

Part 3: New Algebraic Study of Magic Squares: Kanji Setsuda
Chapter 9: Fundamental Study of Composite Magic Squares:
Section 6: 'Diamond Composite' Pan-diagonal Squares of Order 10

#0. Study More about 'Diamond Composite & Complete' Pandiagonal Squares

In this section let's study and know whether we can build any 'Diamond Composite' squares or not in the cases of any other orders than 6. If we can build no real object, then we must prove it is impossible with any logical method.

Let's build any actual solutions of 'Diamond Composite and Complete' Pandiagonal Semi-magic Squares of Order 10 in the end.

#1. Prove Impossibilities of Making 'Diamond C & C' of Order 4, 5, 7, and 8.

We use the *reductio ad absurdum* for our logical proof of impossibility. It is the way we demonstrate the definitions to be impossible by reducing our calculation to any unreasonable, unacceptable result under those definitions. We must explain our logical result proves to be against the first definitions themselves or against the basic promise such as: "Each of serial Natural Numbers {1,2,3,4, ..., N²} is used strictly once for making the object. Neither duplication nor lack of any number is permitted".

1-1. Case Study of Order 4: Any 'Diamond Composite' Square 4x4 is impossible.

Suppose you are making your object under such definitions as follows:

**** Basic Form and Basic Equations for DCS44 ****

11 12 9 10 11 12 9 10 11	$n_1+n_6+n_8+n_9 = D$	...dc1;
15 16 13 14 15 16 13 14 15	$n_2+n_7+n_5+n_{10} = D$	...dc2;
3 4 1 2 3 4 1 2 3	$n_3+n_8+n_6+n_{11} = D$	...dc3;
7 8 5 6 7 8 5 6 7	$n_4+n_5+n_7+n_{12} = D$	...dc4;
11 12 9 10 11 12 9 10 11	$n_5+n_{10}+n_{12}+n_{13} = D$	...dc5;
15 16 13 14 15 16 13 14 15	$n_6+n_{11}+n_9+n_{14} = D$	...dc6;
3 4 1 2 3 4 1 2 3	$n_7+n_{12}+n_{10}+n_{15} = D$	...dc7;
7 8 5 6 7 8 5 6 7	$n_8+n_9+n_{11}+n_{16} = D$	...dc8;
11 12 9 10 11 12 9 10 11	$n_9+n_{14}+n_{16}+n_1 = D$	...dc9;
15 16 13 14 15 16 13 14 15	$n_{10}+n_{15}+n_{13}+n_2 = D$	...dc10;
3 4 1 2 3 4 1 2 3	$n_{11}+n_{16}+n_{14}+n_3 = D$	...dc11;
7 8 5 6 7 8 5 6 7	$n_{12}+n_{13}+n_{15}+n_4 = D$	...dc12;
	$n_{13}+n_2+n_4+n_5 = D$	...dc13;
	$n_{14}+n_3+n_1+n_6 = D$	...dc14;
	$n_{15}+n_4+n_2+n_7 = D$	...dc15;
	$n_{16}+n_1+n_3+n_8 = D$	...dc16;

Add both sides of those 16 equations above: $dc_1+dc_2+dc_3+\dots+dc_{15}+dc_{16}$

$$\begin{aligned}
 4*(n_1+n_2+n_3+n_4+\dots+n_{14}+n_{15}+n_{16}) &= 16*D \\
 n_1+n_2+n_3+n_4+\dots+n_{14}+n_{15}+n_{16} &= 4*D \\
 1+2+3+4+5+6+\dots+14+15+16 &= 4*D \\
 (1+16)*16/2 &= 4*D \\
 \text{Therefore } D &= 34
 \end{aligned}$$

Find the Complementary Pairs whose sum is equal to each other.

$$\begin{aligned}
 n_1+n_6+n_8+n_9=D \quad \dots dc_1; \quad n_8+n_9+n_{11}+n_{16}=D \quad \dots dc_8; \quad \rightarrow n_1+n_6=n_{11}+n_{16}=CS_1 \\
 n_6+n_{11}+n_9+n_{14}=D \quad \dots dc_6; \quad n_9+n_{14}+n_{16}+n_1=D \quad \dots dc_9; \quad \rightarrow n_6+n_{11}=n_{16}+n_1=CS_2 \\
 CS_1-CS_2: \quad n_1-n_{11}=n_{11}-n_1; \quad \text{or } 2*n_1=2*n_{11}; \quad \text{or } n_1=n_{11};
 \end{aligned}$$

It means both n_1 and n_{11} should take the same value.

But this conclusion is too unreasonable to accept. It is against our first promise that we must use each of Natural Numbers {1, 2, 3, 4, 5, ..., 14, 15, 16} strictly once for making our object. No duplication of any number is permitted.

Because you should inevitably come up against this unreasonable result under the definitions, it is impossible to make any 'Diamond Composite' Squares of Order 4.

1-2. Case Study of Order 5: Any 'Diamond Composite' Square 5x5 is impossible.

Suppose you are making your object under such definitions as follows:

**** Basic Form and Basic Equations for DCS55 ****

23	24	25	21	22	23	24	25	21	22	23	$n1+n7+n10+n11=D$	...	dc1;
3	4	5	1	2	3	4	5	1	2	3	$n2+n8+n6+n12=D$	...	dc2;
8	9	10	6	7	8	9	10	6	7	8	$n3+n9+n7+n13=D$	...	dc3;
13	14	15	11	12	13	14	15	11	12	13	$n4+n10+n8+n14=D$	...	dc4;
18	19	20	16	17	18	19	20	16	17	18	$n5+n6+n9+n15=D$	...	dc5;
23	24	25	21	22	23	24	25	21	22	23	$n6+n12+n15+n16=D$	...	dc6;
3	4	5	1	2	3	4	5	1	2	3	$n7+n13+n11+n17=D$	...	dc7;
8	9	10	6	7	8	9	10	6	7	8	$n8+n14+n12+n18=D$	...	dc8;
											$n9+n15+n13+n19=D$	...	dc9;
											$n10+n11+n14+n20=D$	...	dc10;
											$n11+n17+n20+n21=D$	...	dc11;
											$n12+n18+n16+n22=D$...	dc12;
											$n13+n19+n17+n23=D$...	dc13;
											$n14+n20+n18+n24=D$...	dc14;
											$n15+n16+n19+n25=D$...	dc15;
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											$n16+n22+n25+n1=D$...	dc16;
											$n17+n23+n21+n2=D$...	dc17;
											$n18+n24+n22+n3=D$...	dc18;
											$n19+n25+n23+n4=D$...	dc19;
											$n20+n21+n24+n5=D$	...	dc20;
											$n21+n2+n5+n6=D$	...	dc21;
											$n22+n3+n1+n7=D$	...	dc22;
											$n23+n4+n2+n8=D$	...	dc23;
											$n24+n5+n3+n9=D$	...	dc24;
											$n25+n1+n4+n10=D$	...	dc25;

Find the following complementary pairs whose sum is equal to each other.

$$n1+n7=n14+n20=n22+n3=n10+n11=n18+n24$$

Pick up $n1+n7+n22+n3=D$...dc22; and replace $n22+n3$ with $n1+n7$;

$$n1+n7+n1+n7=D; \text{ Therefore } n1+n7=D/2 \text{ ...CS1;}$$

On the other hand $n7+n13=n20+n21=n3+n9=n11+n17=n24+n5$

Pick up $n7+n13+n11+n17=D$...dc7; and replace $n11+n17$ with $n7+n13$;

$$n7+n13+n7+n13=D \text{ Therefore } n7+n13=D/2 \text{ ...CS2}$$

Because $CS1=CS2$; $n1+n7=n7+n13=26$; Therefore $n1=n13$

Because you should inevitably come up to this unreasonable result under the definitions, it is impossible to make any 'Diamond Composite' Squares of Order 5.

The 'net' structure of any odd order is always confused in its extended space.

1-3. Case Study of Order 7: Any 'Diamond Composite' Square 7x7 is impossible.

Suppose you are making your object under such definitions as follows:

**** Basic Form and Basic Equations for DCS77 ****

47	48	49	43	44	45	46	47	48	49	43	44	45	$n1+n9+n14+n15=D$	...	dc1;
5	6	7	1	2	3	4	5	6	7	1	2	3	$n2+n10+n8+n16=D$	...	dc2;
12	13	14	8	9	10	11	12	13	14	8	9	10	$n3+n11+n9+n17=D$	...	dc3;
19	20	21	15	16	17	18	19	20	21	15	16	17	$n4+n12+n10+n18=D$	...	dc4;
26	27	28	22	23	24	25	26	27	28	22	23	24	$n5+n13+n11+n19=D$	...	dc5;
33	34	35	29	30	31	32	33	34	35	29	30	31	$n6+n14+n12+n20=D$	...	dc6;
40	41	42	36	37	38	39	40	41	42	36	37	38	$n7+n8+n13+n21=D$	...	dc7;
47	48	49	43	44	45	46	47	48	49	43	44	45	$n8+n16+n21+n22=D$	...	dc8;
5	6	7	1	2	3	4	5	6	7	1	2	3	$n9+n17+n15+n23=D$	...	dc9;
12	13	14	8	9	10	11	12	13	14	8	9	10	$n10+n18+n16+n24=D$	...	dc10;
													$n11+n19+n17+n25=D$	...	dc11;
													$n12+n20+n18+n26=D$	...	dc12;
													$n13+n21+n19+n27=D$	...	dc13;
													$n14+n15+n20+n28=D$	...	dc14;
													$n15+n23+n28+n29=D$	...	dc15;
													$n16+n24+n22+n30=D$...	dc16;
													$n17+n25+n23+n31=D$...	dc17;
													$n18+n26+n24+n32=D$...	dc18;
													$n19+n27+n25+n33=D$...	dc19;
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													$n20+n28+n26+n34=D$...	dc20;
													$n21+n22+n27+n35=D$...	dc21;
													$n22+n30+n35+n36=D$...	dc22;
													$n23+n31+n29+n37=D$...	dc23;
													$n24+n32+n30+n38=D$	...	dc24;
													$n25+n33+n31+n39=D$	...	dc25;
													$n26+n34+n32+n40=D$	...	dc26;
													$n27+n35+n33+n41=D$	...	dc27;

n28+n29+n34+n42=D ... dc28;	n29+n37+n42+n43=D ... dc29;
n30+n38+n36+n44=D ... dc30;	n31+n39+n37+n45=D ... dc31;
n32+n40+n38+n46=D ... dc32;	n33+n41+n39+n47=D ... dc33;
n34+n42+n40+n48=D ... dc34;	n35+n36+n41+n49=D ... dc35;
n36+n44+n49+n1=D ... dc36;	n37+n45+n43+n2=D ... dc37;
n38+n46+n44+n3=D ... dc38;	n39+n47+n45+n4=D ... dc39;
n40+n48+n46+n5=D ... dc40;	n41+n49+n47+n6=D ... dc41;
n42+n43+n48+n7=D ... dc42;	n43+n2+n7+n8=D ... dc43;
n44+n3+n1+n9=D ... dc44;	n45+n4+n2+n10=D ... dc45;
n46+n5+n3+n11=D ... dc46;	n47+n6+n4+n12=D ... dc47;
n48+n7+n5+n13=D ... dc48;	n49+n1+n6+n14=D ... dc49;

