

Crystal structure of $2\text{Mg}_2\text{SiO}_4 \cdot 3\text{Mg}(\text{OH})_2$, a new high-pressure structure typeHIROYUKI HORIUCHI, NOBUO MORIMOTO¹*Institute of Scientific and Industrial Research
Osaka University, Suita, Osaka 565, Japan*

KATSUHIRO YAMAMOTO

*Water Research Institute, Nagoya University
Chikusa-ku, Nagoya 464, Japan*

AND SYUN-ITI AKIMOTO

*Institute for Solid State Physics, The University of Tokyo
Roppongi, Minato-ku, Tokyo 106, Japan*

Abstract

Phase A [$2\text{Mg}_2\text{SiO}_4 \cdot 3\text{Mg}(\text{OH})_2$], a high-pressure hydrous silicate which is a possible H_2O -bearing mineral phase in the mantle, is hexagonal with $a = 7.8603(2)$, $c = 9.5730(2)\text{\AA}$; $P6_3$ and $Z = 2$. The structure has been determined with 1653 counter-measured intensities and refined by the least-squares method to $R = 0.059$. The structure is based on a slightly distorted ABCE packing of anions (O^{2-} , OH^-) in which one-half of the octahedral sites are filled by Mg and one-fourteenth of the tetrahedral sites by Si. Two types of layers alternate in the structure parallel to (001), one consisting of networks of Mg octahedra and the other of blocks of three Mg octahedra. The first layer is identical to that found in welinite, $\text{Mn}^{4+}\text{Mn}_3^{2+}\text{SiO}_7$, and the second one is similar to a layer observed in hematolite, $(\text{Mn}^{2+}, \text{Mg}, \text{Al})_{13}(\text{OH})_{22}(\text{AsO}_3)(\text{AsO}_4)_2$. In phase A the chains of Mg octahedra are linked to other similar chains by Mg octahedra to form sheets. Therefore, no isolated chains of Mg octahedra are observed in the structure, though they are important constituents in the humite group minerals of composition $m\text{Mg}_2\text{SiO}_4 \cdot n\text{Mg}(\text{F}, \text{OH})_2$ with $1 \leq m/n \leq 4$.

Introduction

Ringwood and Major (1967) reported synthesis of a new hydrated magnesium silicate, designated phase A, in their investigation of the system Mg_2SiO_4 - MgO - H_2O at high pressures and temperatures. Yamamoto and Akimoto (1974) determined the chemical formula of phase A to be $2\text{Mg}_2\text{SiO}_4 \cdot 3\text{Mg}(\text{OH})_2$. The stability diagram of the system MgO - SiO_2 - H_2O reported by Yamamoto and Akimoto (1977) indicates that phase A can coexist with forsterite and enstatite up to 800°C at 77 kbar. This suggests that phase A is a possible H_2O -bearing mineral phase in the subduction zone in the mantle.

Yamamoto and Akimoto (1974) reported that phase A has hexagonal symmetry with $a = 7.866(2)$

and $c = 9.600(3)\text{\AA}$, and its possible space groups are $P6_3$ and $P6_3/m$. However, they reported that the optical interference figure of phase A indicates a biaxial nature, although the X-ray data indicate hexagonal symmetry.

In the system MgO - SiO_2 - H_2O , all compounds of composition $m\text{Mg}_2\text{SiO}_4 \cdot n\text{Mg}(\text{OH})_2$ with $1 \leq m/n \leq 4$ belong to the humite group. However, phase A is the only compound with $m/n < 1$ and has quite different crystallographic characteristics relative to compounds of the humite group. Because of the uniqueness of the crystallographic data and of the possible importance of this compound in the upper mantle, we have determined the structure.

Experimental

The crystals of phase A used in this study were synthesized from mixtures of appropriate amounts of

¹ Present address: Department of Geology and Mineralogy, Faculty of Science, Kyoto University, Kyoto 606, Japan.

Comparison of d_{obs} and d_{calc} used for least squares fitting of lattice constants.

WAVE LENGTH = 0.7092610 (MoK α_1)

H	K	L	D(OBS)	D(CALC)
0	0	18	0.531814	0.531836
4	1	16	0.554946	0.554988
4	1	14	0.621178	0.621140
6	4	12	0.557999	0.558021
4	1	12	0.702833	0.702815
2	0	12	0.777018	0.776705
2	3	12	0.710378	0.710429
2	1	12	0.762120	0.761967
1	2	11	0.824346	0.824394
0	0	16	0.598229	0.598316
0	0	14	0.683693	0.683789
0	0	12	0.797745	0.797754
0	0	10	0.957522	0.957305
5	3	10	0.682123	0.682211
4	4	10	0.685666	0.685663
3	1	10	0.853921	0.853818
3	0	10	0.882105	0.882021
2	4	10	0.768016	0.767995
0	7	9	0.717894	0.717716
3	6	8	0.697178	0.697083
7	3	7	0.668171	0.668221
6	0	7	0.873090	0.873178
4	5	7	0.735004	0.734997
2	6	7	0.776992	0.776884
8	1	6	0.712754	0.712795
7	0	6	0.830342	0.830377
6	4	6	0.701367	0.701354
1	8	6	0.712819	0.712795
0	7	6	0.830403	0.830377
7	0	5	0.866798	0.867031
6	1	5	0.912736	0.912582
5	6	5	0.668749	0.668657
5	3	5	0.867034	0.867031
7	1	4	0.843709	0.843745
3	9	4	0.608638	0.608636
0	9	0	0.756376	0.756356
3	6	0	0.857463	0.857628
3	9	0	0.629226	0.629327
5	5	0	0.785774	0.786029
7	1	0	0.902047	0.901637
8	2	0	0.742759	0.742727
9	0	0	0.756226	0.756356
7	7	0	0.561519	0.561449
2	11	0	0.561399	0.561449
8	5	0	0.599381	0.599341

WAVE LENGTH = 0.7135430 (MoK α_2)

H	K	L	D(OBS)	D(CALC)
0	0	18	0.531837	0.531836
4	1	16	0.555038	0.554988
4	1	14	0.621145	0.621140
6	4	12	0.558026	0.558021
4	1	12	0.702862	0.702815
2	0	12	0.776745	0.776705
2	3	12	0.710431	0.710429
2	1	12	0.761944	0.761967
1	2	11	0.824775	0.824394
0	0	16	0.598243	0.598316
0	0	14	0.683792	0.683789
0	0	12	0.797683	0.797754
0	0	10	0.957355	0.957305
4	4	10	0.685691	0.685663
3	1	10	0.853857	0.853818
3	0	10	0.881999	0.882021
0	7	9	0.718369	0.717716
3	6	8	0.697210	0.697083
7	3	7	0.668243	0.668221
6	0	7	0.873221	0.873178
4	5	7	0.734882	0.734997
2	6	7	0.776823	0.776884
8	1	6	0.712681	0.712795
7	0	6	0.830388	0.830377
6	4	6	0.701490	0.701354
1	8	6	0.712832	0.712795
0	7	6	0.830418	0.830377
7	0	5	0.866872	0.867031
6	1	5	0.912787	0.912582
5	6	5	0.668723	0.668657
7	1	4	0.844794	0.843745
3	9	4	0.608615	0.608636
0	9	0	0.756395	0.756356
3	6	0	0.857437	0.857628
5	5	0	0.785857	0.786029
8	2	0	0.742810	0.742727
9	0	0	0.756246	0.756356
7	7	0	0.561451	0.561449
2	11	0	0.561475	0.561449

THE FO AND FC TABLE FOR PHASE A (2MG2SIO4.3MG(OH)2)

LIST LINE ICORUM IVFORM ICOHKL
 1 55 3 5 0

INDEXES ARE SORTED UNDER THE ORDER OF L H AND K IEXTC = 0

JK ITF NF NFD NFAD NA ICENT NS
 10 2 3 0 0 11 0 6

NON-CENTROSYMMETRIC

SCATTERING FACTOR TABLE 1

10.000	9.633	8.671	7.423	6.174	5.081	4.192	3.498
2.968	2.570	2.274	2.054	1.891	1.769	1.676	1.602
1.543	1.492	1.447	1.406	1.367	1.328	1.291	1.254
1.216	1.179	1.142	1.104	1.068	1.031	0.995	0.959

SCATTERING FACTOR TABLE 2

10.000	9.914	9.662	9.265	8.751	8.156	7.513	6.856
6.210	5.595	5.025	4.508	4.046	3.641	3.288	2.984
2.724	2.502	2.315	2.157	2.023	1.910	1.813	1.732
1.662	1.602	1.548	1.501	1.460	1.424	1.388	0.

