and Complete' type of Pandiagonal Semi-magic Squares of Order 6, whose properties are really unique: their pandiagonals add up to the magic constant, while their rows and columns do not always add up equal to the constant. These characters show a good contrast to the ones of ordinary Composite Semi-panmagic Squares of order 6: their rows and columns add up to the magic constant, while their pandiagonals do not add up equal to the constant.

The 'Diamond Composite' Conditions and the ordinary Composite Conditions are 'incompatible' with each other. If you take both of them totally for the first definitions, you can not make any actual solution at all.

They are not interdependent, either. They are really independent.

Both of them, however, seem to work well together to explain effectively about the negative secrets of the world of Order 6. Remember we can build neither any Pandiagonal Magic Squares nor any Self-complementary Magic Squares of Order 6.

For my last words, I have to express my deepest thanks to Miguel (Angel Amela), who inspired and encouraged me a lot by his mails full of gentle heart.

(English Version written on March 16, 2010 by Kanji Setsuda with MacOSX & Xcode3.1.2)

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