

The crystal structure of bredigite and the genealogy of some alkaline earth orthosilicates

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Abstract

Bredigite, $(\text{Ca}, \text{Ba})\text{Ca}_{13}\text{Mg}_2[\text{SiO}_4]_{16}$, $Z = 2$, $a = 10.909(9)\text{\AA}$, $b = 18.34(1)\text{\AA}$, $c = 6.739(9)\text{\AA}$, space group $P2_{1n}$, possesses a crystal structure based on a new kind of pinwheel arrangement. $R(hkl) = 0.108$ ($R_w(hkl) = 0.059$) for 1977 independent reflections.

The space group genealogy for bredigite is: $P2_{1n} \leftarrow Pmnn \leftarrow Pmcb \leftarrow Cmcn \leftarrow P6_3/mmc$. Its idealized arrangement is based on $Pmcb$, $a' = a/2$, $b' = b$, $c' = c$, but ordering of Ba^{2+} and minor Mn^{2+} leads to $Pmnn$ with $a' = a$. Tilting of the tetrahedra lowers the symmetry to $P2_{1n}$.

It is proposed that bredigite is an ordered Ca:Mg compound with a probable composition range between $\text{Ca}_{14}\text{Mg}_2[\text{SiO}_4]_{16}$ and $\text{BaCa}_{13}\text{Mg}_2[\text{SiO}_4]_{16}$. The ideal polyhedral formula is $X^{12}X_2^*Y_4^{10}M^6[T\text{O}_4]_{16}$, where X and Y are large polyhedra, M is the octahedron and T the tetrahedron. Evidence, based on combinatorial analysis and calculated powder patterns, suggests that proper definitions of phases in the system $\text{BaO}-\text{CaO}-\text{MgO}-\text{SiO}_2$ require careful single crystal studies.

Introduction

Bredigite—an important phase in the crystal chemistry of cements, clinkers, slags, and fertilizers—has fostered contention among silicate scientists since its original recognition as a discrete species. In the system $\text{CaO}-\text{MgO}-\text{SiO}_2$, Nature has been particularly perverse in Her choice of what shall be deemed stable. These compounds share all the problems encountered in substructure-superstructure relations, twinning, exsolution, order-disorder, and grotesque stoichiometry. We hope that some questions may be answered in this study but we fear that just as many answers in the earlier studies must be questioned. In particular, detailed single crystal studies are required—and urgently needed—to properly establish the relationships between composition and stability among the phases.

Experimental

The type specimen of Middlesbrough spiegeleisen slag described by Tilley and Vincent (1948) (University of Cambridge specimen number 47706) was kindly placed at our disposal by Professor S. O. Agrell. The bredigite occurs as long prismatic crystals with hexagonal cross-section up to 2 mm in length parallel to the c axis, which project into the cavities of the melilite groundmass. Twinning on (110) occurs for most of the crystals but is superficially concealed

owing to the pseudohexagonal subcell. Several crystals were extracted from the cavities; the sixth crystal examined by X-ray single crystal photography was free from twinning but showed the persistent extra diffuse reflections which Douglas (1952) attributed to the presence of the trigonal phase. This phase, also an alkaline earth orthosilicate, possesses $a = 5.46\text{\AA}$, ($b = a\sqrt{3} = 9.46\text{\AA}$), $c = 6.76\text{\AA}$ and is oriented with its a^* and b^* reciprocal lattice vectors parallel to those of bredigite. At low angles, the reflections of the trigonal phase severely overlap those hkl reflections of bredigite for which $(h, k = 2n)$, $h + k = 4n$. The crystal selected for complete structure analysis was a symmetrical prism $0.12 \times 0.12 \times 0.20$ mm in dimension. The cell data, obtained from calibrated precession photographs, are $a = 10.909(9)\text{\AA}$, $b = 18.34(1)\text{\AA}$, $c = 6.739(9)\text{\AA}$ and the extinction criteria are compatible with the space groups $Pmnn$ or $P2_{1n}$, confirming the observations of Douglas (1952).

The crystal was mounted parallel to its c axis on a PALRED automated diffractometer utilizing graphite monochromatized $\text{MoK}\alpha_1$ ($\lambda = 0.70926\text{\AA}$) radiation, $2\theta_{\text{max}} = 60^\circ$, and the data were gathered from the $l = 0$ through the $l = 9$ levels. Other salient details: scan speed 1°min^{-1} , background counting times 20 sec, scan ranges from 3.6° to 5.2° (the latter at higher levels). Reflections in the blind region of the apparatus were photographically estimated but not in

PREDIGIT

SHEET NO. 1 PART 1

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J	K	L	FD	FD	ALPH	H	K	L	FD	FD	ALPH	H	K	L	FD	FD	ALPH
1	25	0	91.4	81.4	134.1	14	2	0	24.1	21.6	248.5	5	12	1	23.7	15.2	11.2
3	25	0	91.5	81.9	209.0	3	1	0	12.9	9.4	248.4	6	12	1	21.5	22.3	197.4
3	25	0	100.5	102.9	1.6	5	1	0	17.0	3.1	-42.5	7	12	1	16.9	12.0	-95.7
2	24	0	65.5	60.1	-0.6	7	1	0	10.2	12.7	233.7	8	12	1	25.0	19.3	67.4
4	24	0	102.5	90.7	7.1	9	1	0	17.9	15.5	14.1	9	12	1	16.2	18.0	9.3
1	23	0	91.5	15.4	-21.5	11	1	0	9.5	8.2	244.0	10	12	1	19.8	21.5	190.6
3	23	0	91.3	13.1	-31.5	13	1	0	11.0	3.7	251.5	11	12	1	9.5	7.0	-67.2
3	23	0	35.3	34.5	37.8	15	1	0	9.3	9.5	230.8	12	12	1	22.2	11.7	101.1
7	23	0	20.2	9.7	79.0	2	0	0	15.4	16.0	-66.2	13	12	1	21.0	1.0	-31.4
3	22	0	77.4	79.0	3.4	4	0	0*	859.4	589.7	9.7	0	11	1	95.0	96.2	181.4
2	22	0	69.7	67.1	190.2	6	0	0	71.2	76.2	-9.0	1	11	1	10.2	11.2	143.4
4	22	0	96.5	101.9	4.8	8	0	0*	507.4	472.8	12.0	2	11	1	73.2	82.3	0.6
3	22	0	61.6	57.3	197.2	10	0	0	63.7	64.1	7.5	3	11	1	50.6	33.7	161.5
3	22	0	46.3	51.6	7.1	12	0	0	181.8	173.7	25.2	4	11	1	91.3	82.5	187.3
1	21	0	30.0	26.5	-0.5	14	0	0	68.5	67.0	42.1	5	11	1	51.3	52.0	196.6
3	21	0	23.7	24.0	204.5	0	25	1	9.3	1.7	6.5	6	11	1	64.0	64.1	11.7
2	21	0	18.7	9.5	73.9	1	25	1	9.5	17.5	148.2	7	11	1	20.3	21.4	-5.1
7	21	0	17.9	11.3	-44.9	2	25	1	33.3	28.2	-4.4	8	11	1	63.6	61.0	190.6
9	21	0	25.5	26.7	-2.6	3	25	1	9.5	9.7	-25.0	9	11	1	9.9	27.7	178.8
0	20	0	47.6	46.6	131.0	0	24	1	9.7	15.8	1.7	10	11	1	27.2	27.5	17.6
2	20	0	63.2	69.4	2.8	1	24	1	17.2	18.1	213.0	11	11	1	9.4	14.5	148.7
4	20	0	90.1	99.3	186.7	2	24	1	64.3	96.5	167.1	12	11	1	32.1	36.0	203.7
3	20	0	96.7	93.8	3.2	3	24	1	19.7	10.7	90.4	13	11	1	18.6	14.9	211.8
3	20	0	21.7	25.4	107.2	4	24	1	8.5	17.0	25.0	0	10	1	26.0	32.4	7.1
1	19	0	78.7	77.5	213.9	5	24	1	28.3	26.5	217.2	1	10	1	36.2	36.4	-1.9
3	19	0	13.0	21.0	151.1	0	23	1	91.0	1.6	-8.9	2	10	1*	29.3	16.5	126.0
5	19	0	81.2	43.5	207.0	1	23	1	22.2	18.7	188.5	3	10	1	26.2	32.6	-0.7
7	19	0	91.3	15.3	81.9	2	23	1	2.5	8.9	42.1	4	10	1	20.1	28.1	25.5
9	19	0	43.6	43.5	216.9	3	23	1	17.1	4.3	232.7	5	10	1	21.0	34.8	20.4
0	18	0	16.7	17.3	7.6	4	23	1	91.6	13.6	168.7	6	10	1*	36.0	19.9	183.2
2	18	0	161.1	160.5	4.9	5	23	1	21.3	19.4	175.2	7	10	1	27.6	24.0	144.0
4	18	0	66.0	17.5	5.4	6	23	1	9.3	9.6	-10.6	8	10	1	16.4	19.2	55.9
3	18	0	141.7	140.5	14.4	0	23	1	91.0	22.4	-2.1	9	10	1	9.3	12.7	76.2
3	18	0	30.2	48.6	7.9	1	22	1	10.7	13.4	52.2	10	10	1*	26.4	9.0	44.4
10	18	0	128.0	121.3	16.1	2	22	1	27.5	16.6	168.2	11	10	1	17.3	13.1	16.0
1	17	0	25.0	32.5	-4.7	3	22	1	28.2	13.2	194.9	12	10	1	9.5	11.7	92.3
3	17	0	19.0	15.0	167.0	4	22	1	31.5	29.5	18.3	13	10	1	0.5	9.7	21.2
5	17	0	17.4	29.6	47.5	5	22	1	25.0	23.2	8.6	14	10	1	9.6	5.5	155.0
7	17	0	91.4	9.3	50.3	6	22	1	9.3	12.6	214.4	0	9	1	161.2	160.8	1.4
8	17	0	66.1	30.4	114.1	7	22	1	35.3	21.0	208.4	1	9	1	16.4	16.6	-0.3
11	17	0	50.6	25.3	191.0	0	21	1	91.3	13.6	4.7	2	9	1	46.9	46.6	181.2
0	16	0	113.0	112.9	180.7	1	21	1	91.5	5.3	-3.3	3	9	1	22.9	22.6	161.7
2	16	0	141.6	149.2	6.3	2	21	1	26.0	13.0	20.7	4	9	1	95.0	86.5	6.9
4	16	0	79.6	79.5	139.1	3	21	1	91.3	11.3	10.1	5	9	1	10.7	7.5	201.8
6	16	0	91.6	91.3	0.9	4	21	1	91.3	15.2	-11.4	6	9	1	19.0	14.8	173.7
3	16	0	52.6	51.6	212.2	5	21	1	91.3	9.8	-37.1	7	9	1	16.5	20.5	57.4
10	16	0	52.6	52.6	9.2	6	21	1	91.3	18.4	41.6	8	9	1	50.3	50.7	4.8
12	16	0	23.6	25.5	254.7	7	21	1	91.3	3.7	30.0	9	9	1	91.0	3.4	207.7
1	15	0	26.6	30.9	21.4	8	21	1	91.6	3.3	-79.5	10	9	1	91.7	9.2	70.0
3	15	0	10.1	17.0	59.6	0	20	1	91.6	7.1	192.3	11	9	1	91.6	5.4	109.5
5	15	0	21.3	26.1	218.0	1	20	1	91.3	15.5	14.1	12	9	1	91.5	5.5	-17.7
7	15	0	47.7	52.3	0.7	2	20	1	39.3	35.5	-9.1	13	9	1	91.6	8.5	111.0
9	15	0	9.3	15.9	183.3	3	20	1	96.2	43.4	4.5	14	9	1	24.1	21.4	50.2
11	15	0	31.9	35.8	35.2	4	20	1	91.5	13.7	124.5	0	8	1*	223.9	198.5	180.7
0	14	0	37.4	39.6	1.6	5	20	1	91.5	9.8	9.7	1	8	1	21.4	34.0	21.3
2	14	0	95.6	91.2	180.5	6	20	1	23.2	23.5	11.1	2	8	1	24.1	28.4	10.5
4	14	0	96.2	52.7	-1.0	7	20	1	39.9	36.8	14.3	3	8	1	27.3	27.0	192.2
6	14	0	52.7	52.4	207.5	8	20	1	91.5	5.1	-44.4	4	8	1*	39.5	20.7	-43.2

