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Completion of Standard Model-like embeddings

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Abstract

Inequivalent Standard Model-like “observable sector” embeddings in Z_3 orbifolds with two discrete Wilson lines, as determined by Casas, Mondragon and Muñoz, are completed by examining all possible ways of embedding the “hidden sector.” The hidden sector embeddings are relevant to twisted matter in nontrivial irreps. of the Standard Model and to scenarios where supersymmetry breaking is generated in a hidden sector. We find a set of 606 models which have a hidden sector gauge group which is viable for dynamical supersymmetry breaking.

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One of the distasteful aspects of four dimensional heterotic string phenomenology is the glut of vacua possible in the most elementary compactification schemes. Even the lowly Z_3 orbifold [1] admits an enormously large number of low energy effective theories, once nonstandard embeddings—including discrete Wilson lines—are allowed. However, it was pointed out some time ago by Casas, Mondragon and Muñoz (CMM) that most of the embeddings are actually redundant, and only a relatively small set of inequivalent embeddings exist [2].

In such models, the embedding is expressed in terms of four vectors, V, a_1, a_3, a_5 , satisfying

$$3V, 3a_i \in \Lambda_{E_8 \times E_8}, \quad (1)$$

where $\Lambda_{E_8 \times E_8}$ is the $E_8 \times E_8$ root lattice. It is convenient to denote the vector formed from the first eight entries of V by V_A and the vector formed from the last eight entries of V by V_B , so that

$$V = (V_A; V_B), \quad 3V_A, 3V_B \in \Lambda_{E_8}, \quad (2)$$

where Λ_{E_8} is the E_8 root lattice. Similar definitions are made for a_i . V_A, a_{iA} embed the orbifold action into the first E_8 , while V_B, a_{iB} embed the orbifold action into the second E_8 . For discrete Wilson lines, this has the effect of breaking each E_8 down to a rank eight subgroup:

$$E_8(A) \rightarrow G_O, \quad E_8(B) \rightarrow G_H, \quad (3)$$

where G_O and G_H are the observable and hidden sector gauge groups respectively. Typically, G_O and G_H contain one or more $U(1)$'s, as required to conserve rank. We note that one must be careful not to take the term "observable sector" too literally in these models since twisted fields charged under the nonabelian factors of G_O are typically also charged under $U(1)$'s contained in G_H .

Three generation constructions with

$$G_O = SU(3) \times SU(2) \times U(1)^5, \quad (4)$$

can be obtained by choosing a_5 to vanish [3]. CMM have determined all inequivalent observable sector embeddings of this type, with the additional requirement of (3,2) irreps. in the untwisted sector. It is surprising that only nine exist; they are displayed in Table 1. This does not mean that only nine models of this type exist. CMM have left the hidden sector embedding unspecified and the purpose of this paper is to enumerate the allowed ways (modulo equivalences) of embedding the hidden sector. This is not only important because twisted sector irreps. under (4) and their $U(1)$ charges depend on V_B, a_{iB} , but also because G_H and the nontrivial matter irreps. under it play a crucial role in models of dynamical supersymmetry breaking [4].

The allowed ways of completing the embeddings of Table 1 may be determined from the consistency conditions (which ensure world sheet modular invariance of the underlying theory) presented in ref. [3]:

$$3V_B \in \Lambda_{E_8}, \quad 3a_{iB} \in \Lambda_{E_8}, \quad (5)$$

$$3V \cdot V \in \mathbf{Z}, \quad 3a_i \cdot a_j \in \mathbf{Z}, \quad 3V \cdot a_i \in \mathbf{Z}. \quad (6)$$

For example, the first embedding in Table 1, which we will refer to as CMM 1, has $9V_A \cdot a_{1A} = -2$. Then the hidden sector embeddings which complete CMM 1 must satisfy $9V_B \cdot a_{1B} = 2 \pmod{3}$.

Even once these constraints and trivial permutation and sign redundancies such as

$$\begin{pmatrix} V_B^I \\ a_{1B}^I \\ a_{3B}^I \end{pmatrix} \leftrightarrow \pm \begin{pmatrix} V_B^J \\ a_{1B}^J \\ a_{3B}^J \end{pmatrix}, \quad \forall I, J \quad (7)$$

are eliminated, the number of consistent hidden sector embeddings is vast ($10^4 \sim 10^5$). However, just as with the observable sector embeddings, the equivalence relations pointed out by CMM allow for a dramatic reduction when one determines the physically distinct models.

We have carried out an automated reduction using the equivalence relations of CMM, which they have enumerated (i) through (vi). Operations (ii) through (v) would affect the observable embedding and are thus irrelevant to our analysis. This leaves two types of equivalence relations for our analysis: (i) addition of an Λ_{E_8} vector to any of V_B, a_{iB} ; (vi) simultaneous Weyl reflection of the embedding vectors V_B, a_{iB} by a nonzero E_8

CMM #	$3V_A$	$3a_{1A}$	$3a_{3A}$
1	(-1,-1,0,0,0,2,0,0)	(1,1,-1,-1,2,0,0,0)	(0,0,0,0,0,0,2,0)
2	(-1,-1,0,0,0,2,0,0)	(1,1,-1,-1,-1,-1,0,0)	(0,0,0,0,0,0,2,0)
3	(-1,-1,0,0,0,2,0,0)	(1,1,-1,-1,-1,0,1,0)	(0,0,0,0,0,2,1,1)
4	(-1,-1,0,0,0,2,0,0)	(1,1,-1,-1,-1,0,1,0)	(0,0,0,0,0,0,2,0)
5	(-1,-1,0,0,0,2,0,0)	(1,1,-1,-1,-1,-1,-1,-1)	(0,0,0,0,0,2,1,1)
6	(-1,-1,0,0,0,2,0,0)	(1,1,-1,-1,-1,2,1,0)	(0,0,0,0,0,1,1,2)
7	(-1,-1,0,0,0,2,0,0)	(1,1,-1,-1,-1,2,1,0)	(0,0,0,0,0,0,2,0)
8	(-1,-1,0,0,0,1,1,0)	(1,1,-1,-1,-1,1,1,1)	(0,0,0,0,0,1,2,1)
9	(-1,-1,0,0,0,1,1,0)	(1,1,-1,-1,-1,-2,0,1)	(0,0,0,0,0,0,0,2)

Table 1: Observable sector embeddings.

root. Most of the redundancies related to these two operations can be eliminated by imposing bounds on the entries of V_B, a_{iB} and ordering and sign conventions, at each stage in the analysis, as we now describe.

Operation (i) corresponds to invariance under the translation group \mathbf{T} on Λ_{E_8} and (vi) is the invariance under the E_8 Weyl group \mathbf{W} . Respectively, these are generated by the action on $P \in \mathbf{R}^8$ under the simple roots α_i :

$$t_i : P \rightarrow P + \alpha_i, \quad (8)$$

$$w_i : P \rightarrow P - (P \cdot \alpha_i)\alpha_i, \quad (9)$$

$$\mathbf{T} = \{1, t_i, t_i^{-1}, t_i t_j, \dots\}, \quad (10)$$

$$\mathbf{W} = \{1, w_i, w_i w_j, \dots\}. \quad (11)$$

It is convenient to define elements $T_\ell \in \mathbf{T}$ by

$$T_\ell P = P + \ell, \quad \ell \in \Lambda_{E_8}. \quad (12)$$

With this notation, there is a useful theorem which we can prove: if $W_i \in \mathbf{W}$ and $T_\ell \in \mathbf{T}$, then $\exists T_k \in \mathbf{T}$ s.t. $W_i T_\ell = T_k W_i$. To see this, we compute

$$W_i T_\ell P = W_i(P + \ell) = W_i P + W_i \ell. \quad (13)$$

Clearly $\exists k \in \Lambda_{E_8}$ s.t. $W_i \ell = k$.

Because of this, any sequence of operations (i) and (vi) can be represented in the form $t_i t_j \dots t_k w_m w_n \dots w_p \equiv T_\ell W_q$. Redundancies related to different choices of T_ℓ can be eliminated by reducing V_B, a_{iB} to a “minimal” form. For example, if any entry $|3V_B^j| > 2$, then we can reduce to $|3V_B^j| \rightarrow 0, 1, 2$ by a transformation of the form (12). Similarly, any pair of ± 2 's can be reduced to a pair of ± 1 's. Thus, we can always reduce to a form where at most one element of $3V_B$ has magnitude 2 and all others are $0, \pm 1$. This effectively mods out by all members of \mathbf{T} except those which exchange $(\dots, 2, \dots, 1, \dots) \rightarrow (\dots, -1, \dots, -2, \dots)$ in $3V_B$ by adding $3\ell = (\dots, -3, \dots, -3, \dots)$. This is no matter since such operations can always be represented by Weyl reflections, as we now discuss.

