Summer 2010

Achiral and chiral, C2-symmetric bicyclic guanidinates based on 1,5,7-triazabicyclo[4.4.0.]dec-5-ene as ligands in high- and mid-valent early transition metal chemistry

Adil Mohammad
University of Iowa

ACHIRAL AND CHIRAL, C_2-SYMMETRIC BICYCLIC GUANIDINATES BASED ON 1,5,7-TRIAZABICYCLO[4.4.0.]DEC-5-ENE AS LIGANDS IN HIGH- AND MID- VALENT EARLY TRANSITION METAL CHEMISTRY

by

Adil Mohammad

An Abstract

Of a thesis submitted in partial fulfillment
of the requirements for the Doctor of
Philosophy degree in Chemistry
in the Graduate College of
The University of Iowa

July 2010

Thesis Supervisor: Associate Professor Louis Messerle

ABSTRACT

The syntheses of achiral and chiral, C_2-symmetric bicyclic guanidine derivatives of 1,5,7-triazabicylo[4.4.0]dec-5-ene (hppH) are described.

Quantum mechanical MO calculations based on Spartan were performed in order to study the effects (electronic and steric) of substituents on the basicity of hppH derivatives. These calculations showed that substituting only one methyl group on each carbon next to the bridgehead nitrogen of hppH gives high basicity. Based on these calculations, syntheses of achiral (hpp*H, with four methyl groups) and chiral C_2-symmetric (hpp'H, with two methyl groups) derivatives of hppH were developed based on cyclization of 1,5,9-triaminononanes with C1 reagents.

The synthesis of hpp*H started from commercially available ethyl cyanoacetate and was completed in six steps with 2.5% overall yield. The synthesis of the chiral, C_2-symmetric hpp'H was carried out using L-alanine as the chiral precursor. The key step was the diastereoselective coupling of L-alaninol (derived from L-alanine) with commercially available hydroxyacetone via a reductive amination approach. An important step was successful diastereoselective resolution of N-benzyl-protected meso and C_2-symmetric aminodinitriles. Chiral hpp'H was synthesized in six steps starting from L-alaninol in 9% overall yield and was isolated as hpp'$H_2^+I^-$. Both hpp*H and hpp'H_2^+I were characterized by ^{1}H and ^{13}C NMR spectroscopy and high resolution mass spectrometry. hpp'H_2^+I was also characterized by single-crystal X-ray diffractometry.

The coordination chemistry of non-methylated hpp$^-$ with tantalum is described. The new tantalum complexes $Ta^V(hpp)Cl_4$, $Ta^V(hpp)_2Cl_3$, $Cp^*Ta^V(hpp)Cl_3$ ($Cp^* = C_5Me_5$) and $Cp''Ta^V(hpp)Cl_3$ ($Cp'' = C_5Me_4Et$) were synthesized. The first mid-valent hpp$^-$ complexes of tantalum, $Cp^*Ta^{IV}(hpp)Cl_2$ and $Cp''Ta^{IV}(hpp)Cl_2$, were obtained by reduction of $(C_5Me_4R)Ta(hpp)Cl_3$ (R =Me, Et) or reaction of $(C_5Me_4R)_2Ta_2(\mu\text{-}Cl)_4$ with $(hpp)SiMe_3$. ^{1}H NMR spectroscopy and comparative single-crystal X-ray diffractometry of these complexes is discussed.

Abstract Approved: _____
Thesis Supervisor

_____
Title and Department

_____
Date

ACHIRAL AND CHIRAL, C_2-SYMMETRIC BICYCLIC GUANIDINATES BASED ON 1,5,7-TRIAZABICYCLO[4.4.0.]DEC-5-ENE AS LIGANDS IN HIGH- AND MID- VALENT EARLY TRANSITION METAL CHEMISTRY

by

Adil Mohammad

A thesis submitted in partial fulfillment
of the requirements for the Doctor of
Philosophy degree in Chemistry
in the Graduate College of
The University of Iowa

July 2010

Thesis Supervisor: Associate Professor Louis Messerle

Graduate College

The University of Iowa

Iowa City, Iowa

CERTIFICATE OF APPROVAL

_____

PH.D. THESIS

_____

This is to certify that the Ph.D. thesis of

Adil Mohammad

has been approved by the Examining Committee
for the thesis requirement for the Doctor of Philosophy
degree in Chemistry at the July 2010 graduation.

Thesis Committee: _____
Louis Messerle, Thesis Supervisor

_____
Edward G. Gillan

_____
Horacio F. Olivo

_____
F. Christopher Pigge

_____
Jan-Uwe Rohde

Dedicated to my Late Father Mr. Hanif Mohammad

ACKNOWLEDGMENTS

In the past years that have preceded the dissertation of this thesis, I have had an opportunity to know many people, each of which have contributed to my life at the University of Iowa, professionally and personally. To those people I now give my sincere gratitude.

First I would like to thank my advisor Prof. Lou Messerle, for guiding my work with greatest concern and providing me with knowledge and experiences beyond my expectations. As an advisor you have always been available and supportive. The most important thing I learnt from you is how to be "devil's advocate" when it comes to chemistry. This has helped me especially in my last two years of thesis research work in the lab. You have been an excellent supervisor providing encouragement, expert advice and criticism during the completion of this work. You have always tried to be fair and very supportive in all my endeavors. Without your support and continuous encouragement, this work would not have been completed in the current form.

I would also like to thank my past and current group members. I am really helpful to Dr. Yibo Zhou, a post-doc in our group. She was the one who showed me how to set-up reactions and work them up in the lab. I am really thankful to my current group member David Rotsch. He has been really helpful and supportive in the lab. I am also thankful to him very recently for helping me solve X-ray single crystal structures and teaching me the software, with patience. My sincere thanks to my undergraduates Spencer Smith, Mitch Wiese, and Katie Christ for helping me out in various parts of my projects, during the course of my Ph.D. I would also like to thank all my colleagues in the group for providing such a wonderful environment to do science. My day-to-day life would not have been so stimulating without your help and support.

I would like to thank other people whom I met in the department. I would like to thank Dr. Dhanya Panicker for good ideas about reactions in organic chemistry and for helping me out when I used to get stuck with my chemistry. My special thanks go to Dr. Murat Unlu for being helpful and a wonderful friend. I will never forget the days when we used to meet for a tea break in the day and I will always miss your Turkish tea with tasty desserts. Thanks to Harsha, Gopee, Sharavathi, Pradeep, Lokesh, Alex, Rashmi and Mayuri for being nice friends. I would also like to thank some special friends I made in Iowa City who became my family here, away from home back in India. My special thank to Dr. Jigar Bandaria and Dr. Ram Kanthasamy for being my roommates for the first five years here. Those were my best days in Iowa. I would also like to thank Samrat Dutta and his wife Mary Biswas for been very helpful, supportive and nice friends. My sincere thanks to Alex Rediger and his wife Bushra Sabri, for being wonderful friends and

neighbours. There are not enough words in which I can thank you all for everything that your have done for me.

Most of all, I would like to thank my parents. They let me come to USA, far away from them and family. My father had always encouraged me to study and work hard in life. He will be my inspiration all throughout my life. My mother who always misses me since I am gone and her words of encouragement have always been treasured. I would like to thank the rest of my family members for always encouraging me and supporting me morally.

Finally, I would like to thank my wife Nazli Bano for her inspiring role, deepest care and moral assistance in the past two years, which ultimately helped me finish this thesis.

ABSTRACT

The syntheses of achiral and chiral, C_2-symmetric bicyclic guanidine derivatives of 1,5,7-triazabicylo[4.4.0]dec-5-ene (hppH) are described.

Quantum mechanical MO calculations based on Spartan were performed in order to study the effects (electronic and steric) of substituents on the basicity of hppH derivatives. These calculations showed that substituting only one methyl group on each carbon next to the bridgehead nitrogen of hppH gives high basicity. Based on these calculations, syntheses of achiral (hpp*H, with four methyl groups) and chiral C_2-symmetric (hpp'H, with two methyl groups) derivatives of hppH were developed based on cyclization of 1,5,9-triaminononanes with C1 reagents.

The synthesis of hpp*H started from commercially available ethyl cyanoacetate and was completed in six steps with 2.5% overall yield. The synthesis of the chiral, C_2-symmetric hpp'H was carried out using L-alanine as the chiral precursor. The key step was the diastereoselective coupling of L-alaninol (derived from L-alanine) with commercially available hydroxyacetone via a reductive amination approach. An important step was successful diastereoselective resolution of N-benzyl-protected meso and C_2-symmetric aminodinitriles. Chiral hpp'H was synthesized in six steps starting from L-alaninol in 9% overall yield and was isolated as hpp'$H_2^+I^-$. Both hpp*H and hpp'$H_2^+I^-$ were characterized by ^1H and ^{13}C NMR spectroscopy and high resolution mass spectrometry. hpp'$H_2^+I^-$ was also characterized by single-crystal X-ray diffractometry.

The coordination chemistry of non-methylated hpp$^-$ with tantalum is described. The new tantalum complexes $Ta^V(hpp)Cl_4$, $Ta^V(hpp)_2Cl_3$, $Cp^*Ta^V(hpp)Cl_3$ ($Cp^* = C_5Me_5$) and $Cp''Ta^V(hpp)Cl_3$ ($Cp'' = C_5Me_4Et$) were synthesized. The first mid-valent hpp$^-$ complexes of tantalum, $Cp^*Ta^{IV}(hpp)Cl_2$ and $Cp''Ta^{IV}(hpp)Cl_2$, were obtained by reduction of $(C_5Me_4R)Ta(hpp)Cl_3$ (R =Me, Et) or reaction of $(C_5Me_4R)_2Ta_2(\mu\text{-}Cl)_4$ with $(hpp)SiMe_3$. ^1H and NMR spectroscopy and comparative single-crystal X-ray diffractometry of these complexes is discussed.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF SCHEMES

CHAPTER 1

INTRODUCTION

Since the discovery of the first dinuclear species containing a quadruple bond, $Re_2Cl_8^{2-}$ in 1965,[1] followed by the first compound with a metal-metal triple bond,[2] the chemistry of metal-metal bonded species has grown at a rapid pace, and a plethora of knowledge has accumulated on metal-metal bonded complexes.[3] The chemistry of metal-metal multiple bonds can be divided into metal-metal quadruple-, triple-, and double-bonded complexes. Complexes with metal-metal quadruple bonds are structurally interesting, but their reactivity has been less systematically studied as they are susceptible to cleavage. On the other hand, the chemistry of complexes with triple and double metal-metal bonds is very interesting particularly for small molecule activation.[4] Much of the progress in the field of metal-metal multiple bonds has been associated with the development of new types of metal-to-metal bridging ligands, which we term dinucleating ligands. A schematic dinucleating ligand (**I)** is shown in Figure 1.

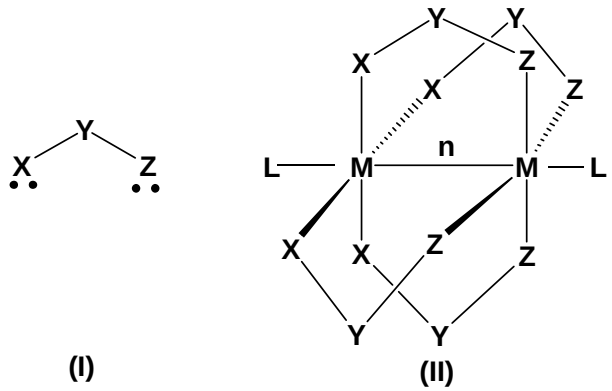


Figure 1: **I** Dinucleating ligands, and **II,** typical paddlewheel or lantern structures.

These are uninegative, bent, trinuclear (in the ligand backbone) anions with X-Z distances similar to the M-M distances across which they form a pair of approximately parallel X-M and Z-M bonds. Acetates are the now classic example of X-Y-Z

dinucleating ligand. Numerous compounds having two metal atoms (bond order ranging from ½ to 4) bridged by four monoanions have been prepared and are known as *paddlewheel* (structure II, Figure 1**)** or *tetragonal lantern* (without the axial ligands **L**) complexes.

An Overview of Electronic Structure of Metal-Metal Multiple Bonds

The body of literature on M-M multiple bonds is immense. In this thesis the focus is on compounds that have each of two metal atoms forming a square or square pyramidal MX_4 arrangement. Transition metals can form double or higher bonds from overlap of orbitals of angular momentum quantum number 2 (*d*-orbitals). A qualitative picture of quadruple bond formation can be obtained by considering *d*-orbital overlaps. When two metal atoms approach, symmetry allows five non-zero overlaps between pairs of *d*-orbitals on the two atoms. These five non-zero overlaps are those between the corresponding pairs, i.e. d_{z^2} with d_{z^2}, d_{xz} with d_{xz} , d_{xy} with d_{xy} , d_{zx} with d_{zx} and $d_{x^2-y^2}$ with $d_{x^2-y^2}$. The positive overlap of the two d_{z^2} orbitals, $d_{z^2}^{(\text{atom 1})} + d_{z^2}^{(\text{atom 1})}$, gives rise to a σ-bonding orbital (Figure 2). The corresponding antibonding σ^* molecular orbital is formed by negative overlap, $d_{z^2}^{(\text{atom 1})} - d_{z^2}^{(\text{atom 1})}$. The $d_{xz}^{(\text{atom 1})} + d_{xz}^{(\text{atom 2})}$ and $d_{yz}^{(\text{atom 1})} + d_{yz}^{(\text{atom 2})}$ (degenerate and orthogonal) atomic orbitals overlap to form molecular π bonds. Similarly, antibonding π^* molecular orbitals are formed by the negative overlap of each of these pairs of atomic orbitals. The combination of d_{xy} orbitals leads to the formation of bonding and antibonding δ and δ^* molecular orbitals. The remaining atomic orbital $d_{x^2-y^2}$ on each metal atom interacts primarily with the ligand orbitals, as shown by calculations. Thus, they make a strong contribution to metal-ligand bonding but very little to M-M bonding. According to Hückel theory, MO energies are proportional to overlap integrals for similar types of atomic orbitals, and atomic orbital overlap increases in the order σ < < π < δ, so the molecular orbitals are ordered in energy as follows, beginning with the most stable:

$$\sigma < \pi << \delta < \delta^* << \pi^* < \sigma^*$$

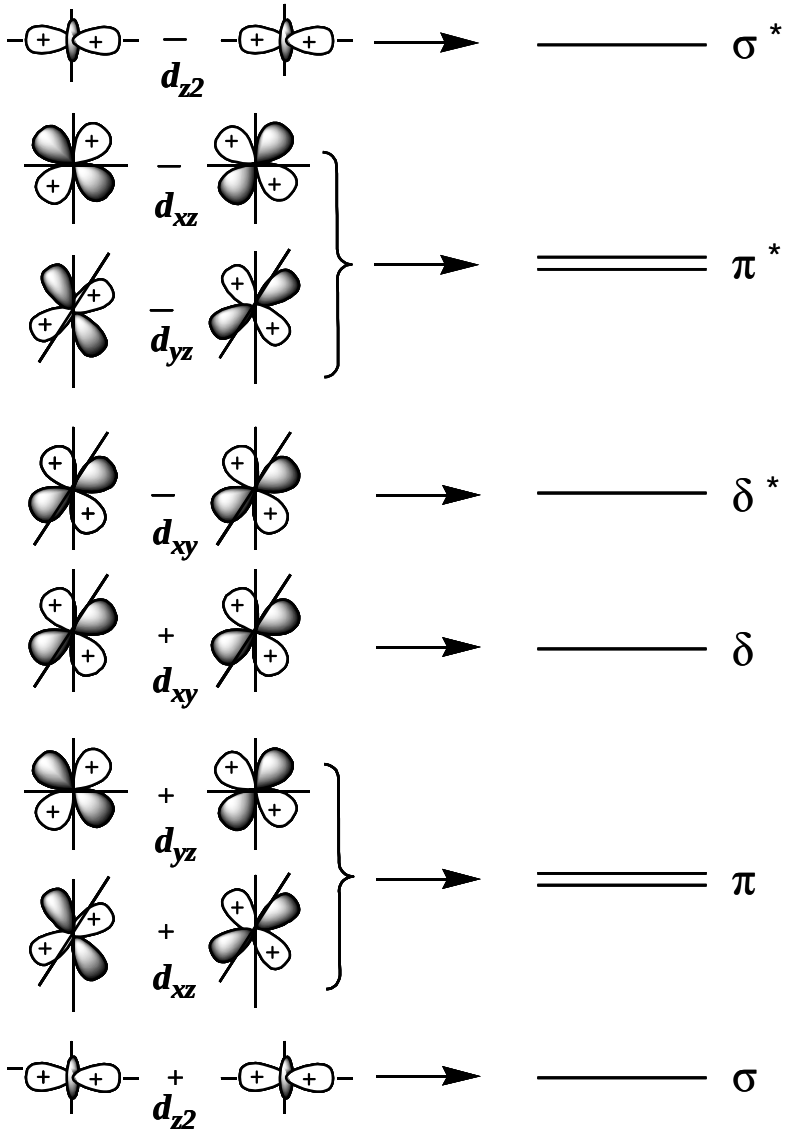


Figure 2: Diagram of overlaps of *d*-orbitals and resulting energy levels in the formation of M-M multiple bonds in $X_4M\text{-}MX_4$ structure.

For the $[Re_2Cl_8]^{2-}$ ion (the first recognized example of a compound with a quadruple bond), there are eight electrons (the Re atoms are in a formal oxidation state III and are thus each d^4) to be placed in these molecular orbitals. These eight electrons fill

the bonding molecular orbitals, giving the configuration $\sigma^2\ \pi^4\ \delta^2$. There are four pairs of bonding and no antibonding electrons. According to MO theory, the definition of bond order is

$$\text{Bond order} = \frac{n_b - n_a}{2}$$

where n_b and n_a designate the number of electrons occupying bonding and antibonding orbitals, respectively. For $[Re_2Cl_8]^{2-}$ the bond order is therefore 4, i.e. a quadruple bond. The quadruple bond accounts for two prominent molecular features: the extreme shortness of the Re-Re bond and the bond's tendency to impose an eclipsed configuration for the ligands. The σ-bond is cylindrically symmetric. Hence, the $\sigma^2\ \pi^4$ part is insensitive to the angle of internal rotation. The δ component of the bond is markedly angle sensitive. The $d_{xy}^{\text{(atom 1)}} + d_{xy}^{\text{(atom 2)}}$ overlap has its maximum value when the two $ReCl_4$ units are precisely eclipsed, and it has a value of zero when the rotational conformation is precisely staggered. Therefore, any rotation from the eclipsed conformation causes a loss of δ bond energy and, when carried to the limit of precise staggering, causes complete disappearance of the δ bond. It is this dependence of the δ bond on rotation angle that opposes any staggered conformation of ligands in these types of complexes.

Complexes with metal-metal bonds can be divided into two broad categories based on the oxidation state of the metal: (1) Those complexes with the metal atoms in a formal oxidation state of zero or close to it, including negative ones. Metal carbonyls are a prominent class of such complexes. These compounds have M-M bonds which are typically long, weak, and of bond order one. (2) Compounds with metal atoms in low to medium positive oxidation states. Many ground state electronic configurations are possible for the MX_4 type paddlewheel complexes as shown in the energy level diagram. (Figure 2). Bond orders can vary, in steps of ½ , from ½ to 4. Bond orders can result in two ways: "electron poor" are those which have electrons in bonding molecular orbitals, while "electron rich" are those with electrons in both bonding and antibonding molecular orbitals.

Ligands used in Paddlewheel Complexes

Much of the evolution in this field has come from advancements in the development of new types of dinucleating ligands, primarily (1) to extend the range of M_2^{n+} chemistry to other elements and other oxidation states, (2) to give a greater ease of preparation and greater stability, and (3) to obtain compounds with a range of properties such as redox potentials. The first dinucleating ligand to be widely used was acetate (**1)** (Figure 3), and trifluoroacetate anions led to the synthesis of paddlewheel complexes of Cr, Mo, W, Tc, Re, Ru, Os, Rh and Pt.[1]

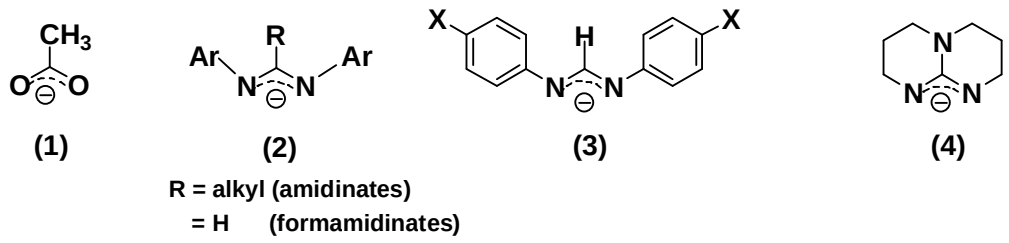


Figure 3: Various ligands used in paddlewheel complexes.

The further extension of metal-metal multiple bonding to other elements as paddlewheel complexes came with the incorporation of amidinate-type ligands **(2)**, such as formamidinates **(3)**. These ligands were postulated to be better than carboxylates as they are more basic (having nitrogens instead of oxygens, as in carboxylates). Complexes with formamidinates were easy to prepare, and variation of the *p*-substituents, X, permitted control of redox potential[5] and solubility. Significant developments using formamidinate ligands were the synthesis of the first V≡≡V (triple) bond[6], the first Ni_2^{5+} complex with bond order 1/2, [7] and the first $Fe_2^{3+,4+}$, [8,9] $Co_2^{3+,4+,5+}$,[10,11] Ir_2^{4+}, [12] and $Pt_2^{4+,5+,6+}$ complexes.[13] Formamidinate ligands, mainly with Ar = phenyl or *p*-tolyl, were thought to be "perfect" ligand for these type of complexes. However, it was discovered that formamidinates are cleaved under the strong reducing conditions used to synthesize

Nb_2^{2+} and Ta_2^{2+} complexes.[14,15] It then became critical to find a more robust ligand. The ideal ligand would retain the N-C-N core of formamidinates and resist cleavage. A ligand which has these desirable characteristics is the anion of 1,3,4,6,7,8-hexahydro-2*H*-pyrimido[1,2-*a*]pyrimidine (also known as 1,5,7-triazabicyclo[4.4.0]dec-5-ene **(4)**. Because of its long chemical name, it is abbreviated as hppH, and the anionic ligand obtainable from it by deprotonation is hpp^-. The first dinuclear complex, $Ru_2(hpp)_4Cl_2$, using hpp^- as a ligand was made by Bear *et. al* in 1996.[16] Cottton and co-workers at the same time were looking for a more robust ligand. After Bear's success, Cotton and co-workers started exploring the capabilities of hpp^- as a ligand to stabilize M_2^{n+} units. The bicyclic nature of hpp^- was thought to stabilize the ligand towards cleavage by reduced metal ions. Cotton and co-workers were able to synthesize the first triply- bonded Nb_2^{4+} complex[17] with hpp^- ligands. Complexes[18] analogous to those already synthesized with formamidinates, such as $V_2(hpp)_4$, $Cr_2(hpp)_4$ and $Mo_2(hpp)_4$ were easily prepared. Hpp^- also stabilizes dinuclear frameworks, M_2^{n+}, with high oxidation states such as $Mo_2^{4+,5+,6+}$, [19] $W_2^{4+,5+,6+}$,[20] $Re_2^{6+,7+}$,[21,22] Ru_2^{6+},[16] $Os_2^{6+,7+}$,[23] Ni_2^{5+},[24] Pd_2^{6+},[25] and Pt_2^{6+}.[26]

The hpp^- ligand has a stronger electron donating ability than carboxylates and formamidinates and can stabilize dimetal units with high oxidation numbers, as shown in electrochemical studies[19] of several complexes of Mo and W. Figure 4 depicts electrode potentials (relative to Ag/AgCl) on the y-axis and various ligands (carboxylates, formamidinates, acyclic guanidinates, and hpp^-) for the complexes of Mo and W on the x-axis. It can be inferred from Figure 4 that oxidation of comparable quadruply-bonded W_2^{4+} species is significantly easier (as expected by periodic trends) than corresponding Mo_2^{4+} species. Also, oxidation of complexes containing carboxylates is not much different than for complexes with formamidinates. Oxidation of complexes with acyclic guanidinates is less than complexes with carboxylate or formamidinate as ligands. However, the most significant difference is that it is easier to oxidize complexes when the ligand is hpp^- as compared to carboxylates and formamidinates ligands. The oxidation of $Mo_2(hpp)_4^+$ is far easier than the neutral tetraformamidinate or carboxylate analog species. Further evidence that hpp^- is an extremely basic ligand for lantern and paddlewheel complexes was the observation that the $W_2(hpp)_4$ molecule is the most easily oxidized known molecule,[27] as it has an onset ionization potential of 3.51 eV even

lower than that of 3.89 eV for Cs in the gas phase. In these $M_2(hpp)_4$ compounds, it is observed that there is a strong interaction of the ligand π orbitals and the electrons in the δ orbital of the quadruply bonded M_2^{4+} units.[28] This strong destabilization of the dimetal δ orbitals favors oxidation. Thus, $W_2(hpp)_4$ could be used as an organic-soluble reducing agent by synthetic chemists.

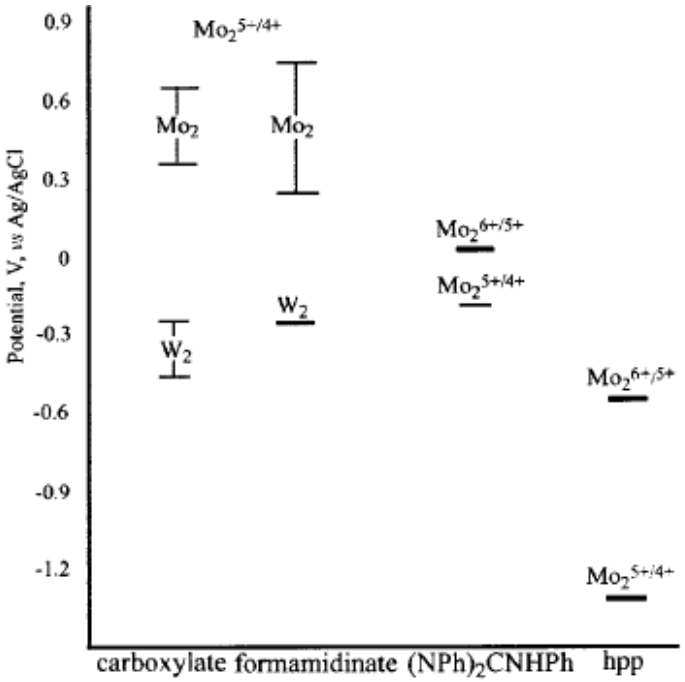


Figure 4: Variation in potentials as a function of ligand (carboxylates, formamidinates, acyclic guanidinate, and cyclic guanidinate hpp^-) for paddlewheel complexes of the type M_2L_4, M = Mo, W.

Consequences of the Bicyclic Framework

It is clear from the work of many researchers that the hpp^- ligand is not only more robust than carboxylates and amidinates but also exhibits significant electronic differences. This can be attributed to two main reasons:

1. Guanidinates can delocalize (Figure 5a) the negative charge throughout the molecule. In other words, confining the substituents of the non-amidine nitrogen atom N_3 into

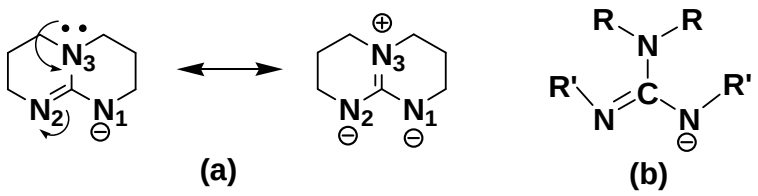


Figure 5: (a) Delocalized forms of bicyclic guanidinate anion hpp^- and (b) structure of an acyclic guanidinate ligand.

the ring generates a favorable alignment for the lone-pair of this atom to be included in delocalization. In contrast, acyclic guanidinates (Figure 5b) have an orthogonal displacement of the N_3 substituents, from steric interactions with respect to the CN_2 amidine unit. Also electronic structure calculations[29] have shown that hpp^- is a very strong Brønstead base, being 100 times more basic than tetramethylguanidinate.

2. A rigid framework is formed from constraining the nitrogen substituents into the ring, leading to decreased rotational freedom about C-N bonds and no isomerization of the C=N double bond.

Guanidines as Catalysts in Organic Synthesis

Ionic bases have been known for centuries and are extensively used in organic synthesis.[30,31] However non-ionic nitrogen bases have not achieved the same degree of use. The simplicity of handling and mildness of reaction conditions render non-ionic bases excellent tools for generating carbanions for interesting and useful organic transformations. A large variety of non-ionic nitrogen bases with low to very high steric hindrance and weak to medium base strengths are available (Figure 6). Various sterically hindered amines and amidines acts as weak nucleophile and are widely used as proton acceptors in organic synthesis.[32]

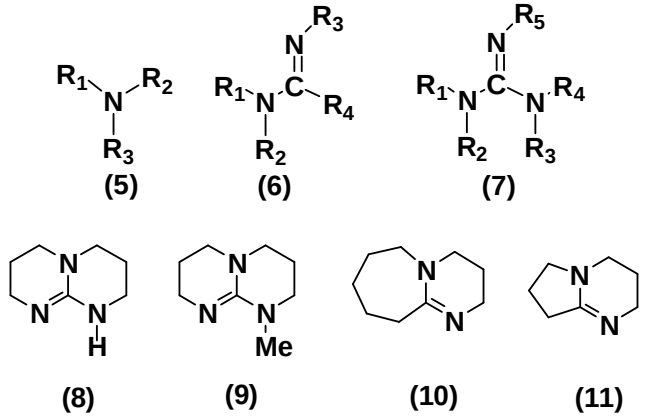


Figure 6: Various Organobases: (5) Amines, (6) Amidines, (7) Guanidines, (8) hppH, (9) Me-hpp, (10) DBU, and (11) DBN.

Stronger amidine base such as DBN are extensively used in dehydrohalogenation reactions[33]. The bicyclic guanidine bases hppH and Me-hpp are known as superbases because of their high pKa values[34]. The bicyclic hppH has been extensively used as a catalyst in several organic reactions such as Michael additions[35], nitroaldol (Henry

reactions)[36], Horner-Wadsworth-Emmons[37], ring-opening polymerization of cyclic esters[38], and transesterification reactions.[39] Various chiral bicyclic guanidines are also used as catalysts in various asymmetric reactions such as the diastereoselective Henry reaction[40], enantioselective synthesis of α-amino nitriles[41], and asymmetric trimethylsilycyanation of carbonyl compounds.[42]

Bicyclic Guanidine Units in Natural Products

The guanidine unit is very important to life on earth as it forms the core of the DNA base guanine (Figure 7). Bicyclic guanidines are very important as natural guanidine derivatives are abundant in natural products. The guanidine unit is present in several structurally novel marine alkaloids within complex polycyclic architectures such

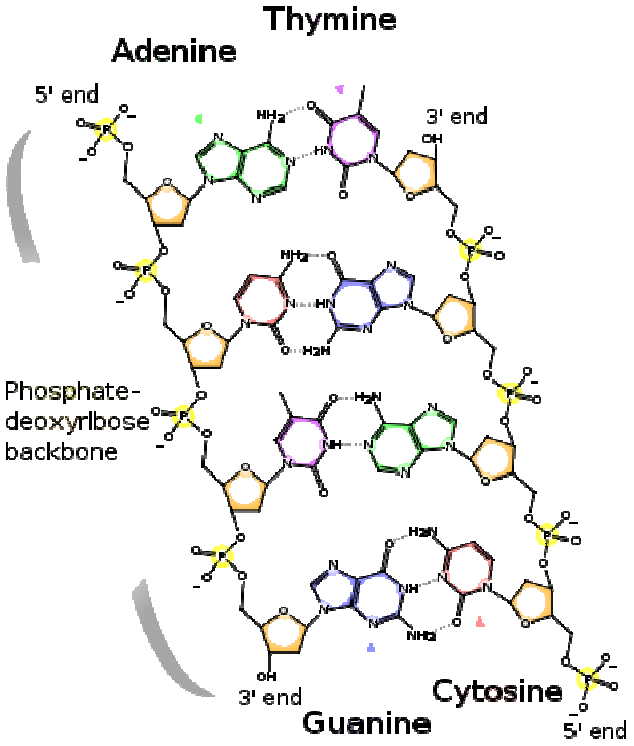
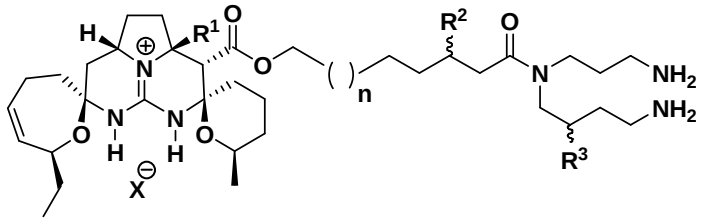
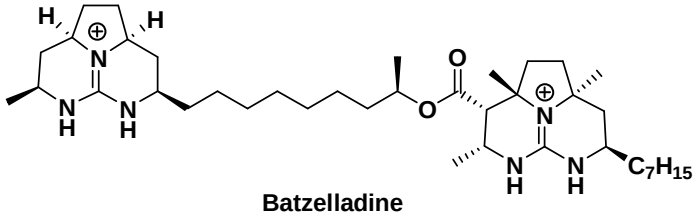


Figure 7: Base pairs in DNA double-helix structure

as the crambescidin/ptilomycalin and batzelladin families (Figure 8).[43] These guanidine alkaloids exhibit promising anti-cancer and anti-viral activities.[44,45] As shown in Figure 6, all of these natural products incorporate the hppH core. The complex nature of crambescidins and batzelladins and their compelling biological activities have sparked intense effort toward their total chemical synthesis.



Ptilomycalin A (R^1 = R^2 = $R^{3=}$ H; n = 10)
Crambescidin 800 (R^1 = R^2 = H, R^3 = alpha-OH; n = 10)
Crambescidin 816 (R^1 = OH, R^2 = H, R^3 = alpha-OH; n = 10)
Crambescidin 844 (R^1 = R^3 = OH, R^2 = H; n = 13
Celeromycalin (R^1 = R^3 = H, R^2 = beta-OH; n = 10)



Batzelladine

Figure 8: Guanidine alkaloids from marine sponges.

Applications of Paddlewheel Complexes

Even though complexes with metal-metal multiple bonds were discovered in 1965, the potential applications of these complexes have not been investigated in detail. Paddlewheel complexes with metal-metal multiple bonds have been used in a variety of diverse applications such as:

1. Several complexes of Mo with foramidinate ligands are connected with several one-dimensional linkers for applications in material science and supramolecular structures.[46]
2. Complexes such as $Rh_2(O_2CR_4)L_2$ (R = Me, Et, Pr; L = solvent) have potential medicinal applications as they bind to base pairs in DNA.[47]
3. Chiral dirhodium complexes with orthometallated aryl phosphine ligands act as catalysts in enantioselective C-H insertions of α-diazoketones. [48]
4. Several paddlewheel complexes of Mo carboxylates exhibit liquid crystal phases and have interesting optical, magnetic, and electronic properties.[49]

Disadvantages and Challenges of hpp^- Ligand:

As discussed above, hpp^- ligand has been a very robust and versatile ligand for metal-metal multiple bonded complexes. But, a major disadvantage is that these complexes are not very soluble in common organic solvents,[18,28] thereby limiting their solution characterization and use in organic synthesis as catalysts. Also attempts to make paddlewheel complexes of Ti, Zr, Hf and Ta have so far been unsuccessful.[50]

Thesis Overview

The main aim of this dissertation is to design and synthesize derivatives (both achiral and chiral) of hppH which not only make the complexes more soluble but also make them more basic. An obvious question is what would be the best position on the hpp^- ring (C1, C2 or C3; Figure 9) which would not only make them more soluble but also render the ligand more basic? Chapter 2 deals with quantum mechanical calculations to determine the electronic and steric effects of various substituents on the basicity of hpp^- derivatives. These calculations also show that substituting only one methyl group at C1 position makes the ligand most basic. A derivative with four methyl substituents at the C2 positions was also chosen in order to test synthetic methodology.

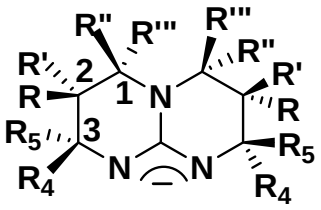


Figure 9: Substituents of various carbons on the hpp$^-$ ring system

Chapter 3 deals with the synthesis of the achiral tetramethyl derivative of hppH (3,3,9,9-tetramethyl-1,5,7-triazabicyclo[4.4.0]dec-5-ene; denoted as hpp*H). The C_2 symmetric bicyclic guanidine (2-(S),10-(S)-2,10-dimethyl-1,5,7-triazabicyclo[4.4.0]dec-5-ene (denoted as hpp'H) should eliminate the formation of several isomers during the formation of paddlewheel complexes (Chapter 4). The beauty of the hpp'H ligand is that it yields only one isomer when four ligands react to form an M_2L_4 complex. Derivatives of hppH with substituents at C3 might lead to metallation during the formation of dinuclear complexes. Chapter 4 discusses the synthesis and characterization of this chiral C_2 symmetric hpp'H ligand. Chapter 5 describes the coordination chemistry of hpp$^-$ with Ta.

CHAPTER 2

COMPUTATIONAL STUDIES

As discussed in the last part of Chapter 1, complexes of hppH are often sparingly soluble, impacting the study of their reactivity in solution. Attempts to make complexes of hpp^- with a Ta-Ta triple bond have so far been unsuccessful. Paddlewheel hpp^- complexes of Zr, Ti and Hf are unknown. Paddlewheel complexes of Zr with a metal-metal multiple bonds could be highly reactive because of the larger HOMO and LUMO gap for the lower oxidation states.

Derivatives of hpp^- with aliphatic side groups could increase the solubility and could also be favorable electronically for stabilizing metals in middle oxidation states. These factors led to the question: where to place substituents on the ring (C1, C2 or C3, Figure 10a) and which substituents would be the best for ligand basicity. To answer this question, we turned to computational methods. This chapter deals with calculating the basicities of various substituted bicyclic guanidinates (Figure 10a).

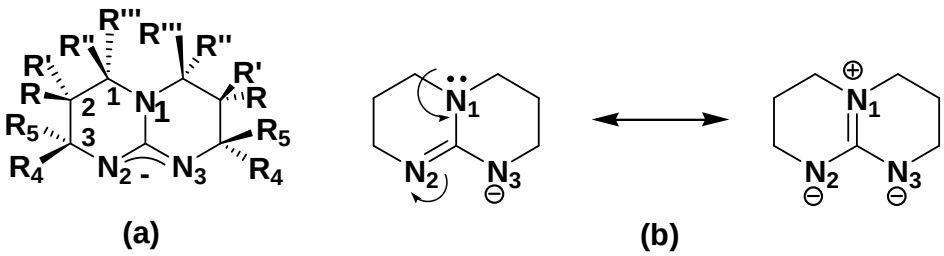
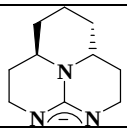


Figure 10: (a) Substituted bicyclic guadinate ligand and (b) electronic delocalization in guanidinate core of hpp^- ligand.

The following table (Table 1) shows the various groups (substituents at R, R', R", R''', R_4 and R_5 positions) used to study steric and electronic effects on the basicities.

Table 1: Various substituents on hppH used to calculate steric and electronic effects.

	R	**R'**	**R"**	**R'"**	**R_4**	**R_5**
1.	H	H	H	H	H	H
2.	Me	Me	H	H	H	H
3.	H	H	Me	Me	H	H
4.	*iso-Pr*	H	H	H	H	H
5.	*tert-Bu*	H	H	H	H	H
6.	H	H	*iso-Pr*	H	H	H
7.	H	H	*tert-Bu*	H	H	H
8.	H	H	Me	H	H	H
9.	Me	H	H	H	H	H
10.			$PhCH_2$	H	H	H
11.	H	H	$CH_2CH(CH_3)_2$	H	H	H
12.	H	H	$CH(CH_3)CH_2CH_3$	H	H	H
13.	H	H	OMe	H	H	H
14.	H	H	$SiMe_3$	H	H	H
15.	H	H	SMe	H	H	H
16.	H	H	F	H	H	H
17.	H	H	CF_3	H	H	H
18.	N ⟷ P				H	H
19.						
20.	H	H	H	H	Me	H
21.	H	H	H	H	Me	Me
22.	H	H	H	H	*iso-Pr*	H
23.	H	H	H	H	*tert-Bu*	H
24.	Me	H	Me	H	H	H
25.	H	Me	Me	H	H	H
26.	H	H	Me	H	Me	H
27.	H	H	Me	H	H	Me
28.	N ⟷ P		Me	H	H	H
29.	H	H	H	H	OMe	H
30.	H	H	H	H	$SiMe_3$	H
31.	H	H	H	H	SMe	H
32.	H	H	H	H	F	H
33.	H	H	H	H	CF_3	H

Thus calculations will give us some idea about the position of substituents on the ring (both in terms of sterics and electronics), the effect of P and N substitution, and help us to select the appropriate ligand for synthesis.

Computation Background

There are several computational tools available to chemists to understand molecular geometry and conformation. The simplest and most commonly used is molecular mechanics[51]. Molecular mechanics uses Newtonian/classical mechanics to model molecular systems. The potential function computes the molecular potential energy as a sum of energy terms that describe the deviation of bond lengths, bond angles and torsion angles away from equilibrium values, plus terms for non-bonded pairs of atoms describing van der Waals and electrostatic interactions. As a consequence, molecular mechanics may not be used to calculate the relative energies of different (isomeric) molecules or reaction energies, except in cases where the bonding is identical. The molecular mechanics approach is simple and often predicts a molecule's equilibrium geometry with very little computational effort. Its major drawback is the need for explicit parameterization. Molecular mechanics cannot be used to study reaction pathways connecting stable structures, particularly in locating energy maxima (transition states) along these pathways. In these situations, molecular orbital (or quantum mechanical) calculations are used explicitly and for other calculations as well.

Ab Initio Molecular Orbital Models

The majority of molecular orbital methods (or quantum mechanical methods) solve an approximate solution to the Schrödinger equation.

$$\hat{H}\psi = E\psi$$

In this equation, the Hamiltonian operator, $\hat{H}$ describes both the kinetic energies of the particles (i.e. electrons and nuclei) of the molecule, and the electrostatic interactions (nuclei, which are positively charged, repel other nuclei, and electrons, which are negatively charged, repel other electrons, but nuclei attract electrons) experienced between individual particles. The quantity E in the Schrödinger equation is the energy of

the system, and ψ is the wave function. The square of the wave function corresponds to the probability of finding the particles at a particular set of coordinates. The Schrödinger equation has been solved exactly for the hydrogen atom (a one-electron system). Although the Schrödinger equation can be written for many-electron systems, it cannot be solved exactly. Approximations must therefore be made in order to solve it for more complex systems. Most of the "ab initio" (Latin word for 'from the beginning') molecular orbital methods start from the Schrödinger equation and then make three approximations:

1. The separation of nuclear and electron motions, or the Born-Oppenheimer approximation. This assumes that nuclei are stationary as compared to electrons.
2. The separation of electron motions, the Hartree-Fock approximation. This assumes many-electron wave functions as a sum of products of one-electron wave functions.
3. The representation of the individual molecular orbitals in terms of linear combinations of atom-centered basis functions or atomic orbitals (also known as the LCAO approximation.

Practical *ab initio* methods differ in the number and kind of atomic basis functions, and their computational cost increases as the fourth power of the number of basis functions (compared to a square power dependence on the number of atoms for molecular mechanics techniques). The simplest *ab initio* method uses a "minimal basis set" of atomic orbitals, which includes only those functions required to represent all electrons on an atom and to maintain spherical symmetry. The most commonly used basis sets in *ab initio* methods are "split-valence basis sets"[52]. The split-valence basis sets include multiple basis functions corresponding to each valence atomic orbital, and are called valence double, triple, or quadruple-zeta basis sets. These basis sets are designated by 'Pople' notation, typically as *X-YZg*. In this case, *X* represents the number of primitive Gaussians comprising each core atomic orbital basis function. The two numbers after the hyphens specifies that the basis set is a *split-valence double-zeta* basis set. The *Y* and *Z* indicate that the valence orbitals are composed of two basis functions each, the first one composed of a linear combination of *Y* primitive Gaussian functions, the other composed of a linear combination of *Z* primitive Gaussian functions. The most common Pople notations which will be used here are 3-21G and 6-31G*, where * designates polarized basis sets. 3-21G means a basis set in which inner-shell atomic orbitals are represented in

terms of three Gaussian functions, and each valence-shell atomic orbital is split into two parts, written in terms of two and one Gaussians, respectively. 6-31G* represents a basis set in which inner-shell atomic orbitals are represented in terms of six Gaussian functions, and each valence-shell atomic orbital is split into two parts represented in terms of three and one Gaussians, respectively. *Ab initio* molecular methods using split-valence or polarization basis sets have now been commonly used to describe structures, stabilities and other properties of organic molecules. They have also been applied with considerable success to describe reaction pathways and to elucidate product distributions.

Semi-Empirical Molecular Orbital Models

The principal disadvantage of *ab initio* methods is their computational cost and time. It is possible to introduce further approximations in order to reduce these costs significantly while still retaining the quantum mechanical formalism. Semi-empirical quantum mechanical methods are based on the Hartree-Fock formalism but make some approximations and obtain some parameters from empirical data. Semi-empirical methods of calculation use the following key approximations:

1. The elimination of overlap between functions of different atoms. This drastically reduces the computation effort by more than an order of magnitude over *ab-initio* methods.
2. Inner-shell (core) functions are not included explicitly. The cost of calculation involving a second-row element, e.g., silicon, is no more than that incurred for the corresponding first-row element, e.g., carbon.
3. Approximations to further simplify the calculations, varying among the different semi-empirical methods. The choice of parameters is the key to the success of semi-empirical methods.

Semi-empirical calculations are much faster than their *ab initio* counterparts. However, their results can be different if the molecule being computed is not similar enough to the molecules used to parameterize the method. Semi-empirical calculations have been most

successful in the description of organic molecules with only a few elements and molecules with moderate size.

Which Models are Most Suitable?

Which of the available computational tools mentioned above are the most appropriate? The answer depends on: 1) the problem at hand, 2) the level of confidence required in the results, and 3) available computational resources. The following four methods were used for calculations in this chapter: AM1 and AM1-SM2 semi-empirical models and *ab initio* models using 3-21G (split-valence) and 6-31G* (polarization basis sets). All four of these methods have become standards for calculations on organic systems. Molecular mechanics have been used rarely. Molecular orbital methods are preferred because they are more general and reliable. Because of its low cost, molecular mechanics is used particularly for preliminary refinement of geometry and, most importantly, for conformational searching.

AM1 (Austin Model 1): This is the most popular semi-empirical method for application to organic systems. It provides a good account of equilibrium structures and usually reproduces transition-state geometries obtained from higher-level *ab initio* calculations. However, it is less reliable than *ab-initio* methods in dealing with the geometries of molecules with second-row (and heavier) elements. AM1, though, does not provide an acceptable account of reaction thermochemistry, however, they are used to provide geometries used for higher-level calculations of energies.

AM1-SM2: This semi-empirical method is based on AM1 and is used to calculate aqueous heats of solvation. It is parameterized to reproduce experimental heats of (aqueous) solvation. The method works well for neutral organic molecules but often leads to errors for charged species and heavier atoms.

3-21G: This is the simplest *ab initio* model that affords equilibrium and transition state geometries as well as energetics of reactions that do not involve bond forming and bond breaking.

6-31G*: This polarization basis, like 3-21G, is more successful in predicting equilibrium and transition state geometries. It is more accurate than the superior account 3-21G method.

Computation Methodology

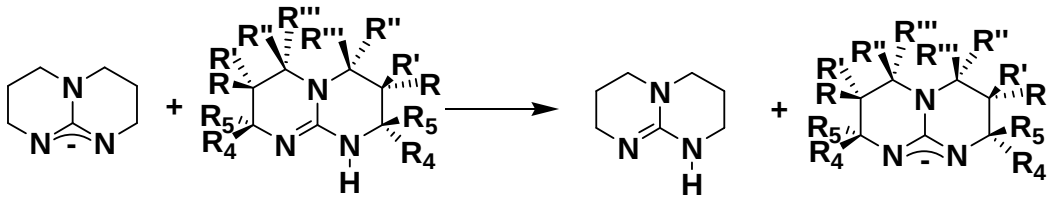
Spartan

Spartan'02 was used to calculate the basicities of various substituted bicyclic guanidinates. The neutral substituted guanidines as well as their deprotonated forms were first optimized using AM1 semi-empirical calculations (starting from molecular mechanics optimized geometries). A better estimate of gas phase basicities was made by doing single-point energy calculations using 3-21G and 6-31G* *ab-initio* methods (using the AM1 geometries). No other constraints were applied and no other calculations were done.

Results and Discussion

The geometries of the various substituted bicyclic guanidines were optimized using the semi-empirical AM1 calculations. A better estimate of the basicities was obtained by doing single-point 3-21G and 6-31G* calculations. In order to determine the effect of solvent on the basicities, AM1-SM2 calculations were also done.

The basicities of various substituted bicyclic guanidines were calculated by using the following isodesmic reaction (reaction in which the reactants and products have exactly the same numbers of each kind of formal chemical bond and each kind of formal nonbonded lone pair, Equation 1).



Equation 1: Isodesmic reaction for calculating the effect of substituents on the basicities of various substituted hpp^- derivatives

ΔH of the above reaction was computed by using the equation:

$$\Delta H_{rn} = \Sigma H_f(products) - \Sigma H_f(reactants)$$

For the above isodesmic reaction, it can be assumed that the entropy differences are very small, and that the solvation effects will mostly cancel for different bicyclic guanidines. Thus, it can be assumed that the experimental relative free energies of protonation (ΔG) in solution closely approximate the relative enthalpies of protonation (ΔH) in the gas phase. The energy values therefore represent the pK_a values of the bicyclic guanidines. The more positive the value, the more basic is the bicyclic guanidine, and the more negative value means more acidic nature of the bicyclic guanidine. The energies computed by *ab initio* methods (3-21G and 6-31G*) were obtained in Hartree units and were converted to kcal/mol by multiplying by 627.509; the resulting number was rounded off to two decimal places for simplicity.

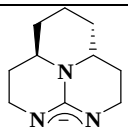
The relative basicities of various substituted guanidines were calculated from different levels of calculations and are tabulated in Table 2 below. The key observations are:

1. There is some trend in the relative basicities obtained from AM1 calculations. For example, the basicities decreases as bulky groups are substituted (entries 4, 5, 9 and 20, 22 and 23 in Table 2). The basicity decreases when bulky groups are placed on the rings (this is expected because bulky groups lead to more puckering of the ring, thus affecting the delocalization (Figure 10b)). However, the reversal trend in case of entries 8, 6 and 7 could not be explained. Therefore single-point 3-21G and 6-31G* energies (optimized at the AM1 level) were calculated in order to get more accurate and credible numbers. The results from 3-21G follow the same trend as seen for 6-31G* calculations. All subsequent discussions will be based on the results of 6-31G* calculations. Table 3 lists the basicities of various substituted ligands as calculated from the 6-31G*//AM1 calculations.

Table 2: ΔH_{rn} (enthalpy) calculated for Equation 1 from different levels of calculations.

	AM1 (kcal/mol)	**AM1-SM2 (kcal/mol)**	**3-21G//AM1 (kcal/mol)**	**6-31G*//AM1 (kcal/mol)**
1				
2	-0.58	2.55	-1.62	-1.61
3	0.16	2.96	2.70	2.87
4	-0.97	2.98	-628.38	-0.50
5	-1.25	3.59	-1.85	-1.38
6	-1.99	5.36	-4.52	-4.92
7	-0.66	6.42	-5.54	-5.29
8	0.72	1.38	0.11	1.03
9	-0.19	1.36	0.90	1.17
10	-26.79	6.2	1.96	1.62
11	1.14	2.92	2.10	1.00
12	24.39	4.73	1.24	0.50
13	-4.21	5.72	-3.08	-2.40
14	-1.22	-	1.09	1.94
15	-10.84	0	-11.79	-6.92
16	-7.36	5.31	-10.12	-9.37
17	-15.56	13.06	-12.61	-10.41
18	-1.16	-	-0.41	2.17
19	0.91	0.97	1.75	1.68
20	0.79	4.53	-1.34	-0.79
21	1.26	8.81	-3.23	-2.63
22	-0.46	8.83	-5.77	-5.01
23	-1.45	24.52	-642.22	-4.97
24	0.32	1.43	0.50	0.90
25	0.24	3.05	0.09	0.16
26	1.18	4.96	-1.16	-0.66
27	1.91	-	-1.88	-2.69
28	-3.3	-	1.35	2.17
29	-7.61	10.51	-13.65	-11.79
30	-3.75	-	-10.84	-8.12
31	-20.41	16.33	-24.92	-16.47
32	-10.34	4.5	-17.16	-15.74
33	-24.12	16.17	-22.10	-19.98

Table 3: ΔH_{rn} (enthalpy) calculated for Equation 1 from 6-31G*//AM1 calculations.

	R	**R'**	**R"**	**R'"**	**R_4**	**R_5**	**6-31G*//AM1 (kcal/mol)**
1	H	H	H	H	H	H	
2	Me	Me	H	H	H	H	-1.61
3	H	H	Me	Me	H	H	2.87
4	*iso-Pr*	H	H	H	H	H	-0.50
5	*tert.-Bu*	H	H	H	H	H	-1.38
6	H	H	*iso-Pr*	H	H	H	-4.92
7	H	H	*tert.-Bu*	H	H	H	-5.29
8	H	H	Me	H	H	H	1.03
9	Me	H	H	H	H	H	1.17
10			$PhCH_2$	H	H	H	1.62
11	H	H	$CH_2CH(CH_3)_2$	H	H	H	1.00
12	H	H	$CH(CH_3)CH_2CH_3$	H	H	H	0.50
13	H	H	OMe	H	H	H	-2.40
14	H	H	$SiMe_3$	H	H	H	1.94
15	H	H	SMe	H	H	H	-6.92
16	H	H	F	H	H	H	-9.37
17	H	H	CF_3	H	H	H	-10.41
18	N ⟷ P				H	H	2.17
19							1.68
20	H	H	H	H	Me	H	-0.79
21	H	H	H	H	Me	Me	-2.63
22	H	H	H	H	*iso-Pr*	H	-5.01
23	H	H	H	H	*tert.-Bu*	H	-4.97
24	Me	H	Me	H	H	H	0.90
25	H	Me	Me	H	H	H	0.16
26	H	H	Me	H	Me	H	-0.66
27	H	H	Me	H	H	Me	-2.69
28	N ⟷ P		Me	H	H	H	2.17
29	H	H	H	H	OMe	H	-11.79
30	H	H	H	H	$SiMe_3$	H	-8.12
31	H	H	H	H	SMe	H	-16.47
32	H	H	H	H	F	H	-15.74
33	H	H	H	H	CF_3	H	-19.98

2. The effect of solvation on the basicities was determined from AM1-SM2 calculations. Spartan could not calculate the solvation energies when the atoms Si, P and S were present in the system (because the AM1-SM2 model does not work for second row elements). From AM1-SM2 calculations, it could be inferred that all of the bicyclic guanidines are more basic than hppH. However, calculations do not follow normal trends. For example, substituting bulky alkyl groups or electron withdrawing groups should decrease the basicity (electron withdrawing groups makes N more electron deficient, while bulky groups pucker the ring, both affecting the delocalization, Figure 10b) but the opposite trend is observed. The reason for this could be that the solvent model is not very good and therefore could not give better estimates of basicities in water.
3. From 6-31G*//AM1 calculations, it can be inferred that some bicylic guanidines are more basic than hppH (entries 3, 8-12, 24, 25 and 28), while in some cases they are less basic than hppH.
4. 6-31G*//AM1 calculations showed that substituting groups at C1 (Figure 10a) made the guanidines more basic than substituting groups at C2 and C3. C2 is better for substitution than C3, perhaps because C1 is much closer to the N1 nitrogen involved in delocalization into the guanidine core (Figure 10b).
5. Entries 2-12 and 20-23 were the result of calculations to determine steric effects on the basicities of the ligand. Bulky alkyl groups should decrease the basicitiy of the guanidine because of puckering of the ring system that affects the delocalization of the amine lone pair into the core of the ligand (Figure 10b, entries 9, 4, 5, 6, 7 and 20, 22 and 23). This can be explained by the puckering of the rings as shown by a comparison of the dihedral angles (Tables A3 and A4, Appendix A) vs. hppH. For example, substituting *iso*-propyl and *tert*-butyl groups (entries 4 and 5) changes the dihedral angles C1(N1)C3(C5) from -22.8 (entry 1; hppH) to 42.5 (entry 4) and to 43.3 (entry 5). Similarly, dihedral angle C3(C5)C7(N3) changes from -45.2 (entry 1; hppH) to 41 (entry 4) and to 40.9 (entry 5). In these cases, the change in dihedral angle is more for *tert*-butyl group, as would be expected based on sterics.
6. When bulky groups are substituted at the C2 position, the decrease in basicity is less as compared to when they are substituted at C1. This trend is also expected because

when groups are substituted at the C2 position, they are further from each other. This argument is supported by comparing dihedral angles. The dihedral angle N2(C1)N1(C3) changes from -2.4 (entry 1) to -14.7 and -15.3 (entries 4 and 5). For entries 6 and 7, the dihedral angle changes more (23.6 and 30.2). The dihedral angle C5(C7)N3(C1) changes from 23.2 (entry 1) to -15.9 for entries 4 and 5 and then to -33.7 and 0.6 (entries 6 and 7). Similar trends are observed when substituents are placed on C3.

7. Placing two methyl groups at C1 (entry 3) makes the bicyclic guanidine more basic than hppH, as compared to substituting at C2 (entry 2). This could be the result of the positive inductive effect of a methyl group, which makes the nitrogen next to it more electron rich. This is confirmed by the electrostatic charges at the three nitrogens N1, N2 and N3 (Figure 10a). The electrostatic charge (Table A5, Appendix A) decreases from -0.59

   Coulombs (entry 1) to -0.51 Coulombs for entry 2 but it increases to -1.15 Coulombs for entry 3. The charge on N1 for entry 3 is the largest amongst all the other bicyclic guanidines, and the derivative represented by entry 3 is therefore the most basic bicyclic guanidine. The greater the charge on N1, the more charge it can delocalize into the bicyclic guanidine core.
8. Placing only one methyl group at C1 or C2 (entries 8 and 9) does not make much difference in the basicity. This guanidine is more basic than hppH but less basic than a guanidine with two methyl groups at C1 (entry 3). For entry 8 (one Me group at C1), the electrostatic charge on N1 increases from -0.59 to -0.8, thus rendering the bicyclic guanidine more basic.
9. Placing other substituents at C1 effects the basicity of the bicyclic guanidines. Bulky groups (e.g. *iso*-propyl, entry 6; *tert*-butyl, entry 7) decrease the basicity because of puckering of the bicyclic rings. A benzyl group (entry 10) increases the basicity. The electrostatic charge for entry 10; increases from -0.59 in hppH to -0.83 supporting the idea of greater basicity.
10. Substituting N1 of the bicyclic guanidine core by phosphorus (more electropositive than N, entries 18 and 28), increases the basicity as expected.