SCATTERING FACTOR TABLE 3

10.000	9.947	9.790	9.537	9.199	8.790	8.327	7.827
7.306	6.779	6.250	5.755	5.277	4.830	4.418	4.041
3.701	3.396	3.124	2.884	2.673	2.487	2.326	2.185
2.063	1.956	1.864	1.782	1.712	1.654	1.595	0.

SYMMETRY OPERATION 1

I	R(I,1)	R(I,2)	R(I,3)	T(I)
1	1.00	0.	0.	0.
2	0.	1.00	0.	0.
3	0.	0.	1.00	0.

SYMMETRY OPERATION 2

I	R(I,1)	R(I,2)	R(I,3)	T(I)
1	0.	-1.00	0.	0.
2	1.00	-1.00	0.	0.
3	0.	0.	1.00	0.

SYMMETRY OPERATION 3

I	R(I,1)	R(I,2)	R(I,3)	T(I)
1	-1.00	1.00	0.	0.
2	-1.00	0.	0.	0.
3	0.	0.	1.00	0.

SYMMETRY OPERATION 4

I	R(I,1)	R(I,2)	R(I,3)	T(I)
1	-1.00	0.	0.	0.
2	0.	-1.00	0.	0.
3	0.	0.	1.00	0.500000

SYMMETRY OPERATION 5

I	R(I,1)	R(I,2)	R(I,3)	T(I)
1	0.	1.00	0.	0.
2	-1.00	1.00	0.	0.
3	0.	0.	1.00	0.5000000

SYMMETRY OPERATION 6

I	R(I,1)	R(I,2)	R(I,3)	T(I)
1	1.00	-1.00	0.	0.
2	1.00	0.	0.	0.
3	0.	0.	1.00	0.5000000

RECIPROCAL CELL PARAMETERS

0.146900 0.146900 0.104450 0. 0. 0.500000

SCALE = 0.717698 TO = 0.

NA = 11 ITPF = 1

N	ATOM	X	Y	Z	BISO	ISF	LDP	LDPP	AI
1	O 1	0.20009	0.02744	-0.02401	0.462	1	0	0	1.000
2	O 2	0.47664	0.09883	0.48444	0.517	1	0	0	1.000
3	O 3	0.45375	0.29467	0.23197	0.535	1	0	0	1.000
4	O 4	0.17036	0.43668	0.23975	0.542	1	0	0	1.000
5	MG1	0.37224	0.45474	0.38573	0.555	2	0	0	1.000
6	MG2	0.22517	0.24378	0.11273	0.487	2	0	0	1.000
7	O 5	0.66667	0.33333	0.	0.528	1	0	0	0.333
8	O 6	0.	0.	0.23227	0.517	1	0	0	0.333
9	MG3	0.33333	0.66667	0.10285	0.499	2	0	0	0.333
10	SI1	0.66667	0.33333	0.17408	0.332	3	0	0	0.333
11	SI2	0.	0.	0.40184	0.358	3	0	0	0.333

N	ATOM	B11	B22	B33	B12	B13	B23
1	O 1	0.002513	0.002405	0.001178	0.001145	-0.000063	-0.000101
2	O 2	0.003203	0.002683	0.001360	0.001488	0.000044	-0.000125
3	O 3	0.002189	0.004009	0.001362	0.001640	-0.000164	-0.000074
4	O 4	0.002935	0.002801	0.001757	0.001451	0.000207	0.000230
5	MG1	0.002888	0.002916	0.001449	0.001253	-0.000471	0.000048
6	MG2	0.002906	0.002416	0.001259	0.001265	-0.000389	-0.000330
7	O 5	0.002787	0.002787	0.001199	0.001394	0.	0.
8	O 6	0.003658	0.003658	0.000547	0.001829	0.	0.
9	MG3	0.002829	0.002829	0.001329	0.001415	0.	0.
10	SI1	0.001961	0.001961	0.000731	0.000981	0.	0.
11	SI2	0.002038	0.002038	0.000701	0.001019	0.	0.

FORMAT OF INPUT H K L FO AND SIGF IS (5(3I2, F5.2, F4.3))

FORMAT OF INPUT H K L FO AND SIGF IS (5(2I3, I2, F5.2, F1.0))

SUMFO = 21798.33 SUMFC = 21907.66 NUMBER OF REFLECTIONS 2188

R FACTOR = 0.09476

R FACTOR(OMITTING ZERO) = 0.07802 (2032 REFLECTIONS)

R FACTOR(USED FOR LS) = 0.05904 (1653 REFLECTIONS)

FO AND FC VALUES ARE MULTIPLIED BY 10

**MARKED REFLECTIONS HAVE BEEN ELIMINATED FROM LS PROCEDURE

H	K	L	FO	FC	H	K	L	FO	FC	H	K	L	FO	FC
0	1	0	113	102	3	13	0	57	48	8	9	0	52	38
0	2	0	92	85	4	1	0	1900	1940	9	1	0	115	106
0	3	0	463	440	4	2	0	186	193	9	2	0	0*	8
0	4	0	323	320	4	3	0	173	175	9	3	0	188	190
0	5	0	258	277	4	4	0	494	494	9	4	0	31*	14
0	6	0	354	351	4	5	0	203	202	9	5	0	0*	17
0	7	0	27*	25	4	6	0	82	78	9	6	0	126	109
0	8	0	70	76	4	7	0	236	234	9	7	0	32*	1
0	9	0	321	324	4	8	0	61	60	9	8	0	116	121
0	10	0	63	50	4	9	0	50	40	10	1	0	189	194
0	11	0	192	189	4	10	0	139	135	10	2	0	0*	17
0	12	0	135	143	4	11	0	12*	26	10	3	0	80	81
0	13	0	120	117	4	12	0	166	163	10	4	0	0*	18
0	14	0	0*	41	4	13	0	96	101	10	5	0	115	122
0	15	0	31*	18	5	1	0	41	40	10	6	0	0*	23
1	1	0	498	476	5	2	0	276	270	10	7	0	129	128
1	2	0	72	61	5	3	0	38	30	11	1	0	25*	31
1	3	0	0*	15	5	4	0	0*	4	11	2	0	199	207
1	4	0	522	523	5	5	0	268	263	11	3	0	52	54
1	5	0	42	47	5	6	0	45	34	11	4	0	99	83
1	6	0	222	225	5	7	0	171	177	11	5	0	130	125
1	7	0	138	140	5	8	0	86	84	11	6	0	34*	22
1	8	0	196	194	5	9	0	130	122	12	1	0	41*	57
1	9	0	59	52	5	10	0	60	56	12	2	0	53	37
1	10	0	58	61	5	11	0	61	78	12	3	0	163	155
1	11	0	74	87	5	12	0	28*	7	12	4	0	50	50
1	12	0	106	110	6	1	0	33	26	12	5	0	76	78
1	13	0	106	116	6	2	0	134	127	13	1	0	158	148
1	14	0	0*	3	6	3	0	80	75	13	2	0	32*	8
2	1	0	201	178	6	4	0	199	195	13	3	0	0*	15
2	2	0	162	162	6	5	0	53	43	13	4	0	129	120
2	3	0	250	251	6	6	0	179	170	14	1	0	47	36
2	4	0	124	122	6	7	0	69	72	14	2	0	83	94
2	5	0	217	210	6	8	0	130	137	15	1	0	130	122
2	6	0	165	172	6	9	0	115	113	0	1	1	63	79
2	7	0	224	227	6	10	0	17*	4	0	2	1	242	224
2	8	0	179	168	6	11	0	0*	16	0	3	1	92	79
2	9	0	45	32	7	1	0	376	376	0	4	1	222	219
2	10	0	0*	31	7	2	0	73	73	0	5	1	94	104
2	11	0	244	244	7	3	0	200	200	0	6	1	234	234
2	12	0	53	40	7	4	0	173	158	0	7	1	83	83
2	13	0	12*	27	7	5	0	40	41	0	8	1	32*	41
2	14	0	159	150	7	6	0	28*	28	0	9	1	38	48
3	1	0	51	39	7	7	0	246	245	0	10	1	121	115
3	2	0	287	291	7	8	0	65	57	0	11	1	101	118
3	3	0	212	207	7	9	0	65	62	0	12	1	68	47
3	4	0	84	81	7	10	0	160	155	0	13	1	76	72
3	5	0	78	75	8	1	0	143	143	0	14	1	18*	30
3	6	0	795	783	8	2	0	567	561	0	15	1	41	21
3	7	0	78	81	8	3	0	141	132	1	1	1	432	450
3	8	0	71	84	8	4	0	152	141	1	2	1	17*	17
3	9	0	287	288	8	5	0	261	259	1	3	1	183	187
3	10	0	47	65	8	6	0	52	50	1	4	1	124	123
3	11	0	46	19	8	7	0	10*	6	1	5	1	222	216
3	12	0	157	155	8	8	0	176	168	1	6	1	265	269