Find the following complementary pairs whose sum is equal to each other.

$$n1+n9=n20+n28=n32+n40=n44+n3=n14+n15=n26+n34=n38+n46$$

Pick up $n1+n9+n44+n3=D \dots dc44$; and replace $n44+n3$ with $n1+n9$

$$n1+n9+n1+n9=D; \text{ or } n1+n9=D/2 \dots CS1$$

In the same way $n9+n17=n28+n29=n40+n48=n3+n11=n15+n23=n34+n42=n46+n5$

Pick up $n9+n17+n15+n23=D \dots dc9$; and replace $n15+n23$ with $n9+n17$

$$n9+n17+n9+n17=D; \text{ or } n9+n17=D/2 \dots CS2$$

$$CS1=CS2 \rightarrow n1+n9=n9+n17=50 \text{ or } n1=n17$$

As you should inevitably come up to this unreasonable result under the definitions, it is impossible to make any 'Diamond Composite' Squares of Order 7.

The confused net structure of any odd order always denies any object to be made.

1-4. Case Study of Order 8: Any 'Diamond Composite' Square 8x8 is impossible.

Suppose you are making your object under such definitions as follows:

**** Basic Form and Basic Equations for DCS88 ****

54 55 56 49 50 51 52 53 54 55 56 49 50 51 52	n1+n16+n10+n17=D ... dc1;
62 63 64 57 58 59 60 61 62 63 64 57 58 59 60	n2+n9+n11+n18=D ... dc2;
6 7 8 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 2 3 4	n3+n10+n12+n19=D ... dc3;
14 15 16 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 9 10 11 12	n4+n11+n13+n20=D ... dc4;
22 23 24 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 17 18 19 20	n5+n12+n14+n21=D ... dc5;
30 31 32 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 25 26 27 28	n6+n13+n15+n22=D ... dc6;
38 39 40 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 33 34 35 36	n7+n14+n16+n23=D ... dc7;
46 47 48 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 41 42 43 44	n8+n15+n9+n24=D ... dc8;
54 55 56 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 49 50 51 52	n9+n24+n18+n25=D ... dc9;
62 63 64 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 57 58 59 60	n10+n17+n19+n26=D ... dc10;
6 7 8 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 2 3 4	n11+n18+n20+n27=D ... dc11;
14 15 16 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 9 10 11 12	n12+n19+n21+n28=D ... dc12;
...	n13+n20+n22+n29=D ... dc13;
...	n14+n21+n23+n30=D ... dc14;
...	n15+n22+n24+n31=D ... dc15;
...	n16+n23+n17+n32=D ... dc16;
...	n17+n32+n26+n33=D ... dc17;
...	n18+n25+n27+n34=D ... dc18;
...	n19+n26+n28+n35=D ... dc19;
...	n20+n27+n29+n36=D ... dc20;
...	n21+n28+n30+n37=D ... dc21;
...	n22+n29+n31+n38=D ... dc22;
...	n23+n30+n32+n39=D ... dc23;
...	n24+n31+n25+n40=D ... dc24;

Find the following complementary pairs whose sum is equal to each other.

$$n1+n10=n23+n32=n37+n46=n51+n60=CS1$$

$$n19+n28=n33+n42=n55+n64=n5+n14=CS2$$

Pick up the diagonal $n1+n10+n19+n28+n37+n46+n55+n64=Pd$ and replace equal pairs:

$$=n1+n10+n19+n28+n1+n10+n19+n28=Pd$$

Therefore $n1+n10+n19+n28=Pd/2 \dots (a)$

On the other hand $n64+n1=n14+n23=n28+n37=n42+n51=CS3$

$$n10+n19=n32+n33=n46+n55=n60+n5=CS4$$

Replace the diagonal $n1+n10+n19+n28+n37+n46+n55+n64=Pd$ with equal pairs:

$$=n64+n1+n10+n19+n64+n1+n10+n19=Pd$$

Therefore $n64+n1+n10+n19=Pd/2 \dots (b)$

Because (a)=(b), $n_{28}=n_{64}$

As you should inevitably come up to this unreasonable result under the definitions, it is impossible for you to make any 'Diamond Composite' Squares of Order 8.

If you do the same thing as above, you can prove any of DCS9, DCS11, DCS12 or DCS13, ... is impossible to be made.

Which orders can you make 'Diamond Composite and Complete' Pandiagonal Semi-magic Squares of, then? You can make only DCS6, DCS10, DCS14 and DCS18,

#2. Build the 'Diamond Composite & Complete' Pandiagonal Squares 10x10

2-1. Definitions: Basic Form and Basic Equations ('H0' means '100')

96	97	98	99	H0	91	92	93	94	95	96	97	98	99	H0	91	92	93	94	95
6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5
16	17	18	19	20	11	12	13	14	15	16	17	18	19	20	11	12	13	14	15
26	27	28	29	30	21	22	23	24	25	26	27	28	29	30	21	22	23	24	25
36	37	38	39	40	31	32	33	34	35	36	37	38	39	40	31	32	33	34	35
46	47	48	49	50	41	42	43	44	45	46	47	48	49	50	41	42	43	44	45
56	57	58	59	60	51	52	53	54	55	56	57	58	59	60	51	52	53	54	55
66	67	68	69	70	61	62	63	64	65	66	67	68	69	70	61	62	63	64	65
76	77	78	79	80	71	72	73	74	75	76	77	78	79	80	71	72	73	74	75
86	87	88	89	90	81	82	83	84	85	86	87	88	89	90	81	82	83	84	85
96	97	98	99	H0	91	92	93	94	95	96	97	98	99	H0	91	92	93	94	95
6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5
16	17	18	19	20	11	12	13	14	15	16	17	18	19	20	11	12	13	14	15

** Constant Sum of 'Diamond Composite' Combinations of 4 numbers: D=202 **

$n_1+n_{12}+n_{20}+n_{21}=D$	... dc1;	$n_{51}+n_{62}+n_{70}+n_{71}=D$	... dc51;
$n_2+n_{13}+n_{11}+n_{22}=D$	... dc2;	$n_{52}+n_{63}+n_{61}+n_{72}=D$	... dc52;
$n_3+n_{14}+n_{12}+n_{23}=D$	... dc3;	$n_{53}+n_{64}+n_{62}+n_{73}=D$	... dc53;
$n_4+n_{15}+n_{13}+n_{24}=D$	... dc4;	$n_{54}+n_{65}+n_{63}+n_{74}=D$	... dc54;
$n_5+n_{16}+n_{14}+n_{25}=D$	... dc5;	$n_{55}+n_{66}+n_{64}+n_{75}=D$	... dc55;
$n_6+n_{17}+n_{15}+n_{26}=D$	... dc6;	$n_{56}+n_{67}+n_{65}+n_{76}=D$	... dc56;
$n_7+n_{18}+n_{16}+n_{27}=D$	... dc7;	$n_{57}+n_{68}+n_{66}+n_{77}=D$	... dc57;
$n_8+n_{19}+n_{17}+n_{28}=D$	... dc8;	$n_{58}+n_{69}+n_{67}+n_{78}=D$	... dc58;
$n_9+n_{20}+n_{18}+n_{29}=D$	... dc9;	$n_{59}+n_{70}+n_{68}+n_{79}=D$	... dc59;
$n_{10}+n_{11}+n_{19}+n_{30}=D$	... dc10;	$n_{60}+n_{61}+n_{69}+n_{80}=D$	... dc60;
$n_{11}+n_{22}+n_{30}+n_{31}=D$	... dc11;	$n_{61}+n_{72}+n_{80}+n_{81}=D$	... dc61;
$n_{12}+n_{23}+n_{21}+n_{32}=D$	... dc12;	$n_{62}+n_{73}+n_{71}+n_{82}=D$	... dc62;
$n_{13}+n_{24}+n_{22}+n_{33}=D$	... dc13;	$n_{63}+n_{74}+n_{72}+n_{83}=D$	... dc63;
$n_{14}+n_{25}+n_{23}+n_{34}=D$	... dc14;	$n_{64}+n_{75}+n_{73}+n_{84}=D$	... dc64;
$n_{15}+n_{26}+n_{24}+n_{35}=D$	... dc15;	$n_{65}+n_{76}+n_{74}+n_{85}=D$	... dc65;
$n_{16}+n_{27}+n_{25}+n_{36}=D$	... dc16;	$n_{66}+n_{77}+n_{75}+n_{86}=D$	... dc66;
$n_{17}+n_{28}+n_{26}+n_{37}=D$	... dc17;	$n_{67}+n_{78}+n_{76}+n_{87}=D$	... dc67;
$n_{18}+n_{29}+n_{27}+n_{38}=D$	... dc18;	$n_{68}+n_{79}+n_{77}+n_{88}=D$	... dc68;
$n_{19}+n_{30}+n_{28}+n_{39}=D$	... dc19;	$n_{69}+n_{80}+n_{78}+n_{89}=D$	... dc69;
$n_{20}+n_{21}+n_{29}+n_{40}=D$	... dc20;	$n_{70}+n_{71}+n_{79}+n_{90}=D$	... dc70;
$n_{21}+n_{32}+n_{40}+n_{41}=D$	... dc21;	$n_{71}+n_{82}+n_{90}+n_{91}=D$	... dc71;
$n_{22}+n_{33}+n_{31}+n_{42}=D$	... dc22;	$n_{72}+n_{83}+n_{81}+n_{92}=D$	... dc72;
$n_{23}+n_{34}+n_{32}+n_{43}=D$	... dc23;	$n_{73}+n_{84}+n_{82}+n_{93}=D$	... dc73;