11. Entries 13-18 and 29-33 were studied in order to determine electronic effects on the basicity of bicyclic guanidines. The electrostatic charges on N1, N2 and N3 (Figure A1, Appendix A) are given in Table A5 (Appendix A). The major effect of the charge is seen on N1. As expected, when electron withdrawing groups are placed (entries 13, 16 17; 29, 32 and 33) the basicity should decrease, and it follows the trend. This trend is supported by the fact that the electrostatic charge on N1 also decreases. For example, electrostatic charge decreases from -0.59 (entry 1, H) to -0.47 (entry 13; OMe), -0.54 (entry 16; F) and to -0.3 (entry 17; CF_3). The electron donating substituent $SiMe_3$ (entry 14) increases the charge on N1 from -0.59 in hppH to -0.72, making the derivative more basic than hppH. A similar trend is observed for entries 29 (OMe), 30 ($SiMe_3$), 32 (F) and 33 (CF_3).
12. Entries 20-23 show the effects of substituents at the C3 position. Entry 20 (Me at C3) is similar to entry 8 (Me at C1) except that substituents are closer to N2 and N3. The charges on N2 and N3 are -0.98 and -097 Coulombs in entry 20, are higher than in entries 8 and 1. Thus, if electrostatics is considered, this guanidine (Me at C3) should be more basic than both entry 8 (Me at C1) and 1 (H, hppH). But instead basicity values suggest that it is weaker base than both entry 8 and entry 1. The explanation for this may lie in the dihedral angles. Dihedral angle N2(C1)N1(C3) changes from -11.4 in entry 8 (Me at C1) to -3 in entry 20 (Me at C3), whereas dihedral angle C1(N1)C3(C5) changes from 38.2 to -22.3. Dihedral angle C5(C7)N3(C1) changes from -16.2 in entry 8 (Me at C1) to 23.5 in entry 20 (Me at C3). Because of greater puckering of the rings, delocalization is affected and the basicity decreases.
13. Calculations on entries 24-27 were used to evaluate the additive effect of substituents at C1 (and C3) and C1 (and C2). On comparing the numbers for entry 24 (energy of entry 8 + energy of 9 = 2.12 kcal/mol; calculated energy is 0.84 kcal/mol) and entry 26 (energy of entry 8 + energy of entry 20 = 0.24 kcal/mol; calculated energy is only -0.66 kcal/mol), it can be inferred that the effects are not additive.

Conclusions

1. The basicity of bicyclic guanidines varies with substituents on the carbon backbone. The effect is greatest if the substituents are at C1 (i.e., carbon next to quaternary nitrogen N1).
2. The change in the basicity depends on the nature of the substituents. Bulky substituents lead to less basicity (i.e., sterics plays an important role). This is supported by the change in dihedral angles of the rings upon adding substituents.
3. Electrostatics also effect the basicity as seen in the case of electron donating and electron withdrawing groups. This is buttressed by the electrostatic charges calculated on the nitrogens of the bicyclic guanidinate core. Electron withdrawing groups decrease the basicity, whereas electron donating groups increase the basicity, as compared to hppH.
4. The effect of substituents on basicity is not additive as seen in the examples where two substituents are placed on separate carbons.
5. Based on these calculations, placing two Me groups at C1 (entry 3) makes the bicyclic guanidine more basic than hppH.
6. Placing only one Me group at C1 makes the bicyclic guanidine more basic than hppH (and is similar to substituting at C2). These calculations informed our synthetic targets. These calculations also show that placing a benzyl group at C1 is better than placing a Me group at C1 in terms of higher basicity.

CHAPTER 3

SYNTHESIS OF 3,3,9,9-TETRAMETHYL-1,5,7-TRIAZABICYCLO[4.4.0]DEC-5-ENE

Bicyclic guanidines are a class of substituted guanidines in which the carbon of the central CN_3 unit is incorporated into a bicyclic framework fused along one C-N bond,

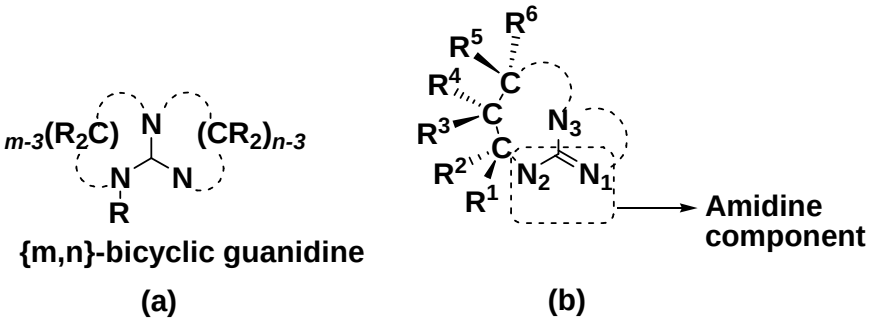


Figure 11: General structure of bicyclic guanidines.

as shown in Figure 11[53]. They exhibit distinctive physical, electronic and chemical characteristics compared to acyclic analogues. The nomenclature of these bicyclic guanidines is very complicated, so it is convenient to describe these compounds as *{m,n}*-bicyclic guanidines [Figure 11 (a)], with *m* and *n* defining the size of the component heterocyclic rings.

HppH (Figure 12) is the only bicyclic guanidine available commercially. Syntheses of non-functionalized bicyclic guanidines are based on either multi-step procedures[54] or use expensive starting materials.[55] A simple one-pot procedure to the {6,6} and {5,5} guanidines, Hhpp and Htbo (2,3,5,6-tetrahydro-1*H*-imidazole[1,2*a*]imidazole, Figure 12) was published by A'Court in a patent[56] in 1986.

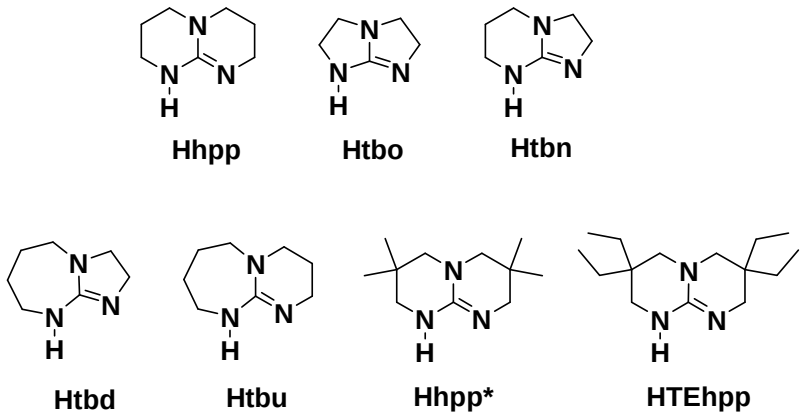
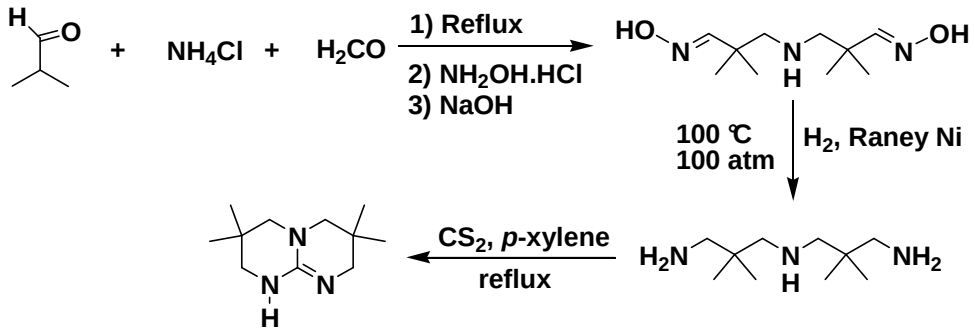


Figure 12: Derivatives and abbreviations for bicyclic guanidines.

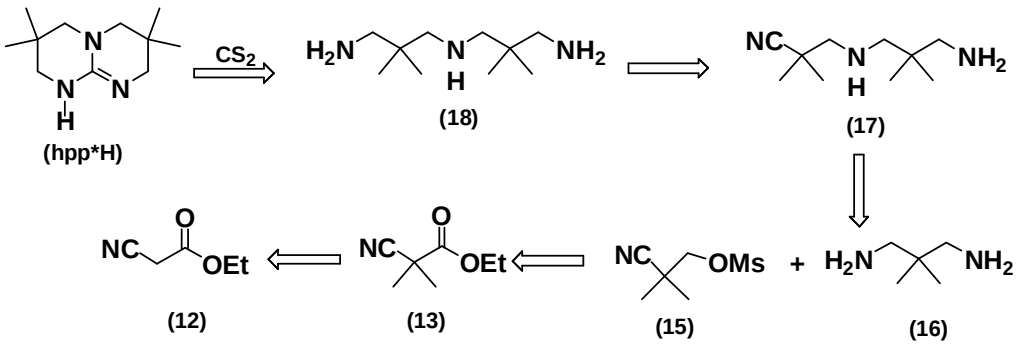
This synthetic procedure was extended to the non-symmetric {6,5}-bicyclic H-tbn (2,3,5,6,7,8-hexahydroimidazo[1,2-*a*]pyrimidine by Cotton and co-workers.[57] A multi-step synthetic procedure to non-functionalized guanidines containing seven-membered rings, mainly Htbd (2,5,6,7,8,9-hexahydro-3H-imidazo[1,2-*a*][1,3]diazepine and H-tbu (2,3,4,6,7,8,9,10-octahydropyrimido[1,2-*a*]-[1,3]diazepine was published at the same time.[58] The study of metal complexes of anions of Htbo, Htbn, Htbd and Htbd[57,58] has showed that the ring sizes in the ligands effect the oxidation potential of the corresponding dimolybdenum complexes. From this study it was apparent that complexes with hpp^- ligands are the most easily oxidized in solution. Thus the hpp^- ligand (with two fused six membered rings) is the most basic ligand among the various non-functionalized bicyclic guanidines. Unfortunately, hpp^- complexes have low solubility in common organic solvents. Therefore, derivatives of hppH with aliphatic side chains should enhance the solubility without altering the basicity.[59] This chapter discusses the synthesis of tetramethyl hppH (3,3,9,9-tetramethyl-1,5,7-triazabicyclo[4.4.0]dec-5-ene; termed as hpp*H in this chapter). The synthesis of hpp*H (and also tetraethyl hppH named as TEhpp, Figure 12) was published by Cotton and co-workers[59] during the course of our research. Cotton's synthesis of hpp*H is shown in Scheme 1 below.



Scheme 1: Synthesis of hppH* as reported by Cotton and co-workers.

Retrosynthetic Analysis

This chapter discusses an alternate route to hpp*H. A retrosynthetic analysis of hpp*H is given in Scheme 2 below.

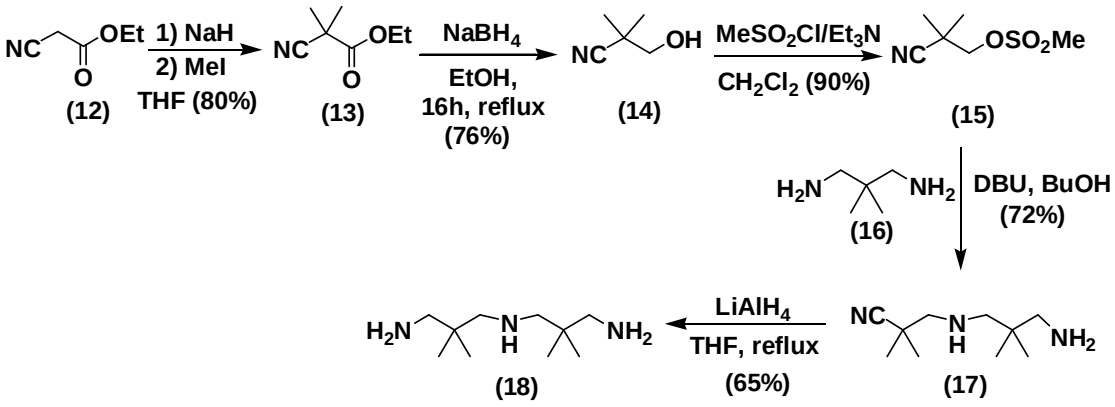


Scheme 2: Retrosynthetic analysis of hppH*.

Retrosynthetically, hpp*H can be synthesized from the substituted triamine. The key challenge in the synthesis of hpp*H was the synthesis of tetrasubstituted triamine **18**. As described in this chapter, triamine **18** was obtained from the diaminonitrile **17,** which was obtained from the coupling of commercially available diamine **16** with mesylate **15**. Mesylate **15** was derived from the corresponding ester **13**, which in turn was obtained from the commercially available ethyl cyanoacetate **12**.

Results and Discussion

As discussed in the retrosynthetic analysis of hpp*H, the main target for synthesis of hpp*H is the tetrasubstituted triamine **18**. There is only one report for the synthesis of triamine **18** by Cotton and co-workers, as given in Scheme 1. Our synthesis of the triamine **18** is given in Scheme 3 below and is different from that of Cotton and co-workers.

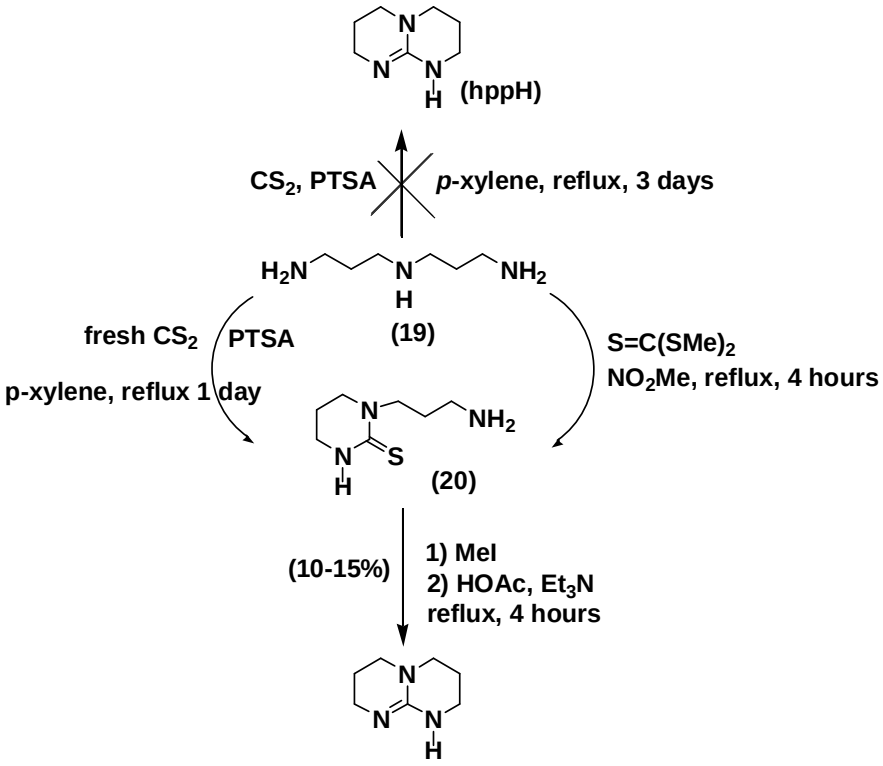


Scheme 3: Synthesis of tetramethyl triamine **18**.

The synthesis of triamine **18** starts with commercially available ethyl cyanoacetate **12**, which was dimethylated by treating with sodium hydride followed by iodomethane.[60]

The next step was to selectively[61] reduce the ester to the primary alcohol without reducing the nitrile group in **13**. This was successfully achieved by refluxing ester **13** with $NaBH_4$ to obtain pure alcohol **14** in appreciable yields. The alcohol was converted to the better leaving group methanesulfonate (or mesylate) **15**. An S_N2 displacement reaction[62] on **15** with commercially available 2,2-dimethyl-propane-1,3-diamine **16** yielded diaminonitrile **17**. Compound **17** is a highly polar molecule and was difficult to purify on silica gel during column chromatography. Instead we used Florisil (magnesium silicate; 84% SiO_2, 15.5% MgO and 0.5% Na_2SO_4) to effect separation. The separation is easier and quicker than with silica gel. The triamine **18** was finally obtained from **17** by reducing the nitrile group to a primary amine using $LiAlH_4$.

The next step was to cyclize the triamine **18** to hpp*H using a C1 reagent. The conditions for the final cyclization step were first optimized on non-methylated triamine [**19**, N-(3-aminopropyl)-1,3-propanediamine] which is available commercially. In the literature, the triamine can be cyclized to the corresponding bicyclic guanidine using a C1 reagent (a C1 reagent provides the carbon atom of the guanidine core). The various C1 reagents which have been used to cyclize the triamine to the bicyclic guanidine hppH are carbon disulfide,[56] thiophosgene,[63] dimethyltrithio carbonate[64] 1,1'(thiocarbonyl)dimidazole,[65] and tetramethyl orthocarbonate.[65] However, the most common C1 reagent used is carbon disulfide (CS_2) because it is easy to handle and inexpensive as compared to the other reagents. Cotton and co-workers reported the synthesis of hpp*H via cyclizing triamine **18** using CS_2. Their CS_2 method was based on the A'Court patent reported in 1986.[56] When we tried the same reaction on the regular triamine **19**, the desired product hppH was not obtained. Instead we were able to isolate moncyclized thiourea **20** as the only product, as shown in Scheme 4 below, in appreciable yields.



Scheme 4: Cyclization of non-methylated triamine to hppH.

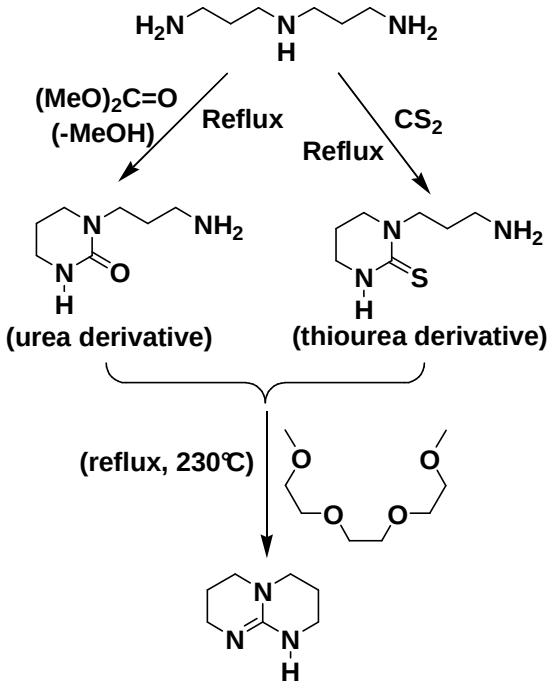
This cyclization reaction of the non-alkylated triamine was studied extensively in order to optimize the reaction conditions for this last step. Our results are summarized in Table 4.

Table 4: Cyclization of non-methylated triamine using CS_2 as the C1 reagent.

	Amount triamine 8 (mmoles)	**Amount CS_2 (mmoles)**	**Triamine:CS_2**	**Amount PTSA (g)**	**Amount Solvent, *p*-xylene (ml)**	**Reflux time (hours)**	**% Yield of 20**
1	7.15	8.58	0.84	0.05	40	24	34
2	7.15	8.58	0.84	0.05	40	72	23
3	7.15	6.43	1.1	0.05	40	24	47
4	7.15	6.43	1.1	0.05	20	24	13
5	7.15	6.43	1.1	0.05	80	24	77
6	7.15	6.43	1.1	0.05 (fresh)	40	24	60
7	7.15	6.43	1.1	0.05	160	24	82

From the studies summarized in Table 4, it can be inferred that the cyclization is sensitive to dilution (higher dilution leads to higher yields). We also noted that fresh PTSA was needed. The cyclization required only 24 hours, yielding the monocyclized thiourea derivative **20** in appreciable yields. However the double cyclized product, hppH was not obtained under any conditions.

Two very recent patents discuss an alternate cyclization route to hppH involving CS_2[66] and dimethyl carbonate[67] $[O=C(OMe)_2]$ as C1 reagents with non-methylated triamine **19**. These patents report that with CS_2 as the C1 reagent, the monocyclized thiourea is formed. When dimethyl carbonate is used, the corresponding monocyclic urea derivative is formed (Scheme 5). According to these patents, either of the monocyclized derivatives (thiourea or urea) can be cyclized by refluxing them in the high boiling point polar solvent triethyleneglycol dimethyl ether, yielding hppH in 50% yield. We found that the second cyclization of the monocyclized thiourea precursor to hppH was achieved by refluxing in this high boiling point polar solvent for 3 days. The isolation of hppH by this method was very simple: adding hexanes to the cooled reaction mixture and cooling to -10°C overnight gave crystalline hppH in ~50% yields.



Scheme 5: Synthesis of hppH using CS_2 and dimethyl carbonate as C1 reagents.

Double cyclization to hppH was also achieved using the method of Davis and co-workers[64] by treating **20** with acetic acid and MeI (Scheme 4). However the yield for this double cyclization was very low (10-15%).

The same procedure was used for the synthesis of hpp*H by cyclizing the tetramethyl triamine **18**. The bicyclic guanidine hpp*H was also obtained in very low yield (10%). Sublimation of the crude solid yielded pure hpp*H. hpp*H was characterized by ^{1}H and ^{13}C NMR spectroscopy and mass spectrometry. The ^{1}H NMR spectrum (Figure 13) consisted of 3 peaks at δ 1.01 (CH_3, 12H), 2.81 (CH_2, 4H) and 2.91 (CH_2, 4H) consistent with the structure. We cannot deifinitively differentiate the CH_2 resonances on C1 v/s C3 carbons on the ring.

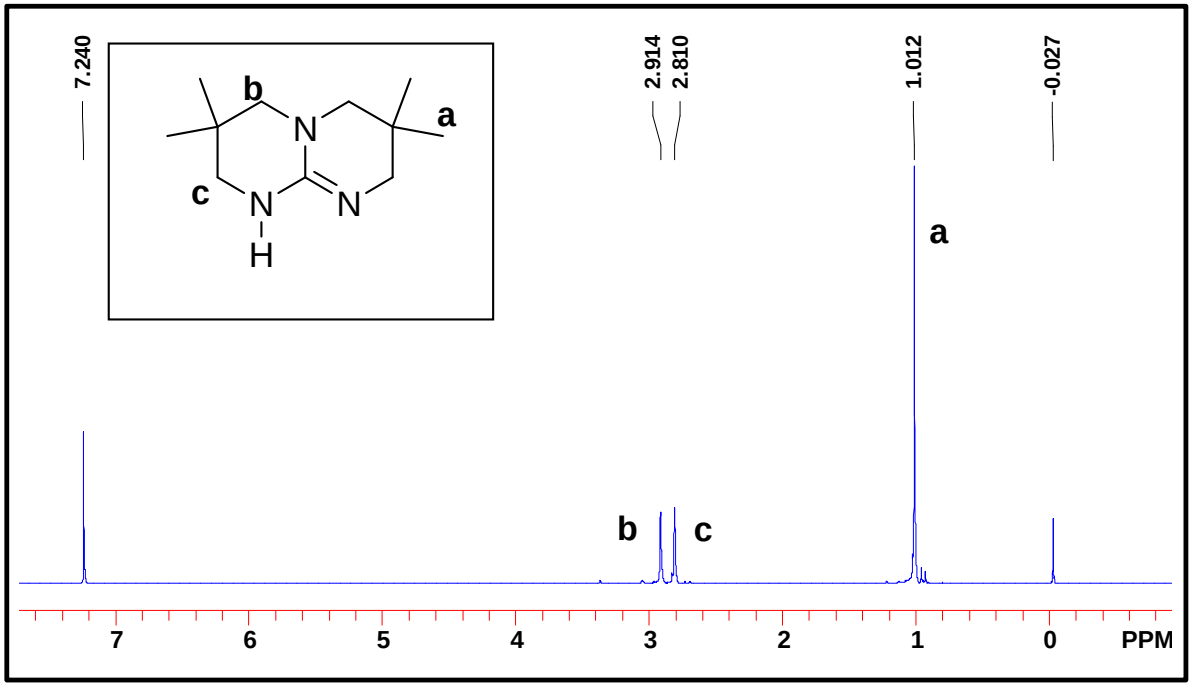


Figure 13: 300 MHz ^{1}H NMR spectrum of sublimed hpp*H in $CDCl_3$.

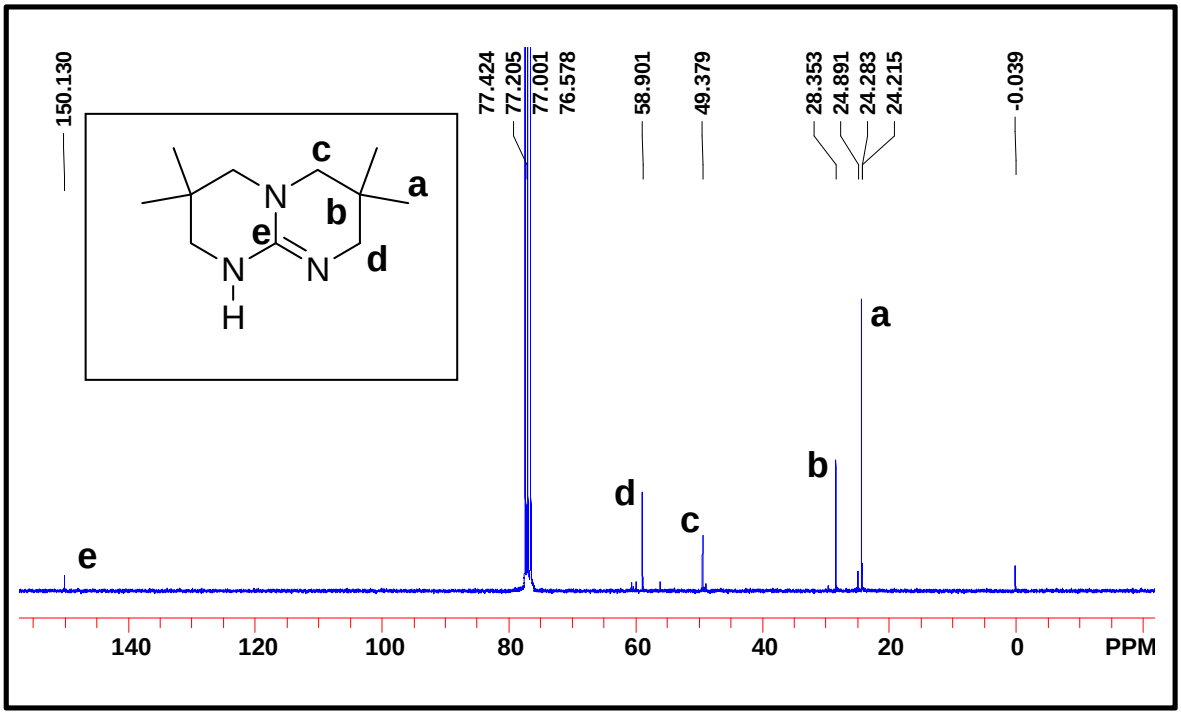


Figure 14: 75 MHz ^{13}C NMR of sublimed hpp*H in $CDCl_3$.

The ^{13}C NMR spectrum of sublimed hpp*H (Figure 14) was also consistent with the structure and consisted of 5 peaks. The HRMS (EI) also corresponds to the molecular mass within the error limit.

In summary we have developed an alternate route to hpp*H that, while in low overall yield (3.9%, unoptimized, v/s 39% as reported by Cotton), and having more steps (6 v/s 3 reported by Cotton) is reproducible and does not require high pressure (1500 psi) methods. In privileged discussions with a co-worker of Cotton, their second step, the hydrogen reduction of the hydroxyimines, is not easily reproducible. Our method allows

for easier changes in the substituents on C2, since these groups are introduced in the first step using an alkyl iodide.

Conclusions

Cyclization of non-methylated triamine $NH((CH_2)_3NH_2)_2$ using CS_2 as a C1 reagent yielded the monocyclized thiourea derivative **20** instead of the doubly cyclized product, hppH, unlike literature reports. Synthesis of hppH was carried out by heating the monocyclized thiourea **20** in a high boiling point solvent (triethylene glycol dimethyl ether) for three days. The isolation of hppH from triethylene glycol dimethyl ether was easier than from the *in situ* double cyclization route, starting with dimethyl trithiocarbonate as C1 reagent, in nitromethane.

The tetramethyl triamine $NH(CH_2C(CH_3)_2CH_2NH_2)_2$ was derived in five steps starting from commercially available ethyl cyanoacetate in 26% overall yield. The key step was the S_N2 reaction of commercially available 2,2-dimethyl-1,3-diaminopropane with the mesylate derivative of the synthesized alcohol ($HOCH_2C(CH_3)_2CN$). Purification of the diaminonitrile product $NCC(CH_3)_2CH_2NHCH_2C(CH_3)_2CH_2NH_2$ **17** was achieved, using Florisil instead of silica gel, via column chromatography. Hpp*H was obtained by cyclizing the tetramethyl triamine $NH(CH_2C(CH_3)_2CH_2NH_2)_2$ using dimethyl trithiocarbonate as a C1 reagent. The yield of this double cyclization (10-15%) needs further optimization. ^1H and ^{13}C NMR spectroscopy and high resolution mass spectral analyses of the doubly cyclized product was consistent with the structure of hpp*H and matches literature data from the Cotton and co-workers group.[59]

Once the yield for the double cyclization step is optimized, the utility of this ligand for early transition metal chemistry, particularly Ta, will be studied in the future. A future study of the coordination complexes of hpp^{*-} will ascertain whether the tetramethylation leads to more solubility for coordination complexes and also whether the hpp^{*-} ligand is more basic than hpp^-.

Experimental

General Procedures. All procedures were performed under an argon atmosphere unless noted and all glassware was oven dried before use. Ethyl cyanoacetate, sodium hydride, lithium aluminum hydride, p-toluenesulfonic acid monohydrate, iodomethane, sodium borohydride, dimethyl trithiocarbonate and 1,8-diazabicyclo[5.4.0]undec-7-ene (DBU) were purchased from Aldrich and were used as received. Methanesulfonyl chloride and triethylene glycol dimethyl ether were purchased from Acros Chemicals. Lead(II) acetate strips and Florisil (100-200 mesh) were purchased from Fisher Scientific. The evolution of H_2S gas in the synthesis of hppH and hpp*H was monitored by exposing lead(II) acetate strips to gases evolved during the reaction. Flash column chromatography was performed employing 230-400 mesh silica gel. Thin-layer chromatography was performed using glass plates pre-coated to a depth of 0.25 mm with 230-400 mesh silica gel impregnated with a fluorescent indicator (254 nm). Proton and carbon-13 nuclear magnetic resonance (^{1}H NMR and ^{13}C NMR) spectra were recorded on a Bruker Avance 300 instrument; chemical shifts are expressed in parts per million (δ scale) downfield from tetramethylsilane and are referenced to the residual proton resonance in the deuterated NMR solvent ($CHCl_3$: δ 7.26 for ^{1}H NMR) or the solvent carbon-13 chemical shift ($CDCl_3$: δ 77.16).

Preparation of ethyl 2-cyano-2,2-dimethylpropionate (13). Ethyl cyanoacetate **12** (15.01 g, 0.14 mol) was dissolved in 200 mL THF and stirred at 0°C in an ice-bath for 10 minutes. NaH (13.26 g, 0.35 mol) was added slowly in four portions, with stirring and cooling, at intervals of 30 minutes. Methyl iodide (18.16 g, 0.31 mol) was added in four equal portions, one after each portion of NaH added. The resulting mixture was stirred at 25°C overnight. The reaction was quenched by addition of ice. The aqueous layer was extracted with ethyl acetate (4 x 50 mL). The combined organic extracts were dried over Na_2SO_4, filtered, and evaporated to obtain a crude oil. The crude oil was distilled *in vacuo* (50°C/150mTorr, lit.[60] bp 34°C/110 mTorr) to yield **13** (14.05 g, 75% based on **12**) as colorless oil. ^{1}H NMR ($CDCl_3$, 300 MHz): δ 1.33 (t, 3H, 7.1 Hz, $C\underline{H}_3CH_2$-), 1.60 (s, 6H, -($C\underline{H}_3$)$_2$), 4.27 (q, 2H, 7.1 Hz, $CH_3C\underline{H}_2$-).

Preparation of 3-hydroxy-2,2-dimethylpropanenitrile (14). A solution of **13** (10.01 g, 0.07 mol) in 10 mL absolute ethanol was added dropwise to an ice-cooled suspension of sodium borohydride (4.23 g, 0.105 mol) in 250 mL of absolute ethanol. After complete addition, the mixture was refluxed for 24 hours. The reaction mixture was cooled in an ice-bath and the solution neutralized with 2N HCl until the pH was 7. The white granulated precipitate was removed by filtration and the filtrate concentrated using a rotary evaporator to give **14** (4.9 g, 70% based on **13**) as a colorless oil. ^{1}H NMR ($CDCl_3$, 300 MHz): δ 1.26 (s, 6H, -($C\underline{H}_3$)$_2$), 3.47 (s, 2H, -$C\underline{H}_2$). ^{13}C NMR ($CDCl_3$, 75 MHz): δ 22.6 (-($\underline{C}H_3$)$_2$), 34.94 (-$\underline{C}(CH_3)_2$), 68.35 (-$\underline{C}H_2OH$), 124.25 ($\underline{C}N$).

Preparation of 2-cyano-2-methylpropyl methanesulfonate (15). To a stirred solution of **14** (16.01 g, 0.16 mol) and trimethylamine (45.5 mL, 0.32 mol) in CH_2Cl_2 (200 mL) cooled to 0°C was added, dropwise, a solution of methanesulfonyl chloride (17.5 mL, 0.22 mol) in 20 ml CH_2Cl_2. The mixture was stirred overnight. The solution was washed with saturated aqueous $NaHCO_3$ solution. The organic layer was dried over Na_2SO_4 and concentrated under vacuum to give crude as a yellow-orange oil. The oil was purified using column chromatography (hexane/ethyl acetate 1:1, R_f = 0.6) to afford **15** (27.50 g, 96% based on **14**) as a yellow-orange oil. ^{1}H NMR ($CDCl_3$, 300 MHz): δ 1.44 (s, 6H, -($C\underline{H}_3$)$_2$), 3.31 (s, 3H, -$OSO_2C\underline{H}_3$), 4.12 (s, 2H, $C\underline{H}_2OH$). ^{13}C NMR ($CDCl_3$, 75 MHz): δ 20.81 (-($\underline{C}H_3$)$_2$), 32.92 (-$OSO_2\underline{C}H_3$), 37.53 (-$\underline{C}(CH_3)_2$), 72.80 (-$\underline{C}H_2O$-), 121.92 ($\underline{C}N$).

Preparation of 3-(3-amino-2,2-dimethylpropylamino)-2,2-dimethylpropanenitrile (17). 2,2-Dimethyl-1,3-diaminopropane **16** (13.6 mL, 0.13 mol) was added to a stirred solution of **15** (10.03 g, 56.60 mmol) in 100 mL *n*-butanol and 20 drops of 1,8-diazabicyclo[5.4.0]undec-7-ene (DBU). The mixture was refluxed for 48 h. After cooling, the mixture was concentrated under vacuum to give a viscous oil. The oil was then subjected to flash chromatography using Florisil as a solid support (CH_2Cl_2: MeOH: NH_4OH 8:2:0.01, R_f = 0.38) to obtain **17** (7.47 g, 72% based on **15**) as a colorless viscous oil. ^{1}H NMR ($CDCl_3$, 300 MHz): δ 0.89 (s, 6H, -($C\underline{H}_3$)$_2$), 1.34 (s, 6H, -($C\underline{H}_3$)$_2$), 1.95 (broad s, 3H, -$N\underline{H}_2$ + -$N\underline{H}$,), 2.52 (s, 2H, -$C\underline{H}_2$), 2.56 (s, 2H, -$C\underline{H}_2$), 2.66 (s, 2H, -$C\underline{H}_2$). ^{13}C NMR ($CDCl_3$, 75 MHz): δ 23.36 (-($\underline{C}H_3$)$_2$), 24.25 (-($\underline{C}H_3$)$_2$), 33.84 (-$\underline{C}(CH_3)_2$), 35.34 (-$\underline{C}(CH_3)_2$), 50.72 (-$\underline{C}H_2$-NH_2), 58.94 (-$\underline{C}H_2$-N-), 59.00 (-$\underline{C}H_2$-N-), 124.65 ($\underline{C}N$).

Preparation of bis-(3-amino-2,2-dimethylpropyl) amine (18). The solution of **17** (15.01 g, 81.96 mmol) in 200 mL THF under argon was cooled in an ice-bath for 10 minutes. $LiAlH_4$ (8.18 g, 204.9 mmol) was added slowly, with constant stirring. After complete addition, the mixture was refluxed for 2 days. The reaction mixture was cooled in an ice-bath and the pH neutralized to 8 by slow addition of 20% aqueous NaOH. The white precipitate was filtered and the filtrate dried over Na_2SO_4 and concentrated using rotary evaporator to yield **18** as a colorless, viscous oil. The oil was distilled *in vacuo* (60-65°C at 150 mTorr) to yield **18** (9.98 g, 65% based on **17**) as a pure colorless oil. ^{1}H NMR ($CDCl_3$, 300 MHz): δ 0.79 (s, 12H, -($C\underline{H}_3$)$_2$), 1.16 (broad s, 4.78, -$N\underline{H}_2$ + -N$\underline{H}$), 2.33 (s, 4H, -$C\underline{H}_2$), 2.46 (s, 4H, -$C\underline{H}_2$). ^{13}C NMR ($CDCl_3$, 75 MHz): δ 23.76 (-($\underline{C}H_3$)$_2$), 35.58 (-$\underline{C}(CH_3)_2$), 51.54 (-$\underline{C}H_2$-NH_2), 59.87 (-$\underline{C}H_2$-N-).

Preparation of 1-(3-aminopropyl)tetrahydropyrimidine-2-thione (20). Distilled **19** (1.01 mL, 7.15 mmol) was dissolved in 80 mL dry *p*-xylene under argon and *p*-toluenesulfonic acid (0.05 g) was added. Carbon disulfide (0.39 mL, 6.43 mmol) was slowly added, resulting in the formation of a white precipitate. The mixture was refluxed for 24 hours. *p*-Xylene was decanted to leave behind any oily residue in the flask, and cooled to room temperature under argon. A white precipitate was filtered and dried under vacuum to yield pure **20** (0.87 g, 70% based on **19**) ^{1}H NMR ($CDCl_3$, 300 MHz): δ 1.34 (broad s, 2H, $N\underline{H}_2$), 1.77 (quintet, 2H, 7.05 Hz, -CH_2-$C\underline{H}_2$-CH_2-), 1.99 (quintet, 2H, 5.85 Hz, -CH_2-$C\underline{H}_2$-CH_2-), 2.73 (t, 2H, 6.6 Hz, -N-$C\underline{H}_2$-), 3.26-3.38 (m, 4H, -$C\underline{H}_2$-NH_2 + -$C\underline{H}_2$-N-), 3.94 (t, 2H, 7.05 Hz, -N-$C\underline{H}_2$-), 6.37 (broad s, 1H, -N$\underline{H}$). ^{13}C NMR ($CDCl_3$, 75 MHz): δ 20.8 (-CH_2-$\underline{C}H_2$-CH_2-), 30.67 (-CH_2-$\underline{C}H_2$-CH_2-), 38.74 (-$\underline{C}H_2$-NH_2), 40.62 (-$\underline{C}H_2$-NH), 45.81 (-$\underline{C}H_2$-N), 51.13 (-$\underline{C}H_2$-N), 178.12 (-$\underline{C}$=S).

Preparation of 1,5,7-triazabicyclo[4.4.0]dec-5-ene (hppH). A solution of **20** (2.11 g, 12.18 mmol) in 10 mL triethylene glycol dimethyl ether was refluxed at 230°C for 3 days. Evolution of H_2S was detected using lead acetate strips. The contents of the flask were cooled to room temperature and hexane (20 mL) was slowly added dropwise. The mixture was then kept in a freezer (5°C) overnight to yield white crystals of hppH (0.79 g, 47% based on **20**). The ^{1}H NMR matches that of a commercially available sample from Aldrich. ^{1}H NMR ($CDCl_3$, 300 MHz): δ 1.86 (quintet, 2H, 5.91 Hz, -CH_2-$C\underline{H}_2$-CH_2), 3.10 (t, 2H, 6 Hz, -N-$C\underline{H}_2$-), 3.18 (t, 2H, 6 Hz -N-$C\underline{H}_2$-).

Preparation of 3,3,9,9-tetramethyl-1,5,7-triazabicyclo[4.4.0]dec-5-ene (hpp*H). Tetramethyl triamine **18** (1.01 g, 5.30 mmol) was dissolved in dry, degassed NO_2Me and stirred under argon. Dimethyl trithiocarbonate (0.71 mL, 6.4 mmol) was added and the mixture refluxed for 3 hours, then allowed to cool. Acetic acid (1.25 mL, 21.3 mmol) and methyl iodide (0.68 mL, 10.6 mmol) was added. The mixture was refluxed for 3 hours and stirred at room temperature overnight. The mixture was evaporated under reduced pressure and the residue partitioned between CH_2Cl_2 and water. The products were extracted into CH_2Cl_2 (3 x 15 mL). Excess C1 reagent was removed by passing a CH_2Cl_2 solution of the product through a plug of silica gel and further eluting with CH_2Cl_2 (50 mL) and then MeOH-CH_2Cl_2 (1:4). The combined MeOH- CH_2Cl_2 washes were treated with charcoal, dried over Na_2SO_4 and concentrated to yield a brown-red solid. The solid was dissolved in 20 mL water and extracted with CH_2Cl_2 (3 x 30 mL). The combined CH_2Cl_2 extracts were dried over Na_2SO_4 and concentrated under reduced pressure to yield a yellow-brown solid. The crude solid was purified by sublimation to obtain hpp*H (0.12 g, 11% based on **18**) as a white solid. ^{1}H NMR ($CDCl_3$, 300 MHz): δ 0.96 (s, 12H, (-C<u>H</u>$_3$)$_4$), 2.78 (s, 4H, -N-C<u>H</u>$_2$-), 2.91 (s, 4H, -N-C<u>H</u>$_2$-). ^{13}C NMR ($CDCl_3$, 75 MHz): δ 24.29 (-<u>C</u>H$_3$), 28.36 (-<u>C</u>(CH$_3$)$_2$), 49.39 (-N-<u>C</u>H$_2$-), 58.91 (-N-<u>C</u>H$_2$-), 150.14 (-<u>C</u>=N-). HRMS (EI): calculated for $C_{11}H_{21}N_3$ (M^+): 195.1735, found 195.1739.

CHAPTER 4

SYNTHESIS OF 2-(S),10-(S)-2,10-DIMETHYL-1,5,7-TRIAZABICYCLO[4.4.0]DEC-5-ENE

Compounds containing the bicyclic guanidine unit are of substantial biological interest because of hydrogen-bonded mediated interactions **21** (Figure 15) with a variety of oxoanions such as carboxylates[68] and phosphates.[69] The bicyclic guanidinium scaffold **22** (Figure 15) has been widely adopted for the construction of molecular hosts for anions.[70] The parent bicyclic guanidine hppH (Figure 15) is available commercially and has been used as a versatile and robust ligand to stabilize low oxidation state transition metals with metal-metal multiple bonds, as discussed in Chapter 1. Chiral C_2-symmetric derivatives of hppH at carbon C3 **23** (Figure 15, R = CH_2OH[71], CH_2NH_2[72] and $CHPh_2$[64])

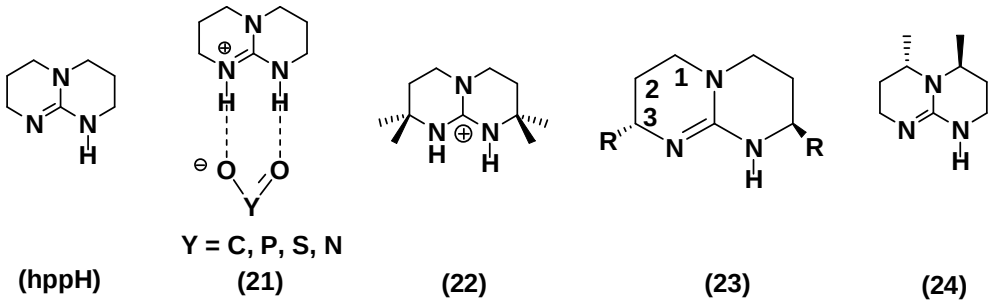


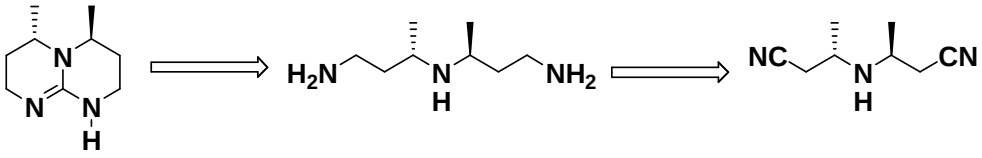
Figure 15: Bicyclic guanidinium hppH as molecular host **21** and **22**; chiral bicyclic guanidine derivatives of hppH **23** and **24**.

have been synthesized and used as chiral molecular hosts. Unfortunately, these known derivatives may not be suitable for dinuclear chemistry because they could be susceptible to ortho-metallation during the synthesis of paddlewheel complexes. Chiral C_2-symmetric derivatives at C1 and C2 (**23** Figure 15) are unknown. From MO calculations discussed in Chapter 2, a Me substituent at C1 makes the bicyclic guanidine more basic than hppH. Thus, on the basis of these calculations, we decided to synthesize a chiral C_2-symmetric

derivative of hppH (**24,** R = CH_3, Figure 15). This derivative 2-(S),10-(S)-2,10-dimethyl-1,5,7-triazabicyclo[4.4.0]dec-5-ene (**24** Figure 15) will be designated as hpp'H.

Retrosynthetic Analysis

As discussed in Chapter 2, bicyclic guanidines can be synthesized from the



hpp'H (A) (B)

Scheme 6: Retrosynthetic analysis of chiral C_2-symmetric hpp'H.

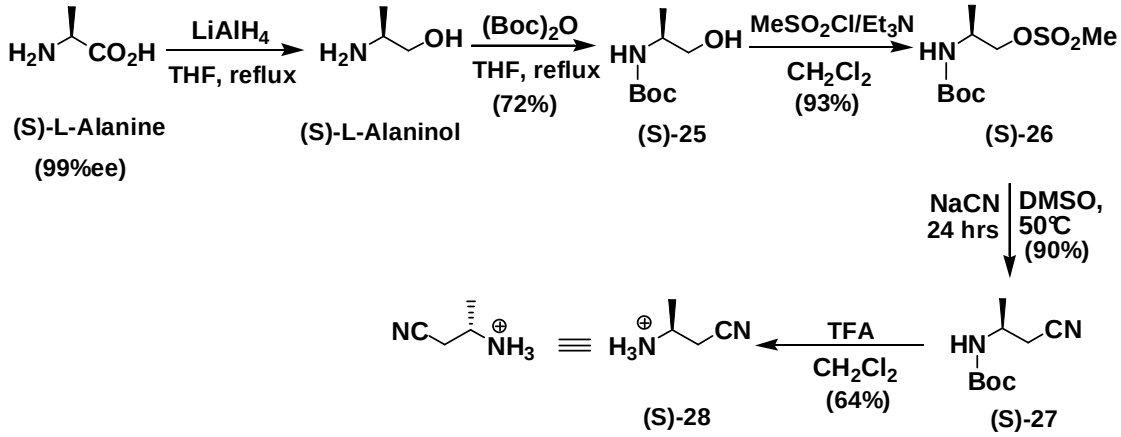
corresponding triaminonanes. Thus chiral C_2-symmetric hpp'H could be synthesized from chiral C_2-symmetric triamine **A** (Scheme 6). This chiral triamine **A** can be synthesized from the chiral dinitrile **B** using a reducing agent.

Results and Discussion

Attempts to synthesize chiral dinitrile **B**

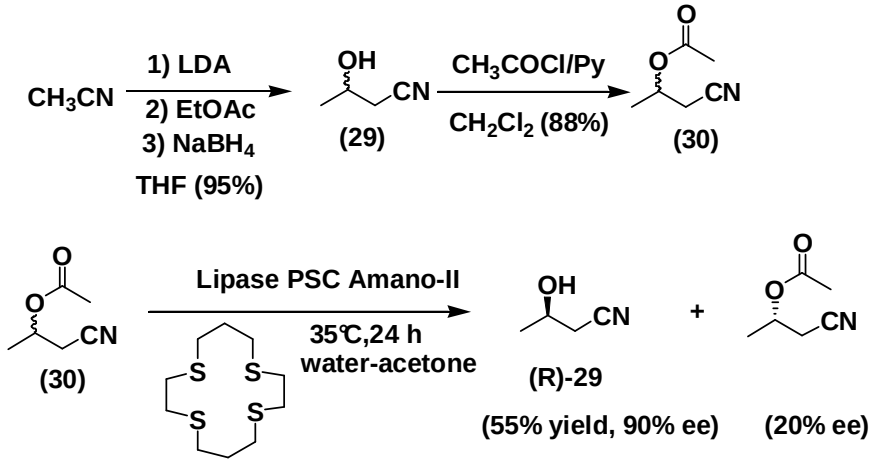
Several routes were employed in attempts to synthesize chiral dinitrile **B**. The chiral hpp'H (or the chiral dinitrile **B**) has a methyl group next to the tertiary nitrogen. The synthesis of chiral C_2-symmetric hpp'H was designed to use a chiral source that was inexpensive and easily available. L-Alanine is the simplest chiral amino acid which has one methyl group adjacent to the amino group. L-Alanine therefore was chosen as a chiral source for the synthesis of chiral hpp'H.

The first step in synthesis of chiral dinitrile **B** was the derivatization of L-alanine (99% ee) as shown in Scheme 7 below. Reduction of L-alanine to L-alaninol via $LiAlH_4$ was followed by protection of the amino group with $(Boc)_2O$ in a single pot to yield **(S)-25**.[73] The next step was to convert the alcohol to a nitrile. This was achieved by converting the OH group to a better leaving group, mesylate, by treating with



Scheme 7: Derivatization of L-alanine to synthesize chiral aminonitrile.

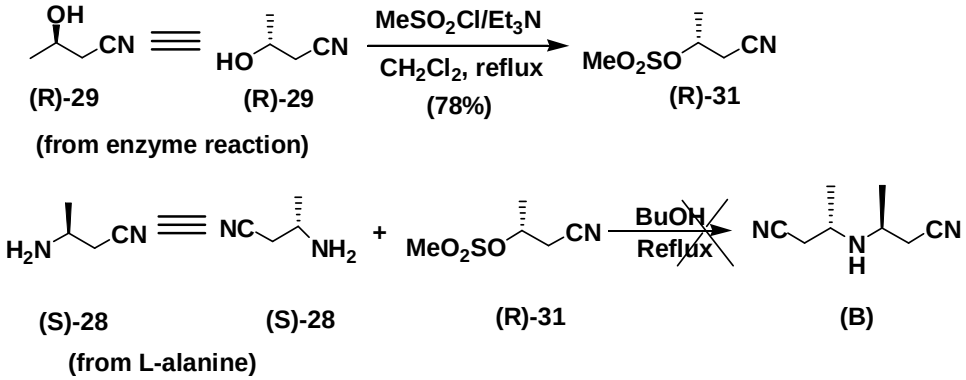
methanesulfonyl chloride/Et_3N[62] to form **(S)-26**. S_N2 displacement of the mesylate group by NaCN lead to the N-Boc-protected chiral nitrile **(S)-27**. The last step was the removal of the Boc group with trifluoroacetic acid in CH_2Cl_2 as solvent.[74] **(S)-28** was characterized by ^1H and ^{13}C NMR spectroscopies and mass spectrometry and is consintent with the ammonium salt.



Scheme 8: Synthesis of chiral β-hydroxynitrile.

The next target in the synthesis of chiral dinitrile **B** was the chiral β-hydroxynitrile **(R)-29,** as shown in Scheme 8 above. The synthesis of chiral β-hydroxynitrile **(R)-29** began with the synthesis of racemic β-hydroxynitrile **29**. Deprotonation of acetonitile using the base lithium diisopropylamide, LDA, followed by treatment with EtOAc and *in situ* reduction of the resulting ketone gave racemic β-hydroxynitrile **29**[75] in almost quantitative yields. The alcohol was then converted to ester acetate **30** by treatment with acetyl chloride/pyridine. The resulting racemic ester **30** was hydrolyzed[76] by Lipase PSC Amano-II enzyme in the presence of a 1,4,8,11-tetrathiacyclotetradecane (thiacrown ether) to yield the chiral β-hydroxynitrile **(R)-29** in appreciable yield and very high optical purity (90% ee by chiral GC).

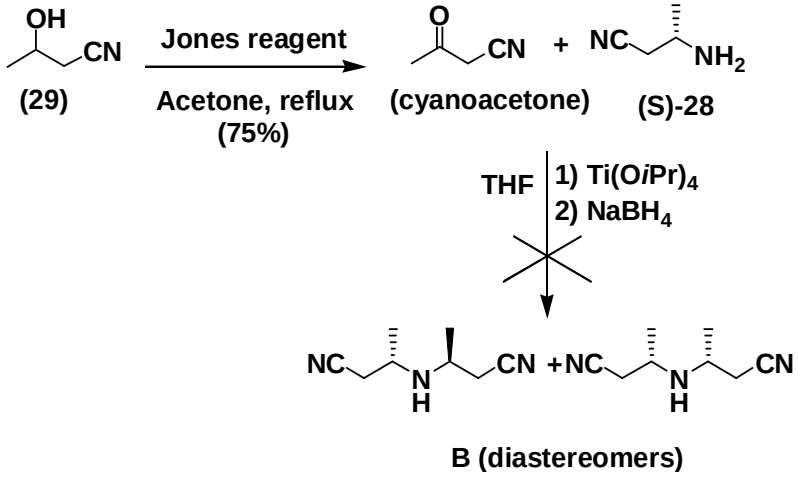
The next step was to couple (Scheme 9) chiral amino nitrile **(S)-28** with the mesylate (**(R)-31**) of the chiral β-hydroxynitrile **(R)-29** by refluxing in butanol in the presence of DBU (1,8-diazabicyclo[5.4.0]undec-7-ene**)** as base.



Scheme 9: Attempt to synthesize dinitrile **B**.

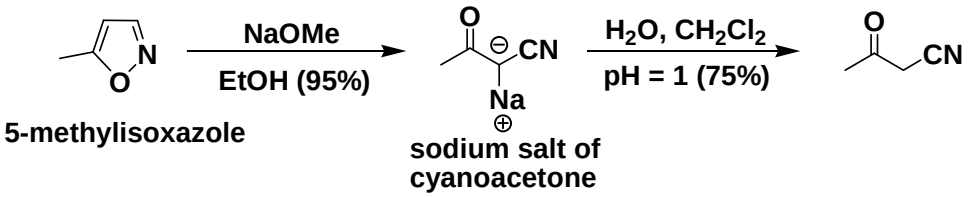
Unfortunately, the desired chiral dinitrile **B** was not obtained. The ^{1}H NMR of the obtained product was too complicated to interpret. The reason for this could be due to steric hindrance.

After this unsuccessful result, a reductive amination approach[77] was used as an alternate route to chiral dinitrile **B** as shown in Scheme 10 below. The key step is the coupling of chiral amino nitrile **(S)-28** (obtained from derivatization of L-alanine) and cyanoacetone (obtained from oxidation of **29** using Jones reagent) in the presence of Ti(O*i*Pr)$_4$ (as acid) and sodium borohydride (as reducing agent). In this case, the desired diastereomers were not obtained. Instead, the reduced secondary alcohol of cyanoacetone and pure chiral amine **(S)-28** was obtained.



Scheme 10: Reductive amination approach to chiral dinitrile **B**.

We assumed that the unidentified impurities in the cyanoacetone was the reason for the lack of success, so we sought to synthesize cyanoacetone by another synthetic route. Cyanoacetone was then prepared from the sodium salt of cyanoaetone (Scheme 11 below).

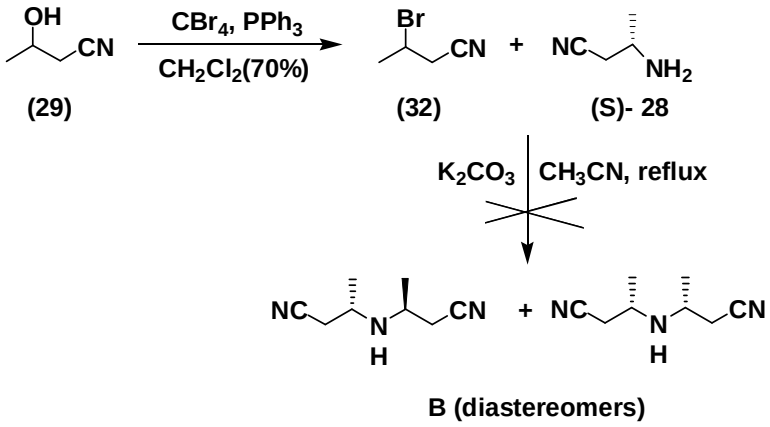


Scheme 11: Alternate synthesis of cyanoacetone.

Cyanoacetone was synthesized by treating 5-methylisoxazole[78] with sodium methoxide (Scheme 11) to yield the sodium salt of cyanoacetone. The salt is a stable white solid and can be stored at room temperature. Treatment of the sodium salt of cyanoacetone[79] with HCl until the pH decreased to 1, and extracting into organic phase yielded cyanoacetone in appreciable yields. However, the coupling of cyanoacetone with chiral amine **(S)-28**

(as in Scheme 10) did not form the desired diastereomers of **B**. Instead, the chiral amine and reduced secondary alcohol of cyanoacetone were obtained as major products.

Another approach to form the diastereomers of **B** was to convert the β-hydroxynitrile **(29)** to the corresponding bromide by treatment with CBr_4/PPh_3, followed by reacting the bromide with chiral amine **S-28** as shown in Scheme 12 below.

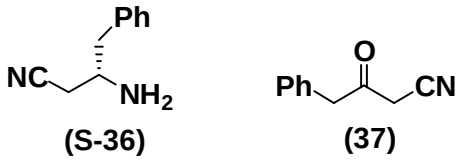


Scheme 12: Approach to diastereomers of dinitrile **B**.

Again, the desired diastereomers of **B** were not obtained. The reason could be that **32** is a low boiling liquid and could have evaporated during the reflux reaction conditions (temperature around 80°C).

We postulated several reasons for this lack of success, possibly involving the chiral amine **(S)-28** and also cyanoacetone. The chiral amine **(S)-28** is unreported in the literature. We synthesized this chiral **(S)-28** amine as the trifluoroacetate ammonium salt. However, when we tried neutralization we were unable to isolate the neutral chiral amine, as shown by ^{1}H NMR spectroscopy. Also, cyanoacetone is an unstable compound, forming an orange polymer (insoluble in any organic solvent) on standing for 10 minutes in air. It is also reported in the literature that is an unstable compound.[79] We surmised that if we could add bulky substituents on these two compounds, we might be able to stabilize and isolate these precursors and then continue the synthesis. To our surprise, we found

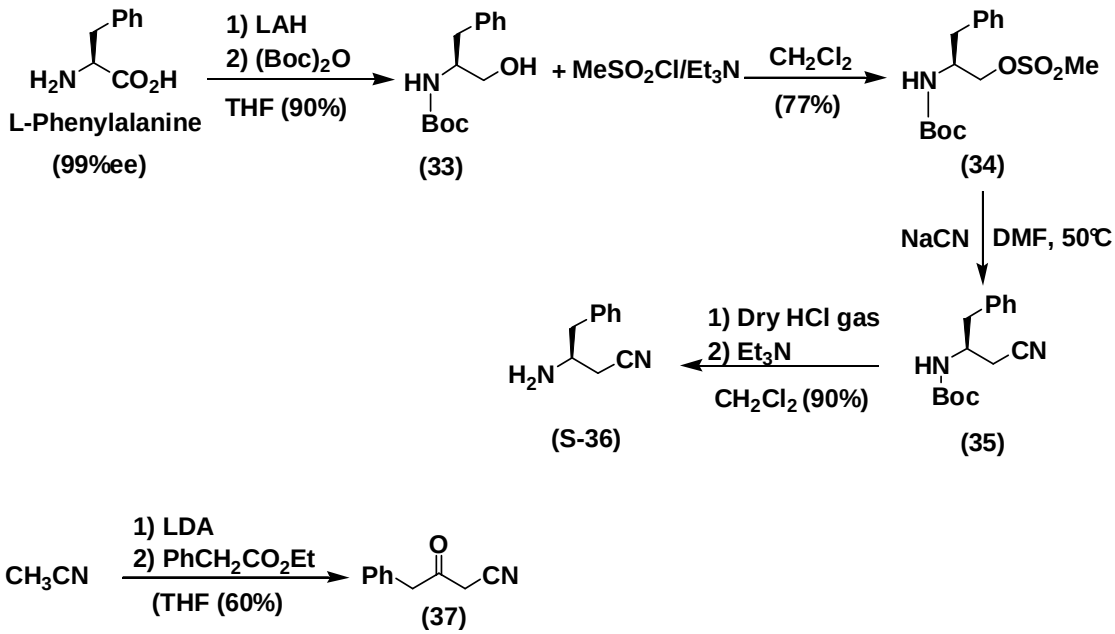
that the corresponding compounds with a phenyl group are stable and reported in the literature. The corresponding chiral amino nitrile[80] (**S-36**, Figure 16) can be isolated as a neutral amine as a colorless viscous oil, and the corresponding ketone was a yellow-orange stable solid[81,82] (**37**, Figure 16).