H	K	L	FO	FC	H	K	L	FO	FC	H	K	L	FO	FC
1	7	1	117	111	5	8	1	28*	17	11	6	1	46*	53
1	8	1	153	158	5	9	1	70	81	12	1	1	0*	30
1	9	1	78	65	5	10	1	49	60	12	2	1	50	41
1	10	1	78	72	5	11	1	0*	31	12	3	1	46*	51
1	11	1	74	69	5	12	1	0*	10	12	4	1	13*	26
1	12	1	92	92	6	1	1	116	122	12	5	1	42*	35
1	13	1	43*	49	6	2	1	128	123	13	1	1	70	65
1	14	1	53	41	6	3	1	70	68	13	2	1	40*	27
2	1	1	275	255	6	4	1	191	188	13	3	1	102	88
2	2	1	245	242	6	5	1	78	80	13	4	1	22*	30
2	3	1	352	343	6	6	1	69	62	14	1	1	62	59
2	4	1	117	103	6	7	1	61	61	14	2	1	18*	40
2	5	1	114	109	6	8	1	148	151	0	0	2	191	202
2	6	1	74	80	6	9	1	67	56	0	1	2	213	197
2	7	1	204	199	6	10	1	74	62	0	2	2	792	767
2	8	1	178	173	6	11	1	43*	58	0	3	2	214	211
2	9	1	29*	36	7	1	1	59	59	0	4	2	270	267
2	10	1	151	142	7	2	1	155	162	0	5	2	100	102
2	11	1	54	63	7	3	1	201	201	0	6	2	100	97
2	12	1	109	103	7	4	1	105	119	0	7	2	249	239
2	13	1	46	24	7	5	1	37*	47	0	8	2	98	109
2	14	1	47	42	7	6	1	110	102	0	9	2	146	142
3	1	1	222	207	7	7	1	72	61	0	10	2	168	158
3	2	1	242	247	7	8	1	71	65	0	11	2	237	229
3	3	1	334	342	7	9	1	0*	22	0	12	2	98	93
3	4	1	42	38	7	10	1	30*	61	0	13	2	85	73
3	5	1	217	216	8	1	1	116	119	0	14	2	57	70
3	6	1	55	52	8	2	1	45	38	0	15	2	0*	4
3	7	1	122	130	8	3	1	76	67	1	1	2	178	179
3	8	1	32*	24	8	4	1	70	71	1	2	2	1051	1078
3	9	1	69	75	8	5	1	101	88	1	3	2	421	413
3	10	1	0*	18	8	6	1	24*	17	1	4	2	222	232
3	11	1	34*	31	8	7	1	80	82	1	5	2	399	406
3	12	1	59	58	8	8	1	55	61	1	6	2	533	527
3	13	1	76	60	8	9	1	53	45	1	7	2	127	122
4	1	1	0*	14	9	1	1	29*	17	1	8	2	293	282
4	2	1	85	88	9	2	1	136	149	1	9	2	163	162
4	3	1	123	122	9	3	1	130	124	1	10	2	33*	21
4	4	1	65	59	9	4	1	50	48	1	11	2	109	102
4	5	1	71	62	9	5	1	51	57	1	12	2	71	57
4	6	1	107	104	9	6	1	0*	43	1	13	2	73	84
4	7	1	136	144	9	7	1	30*	64	1	14	2	44*	73
4	8	1	75	63	9	8	1	42	33	2	1	2	741	717
4	9	1	41	20	10	1	1	79	80	2	2	2	141	138
4	10	1	44	29	10	2	1	71	64	2	3	2	697	698
4	11	1	83	77	10	3	1	36*	23	2	4	2	463	461
4	12	1	11*	57	10	4	1	21*	16	2	5	2	31	24
4	13	1	0*	29	10	5	1	66	59	2	6	2	131	123
5	1	1	160	160	10	6	1	67	72	2	7	2	169	164
5	2	1	338	330	10	7	1	29*	23	2	8	2	123	120
5	3	1	90	92	11	1	1	76	77	2	9	2	138	138
5	4	1	120	117	11	2	1	48	45	2	10	2	78	81
5	5	1	54	45	11	3	1	119	120	2	11	2	25*	37
5	6	1	132	133	11	4	1	104	115	2	12	2	126	131
5	7	1	101	102	11	5	1	20*	43	2	13	2	54*	76

H	K	L	FO	FC	H	K	L	FO	FC	H	K	L	FO	FC
2	14	2	0*	28	7	6	2	105	105	0	10	3	104	103
3	1	2	134	127	7	7	2	43	39	0	11	3	11*	44
3	2	2	165	165	7	8	2	87	83	0	12	3	40	15
3	3	2	181	171	7	9	2	50	39	0	13	3	35*	33
3	4	2	260	255	7	10	2	34*	32	0	14	3	53	48
3	5	2	171	166	8	1	2	173	166	0	15	3	87	97
3	6	2	50	45	8	2	2	42	42	1	1	3	496	480
3	7	2	242	231	8	3	2	130	134	1	2	3	907	912
3	8	2	181	179	8	4	2	111	114	1	3	3	145	144
3	9	2	79	76	8	5	2	100	99	1	4	3	260	264
3	10	2	117	104	8	6	2	64	70	1	5	3	168	177
3	11	2	133	119	8	7	2	136	148	1	6	3	192	187
3	12	2	37*	35	8	8	2	83	61	1	7	3	64	64
3	13	2	0*	22	8	9	2	0*	4	1	8	3	37	8
4	1	2	96	95	9	1	2	82	76	1	9	3	82	81
4	2	2	281	282	9	2	2	237	229	1	10	3	123	120
4	3	2	436	433	9	3	2	91	81	1	11	3	0*	30
4	4	2	198	200	9	4	2	84	75	1	12	3	46	32
4	5	2	107	98	9	5	2	41*	54	1	13	3	68	81
4	6	2	218	212	9	6	2	33*	21	1	14	3	52	50
4	7	2	50	54	9	7	2	110	114	2	1	3	301	306
4	8	2	65	58	9	8	2	92	87	2	2	3	194	207
4	9	2	68	67	10	1	2	0*	40	2	3	3	133	134
4	10	2	8*	48	10	2	2	182	181	2	4	3	420	411
4	11	2	98	106	10	3	2	150	149	2	5	3	52	44
4	12	2	103	98	10	4	2	36*	17	2	6	3	162	149
4	13	2	78	64	10	5	2	165	156	2	7	3	44	25
5	1	2	319	320	10	6	2	63	55	2	8	3	172	169
5	2	2	113	102	10	7	2	69	49	2	9	3	68	69
5	3	2	264	259	11	1	2	0*	39	2	10	3	141	138
5	4	2	142	148	11	2	2	49	53	2	11	3	69	58
5	5	2	93	88	11	3	2	73	71	2	12	3	79	74
5	6	2	241	239	11	4	2	69	78	2	13	3	52	63
5	7	2	245	229	11	5	2	64	72	2	14	3	41*	38
5	8	2	60	69	11	6	2	63	56	3	1	3	376	374
5	9	2	145	154	12	1	2	69	76	3	2	3	194	188
5	10	2	112	86	12	2	2	101	94	3	3	3	319	319
5	11	2	0*	29	12	3	2	49	32	3	4	3	186	182
5	12	2	64	66	12	4	2	11*	24	3	5	3	297	289
6	1	2	418	413	12	5	2	0*	12	3	6	3	32*	47
6	2	2	356	367	13	1	2	77	59	3	7	3	101	105
6	3	2	43	43	13	2	2	76	74	3	8	3	91	105
6	4	2	363	358	13	3	2	106	115	3	9	3	67	80
6	5	2	150	143	13	4	2	70	66	3	10	3	105	110
6	6	2	56	52	14	1	2	63	56	3	11	3	84	92
6	7	2	101	96	14	2	2	25*	15	3	12	3	38*	44
6	8	2	99	86	0	1	3	374	363	3	13	3	50*	56
6	9	2	79	92	0	2	3	82	73	4	1	3	16*	5
6	10	2	63	53	0	3	3	252	251	4	2	3	100	101
6	11	2	73	62	0	4	3	420	426	4	3	3	73	73
7	1	2	97	89	0	5	3	316	316	4	4	3	148	149
7	2	2	80	70	0	6	3	254	243	4	5	3	240	231
7	3	2	156	148	0	7	3	265	251	4	6	3	156	151
7	4	2	122	121	0	8	3	91	88	4	7	3	129	125
7	5	2	73	74	0	9	3	114	111	4	8	3	89	91