Weyl reflections using roots of the form $(1, -1, 0, \dots, 0)$ exchange two entries. Weyl reflections using roots of the form $(1, 1, 0, \dots, 0)$ exchange two entries and flip both signs (underlining indicates that any permutation of entries can be taken). We will refer to these as “integral” Weyl reflections. The second type uses roots of the form $(\pm 1/2, \dots, \pm 1/2)$ with an even number of positive entries, and we will refer to these as “half-integral” Weyl reflections. These tend to have more dramatic effects. For example, $3V_B = (1, \dots, 1)$ can be reflected to $3V_B = (2, 2, 0, \dots, 0)$, which can then be transformed to $3V_B = (1, 1, 0, \dots, 0)$ using operation (i) and an integral Weyl reflection. The Weyl group of E_8 is nonabelian and has order 696 729 600 while there are only 120 positive roots [5]. Thus, the generic elements of \mathbf{W} cannot be written as a reflection by a single root, and the order of reflections matters. We can eliminate most redundancies related to integral Weyl reflections

Case	G_H
1	$SO(10) \times U(1)^3$
2	$SU(5) \times SU(2) \times U(1)^3$
3	$SU(4) \times SU(2)^2 \times U(1)^3$
4	$SU(3) \times SU(2)^2 \times U(1)^4$
5	$SU(2)^2 \times U(1)^6$

Table 2: Allowed hidden sector gauge groups G_H .

by enforcing ordering and sign conventions on the embeddings. It is apparent that a string of integral Weyl reflections sandwiched between two half-integral reflections can be traded for a pair of half-integral reflections, since the string of integral Weyl reflections can be viewed as a change in basis. Thus, we can limit ourselves to strings of half-integral Weyl reflections, and then transform the final result to a “canonical” form which is minimal and satisfies certain ordering and sign conventions. Going to canonical form is accomplished by a sequence of operations of type (i) and integral Weyl reflections.

In our automated analysis, we first generated a list of all possible consistent embeddings of the hidden sector, constraining them to be of minimal form. Since all embeddings can be reduced to minimal form by way of operation (i), we are assured that this list is complete. We then used the symmetries of (7) to enforce ordering and sign conventions on the embeddings (canonical form), effectively eliminating redundancies under integral Weyl reflections. We then took 1, 2 and 3 half-integral Weyl reflections of these embeddings, followed by a transformation to canonical form, and finally eliminated redundancies. The initial list of $\sim 10^4$ minimal embeddings (encompassing all nine CMM observable sector embeddings) was thereby reduced to a mere 733. This list is guaranteed to be complete, but not necessarily inequivalent. Because the Weyl group is so large, it proved to be impractical to act on each of the initial embeddings with each of its elements. It also proved impractical to perform four or more half-integral Weyl reflections. The number of positive half-integral roots is 64 (negative roots generate the same Weyl reflections because the operation is even in the root used); four Weyl reflections would have required $\sim 10^7$ different operations for each embedding. However, already in going from 2 half-integral Weyl reflections to 3 half-integral Weyl reflections, the list did not shrink by much. It would appear that though there may be some equivalences remaining, there should not be very many.

We have, in addition, determined the hidden sector gauge group G_H for each of the 733 embeddings. Only five G_H were found to be possible, displayed in Table 2. Apparently, demanding (4) has a significant effect on what is possible in the hidden sector in these models.

In the Appendix, we present lists of the hidden sector embeddings which complete the CMM analysis. We have not displayed Case 5 G_H models, since we do not regard them to afford viable scenarios of hidden sector dynamical supersymmetry breaking. They are, however, available from the author upon request. Also not included is the enumeration of the spectrum of massless matter for these models, with their $U(1)$ charges. We have begun this analysis and hope to present interesting examples and a summary of general features in a later publication.

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Appendix

To construct the full 16-dimensional embedding vectors V, a_1, a_3 , simply take the direct sum of a CMM observable sector embedding (labeled by subscript A) and a hidden sector embedding (labeled by subscript B) from a corresponding table:

$$V = (V_A; V_B), \quad a_1 = (a_{1A}; a_{1B}), \quad a_3 = (a_{3A}; a_{3B}). \quad (14)$$

For instance, the observable sector embedding CMM 1 from Table 1 may be completed by any of the embeddings in Table 3. Any other hidden sector embedding which is consistent with CMM 1 will be equivalent to one of the choices given in Table 3. It should be noted that CMM 8 and CMM 9 each allow two inequivalent hidden sector twist embeddings V_B ; as a consequence, two hidden sector embedding tables are given for each. We have abbreviated G_H by the cases defined in Table 2.

Table 3: CMM 1, $3V_B = (2,1,1,0,0,0,0)$.

#	$3a_{1B}$	$3a_{3B}$	G_H	#	$3a_{1B}$	$3a_{3B}$	G_H
1	(-2,0,0,0,0,0,0)	(0,1,-1,0,0,0,0)	1	2	(0,2,0,0,0,0,0)	(-1,0,-1,0,0,0,0)	1
3	(0,2,0,0,0,0,0)	(1,0,1,0,0,0,0)	1	4	(-2,0,0,0,0,0,0)	(0,0,0,2,1,1,1)	2
5	(-1,-1,-1,1,0,0,0)	(-2,-1,-1,-1,1,0,0)	2	6	(-1,-1,-1,1,0,0,0)	(2,1,1,1,1,0,0)	2
7	(-1,1,0,1,1,0,0,0)	(-1,-1,0,0,0,0,0)	2	8	(-1,1,0,1,1,0,0,0)	(0,0,0,1,-1,0,0,0)	2
9	(-1,1,0,1,1,0,0,0)	(1,1,0,0,0,0,0,0)	2	10	(0,1,1,1,1,0,0,0)	(0,0,0,1,-1,0,0,0)	2
11	(0,1,1,1,1,0,0,0)	(0,1,-1,0,0,0,0,0)	2	12	(0,2,0,0,0,0,0,0)	(0,0,0,2,1,1,1)	2
13	(1,1,-1,1,0,0,0,0)	(-2,-1,-1,-1,1,0,0,0)	2	14	(1,1,-1,1,0,0,0,0)	(2,1,1,1,1,0,0,0)	2
15	(-2,0,0,0,0,0,0,0)	(0,0,0,1,1,0,0,0)	3	16	(-1,1,0,1,1,0,0,0)	(-2,-1,-1,1,1,0,0,0)	3
17	(-1,1,0,1,1,0,0,0)	(2,1,1,-1,-1,0,0,0)	3	18	(-1,1,0,1,1,0,0,0)	(-1,1,1,-1,-1,1,1)	3
19	(0,1,1,1,1,0,0,0)	(-2,-1,-1,1,1,0,0,0)	3	20	(0,1,1,1,1,0,0,0)	(2,1,1,-1,-1,0,0,0)	3
21	(0,1,1,1,1,0,0,0)	(-1,1,1,-1,-1,1,1)	3	22	(0,2,0,0,0,0,0,0)	(0,0,0,1,1,0,0,0)	3
23	(2,1,0,1,1,1,1,1)	(0,0,0,2,1,-1,-1,-1)	3	24	(0,1,-2,1,1,1,1,1)	(0,0,0,2,1,-1,-1,-1)	3
25	(-2,0,0,0,0,0,0,0)	(0,2,1,1,1,1,0,0)	4	26	(-1,-1,-1,1,0,0,0,0)	(0,-1,-2,0,1,1,1,0)	4
27	(-1,1,0,1,1,0,0,0)	(-2,-1,-1,0,-1,1,0,0)	4	28	(-1,1,0,1,1,0,0,0)	(-2,0,1,-1,-1,1,0,0)	4
29	(-1,1,0,1,1,0,0,0)	(-2,1,0,0,0,1,1,1)	4	30	(-1,1,0,1,1,0,0,0)	(2,1,1,1,0,1,0,0)	4
31	(-1,1,0,1,1,0,0,0)	(2,-1,0,0,0,1,1,1)	4	32	(-1,1,0,1,1,0,0,0)	(0,0,0,2,1,1,1,1)	4
33	(-1,1,0,1,1,0,0,0)	(0,0,0,0,0,1,1,0)	4	34	(0,0,-1,1,1,1,0,0)	(-2,1,0,-1,-1,-1,0,0)	4
35	(0,0,-1,1,1,1,0,0)	(2,-1,0,1,1,1,0,0)	4	36	(0,1,1,1,1,0,0,0)	(-2,-1,-1,0,-1,1,0,0)	4
37	(0,1,1,1,1,0,0,0)	(-2,1,0,1,1,1,0,0)	4	38	(0,1,1,1,1,0,0,0)	(2,0,-1,-1,-1,1,0,0)	4
39	(0,1,1,1,1,0,0,0)	(2,1,1,1,0,1,0,0)	4	40	(0,1,1,1,1,0,0,0)	(0,0,0,2,1,1,1,1)	4
41	(0,1,1,1,1,0,0,0)	(0,0,0,0,0,1,1,0)	4	42	(0,1,1,1,1,0,0,0)	(0,-1,-2,0,0,1,1,1)	4

Table 3: (continued) CMM 1, $3V_B = (2,1,1,0,0,0,0)$.