(S-36) **(37)**

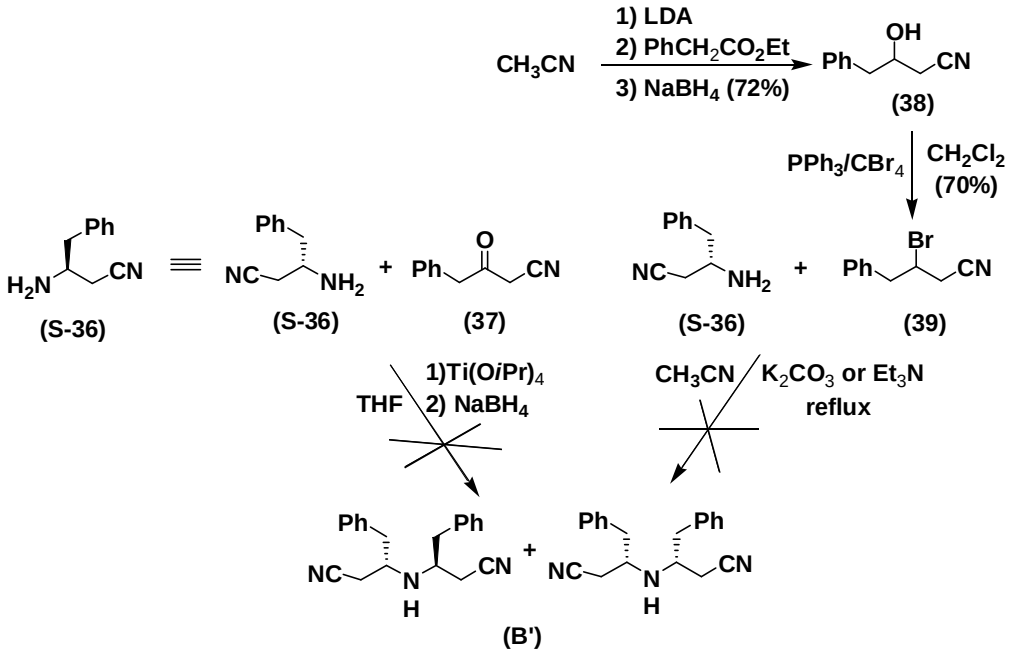
Figure 16: Chiral aminonitrile and β-ketonitrile with phenyl group as substituent.

The synthesis of (**S**)-**36** and **37** is shown in Scheme 13 below.



Scheme 13: Synthesis of **(S)-36** and **37**.

The synthesis of chiral **(S)-36** is similar to chiral **(S)-28**, but starts with L-phenylalanine as the chiral source. The only difference was that the neutral chiral amine **(S)-36** was isolated and was a stable, colorless, viscous oil unlike the chiral amine **(S)-28** derived from L-alanine. The β-ketonitrile **37** was synthesized from acetonitrile, using LDA as base and then treating with the corresponding ester, ethyl phenylacetate, to yield **37** in appreciable yields.

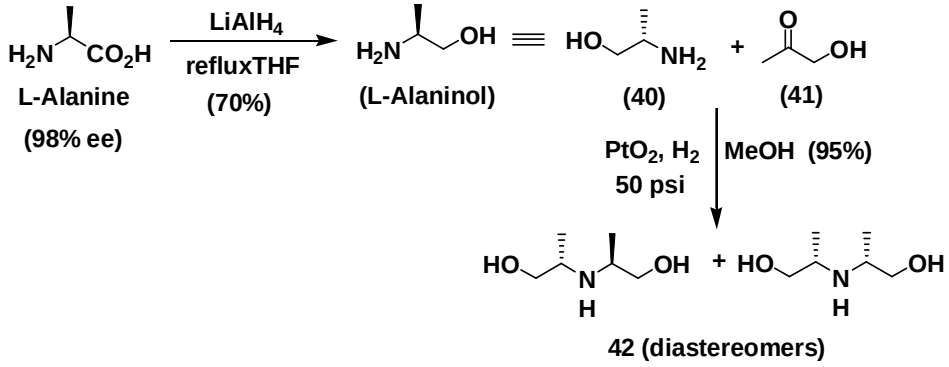


Scheme 14: Attempts to synthesize chiral dibenzylnitrile.

The next step was to couple the chiral amino nitrile **(S)-36** with ketone **37** via reductive amination using Ti(O*i*Pr)$_4$ and $NaBH_4$, as shown in Scheme 14. The desired diastereomers **B'** were not obtained; instead, the chiral amine **(S)-36** and the corresponding reduced secondary alcohol (of the ketone) was obtained. This was confirmed by gas-chromatography-mass spectrometry (GC-MS) on the two products isolated. In another attempt, the secondary alcohol **38** was synthesized from the corresponding ketone using $NaBH_4$ as reducing agent. The secondary alcohol **38** was converted to the corresponding bromide **39** using CB_4/PPh_3. The next step was an S_N2 reaction with chiral amine **(S)-36** to yield the desired diastereomers **B'**. However, the desired diastereomers **B'** were not obtained. In this case, the bromide **39** did not react, as its spot on TLC was visible even after 24 hour reflux, and no new spot on TLC was observed.

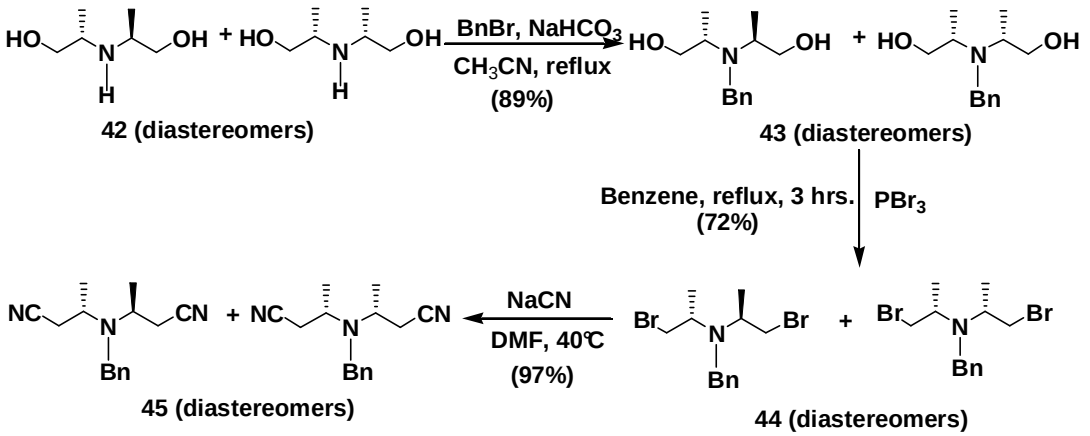
After these unsuccessful attempts, we altered our strategy. If we could couple the chiral amino alcohol with the prochiral ketoalcohol to get the chiral aminoalcohol, then the CN group can be introduced using NaCN. This first step of coupling the chiral L-alaninol with the corresponding prochiral ketoalcohol (hydroxyacetone, available

commercially) is also reported in the literature.[83] When we tried the same reaction, we were able to synthesize the chiral aminoalcohol **42** as a mixture of diastereomers (meso compound and the chiral C_2-symmetric diastereomer) in almost quantitative yields as shown in Scheme 15 below.



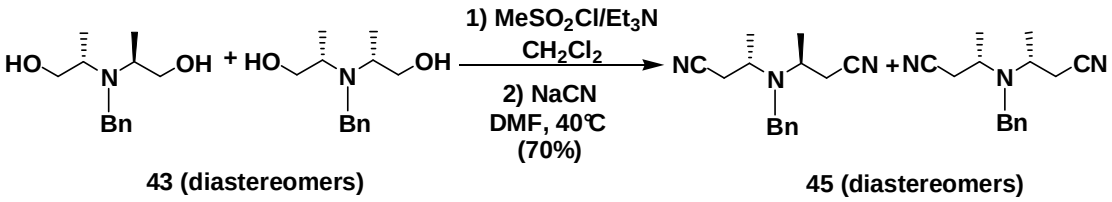
Scheme 15: Synthesis of diastereomers **42** starting from chiral L-alaninol.

The next step was to protect the secondary amino group in **42.** The reaction with $(Boc)_2O$ was unsuccessful. Refluxing **42** with benzyl bromide in the presence of $NaHCO_3$ yielded the benzyl-protected chiral aminoalcohol **43** as shown in Scheme 16 below. The next step was to convert the hydroxyl groups in **43** to better leaving groups so that an S_N2 reaction by NaCN would yield the N-benzyl-protected chiral dinitrile **45**. The first attempts involved conversion of the hydroxyl groups to bromides. Only PBr_3 worked of the several reagents (PPh_3/CBr_4, HBr, PPh_3/Br_2, Vilsmeier's reagent) tried. Refluxing **43** in benzene in presence of PBr_3 yielded **44** in appreciable yields as a mixture of diastereomers. The S_N2 displacement reaction of bromide in **44** with sodium cyanide (NaCN) yielded the N-benzyl-protected chiral dinitrile **45** (as a mixture of diastereomers) in very good yields as determined by ^1H NMR.



Scheme 16: Attempts to synthesize benzyl protected chiral dinitrile **30**.

However, the specific rotation [α] of **45** was determined to be zero. Therefore racemization occurred in one of the steps involved in Scheme 16 above. We postulated that the bromination step using PBr_3 was responsible, as the conditions are highly acidic. This was proved when the reaction with PBr_3 was carried out at different time intervals (30 minutes, one hour and 3 hours). The specific rotation [α] of different batches of **45** obtained from these experiments decreased from 5.75° (30 minutes), to 4.93° (one hour) and finally to 1.6° for 3 hour reaction. This proved that racemization was occurring using PBr_3 as the brominating reagent. We then explored milder conditions to convert the hydroxyl group to a nitrile. We first converted the hydroxyl group in **43** to a mesylate group and then performed the S_N2 displacement reaction with NaCN. This approach (shown in Scheme 17 below) worked very well and yielded N-benzyl-protected chiral dinitrile **45** (as a mixture of diastereomers) in appreciable yield. The specific rotation of **45** by this route was determined to be 22°, which indicated that it was not racemized under the reaction conditions. The mixture of diastereomers **45** was isolated as a solid. We then tried to separate these diastereomers by recrystallization.



Scheme 17: Converting hydroxyl groups in **43** to nitrile groups.

The separation of disatereomers was carried out by crystallization using CH_2Cl_2 as solvent. The white solid obtained as the first crop showed mostly one diastereomer by ^1H NMR spectroscopy (as depicted by Figure 17 below), indicating that the diastereomers were separated. The specific rotation of the separated diastereomer, as determined with a polarimeter, was 53.38°. This specific rotation proved that the first crop was the chiral C_2-symmetric diastereomer (the other, more soluble meso diastereomer is achiral and therefore should have zero optical rotation). This was further supported by the optical rotation of the solid left after obtaining the first crop. The specific rotation of the solid was 7.99° (the non-zero value showed that some of the chiral diastereomer remained, as shown by ^1H NMR spectroscopy, Figure 17). Recrystallization of the first crop separated diastereomer (using CH_2Cl_2) yielded pure, chiral C_2-symmetric diastereomer, with a specific rotation of 72.09.°

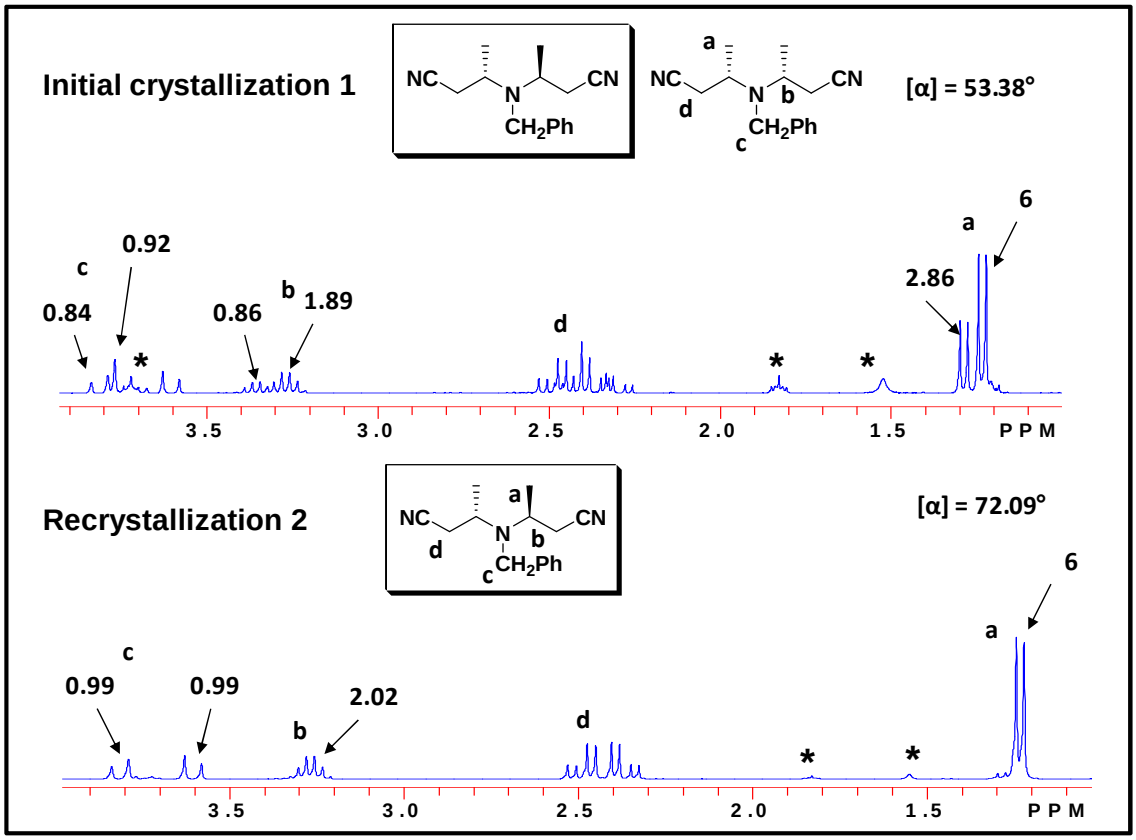
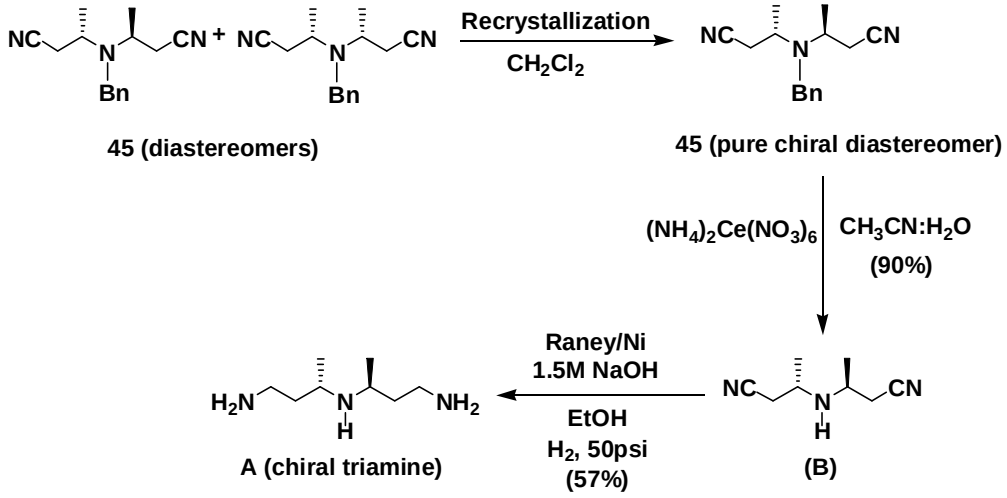


Figure 17: 300 MHz ^{1}H NMR in $CDCl_3$ depicting the separation of diastereomers **30.**

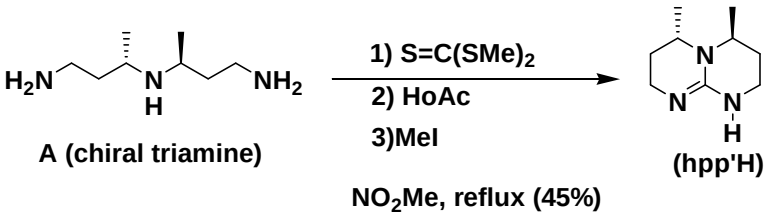
The upper spectrum displays the spectrum of the first crop of mixed diastereomers after recrystallization 1 and the bottom spectrum displays the spectrum of recrystallized product with only a single diastereomer (recrystallization 2). Numerical values above spectral features represent integration of resonances compared to the resonance at δ 1.22 set to a value of 6 protons, [α] values are the specific rotation values of crystallized and recrystallized products, * denotes resonances of impurities.



Scheme 18: Synthesis of chiral C_2 symmetric triamine.

The next step was to remove the N-benzyl group from pure **45**. This was achieved using ceric ammonium nitrate[84] as the debenzylating reagent in acetonitrile:H_2O as the solvent system. The desired chiral diastereomer **B** was obtained in 90% yields (Scheme 18). The last step in the synthesis of the desired chiral triamine **A**, reduction of the nitrile groups, was achieved by hydrogenation under dihydrogen pressure (50 psi) using Raney-Nickel[85] as catalyst. The chiral triamine **A** was obtained in appreciable yields after purification of crude product by vacuum distillation. A specific rotation of +27.67˚ indicated no racemization, and ^{13}C NMR spectra also show no peaks of diastereomers (in case racemization had occurred).

The last step in the synthesis of hpp'H was cyclization using a C1 reagent. The cyclization was achieved using the method of Davis and co-workers[64] with dimethyl trithiocarbonate, $S=C(SMe)_2$, as a C1 reagent, giving chiral, C_2-symmetric hpp'H (Scheme 19). The specific rotation of the cyclized product was determined to be +8.73,° which indicated that there was no racemization during the cyclization.



Scheme 19: Cyclization of chiral triamine **A** to synthesize hpp'H.

Spectroscopic Characterization of hpp'H

The cyclized product, either the guanidine hpp'H or the guanidinium hpp'$H_2^+I^-$, was characterized by ^{1}H (600 MHz) and ^{13}C (75 MHz) NMR spectroscopies. The ^{1}H (600 MHz) spectrum consists of a doublet at δ 1.235 with coupling constant of 6 Hz and corresponds to the methyl group. There are multiplets at δ 1.85 and 1.94 corresponding to 2 protons (by integration) each in the ^{1}H NMR spectrum. Another multiplet exists at δ 3.35 corresponds to 4 protons (by integration). A multiplet at δ 3.58 corresponds to the CH attached to the methyl group. High field 2D NMR experiments (^{1}H COSY) will be needed in future studies in order to interpret the ^{1}H NMR spectrum more conclusively. The ^{13}C NMR (75 MHz) of hpp'H (if proton exchange between the amidine N's of the guanidine is rapid on the NMR time scale) has 5 peaks that are consistent with the structure of hpp'H or hpp'$H_2^+I^-$. The key resonance at δ 150.23 corresponds to the guanidine core carbon atom.

Solid-State Structure of hpp$H_2^+I^-$ via Single-Crystal X-ray Diffractometry

What was thought to be hpp'H crystallized in a chiral space group $P2_12_12_1$. Surprisingly, the compound studied was the HI salt hpp'$H_2^+I^-$, as shown by single-crystal X-ray diffractometry. The iodide presumably was derived from the last step in the synthesis that used MeI. Therefore, the reaction mixture was not sufficiently neutralized by NaOH. However, the presence of the adventitious I^- proved fortuitous as it allowed for

direct assignment of the chiral centres. Dempsey's method[64] also generated the iodide salt before neutralization.

The solid state structure of hpp'$H_2^+I^-$ compares closely to that of hpp*H as synthesized by Cotton and co-workers;[59] they crystallized hpp*H as the HCO^-_3 salt hpp*$H_2^+(HCO_3)^-$. The crystal structure of hpp'$H_2^+I^-$ (Figure 18) shows the expected

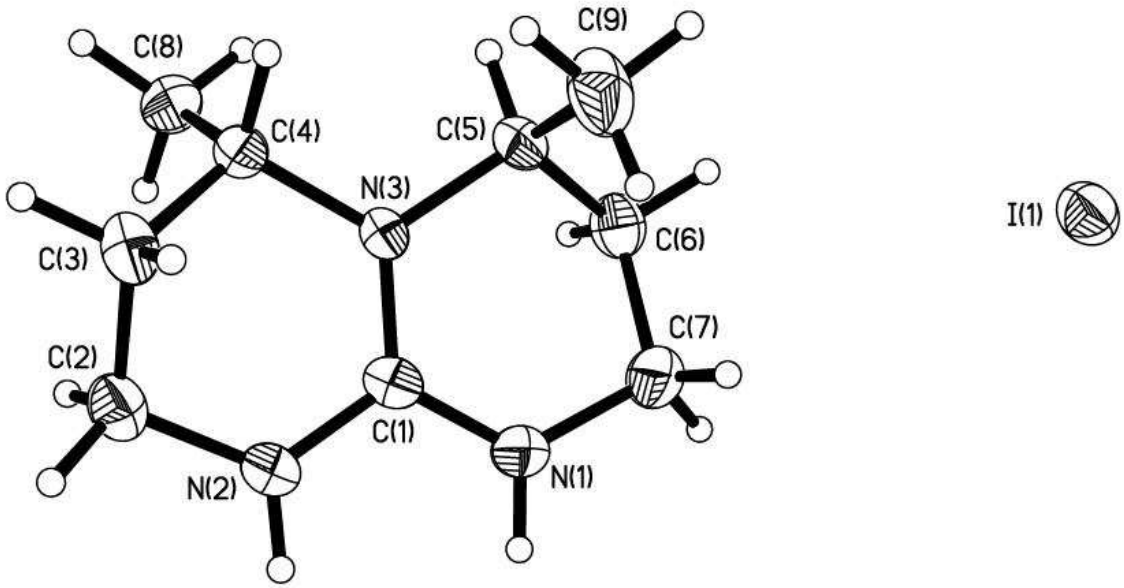


Figure 18: View of solid-state structure of hpp'$H_2^+I^-$ approximately perpendicular to the bicyclic structure. Thermal ellipsoids are shown at the 50% probability level.

stereochemistry of the methyl groups at the carbons attached to the bridge-head nitrogen (N3), which suggests no racemization and no isomerization during the course of chemical synthesis, though on the basis of the one crystal examined. The C-N bond lengths of the guanidinium core of hpp'$H_2^+I^-$ (C(1)-N(3) = 1.323(6) Å, C(1)-N(1) = 1.337(7) Å and C(1)-N(2) = 1.333(7) Å) are consistent with delocalization of the lone pair of the bridge-head nitrogen (N3) into the guanidinium core. The bond lengths C(1)-N(1) and C(1)-N(2) are similar, consistent with a guanidinium structure. The C-N bond lengths are also

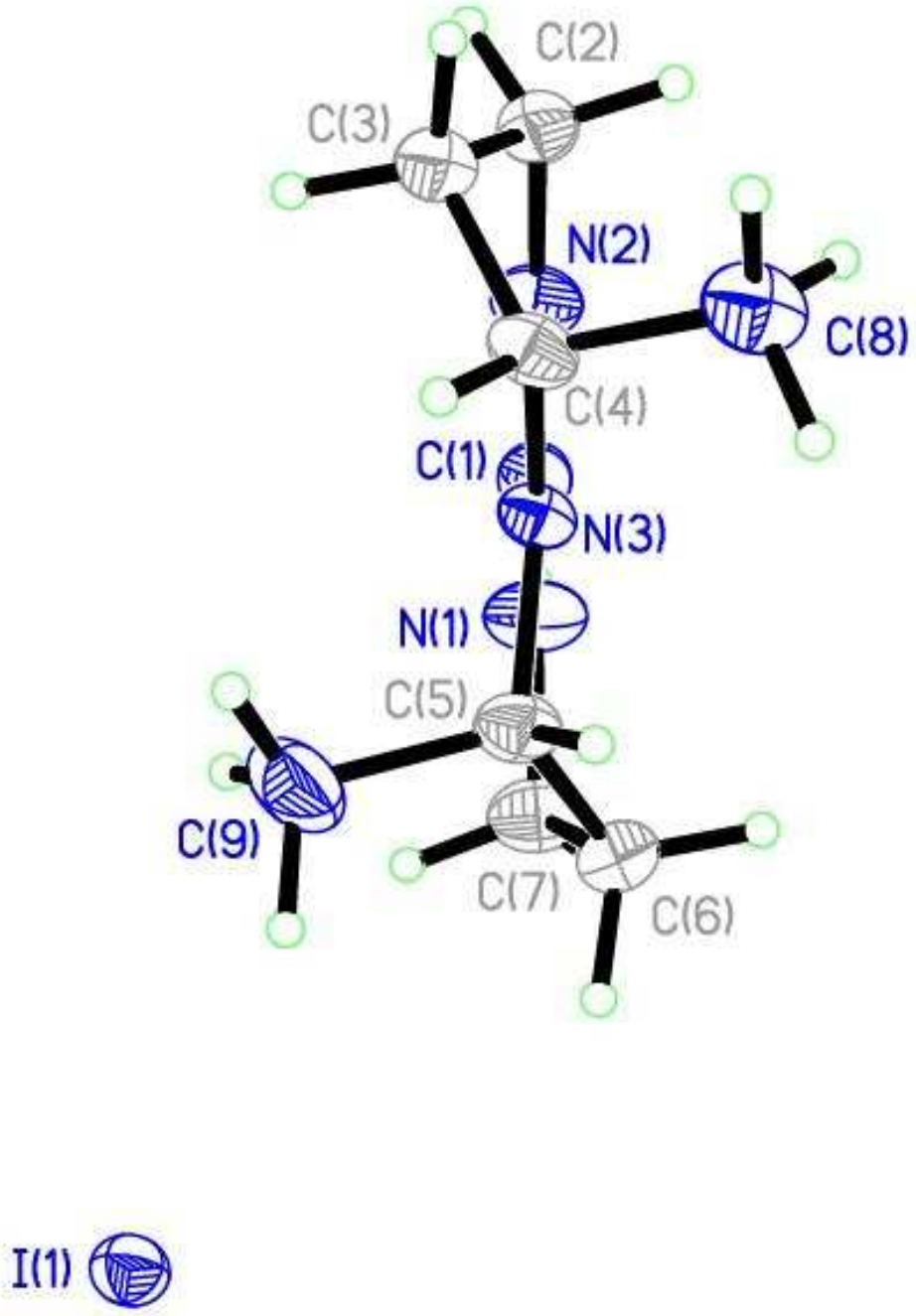


Figure 19: View of solid-state structure of hpp'$H_2^+I^-$ down the N(3)-C(1) bond. Thermal ellipsoids are shown at the 50% probability level.

similar to those in Cotton's[59] hpp*$H_2^+(HCO_3)^-$ (C(1)-N(3) = 1.333(2) Å, C(1)-N(1) = 1.335(2) Å and C(1)-N(2) = 1.334(2) Å)). The bond angles around C(1) (N(3)-C(1)-N(2) = 121.1(5)˚, N(3)-C(1)-N1(1) = 121.6(5)˚ and N(1)-C(1)-N(2) = 117.2(5)˚) are also very similar to those found in Cotton's hpp*$H_2^+(HCO_3)^-$ (N(3)-C(1)-N(2) = 121.0(2)˚, N(3)-C(1)-N1(1) = 120.6(2)˚ and N(1)-C(1)-N(2) = 118.3(2)˚). The bond angles around N(3) in hpp$H_2^+I^-$are C(1)-N(3)-C(4) = 122.1(4)˚, C(1)-N(3)-C(5) = 120.3(4)˚ and C(4)-N(3)-C(5) = 117.2(4)˚. The sum of the angles at both C(1) (359.9˚) and N(3) (359.6˚) show that these atoms are planar, consistent with delocalization of electron density from the bridge-head nitrogen N(3) into the core of the ring. Figure 19 shows the planarity of the guanidinium N_2CN core of the ring and also the orientation of the two methyl groups.

Conclusions

The synthesis of hpp'H, the precursor to the C_2-symmetric guanidinate hpp'$^-$ was based on L-alanine as the chiral precursor. The key step was the coupling of L-alaninol (derived from L-alanine) with commercially available hydroxyacetone via reductive amination. An important step was the diastereoselective resolution of N-benzyl-protected meso and C_2-symmetric aminodinitriles $PhCH_2N(CH(CH_3)CH_2CN)_2$. Cyclization of the chiral, C_2-symmetric triamine $HN(CH(CH_3)CH_2CH_2NH_2)_2$, derived from reduction of the debenzylated aminodinitrile, using dimethyl trithiocarbonate yielded hpp'$H_2^+I^-$ in 26% yield (assuming the product obtained was only hpp'$H_2^+I^-$ and not neutral hpp'H or a mixture of the two). Hpp'H was isolated as hpp'$H_2^+I^-$, presumably from incomplete neutralization by NaOH, as determined by single-crystal X-ray diffractometry.

Chiral hpp'$H_2^+I^-$ was synthesized in six steps, starting from L-alaninol, in 9% overall yield. Chiral hpp'$H_2^+I^-$ was characterized by ^1H and ^{13}C NMR spectroscopies, single-crystal X-ray diffractometry, and high resolution mass spectrometry.

An alternate route to synthesize neutral hpp'H, using carbon disulfide or dimethyl carbonate as C1 reagents, will be explored in the near future.

The potential use of chiral hpp'H as a catalyst in the diastereoselective Henry reaction and enantioselective synthesis of α-amino acids will be studied in the future.

Also, the coordination chemistry of hpp'$^-$ with Ta will be studied. The complexes of hpp'$^-$ will be chiral and are postulated to be more soluble than hpp$^-$ complexes. Also, the C_2-symmetry of hpp'$^-$ will lead to only a single isomer during the formation of paddlewheel complexes. These future studies will determine whether hpp'$^-$ is more basic than hpp$^-$ upon coordination to a metal ion.

Experimental

General Procedures. All procedures were performed under an argon atmosphere unless noted and all glassware was oven dried before use. Sodium cyanide, di-tert-butyldicarbonate [$(Boc)_2O$], carbon tetrabromide, triphenyl phosphine, benzyl bromide, ceric ammonium nitrate, hydroxyacetone, Raney-Nickel (Raney 2800 nickel slurry in water), carbon disulfide (anhydrous) and dimethyl trithiocarbonate were purchased from Aldrich and were used as received. Lithium aluminum hydride and 5-methylisoxazole were purchased from TCI America. Chromium oxide, L-alanine (99% ee), L-phenylalanine, sodium hydride (60% dispersion in mineral oil), and iodomethane were purchased from Acros Organics. L-Alaninol (98% ee) was purchased from Chem-Impex International. Lipase PSC Amano II was a gift from Amano Pharmaceuticals, Japan.
Optical rotation was recorded on Rudolph Research Analytical Autopol III polarimeter at 25°C and 589nm.

Preparation of (S)-L-alaninol. Lithium aluminum hydride (8.96 g, 0.22 mol) was suspended in dry THF, stirred under argon, and cooled in an ice-bath for 15 minutes. After cooling, L-alanine (10.0 g, 0.11 mol) was added to the mixture using a solid addition funnel, slowly and with constant stirring. L-alanine was completely added over a period of 30 minutes. After complete addition, the ice-bath was removed and the mixture refluxed overnight. The reaction mixture was removed from the oil bath and cooled to room temperature and then in an ice-bath for 15 minutes. To this cooled reaction mixture was added 9 mL of water (very slowly, dropwise as the reaction is very exothermic, especially in the beginning), followed by 9 mL of 15% NaOH solution and finally 27 mL water. This resulted in formation of a white granular solid, which was removed by

filtration and washed with EtOAc (20 mL x 3 times). The resulting filtrate was dried over $NaSO_4$ and concentrated using a rotary evaporator to yield L-alaninol as a colorless, viscous oil (7.59 g) used in the next step without purification.

Preparation of 2-hydroxy-1 (S)-methylethyl carbamic acid *tert*-butyl ester ((S)-25) .[62] The crude L-alaninol (7.59 g, 0.11 mmol) obtained above was dissolved in 60 mL THF, stirred under argon, and cooled in ice-bath for 15 minutes. $(Boc)_2O$ (20.95 g, 0.09 mol) dissolved in 20 mL THF was slowly added to the cooled solution of L-alaninol. After complete addition, the mixture was stirred overnight at room temperature. The solvent was removed using a rotary evaporator and the resulting oil dissolved in water and then extracted using CH_2Cl_2 (50 mL x 3 times). The combined organic layers were dried over Na_2SO_4 and concentrated to an oil. The resulting oil solidified to a white solid on cooling to 5°C. The white solid was recrystallized using heptane to yield **(S)-25** (12.68 g, 72% overall yield starting from L-alanine) as white crystals. Melting point 62-64°C (lit[62] 60 °C). ^{1}H NMR ($CDCl_3$, 300 MHz): δ 1.1 (d, 3H, 6.6 Hz, -CH-C$\underline{H}_3$), 1.41 (s, 9H, -(C$\underline{H}_3$)$_3$), 2.6 (broad s, 1H, -O$\underline{H}$), 3.44-3.62 (m, 2H, -CH-C$\underline{H}_2$-), 3.7 (m, 1H, -C$\underline{H}$-CH_3), 4.67 (broad s, 1H, -N$\underline{H}$-). ^{13}C NMR ($CDCl_3$, 75 MHz): δ 17.19 (-$\underline{C}H_3$), 28.26 (-($\underline{C}H_3$)$_3$), 48.53 (-$\underline{C}$H-CH_2-), 67.21 (-CH-$\underline{C}H_2$-), 79.58 (-O-$\underline{C}$(CH_3)$_3$), 156.26 (-NH-$\underline{C}O_2$-).

Preparation of 2-methylsulfonyloxy-1 (S)-methylethyl carbamic acid *tert*-butyl ester ((S)-26)[62]**.** The recrystallized **(S)-25** (16.01 g, 0.09 mol) obtained from the above reaction was dissolved in 100 mL CH_2Cl_2, cooled in ice bath, and stirred under argon. After stirring for 15 minutes, triethylamine (25.68 mL, 0.18 mol) was added. A solution of methanesulfonyl chloride (9.94 mL, 0.13 mol) in 20 mL CH_2Cl_2 was slowly added, with constant stirring, to the cooled mixture. After complete addition, the reaction mixture was stirred overnight at room temperature. The reaction mixture was added to 100 mL distilled water and extracted into CH_2Cl_2 (75 x 3mL). The combined organic layers were washed with 0.1N aqueous HCl and then aqueous $NaHCO_3$ solution. The organic layers were combined, dried over Na_2SO_4, and concentrated to yield a yellow-white solid. The crude product was used, without purification, in the next step. ^{1}H NMR ($CDCl_3$, 300 MHz): δ 1.57 (d, 3H, 6.3 Hz, -CH-C$\underline{H}_3$), 1.43 (s, 9H, -(C$\underline{H}_3$)$_3$), 2.71-2.89 (m, 2H, -CH-C$\underline{H}_2$-), 3.11 (s, 3H, -$OSO_2C\underline{H}_3$), 4.96-5.06 (m, 1H, -C$\underline{H}$-CH_2-).

Preparation of 2-cyano-1 (S)-methylethyl carbamic acid *tert*-butyl ester ((S)-27).[62] To a stirred solution of **(S)-26** (18.63 g, 0.07 mol) in 140 mL DMSO was added NaCN (10.81 g, 0.22 mol). The mixture was stirred at 45°C for 24 hours. After cooling to room temperature, water (50 mL) was added and the product was extracted into ethyl acetate (4 x 40 mL). The combined organic layers were dried using Na_2SO_4 and evaporated to yield crude oil. The oil was purified using flash chromatography (hexane/ethyl acetate 1:1, R_f = 0.70) to yield **(S)-27** as a white solid (12.19 g, 90% based on **(S)-25**). ^{1}H NMR ($CDCl_3$, 300 MHz): δ 1.28 (d, 3H, 6.8 Hz, -CH-C$\underline{H}_3$), 1.41 (s, 9H, -($C\underline{H}_3$)$_3$), 2.49-2.52 (m, 1H, -CH-C$\underline{H}_2$-), 2.71-2.74 (m, 1H, -CH-C$\underline{H}_2$-), 3.87-3.95 (m, 1H, -$\underline{CH}$-CH_3), 4.67 (broad s, 1H, -N$\underline{H}$). ^{13}C NMR ($CDCl_3$, 75 MHz): δ 19.44 (-CH-$\underline{C}H_3$), 25.13 (-($\underline{C}H_3$)$_3$), 28.25 (-CH-$\underline{C}H_2$-), 43.19 (-$\underline{C}$H-CH_2), 80.00 [-O$\underline{C}$(CH_3)$_3$], 117.27 ($\underline{C}$N), 154.78 (-NH-$\underline{C}O_2$-).

Preparation of 2-cyano-1-(S)-methylethylammonium trifluoroacetate ((S)-28). A solution of **(S)-27** (14.29 g, 0.08 mol) in 60 mL CH_2Cl_2 was stirred under argon and cooled in an ice-bath for 10 minutes. A solution of trifluoroacetic acid (29.81 mL, 0.39 mol) in 20 mL CH_2Cl_2 was slowly added to the reaction mixture, with constant stirring. The mixture was stirred at room temperature for 4 hours. The solvent was then removed using a rotary evaporator. The excess TFA was removed by adding diethyl ether and removing bath with the rotary evaporator. This cycle of adding ether and removing volatiles was continued (6 x 20 mL) until the end product was a white solid, a very fine crystalline powder (9.83 g, 64% based on **(S)-27**). ^{1}H NMR ($CDCl_3$ + CD_3OD, 300 MHz): δ 1.47-1.49 (d, 3H, 6.6 Hz,-CH-C$\underline{H}_3$), 2.76-2.94 (m, 2H, -CH-C$\underline{H}_2$-), 3.56-3.65 (m, 1H, -$\underline{CH}$-CH_2-), 3.87-3.89 (broad s, 1H, -$^+$N$\underline{H}_3$,). ^{13}C NMR ($CDCl_3$ + CD_3OD, 75 MHz): δ 17.64 (-$\underline{C}H_3$), 22.53 (-CH-$\underline{C}H_2$-), 43.90 (-$\underline{C}$H-CH_2), 115.52 ($\underline{C}$N).

Preparation of 3-hydroxybutyronitrile (29).[75] Diisopropylamine (14.01 mL, 99.89 mmol) was dissolved in 150 mL dry THF and cooled to -20°C (dry ice-acetonitrile bath), and was stirred for 15 minutes under argon. A 2.5 M hexane solution of butyllithium (39.6 mL, 99.01 mmol) was added slowly via syringe. The mixture was stirred at -20°C for 30 minutes. The mixture was then cooled to -80°C (dry ice-acetone bath) and 5.17 mL (99.01 mmol) of acetonitrile in 20 mL THF was added dropwise with stirring for 30 minutes. Ethyl acetate (9.67 mL, 99.01 mmol) dissolved in 15 mL THF was then added dropwise and the resulting mixture stirred at -60°C (dry ice-acetonitrile bath) for 4 hours.

$NaBH_4$ (2.29 g, 59.52 mmol) was added and the mixture brought to room temperature and stirred for 3 hours. The contents were cooled in an ice-bath and the pH slowly neutralized to just acidic (pH=6) by adding aqueous 4N HCl solution. The resulting white solids were filtered and washed with EtOAc (3 x 20 mL). The organic layers were combined, dried over Na_2SO_4, and concentrated in vacuum to yield crude product as a viscous oil with some white precipitate. The crude product was purified using flash chromatography (hexane/ethyl acetate 1:1, R_f = 0.23) to yield pure **29** (8.01 g, 95% based on acetonitrile) as a colorless, viscous oil. ^{1}H NMR ($CDCl_3$, 300 MHz): δ 1.26 (d, 3H, 6.3 Hz, C<u>H</u>$_3$CH-), 2.43, 2.50 (doublets of AB q, 2H, $^2J_{AB}$ = 17.1 Hz, C_{HAHB}, $^3J_{AC}$ = 5.56 Hz, C_{HAHC}, -CH-C<u>H</u>$_2$-), 3.28 (broad s, 1H, O<u>H</u>,), 4.04-4.01 (sextet, 1H, 6 Hz, -CH_2-C<u>H</u>-). ^{13}C NMR ($CDCl_3$, 75 MHz): δ 22.34 (<u>C</u>H$_3$), 27.17 (-<u>C</u>H$_2$), 63.59 (-<u>C</u>H), 117.74 (<u>C</u>N).

Preparation of acetic acid-2-cyano-1-methyl-ethyl ester[76] (**30**)**.** A solution of 3-hydroxybutyronitrile (**29**) (14.12 g, 0.17 mol) in 200 mL of CH_2Cl_2 was stirred under argon and cooled in ice-bath. Pyridine (30 mL) was added followed by slow addition of acetyl chloride (23.6 mL, 0.33 mol) dissolved in 20 mL CH_2Cl_2. The reaction mixture was stirred overnight at room temperature. The contents of the flask were cooled in ice, and ice was added to quench the reaction. The product was extracted into CH_2Cl_2 (3 x 25 mL) and washed with concentrated aqueous $NaHCO_3$ and finally with brine solution. The combined organic extracts were dried over Na_2SO_4 and concentrated to yield an orange-red oil. The crude product was purified using flash chromatography (hexane/ethyl acetate 1:1, R_f = 0.58) to yield **30** (18.6 g, 88.2 % based on **29**) as a yellow oil. ^{1}H NMR ($CDCl_3$, 300 MHz): δ 1.38 (d, 3H, 6.3 Hz, C<u>H</u>$_3$-CH-), 2.05 (s, 3H, C<u>H</u>$_3$CO-), 2.65, 2.73 (doublets of AB q, 2H, $^2J_{AB}$ = 16.95 Hz, C_{HAHB}, $^3J_{AC}$ = 5.40 Hz, C_{HAHC}, -CH-C<u>H</u>$_2$-), 5.02-5.08 (sextet, 1H, 5.4 Hz, -CH_2-C<u>H</u>-).

Preparation of chiral (R)-3-hydroxybutyronitrile ((R)-29): Enzyme catalyzed reaction.[76] To a solution of **30** (3.01 g, 0.02 mol) in deionized water-acetone (200mL: 30 mL), was added 1,4,8,11-tetrathiacyclotetradecane (0.32 g, 1.18 mmol). Lipase PSC Amano-II (0.31 g) was added and the mixture stirred at 35°C for 24 hours. The contents were then cooled to room temperature and filtered in order to recover the enzyme. The product was extracted into ethyl acetate (3 x 35 mL). The combined organic extracts were dried over Na_2SO_4 and concentrated to yield a viscous oil. The crude was then purified

using flash chromatography (hexane/ethyl acetate 1:1, R_f = 0.23) to yield pure **(R)-29** as a colorless oil (1.11 g, 55% based on **30**). The enantiomeric excess of **(R)-29** was determined using chiral GC (90% ee). ^{1}H NMR ($CDCl_3$, 300 MHz): δ 1.26 (d, 3H, 6.0 Hz, C<u>H</u>$_3$-CH-), 2.69, 2.43, 3.50 (doublets of AB q, 2H, $^2J_{AB}$ = 17.1 Hz, C_{HAHB}, $^3J_{AC}$ = 5.56 Hz, C_{HAHC}, -CH-C<u>H</u>$_2$-), 3.28 (broad s, 1H, O<u>H</u>), 4.04-4.01 (sextet, 1H, 6 Hz, -CH_2-C<u>H</u>-). ^{13}C NMR ($CDCl_3$, 75 MHz): δ 22.34 (<u>C</u>H_3), 27.17 (-<u>C</u>H_2), 63.59 (-<u>C</u>H), 117.74 (<u>C</u>N).

Preparation of methanesulfonic acid-2-cyano-1(R)-methylethyl ester ((R)-31). A solution of **(R)-29** (2.01 g, 0.02 mol) in 30 mL CH_2Cl_2 was stirred under argon and cooled in an ice-bath for 10 minutes. Triethylamine (6.61 mL, 0.05 mol) was added, followed by a solution of methanesulfonyl chloride (2.54 mL, 0.03 mol) in 5 mL CH_2Cl_2. The reaction mixture was refluxed for 4 hours, cooled to room temperature, and mixed with distilled water. The product was extracted with CH_2Cl_2 (3 x 15 mL) and washed with 0.1 N aqueous HCl and aqueous $NaHCO_3$ solution. The organic phase was dried with Na_2SO_4 and concentrated under vacuum to yield an oil. The crude oil was purified using flash chromatography (hexane/ethyl acetate 1:1, R_f = 0.4), to yield **(R)–31** as orange-yellow oil (2.99 g, 78% based on **(R)-29**). ^{1}H NMR ($CDCl_3$, 300 MHz): δ 1.46 (d, 3H, 6 Hz, C<u>H</u>$_3$-CH-), 2.84, 2.65 (doublets of AB q, 2H, $^2J_{AB}$ = 17.1 Hz, C_{HAHB}, $^3J_{AC}$ = 5.6 Hz, C_{HAHC}, -CH-C<u>H</u>$_2$-), 3.01 (s, 3H, -O-SO_2-C<u>H</u>$_3$), 4.90 (sextet, 1H, 5.7 Hz, -C<u>H</u>-CH_2-). ^{13}C NMR ($CDCl_3$, 75 MHz): δ 20.82 (<u>C</u>H_3-CH-), 25.32 (-<u>C</u>H_2-CN), 38.40 (-O-SO_2-<u>C</u>H_3), 72.78 (-O-<u>C</u>H-), 115.78 (<u>C</u>N).

Preparation of cyanoacetone. A solution of 3-hydroxybutyronitrile **29** (2.01 g, 0.02 mol) in 50 mL acetone was cooled in an ice-bath. Jones reagent (12 mL, prepared by adding 5.01 g of CrO_3 to 5 mL conc. H_2SO_4, followed by adding to 15 mL cooled water to give an orange-red solution) was slowly added to the cooled solution until the red color of Jones reagent persisted. The mixture was then refluxed for 1 hour, followed by cooling to room temperature. The pH of the reaction mixture was neutralized to just basic by adding 20% aqueous NaOH solution. The resulting precipitate was filtered through Celite and the product extracted into EtOAc (3 x 25 mL). The organic extracts were dried over Na_2SO_4 and concentrated under vacuum to yield cyanoacetone (1.46 g, 75% based on **29**). The product obtained was pure by TLC and ^{1}H NMR spectroscopy. Cyanoacetone

prepared above was used immediately as it decomposes to an orange-red polymer (which is not soluble in common organic solvents) in air for 10 minutes. ^{1}H NMR ($CDCl_3$, 300 MHz): δ 2.4 (s, 3H, C<u>H</u>$_3$), 3.68 (s, 2H, C<u>H</u>$_2$). ^{13}C NMR ($CDCl_3$, 75 MHz): δ 29.27 (<u>C</u>H$_3$), 32.86 (-<u>C</u>H$_2$), 114.16 (-<u>C</u>N), 198.12 (-<u>C</u>=O).

Coupling of cyanoacetone with (S)-28 via reductive amination. Freshly-prepared cyanoacetone (1.46 g, 17.51 mmol) was dissolved in 30 mL dry THF and stirred under argon. Ti(O*i*Pr)$_4$ (6.31 mL, 21.01 mmol) was added slowly to the reaction mixture with stirring at room temperature for 10 minutes. **(S)-28** (3.48 g, 17.51 mmol) was added and the mixture was stirred at room temperature for 5 hours. $NaBH_4$ (1.38 g, 35.01 mmol) was then added very slowly and the contents stirred at room temperature overnight. The reaction was quenched with 30 mL 1N aqueous NaOH (added very slowly as the reaction was rapid and resulted in the formation of bubbles) to give a white precipitate. The white precipitate was filtered and the solvent removed under vacuum. The resulting oil was dissolved in distilled water and the products extracted into CH_2Cl_2 (3 x 25 mL), dried over Na_2SO_4, and concentrated under vacuum. The crude products were analyzed by GC-MS and were determined to be the reduced secondary alcohol of cyanoacetone and the neutral chiral amine **(S)-28**. The desired diastereomers **B** were not obtained.

Preparation of the sodium salt of cyanoacetone.[78] Sodium methoxide (1.95 g, 36.01 mmol) was suspended in 10 mL absolute EtOH, cooled in an ice-bath and stirred under argon. After 10 minutes, a solution of 5-methylisoxazole (3.01 g, 36.01 mmol) in 10 mL EtOH was added slowly dropwise. The mixture was stirred at room temperature overnight. The solvent was removed under vacuum and the white solid (3.61 g, 95% based on 5-methylisoxazole) dried under vacuum and then used in the next step without purification.

Preparation of cyanoacetone from sodium salt of cyanoacetone.[79] The sodium salt of cyanoacetone (1.01 g, 9.51 mmol) was suspended in a 1:1 mixture of CH_2Cl_2:H_2O (15 mL: 15 mL). Aqueous 2N HCl solution was added dropwise until the pH of the solution reached 1. The product was extracted into CH_2Cl_2 (3 x 20 mL), dried under Na_2SO_4, and concentrated under vacuum to yield cyaoacetone (0.59 g, 75%) as a colorless oil. The product obtained was used immediately for the next step as it decomposes to an orange-red polymer in air.

Preparation of 3-bromobutyronitrile (32). A solution of 3-hydroxybutyronitrile (**29**) (4.01 g, 47.01 mmol) in 50 mL CH_2Cl_2 was cooled in an ice-bath and stirred for 10 minutes. Triphenylphosphine (14.79 g, 56.41 mmol) was added, followed by dropwise addition of carbon tetrabromide (18.71 g, 56.41 mmol) in 10 mL CH_2Cl_2 using an addition funnel over a period of 10 minutes. The reaction mixture was stirred at room temperature for 14 hours. Water (20 mL) was added and the mixture extracted with CH_2Cl_2 (3 x 15 mL). The combined organic extracts were dried over Na_2SO_4 and concentrated to yield a crude yellow-orange solid. The solid was purified using column chromatography (hexane/ethyl acetate 6:4, R_f = 0.56) to yield **32** as a colorless oil (4.81 g, 70% based on **29**). The product **32** is very volatile, so concentration on a rotary evaporator must be done very carefully in order to minimize product loss. ^{1}H NMR ($CDCl_3$, 300 MHz): δ 1.84 (d, 3H, 6.6 Hz, C<u>H</u>$_3$-CH-), 2.98 (d, 2H, 6 Hz, -CH-C<u>H</u>$_2$-), 4.28 (m, 1H, -C<u>H</u>-CH$_2$-). ^{13}C NMR ($CDCl_3$, 75 MHz): δ 25.29 (<u>C</u>H$_3$-CH-), 29.54 (-CH-<u>C</u>H$_2$-), 40.19 (-<u>C</u>H-CH$_2$-), 116.51 (<u>C</u>N).

Preparation of 1-hydroxy-3-(S)-phenyl propyl carbamic acid *tert*-butyl ester (33). Lithium aluminum hydride (8.01 g, 0.21 moles) was suspended in 250 mL dry THF under argon and cooled in an ice-bath. L-Phenylalanine (16.59 g, 0.11 moles) was slowly added using a solid-addition funnel, keeping the temperature of the reaction flask below 40°C, over a period of 45 minutes. The ice-bath was removed and the mixture allowed to rise to room temperature. The reaction mixture was refluxed for 14 hours. The flask was cooled to room temperature, then in an ice-bath for 10 minutes. The excess lithium aluminum hydride was destroyed by slowly adding 8 mL H_2O, followed by 8 mL of 15% NaOH and then finally with 24 mL of H_2O. The resulting white granular solid was stirred for 5 minutes. $(Boc)_2O$ (21.91 g, 0.11 moles) dissolved in 20 mL dry THF, was added to the reaction mixture slowly, with stirring. The resulting mixture was refluxed overnight. The white granular solids were removed by filtration and washed with EtOAc (5 x 25 mL). The combined organic extracts were dried over Na_2SO_4 and concentrated to yield **33** (22.7 g, 90% based on L-phenylalanine) as a white solid. The solid was used in the next step without purification. ^{1}H NMR ($CDCl_3$, 300 MHz) δ 1.40 (s, 9H, -C(C<u>H</u>$_3$)$_3$), 2.83 (d, 2H, 7.05 Hz, -C<u>H</u>$_2$Ph), 3.49-3.65 (m, 2H, -CH-C<u>H</u>$_2$-), 3.86 (m, 1H, -C<u>H</u>-CH$_2$-), 4.92 (broad s, 1H, -N<u>H</u>-CO-,), 7.20-7.29 (m, 5H, <u>Ph</u>).

Preparation of methanylsulfonyloxy-2 (S)-3-phenyl propyl carbamic acid *tert*-butyl ester (34). A solution of **33** (22.51 g, 89.51 mmol) in 100 mL CH_2Cl_2 under argon was cooled in an ice bath. After stirring for 15 minutes, triethylamine (25.18 mL, 0.18 mol) was added followed by solution of methanesulfonyl chloride, (8.35 mL, 0.11 mol) in 20 mL CH_2Cl_2. The reaction mixture was stirred overnight at room temperature, added to 100 mL distilled water, and extracted into CH_2Cl_2 (5 x 30 mL). The combined organic layers were washed with 0.1N aqueous HCl and saturated aqueous $NaHCO_3$ solution. The organic layers were dried over Na_2SO_4 and concentrated to yield a yellow-white solid. The crude product was purified using flash chromatography (hexane/ethyl acetate 1:1, R_f = 0.53) to give **34** as a white solid (22.72 g, 77% based on **33**). ^{1}H NMR ($CDCl_3$, 300 MHz): δ 1.43 (s, 9H, -C(C$\underline{H}_3$)$_3$], 2.88 (m, 2H, -C$\underline{H}_2$Ph), 3.02 (s, 3H, -OSO$_2$C$\underline{H}_3$), 4.1-4.24 (m, 3H, -C$\underline{H}_2$-C$\underline{H}$-), 4.8 (m, 1H, -$\underline{NH}$-CO-), 7.24-7.33 (m, 5H, Ph). ^{13}C NMR ($CDCl_3$, 75 MHz): δ 28.23 (-C($\underline{C}$H$_3$)$_3$), 37.16 (-OSO$_2\underline{C}$H$_3$), 49.20 (-$\underline{C}$H-NH-), 69.76 (-$\underline{C}$H$_2$-O-), 84.42 [-O-$\underline{C}$(CH$_3$)$_3$], 126.89, 128.70, 129.20, 136.54 (Ph), 155.86 (-NH-$\underline{C}$=O).

Preparation of 3-cyano-2 (S)-phenyl propyl carbamic acid *tert*-butyl ester (35). To a stirred solution of **34** (22.68 g, 68.8 mmol) in 250 mL dry DMSO, was added NaCN (8.43 g, 172 mmol). The contents of the reaction mixture were stirred at 50°C for 24 hours. The reaction was quenched with 200 mL water and 100 mL brine solution. The product was extracted with EtOAc (4 x 60 mL) and the combined organic extracts were dried over Na_2SO_4 and concentrated to yield a dark-brown oil. The crude product was purified using flash chromatography (hexane/ethyl acetate 1:1, R_f = 0.75) to yield **35** as a white solid (11.06 g, 61% based on **34**). ^{1}H NMR ($CDCl_3$, 300 MHz): δ 1.4 (s, 9H, -C(C$\underline{H}_3$)$_3$), 2.35-2.42 (dd, 1H, $^2J_{AB}$ = 16.8 Hz, C_{HAHB}, $^3J_{AC}$ = 4.32. C_{HAHC}, -C$\underline{H}_2$Ph), 2.65-2.67 (m, 1H, -C$\underline{H}_2$-CH-), 2.79-2.87 (m, 1H, -C$\underline{H}_2$Ph), 2.96-2.98 (m, 1H, C$\underline{H}_2$-CH-), 4.05 (m, 1H,-CH$_2$-C$\underline{H}$-), 4.74-4.77 (m, 1H, -$\underline{NH}$-CO-), 7.19-7.32 (m, 5H, Ph). ^{13}C NMR ($CDCl_3$, 75 MHz): δ 22.34 (-$\underline{C}$H$_2$-CN), 28.15 (-C($\underline{C}$H$_3$)$_3$), 39.26 ($\underline{C}$H$_2$Ph), 48.36 (-$\underline{C}$H-NH-), 80.16 [-O-$\underline{C}$(CH$_3$)$_3$], 117.24 ($\underline{C}$N), 127.12, 128.82, 128.98, 136.0 (Ph), 154.74 (-NH-$\underline{C}$=O).

Preparation of 3-amino-4-(S)-phenyl-butyronitrile ((S)-36). Pure **35** (10.01 g, 38.41 mmol) was dissolved in 100 mL CH_2Cl_2 and stirred under argon. Dry HCl gas was bubbled through the solution via a needle through a septum. Immediately, white solid

precipitated. Dry HCl gas was added for 30 minutes until the spot on TLC for **35** disappeared. The resulting white solid was filtered and dried under vacuum. The white solid was suspended in 100 mL CH_2Cl_2 and the pH of the solution increased by adding Et_3N until the pH was basic (~8.0 using pH paper). Water was added and the product was extracted into CH_2Cl_2 (3 x 50 mL), dried over Na_2SO_4 and concentrated to yield a viscous oil. The crude product was purified by flash chromatography (CH_2Cl_2/MeOH 9:1, R_f = 0.47) to yield pure **(S)-36** (5.51 g, 90% based on **35**) as a colorless, viscous oil. ^{1}H NMR ($CDCl_3$, 300 MHz): δ 1.38 (broad s, 2H, -N$\underline{H}_2$,), 2.35, 2.45 (doublets of AB q, 2H, $^2J_{AB}$ = 17.1 Hz, C_{HAHB}, $^2J_{AC}$ = 5.73 Hz, C_{HAHC}, -C$\underline{H}_2$-Ph), 2.73, 2.83 (doublets of AB q, 2H, $^2J_{AB}$ = 16.1 Hz, C_{HAHB}, $^2J_{AC}$ = 7.56 Hz, C_{HAHC}, -C$\underline{H}_2$-CN), 3.33-3.38 (quintet, 1H, 5.78 Hz -CH_2-C$\underline{H}$-), 7.17-7.31 (m, 5H, Ph). ^{13}C NMR ($CDCl_3$, 75 MHz): δ 25.82 (-$\underline{C}H_2$-CN), 43.20 ($\underline{C}H_2$Ph), 49.74 (-$\underline{C}$H-CH_2-), 117.99 ($\underline{C}$N), 126.86, 128.70, 129.04, 137.25 (Ph).