H	K	L	FO	FC	H	K	L	FO	FC	H	K	L	FO	FC
4	9	3	0*	17	10	2	3	129	132	2	4	4	347	348
4	10	3	72	53	10	3	3	46	41	2	5	4	272	271
4	11	3	92	78	10	4	3	107	119	2	6	4	32	15
4	12	3	56	19	10	5	3	46	16	2	7	4	0*	15
5	1	3	208	202	10	6	3	0*	14	2	8	4	149	148
5	2	3	325	327	10	7	3	56	18	2	9	4	17*	34
5	3	3	242	242	11	1	3	73	62	2	10	4	5*	4
5	4	3	62	61	11	2	3	24*	39	2	11	4	88	98
5	5	3	103	103	11	3	3	63	70	2	12	4	40*	35
5	6	3	163	167	11	4	3	6*	14	2	13	4	16*	30
5	7	3	72	68	11	5	3	58	38	2	14	4	126	121
5	8	3	80	82	11	6	3	13*	24	3	1	4	125	130
5	9	3	1*	31	12	1	3	44	35	3	2	4	35	21
5	10	3	25*	55	12	2	3	100	91	3	3	4	179	182
5	11	3	63	68	12	3	3	0*	22	3	4	4	133	135
5	12	3	34*	21	12	4	3	0*	29	3	5	4	103	98
6	1	3	198	200	12	5	3	23*	12	3	6	4	237	240
6	2	3	176	162	13	1	3	57	56	3	7	4	57	53
6	3	3	101	97	13	2	3	60	65	3	8	4	60	60
6	4	3	61	55	13	3	3	91	72	3	9	4	284	277
6	5	3	90	83	14	1	3	46	39	3	10	4	0*	16
6	6	3	55	57	14	2	3	62	55	3	11	4	35*	45
6	7	3	67	62	0	0	4	855	820	3	12	4	85	104
6	8	3	0*	18	0	1	4	126	124	3	13	4	52	33
6	9	3	65	73	0	2	4	213	211	4	1	4	438	454
6	10	3	33*	31	0	3	4	456	464	4	2	4	61	56
6	11	3	77	91	0	4	4	198	192	4	3	4	164	163
7	1	3	71	73	0	5	4	118	125	4	4	4	448	444
7	2	3	187	178	0	6	4	221	222	4	5	4	87	96
7	3	3	58	53	0	7	4	192	194	4	6	4	91	78
7	4	3	68	84	0	8	4	178	175	4	7	4	194	189
7	5	3	84	70	0	9	4	245	239	4	8	4	31*	13
7	6	3	151	152	0	10	4	41	41	4	9	4	85	91
7	7	3	15*	35	0	11	4	118	112	4	10	4	77	75
7	8	3	36*	39	0	12	4	68	60	4	11	4	59	67
7	9	3	43*	38	0	13	4	99	92	4	12	4	81	84
7	10	3	43*	54	0	14	4	29*	38	5	1	4	92	94
8	1	3	227	222	0	15	4	43*	42	5	2	4	259	265
8	2	3	36	14	1	1	4	218	215	5	3	4	162	157
8	3	3	49	36	1	2	4	656	649	5	4	4	103	102
8	4	3	51	44	1	3	4	201	199	5	5	4	124	124
8	5	3	84	91	1	4	4	299	295	5	6	4	118	111
8	6	3	86	94	1	5	4	84	89	5	7	4	127	124
8	7	3	67	80	1	6	4	177	176	5	8	4	69	75
8	8	3	63	55	1	7	4	90	96	5	9	4	77	72
8	9	3	61	36	1	8	4	145	149	5	10	4	0*	19
9	1	3	148	156	1	9	4	82	68	5	11	4	50	61
9	2	3	118	118	1	10	4	99	108	5	12	4	0*	18
9	3	3	132	129	1	11	4	0*	17	6	1	4	125	119
9	4	3	29*	41	1	12	4	0*	21	6	2	4	109	115
9	5	3	40*	37	1	13	4	64	77	6	3	4	135	131
9	6	3	72	60	1	14	4	41*	51	6	4	4	126	126
9	7	3	79	93	2	1	4	215	203	6	5	4	107	111
9	8	3	0*	25	2	2	4	194	193	6	6	4	172	163
10	1	3	80	73	2	3	4	222	221	6	7	4	0*	15

H	K	L	FO	FC	H	K	L	FO	FC	H	K	L	FO	FC
6	8	4	0*	8	0	2	5	269	270	4	1	5	11*	6
6	9	4	51	56	0	3	5	158	149	4	2	5	188	189
6	10	4	34*	9	0	4	5	59	56	4	3	5	230	235
6	11	4	15*	22	0	5	5	62	53	4	4	5	153	149
7	1	4	373	368	0	6	5	156	155	4	5	5	31*	38
7	2	4	42	28	0	7	5	497	491	4	6	5	54	43
7	3	4	29*	2	0	8	5	50	43	4	7	5	103	97
7	4	4	80	73	0	9	5	108	116	4	8	5	214	214
7	5	4	83	88	0	10	5	218	221	4	9	5	49	66
7	6	4	29*	10	0	11	5	86	80	4	10	5	62	48
7	7	4	95	99	0	12	5	0*	18	4	11	5	154	159
7	8	4	0*	23	0	13	5	122	114	4	12	5	59	47
7	9	4	51	55	0	14	5	62	67	5	1	5	55	65
7	10	4	154	147	0	15	5	81	68	5	2	5	149	152
8	1	4	89	81	1	1	5	204	189	5	3	5	487	487
8	2	4	184	185	1	2	5	1209	1212	5	4	5	169	174
8	3	4	41	17	1	3	5	128	123	5	5	5	125	119
8	4	4	122	120	1	4	5	202	198	5	6	5	266	279
8	5	4	242	244	1	5	5	344	348	5	7	5	63	63
8	6	4	19*	14	1	6	5	159	160	5	8	5	70	72
8	7	4	51	58	1	7	5	18*	24	5	9	5	124	120
8	8	4	85	87	1	8	5	177	177	5	10	5	88	85
8	9	4	68	70	1	9	5	237	230	5	11	5	53	54
9	1	4	55	55	1	10	5	116	108	6	1	5	328	332
9	2	4	62	65	1	11	5	41*	55	6	2	5	90	91
9	3	4	153	146	1	12	5	110	120	6	3	5	112	111
9	4	4	36*	35	1	13	5	82	86	6	4	5	141	148
9	5	4	34*	23	1	14	5	81	56	6	5	5	244	236
9	6	4	75	75	2	1	5	150	156	6	6	5	60	61
9	7	4	66	84	2	2	5	23	20	6	7	5	48	25
9	8	4	97	83	2	3	5	215	222	6	8	5	116	107
10	1	4	148	150	2	4	5	714	712	6	9	5	79	83
10	2	4	93	92	2	5	5	103	103	6	10	5	59	30
10	3	4	89	88	2	6	5	118	109	6	11	5	54	33
10	4	4	83	64	2	7	5	202	202	7	1	5	90	86
10	5	4	69	69	2	8	5	107	107	7	2	5	0*	32
10	6	4	35*	32	2	9	5	0*	30	7	3	5	156	154
10	7	4	74	73	2	10	5	34*	24	7	4	5	50	51
11	1	4	0*	42	2	11	5	46	48	7	5	5	0*	29
11	2	4	165	167	2	12	5	32*	25	7	6	5	32*	26
11	3	4	0*	15	2	13	5	78	81	7	7	5	0*	38
11	4	4	7*	16	2	14	5	52	44	7	8	5	70	79
11	5	4	37*	36	3	1	5	113	116	7	9	5	54	62
11	6	4	42	26	3	2	5	223	234	7	10	5	66	61
12	1	4	96	83	3	3	5	117	114	8	1	5	0*	24
12	2	4	42	8	3	4	5	65	63	8	2	5	22*	19
12	3	4	76	66	3	5	5	27*	25	8	3	5	145	145
12	4	4	0*	33	3	6	5	28*	39	8	4	5	129	134
12	5	4	71	79	3	7	5	96	88	8	5	5	107	101
13	1	4	121	115	3	8	5	162	170	8	6	5	32*	23
13	2	4	0*	18	3	9	5	98	91	8	7	5	23*	36
13	3	4	59	49	3	10	5	34*	36	8	8	5	59	55
14	1	4	42*	30	3	11	5	69	69	8	9	5	86	85
14	2	4	72	78	3	12	5	82	72	9	1	5	65	59
0	1	5	158	145	3	13	5	98	91	9	2	5	4*	18