n24+n35+n33+n44=D ... dc24;	|	n74+n85+n83+n94=D ... dc74;
n25+n36+n34+n45=D ... dc25;	|	n75+n86+n84+n95=D ... dc75;
n26+n37+n35+n46=D ... dc26;	|	n76+n87+n85+n96=D ... dc76;
n27+n38+n36+n47=D ... dc27;	|	n77+n88+n86+n97=D ... dc77;
n28+n39+n37+n48=D ... dc28;	|	n78+n89+n87+n98=D ... dc78;
n29+n40+n38+n49=D ... dc29;	|	n79+n90+n88+n99=D ... dc79;
n30+n31+n39+n50=D ... dc30;	|	n80+n81+n89+n100=D ... dc80;
n31+n42+n50+n51=D ... dc31;	|	n81+n92+n100+n1=D ... dc81;
n32+n43+n41+n52=D ... dc32;	|	n82+n93+n91+n2=D ... dc82;
n33+n44+n42+n53=D ... dc33;	|	n83+n94+n92+n3=D ... dc83;
n34+n45+n43+n54=D ... dc34;	|	n84+n95+n93+n4=D ... dc84;
n35+n46+n44+n55=D ... dc35;	|	n85+n96+n94+n5=D ... dc85;
n36+n47+n45+n56=D ... dc36;	|	n86+n97+n95+n6=D ... dc86;
n37+n48+n46+n57=D ... dc37;	|	n87+n98+n96+n7=D ... dc87;
n38+n49+n47+n58=D ... dc38;	|	n88+n99+n97+n8=D ... dc88;
n39+n50+n48+n59=D ... dc39;	|	n89+n100+n98+n9=D ... dc89;
n40+n41+n49+n60=D ... dc40;	|	n90+n91+n99+n10=D ... dc90;
n41+n52+n60+n61=D ... dc41;	|	n91+n2+n10+n11=D ... dc91;
n42+n53+n51+n62=D ... dc42;	|	n92+n3+n1+n12=D ... dc92;
n43+n54+n52+n63=D ... dc43;	|	n93+n4+n2+n13=D ... dc93;
n44+n55+n53+n64=D ... dc44;	|	n94+n5+n3+n14=D ... dc94;
n45+n56+n54+n65=D ... dc45;	|	n95+n6+n4+n15=D ... dc95;
n46+n57+n55+n66=D ... dc46;	|	n96+n7+n5+n16=D ... dc96;
n47+n58+n56+n67=D ... dc47;	|	n97+n8+n6+n17=D ... dc97;
n48+n59+n57+n68=D ... dc48;	|	n98+n9+n7+n18=D ... dc98;
n49+n60+n58+n69=D ... dc49;	|	n99+n10+n8+n19=D ... dc99;
n50+n51+n59+n70=D ... dc50;	|	n100+n1+n9+n20=D ... dc100;

**** For Constant Sum of Pan-diagonals: C=505 ****

n1+n12+n23+n34+n45+n56+n67+n78+n89+n100=C; ...Pd1
n10+n19+n28+n37+n46+n55+n64+n73+n82+n91=C; ...Pb1

**** Constant Sum of 'Complete' Complementary Pairs: CC=101 ****

n1+n56=n2+n57=n3+n58=n4+n59=n5+n60=n6+n51=n7+n52=n8+n53=n9+n54=n10+n55=n11+n66
=n12+n67=n13+n68=n14+n69=n15+n70=n16+n61=n17+n62=n18+n63=n19+n64=n20+n65=n21+n76
=n22+n77=n23+n78=n24+n79=n25+n80=n26+n71=n27+n72=n28+n73=n29+n74=n30+n75=n31+n86
=n32+n87=n33+n88=n34+n89=n35+n90=n36+n81=n37+n82=n38+n83=n39+n84=n40+n85=n41+n96
=n42+n97=n43+n98=n44+n99=n45+n100=n46+n91=n47+n92=n48+n93=n49+n94=n50+n95=CC

You may wonder why I list up only two conditions to define all pan-diagonals. It is all right, for we have got 'Diamond Composite Conditions' as many as 100.

Let me explain it by some algebraic calculations as follows:

Find the group of Complementary Pairs whose sums are equal to each other:

n1+n12=n29+n40=n47+n58=n65+n76=n83+n94
n56+n67+n65+n76=D; --> n1+n12+n56+n67=D; ... (A)
n23+n34=n41+n52=n69+n80=n87+n98=n5+n16
n78+n89+n87+n98=D; --> n23+n34+n78+n89=D; ... (B)
n45+n56=n63+n74=n81+n92=n9+n20=n27+n38
n100+n1+n9+n20=D; --> n45+n56+n100+n1=D; ... (C)

(A)+(B)+(C)
(n1+n12+n23+n34+n45+n56+n67+n78+n89+n100)+(n1+n56)=3*D ... (D)

In the same way

(n1+n12+n23+n34+n45+n56+n67+n78+n89+n100)+(n12+n67)=3*D
(n1+n12+n23+n34+n45+n56+n67+n78+n89+n100)+(n23+n78)=3*D
(n1+n12+n23+n34+n45+n56+n67+n78+n89+n100)+(n34+n89)=3*D
(n1+n12+n23+n34+n45+n56+n67+n78+n89+n100)+(n45+n100)=3*D

If you assume n1+n12+n23+n34+n45+n56+n67+n78+n89+n100=505; ...Pd1

then n1+n56=n12+n67=n23+n78=n34+n89=n45+n100=3*202-505=101; ...CC

Or if you assume n1+n56=n12+n67=n23+n78=n34+n89=n45+n100=101; ...CC

then n1+n12+n23+n34+n45+n56+n67+n78+n89+n100=3*D-101=505; ...Pd1

In the same way

$$(n1+n20+n29+n38+n47+n56+n65+n74+n83+n92)+(n1+n56)=3*D \quad \dots (E)$$

and $n1+n56=n20+n65=n29+n74=n38+n83=n47+n92=3*202-505=101 \quad \dots CC$

Because (D)=(E),

$$n1+n12+n23+n34+n45+n56+n67+n78+n89+n100 \quad \dots Pd1$$

$$=n1+n20+n29+n38+n47+n56+n65+n74+n83+n92=505 \quad \dots Pb1$$

. . . .

Those 'Complete Conditions' above are really the inherent property of 'Diamond Composite' type, and you may cut them out of the first definitions. But, you may well add them to the definition list and cut the Pan-diagonal conditions. Even when you take all of those conditions at first, you could change nothing about the result.

I like to add them all to the first list and use such the subtraction forms of them as below in our program modules. They can surely improve our calculating speed.

$$n56=101-n1; n57=101-n2; n58=101-n3; n59=101-n4; n60=101-n5; n51=101-n6; \\ n52=101-n7; n53=101-n8; n54=101-n9; n55=101-n10; n66=101-n11; \dots$$

```
/** Important Part of my Test Program **/
/* Set N1 and n56=101-N1 */
void stp01(){
  short a,b;
  for(a=1;a<98;a++){b=101-a; // (a, b) is a Complementary Pair of 101.
    if((uflg[a]==0)&&(uflg[b]==0)){
      nm[1]=a; nm[56]=b; // Set the Pair at the same time.
      uflg[a]=1; uflg[b]=1;
      stp02();
      uflg[b]=0; uflg[a]=0;}
  }
}
/* Set N12 and n67=101-N12 */
void stp02(){
  short a,b;
  for(a=100;a>0;a--){b=101-a;
    if((uflg[a]==0)&&(uflg[b]==0)){
      nm[12]=a; nm[67]=b;
      uflg[a]=1; uflg[b]=1;
      stp03();
      uflg[b]=0; uflg[a]=0;}
  }
}
/* Set N20 and n65=101-N20 */
void stp03(){
  short a,b;
  for(a=100;a>0;a--){b=101-a;
    if((uflg[a]==0)&&(uflg[b]==0)){
      nm[20]=a; nm[65]=b;
      uflg[a]=1; uflg[b]=1;
      stp04();
      uflg[b]=0; uflg[a]=0;}
  }
}
/* Set n21=202-n1-n20-n12 and n76=101-n21 */
void stp04(){
  short a,b;
  a=202-nm[1]-nm[20]-nm[12];
  b=202-nm[56]-nm[65]-nm[67];
  if((0<a)&&(a<101)&&(a+b==101)){
    if((uflg[a]==0)&&(uflg[b]==0)){
      nm[21]=a; nm[76]=b;
      uflg[a]=1; uflg[b]=1;
      stp05();
      uflg[b]=0; uflg[a]=0;}}
```

```

}
/* Set N2 and n57=101-N2 */
void stp05(){
short a,b;
for(a=100;a>0;a--){b=101-a;
if((uflg[a]==0)&&(uflg[b]==0)){
nm[2]=a; nm[57]=b;
uflg[a]=1; uflg[b]=1;
stp06();
uflg[b]=0; uflg[a]=0;}
}
}
. . . .