#	$3a_{1B}$	$3a_{3B}$	G_H	#	$3a_{1B}$	$3a_{3B}$	G_H
43	(0,2,0,0,0,0,0)	(-2,0,1,1,1,1,0,0)	4	44	(0,2,0,0,0,0,0,0)	(2,0,-1,1,1,1,0,0)	4
45	(1,0,0,1,1,1,0,0)	(-2,1,0,0,0,-1,1,1)	4	46	(1,0,0,1,1,1,0,0)	(2,0,-1,1,0,0,1,1)	4
47	(1,1,-1,1,0,0,0,0)	(-2,0,1,0,1,1,1,0)	4	48	(-2,1,-1,1,1,1,1,0)	(-2,0,1,1,1,1,0,0)	4
49	(-2,1,-1,1,1,1,1,0)	(0,-2,-1,0,0,-1,-1,1)	4	50	(2,-1,-1,1,1,1,1,0)	(-2,-1,-1,0,0,0,-1,1)	4
51	(2,-1,-1,1,1,1,1,0)	(-1,1,1,1,-1,-1,-1,1)	4	52	(2,-1,-1,1,1,1,1,0)	(0,2,1,0,-1,-1,-1,0)	4
53	(2,-1,-1,1,1,1,1,0)	(0,0,0,2,1,1,-1,1)	4	54	(2,-1,-1,1,1,1,1,0)	(0,-1,-2,1,1,1,0,0)	4
55	(2,1,0,1,1,1,1,1)	(-2,1,0,0,0,-1,-1,-1)	4	56	(2,1,0,1,1,1,1,1)	(-2,1,0,1,1,1,0,0)	4
57	(2,1,0,1,1,1,1,1)	(2,-1,0,0,0,-1,-1,-1)	4				

Table 4: CMM 2, $3V_B = (2,1,1,0,0,0,0)$.

#	$3a_{1B}$	$3a_{3B}$	G_H	#	$3a_{1B}$	$3a_{3B}$	G_H
1	(-2,0,-1,1,0,0,0,0)	(-1,0,-1,0,0,0,0,0)	1	2	(-2,0,-1,1,0,0,0,0)	(1,0,1,0,0,0,0,0)	1
3	(-2,1,1,0,0,0,0,0)	(0,1,-1,0,0,0,0,0)	1	4	(-2,0,-1,1,0,0,0,0)	(-2,-1,-1,1,1,0,0,0)	2
5	(-2,0,-1,1,0,0,0,0)	(2,1,1,-1,1,0,0,0)	2	6	(-2,1,1,0,0,0,0,0)	(0,0,0,2,1,1,1,1)	2
7	(-1,0,0,1,1,1,1,1)	(-2,-1,-1,0,0,0,-1,-1)	2	8	(-1,0,0,1,1,1,1,1)	(2,1,1,1,1,0,0,0)	2
9	(-1,0,0,1,1,1,1,1)	(-1,1,1,1,1,1,1,1)	2	10	(-1,0,0,1,1,1,1,1)	(1,-1,-1,-1,-1,-1,-1,-1)	2
11	(2,0,0,1,1,0,0,0)	(0,0,0,1,-1,0,0,0)	2	12	(2,0,0,1,1,0,0,0)	(0,1,-1,0,0,0,0,0)	2
13	(-1,1,-1,1,1,1,0,0)	(-1,-1,0,0,0,0,0,0)	2	14	(-1,1,-1,1,1,1,0,0)	(0,0,0,0,0,0,1,1)	2
15	(-1,1,-1,1,1,1,0,0)	(1,1,0,0,0,0,0,0)	2	16	(0,2,-1,1,0,0,0,0)	(-2,-1,-1,1,1,0,0,0)	2
17	(0,2,-1,1,0,0,0,0)	(2,1,1,-1,1,0,0,0)	2	18	(1,0,-1,1,1,1,1,0)	(-1,0,-1,0,0,0,0,0)	2
19	(1,0,-1,1,1,1,1,0)	(1,-1,-1,1,1,1,1,1)	2	20	(1,0,-1,1,1,1,1,0)	(1,0,1,0,0,0,0,0)	2
21	(-2,0,-1,1,0,0,0,0)	(-1,1,1,-1,1,1,1,1)	3	22	(-2,0,-1,1,0,0,0,0)	(0,0,0,0,1,1,0,0)	3
23	(-2,1,1,0,0,0,0,0)	(0,0,0,1,1,0,0,0)	3	24	(2,0,0,1,1,0,0,0)	(-2,-1,-1,-1,-1,0,0,0)	3
25	(2,0,0,1,1,0,0,0)	(2,1,1,1,1,0,0,0)	3	26	(2,0,0,1,1,0,0,0)	(-1,1,1,1,1,1,1,1)	3
27	(-1,1,-1,1,1,1,0,0)	(-2,-1,-1,0,-1,-1,0,0)	3	28	(-1,1,-1,1,1,1,0,0)	(2,1,1,1,1,0,0,0)	3
29	(1,0,-1,1,1,1,1,0)	(-1,1,1,-1,-1,-1,-1,1)	3	30	(-2,0,-1,1,0,0,0,0)	(-2,0,1,0,1,1,1,0)	4
31	(-2,0,-1,1,0,0,0,0)	(-2,1,0,-1,1,1,0,0)	4	32	(-2,0,-1,1,0,0,0,0)	(0,-2,-1,-1,1,1,0,0)	4
33	(2,1,-1,0,0,0,0,0)	(-2,1,0,1,1,1,0,0)	4	34	(-2,1,1,0,0,0,0,0)	(0,2,1,1,1,1,0,0)	4
35	(-1,0,0,1,1,1,1,1)	(-2,1,0,1,1,0,0,-1)	4	36	(2,0,0,1,1,0,0,0)	(-2,-1,-1,1,0,1,0,0)	4
37	(2,0,0,1,1,0,0,0)	(-2,1,0,-1,-1,1,0,0)	4	38	(2,0,0,1,1,0,0,0)	(2,0,-1,1,1,1,0,0)	4
39	(2,0,0,1,1,0,0,0)	(2,1,1,0,-1,1,0,0)	4	40	(2,0,0,1,1,0,0,0)	(0,0,0,-1,-2,1,1,1)	4
41	(2,0,0,1,1,0,0,0)	(0,0,0,0,0,1,1,0)	4	42	(2,0,0,1,1,0,0,0)	(0,-1,-2,0,0,1,1,1)	4
43	(-1,1,-1,1,1,1,0,0)	(-2,-1,-1,1,0,0,1,0)	4	44	(-1,1,-1,1,1,1,0,0)	(-2,0,1,1,-1,-1,0,0)	4
45	(-1,1,-1,1,1,1,0,0)	(-2,1,0,-1,-1,-1,0,0)	4	46	(-1,1,-1,1,1,1,0,0)	(-2,1,0,1,1,1,0,0)	4
47	(-1,1,-1,1,1,1,0,0)	(2,1,1,0,0,-1,1,0)	4	48	(0,-1,-1,1,1,1,1,0)	(0,-1,-2,0,-1,-1,-1,0)	4
49	(0,2,-1,1,0,0,0,0)	(2,-1,0,-1,1,1,0,0)	4	50	(0,0,-2,1,1,0,0,0)	(0,0,0,2,1,1,1,1)	4
51	(1,0,-1,1,1,1,1,0)	(-2,-1,-1,0,0,-1,-1,0)	4	52	(1,0,-1,1,1,1,1,0)	(-2,-1,-1,1,0,0,0,1)	4
53	(1,0,-1,1,1,1,1,0)	(-2,0,1,1,1,1,0,0)	4	54	(1,0,-1,1,1,1,1,0)	(2,1,1,1,1,0,0,0)	4
55	(1,0,-1,1,1,1,1,0)	(2,0,-1,1,1,1,0,0)	4	56	(1,0,-1,1,1,1,1,0)	(0,0,0,1,0,0,-1,0)	4

Table 5: CMM 3, $3V_B = (2,1,1,0,0,0,0)$.

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

Table 6: CMM 4, $3V_B = (2,1,1,0,0,0,0,0)$.

#	$3a_{1B}$	$3a_{3B}$	G_H	#	$3a_{1B}$	$3a_{3B}$	G_H
1	(-2,1,-1,0,0,0,0,0)	(-1,-1,0,0,0,0,0,0)	1	2	(-2,1,-1,0,0,0,0,0)	(0,-1,1,0,0,0,0,0)	1
3	(2,-1,-1,0,0,0,0,0)	(1,1,0,0,0,0,0,0)	1	4	(-2,0,0,1,1,0,0,0)	(-2,-1,-1,1,-1,0,0,0)	2
5	(-2,0,0,1,1,0,0,0)	(1,1,0,0,0,0,0,0)	2	6	(-2,1,-1,0,0,0,0,0)	(1,-1,-1,1,1,1,1,1)	2
7	(2,1,0,1,0,0,0,0)	(2,1,1,-1,1,0,0,0)	2	8	(2,1,0,1,0,0,0,0)	(0,0,0,1,1,0,0,0)	2
9	(-1,1,0,1,1,1,1,0)	(-1,0,-1,0,0,0,0,0)	2	10	(-1,1,0,1,1,1,1,0)	(-1,1,1,-1,-1,-1,-1,1)	2

Table 6: (continued) CMM 4, $3V_B = (2,1,1,0,0,0,0)$.