3	14	0	47.6	50.8	-1.8	9	20	1	17.0	12.7	181.4	5	8	1	16.2	12.0	267.6
10	14	0	24.3	23.2	222.3	0	19	1	27.3	29.1	179.3	6	8	1	17.2	7.7	-71.9
2	14	0	9.4	16.1	-29.0	1	19	1	21.0	19.5	233.0	7	8	1	17.2	7.7	-71.9
1	13	0	10.1	10.5	106.3	2	19	1	32.3	29.2	8.4	8	8	1	61.9	49.5	190.4
3	13	0	10.0	16.0	252.2	3	19	1	9.5	7.9	-86.1	9	8	1	32.6	33.1	24.4
5	13	0	34.1	34.5	17.3	4	19	1	20.1	19.3	201.4	10	8	1	9.7	9.2	-62.1
7	13	0	32.7	35.3	211.8	5	19	1	16.5	7.0	24.0	11	8	1	26.2	21.1	194.0
9	13	0	23.6	24.0	25.9	6	19	1	9.5	16.7	9.0	12	8	1	24.3	22.9	-23.2
11	13	0	27.5	40.7	224.0	7	19	1	9.5	10.6	142.0	13	8	1	24.7	18.7	36.4
15	13	0	36.3	35.8	25.8	8	19	1	20.0	13.2	215.2	14	8	1	9.5	12.6	252.9
0	12	0*	336.0	314.8	1.3	9	19	1	9.5	16.7	253.6	0	7	1	42.1	48.0	179.9
2	12	0	48.1	49.5	8.5	10	19	1	9.5	3.2	-11.8	1	7	1	31.9	32.3	14.6
4	12	0*	399.7	367.5	6.9	0	18	1	71.5	71.1	181.2	2	7	1	121.2	119.5	5.0
5	12	0	55.2	56.0	-2.8	1	18	1	17.3	9.5	68.1	3	7	1	27.4	30.7	164.1
6	12	0	193.6	186.9	16.6	2	18	1	18.5	7.3	10.4	4	7	1	68.0	66.8	193.2
10	12	0	48.3	49.2	11.1	3	18	1	9.7	9.9	205.2	5	7	1	17.1	12.4	-48.1
12	12	0	161.0	152.2	17.9	4	18	1	37.2	33.8	135.9	6	7	1	51.1	52.0	4.0
1	11	0	42.6	49.0	13.7	5	18	1	25.2	19.4	4.2	7	7	1	10.0	6.9	-33.9
3	11	0	55.7	57.1	12.0	6	18	1	9.5	15.3	49.9	8	7	1	10.2	5.8	-68.6
5	11	0	10.0	3.2	-83.1	7	18	1	29.5	26.3	204.9	9	7	1	20.6	12.7	24.2
7	11	0	64.0	63.2	4.3	8	18	1	59.7	57.5	197.6	10	7	1	9.7	7.5	-9.7
9	11	0	9.6	11.7	172.8	9	18	1	29.1	29.0	18.7	11	7	1	9.6	6.5	135.3
11	11	0	57.8	57.5	18.1	10	18	1	9.6	14.4	51.2	12	7	1	9.5	4.9	24.5
13	11	0	30.1	32.5	206.6	0	17	1	51.8	57.9	2.9	13	7	1	9.6	6.8	-50.3
0	10	0	150.4	157.3	1.1	1	17	1	17.6	17.7	-15.4	14	7	1	19.3	19.0	228.6
2	10	0*	45.1	14.0	208.8	2	17	1	46.3	44.1	186.5	0	6	1	27.6	28.7	181.4
4	10	0	87.5	92.4	4.0	3	17	1	19.1	13.0	172.0	1	6	1	12.0	7.3	-41.3
6	10	0	44.5	43.1	222.3	4	17	1	46.0	48.6	7.3	2	6	1*	58.1	12.9	29.0
8	10	0	85.4	87.6	9.9	5	17	1	18.7	20.7	177.5	3	6	1	40.4	38.3	9.3
10	10	0	33.5	29.7	240.9	6	17	1	43.1	40.3	195.5	4	6	1	48.0	47.1	193.8
12	10	0	34.2	37.4	12.2	7	17	1	22.3	16.2	9.4	5	6	1	37.4	37.2	207.6
14	10	0	40.4	37.6	240.8	8	17	1	18.1	36.5	12.9	6	6	1*	37.0	15.9	181.9
1	9	0	44.1	49.5	178.3	9	17	1	9.5	5.5	-27.2	7	6	1	56.8	57.0	9.1
3	9	0	35.8	39.2	195.2	10	17	1	29.2	30.3	200.0	8	6	1	16.8	21.4	199.2
5	9	0	73.8	79.3	-0.5	11	17	1	18.9	14.9	175.7	9	6	1	35.5	39.9	216.6
7	9	0	100.4	104.3	192.0	0	16	1	10.1	16.2	4.9	10	6	1	33.1	22.7	33.1
9	9	0	37.2	45.9	18.5	1	16	1	18.7	13.4	190.1	11	6	1	39.5	39.8	16.2
11	9	0	36.8	44.9	206.5	2	16	1	27.4	29.4	3.9	12	6	1	33.3	27.1	210.5
13	9	0	40.8	48.6	6.1	3	16	1	33.3	31.1	5.2	13	6	1	26.5	29.3	218.2
0	8	0	82.3	85.0	178.9	4	16	1	19.8	22.2	193.1	14	6	1	9.8	10.1	163.6
2	8	0	53.0	51.9	-4.7	5	16	1	24.5	26.8	192.7	0	5	1	82.9	86.4	2.4
4	8	0*	64.0	36.8	-13.2	6	16	1	24.2	24.3	34.0	1	5	1	26.5	23.4	177.1
6	8	0	44.3	44.3	4.0	7	16	1	29.6	32.4	16.7	2	5	1	37.0	40.8	171.3
8	8	0	53.0	45.3	205.0	8	16	1	15.9	10.1	-42.6	3	5	1	39.9	37.9	-5.0
10	8	0	27.0	26.7	-13.7	9	16	1	42.2	37.5	198.6	4	5	1	115.7	113.8	9.0
12	8	0	22.6	17.9	-86.1	10	16	1	28.5	25.3	35.2	5	5	1	15.9	3.6	221.0
14	8	0	19.4	21.5	11.9	11	16	1	39.8	34.2	11.6	6	5	1	46.7	46.4	192.9
1	7	0	94.2	93.8	186.5	0	15	1	23.7	4.5	172.7	7	5	1	10.1	9.8	26.8
3	7	0	42.1	44.7	9.5	1	15	1	23.7	26.7	3.0	8	5	1	47.7	48.2	23.9
5	7	0	88.4	91.4	187.1	2	15	1	78.5	81.7	-0.7	9	5	1	24.7	21.1	183.3
7	7	0	32.8	35.2	43.3	3	15	1	10.0	8.8	-52.3	10	5	1	37.7	35.8	202.6
9	7	0	76.1	77.7	202.4	4	15	1	17.5	16.2	37.3	11	5	1	9.6	2.8	-63.7
11	7	0	32.3	41.9	16.4	5	15	1	28.2	34.1	26.1	12	5	1	21.1	29.5	35.1
13	7	0	45.1	47.3	197.5	6	15	1	54.3	58.5	13.4	13	5	1	9.8	5.4	14.9
0	6	0	27.5	31.1	2.8	7	15	1	18.0	10.4	-2.6	14	5	1	20.0	19.6	202.9
2	6	0*	774.3	529.9	3.4	8	15	1	9.6	13.7	83.1	0	4	1*	68.4	37.0	176.1
4	6	0	16.2	14.3	-44.9	9	15	1	16.8	16.6	26.6	1	4	1	38.8	38.3	-0.8
6	6	0*	464.6	396.9	12.5	10	15	1	18.3	24.3	-3.5	2	4	1	19.8	18.7	3.4
8	6	0	23.7	29.8	-14.2	11	15	1	9.6	3.6	180.3	3	4	1	27.4	28.7	-6.0
10	6	0	250.9	240.2	18.4	12	15	1	26.8	23.8	58.0	4	4	1*	213.2	186.1	4.1
12	6	0	22.3	25.7	-1.5	0	14	1	10.3	4.0	173.4	5	4	1	56.1	55.8	-1.4
14	6	0*	157.5	141.7	24.4	1	14	1	17.0	14.6	-49.0	6	4	1	21.3	24.2	38.9
1	5	0	41.5	44.0	-1.4	2	14	1	26.6	14.7	-15.6	7	4	1	16.2	8.9	235.3
3	5	0	94.4	98.0	9.1	3	14	1	10.2	6.2	43.4	8	4	1	50.8	40.9	175.1
5	5	0	60.6	63.1	1.6	4	14	1	34.8	36.9	-1.1	9	4	1	47.7	48.7	3.5
7	5	0	10.1	14.5	92.3	5	14	1	24.5	25.3	-3.2	10	4	1	23.9	26.9	32.1

9	5	0	47.0	47.4	28.9	6	14	1	10.0	8.1	-72.1	11	4	1	29.2	23.7	217.9
11	5	0	9.5	9.4	91.4	7	14	1	9.7	9.9	151.7	12	4	1	33.7	24.1	1.4
13	5	0	39.9	37.9	16.6	8	14	1	19.7	15.7	-9.4	13	4	1	52.2	45.9	14.7
15	5	0	30.0	22.9	202.5	9	14	1	9.5	21.2	-7.9	14	4	1	9.7	16.8	67.6
0	+	0*	47.8	2.1	80.7	10	14	1	9.6	13.5	262.9	15	4	1	9.6	25.3	220.1
2	+	0	31.2	32.4	-11.4	11	14	1	9.6	6.7	193.6	0	3	1	12.2	8.0	11.3
4	+	0	149.5	142.2	191.3	12	14	1	31.1	28.0	0.8	1	3	1	20.7	20.2	-3.5
6	+	0	25.3	24.8	-5.4	0	13	1	76.5	77.0	2.0	2	3	1	70.1	71.4	10.1
8	+	0	37.6	33.5	-84.0	1	13	1	22.8	26.5	-0.4	3	3	1	15.8	8.9	-68.9
10	+	0	20.0	11.9	-59.1	2	13	1	58.1	60.0	18.9	4	3	1	19.2	6.5	59.7
12	+	0	51.7	48.4	219.1	3	13	1	44.6	47.8	196.1	5	3	1	22.2	23.2	9.8
14	+	0	27.9	20.1	-1.5	4	13	1	38.0	38.5	12.0	6	3	1	32.8	36.8	10.8
1	3	0	17.3	7.0	-63.7	5	13	1	18.4	18.6	162.4	7	3	1	17.0	6.0	231.8
3	3	0	29.7	30.0	-15.5	6	13	1	32.1	38.9	191.2	8	3	1	10.1	13.9	105.8
5	3	0	30.2	29.5	23.3	7	13	1	9.9	16.9	-30.6	9	3	1	20.8	17.3	-14.6
7	3	0	16.4	0.1	-26.4	8	13	1	35.1	30.3	10.1	10	3	1	25.2	25.8	36.7
9	3	0	10.0	11.7	-65.5	9	13	1	18.5	17.4	-33.0	11	3	1	9.7	11.1	239.3
11	3	0	9.4	31.7	-2.9	10	13	1	19.5	16.4	192.0	12	3	1	9.7	7.7	100.3
13	3	0	17.2	11.3	189.7	11	13	1	22.5	20.9	214.8	13	3	1	9.7	11.9	26.3
15	3	0	23.7	24.0	31.7	12	13	1	9.6	5.0	189.8	14	3	1	9.6	4.1	125.7
2	2	0*	52.7	40.2	-18.5	13	13	1	9.5	2.1	114.7	15	3	1	9.7	5.8	190.7
4	2	0	21.2	13.8	-16.0	0	12	1	43.7	32.9	0.7	2	2	1*	58.6	27.3	-21.6
6	2	0*	55.5	42.2	-19.2	1	12	1	23.7	28.4	-1.1	3	2	1	46.7	43.9	8.1
8	2	0	21.2	27.7	-24.5	2	12	1	59.8	60.9	179.4	4	2	1	11.3	11.0	-66.7
10	2	0	40.4	47.3	226.1	3	12	1	10.1	8.9	213.2	5	2	1	42.9	39.8	194.8
12	2	0	38.1	34.8	6.7	4	12	1	36.6	26.9	23.6	6	2	1*	45.3	14.3	231.5