Preparation of 3-oxo-4-phenylbutyronitrile (37). Freshly distilled (from KOH) diisopropylamine (14.00 mL, 99.61 mmol) was dissolved in dry THF (200 mL), stirred under argon, and cooled to -20°C in a dryice-acetonitrile bath. After 15 minutes, 2.5 M BuLi (40.10 mL, 99.61 mmol) was added very slowly, with constant stirring over 10 minutes. The mixture was stirred at -20°C for 30 minutes, then cooled to -80°C (dry ice-acetone bath). A solution of CH_3CN (5.00 mL, 95.71 mmol) in 10 mL THF was added slowly to yield a white, milky suspension. The mixture was stirred for 30 minutes. Ethyl phenylacetate (15.00 mL, 94.18 mmol) dissolved in 10 mL THF was added to the mixture, resulting in a clear yellow solution. The mixture was stirred at -60°C (dry ice - acetonitrile bath) for 4 hours then allowed to warm to room temperature. The mixture was cooled in an ice-bath and the pH neutralized to 7 using aqueous 1N HCl. The product was extracted into EtOAc (5 x 30 mL), dried over Na_2SO_4 and concentrated to yield a yellow, viscous oil. The crude product was purified using flash chromatography (hexane/ethyl acetate 1:1, R_f = 0.63) to give **37** (9.14 g, 60% based on acetonitrile) as a yellow-white solid. ^{1}H NMR ($CDCl_3$, 300 MHz): δ 3.4 (s, 2H, -C$\underline{H}_2$-CN), 3.82 (s, 2H, -$\underline{C}H_2$-Ph), 7.17-7.35 (m, 5H, Ph). ^{13}C NMR ($CDCl_3$, 75 MHz): δ 31.13 (-$\underline{C}H_2$-CN), 49.03 (-$\underline{C}H_2$-Ph), 113.65 ($\underline{C}$N), 127.82 , 129.10, 129.34, 131.87 (Ph), 195.38 (–$\underline{C}$=O).

Preparation of 3-hydroxy-4-phenylbutyronitrile (38). Diisopropylamine (20 mL, 142 mmol) was dissolved in dry THF (250mL) in a three-neck flask under argon and cooled

at -20°C (dry ice-acetonitrile bath) for 15 minutes. A hexane solution of 2.5 M BuLi (57 mL, 142 mmol) was slowly added, using a syringe, with constant stirring. The contents of the flask were stirred at -20°C for 30 minutes. The mixture was cooled to -70°C in a dryice- acetone bath for 30 minutes, and CH_3CN (7.3 mL, 140 mmol) diluted with 10 mL THF was slowly added to the reaction mixture to give a white-turbid solution. Ethyl phenylacetate (22.29 mL, 140 mmol), diluted with 20 mL THF, was added slowly to the reaction mixture. The mixture was stirred at -60°C (dry ice-acetonitrile bath) for 4 hours. Sodium borohydride (5.4 g , 142 mmol) was slowly added and the reaction mixture allowed to warm to room temperature and stirred overnight. The reaction mixture was cooled in an ice-bath and the pH was neutralized with 2N aqueous HCl to pH 6. The product was extracted with EtOAc (4 x 30 mL), and the extracts were dried over Na_2SO_4 and then concentrated to yield a light yellow oil. The crude oil was purified using flash chromatography (hexane/ethyl acetate 1:1, R_f = 0.47) to give **38** (16.12 g, 72% based on acetonitrile) as a colorless oil. ^{1}H NMR ($CDCl_3$, 300 MHz): δ 2.43, 2.51 (doublet of AB q, 2H, $^2J_{AB}$ = 16.74 Hz, C_{HAHB}, $^3J_{AC}$ = 5.5 Hz, C_{HAHC}, -C<u>H</u>$_2$-CN), 2.83-2.86 (m, 2H, Ph-C<u>H</u>$_2$-), 3.19-3.21 (m, 1H, CH-O<u>H</u>), 4.07-4.09 (m, 1H, -C<u>H</u>-CH$_2$-), 7.18-7.30 (m, 5H, Ph). ^{13}C NMR ($CDCl_3$, 75 MHz): δ 24.79 (-<u>C</u>H$_2$-CN), 42.45 (Ph-<u>C</u>H$_2$-), 68.23 (-<u>C</u>H-OH), 117.64 (<u>C</u>N), 126.82, 128.57, 129.14, 136.36 (Ph).

Preparation of 3-bromo-4-phenylbutyronitrile (39). A solution of **38** (3.00 g, 18.6 mmol) in 25 mL CH_2Cl_2 in a three-neck flask was cooled in an ice-bath. Triphenylphosphine (5.80 g, 22.31 mmol) was added, followed by dropwise addition of carbon tetrabromide (7.41 g, 22.31 mmol) in 10 mL CH_2Cl_2 using an addition funnel. The reaction mixture was stirred at room temperature for 12 hours, then added to 10 mL water. The product was extracted into CH_2Cl_2 (3 x 15 mL). The combined organic layers were dried over Na_2SO_4 and concentrated to yield a solid. The crude product was purified using column chromatography (hexane/ethyl acetate 7:3, R_f = 0.6) to yield **39** (2.9 g, 70% based on **38**) as a colorless oil. ^{1}H NMR ($CDCl_3$, 300 MHz): δ 2.83-2.87 (m, 2H, -C<u>H</u>$_2$-CN), 3.18-3.44 (m, 2H, Ph-C<u>H</u>$_2$-), 4.22-4.35 (quintet, 1H, 6.2 Hz, -C<u>H</u>-Br), 7.12-7.34 (m, 5H, Ph). ^{13}C NMR ($CDCl_3$, 75 MHz) δ: 26.81 (-<u>C</u>H$_2$-CN), 44.07 (Ph-<u>C</u>H$_2$-), 45.42 (-<u>C</u>H-Br), 116.45 (<u>C</u>N), 127.49, 128.78, 128.96, 136.24 (Ph).

Preparation of 2-(2-hydroxy-1-methyl-ethylamino)propan-1-ol (42).[83] L-Alaninol (15.36 g, 204.5 mmol) was added to 350 mL MeOH, in a pressure reactor glass bottle, followed by hydroxyacetone (17.15 mL, 224.95 mmol). PtO_2 (0.15 g) was added to the reaction mixture and the reactor bottle was pressurized with H_2 gas at 50 psi. The mixture was stirred at room temperature for 15 hours. The brown catalyst (PtO_2) turned black after stirring under H_2. The mixture was filtered through Celite and the solids washed with 10 mL MeOH. The filtrates were combined and concentrated on a rotary evaporator to yield a viscous oil. The crude product was purified using vacuum distillation (90-95°C/120 mTorr, literature value[83] = 83°C/150 mTorr) to yield pure **42** (24.27 g, 89% based on L-alaninol) as a highly viscous oil (mixture of diastereomers, 1:0.9 by ^{1}H NMR integration). The product was stored at 5°C. ^{1}H NMR ($CDCl_3$, 300 MHz): δ 0.89-0.96 (d, 6H, 6.5 Hz, C<u>H</u>$_3$-CH-), 2.27-2.84 (m, 2H, -C<u>H</u>-CH$_2$-), 3.18-3.29 (m, 4H, -CH-C<u>H</u>$_2$-), 3.44-3.50 (m, 4H, -CH-C<u>H</u>$_2$-), 3.9 (broad s, 3H, -N<u>H</u> + -O<u>H</u>). ^{13}C NMR ($CDCl_3$, 75 MHz): δ 16.29, 17.79 (<u>C</u>H$_3$-CH-), 50.68, 51.80 (-<u>C</u>H-CH$_2$-), 65.06, 66.02 (-<u>C</u>H-CH$_2$-). $[\alpha]^{25°C}_{589nm}$ = +21.45° (*c* = 0.1434, EtOH). HRMS (ESI) calculated for $C_6H_{16}NO_2$ (M+H): 134.1181, found 134.1185.

Preparation of 2-[benzyl-(2-hydroxy-1-methyl-ethyl)-amino]propan-1-ol (43). Pure **42** (18.5 g, 138.9 mmol) was dissolved in 150 mL dry CH_3CN in a three-neck flask under argon. $NaHCO_3$ (17.51 g, 208.3 mmol) and dry benzyl bromider (18.17 mL, 152.79 mmol) was added and the mixture refluxed for 20 hours. The reaction mixture was cooled to room temperature and the white solid filtered and washed with 10 mL CH_3CN. The filtrate was concentrated using a rotary evaporator to a viscous oil. The crude oil was purified using flash chromatography (hexane/ethyl acetate 2:8, R_f = 0.31) to yield pure **43** (27.58 g, 89% based on **42**) as a white solid (mixture of diastereomers). ^{1}H NMR ($CDCl_3$, 300 MHz) δ 0.97-0.99 (d, 5H, 6.6 Hz, C<u>H</u>$_3$-CH-), 1.05-1.07 (d, 6H, 6.75 Hz, C<u>H</u>$_3$-CH-), 2.62 (broad s, 4H, O<u>H</u>), 2.99-3.05 (m, 4H, CH$_3$-C<u>H</u>-), 3.34-3.39 (m, 8H, -CH-C<u>H</u>$_2$-), 3.52-3.56 (d, 1H, 13.98 Hz, -C<u>H</u>$_2$-Ph), 3.72 (s, 2H, -C<u>H</u>$_2$-Ph), 3.80-3.84 (d, 1H, 14 Hz, -C<u>H</u>$_2$-Ph), 7.23-7.31 (m, 10H). ^{13}C NMR ($CDCl_3$, 75 MHz): δ 12.79, 14.92 (<u>C</u>H$_3$-CH-), 47.64, 48.78 (-<u>C</u>H$_2$-Ph), 52.46, 56.54 (CH$_3$-<u>C</u>H-), 63.79, 64.17 (-<u>C</u>H$_2$-OH), 126.96, 128.38, 128.46, 128.73 (Ph). $[\alpha]^{25°C}_{589nm}$ = + 60.68° (*c* = 0.0515, CH_2Cl_2). HRMS (ESI) calculated for $C_{13}H_{21}NO_2$ (M+H): 224.1651, found 224.1658.

Preparation of benzylbis(2-bromo-1-methylethyl)amine (44). A three-neck flask was charged with pure **43** (8.08 g, 36.2 mmol) and dissolved in 50 mL of dry benzene. The flask was stirred under argon and cooled in an ice-bath for 15 minutes. PBr_3 (10.21 mL, 108.6 mmol) was slowly added (with constant stirring), leading to the formation of a white precipitate. After complete addition, an orange precipitate formed. The mixture was refluxed for 4 hours, and then was brought to room temperature. Benzene was decanted and the orange viscous oil was washed with Et_2O (10 mL). The pH of the orange viscous oil was slowly neutralized to pH = 8.0 using saturated aqueous $NaHCO_3$. The product was extracted into EtOAc (4 x 30 mL). The combined organic extracts were dried over Na_2SO_4 and concentrated using rotary evaporation to yield **44** (hexane/ethyl acetate 1:1, R_f = 0.9) as a brown oil (8.98 g, 71% based on **43**). The product was pure by TLC and NMR spectroscopy and used in the next step without purification. ^{1}H NMR ($CDCl_3$, 300 MHz): δ 1.62-1.66 (m, 6H, C<u>H</u>$_3$-CH-), 2.65-2.91 (m, 4H, -C<u>H</u>$_2$-CH-), 3.56-3.79 (m, 2H, Ph-C<u>H</u>$_2$-), 4.02-4.04 (m, 2H, -CH$_2$-C<u>H</u>-), 7.27-7.31 (m, 5H, Ph). ^{13}C NMR ($CDCl_3$, 75 MHz): δ 23.81 23.89 (<u>C</u>H$_3$-CH-), 47.71, 47.76 (-<u>CH</u>$_2$-Ph), 59.68, 59.86 (-<u>CH</u>-CH$_3$), 63.70, 64.13 (-<u>C</u>H$_2$-Br), 127.22, 127.26, 128.17, 128.23, 128.83, 128.94, 138, 28, 138.36 (Ph). Mass Spectrometry EI (347:349:351; 1:2:1; two Br isotope pattern in mass spectrum).

Preparation of 3-[benzyl-(2-cyano-1-methylethyl)amino]butyronitrile (45). Compound **44** (8.99 g, 25.75 mmol) was dissolved in 80 mL dry DMF in a three-neck flask. Sodium cyanide (5.05 g, 103.01 mmol) was added and the contents heated at 40-50°C for 20 hours. The reaction mixture was cooled to room temperature. Water (100 mL) was added, and the product extracted into CH_2Cl_2 (3 x 30 mL). The combined organic extracts were washed with brine solution, dried over Na_2SO_4, and concentrated under vacuum to yield an oil. The crude product was purified using flash chromatography (hexane/ethyl acetate 1:1, R_f = 0.63) to yield pure **45** (6.48 g, 97% based on **44**) as a white solid. ^{1}H NMR ($CDCl_3$, 300 MHz): δ 1.13-1.20 (m, 6H, C<u>H</u>$_3$-CH-), 2.23-2.40 (m, 4H, -C<u>H</u>$_2$-CH-), 3.13-3.26 (m, 2H, -CH$_2$-C<u>H</u>-), 3.53-3.70 (m, 2H, -C<u>H</u>$_2$-Ph), 7.24-7.29 (m m, 5H, Ph). ^{13}C NMR ($CDCl_3$, 75 MHz): δ 16.17, 18.16 (<u>C</u>H$_3$-CH-), 22.7, 24.51 (-<u>C</u>H$_2$-CH-), 48.56, 48.97 (-<u>C</u>H$_2$-Ph), 49.84, 49.97 (-CH$_2$-<u>C</u>H-), 118.48 (<u>C</u>N), 127.11, 127.15, 127.89, 128.01, 128.34, 128.36, 138.77, 138.80 (Ph).

Preparation of 3-[benzyl-(2-cyano-1-methyl-ethyl)-amino]-butyronitrile (45) via a mesylate route. A solution of **43** (15.31 g, 68.61 mmol) in dry 200 mL CH_2Cl_2 was stirred under argon and cooled in an ice-bath. Triethylamine (24.01 mL, 171.41 mmol) was added, followed by slow addition of methanesulfonyl chloride (11.19 mL, 143.0 mmol). The resulting solution was stirred for two hours at room temperature. The solvent was removed using a rotary evaporator and the resulting oil suspended in 120 mL dry DMF. Sodium cyanide (13.44 g, 274.2 mmol) was added and the mixture was heated at 40°C for 20 hours. The solvent was removed using a rotary evaporator and the resulting oil was suspended in 100 mL water and extracted into EtOAc (4 x 50 mL). The combined organic extracts were dried using Na_2SO_4 and concentrated under vacuum to yield a deep brown viscous oil. The crude product was purified using flash chromatography (hexane/ethyl acetate 1:1, R_f = 0.63) to yield pure **45** (11.55 g, 70% based on **43**) as a white solid. ^{1}H and ^{13}C NMR peaks were identical to those mentioned above. $[\alpha]^{25°C}_{589nm}$ = + 21.87° (*c* = 0.12, $CHCl_3$). HRMS (ESI) calculated for $C_{15}H_{20}N_3$ (M+H): 242.1657, found 242.1658.

Separation of diastereomers of 45 to yield pure, chiral *C*$_2$-symmetric 45. Purified **45** (8.69 g, as a mixture of diastereomers) was suspended in 2 mL CH_2Cl_2 and stirred at room temperature for 4 hours. The solid was filtered, washed with cold CH_2Cl_2: hexane (2:8) and dried under vacuum to yield a white solid (3.37 g). This white solid was again suspended in 2 mL CH_2Cl_2 and stirred at room temperature for 2 hours. The white solid was filtered, washed with cold CH_2Cl_2: hexane (2:8) and dried under vaccum to yield pure **45** (2.45 g) as a single diastereomer. ^{1}H NMR ($CDCl_3$, 300 MHz): δ 1.23 (d, 6H, 6.66 Hz, C<u>H</u>$_3$-CH-) δ 2.44, 2.80 (doublet of AB q, 4H, $^2J_{AB}$ = 16.75 Hz, C_{HAHB}, $^3J_{AC}$ = 7.23 Hz, C_{HAHC}, -C<u>H</u>$_2$-CN), 3.27 (sextet, 2H, 6.84 Hz, CH_3-C<u>H</u>-), 3.6 (d, 1H, 14.5 Hz, -C<u>H</u>$_2$-Ph), 3.81 (d, 1H, 14.5 Hz, -C<u>H</u>$_2$-Ph), 7.22-7.35 (m, 5H, Ph). ^{13}C NMR ($CDCl_3$, 75 MHz): δ 16.54 (<u>C</u>H$_3$-CH-), 24.86 (-<u>C</u>H$_2$-CH-), 49.29 (CH$_3$-<u>C</u>H-), 50.44 (-<u>C</u>H$_2$-Ph), 118.51 (<u>C</u>N), 127.47, 128.21, 128.63, 138.93 (Ph). $[\alpha]^{25°C}_{589nm}$ = + 72.09˚ (*c* = 0.055, $CHCl_3$).

Preparation of 3-(2-cyano-1-methylethylamino)butyronitrile (B). In a three-neck flask, pure **45** (14.79 g, 61.3 mmol) was dissolved in a CH_3CN:H_2O (200 mL:40 mL) solvent mixture under argon. The mixture was cooled in an ice-bath, and ceric

ammonium nitrate (70.56 g, 128.71 mmol) was slowly added with constant stirring. The mixture was stirred at room temperature for three hours, cooled in an ice-bath, and treated with aqueous saturated $NaHCO_3$ until the pH increased to 8.0. The products were then extracted into EtOAc (5 x 40 mL). The organic extracts were dried over Na_2SO_4 and concentrated using a rotary evaporator to yield an oil. The crude product was purified using flash chromatography (hexane/ethyl acetate 2:8, R_f = 0.44) to yield pure **B** (8.79 g, 95% based on **45**) as a yellow-orange oil. ^{1}H NMR ($CDCl_3$, 300 MHz): δ 1.01 (broad s, 1H, N<u>H</u>), 1.18 (d, 6H, 6.4 Hz, C<u>H</u>$_3$-CH-), 2.37, 2.43 (doublet of AB q, 4H, $^2J_{AB}$ = 16.70 Hz, C_{HAHB}, $^3J_{AC}$ = 5.46 Hz, C_{HAHC}, -C<u>H</u>$_2$-CN), 3.08 (sextet, 2H, 6.0 Hz, CH_3-C<u>H</u>-). ^{13}C NMR ($CDCl_3$, 75 MHz): δ 20.86 (<u>C</u>H_3-CH-). 25.43 (-C<u>H</u>$_2$-CH-), 47.12 (-<u>CH</u>$_2$-<u>C</u>H-), 117.64 (<u>C</u>N). $[\alpha]^{25°C}_{589nm}$ = -37.52˚ (*c* = 0.11, $CHCl_3$). HRMS (ESI) calculated for $C_8H_{14}N_3$ (M+H): 152.1188, found 152.1192.

Preparation of 3-(amino-1-methylpropyl)butane-1,3-diamine (A). A glass pressure reactor bottle was charged with pure **B** (8.78 g, 58 mmol), dissolved in 70 mL EtOH and 5 mL H_2O. Sodium hydroxide (1.25 g) was added and the mixture was stirred to dissolve the NaOH. Raney nickel (1.25 g) was washed with H_2O (2 mL x 5 times) and then EtOH (2 mL x 5 times) and transferred to the reaction mixture. The pressure bottle was pressurized with dihydrogen gas (50 psi) and the mixture stirred at room temperature for 24 hours. Fresh washed (water and EtOH) Raney nickel (0.5 g) was again added and the reaction stirred for additional 12 hours under 50 psi of dihydrogen gas. The catalyst mixture was filtered through Celite (caution: catalyst was never dried and always left wet with EtOH) and the solids washed with 5 mL EtOH. The filtrate was concentrated using a rotary evaporator to yield a viscous oil. The oil was dissolved in 20 mL saturated NaOH and extracted with CH_2Cl_2 (5 x 20 mL). The combined organic extracts were dried over Na_2SO_4 and concentrated to yield an oil. The crude oil was purified by vacuum distillation (65-70°C/150 mTorr) to yield **A** (6.91 g, 74% based on **B**) as a colorless oil. ^{1}H NMR ($CDCl_3$, 300 MHz): δ 0.96 (d, 6H, 6.2 Hz, C<u>H</u>$_3$-CH-), 1.01 (broad s, 5H, N<u>H</u>$_2$ + N<u>H</u>), 1.4 (m, 4H, -C<u>H</u>$_2$-CH-), 2.66-2.81 (m, 6H, -C<u>H</u>$_2$-NH_2 + -C<u>H</u>-NH-). ^{13}C NMR ($CDCl_3$, 75 MHz): δ 20.62 (<u>C</u>H_3-CH-), 39.38 (-CH_2-<u>C</u>H_2-CH-), 41.75 (-<u>C</u>H_2-NH_2), 47.93 (CH_3-<u>C</u>H-). $[\alpha]^{25°C}_{589nm}$ = + 27.67˚ (*c* = 0.11, $CHCl_3$). HRMS (ESI) calculated for $C_8H_{22}N_3$ (M+H): 160.1814, found 160.1816.

Preparation of 2-(S),10-(S)-2,10-dimethyl-1,5,7-triazabicyclo[4.4.0]dec-5-ene (hpp'H). A three-neck flask was charged with pure **A** (1.1 g, 6.9 mmol) and dissolved in 40 mL dry, degassed NO_2Me under argon. Dimethyl trithiocarbonate (0.95 mL, 8.61 mmol) was added and the mixture was refluxed for three hours. The mixture was cooled to room temperature. Acetic acid (1.58 g, 27.6 mmol) and methyl iodide (0.86 mL, 13.8 mmol) was added and the mixture refluxed for three hours and then stirred at room temperature overnight. The solvent was evaporated under reduced pressure and the resulting oil suspended in 20 mL water and extracted into CH_2Cl_2 (5 x 20 mL). The organic extracts were passed through a plug of silica gel and eluted with 25 mL CH_2Cl_2, and then with 30 mL MeOH-CH_2Cl_2 (1:4). The collected MeOH-CH_2Cl_2 layers were treated with charcoal, dried with Na_2SO_4, and concentrated under reduced pressure to yield a yellow oil. The oil was dissolved in aqueous 4N NaOH and extracted with CH_2Cl_2 (5 x 15 mL). The combined organic extracts were dried over Na_2SO_4 and concentrated using a rotary evaporator to yield hpp'H (0.53 g, 26% based on **A**) as a yellow-white solid. The product was characterized as hpp'H.HI by single-crystal X-ray diffractometry. ^{1}H NMR ($CDCl_3$, 300 MHz): δ 1.19 (d, 6H, 6.6 Hz, C<u>H</u>$_3$-CH-), 1.75-1.91 (m, 4H, -CH$_2$-C<u>H</u>$_2$-CH-), 3.28-3.33 (m, 4H, -N-C<u>H</u>$_2$-), 3.51-3.57 (m, 2H, -N-C<u>H</u>-), 1H NMR ($CDCl_3$, 600 MHz): δ 1.235 (d, 3H, 6 Hz, C<u>H</u>$_3$-CH-), 1.83-1.86 (m, 2H, -CH$_2$-C<u>H</u>$_2$-CH-), 1.92-1.96 (m, 2H, -CH$_2$-C<u>H</u>$_2$-CH-), 3.33-3.38 (m, 4H, -C<u>H</u>$_2$-CH$_2$-CH-), 3.57-3.59 (m, 2H, -CH$_2$-CH$_2$-C<u>H</u>-). ^{13}C NMR ($CDCl_3$, 75 MHz): δ 17.98 (<u>C</u>H$_3$-CH-), 26.40 (-<u>C</u>H$_2$-CH-), 34.56 (-N-<u>C</u>H$_2$-CH$_2$-), 48.65 (CH$_3$-<u>C</u>H-), 150.03 (-<u>C</u>=N-). HRMS (ESI) calculated for $C_9H_{18}N_3$ (M+H) 168.1501; found 168.1502.

X-Ray Diffractometry : hpp'$H_2^+I^-$. A colorless blade with 0.22 x 0.09 x 0.02 mm^3 dimensions was mounted *via* grease to the tip of a glass fiber (epoxied to a brass pin) and placed on the diffractometer with the long crystal dimension (the *b* unit cell dimension) approximately parallel to the diffractometer phi axis. Data were collected on a Nonius KappaCCD diffractometer (Mo K_α radiation, graphite monochromator) at 190 K (cold N_2 gas stream) using standard CCD data collection techniques. Lorentz and polarization corrections were applied to the 10536 data. A correction for absorption using the multi-scan technique was applied (T_{max} = 0.9485, T_{min} = 0.5912). Equivalent data were averaged yielding 2806 unique data (R-int = 0.0424, 2806 with $F > 2\sigma(F)$). Based on

preliminary examination of the crystal, the space group $P\ 2_12_12_1$ was assigned. The computer programs from the HKLint package were used for the data reduction. Structure refinement was performed with the SHELXTL v6.1 package.

CHAPTER 5

HIGH- AND MID- VALENT TANTALUM AND MONO(PERALKYLCYCLOPENTADIENYL)TANTALUM COMPLEXES OF THE BICYCLIC GUANIDINATE HEXAHYDROPYRIMIDOPYRIMIDINATE

Mono(cyclopentadienyl) piano stool complexes of the early transition metals and lanthanides are of considerable interest in alkene polymerization, e.g., for constrained-geometry catalyst systems,[86,87,88,89,90,91] and small molecule reactivity because they are less sterically encumbered than the extensively–studied bent-sandwich bis(cyclopentadienyl) complexes. Steric and electronic factors of relevance to catalytic activity, selectivity, enantioselectivitiy, and stability can be modified by changes in cyclopentadienyl substituents and the other ancillary ligands in the coordination sphere in these mono(cyclopentadienyl) complexes.

The anion (often abbreviated hpp) of the bicyclic guanidine 1,3,4,6,7,8-hexahydro-2*H*-pyrimido[1,2-*a*]pyrimidine, or 1,5,7-triazabicyclo[4.4.0]dec-5-ene, abbreviated hppH or TBD, exhibits diverse mononuclear and dinuclear transition metal, main group element, and lanthanide coordination chemistries. This area has been reviewed by Coles recently.[53] Since the first demonstration of dinuclear bridging hpp coordination[16] by Bear et al. in 1996, an extensive and interesting range of dinuclear metal-metal bonded hpp paddlewheel- and lantern-style complexes have been reported by Cotton and Murillo,[27,92,93,94] Chisholm,[95] Fackler,[96] and co-workers predominantly for the middle and late transition metals. Notable among these reports is the remarkable $W_2(hpp)_4$ with a highly-reducing ditungsten(II) quadruple bond.

Guanidinate ligands are more basic than the common carboxylate, amidinate, and formamidinate ligands because of a canonical form with donation of the non-coordinating nitrogen's lone pair to the resonance-stabilized NCN portion of the guanidinate. Amidinate and formamidinate ligands have led to a significant early transition metal chemistry relevant to alkene polymerization and small molecule activation (recently and notably dinitrogen activation and cleavage).[97] Amidinates and formamidinates have also been utilized as dinucleating ligands, though they are susceptible to cleavage by strongly reducing early transition metals in their low oxidation states.[98] The bicyclic guanidinate

hpp^- has been shown to be more robust and resistant to such cleavage, leading to low-valent complexes such as $V_2(hpp)_4$,[18] $Nb_2(hpp)_4$,[99] and $[Nb_2(\eta^2\text{-hpp})_4(\mu\text{-}\eta^2,\eta^2\text{-hpp})](PF_6)$.[100] The latter compound as well as $Ti_2(\eta^2\text{-hpp})_2(\mu\text{-}\eta^2,\eta^2\text{-hpp})_2Cl_2$ demonstrate that the hpp ligand can chelate as well as bridge in dinuclear chemistry.

We have been developing mid-valent early transition metal hpp chemistry of tantalum with the goal of accessing new organoditantalum complexes and studying their small molecule, for example dinitrogen,[101] activation chemistry. Tantalum hpp coordination chemistry is poorly developed. The tantalum analog of $V_2(hpp)_4$ and $Nb_2(hpp)_4$, $Ta_2(hpp)_4$, is unknown and only a mononuclear $[Ta^V(hpp)_4]^+$ salt was obtained during synthetic attempts.[50] There are no tantalum analogs of the reported $Nb(hpp)Cl_4$ or $Nb(hpp)_2Cl_3$,[102] as similar synthetic approaches via $TaCl_5$ yielded only $[Ta(hpp)_4]^+[TaCl_6]^-$.[103] There are also no reported mid- or low-valent tantalum or mono(cyclopentadienyl)tantalum hpp complexes.

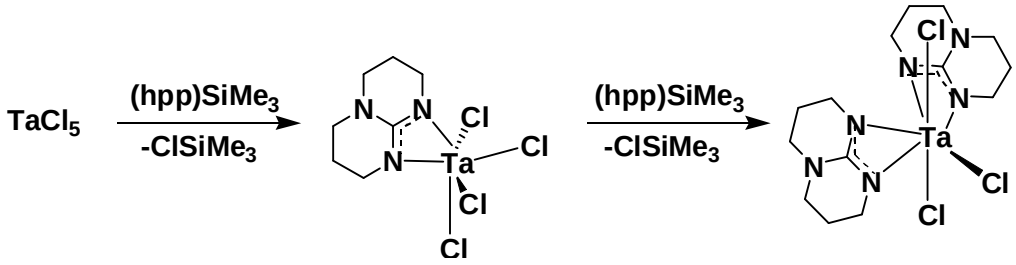
Results and Discussion

Synthesis and Spectroscopic Characterization of $Ta(hpp)_xCl_{4-x}$ (x = 1, 2). The addition of one equivalent of distilled (i.e., not generated *in situ* from Li(hpp) and $ClSiMe_3$ in ethereal solvents) $(hpp)SiMe_3$ to $TaCl_5$ suspended in dichloromethane cleanly gives the mono(hpp) adduct $Ta(hpp)Cl_4$ in 70% yield via elimination of $ClSiMe_3$ (Scheme 20). $Ta(hpp)Cl_4$ is yellow as a recrystallized solid and air- and moisture-sensitive. It is somewhat soluble in aromatic solvents and very soluble in dichloromethane.

The ^1H NMR spectra in C_6D_6 and in CD_2Cl_2 each showed two triplets and an apparent quintet for three sets of methylene protons of the hpp ligand at room temperature. This suggests that either a mirror plane bisects the bicyclic quanidinate in the solution structure or that the hpp ligand is undergoing a dynamic process on the proton NMR time scale that averages the two halves of the hpp ligand.

The bis(hpp) compound $Ta(hpp)_2Cl_3$ cannot be prepared directly from $TaCl_5$ and $(hpp)SiMe_3$ under our reaction conditions (room temperature, dichloromethane solvent);

instead, the reported compound $[Ta(hpp)_4]^+[TaCl_6]^-$ was obtained. This may be the result of the relative insolubility of $TaCl_5$ in dichloromethane, such that hpp/Cl metathesis proceeds too rapidly compared to dissolution/reaction of $TaCl_5$. However, $Ta(hpp)_2Cl_3$ can be prepared in nearly quantitative yield by addition of a second equivalent of $(hpp)SiMe_3$ to a dichloromethane solution of $Ta(hpp)Cl_4$ at 25°C (Scheme 20).



Scheme 20: Synthesis of $Ta(hpp)_xCl_{4-x}$ (x = 1, 2).

$Ta(hpp)_2Cl_3$ exhibited a fast-exchange limit ^1H NMR spectrum at room temperature in CD_2Cl_2, with two triplets and an apparent quintet at chemical shifts slightly upfield of those for $Ta(hpp)Cl_4$ in the same solvent. Given the solid-state pentagonal bipyramidal structure (*vide infra*) of $Ta(hpp)_2Cl_3$, there should be six sets of methylene resonances, so $Ta(hpp)_2Cl_3$ is clearly fluxional in solution. Interestingly, the ^1H NMR spectrum of $Ta(hpp)_2Cl_3$ in C_6D_6 at room temperature shows a broad, poorly resolved doublet, one just past coalescence, for the most downfield methylene resonance. The middle resonance is a slightly broadened triplet, while the upfield quintet is instead a broad apparent singlet. Variable-temperature ^1H NMR spectra in CD_2Cl_2 are shown in stacked form in Figure 20. The spectra show clear trending toward a slow-exchange limit

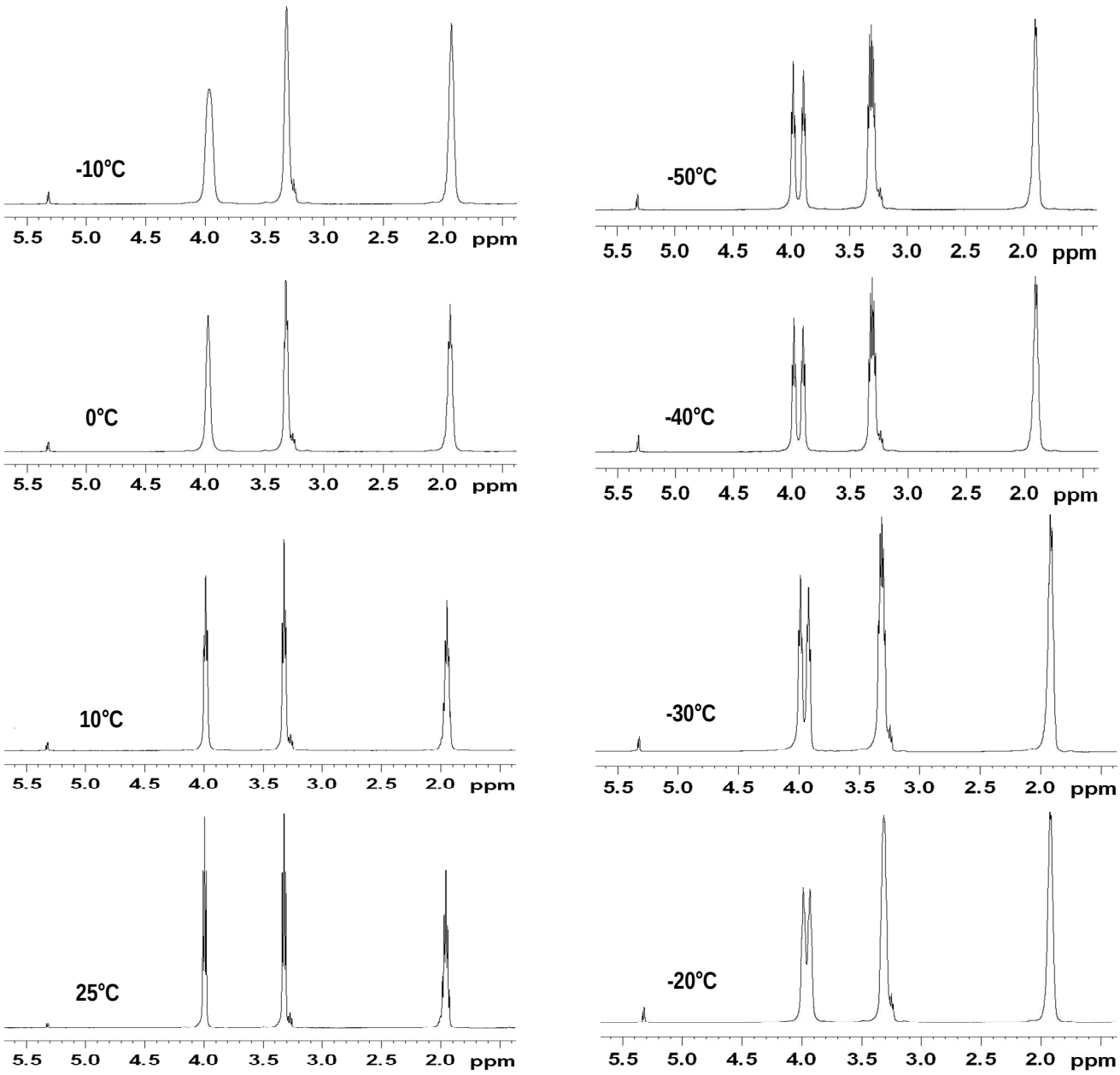


Figure 20: Variable-temperature ^{1}H NMR spectra of $Ta(hpp)_2Cl_3$ (in CD_2Cl_2) as a function of temperature.

spectrum at -60°C with six different methylene resonances, consistent with the solid-state structure (*vide infra*).

Solid-State Structures of $Ta(hpp)_xCl_{4-x}$ (x = 1, 2) via Single-Crystal X-ray Diffractometry.

$Ta(hpp)Cl_4$ has a distorted octahedral structure in the solid-state (Figure 21) in terms of directly-bonded atoms, with one independent molecule in the unit cell. Tables 5 and 6 compare selected bond distances, bond angles, and dihedral angles for all new tantalum hpp complexes that were characterized structurally. For $Ta(hpp)Cl_4$, the Ta(1)–N(1) and Ta(1)–N(2) distances of 2.04(1) and 2.06(1) Å, respectively, are nominally the shortest of all the new tantalum hpp complexes reported here, and are the same statistically. The error limits are large for the poorer-quality data set for the $Ta(hpp)Cl_4$ crystal that was examined because the guanidinate carbon C(1) refined to a negative isotropic thermal parameter and a non-positive anisotropic thermal parameter; its isotropic thermal parameter was then set to that of N(1) and constrained during refinement. The Cl(3)–Ta(1)–N(1) and Cl(1)–Ta(1)–N(2) angles are 86.8(5)° and 90.5(5)°, respectively. Because of the acute chelate bite angle of the hpp ligand (N(1)–Ta–N(2), 62.5(7)°), Cl(1) and Cl(3) are bent up from the idealized octahedral positions to give an obtuse Cl(1)–Ta–Cl(3) angle of 119.4(1)°, or nearly 120°. Thus, an alternate description of the coordination geometry would be that of a trigonal bipyramid with Cl(1), Cl(3), and the non-tantalum-bonded bridgehead C(1) (Ta(1)···C(1), 2.56(2)Å) being the equatorial positions. The Cl(1)–Ta(1)···C(1) and Cl(3)–Ta(1)···C(1) angles are 121.1(4)° and 119.5(4)°, respectively, for a total combined with the 119.4(1)° value for Cl(1)–Ta(1)–Cl(3) of 360° within experimental error. Cl(2) and Cl(4) are bent away (Cl(2)–Ta–Cl(4) angle of 164.9(2)°) from their idealized octahedral positions (or, alternately, from the axial positions of a trigonal bipyramid) and from the hpp ligand, presumably from steric interactions with the closest hydrogens on C(2) and C(7). The Cl(2)···H(7B) distance, 4.25 Å, and Cl(4)···H(2B) distance, 4.23 Å, are approximately the sum (4.30Å) of the van der Waals radii for a hydrogen, 1.91 Å, and a chlorine, 2.39 Å, derived from the van der Waals constants for H_2 and Cl_2.

Figure 22 shows a view perpendicular to the least squares plane defined by Ta and the guanidinate nitrogens and C(1). As is typical for hpp complexes, the two fused aliphatic six-membered rings are puckered. The Ta-guanidinate core is highly planar, with the dihedral angle between the Ta(1)/N(1)/N(2) plane and the N(1)/N(2)/C(1)/N(3) least squares plane being 0.2°.

The C(1)–N(3) distance of 1.28(2) Å for the bridgehead nitrogen is statistically similar to that of C(1)–N(2), 1.31(2) Å, and shorter than C(1)–N(1), 1.39(2) Å. This suggests that there is a significant electronic contribution from delocalization of the bridgehead nitrogen N(3)'s lone pair to C(1) and thus to N(1) and N(2), increasing the hpp ligand basicity.

Table 5: Bond lengths (Å) for new tantalum hpp complexes. Cp* = C_5Me_5; Cp" = C_5Me_4Et

	Ta(hpp)Cl_4	**Ta(hpp)$_2Cl_3$**	**Cp*Ta(hpp)Cl_3 (molecule A)**	**Cp*Ta(hpp)Cl_3 (molecule B)**	**Cp*Ta(hpp)Cl_2 (moleule A)**	**Cp*Ta(hpp)Cl_2 (molecule B)**	**Cp"Ta(hpp)Cl_2**
Ta–N	2.04(1) N1 2.06(1) N2	2.115(5) N1 2.109(5) N2 2.114(5) N4 2.119(5) N5	2.153(5) N1 2.075(5) N2	2.151(5) N21 2.082(5) N22	2.12(3) N1 2.14(2) N2	2.11(3) N21 2.06(3) N22	2.128(8) N1 2.089(7) N2
Ta···C1	2.56(2) C1	2.566(6) C1 2.598(6) C8	2.574(6) C1	2.584(6) C21	2.54(2) C1	2.64(3) C21	2.569(9) C1
Ta–Cl	2.341(5) Cl1 2.368(6) Cl2 2.365(5) Cl3 2.340(4) Cl4	2.463(2) Cl1 2.395(2) Cl2 2.407(2) Cl3	2.426(2) Cl1 2.463(2) Cl2 2.443(2) Cl3	2.424(2) Cl4 2.459(2) Cl5 2.484(2) Cl6	2.424(9) Cl1 2.407(9) Cl2	2.43(1) Cl3 2.421(9) Cl4	2.413(2) Cl1 2.414(9) Cl2
Ta···Cp centroid	N/A	N/A	2.14	2.21	2.066	2.06	2.05
C1–N	1.39(2) N1 1.31(2) N2	1.345(8) N1 1.347(8) N2	1.305(8) N1 1.372(8) N2	1.319(8) N21 1.367(8) N22	1.36(3) N1 1.23(4) N2	1.49(4) N21 1.37(4) N22	1.33(1) N1 1.37(1) N2
C1–N(bridge)	1.28(2) N3	1.333(8) N3	1.339(8) N3	1.329(8) N23	1.41(4) N3	1.25(4) N23	1.33(1) N3
C8–N	N/A	1.348(8) N4 1.357(9) N5	N/A	N/A	N/A	N/A	N/A
C8–N(bridge)	N/A	1.315(8) N6	N/A	N/A	N/A	N/A	N/A

Table 6: Bond and non-bond angles (°) for new tantalum hpp complexes. Cp* = C_5Me_5; Cp" = C_5Me_4Et

	$Ta(hpp)Cl_4$	**$Ta(hpp)_2Cl_3$**	**$Cp^*Ta(hpp)Cl_3$ (molecule A)**	**$Cp^*Ta(hpp)Cl_3$ (molecule B)**	**$Cp^*Ta(hpp)Cl_2$ (molecule A)**	**$Cp^*Ta(hpp)Cl_2$ (molecule B)**	**$Cp"Ta(hpp)Cl_2$**
Cl1–Ta–Cl	85.9(2) Cl2 119.4(1) Cl3 86.0(2) Cl4	88.66(6) Cl2 89.13(7) Cl3	84.15(7) Cl2 85.05(7) Cl3	85.50(6) Cl5 86.30(6) Cl6	87.2(4) Cl2	86.6(3) Cl2	86.42(9) Cl2
Cl2–Ta–Cl	86.3(2) Cl3 164.9(2) Cl4	177.77(6) Cl3	154.97(7) Cl3	156.26(6) Cl6	N/A	N/A	N/A
Cl3–Ta–Cl	86.0(2) Cl4		N/A	N/A	N/A	N/A	N/A
Cp centroid–Ta–Cl	N/A	N/A	102.0 Cl1 102.7 Cl2 106.6 Cl3	102.4 Cl4 101.2 Cl5 105.5 Cl5	115.1 Cl1 111.2 Cl2	115.2 Cl3 111.4 Cl4	114.4 Cl1 112.3 Cl2
Cp centroid–Ta–N	N/A	N/A	108.4 N1 170.7 N2	109.9 N21 172.2 N22	116.7 N1 116.7 N2	114.0 N21 109.9 N22	112.4 N1 116.4 N2
N–Ta–N	62.5(7)	62.2(2) N1-N2 62.3(2) N4-N5	62.4(2)	62.3(2)	61.0(9)	61.0(9)	62.9(3)
N–C1–N	106(2)	108.4(5)	109.8(5)	109.2(5)	113(2)	102(3)	109.3(8)
N–C8–N		108.1(5)					
N(bridge)–C1–N	127(2) N1 127(2) N2	126.0(6) N1 125.4(6) N2	125.0(6) N1 125.2(6) N2	126.3(6) N21 124.5(6) N22	119(2) N1 128(3) N2	124(3) N21 135(3) N22	127.3(9) N1 123.4(9) N2
N(bridge)–C8–N	N/A	126.2(6) N4 125.6(6) N5	N/A	N/A	N/A	N/A	N/A
Dihedral angle between N1-Ta-N2 and N1-N2-C1-N3	0.2	21.1 hpp(1) 10.7 hpp(2)	8.3	9.7	10.1	20.3	11.6

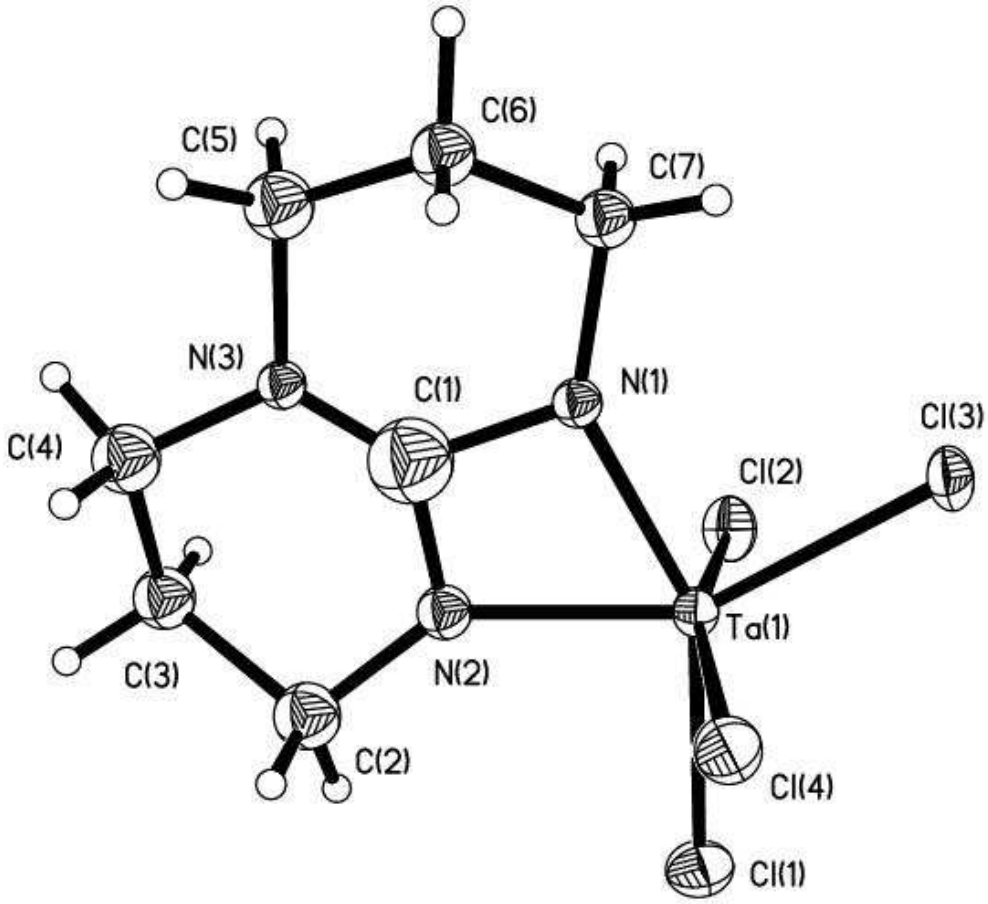


Figure 21: View of solid-state molecular structure of Ta(hpp)Cl_4 approximately perpendicular to the Ta-guanidinate plane. Thermal ellipsoids are shown at the 50% probability level.

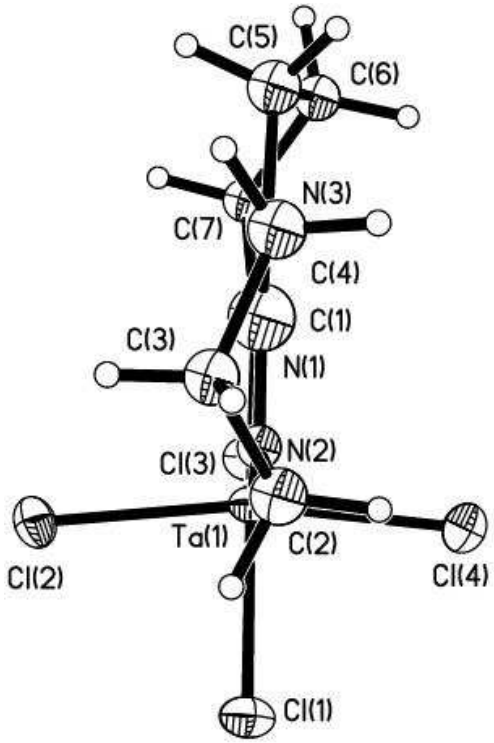


Figure 22: View of solid-state structure of Ta(hpp)Cl_4 approximately parallel to the plane containing Ta(1) and the guanidinate N_2CN core of the hpp ligand, showing its planarity. Thermal ellipsoids are shown at the 50% probability level.

Ta(hpp)$_2Cl_3$ crystallizes with one independent molecule in the unit cell. The solid-state seven-coordinate structure of Ta(hpp)$_2Cl_3$ can be best described as a pentagonal bipyramid with the hpp ligands coordinated in the pentagonal plane along with one equatorial chlorine atom, Cl(1), and two axial chlorine atoms, Cl(2) and Cl(3) (Figure 23). The Ta–N distances are longer than those in Ta(hpp)Cl_4, as might be expected for either the lowered Lewis acidity of a Ta(V) with four basic nitrogen donor atoms and/or greater steric crowding in a seven-coordinate structure.

The guanidinate moieties of the hpp ligands in Ta(hpp)$_2Cl_3$ are less planar than in the case of Ta(hpp)Cl_4. Figures 24 and 25 show two views of Ta(hpp)$_2Cl_3$ that differ

in which of the Ta–guanidinate moieties are oriented perpendicular to the page. The dihedral angles between the Ta/N/N planes and the least-squares N_2CN planes for both hpp ligands are both larger than that in $Ta(hpp)Cl_4$ (0.2°) and differ substantially from each other, with a dihedral angle between the Ta(1)/N(2)/N(3) plane and the least-squares plane N(1)/N(2)/C(1)/N(3) of 21.1° and a dihedral angle between the Ta(1)/N(4)/N(5) plane and the least-squares plane N(4)/N(5)/C(8)/N(6) of 10.7°. We ascribe the difference in dihedral angles of the two hpp ligands in $Ta(hpp)_2Cl_3$ to steric crowding between the hpp ligands in the pentagonal plane.

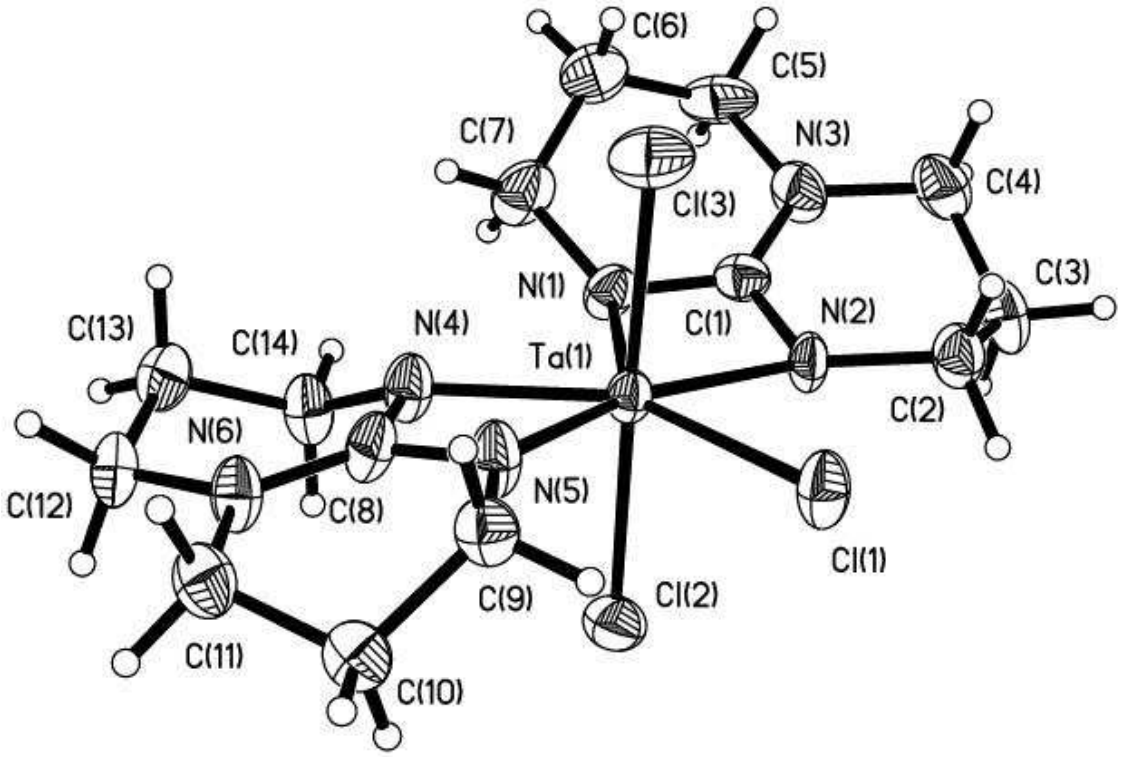


Figure 23: View of solid-state structure of seven-coordinate $Ta(hpp)_2Cl_3$. Thermal ellipsoids are shown at the 50% probability level.

The bridgehead nitrogen–to–bridgehead carbon distances of 1.333(8) Å (C(1)–N(3)) and 1.315(8) Å (C(8)–N(6)) for the two hpp ligands are shorter than the Ta–bonded nitrogen–to–bridgehead carbon distances (C(1)–N(1), 1.345(8) Å; C(1)–N(2), 1.347(8) Å; C(8)–N(4), 1.348(8) Å; C(8)–N(5), 1.357(9) Å). This is consistent, as was the case with the less-accurate $Ta(hpp)Cl_4$ solid-state structure, with significant bridgehead nitrogen lone pair donation to the bridgehead carbons and thus to the tantalum–bonded nitrogens.

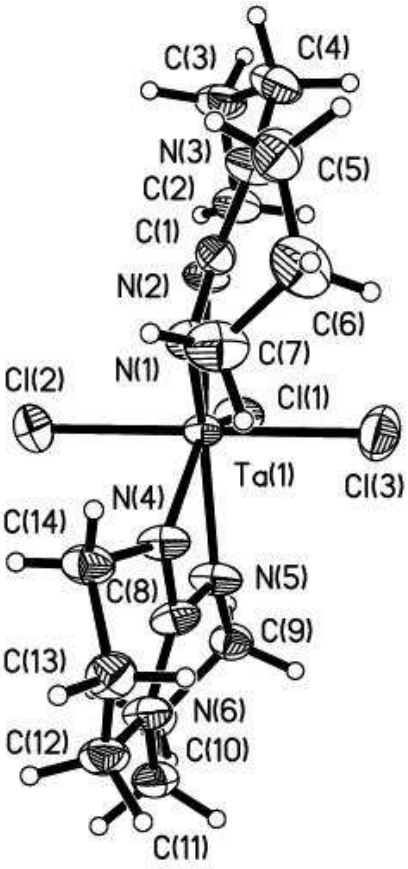


Figure 24: View of solid-state structure of $Ta(hpp)_2Cl_3$ approximately parallel to the plane containing Ta(1) and the guanidinate N_2CN core of the first hpp ligand. Thermal ellipsoids are shown at the 50% probability level.

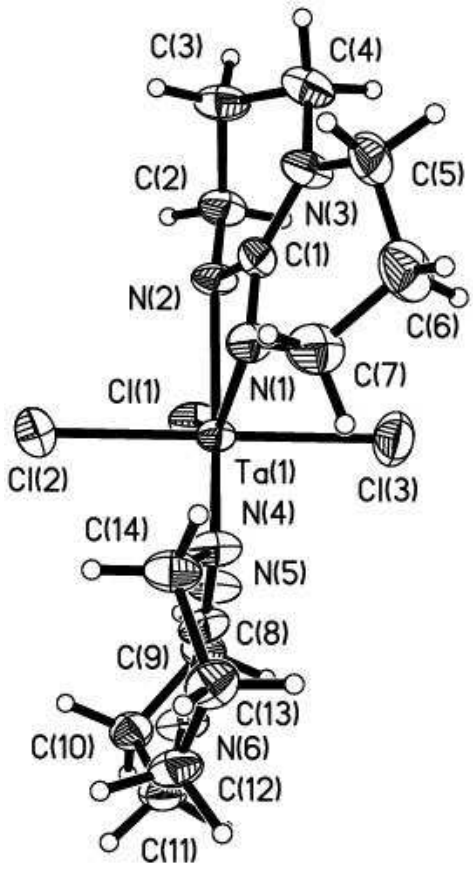
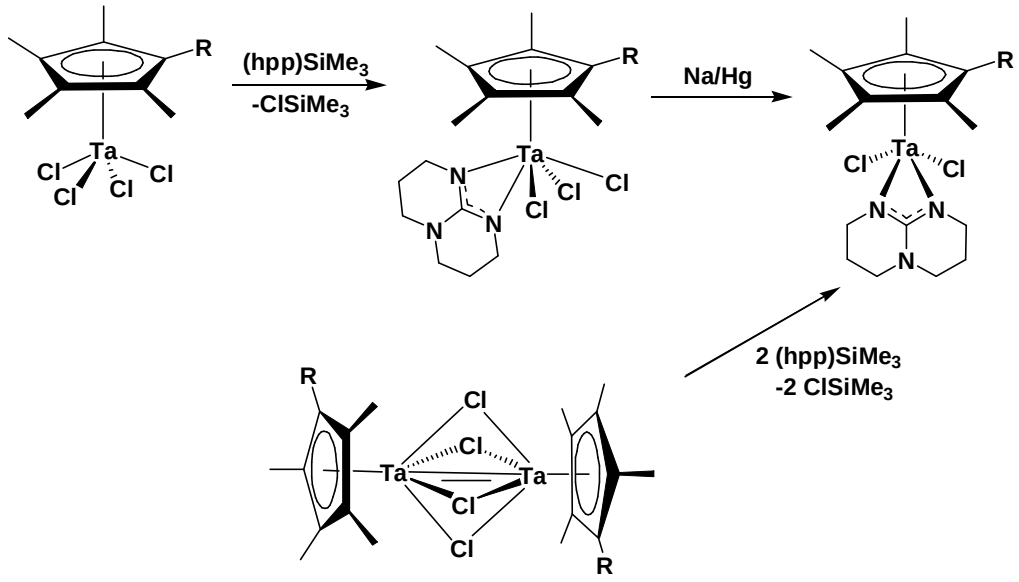


Figure 25: View of solid-state structure of $Ta(hpp)_2Cl_3$ approximately parallel to the plane containing Ta(1) and the guanidinate N_2CN core of the second hpp ligand; the view is a slight rotation of that shown in Figure 22. Thermal ellipsoids are shown at the 50% probability level.

Synthesis and Spectroscopic Characterization of (η-C_5Me_4R)Ta(hpp)Cl_3 (R = Me, Et).