```

2-2 Result of the first Test Run:

Watch the next result list of my calculation, and find every pandiagonals of each solution add up to the magic constant 505, while rows and columns do not always add up equally to the same constant. But, check if two kinds of sums of rows or columns add up to up to the double constant 1010(=505x2).

487+523=1010; 296+714=1010; 426+584=1010; 263+747=1010; ...

They are really the characteristic properties of 'true' solutions.

**** Solutions of 'Diamond Composite & Complete' Pandiagonal Squares 10x10 ****
**** Compact List with Check-Sums: Calculated by Kanji Setsuda ****

1/ Row\PD										353/ Row\PD											
5	86	7	68	66	28	58	82	3	84	=487\505	6	71	3	68	20	44	54	77	9	74	=426\505
14	97	12	50	52	46	63	74	16	99	=523\505	26	99	29	82	53	85	40	51	23	96	=584\505
1	90	48	70	40	59	24	41	26	88	=487\505	1	76	18	52	15	65	12	62	46	79	=426\505
10	56	30	64	21	92	39	78	57	76	=523\505	21	84	45	87	32	90	35	93	38	59	=584\505
69	72	34	81	6	83	8	65	22	47	=487\505	58	60	13	73	10	70	7	67	4	64	=426\505
73	43	19	98	17	96	15	94	33	35	=523\505	57	47	24	92	27	95	30	98	33	81	=584\505
55	38	27	85	2	87	4	89	51	49	=487\505	16	61	50	78	5	75	2	72	19	48	=426\505
42	77	60	75	13	100	11	53	31	61	=523\505	36	89	39	55	22	100	25	83	49	86	=584\505
9	62	23	44	25	91	45	71	37	80	=487\505	11	66	8	63	42	80	17	56	14	69	=426\505
18	93	36	79	54	32	29	67	20	95	=523\505	31	94	34	97	37	43	41	88	28	91	=584\505
|296|714|296|714|296|714|296|714|296|714| Column										|263|747|263|747|263|747|263|747|263|747| Column											
/505/505/505/505/505/505/505/505/505/505| PDSums										/505/505/505/505/505/505/505/505/505/505| PDSums											
15969/ Row\PD										138753/ Row\PD											
7	76	3	72	96	51	92	84	11	80	=572\505	8	77	5	74	97	61	94	83	11	80	=590\505
20	99	24	36	33	10	49	56	16	95	=438\505	19	98	22	51	35	9	38	37	16	95	=420\505
1	82	64	73	60	69	44	53	40	86	=572\505	1	84	48	71	45	68	62	65	59	87	=590\505
14	38	23	42	27	88	31	62	47	66	=438\505	12	55	25	58	28	86	31	44	34	47	=420\505
97	83	58	79	12	75	8	71	34	55	=572\505	99	81	41	78	13	75	10	72	52	69	=590\505
50	9	17	90	21	94	25	98	29	5	=438\505	40	7	18	90	21	93	24	96	27	4	=420\505
91	52	45	85	6	81	2	77	65	68	=572\505	92	63	64	85	6	82	3	79	50	66	=590\505
32	57	48	61	15	100	19	37	28	41	=438\505	33	39	36	42	14	100	17	53	30	56	=420\505
13	70	39	54	35	87	63	78	59	74	=572\505	15	70	57	67	54	89	46	76	43	73	=590\505
26	93	30	67	46	4	18	43	22	89	=438\505	26	91	29	49	32	2	20	60	23	88	=420\505
|351|659|351|659|351|659|351|659|351|659| Column										|345|665|345|665|345|665|345|665|345|665| Column											
/505/505/505/505/505/505/505/505/505/505| PDSums										/505/505/505/505/505/505/505/505/505/505| PDSums											
260321/ Row\PD										348321/ Row\PD											
9	62	3	97	79	50	46	74	15	68	=503\505	10	63	3	76	16	48	46	77	17	70	=426\505
32	99	38	47	44	56	14	58	26	93	=507\505	30	99	37	86	45	93	36	43	23	92	=584\505
1	70	53	23	20	94	42	88	36	76	=503\505	1	72	14	44	7	73	20	66	50	79	=426\505
24	49	71	82	41	84	6	66	12	72	=507\505	21	88	49	95	40	82	27	89	34	59	=584\505
80	37	18	67	16	61	10	96	28	90	=503\505	54	60	5	69	18	62	11	75	4	68	=426\505
51	55	27	86	33	92	39	98	4	22	=507\505	53	55	24	84	31	91	38	98	25	85	=584\505
45	87	43	75	8	69	2	63	54	57	=503\505	8	65	58	78	9	71	2	64	15	56	=426\505
7	59	13	65	25	100	31	48	78	81	=507\505	28	81	35	51	22	100	29	87	57	94	=584\505
17	95	35	89	29	77	52	30	19	60	=503\505	19	74	12	67	42	80	13	52	6	61	=426\505
40	91	5	73	11	21	64	83	34	85	=507\505	39	90	26	97	33	47	41	96	32	83	=584\505
|306|704|306|704|306|704|306|704|306|704| Column										|263|747|263|747|263|747|263|747|263|747| Column											
/505/505/505/505/505/505/505/505/505/505| PDSums										/505/505/505/505/505/505/505/505/505/505| PDSums											

366689/ Row\PD										385697/ Row\PD											
11	68	3	74	96	9	48	84	19	76	=488\505	12	76	3	73	56	36	50	94	21	85	=506\505
24	99	32	44	83	54	39	40	16	91	=522\505	15	99	24	81	61	55	35	38	6	90	=504\505
1	78	56	13	8	71	60	63	52	86	=488\505	1	87	19	44	10	70	59	67	53	96	=506\505
14	46	79	94	35	80	29	50	37	58	=522\505	4	83	47	92	27	78	30	52	33	58	=504\505
97	31	6	75	20	67	12	73	42	65	=488\505	60	64	8	84	22	75	13	72	39	69	=506\505
92	53	17	82	25	90	33	98	27	5	=522\505	65	51	7	80	16	89	25	98	28	45	=504\505
47	62	61	85	10	77	2	69	57	18	=488\505	46	66	63	95	11	86	2	77	20	40	=506\505
30	41	38	49	15	100	23	45	88	93	=522\505	31	42	34	48	5	100	14	82	57	91	=504\505
21	72	51	64	43	87	55	22	7	66	=488\505	23	71	49	68	43	97	18	54	9	74	=506\505
34	89	28	59	36	4	70	95	26	81	=522\505	26	88	29	62	32	41	37	93	17	79	=504\505
|371|639|371|639|371|639|371|639|371|639| CoTumn										|283|727|283|727|283|727|283|727|283|727| CoTumn											
/505/505/505/505/505/505/505/505/505/505| PDSums										/505/505/505/505/505/505/505/505/505/505| PDSums											
595489/ Row\PD										929361/ Row\PD											
13	77	5	74	92	56	84	93	21	85	=600\505	14	78	6	73	91	55	83	94	22	86	=602\505
14	98	22	36	35	19	43	47	6	90	=410\505	13	97	21	35	36	20	44	48	5	89	=408\505
1	89	63	71	55	68	52	60	44	97	=600\505	2	90	64	72	56	67	51	59	43	98	=602\505
2	40	20	48	28	76	31	59	39	67	=410\505	1	39	19	47	27	75	32	60	40	68	=408\505
94	91	51	83	23	75	15	72	32	64	=600\505	93	92	52	84	24	76	16	71	31	63	=602\505
45	17	8	80	16	88	24	96	27	9	=410\505	46	18	7	79	15	87	23	95	28	10	=408\505
82	58	54	95	11	87	3	79	65	66	=600\505	81	57	53	96	12	88	4	80	66	65	=602\505
33	49	41	57	4	100	12	38	30	46	=410\505	34	50	42	58	3	99	11	37	29	45	=408\505
25	70	42	62	34	99	61	81	53	73	=600\505	26	69	41	61	33	100	62	82	54	74	=602\505
26	86	29	69	37	7	10	50	18	78	=410\505	25	85	30	70	38	8	9	49	17	77	=408\505
|335|675|335|675|335|675|335|675|335|675| CoTumn										|335|675|335|675|335|675|335|675|335|675| CoTumn											
/505/505/505/505/505/505/505/505/505/505| PDSums										/505/505/505/505/505/505/505/505/505/505| PDSums											