H	K	L	F0	FC	H	K	L	F0	FC	H	K	L	F0	FC
9	3	5	107	92	1	13	6	54	67	6	5	6	175	171
9	4	5	145	150	1	14	6	53	41	6	6	6	54	69
9	5	5	109	116	2	1	6	467	462	6	7	6	93	98
9	6	5	58	71	2	2	6	134	140	6	8	6	55	65
9	7	5	160	153	2	3	6	505	505	6	9	6	63	82
9	8	5	51	52	2	4	6	413	407	6	10	6	0*	22
10	1	5	103	106	2	5	6	107	111	7	1	6	54	61
10	2	5	187	196	2	6	6	126	127	7	2	6	158	150
10	3	5	54	48	2	7	6	62	64	7	3	6	104	101
10	4	5	79	92	2	8	6	83	89	7	4	6	74	78
10	5	5	74	80	2	9	6	77	90	7	5	6	84	74
10	6	5	66	77	2	10	6	134	130	7	6	6	150	150
10	7	5	0*	16	2	11	6	78	61	7	7	6	64	61
11	1	5	151	162	2	12	6	72	62	7	8	6	46*	53
11	2	5	32*	44	2	13	6	0*	20	7	9	6	52	60
11	3	5	0*	18	3	1	6	268	268	7	10	6	10*	43
11	4	5	62	62	3	2	6	99	96	8	1	6	246	245
11	5	5	18*	44	3	3	6	121	119	8	2	6	104	102
11	6	5	0*	30	3	4	6	167	172	8	3	6	9*	44
12	1	5	34*	28	3	5	6	261	250	8	4	6	136	139
12	2	5	44	14	3	6	6	140	132	8	5	6	75	68
12	3	5	3*	28	3	7	6	51	48	8	6	6	132	130
12	4	5	106	98	3	8	6	87	76	8	7	6	74	68
13	1	5	43*	60	3	9	6	64	56	8	8	6	0*	17
13	2	5	0*	51	3	10	6	163	158	8	9	6	75	73
13	3	5	25*	14	3	11	6	80	82	9	1	6	134	127
14	1	5	110	111	3	12	6	0*	17	9	2	6	58	59
14	2	5	67	72	3	13	6	87	65	9	3	6	53	34
0	0	6	499	477	4	1	6	273	281	9	4	6	131	140
0	1	6	280	274	4	2	6	40	36	9	5	6	40*	33
0	2	6	371	374	4	3	6	265	277	9	6	6	33*	29
0	3	6	72	69	4	4	6	93	100	9	7	6	59	28
0	4	6	407	401	4	5	6	255	243	9	8	6	35*	51
0	5	6	236	241	4	6	6	55	7*	10	1	6	25*	43
0	6	6	47	46	4	7	6	40	24	10	2	6	0*	14
0	7	6	285	273	4	8	6	143	144	10	3	6	111	91
0	8	6	122	120	4	9	6	84	86	10	4	6	47	42
0	9	6	54	60	4	10	6	38*	4	10	5	6	164	164
0	10	6	0*	16	4	11	6	51	27	10	6	6	51	45
0	11	6	197	193	4	12	6	92	74	10	7	6	8*	38
0	12	6	39*	35	5	1	6	50	66	11	1	6	103	95
0	13	6	125	128	5	2	6	68	66	11	2	6	29*	37
0	14	6	104	98	5	3	6	291	297	11	3	6	86	93
1	1	6	79	85	5	4	6	77	66	11	4	6	80	76
1	2	6	656	658	5	5	6	37	22	11	5	6	48	51
1	3	6	177	175	5	6	6	32*	37	12	1	6	100	90
1	4	6	50	48	5	7	6	165	159	12	2	6	125	128
1	5	6	83	82	5	8	6	0*	5	12	3	6	40*	45
1	6	6	387	384	5	9	6	189	184	12	4	6	59	48
1	7	6	72	65	5	10	6	96	95	13	1	6	0*	34
1	8	6	278	276	5	11	6	24*	47	13	2	6	101	91
1	9	6	194	202	6	1	6	121	124	13	3	6	79	63
1	10	6	80	82	6	2	6	253	246	14	1	6	31*	2
1	11	6	92	95	6	3	6	91	87	0	1	7	407	406
1	12	6	48	42	6	4	6	312	313	0	2	7	141	144

H	K	L	FO	FC	H	K	L	FO	FC	H	K	L	FO	FC
0	3	7	102	94	4	5	7	225	229	10	3	7	84	96
0	4	7	360	357	4	6	7	88	85	10	4	7	67	55
0	5	7	254	256	4	7	7	187	177	10	5	7	38*	47
0	6	7	249	258	4	8	7	54	43	10	6	7	73	54
0	7	7	69	67	4	9	7	83	78	11	1	7	35*	53
0	8	7	188	183	4	10	7	28*	24	11	2	7	44	28
0	9	7	74	69	4	11	7	38*	21	11	3	7	74	51
0	10	7	49	42	4	12	7	0*	22	11	4	7	146	147
0	11	7	70	59	5	1	7	133	128	11	5	7	43*	58
0	12	7	56	37	5	2	7	345	348	12	1	7	132	127
0	13	7	47*	67	5	3	7	52	62	12	2	7	123	118
0	14	7	0*	48	5	4	7	107	109	12	3	7	30*	30
1	1	7	370	378	5	5	7	85	72	12	4	7	41*	19
1	2	7	109	102	5	6	7	83	86	13	1	7	50	51
1	3	7	207	204	5	7	7	54	62	13	2	7	85	92
1	4	7	193	188	5	8	7	45	24	14	1	7	0*	24
1	5	7	146	149	5	9	7	56	69	0	0	8	1099	1081
1	6	7	126	121	5	10	7	36*	58	0	1	8	67	63
1	7	7	67	69	5	11	7	43*	43	0	2	8	252	246
1	8	7	99	100	6	1	7	129	132	0	3	8	167	163
1	9	7	62	62	6	2	7	129	138	0	4	8	209	208
1	10	7	98	101	6	3	7	97	85	0	5	8	162	154
1	11	7	153	150	6	4	7	103	103	0	6	8	54	58
1	12	7	106	98	6	5	7	76	71	0	7	8	22*	8
1	13	7	100	101	6	6	7	77	72	0	8	8	83	81
1	14	7	94	101	6	7	7	94	80	0	9	8	57	72
2	1	7	162	168	6	8	7	166	168	0	10	8	44	42
2	2	7	115	115	6	9	7	89	100	0	11	8	132	130
2	3	7	150	152	6	10	7	125	132	0	12	8	13*	20
2	4	7	76	79	7	1	7	29*	37	0	13	8	101	95
2	5	7	87	98	7	2	7	153	145	0	14	8	41*	58
2	6	7	261	258	7	3	7	267	273	1	1	8	154	155
2	7	7	245	245	7	4	7	140	138	1	2	8	60	61
2	8	7	216	221	7	5	7	191	188	1	3	8	174	176
2	9	7	172	175	7	6	7	124	120	1	4	8	71	66
2	10	7	65	79	7	7	7	29*	50	1	5	8	108	112
2	11	7	53	43	7	8	7	44	10	1	6	8	212	209
2	12	7	0*	19	7	9	7	72	58	1	7	8	127	129
2	13	7	48	45	8	1	7	205	207	1	8	8	181	169
3	1	7	383	378	8	2	7	0*	21	1	9	8	51	43
3	2	7	413	416	8	3	7	90	83	1	10	8	131	134
3	3	7	302	305	8	4	7	73	75	1	11	8	75	84
3	4	7	226	221	8	5	7	66	69	1	12	8	88	86
3	5	7	224	218	8	6	7	135	132	1	13	8	24*	11
3	6	7	24*	37	8	7	7	0*	22	2	1	8	279	276
3	7	7	0*	23	8	8	7	86	84	2	2	8	233	240
3	8	7	68	82	9	1	7	151	152	2	3	8	275	275
3	9	7	16*	53	9	2	7	39	9	2	4	8	55	50
3	10	7	137	140	9	3	7	157	174	2	5	8	185	192
3	11	7	72	67	9	4	7	40*	43	2	6	8	115	115
3	12	7	58	66	9	5	7	0*	16	2	7	8	161	159
4	1	7	15*	6	9	6	7	0*	8	2	8	8	48	45
4	2	7	229	229	9	7	7	56	38	2	9	8	74	67
4	3	7	112	102	10	1	7	76	81	2	10	8	19*	17
4	4	7	66	73	10	2	7	85	72	2	11	8	77	76