Addition of (hpp)$SiMe_3$ (one equivalent) to a dichloromethane solution of (η-C_5Me_4R)$TaCl_4$ yields the mono(hpp) adduct (η-C_5Me_4R)Ta(hpp)Cl_3 straightforwardly in high yields (86%, R = Me; 95%, R = Et) (Scheme 21). (η-C_5Me_4R)Ta(hpp)Cl_3 is a red solid that yields bright pinkish-red solutions in dichloromethane. For R = Me the

compound has unusual solubility characteristics (e.g., soluble in benzene, insoluble in toluene) that suggest ionic character, such as $[(\eta\text{-}C_5Me_4R)Ta(hpp)Cl_2]^+Cl^-$, in the more polar toluene, or disparate solvent coordination with the molecule. Future solution conductivity studies should be able to address these unusual solubility characteristics.



Scheme 21: Synthesis of $(\eta\text{-}C_5Me_4R)Ta(hpp)Cl_x$ (R = Me, Et; x = 3, 2).

The ^1H NMR spectra of $(C_5Me_4R)Ta(hpp)Cl_3$ in C_6D_6 at room temperature are consistent with a static structure with the two nitrogens in very different chemical environments, given the wide range of chemical shifts for the six inequivalent methylene proton resonances. The molecule has a plane of symmetry through the cyclopentadienyl centroid for the C_5Me_4Et compound, with only two ring methyl singlets (vs. four) and a simple quartet (rather than an AB quartet) for the methylene resonance of the ring Et group. The spectra are therefore consistent with a hpp coordination mode with one nitrogen in a pseudo-equatorial position of a four-legged piano-stool structure and the

other nitrogen coordinated in an axial position *trans* to the centroid of the cyclopentadienyl group. This solution structure is consistent with the solid-state structure (*vide infra*).

Syntheses and Spectroscopic Characterization of the Ta(IV) hpp Complexes (η-C_5Me_4R)Ta(hpp)Cl_2 (R = Me, Et).

Given the lack of mid- or low-valent hpp complexes of tantalum, we examined reactions of the mid-valent organoditantalum(III) complex (η-$C_5Me_4Et)_2Ta_2(\mu$-$Cl)_4$ with (hpp)$SiMe_3$ as well as direct reduction of (η-C_5Me_4R)Ta(hpp)Cl_3 with sodium amalgam (Scheme 21). Addition of two equivalents of (hpp)$SiMe_3$ to (η-$C_5Me_4Et)_2Ta_2(\mu$-$Cl)_4$ in toluene under dinitrogen leads to disproportionation and crystallization of the Ta(IV) complex (η-C_5Me_4R)Ta(hpp)Cl_2. Other mid-valent organotantalum complexes (e.g., Ta(II), or higher oxidation state dinitrogen adducts), as would be expected from a disproportionation of the organoditantalum(III) reactant, have not yet been isolated.

Solid-State Structures of (η-C_5Me_5)Ta(hpp)Cl_3 and the Ta(IV) hpp adducts (η-C_5Me_5R)Ta(hpp)Cl_2 and (η-C_5Me_4Et)Ta(hpp)Cl_2 via Single-Crystal X-ray Diffractometry.

The Ta(V) hpp adduct (η-C_5Me_5)Ta(hpp)Cl_3 crystallizes from dichloromethane with two independent molecules in the unit cell, termed A and B, in which the hpp is coordinated with one nitrogen *trans* axial to the C_5Me_5 centroid and the other coordinated in the equatorial plane along with the three chlorines. The metrics are similar in molecules A and B (Tables 5 and 6), so only the values in molecule A are discussed here.

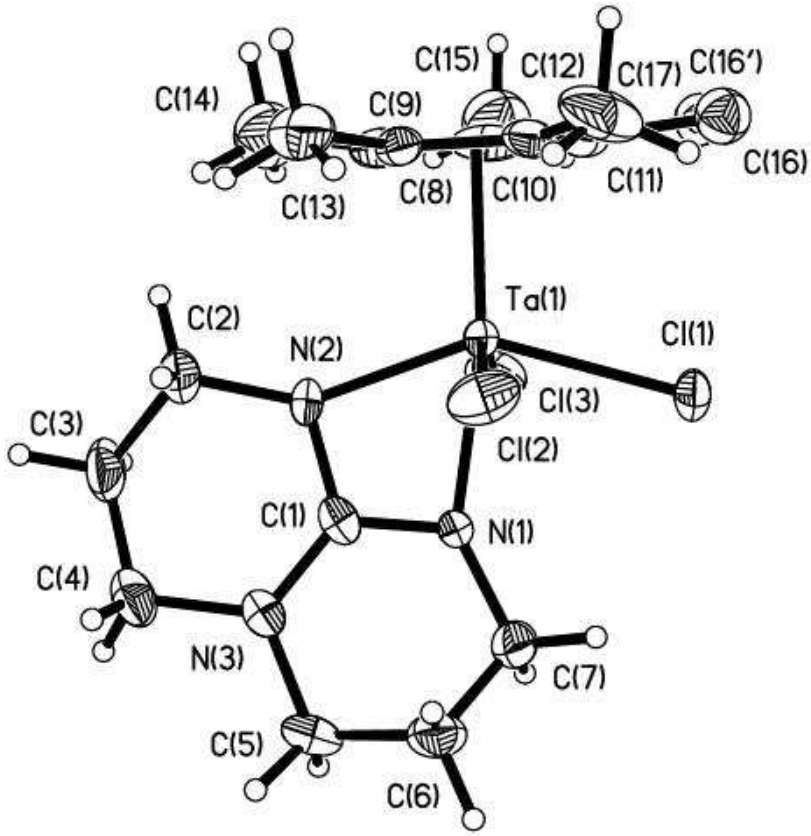


Figure 26: View of solid-state structure of (C_5Me_5)Ta(hpp)Cl_3 (independent molecule A) approximately perpendicular to the hpp ligand plane. Thermal ellipsoids are shown at the 50% probability level.

Figure 26 shows one view of molecule A of (η-C_5Me_5)Ta(hpp)Cl_3. The Ta(1)–N(1) and Ta(1)–N(2) distances are 2.153(5) and 2.075(5) Å, respectively, so the axial nitrogen N(1) is further away. This asymmetry in the hpp coordination suggests that the N–C–N delocalization is somewhat diminished, so that the axial nitrogen interaction is more dative, via a localized imide nitrogen, and the pseudo-equatorial nitrogen is covalently bonded as an amido group. This would suggest that the N(1)–C(1) distance, 1.305(8)Å, should be shorter than the N(2)–C(1) distance, 1.372(8)Å, as is the case. The short C(1)–N(3) distance of 1.339(8) Å is consistent with significant lone pair electron donation from the bridgehead nitrogen N(3) to the guanidinate core. The Ta-guanidinate

core is also quite flat (though less so than in the case of Ta(hpp)Cl_4), with a dihedral angle between the Ta(1)/N(1)/N(2) plane and the N(1)/C(1)/N(2)/N(3) least-squares plane of 8.3°. The pseudo-equatorial Ta(1)–chlorine distances are 2.426(2) Å for Cl(1) (trans to N(2)), 2.463(2) for Cl(2), and 2.443(2) for Cl(3).

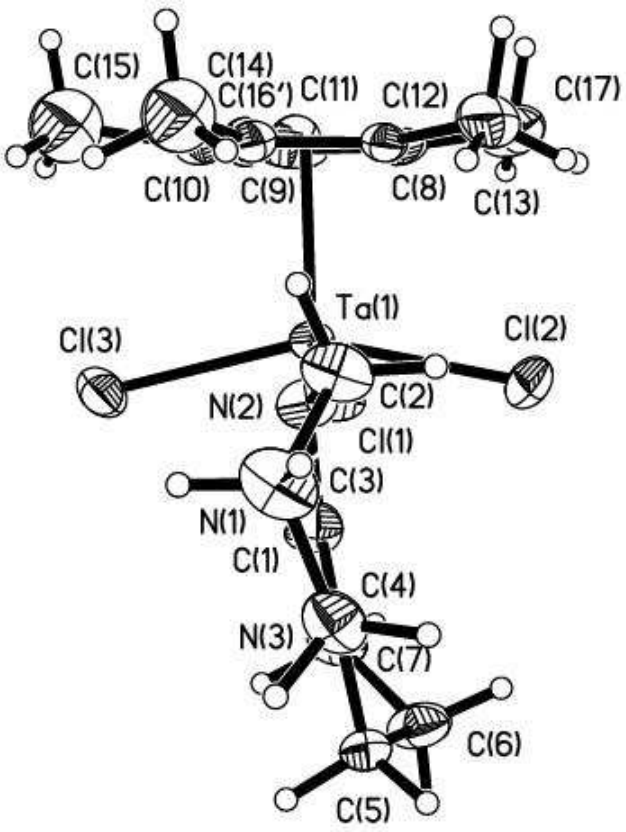


Figure 27: View of solid-state structure of (C_5Me_5)Ta(hpp)Cl_3 (independent molecule A) approximately parallel to the plane containing Ta(1) and the guanidinate N_2CN core of the hpp ligand. Thermal ellipsoids are shown at the 50% probability level.

The Ta(IV) hpp complexes (η-C_5Me_4R)Ta(hpp)Cl_2 (R = Me, Et) have solid-state four-legged piano-stool structures with the two chlorines and two guanidinate nitrogens of an hpp chelate in the equatorial plane. (η-C_5Me_5)Ta(hpp)Cl_2 crystallizes with two independent molecules in the unit cell that, while isostructural, have some differences in bond distances and bond angles because of twinning, as shown in Table 5.

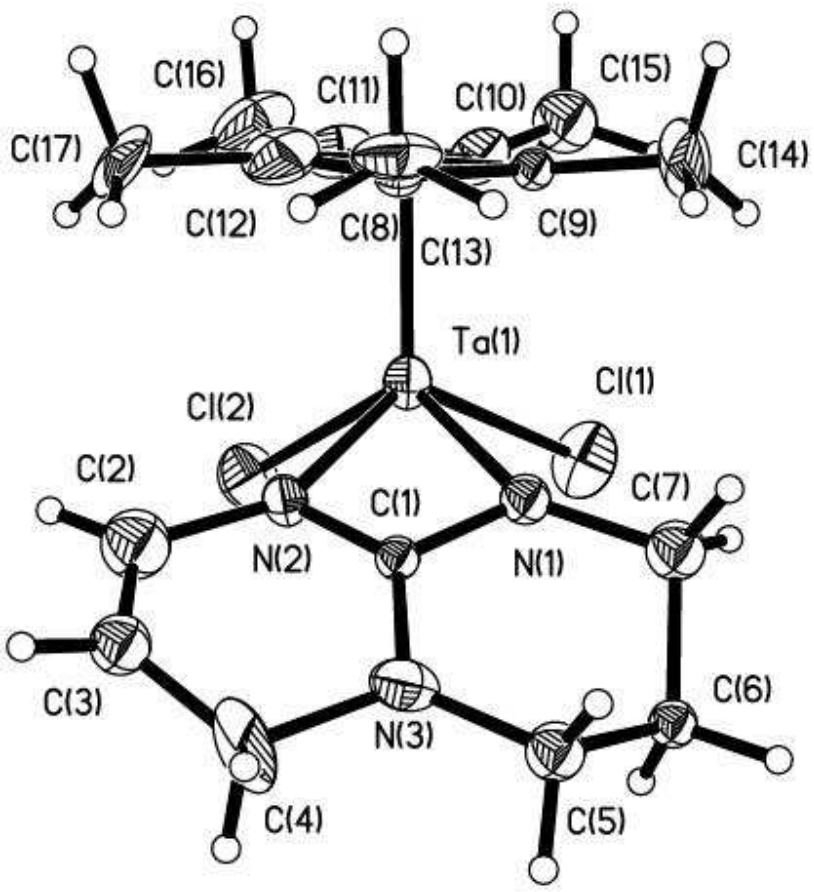


Figure 28: View of solid-state structure of (C_5Me_5)Ta(hpp)Cl_2 (independent molecule A) approximately perpendicular to the Ta(1)–C_5Me_5 centroid axis. The hpp ligand is tilted above and away from the plane of the page. Thermal ellipsoids are shown at the 50% probability level.

Figures 28 and 29 show two views of the solid-state structure for molecule A of (η-C_5Me_5)Ta(hpp)Cl_2. (η-C_5Me_4Et)Ta(hpp)Cl_2 crystallizes with one independent molecule in the unit cell, and the data set was more accurate and not twinned, so it will be discussed here since it is isostructural (Figures 30 and 31) to that of the C_5Me_5 derivative.

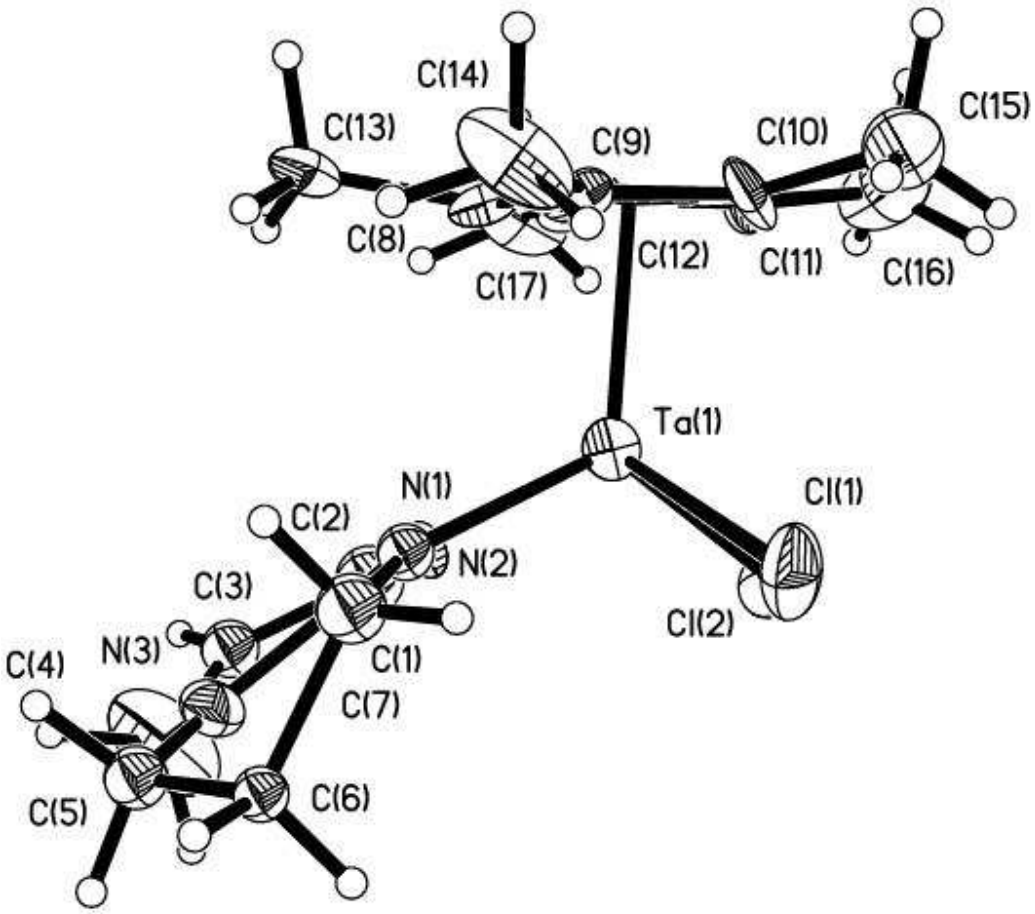


Figure 29: View of solid-state structure of (C_5Me_5)Ta(hpp)Cl_2 (independent molecule A) approximately parallel to the plane containing Ta(1) and the guanidinate N_2CN core of the hpp ligand. Thermal ellipsoids are shown at the 50% probability level.

The Ta(1)–N(1) and Ta(1)–N(2) distances, 2.128(8) and 2.089(7) Å, are on average shorter than the average in the Ta(V) adduct (η-C_5Me_5)Ta(hpp)Cl_3. Since a longer distance would be expected for a Ta^{IV}–N bond given the greater covalent radius of Ta(IV) over Ta(V), the observed shorter distance for the Ta(IV) compound must be the result of either an electronic effect on equatorial coordination of nitrogen or a greater steric crowding in the Ta(V) adduct.

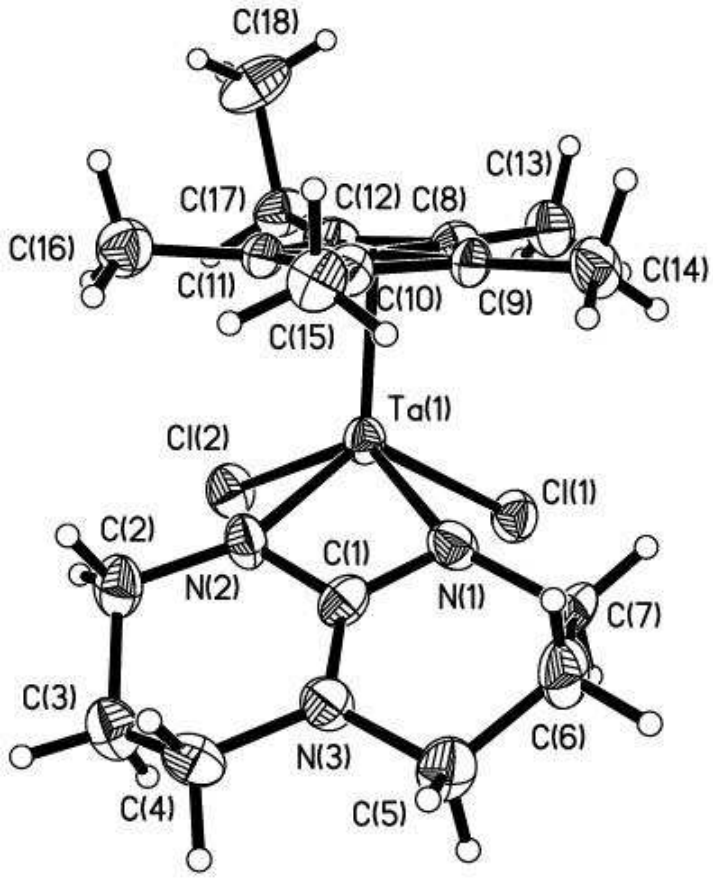


Figure 30: View of solid-state structure of (C_5Me_4Et)Ta(hpp)Cl_2 approximately perpendicular to the Ta(1)–C_5Me_5 centroid axis. The hpp ligand is tilted above and away from the plane of the page. Thermal ellipsoids are shown at the 50% probability level.

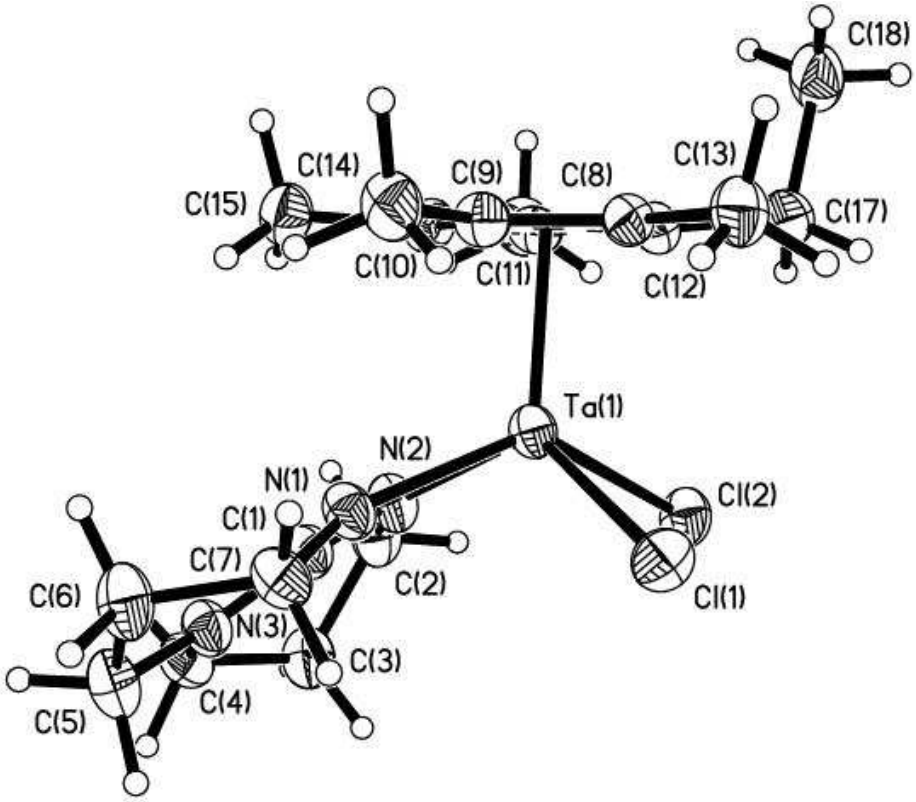


Figure 31: View of solid-state structure of (C_5Me_4Et)Ta(hpp)Cl_2 approximately parallel to the plane containing Ta(1) and the guanidinate N_2CN core of the hpp ligand. Thermal ellipsoids are shown at the 50% probability level.

The Ta(1)–chlorine distances in the Ta(IV) adduct are statistically shorter than those in the Ta(V) adduct, as would be expected from the shorter Ta(IV) covalent radius. The four-legged piano stool structure has cyclopentadienyl centroid···Ta(1)–chlorine angles of 114.4° for Cl(1) and 112.3° for Cl(2), similar to the centroid···Ta(1)–N angles of 112.4° for N(1) and 116.4° for N(2).

There is a small but statistically insignificant asymmetry in the hpp coordination in (η-C_5Me_4Et)Ta(hpp)Cl_2 as shown by both the Ta(1)–N distances and the C(1)–N(1) and C(1)–N(2) distances (1.33(1) and 1.37(1) Å, respectively).

The short C(1)–N(3) distance for the bridgehead atoms, 1.33(1) Å, is again consistent with significant bridgehead nitrogen lone pair donation into the guanidinate core. The dihedral angle between the Ta(1)/N(1)/N(2) plane and the least-squares N(1)/C(1)/N(2)/N(3) plane is 11.6°, also consistent with strong interaction of a basic guanidinate ligand with the Ta(IV) center.

Conclusions

The hpp silane (hpp)$SiMe_3$ is an effective hpp transfer reagent in tantalum and mono(peralkylcyclopentadienyl)tantalum chemistries, particularly as a pure distilled reagent rather than one generated *in situ* from Li(hpp) and $ClSiMe_3$ in ethereal solvents. The new complex Ta(hpp)Cl_4 can be prepared by (hpp)$SiMe_3$ addition in dichloromethane to $TaCl_5$. It has a distorted octahedral six-coordinate structure with a strong Ta–hpp interaction and significant bridgehead nitrogen lone pair donation to the guanidinate core. Ta(hpp)$_2Cl_3$ is obtained by addition of a second equivalent of (hpp)$SiMe_3$ to previously-isolated Ta(hpp)Cl_4. The pentagonal bipyramidal structure with two equatorial hpp ligands is highly fluxional in solution by proton NMR spectroscopy. Mono(peralkylcyclopentadienyl) tantalum(V) hpp complexes (η-C_5Me_4R)Ta(hpp)Cl_3 are prepared in high yield by addition of one equivalent of (hpp)$SiMe_3$ to (η-C_5Me_4R)$TaCl_4$. These bright pinkish-red compounds have axial-ligated, four-legged piano-stool structures with an hpp ligand chelated to the axial and equaorial positions. The Ta(IV) hpp complexes (η-C_5Me_4R)Ta(hpp)Cl_2 , the first mid-valent tantalum hpp complexes, can be obtained from either reduction of (η-

$C_5Me_4R)Ta(hpp)Cl_3$ or addition of $(hpp)SiMe_3$ to $(\eta\text{-}C_5Me_4R)_2Ta_2(\mu\text{-}Cl)_4$. The Ta(IV) complexes have a four-legged piano-stool structure with a chelating hpp ligand. The solid-state structures of all new tantalum hpp complexes have metrics consistent with coordination of highly basic hpp ligands in which the bridgehead nitrogens donate their lone pairs to the guanidinate cores.

Experimental

General Procedures. Compounds were manipulated under dinitrogen in a Vacuum Atmospheres glove box with -40°C refrigerator, rotary evaporator, and internal vacuum system for filtration and compound drying. $TaCl_5$ stored in glass ampules was purchased from Cerac or Alfa Aesar and used as received. Chlorotrimethylsilane (Aldrich) was distilled prior to use. $(\eta\text{-}C_5Me_4R)TaCl_4$ (R = Me, Et) were prepared from room-temperature reaction of $(C_5Me_4R)SnBu_3$ and $TaCl_5$ in CH_2Cl_2 and purified by fractional recrystallization from CH_2Cl_2, as described elsewhere along with additional procedures and syntheses of the precursors MeBrC=CHMe, C_5Me_4RH, $Li(C_5Me_4R)$, and $(C_5Me_4R)SnBu_3$.[104] Na/Hg (0.413% by weight) was prepared in the glove box by slow addition of clean Na pieces in one Erlenmeyer flask to Hg in a second flask, connected to the first via a flexible gooseneck adapter, in a closed system to avoid contamination of the glove box atmosphere with warm Hg vapor; the resulting amalgam was allowed to cool before transfer to a storage bottle. $(C_5Me_5)_2Ta_2(\mu\text{-}Cl)_4$ was prepared[105] by Na/Hg reduction of $(C_5Me_5)TaCl_4$ with two equivalents of Na/Hg in toluene and purified by recrystallization from toluene/hexanes. HppH (Aldrich) was doubly sublimed before use. The silicon reagent $(hpp)SiMe_3$ was prepared by a literature procedure[106] from hppH, BuLi, and Me_3SiCl, purified by distillation, and stored under dinitrogen because of its

water sensitivity. Anhydrous dichloromethane, toluene, and hexanes were purchased from Aldrich and used as received.

^{1}H and $^{13}C\{^{1}H\}$ NMR spectra were obtained on a Bruker Avance III 300 MHz NMR spectrometer. Variable temperature NMR spectra were recorded on a Bruker DRX 400 MHz spectrometer.

Preparation of (hpp)SiMe$_3$. In a modification of the published procedure,[106] 1,3,4,6,7,8-hexahydro-2*H*-pyrimido[1,2-*a*]pyrimidine (hppH; 4.7 g, 33.8 mmol) was dissolved in 30 mL dry benzene under argon and cooled in an ice-bath for 10 minutes. A solution of 2.5 M BuLi (21.1 mL, 33.8 mmol) was slowly added to the reaction mixture, with constant stirring. The reaction mixture was stirred at room temperature for 12 hours. Chlorotrimethylsilane (5.14 mL, 40.5 mmol) was slowly added to the ice-bath cooled reaction mixture, leading to the formation of a white precipitate. The mixture was heated at 40°C for 12 hours. After filtration, the filtrate was concentrated under vacuum to yield an oil. The oil was distilled *in vacuo* (96-100°C/10 mm Hg) to yield pure (hpp)SiMe$_3$ (5.1 g, 71% based on hppH) as a colorless oil. The product is air- and moisture-sensitive and was stored in a glove box. ^{1}H NMR (δ, $CDCl_3$, 300 MHz): 0.17 (s, 9H, (C$\underline{H}_3$)$_3$), 1.73 (quintet, 4H, 5.89 Hz, $CH_2C\underline{H}_2CH_2$), 2.98 (t, 4H, 6.16 Hz, $NC\underline{H}_2CH_2$), 3.10 (t, 4H, 5.65 Hz, $NC\underline{H}_2CH_2$). ^{13}C NMR (δ, $CDCl_3$, 75 MHz): 1.35 ($\underline{C}H_3)_3$, 23.87 ($CH_2\underline{C}H_2CH_2$), 42.11 ($N\underline{C}H_2CH_2$), 48.21 ($N\underline{C}H_2CH_2$), 151.71 ($N\underline{C}N$).

Preparation of Ta(hpp)Cl$_4$. A suspension of $TaCl_5$ (1.0 g, 2.80 mmol) in 50 mL CH_2Cl_2 was stirred for 5 minutes. A solution of (hpp)SiMe$_3$ (0.53 g, 2.53 mmol) in 5 mL CH_2Cl_2 was slowly added dropwise. The solution color changed to deep red-brown and $TaCl_5$ slowly dissolved. The reaction mixture was stirred overnight at room temperature. Charcoal was added and the mixture stirred for 10 minutes. The deep-brown solution was filtered and concentrated to ~2 mL volume. The solution was layered with hexanes and stored at -40°C. Yellow-brown Ta(hpp)Cl$_4$ (0.8 g, 70% based on (hpp)SiMe$_3$) was recovered by filtration. Yellow crystals suitable for X-ray diffractometry were grown by

dissolution in a minimum amount of CH_2Cl_2, layering with hexanes, and cooling to -40°C for 3 days. ^{1}H NMR (δ, C_6D_6, 300 MHz): 0.83 (m, 2H, $CH_2C\underline{H}_2CH_2$), 1.77 (t, 2H, 6 Hz, $NC\underline{H}_2$), 3.70 (t, 2H, 6 Hz, $NC\underline{H}_2$). ^{1}H NMR (δ, CD_2Cl_2, 300 MHz): 2.08 (quintet, 2H, 6.0 Hz, $CH_2C\underline{H}_2CH_2$), 3.5 (t, 2H, 6.0 Hz, $NC\underline{H}_2$), 4.29 (t, 2H, 6.0 Hz, $NC\underline{H}_2$).

Attempted Synthesis of $Ta(hpp)_2Cl_3$ from $TaCl_5$ and $(hpp)SiMe_3$. A solution of $(hpp)SiMe_3$ (0.42 g, 2.0 mmol) in 2 mL CH_2Cl_2 was slowly added to a suspension of $TaCl_5$ (0.36 g, 1.00 mmol) in 15 mL CH_2Cl_2. The yellow-orange solution was stirred overnight at room temperature. The solution was filtered and concentrated under vaccum to ~2 mL volume and mixed with hexane to yield ruby-red crystals of the previously reported $[Ta(hpp)_4]^+[TaCl_6]^-$ as determined by X-ray diffractometry. The product is not soluble in any organic solvent except CH_2Cl_2. Crystals for X-ray diffractometry were grown by dissolving in minimum CH_2Cl_2, layering with hexanes, and storing at -40°C for one day.

Preparation of $Ta(hpp)_2Cl_3$ via Reaction of $Ta(hpp)Cl_4$ and $(hpp)SiMe_3$. To a stirred solution of $Ta(hpp)Cl_4$ (0.6 g, 1.3 mmol) in 60 mL at room temperature was added slowly a solution of $(hpp)SiMe_3$ (0.28 g, 1.3 mmol) in 5 mL CH_2Cl_2. The mixture was stirred for one hour. The solution was concentrated in vacuum to ~2 mL volume, layered with 1 mL hexanes, and stored at -40°C. Bright-yellow crystals of $Ta(hpp)_2Cl_3$ (0.72 g, 98% based on $Ta(hpp)Cl_4$) were recovered by filtration and dried *in vacuo*. ^{1}H NMR (δ, C_6D_6, 300 MHz): 1.34 (m, 2H, $CH_2C\underline{H}_2CH_2$), 2.65 (t, 2H, 6.0 Hz, $NC\underline{H}_2$), 3.9-4.2 (broad m, 2H, $NC\underline{H}_2$). ^{1}H NMR (δ, CD_2Cl_2, 300 MHz): 1.96 (t, 2H, 6.0 Hz, $CH_2C\underline{H}_2CH_2$), 3.33 (t, 2H, 6.0 Hz, $NC\underline{H}_2$), 3.99 (t, 2H, 6.0 Hz, $NC\underline{H}_2$).

Preparation of $(C_5Me_5)Ta(hpp)Cl_3$. $(C_5Me_5)TaCl_4$ (2.01 g, 4.39 mmol) was dissolved in 120 mL CH_2Cl_2. A solution of $(hpp)SiMe_3$ (0.93 g, 4.39 mmol) in 5 mL CH_2Cl_2 was slowly added. The color of the solution immediately changed from bright yellow to deep pink-red. The mixture was stirred for 30 minutes and the solution concentrated under vacuum to ~5 mL volume. Hexanes (2 mL) were added and the solution stored at -40°C

for two hours. Red crystals of $(C_5Me_5)Ta(hpp)Cl_3$ (2.13 g, 86% based on $(C_5Me_5)TaCl_4$) were recovered by filtration and dried *in vacuo*. ^1H NMR (δ, C_6D_6, 300 MHz): 1.19 (quintet, 2H, 6.0 Hz, $CH_2C\underline{H}_2CH_2$), 1.48 (quintet, 2H, 6.0 Hz, $CH_2C\underline{H}_2CH_2$), 2.17 (t, 2H, 6.0 Hz, $NC\underline{H}_2CH_2$), 2.25 (s, 15H, C_5Me_5), 2.31 (t, 2H, $NC\underline{H}_2CH_2$), 3.30 (t, 2H, 6.0 Hz, $NC\underline{H}_2CH_2$), 4.08 (t, 2H, 6.0 Hz, $NC\underline{H}_2CH_2$).

Preparation of $(C_5Me_4Et)Ta(hpp)Cl_3$. A solution of $(hpp)SiMe_3$ (0.22 g, 1.06 mmol) in 2 mL CH_2Cl_2 was slowly added to a stirred solution of $(C_5Me_4Et)TaCl_4$ (0.5 g, 1.06 mmol) in 5 mL CH_2Cl_2. An immediate color change was observed from bright yellow to deep pink-red. The mixture was stirred for 30 minutes. The solution was concentrated to ~1 mL volume, layered with 2 mL hexanes, and stored at -40°C for 2 hours to yield red crystals of $(C_5Me_4Et)Ta(hpp)Cl_3$ (0.58 g, 95% based on $(C_5Me_4Et)TaCl_4$). ^1H NMR (δ, C_6D_6, 300 MHz): 0.85 (t, 3H, 7.65 Hz, $C\underline{H}_3CH_2$), 1.12 (quintet, 2H, 5.76 Hz, $NCH_2C\underline{H}_2CH_2N$), 1.52 (t, 2H, 5.84 Hz, $NC\underline{H}_2$), 2.22-2.62 (m, 8H, Me and $NC\underline{H}_2$), 2.31-2.36 (m, 8H, Me and $NC\underline{H}_2$), 2.83 (q, 2H, 7.65 Hz, $CH_3C\underline{H}_2$), 3.33 (t, 2H, 5.63 Hz, $NC\underline{H}_2$), 4.09 (t, 2H, 5.80 Hz, $NC\underline{H}_2$).

Preparation of $(C_5Me_5)Ta(hpp)Cl_2$ via Reaction of $(C_5Me_5)_2Ta_2(\mu\text{-}Cl)_4$ with $(hpp)SiMe_3$. A solution of $(C_5Me_4Et)_2Ta_2(\mu\text{-}Cl)_4$ (0.2 g, 0.25 mmol) in 10 mL toluene was treated with $(hpp)SiMe_3$ (2 equivalents, 0.05 g, 0.50 mmol). The solution was stirred overnight at room temperature. The solution was concentrated *in vacuo* to ~2 mL volume and stored at -40°C overnight. Orange-red crystals of $(C_5Me_4Et)Ta(hpp)Cl_2$ (0.06 g, 45% based on $(C_5Me_4Et)_2Ta_2(\mu\text{-}Cl_4)$) were filtered, washed with hexanes, and dried under vacuum.

Preparation of $(C_5Me_5)Ta(hpp)Cl_2$ via Na/Hg Reduction of $(C_5Me_5)Ta(hpp)Cl_3$. To a suspension of $(C_5Me_5)Ta(hpp)Cl_3$ (0.21 g, 0.37 mmol) in 15 mL benzene was added 0.413% w/w Na/Hg (2.09 g, 0.37 mmol Na) in a 20 mL scintillation vial. The vial was tightly capped and agitated on a vortex mixer for 2 hours. The color changed from deep pink-red to orange-red. Amalgum was allowed to settle for 15 minutes. The supernatant

solution was filtered through Celite to yield an orange-red solution. The solution was concentrated under vacuum to ~3 mL volume and hexanes (2 mL) were layered on top. After sitting undisturbed for 12 hours at room temperature, orange crystals of $(C_5Me_5)Ta(hpp)Cl_2$ (0.15 g, 75% based on $(C_5Me_4Et)Ta(hpp)Cl_3$) were recovered by filtration, washed with hexane, and dried under vacuum.

X-Ray Diffractometry: $Ta(hpp)Cl_4$. A yellow prismatic crystal with 0.11 x 0.09 x 0.07 mm^3 dimensions was mounted *via* grease to the tip of a glass fiber (epoxied to a brass pin) and placed on the diffractometer with the long crystal dimension (the *b* unit cell axis) approximately parallel to the diffractometer phi axis. Data were collected on a Nonius KappaCCD diffractometer (Mo K_α radiation, graphite monochromator) at 150 K (cold N_2 gas stream) using standard CCD data collection techniques. Lorentz and polarization corrections were applied to the 6825 data. A correction for absorption using the multi-scan technique was applied (T_{max} = 0.6317 , T_{min} = 0.5037). Equivalent data were averaged yielding 2078 unique data (R-int = 0.1179, 1827 with $F > 4\sigma(F)$). Based on preliminary examination of the crystal, the space group *Fdd*2 was assigned. The computer programs from the HKLint package were used for data reduction. Structure refinement was performed with the SHELXTL v6.1 package.

The preliminary model of the structure was obtained using XS, a direct methods program. Least-squares refining of the model vs. the data was performed with the XL program. Tables were made with the XCIF program. All non-hydrogen atoms were refined with anisotropic thermal parameters. All H atoms were included with the riding model using the XL program default values. Any restraints and constraints imposed on the data are described in the .cif files.

X-Ray Diffractometry: $Ta(hpp)_2Cl_3$. A yellow prismatic crystal with 0.12 x 0.07 x 0.05 mm^3 dimensions was mounted *via* grease to the tip of a glass fiber (epoxied to a brass pin) and placed on the diffractometer with the long crystal dimension (the diagonal of the *a* and *c* unit cell axes) approximately parallel to the diffractometer phi axis. Data were collected on a Nonius KappaCCD diffractometer (Mo K_α radiation, graphite monochromator) at 190 K (cold N_2 gas stream) using standard CCD data collection

techniques. Lorentz and polarization corrections were applied to the 28281 data. A correction for absorption using the multi-scan technique was applied (T_{max} = 0.7442, T_{min} = 0.5195). Equivalent data were averaged yielding 4483 unique data (R-int = 0.0583, 3202 with F > 4σ(F)). Based on preliminary examination of the crystal, the space group *Pbca* was assigned. The computer programs from the HKLint package were used for the data reduction. Structure refinement was performed with the SHELXTL v6.1 package.

The preliminary model of the structure was obtained using XS, a direct methods program. Least-squares refining of the model vs. the data was performed with the XL program. Tables were made with the XCIF program. All non-hydrogen atoms were refined with anisotropic thermal parameters. All H atoms were included with the riding model using the XL program default values. Any restraints and constraints imposed on the data are described in the .cif files.

X-Ray Diffractometry: $(C_5Me_5)Ta(hpp)Cl_3$. An orange prismatic crystal with 0.16 x 0.16 x 0.10 mm^3 dimensions was mounted *via* grease to the tip of a glass fiber (epoxied to a brass pin) and placed on the diffractometer with the long crystal dimension (the diagonal of the *a* and *c* unit cell axes) approximately parallel to the diffractometer phi axis. Data were collected on a Nonius KappaCCD diffractometer (Mo K_α radiation, graphite monochromator) at 150 K (cold N_2 gas stream) using standard CCD data collection techniques. Lorentz and polarization corrections were applied to the 33458 data. A correction for absorption using the multi-scan technique was applied (T_{max} = 0.9290, T_{min} = 0.8898). Equivalent data were averaged yielding 9421 unique data (R-int = 0.0420, 7671 with F > 4σ(F)). Based on preliminary examination of the crystal, the space group *C*2/*c* was assigned. The computer programs from the HKLint package were used for the data reduction. Structure refinemet was performed with the SHELXTL v6.1 package.

The preliminary model of the structure was obtained using XS, a direct methods program. Least-squares refining of the model vs. the data was performed with the XL program. Tables were made with the XCIF program. All non-hydrogen atoms were refined with anisotropic thermal parameters. All H atoms were included with the riding

model using the XL program default values. Any restraints and constraints imposed on the data are described in the .cif files.

X-Ray Diffractometry: (C_5Me_5)Ta(hpp)Cl_2. An orange plate with 0.12 x 0.07 x 0.03 mm^3 dimensions was mounted *via* grease to the tip of a glass fiber (epoxied to a brass pin) and placed on the diffractometer with the long crystal dimension (the body diagonal of the unit cell axes) approximately parallel to the diffractometer phi axis. Data were collected on a Nonius KappaCCD diffractometer (Mo K_α radiation, graphite monochromator) at 190 K (cold N_2 gas stream) using standard CCD data collection techniques. Lorentz and polarization corrections were applied to the 8387 data. A correction for absorption using the multi-scan technique was applied (T_{max} = 0.8393, T_{min} = 0.5303). Equivalent data were averaged yielding 8387 unique data (R-int = 0.0000, 6916 with $F > 4\sigma(F)$). Based on preliminary examination of the crystal, the space group $P\bar{1}$ was assigned. The computer programs from the HKLint package were used for the data reduction. Structure refinement was performed with the SHELXTL v6.1 package.

The preliminary model of the structure was obtained using XS, a direct methods program. Least-squares refining of the model vs. the data was performed with the XL program. Tables were made with the XCIF program. All non-hydrogen atoms were refined with anisotropic thermal parameters. All H atoms were included with the riding model using the XL program default values. Any restraints and constraints imposed on the data are described in the cif files.

X-Ray Diffractometry: (C_5Me_4Et)Ta(hpp)Cl_2. An orange plate with 0.16 x 0.13 x 0.05 mm^3 dimensions was mounted *via* grease to the tip of a glass fiber (epoxied to a brass pin) and placed on the diffractometer with the long crystal dimension (the *b* unit cell axis) approximately parallel to the diffractometer phi axis. Data were collected on a Nonius KappaCCD diffractometer (Mo K_α radiation, graphite monochromator) at 150 K (cold N_2 gas stream) using standard CCD data collection techniques. Lorentz and polarization corrections were applied to the 8346 data. A correction for absorption using the multi-scan technique was applied (T_{max} = 0.7564, T_{min} = 0.4512). Equivalent data

were averaged yielding 4630 unique data (R-int = 0.0352, 3939 with $F > 4\sigma(F)$). Based on preliminary examination of the crystal, the space group $P\bar{1}$ was assigned. The computer programs from the HKLint package were used for the data reduction. Structure refinement was performed with the SHELXTL v6.1 package.

The preliminary model of the structure was obtained using XS, a direct methods program. Least-squares refining of the model vs. the data was performed with the XL program. Tables were made with the XCIF program. All non-hydrogen atoms were refined with anisotropic thermal parameters. All H atoms were included with the riding model using the XL program default values. Any restraints and constraints imposed on the data are described in the .cif files.

REFERENCES

(1) Cotton, F. A.; Harris, C. B. *Inorg. Chem.* **1965**, *4*, 330.

(2) Bennett, M. J.; Cotton, F. A.; Walton, R. A. *J. Am. Chem. Soc.* **1966**, *88*, 3866.

(3) Cotton, F. A., Murillo, C. A., Walton, R. A. *Multiple Bonds between Metal Atoms*; Springer Science and Business Media, Inc.: New York, 2005.

(4) Chisholm, M. H. *Reactivity of Metal-Metal Bonds*; ACS Symposium Series: Washington D. C. ,1981.

(5) Lin, C.; Ren, T.; Valente, E. J.; Zubkowski, J. D. *J. Chem. Soc., Dalton Trans.* **1998**, 571

(6) Cotton, F. A.; Daniels, L. M.; Murillo, C. A. *Inorg. Chem.* **1993**, *32*, 2881.

(7) Cotton, F. A.; Matusz, M.; Poli, R.; Feng, X. *J. Am. Chem. Soc.* **1988**, *110*, 1144.

(8) Cotton, F. A.; Daniels, L. M.; Falvello, L. R.; Matonic, J. H.; Murillo, C. A. *Inorg. Chim. Acta* **1997**, *256*, 269.

(9) Cotton, F. A.; Daniels, L. M.; Matonic, J. H.; Murillo, C. A. *Inorg. Chim. Acta* **1997**, *256*, 277.

(10) Cotton, F. A.; Daniels, L. M.; Maloney, D. J.; Matonic, J. H.; Murillo, C. A. *Inorg. Chim. Acta* **1997**, *256*, 283.

(11) Cotton, F. A.; Daniels, L. M.; Feng, X.; Maloney, D. J.; Matonic, J. H.; Murilio, C. A. *Inorg. Chim. Acta* **1997**, *256*, 291.

(12) Cotton, F. A.; Poli, R. *Polyhedron* **1987**, *6*, 1625.

(13) Cotton, F. A.; Matonic, J. H.; Murillo, C. A. *Inorg. Chim. Acta* **1997**, *264*, 61.

(14) Cotton, F. A.; Daniels, L. M.; Murillo, C. A.; Wang, X. *Inorg. Chem.* **1997**, *36*, 896.

(15) Cotton, F. A.; Daniels, L. M.; Matonic, J. H.; Wang, X.; Murillo, C. A. *Polyhedron* **1997**, *16*, 1177.

(16) Bear, J. L.; Li, Y.; Han, B.; Kadish, K. M. *Inorg. Chem.* **1996**, *35*, 1395.

(17) Cotton, F. A.; Matonic, J. H.; Murillo, C. A. *J. Am. Chem. Soc.* **1997**, *119*, 7889.

(18) Cotton, F. A.; Timmons, D. J. *Polyhedron* **1998**, *17*, 179.

(19) Cotton, F. A.; Daniels, L. M.; Murillo, C. A.; Timmons, D. J.; Wilkinson, C. C. *J. Am. Chem. Soc.* **2002**, *124*, 9249.

(20) Cotton, F. A.; Huang, P.; Murillo, C. A.; Timmons, D. J. *Inorg. Chem. Commun.* **2002**, *5*, 501.

(21) Cotton, F. A. Gu, J.; Murillo, C. A.; Timmons, D. J. *J. Chem. Soc. Dalton Trans.* **1999**, 3741.

(22) Berry, J. F.; Cotton, F. A.; Huang, P.; Murillo, C. A. *Dalton Trans.* **2003**, 1218.

(23) Cotton, F. A.; Dalal, N. S.; Huang, P.; Murillo, C. A.; Stowe, A. C.; Wang, X. *Inorg. Chem.* **2003**, *42*, 670.

(24) Berry, J. F.; Cotton, F. A.; Huang, P.; Murillo, C. A.; Wang, X. *Dalton Trans.* **2005**, 3713.

(25) Cotton, F. A.; Gu, J.; Murillo, C. A.; Timmons, D. J. *J. Am. Chem. Soc.* **1998**, *120*, 13280.

(26) Clerac, R.; Cotton, F. A.; Daniels, L. M.; Donahue, J. P.; Murillo, C. A.; Timmons, D. J. *Inorg. Chem.* **2000**, *39*, 2581.

(27) Cotton, F. A.; Gruhn, N. E.; Gu, J.; Huang, P.; Lichtenberger, D. L.; Murillo, C. A.; Van Dorn, L. O.; Wilkinson, C. C. *Science* **2002**, *298*, 1971.

(28) Chisholm, M. H.; Gallucci, J.; Hadad, C. M.; Huffman, J. C.; Wilson, P. J. *J. Am. Chem. Soc.* **2003**, *125*, 16040.

(29) Novak, I.; Wei, X.; Chin, W. S. *J. Phys. Chem. A* **2001**, *105*, 1783.

(30) House, H. O. *Modern Synthetic Reactions*, **1972**, *2nd edition*, 492.

(31) Carruthers, W. *Some Modern Methods of Organic synthesis* **1986**, 1.

(32) Sommer, H. Z.; Lipp, H. I.; Jackson, L. L. *J. Org. Chem.* **1971**, *36*, 824.

(33) Sommer, H. Z.; Moller, F.; Eiter, K. *Synthesis* **1972**, 591.

(34) KovacÌŒevic, B.; Maksic, Z. B. *Org. Lett.* **2001**, *3*, 1523.

(35) Ye, W.; Xu, J.; Tan, C.-T.; Tan, C.-H. *Tetrahedron Lett.* **2005**, *46*, 6875.

(36) Simoni, D.; Rondanin, R.; Morini, M.; Baruchello, R.; Invidiata, F. P. *Tetrahedron Lett.* **2000**, *41*, 1607.

(37) Simoni, D.; Rossi, M.; Rondanin, R.; Mazzali, A.; Baruchello, R.; Malagutti, C.; Roberti, M.; Invidiata, F. P. *Org. Lett.* **2000**, *2*, 3765.

(38) Pratt, R. C.; Lohmeijer, B. G. G.; Long, D. A.; Waymouth, R. M.; Hedrick, J. L. *J. Am. Chem. Soc.* **2006**, *128*, 4556.

(39) Gelbard, G.; Vielfaure-Joly, F. *Tetrahedron Lett.* **1998**, *39*, 2743.

(40) Ma, D.; Pan, Q.; Han, F. *Tetrahedron Lett.* **2002**, *43*, 9401.

(41) Corey, E. J.; Grogan, M. J. *Org. Lett.* **1999**, *1*, 157-160.

(42) Yukari, K.; Takuya, K.; Toshio, I.; Keiko, F.; Tsutomu, I. *Adv. Syn. Catal.* **2005**, *347*, 1653-1658.

(43) Kashman, Y.; Hirsh, S.; McConnell, O. J.; Ohtani, I.; Kusumi, T.; Kakisawa, H. *J. Am. Chem. Soc.* **1989**, *111*, 8925.

(44) Ohtani, I.; Kusumi, T.; Kakisawa, H.; Kashman, Y.; Hirsh, S. *J. Am. Chem. Soc.* **1992**, *114*, 8472.

(45) Jares-Erijman, E. A.; Sakai, R.; Rinehart, K. L. *J. Org. Chem.* **1991**, *56*, 5712.

(46) Cotton, F. A.; Donahue, J. P.; Murillo, C. A. *J. Am. Chem. Soc.* **2003**, *125*, 5436.

(47) Asara, J. M.; Hess, J. S.; Lozada, E.; Dunbar, K. R.; Allison, J. *J. Am. Chem. Soc.* **1999**, *122*, 8.

(48) Estevan, F.; Herbst, K.; Lahuerta, P.; Barberis, M.; Perez-Prieto, J. *Organometallics* **2001**, *20*, 950.

(49) Baxter, D. V.; Cayton, R. H.; Chisholm, M. H.; Huffman, J. C.; Putilina, E. F.; Tagg, S. L.; Wesemann, J. L.; Zwanziger, J. W.; Darrington, F. D. *J. Am. Chem. Soc.* **1994**, *116*, 4551.

(50) Cotton, F. A.; Murillo, C. A.; Wang, X. *Inorg. Chim. Acta* **2000**, *300*, 1.

(51) Cramer, C. J. *Essentials of Computational Chemistry*; John Wiley & Sons, Ltd.: England, 2005.

(52) Hehre, W. J. S., A. J.; Huang, W. W. *A Laboratory Book of Computational Organic Chemistry*; Wavefunction, Inc.: USA, 1996.

(53) Coles, M. P. *Chem. Commun.* **2009**, 3659.

(54) McKay, A. F. Kreling, M. E. *Can. J. Chem.* **1957**, *35*, 1438.

(55) Schmidtchen, F. P. *Chem. Ber.* **1980**, *113*, 2175.

(56) A' Court, R. *Eur. Pat.* **1986**, *EPO 0198680*.

(57) Cotton, F. A.; Murillo, C. A.; Wang, X.; Wilkinson, C. C. *Inorg. Chem.* **2006**, *45*, 5493.

(58) Cotton, F. A. Gu, J.; Murillo, C. A.; Wang, X.; Wilkinson, C. C. *Dalton Trans.* **2006**, 4623.

(59) Cotton, F. A. G., J.; Murillo, C. A.; Wang, X.; Wilkinson, C. C. *Dalton Trans.* **2007**, 3943.

(60) Thompson, H. W.; Swistok, J. *J. Org. Chem.* **1981**, *46*, 4907.

(61) Mauger, J.; Robert, A. *Tetrahedron* **1988**, *44*, 2493.

(62) Lebreton, L.; Jost, E.; Carboni, B.; Annat, J.; Vaultier, M.; Dutartre, P.; Renaut, P. *J. Med. Chem.* **1999**, *42*, 4749.

(63) Schmidtchen, F. P. *Chem. Ber.* **1980**, *113*, 2175.

(64) Davis, A. P.; Dempsey, K. J. *Tetrahedron: Asymmetry* **1995**, *6*, 2829.

(65) Antonio, E.; Amalia, G.; Javier de, M.; Armando, S.; Jean-Marie, L. *Helv. Chim. Acta* **1988**, *71*, 685.

(66) Minch, B. A. H., C. R.; Karabin, R. F.; Zawacky, S. R.; Hockswender, T. R.; McCollum, G. J. *US Patent* **2009**, *286978 A1*.

(67) Minch, B. A. H., C. R.; Karabin, R. F.; Hockswender, T. R.; McCollum, G. J. *US Patent* **2009**, *281313 A1*.

(68) Müller G.; Jürgen, R. F.; Schmidtchen, P. *Angew. Chem. Int. Ed.* **1988**, *27*, 1516-1518.

(69) Kato, Y.; Conn, M. M.; Rebek, J., Jr. *J. Am. Chem. Soc.* **1994**, *116*, 3279.

(70) Schmidtchen, F. P. *Coord. Chem. Rev.* **2006**, *250*, 2918.

(71) Schmidtchen, F. P. *Tetrahedron Lett.* **1990**, *31*, 2269.

(72) Jadhav, V. D.; Schmidtchen, F. P. *J. Org. Chem.* **2007**, *73*, 1077.

(73) Kiran Kumar, K.; Datta, A. *Tetrahedron* **1999**, *55*, 13899.

(74) Caputo, R.; Cassano, E.; Longobardo, L.; Palumbo, G. *Tetrahedron* **1995**, *51*, 12337.

(75) Rutger, B. B.; Yolanda Pazos, R.; Hendrikus, N. S. v. d. H.; Marleen van, R.-B.; Johan, L. *Eur. J. Org. Chem.* **2002**, 2094.

(76) Itoh, T.; Mitsukura, K.; Kanphai, W.; Takagi, Y.; Kihara, H.; Tsukube, H. *J. Org. Chem.* **1997**, *62*, 9165.

(77) Salmi, C.; Letourneux, Y.; Brunel, J. M. *Lett. Org. Chem.* **2006**, *3*, 396.

(78) Hanifin, Jr. J. W. Ridge, D, N. *US Patent* **1980**, *4197310*.

(79) Eller, G.; Holzer, W. *Molecules* **2006**, *11*, 371.

(80) Cantrill, A. A.; Osborn, H. M. I.; Sweeney, J. *Tetrahedron* **1998**, *54*, 2181.

(81) Chen, Y.; Sieburth, S. M. N. *Synthesis* **2002**, *2002*, 2191.

(82) Harada, K. N., S.; Hirotsu, K.; Nakamura, A.; Harada, T. *US Patent* **2006**, *7049458 B2*.

(83) Enders, D.; Meyer, O.; Raabe, G.; Runsink, J. *Synthesis* **1994**, *1994*, 66.

(84) Bull S. D.; Davies. S. G.; Fenton G.; Mulvaney A. W.; Prasad R. S. and Smith, A. D. *J. Chem. Soc., Perkin Trans. 1* **2000**, *1*, 3765.

(85) Bergeron, R. J., Garlich, J. R. *Synthesis* **1984**, 782.

(86) Stevens, J. C. *Stud. Surf. Sci. Catal.* **1996**, *101*, 11.

(87) McKnight, A. L.; Waymouth, R. M. *Chem. Rev.* **1998**, *98*, 2587.
(88) George, J. P. B.; Vernon, C. G.; Duncan, F. W. *Angew. Chem. Int. Ed.* **1999**, *38*, 428.

(89) Chum, P. S.; Kruper, W. J.; Guest, M. J. *Adv. Mater.* **2000**, *12*, 1759.

(90) Okuda, J. *Dalton Trans.* **2003**, 2367.

(91) Braunschweig, H.; Breitling, F. M. *Coord. Chem. Rev.* **2006**, *250*, 2691.

(92) Cotton, F. A.; Donahue, J. P.; Lichtenberger, D. L.; Murillo, C. A.; Villagran, D. *J. Am. Chem. Soc.* **2005**, *127*, 10808.

(93) Cotton, F. A.; Donahue, J. P.; Gruhn, N. E.; Lichtenberger, D. L.; Murillo, C. A.; Timmons, D. J.; Van Dorn, L. O.; VillagrÃ¡n, D.; Wang, X. *Inorg. Chem.* **2006**, *45*, 201.

(94) Cotton, F. A; Huang, P.; Murillo, C. A.; Wang, X. *Inorg. Chem. Commun.* **2003**, *6*, 121.

(95) Chisholm, M. H.; Gallucci, J.; Hadad, C. M.; Huffman, J. C.; Wilson, P. J. *J. Am. Chem. Soc.* **2003**, *125*, 16040.

(96) Mohamed, A.; Abdou, H.; Mayer, A.; Fackler, J. *J. Clust. Sci.* **2008**, *19*, 551.

(97) Hirotsu, M.; Fontaine, P. P.; Epshteyn, A.; Sita, L. R. *J. Am. Chem. Soc.* **2007**, *129*, 9284.

(98) Cotton, F. A. *Inorg. Chem.* **1998**, *37*, 5710.

(99) Cotton, F. A.; Matonic, J. H.; Murillo, C. A. *J. Am. Chem. Soc.* **1998**, *120*, 6047.

(100) Cotton, F. A.; Ibragimov, S. A.; Murillo, C. A.; Poplaukhin, P. V.; Zhao, Q. *J. Mol. Struct.* **2008**, *890*, 3.

(101) Lee, T.-Y.; Wooten, A. J.; Luci, J. J.; Swenson, D. C.; Messerle, L. *Chem. Commun.* **2005**, 5444.

(102) Soria, D. B.; Grundy, J.; Coles, M. P.; Hitchcock, P. B. *J. Organomet. Chem.* **2005**, *690*, 2278.

(103) Soria, D. B.; Grundy, J.; Coles, M. P.; Hitchcock, P. B. *Polyhedron* **2003**, *22*, 2731.

(104) Meyer, T. Y.; Garner, L. R.; Baenziger, N. C.; Messerle, L. *Inorg. Chem.* **1990**, *29*, 4045.

(105) Ting, C.; Baenziger, N. C.; Messerle, L. *J. Chem. Soc., Chem. Commun.* **1988**, 1133.

(106) Kummer, D.; Abdel Halim, S. H.; Kuhs, W.; Mattern, G. *J. Organomet. Chem.* **1993**, *446*, 51.

APPENDIX A

COMPUTATIONAL DATA

Table A 1: Energies for neutral bicyclic guanidines.

	AM1 (kcal/mol)	**AM1-SM2 (kcal/mol)**	**3-21G (Hartrees)**	**6-31G* (Hartrees)**
1	26.5	-13.2	-433.525791	-435.960229
2	10.23	-8.12	-588.810048	-592.093328
3	24.29	-9.86	-588.788187	-592.070551
4	-1.79	-8.18	-666.431134	-670.149474
5	-4.85	-7.36	-744.065748	-748.206749
6	4.48	-8.9	-666.422225	-670.136997
7	2.69	-5.82	-744.053321	-748.189589
8	20.05	-11.42	-511.165661	-514.026374
9	16.1	-10.49	-511.169891	-514.031063
10	77.34	-11.21	-976.681271	-973.098645
11	-13.49	-8.28	-744.062153	-748.207000
12	-7.58	-7.79	-744.055814	-748.198011
13	-51.35	-12.94	-660.034535	-663.717230
14	-42.97		-1243.804505	-1250.338031
15	34.7		-1302.257060	-1309.027075
16	-60.27	-11.72	-630.195684	-633.684010
17	-286.15	-8.96	-1101.161081	-1107.186733
18	24.51		-718.349412	-722.210779
19	18.29	-11.76	-548.819648	-551.893447
20	18.44	-9.81	-511.167170	-514.028465
21	15.53	-6.42	-588.814145	-592.100019
22	0.51	-5.42	-666.427941	-670.145705
23	-2.94	-12.41	-744.062448	-748.203062
24	12.24	-9.56	-588.802797	-592.089862
25	10.93	-8.51	-588.804445	-592.089582
26	14.29	-7.53	-588.796821	-592.085050
27	11.94	-6.93	-588.810748	-592.097953
28	25.41		-795.978690	-800.263337
29	-52.88	-11.31	-660.042596	-663.727356
30	-50.75		-1243.815398	-1250.349075
31	32.17	-9.72	-1302.263857	-1309.035669
32	-60.79	-13.91	-630.191923	-633.682762
33	-288.82	-9.41	-1101.160210	-1107.192508

Table A 2: Energies for bicyclic guanidinates.