(4)

5	21	2	23.4	20.7	9.5	10	9	2	43.0	51.5	199.3	4	21	3	30.4	29.1	11.7
6	21	2	56.6	42.4	187.9	11	9	2	59.3	56.9	199.4	5	21	3	9.5	7.1	240.9
7	21	2	9.6	13.6	216.5	12	9	2	23.8	32.8	40.9	6	21	3	45.8	43.9	203.5
8	21	2	27.5	18.6	17.1	13	9	2	35.3	27.4	33.7	7	21	3	9.4	2.5	137.4
0	20	2	61.1	51.1	1.5	0	8	2*	336.4	283.8	1.1	0	20	3	45.5	48.0	180.7
1	20	2	9.5	7.7	133.3	1	8	2	10.5	6.4	191.8	1	20	3	9.4	5.1	-59.0
2	20	2	92.2	85.0	4.5	2	8	2	85.4	82.8	2.5	2	20	3	9.5	5.2	52.6
3	20	2	19.1	2.2	157.2	3	8	2	10.2	7.5	165.5	3	20	3	9.4	2.3	163.6
4	20	2	50.2	47.0	4.2	4	8	2*	227.5	200.8	4.2	4	20	3	23.5	28.2	192.6
5	20	2	20.1	14.8	185.3	5	8	2	40.5	40.4	196.3	5	20	3	37.2	37.7	194.6
6	20	2	77.2	69.5	6.0	6	8	2	62.8	60.3	-3.6	6	20	3	9.4	6.1	36.3
7	20	2	18.1	4.6	-21.1	7	8	2	22.0	9.0	8.1	7	20	3	38.6	37.8	2.5
8	20	2	52.4	44.8	6.3	8	8	2*	178.1	160.3	7.8	8	20	3	44.6	37.0	195.4
9	20	2	17.9	11.0	161.6	9	8	2	19.1	11.7	216.7	0	19	3	21.6	14.0	181.0
0	19	2	99.6	87.5	1.6	10	8	2	48.2	48.2	1.0	1	19	3	19.1	13.8	146.9
1	19	2	20.0	15.7	-0.4	11	8	2	9.6	4.2	150.9	2	19	3	20.6	11.1	11.0
2	19	2	18.3	9.5	108.0	12	8	2	85.2	80.9	11.9	3	19	3	18.3	8.7	209.1
3	19	2	32.1	25.3	2.2	13	8	2	19.5	13.2	214.6	4	19	3	18.8	19.9	166.6
4	19	2	69.6	59.4	13.5	14	8	2	23.7	31.6	1.0	5	19	3	18.2	12.8	163.1
5	19	2	9.6	6.3	-14.1	0	7	2	208.9	203.1	0.9	6	19	3	16.6	10.0	19.7
6	19	2	9.6	10.8	257.4	1	7	2	18.9	15.3	63.1	7	19	3	9.4	9.5	227.2
7	19	2	19.4	21.2	23.5	2	7	2	16.9	16.1	-53.0	8	19	3	9.6	21.3	155.4
8	19	2	73.6	64.1	20.5	3	7	2	42.4	42.6	2.3	9	19	3	9.5	11.8	153.0
9	19	2	9.6	7.6	-47.1	4	7	2	151.4	147.1	14.4	0	18	3	9.5	15.4	-0.3
0	18	2	78.6	75.5	2.6	5	7	2	21.3	22.4	200.1	1	18	3	17.0	15.1	-35.7
1	18	2	29.1	12.0	25.8	6	7	2	29.9	27.7	29.4	2	18	3	16.3	6.5	-89.8
2	18	2	89.8	84.8	187.2	7	7	2	66.5	64.7	5.7	3	18	3	9.4	3.9	133.2
3	18	2	9.6	10.5	71.2	8	7	2	99.5	101.8	20.0	4	18	3	9.5	7.9	185.4
4	18	2	63.3	59.7	2.7	9	7	2	43.6	42.9	189.8	5	18	3	18.8	13.9	20.8
5	18	2	9.6	10.4	-41.5	10	7	2	9.7	8.3	-22.0	6	18	3	9.4	2.9	115.6
6	18	2	77.7	71.0	198.3	11	7	2	54.9	52.4	22.5	7	18	3	20.1	9.8	102.5
7	18	2	9.5	3.5	-13.6	12	7	2	55.7	62.7	37.8	8	18	3	17.8	15.4	-7.5
8	18	2	50.3	50.3	3.7	13	7	2	23.1	30.5	210.3	9	18	3	19.2	18.1	-15.1
9	18	2	18.3	12.6	39.1	14	7	2	9.6	16.5	34.6	0	17	3	22.9	24.0	4.4
10	18	2	70.8	59.7	207.0	0	6	2	40.5	43.0	179.0	1	17	3	9.6	11.9	48.9
0	17	2	55.0	55.4	180.9	1	6	2	11.0	16.2	218.7	2	17	3	50.2	48.8	8.3
1	17	2	17.9	23.8	152.7	2	6	2*	70.5	21.4	-3.7	3	17	3	9.6	19.5	-13.5
2	17	2	9.8	12.4	199.0	3	6	2	15.1	7.2	-24.8	4	17	3	29.6	29.9	2.7
3	17	2	18.5	8.9	-44.9	4	6	2	10.3	12.0	-58.6	5	17	3	18.7	20.8	30.0
4	17	2	23.0	28.3	188.0	5	6	2	18.2	16.4	23.7	6	17	3	39.4	38.0	16.5
5	17	2	9.6	10.2	-0.4	6	6	2*	65.3	52.5	221.1	7	17	3	19.0	5.5	7.8
6	17	2	9.8	15.7	213.0	7	6	2	10.0	4.5	126.1	8	17	3	9.5	16.2	6.7
7	17	2	34.9	31.2	211.5	8	6	2	22.9	23.7	-7.7	9	17	3	9.5	11.9	63.0
8	17	2	30.6	31.8	186.0	9	6	2	9.9	7.9	247.7	10	17	3	38.7	29.1	21.7
9	17	2	9.4	8.8	72.5	10	6	2	69.2	65.6	222.0	0	16	3	45.7	43.7	0.5
10	17	2	26.1	20.0	229.8	11	6	2	9.5	5.0	-44.7	1	16	3	18.7	21.4	-8.0
11	17	2	9.6	14.3	235.6	12	6	2	29.2	31.3	8.7	2	16	3	32.5	33.1	184.0
0	16	2	122.0	120.4	1.3	13	6	2	9.7	5.9	47.7	3	16	3	15.9	15.2	45.5
1	16	2	31.5	33.4	193.1	14	6	2	72.0	67.4	224.5	4	16	3	42.5	40.4	13.6
2	16	2	122.2	118.9	1.3	0	5	2	116.5	118.1	181.2	5	16	3	16.4	11.9	210.7
3	16	2	9.8	7.3	142.5	1	5	2	106.7	104.5	2.0	6	16	3	33.4	25.2	207.0
4	16	2	82.0	83.8	7.7	2	5	2	15.1	16.5	198.3	7	16	3	41.3	39.6	14.2
5	16	2	16.6	13.6	-80.3	3	5	2	11.0	15.4	-17.8	8	16	3	35.6	32.2	22.5
6	16	2	97.9	95.1	8.2	4	5	2	176.4	168.7	187.3	9	16	3	9.5	9.4	203.8
7	16	2	26.1	28.8	180.5	5	5	2	39.0	37.8	12.9	10	16	3	32.5	23.0	202.5
8	16	2	92.8	88.2	10.8	6	5	2	10.2	15.1	194.1	11	16	3	18.7	25.3	34.2
9	16	2	18.9	15.1	224.6	7	5	2	33.1	37.3	0.6	0	15	3	95.2	92.5	181.7
10	16	2	55.7	54.4	2.9	8	5	2	61.8	62.2	208.2	1	15	3	9.8	2.6	206.4
11	16	2	9.5	5.0	256.6	9	5	2	55.6	51.8	0.0	2	15	3	95.0	95.7	11.2
0	15	2	68.3	68.7	151.7	10	5	2	25.1	27.6	205.2	3	15	3	9.8	4.2	206.1
1	15	2	17.7	24.1	224.6	11	5	2	19.7	14.7	219.7	4	15	3	96.3	98.1	192.7
2	15	2	46.1	47.9	12.3	12	5	2	58.9	53.2	202.3	5	15	3	9.5	16.8	175.5
3	15	2	36.0	35.1	10.4	13	5	2	34.5	30.0	25.4	6	15	3	53.9	56.7	-4.3
4	15	2	65.4	60.2	187.0	14	5	2	9.7	11.8	228.0	7	15	3	9.5	3.6	5.2
5	15	2	32.1	33.0	189.4	0	4	2*	365.1	253.6	1.5	8	15	3	41.9	46.0	207.6
6	15	2	42.9	42.5	11.9	1	4	2	47.0	48.8	0.5	9	15	3	9.4	3.6	208.4
7	15	2	20.1	20.1	-35.2	2	4	2	20.1	20.1	-35.2	7	15	3	20.1	20.1	-35.2