H	K	L	FO	FC	H	K	L	FO	FC	H	K	L	FO	FC
2	12	8	69	70	7	9	8	56	50	1	9	9	93	94
2	13	8	28*	19	8	1	8	121	125	1	10	9	39	15
3	1	8	36	26	8	2	8	198	198	1	11	9	105	103
3	2	8	144	140	8	3	8	100	109	1	12	9	143	138
3	3	8	157	156	8	4	8	109	108	1	13	9	39*	32
3	4	8	140	141	8	5	8	88	94	2	1	9	59	54
3	5	8	77	78	8	6	8	55	54	2	2	9	72	73
3	6	8	278	282	8	7	8	46*	60	2	3	9	22*	42
3	7	8	104	95	8	8	8	60	56	2	4	9	306	307
3	8	8	66	63	9	1	8	85	80	2	5	9	44	30
3	9	8	107	103	9	2	8	72	70	2	6	9	111	112
3	10	8	60	68	9	3	8	20*	25	2	7	9	218	225
3	11	8	7*	51	9	4	8	0*	34	2	8	9	54	45
3	12	8	69	47	9	5	8	23*	19	2	9	9	57	47
4	1	8	649	638	9	6	8	26*	20	2	10	9	70	62
4	2	8	125	124	9	7	8	0*	11	2	11	9	64	53
4	3	8	181	174	10	1	8	41	35	2	12	9	0*	37
4	4	8	123	125	10	2	8	0*	8	2	13	9	0*	16
4	5	8	147	152	10	3	8	68	65	3	1	9	64	60
4	6	8	70	61	10	4	8	77	104	3	2	9	212	218
4	7	8	40*	50	10	5	8	103	93	3	3	9	111	102
4	8	8	48	51	10	6	8	33*	22	3	4	9	81	79
4	9	8	34*	43	11	1	8	4*	30	3	5	9	70	68
4	10	8	28*	32	11	2	8	69	70	3	6	9	54	36
4	11	8	0*	22	11	3	8	21*	48	3	7	9	0*	20
4	12	8	111	108	11	4	8	42*	77	3	8	9	59	65
5	1	8	47	47	11	5	8	47	27	3	9	9	73	79
5	2	8	77	82	12	1	8	56	51	3	10	9	20*	29
5	3	8	0*	20	12	2	8	42*	43	3	11	9	33*	34
5	4	8	48	59	12	3	8	61	46	3	12	9	52	30
5	5	8	25*	19	12	4	8	30*	43	4	1	9	0*	6
5	6	8	41	37	13	1	8	7*	54	4	2	9	140	138
5	7	8	121	120	13	2	8	58	39	4	3	9	67	78
5	8	8	73	70	0	1	9	69	64	4	4	9	94	88
5	9	8	124	106	0	2	9	130	130	4	5	9	43	25
5	10	8	34*	57	0	3	9	31	19	4	6	9	31*	40
5	11	8	59	50	0	4	9	32	33	4	7	9	0*	21
6	1	8	89	93	0	5	9	20*	25	4	8	9	65	66
6	2	8	148	149	0	6	9	34	23	4	9	9	70	65
6	3	8	166	180	0	7	9	204	203	4	10	9	42*	39
6	4	8	171	174	0	8	9	98	104	4	11	9	87	81
6	5	8	0*	25	0	9	9	71	75	5	1	9	42	27
6	6	8	85	96	0	10	9	123	132	5	2	9	61	58
6	7	8	67	69	0	11	9	35*	27	5	3	9	214	213
6	8	8	110	108	0	12	9	37*	44	5	4	9	147	148
6	9	8	0*	28	0	13	9	80	68	5	5	9	45	55
6	10	8	46	20	0	14	9	42	22	5	6	9	150	151
7	1	8	121	126	1	1	9	71	71	5	7	9	24*	13
7	2	8	31*	47	1	2	9	481	484	5	8	9	38*	51
7	3	8	147	148	1	3	9	162	167	5	9	9	47*	63
7	4	8	65	53	1	4	9	55	41	5	10	9	42	25
7	5	8	44*	51	1	5	9	207	220	6	1	9	165	164
7	6	8	55	38	1	6	9	60	55	6	2	9	11*	23
7	7	8	60	76	1	7	9	68	75	6	3	9	55	45
7	8	8	59	64	1	8	9	77	79	6	4	9	70	60

H	K	L	FO	FC	H	K	L	FO	FC	H	K	L	FO	FC
6	5	9	90	84	0	10	10	46	38	5	6	10	96	103
6	6	9	38*	27	0	11	10	53	40	5	5	10	107	102
6	7	9	34*	13	0	12	10	20*	61	5	6	10	74	78
6	8	9	179	176	0	13	10	75	75	5	7	10	43*	44
6	9	9	0*	41	1	1	10	130	125	5	8	10	67	57
6	10	9	39*	46	1	2	10	436	424	5	9	10	32*	42
7	1	9	51	59	1	3	10	134	130	5	10	10	65	51
7	2	9	44	51	1	4	10	213	205	6	1	10	99	104
7	3	9	215	213	1	5	10	94	90	6	2	10	22*	52
7	4	9	52	54	1	6	10	81	81	6	3	10	66	81
7	5	9	34*	56	1	7	10	66	59	6	4	10	55	51
7	6	9	0*	35	1	8	10	85	80	6	5	10	122	131
7	7	9	34*	50	1	9	10	149	146	6	6	10	120	133
7	8	9	29*	23	1	10	10	67	86	6	7	10	36*	53
7	9	9	21*	22	1	11	10	44	37	6	8	10	30*	37
8	1	9	45	28	1	12	10	35*	39	6	9	10	0*	32
8	2	9	39	25	1	13	10	0*	31	7	1	10	221	217
8	3	9	112	111	2	1	10	118	112	7	2	10	159	154
8	4	9	73	64	2	2	10	124	120	7	3	10	19*	52
8	5	9	87	89	2	3	10	103	113	7	4	10	34*	39
8	6	9	54	47	2	4	10	310	305	7	5	10	110	93
8	7	9	0*	41	2	5	10	169	164	7	6	10	173	167
8	8	9	30*	13	2	6	10	108	103	7	7	10	106	104
9	1	9	34*	41	2	7	10	0*	35	7	8	10	28*	14
9	2	9	43	57	2	8	10	0*	21	8	1	10	232	237
9	3	9	25*	11	2	9	10	20*	39	8	2	10	158	162
9	4	9	45*	54	2	10	10	132	141	8	3	10	12*	16
9	5	9	75	64	2	11	10	102	103	8	4	10	95	88
9	6	9	52	49	2	12	10	46*	28	8	5	10	144	157
9	7	9	62	67	3	1	10	241	240	8	6	10	90	101
10	1	9	45	51	3	2	10	103	98	8	7	10	33*	48
10	2	9	84	83	3	3	10	45	31	9	1	10	51	58
10	3	9	48	26	3	4	10	105	107	9	2	10	65	69
10	4	9	51	29	3	5	10	253	255	9	3	10	0*	14
10	5	9	60	29	3	6	10	195	200	9	4	10	96	106
10	6	9	40*	26	3	7	10	51	43	9	5	10	47*	52
11	1	9	52	36	3	8	10	51	61	9	6	10	54	46
11	2	9	38*	45	3	9	10	175	176	10	1	10	59	61
11	3	9	71	54	3	10	10	151	152	10	2	10	29*	65
11	4	9	132	135	3	11	10	0*	12	10	3	10	0*	20
12	1	9	59	45	3	12	10	0*	34	10	4	10	44*	45
12	2	9	0*	3	4	1	10	337	344	10	5	10	33*	17
12	3	9	31*	37	4	2	10	34	21	11	1	10	80	71
13	1	9	44*	57	4	3	10	96	105	11	2	10	137	136
13	2	9	49	51	4	4	10	248	251	11	3	10	67	68
0	0	10	501	486	4	5	10	187	190	11	4	10	31*	31
0	1	10	161	163	4	6	10	52	45	12	1	10	100	92
0	2	10	147	138	4	7	10	48	39	12	2	10	133	134
0	3	10	248	244	4	8	10	127	116	12	3	10	87	84
0	4	10	301	296	4	9	10	99	99	13	1	10	83	86
0	5	10	135	133	4	10	10	70	68	0	1	11	125	116
0	6	10	86	93	4	11	10	11*	31	0	2	11	81	77
0	7	10	223	224	5	1	10	50	53	0	3	11	119	117
0	8	10	134	146	5	2	10	0*	32	0	4	11	181	178
0	9	10	171	164	5	3	10	237	236	0	5	11	82	89