2-3. The Solution List starting with n1=1 on Left-top: (Part): by Kanji Setsuda

1/ Row\PD										18433/ Row\PD											
1	99	37	34	56	53	75	72	83	11	=521\505	1	94	37	39	56	53	75	72	83	11	=521\505
82	80	7	44	68	25	49	6	30	98	=489\505	87	80	2	44	68	25	49	6	30	98	=489\505
23	14	41	93	77	32	96	51	15	79	=521\505	23	19	41	93	77	32	96	51	15	74	=521\505
27	58	88	40	9	4	70	85	42	66	=489\505	22	58	88	40	9	4	70	85	47	66	=489\505
55	73	63	12	81	91	17	39	36	54	=521\505	55	73	63	12	81	91	17	34	36	59	=521\505
48	26	29	18	90	100	2	64	67	45	=489\505	48	26	29	18	90	100	7	64	62	45	=489\505
76	52	95	71	3	19	21	94	57	33	=521\505	76	52	95	71	3	14	21	99	57	33	=521\505
69	5	50	86	22	78	87	60	8	24	=489\505	69	5	50	86	27	78	82	60	8	24	=489\505
97	31	16	59	35	74	43	13	61	92	=521\505	97	31	16	54	35	79	43	13	61	92	=521\505
10	84	62	65	47	46	28	38	89	20	=489\505	10	84	67	65	42	46	28	38	89	20	=489\505
|488|522|488|522|488|522|488|522|488|522| CoTumn										|488|522|488|522|488|522|488|522|488|522| CoTumn											
/505/505/505/505/505/505/505/505/505/505| PDSums										/505/505/505/505/505/505/505/505/505/505| PDSums											
36865/ Row\PD										55297/ Row\PD											
1	93	37	39	56	54	75	72	83	11	=521\505	1	92	37	39	56	54	75	73	83	11	=521\505
88	80	2	44	67	25	49	6	30	98	=489\505	89	80	2	44	67	25	48	6	30	98	=489\505
23	19	41	94	77	32	96	51	15	73	=521\505	23	19	41	94	77	33	96	51	15	72	=521\505
22	58	87	40	9	4	70	85	48	66	=489\505	22	58	87	40	8	4	70	85	49	66	=489\505
55	74	63	12	81	91	17	33	36	59	=521\505	55	74	63	13	81	91	17	32	36	59	=521\505
47	26	29	18	90	100	8	64	62	45	=489\505	47	26	28	18	90	100	9	64	62	45	=489\505
76	52	95	71	3	13	21	99	57	34	=521\505	76	53	95	71	3	12	21	99	57	34	=521\505
69	5	50	86	28	78	82	60	7	24	=489\505	68	5	50	86	29	78	82	60	7	24	=489\505
97	31	16	53	35	79	43	14	61	92	=521\505	97	31	16	52	35	79	43	14	61	93	=521\505
10	84	68	65	42	46	27	38	89	20	=489\505	10	84	69	65	42	46	27	38	88	20	=489\505
|488|522|488|522|488|522|488|522|488|522| CoTumn										|488|522|488|522|488|522|488|522|488|522| CoTumn											
/505/505/505/505/505/505/505/505/505/505| PDSums										/505/505/505/505/505/505/505/505/505/505| PDSums											
73729/ Row\PD										92161/ Row\PD											
1	91	37	39	56	54	75	73	83	12	=521\505	1	90	37	19	56	54	75	73	83	32	=520\505
90	80	2	44	67	25	48	6	29	98	=489\505	71	80	2	44	87	25	48	6	29	98	=490\505
23	19	41	94	77	33	96	52	15	71	=521\505	23	39	41	94	77	13	96	52	15	70	=520\505
22	58	87	40	8	4	69	85	50	66	=489\505	22	58	67	40	8	4	89	85	51	66	=490\505
55	74	63	13	81	92	17	31	36	59	=521\505	55	74	63	33	81	92	17	10	36	59	=520\505
47	26	28	18	89	100	10	64	62	45	=489\505	47	26	28	18	69	100	11	64	82	45	=490\505
76	53	95	72	3	11	21	99	57	34	=521\505	76	53	95	72	3	30	21	99	57	14	=520\505
68	5	49	86	30	78	82	60	7	24	=489\505	88	5	49	86	31	78	62	60	7	24	=490\505
97	32	16	51	35	79	43	14	61	93	=521\505	97	12	16	50	35	79	43	34	61	93	=520\505
9	84	70	65	42	46	27	38	88	20	=489\505	9	84	91	65	42	46	27	38	68	20	=490\505

| 488 | 522 | 488 | 522 | 488 | 522 | 488 | 522 | 488 | 522 | 488 | 522 |	CoTumn	| 489 | 521 | 489 | 521 | 489 | 521 | 489 | 521 | 489 | 521 | 489 | 521 |	CoTumn
/505/505/505/505/505/505/505/505/505/505/505/505/	PD Sums	/505/505/505/505/505/505/505/505/505/505/505/505/	PD Sums
108289/ Row\PD		124417/ Row\PD	
1 89 37 19 56 54 75 73 83 31|=518\505		1 88 37 19 56 54 75 72 83 31|=516\505	
72 80 2 44 87 25 48 6 30 98|=492\505		73 80 2 44 87 25 49 6 30 98|=494\505	
23 39 41 94 77 13 96 51 15 69|=518\505		23 39 41 94 77 12 96 51 15 68|=516\505	
22 58 67 40 8 4 90 85 52 66|=492\505		22 58 67 40 9 4 90 85 53 66|=494\505	
55 74 63 33 81 91 17 9 36 59|=518\505		55 74 63 32 81 91 17 8 36 59|=516\505	
47 26 28 18 70 100 12 64 82 45|=492\505		47 26 29 18 70 100 13 64 82 45|=494\505	
76 53 95 71 3 29 21 99 57 14|=518\505		76 52 95 71 3 28 21 99 57 14|=516\505	
88 5 50 86 32 78 62 60 7 24|=492\505		89 5 50 86 33 78 62 60 7 24|=494\505	
97 11 16 49 35 79 43 34 61 93|=518\505		97 11 16 48 35 79 43 34 61 92|=516\505	
10 84 92 65 42 46 27 38 68 20|=492\505		10 84 93 65 42 46 27 38 69 20|=494\505	
| 491 | 519 | 491 | 519 | 491 | 519 | 491 | 519 | 491 | 519 | 491 | 519 |	CoTumn	| 493 | 517 | 493 | 517 | 493 | 517 | 493 | 517 | 493 | 517 | 493 | 517 |	CoTumn
/505/505/505/505/505/505/505/505/505/505/505/505/	PD Sums	/505/505/505/505/505/505/505/505/505/505/505/505/	PD Sums
140545/ Row\PD		156673/ Row\PD	
1 87 37 19 56 53 75 72 83 31|=514\505		1 82 37 14 56 53 75 72 83 31|=504\505	
74 80 2 44 88 25 49 6 30 98|=496\505		79 80 7 44 88 25 49 6 30 98|=506\505	
23 39 41 93 77 12 96 51 15 67|=514\505		23 34 41 93 77 12 96 51 15 62|=504\505	
22 58 68 40 9 4 90 85 54 66|=496\505		27 58 68 40 9 4 90 85 59 66|=506\505	
55 73 63 32 81 91 17 7 36 59|=514\505		55 73 63 32 81 91 17 2 36 54|=504\505	
48 26 29 18 70 100 14 64 82 45|=496\505		48 26 29 18 70 100 19 64 87 45|=506\505	
76 52 95 71 3 27 21 99 57 13|=514\505		76 52 95 71 3 22 21 94 57 13|=504\505	
89 5 50 86 34 78 62 60 8 24|=496\505		89 5 50 86 39 78 67 60 8 24|=506\505	
97 11 16 47 35 79 43 33 61 92|=514\505		97 11 16 42 35 74 43 33 61 92|=504\505	
10 84 94 65 42 46 28 38 69 20|=496\505		10 84 99 65 47 46 28 38 69 20|=506\505	
| 495 | 515 | 495 | 515 | 495 | 515 | 495 | 515 | 495 | 515 | 495 | 515 |	CoTumn	| 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 |	CoTumn
/505/505/505/505/505/505/505/505/505/505/505/505/	PD Sums	/505/505/505/505/505/505/505/505/505/505/505/505/	PD Sums
.			

The last solution in my list just above seems very close to the complete magic square whose rows and columns add up to the constant, say, it is 'almost complete' or 'too good to be thrown away'. Are there any other solutions of that kind?

Let me show you my collection of those 'almost complete' solutions, only a part.

**** 'Diamond Composite and Complete' Pandiagonal Semi-magic Squares 10x10 ****
**** Collection of 'Almost Complete' Solutions with n1=1: by Kanji Setsuda ****

1/ Row\PD		1153/ Row\PD	
1 99 37 30 56 49 75 68 83 7|=505\505		1 94 37 33 56 52 75 71 83 2|=504\505	
82 80 11 44 72 25 53 6 34 98|=505\505		87 80 8 44 69 25 50 6 39 98|=506\505	
23 10 41 89 77 28 96 47 15 79|=505\505		23 13 41 92 77 31 96 42 15 74|=504\505	
31 58 92 40 13 4 74 85 42 66|=505\505		28 58 89 40 10 4 79 85 47 66|=506\505	
55 69 63 8 81 87 17 39 36 50|=505\505		55 72 63 11 81 82 17 34 36 53|=504\505	
52 26 33 18 94 100 2 64 71 45|=505\505		49 26 30 18 99 100 7 64 68 45|=506\505	
76 48 95 67 3 19 21 90 57 29|=505\505		76 51 95 62 3 14 21 93 57 32|=504\505	
73 5 54 86 22 78 91 60 12 24|=505\505		70 5 59 86 27 78 88 60 9 24|=506\505	
97 27 16 59 35 70 43 9 61 88|=505\505		97 22 16 54 35 73 43 12 61 91|=504\505	
14 84 62 65 51 46 32 38 93 20|=505\505		19 84 67 65 48 46 29 38 90 20|=506\505	
| 504 | 506 | 504 | 506 | 504 | 506 | 504 | 506 | 504 | 506 | 504 | 506 |	CoTumn	| 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 |	CoTumn
/505/505/505/505/505/505/505/505/505/505/505/505/	PD Sums	/505/505/505/505/505/505/505/505/505/505/505/505/	PD Sums
2305/ Row\PD		3457/ Row\PD	
1 93 37 34 56 52 75 71 83 2|=504\505		1 92 37 34 56 53 75 71 83 2|=504\505	
88 80 7 44 69 25 50 6 39 98|=506\505		89 80 7 44 68 25 50 6 39 98|=506\505	
23 14 41 92 77 31 96 42 15 73|=504\505		23 14 41 93 77 31 96 42 15 72|=504\505	
27 58 89 40 10 4 79 85 48 66|=506\505		27 58 88 40 10 4 79 85 49 66|=506\505	
55 72 63 11 81 82 17 33 36 54|=504\505		55 73 63 11 81 82 17 32 36 54|=504\505	
49 26 30 18 99 100 8 64 67 45|=506\505		48 26 30 18 99 100 9 64 67 45|=506\505	
76 51 95 62 3 13 21 94 57 32|=504\505		76 51 95 62 3 12 21 94 57 33|=504\505	
70 5 59 86 28 78 87 60 9 24|=506\505		70 5 59 86 29 78 87 60 8 24|=506\505	
97 22 16 53 35 74 43 12 61 91|=504\505		97 22 16 52 35 74 43 13 61 91|=504\505	
19 84 68 65 47 46 29 38 90 20|=506\505		19 84 69 65 47 46 28 38 90 20|=506\505	
| 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 |	CoTumn	| 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 |	CoTumn
/505/505/505/505/505/505/505/505/505/505/505/505/	PD Sums	/505/505/505/505/505/505/505/505/505/505/505/505/	PD Sums

4609/ Row\PD

Table with 10 columns and 10 rows of numerical data.