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H	K	L	FO	FC	ALPH	H	K	L	FO	FC	ALPH	H	K	L	FO	FC	ALPH
7	2	1	65.4	67.1	9.5	7	13	2	42.3	44.7	196.1	13	3	2	9.7	19.0	216.1
8	2	1	20.1	22.6	-3.2	8	13	2	9.7	7.9	227.3	14	3	2	22.1	35.8	27.0
9	2	1	36.7	35.2	195.1	9	13	2	69.8	66.7	18.8	2	2	2*	401.6	311.2	3.5
10	2	1*	37.7	11.4	-50.5	10	13	2	75.4	62.1	27.5	3	2	2	29.6	31.9	9.3
11	2	1	58.5	56.2	20.1	11	13	2	57.7	37.4	195.1	4	2	2	29.0	27.3	-11.4
12	2	1	9.5	14.3	-23.5	12	13	2	9.6	7.1	251.6	5	2	2	10.4	12.5	88.9
13	2	1	40.1	38.4	208.0	0	12	2	89.0	81.5	180.3	6	2	2*	235.7	206.9	9.7
14	2	1	23.9	14.5	233.2	1	12	2	10.1	6.8	17.9	7	2	2	10.3	20.9	31.8
15	2	1	40.5	40.4	22.4	2	12	2	37.5	38.3	-3.8	8	2	2	31.3	30.4	-11.6
2	1	1	19.1	21.4	10.6	3	12	2	40.6	40.8	1.9	9	2	2	16.4	7.6	161.4
3	1	1	16.7	16.6	246.5	4	12	2	144.8	137.1	187.6	10	2	2*	168.2	149.0	14.0
4	1	1	50.0	49.3	-7.9	5	12	2	44.0	44.2	14.6	11	2	2	9.6	5.0	72.8
5	1	1	44.9	45.6	-5.2	6	12	2	32.7	29.3	4.6	12	2	2	22.6	24.3	-9.8
6	1	1	21.2	15.1	-18.1	7	12	2	9.9	8.5	134.0	13	2	2	17.8	9.0	80.8
7	1	1	26.7	26.7	215.2	8	12	2	71.6	63.7	207.7	14	2	2*	77.4	60.2	21.6
8	1	1	25.9	24.5	205.1	9	12	2	9.6	14.3	44.1	15	2	2	9.6	5.6	131.7
9	1	1	20.3	16.7	33.0	10	12	2	9.7	16.5	-4.5	2	1	2	123.4	121.1	7.3
10	1	1	19.4	18.5	11.7	11	12	2	23.0	16.6	8.2	3	1	2	71.5	70.2	181.9
11	1	1	9.7	3.9	268.3	12	12	2*	81.0	67.6	208.7	4	1	2	37.8	37.0	14.6
12	1	1	17.9	16.5	250.2	13	12	2	21.3	15.8	39.9	5	1	2	36.5	32.2	19.6
13	1	1	9.6	15.6	-25.1	0	11	2	71.1	74.6	180.7	6	1	2	117.7	114.4	15.6
14	1	1	9.6	7.9	37.1	1	11	2	10.3	10.9	241.9	7	1	2	21.5	25.6	186.2
15	1	1	9.9	7.5	-62.7	2	11	2	69.2	70.4	194.5	8	1	2	9.9	3.8	251.4
0	0	1	23.0	25.1	192.9	3	11	2	26.3	25.3	0.7	9	1	2	28.9	30.0	13.8
5	0	1	142.2	141.5	13.1	4	11	2	26.3	26.4	206.0	10	1	2	74.2	73.9	23.3
7	0	1	92.1	90.6	191.8	5	11	2	13.9	6.7	219.5	11	1	2	30.7	28.0	192.3
9	0	1	76.5	75.5	20.9	6	11	2	59.0	58.7	187.2	12	1	2	9.5	4.5	7.0
11	0	1	49.6	52.4	207.9	7	11	2	29.5	27.9	16.2	13	1	2	9.6	20.6	25.6
13	0	1	60.9	61.6	26.0	8	11	2	33.4	33.1	215.6	14	1	2	49.8	55.8	38.5
15	0	1	34.3	38.2	199.9	9	11	2	37.1	31.9	209.0	15	1	2	9.6	6.5	170.3
0	25	2	9.5	1.3	196.7	10	11	2	59.5	57.2	210.4	2	0	2	15.3	15.0	246.9
1	25	2	20.8	0.3	208.8	11	11	2	39.9	36.7	14.6	4	0	2*	123.3	99.3	-4.4
2	25	2	66.9	48.6	6.7	12	11	2	9.9	11.2	-82.7	6	0	2	10.2	8.3	257.6
0	24	2	79.7	70.3	181.1	13	11	2	23.1	25.8	217.5	8	0	2	94.9	85.0	198.9
1	24	2	29.6	21.5	7.5	0	10	2	113.1	118.1	1.2	10	0	2	26.5	23.8	-2.4
2	24	2	64.1	59.6	5.3	1	10	2	17.6	17.6	169.4	12	0	2	43.3	43.9	245.4
3	24	2	16.7	1.7	69.9	2	10	2*	157.1	176.7	5.4	14	0	2	10.0	18.5	18.8
4	24	2*	77.4	61.5	188.0	3	10	2	10.2	14.2	-81.8	0	24	3	9.4	8.2	180.4
0	23	2	27.7	21.4	182.3	4	10	2	127.7	123.6	3.8	1	24	3	17.3	5.0	-51.2
1	23	2	20.1	8.8	184.3	5	10	2	10.1	6.8	50.7	2	24	3	9.4	14.6	-2.9
2	23	2	9.6	15.5	181.3	6	10	2*	172.0	157.2	10.1	3	24	3	9.6	11.7	8.5
3	23	2	17.1	17.9	159.0	7	10	2	19.9	16.3	210.4	0	23	3	53.9	44.4	3.7
4	23	2	31.4	28.9	199.3	8	10	2	54.8	51.6	4.2	1	23	3	18.9	4.7	-1.5
5	23	2	9.6	14.5	233.8	9	10	2	17.7	4.5	168.4	2	23	3	9.4	8.4	252.0
6	23	2	20.7	16.4	191.7	10	10	2*	129.0	109.2	18.4	3	23	3	17.4	8.8	48.1
0	22	2	124.7	117.0	1.7	11	10	2	9.7	10.4	-57.0	4	23	3	75.4	60.3	6.2
1	22	2	9.6	5.2	119.2	12	10	2	48.8	39.8	4.6	5	23	3	17.8	15.1	-23.3
2	22	2	22.9	30.2	4.4	13	10	2	9.6	3.8	205.4	0	22	3	9.4	2.9	189.0
3	22	2	19.0	11.0	253.7	0	9	2	144.9	142.5	0.7	1	22	3	24.8	20.0	16.5
4	22	2	79.5	75.7	4.9	1	9	2	18.8	18.8	1.9	2	22	3	41.8	40.1	4.6
5	22	2	9.5	7.3	103.4	2	9	2	99.6	99.1	190.3	3	22	3	17.6	21.2	245.0
6	22	2	40.4	41.0	18.3	3	9	2	58.6	59.1	184.3	4	22	3	9.6	12.8	188.2
7	22	2	9.5	6.5	267.0	4	9	2	64.3	63.3	15.3	5	22	3	48.0	48.4	32.7
0	21	2	39.9	31.0	1.6	5	9	2	10.1	6.5	87.9	6	22	3	35.5	31.8	17.1
1	21	2	18.0	9.3	118.4	6	9	2	71.4	71.5	191.4	0	21	3	44.0	40.4	2.0
2	21	2	72.5	54.1	187.8	7	9	2	34.9	33.4	202.5	1	21	3	9.4	7.6	-84.1
3	21	2	23.3	20.5	-7.9	8	9	2	76.3	75.2	16.6	2	21	3	44.8	44.2	186.7
4	21	2	36.8	33.1	8.3	9	9	2	47.4	43.0	10.8	3	21	3	9.4	6.9	169.2

7	15	2	34.9	37.5	37.0	2	4	2	35.8	33.0	-2.2	10	15	3	21.8	26.8	21.4
8	15	2	56.0	55.2	192.3	3	4	2	66.2	66.4	173.5	11	15	3	9.5	5.3	-24.1
9	15	2	48.1	45.5	204.1	4	4	2*	398.5	315.5	5.1	0	14	3	17.7	25.4	1.1
10	15	2	36.1	38.2	30.6	5	4	2	25.3	21.7	201.8	1	14	3	16.0	9.5	32.1
11	15	2	37.7	38.7	18.1	6	4	2	31.1	29.6	-11.0	2	14	3	73.4	72.9	187.6
12	15	2	39.3	38.7	200.9	7	4	2	10.1	6.5	-80.2	3	14	3	21.0	19.1	172.9
0	14	2	78.9	71.7	3.1	8	4	2*	165.6	145.1	14.0	4	14	3	9.7	4.8	111.8
1	14	2	16.4	14.2	139.4	9	4	2	19.0	26.6	16.2	5	14	3	16.0	10.2	-54.9
2	14	2	104.8	100.8	1.9	10	4	2	42.9	41.0	0.5	6	14	3	53.0	50.1	181.5
3	14	2	10.1	7.8	48.1	11	4	2	17.0	18.8	171.6	7	14	3	9.6	16.9	226.3
4	14	2	84.9	81.5	3.5	12	4	2*	118.2	101.7	15.1	8	14	3	9.5	10.3	29.2
5	14	2	20.5	16.9	208.1	13	4	2	9.7	6.1	222.4	9	14	3	27.8	19.6	2.3
6	14	2	102.1	94.1	6.4	14	4	2	35.8	26.8	4.2	10	14	3	51.3	39.9	198.4
7	14	2	17.5	4.8	195.7	0	3	2	91.2	90.2	181.4	11	14	3	30.4	21.7	201.3
8	14	2	43.5	42.1	4.7	1	3	2	15.8	13.0	180.6	12	14	3	18.8	8.3	125.2
9	14	2	9.5	10.7	132.6	2	3	2	82.9	82.8	2.1	0	13	3	76.8	75.0	3.4
10	14	2	66.3	62.7	10.3	3	3	2	25.5	18.6	23.2	1	13	3	46.3	45.1	190.6
11	14	2	9.5	4.6	89.3	4	3	2	184.9	174.3	187.6	2	13	3	85.2	84.2	181.1
12	14	2	34.0	34.6	4.8	5	3	2	45.5	45.0	202.1	3	13	3	9.9	7.2	111.0
0	13	2	10.0	2.9	182.1	6	3	2	78.3	75.5	14.2	4	13	3	94.2	91.1	7.3
1	13	2	27.2	26.3	9.0	7	3	2	44.9	45.6	5.0	5	13	3	9.8	13.0	243.7
2	13	2	89.8	90.1	5.2	8	3	2	63.1	66.0	205.3	6	13	3	52.1	53.3	181.8
3	13	2	24.3	21.0	180.5	9	3	2	40.0	40.8	192.8	7	13	3	29.4	31.3	180.5
4	13	2	17.2	4.5	260.5	10	3	2	49.4	48.2	26.4	8	13	3	16.3	20.1	25.6
5	13	2	63.5	57.9	11.1	11	3	2	9.7	19.5	19.7	9	13	3	23.3	24.1	196.7
6	13	2	81.4	79.1	17.8	12	3	2	60.6	63.9	203.3	10	13	3	16.9	22.4	165.3