#	$3a_{1B}$	$3a_{3B}$	G_H	#	$3a_{1B}$	$3a_{3B}$	G_H
11	(-1,1,0,1,1,1,0)	(0,1,-1,0,0,0,0)	2	12	(2,-1,-1,0,0,0,0)	(1,-1,-1,1,1,1,1)	2
13	(0,0,-1,1,1,1,1)	(-1,1,1,1,1,1,1)	2	14	(0,2,0,1,1,0,0,0)	(-2,-1,-1,1,-1,0,0,0)	2
15	(0,2,0,1,1,0,0,0)	(-1,-1,0,0,0,0,0,0)	2	16	(0,2,0,1,1,0,0,0)	(0,-1,1,0,0,0,0,0)	2
17	(0,1,-2,1,0,0,0,0)	(2,1,1,-1,1,0,0,0)	2	18	(0,1,-2,1,0,0,0,0)	(0,0,0,1,1,0,0,0)	2
19	(-2,0,0,1,1,0,0,0)	(2,1,1,1,1,0,0,0)	3	20	(-2,0,0,1,1,0,0,0)	(0,0,0,-1,-1,0,0,0)	3
21	(-2,1,-1,0,0,0,0,0)	(-2,-1,-1,1,1,0,0,0)	3	22	(-1,-1,-1,1,1,1,0,0)	(1,-1,-1,-1,-1,-1,1,1)	3
23	(-1,1,0,1,1,1,1,0)	(0,0,0,1,0,0,0,1)	3	24	(2,-1,-1,0,0,0,0,0)	(-2,-1,-1,1,1,0,0,0)	3
25	(0,2,0,1,1,0,0,0)	(2,1,1,1,1,0,0,0)	3	26	(0,2,0,1,1,0,0,0)	(0,0,0,-1,-1,0,0,0)	3
27	(0,1,1,1,1,1,1,0)	(0,0,0,1,1,1,-2,1)	3	28	(1,1,-1,1,1,1,0,0)	(1,-1,-1,-1,-1,-1,1,1)	3
29	(-2,0,0,1,1,0,0,0)	(-2,-1,-1,0,0,1,1,0)	4	30	(-2,0,0,1,1,0,0,0)	(-2,1,0,0,0,1,1,1)	4
31	(-2,0,0,1,1,0,0,0)	(2,1,1,0,-1,1,0,0)	4	32	(-2,0,0,1,1,0,0,0)	(-1,1,1,1,1,1,1,1)	4
33	(-2,0,0,1,1,0,0,0)	(0,0,0,1,0,1,0,0)	4	34	(-2,0,0,1,1,0,0,0)	(0,-1,-2,-1,-1,1,0,0)	4
35	(-2,0,0,1,1,0,0,0)	(1,-1,-1,1,-1,1,1,1)	4	36	(-2,1,-1,0,0,0,0,0)	(2,-1,0,1,1,1,0,0)	4
37	(-2,1,-1,0,0,0,0,0)	(0,2,1,1,1,1,0,0)	4	38	(-1,-1,-1,1,1,1,0,0)	(-2,1,0,-1,-1,-1,0,0)	4
39	(2,1,0,1,0,0,0,0)	(-2,0,1,-1,1,1,0,0)	4	40	(-1,1,0,1,1,1,1,0)	(-2,-1,-1,1,0,0,-1,0)	4
41	(-1,1,0,1,1,1,1,0)	(-2,1,0,0,0,-1,-1,1)	4	42	(-1,1,0,1,1,1,1,0)	(2,1,1,0,0,0,-1,1)	4
43	(-1,1,0,1,1,1,1,0)	(2,1,1,1,1,0,0,0)	4	44	(-1,1,0,1,1,1,1,0)	(2,-1,0,0,0,-1,-1,1)	4
45	(-1,1,0,1,1,1,1,0)	(2,0,-1,0,-1,-1,-1,0)	4	46	(-1,1,0,1,1,1,1,0)	(-1,1,1,1,1,1,-1,1)	4
47	(-1,1,0,1,1,1,1,0)	(0,-2,-1,0,-1,-1,-1,0)	4	48	(-1,1,0,1,1,1,1,0)	(0,0,0,0,0,-1,-1,0)	4
49	(2,1,0,1,0,0,0,0)	(0,-2,-1,0,1,1,1,0)	4	50	(2,-1,-1,0,0,0,0,0)	(-2,1,0,1,1,1,0,0)	4
51	(0,0,-1,1,1,1,1,1)	(2,0,-1,1,1,1,0,0)	4	52	(0,0,-1,1,1,1,1,1)	(0,0,0,1,1,-1,-1,-2)	4
53	(0,2,0,1,1,0,0,0)	(-2,-1,-1,0,0,1,1,0)	4	54	(0,2,0,1,1,0,0,0)	(-2,1,0,1,1,1,0,0)	4
55	(0,2,0,1,1,0,0,0)	(-2,0,1,-1,-1,1,0,0)	4	56	(0,2,0,1,1,0,0,0)	(2,1,1,0,-1,1,0,0)	4
57	(0,2,0,1,1,0,0,0)	(2,0,-1,-1,-1,1,0,0)	4	58	(0,2,0,1,1,0,0,0)	(2,-1,0,0,0,1,1,1)	4
59	(0,2,0,1,1,0,0,0)	(-1,1,1,1,1,1,1,1)	4	60	(0,2,0,1,1,0,0,0)	(0,-1,-2,0,0,1,1,1)	4
61	(0,2,0,1,1,0,0,0)	(0,1,2,1,1,1,0,0)	4	62	(0,2,0,1,1,0,0,0)	(0,0,0,1,0,1,0,0)	4
63	(0,2,0,1,1,0,0,0)	(1,-1,-1,1,-1,1,1,1)	4	64	(0,1,-2,1,0,0,0,0)	(-2,1,0,0,1,1,1,0)	4
65	(0,1,1,1,1,1,1,0)	(-2,1,0,1,1,1,0,0)	4	66	(0,1,1,1,1,1,1,0)	(0,0,0,-1,-1,-1,-2,1)	4
67	(0,1,1,1,1,1,1,0)	(0,-1,-2,0,0,-1,-1,1)	4	68	(1,0,0,1,1,1,1,1)	(-2,1,0,0,0,-1,-1,-1)	4
69	(1,0,0,1,1,1,1,1)	(-2,1,0,1,1,1,0,0)	4	70	(1,1,-1,1,1,1,0,0)	(-2,1,0,0,0,-1,1,1)	4
71	(1,1,-1,1,1,1,0,0)	(2,-1,0,1,1,1,0,0)	4	72	(1,1,-1,1,1,1,0,0)	(2,0,-1,1,0,0,1,1)	4

Table 7: CMM 5, $3V_B = (2,1,1,0,0,0,0)$.

#	$3a_{1B}$	$3a_{3B}$	G_H	#	$3a_{1B}$	$3a_{3B}$	G_H
1	(-1,1,-1,1,0,0,0,0)	(2,0,1,-1,0,0,0,0)	1	2	(-1,1,-1,1,0,0,0,0)	(0,-2,1,-1,0,0,0,0)	1
3	(1,1,1,1,0,0,0,0)	(2,1,0,-1,0,0,0,0)	1	4	(-1,0,0,1,1,1,0,0)	(1,0,0,-1,-1,-1,1,1)	2
5	(-1,0,0,1,1,1,0,0)	(1,1,-1,-1,-1,-1,0,0)	2	6	(-1,1,-1,1,0,0,0,0)	(2,1,0,0,1,0,0,0)	2
7	(-1,1,-1,1,0,0,0,0)	(0,0,2,1,1,0,0,0)	2	8	(0,-1,-1,1,1,0,0,0)	(0,1,-2,1,0,0,0,0)	2
9	(0,1,0,1,1,1,0,0)	(-1,-1,-1,-1,-1,-1,0,0)	2	10	(0,1,0,1,1,1,0,0)	(0,-1,0,-1,-1,-1,1,1)	2
11	(0,1,0,1,1,1,0,0)	(1,-1,1,-1,-1,-1,0,0)	2	12	(1,0,-1,1,1,0,0,0)	(2,0,1,1,0,0,0,0)	2

Table 7: (continued) CMM 5, $3V_B = (2,1,1,0,0,0,0)$.