5761/ Row\PD

Table with 10 columns and 10 rows of numerical data.

| 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | Co\umn PDSums

| 504 | 506 | 504 | 506 | 504 | 506 | 504 | 506 | 504 | 506 | Co\umn PDSums

6769/ Row\PD

Table with 10 columns and 10 rows of numerical data.

7777/ Row\PD

Table with 10 columns and 10 rows of numerical data.

| 504 | 506 | 504 | 506 | 504 | 506 | 504 | 506 | 504 | 506 | Co\umn PDSums

| 504 | 506 | 504 | 506 | 504 | 506 | 504 | 506 | 504 | 506 | Co\umn PDSums

8785/ Row\PD

Table with 10 columns and 10 rows of numerical data.

9793/ Row\PD

Table with 10 columns and 10 rows of numerical data.

| 504 | 506 | 504 | 506 | 504 | 506 | 504 | 506 | 504 | 506 | Co\umn PDSums

| 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | Co\umn PDSums

10801/ Row\PD

Table with 10 columns and 10 rows of numerical data.

11809/ Row\PD

Table with 10 columns and 10 rows of numerical data.

| 504 | 506 | 504 | 506 | 504 | 506 | 504 | 506 | 504 | 506 | Co\umn PDSums

| 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | Co\umn PDSums

12817/ Row\PD

Table with 10 columns and 10 rows of numerical data.

13825/ Row\PD

Table with 10 columns and 10 rows of numerical data.

| 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | Co\umn PDSums

| 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | Co\umn PDSums

14833/ Row\PD										15841/ Row\PD											
1	71	37	14	56	53	75	92	83	22	=504\505	1	70	37	19	56	29	75	88	83	47	=505\505
70	80	27	44	88	25	49	6	19	98	=506\505	51	80	22	44	92	25	73	6	14	98	=505\505
23	34	41	73	77	12	96	42	15	91	=504\505	23	59	41	69	77	8	96	27	15	90	=505\505
7	58	68	40	29	4	99	85	50	66	=506\505	2	58	52	40	33	4	94	85	71	66	=505\505
55	93	63	32	81	62	17	11	36	54	=504\505	55	89	63	48	81	67	17	10	36	39	=505\505
48	26	9	18	79	100	30	64	87	45	=506\505	72	26	13	18	54	100	31	64	82	45	=505\505
76	52	95	82	3	31	21	74	57	13	=504\505	76	28	95	87	3	50	21	79	57	9	=505\505
89	5	59	86	10	78	67	60	28	24	=506\505	93	5	74	86	11	78	42	60	32	24	=505\505
97	2	16	51	35	94	43	33	61	72	=504\505	97	7	16	30	35	99	43	49	61	68	=505\505
39	84	90	65	47	46	8	38	69	20	=506\505	34	84	91	65	62	46	12	38	53	20	=505\505
| 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 |	Column	| 504 | 506 | 504 | 506 | 504 | 506 | 504 | 506 | 504 | 506 | 504 | 506 |	Column																		
/505/505/505/505/505/505/505/505/505/505/505/505/	PDSums	/505/505/505/505/505/505/505/505/505/505/505/505/	PDSums																		

.....

There are too many solutions for us to count all through up to the last. It took too long a time to count even when n1=1. I had to give it up on my way.

There are also so many solutions of the 'almost complete' type. You may expect you will be able to build any complete magic squares very soon. However, there is none of such the complete one. It is the fatal fact of order 10 that neither Pandiagonal nor Self-Complementary type of Magic Squares could be built by any means.

#3. Build the ordinary type of 'Composite' Semi-panmagic Squares 10x10

Let's build and have some solutions of ordinary 'Composite' Semi-panmagic Squares of Order 10 now for our comparative study of them.

3-1. Definition of the Ordinary 'Composite' Type

** Basic Form and Basic Conditions for ordinary 'Composite' Semi-panmagic Squares of Order 10: ('H0' means '100') **

96	97	98	99	H0	91	92	93	94	95	96	97	98	99	H0	91	92	93	94	95
6	7	8	9	10	| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |	1	2	3	4	5									
16	17	18	19	20	| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |	11	12	13	14	15									
26	27	28	29	30	| 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |	21	22	23	24	25									
36	37	38	39	40	| 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |	31	32	33	34	35									
46	47	48	49	50	| 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |	41	42	43	44	45									
56	57	58	59	60	| 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |	51	52	53	54	55									
66	67	68	69	70	| 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 |	61	62	63	64	65									
76	77	78	79	80	| 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 |	71	72	73	74	75									
86	87	88	89	90	| 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 |	81	82	83	84	85									
96	97	98	99	H0	| 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | H0 |	91	92	93	94	95									
6	7	8	9	10	| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |	1	2	3	4	5									

** Conditions for the Composite Combinations: CC=202 **

n1+n2+n11+n12=CC ... cc1; | n51+n52+n61+n62=CC ... cc51;

n2+n3+n12+n13=CC ... cc2; | n52+n53+n62+n63=CC ... cc52;

n3+n4+n13+n14=CC ... cc3; | n53+n54+n63+n64=CC ... cc53;

n4+n5+n14+n15=CC ... cc4; | n54+n55+n64+n65=CC ... cc54;

n5+n6+n15+n16=CC ... cc5; | n55+n56+n65+n66=CC ... cc55;

n6+n7+n16+n17=CC ... cc6; | n56+n57+n66+n67=CC ... cc56;

n7+n8+n17+n18=CC ... cc7; | n57+n58+n67+n68=CC ... cc57;

n8+n9+n18+n19=CC ... cc8; | n58+n59+n68+n69=CC ... cc58;

n9+n10+n19+n20=CC ... cc9; | n59+n60+n69+n70=CC ... cc59;

n10+n1+n20+n11=CC ... cc10; | n60+n51+n70+n61=CC ... cc60;

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n11+n12+n21+n22=CC ... cc11; | n61+n62+n71+n72=CC ... cc61;
n12+n13+n22+n23=CC ... cc12; | n62+n63+n72+n73=CC ... cc62;
n13+n14+n23+n24=CC ... cc13; | n63+n64+n73+n74=CC ... cc63;
n14+n15+n24+n25=CC ... cc14; | n64+n65+n74+n75=CC ... cc64;
n15+n16+n25+n26=CC ... cc15; | n65+n66+n75+n76=CC ... cc65;
n16+n17+n26+n27=CC ... cc16; | n66+n67+n76+n77=CC ... cc66;
n17+n18+n27+n28=CC ... cc17; | n67+n68+n77+n78=CC ... cc67;
n18+n19+n28+n29=CC ... cc18; | n68+n69+n78+n79=CC ... cc68;
n19+n20+n29+n30=CC ... cc19; | n69+n70+n79+n80=CC ... cc69;
n20+n11+n30+n21=CC ... cc20; | n70+n61+n80+n71=CC ... cc70;

n21+n22+n31+n32=CC ... cc21; | n71+n72+n81+n82=CC ... cc71;
n22+n23+n32+n33=CC ... cc22; | n72+n73+n82+n83=CC ... cc72;
n23+n24+n33+n34=CC ... cc23; | n73+n74+n83+n84=CC ... cc73;
n24+n25+n34+n35=CC ... cc24; | n74+n75+n84+n85=CC ... cc74;
n25+n26+n35+n36=CC ... cc25; | n75+n76+n85+n86=CC ... cc75;
n26+n27+n36+n37=CC ... cc26; | n76+n77+n86+n87=CC ... cc76;
n27+n28+n37+n38=CC ... cc27; | n77+n78+n87+n88=CC ... cc77;
n28+n29+n38+n39=CC ... cc28; | n78+n79+n88+n89=CC ... cc78;
n29+n30+n39+n40=CC ... cc29; | n79+n80+n89+n90=CC ... cc79;
n30+n21+n40+n31=CC ... cc30; | n80+n71+n90+n81=CC ... cc80;

n31+n32+n41+n42=CC ... cc31; | n81+n82+n91+n92=CC ... cc81;
n32+n33+n42+n43=CC ... cc32; | n82+n83+n92+n93=CC ... cc82;
n33+n34+n43+n44=CC ... cc33; | n83+n84+n93+n94=CC ... cc83;
n34+n35+n44+n45=CC ... cc34; | n84+n85+n94+n95=CC ... cc84;
n35+n36+n45+n46=CC ... cc35; | n85+n86+n95+n96=CC ... cc85;
n36+n37+n46+n47=CC ... cc36; | n86+n87+n96+n97=CC ... cc86;
n37+n38+n47+n48=CC ... cc37; | n87+n88+n97+n98=CC ... cc87;
n38+n39+n48+n49=CC ... cc38; | n88+n89+n98+n99=CC ... cc88;
n39+n40+n49+n50=CC ... cc39; | n89+n90+n99+n100=CC ... cc89;
n40+n31+n50+n41=CC ... cc40; | n90+n81+n100+n91=CC ... cc90;