H	K	L	FO	FC	H	K	L	FO	FC	H	K	L	FO	FC
0	6	11	126	125	5	3	11	122	124	0	7	12	147	145
0	7	11	134	132	5	4	11	60	68	0	8	12	26*	37
0	8	11	71	80	5	5	11	0*	18	0	9	12	56	76
0	9	11	54	38	5	6	11	105	105	0	10	12	68	78
0	10	11	77	70	5	7	11	38*	39	0	11	12	198	205
0	11	11	36*	34	5	8	11	19*	49	0	12	12	88	86
0	12	11	47	15	5	9	11	11*	54	1	1	12	206	206
0	13	11	49	53	5	10	11	51	63	1	2	12	272	269
1	1	11	248	244	6	1	11	127	119	1	3	12	137	136
1	2	11	252	241	6	2	11	85	79	1	4	12	119	116
1	3	11	87	85	6	3	11	17*	35	1	5	12	144	156
1	4	11	118	102	6	4	11	59	52	1	6	12	281	284
1	5	11	93	98	6	5	11	74	72	1	7	12	152	157
1	6	11	84	89	6	6	11	0*	31	1	8	12	173	172
1	7	11	78	60	6	7	11	56	55	1	9	12	81	91
1	8	11	56	65	6	8	11	0*	51	1	10	12	80	76
1	9	11	86	73	6	9	11	30*	8	1	11	12	24*	38
1	10	11	59	70	7	1	11	14*	29	1	12	12	31*	10
1	11	11	62	51	7	2	11	116	129	2	1	12	273	268
1	12	11	47	41	7	3	11	67	62	2	2	12	203	195
2	1	11	117	119	7	4	11	41*	53	2	3	12	291	292
2	2	11	136	139	7	5	11	80	73	2	4	12	201	204
2	3	11	78	81	7	6	11	105	125	2	5	12	125	115
2	4	11	166	159	7	7	11	0*	21	2	6	12	38*	45
2	5	11	0*	5	7	8	11	41*	37	2	7	12	32*	47
2	6	11	113	103	8	1	11	128	124	2	8	12	164	164
2	7	11	35*	48	8	2	11	26*	17	2	9	12	85	91
2	8	11	97	99	8	3	11	30*	46	2	10	12	25*	28
2	9	11	73	62	8	4	11	57	64	2	11	12	88	104
2	10	11	118	121	8	5	11	40*	48	3	1	12	0*	33
2	11	11	0*	47	8	6	11	13*	28	3	2	12	56	62
2	12	11	61	48	8	7	11	29*	16	3	3	12	223	214
3	1	11	187	186	9	1	11	69	61	3	4	12	102	106
3	2	11	114	103	9	2	11	0*	40	3	5	12	0*	18
3	3	11	198	193	9	3	11	72	79	3	6	12	186	186
3	4	11	99	94	9	4	11	68	55	3	7	12	101	103
3	5	11	174	181	9	5	11	41*	45	3	8	12	120	114
3	6	11	49	27	9	6	11	54	37	3	9	12	74	63
3	7	11	50	60	10	1	11	0*	3	3	10	12	0*	16
3	8	11	77	83	10	2	11	103	91	3	11	12	48*	75
3	9	11	15*	38	10	3	11	36*	39	4	1	12	259	253
3	10	11	0*	37	10	4	11	64	83	4	2	12	103	103
3	11	11	57	53	10	5	11	12*	37	4	3	12	196	203
4	1	11	0*	3	11	1	11	58	64	4	4	12	110	111
4	2	11	45	34	11	2	11	15*	24	4	5	12	58	41
4	3	11	87	83	11	3	11	70	61	4	6	12	120	127
4	4	11	41	46	12	1	11	63	61	4	7	12	145	139
4	5	11	101	89	12	2	11	49	60	4	8	12	51	47
4	6	11	35*	26	0	0	12	308	306	4	9	12	44	29
4	7	11	75	74	0	1	12	91	93	4	10	12	50	53
4	8	11	85	77	0	2	12	256	262	5	1	12	138	146
4	9	11	43*	57	0	3	12	140	143	5	2	12	199	203
4	10	11	0*	37	0	4	12	62	61	5	3	12	133	132
5	1	11	26*	13	0	5	12	114	106	5	4	12	61	48
5	2	11	197	191	0	6	12	169	161	5	5	12	75	86

H	K	L	FO	FC	H	K	L	FO	FC	H	K	L	FO	FC
5	6	12	133	135	1	6	13	95	86	7	3	13	81	83
5	7	12	204	205	1	7	13	48	42	7	4	13	0*	8
5	8	12	95	92	1	8	13	36*	48	7	5	13	40*	46
5	9	12	136	130	1	9	13	67	72	7	6	13	34*	33
6	1	12	183	191	1	10	13	77	83	7	7	13	50	18
6	2	12	208	208	1	11	13	66	47	8	1	13	38*	46
6	3	12	126	132	2	1	13	95	107	8	2	13	31*	25
6	4	12	230	228	2	2	13	56	60	8	3	13	0*	39
6	5	12	102	109	2	3	13	44	67	8	4	13	15*	28
6	6	12	32*	38	2	4	13	209	205	8	5	13	64	73
6	7	12	60	52	2	5	13	78	85	8	6	13	18*	41
6	8	12	0*	23	2	6	13	43	37	9	1	13	46	43
7	1	12	74	76	2	7	13	92	85	9	2	13	55	46
7	2	12	57	31	2	8	13	19*	12	9	3	13	0*	19
7	3	12	42*	41	2	9	13	43*	37	9	4	13	70	63
7	4	12	123	138	2	10	13	70	48	9	5	13	45*	49
7	5	12	0*	22	2	11	13	54	39	10	1	13	74	69
7	6	12	40*	18	3	1	13	27*	31	10	2	13	111	112
7	7	12	103	105	3	2	13	72	65	10	3	13	0*	13
8	1	12	9*	16	3	3	13	0*	21	11	1	13	58	57
8	2	12	145	159	3	4	13	93	90	11	2	13	66	37
8	3	12	37*	46	3	5	13	63	60	0	0	14	447	446
8	4	12	107	94	3	6	13	15*	20	0	1	14	140	146
8	5	12	72	75	3	7	13	49	25	0	2	14	46	33
8	6	12	59	33	3	8	13	49	64	0	3	14	115	121
9	1	12	68	78	3	9	13	71	64	0	4	14	130	133
9	2	12	115	118	3	10	13	55	48	0	5	14	140	141
9	3	12	124	129	4	1	13	0*	5	0	6	14	70	62
9	4	12	37*	32	4	2	13	37*	47	0	7	14	63	59
9	5	12	36*	23	4	3	13	39*	23	0	8	14	99	101
10	1	12	120	112	4	4	13	66	67	0	9	14	110	109
10	2	12	126	121	4	5	13	54	43	0	10	14	87	92
10	3	12	138	140	4	6	13	54	46	0	11	14	52	54
10	4	12	70	77	4	7	13	41*	48	1	1	14	75	75
11	1	12	76	61	4	8	13	93	88	1	2	14	145	147
11	2	12	0*	4	4	9	13	33*	31	1	3	14	86	79
11	3	12	32*	47	5	1	13	29*	40	1	4	14	117	121
12	1	12	56	30	5	2	13	43	19	1	5	14	115	99
0	1	13	42	27	5	3	13	167	160	1	6	14	46	48
0	2	13	70	79	5	4	13	104	95	1	7	14	55	54
0	3	13	46	49	5	5	13	40*	49	1	8	14	43*	50
0	4	13	35*	47	5	6	13	164	155	1	9	14	40*	52
0	5	13	51	40	5	7	13	35*	32	1	10	14	31*	28
0	6	13	55	47	5	8	13	20*	45	1	11	14	35*	25
0	7	13	149	158	5	9	13	33*	40	2	1	14	0*	9
0	8	13	43*	68	6	1	13	127	131	2	2	14	73	66
0	9	13	0*	56	6	2	13	81	77	2	3	14	29*	44
0	10	13	123	120	6	3	13	63	85	2	4	14	111	110
0	11	13	30*	27	6	4	13	34*	55	2	5	14	79	67
0	12	13	38*	13	6	5	13	69	69	2	6	14	54	47
1	1	13	33*	27	6	6	13	71	57	2	7	14	62	73
1	2	13	308	301	6	7	13	21*	42	2	8	14	53	68
1	3	13	94	104	6	8	13	87	74	2	9	14	55	37
1	4	13	34*	42	7	1	13	61	56	2	10	14	52	24
1	5	13	158	152	7	2	13	42*	55	3	1	14	88	81