#	$3a_{1B}$	$3a_{3B}$	G_H	#	$3a_{1B}$	$3a_{3B}$	G_H
13	(1,1,1,1,0,0,0,0)	(-2,0,0,1,1,0,0,0)	2	14	(1,1,1,1,0,0,0,0)	(0,1,-2,0,1,0,0,0)	2
15	(2,1,-1,1,1,1,1,0)	(-1,0,1,-1,-1,-1,-1,0)	2	16	(2,1,-1,1,1,1,1,0)	(0,1,1,-1,-1,-1,-1,0)	2
17	(-2,1,1,1,1,1,1,0)	(-1,1,0,-1,-1,-1,-1,0)	2	18	(-1,0,0,1,1,1,0,0)	(0,1,-2,0,0,-1,0,0)	3
19	(-1,1,-1,1,0,0,0,0)	(-1,1,0,0,1,1,1,1)	3	20	(-1,1,-1,1,0,0,0,0)	(1,-1,1,-1,1,1,0,0)	3
21	(0,1,0,1,1,1,0,0)	(2,0,1,0,0,-1,0,0)	3	22	(1,1,1,1,0,0,0,0)	(-1,-1,-1,-1,1,1,0,0)	3
23	(1,1,1,1,0,0,0,0)	(0,1,1,0,1,1,1,1)	3	24	(2,1,-1,1,1,1,1,0)	(0,0,-1,1,1,1,1,1)	3
25	(-2,1,1,1,1,1,1,0)	(1,0,0,1,1,1,1,1)	3	26	(-1,0,0,1,1,1,0,0)	(-2,0,0,0,0,0,1,1)	4
27	(-1,0,0,1,1,1,0,0)	(-2,0,0,1,0,-1,0,0)	4	28	(-1,0,0,1,1,1,0,0)	(-2,1,-1,0,0,0,0,0)	4
29	(-1,0,0,1,1,1,0,0)	(-1,-1,-1,0,-1,-1,1,0)	4	30	(-1,0,0,1,1,1,0,0)	(0,2,0,1,1,0,0,0)	4
31	(-1,0,0,1,1,1,0,0)	(0,1,1,1,0,0,1,1)	4	32	(-1,1,-1,1,0,0,0,0)	(-2,0,0,0,1,1,0,0)	4
33	(-1,1,-1,1,0,0,0,0)	(-1,0,1,-1,1,1,1,0)	4	34	(-1,1,-1,1,0,0,0,0)	(0,2,0,0,1,1,0,0)	4
35	(0,-1,-1,1,1,0,0,0)	(0,1,1,1,0,1,1,1)	4	36	(0,1,0,1,1,1,0,0)	(-2,-1,1,0,0,0,0,0)	4
37	(0,1,0,1,1,1,0,0)	(-2,0,0,1,1,0,0,0)	4	38	(0,1,0,1,1,1,0,0)	(2,-1,-1,0,0,0,0,0)	4
39	(0,1,0,1,1,1,0,0)	(-1,0,1,1,-1,-1,1,0)	4	40	(0,1,0,1,1,1,0,0)	(-1,0,1,1,1,0,1,1)	4
41	(0,1,0,1,1,1,0,0)	(0,2,0,1,0,-1,0,0)	4	42	(0,1,0,1,1,1,0,0)	(0,2,0,0,0,0,1,1)	4
43	(0,1,0,1,1,1,0,0)	(0,0,2,1,1,0,0,0)	4	44	(0,1,0,1,1,1,0,0)	(1,1,-1,0,-1,-1,1,0)	4
45	(1,0,-1,1,1,0,0,0)	(-1,0,1,1,0,1,1,1)	4	46	(1,1,1,1,0,0,0,0)	(-1,1,0,-1,1,1,1,0)	4
47	(1,1,1,1,0,0,0,0)	(0,2,0,0,1,1,0,0)	4	48	(2,1,-1,1,1,1,1,0)	(2,0,1,0,0,0,-1,0)	4
49	(2,1,-1,1,1,1,1,0)	(-1,-1,-1,0,0,-1,-1,1)	4	50	(2,1,-1,1,1,1,1,0)	(-1,1,0,0,-1,-1,-1,1)	4
51	(2,1,-1,1,1,1,1,0)	(-1,0,1,1,1,1,-1,0)	4	52	(2,1,-1,1,1,1,1,0)	(0,1,-2,0,0,0,-1,0)	4
53	(2,1,-1,1,1,1,1,0)	(0,0,2,1,0,0,0,1)	4	54	(2,1,-1,1,1,1,1,0)	(0,0,2,0,0,-1,-1,0)	4
55	(2,1,-1,1,1,1,1,0)	(0,1,1,1,1,1,-1,0)	4	56	(2,1,-1,1,1,1,1,0)	(1,1,-1,0,0,-1,-1,1)	4
57	(2,1,-1,1,1,1,1,0)	(1,-1,1,1,1,0,0,1)	4	58	(-2,1,1,1,1,1,1,0)	(0,1,1,1,1,-1,-1,0)	4
59	(-2,1,1,1,1,1,1,0)	(0,1,1,1,1,1,0,1)	4				

Table 8: CMM 6, $3V_B = (2,1,1,0,0,0,0,0)$.

#	$3a_{1B}$	$3a_{3B}$	G_H	#	$3a_{1B}$	$3a_{3B}$	G_H
1	(-1,0,0,1,0,0,0,0)	(-2,0,-1,1,0,0,0,0)	1	2	(0,1,0,1,0,0,0,0)	(-2,-1,0,1,0,0,0,0)	1
3	(0,1,0,1,0,0,0,0)	(0,2,-1,1,0,0,0,0)	1	4	(-1,0,0,1,0,0,0,0)	(2,0,0,-1,1,0,0,0)	2
5	(-1,0,0,1,0,0,0,0)	(0,2,-1,0,1,0,0,0)	2	6	(0,1,0,1,0,0,0,0)	(-2,0,-1,0,1,0,0,0)	2
7	(0,1,0,1,0,0,0,0)	(0,-2,0,-1,1,0,0,0)	2	8	(-2,0,-1,1,1,1,0,0)	(-1,1,-1,1,1,1,0,0)	2
9	(-2,0,-1,1,1,1,0,0)	(0,1,0,1,1,1,1,1)	2	10	(-2,0,-1,1,1,1,0,0)	(1,1,1,1,1,1,0,0)	2
11	(2,1,-1,1,1,0,0,0)	(-2,-1,0,0,-1,0,0,0)	2	12	(-2,1,1,1,1,0,0,0)	(0,2,-1,0,-1,0,0,0)	2
13	(-2,1,1,1,1,0,0,0)	(0,0,-2,1,1,0,0,0)	2	14	(0,0,-2,1,1,1,1,0)	(0,-1,-1,1,1,1,1,0)	2
15	(0,0,-2,1,1,1,1,0)	(1,0,-1,1,1,1,1,0)	2	16	(-1,0,0,1,0,0,0,0)	(-1,0,0,-1,1,1,1,1)	3
17	(-1,0,0,1,0,0,0,0)	(1,1,1,1,1,1,0,0)	3	18	(0,1,0,1,0,0,0,0)	(-1,-1,1,1,1,1,0,0)	3
19	(0,1,0,1,0,0,0,0)	(0,1,0,-1,1,1,1,1)	3	20	(-2,0,-1,1,1,1,0,0)	(-2,0,-1,1,0,0,0,0)	3
21	(-2,0,-1,1,1,1,0,0)	(-1,-1,1,1,-1,-1,0,0)	3	22	(-2,1,1,1,1,0,0,0)	(-2,1,1,0,0,0,0,0)	3
23	(-2,1,1,1,1,0,0,0)	(-1,0,0,-1,-1,1,1,1)	3	24	(-2,1,1,1,1,0,0,0)	(2,0,0,-1,-1,0,0,0)	3
25	(0,0,-2,1,1,1,1,0)	(-2,-1,0,0,0,0,0,1)	3	26	(0,0,-2,1,1,1,1,0)	(1,-1,0,1,1,1,0,1)	3

Table 8: (continued) CMM 6, $3V_B = (2,1,1,0,0,0,0)$.

#	$3a_{1B}$	$3a_{3B}$	G_H	#	$3a_{1B}$	$3a_{3B}$	G_H
27	(-1,0,0,1,0,0,0,0)	(-1,1,-1,-1,1,0,0)	4	28	(-1,0,0,1,0,0,0,0)	(1,0,-1,1,1,1,0)	4
29	(0,1,0,1,0,0,0,0)	(2,0,0,0,1,1,0,0)	4	30	(0,1,0,1,0,0,0,0)	(-1,1,-1,-1,1,0,0)	4
31	(0,1,0,1,0,0,0,0)	(1,-1,0,1,1,1,0)	4	32	(-2,0,-1,1,1,0,0)	(-2,-1,0,0,-1,0,0)	4
33	(-2,0,-1,1,1,0,0)	(-2,1,1,0,0,0,0,0)	4	34	(-2,0,-1,1,1,0,0)	(-1,-1,1,0,0,-1,1,1)	4
35	(-2,0,-1,1,1,0,0)	(-1,-1,1,1,0,1,0)	4	36	(-2,0,-1,1,1,0,0)	(2,0,0,0,-1,-1,0,0)	4
37	(-2,0,-1,1,1,0,0)	(-1,1,-1,-1,-1,-1,0,0)	4	38	(-2,0,-1,1,1,0,0)	(0,1,0,-1,-1,-1,1,1)	4
39	(-2,1,1,1,0,0,0)	(-2,0,-1,0,0,1,0,0)	4	40	(-2,1,1,1,0,0,0)	(2,0,0,1,0,1,0,0)	4
41	(-2,1,1,1,0,0,0)	(-1,1,-1,-1,-1,1,0,0)	4	42	(-2,1,1,1,0,0,0)	(0,-1,-1,0,-1,1,1,1)	4
43	(-2,1,1,1,0,0,0)	(0,-1,-1,1,1,1,0)	4	44	(-2,1,1,1,0,0,0)	(0,1,0,1,1,1,1,1)	4
45	(-2,1,1,1,0,0,0)	(1,1,1,0,0,1,1,1)	4	46	(-2,1,1,1,0,0,0)	(1,1,1,1,-1,1,0,0)	4
47	(0,0,-2,1,1,1,0)	(-2,0,-1,1,0,0,0,0)	4	48	(0,0,-2,1,1,1,0)	(-1,1,-1,0,0,-1,-1,1)	4
49	(0,0,-2,1,1,1,0)	(0,-1,-1,1,-1,-1,-1,0)	4	50	(0,0,-2,1,1,1,0)	(0,0,-2,0,0,-1,1)	4
51	(0,0,-2,1,1,1,0)	(0,0,-2,1,1,0,0,0)	4	52	(0,0,-2,1,1,1,0)	(0,0,1,1,1,1,-1,1)	4
53	(0,0,-2,1,1,1,0)	(1,0,-1,1,-1,-1,-1,0)	4				

Table 9: CMM 7, $3V_B = (2,1,1,0,0,0,0,0)$.