7

8

H	K	L	FO	FC	ALPH	H	K	L	FO	FC	ALPH	H	K	L	FO	FC	ALPH
11	13	3	9.5	3.3	153.3	7	2	3	29.1	26.0	5.6	1	10	4	14.6	1.8	170.4
12	13	3	9.5	10.6	-13.9	8	2	3	21.4	23.5	44.7	2	10	4	69.2	61.1	-8.0
0	12	3*	62.2	37.7	0.2	9	2	3	47.0	41.4	206.7	3	10	4	18.6	18.2	159.8
1	12	3	23.7	22.5	26.9	10	2	3	52.9	46.9	190.2	4	10	4	15.9	10.1	-16.5
2	12	3	22.5	18.9	2.7	11	2	3	39.2	41.4	3.6	5	10	4	22.9	27.0	181.3
3	12	3	50.7	51.2	-7.7	12	2	3	16.2	17.4	52.9	6	10	4	60.2	54.5	15.2
4	12	3*	51.5	6.2	141.2	13	2	3	31.2	30.9	209.0	7	10	4	17.5	10.9	18.4
5	12	3	37.9	39.9	18.4	14	2	3	32.5	24.2	210.3	8	10	4	19.5	20.1	-39.8
6	12	3	20.8	19.8	1.0	2	1	3	27.1	26.4	201.7	9	10	4	9.4	13.1	183.8
7	12	3	21.1	19.5	-7.9	3	1	3	53.9	52.4	184.6	10	10	4	43.3	35.4	-3.8
8	12	3*	43.2	20.1	11.2	4	1	3	105.9	103.8	14.5	11	10	4	9.4	11.4	151.4
9	12	3	19.2	12.9	50.4	5	1	3	65.9	64.1	184.4	12	10	4	9.5	12.3	265.0
10	12	3	9.4	5.9	-1.7	6	1	3	10.0	9.6	21.5	0	9	4	122.1	123.0	180.8
11	12	3	9.6	23.1	-18.0	7	1	3	9.9	8.6	206.3	1	9	4	24.7	26.0	29.9
12	12	3	17.9	5.4	96.9	8	1	3	92.3	91.3	10.7	2	9	4	90.2	92.6	8.8
0	11	3	45.6	42.9	2.7	9	1	3	9.8	17.0	203.1	3	9	4	9.7	8.4	-79.0
1	11	3	20.1	23.6	-15.8	10	1	3	9.6	5.6	91.2	4	9	4	67.8	65.1	193.1
2	11	3	62.9	60.7	14.0	11	1	3	9.5	15.1	209.3	5	9	4	62.3	63.7	19.6
3	11	3	15.9	9.8	-1.8	12	1	3	17.4	19.6	49.1	6	9	4	62.1	64.7	11.8
4	11	3	44.3	45.3	10.4	13	1	3	28.2	26.8	189.8	7	9	4	30.7	29.1	194.5
5	11	3	9.9	14.1	-0.5	14	1	3	9.7	13.1	41.1	8	9	4	70.8	69.4	194.0
6	11	3	37.7	37.6	-1.1	3	0	3	26.6	27.0	175.7	9	9	4	50.4	51.9	25.0
7	11	3	18.6	6.2	77.4	5	0	3	45.5	45.9	9.4	10	9	4	49.6	50.2	19.3
8	11	3	22.7	28.1	29.9	7	0	3	23.6	23.6	244.4	11	9	4	24.0	30.4	194.5
9	11	3	28.9	27.5	-7.1	9	0	3	100.2	95.9	21.3	12	9	4	34.7	30.9	218.7
10	11	3	28.5	24.4	28.7	11	0	3	49.9	48.4	195.9	0	8	4*	121.9	96.4	2.3
11	11	3	9.5	4.8	22.0	13	0	3	46.2	47.8	23.7	1	8	4	14.5	17.5	-73.7
12	11	3	22.2	27.6	29.1	0	23	4	9.7	17.6	2.2	2	8	4	43.6	44.5	7.9
13	11	3	17.8	5.6	-9.1	1	23	4	16.4	5.8	194.6	3	8	4	15.2	9.4	149.7
0	10	3	29.5	29.1	181.8	2	23	4	18.1	25.6	4.7	4	8	4*	74.9	51.2	1.1
1	10	3	34.9	34.0	19.3	0	22	4	29.7	33.7	3.7	5	8	4	23.2	26.8	-2.7
2	10	3	91.9	87.2	3.9	1	22	4	9.5	1.4	15.7	6	8	4	39.3	39.8	-1.8
3	10	3	10.0	6.9	33.6	2	22	4	20.9	11.5	122.2	7	8	4	9.7	13.3	130.7
4	10	3	28.0	27.8	196.9	3	22	4	16.7	6.7	50.0	8	8	4*	70.0	54.1	-1.6
5	10	3	25.7	31.3	-8.5	4	22	4	37.1	39.6	-1.9	9	8	4	9.5	15.4	-28.9
6	10	3	83.9	77.6	11.1	0	21	4	33.5	42.0	181.1	10	8	4	24.6	25.9	18.7
7	10	3	9.7	9.0	267.6	1	21	4	20.9	23.3	24.7	11	8	4	9.4	5.4	139.4
8	10	3	21.2	19.2	212.7	2	21	4	45.8	40.6	6.4	12	8	4	23.6	21.3	-7.5
9	10	3	28.1	29.0	24.9	3	21	4	9.5	9.0	-65.1	0	7	4	166.3	166.1	181.1
10	10	3	36.6	38.9	25.9	4	21	4	40.5	41.2	187.7	1	7	4	14.9	8.6	230.3
11	10	3	18.8	9.6	27.6	5	21	4	17.4	20.7	40.3	2	7	4	18.2	14.5	142.5
12	10	3	9.7	11.5	241.7	6	21	4	39.6	31.3	0.5	3	7	4	16.7	13.8	166.2
13	10	3	9.4	8.4	-64.3	0	20	4	43.6	35.5	179.6	4	7	4	119.5	118.3	190.5
0	9	3	60.7	60.2	2.4	1	20	4	9.5	12.1	-40.2	5	7	4	72.7	72.2	188.9
1	9	3	18.9	17.7	163.7	2	20	4	89.3	88.2	4.2	6	7	4	28.0	31.6	205.4
2	9	3	97.9	101.4	189.2	3	20	4	9.4	7.0	45.2	7	7	4	38.8	39.6	12.3
3	9	3	33.2	34.3	1.3	4	20	4	17.4	9.7	230.6	8	7	4	91.0	93.0	193.2
4	9	3	83.3	82.5	2.7	5	20	4	21.8	15.3	-4.1	9	7	4	36.4	35.4	206.6
5	9	3	19.7	21.5	-3.0	6	20	4	66.5	67.5	16.0	10	7	4	22.7	16.2	186.8
6	9	3	82.4	82.6	197.3	7	20	4	9.4	7.6	87.9	11	7	4	18.4	22.1	22.9
7	9	3	19.0	14.9	206.2	0	19	4	96.4	90.3	181.7	12	7	4	53.0	56.1	208.0
8	9	3	31.6	31.9	12.3	1	19	4	9.5	4.7	150.7	13	7	4	46.3	47.2	198.6
9	9	3	9.5	4.0	114.1	2	19	4	16.2	9.0	248.0	0	6	4	69.8	70.1	2.1
10	9	3	52.1	50.5	212.0	3	19	4	16.5	15.0	22.0	1	6	4	10.0	6.1	95.7
11	9	3	9.5	10.2	-12.1	4	19	4	70.1	64.4	191.2	2	6	4*	200.5	185.5	3.6
12	9	3	19.9	16.8	-4.5	5	19	4	9.5	6.7	-174.5	3	6	4	22.1	16.0	181.4
13	9	3	20.3	8.5	-0.8	6	19	4	19.2	8.1	129.8	4	6	4	61.0	61.0	-0.8
0	8	3	35.9	34.7	180.8	7	19	4	9.4	10.5	4.3	5	6	4	25.7	25.1	196.1

1	3	3	62.5	63.7	181.9	8	19	4	68.6	64.8	196.8	6	6	4*	152.0	139.2	8.1
2	3	3	10.2	10.7	28.2	0	18	4	69.2	89.2	2.8	7	6	4	9.5	10.9	-56.6
3	3	3	10.1	12.5	237.4	1	18	4	22.7	25.2	201.5	8	6	4	69.8	67.0	4.6
4	3	3	113.3	105.3	189.1	2	18	4	28.0	32.7	11.4	9	6	4	17.9	6.2	189.3
5	3	3	10.0	13.8	8.2	3	18	4	16.2	16.0	210.5	10	6	4	80.8	72.3	6.2
6	3	3	18.5	16.3	28.9	4	18	4	84.6	83.8	1.8	11	6	4	9.4	4.5	189.5
7	3	3	54.1	52.6	188.1	5	18	4	23.3	21.3	181.6	12	6	4	53.7	54.8	14.9
8	3	3	45.3	41.7	212.2	6	18	4	19.2	24.1	-8.5	13	6	4	9.4	10.4	217.5
9	3	3	17.9	10.3	210.2	7	18	4	17.0	8.9	181.0	0	5	4	124.7	126.1	1.2
10	3	3	17.1	7.2	41.8	8	18	4	63.0	63.5	2.8	1	5	4	32.3	32.7	192.2
11	3	3	18.8	19.0	239.3	0	17	4	86.5	86.8	0.9	2	5	4	32.0	32.7	9.1
12	3	3	57.0	48.7	202.9	1	17	4	16.7	5.5	61.9	3	5	4	24.0	23.0	15.1
13	3	3	9.5	13.0	9.9	2	17	4	26.4	23.6	19.9	4	5	4	159.4	158.5	6.6
0	7	3	99.2	101.3	180.6	3	17	4	13.5	25.3	197.6	5	5	4	39.2	39.8	-10.4
1	7	3	10.3	15.2	187.9	4	17	4	68.1	65.5	9.5	6	5	4	30.4	31.7	24.1
2	7	3	125.0	125.9	3.1	5	17	4	9.4	10.1	149.0	7	5	4	36.8	36.7	186.0
3	7	3	18.6	15.1	-3.0	6	17	4	27.6	23.3	21.5	8	5	4	72.7	71.7	22.0
4	7	3	34.6	36.8	180.7	7	17	4	16.5	12.7	211.0	9	5	4	9.5	9.2	-21.6
5	7	3	17.2	6.3	156.2	8	17	4	50.1	54.0	15.8	10	5	4	40.7	40.5	27.9
6	7	3	88.3	86.6	17.0	9	17	4	9.5	15.2	25.7	11	5	4	18.9	13.6	215.1
7	7	3	20.6	13.4	178.4	0	16	4	9.7	1.7	103.1	12	5	4	64.9	59.2	19.3
8	7	3	46.8	49.3	183.7	1	16	4	18.2	11.6	-6.1	13	5	4	35.8	31.4	6.0
9	7	3	9.5	8.0	148.3	2	16	4	58.8	55.9	-2.9	0	4	4*	162.4	149.3	2.0
10	7	3	38.7	39.4	14.6	3	16	4	16.5	10.8	171.7	1	4	4	26.0	28.5	196.1
11	7	3	9.4	2.9	-83.7	4	16	4	43.1	40.8	8.9	2	4	4	14.8	15.0	183.7
12	7	3	9.6	10.5	142.7	5	16	4	9.5	11.8	170.4	3	4	4	24.7	28.1	-23.1
13	7	3	9.5	7.9	164.0	6	16	4	37.9	35.9	-6.7	4	4	4*	117.1	90.5	10.8
0	6	3	23.7	21.5	180.4	7	16	4	21.8	11.2	-0.2	5	4	4	16.7	11.4	71.7
1	6	3	15.0	13.2	-23.8	8	16	4	22.9	14.2	43.0	6	4	4	9.6	11.2	247.4
2	6	3*	63.6	9.4	138.6	9	16	4	9.4	2.6	28.8	7	4	4	9.3	8.1	126.2
3	6	3	101.3	100.2	10.9	10	16	4	9.5	20.6	-33.7	8	4	4*	90.3	76.0	14.0
4	6	3	10.1	5.3	256.5	0	15	4	54.1	53.6	1.7	9	4	4	25.3	24.0	196.2
5	6	3	29.5	31.3	207.9	1	15	4	9.6	8.3	255.0	10	4	4	9.6	9.3	259.6
6	6	3*	60.1	9.3	-57.6	2	15	4	44.1	46.2	189.1	11	4	4	9.3	8.1	-50.3
7	6	3	85.8	84.4	22.4	3	15	4	33.4	34.3	19.7	12	4	4	38.6	26.9	23.8
8	6	3	9.8	8.2	195.9	4	15	4	61.0	56.9	5.4	13	4	4	9.5	5.9	81.5
9	6	3	36.4	37.4	201.7	5	15	4	9.6	14.2	226.0	0	3	4	80.1	82.3	1.5
10	6	3*	40.1	9.8	169.4	6	15	4	44.8	43.4	193.3	1	3	4	29.8	29.5	9.0
11	6	3	66.9	67.9	24.7	7	15	4	35.3	40.5	26.7	2	3	4	103.0	103.4	185.8
12	6	3	16.9	7.9	-26.2	8	15	4	49.5	45.8	13.0	3	3	4	42.3	40.4	1.0
13	6	3	31.9	29.0	211.3	9	15	4	37.6	36.9	208.4	4	3	4	124.9	124.9	6.3
14	6	3*	27.5	6.2	-52.0	10	15	4	34.7	35.2	207.5	5	3	4	20.3	6.2	203.2
0	5	3	64.6	67.3	1.9	0	14	4	107.3	107.0	1.9	6	3	4	87.3	88.1	196.7
1	5	3	20.3	21.4	45.2	1	14	4	27.7	23.6	13.4	7	3	4	38.8	37.9	13.0
2	5	3	62.6	63.2	0.6	2	14	4	27.4	24.5	-18.9	8	3	4	56.9	57.9	19.3
3	5	3	24.7	24.9	-9.0	3	14	4	15.2	15.7	-82.8	9	3	4	17.6	6.0	-23.5
4	5	3	15.1	3.3	46.3	4	14	4	83.1	83.0	9.6	10	3	4	58.1	54.7	211.0
5	5	3	19.4	21.2	30.0	5	14	4	20.4	30.3	42.5	11	3	4	36.9	35.1	20.3
6	5	3	47.0	45.8	24.3	6	14	4	27.4	17.5	4.6	12	3	4	49.1	53.7	19.8
7	5	3	9.9	5.3	-16.1	7	14	4	9.4	13.1	-22.2	13	3	4	9.4	14.9	213.0
8	5	3	50.3	26.9	14.9	8	14	4	68.8	66.3	15.6	2	2	4*	146.6	132.7	7.4
9	5	3	16.5	17.1	33.6	9	14	4	16.8	15.1	18.0	3	2	4	13.0	12.2	-42.8
10	5	3	20.7	29.0	35.1	10	14	4	25.0	24.3	-22.1	4	2	4	10.0	9.2	-75.4
11	5	3	9.5	18.4	15.3	11	14	4	2.4	7.8	-47.4	5	2	4	39.6	36.9	20.0
12	5	3	9.4	11.0	157.9	0	13	4	27.1	27.9	181.0	6	2	4*	111.8	98.0	-1.4
13	5	3	9.6	3.3	80.3	1	13	4	20.1	20.8	-12.9	7	2	4	9.5	11.4	-49.5
14	5	3	10.0	24.6	29.7	2	13	4	99.9	104.1	183.2	8	2	4	16.4	4.3	-68.7
0	4	3	118.6	113.8	0.3	3	13	4	32.3	27.8	192.6	9	2	4	23.6	28.5	29.4
1	4	3	50.0	50.9	3.0	4	13	4	18.5	21.6	188.1	10	2	4*	64.1	45.8	13.8
2	4	3	44.0	45.5	183.4	5	13	4	24.6	26.0	4.5	11	2	4	9.3	9.4	4.1
3	4	3	16.2	7.1	38.8	6	13	4	94.7	94.5	197.3	12	2	4	9.4	18.1	-15.2
4	4	3	46.0	46.1	23.6	7	13	4	27.8	26.9	211.3	13	2	4	9.4	8.5	36.0
5	4	3	59.8	58.8	0.7	8	13	4	20.2	15.7	191.0	2	1	4	120.4	121.8	186.8
6	4	3	29.1	32.3	201.4	9	13	4	42.2	41.6	9.7	3	1	4	27.0	28.5	-3.6
7	4	3	19.2	21.0	205.9	10	13	4	70.4	67.8	203.8	4	1	4	52.9	53.6	195.1
8	4	3	80.3	76.1	20.1	11	13	4	45.5	40.3	209.1	5	1	4	42.4	42.4	8.2