H	K	L	FO	FC	H	K	L	FO	FC	H	K	L	FO	FC
3	2	14	80	87	0	4	15	58	67	6	4	15	81	88
3	3	14	72	66	0	5	15	29*	56	6	5	15	76	90
3	4	14	46	58	0	6	15	127	119	6	6	15	41*	46
3	5	14	42*	40	0	7	15	99	106	6	7	15	0*	13
3	6	14	168	170	0	8	15	66	54	7	1	15	0*	26
3	7	14	67	66	0	9	15	31*	51	7	2	15	0*	30
3	8	14	33*	42	0	10	15	0*	37	7	3	15	112	111
3	9	14	122	119	0	11	15	66	60	7	4	15	91	76
3	10	14	38*	36	1	1	15	120	126	7	5	15	48*	60
4	1	14	311	319	1	2	15	139	134	7	6	15	42	33
4	2	14	109	104	1	3	15	61	64	8	1	15	56	51
4	3	14	24*	18	1	4	15	80	88	8	2	15	0*	9
4	4	14	146	152	1	5	15	32*	42	8	3	15	37*	20
4	5	14	100	92	1	6	15	84	97	8	4	15	43*	27
4	6	14	82	77	1	7	15	39	20	9	1	15	66	44
4	7	14	18*	43	1	8	15	62	74	9	2	15	55	49
4	8	14	0*	32	1	9	15	89	84	9	3	15	113	109
4	9	14	79	85	1	10	15	56	67	10	1	15	36*	54
5	1	14	106	119	2	1	15	88	90	10	2	15	0*	8
5	2	14	41*	51	2	2	15	27*	30	0	0	16	322	317
5	3	14	81	71	2	3	15	123	112	0	1	16	108	93
5	4	14	110	102	2	4	15	112	121	0	2	16	129	123
5	5	14	78	66	2	5	15	66	59	0	3	16	58	43
5	6	14	83	93	2	6	15	44*	55	0	4	16	93	93
5	7	14	43*	48	2	7	15	104	92	0	5	16	86	69
5	8	14	0*	32	2	8	15	133	124	0	6	16	137	129
6	1	14	52	68	2	9	15	40*	53	0	7	16	42*	63
6	2	14	14*	23	2	10	15	43*	44	0	8	16	0*	21
6	3	14	0*	35	3	1	15	62	55	0	9	16	56	56
6	4	14	82	64	3	2	15	89	95	0	10	16	0*	61
6	5	14	36*	36	3	3	15	120	117	1	1	16	83	93
6	6	14	68	60	3	4	15	55	61	1	2	16	82	66
6	7	14	17*	27	3	5	15	41*	46	1	3	16	69	80
7	1	14	101	119	3	6	15	44	16	1	4	16	87	87
7	2	14	52	24	3	7	15	35*	33	1	5	16	92	92
7	3	14	69	57	3	8	15	0*	6	1	6	16	80	81
7	4	14	69	69	3	9	15	55	26	1	7	16	50	36
7	5	14	66	75	4	1	15	54	2	1	8	16	61	55
7	6	14	24*	12	4	2	15	48	37	1	9	16	0*	41
8	1	14	71	60	4	3	15	69	59	1	10	16	41*	28
8	2	14	134	125	4	4	15	24*	45	2	1	16	112	115
8	3	14	55	57	4	5	15	54	59	2	2	16	39*	38
8	4	14	0*	36	4	6	15	51	40	2	3	16	105	114
8	5	14	109	113	4	7	15	110	103	2	4	16	69	58
9	1	14	73	63	4	8	15	66	68	2	5	16	41	24
9	2	14	44*	54	5	1	15	0*	35	2	6	16	84	78
9	3	14	39*	49	5	2	15	155	155	2	7	16	105	104
9	4	14	0*	24	5	3	15	109	102	2	8	16	71	72
10	1	14	28*	37	5	4	15	39*	47	2	9	16	30*	34
10	2	14	54	66	5	5	15	51	56	3	1	16	55	70
10	3	14	42*	27	5	6	15	0*	11	3	2	16	98	101
11	1	14	0*	24	5	7	15	35*	46	3	3	16	71	69
0	1	15	66	61	6	1	15	19*	19	3	4	16	55	53
0	2	15	91	73	6	2	15	31*	53	3	5	16	47*	62
0	3	15	52	41	6	3	15	52	55	3	6	16	133	140

H	K	L	FO	FC	H	K	L	FO	FC	H	K	L	FO	FC
3	7	16	119	107	2	5	17	54	21	2	3	18	0*	31
3	8	16	36*	47	2	6	17	61	51	2	4	18	150	161
4	1	16	233	240	2	7	17	43*	38	2	5	18	71	85
4	2	16	112	118	2	8	17	61	64	2	6	18	74	58
4	3	16	97	80	3	1	17	90	82	2	7	18	81	56
4	4	16	53	47	3	2	17	53	52	3	1	18	83	82
4	5	16	29*	63	3	3	17	70	86	3	2	18	63	66
4	6	16	62	67	3	4	17	101	108	3	3	18	82	93
4	7	16	127	130	3	5	17	80	86	3	4	18	38*	21
5	1	16	90	101	3	6	17	24*	22	3	5	18	111	103
5	2	16	121	116	3	7	17	57	65	3	6	18	108	109
5	3	16	44*	47	4	1	17	53	1	4	1	18	170	163
5	4	16	50	42	4	2	17	23*	48	4	2	18	56	70
5	5	16	96	88	4	3	17	61	39	4	3	18	46	20
5	6	16	79	81	4	4	17	59	69	4	4	18	150	148
5	7	16	0*	31	4	5	17	111	105	4	5	18	69	87
6	1	16	95	92	4	6	17	103	91	4	6	18	32*	46
6	2	16	55	62	4	7	17	50	38	5	1	18	29*	67
6	3	16	0*	21	5	1	17	103	100	5	2	18	78	85
6	4	16	73	64	5	2	17	71	74	5	3	18	140	131
6	5	16	43*	54	5	3	17	53	58	5	4	18	45	5
6	6	16	41*	20	5	4	17	70	62	5	5	18	73	66
7	1	16	0*	11	5	5	17	32*	42	6	1	18	51	45
7	2	16	48	51	5	6	17	11*	29	6	2	18	56	28
7	3	16	94	92	6	1	17	40*	33	6	3	18	72	65
7	4	16	53	54	6	2	17	110	97	6	4	18	47	40
7	5	16	32*	20	6	3	17	33*	44	7	1	18	114	118
8	1	16	70	73	6	4	17	47*	56	7	2	18	74	74
8	2	16	104	108	6	5	17	0*	42	8	1	18	99	105
8	3	16	91	91	7	1	17	63	45	0	1	19	0*	57
9	1	16	24*	23	7	2	17	82	69	0	2	19	57	42
9	2	16	89	95	7	3	17	0*	50	0	3	19	26*	36
10	1	16	115	110	7	4	17	68	53	0	4	19	32*	26
0	1	17	93	93	8	1	17	96	93	0	5	19	52	54
0	2	17	81	78	8	2	17	39*	8	0	6	19	44*	40
0	3	17	24*	52	9	1	17	86	82	0	7	19	81	76
0	4	17	97	111	0	0	18	204	204	1	1	19	71	69
0	5	17	101	112	0	1	18	77	68	1	2	19	136	133
0	6	17	61	49	0	2	18	0*	8	1	3	19	53	38
0	7	17	54	59	0	3	18	108	123	1	4	19	45*	26
0	8	17	89	84	0	4	18	93	96	1	5	19	60	47
0	9	17	64	60	0	5	18	64	63	1	6	19	58	66
1	1	17	75	78	0	6	18	69	70	1	7	19	37*	21
1	2	17	128	128	0	7	18	138	129	2	1	19	84	70
1	3	17	114	104	0	8	18	45*	33	2	2	19	18*	48
1	4	17	67	60	1	1	18	95	93	2	3	19	69	58
1	5	17	53	61	1	2	18	202	195	2	4	19	86	92
1	6	17	97	97	1	3	18	33*	12	2	5	19	38*	8
1	7	17	65	64	1	4	18	108	110	2	6	19	0*	8
1	8	17	36*	41	1	5	18	59	38	3	1	19	0*	23
1	9	17	64	39	1	6	18	34*	28	3	2	19	61	36
2	1	17	126	121	1	7	18	82	81	3	3	19	66	63
2	2	17	66	65	1	8	18	54	60	3	4	19	47*	60
2	3	17	82	83	2	1	18	6*	20	3	5	19	36*	25
2	4	17	94	86	2	2	18	77	92	4	1	19	0*	1