#	$3a_{1B}$	$3a_{3B}$	G_H	#	$3a_{1B}$	$3a_{3B}$	G_H
1	(-1,0,0,1,0,0,0,0)	(-1,0,-1,0,0,0,0,0)	1	2	(0,1,0,1,0,0,0,0)	(0,1,-1,0,0,0,0,0)	1
3	(0,1,0,1,0,0,0,0)	(1,1,0,0,0,0,0,0)	1	4	(-1,0,0,1,0,0,0,0)	(-2,-1,-1,-1,1,0,0,0)	2
5	(-1,0,0,1,0,0,0,0)	(0,0,0,1,1,0,0,0)	2	6	(0,1,0,1,0,0,0,0)	(-2,-1,-1,-1,1,0,0,0)	2
7	(0,1,0,1,0,0,0,0)	(0,0,0,1,1,0,0,0)	2	8	(-2,0,-1,1,1,0,0)	(2,1,1,0,0,0,1,1)	2
9	(-2,0,-1,1,1,0,0)	(0,1,-1,0,0,0,0,0)	2	10	(-2,0,-1,1,1,0,0)	(1,1,0,0,0,0,0,0)	2
11	(-2,1,1,1,0,0,0)	(-1,0,-1,0,0,0,0,0)	2	12	(-2,1,1,1,0,0,0)	(2,1,1,1,-1,0,0,0)	2
13	(0,0,-2,1,1,1,0)	(0,-1,1,0,0,0,0,0)	2	14	(0,0,-2,1,1,1,0)	(0,0,0,1,1,1,-2,1)	2
15	(0,0,-2,1,1,1,0)	(1,0,1,0,0,0,0,0)	2	16	(-1,0,0,1,0,0,0,0)	(2,1,1,0,1,1,0,0)	3
17	(-1,0,0,1,0,0,0,0)	(0,0,0,-2,1,1,1,1)	3	18	(0,1,0,1,0,0,0,0)	(2,1,1,0,1,1,0,0)	3
19	(0,1,0,1,0,0,0,0)	(0,0,0,-2,1,1,1,1)	3	20	(-2,0,-1,1,1,0,0)	(-2,-1,-1,1,0,0,0)	3
21	(-2,0,-1,1,1,0,0)	(0,0,0,0,-1,-1,0,0)	3	22	(-2,1,1,1,0,0,0)	(-2,-1,-1,1,0,0,0)	3
23	(-2,1,1,1,0,0,0)	(0,0,0,-1,-1,0,0,0)	3	24	(-2,1,1,1,0,0,0)	(1,-1,-1,1,1,1,1,1)	3
25	(-1,0,0,1,0,0,0,0)	(-2,1,0,-1,1,1,0,0)	4	26	(0,1,0,1,0,0,0,0)	(-2,0,1,1,1,0,0)	4
27	(0,1,0,1,0,0,0,0)	(-2,1,0,0,1,1,1,0)	4	28	(0,1,0,1,0,0,0,0)	(0,-2,-1,0,1,1,1,0)	4
29	(1,0,-1,0,0,0,0,0)	(-2,1,0,1,1,1,0,0)	4	30	(-2,0,-1,1,1,0,0)	(-2,-1,-1,0,0,-1,1,0)	4
31	(-2,0,-1,1,1,0,0)	(-2,0,1,1,1,-1,0,0)	4	32	(-2,0,-1,1,1,0,0)	(-2,1,0,-1,-1,-1,0,0)	4
33	(-2,0,-1,1,1,0,0)	(-2,1,0,1,1,1,0,0)	4	34	(-2,0,-1,1,1,0,0)	(-1,1,1,-1,-1,-1,1,1)	4
35	(-2,0,-1,1,1,0,0)	(-1,1,1,1,1,1,1,1)	4	36	(-2,0,-1,1,1,0,0)	(0,-2,-1,-1,-1,-1,0,0)	4
37	(-2,0,-1,1,1,0,0)	(0,0,0,1,0,0,1,0)	4	38	(2,1,-1,1,0,0,0,0)	(-2,1,0,-1,-1,1,0,0)	4
39	(-2,1,1,1,0,0,0)	(-2,-1,-1,0,-1,1,0,0)	4	40	(-2,1,1,1,0,0,0)	(-2,1,0,1,1,1,0,0)	4
41	(-2,1,1,1,0,0,0)	(2,0,-1,0,0,1,1,1)	4	42	(-2,1,1,1,0,0,0)	(2,1,1,0,0,1,1,0)	4
43	(-2,1,1,1,0,0,0)	(-1,1,1,1,-1,1,1,1)	4	44	(-2,1,1,1,0,0,0)	(0,2,1,-1,-1,1,0,0)	4
45	(-2,1,1,1,0,0,0)	(0,0,0,2,-1,1,1,1)	4	46	(-2,1,1,1,0,0,0)	(0,0,0,1,0,1,0,0)	4

Table 9: (continued) CMM 7, $3V_B = (2,1,1,0,0,0,0)$.

#	$3a_{1B}$	$3a_{3B}$	G_H	#	$3a_{1B}$	$3a_{3B}$	G_H
47	(-1,1,-1,1,1,1,1)	(-2,1,0,1,1,0,0,-1)	4	48	(0,2,-1,1,1,1,0,0)	(2,-1,0,-1,-1,-1,0,0)	4
49	(0,0,-2,1,1,1,1,0)	(-2,-1,-1,1,1,0,0,0)	4	50	(0,0,-2,1,1,1,1,0)	(-2,0,1,1,1,1,0,0)	4
51	(0,0,-2,1,1,1,1,0)	(2,1,1,1,0,0,-1,0)	4	52	(0,0,-2,1,1,1,1,0)	(-1,1,1,1,1,-1,-1,1)	4
53	(0,0,-2,1,1,1,1,0)	(0,0,0,0,0,-1,-1,0)	4	54	(0,0,-2,1,1,1,1,0)	(0,0,0,-1,-1,-1,-2,1)	4
55	(0,0,-2,1,1,1,1,0)	(0,0,0,1,0,0,0,1)	4	56	(0,0,-2,1,1,1,1,0)	(1,-1,-1,1,1,1,-1,1)	4
57	(0,0,-2,1,1,1,1,0)	(0,-1,-2,1,1,1,0,0)	4	58	(0,0,-2,1,1,1,1,0)	(0,-1,-2,0,-1,-1,-1,0)	4
59	(0,0,-2,1,1,1,1,0)	(0,1,2,1,1,0,0,1)	4				

Table 10: CMM 8, $3V_B = (1,1,0,0,0,0,0,0)$.

#	$3a_{1B}$	$3a_{3B}$	G_H	#	$3a_{1B}$	$3a_{3B}$	G_H
1	(0,0,1,1,1,1,0,0)	(0,0,-1,-1,-1,-1,1,1)	1	2	(0,0,2,0,0,0,0,0)	(-1,-2,1,0,0,0,0,0)	1
3	(0,0,1,1,1,1,0,0)	(-1,-2,0,0,0,-1,0,0)	2	4	(0,0,1,1,1,1,0,0)	(1,-1,1,1,1,-1,0,0)	2
5	(1,-1,1,1,0,0,0,0)	(0,0,1,-2,1,0,0,0)	2	6	(2,1,1,1,1,1,1,0)	(-2,-1,1,0,0,0,0,0)	2
7	(0,0,1,1,1,1,0,0)	(1,-1,-1,-1,-1,-1,0,0)	3	8	(2,1,1,1,1,1,1,0)	(1,-1,1,0,-1,-1,-1,0)	3
9	(0,0,1,1,1,1,0,0)	(1,-1,1,0,-1,-1,1,0)	4	10	(0,0,1,1,1,1,0,0)	(1,-1,1,1,0,0,1,1)	4
11	(2,1,1,1,1,1,1,0)	(-1,1,1,1,0,-1,-1,0)	4	12	(2,1,1,1,1,1,1,0)	(0,0,2,1,0,0,-1,0)	4

Table 11: CMM 8, $3V_B = (2,1,1,1,1,0,0,0)$.