	AM1 (kcal/mol)	**AM1-SM2 (kcal/mol)**	**3-21G//AM1 (Hartrees)**	**6-31G*//AM1 (Hartrees)**
1	24.6	-82.86	-432.881630	-435.333420
2	7.75	-75.23	-588.168468	-591.469087
3	22.55	-76.56	-588.139723	-591.439169
4	-4.66	-74.86	-666.788377	-669.523456
5	-8	-73.43	-743.424531	-747.582142
6	0.59	-73.2	-665.785265	-669.517499
7	0.13	-69.06	-743.417995	-747.571211
8	18.87	-79.7	-510.521330	-513.397930
9	14.01	-78.79	-510.524291	-513.402509
10	75.15	-74.67	-967.033991	-972.469261
11	-14.25	-75.02	-743.414645	-747.578598
12	-9.69	-72.72	-743.409805	-747.570405
13	-57.46	-76.88	-659.395277	-663.093993
14	-46.09		-1243.158604	-1249.708335
15	21.96		-1301.631684	-1308.410553
16	-69.53	-76.07	-629.567656	-633.071141
17	-303.61	-65.56	-1100.537023	-1106.576517
18	21.45		-717.705901	-721.580748
19	17.3	-80.45	-548.172691	-551.263953
20	17.33	-74.94	-510.525151	-513.402910
21	14.89	-67.27	-588.175127	-591.477120
22	-1.85	-66.25	-665.792976	-669.526343
23	-6.29	-57.55	-744.441747	-747.584178
24	10.66	-77.79	-588.157839	-591.461712
25	9.27	-75.12	-588.160146	-591.462524
26	13.57	-72.23	-588.154514	-591.459296
27	11.95	-71.15	-588.169583	-591.475144
28	20.21		-795.332385	-799.633078
29	-62.39	-70.46	-659.420193	-663.119338
30	-56.4		-1243.188511	-1249.735202
31	9.86	-63.05	-1301.659406	-1308.435101
32	-73.03	-79.07	-629.575113	-633.081031
33	-314.84	-62.9	-1100.551266	-1106.597546

Table A 3: Dihedral angles for bicyclic guanidinates.

	N2C1NIC2	N2C1N1C3	C1N1C2C4	C1N1C3C5	N1C2C4C6	N1C3C5C7
1	41.2	-2.4	-45.1	-22.8	48.6	44.9
2	-43.6	0.4	47.1	25.6	-48.4	-46.1
3	43.8	5.9	-52.8	22.9	56	-49.8
4	37.3	-14.7	-45.9	42.4	52.7	-54.2
5	35.1	-15.3	-41.8	43.3	50	-54.5
6	47.6	23.6	-54.6	-9.1	53.3	-22.5
7	27.2	30.2	-32.6	-45.9	41.7	40.3
8	36.4	-11.4	-44	38.2	51	-52.8
9	36.1	-14.4	-43.1	39.4	50.1	-49.9
10	33.1	-6.3	-35.9	33.6	43.2	-52.1
11	3.6	30.7	-19.9	-49.8	45	48.8
12	27	17.1	-35	-40.8	45.4	50.8
13	22.8	7.8	-21	-29.5	33	45.2
14	44	3.7	-46.4	-22.3	46	36.3
15	31.4	7	-38	-27.2	46.8	41.7
16	15.3	5.9	-23.7	-26.5	42.2	43.4
17	15.1	12.4	-23.3	-31.7	41.3	43.4
18	-55	25.1	60.5	-55	-65.3	68.1
19	-16.4	22.8	53.3	3.2	-40.7	-35.8
20	41.4	-3	-44.8	-22.3	48.3	45.5
21	41.2	-3.9	-43.1	-21.1	47.8	45.4
22	44.9	-2.1	-45.3	-23.7	43.4	46.6
23	45.5	0.3	-44.7	-23.6	43	41.8
24	43.5	3.3	-49.5	-29.8	51.9	49.1
25	38.2	2.3	-44	-26.1	48.2	44.7
26	47.3	7.3	-45.8	-29.3	41.9	42
27	5	-22.2	-46.4	-4.3	52	37.3
28	-50.8	2.1	57.9	-54.6	-65.2	67.8
29	38	-3	-45.1	-23.5	48.9	46.3
30	20.3	-16	-51.7	-7.8	32.9	30.8
31	-3.7	20.9	-11.6	-40.4	37.5	45.7
32	35.2	-4.8	-43.1	-21.5	49.6	46.6
33	35.2	-2.6	-43.8	-22.6	47	43.5

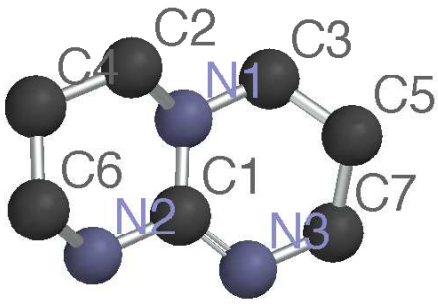
Table A 4: Dihedral angles for various bicyclic guanidinates (continued).

	C2C4C6N2	C3C5C7N3	C4C6N2C1	C5C7N3C1	C6N2C1N1	C7N3C1NI
1	-49.8	-45.2	47.5	23.2	-42.4	2.3
2	48.7	44.5	-47.7	-22.6	43.8	-2
3	-49.7	51.2	40.3	-23.9	-37.1	-5.9
4	-52.8	41	46.7	-15.9	-37.9	0.9
5	-54	40.9	50	-15.9	-39.3	1
6	-47.1	44.7	39.5	-33.7	-38.5	-0.3
7	-47.3	-19.1	41.7	0.6	-31	-5.3
8	-51.6	42.2	45.1	-16.2	-36.8	-0.5
9	-52.2	37.3	47.6	-14	-38.6	1
10	-49.1	45.7	47.2	-19.5	-38.7	-1.5
11	-56.3	-29.4	41.8	8.7	-14.9	-8.4
12	-50.2	-39.7	42.7	15.7	-30.1	-3
13	-48.3	-42.2	51.4	22	-38	-3.3
14	-44	-33.3	-41.2	-0.5	-41.2	-0.5
15	-51.3	-38	46.5	19.7	-35.3	-2.9
16	-55.2	-43	48.8	23.7	-27.8	-3.8
17	-53.3	-37.8	47.2	19.5	-27.2	-5.6
18	58	-43.6	-50.6	6.9	52.4	-1
19	-5.6	48.5	44	-26.5	-33.7	-10.4
20	-48.8	-45.7	46.9	23.5	-42.9	2.2
21	-50.3	-46.5	49.8	24.5	-45.4	1.7
22	-40.6	-45.6	41.2	22.9	-43.5	2.2
23	-41.3	-37.6	43.1	16.4	-45.6	3.4
24	-50.8	-45.3	45.4	20.8	-40.6	1.9
25	-49.6	-43	45.3	21.5	-38.2	0.5
26	-39.6	-33.7	40.6	12.2	-44.3	1.9
27	-18.3	-50.7	-24.3	27.3	32.9	9.6
28	60.3	-44.9	-50.8	8.2	48.9	-2.3
29	-47.4	-45.8	42.4	22.7	-36.9	3.2
30	13.9	-33.8	-46.8	12.7	30.2	13.5
31	-49.8	-33.1	37	13.7	-9.8	-6.5
32	-49.5	-48.6	43.9	25.8	-36.1	2.2
33	-43.6	-42.4	36.8	19.9	-31.7	4

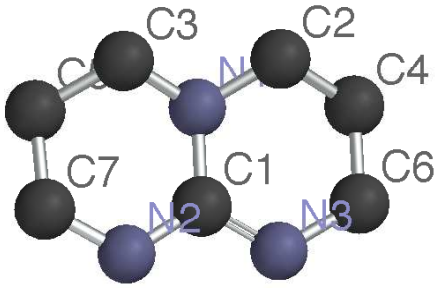
Table A 5: Electrostatic charges on neutral bicyclic guandines (Coulombs).

	N1	**N3**	**N2**
1	-0.59	-0.85	-0.85
2	-0.51	-0.82	-0.79
3	-1.15	-0.78	-0.84
4	-0.59	-0.85	-0.82
5	-0.6	-0.85	-0.82
6	-0.68	-0.78	-0.62
7	-0.59	-0.82	-0.87
8	-0.8	-0.79	-0.82
9	-0.55	-0.9	-0.82
10	-0.83	-0.8	-0.84
11	-0.84	-0.85	-0.9
12	-0.53	-0.78	-0.84
13	-0.47	-0.85	-0.86
14	-0.72	-0.83	-0.86
15	-0.27	-0.81	-0.8
16	-0.54	-0.82	-0.85
17	-0.3	-0.78	-0.79
18	-0.46	-0.88	-0.84
19	-0.81	-0.89	-0.87
20	-0.69	-0.98	-0.97
21	0.61	-1	-1
22	-0.64	-0.93	-0.94
23	-0.63	-0.96	-0.96
24	-0.84	-0.85	-0.86
25	-0.71	-0.8	-0.83
26	-0.89	-0.97	-0.99
27	-0.85	-0.97	-0.98
28	-0.71	-0.8	-0.9
29	-0.66	-0.96	-0.93
30	-0.76	-0.93	-0.9
31	-0.76	-0.93	-0.9
32	-0.91	-0.9	-0.91
33	-0.57	-0.8	-0.84

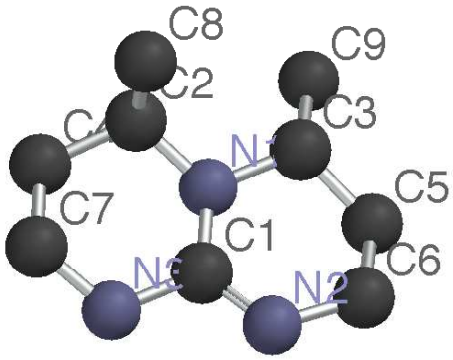
Figure A 1: Ball and Spoke Models of carbon and nitrogen backbones of neutral and anionic ligands from Spartan Calculations.

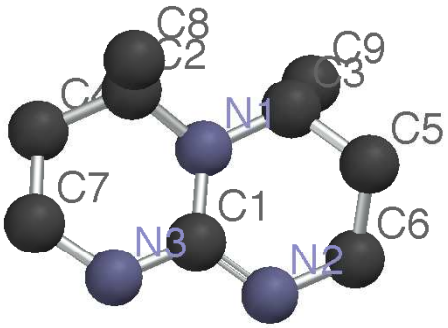


hppH



hpp$^-$





APPENDIX B

CRYSTALLOGRAPHIC DATA FOR hpp'$H_2^+I^-$

Crystal data and structure refinement for mes1028.

Identification code	mes1028	
Empirical formula	C9 H18 I N3	
Formula weight	295.16	
Temperature	190(2) K	
Wavelength	0.71073 Å	
Crystal system	Orthorhombic	
Space group	P 2(1) 2(1) 2(1)	
Unit cell dimensions	a = 7.4508(8) Å	α= 90°.
	b = 10.5820(11) Å	β= 90°.
	c = 15.0197(16) Å	γ = 90°.
Volume	1184.2(2) $Å^3$	
Z	4	
Density (calculated)	1.656 Mg/m^3	
Absorption coefficient	2.670 mm^{-1}	
F(000)	584	
Crystal size	0.22 x 0.09 x 0.02 mm^3	
Theta range for data collection	2.35 to 27.87°.	
Index ranges	-9<=h<=9, -13<=k<=13, -19<=l<=19	
Reflections collected	10536	
Independent reflections	2806 [R(int) = 0.0424]	
Completeness to theta = 27.87°	100.0 %	
Max. and min. transmission	0.9485 and 0.5912	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	2806 / 0 / 118	
Goodness-of-fit on F^2	0.989	
Final R indices [I>2sigma(I)]	R1 = 0.0329, wR2 = 0.0827	
R indices (all data)	R1 = 0.0408, wR2 = 0.1027	
Absolute structure parameter	-0.09(4)	
Largest diff. peak and hole	1.256 and -0.937 $e.Å^{-3}$	

Atomic coordinates (x 10^4) and equivalent isotropic displacement parameters ($Å^2$x 10^3) for mes1028. U(eq) is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	U(eq)
I(1)	1783(1)	429(1)	9338(1)	31(1)
N(3)	8066(6)	-1155(4)	11721(3)	24(1)
C(1)	7106(7)	-782(5)	12414(3)	26(1)
C(3)	8932(8)	-3045(5)	12547(4)	32(1)
C(2)	8657(8)	-2276(6)	13384(4)	32(1)
C(4)	9396(7)	-2178(5)	11786(3)	28(1)
N(1)	5881(7)	136(5)	12344(3)	36(1)
C(6)	7037(8)	689(5)	10900(4)	32(1)
C(5)	7664(7)	-662(5)	10822(3)	28(1)
N(2)	7359(6)	-1286(5)	13217(3)	32(1)
C(7)	5452(9)	794(6)	11529(4)	37(1)
C(8)	11309(8)	-1648(6)	11836(4)	37(1)
C(9)	6351(10)	-1510(6)	10333(4)	49(2)

Bond lengths [Å] and angles [°] for mes1028.

N(3)-C(1)	1.323(6)
N(3)-C(4)	1.471(7)
N(3)-C(5)	1.478(6)
C(1)-N(2)	1.333(7)
C(1)-N(1)	1.337(7)
C(3)-C(4)	1.506(8)
C(3)-C(2)	1.511(8)
C(3)-H(3A)	0.9900
C(3)-H(3B)	0.9900
C(2)-N(2)	1.447(7)
C(2)-H(4A)	0.9900
C(2)-H(4B)	0.9900
C(4)-C(8)	1.534(8)
C(4)-H(2A)	1.0000
N(1)-C(7)	1.444(7)
N(1)-H(1A)	0.8800
C(6)-C(5)	1.509(8)
C(6)-C(7)	1.517(8)
C(6)-H(6A)	0.9900
C(6)-H(6B)	0.9900
C(5)-C(9)	1.517(8)
C(5)-H(5A)	1.0000
N(2)-H(2B)	0.8800
C(7)-H(7A)	0.9900
C(7)-H(7B)	0.9900
C(8)-H(8A)	0.9800
C(8)-H(8B)	0.9800
C(8)-H(8C)	0.9800
C(9)-H(9A)	0.9800
C(9)-H(9B)	0.9800
C(9)-H(9C)	0.9800

C(1)-N(3)-C(4)	122.1(4)
C(1)-N(3)-C(5)	120.2(4)

C(4)-N(3)-C(5)	117.2(4)
N(3)-C(1)-N(2)	121.1(5)
N(3)-C(1)-N(1)	121.6(5)
N(2)-C(1)-N(1)	117.2(5)
C(4)-C(3)-C(2)	109.5(5)
C(4)-C(3)-H(3A)	109.8
C(2)-C(3)-H(3A)	109.8
C(4)-C(3)-H(3B)	109.8
C(2)-C(3)-H(3B)	109.8
H(3A)-C(3)-H(3B)	108.2
N(2)-C(2)-C(3)	109.7(4)
N(2)-C(2)-H(4A)	109.7
C(3)-C(2)-H(4A)	109.7
N(2)-C(2)-H(4B)	109.7
C(3)-C(2)-H(4B)	109.7
H(4A)-C(2)-H(4B)	108.2
N(3)-C(4)-C(3)	110.1(4)
N(3)-C(4)-C(8)	111.1(5)
C(3)-C(4)-C(8)	113.5(5)
N(3)-C(4)-H(2A)	107.3
C(3)-C(4)-H(2A)	107.3
C(8)-C(4)-H(2A)	107.3
C(1)-N(1)-C(7)	124.6(5)
C(1)-N(1)-H(1A)	117.7
C(7)-N(1)-H(1A)	117.7
C(5)-C(6)-C(7)	111.0(5)
C(5)-C(6)-H(6A)	109.4
C(7)-C(6)-H(6A)	109.4
C(5)-C(6)-H(6B)	109.4
C(7)-C(6)-H(6B)	109.4
H(6A)-C(6)-H(6B)	108.0
N(3)-C(5)-C(6)	109.0(4)
N(3)-C(5)-C(9)	111.3(5)
C(6)-C(5)-C(9)	113.5(5)
N(3)-C(5)-H(5A)	107.6
C(6)-C(5)-H(5A)	107.6

C(9)-C(5)-H(5A)	107.6
C(1)-N(2)-C(2)	122.7(4)
C(1)-N(2)-H(2B)	118.6
C(2)-N(2)-H(2B)	118.6
N(1)-C(7)-C(6)	108.7(5)
N(1)-C(7)-H(7A)	110.0
C(6)-C(7)-H(7A)	110.0
N(1)-C(7)-H(7B)	110.0
C(6)-C(7)-H(7B)	110.0
H(7A)-C(7)-H(7B)	108.3
C(4)-C(8)-H(8A)	109.5
C(4)-C(8)-H(8B)	109.5
H(8A)-C(8)-H(8B)	109.5
C(4)-C(8)-H(8C)	109.5
H(8A)-C(8)-H(8C)	109.5
H(8B)-C(8)-H(8C)	109.5
C(5)-C(9)-H(9A)	109.5
C(5)-C(9)-H(9B)	109.5
H(9A)-C(9)-H(9B)	109.5
C(5)-C(9)-H(9C)	109.5
H(9A)-C(9)-H(9C)	109.5
H(9B)-C(9)-H(9C)	109.5

Anisotropic displacement parameters ($Å^2 x\ 10^3$)for mes1028. The anisotropic displacement factor exponent takes the form: $-2\pi^2[\ h^2 a^{*2} U^{11} + ... + 2\ h\ k\ a^*\ b^*\ U^{12}\ ]$

	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
I(1)	32(1)	35(1)	26(1)	2(1)	-1(1)	-1(1)
N(3)	24(2)	29(2)	19(2)	1(2)	-2(2)	2(2)
C(1)	30(3)	28(2)	22(2)	-1(2)	2(2)	-1(2)
C(3)	36(3)	31(3)	30(3)	4(2)	-7(2)	0(2)
C(2)	34(3)	34(3)	30(3)	6(2)	-2(2)	-2(2)
C(4)	29(3)	34(3)	22(2)	-4(2)	-3(2)	7(2)
N(1)	37(3)	45(3)	27(2)	6(2)	8(2)	14(2)
C(6)	36(3)	27(3)	33(3)	7(2)	-2(2)	0(2)
C(5)	30(3)	35(3)	20(2)	4(2)	1(2)	2(2)
N(2)	36(2)	39(2)	21(2)	0(2)	2(2)	7(2)
C(7)	39(3)	37(3)	36(3)	5(2)	2(2)	11(2)
C(8)	29(3)	49(3)	34(3)	3(3)	5(2)	7(2)
C(9)	60(5)	40(3)	45(3)	-11(3)	-26(3)	5(3)

Hydrogen coordinates (x 10^4) and isotropic displacement parameters ($Å^2$x 10^3)
for mes1028.

	x	y	z	U(eq)
H(3A)	9914	-3661	12640	39
H(3B)	7823	-3520	12406	39
H(4A)	8222	-2830	13869	39
H(4B)	9811	-1898	13572	39
H(2A)	9311	-2686	11226	34
H(1A)	5295	354	12829	44
H(6A)	6687	1006	10304	39
H(6B)	8034	1221	11122	39
H(5A)	8811	-660	10476	34
H(2B)	6709	-1005	13665	39
H(7A)	5197	1694	11658	44
H(7B)	4372	416	11252	44
H(8A)	11524	-1091	11326	56
H(8B)	12173	-2346	11826	56
H(8C)	11453	-1167	12390	56
H(9A)	6834	-2370	10305	73
H(9B)	6168	-1189	9728	73
H(9C)	5202	-1518	10651	73

Torsion angles [°] for mes1028.

C(4)-N(3)-C(1)-N(2)	2.8(8)
C(5)-N(3)-C(1)-N(2)	174.9(5)
C(4)-N(3)-C(1)-N(1)	-178.9(5)
C(5)-N(3)-C(1)-N(1)	-6.9(8)
C(4)-C(3)-C(2)-N(2)	53.2(6)
C(1)-N(3)-C(4)-C(3)	24.7(7)
C(5)-N(3)-C(4)-C(3)	-147.6(4)
C(1)-N(3)-C(4)-C(8)	-101.9(6)
C(5)-N(3)-C(4)-C(8)	85.8(6)
C(2)-C(3)-C(4)-N(3)	-51.8(6)
C(2)-C(3)-C(4)-C(8)	73.5(6)
N(3)-C(1)-N(1)-C(7)	0.9(9)
N(2)-C(1)-N(1)-C(7)	179.3(6)
C(1)-N(3)-C(5)-C(6)	34.1(7)
C(4)-N(3)-C(5)-C(6)	-153.4(5)
C(1)-N(3)-C(5)-C(9)	-91.8(6)
C(4)-N(3)-C(5)-C(9)	80.6(6)
C(7)-C(6)-C(5)-N(3)	-55.3(6)
C(7)-C(6)-C(5)-C(9)	69.5(6)
N(3)-C(1)-N(2)-C(2)	-1.0(8)
N(1)-C(1)-N(2)-C(2)	-179.4(5)
C(3)-C(2)-N(2)-C(1)	-27.9(7)
C(1)-N(1)-C(7)-C(6)	-22.9(8)
C(5)-C(6)-C(7)-N(1)	49.4(7)

Observed and calculated structure factors for mes1028

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
2	0	0	1516	1572	9	3	10	0	182	175	5	-6	4	1	259	264	6	-6	9	1	194	185	16	-5	2	2	468	463	3
4	0	0	340	340	8	4	10	0	68	89	34	-5	4	1	476	470	5	-5	9	1	245	232	14	-4	2	2	393	396	3
6	0	0	650	641	10	5	10	0	170	179	14	-4	4	1	523	530	5	-4	9	1	107	120	25	-3	2	2	567	571	3
8	0	0	491	454	9	6	10	0	305	308	18	-3	4	1	389	393	3	-3	9	1	431	413	4	-2	2	2	695	718	4
1	1	0	560	566	3	1	11	0	411	387	5	-2	4	1	655	665	4	-2	9	1	284	279	4	-1	2	2	1431	1479	7
2	1	0	624	638	4	2	11	0	145	158	9	-1	4	1	1050	1081	6	-1	9	1	276	277	4	0	2	2	1131	1156	6
3	1	0	112	131	4	3	11	0	119	112	7	0	4	1	404	414	3	0	9	1	396	396	4	1	2	2	1458	1485	7
4	1	0	157	175	3	4	11	0	0	65	1	1	4	1	1050	1082	5	1	9	1	269	273	4	2	2	2	709	727	4
5	1	0	854	830	6	5	11	0	154	182	17	2	4	1	669	681	4	2	9	1	303	291	5	3	2	2	560	565	4
6	1	0	165	170	4	6	11	0	0	6	1	3	4	1	394	392	3	3	9	1	435	418	6	4	2	2	382	388	3
7	1	0	628	605	7	0	12	0	416	394	9	4	4	1	540	537	9	4	9	1	90	121	19	5	2	2	477	473	7
8	1	0	46	54	41	1	12	0	0	6	1	5	4	1	477	470	8	5	9	1	235	237	10	6	2	2	416	409	5
9	1	0	149	184	25	2	12	0	246	249	9	6	4	1	268	268	5	6	9	1	173	184	12	7	2	2	410	389	6
0	2	0	1550	1612	12	3	12	0	35	37	35	7	4	1	425	400	7	7	9	1	61	67	61	8	2	2	241	247	10
1	2	0	134	132	1	4	12	0	75	67	31	8	4	1	129	145	12	-6	10	1	90	119	27	9	2	2	165	200	17
2	2	0	1026	1070	6	1	13	0	374	349	10	9	4	1	139	150	18	-5	10	1	175	155	12	-9	3	2	142	155	14
3	2	0	649	680	4	2	13	0	122	112	13	-9	5	1	66	120	65	-4	10	1	411	397	10	-8	3	2	226	247	5
4	2	0	20	12	19	3	13	0	64	17	32	-8	5	1	332	333	9	-3	10	1	210	208	4	-7	3	2	206	209	5
5	2	0	339	335	3	1	0	1	138	131	2	-7	5	1	223	222	7	-2	10	1	433	418	7	-6	3	2	467	445	6
6	2	0	605	578	4	2	0	1	1578	1609	8	-6	5	1	655	620	7	-1	10	1	245	245	5	-5	3	2	633	629	4
7	2	0	42	27	16	3	0	1	320	337	2	-5	5	1	181	175	6	0	10	1	187	192	4	-4	3	2	632	641	4
8	2	0	452	433	7	4	0	1	1113	1135	5	-4	5	1	339	336	5	1	10	1	238	243	4	-3	3	2	951	959	5
9	2	0	95	115	22	5	0	1	426	420	4	-3	5	1	222	226	8	2	10	1	423	419	7	-2	3	2	796	819	5
1	3	0	1033	1068	6	6	0	1	230	232	6	-2	5	1	633	644	4	3	10	1	200	204	5	-1	3	2	1057	1076	5
2	3	0	721	736	5	7	0	1	93	105	7	-1	5	1	497	503	6	4	10	1	404	395	10	0	3	2	919	937	5
3	3	0	416	407	5	8	0	1	270	253	6	0	5	1	1333	1357	7	5	10	1	155	156	18	1	3	2	1053	1068	5
4	3	0	885	878	7	9	0	1	81	111	25	1	5	1	490	501	3	6	10	1	80	121	33	2	3	2	815	832	4
5	3	0	379	377	3	-9	1	1	277	249	13	2	5	1	620	637	4	-5	11	1	239	252	13	3	3	2	936	934	5
6	3	0	360	350	6	-8	1	1	164	166	7	3	5	1	230	236	2	-4	11	1	71	117	28	4	3	2	639	649	5
7	3	0	523	494	5	-7	1	1	90	96	8	4	5	1	342	339	5	-3	11	1	379	363	5	5	3	2	642	629	5
8	3	0	151	148	7	-6	1	1	220	224	4	5	5	1	177	178	7	-2	11	1	255	253	5	6	3	2	457	443	4
9	3	0	139	144	12	-5	1	1	753	741	4	6	5	1	635	611	8	-1	11	1	185	196	7	7	3	2	216	214	5
0	4	0	365	381	4	-4	1	1	561	562	3	7	5	1	223	224	10	0	11	1	75	84	11	8	3	2	233	239	5
1	4	0	369	391	2	-3	1	1	1293	1320	6	8	5	1	329	339	11	1	11	1	197	202	5	9	3	2	172	158	30
2	4	0	39	18	9	-2	1	1	302	307	2	9	5	1	80	120	79	2	11	1	245	252	7	-9	4	2	171	174	18
3	4	0	956	990	7	-1	1	1	686	703	4	-8	6	1	150	147	20	3	11	1	377	359	11	-8	4	2	183	187	8
4	4	0	251	260	5	0	1	1	28	290	27	-7	6	1	407	406	17	4	11	1	134	114	17	-7	4	2	135	147	10
5	4	0	590	578	5	1	1	1	646	661	3	-6	6	1	246	237	9	5	11	1	257	251	13	-6	4	2	304	303	4
6	4	0	228	234	8	2	1	1	273	275	2	-5	6	1	332	336	7	-4	12	1	322	291	14	-5	4	2	312	319	10
7	4	0	75	63	19	3	1	1	1288	1319	7	-4	6	1	69	87	13	-3	12	1	116	129	18	-4	4	2	565	565	5
8	4	0	206	196	9	4	1	1	551	555	3	-3	6	1	239	239	4	-2	12	1	224	237	8	-3	4	2	575	582	4
9	4	0	273	268	14	5	1	1	741	734	5	-2	6	1	138	151	3	-1	12	1	31	35	30	-2	4	2	659	670	4
1	5	0	663	660	4	6	1	1	220	226	4	-1	6	1	928	940	5	0	12	1	89	89	13	-1	4	2	493	510	3
2	5	0	1305	1296	7	7	1	1	73	98	8	0	6	1	265	272	3	1	12	1	32	25	31	0	4	2	388	405	3
3	5	0	320	309	6	8	1	1	170	170	9	1	6	1	932	940	5	2	12	1	227	235	8	1	4	2	495	512	3
4	5	0	880	877	7	9	1	1	229	246	14	2	6	1	140	148	3	3	12	1	134	130	10	2	4	2	687	701	4
5	5	0	72	74	12	-9	2	1	143	145	16	3	6	1	231	237	3	4	12	1	295	285	16	3	4	2	576	580	4
6	5	0	221	232	6	-8	2	1	166	182	11	4	6	1	59	86	14	-3	13	1	254	273	11	4	4	2	595	584	4
7	5	0	129	116	14	-7	2	1	301	294	4	5	6	1	348	344	7	-2	13	1	123	127	15	5	4	2	303	313	4
8	5	0	149	181	16	-6	2	1	389	379	4	6	6	1	207	232	8	-1	13	1	143	159	24	6	4	2	292	298	4
9	5	0	67	61	61	-5	2	1	353	352	3	7	6	1	427	405	8	0	13	1	151	109	15	7	4	2	140	151	5
0	6	0	245	234	4	-4	2	1	838	840	5	8	6	1	148	148	27	1	13	1	177	152	19	8	4	2	147	186	13
1	6	0	333	349	5	-3	2	1	598	610	4	-8	7	1	296	298	10	2	13	1	109	127	23	9	4	2	183	177	17
2	6	0	224	218	3	-2	2	1	1102	1150	9	-7	7	1	134	159	13	3	13	1	254	277	17	-9	5	2	153	190	19
3	6	0	1001	989	8	-1	2	1	1249	1291	9	-6	7	1	443	434	14	0	0	2	0	268	1	-8	5	2	114	135	17
4	6	0	144	157	6	0	2	1	926	949	5	-5	7	1	169	187	8	1	0	2	1508	1541	9	-7	5	2	89	99	12
5	6	0	581	574	7	1	2	1	1279	1324	7	-4	7	1	104	129	8	2	0	2	769	782	4	-6	5	2	269	277	6
6	6	0	0	41	1	2	2	1	1143	1188	11	-3	7	1	247	250	3	3	0	2	250	258	3	-5	5	2	488	468	6
7	6	0	0	20	1	3	2	1	601	615	4	-2	7	1	532	526	4	4	0	2	136	147	5	-4	5	2	727	719	5
8	6	0	97	72	33	4	2	1	839	846	5	-1	7	1	528	518	3	5	0	2	286	285	3	-3	5	2	668	677	5
1	7	0	171	177	3	5	2	1	365	365	4	0	7	1	850	845	5	6	0	2	635	606	5	-2	5	2	658	670	4
2	7	0	653	654	4	6	2	1	387	382	4	1	7	1	516	514	5	7	0	2	631	595	6	-1	5	2	480	480	3
3	7	0	0	3	1	7	2	1	286	288	5	2	7	1	527	521	4	8	0	2	302	284	6	0	5	2	374	376	3
4	7	0	674	661	7	8	2	1	175	181	8	3	7	1	229	245	5	9	0	2	232	254	15	1	5	2	467	470	3
5	7	0	184	192	10	9	2	1	134	143	35	4	7	1	112	120	9	-9	1	2	195	211	18	2	5	2	647	663	4
6	7	0	206	221	9	-9	3	1	183	179	17	5	7	1	178	194	8	-8	1	2	283	274	9	3	5	2	661	665	4
7	7	0	34	74	34	-8	3	1	339	333	9	6	7	1	431	426	10	-7	1	2	462	449	5	4	5	2	731	717	5
8	7	0	72	99	28	-7	3	1	180	193	4	7	7	1	150	161	35	-6	1	2	547	529	4	5	5	2	482	471	8
0	8	0	502	515	9	-6	3	1	445	437	5	8	7	1	279	296	12	-5	1	2	363	365	3	6	5	2	283	280	10
1	8	0	387	388	5	-5	3	1	481	475	3	-8	8	1	76	92	57	-4	1	2	421	413	3	7	5	2	94	105	11
2	8	0	258	256	5	-4	3	1	386	393	3	-7	8	1	260	284	14	-3	1	2	364	366	2	8	5	2	123	130	15
3	8	0	623	606	5	-3	3	1	914	919	6	-6	8	1	209	206	10	-2	1	2	664	678	4	9	5	2	206	190	16
4	8	0	68	60	18	-2	3	1	598	620	4	-5	8	1	365	353	9	-1	1	2	1231	1270	8	-8	6	2	102	115	18

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
5	8	0	417	393	9	-1	3	1	562	579	3	-4	8	1	355	355	7	0	1	2	571	564	3	-7	6	2	34	42	34
6	8	0	235	227	12	0	3	1	1124	1164	6	-3	8	1	214	221	9	1	1	2	1211	1254	6	-6	6	2	165	173	15
7	8	0	0	20	1	1	3	1	556	569	3	-2	8	1	381	375	3	2	1	2	640	652	3	-5	6	2	354	346	6
8	8	0	119	126	23	2	3	1	609	626	4	-1	8	1	624	618	5	3	1	2	360	365	2	-4	6	2	687	676	7
1	9	0	582	559	5	3	3	1	885	879	6	0	8	1	194	194	4	4	1	2	409	408	3	-3	6	2	518	525	5
2	9	0	273	281	4	4	3	1	377	384	3	1	8	1	624	620	4	5	1	2	382	380	3	-2	6	2	630	633	5
3	9	0	31	7	18	5	3	1	477	470	3	2	8	1	382	378	4	6	1	2	538	524	4	-1	6	2	369	378	3
4	9	0	389	381	12	6	3	1	458	448	4	3	8	1	209	216	3	7	1	2	484	461	5	0	6	2	95	86	8
5	9	0	231	249	13	7	3	1	184	188	4	4	8	1	356	356	7	8	1	2	284	272	8	1	6	2	388	391	3
6	9	0	101	101	25	8	3	1	344	331	6	5	8	1	365	363	8	9	1	2	206	212	14	2	6	2	627	637	4
7	9	0	242	247	14	9	3	1	165	176	11	6	8	1	192	203	10	-9	2	2	183	192	34	3	6	2	531	531	4
0	10	0	543	536	7	-9	4	1	130	148	17	7	8	1	268	285	10	-8	2	2	256	255	6	4	6	2	694	680	7
1	10	0	68	72	10	-8	4	1	124	143	13	8	8	1	98	95	34	-7	2	2	396	378	5	5	6	2	374	356	12
2	10	0	384	376	4	-7	4	1	417	399	8	-7	9	1	99	61	35	-6	2	2	444	433	4	6	6	2	131	166	9
7	6	2	56	42	30	2	13	2	152	146	23	-9	5	3	169	186	21	-2	10	3	206	206	5	-6	3	4	441	422	4
8	6	2	103	119	27	3	13	2	70	108	70	-8	5	3	106	122	23	-1	10	3	228	236	5	-5	3	4	523	509	5
-8	7	2	118	126	17	1	0	3	892	900	8	-7	5	3	536	523	16	0	10	3	309	298	4	-4	3	4	197	197	5
-7	7	2	102	146	43	2	0	3	375	375	3	-6	5	3	80	120	12	1	10	3	228	235	5	-3	3	4	799	808	12
-6	7	2	243	245	9	3	0	3	1333	1363	9	-5	5	3	511	506	5	2	10	3	198	205	12	-2	3	4	632	637	4
-5	7	2	316	325	6	4	0	3	503	504	4	-4	5	3	111	113	5	3	10	3	452	441	5	-1	3	4	497	496	5
-4	7	2	552	551	7	5	0	3	703	700	5	-3	5	3	296	302	4	4	10	3	105	121	19	0	3	4	989	1004	6
-3	7	2	583	570	4	6	0	3	249	248	4	-2	5	3	435	425	3	5	10	3	261	274	11	1	3	4	473	482	3
-2	7	2	455	444	4	7	0	3	77	79	9	-1	5	3	1039	1057	6	6	10	3	125	140	24	2	3	4	620	631	3
-1	7	2	338	337	4	8	0	3	43	27	43	0	5	3	368	368	3	-5	11	3	0	66	1	3	3	4	818	822	5
0	7	2	83	80	5	9	0	3	349	302	13	1	5	3	1048	1060	6	-4	11	3	364	356	9	4	3	4	209	205	4
1	7	2	338	337	3	-9	1	3	135	143	19	2	5	3	430	431	3	-3	11	3	142	152	12	5	3	4	514	504	4
2	7	2	441	438	3	-8	1	3	169	178	8	3	5	3	287	291	2	-2	11	3	296	298	6	6	3	4	457	437	6
3	7	2	587	574	5	-7	1	3	168	164	11	4	5	3	97	100	4	-1	11	3	56	81	16	7	3	4	60	52	9
4	7	2	537	535	9	-6	1	3	329	322	4	5	5	3	508	512	8	0	11	3	66	71	15	8	3	4	243	252	9
5	7	2	330	333	6	-5	1	3	200	202	3	6	5	3	124	126	4	1	11	3	65	77	24	9	3	4	256	194	20
6	7	2	240	241	9	-4	1	3	1004	1001	5	7	5	3	576	521	9	2	11	3	301	296	8	-9	4	4	77	127	35
7	7	2	134	150	17	-3	1	3	167	175	4	8	5	3	130	120	28	3	11	3	153	155	8	-8	4	4	204	216	9
8	7	2	91	120	34	-2	1	3	1357	1375	6	9	5	3	149	190	32	4	11	3	360	358	16	-7	4	4	320	332	9
-7	8	2	124	133	17	-1	1	3	546	562	6	-8	6	3	279	271	10	5	11	3	0	68	1	-6	4	4	169	173	3
-6	8	2	210	222	14	0	1	3	29	7	8	-7	6	3	173	177	15	-4	12	3	100	89	41	-5	4	4	352	348	5
-5	8	2	209	221	18	1	1	3	558	566	4	-6	6	3	447	436	8	-3	12	3	334	325	13	-4	4	4	822	799	5
-4	8	2	367	361	7	2	1	3	1377	1380	8	-5	6	3	226	233	7	-2	12	3	155	151	10	-3	4	4	188	179	4
-3	8	2	496	482	6	3	1	3	185	189	2	-4	6	3	212	218	7	-1	12	3	189	194	10	-2	4	4	853	860	5
-2	8	2	536	526	4	4	1	3	1008	1003	6	-3	6	3	60	66	8	0	12	3	0	15	1	-1	4	4	499	511	3
-1	8	2	474	473	5	5	1	3	190	202	3	-2	6	3	634	631	8	1	12	3	186	187	8	0	4	4	0	4	1
0	8	2	381	385	4	6	1	3	328	322	4	-1	6	3	289	294	3	2	12	3	159	151	10	1	4	4	492	501	4
1	8	2	478	474	5	7	1	3	156	166	5	0	6	3	1176	1172	7	3	12	3	344	324	8	2	4	4	846	858	4
2	8	2	535	524	5	8	1	3	151	164	13	1	6	3	296	293	3	4	12	3	92	92	25	3	4	4	182	180	4
3	8	2	501	488	4	9	1	3	161	146	14	2	6	3	637	630	4	-3	13	3	78	65	28	4	4	4	813	801	5
4	8	2	352	354	6	-9	2	3	286	270	15	3	6	3	79	72	6	-2	13	3	249	232	15	5	4	4	340	333	3
5	8	2	222	229	16	-8	2	3	154	164	6	4	6	3	212	219	4	-1	13	3	102	107	19	6	4	4	181	184	5
6	8	2	195	216	20	-7	2	3	56	46	13	5	6	3	223	231	7	0	13	3	59	31	41	7	4	4	325	323	9
7	8	2	117	131	15	-6	2	3	312	307	4	6	6	3	440	439	7	1	13	3	96	111	41	8	4	4	216	220	9
-7	9	2	182	178	18	-5	2	3	735	722	4	7	6	3	173	179	12	2	13	3	242	237	11	9	4	4	121	128	29
-6	9	2	208	214	12	-4	2	3	508	497	3	8	6	3	279	268	14	3	13	3	28	61	27	-8	5	4	67	51	38
-5	9	2	232	245	10	-3	2	3	996	1002	6	-8	7	3	0	47	1	0	0	4	174	166	4	-7	5	4	55	48	11
-4	9	2	159	188	10	-2	2	3	446	457	3	-7	7	3	395	377	11	1	0	4	2021	2068	12	-6	5	4	91	96	6
-3	9	2	319	322	6	-1	2	3	650	656	5	-6	7	3	87	114	16	2	0	4	176	166	4	-5	5	4	654	636	6
-2	9	2	261	259	4	0	2	3	824	832	5	-5	7	3	384	378	7	3	0	4	507	513	4	-4	5	4	120	125	7
-1	9	2	222	219	4	1	2	3	617	624	4	-4	7	3	266	257	6	4	0	4	156	161	3	-3	5	4	1245	1210	7
0	9	2	332	318	4	2	2	3	432	446	3	-3	7	3	250	255	3	5	0	4	733	712	5	-2	5	4	213	212	3
1	9	2	225	220	4	3	2	3	1010	1010	5	-2	7	3	271	264	5	6	0	4	120	121	5	-1	5	4	637	637	4
2	9	2	259	257	4	4	2	3	503	496	4	-1	7	3	743	731	5	7	0	4	487	463	5	0	5	4	390	377	3
3	9	2	313	318	5	5	2	3	729	719	5	0	7	3	319	305	5	8	0	4	50	64	32	1	5	4	632	635	4
4	9	2	177	185	8	6	2	3	297	293	4	1	7	3	751	742	5	9	0	4	122	118	22	2	5	4	202	209	3
5	9	2	246	247	13	7	2	3	57	58	12	2	7	3	265	264	6	-9	1	4	117	74	21	3	5	4	1238	1209	9
6	9	2	212	211	12	8	2	3	162	159	7	3	7	3	259	264	3	-8	1	4	504	476	6	4	5	4	123	129	4
7	9	2	159	179	17	9	2	3	280	282	14	4	7	3	258	256	9	-7	1	4	29	48	28	5	5	4	647	630	6
-6	10	2	159	170	14	-9	3	3	161	185	11	5	7	3	373	373	7	-6	1	4	752	727	5	6	5	4	111	110	5
-5	10	2	208	205	11	-8	3	3	133	141	9	6	7	3	109	112	16	-5	1	4	202	201	4	7	5	4	46	48	19
-4	10	2	170	178	12	-7	3	3	507	483	6	7	7	3	399	382	9	-4	1	4	405	395	3	8	5	4	0	54	1
-3	10	2	232	233	6	-6	3	3	362	353	3	8	7	3	37	44	37	-3	1	4	315	319	2	-8	6	4	158	193	13
-2	10	2	258	258	5	-5	3	3	427	427	4	-7	8	3	120	96	16	-2	1	4	645	661	3	-7	6	4	0	5	1
-1	10	2	386	378	5	-4	3	3	658	650	4	-6	8	3	302	304	11	-1	1	4	163	158	1	-6	6	4	186	205	8
0	10	2	509	494	5	-3	3	3	579	581	4	-5	8	3	168	181	10	0	1	4	1583	1626	8	-5	6	4	56	55	11
1	10	2	378	370	7	-2	3	3	880	894	6	-4	8	3	102	111	7	1	1	4	142	139	2	-4	6	4	626	618	6
2	10	2	266	259	4	-1	3	3	1185	1192	6	-3	8	3	375	373	9	2	1	4	621	643	4	-3	6	4	116	124	7
3	10	2	229	232	4	0	3	3	228	234	2	-2	8	3	416	410	4	3	1	4	323	332	4	-2	6	4	727	709	5
4	10	2	165	181	11	1	3	3	1159	1173	6	-1	8	3	380	372	4	4	1	4	411	399	3	-1	6	4	35	50	17
5	10	2	176	207	15	2	3	3	871	882	5	0	8	3	815	778	5	5	1	4	203	206	3	0	6	4	235	227	3
6	10	2	177	168	14	3	3	3	578	582	3	1	8	3	378	372	4	6	1	4	761	735	6	1	6	4	54	46	7
-5	11	2	113	150	24	4	3	3	665	664	5	2	8	3	410	401	4	7	1	4	56	54	13	2	6	4	704	702	5
-4	11	2	71	79	24	5	3	3	433	428	5	3	8	3	381	371	4	8	1	4	507	474	8	3	6	4	118	117	5
-3	11	2	95	72	13	6	3	3	366	360	6	4	8	3	105	117	9	9	1	4	44	69	44	4	6	4	621	609	5

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
-2	11	2	227	223	5	7	3	3	514	485	5	5	8	3	168	176	10	-9	2	4	216	216	15	5	6	4	41	52	17
-1	11	2	301	303	5	8	3	3	129	142	8	6	8	3	325	312	10	-8	2	4	101	113	14	6	6	4	205	210	12
0	11	2	434	414	5	9	3	3	224	188	19	7	8	3	80	97	33	-7	2	4	584	542	6	7	6	4	52	7	27
1	11	2	309	302	5	-9	4	3	106	130	36	-7	9	3	217	219	19	-6	2	4	258	259	5	8	6	4	182	194	19
2	11	2	237	233	5	-8	4	3	303	294	8	-6	9	3	160	147	15	-5	2	4	392	382	3	-8	7	4	80	113	34
3	11	2	60	74	23	-7	4	3	198	202	5	-5	9	3	251	236	13	-4	2	4	529	528	6	-7	7	4	81	70	23
4	11	2	31	75	30	-6	4	3	515	494	5	-4	9	3	410	389	6	-3	2	4	386	379	3	-6	7	4	118	122	16
5	11	2	139	152	16	-5	4	3	364	366	4	-3	9	3	190	195	4	-2	2	4	667	672	5	-5	7	4	548	528	6
-4	12	2	0	54	1	-4	4	3	188	187	5	-2	9	3	366	354	4	-1	2	4	1188	1205	9	-4	7	4	102	96	8
-3	12	2	30	46	30	-3	4	3	488	492	3	-1	9	3	303	307	5	0	2	4	49	36	7	-3	7	4	772	752	6
-2	12	2	155	157	11	-2	4	3	631	633	4	0	9	3	102	107	7	1	2	4	1219	1233	10	-2	7	4	87	94	9
-1	12	2	263	247	13	-1	4	3	248	257	3	1	9	3	306	311	6	2	2	4	662	668	4	-1	7	4	384	380	7
0	12	2	255	258	7	0	4	3	978	1001	6	2	9	3	357	348	4	3	2	4	399	389	3	0	7	4	287	279	4
1	12	2	238	250	17	1	4	3	230	247	2	3	9	3	187	187	5	4	2	4	521	522	4	1	7	4	374	371	4
2	12	2	163	154	9	2	4	3	648	648	5	4	9	3	402	390	7	5	2	4	384	372	4	2	7	4	65	77	8
3	12	2	74	46	17	3	4	3	495	496	3	5	9	3	228	228	10	6	2	4	256	258	4	3	7	4	789	768	6
4	12	2	91	54	31	4	4	3	164	167	4	6	9	3	105	146	23	7	2	4	568	536	6	4	7	4	81	91	10
-3	13	2	79	104	24	5	4	3	347	350	8	7	9	3	195	209	17	8	2	4	90	115	10	5	7	4	554	527	6
-2	13	2	129	146	17	6	4	3	520	495	5	-6	10	3	144	138	19	9	2	4	203	214	24	6	7	4	92	119	17
-1	13	2	183	188	22	7	4	3	195	201	6	-5	10	3	274	277	10	-9	3	4	208	199	11	7	7	4	56	71	56
0	13	2	269	271	11	8	4	3	284	289	12	-4	10	3	118	119	6	-8	3	4	232	245	7	8	7	4	105	115	30
1	13	2	187	187	12	9	4	3	116	127	29	-3	10	3	454	434	6	-7	3	4	53	57	14	-7	8	4	191	210	15
-6	8	4	103	122	20	2	1	5	709	721	4	-3	6	5	167	163	3	0	12	5	49	95	49	2	4	6	588	580	5
-5	8	4	191	208	10	3	1	5	546	550	4	-2	6	5	713	689	7	1	12	5	146	145	10	3	4	6	630	610	4
-4	8	4	572	549	6	4	1	5	836	835	5	-1	6	5	474	467	4	2	12	5	165	173	17	4	4	6	462	451	4
-3	8	4	132	129	6	5	1	5	305	296	6	0	6	5	891	879	5	3	12	5	246	253	9	5	4	6	527	513	5
-2	8	4	496	485	5	6	1	5	287	291	6	1	6	5	472	460	3	4	12	5	136	139	25	6	4	6	278	279	4
-1	8	4	482	475	4	7	1	5	174	185	6	2	6	5	698	681	5	-2	13	5	168	191	13	7	4	6	118	124	6
0	8	4	51	40	9	8	1	5	281	261	8	3	6	5	171	168	4	-1	13	5	106	117	19	8	4	6	143	176	19
1	8	4	489	482	4	9	1	5	84	140	61	4	6	5	35	13	17	0	13	5	25	46	25	-8	5	6	77	93	23
2	8	4	486	479	5	-9	2	5	171	172	14	5	6	5	265	276	7	1	13	5	117	115	19	-7	5	6	43	64	30
3	8	4	117	130	7	-8	2	5	212	213	7	6	6	5	473	456	12	2	13	5	200	186	11	-6	5	6	264	261	7
4	8	4	572	553	10	-7	2	5	58	65	10	7	6	5	190	213	12	0	0	6	1044	1077	7	-5	5	6	284	271	4
5	8	4	189	208	10	-6	2	5	315	306	4	8	6	5	273	289	15	1	0	6	911	925	4	-4	5	6	706	674	5
6	8	4	104	123	19	-5	2	5	524	514	4	-8	7	5	70	111	69	2	0	6	787	786	9	-3	5	6	556	549	4
7	8	4	201	204	16	-4	2	5	562	556	4	-7	7	5	356	344	12	3	0	6	54	58	8	-2	5	6	570	560	4
-7	9	4	80	30	48	-3	2	5	943	945	7	-6	7	5	200	207	19	4	0	6	134	144	4	-1	5	6	362	357	3
-6	9	4	280	286	30	-2	2	5	528	541	3	-5	7	5	273	267	9	5	0	6	377	371	4	0	5	6	10	13	10
-5	9	4	203	209	10	-1	2	5	523	537	5	-4	7	5	154	151	6	6	0	6	448	429	5	1	5	6	359	356	6
-4	9	4	127	140	6	0	2	5	522	542	3	-3	7	5	190	195	4	7	0	6	367	353	7	2	5	6	567	568	4
-3	9	4	302	291	8	1	2	5	526	541	3	-2	7	5	290	288	4	8	0	6	347	311	19	3	5	6	569	549	4
-2	9	4	272	280	4	2	2	5	540	551	3	-1	7	5	560	553	5	9	0	6	159	158	19	4	5	6	722	677	5
-1	9	4	186	192	5	3	2	5	955	948	6	0	7	5	429	434	4	-9	1	6	101	151	98	5	5	6	276	274	4
0	9	4	458	437	5	4	2	5	564	549	5	1	7	5	569	559	6	-8	1	6	247	233	14	6	5	6	252	259	6
1	9	4	192	194	5	5	2	5	540	520	5	2	7	5	287	287	4	-7	1	6	537	503	7	7	5	6	81	68	15
2	9	4	279	279	7	6	2	5	327	313	5	3	7	5	182	193	4	-6	1	6	400	387	4	8	5	6	114	96	33
3	9	4	308	291	5	7	2	5	81	79	8	4	7	5	156	156	5	-5	1	6	466	451	4	-8	6	6	75	88	38
4	9	4	128	143	19	8	2	5	216	216	9	5	7	5	283	273	21	-4	1	6	244	252	4	-7	6	6	0	32	1
5	9	4	205	202	11	9	2	5	165	162	53	6	7	5	202	206	12	-3	1	6	257	264	3	-6	6	6	178	176	9
6	9	4	292	297	11	-9	3	5	193	184	14	7	7	5	343	341	15	-2	1	6	533	535	5	-5	6	6	327	306	5
7	9	4	59	27	59	-8	3	5	197	215	7	8	7	5	105	117	39	-1	1	6	915	937	5	-4	6	6	501	486	4
-6	10	4	95	126	54	-7	3	5	355	333	5	-7	8	5	124	153	21	0	1	6	711	737	4	-3	6	6	638	622	5
-5	10	4	209	219	14	-6	3	5	364	365	4	-6	8	5	316	305	10	1	1	6	919	938	8	-2	6	6	434	426	5
-4	10	4	234	236	21	-5	3	5	459	455	4	-5	8	5	278	265	5	2	1	6	539	536	4	-1	6	6	421	421	4
-3	10	4	89	94	17	-4	3	5	661	657	5	-4	8	5	195	199	7	3	1	6	262	269	3	0	6	6	36	26	13
-2	10	4	232	239	8	-3	3	5	493	492	4	-3	8	5	305	309	5	4	1	6	265	264	4	1	6	6	425	421	4
-1	10	4	588	565	6	-2	3	5	777	789	5	-2	8	5	360	353	6	5	1	6	465	450	7	2	6	6	455	448	4
0	10	4	67	82	12	-1	3	5	830	828	11	-1	8	5	380	368	6	6	1	6	396	377	6	3	6	6	634	616	4
1	10	4	586	570	6	0	3	5	523	532	4	0	8	5	614	594	5	7	1	6	532	502	7	4	6	6	506	496	7
2	10	4	242	238	5	1	3	5	848	841	5	1	8	5	361	355	4	8	1	6	245	240	8	5	6	6	319	312	13
3	10	4	90	97	9	2	3	5	789	790	4	2	8	5	360	352	4	9	1	6	179	153	16	6	6	6	168	174	6
4	10	4	228	235	10	3	3	5	490	486	3	3	8	5	316	312	5	-9	2	6	177	171	16	7	6	6	0	35	1
5	10	4	207	215	13	4	3	5	653	649	8	4	8	5	186	191	8	-8	2	6	287	281	10	8	6	6	65	84	64
6	10	4	119	130	21	5	3	5	463	460	5	5	8	5	270	260	6	-7	2	6	253	254	7	-7	7	6	94	92	43
-5	11	4	0	31	1	6	3	5	358	357	5	6	8	5	293	303	15	-6	2	6	399	386	6	-6	7	6	185	180	5
-4	11	4	92	75	14	7	3	5	336	328	7	7	8	5	137	153	28	-5	2	6	393	390	6	-5	7	6	266	261	6
-3	11	4	43	41	37	8	3	5	193	215	8	-7	9	5	169	139	21	-4	2	6	357	358	3	-4	7	6	534	517	6
-2	11	4	265	256	13	9	3	5	200	179	34	-6	9	5	142	161	19	-3	2	6	515	514	3	-3	7	6	516	502	6
-1	11	4	0	29	1	-9	4	5	128	129	23	-5	9	5	163	175	7	-2	2	6	790	794	6	-2	7	6	690	669	5
0	11	4	432	403	6	-8	4	5	260	275	10	-4	9	5	320	316	9	-1	2	6	866	875	10	-1	7	6	242	232	4
1	11	4	0	26	1	-7	4	5	186	196	9	-3	9	5	192	191	6	0	2	6	1480	1474	12	0	7	6	209	218	3
2	11	4	249	245	9	-6	4	5	411	404	6	-2	9	5	447	426	5	1	2	6	849	857	9	1	7	6	225	219	3
3	11	4	39	35	38	-5	4	5	216	212	3	-1	9	5	470	460	6	2	2	6	785	794	12	2	7	6	700	676	5
4	11	4	0	75	1	-4	4	5	215	221	4	0	9	5	194	190	7	3	2	6	510	512	5	3	7	6	479	472	4
5	11	4	0	23	1	-3	4	5	343	344	3	1	9	5	472	463	4	4	2	6	359	358	4	4	7	6	541	522	6
-4	12	4	0	26	1	-2	4	5	585	597	4	2	9	5	450	431	6	5	2	6	398	389	4	5	7	6	252	257	7
-3	12	4	45	91	44	-1	4	5	579	566	4	3	9	5	190	189	8	6	2	6	398	388	5	6	7	6	180	183	6
-2	12	4	14	58	13	0	4	5	1379	1356	8	4	9	5	319	320	6	7	2	6	251	253	6	7	7	6	117	91	22