n41+n42+n51+n52=CC ... cc41; | n91+n92+n1+n2=CC ... cc91;
n42+n43+n52+n53=CC ... cc42; | n92+n93+n2+n3=CC ... cc92;
n43+n44+n53+n54=CC ... cc43; | n93+n94+n3+n4=CC ... cc93;
n44+n45+n54+n55=CC ... cc44; | n94+n95+n4+n5=CC ... cc94;
n45+n46+n55+n56=CC ... cc45; | n95+n96+n5+n6=CC ... cc95;
n46+n47+n56+n57=CC ... cc46; | n96+n97+n6+n7=CC ... cc96;
n47+n48+n57+n58=CC ... cc47; | n97+n98+n7+n8=CC ... cc97;
n48+n49+n58+n59=CC ... cc48; | n98+n99+n8+n9=CC ... cc98;
n49+n50+n59+n60=CC ... cc49; | n99+n100+n9+n10=CC ... cc99;
n50+n41+n60+n51=CC ... cc50; | n100+n91+n10+n1=CC ... cc100;

```

**** Basic Conditions for Rows and Columns: LSM=505 ****

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n1+n2+n3+n4+n5+n6+n7+n8+n9+n10=LSM ... row1;
n1+n11+n21+n31+n41+n51+n61+n71+n81+n91=LSM ... c1m1;

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3-2. Result List of my Calculation for Ordinary 'Composite' Type

**** Ordinary Type of 'Composite' Semi-Panmagic Squares of Order 10 ****

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

1/ Row\PD										721/ Row\PD									
1	100	2	99	3	98	4	97	5	96|=505\520	1	100	2	99	3	98	4	97	5	96|=505\520
20	81	19	82	18	83	17	84	16	85|=505\490	25	76	24	77	23	78	22	79	21	80|=505\490
66	35	67	34	68	33	69	32	70	31|=505\520	66	35	67	34	68	33	69	32	70	31|=505\520
60	41	59	42	58	43	57	44	56	45|=505\490	55	46	54	47	53	48	52	49	51	50|=505\490
61	40	62	39	63	38	64	37	65	36|=505\520	61	40	62	39	63	38	64	37	65	36|=505\520
75	26	74	27	73	28	72	29	71	30|=505\490	75	26	74	27	73	28	72	29	71	30|=505\490
76	25	77	24	78	23	79	22	80	21|=505\520	81	20	82	19	83	18	84	17	85	16|=505\520
90	11	89	12	88	13	87	14	86	15|=505\490	90	11	89	12	88	13	87	14	86	15|=505\490
46	55	47	54	48	53	49	52	50	51|=505\520	41	60	42	59	43	58	44	57	45	56|=505\520
10	91	9	92	8	93	7	94	6	95|=505\490	10	91	9	92	8	93	7	94	6	95|=505\490
| 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | CoTumn										| 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | CoTumn									
/ 520 / 490 / 520 / 490 / 520 / 490 / 520 / 490 / 520 / 490 | PDSums										/ 520 / 490 / 520 / 490 / 520 / 490 / 520 / 490 / 520 / 490 | PDSums									

13681/ Row\PD										15121/ Row\PD									
1	100	2	99	3	98	4	97	5	96|=505\440	1	100	2	99	3	98	4	97	5	96|=505\530
85	16	84	17	83	18	82	19	81	20|=505\570	25	76	24	77	23	78	22	79	21	80|=505\480
56	45	57	44	58	43	59	42	60	41|=505\440	66	35	67	34	68	33	69	32	70	31|=505\530
40	61	39	62	38	63	37	64	36	65|=505\570	55	46	54	47	53	48	52	49	51	50|=505\480
51	50	52	49	53	48	54	47	55	46|=505\440	61	40	62	39	63	38	64	37	65	36|=505\530
70	31	69	32	68	33	67	34	66	35|=505\570	75	26	74	27	73	28	72	29	71	30|=505\480
76	25	77	24	78	23	79	22	80	21|=505\440	86	15	87	14	88	13	89	12	90	11|=505\530
90	11	89	12	88	13	87	14	86	15|=505\570	85	16	84	17	83	18	82	19	81	20|=505\480
26	75	27	74	28	73	29	72	30	71|=505\440	41	60	42	59	43	58	44	57	45	56|=505\530
10	91	9	92	8	93	7	94	6	95|=505\570	10	91	9	92	8	93	7	94	6	95|=505\480

| 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | Column
/440/570/440/570/440/570/440/570/440/570 | PD Sums | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | Column
/530/480/530/480/530/480/530/480/530/480 | PD Sums

25201/ Row\PD										35281/ Row\PD									
1	100	2	99	3	98	4	97	5	96|=505\540	1	100	2	99	3	98	4	97	5	96|=505\540
20	81	19	82	18	83	17	84	16	85|=505\470	20	81	19	82	18	83	17	84	16	85|=505\470
66	35	67	34	68	33	69	32	70	31|=505\540	66	35	67	34	68	33	69	32	70	31|=505\540
60	41	59	42	58	43	57	44	56	45|=505\470	60	41	59	42	58	43	57	44	56	45|=505\470
61	40	62	39	63	38	64	37	65	36|=505\540	61	40	62	39	63	38	64	37	65	36|=505\540
75	26	74	27	73	28	72	29	71	30|=505\470	80	21	79	22	78	23	77	24	76	25|=505\470
86	15	87	14	88	13	89	12	90	11|=505\540	86	15	87	14	88	13	89	12	90	11|=505\540
80	21	79	22	78	23	77	24	76	25|=505\470	75	26	74	27	73	28	72	29	71	30|=505\470
46	55	47	54	48	53	49	52	50	51|=505\540	46	55	47	54	48	53	49	52	50	51|=505\540
10	91	9	92	8	93	7	94	6	95|=505\470	10	91	9	92	8	93	7	94	6	95|=505\470

| 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | Column
/540/470/540/470/540/470/540/470/540/470 | PD Sums | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | Column
/540/470/540/470/540/470/540/470/540/470 | PD Sums

45361/ Row\PD										60481/ Row\PD									
1	100	2	99	3	98	4	97	5	96|=505\550	1	100	2	99	3	98	4	97	5	96|=505\560
20	81	19	82	18	83	17	84	16	85|=505\460	20	81	19	82	18	83	17	84	16	85|=505\450
71	30	72	29	73	28	74	27	75	26|=505\550	71	30	72	29	73	28	74	27	75	26|=505\560
60	41	59	42	58	43	57	44	56	45|=505\460	60	41	59	42	58	43	57	44	56	45|=505\450
61	40	62	39	63	38	64	37	65	36|=505\550	66	35	67	34	68	33	69	32	70	31|=505\560
80	21	79	22	78	23	77	24	76	25|=505\460	80	21	79	22	78	23	77	24	76	25|=505\450
86	15	87	14	88	13	89	12	90	11|=505\550	86	15	87	14	88	13	89	12	90	11|=505\560
70	31	69	32	68	33	67	34	66	35|=505\460	65	36	64	37	63	38	62	39	61	40|=505\450
46	55	47	54	48	53	49	52	50	51|=505\550	46	55	47	54	48	53	49	52	50	51|=505\560
10	91	9	92	8	93	7	94	6	95|=505\460	10	91	9	92	8	93	7	94	6	95|=505\450

| 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | Column
/550/460/550/460/550/460/550/460/550/460 | PD Sums | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | Column
/560/450/560/450/560/450/560/450/560/450 | PD Sums

70561/ Row\PD										80641/ Row\PD									
1	100	2	99	3	98	4	97	5	96|=505\560	1	100	2	99	3	98	4	97	5	96|=505\550
20	81	19	82	18	83	17	84	16	85|=505\450	25	76	24	77	23	78	22	79	21	80|=505\460
71	30	72	29	73	28	74	27	75	26|=505\560	71	30	72	29	73	28	74	27	75	26|=505\550
65	36	64	37	63	38	62	39	61	40|=505\450	65	36	64	37	63	38	62	39	61	40|=505\460
66	35	67	34	68	33	69	32	70	31|=505\560	66	35	67	34	68	33	69	32	70	31|=505\550
80	21	79	22	78	23	77	24	76	25|=505\450	85	16	84	17	83	18	82	19	81	20|=505\460
86	15	87	14	88	13	89	12	90	11|=505\560	86	15	87	14	88	13	89	12	90	11|=505\550
60	41	59	42	58	43	57	44	56	45|=505\450	55	46	54	47	53	48	52	49	51	50|=505\460
46	55	47	54	48	53	49	52	50	51|=505\560	41	60	42	59	43	58	44	57	45	56|=505\550
10	91	9	92	8	93	7	94	6	95|=505\450	10	91	9	92	8	93	7	94	6	95|=505\460

| 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | Column
/560/450/560/450/560/450/560/450/560/450 | PD Sums | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | Column
/550/460/550/460/550/460/550/460/550/460 | PD Sums

90721/ Row\PD										95761/ Row\PD									
1	100	2	99	3	98	4	97	5	96|=505\580	1	100	2	99	3	98	4	97	5	96|=505\570
20	81	19	82	18	83	17	84	16	85|=505\430	25	76	24	77	23	78	22	79	21	80|=505\440
71	30	72	29	73	28	74	27	75	26|=505\580	71	30	72	29	73	28	74	27	75	26|=505\570
65	36	64	37	63	38	62	39	61	40|=505\430	65	36	64	37	63	38	62	39	61	40|=505\440
66	35	67	34	68	33	69	32	70	31|=505\580	66	35	67	34	68	33	69	32	70	31|=505\570
80	21	79	22	78	23	77	24	76	25|=505\430	85	16	84	17	83	18	82	19	81	20|=505\440
86	15	87	14	88	13	89	12	90	11|=505\580	86	15	87	14	88	13	89	12	90	11|=505\570
50	51	49	52	48	53	47	54	46	55|=505\430	45	56	44	57	43	58	42	59	41	60|=505\440
56	45	57	44	58	43	59	42	60	41|=505\580	51	50	52	49	53	48	54	47	55	46|=505\570
10	91	9	92	8	93	7	94	6	95|=505\430	10	91	9	92	8	93	7	94	6	95|=505\440

| 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | Column
/580/430/580/430/580/430/580/430/580/430 | PD Sums | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | Column
/570/440/570/440/570/440/570/440/570/440 | PD Sums

100801/ Row\PD										105841/ Row\PD											
1	100	2	99	3	98	4	97	5	96	=505\580	1	100	2	99	3	98	4	97	5	96	=505\580
30	71	29	72	28	73	27	74	26	75	=505\430	40	61	39	62	38	63	37	64	36	65	=505\430
76	25	77	24	78	23	79	22	80	21	=505\580	76	25	77	24	78	23	79	22	80	21	=505\580
60	41	59	42	58	43	57	44	56	45	=505\430	60	41	59	42	58	43	57	44	56	45	=505\430
66	35	67	34	68	33	69	32	70	31	=505\580	66	35	67	34	68	33	69	32	70	31	=505\580