#	$3a_{1B}$	$3a_{3B}$	G_H	#	$3a_{1B}$	$3a_{3B}$	G_H
1	(-1,0,0,0,-1,1,1,0)	(-1,1,1,1,-1,0,0,1)	2	2	(-1,0,0,0,-1,1,1,0)	(0,1,1,1,0,1,1,1)	2
3	(-1,1,0,-1,-1,0,0,0)	(-2,-1,0,0,-1,0,0,0)	2	4	(-1,1,0,-1,-1,0,0,0)	(2,0,0,1,1,0,0,0)	2
5	(-1,1,0,-1,-1,0,0,0)	(0,-2,0,1,1,0,0,0)	2	6	(-1,1,1,0,0,1,0,0)	(1,-1,-1,0,0,-1,1,1)	2
7	(-1,1,1,0,0,1,0,0)	(1,-1,-1,1,-1,-1,0,0)	2	8	(0,1,0,0,-1,1,1,0)	(-1,0,1,1,0,1,1,1)	2
9	(0,1,0,0,-1,1,1,0)	(-1,1,1,1,-1,0,0,1)	2	10	(0,1,1,1,0,1,0,0)	(-1,-1,-1,-1,-1,-1,0,0)	2
11	(0,1,1,1,0,1,0,0)	(0,-1,-1,-1,0,-1,1,1)	2	12	(0,1,1,1,0,1,0,0)	(1,-1,-1,-1,1,-1,0,0)	2
13	(1,1,0,0,0,1,1,0)	(0,0,1,1,1,1,1,1)	2	14	(1,1,0,0,0,1,1,0)	(1,1,1,1,1,0,0,1)	2
15	(-2,1,-1,-1,-1,1,1,0)	(-1,-1,1,1,1,1,0,0)	2	16	(2,1,1,1,-1,1,1,0)	(0,0,0,0,0,1,-2,1)	2
17	(2,1,1,1,-1,1,1,0)	(1,-1,-1,-1,1,1,0,0)	2	18	(-1,0,0,0,-1,1,1,0)	(-1,1,1,0,0,-1,-1,1)	3
19	(-1,0,0,0,-1,1,1,0)	(1,1,1,1,1,1,0,0)	3	20	(-1,1,0,-1,-1,0,0,0)	(-1,1,1,0,0,1,1,1)	3
21	(-1,1,1,0,0,1,0,0)	(-2,0,0,-1,-1,0,0,0)	3	22	(-1,1,1,0,0,1,0,0)	(-1,1,-1,1,1,1,0,0)	3
23	(-1,1,1,0,0,1,0,0)	(1,1,1,1,1,1,0,0)	3	24	(0,1,0,0,-1,1,1,0)	(-1,-1,1,1,1,1,0,0)	3
25	(0,1,0,0,-1,1,1,0)	(-1,1,1,0,0,-1,-1,1)	3	26	(0,1,1,1,0,1,0,0)	(-2,0,0,-1,-1,0,0,0)	3
27	(0,1,1,1,0,1,0,0)	(-1,1,1,-1,1,1,0,0)	3	28	(1,1,0,0,0,1,1,0)	(-1,-1,1,1,1,1,0,0)	3
29	(-2,1,-1,-1,-1,1,1,0)	(-1,0,1,1,0,1,1,1)	3	30	(-2,1,-1,-1,-1,1,1,0)	(0,0,0,0,0,1,-2,1)	3
31	(2,1,1,1,-1,1,1,0)	(-1,1,1,1,-1,0,0,1)	3	32	(-2,1,1,1,1,1,1,0)	(1,1,-1,-1,-1,0,0,1)	3
33	(-1,0,0,0,-1,1,1,0)	(-2,0,-1,-1,0,0,0,0)	4	34	(-1,0,0,0,-1,1,1,0)	(-2,0,0,0,1,1,0,0)	4
35	(-1,0,0,0,-1,1,1,0)	(-2,1,0,0,0,0,0,1)	4	36	(-1,0,0,0,-1,1,1,0)	(-1,0,-1,-1,1,0,-1,1)	4
37	(-1,0,0,0,-1,1,1,0)	(2,0,0,0,-1,0,0,1)	4	38	(-1,0,0,0,-1,1,1,0)	(-1,1,0,0,1,1,1,1)	4

Table 11: (continued) CMM 8, $3V_B = (2,1,1,1,0,0,0)$.

#	$3a_{1B}$	$3a_{3B}$	G_H	#	$3a_{1B}$	$3a_{3B}$	G_H
39	(-1,0,0,0,-1,1,1,0)	(-1,1,1,-1,1,0,-1,0)	4	40	(-1,0,0,0,-1,1,1,0)	(1,1,-1,-1,-1,0,-1,0)	4
41	(-1,1,1,0,0,1,0,0)	(-2,1,0,0,0,-1,0,0)	4	42	(-1,1,1,0,0,1,0,0)	(-1,-1,-1,-1,-1,0,1,0)	4
43	(-1,1,1,0,0,1,0,0)	(2,1,0,1,0,0,0,0)	4	44	(-1,1,1,0,0,1,0,0)	(2,0,-1,0,0,-1,0,0)	4
45	(-1,1,1,0,0,1,0,0)	(2,0,0,0,-1,1,0,0)	4	46	(-1,1,1,0,0,1,0,0)	(-1,0,0,1,1,1,1,1)	4
47	(-1,1,1,0,0,1,0,0)	(-1,1,0,-1,-1,0,1,1)	4	48	(-1,1,1,0,0,1,0,0)	(-1,1,1,0,0,-1,1,1)	4
49	(-1,1,1,0,0,1,0,0)	(-1,1,1,1,-1,-1,0,0)	4	50	(-1,1,1,0,0,1,0,0)	(0,2,1,0,0,-1,0,0)	4
51	(-1,1,1,0,0,1,0,0)	(0,-1,-1,1,1,1,1,0)	4	52	(-1,1,1,0,0,1,0,0)	(0,1,-2,1,0,0,0,0)	4
53	(-1,1,1,0,0,1,0,0)	(0,1,0,1,1,1,1,1)	4	54	(-1,1,1,0,0,1,0,0)	(1,0,-1,1,1,1,1,0)	4
55	(-1,1,1,0,0,1,0,0)	(1,1,-1,-1,-1,0,1,0)	4	56	(0,1,0,0,-1,1,1,0)	(-1,-1,1,-1,0,1,-1,0)	4
57	(0,1,0,0,-1,1,1,0)	(0,2,1,0,0,0,0,1)	4	58	(0,1,1,-1,-1,0,0,0)	(0,1,0,1,1,1,1,1)	4
59	(0,1,1,1,0,1,0,0)	(-2,0,0,0,1,-1,0,0)	4	60	(0,1,1,1,0,1,0,0)	(-2,1,0,0,0,1,0,0)	4
61	(0,1,1,1,0,1,0,0)	(-1,0,-1,-1,1,1,1,0)	4	62	(0,1,1,1,0,1,0,0)	(2,1,1,0,0,0,0,0)	4
63	(0,1,1,1,0,1,0,0)	(-1,1,0,0,1,1,1,1)	4	64	(0,1,1,1,0,1,0,0)	(-1,1,1,1,-1,-1,0,0)	4
65	(0,1,1,1,0,1,0,0)	(0,2,1,0,0,-1,0,0)	4	66	(0,1,1,1,0,1,0,0)	(0,1,0,-2,1,0,0,0)	4
67	(0,1,1,1,0,1,0,0)	(0,1,1,1,0,-1,1,1)	4	68	(0,1,1,1,0,1,0,0)	(1,1,-1,-1,-1,0,1,0)	4
69	(-2,1,-1,-1,-1,1,1,0)	(-1,0,1,-1,-1,0,-1,1)	4	70	(2,1,0,-1,-1,1,1,1)	(-1,1,1,0,0,-1,-1,-1)	4
71	(2,1,0,-1,-1,1,1,1)	(0,0,-1,-1,-1,1,1,1)	4	72	(2,1,0,-1,-1,1,1,1)	(0,0,1,1,1,1,1,-1)	4
73	(2,1,0,-1,-1,1,1,1)	(1,-1,-1,1,-1,1,0,0)	4	74	(2,1,0,-1,-1,1,1,1)	(1,-1,0,0,-1,1,1,1)	4
75	(-2,1,1,0,-1,1,1,1)	(-1,0,0,1,1,1,1,-1)	4	76	(-2,1,1,0,-1,1,1,1)	(0,2,1,0,0,0,0,-1)	4
77	(2,1,1,1,-1,1,1,0)	(-1,1,-1,-1,0,1,1,0)	4	78	(0,1,-1,-1,-2,1,1,1)	(-1,1,0,0,1,-1,-1,-1)	4
79	(0,1,-1,-1,-2,1,1,1)	(1,-1,1,1,0,1,1,0)	4	80	(0,2,1,1,-1,1,1,1)	(0,0,-1,-1,-1,1,1,1)	4
81	(0,2,1,1,-1,1,1,1)	(1,-1,0,0,-1,1,1,1)	4	82	(-2,1,1,0,-1,1,1,1)	(0,0,0,0,0,-1,-1,-2)	4

Table 12: CMM 9, $3V_B = (1,1,0,0,0,0,0,0)$.

#	$3a_{1B}$	$3a_{3B}$	G_H	#	$3a_{1B}$	$3a_{3B}$	G_H
1	(1,0,1,0,0,0,0,0)	(-1,1,-1,1,1,1,1,1)	1	2	(1,0,1,0,0,0,0,0)	(0,0,1,1,0,0,0,0)	1
3	(1,0,1,0,0,0,0,0)	(-2,-1,0,1,1,1,0,0)	2	4	(2,-1,1,1,1,0,0,0)	(-2,-1,1,1,-1,0,0,0)	2
5	(2,-1,1,1,1,0,0,0)	(-1,1,1,1,-1,1,1,1)	3	6	(2,-1,1,1,1,0,0,0)	(0,0,1,0,0,1,0,0)	3
7	(2,-1,1,1,1,0,0,0)	(0,0,0,-1,-1,0,0,0)	3	8	(2,-1,1,1,1,0,0,0)	(-2,-1,1,0,0,1,1,0)	4
9	(2,-1,1,1,1,0,0,0)	(-2,-1,0,-1,-1,1,0,0)	4	10	(2,-1,1,1,1,0,0,0)	(0,0,2,0,-1,1,1,1)	4

Table 13: CMM 9, $3V_B = (2,1,1,1,1,0,0,0)$.