9	4	3	63.1	61.4	13.5	0	12	4	91.6	89.3	1.1	6	1	4	111.9	112.5	195.4
10	4	3	26.1	26.4	214.3	1	12	4	14.9	3.7	-41.9	7	1	4	32.8	32.0	197.8
11	4	3	23.6	21.9	207.6	2	12	4	85.5	86.5	3.5	8	1	4	21.5	26.2	203.5
12	4	3	38.6	35.2	41.1	3	12	4	23.4	27.5	177.5	9	1	4	18.0	12.0	50.9
13	4	3	40.9	37.6	16.7	4	12	4	94.9	89.4	1.4	10	1	4	84.4	81.9	202.1
14	4	3	9.7	13.0	215.9	5	12	4	20.0	25.5	190.8	11	1	4	9.3	9.9	-46.8
0	3	3	147.9	147.9	180.6	6	12	4	76.6	75.3	3.2	12	1	4	9.5	19.0	224.5
1	3	3	66.3	68.1	187.0	7	12	4	16.0	7.2	-14.9	13	1	4	9.3	8.4	20.2
2	3	3	18.9	18.4	-33.0	8	12	4	98.9	57.1	-0.5	2	0	4	59.6	60.8	0.5
3	3	3	10.4	9.1	103.7	9	12	4	9.4	6.4	234.8	4	0	4	217.1	207.1	2.1
4	3	3	123.4	122.2	188.7	10	12	4	93.4	55.1	11.9	6	0	4	68.3	70.3	0.9
5	3	3	10.0	14.1	259.3	11	12	4	19.8	17.6	179.8	8	0	4	142.9	138.5	2.2
6	3	3	10.0	4.1	32.9	0	11	4	93.4	52.3	1.2	10	0	4	65.5	63.2	0.1
7	3	3	31.5	32.2	179.9	1	11	4	24.2	22.5	-6.8	12	0	4	68.3	64.2	-2.9
8	3	3	56.8	54.4	211.3	2	11	4	75.3	79.2	13.4	0	22	5	9.3	9.3	181.3
9	3	3	21.5	24.4	196.3	3	11	4	23.4	20.4	-3.2	1	22	5	9.4	2.4	45.8
10	3	3	36.6	34.8	218.1	4	11	4	51.8	34.0	12.2	0	21	5	9.4	19.7	3.9
11	3	3	9.5	4.2	44.0	5	11	4	17.2	14.4	174.5	1	21	5	16.6	16.2	164.7
12	3	3	18.3	24.0	210.5	6	11	4	68.9	68.3	8.1	2	21	5	9.4	8.9	-2.8
13	3	3	9.5	9.7	259.8	7	11	4	46.3	46.1	8.3	3	21	5	9.4	7.2	239.4
14	3	3	9.6	20.2	210.3	8	11	4	20.9	26.4	33.7	4	21	5	9.2	10.3	10.4
2	2	3	99.2	95.2	178.5	9	11	4	17.1	22.0	210.2	0	20	5	75.3	74.0	1.5
3	2	3	26.0	28.4	-12.8	10	11	4	71.9	67.8	27.2	1	20	5	9.5	7.9	-58.7
4	2	3	52.2	51.6	12.9	11	11	4	40.3	34.3	14.3	2	20	5	17.2	23.2	165.9
5	2	3	16.3	11.0	191.8	12	11	4	9.8	9.1	59.5	3	20	5	27.0	28.0	25.5
6	2	3	76.5	67.4	189.9	0	10	4	99.5	37.8	1.6	4	20	5	51.8	49.2	16.1

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H	K	L	FO	FC	ALPH	H	K	L	FO	FC	ALPH	H	K	L	FO	FC	ALPH
5	20	5	16.8	11.5	-77.4	8	6	5	9.5	11.4	-0.4	2	10	6	43.8	37.0	16.2
0	19	5	29.2	21.9	180.4	9	6	5	15.9	4.7	-78.2	3	10	6	28.2	29.8	-10.8
1	19	5	23.7	20.7	24.6	10	6	5	9.7	12.3	269.3	4	10	6	32.0	81.5	1.9
2	19	5	64.6	60.9	2.7	11	6	5	34.7	34.4	20.1	5	10	6	25.2	21.0	16.4
3	19	5	9.4	13.7	19.5	12	6	5	9.4	5.4	86.6	6	10	6	28.0	31.9	-32.1
4	19	5	20.2	27.8	190.8	0	5	5	9.7	5.6	157.0	7	10	6	9.4	9.6	-3.0
5	19	5	9.3	3.4	6.0	1	5	5	14.2	14.0	201.0	8	10	6	55.6	55.8	6.3
6	19	5	59.1	46.7	11.5	2	5	5	9.7	5.6	95.9	9	10	6	9.4	10.5	44.4
0	13	5	9.4	9.6	5.7	3	5	5	44.2	43.1	183.0	10	10	6	18.8	20.9	-1.0
1	13	5	9.4	8.1	66.7	4	5	5	14.9	12.7	-19.7	0	9	6	28.4	30.5	-0.2
2	13	5	9.4	10.0	121.3	5	5	5	18.4	22.1	193.4	1	9	6	15.4	11.3	21.5
3	13	5	15.8	6.7	231.9	6	5	5	16.8	12.9	211.9	2	9	6	13.4	14.9	198.6
4	13	5	23.3	22.9	9.5	7	5	5	15.9	15.5	213.9	3	9	6	23.0	23.1	200.1
5	13	5	24.5	27.8	3.7	8	5	5	9.4	5.0	248.7	4	9	6	20.0	19.7	5.7
6	13	5	9.3	14.9	245.9	9	5	5	9.4	12.0	201.5	5	9	6	30.2	30.5	16.2
7	13	5	26.0	28.9	200.7	10	5	5	9.4	6.6	193.8	6	9	6	14.5	7.8	144.5
0	17	5	20.9	26.4	3.9	11	5	5	25.8	22.2	202.4	7	9	6	30.3	38.2	200.4
1	17	5	16.8	16.6	222.4	12	5	5	9.6	8.5	259.8	8	9	6	16.4	20.0	1.9
2	17	5	19.1	14.1	198.4	0	4	5	12.5	122.9	181.3	9	9	6	41.1	42.3	19.3
3	17	5	9.4	16.1	152.2	1	4	5	35.7	38.5	2.7	10	9	6	9.4	12.8	196.2
4	17	5	9.5	14.9	3.2	2	4	5	20.0	21.1	20.0	0	8	6	47.7	46.3	2.8
5	17	5	9.4	12.2	248.2	3	4	5	17.4	19.2	-34.2	1	8	6	28.4	30.9	178.0
6	17	5	9.4	10.7	163.7	4	4	5	133.7	130.1	190.9	2	8	6	29.2	30.4	-21.9
7	17	5	9.4	16.9	167.0	5	4	5	38.8	41.5	21.3	3	8	6	15.1	9.1	145.3
8	17	5	9.3	14.1	-11.3	6	4	5	9.3	14.2	-6.8	4	8	6	73.1	70.8	1.0
0	16	5	76.6	81.4	181.4	7	4	5	15.3	9.5	-41.3	5	8	6	30.0	28.1	207.0
1	16	5	9.3	10.7	141.5	8	4	5	65.7	85.3	203.7	6	8	6	23.0	22.4	0.5
2	16	5	9.3	7.3	-57.8	9	4	5	35.5	39.5	14.2	7	8	6	21.6	20.2	202.1
3	16	5	29.5	28.0	-4.7	10	4	5	15.5	12.4	52.2	8	8	6	32.2	30.4	-0.5
4	16	5	54.2	56.2	190.7	11	4	5	23.6	24.2	222.1	9	8	6	22.5	21.3	186.0
5	16	5	28.5	21.9	180.2	12	4	5	68.7	65.3	207.3	10	8	6	16.9	27.8	-34.8
6	16	5	9.3	0.9	22.5	0	3	5	9.9	9.1	167.9	1	7	6	62.6	64.2	0.8
7	16	5	27.5	25.9	-2.0	1	3	5	31.4	33.8	-12.7	2	7	6	27.2	30.0	188.0
8	16	5	56.7	59.4	193.4	2	3	5	30.3	30.4	18.9	3	7	6	34.5	36.2	5.2
9	16	5	30.4	29.0	181.9	3	3	5	34.5	35.2	168.6	4	7	6	40.7	41.6	8.5
0	15	5	9.5	6.8	174.6	4	3	5	17.0	15.0	4.0	5	7	6	37.1	40.4	4.7
1	15	5	15.1	15.7	175.6	5	3	5	19.3	17.1	208.4	6	7	6	19.8	21.4	210.4
2	15	5	37.4	41.6	-1.5	6	3	5	17.9	19.6	23.9	7	7	6	34.7	37.4	12.4
3	15	5	9.3	6.2	90.8	7	3	5	9.2	10.8	19.3	8	7	6	26.9	28.7	30.5
4	15	5	23.7	8.2	163.2	8	3	5	19.6	13.1	154.4	9	7	6	41.1	42.3	6.2
5	15	5	9.3	10.8	-81.4	9	3	5	30.6	23.1	-10.2	10	7	6	58.0	56.2	199.2
6	15	5	34.0	35.1	17.9	10	3	5	20.1	22.9	36.6	11	7	6	28.0	25.1	19.2
7	15	5	9.4	12.1	187.7	11	3	5	21.3	22.1	175.2	12	7	6	45.9	44.7	19.3
8	15	5	18.8	4.2	150.0	12	3	5	9.5	2.7	101.2	0	6	6	9.2	5.0	7.3
9	15	5	9.4	9.9	188.3	13	3	5	9.5	2.6	259.0	1	6	6	9.2	11.1	94.5
0	14	5	30.1	29.2	182.7	2	2	5	133.0	138.9	2.1	2	6	6	157.6	153.2	4.5
1	14	5	17.6	9.0	18.5	3	2	5	14.2	14.0	37.6	3	6	6	18.2	18.7	-16.3
2	14	5	83.7	91.0	12.2	4	2	5	18.9	18.7	182.8	4	6	6	9.0	9.5	16.9
3	14	5	17.2	15.1	-10.5	5	2	5	41.7	41.5	192.9	5	6	6	9.0	11.0	33.9
4	14	5	18.2	20.0	194.6	6	2	5	118.5	121.4	17.0	6	6	6	127.1	117.9	10.5
5	14	5	23.2	24.5	25.1	7	2	5	49.4	52.5	9.8	7	6	6	9.1	2.8	250.1
6	14	5	73.8	73.6	10.5	8	2	5	18.0	15.2	217.4	8	6	6	9.3	7.2	29.8
7	14	5	17.2	5.2	147.9	9	2	5	41.1	40.7	205.2	9	6	6	16.5	12.6	91.0
8	14	5	25.4	26.7	197.7	10	2	5	88.2	86.5	20.9	10	6	6	82.6	80.4	15.9
9	14	5	16.8	15.9	39.1	11	2	5	33.9	37.2	25.9	11	6	6	9.4	11.9	-4.3
10	14	5	72.3	70.5	32.8	12	2	5	18.4	17.5	212.3	0	5	6	77.1	82.8	181.0
0	13	5	71.9	76.7	2.1	13	2	5	32.6	37.8	204.8	1	5	6	42.0	42.9	-3.5
1	13	5	34.8	36.0	7.7	2	1	5	12.0	15.1	185.3	2	5	6	32.4	34.2	181.5