85	16	84	17	83	18	82	19	81	20	=505\430	85	16	84	17	83	18	82	19	81	20	=505\430
86	15	87	14	88	13	89	12	90	11	=505\580	86	15	87	14	88	13	89	12	90	11	=505\580
40	61	39	62	38	63	37	64	36	65	=505\430	30	71	29	72	28	73	27	74	26	75	=505\430
51	50	52	49	53	48	54	47	55	46	=505\580	51	50	52	49	53	48	54	47	55	46	=505\580
10	91	9	92	8	93	7	94	6	95	=505\430	10	91	9	92	8	93	7	94	6	95	=505\430
| 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | Column PDSums										| 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | Column PDSums											
110881/ Row\PD										115921/ Row\PD											
1	100	2	99	3	98	4	97	5	96	=505\570	1	100	2	99	3	98	4	97	5	96	=505\580
45	56	44	57	43	58	42	59	41	60	=505\440	50	51	49	52	48	53	47	54	46	55	=505\430
71	30	72	29	73	28	74	27	75	26	=505\570	71	30	72	29	73	28	74	27	75	26	=505\580
65	36	64	37	63	38	62	39	61	40	=505\440	65	36	64	37	63	38	62	39	61	40	=505\430
66	35	67	34	68	33	69	32	70	31	=505\570	66	35	67	34	68	33	69	32	70	31	=505\580
85	16	84	17	83	18	82	19	81	20	=505\440	80	21	79	22	78	23	77	24	76	25	=505\430
86	15	87	14	88	13	89	12	90	11	=505\570	86	15	87	14	88	13	89	12	90	11	=505\580
25	76	24	77	23	78	22	79	21	80	=505\440	20	81	19	82	18	83	17	84	16	85	=505\430
51	50	52	49	53	48	54	47	55	46	=505\570	56	45	57	44	58	43	59	42	60	41	=505\580
10	91	9	92	8	93	7	94	6	95	=505\440	10	91	9	92	8	93	7	94	6	95	=505\430
| 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | Column PDSums										| 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | Column PDSums											
120961/ Row\PD										136081/ Row\PD											
1	100	2	99	3	98	4	96	5	97	=505\520	1	100	2	99	3	98	4	96	5	97	=505\530
20	81	19	82	18	83	17	85	16	84	=505\490	25	76	24	77	23	78	22	80	21	79	=505\480
66	35	67	34	68	33	69	31	70	32	=505\520	66	35	67	34	68	33	69	31	70	32	=505\530
60	41	59	42	58	43	57	45	56	44	=505\490	55	46	54	47	53	48	52	50	51	49	=505\480
61	40	62	39	63	38	64	36	65	37	=505\520	61	40	62	39	63	38	64	36	65	37	=505\530
75	26	74	27	73	28	72	30	71	29	=505\490	75	26	74	27	73	28	72	30	71	29	=505\480
76	25	77	24	78	23	79	21	80	22	=505\520	86	15	87	14	88	13	89	11	90	12	=505\530
90	11	89	12	88	13	87	15	86	14	=505\490	85	16	84	17	83	18	82	20	81	19	=505\480
46	55	47	54	48	53	49	51	50	52	=505\520	41	60	42	59	43	58	44	56	45	57	=505\530
10	91	9	92	8	93	7	95	6	94	=505\490	10	91	9	92	8	93	7	95	6	94	=505\480
| 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | Column PDSums										| 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | Column PDSums											

Watch the result lists above and below, and find every rows and columns of each solution add up to the magic constant, while pandiagonals do not add up equally to the same constant. But, two kinds of pandiagonal sums add to up to 1010(=505x2).

580+430=1010; 520+490=1010; 530+480=1010; 510+500=1010; ...

They are the characteristic properties of true solutions.

Let's have another list of 'Almost Complete' solutions of our object now.

**** Ordinary Type of 'Composite' Semi-Panmagic Squares of Order 10 ****
**** Abstract List 2 of 'Almost Complete' Solutions with Check-Sums ****

1/ Row\PD										1585/ Row\PD											
1	100	2	99	3	98	4	97	5	96	=505\510	1	100	2	99	3	98	4	97	5	96	=505\510
20	81	19	82	18	83	17	84	16	85	=505\500	25	76	24	77	23	78	22	79	21	80	=505\500
66	35	67	34	68	33	69	32	70	31	=505\510	66	35	67	34	68	33	69	32	70	31	=505\510
65	36	64	37	63	38	62	39	61	40	=505\500	65	36	64	37	63	38	62	39	61	40	=505\500
56	45	57	44	58	43	59	42	60	41	=505\510	51	50	52	49	53	48	54	47	55	46	=505\510
75	26	74	27	73	28	72	29	71	30	=505\500	75	26	74	27	73	28	72	29	71	30	=505\500
76	25	77	24	78	23	79	22	80	21	=505\510	86	15	87	14	88	13	89	12	90	11	=505\510
90	11	89	12	88	13	87	14	86	15	=505\500	85	16	84	17	83	18	82	19	81	20	=505\500
46	55	47	54	48	53	49	52	50	51	=505\510	41	60	42	59	43	58	44	57	45	56	=505\510
10	91	9	92	8	93	7	94	6	95	=505\500	10	91	9	92	8	93	7	94	6	95	=505\500
| 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | Column PDSums										| 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | Column PDSums											

12529/ Row\PD										13249/ Row\PD											
1	100	2	99	3	98	4	97	5	96	=505\500	1	100	2	99	3	98	4	97	5	96	=505\510
55	46	54	47	53	48	52	49	51	50	=505\510	60	41	59	42	58	43	57	44	56	45	=505\500
66	35	67	34	68	33	69	32	70	31	=505\500	66	35	67	34	68	33	69	32	70	31	=505\510
85	16	84	17	83	18	82	19	81	20	=505\510	80	21	79	22	78	23	77	24	76	25	=505\500
61	40	62	39	63	38	64	37	65	36	=505\500	61	40	62	39	63	38	64	37	65	36	=505\510
90	11	89	12	88	13	87	14	86	15	=505\510	90	11	89	12	88	13	87	14	86	15	=505\500
71	30	72	29	73	28	74	27	75	26	=505\500	71	30	72	29	73	28	74	27	75	26	=505\510
25	76	24	77	23	78	22	79	21	80	=505\510	20	81	19	82	18	83	17	84	16	85	=505\500
41	60	42	59	43	58	44	57	45	56	=505\500	46	55	47	54	48	53	49	52	50	51	=505\510
10	91	9	92	8	93	7	94	6	95	=505\510	10	91	9	92	8	93	7	94	6	95	=505\500
| 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 |	Column	| 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 |	Column																		
/ 500 / 510 / 500 / 510 / 500 / 510 / 500 / 510 / 500 / 510 |	PDSums	/ 510 / 500 / 510 / 500 / 510 / 500 / 510 / 500 / 510 / 500 |	PDSums																		
13825/ Row\PD										15409/ Row\PD											
1	100	2	99	3	98	4	96	5	97	=505\510	1	100	2	99	3	98	4	96	5	97	=505\510
20	81	19	82	18	83	17	85	16	84	=505\500	25	76	24	77	23	78	22	80	21	79	=505\500
66	35	67	34	68	33	69	31	70	32	=505\510	66	35	67	34	68	33	69	31	70	32	=505\510
65	36	64	37	63	38	62	40	61	39	=505\500	65	36	64	37	63	38	62	40	61	39	=505\500
56	45	57	44	58	43	59	41	60	42	=505\510	51	50	52	49	53	48	54	46	55	47	=505\510
75	26	74	27	73	28	72	30	71	29	=505\500	75	26	74	27	73	28	72	30	71	29	=505\500
76	25	77	24	78	23	79	21	80	22	=505\510	86	15	87	14	88	13	89	11	90	12	=505\510
90	11	89	12	88	13	87	15	86	14	=505\500	85	16	84	17	83	18	82	20	81	19	=505\500
46	55	47	54	48	53	49	51	50	52	=505\510	41	60	42	59	43	58	44	56	45	57	=505\510
10	91	9	92	8	93	7	95	6	94	=505\500	10	91	9	92	8	93	7	95	6	94	=505\500
| 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 |	Column	| 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 | 505 |	Column																		
/ 510 / 500 / 510 / 500 / 510 / 500 / 510 / 500 / 510 / 500 |	PDSums	/ 510 / 500 / 510 / 500 / 510 / 500 / 510 / 500 / 510 / 500 |	PDSums																		

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

I have got too many solutions again to count up all to the last even when n1=1.
 I have not yet known about the total solution counts of this type now, but I suppose these sample solutions are enough for us to have any comparative study.

#4. Conclusion

The two types of 'Composite' Squares 10x10: (1) 'Diamond Composite & Complete' Semi-magic Squares 10x10 and (2) Ordinary 'Composite' Semi-panmagic Squares 10 x10 show themselves with a good contrast to each other especially in their properties, though they are made completely independent from each other.

How impressive they are!

You know there are many types of magic squares of order 10 that are thought to be really impossible to be made. Neither Self-complementary type nor Pandiagonal one can be made at all. Either 'Complete Euler Squares' or any Simultaneous types are quite hopeless to be made.

Then the two types of these 'Composite' objects could come. They are really the precious gift to us from heaven, don't you think so?

Our comparative study could work well not only to explain the negative characters of the world of order 10 but to demonstrate the wonderful possibilities of those two.

It is just the hopeful concepts that move us a lot, more than the hopeless facts.

(English Version written on March 22, 2010 by Kanji Setsuda with MacOSX & Xcode3.1.2)

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