#	$3a_{1B}$	$3a_{3B}$	G_H	#	$3a_{1B}$	$3a_{3B}$	G_H
1	(-1,0,0,0,0,1,0,0)	(-1,0,0,0,-1,0,0,0)	2	2	(-1,0,0,0,0,1,0,0)	(0,0,0,0,0,1,1,0)	2
3	(0,1,0,0,0,1,0,0)	(-1,-1,-1,-1,-1,-1,1,1)	2	4	(0,1,0,0,0,1,0,0)	(0,0,0,0,0,1,1,0)	2
5	(0,1,0,0,0,1,0,0)	(1,1,0,0,0,0,0,0)	2	6	(-2,0,0,0,-1,1,1,1)	(-1,-1,-1,-1,-1,1,1,-1)	2
7	(-2,0,0,0,-1,1,1,1)	(-1,1,1,-1,1,1,1,1)	2	8	(-2,0,0,0,-1,1,1,1)	(0,0,0,0,0,0,-1,-1)	2
9	(-2,0,0,0,-1,1,1,1)	(0,1,0,0,-1,0,0,0)	2	10	(-2,0,0,0,-1,1,1,1)	(1,1,0,0,0,0,0,0)	2

Table 13: (continued) CMM 9, $3V_B = (2,1,1,1,0,0,0)$.

#	$3a_{1B}$	$3a_{3B}$	G_H	#	$3a_{1B}$	$3a_{3B}$	G_H
11	(-2,1,1,1,-1,0,0,0)	(-1,0,0,-1,0,0,0,0)	2	12	(-2,1,1,1,-1,0,0,0)	(0,0,0,-1,1,0,0,0)	2
13	(0,1,1,1,-2,1,0,0)	(1,0,0,0,1,0,0,0)	2	14	(-1,0,0,0,0,1,0,0)	(2,1,1,0,0,0,1,1)	3
15	(0,0,0,-1,-1,0,0,0)	(-2,0,-1,1,1,1,0,0)	3	16	(0,1,0,0,0,1,0,0)	(-2,0,0,-1,-1,1,1,0)	3
17	(0,1,0,0,0,1,0,0)	(-2,0,1,1,-1,1,0,0)	3	18	(-2,0,0,0,-1,1,1,1)	(-2,0,0,-1,-1,1,1,0)	3
19	(-2,0,0,0,-1,1,1,1)	(-2,0,0,0,1,1,1,-1)	3	20	(-2,0,0,0,-1,1,1,1)	(-2,1,0,0,0,1,1,1)	3
21	(-2,0,0,0,-1,1,1,1)	(0,-1,-1,-2,1,0,0,-1)	3	22	(-2,1,1,1,-1,0,0,0)	(-2,1,-1,-1,-1,0,0,0)	3
23	(-2,1,1,1,-1,0,0,0)	(-2,1,1,0,-1,1,0,0)	3	24	(-2,1,1,1,-1,0,0,0)	(2,0,0,-1,0,1,1,1)	3
25	(-2,1,1,1,-1,0,0,0)	(0,2,0,0,1,1,1,1)	3	26	(-1,0,0,0,0,1,0,0)	(-2,0,0,-1,-1,-1,1,0)	4
27	(-1,0,0,0,0,1,0,0)	(-2,1,1,0,-1,-1,0,0)	4	28	(-1,0,0,0,0,1,0,0)	(-2,1,0,0,0,-1,1,1)	4
29	(0,1,0,0,0,1,0,0)	(-2,-1,0,0,-1,-1,1,0)	4	30	(0,1,0,0,0,1,0,0)	(-2,-1,1,1,0,-1,0,0)	4
31	(0,1,0,0,0,1,0,0)	(-2,0,1,0,0,1,1,1)	4	32	(0,1,0,0,0,1,0,0)	(-2,1,1,0,-1,0,1,0)	4
33	(0,1,0,0,0,1,0,0)	(0,-2,1,-1,-1,0,1,0)	4	34	(1,0,0,0,-1,0,0,0)	(-2,1,0,0,0,1,1,1)	4
35	(-2,0,0,0,-1,1,1,1)	(-2,0,-1,-1,0,1,0,-1)	4	36	(-2,0,0,0,-1,1,1,1)	(-2,1,0,-1,1,1,0,0)	4
37	(-2,0,0,0,-1,1,1,1)	(-2,1,0,0,0,-1,-1,-1)	4	38	(-2,0,0,0,-1,1,1,1)	(-2,1,1,0,-1,0,0,-1)	4
39	(-2,0,0,0,-1,1,1,1)	(-1,1,1,1,-1,1,1,-1)	4	40	(-2,0,0,0,-1,1,1,1)	(0,0,-1,-2,0,1,1,-1)	4
41	(-2,0,0,0,-1,1,1,1)	(0,0,0,-2,-1,-1,-1,-1)	4	42	(-2,1,0,-1,-1,1,0,0)	(-2,0,-1,1,1,-1,0,0)	4
43	(-2,1,0,-1,-1,1,0,0)	(-2,1,0,1,-1,-1,0,0)	4	44	(-2,1,0,-1,-1,1,0,0)	(-2,1,1,0,-1,1,0,0)	4
45	(-2,1,0,-1,-1,1,0,0)	(-1,-1,0,0,0,0,0,0)	4	46	(-2,1,0,-1,-1,1,0,0)	(2,0,-1,1,-1,-1,0,0)	4
47	(-2,1,0,-1,-1,1,0,0)	(0,-2,1,-1,-1,1,0,0)	4	48	(-2,1,0,-1,-1,1,0,0)	(0,2,0,-1,-1,0,1,1)	4
49	(-2,1,0,-1,-1,1,0,0)	(0,0,0,0,0,1,1,0)	4	50	(2,0,-1,-1,-1,1,0,0)	(-2,-1,1,1,0,1,0,0)	4
51	(2,0,-1,-1,-1,1,0,0)	(-2,0,0,-1,-1,0,1,1)	4	52	(2,0,-1,-1,-1,1,0,0)	(0,0,1,1,-2,1,1,0)	4
53	(2,0,-1,-1,-1,1,0,0)	(0,0,2,-1,-1,1,1,0)	4	54	(2,0,-1,-1,-1,1,0,0)	(0,1,0,0,-1,0,0,0)	4
55	(2,1,0,0,-1,1,1,0)	(-2,-1,0,0,-1,0,-1,1)	4	56	(2,1,0,0,-1,1,1,0)	(-2,0,1,-1,1,0,0,1)	4
57	(2,1,0,0,-1,1,1,0)	(0,0,2,0,1,1,1,1)	4	58	(2,1,0,0,-1,1,1,0)	(0,1,0,-1,0,0,0,0)	4
59	(0,2,1,-1,-1,1,0,0)	(-2,-1,1,-1,-1,0,0,0)	4	60	(0,2,1,-1,-1,1,0,0)	(-2,0,0,1,0,-1,1,1)	4
61	(0,2,1,-1,-1,1,0,0)	(-2,1,0,1,-1,-1,0,0)	4	62	(0,2,1,-1,-1,1,0,0)	(-1,0,0,0,-1,0,0,0)	4
63	(-2,1,1,0,0,1,1,0)	(-2,-1,-1,0,0,0,-1,1)	4	64	(-2,1,1,0,0,1,1,0)	(-2,1,0,0,0,1,1,1)	4
65	(-2,1,1,0,0,1,1,0)	(-1,-1,-1,-1,-1,-1,-1,1)	4	66	(-2,1,1,0,0,1,1,0)	(0,0,0,0,0,1,0,1)	4
67	(-2,1,1,0,0,1,1,0)	(1,0,0,1,0,0,0,0)	4	68	(-2,1,1,1,-1,0,0,0)	(-2,0,0,-1,-1,1,1,0)	4
69	(-2,1,1,1,-1,0,0,0)	(2,1,-1,-1,0,1,0,0)	4	70	(-2,1,1,1,-1,0,0,0)	(2,1,1,0,0,1,1,0)	4
71	(-2,1,1,1,-1,0,0,0)	(0,2,1,-1,1,1,0,0)	4	72	(-2,1,1,1,-1,0,0,0)	(0,1,0,-2,1,1,1,0)	4
73	(-2,1,1,1,-1,0,0,0)	(1,1,-1,-1,-1,1,1,1)	4	74	(-1,1,1,-1,-1,1,1,1)	(-2,0,0,1,0,-1,-1,-1)	4
75	(-1,1,1,-1,-1,1,1,1)	(-2,0,0,1,0,1,1,1)	4	76	(-1,1,1,-1,-1,1,1,1)	(-1,-1,-1,-1,-1,1,1,1)	4
77	(-1,1,1,-1,-1,1,1,1)	(2,-1,-1,-1,-1,0,0,0)	4	78	(-1,1,1,-1,-1,1,1,1)	(0,2,0,1,0,-1,-1,-1)	4
79	(-1,1,1,-1,-1,1,1,1)	(0,0,-1,1,0,0,0,0)	4	80	(0,1,0,-1,-2,1,1,0)	(-2,0,0,1,0,1,1,1)	4
81	(0,1,0,-1,-2,1,1,0)	(-2,0,-1,1,1,1,0,0)	4	82	(0,1,0,-1,-2,1,1,0)	(0,1,1,0,-2,1,1,0)	4

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