2	13	5	67.5	63.2	186.7	3	1	5	54.1	55.4	-3.7	3	5	6	14.2	7.0	85.8
3	13	5	16.1	14.6	5.8	4	1	5	70.0	72.0	7.9	4	5	6	83.4	86.3	185.9
4	13	5	55.3	54.9	11.2	5	1	5	45.1	46.7	17.0	5	5	6	9.0	12.5	-32.1
5	13	5	9.5	16.4	16.3	6	1	5	18.5	23.1	207.6	6	5	6	29.5	31.2	195.9
6	13	5	52.8	53.8	199.9	7	1	5	9.4	21.7	10.4	7	5	6	9.1	17.0	12.3
7	13	5	18.8	22.6	13.7	8	1	5	24.5	24.9	34.6	8	5	6	50.4	54.1	196.4
8	13	5	47.1	45.2	12.7	9	1	5	9.4	7.2	59.6	9	5	6	35.6	39.1	3.1
9	13	5	25.2	27.7	17.1	10	1	5	9.3	8.2	244.0	10	5	6	19.6	31.2	192.2
10	13	5	41.2	36.1	207.4	11	1	5	28.8	25.0	11.8	11	5	6	16.4	14.0	181.1
0	12	5	37.3	32.7	180.5	12	1	5	19.9	18.7	18.2	0	4	6	66.0	65.5	2.5
1	12	5	15.7	19.1	16.0	13	1	5	9.6	23.5	23.8	1	4	6	12.7	13.1	19.9
2	12	5	15.8	15.8	-13.4	3	0	5	42.3	42.2	197.2	2	4	6	49.8	51.0	1.0
3	12	5	9.1	5.3	28.0	5	0	5	54.8	64.2	16.2	3	4	6	16.3	18.3	37.8
4	12	5	25.1	16.3	-13.4	7	0	5	49.8	51.3	185.1	4	4	6	73.9	70.4	1.0
5	12	5	9.6	15.9	-1.4	9	0	5	48.3	51.2	5.8	5	4	6	29.3	29.6	-7.7
6	12	5	16.0	15.3	58.2	11	0	5	42.3	45.3	201.5	6	4	6	37.4	39.8	4.1
7	12	5	9.3	8.9	-32.2	13	0	5	44.1	47.1	20.5	7	4	6	16.5	6.6	142.3
8	12	5	24.4	18.6	197.4	0	20	6	19.4	8.7	-0.0	8	4	6	44.9	44.9	-2.8
9	12	5	17.9	15.2	12.0	0	19	6	23.6	13.4	0.4	9	4	6	20.3	23.5	14.6
10	12	5	9.4	10.2	15.4	1	19	6	9.3	10.1	-69.8	10	4	6	33.5	31.4	6.7
11	12	5	9.4	11.4	15.0	2	19	6	27.1	30.8	4.1	11	4	6	16.4	11.6	54.9
0	11	5	19.1	28.5	183.3	3	19	6	9.4	3.6	47.7	0	3	6	12.9	13.1	178.4
1	11	5	37.4	39.6	179.2	0	18	6	51.7	48.4	3.3	1	3	6	9.4	9.7	211.1
2	11	5	32.2	31.3	-0.0	1	18	6	9.4	11.3	75.2	2	3	6	9.4	11.7	-7.3
3	11	5	9.2	14.5	207.9	2	18	6	24.5	27.2	-2.7	3	3	6	14.1	5.0	8.1
4	11	5	27.1	27.2	177.5	3	18	6	9.4	6.2	-64.0	4	3	6	9.0	10.4	167.4
5	11	5	15.8	3.4	138.0	4	18	6	39.3	44.8	7.6	5	3	6	9.0	7.5	-56.1
6	11	5	20.6	23.3	13.5	5	18	6	9.4	10.7	71.4	6	3	6	18.8	17.3	19.2
7	11	5	27.8	29.5	196.4	0	17	6	53.7	55.4	181.1	7	3	6	8.8	6.7	-12.9
8	11	5	22.5	20.9	172.1	1	17	6	9.4	7.2	-20.1	8	3	6	18.0	14.8	169.3
9	11	5	30.6	27.3	182.1	1	17	6	26.8	19.0	200.7	9	3	6	22.7	19.1	209.6
10	11	5	13.1	4.3	-12.7	2	17	6	9.3	11.2	23.5	10	3	6	15.6	10.6	14.4
11	11	5	9.3	11.4	246.1	3	17	6	57.7	57.3	186.8	11	3	6	17.3	14.9	-9.5
0	10	5	9.3	4.5	178.7	4	17	6	21.9	24.7	7.4	2	2	6	84.9	88.1	-5.9
1	10	5	17.8	15.1	266.2	0	17	6	16.7	16.2	186.4	3	2	6	31.7	32.7	174.5
2	10	5	95.6	99.3	188.2	0	16	6	17.4	9.1	-0.9	4	2	6	14.0	6.2	-43.2
3	10	5	9.2	8.7	53.1	1	16	6	9.4	10.0	8.9	5	2	6	37.7	38.0	201.4
4	10	5	9.2	2.4	226.8	2	16	6	122.3	124.1	6.3	6	2	6	71.4	64.5	12.6
5	10	5	9.1	11.8	261.8	3	16	6	9.4	8.7	11.1	7	2	6	27.9	31.3	186.9
6	10	5	89.4	90.5	188.8	4	16	6	18.1	16.5	211.1	8	2	6	19.9	26.7	-22.1
7	10	5	9.4	10.3	52.5	5	16	6	9.5	13.4	7.9	9	2	6	23.9	27.5	197.6
8	10	5	9.3	6.7	-34.7	6	16	6	42.5	96.1	5.7	10	2	6	37.4	36.6	-17.6
9	10	5	9.4	17.1	252.1	7	16	6	9.3	3.6	49.6	11	2	6	22.2	20.0	201.6
10	10	5	60.2	63.6	203.7	0	15	6	9.3	4.1	180.4	2	1	6	64.0	66.6	11.2
11	10	5	16.1	5.0	18.2	1	15	6	9.3	9.0	-77.0	3	1	6	17.2	14.5	190.1
0	9	5	106.8	112.5	2.1	2	15	6	9.4	13.2	0.4	4	1	6	38.4	39.0	5.9
1	9	5	9.4	8.5	67.2	3	15	6	9.3	12.1	103.2	5	1	6	9.0	9.0	65.6
2	9	5	23.7	23.5	157.4	4	15	6	21.1	22.2	178.3	6	1	6	59.1	59.5	12.6
3	9	5	32.1	29.9	196.0	5	15	6	28.3	31.7	214.0	7	1	6	17.1	11.6	-22.4
4	9	5	19.3	79.1	8.2	6	15	6	22.6	18.5	29.4	8	1	6	35.4	37.2	7.1
5	9	5	33.9	36.5	175.8	7	15	6	20.6	22.7	15.6	9	1	6	25.6	24.8	31.3
6	9	5	17.2	6.7	148.5	0	14	6	36.6	36.5	3.3	10	1	6	52.2	51.9	27.7
7	9	5	9.5	13.0	-17.1	1	14	6	34.6	34.3	185.4	11	1	6	17.9	16.0	188.6
8	9	5	42.1	44.4	12.6	2	14	6	14.8	22.9	26.0	2	0	6	37.0	35.8	179.7
9	9	5	9.4	6.2	157.2	3	14	6	17.9	18.1	188.2	4	0	6*	182.2	167.3	9.1
10	9	5	21.5	20.7	57.4	4	14	6	37.4	40.7	-2.9	6	0	6	13.8	16.8	233.3
11	9	5	20.0	10.7	190.9	5	14	6	21.8	26.5	193.0	8	0	6	121.5	112.0	11.7
12	9	5	9.4	5.8	30.8	6	14	6	21.7	21.7	-15.1	10	0	6	9.4	12.3	46.5
0	8	5	119.2	119.7	1.4	7	14	6	23.7	22.7	193.2	0	17	7	64.1	60.1	3.0
1	8	5	16.4	11.7	19.7	8	14	6	21.4	20.9	-10.5	1	17	7	9.3	5.5	-82.0
2	8	5	42.2	40.4	191.4	0	13	6	52.2	52.1	1.3	2	17	7	55.1	54.6	180.9
3	8	5	17.9	17.3	173.5	1	13	6	3.9	11.3	135.8	0	16	7	61.9	56.4	1.7
4	8	5	125.6	124.8	13.2	2	13	6	26.6	24.4	-14.8	1	16	7	9.4	6.1	-66.3
5	8	5	9.2	5.1	-2.8	3	13	6	18.6	15.0	226.3	2	16	7	17.0	13.1	43.9
6	8	5	31.5	32.4	203.4	4	13	6	35.1	37.8	11.0	3	16	7	16.2	17.2	10.0
7	8	5	9.4	10.4	223.6	5	13	6	29.2	25.6	24.0	4	16	7	53.2	48.1	10.8

8	8	5	81.8	83.7	25.7	6	13	6	31.6	31.2	21.7	0	15	7	22.7	14.0	179.9
9	8	5	22.7	20.7	16.7	7	13	6	42.1	39.6	200.8	1	15	7	17.7	10.4	22.9
10	8	5	19.6	19.7	207.9	8	13	6	33.0	33.0	12.7	2	15	7	65.1	60.8	-1.6
11	8	5	18.6	23.9	193.3	9	13	6	24.2	24.4	25.5	3	15	7	9.4	11.9	242.1
12	8	5	68.4	64.5	35.7	0	12	6	84.4	84.6	2.9	4	15	7	19.9	10.4	32.3
0	7	5	82.4	83.7	180.6	1	12	6	15.4	5.3	-78.7	5	15	7	9.3	13.8	88.1
1	7	5	35.2	34.1	-4.7	2	12	6	20.2	13.1	-7.4	0	14	7	9.4	13.1	180.6
2	7	5	114.8	116.9	5.2	3	12	6	9.0	11.3	81.3	1	14	7	29.5	27.2	-19.6
3	7	5	27.1	28.4	12.2	4	12	6	74.4	74.7	9.3	2	14	7	56.7	56.5	189.6
4	7	5	58.1	61.6	196.1	5	12	6	9.3	12.6	-51.9	3	14	7	9.4	11.9	52.6
5	7	5	27.5	21.8	11.4	6	12	6	15.4	15.7	31.0	4	14	7	17.8	13.4	206.9
6	7	5	69.9	73.1	5.6	7	12	6	15.2	12.1	144.1	5	14	7	31.4	25.4	-9.2
7	7	5	34.0	36.8	22.0	8	12	6	56.0	52.2	17.0	6	14	7	51.7	50.0	188.2
8	7	5	28.3	32.4	207.8	9	12	6	9.4	9.2	-12.4	0	13	7	13.9	3.6	27.4
9	7	5	17.5	13.0	-7.4	0	11	6	14.3	12.9	184.4	1	13	7	16.7	19.0	153.6
10	7	5	33.5	31.6	11.3	1	11	6	14.5	17.2	32.6	2	13	7	17.5	3.5	100.0
11	7	5	9.5	16.2	34.5	2	11	6	49.8	52.7	189.2	3	13	7	14.8	15.5	221.5
12	7	5	9.5	13.5	251.3	3	11	6	43.3	41.0	5.1	4	13	7	15.3	9.1	209.5
0	6	5	12.0	13.1	1.4	4	11	6	38.8	36.5	178.5	5	13	7	9.4	8.1	105.0
1	6	5	36.9	40.7	10.8	5	11	6	16.1	7.5	12.1	6	13	7	9.5	7.2	54.2
2	6	5*	46.9	15.2	-83.6	6	11	6	44.8	46.0	198.3	7	13	7	23.0	20.8	216.4
3	6	5	37.2	35.8	-2.3	7	11	6	35.6	35.1	5.9	0	12	7	26.7	19.1	0.5
4	6	5	9.4	5.1	116.3	8	11	6	9.5	8.1	196.9	1	12	7	8.8	8.1	-61.9
5	6	5	15.0	10.9	25.1	9	11	6	9.4	15.1	159.0	2	12	7	24.5	27.0	171.4
6	6	5*	36.0	12.3	97.9	0	10	6	75.9	74.4	2.4	3	12	7	18.1	10.2	187.2
7	6	5	52.0	51.2	7.0	1	10	6	9.1	13.2	44.1	4	12	7	17.1	4.7	148.8