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
-1	12	4	331	323	18	1	4	5	562	552	4	5	9	5	176	183	15	8	2	6	273	285	9	-7	8	6	129	113	36
0	12	4	37	55	36	2	4	5	583	596	3	6	9	5	149	161	14	9	2	6	157	170	20	-6	8	6	143	149	19
1	12	4	343	327	8	3	4	5	340	342	3	7	9	5	131	146	25	-9	3	6	122	124	19	-5	8	6	301	287	5
2	12	4	77	53	20	4	4	5	213	224	4	-6	10	5	122	139	25	-8	3	6	156	163	10	-4	8	6	259	267	7
3	12	4	95	94	16	5	4	5	214	214	3	-5	10	5	174	184	17	-7	3	6	334	319	6	-3	8	6	411	398	5
4	12	4	14	26	13	6	4	5	411	408	6	-4	10	5	172	177	18	-6	3	6	326	324	4	-2	8	6	534	515	5
-2	13	4	225	224	12	7	4	5	194	199	8	-3	10	5	418	407	6	-5	3	6	450	439	5	-1	8	6	245	247	4
-1	13	4	86	53	28	8	4	5	272	281	14	-2	10	5	165	174	6	-4	3	6	553	552	4	0	8	6	559	544	4
0	13	4	356	330	28	9	4	5	105	126	47	-1	10	5	251	250	5	-3	3	6	544	535	4	1	8	6	229	233	5
1	13	4	65	58	52	-8	5	5	196	207	8	0	10	5	0	22	1	-2	3	6	660	658	7	2	8	6	541	527	5
2	13	4	213	221	12	-7	5	5	401	375	13	1	10	5	245	250	8	-1	3	6	316	338	3	3	8	6	408	390	4
1	0	5	877	879	4	-6	5	5	260	251	7	2	10	5	172	172	6	0	3	6	700	694	7	4	8	6	280	274	4
2	0	5	409	407	5	-5	5	5	545	520	8	3	10	5	412	402	7	1	3	6	320	347	4	5	8	6	281	285	19
3	0	5	1445	1423	8	-4	5	5	367	355	5	4	10	5	151	172	9	2	3	6	647	652	3	6	8	6	124	145	18
4	0	5	600	587	4	-3	5	5	164	165	3	5	10	5	187	187	16	3	3	6	539	534	3	7	8	6	114	119	21
5	0	5	678	652	6	-2	5	5	320	309	3	6	10	5	102	138	24	4	3	6	550	544	4	-6	9	6	185	198	18
6	0	5	312	317	4	-1	5	5	891	888	5	-5	11	5	75	106	75	5	3	6	456	446	4	-5	9	6	212	217	23
7	0	5	29	4	29	0	5	5	523	529	4	-4	11	5	348	322	15	6	3	6	314	317	7	-4	9	6	238	242	7
8	0	5	36	77	35	1	5	5	879	886	5	-3	11	5	215	210	7	7	3	6	315	320	6	-3	9	6	219	215	6
9	0	5	251	246	15	2	5	5	330	325	3	-2	11	5	279	271	6	8	3	6	163	162	10	-2	9	6	299	290	6
-9	1	5	143	142	18	3	5	5	181	186	3	-1	11	5	163	166	7	9	3	6	129	127	42	-1	9	6	206	199	7
-8	1	5	249	258	7	4	5	5	381	366	4	0	11	5	53	30	17	-8	4	6	187	177	15	0	9	6	328	318	4
-7	1	5	178	184	5	5	5	5	546	517	6	1	11	5	167	174	14	-7	4	6	110	124	6	1	9	6	182	184	5
-6	1	5	292	296	6	6	5	5	271	259	5	2	11	5	283	273	7	-6	4	6	270	287	7	2	9	6	298	294	6
-5	1	5	299	294	3	7	5	5	385	373	8	3	11	5	204	211	11	-5	4	6	523	505	4	3	9	6	199	209	7
-4	1	5	836	845	6	8	5	5	175	209	16	4	11	5	337	318	10	-4	4	6	467	452	4	4	9	6	229	240	7
-3	1	5	549	559	3	-8	6	5	288	290	12	5	11	5	133	111	24	-3	4	6	632	614	4	5	9	6	211	218	8
-2	1	5	704	718	8	-7	6	5	214	216	12	-4	12	5	124	138	38	-2	4	6	597	589	4	6	9	6	149	192	17
-1	1	5	451	453	2	-6	6	5	477	458	6	-3	12	5	256	248	11	-1	4	6	386	389	3	-6	10	6	181	208	17
0	1	5	453	454	3	-5	6	5	275	282	4	-2	12	5	117	174	16	0	4	6	708	688	5	-5	10	6	199	202	14
1	1	5	446	451	5	-4	6	5	27	5	27	-1	12	5	126	144	23	1	4	6	401	406	3	-4	10	6	77	95	21
-3	10	6	194	204	7	1	3	7	291	298	3	6	8	7	57	83	57	-7	3	8	308	302	8	1	8	8	323	329	5
-2	10	6	262	244	17	2	3	7	579	573	6	7	8	7	268	268	16	-6	3	8	235	239	5	2	8	8	164	161	11
-1	10	6	287	272	5	3	3	7	665	658	4	-6	9	7	183	183	19	-5	3	8	250	233	5	3	8	8	516	499	6
0	10	6	378	376	5	4	3	7	284	284	9	-5	9	7	246	239	9	-4	3	8	774	736	5	4	8	8	144	151	7
1	10	6	275	272	5	5	3	7	467	454	4	-4	9	7	122	118	7	-3	3	8	153	151	3	5	8	8	285	289	9
2	10	6	251	253	7	6	3	7	475	452	5	-3	9	7	367	353	6	-2	3	8	703	681	4	6	8	8	192	194	17
3	10	6	190	207	11	7	3	7	106	106	8	-2	9	7	247	239	5	-1	3	8	867	852	5	-6	9	8	82	61	60
4	10	6	68	104	33	8	3	7	247	257	10	-1	9	7	218	220	6	0	3	8	9	8	9	-5	9	8	182	186	12
5	10	6	219	200	16	-8	4	7	127	123	14	0	9	7	475	452	5	1	3	8	876	860	5	-4	9	8	255	262	8
6	10	6	207	205	18	-7	4	7	425	420	8	1	9	7	190	205	5	2	3	8	709	683	7	-3	9	8	88	92	11
-5	11	6	141	147	24	-6	4	7	213	210	7	2	9	7	215	223	8	3	3	8	147	148	4	-2	9	8	265	270	8
-4	11	6	46	32	32	-5	4	7	350	344	4	3	9	7	373	355	9	4	3	8	763	732	6	-1	9	8	463	453	6
-3	11	6	69	87	21	-4	4	7	306	310	4	4	9	7	110	113	11	5	3	8	236	235	5	0	9	8	52	61	15
-2	11	6	174	179	8	-3	4	7	265	269	4	5	9	7	221	237	12	6	3	8	230	239	5	1	9	8	467	459	8
-1	11	6	404	385	6	-2	4	7	422	415	4	6	9	7	142	181	32	7	3	8	317	306	7	2	9	8	270	262	11
0	11	6	267	267	7	-1	4	7	932	922	6	-5	10	7	188	163	11	8	3	8	58	86	31	3	9	8	79	93	27
1	11	6	394	381	7	0	4	7	80	78	4	-4	10	7	335	336	13	-8	4	8	167	189	14	4	9	8	230	252	7
2	11	6	170	176	12	1	4	7	951	935	5	-3	10	7	126	112	13	-7	4	8	70	82	17	5	9	8	193	192	14
3	11	6	59	86	27	2	4	7	414	415	3	-2	10	7	320	320	7	-6	4	8	268	266	7	6	9	8	0	57	1
4	11	6	0	41	1	3	4	7	268	267	3	-1	10	7	165	180	8	-5	4	8	338	332	4	-5	10	8	50	113	49
5	11	6	154	149	20	4	4	7	297	303	4	0	10	7	175	176	9	-4	4	8	111	122	8	-4	10	8	111	149	20
-3	12	6	0	29	1	5	4	7	359	358	5	1	10	7	187	182	5	-3	4	8	764	753	10	-3	10	8	212	208	18
-2	12	6	62	108	23	6	4	7	209	213	5	2	10	7	332	326	6	-2	4	8	287	295	4	-2	10	8	261	264	7
-1	12	6	190	189	9	7	4	7	434	420	6	3	10	7	116	113	10	-1	4	8	585	572	5	-1	10	8	128	123	7
0	12	6	229	226	8	8	4	7	118	119	16	4	10	7	333	343	8	0	4	8	353	355	3	0	10	8	531	498	6
1	12	6	169	188	12	-8	5	7	327	307	12	5	10	7	156	162	16	1	4	8	579	568	4	1	10	8	124	126	13
2	12	6	127	116	13	-7	5	7	93	110	17	-4	11	7	70	43	42	2	4	8	281	283	5	2	10	8	258	262	8
3	12	6	67	35	27	-6	5	7	497	477	5	-3	11	7	410	374	24	3	4	8	774	766	9	3	10	8	194	211	9
-1	13	6	270	279	17	-5	5	7	160	165	12	-2	11	7	101	88	14	4	4	8	111	119	5	4	10	8	117	147	16
0	13	6	196	189	13	-4	5	7	265	269	3	-1	11	7	209	201	9	5	4	8	350	344	5	5	10	8	56	115	55
1	13	6	291	277	12	-3	5	7	352	345	5	0	11	7	130	137	9	6	4	8	249	260	5	-4	11	8	37	49	36
1	0	7	33	20	15	-2	5	7	584	570	4	1	11	7	182	194	8	7	4	8	75	85	17	-3	11	8	92	74	23
2	0	7	1028	1033	7	-1	5	7	315	306	3	2	11	7	67	88	21	8	4	8	187	184	11	-2	11	8	76	56	24
3	0	7	116	117	4	0	5	7	927	917	5	3	11	7	388	369	11	-8	5	8	98	117	20	-1	11	8	312	298	8
4	0	7	1014	993	6	1	5	7	312	301	4	4	11	7	41	41	40	-7	5	8	67	80	18	0	11	8	50	58	36
5	0	7	85	105	6	2	5	7	564	562	4	-3	12	7	68	100	67	-6	5	8	209	221	6	1	11	8	291	296	10
6	0	7	308	294	5	3	5	7	347	336	3	-2	12	7	242	248	11	-5	5	8	145	150	4	2	11	8	0	56	1
7	0	7	58	68	23	4	5	7	246	255	5	-1	12	7	89	56	21	-4	5	8	760	716	6	3	11	8	58	65	29
8	0	7	143	137	11	5	5	7	153	157	5	0	12	7	50	30	50	-3	5	8	244	259	4	4	11	8	41	49	41
9	0	7	0	46	1	6	5	7	484	471	6	1	12	7	0	58	1	-2	5	8	820	797	9	-2	12	8	245	223	12
-9	1	7	264	248	17	7	5	7	85	114	16	2	12	7	258	249	16	-1	5	8	252	241	4	-1	12	8	32	29	31
-8	1	7	92	120	21	8	5	7	347	307	14	3	12	7	86	99	33	0	5	8	0	3	1	0	12	8	370	366	15
-7	1	7	23	38	23	-8	6	7	67	68	67	0	13	7	70	95	69	1	5	8	249	242	8	1	12	8	58	28	40
-6	1	7	203	210	5	-7	6	7	408	391	9	0	0	8	1414	1431	10	2	5	8	804	790	5	2	12	8	213	228	13
-5	1	7	625	611	5	-6	6	7	79	72	16	1	0	8	388	383	2	3	5	8	263	262	4	1	0	9	131	142	3
-4	1	7	282	274	3	-5	6	7	398	378	8	2	0	8	891	879	5	4	5	8	747	706	5	2	0	9	652	653	4
-3	1	7	967	960	5	-4	6	7	195	200	5	3	0	8	211	200	4	5	5	8	153	152	8	3	0	9	521	504	4
-2	1	7	444	435	4	-3	6	7	192	199	4	4	0	8	126	131	5	6	5	8	219	219	9	4	0	9	666	630	5

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
-1	1	7	588	586	3	-2	6	7	76	68	7	5	0	8	28	52	27	7	5	8	70	85	16	5	0	9	336	325	4
0	1	7	217	219	3	-1	6	7	912	876	5	6	0	8	612	575	8	8	5	8	122	119	24	6	0	9	63	80	12
1	1	7	597	600	6	0	6	7	209	217	3	7	0	8	0	6	1	-7	6	8	24	49	24	7	0	9	17	25	16
2	1	7	436	430	3	1	6	7	907	873	6	8	0	8	339	343	11	-6	6	8	9	36	8	8	0	9	227	216	12
3	1	7	980	965	6	2	6	7	67	72	7	-8	1	8	94	106	20	-5	6	8	491	472	9	-8	1	9	86	66	24
4	1	7	285	274	4	3	6	7	181	189	4	-7	1	8	542	504	8	-4	6	8	44	40	31	-7	1	9	30	67	30
5	1	7	628	614	7	4	6	7	203	200	4	-6	1	8	254	251	5	-3	6	8	760	730	6	-6	1	9	213	219	5
6	1	7	215	216	5	5	6	7	396	386	7	-5	1	8	541	521	5	-2	6	8	36	31	24	-5	1	9	544	537	5
7	1	7	0	42	1	6	6	7	70	75	22	-4	1	8	291	284	3	-1	6	8	325	322	7	-4	1	9	452	437	4
8	1	7	148	128	18	7	6	7	411	396	14	-3	1	8	157	173	5	0	6	8	60	66	7	-3	1	9	927	900	5
9	1	7	253	249	22	8	6	7	85	69	55	-2	1	8	201	203	2	1	6	8	341	334	4	-2	1	9	630	623	4
-9	2	7	92	118	25	-7	7	7	0	61	1	-1	1	8	973	997	5	2	6	8	17	35	16	-1	1	9	529	522	3
-8	2	7	124	135	14	-6	7	7	369	355	7	0	1	8	111	117	3	3	6	8	771	741	5	0	1	9	195	206	3
-7	2	7	251	254	6	-5	7	7	109	120	15	1	1	8	982	1000	5	4	6	8	46	46	9	1	1	9	540	527	5
-6	2	7	226	234	4	-4	7	7	179	187	5	2	1	8	210	219	5	5	6	8	484	466	5	2	1	9	641	624	4
-5	2	7	219	210	4	-3	7	7	186	182	10	3	1	8	139	159	7	6	6	8	0	30	1	3	1	9	916	893	6
-4	2	7	843	814	5	-2	7	7	490	476	4	4	1	8	288	289	5	7	6	8	79	49	36	4	1	9	445	433	4
-3	2	7	147	160	3	-1	7	7	344	333	4	5	1	8	530	516	4	-7	7	8	118	138	11	5	1	9	545	525	6
-2	2	7	945	939	5	0	7	7	826	789	5	6	1	8	253	248	5	-6	7	8	221	199	12	6	1	9	212	216	9
-1	2	7	636	640	4	1	7	7	340	334	6	7	1	8	533	497	8	-5	7	8	148	150	6	7	1	9	82	76	12
0	2	7	689	667	4	2	7	7	504	492	5	8	1	8	95	106	19	-4	7	8	561	524	10	8	1	9	84	69	25
1	2	7	643	645	7	3	7	7	190	185	7	-8	2	8	281	277	11	-3	7	8	226	230	8	-8	2	9	145	159	17
2	2	7	939	928	6	4	7	7	188	184	7	-7	2	8	56	67	16	-2	7	8	454	436	8	-7	2	9	239	248	8
3	2	7	160	163	5	5	7	7	110	114	13	-6	2	8	534	511	6	-1	7	8	228	224	6	-6	2	9	227	236	5
4	2	7	850	823	6	6	7	7	366	355	8	-5	2	8	266	260	4	0	7	8	71	75	6	-5	2	9	389	377	4
5	2	7	213	213	7	7	7	7	0	61	1	-4	2	8	141	147	5	1	7	8	218	228	5	-4	2	9	548	528	4
6	2	7	229	234	7	-7	8	7	267	268	13	-3	2	8	383	376	3	2	7	8	425	413	5	-3	2	9	463	456	4
7	2	7	259	248	5	-6	8	7	77	86	17	-2	2	8	681	672	4	3	7	8	212	222	5	-2	2	9	505	506	6
8	2	7	135	138	19	-5	8	7	216	230	11	-1	2	8	344	336	5	4	7	8	566	527	7	-1	2	9	461	462	4
9	2	7	87	110	38	-4	8	7	343	325	5	0	2	8	897	901	5	5	7	8	136	146	5	0	2	9	470	479	3
-8	3	7	259	256	11	-3	8	7	179	181	6	1	2	8	325	319	3	6	7	8	219	204	16	1	2	9	449	455	5
-7	3	7	101	107	9	-2	8	7	301	296	5	2	2	8	685	675	4	7	7	8	146	133	21	2	2	9	514	508	4
-6	3	7	483	458	5	-1	8	7	486	462	5	3	2	8	373	369	4	-6	8	8	189	190	24	3	2	9	449	456	5
-5	3	7	477	460	5	0	8	7	148	148	4	4	2	8	138	146	5	-5	8	8	287	291	10	4	2	9	540	531	5
-4	3	7	288	288	4	1	8	7	496	469	5	5	2	8	261	253	4	-4	8	8	149	152	6	5	2	9	387	379	5
-3	3	7	670	649	7	2	8	7	294	299	6	6	2	8	549	521	6	-3	8	8	499	487	6	6	2	9	241	247	7
-2	3	7	579	578	6	3	8	7	179	178	5	7	2	8	80	71	12	-2	8	8	169	165	7	7	2	9	249	251	8
-1	3	7	277	293	5	4	8	7	329	324	7	8	2	8	269	275	11	-1	8	8	322	324	4	8	2	9	140	154	22
0	3	7	831	828	4	5	8	7	222	237	14	-8	3	8	80	83	28	0	8	8	306	298	4	-8	3	9	200	207	11
-7	3	9	222	232	10	3	8	9	172	182	6	-6	3	10	291	286	7	-4	9	10	201	198	14	-4	4	11	147	151	8
-6	3	9	288	272	5	4	8	9	228	224	6	-5	3	10	474	458	5	-3	9	10	239	257	11	-3	4	11	375	367	5
-5	3	9	299	307	7	5	8	9	188	199	10	-4	3	10	229	226	4	-2	9	10	184	190	9	-2	4	11	549	532	6
-4	3	9	329	322	4	6	8	9	177	190	21	-3	3	10	655	645	5	-1	9	10	245	240	6	-1	4	11	167	168	4
-3	3	9	507	493	4	-6	9	9	100	148	23	-2	3	10	324	330	4	0	9	10	291	283	6	0	4	11	824	812	6
-2	3	9	437	428	4	-5	9	9	178	178	14	-1	3	10	428	426	4	1	9	10	245	234	6	1	4	11	160	172	5
-1	3	9	456	456	4	-4	9	9	172	184	10	0	3	10	644	643	4	2	9	10	190	188	9	2	4	11	540	531	5
0	3	9	657	659	4	-3	9	9	325	318	8	1	3	10	431	425	3	3	9	10	243	255	11	3	4	11	361	363	5
1	3	9	441	450	6	-2	9	9	243	230	6	2	3	10	328	334	4	4	9	10	187	201	10	4	4	11	126	139	9
2	3	9	436	430	4	-1	9	9	179	183	8	3	3	10	664	646	5	5	9	10	184	196	13	5	4	11	221	224	7
3	3	9	525	495	4	0	9	9	291	284	5	4	3	10	243	238	4	-4	10	10	142	146	17	6	4	11	356	347	9
4	3	9	317	312	11	1	9	9	180	185	7	5	3	10	475	459	6	-3	10	10	108	82	22	7	4	11	83	107	22
5	3	9	297	297	5	2	9	9	233	237	11	6	3	10	282	285	6	-2	10	10	158	163	25	-7	5	11	355	352	11
6	3	9	283	270	9	3	9	9	317	321	7	7	3	10	170	173	12	-1	10	10	258	255	10	-6	5	11	87	82	31
7	3	9	221	230	8	4	9	9	170	185	8	8	3	10	231	258	12	0	10	10	154	155	13	-5	5	11	274	286	6
8	3	9	194	206	12	5	9	9	148	180	17	-7	4	10	116	143	35	1	10	10	253	259	12	-4	5	11	112	128	9
-8	4	9	175	137	14	6	9	9	120	147	22	-6	4	10	172	176	6	2	10	10	161	163	9	-3	5	11	124	131	6
-7	4	9	280	277	11	-5	10	9	167	154	14	-5	4	10	365	355	7	3	10	10	107	94	17	-2	5	11	124	117	9
-6	4	9	261	258	11	-4	10	9	284	260	23	-4	4	10	440	425	5	4	10	10	114	144	15	-1	5	11	660	639	6
-5	4	9	428	417	4	-3	10	9	182	169	24	-3	4	10	448	439	5	-3	11	10	0	61	1	0	5	11	145	152	8
-4	4	9	433	434	4	-2	10	9	338	333	8	-2	4	10	470	469	6	-2	11	10	211	209	13	1	5	11	667	646	6
-3	4	9	326	335	4	-1	10	9	169	159	11	-1	4	10	380	370	3	-1	11	10	155	177	14	2	5	11	124	119	6
-2	4	9	381	383	4	0	10	9	162	173	9	0	4	10	217	234	4	0	11	10	317	308	9	3	5	11	123	126	6
-1	4	9	749	727	6	1	10	9	161	163	7	1	4	10	370	360	4	1	11	10	155	177	16	4	5	11	118	122	9
0	4	9	427	423	4	2	10	9	323	330	8	2	4	10	474	473	5	2	11	10	192	203	10	5	5	11	284	296	8
1	4	9	745	727	4	3	10	9	158	164	23	3	4	10	446	436	5	3	11	10	52	57	51	6	5	11	57	72	57
2	4	9	377	380	4	4	10	9	263	256	16	4	4	10	426	417	5	0	12	10	160	141	20	7	5	11	379	352	11
3	4	9	331	337	4	5	10	9	144	159	18	5	4	10	346	346	5	1	0	11	380	383	3	-6	6	11	370	365	11
4	4	9	434	441	5	-4	11	9	150	154	19	6	4	10	179	176	7	2	0	11	253	243	5	-5	6	11	119	125	11
5	4	9	438	419	6	-3	11	9	267	240	18	7	4	10	106	137	19	3	0	11	729	714	5	-4	6	11	127	133	10
6	4	9	273	262	6	-2	11	9	139	142	18	-7	5	10	66	74	36	4	0	11	59	59	12	-3	6	11	16	32	16
7	4	9	276	283	10	-1	11	9	124	129	14	-6	5	10	106	101	13	5	0	11	559	523	6	-2	6	11	405	400	6
8	4	9	147	136	15	0	11	9	0	6	1	-5	5	10	412	394	9	6	0	11	117	121	9	-1	6	11	74	74	11
-7	5	9	238	246	10	1	11	9	145	136	10	-4	5	10	245	249	5	7	0	11	0	44	1	0	6	11	717	684	5
-6	5	9	423	406	7	2	11	9	135	144	18	-3	5	10	535	514	5	8	0	11	0	27	1	1	6	11	66	70	10
-5	5	9	190	192	4	3	11	9	236	242	23	-2	5	10	374	353	8	-8	1	11	143	171	18	2	6	11	403	399	5
-4	5	9	178	187	6	4	11	9	152	153	16	-1	5	10	250	256	5	-7	1	11	132	155	17	3	6	11	59	35	17
-3	5	9	198	201	5	-2	12	9	155	163	16	0	5	10	211	226	4	-6	1	11	188	196	6	4	6	11	132	131	10
-2	5	9	436	429	6	-1	12	9	102	105	34	1	5	10	250	257	4	-5	1	11	111	112	7	5	6	11	128	125	14
-1	5	9	460	452	4	0	12	9	33	39	33	2	5	10	367	350	6	-4	1	11	792	756	6	6	6	11	369	362	11

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
0	5	9	819	799	5	1	12	9	94	110	20	3	5	10	538	511	5	-3	1	11	71	70	10	-6	7	11	35	14	34
1	5	9	461	447	4	2	12	9	151	161	16	4	5	10	256	256	5	-2	1	11	677	658	5	-5	7	11	255	262	17
2	5	9	434	432	8	0	0	10	850	806	6	5	5	10	431	398	7	-1	1	11	106	108	5	-4	7	11	107	131	15
3	5	9	209	216	4	1	0	10	810	786	4	6	5	10	91	109	14	0	1	11	128	115	5	-3	7	11	185	190	8
4	5	9	198	197	4	2	0	10	232	224	3	7	5	10	57	78	57	1	1	11	135	128	4	-2	7	11	113	126	11
5	5	9	179	181	6	3	0	10	233	232	4	-7	6	10	0	37	1	2	1	11	685	667	5	-1	7	11	599	576	6
6	5	9	414	411	8	4	0	10	204	200	5	-6	6	10	91	131	19	3	1	11	84	73	6	0	7	11	112	112	8
7	5	9	256	248	9	5	0	10	291	288	4	-5	6	10	217	223	6	4	1	11	800	761	6	1	7	11	609	578	6
-7	6	9	286	286	11	6	0	10	263	256	5	-4	6	10	575	551	8	5	1	11	113	113	12	2	7	11	111	128	9
-6	6	9	186	185	7	7	0	10	507	475	13	-3	6	10	362	362	5	6	1	11	184	196	7	3	7	11	188	195	6
-5	6	9	209	211	8	8	0	10	141	160	16	-2	6	10	542	538	6	7	1	11	121	150	14	4	7	11	121	129	11
-4	6	9	123	136	10	-8	1	10	249	249	12	-1	6	10	192	210	5	8	1	11	141	168	20	5	7	11	270	264	10
-3	6	9	113	131	11	-7	1	10	215	221	7	0	6	10	55	51	9	-8	2	11	135	162	19	6	7	11	47	16	47
-2	6	9	200	194	5	-6	1	10	390	378	6	1	6	10	207	221	4	-7	2	11	26	21	25	-5	8	11	190	203	15
-1	6	9	596	576	7	-5	1	10	290	282	4	2	6	10	551	539	5	-6	2	11	226	235	6	-4	8	11	40	56	40
0	6	9	536	516	4	-4	1	10	205	205	4	3	6	10	357	359	7	-5	2	11	378	364	5	-3	8	11	302	280	11
1	6	9	592	576	7	-3	1	10	354	347	3	4	6	10	571	549	7	-4	2	11	78	82	8	-2	8	11	220	214	14
2	6	9	199	196	5	-2	1	10	499	506	3	5	6	10	246	226	10	-3	2	11	767	733	6	-1	8	11	142	153	6
3	6	9	126	126	6	-1	1	10	528	526	6	6	6	10	139	137	19	-2	2	11	443	434	4	0	8	11	383	369	9
4	6	9	122	143	10	0	1	10	908	896	5	7	6	10	0	38	1	-1	2	11	509	503	5	1	8	11	134	156	8
5	6	9	200	201	6	1	1	10	509	511	4	-6	7	10	137	167	13	0	2	11	557	543	5	2	8	11	212	209	6
6	6	9	186	187	9	2	1	10	521	517	4	-5	7	10	245	255	8	1	2	11	508	499	4	3	8	11	270	274	10
7	6	9	238	277	17	3	1	10	356	351	4	-4	7	10	270	253	9	2	2	11	441	435	5	4	8	11	56	57	22
-7	7	9	150	171	13	4	1	10	212	211	4	-3	7	10	486	459	11	3	2	11	768	731	5	5	8	11	207	205	12
-6	7	9	332	323	10	5	1	10	290	287	4	-2	7	10	286	284	7	4	2	11	74	92	18	-5	9	11	106	148	31
-5	7	9	215	208	8	6	1	10	402	385	5	-1	7	10	280	276	7	5	2	11	385	369	6	-4	9	11	228	244	13
-4	7	9	78	75	18	7	1	10	215	229	8	0	7	10	48	47	11	6	2	11	217	232	7	-3	9	11	100	82	23
-3	7	9	139	145	11	8	1	10	253	253	15	1	7	10	270	274	7	7	2	11	0	22	1	-2	9	11	234	227	10
-2	7	9	383	369	6	-8	2	10	168	204	15	2	7	10	276	282	5	8	2	11	177	165	30	-1	9	11	327	329	10
-1	7	9	416	417	4	-7	2	10	324	313	11	3	7	10	488	462	6	-7	3	11	283	279	12	0	9	11	0	4	1
0	7	9	531	514	6	-6	2	10	224	227	8	4	7	10	255	245	8	-6	3	11	154	163	8	1	9	11	338	331	6
1	7	9	407	411	6	-5	2	10	398	390	5	5	7	10	249	258	8	-5	3	11	302	303	5	2	9	11	215	229	9
2	7	9	373	367	5	-4	2	10	210	223	4	6	7	10	153	161	12	-4	3	11	452	427	6	3	9	11	0	81	1
3	7	9	143	147	12	-3	2	10	425	419	5	-6	8	10	190	179	13	-3	3	11	133	147	7	4	9	11	249	242	12
4	7	9	53	76	21	-2	2	10	330	324	3	-5	8	10	133	119	20	-2	3	11	398	398	4	5	9	11	146	145	24
5	7	9	209	207	9	-1	2	10	778	767	5	-4	8	10	307	296	13	-1	3	11	539	535	4	-4	10	11	102	69	25
6	7	9	321	329	14	0	2	10	456	460	3	-3	8	10	219	213	11	0	3	11	37	48	18	-3	10	11	332	308	14
7	7	9	157	168	22	1	2	10	778	767	4	-2	8	10	354	350	10	1	3	11	530	529	4	-2	10	11	64	79	45
-6	8	9	179	193	12	2	2	10	336	328	3	-1	8	10	343	331	7	2	3	11	407	399	6	-1	10	11	160	170	17
-5	8	9	210	205	11	3	2	10	425	415	4	0	8	10	209	206	6	3	3	11	114	131	5	0	10	11	214	206	9
-4	8	9	222	224	6	4	2	10	218	223	5	1	8	10	336	332	8	4	3	11	442	429	6	1	10	11	153	164	10
-3	8	9	186	187	7	5	2	10	402	392	6	2	8	10	373	356	9	5	3	11	313	306	6	2	10	11	66	73	31
-2	8	9	354	345	7	6	2	10	213	208	8	3	8	10	213	215	7	6	3	11	173	166	9	3	10	11	308	313	10
-1	8	9	417	399	5	7	2	10	336	310	8	4	8	10	288	297	8	7	3	11	267	278	11	4	10	11	95	72	22
0	8	9	325	311	6	8	2	10	208	201	14	5	8	10	122	124	13	-7	4	11	86	108	26	-2	11	11	311	299	13
1	8	9	407	396	5	-8	3	10	245	255	16	6	8	10	192	175	39	-6	4	11	364	352	9	-1	11	11	81	52	30
2	8	9	340	342	6	-7	3	10	138	169	17	-5	9	10	187	196	13	-5	4	11	228	228	5	0	11	11	46	42	46
1	11	11	61	52	61	-2	6	12	483	464	6	-7	3	13	194	199	17	1	0	14	148	143	8	3	7	14	168	164	13
2	11	11	318	300	11	-1	6	12	52	63	23	-6	3	13	243	231	11	2	0	14	324	310	4	4	7	14	319	344	13
0	0	12	692	666	7	0	6	12	87	112	9	-5	3	13	254	266	12	3	0	14	0	5	1	-4	8	14	90	107	25
1	0	12	857	833	5	1	6	12	55	67	23	-4	3	13	309	301	6	4	0	14	37	55	37	-3	8	14	286	273	25
2	0	12	310	308	4	2	6	12	490	474	7	-3	3	13	353	362	6	5	0	14	197	212	7	-2	8	14	195	210	13
3	0	12	171	168	4	3	6	12	158	170	8	-2	3	13	310	303	9	6	0	14	378	358	10	-1	8	14	144	143	20
4	0	12	26	27	26	4	6	12	466	455	10	-1	3	13	466	455	5	-6	1	14	128	135	17	0	8	14	237	249	10
5	0	12	287	294	5	5	6	12	70	91	22	0	3	13	262	261	8	-5	1	14	252	259	8	1	8	14	126	147	14
6	0	12	74	55	16	6	6	12	127	145	21	1	3	13	461	450	5	-4	1	14	168	173	6	2	8	14	200	211	16
7	0	12	335	337	11	-6	7	12	0	63	1	2	3	13	288	293	7	-3	1	14	197	214	7	3	8	14	282	280	12
-7	1	12	107	92	19	-5	7	12	303	297	10	3	3	13	351	348	6	-2	1	14	260	263	5	4	8	14	99	115	44
-6	1	12	489	477	7	-4	7	12	67	99	39	4	3	13	308	299	8	-1	1	14	677	645	5	-2	9	14	194	213	15
-5	1	12	206	206	6	-3	7	12	488	455	10	5	3	13	265	261	10	0	1	14	530	511	5	-1	9	14	172	163	19
-4	1	12	196	192	5	-2	7	12	140	144	9	6	3	13	206	235	11	1	1	14	664	647	6	0	9	14	142	161	14
-3	1	12	142	148	6	-1	7	12	227	242	6	7	3	13	178	200	20	2	1	14	276	268	5	1	9	14	147	159	15
-2	1	12	581	563	5	0	7	12	188	198	6	-6	4	13	254	261	10	3	1	14	216	214	4	2	9	14	201	210	12
-1	1	12	33	20	15	1	7	12	219	231	5	-5	4	13	185	186	11	4	1	14	183	180	6	1	0	15	77	89	11
0	1	12	794	763	5	2	7	12	136	144	8	-4	4	13	185	181	7	5	1	14	263	265	7	2	0	15	410	389	6
1	1	12	30	30	30	3	7	12	475	453	12	-3	4	13	220	237	7	6	1	14	130	132	19	3	0	15	21	35	21
2	1	12	551	547	6	4	7	12	74	99	30	-2	4	13	366	362	5	-6	2	14	278	253	13	4	0	15	526	516	8
3	1	12	163	164	5	5	7	12	313	294	10	-1	4	13	409	409	6	-5	2	14	205	217	9	5	0	15	0	45	1
4	1	12	198	190	5	6	7	12	19	62	19	0	4	13	511	496	5	-4	2	14	143	170	12	6	0	15	210	209	18
5	1	12	210	212	9	-5	8	12	146	169	22	1	4	13	412	408	6	-3	2	14	281	285	5	-6	1	15	88	105	24
6	1	12	492	475	7	-4	8	12	291	284	17	2	4	13	375	373	7	-2	2	14	349	331	9	-5	1	15	300	312	10
7	1	12	91	96	19	-3	8	12	99	110	21	3	4	13	248	245	6	-1	2	14	170	173	5	-4	1	15	21	18	20
-7	2	12	342	315	11	-2	8	12	215	223	10	4	4	13	180	186	8	0	2	14	693	663	6	-3	1	15	593	556	8
-6	2	12	184	200	8	-1	8	12	254	248	10	5	4	13	190	185	11	1	2	14	153	162	6	-2	1	15	86	105	9
-5	2	12	256	248	6	0	8	12	102	100	12	6	4	13	277	269	12	2	2	14	342	340	6	-1	1	15	316	323	5
-4	2	12	402	391	5	1	8	12	250	251	6	-6	5	13	211	200	17	3	2	14	296	289	5	0	1	15	189	176	6
-3	2	12	51	51	12	2	8	12	224	226	12	-5	5	13	213	235	11	4	2	14	166	172	10	1	1	15	331	329	5
-2	2	12	379	376	4	3	8	12	103	110	19	-4	5	13	98	103	13	5	2	14	206	215	8	2	1	15	102	107	8
-1	2	12	727	698	5	4	8	12	308	287	11	-3	5	13	60	87	17	6	2	14	236	248	11	3	1	15	597	554	7

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
0	2	12	232	231	4	5	8	12	191	168	12	-2	5	13	204	217	7	-6	3	14	137	148	24	4	1	15	23	14	23
1	2	12	738	706	5	-4	9	12	78	126	29	-1	5	13	420	411	5	-5	3	14	257	249	12	5	1	15	332	324	10
2	2	12	368	365	6	-3	9	12	252	271	14	0	5	13	414	411	5	-4	3	14	298	289	7	6	1	15	111	109	19
3	2	12	37	48	14	-2	9	12	182	211	14	1	5	13	409	408	8	-3	3	14	147	149	9	-6	2	15	0	81	1
4	2	12	387	382	5	-1	9	12	136	160	10	2	5	13	220	212	8	-2	3	14	405	393	14	-5	2	15	116	109	15
5	2	12	252	244	6	0	9	12	329	326	8	3	5	13	106	92	9	-1	3	14	340	338	5	-4	2	15	475	446	8
6	2	12	174	194	8	1	9	12	161	162	9	4	5	13	81	104	20	0	3	14	254	264	5	-3	2	15	72	74	19
7	2	12	327	314	12	2	9	12	205	210	10	5	5	13	202	229	11	1	3	14	336	329	5	-2	2	15	435	402	6
-7	3	12	112	128	21	3	9	12	237	264	11	6	5	13	184	194	20	2	3	14	388	391	11	-1	2	15	267	261	9
-6	3	12	273	276	9	4	9	12	93	126	25	-6	6	13	254	238	17	3	3	14	143	156	7	0	2	15	140	145	5
-5	3	12	226	216	5	-3	10	12	69	73	69	-5	6	13	151	157	12	4	3	14	270	286	7	1	2	15	251	255	5
-4	3	12	149	160	5	-2	10	12	148	147	25	-4	6	13	54	82	54	5	3	14	250	253	14	2	2	15	414	397	9
-3	3	12	472	444	8	-1	10	12	306	301	12	-3	6	13	109	99	10	6	3	14	179	155	22	3	2	15	65	73	48
-2	3	12	383	378	5	0	10	12	38	42	38	-2	6	13	353	354	6	-6	4	14	181	181	16	4	2	15	452	442	7
-1	3	12	346	351	4	1	10	12	295	296	10	-1	6	13	312	311	6	-5	4	14	241	249	14	5	2	15	66	104	48
0	3	12	440	434	4	2	10	12	142	149	16	0	6	13	548	528	7	-4	4	14	214	208	7	6	2	15	74	82	35
1	3	12	362	357	4	3	10	12	103	69	21	1	6	13	319	311	6	-3	4	14	467	450	8	-6	3	15	281	268	14
2	3	12	383	380	5	0	11	12	351	340	18	2	6	13	359	348	10	-2	4	14	376	361	8	-5	3	15	234	226	13
3	3	12	455	435	5	1	0	13	385	375	4	3	6	13	86	96	17	-1	4	14	235	254	7	-4	3	15	93	116	21
4	3	12	173	171	6	2	0	13	502	476	4	4	6	13	61	84	34	0	4	14	358	368	10	-3	3	15	393	358	7
5	3	12	228	214	7	3	0	13	559	538	5	5	6	13	128	158	18	1	4	14	246	262	7	-2	3	15	308	305	8
6	3	12	280	284	10	4	0	13	346	328	5	6	6	13	236	238	16	2	4	14	355	355	12	-1	3	15	216	220	6
7	3	12	109	130	39	5	0	13	257	254	11	-5	7	13	160	160	15	3	4	14	465	453	7	0	3	15	500	486	6
-7	4	12	171	176	14	6	0	13	176	185	9	-4	7	13	164	171	19	4	4	14	191	204	8	1	3	15	228	226	6
-6	4	12	127	136	16	7	0	13	83	21	29	-3	7	13	55	80	42	5	4	14	244	242	12	2	3	15	294	300	7
-5	4	12	183	193	11	-7	1	13	91	80	22	-2	7	13	218	236	11	6	4	14	150	178	22	3	3	15	371	364	6
-4	4	12	614	589	6	-6	1	13	154	147	10	-1	7	13	268	264	11	-5	5	14	103	121	18	4	3	15	124	116	14
-3	4	12	128	143	6	-5	1	13	260	267	6	0	7	13	359	368	9	-4	5	14	442	416	8	5	3	15	213	225	12
-2	4	12	509	506	6	-4	1	13	513	487	6	1	7	13	272	269	7	-3	5	14	223	220	7	6	3	15	261	263	13
-1	4	12	298	293	5	-3	1	13	431	417	5	2	7	13	205	233	12	-2	5	14	347	341	9	-5	4	15	199	209	11
0	4	12	67	84	12	-2	1	13	512	497	4	3	7	13	93	78	18	-1	5	14	94	103	26	-4	4	15	178	193	10
1	4	12	301	293	5	-1	1	13	326	327	3	4	7	13	139	171	17	0	5	14	0	40	1	-3	4	15	61	64	23
2	4	12	530	518	5	0	1	13	263	245	4	5	7	13	160	157	22	1	5	14	119	113	12	-2	4	15	167	150	10
3	4	12	136	142	8	1	1	13	322	311	4	-4	8	13	132	131	18	2	5	14	338	331	16	-1	4	15	489	461	7
4	4	12	625	600	8	2	1	13	503	487	6	-3	8	13	156	148	29	3	5	14	226	227	9	0	4	15	63	61	20
5	4	12	187	188	11	3	1	13	439	416	7	-2	8	13	183	190	9	4	5	14	415	411	13	1	4	15	467	461	9
6	4	12	123	137	14	4	1	13	485	474	8	-1	8	13	241	246	8	5	5	14	100	117	21	2	4	15	129	150	12
7	4	12	124	171	17	5	1	13	256	262	7	0	8	13	318	327	8	-5	6	14	254	232	12	3	4	15	63	57	27
-6	5	12	87	86	21	6	1	13	131	145	11	1	8	13	240	247	12	-4	6	14	185	171	10	4	4	15	194	194	20
-5	5	12	340	330	11	7	1	13	46	86	46	2	8	13	176	190	12	-3	6	14	365	374	23	5	4	15	181	209	13
-4	5	12	123	131	21	-7	2	13	100	91	24	3	8	13	145	151	14	-2	6	14	182	183	9	-5	5	15	46	56	46
-3	5	12	591	568	8	-6	2	13	213	207	10	4	8	13	121	133	30	-1	6	14	210	210	7	-4	5	15	0	46	1
-2	5	12	182	183	5	-5	2	13	306	319	11	-3	9	13	186	172	19	0	6	14	53	50	24	-3	5	15	121	135	18
-1	5	12	370	368	5	-4	2	13	320	328	5	-2	9	13	289	283	25	1	6	14	201	216	15	-2	5	15	302	306	7
0	5	12	195	192	5	-3	2	13	426	410	8	-1	9	13	208	210	11	2	6	14	187	180	14	-1	5	15	67	71	19
1	5	12	357	356	5	-2	2	13	349	351	5	0	9	13	200	203	14	3	6	14	386	385	11	0	5	15	497	470	6
2	5	12	172	181	6	-1	2	13	295	300	5	1	9	13	192	207	14	4	6	14	165	166	15	1	5	15	60	70	29
3	5	12	569	557	9	0	2	13	163	167	4	2	9	13	268	284	10	5	6	14	247	239	13	2	5	15	320	313	9
4	5	12	138	136	11	1	2	13	307	314	4	3	9	13	162	177	15	-4	7	14	355	353	11	3	5	15	137	129	17
5	5	12	331	326	9	2	2	13	375	365	10	-2	10	13	117	105	22	-3	7	14	169	168	12	4	5	15	29	43	29
6	5	12	93	88	23	3	2	13	429	424	5	-1	10	13	71	101	70	-2	7	14	354	344	11	5	5	15	0	53	1
-6	6	12	140	146	15	4	2	13	329	335	6	0	10	13	45	34	44	-1	7	14	77	102	15	-4	6	15	39	27	38
-5	6	12	44	94	43	5	2	13	329	321	5	1	10	13	92	104	21	0	7	14	115	139	11	-3	6	15	118	102	12
-4	6	12	463	449	7	6	2	13	204	205	11	2	10	13	96	105	37	1	7	14	90	98	15	-2	6	15	44	60	44
-3	6	12	184	175	7	7	2	13	96	87	26	0	0	14	453	402	7	2	7	14	337	338	9	-1	6	15	471	464	8
0	6	15	7	37	6	-2	2	16	307	306	7	-2	6	16	102	111	20	0	3	17	244	244	15	-2	2	18	154	159	13
1	6	15	459	462	8	-1	2	16	200	197	8	-1	6	16	176	198	12	1	3	17	189	177	11	-1	2	18	353	350	9
2	6	15	72	57	29	0	2	16	440	405	7	0	6	16	0	21	1	2	3	17	255	264	9	0	2	18	100	98	15
3	6	15	80	107	29	1	2	16	197	202	7	1	6	16	216	199	10	3	3	17	155	145	13	1	2	18	356	345	10
4	6	15	11	24	10	2	2	16	308	305	7	2	6	16	74	110	26	4	3	17	187	206	14	2	2	18	123	154	26
-4	7	15	66	67	38	3	2	16	261	252	11	3	6	16	401	384	12	-4	4	17	127	144	22	3	2	18	86	90	29
-3	7	15	144	150	13	4	2	16	83	131	24	-2	7	16	250	277	13	-3	4	17	149	168	12	-3	3	18	228	260	12
-2	7	15	229	233	12	5	2	16	167	188	18	-1	7	16	133	149	18	-2	4	17	240	244	8	-2	3	18	162	183	37
-1	7	15	0	64	1	-5	3	16	98	118	23	0	7	16	0	7	1	-1	4	17	315	302	7	-1	3	18	153	159	11
0	7	15	402	399	10	-4	3	16	273	285	9	1	7	16	119	147	26	0	4	17	350	358	9	0	3	18	296	293	10
1	7	15	64	70	49	-3	3	16	138	144	9	2	7	16	267	276	10	1	4	17	302	303	10	1	3	18	163	169	13
2	7	15	217	235	10	-2	3	16	265	254	7	-1	8	16	43	102	42	2	4	17	235	241	11	2	3	18	155	184	15
3	7	15	151	153	14	-1	3	16	299	293	6	0	8	16	191	180	13	3	4	17	148	164	24	3	3	18	243	262	13
4	7	15	67	73	47	0	3	16	119	126	8	1	8	16	119	109	24	4	4	17	111	146	34	-2	4	18	294	291	12
-2	8	15	168	148	27	1	3	16	283	292	8	1	0	17	129	124	10	-3	5	17	69	57	42	-1	4	18	199	229	13
-1	8	15	299	293	11	2	3	16	252	251	8	2	0	17	240	265	8	-2	5	17	156	172	17	0	4	18	27	68	26
0	8	15	0	24	1	3	3	16	141	152	11	3	0	17	374	353	14	-1	5	17	215	232	10	1	4	18	223	230	12
1	8	15	277	289	10	4	3	16	262	284	11	4	0	17	256	265	11	0	5	17	252	264	9	2	4	18	306	288	11
2	8	15	143	150	35	5	3	16	84	128	22	-4	1	17	217	237	11	1	5	17	201	233	11	-1	5	18	130	141	20
0	9	15	195	213	12	-5	4	16	291	285	11	-3	1	17	335	330	14	2	5	17	169	169	19	0	5	18	11	13	10
0	0	16	605	576	11	-4	4	16	109	117	15	-2	1	17	236	260	11	3	5	17	28	58	27	1	5	18	123	136	17
1	0	16	209	199	7	-3	4	16	382	388	11	-1	1	17	187	199	8	-2	6	17	170	179	14	1	0	19	140	141	17
2	0	16	333	331	7	-2	4	16	121	130	10	0	1	17	36	63	36	-1	6	17	267	272	9	2	0	19	51	33	51
3	0	16	101	112	15	-1	4	16	240	240	7	1	1	17	184	197	8	0	6	17	252	264	10	-2	1	19	338	336	10

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
4	0	16	105	105	18	0	4	16	201	208	8	2	1	17	244	255	10	1	6	17	280	268	10	-1	1	19	69	66	47
5	0	16	93	84	20	1	4	16	232	241	8	3	1	17	326	328	9	2	6	17	136	174	18	0	1	19	57	70	57
-5	1	16	228	239	12	2	4	16	114	126	14	4	1	17	228	237	11	0	7	17	270	269	11	1	1	19	42	67	42
-4	1	16	120	105	23	3	4	16	378	384	9	-4	2	17	202	199	20	0	0	18	139	135	51	2	1	19	361	337	12
-3	1	16	70	79	15	4	4	16	110	115	18	-3	2	17	256	269	12	1	0	18	418	394	8	-2	2	19	126	152	19
-2	1	16	106	130	8	5	4	16	287	291	14	-2	2	17	299	289	20	2	0	18	68	57	31	-1	2	19	139	160	14
-1	1	16	529	506	8	-4	5	16	318	306	11	-1	2	17	225	224	7	3	0	18	52	67	51	0	2	19	294	280	15
0	1	16	243	254	8	-3	5	16	176	194	9	0	2	17	187	210	11	4	0	18	0	51	1	1	2	19	150	163	15
1	1	16	538	508	7	-2	5	16	284	295	9	1	2	17	211	224	8	-3	1	18	129	136	15	2	2	19	151	156	23
2	1	16	133	132	13	-1	5	16	130	140	10	2	2	17	291	291	9	-2	1	18	228	253	13	-1	3	19	210	231	14
3	1	16	54	74	54	0	5	16	82	113	21	3	2	17	274	271	18	-1	1	18	203	196	15	0	3	19	0	12	1
4	1	16	115	117	14	1	5	16	141	142	13	4	2	17	193	206	21	0	1	18	396	386	8	1	3	19	206	222	17
5	1	16	252	236	10	2	5	16	301	302	11	-4	3	17	209	208	12	1	1	18	198	192	9						
-5	2	16	192	196	15	3	5	16	182	194	16	-3	3	17	137	149	11	2	1	18	242	258	9						
-4	2	16	94	131	18	4	5	16	303	307	11	-2	3	17	251	258	12	3	1	18	114	141	18						
-3	2	16	242	257	8	-3	6	16	403	387	19	-1	3	17	160	165	7	-3	2	18	76	94	67						

APPENDIX C

CRYSTALLOGRAPHIC DATA FOR $Ta(hpp)Cl_4$

Identification code	mes1015a	
Empirical formula	C7 H8 Cl4 N3 Ta	
Formula weight	456.91	
Temperature	150(2) K	
Wavelength	0.71073 Å	
Crystal system	Orthorhombic	
Space group	Fdd2	
Unit cell dimensions	a = 20.708(3) Å	α= 90°.
	b = 22.603(3) Å	β= 90°.
	c = 10.6647(12) Å	γ = 90°.
Volume	4991.8(11) $Å^3$	
Z	12	
Density (calculated)	1.824 Mg/m^3	
Absorption coefficient	7.225 mm^{-1}	
F(000)	2544	
Crystal size	0.11 x 0.09 x 0.07 mm^3	
Theta range for data collection	3.45 to 25.36°.	
Index ranges	-24<=h<=24, -27<=k<=27, -12<=l<=10	
Reflections collected	6825	
Independent reflections	2078 [R(int) = 0.1179]	
Completeness to theta = 25.36°	99.8 %	
Max. and min. transmission	0.6317 and 0.5037	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	2078 / 1 / 83	
Goodness-of-fit on F^2	1.241	
Final R indices [I>2sigma(I)]	R1 = 0.0741, wR2 = 0.1706	
R indices (all data)	R1 = 0.0846, wR2 = 0.1774	
Absolute structure parameter	1.01(3)	
Largest diff. peak and hole	11.170 and -2.027 e.$Å^{-3}$	

Atomic coordinates (x 10^4) and equivalent isotropic displacement parameters ($Å^2$x 10^3) for mes1015a. U(eq) is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	U(eq)
Ta(1)	8005(1)	-417(1)	978(1)	18(1)
Cl(3)	7804(3)	-1383(2)	1670(6)	25(1)
Cl(2)	8431(3)	-241(2)	3005(5)	27(1)
Cl(4)	7795(3)	-785(2)	-1066(5)	27(1)
Cl(1)	9034(3)	-174(3)	244(6)	30(1)
N(2)	7685(9)	427(7)	618(17)	21(4)
N(3)	6629(7)	726(7)	1028(18)	16(3)
N(1)	7067(8)	-228(8)	1384(16)	16(4)
C(5)	5974(12)	532(10)	1460(20)	31(6)
C(4)	6692(12)	1318(11)	570(30)	32(6)
C(7)	6476(10)	-470(9)	2020(20)	23(5)
C(3)	7427(10)	1496(10)	640(20)	29(5)
C(6)	5885(10)	-140(10)	1410(20)	25(5)
C(2)	7867(11)	977(11)	10(30)	32(6)

Bond lengths [Å] and angles [°] for mes1015a.

Ta(1)-N(1)	2.035(16)
Ta(1)-N(2)	2.056(17)
Ta(1)-Cl(3)	2.341(5)
Ta(1)-Cl(1)	2.337(6)
Ta(1)-Cl(2)	2.368(6)
Ta(1)-Cl(4)	2.373(6)
N(2)-C(2)	1.45(3)
N(3)-C(4)	1.43(3)
N(3)-C(5)	1.50(3)
N(1)-C(7)	1.50(3)
C(5)-C(6)	1.53(3)
C(5)-H(4A)	0.9900
C(5)-H(4B)	0.9900
C(4)-C(3)	1.58(3)
C(4)-H(5A)	0.9900
C(4)-H(5B)	0.9900
C(7)-C(6)	1.57(3)
C(7)-H(2A)	0.9900
C(7)-H(2B)	0.9900
C(3)-C(2)	1.63(3)
C(3)-H(6A)	0.9900
C(3)-H(6B)	0.9900
C(6)-H(3A)	0.9900
C(6)-H(3B)	0.9900
C(2)-H(7A)	0.9900
C(2)-H(7B)	0.9900

N(1)-Ta(1)-N(2)	62.5(7)
N(1)-Ta(1)-Cl(3)	87.6(5)
N(2)-Ta(1)-Cl(3)	150.1(5)
N(1)-Ta(1)-Cl(1)	153.2(5)
N(2)-Ta(1)-Cl(1)	90.8(5)
Cl(3)-Ta(1)-Cl(1)	119.1(2)
N(1)-Ta(1)-Cl(2)	97.2(5)

N(2)-Ta(1)-Cl(2)	97.7(5)
Cl(3)-Ta(1)-Cl(2)	86.3(2)
Cl(1)-Ta(1)-Cl(2)	85.8(2)
N(1)-Ta(1)-Cl(4)	95.4(5)
N(2)-Ta(1)-Cl(4)	95.5(5)
Cl(3)-Ta(1)-Cl(4)	86.0(2)
Cl(1)-Ta(1)-Cl(4)	86.7(2)
Cl(2)-Ta(1)-Cl(4)	164.88(19)
C(2)-N(2)-Ta(1)	142.6(15)
C(4)-N(3)-C(5)	117.4(17)
C(7)-N(1)-Ta(1)	142.9(14)
N(3)-C(5)-C(6)	112.8(19)
N(3)-C(5)-H(4A)	109.0
C(6)-C(5)-H(4A)	109.0
N(3)-C(5)-H(4B)	109.0
C(6)-C(5)-H(4B)	109.0
H(4A)-C(5)-H(4B)	107.8
N(3)-C(4)-C(3)	108.1(19)
N(3)-C(4)-H(5A)	110.1
C(3)-C(4)-H(5A)	110.1
N(3)-C(4)-H(5B)	110.1
C(3)-C(4)-H(5B)	110.1
H(5A)-C(4)-H(5B)	108.4
N(1)-C(7)-C(6)	106.0(17)
N(1)-C(7)-H(2A)	110.5
C(6)-C(7)-H(2A)	110.5
N(1)-C(7)-H(2B)	110.5
C(6)-C(7)-H(2B)	110.5
H(2A)-C(7)-H(2B)	108.7
C(2)-C(3)-C(4)	109.6(18)
C(2)-C(3)-H(6A)	109.7
C(4)-C(3)-H(6A)	109.8
C(2)-C(3)-H(6B)	109.8
C(4)-C(3)-H(6B)	109.7
H(6A)-C(3)-H(6B)	108.2
C(5)-C(6)-C(7)	111.1(18)

C(5)-C(6)-H(3A)	109.4
C(7)-C(6)-H(3A)	109.4
C(5)-C(6)-H(3B)	109.4
C(7)-C(6)-H(3B)	109.4
H(3A)-C(6)-H(3B)	108.0
N(2)-C(2)-C(3)	106.7(18)
N(2)-C(2)-H(7A)	110.4
C(3)-C(2)-H(7A)	110.4
N(2)-C(2)-H(7B)	110.4
C(3)-C(2)-H(7B)	110.4
H(7A)-C(2)-H(7B)	108.6

Symmetry transformations used to generate equivalent atoms.

Anisotropic displacement parameters ($Å^2 x\ 10^3$)for mes1015a. The anisotropic displacement factor exponent takes the form: $-2\pi^2[\ h^2 a^{*2} U^{11} + ... + 2\ h\ k\ a^*\ b^*\ U^{12}\ ]$

	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
Ta(1)	17(1)	16(1)	23(1)	2(1)	2(1)	1(1)
Cl(3)	27(3)	14(3)	34(3)	2(2)	1(3)	0(2)
Cl(2)	29(3)	25(3)	26(3)	0(2)	-7(2)	2(2)
Cl(4)	32(3)	26(3)	24(3)	-1(2)	1(2)	0(2)
Cl(1)	21(3)	35(3)	35(4)	2(3)	4(2)	-2(2)

Hydrogen coordinates (x 10^4) and isotropic displacement parameters ($Å^2$x 10^3) for mes1015a.

	x	y	z	U(eq)
H(4A)	5641	723	928	38
H(4B)	5906	668	2333	38
H(5A)	6430	1591	1092	39
H(5B)	6537	1342	-304	39
H(2A)	6492	-392	2931	28
H(2B)	6442	-902	1881	28
H(6A)	7496	1874	194	34
H(6B)	7555	1553	1531	34
H(3A)	5840	-266	520	30
H(3B)	5484	-251	1854	30
H(7A)	7785	955	-901	39
H(7B)	8331	1060	147	39

Torsion angles [°] for mes1015a.