BREDIGITE

SHEET NO. 3 PART 1

14

H	K	L	FO	FC	ALPH	H	K	L	FO	FC	ALPH	H	K	L	FO	FC	ALPH
5	12	7	9.4	4.3	232.3	0	7	7	33.7	32.6	1.9	10	4	7	9.4	8.3	-1.8
6	12	7	21.2	22.8	214.8	1	7	7	26.9	24.3	218.9	0	3	7	13.2	18.3	1.9
7	12	7	9.3	4.8	268.2	2	7	7	15.7	15.6	168.8	1	3	7	13.1	9.6	156.4
0	11	7	81.5	82.1	181.7	3	7	7	23.1	25.0	160.7	2	3	7	48.1	49.3	7.7
1	11	7	24.2	21.3	-0.4	4	7	7	15.4	5.2	72.4	3	3	7	9.0	13.0	-26.4
2	11	7	90.4	92.2	4.5	5	7	7	17.2	19.3	228.2	4	3	7	15.8	9.2	139.8
3	11	7	15.1	8.5	13.4	6	7	7	22.5	20.8	205.7	5	3	7	23.1	22.2	28.8
4	11	7	80.2	81.0	190.9	7	7	7	21.3	22.0	172.5	6	3	7	33.9	36.4	-2.8
5	11	7	9.3	7.6	165.7	8	7	7	32.4	32.1	15.7	7	3	7	8.9	14.3	189.9
6	11	7	76.8	76.2	15.9	9	7	7	15.9	14.2	251.0	8	3	7	20.8	16.6	25.7
7	11	7	28.4	25.7	11.1	0	6	7	15.7	16.8	182.0	9	3	7	9.4	7.2	97.6
8	11	7	65.1	60.7	204.1	1	6	7	21.4	24.1	197.9	10	3	7	17.0	13.9	23.1
0	10	7	8.9	9.9	1.2	2	6	7	15.4	14.8	62.4	2	2	7	82.7	77.3	182.2
1	10	7	22.3	19.0	13.5	3	6	7	12.9	13.8	23.3	3	2	7	43.3	43.0	10.3
2	10	7	68.6	66.8	11.5	4	6	7	3.9	2.2	243.4	4	2	7	16.8	15.3	210.2
3	10	7	19.1	13.5	-24.6	5	6	7	37.4	37.5	199.0	5	2	7	8.8	10.6	-61.2
4	10	7	8.9	13.8	7.1	6	6	7	15.5	7.9	-37.9	6	2	7	80.5	71.8	198.2
5	10	7	19.7	22.8	29.3	7	6	7	21.6	20.0	21.5	7	2	7	29.2	31.3	16.2
6	10	7	62.3	59.7	8.7	8	6	7	20.8	13.7	181.3	8	2	7	16.8	14.5	218.3
7	10	7	21.3	9.6	14.7	9	6	7	44.9	45.6	199.7	9	2	7	9.4	10.8	194.3
8	10	7	9.4	6.4	55.7	0	5	7	62.4	82.4	2.8	10	2	7	62.4	54.8	199.4
0	9	7	78.6	77.2	1.9	1	5	7	12.2	9.0	36.7	2	1	7	60.1	60.7	5.5
1	9	7	15.1	13.0	228.2	2	5	7	68.2	91.9	190.8	3	1	7	29.8	29.1	209.0
2	9	7	9.0	8.1	243.6	3	5	7	24.7	24.4	-21.3	4	1	7	35.0	36.2	199.6
3	9	7	13.9	9.7	41.2	4	5	7	33.5	81.1	11.0	5	1	7	17.5	21.3	145.8
4	9	7	63.3	62.4	8.6	5	5	7	3.9	11.5	69.6	6	1	7	61.0	59.9	18.7
5	9	7	14.4	8.6	-27.2	6	5	7	69.2	70.7	189.9	7	1	7	14.3	14.5	239.4
6	9	7	9.4	7.9	70.5	7	5	7	15.8	14.9	-3.4	8	1	7	40.2	40.8	211.8
7	9	7	9.4	9.5	133.5	8	5	7	56.6	54.3	21.6	9	1	7	17.0	9.5	88.4
8	9	7	40.4	42.0	9.9	9	5	7	9.4	3.1	73.2	10	1	7	42.3	41.6	27.7
0	8	7	79.4	72.2	181.7	0	4	7	69.4	82.7	1.7	3	0	7	15.2	16.3	184.8
1	8	7	18.6	20.1	38.5	1	4	7	35.8	25.1	20.1	5	0	7	30.2	32.8	-2.6
2	8	7	8.9	4.9	-27.5	2	4	7	12.4	7.7	233.1	7	0	7	66.0	65.6	198.1
3	8	7	15.5	6.4	270.0	3	4	7	11.0	22.0	9.5	9	0	7	34.3	30.7	23.8
4	8	7	82.0	71.8	189.7	4	4	7	67.2	80.0	9.0	0	14	8	61.1	60.8	2.9
5	8	7	9.0	13.3	43.3	5	4	7	42.5	42.2	4.6	1	14	8	18.8	21.3	23.1
6	8	7	9.0	4.4	226.6	6	4	7	8.4	9.9	87.1	0	13	8	31.3	27.1	182.1
7	8	7	9.3	9.6	-66.8	7	4	7	8.9	8.2	196.3	1	13	8	18.7	24.9	20.5
8	8	7	48.7	44.3	194.6	8	4	7	61.2	53.3	20.8	2	13	8	17.3	15.3	47.7
9	8	7	18.5	23.3	33.0	9	4	7	43.9	40.6	18.7	3	13	8	9.2	5.7	-67.6

BREDIGITE

SHEET NO. 3 PART 2

(15)

H	K	L	FO	FC	ALPH	H	K	L	FO	FC	ALPH	H	K	L	FO	FC	ALPH
0	12	8	16.7	6.0	8.2	1	6	8	13.7	9.5	-8.5	2	1	8	11.1	7.1	256.8
1	12	8	14.2	13.5	245.3	2	6	8	71.3	62.1	5.0	3	1	8	8.7	7.0	13.3
2	12	8	28.1	25.1	6.5	3	6	8	8.7	6.3	-75.6	4	1	8	12.2	12.7	182.8
3	12	8	16.4	5.8	173.7	4	6	8	15.1	10.9	232.5	5	1	8	28.2	24.1	9.0
4	12	8	21.7	16.3	1.2	5	6	8	9.2	9.4	96.6	6	1	8	9.2	11.0	92.7
0	11	8	15.3	6.8	178.4	6	6	8	47.0	40.8	-2.8	7	1	8	14.4	5.0	125.1
1	11	8	9.3	13.3	-43.7	7	6	8	15.8	14.8	3.1	8	1	8	25.0	26.6	186.1
2	11	8	40.2	35.0	-0.9	0	5	8	21.5	21.6	-0.9	2	0	8	10.9	9.9	252.6
3	11	8	16.1	19.6	29.2	1	5	8	15.9	18.7	29.3	4	0	8	71.9	63.3	3.5
4	11	8	30.7	27.6	-10.0	2	5	8	23.3	21.3	1.7	6	0	8	9.2	8.0	269.2
5	11	8	14.5	14.1	236.3	3	5	8	21.6	17.5	-22.8	8	0	8	57.6	48.2	6.1
0	10	8	59.9	55.2	2.1	4	5	8	23.4	19.3	21.4	0	8	9	8.7	2.1	4.3
1	10	8	25.5	27.9	173.8	5	5	8	35.3	36.0	18.5	0	7	9	62.5	60.5	181.3
2	10	8	48.4	47.0	0.9	6	5	8	21.6	18.7	15.3	1	7	9	8.7	6.7	146.7
3	10	8	39.9	36.8	195.7	7	5	8	9.2	9.9	252.5	2	7	9	107.9	102.4	1.5
4	10	8	38.4	38.0	7.9	0	4	8	84.2	90.8	2.7	0	6	9	14.6	1.2	199.0
5	10	8	34.1	34.1	174.7	1	4	8	18.7	20.4	210.9	1	6	9	29.7	27.6	-18.3
0	9	8	9.0	7.5	174.5	2	4	8	13.0	9.6	12.9	2	6	9*	26.0	9.2	-13.4
1	9	8	18.8	14.9	188.1	3	4	8	45.2	43.4	176.9	3	6	9	38.9	37.0	26.1
2	9	8	22.1	20.4	170.6	4	4	8	77.4	73.4	5.5	0	5	9	8.8	7.6	7.7
3	9	8	22.1	22.8	170.9	5	4	8	34.1	34.8	201.5	1	5	9	12.4	13.5	95.6
4	9	8	17.1	10.4	183.1	6	4	8	17.0	12.0	14.0	2	5	9	70.1	65.9	12.7
5	9	8	9.2	8.3	-44.5	7	4	8	17.4	15.6	201.0	3	5	9	8.7	5.2	-34.4
6	9	8	18.5	25.1	207.0	8	4	8	59.4	55.4	10.1	0	4	9	11.9	14.2	180.3
0	8	8	75.0	74.9	2.7	0	3	8	14.0	12.6	-5.4	1	4	9	11.5	12.0	-38.3
1	8	8	28.7	29.9	0.2	1	3	8	9.0	10.8	207.2	2	4	9	42.8	41.3	185.7
2	8	8	33.9	38.1	14.1	2	3	8	8.8	8.7	40.7	3	4	9	15.6	14.1	174.7
3	8	8	17.0	13.6	7.2	3	3	8	8.7	5.1	246.2	4	4	9	15.1	4.4	47.2
4	8	8	69.3	68.4	4.0	4	3	8	12.9	8.6	179.1	1	3	9	8.8	8.8	-82.3
5	8	8	23.0	18.6	28.2	5	3	8	32.4	30.2	180.7	2	3	9	12.4	8.5	214.7
6	8	8	32.3	34.0	-1.6	6	3	8	9.1	7.9	-33.5	3	3	9	8.6	8.8	111.9
0	7	8	12.3	10.5	174.8	7	3	8	9.2	13.8	5.4	4	3	9	41.3	34.6	196.7
1	7	8	13.8	17.4	-0.2	8	3	8	9.2	4.1	-9.3	2	2	9	11.9	3.6	194.3
2	7	8	34.8	35.1	194.2	2	2	8	83.4	91.2	9.0	3	2	9	12.4	3.1	265.7
3	7	8	17.2	15.2	2.8	3	2	8	23.6	22.0	-3.4	4	2	9	39.8	36.6	10.3
4	7	8	13.9	7.5	77.0	4	2	8	19.6	25.7	0.9	2	1	9	32.7	33.0	180.8
5	7	8	14.9	10.4	168.0	5	2	8	22.9	23.5	20.6	3	1	9	12.8	6.4	18.5
6	7	8	30.9	31.9	191.4	6	2	8	78.5	74.5	2.8	4	1	9	87.3	77.7	10.5
7	7	8	32.4	35.2	14.6	7	2	8	27.9	24.4	16.8	3	0	9	12.7	12.4	-78.6
0	6	8	17.8	15.7	179.3	8	2	8	9.1	11.9	17.0						