N(1)-Ta(1)-N(2)-C(2)	-170(3)
Cl(3)-Ta(1)-N(2)-C(2)	-168(2)
Cl(1)-Ta(1)-N(2)-C(2)	10(2)
Cl(2)-Ta(1)-N(2)-C(2)	96(2)
Cl(4)-Ta(1)-N(2)-C(2)	-77(2)
N(2)-Ta(1)-N(1)-C(7)	-171(3)
Cl(3)-Ta(1)-N(1)-C(7)	10(2)
Cl(1)-Ta(1)-N(1)-C(7)	-170.8(18)
Cl(2)-Ta(1)-N(1)-C(7)	-76(2)
Cl(4)-Ta(1)-N(1)-C(7)	96(2)
C(4)-N(3)-C(5)-C(6)	156(2)
C(5)-N(3)-C(4)-C(3)	159.7(19)
Ta(1)-N(1)-C(7)-C(6)	-156.8(18)

N(3)-C(4)-C(3)-C(2)	49(3)
N(3)-C(5)-C(6)-C(7)	48(3)
N(1)-C(7)-C(6)-C(5)	-53(2)
Ta(1)-N(2)-C(2)-C(3)	-158.8(18)
C(4)-C(3)-C(2)-N(2)	-53(2)

Observed and calculated structure factors for $Ta(hpp)Cl_4$.

h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s
0	0	12	387	252	21	0	10	10	307	319	10	3	19	-9	138	130	15	7	1	-7	240	270	6	3	21	-7	208	199	32
4	0	12	110	124	21	2	10	10	149	154	10	0	0	-8	413	296	6	9	1	-7	168	188	5	5	21	-7	171	168	22
8	0	12	231	275	13	4	10	10	60	59	27	4	0	-8	154	158	6	11	1	-7	174	160	6	7	21	-7	145	157	17
2	2	12	244	176	21	6	10	10	91	120	18	8	0	-8	485	485	6	13	1	-7	433	426	8	2	0	-6	667	591	35
4	2	12	130	140	14	8	10	10	305	292	19	12	0	-8	432	397	12	15	1	-7	418	428	7	6	0	-6	437	449	9
6	2	12	44	82	44	10	10	10	88	70	27	16	0	-8	317	332	13	17	1	-7	210	226	8	10	0	-6	506	478	7
8	2	12	80	94	30	12	10	10	272	222	16	2	2	-8	493	412	35	19	1	-7	115	127	15	14	0	-6	152	137	19
0	4	12	213	194	25	2	12	10	252	241	8	4	2	-8	218	202	9	1	3	-7	151	161	4	18	0	-6	399	405	12
2	4	12	205	168	16	4	12	10	34	37	33	6	2	-8	234	248	7	3	3	-7	284	264	24	22	0	-6	445	372	14
4	4	12	88	58	74	6	12	10	156	166	12	8	2	-8	55	58	17	5	3	-7	393	410	9	0	2	-6	700	616	40
6	4	12	251	249	14	8	12	10	84	86	24	10	2	-8	454	449	9	7	3	-7	422	444	7	2	2	-6	280	247	24
8	4	12	126	112	27	10	12	10	401	322	10	12	2	-8	225	220	16	9	3	-7	247	260	5	4	2	-6	318	309	5
2	6	12	0	11	1	0	14	10	392	351	21	14	2	-8	100	102	12	11	3	-7	265	276	9	6	2	-6	286	283	4
4	6	12	354	305	14	2	14	10	61	44	34	16	2	-8	209	202	9	13	3	-7	220	229	7	8	2	-6	514	516	4
6	6	12	110	79	28	4	14	10	54	79	53	18	2	-8	300	281	11	15	3	-7	325	338	10	10	2	-6	72	87	15
0	8	12	79	141	62	6	14	10	159	175	13	0	4	-8	282	260	11	17	3	-7	270	281	9	12	2	-6	449	433	5
2	8	12	158	183	19	8	14	10	278	248	11	2	4	-8	273	258	10	19	3	-7	208	212	16	14	2	-6	273	275	6
4	8	12	57	28	57	2	16	10	140	154	16	4	4	-8	305	259	22	1	5	-7	360	380	7	16	2	-6	172	187	13
1	1	11	236	189	16	4	16	10	239	252	21	6	4	-8	575	495	44	3	5	-7	309	322	9	18	2	-6	104	122	14
3	1	11	190	204	9	1	1	-9	160	145	5	8	4	-8	212	222	5	5	5	-7	273	258	16	20	2	-6	358	312	25
5	1	11	283	291	11	3	1	-9	314	303	8	10	4	-8	51	79	21	7	5	-7	232	242	4	22	2	-6	144	142	29
7	1	11	199	234	11	5	1	-9	393	403	4	12	4	-8	312	297	5	9	5	-7	428	423	5	2	4	-6	474	456	3
9	1	11	167	169	10	7	1	-9	262	284	5	14	4	-8	426	409	8	11	5	-7	404	422	6	4	4	-6	803	729	73
11	1	11	121	97	15	9	1	-9	149	162	9	16	4	-8	85	108	22	13	5	-7	239	246	7	6	4	-6	219	213	10
1	3	11	141	162	12	11	1	-9	147	147	10	18	4	-8	124	129	18	15	5	-7	127	119	16	8	4	-6	320	316	5
3	3	11	342	283	29	13	1	-9	229	230	7	2	6	-8	109	123	14	17	5	-7	222	223	9	10	4	-6	268	265	5
5	3	11	114	112	18	15	1	-9	267	294	11	4	6	-8	647	608	27	19	5	-7	264	249	18	12	4	-6	200	221	8
7	3	11	181	208	12	17	1	-9	173	186	11	6	6	-8	35	28	34	1	7	-7	322	353	10	14	4	-6	178	190	9
9	3	11	164	188	10	1	3	-9	283	281	14	8	6	-8	425	386	50	3	7	-7	385	413	8	16	4	-6	428	413	6
11	3	11	210	212	11	3	3	-9	384	344	26	10	6	-8	46	68	45	5	7	-7	63	57	9	18	4	-6	148	138	13
1	5	11	296	312	11	5	3	-9	241	248	14	12	6	-8	236	250	10	7	7	-7	252	240	16	20	4	-6	92	53	20
3	5	11	70	89	23	7	3	-9	313	330	5	14	6	-8	0	55	1	9	7	-7	392	390	7	0	6	-6	253	257	9
5	5	11	98	88	22	9	3	-9	170	183	6	16	6	-8	410	365	17	11	7	-7	347	362	5	2	6	-6	482	460	6
7	5	11	167	172	11	11	3	-9	197	196	14	18	6	-8	60	75	50	13	7	-7	268	286	16	4	6	-6	76	71	9
9	5	11	170	196	14	13	3	-9	225	234	11	0	8	-8	411	420	15	15	7	-7	101	119	15	6	6	-6	821	714	70
11	5	11	228	244	15	15	3	-9	165	190	9	2	8	-8	179	168	10	17	7	-7	195	206	12	8	6	-6	44	26	12
1	7	11	236	266	11	17	3	-9	140	181	25	4	8	-8	53	57	15	19	7	-7	202	198	12	10	6	-6	87	93	10
3	7	11	189	189	13	1	5	-9	408	416	9	6	8	-8	525	498	14	1	9	-7	331	367	8	12	6	-6	68	71	21
5	7	11	89	89	18	3	5	-9	211	206	20	8	8	-8	262	224	16	3	9	-7	261	289	6	14	6	-6	509	496	6
7	7	11	154	142	13	5	5	-9	223	209	19	10	8	-8	54	32	42	5	9	-7	247	258	4	16	6	-6	127	144	19
9	7	11	214	219	9	7	5	-9	175	179	9	12	8	-8	122	141	12	7	9	-7	321	315	21	18	6	-6	275	236	29
11	7	11	182	210	14	9	5	-9	306	321	6	14	8	-8	478	444	34	9	9	-7	261	229	10	20	6	-6	44	38	44
1	9	11	245	274	13	11	5	-9	361	365	10	16	8	-8	69	17	24	11	9	-7	265	278	5	2	8	-6	369	375	5
3	9	11	178	161	13	13	5	-9	154	176	9	18	8	-8	108	98	17	13	9	-7	253	260	22	4	8	-6	611	589	8
5	9	11	133	143	12	15	5	-9	87	65	19	2	10	-8	316	324	11	15	9	-7	169	159	11	6	8	-6	39	49	16
7	9	11	206	180	21	17	5	-9	57	120	56	4	10	-8	250	244	6	17	9	-7	271	288	15	8	8	-6	168	138	12
9	9	11	132	135	17	1	7	-9	321	354	4	6	10	-8	174	170	7	19	9	-7	165	174	17	10	8	-6	384	372	8
1	11	11	68	70	19	3	7	-9	263	279	5	8	10	-8	209	192	9	1	11	-7	95	128	11	12	8	-6	281	286	5
3	11	11	201	206	11	5	7	-9	215	214	8	10	10	-8	479	402	27	3	11	-7	306	340	12	14	8	-6	137	156	11
5	11	11	256	258	8	7	7	-9	219	206	9	12	10	-8	190	179	8	5	11	-7	372	395	7	16	8	-6	454	402	35
7	11	11	148	174	15	9	7	-9	310	303	12	14	10	-8	87	78	47	7	11	-7	266	273	6	18	8	-6	109	132	19
1	13	11	173	187	13	11	7	-9	170	193	18	16	10	-8	201	198	14	9	11	-7	153	157	8	20	8	-6	87	68	31
3	13	11	184	204	13	13	7	-9	194	211	9	0	12	-8	491	502	19	11	11	-7	220	188	11	0	10	-6	576	566	12
5	13	11	207	239	48	15	7	-9	69	89	30	2	12	-8	65	80	64	13	11	-7	309	284	23	2	10	-6	125	123	5
2	0	10	569	464	24	1	9	-9	200	216	8	4	12	-8	170	161	10	15	11	-7	309	318	31	4	10	-6	120	121	5
6	0	10	254	269	9	3	9	-9	153	154	17	6	12	-8	142	115	11	17	11	-7	169	186	13	6	10	-6	292	275	6
10	0	10	340	335	8	5	9	-9	189	200	9	8	12	-8	391	372	10	1	13	-7	203	220	11	8	10	-6	457	427	9
14	0	10	137	186	22	7	9	-9	297	301	8	10	12	-8	94	93	18	3	13	-7	390	409	14	10	10	-6	114	108	19
0	2	10	634	526	13	9	9	-9	261	244	12	12	12	-8	503	347	10	5	13	-7	331	370	8	12	10	-6	437	323	20
2	2	10	199	160	18	11	9	-9	171	182	12	14	12	-8	55	57	54	7	13	-7	337	348	9	14	10	-6	360	314	47
4	2	10	127	108	10	13	9	-9	261	248	14	16	12	-8	179	168	17	9	13	-7	210	192	19	16	10	-6	122	151	22
6	2	10	243	248	6	15	9	-9	147	133	19	2	14	-8	399	403	7	11	13	-7	131	74	17	18	10	-6	84	60	33
8	2	10	311	302	12	1	11	-9	82	108	17	4	14	-8	228	227	7	13	13	-7	255	207	17	20	10	-6	316	351	14
10	2	10	34	75	33	3	11	-9	274	281	13	6	14	-8	34	47	33	15	13	-7	223	217	14	2	12	-6	447	455	5
12	2	10	256	243	7	5	11	-9	257	277	7	8	14	-8	148	138	10	17	13	-7	221	204	14	4	12	-6	134	129	8
14	2	10	161	150	13	7	11	-9	224	228	20	10	14	-8	497	427	21	1	15	-7	367	367	9	6	12	-6	171	171	6
2	4	10	220	213	9	9	11	-9	60	71	35	12	14	-8	116	116	18	3	15	-7	232	260	10	8	12	-6	157	161	6
4	4	10	569	485	42	11	11	-9	165	122	16	14	14	-8	174	139	15	5	15	-7	296	329	15	10	12	-6	634	561	28
6	4	10	171	170	9	13	11	-9	208	219	15	0	16	-8	194	178	35	7	15	-7	293	296	10	12	12	-6	122	116	11
8	4	10	229	239	6	1	13	-9	117	109	15	2	16	-8	301	311	16	9	15	-7	322	269	24	14	12	-6	138	100	12
10	4	10	153	145	15	3	13	-9	216	243	17	4	16	-8	67	101	23	11	15	-7	246	225	13	16	12	-6	106	39	30
12	4	10	134	133	14	5	13	-9	222	223	11	6	16	-8	466	417	24	13	15	-7	200	192	12	18	12	-6	353	354	12
14	4	10	17	37	17	7	13	-9	235	264	10	8	16	-8	195	176	15	15	15	-7	232	227	14	0	14	-6	549	544	20
0	6	10	108	125	33	9	13	-9	106	128	20	10	16	-8	65	84	37	1	17	-7	456	477	11	2	14	-6	233	211	24
2	6	10	382	356	8	11	13	-9	275	234	15	12	16	-8	195	187	16	3	17	-7	180	190	9	4	14	-6	196	197	9
4	6	10	103	102	11	13	13	-9	249	208	23	2	18	-8	118	116	15	5	17	-7	0	25	1	6	14	-6	195	215	7
6	6	10	575	471	41	1	15	-9	236	243	16	4	18	-8	423	385	20	7	17	-7	161	145	12	8	14	-6	399	365	20

h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s
8	6	-10	30	17	29	3	15	-9	228	227	13	6	18	-8	61	40	35	9	17	-7	331	316	8	10	14	-6	117	111	20
10	6	-10	0	14	1	5	15	-9	245	281	8	8	18	-8	296	263	10	11	17	-7	289	278	17	12	14	-6	391	363	17
12	6	-10	46	52	45	7	15	-9	209	174	20	10	18	-8	55	61	55	13	17	-7	189	174	15	14	14	-6	205	190	10
14	6	-10	289	276	20	9	15	-9	192	174	19	0	20	-8	269	274	28	1	19	-7	243	280	8	16	14	-6	51	96	48
2	8	-10	261	251	16	11	15	-9	184	165	25	2	20	-8	172	187	12	3	19	-7	234	237	9	2	16	-6	232	239	7
4	8	-10	387	369	8	1	17	-9	264	285	27	4	20	-8	74	70	48	5	19	-7	164	105	30	4	16	-6	437	425	17
6	8	-10	0	70	1	3	17	-9	96	123	21	6	20	-8	217	223	13	7	19	-7	239	212	16	6	16	-6	152	144	12
8	8	-10	176	137	17	5	17	-9	43	65	43	1	1	-7	41	31	8	9	19	-7	260	253	10	8	16	-6	439	409	17
10	8	-10	247	208	18	7	17	-9	127	113	18	3	1	-7	228	236	9	11	19	-7	242	244	24	10	16	-6	244	212	8
12	8	-10	225	213	12	1	19	-9	224	231	10	5	1	-7	361	392	3	1	21	-7	209	191	23	12	16	-6	240	247	7
14	16	-6	79	70	24	3	13	-5	314	357	10	2	8	-4	449	439	7	19	1	-3	63	77	20	11	17	-3	344	343	6
16	16	-6	337	308	17	5	13	-5	400	424	7	4	8	-4	220	226	8	21	1	-3	194	187	13	13	17	-3	237	260	10
0	18	-6	33	77	32	7	13	-5	172	198	5	6	8	-4	569	527	8	23	1	-3	286	237	9	15	17	-3	65	54	37
2	18	-6	331	341	9	9	13	-5	145	124	14	8	8	-4	330	294	19	1	3	-3	589	598	5	17	17	-3	167	165	20
4	18	-6	86	63	16	11	13	-5	308	247	16	10	8	-4	87	101	7	3	3	-3	85	8	7	1	19	-3	366	384	6
6	18	-6	491	440	33	13	13	-5	288	264	18	12	8	-4	282	281	5	5	3	-3	494	532	8	3	19	-3	353	331	41
8	18	-6	38	28	37	15	13	-5	285	267	12	14	8	-4	562	523	26	7	3	-3	482	506	3	5	19	-3	216	180	18
10	18	-6	49	20	48	17	13	-5	286	305	8	16	8	-4	80	65	38	9	3	-3	334	368	3	7	19	-3	196	198	7
12	18	-6	0	40	1	19	13	-5	93	108	41	18	8	-4	251	232	14	11	3	-3	405	432	4	9	19	-3	388	402	6
14	18	-6	361	349	11	1	15	-5	250	252	9	20	8	-4	201	212	11	13	3	-3	476	480	7	11	19	-3	197	224	8
2	20	-6	126	141	29	3	15	-5	280	301	9	22	8	-4	233	242	11	15	3	-3	241	259	5	13	19	-3	204	215	9
4	20	-6	327	298	15	5	15	-5	296	316	8	2	10	-4	596	581	4	17	3	-3	279	275	10	15	19	-3	115	90	31
6	20	-6	50	80	50	7	15	-5	179	195	13	4	10	-4	351	327	10	19	3	-3	362	355	16	1	21	-3	332	282	49
8	20	-6	218	208	15	9	15	-5	380	338	34	6	10	-4	156	156	8	21	3	-3	255	239	12	3	21	-3	351	322	26
10	20	-6	273	264	10	11	15	-5	258	229	10	8	10	-4	65	53	21	23	3	-3	197	220	10	5	21	-3	340	341	8
12	20	-6	284	266	12	13	15	-5	216	213	8	10	10	-4	648	588	39	1	5	-3	270	314	5	7	21	-3	196	206	9
0	22	-6	351	288	15	15	15	-5	208	195	14	12	10	-4	204	200	11	3	5	-3	497	508	23	9	21	-3	185	221	10
2	22	-6	190	165	25	17	15	-5	189	204	12	14	10	-4	166	101	26	5	5	-3	219	212	13	11	21	-3	192	221	19
4	22	-6	91	93	42	1	17	-5	331	329	7	16	10	-4	249	239	10	7	5	-3	243	265	3	13	21	-3	143	165	18
6	22	-6	203	176	12	3	17	-5	220	247	9	18	10	-4	307	320	10	9	5	-3	651	666	4	1	23	-3	203	153	15
8	22	-6	241	267	19	5	17	-5	111	116	12	20	10	-4	37	47	37	11	5	-3	505	525	5	3	23	-3	256	277	12
1	1	-5	413	366	31	7	17	-5	226	167	29	0	12	-4	677	671	25	13	5	-3	279	310	4	5	23	-3	309	328	13
3	1	-5	427	455	5	9	17	-5	413	393	10	2	12	-4	268	277	5	15	5	-3	229	221	6	7	23	-3	224	252	13
5	1	-5	673	709	7	11	17	-5	310	318	6	4	12	-4	215	211	7	17	5	-3	415	396	9	9	23	-3	84	101	35
7	1	-5	335	363	3	13	17	-5	108	132	16	6	12	-4	26	31	26	19	5	-3	335	316	36	11	23	-3	110	102	20
9	1	-5	93	102	5	15	17	-5	29	91	28	8	12	-4	562	539	6	21	5	-3	241	273	11	1	25	-3	220	171	52
11	1	-5	78	84	7	1	19	-5	317	332	7	10	12	-4	80	47	13	23	5	-3	82	132	63	3	25	-3	270	249	47
13	1	-5	287	286	5	3	19	-5	126	139	11	12	12	-4	582	442	12	1	7	-3	541	585	5	5	25	-3	309	282	19
15	1	-5	358	379	6	5	19	-5	166	85	31	14	12	-4	188	172	7	3	7	-3	386	414	3	7	25	-3	140	157	24
17	1	-5	281	288	8	7	19	-5	194	204	16	16	12	-4	199	205	14	5	7	-3	87	72	5	2	0	-2	1077	966	29
19	1	-5	83	112	20	9	19	-5	313	320	8	18	12	-4	144	157	12	7	7	-3	350	327	23	10	0	-2	1028	1010	9
21	1	-5	144	132	13	11	19	-5	298	303	8	20	12	-4	411	411	9	9	7	-3	580	594	10	14	0	-2	171	172	6
1	3	-5	339	348	13	13	19	-5	151	148	20	2	14	-4	444	451	8	11	7	-3	438	463	4	18	0	-2	509	504	9
3	3	-5	746	709	66	15	19	-5	72	72	34	4	14	-4	237	248	5	13	7	-3	265	290	5	22	0	-2	331	298	19
5	3	-5	482	509	7	1	21	-5	266	270	8	6	14	-4	173	183	6	15	7	-3	63	72	22	0	2	-2	1161	1074	16
7	3	-5	193	225	2	3	21	-5	188	179	23	8	14	-4	215	213	5	17	7	-3	303	293	8	2	2	-2	473	403	37
9	3	-5	483	496	4	5	21	-5	176	169	13	10	14	-4	578	511	31	19	7	-3	338	339	15	4	2	-2	214	192	2
11	3	-5	324	341	6	7	21	-5	200	224	21	12	14	-4	258	234	10	21	7	-3	273	288	8	6	2	-2	436	426	3
13	3	-5	312	336	6	9	21	-5	144	179	21	14	14	-4	185	160	12	23	7	-3	168	175	19	8	2	-2	690	677	4
15	3	-5	264	280	11	11	21	-5	236	259	14	16	14	-4	256	238	11	1	9	-3	398	430	4	10	2	-2	123	111	9
17	3	-5	244	254	8	1	23	-5	114	127	113	18	14	-4	344	350	8	3	9	-3	341	388	4	12	2	-2	500	486	4
19	3	-5	205	185	14	3	23	-5	273	286	14	0	16	-4	333	328	8	5	9	-3	488	498	7	14	2	-2	290	301	4
21	3	-5	176	173	10	5	23	-5	217	230	20	2	16	-4	350	350	5	7	9	-3	378	377	8	16	2	-2	169	198	6
1	5	-5	692	725	5	7	23	-5	245	263	13	4	16	-4	111	115	9	9	9	-3	529	501	40	18	2	-2	152	151	9
3	5	-5	420	446	13	9	23	-5	105	128	33	6	16	-4	489	463	33	11	9	-3	454	472	6	20	2	-2	552	487	32
5	5	-5	161	168	12	1	25	-5	172	97	172	8	16	-4	219	222	10	13	9	-3	412	397	28	22	2	-2	142	135	13
7	5	-5	381	397	5	0	0	-4	1684	1167	16	10	16	-4	191	178	23	15	9	-3	356	321	29	24	2	-2	117	88	23
9	5	-5	382	401	9	4	0	-4	487	481	11	12	16	-4	223	200	13	17	9	-3	228	229	12	2	4	-2	270	229	3
11	5	-5	367	394	5	8	0	-4	714	695	7	14	16	-4	422	418	7	19	9	-3	149	169	10	4	4	-2	623	526	46
13	5	-5	259	287	5	12	0	-4	603	578	12	16	16	-4	88	122	20	21	9	-3	146	146	14	6	4	-2	293	293	4
15	5	-5	170	183	14	16	0	-4	133	161	18	18	16	-4	224	235	18	1	11	-3	336	376	4	8	4	-2	324	311	3
17	5	-5	130	128	11	20	0	-4	431	436	9	2	18	-4	156	163	12	3	11	-3	500	530	9	10	4	-2	673	661	5
19	5	-5	271	274	7	2	2	-4	874	764	65	4	18	-4	529	483	30	5	11	-3	573	605	12	12	4	-2	589	603	5
21	5	-5	262	263	9	4	2	-4	586	586	4	6	18	-4	92	108	12	7	11	-3	407	428	7	14	4	-2	61	67	24
1	7	-5	458	495	6	6	2	-4	276	274	5	8	18	-4	351	345	7	9	11	-3	275	257	18	16	4	-2	500	491	6
3	7	-5	219	251	3	8	2	-4	373	365	7	10	18	-4	104	106	12	11	11	-3	199	179	5	18	4	-2	343	313	21
5	7	-5	222	211	22	10	2	-4	649	632	7	12	18	-4	319	327	7	13	11	-3	256	250	9	20	4	-2	0	62	1
7	7	-5	588	539	38	12	2	-4	211	190	17	14	18	-4	121	115	13	15	11	-3	289	305	6	22	4	-2	169	137	11
9	7	-5	420	422	18	14	2	-4	217	193	6	16	18	-4	400	404	12	17	11	-3	344	356	10	24	4	-2	347	340	11
11	7	-5	421	432	5	16	2	-4	247	246	6	0	20	-4	188	177	13	19	11	-3	86	130	25	0	6	-2	344	321	3
13	7	-5	171	195	6	18	2	-4	340	331	7	2	20	-4	318	313	9	21	11	-3	69	84	36	2	6	-2	437	421	3
15	7	-5	98	92	23	20	2	-4	84	58	20	4	20	-4	165	187	10	1	13	-3	113	121	5	4	6	-2	324	315	3
17	7	-5	274	258	8	22	2	-4	346	297	30	6	20	-4	394	413	7	3	13	-3	443	458	7	6	6	-2	794	652	74
19	7	-5	267	282	9	0	4	-4	581	569	9	8	20	-4	127	162	12	5	13	-3	532	568	9	8	6	-2	93	70	26
21	7	-5	234	234	15	2	4	-4	608	590	12	10	20	-4	91	93	37	7	13	-3	438	461	7	10	6	-2	173	180	4
1	9	-5	250	289	5	4	4	-4	193	157	12	12	20	-4	174	191	10	9	13	-3	212	202	9	12	6	-2	153	158	12
3	9	-5	486	508	13	6	4	-4	746	721	20	14	20	-4	305	325	17	11	13	-3	109	77	9	14	6	-2	735	725	6
5	9	-5	341	361	8	8	4	-4	376	375	5	2	22	-4	307	288	22	13	13	-3	425	363	28	16	6	-2	71	98	14
7	9	-5	475	468	13	10	4	-4	92	111	10	4	22	-4	236	232	12	15	13	-3	381	384	10	18	6	-2	399	286	49

h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s
9	9	-5	316	300	14	12	4	-4	302	298	5	6	22	-4	0	73	1	17	13	-3	129	137	11	20	6	-2	80	87	23
11	9	-5	153	167	13	14	4	-4	486	468	7	8	22	-4	190	161	20	19	13	-3	56	75	56	22	6	-2	321	319	9
13	9	-5	194	193	13	16	4	-4	224	247	7	10	22	-4	380	384	10	21	13	-3	111	141	24	24	6	-2	0	31	1
15	9	-5	308	296	9	18	4	-4	320	292	13	12	22	-4	140	119	37	1	15	-3	421	424	10	2	8	-2	283	289	2
17	9	-5	234	242	15	20	4	-4	262	218	21	0	24	-4	490	442	15	3	15	-3	381	409	5	4	8	-2	746	706	9
19	9	-5	256	261	8	22	4	-4	193	192	11	2	24	-4	0	26	1	5	15	-3	207	227	5	6	8	-2	310	310	5
21	9	-5	282	283	24	2	6	-4	45	51	7	4	24	-4	156	157	22	7	15	-3	398	389	18	8	8	-2	759	659	71
1	11	-5	200	231	3	4	6	-4	899	840	21	6	24	-4	102	32	101	9	15	-3	216	187	15	10	8	-2	254	227	29
3	11	-5	338	360	5	6	6	-4	46	43	6	8	24	-4	298	312	13	11	15	-3	377	339	9	12	8	-2	407	415	4
5	11	-5	407	426	11	8	6	-4	341	317	14	1	1	-3	313	247	22	13	15	-3	170	151	20	14	8	-2	108	119	10
7	11	-5	325	346	7	10	6	-4	10	36	10	3	1	-3	514	545	3	15	15	-3	268	249	8	16	8	-2	534	431	45
9	11	-5	85	87	9	12	6	-4	352	369	7	5	1	-3	488	532	4	17	15	-3	160	169	13	18	8	-2	273	272	7
11	11	-5	211	170	9	14	6	-4	0	33	1	7	1	-3	490	527	6	19	15	-3	192	228	15	20	8	-2	10	74	9
13	11	-5	402	362	20	16	6	-4	565	522	27	9	1	-3	238	249	7	1	17	-3	417	426	4	22	8	-2	237	228	13
15	11	-5	344	328	26	18	6	-4	126	72	36	11	1	-3	381	388	7	3	17	-3	267	266	6	0	10	-2	1002	978	10
17	11	-5	233	257	15	20	6	-4	90	76	52	13	1	-3	423	424	13	5	17	-3	95	136	17	2	10	-2	210	184	6
19	11	-5	68	83	28	22	6	-4	0	29	1	15	1	-3	532	554	5	7	17	-3	400	379	14	4	10	-2	365	354	3
1	13	-5	238	241	9	0	8	-4	526	521	5	17	1	-3	242	262	7	9	17	-3	281	269	9	6	10	-2	552	528	7
8	10	-2	490	482	9	7	3	-1	134	161	3	1	19	-1	404	403	9	8	10	0	117	111	5	3	3	1	493	465	40
10	10	-2	216	188	14	9	3	-1	582	600	6	3	19	-1	268	246	24	10	10	0	602	525	44	5	3	1	482	497	19
12	10	-2	611	475	18	11	3	-1	470	482	9	5	19	-1	196	162	13	12	10	0	278	263	4	7	3	1	150	180	3
14	10	-2	328	293	19	13	3	-1	400	413	4	7	19	-1	206	198	13	14	10	0	232	183	26	9	3	1	621	626	9
16	10	-2	144	156	7	15	3	-1	211	228	5	9	19	-1	393	412	10	16	10	0	229	222	6	11	3	1	478	486	6
18	10	-2	109	103	14	17	3	-1	265	279	5	11	19	-1	285	307	8	18	10	0	350	332	7	13	3	1	396	405	5
20	10	-2	345	345	10	19	3	-1	324	298	17	13	19	-1	217	240	15	20	10	0	77	9	29	15	3	1	233	244	19
22	10	-2	82	97	57	21	3	-1	212	215	8	15	19	-1	95	102	40	22	10	0	259	268	10	17	3	1	276	280	6
2	12	-2	868	833	6	23	3	-1	266	267	10	17	19	-1	132	156	20	0	12	0	970	844	9	19	3	1	313	284	7
4	12	-2	210	229	6	1	5	-1	664	688	6	1	21	-1	296	274	19	2	12	0	49	22	26	21	3	1	227	228	12
6	12	-2	151	150	4	3	5	-1	491	498	22	3	21	-1	356	321	30	4	12	0	217	200	7	23	3	1	254	243	12
8	12	-2	231	238	4	5	5	-1	406	337	31	5	21	-1	407	387	10	6	12	0	309	319	4	1	5	1	672	686	6
10	12	-2	815	722	31	7	5	-1	391	406	6	7	21	-1	376	376	14	8	12	0	603	596	5	3	5	1	498	514	8
12	12	-2	164	142	8	9	5	-1	517	542	4	9	21	-1	180	183	10	10	12	0	214	185	5	5	5	1	377	309	39
14	12	-2	304	255	19	11	5	-1	396	423	4	11	21	-1	209	231	42	12	12	0	638	479	19	7	5	1	410	416	4
16	12	-2	0	18	1	13	5	-1	272	299	5	13	21	-1	252	277	11	14	12	0	66	50	30	9	5	1	522	538	4
18	12	-2	319	319	8	15	5	-1	54	66	29	15	21	-1	212	198	14	16	12	0	198	202	11	11	5	1	455	480	5
20	12	-2	94	90	23	17	5	-1	345	307	7	1	23	-1	147	52	16	18	12	0	27	54	26	13	5	1	279	307	5
22	12	-2	257	237	12	19	5	-1	425	410	24	3	23	-1	351	335	9	20	12	0	432	444	14	15	5	1	96	86	9
0	14	-2	601	559	7	21	5	-1	417	428	19	5	23	-1	304	335	9	22	12	0	114	131	22	17	5	1	302	293	11
2	14	-2	362	340	22	23	5	-1	165	177	16	7	23	-1	311	331	8	2	14	0	425	375	9	19	5	1	443	398	12
4	14	-2	283	274	4	1	7	-1	756	793	7	9	23	-1	153	164	16	4	14	0	357	343	5	21	5	1	401	408	8
6	14	-2	413	428	5	3	7	-1	40	66	7	11	23	-1	101	123	57	6	14	0	322	319	5	23	5	1	169	175	17
8	14	-2	529	458	18	5	7	-1	163	146	29	13	23	-1	203	164	31	8	14	0	251	255	9	1	7	1	790	794	5
10	14	-2	106	61	19	7	7	-1	597	529	50	1	25	-1	203	122	16	10	14	0	579	486	41	3	7	1	61	71	6
12	14	-2	519	479	5	9	7	-1	544	551	14	3	25	-1	190	179	16	12	14	0	239	231	6	5	7	1	179	162	27
14	14	-2	255	213	19	11	7	-1	602	646	4	5	25	-1	302	311	11	14	14	0	71	66	21	7	7	1	580	524	48
16	14	-2	161	191	17	13	7	-1	210	219	8	7	25	-1	164	203	20	16	14	0	311	291	32	9	7	1	549	561	17
18	14	-2	188	185	10	15	7	-1	164	155	6	9	25	-1	88	70	78	18	14	0	430	435	13	11	7	1	626	656	7
20	14	-2	319	337	8	17	7	-1	240	221	18	1	27	-1	106	172	80	20	14	0	52	10	51	13	7	1	184	185	4
2	16	-2	279	260	4	19	7	-1	448	430	16	4	0	0	321	287	6	0	16	0	496	459	6	15	7	1	136	137	12
4	16	-2	579	569	5	21	7	-1	241	277	11	8	0	0	714	724	18	2	16	0	98	93	7	17	7	1	253	222	8
6	16	-2	118	109	16	23	7	-1	144	186	44	12	0	0	544	508	7	4	16	0	101	98	7	19	7	1	477	447	14
8	16	-2	345	318	20	1	9	-1	671	685	7	16	0	0	296	278	10	6	16	0	450	420	16	21	7	1	264	269	12
10	16	-2	379	339	15	3	9	-1	491	521	9	20	0	0	595	555	17	8	16	0	266	242	5	23	7	1	160	180	30
12	16	-2	299	293	8	5	9	-1	530	539	9	24	0	0	184	87	20	10	16	0	160	157	16	1	9	1	619	630	5
14	16	-2	79	51	19	7	9	-1	410	399	26	4	2	0	852	794	19	12	16	0	206	195	8	3	9	1	472	509	4
16	16	-2	459	423	41	9	9	-1	484	459	50	6	2	0	185	193	4	14	16	0	658	643	20	5	9	1	543	546	5
18	16	-2	212	228	11	11	9	-1	346	348	17	8	2	0	470	458	3	16	16	0	54	57	54	7	9	1	392	393	33
0	18	-2	55	55	25	13	9	-1	328	322	12	10	2	0	870	834	8	18	16	0	147	116	17	9	9	1	495	474	32
2	18	-2	360	358	7	15	9	-1	498	459	21	12	2	0	137	110	17	20	16	0	224	238	15	11	9	1	369	368	11
4	18	-2	73	61	14	17	9	-1	105	110	10	14	2	0	244	225	4	2	18	0	252	239	6	13	9	1	323	300	17
6	18	-2	654	593	25	19	9	-1	257	267	7	16	2	0	212	202	5	4	18	0	579	499	44	15	9	1	522	480	22
8	18	-2	38	30	38	21	9	-1	237	240	13	18	2	0	370	358	5	6	18	0	61	2	61	17	9	1	115	115	13
10	18	-2	61	21	25	23	9	-1	112	197	62	20	2	0	88	78	22	8	18	0	302	294	6	19	9	1	272	270	9
12	18	-2	67	46	34	1	11	-1	378	393	3	22	2	0	338	286	28	10	18	0	25	5	25	21	9	1	201	232	11
14	18	-2	461	461	8	3	11	-1	339	377	3	24	2	0	153	119	20	12	18	0	373	365	9	23	9	1	168	196	18
16	18	-2	83	46	34	5	11	-1	593	618	10	0	4	0	746	625	5	14	18	0	100	112	32	1	11	1	383	396	5
18	18	-2	244	219	24	7	11	-1	576	592	6	2	4	0	894	770	38	16	18	0	434	453	21	3	11	1	369	388	10
2	20	-2	341	326	28	9	11	-1	377	372	14	4	4	0	440	387	38	18	18	0	69	122	69	5	11	1	570	596	6
4	20	-2	515	494	10	11	11	-1	144	125	12	6	4	0	753	703	41	0	20	0	117	115	18	7	11	1	528	560	4
6	20	-2	96	91	23	13	11	-1	403	369	5	8	4	0	409	393	3	2	20	0	336	281	27	9	11	1	357	366	12
8	20	-2	300	286	7	15	11	-1	314	313	5	10	4	0	101	117	7	4	20	0	133	153	13	11	11	1	154	138	7
10	20	-2	158	196	11	17	11	-1	312	316	6	12	4	0	116	101	7	6	20	0	644	592	8	13	11	1	391	354	15
12	20	-2	231	218	9	19	11	-1	130	124	14	14	4	0	462	450	10	8	20	0	156	160	10	15	11	1	322	314	5
14	20	-2	88	117	44	21	11	-1	149	161	14	16	4	0	40	47	40	10	20	0	97	71	20	17	11	1	310	326	7
16	20	-2	323	335	11	1	13	-1	170	173	4	18	4	0	398	362	7	12	20	0	226	228	20	19	11	1	132	142	16
0	22	-2	633	535	14	3	13	-1	540	543	4	20	4	0	534	451	29	14	20	0	378	366	10	21	11	1	157	179	31
2	22	-2	144	113	16	5	13	-1	571	596	5	22	4	0	232	238	11	16	20	0	164	185	16	1	13	1	144	155	10
4	22	-2	160	164	14	7	13	-1	261	285	6	24	4	0	0	24	1	2	22	0	505	431	33	3	13	1	492	503	4

h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s
6	22	-2	189	172	12	9	13	-1	112	107	24	2	6	0	83	100	6	4	22	0	361	331	14	5	13	1	578	596	15
8	22	-2	297	308	8	11	13	-1	209	155	8	4	6	0	829	741	53	6	22	0	72	77	40	7	13	1	281	292	4
10	22	-2	75	109	25	13	13	-1	475	383	37	6	6	0	130	97	16	8	22	0	99	103	20	9	13	1	86	92	10
12	22	-2	283	298	23	15	13	-1	344	353	11	8	6	0	433	368	43	10	22	0	404	408	14	11	13	1	198	145	12
14	22	-2	224	229	14	17	13	-1	228	249	7	10	6	0	60	35	11	12	22	0	79	73	39	13	13	1	499	423	37
2	24	-2	363	328	29	19	13	-1	18	65	18	12	6	0	597	609	9	14	22	0	136	151	31	15	13	1	359	357	6
4	24	-2	69	75	68	21	13	-1	111	88	22	14	6	0	94	94	9	0	24	0	399	362	21	17	13	1	227	240	8
6	24	-2	232	241	12	1	15	-1	261	259	12	16	6	0	623	557	19	2	24	0	71	14	38	19	13	1	0	34	1
8	24	-2	123	125	36	3	15	-1	403	398	9	18	6	0	111	74	19	4	24	0	206	205	12	21	13	1	90	92	34
10	24	-2	306	312	12	5	15	-1	211	226	6	20	6	0	77	16	72	6	24	0	0	30	1	1	15	1	275	272	4
2	26	-2	82	140	81	7	15	-1	351	351	8	22	6	0	0	1	1	8	24	0	364	339	13	3	15	1	400	395	5
4	26	-2	62	73	62	9	15	-1	309	244	31	24	6	0	398	399	11	10	24	0	0	43	1	5	15	1	235	250	6
6	26	-2	52	144	51	11	15	-1	343	323	28	0	8	0	359	329	10	2	26	0	295	288	17	7	15	1	333	341	8
3	1	-1	563	605	6	13	15	-1	272	262	6	2	8	0	778	703	27	4	26	0	136	136	24	9	15	1	309	258	36
5	1	-1	667	710	4	15	15	-1	244	240	14	4	8	0	195	202	6	6	26	0	102	122	41	11	15	1	330	287	17
7	1	-1	740	777	5	17	15	-1	250	252	9	6	8	0	643	582	17	3	1	1	565	600	8	13	15	1	261	258	12
9	1	-1	372	393	3	19	15	-1	192	210	16	8	8	0	339	297	30	5	1	1	677	715	4	15	15	1	238	223	21
11	1	-1	302	296	9	1	17	-1	324	303	10	10	8	0	95	99	8	7	1	1	771	800	5	17	15	1	285	271	11
13	1	-1	393	411	8	3	17	-1	304	299	6	12	8	0	328	317	7	9	1	1	406	425	3	19	15	1	207	211	19
15	1	-1	368	392	4	5	17	-1	197	219	6	14	8	0	460	422	21	11	1	1	275	275	6	1	17	1	284	273	18
17	1	-1	286	317	4	7	17	-1	473	431	29	16	8	0	160	175	8	13	1	1	420	438	4	3	17	1	292	305	6
19	1	-1	114	144	11	9	17	-1	257	248	8	18	8	0	390	357	8	15	1	1	348	371	4	5	17	1	191	203	9
21	1	-1	189	171	19	11	17	-1	266	281	6	20	8	0	188	201	17	17	1	1	297	331	4	7	17	1	488	443	27
23	1	-1	240	225	13	13	17	-1	206	214	9	22	8	0	277	279	10	19	1	1	77	133	29	9	17	1	247	259	8
1	3	-1	498	511	10	15	17	-1	89	101	55	2	10	0	876	799	31	21	1	1	175	168	15	11	17	1	259	265	9
3	3	-1	469	463	46	17	17	-1	303	276	50	4	10	0	425	391	15	23	1	1	244	215	16	13	17	1	214	223	11
5	3	-1	484	511	9	19	17	-1	254	234	47	6	10	0	250	228	4	1	3	1	499	513	12	15	17	1	147	124	17
17	17	1	297	278	55	0	10	2	992	943	19	19	1	3	73	85	33	11	17	3	332	347	9	16	10	4	265	238	12
19	17	1	219	225	16	2	10	2	219	193	18	21	1	3	229	213	12	13	17	3	277	283	13	18	10	4	324	331	10
1	19	1	398	401	12	4	10	2	365	355	4	23	1	3	280	248	12	15	17	3	0	60	1	20	10	4	0	44	1
3	19	1	255	238	22	6	10	2	542	508	5	1	3	3	584	576	4	17	17	3	188	164	21	0	12	4	725	687	9
5	19	1	218	155	30	8	10	2	492	484	4	3	3	3	108	93	2	1	19	3	363	367	7	2	12	4	261	279	8
7	19	1	233	215	8	10	10	2	222	189	17	5	3	3	508	539	6	3	19	3	329	311	35	4	12	4	227	221	5
9	19	1	378	393	7	12	10	2	589	461	12	7	3	3	485	518	4	5	19	3	241	194	22	6	12	4	11	31	10
11	19	1	295	308	9	14	10	2	346	301	14	9	3	3	336	381	5	7	19	3	224	211	10	8	12	4	551	540	11
13	19	1	213	233	15	16	10	2	185	185	13	11	3	3	400	418	3	9	19	3	386	410	9	10	12	4	55	44	55
15	19	1	30	95	29	18	10	2	108	112	18	13	3	3	443	451	8	11	19	3	227	229	15	12	12	4	599	436	15
17	19	1	161	159	48	20	10	2	323	342	14	15	3	3	234	237	7	13	19	3	179	198	46	14	12	4	191	174	19
1	21	1	298	273	16	22	10	2	111	117	23	17	3	3	260	271	7	15	19	3	90	93	81	16	12	4	203	201	33
3	21	1	375	340	28	2	12	2	845	814	8	19	3	3	406	385	9	1	21	3	279	245	23	18	12	4	152	155	34
5	21	1	383	377	11	4	12	2	223	229	4	21	3	3	251	245	9	3	21	3	348	325	26	20	12	4	404	396	16
7	21	1	376	370	14	6	12	2	164	163	8	23	3	3	199	217	14	5	21	3	316	338	11	2	14	4	483	494	6
9	21	1	155	151	17	8	12	2	228	239	8	1	5	3	335	364	4	7	21	3	198	208	12	4	14	4	259	259	6
11	21	1	226	249	11	10	12	2	820	714	25	3	5	3	497	505	13	9	21	3	189	212	13	6	14	4	166	171	9
13	21	1	255	263	15	12	12	2	160	145	7	5	5	3	207	201	25	11	21	3	162	199	19	8	14	4	189	194	18
15	21	1	240	202	72	14	12	2	283	241	7	7	5	3	266	284	3	13	21	3	153	181	26	10	14	4	582	514	51
1	23	1	139	67	38	16	12	2	49	18	49	9	5	3	645	666	9	1	23	3	225	165	20	12	14	4	255	226	11
3	23	1	359	347	9	18	12	2	333	336	13	11	5	3	516	530	7	3	23	3	242	254	12	14	14	4	208	182	15
5	23	1	340	340	9	20	12	2	84	91	43	13	5	3	261	290	7	5	23	3	308	327	11	16	14	4	240	239	30
7	23	1	307	321	10	22	12	2	256	243	14	15	5	3	201	197	8	7	23	3	227	244	14	18	14	4	348	321	17
9	23	1	135	168	18	0	14	2	598	560	9	17	5	3	435	398	12	9	23	3	75	95	46	0	16	4	351	354	17
11	23	1	104	113	33	2	14	2	350	332	10	19	5	3	342	312	16	11	23	3	49	99	48	2	16	4	314	323	6
13	23	1	89	150	88	4	14	2	291	285	6	21	5	3	228	272	20	1	25	3	220	158	98	4	16	4	103	109	13
1	25	1	171	134	16	6	14	2	398	417	5	23	5	3	85	138	42	3	25	3	252	244	21	6	16	4	534	507	56
3	25	1	209	200	12	8	14	2	508	459	23	1	7	3	574	606	7	5	25	3	257	296	26	8	16	4	225	214	17
5	25	1	313	329	20	10	14	2	82	61	26	3	7	3	381	405	3	7	25	3	110	151	59	10	16	4	189	175	16
7	25	1	187	202	22	12	14	2	545	488	7	5	7	3	106	93	3	4	0	4	452	446	9	12	16	4	195	188	12
9	25	1	0	69	1	14	14	2	259	227	35	7	7	3	325	304	31	8	0	4	689	686	14	14	16	4	441	432	19
1	27	1	192	194	22	16	14	2	178	188	15	9	7	3	603	620	5	12	0	4	526	509	14	16	16	4	35	108	34
2	0	2	1070	968	13	18	14	2	179	179	17	11	7	3	424	456	7	16	0	4	155	171	15	18	16	4	235	220	54
6	0	2	214	213	5	20	14	2	320	324	16	13	7	3	270	279	15	20	0	4	473	477	13	2	18	4	152	166	10
10	0	2	1056	1035	8	2	16	2	273	263	6	15	7	3	67	73	20	2	2	4	884	758	77	4	18	4	531	493	11
14	0	2	154	137	7	4	16	2	597	590	16	17	7	3	296	271	10	4	2	4	583	565	5	6	18	4	119	109	28
18	0	2	486	503	9	6	16	2	101	82	13	19	7	3	330	331	9	6	2	4	284	283	4	8	18	4	330	334	16
22	0	2	357	279	17	8	16	2	314	285	25	21	7	3	290	301	11	8	2	4	338	322	9	10	18	4	88	105	34
0	2	2	1166	1070	21	10	16	2	384	353	10	23	7	3	168	160	20	10	2	4	624	619	6	12	18	4	317	312	14
2	2	2	480	404	39	12	16	2	277	266	10	1	9	3	399	429	4	12	2	4	236	222	14	14	18	4	165	118	19
4	2	2	242	225	3	14	16	2	0	52	1	3	9	3	318	360	6	14	2	4	199	182	7	16	18	4	410	406	17
6	2	2	414	400	3	16	16	2	451	431	56	5	9	3	504	516	4	16	2	4	261	249	10	0	20	4	140	169	22
8	2	2	685	671	4	18	16	2	212	228	15	7	9	3	353	356	10	18	2	4	333	322	9	2	20	4	304	289	13
10	2	2	116	112	8	0	18	2	90	56	21	9	9	3	530	496	35	20	2	4	79	61	31	4	20	4	211	204	19
12	2	2	512	496	6	2	18	2	351	343	7	11	9	3	452	458	5	22	2	4	352	297	57	6	20	4	390	388	9
14	2	2	308	303	9	4	18	2	30	62	29	13	9	3	437	400	19	0	4	4	639	615	6	8	20	4	170	162	14
16	2	2	163	190	11	6	18	2	617	583	24	15	9	3	375	314	30	2	4	4	634	603	8	10	20	4	65	97	65
18	2	2	151	147	11	8	18	2	33	31	32	17	9	3	224	224	11	4	4	4	191	153	13	12	20	4	202	217	16
20	2	2	550	479	25	10	18	2	14	23	13	19	9	3	179	182	17	6	4	4	725	694	11	14	20	4	326	349	18
22	2	2	147	146	17	12	18	2	0	48	1	21	9	3	129	150	25	8	4	4	368	361	4	2	22	4	279	276	16
24	2	2	84	79	84	14	18	2	489	470	11	1	11	3	348	373	5	10	4	4	114	114	12	4	22	4	228	236	13
2	4	2	239	198	2	16	18	2	31	48	30	3	11	3	496	529	5	12	4	4	302	296	6	6	22	4	74	75	50

h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s
4	4	2	622	534	40	18	18	2	226	209	20	5	11	3	556	579	5	14	4	4	482	467	6	8	22	4	113	142	22
6	4	2	263	265	5	2	20	2	362	330	18	7	11	3	399	424	4	16	4	4	206	223	8	10	22	4	370	387	16
8	4	2	350	342	3	4	20	2	511	495	20	9	11	3	231	248	17	18	4	4	349	309	28	12	22	4	164	122	31
10	4	2	700	681	5	6	20	2	120	106	23	11	11	3	207	197	6	20	4	4	264	219	31	0	24	4	444	422	21
12	4	2	591	599	5	8	20	2	256	255	10	13	11	3	261	242	34	22	4	4	211	203	14	2	24	4	113	29	45
14	4	2	0	55	1	10	20	2	173	177	14	15	11	3	302	314	14	2	6	4	35	49	35	4	24	4	107	170	53
16	4	2	514	498	8	12	20	2	211	217	13	17	11	3	323	347	10	4	6	4	918	860	7	6	24	4	0	33	1
18	4	2	346	309	16	14	20	2	89	118	88	19	11	3	113	128	24	6	6	4	50	42	17	8	24	4	315	318	19
20	4	2	89	63	20	16	20	2	362	338	17	21	11	3	95	100	40	8	6	4	347	336	10	3	1	5	441	455	9
22	4	2	142	104	17	0	22	2	652	524	24	1	13	3	105	102	8	10	6	4	0	38	1	5	1	5	665	693	10
24	4	2	317	322	22	2	22	2	86	108	28	3	13	3	468	476	17	12	6	4	341	356	6	7	1	5	372	388	7
0	6	2	348	321	6	4	22	2	137	160	16	5	13	3	557	594	5	14	6	4	56	35	27	9	1	5	67	111	16
2	6	2	458	445	3	6	22	2	172	196	15	7	13	3	439	469	5	16	6	4	596	537	27	11	1	5	32	67	31
4	6	2	325	316	8	8	22	2	317	315	21	9	13	3	202	198	12	18	6	4	52	73	51	13	1	5	303	299	9
6	6	2	802	683	62	10	22	2	45	107	44	11	13	3	81	40	18	20	6	4	83	68	31	15	1	5	337	366	10
8	6	2	80	70	14	12	22	2	265	289	25	13	13	3	425	338	57	22	6	4	0	30	1	17	1	5	259	304	13
10	6	2	170	178	4	14	22	2	207	232	31	15	13	3	399	383	10	0	8	4	542	497	7	19	1	5	119	119	118
12	6	2	164	158	6	2	24	2	384	350	26	17	13	3	129	138	98	2	8	4	517	489	5	21	1	5	100	149	58
14	6	2	740	725	9	4	24	2	53	73	53	19	13	3	0	86	1	4	8	4	251	245	4	3	3	5	798	713	122
16	6	2	95	97	18	6	24	2	225	246	14	21	13	3	158	134	45	6	8	4	546	520	8	5	3	5	485	502	5
18	6	2	431	305	53	8	24	2	99	123	44	1	15	3	429	432	11	8	8	4	337	296	33	7	3	5	245	254	5
20	6	2	65	86	31	10	24	2	295	302	13	3	15	3	396	432	6	10	8	4	80	105	14	9	3	5	493	513	7
22	6	2	305	313	9	0	26	2	327	294	25	5	15	3	236	254	6	12	8	4	312	301	7	11	3	5	360	369	9
24	6	2	86	32	85	2	26	2	199	155	25	7	15	3	433	405	28	14	8	4	554	496	42	13	3	5	269	294	8
2	8	2	324	334	3	4	26	2	71	96	70	9	15	3	229	208	29	16	8	4	116	85	18	15	3	5	249	274	10
4	8	2	710	676	5	6	26	2	0	147	1	11	15	3	379	351	23	18	8	4	286	266	12	17	3	5	238	257	12
6	8	2	305	307	3	1	1	3	320	257	43	13	15	3	183	152	15	20	8	4	193	192	21	19	3	5	235	208	12
8	8	2	761	665	61	3	1	3	539	563	5	15	15	3	227	236	29	22	8	4	251	250	16	21	3	5	177	168	33
10	8	2	228	221	15	5	1	3	434	474	5	17	15	3	131	177	33	2	10	4	597	580	4	1	5	5	713	741	10
12	8	2	444	443	5	7	1	3	472	516	6	19	15	3	211	220	39	4	10	4	366	343	9	3	5	5	438	450	6
14	8	2	132	140	9	9	1	3	235	246	5	1	17	3	415	428	6	6	10	4	168	165	3	5	5	5	187	171	8
16	8	2	558	440	58	11	1	3	404	407	6	3	17	3	295	302	6	8	10	4	83	72	13	7	5	5	406	413	6
18	8	2	265	257	8	13	1	3	413	415	5	5	17	3	113	143	13	10	10	4	638	567	57	9	5	5	341	371	6
20	8	2	85	79	23	15	1	3	526	540	6	7	17	3	399	377	33	12	10	4	231	203	19	11	5	5	365	394	9
22	8	2	230	227	22	17	1	3	288	302	10	9	17	3	251	270	9	14	10	4	167	88	34	13	5	5	264	293	8
15	5	5	160	166	12	11	19	5	282	310	23	12	12	6	126	114	55	11	9	7	289	286	14	14	10	8	116	88	116
17	5	5	145	113	33	13	19	5	89	130	88	14	12	6	137	81	33	13	9	7	284	263	27	16	10	8	255	200	55
19	5	5	270	263	14	15	19	5	94	71	93	16	12	6	92	41	60	15	9	7	178	171	48	0	12	8	543	543	11
21	5	5	245	270	16	1	21	5	238	257	16	18	12	6	370	368	36	17	9	7	310	286	14	2	12	8	15	77	14
1	7	5	457	484	5	3	21	5	233	178	36	0	14	6	534	525	10	19	9	7	171	171	31	4	12	8	178	170	24
3	7	5	229	240	4	5	21	5	143	153	18	2	14	6	221	202	16	1	11	7	119	116	10	6	12	8	120	120	45
5	7	5	222	216	15	7	21	5	212	215	16	4	14	6	198	196	9	3	11	7	351	359	9	8	12	8	400	370	13
7	7	5	620	519	40	9	21	5	190	177	18	6	14	6	190	185	11	5	11	7	372	379	10	10	12	8	120	93	108
9	7	5	510	473	31	11	21	5	231	246	36	8	14	6	446	362	23	7	11	7	263	271	11	12	12	8	483	349	15
11	7	5	401	419	10	1	23	5	181	141	23	10	14	6	112	112	45	9	11	7	119	156	22	14	12	8	0	60	1
13	7	5	163	183	12	3	23	5	265	273	14	12	14	6	404	365	22	11	11	7	199	188	16	16	12	8	171	149	25
15	7	5	103	83	18	5	23	5	226	240	18	14	14	6	230	195	18	13	11	7	331	271	47	2	14	8	431	407	11
17	7	5	270	251	11	7	23	5	240	248	17	16	14	6	118	107	44	15	11	7	342	317	16	4	14	8	204	217	15
19	7	5	264	287	13	9	23	5	39	131	38	2	16	6	234	233	9	17	11	7	184	190	21	6	14	8	0	53	1
21	7	5	224	232	16	6	0	6	452	432	10	4	16	6	436	428	8	1	13	7	228	219	8	8	14	8	175	150	20
1	9	5	237	263	8	10	0	6	524	478	13	6	16	6	132	125	17	3	13	7	367	378	7	10	14	8	490	419	77
3	9	5	472	476	8	4	2	6	357	327	14	8	16	6	450	382	43	5	13	7	379	385	9	12	14	8	148	126	32
5	9	5	425	408	5	6	2	6	315	306	7	10	16	6	255	221	12	7	13	7	374	359	10	14	14	8	172	141	31
7	9	5	468	452	15	8	2	6	512	502	16	12	16	6	253	244	15	9	13	7	221	190	21	0	16	8	188	183	25
9	9	5	290	279	39	10	2	6	70	88	21	14	16	6	0	64	1	11	13	7	144	71	31	2	16	8	308	301	21
11	9	5	143	144	17	12	2	6	450	450	13	16	16	6	342	310	30	13	13	7	262	237	16	4	16	8	81	98	47
13	9	5	206	196	11	14	2	6	281	277	16	0	18	6	98	74	26	15	13	7	218	216	20	6	16	8	504	419	28
15	9	5	288	286	10	16	2	6	149	193	26	2	18	6	343	329	9	17	13	7	197	190	22	8	16	8	153	169	23
17	9	5	230	248	14	4	4	6	849	733	126	4	18	6	100	62	21	1	15	7	364	379	9	10	16	8	7	80	6
19	9	5	288	274	34	6	4	6	219	200	29	6	18	6	497	429	46	3	15	7	256	254	24	12	16	8	178	174	26
21	9	5	293	285	15	8	4	6	367	361	9	8	18	6	0	27	1	5	15	7	321	334	10	2	18	8	103	112	76
1	11	5	205	227	6	10	4	6	300	283	9	10	18	6	31	25	31	7	15	7	293	282	18	4	18	8	487	380	14
3	11	5	336	346	5	12	4	6	197	221	11	12	18	6	0	38	1	9	15	7	343	282	31	6	18	8	59	42	59
5	11	5	371	382	5	14	4	6	195	189	13	14	18	6	390	359	17	11	15	7	248	206	38	8	18	8	319	274	14
7	11	5	352	360	6	16	4	6	430	423	34	2	20	6	164	146	19	13	15	7	175	190	20	10	18	8	0	61	1
9	11	5	62	74	61	18	4	6	128	140	28	4	20	6	308	303	18	15	15	7	225	207	24	2	20	8	260	189	26
11	11	5	239	200	10	0	6	6	263	256	11	6	20	6	116	100	42	1	17	7	428	471	10	4	20	8	0	84	1
13	11	5	417	364	47	2	6	6	472	440	12	8	20	6	193	190	29	3	17	7	208	197	14	6	20	8	217	218	29
15	11	5	363	330	33	4	6	6	74	73	20	10	20	6	184	241	34	5	17	7	0	9	1	7	7	9	240	195	18
17	11	5	223	255	16	6	6	6	856	734	110	12	20	6	245	268	22	7	17	7	138	147	38	9	7	9	329	317	19
19	11	5	0	85	1	8	6	6	43	25	42	0	22	6	403	309	23	9	17	7	359	329	25	7	9	9	320	300	25
1	13	5	210	210	6	10	6	6	74	88	20	2	22	6	191	166	24	11	17	7	275	269	18	9	9	9	232	222	28
3	13	5	355	379	6	12	6	6	75	73	36	4	22	6	0	74	1	13	17	7	177	188	29	11	9	9	111	166	51
5	13	5	426	442	12	14	6	6	525	519	11	6	22	6	175	191	35	1	19	7	280	296	17	13	9	9	303	269	21
7	13	5	194	195	17	16	6	6	172	145	20	8	22	6	216	271	21	3	19	7	282	203	17	15	9	9	181	106	43
9	13	5	116	104	19	18	6	6	272	238	15	7	1	7	273	296	7	5	19	7	143	103	118	3	11	9	300	290	18
11	13	5	292	237	23	20	6	6	69	38	68	9	1	7	221	210	14	7	19	7	230	220	16	5	11	9	285	273	18
13	13	5	287	244	25	2	8	6	423	400	6	5	3	7	424	416	12	9	19	7	248	247	56	7	11	9	260	271	14
15	13	5	291	290	14	4	8	6	600	554	8	7	3	7	454	450	13	11	19	7	232	258	21	9	11	9	58	77	57

h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s
17	13	5	288	292	16	6	8	6	48	37	48	9	3	7	275	285	13	1	21	7	214	175	21	11	11	9	143	127	30
19	13	5	77	115	76	8	8	6	198	151	10	11	3	7	236	263	16	3	21	7	311	218	26	13	11	9	268	207	20
1	15	5	260	277	7	10	8	6	395	369	78	5	5	7	300	251	13	5	21	7	118	148	30	3	13	9	289	265	20
3	15	5	279	294	11	12	8	6	342	325	33	7	5	7	264	268	9	7	21	7	147	153	28	5	13	9	213	238	28
5	15	5	319	325	17	14	8	6	162	172	22	9	5	7	414	407	11	6	4	8	629	487	21	7	13	9	251	263	15
7	15	5	208	216	21	16	8	6	472	411	60	11	5	7	443	439	10	8	4	8	219	220	15	9	13	9	173	133	26
9	15	5	421	355	48	18	8	6	90	110	51	13	5	7	232	236	18	6	6	8	0	29	1	11	13	9	243	236	25
11	15	5	266	231	30	20	8	6	30	74	30	15	5	7	103	120	40	8	6	8	504	367	20	13	13	9	249	191	22
13	15	5	187	220	18	0	10	6	593	571	10	17	5	7	273	231	19	10	6	8	44	69	43	3	15	9	205	219	27
15	15	5	156	169	75	2	10	6	115	95	10	1	7	7	318	343	12	12	6	8	258	257	13	5	15	9	275	284	24
17	15	5	218	211	24	4	10	6	142	126	15	3	7	7	414	408	13	4	8	8	92	39	38	7	15	9	193	162	26
1	17	5	334	332	11	6	10	6	284	256	7	5	7	7	55	41	55	6	8	8	554	511	11	9	15	9	245	187	37
3	17	5	250	266	9	8	10	6	455	423	9	7	7	7	268	245	39	8	8	8	261	222	22	11	15	9	198	182	65
5	17	5	81	116	22	10	10	6	111	112	66	9	7	7	388	381	10	10	8	8	48	27	47	3	17	9	127	127	49
7	17	5	219	187	39	12	10	6	416	310	14	11	7	7	367	354	11	12	8	8	172	141	21	5	17	9	84	72	43
9	17	5	407	386	11	14	10	6	428	331	40	13	7	7	251	274	13	14	8	8	494	437	56	7	17	9	60	101	59
11	17	5	329	317	11	16	10	6	183	161	22	15	7	7	140	105	60	16	8	8	108	36	91	3	19	9	86	118	85
13	17	5	138	153	21	18	10	6	78	52	78	17	7	7	224	205	31	18	8	8	74	107	73	6	12	10	127	162	36
15	17	5	16	102	15	20	10	6	362	355	33	19	7	7	217	209	33	2	10	8	356	352	14	8	12	10	37	87	37
1	19	5	310	315	8	2	12	6	468	436	6	1	9	7	311	327	7	4	10	8	284	279	15	10	12	10	381	327	25
3	19	5	103	121	19	4	12	6	124	131	11	3	9	7	254	273	7	6	10	8	170	159	17	6	14	10	131	167	38
5	19	5	166	88	39	6	12	6	188	184	8	5	9	7	285	269	10	8	10	8	194	192	41	8	14	10	273	248	30
7	19	5	218	216	20	8	12	6	155	159	34	7	9	7	342	324	17	10	10	8	514	401	31						
9	19	5	293	322	20	10	12	6	669	548	61	9	9	7	263	236	25	12	10	8	188	162	20						

APPENDIX D

CRYSTALLOGRAPHIC DATA FOR $Ta(hpp)_2Cl_3$

Identification code	mes1021	
Empirical formula	C14 H24 Cl3 N6 Ta	
Formula weight	563.69	
Temperature	190(2) K	
Wavelength	0.71073 Å	
Crystal system	Orthorhombic	
Space group	Pbca	
Unit cell dimensions	a = 10.1922(11) Å	α= 90°.
	b = 14.6406(15) Å	β= 90°.
	c = 25.205(3) Å	γ = 90°.
Volume	3761.1(7) $Å^3$	
Z	8	
Density (calculated)	1.991 Mg/m^3	
Absorption coefficient	6.281 mm^{-1}	
F(000)	2192	
Crystal size	0.12 x 0.07 x 0.05 mm^3	
Theta range for data collection	1.62 to 27.90°.	
Index ranges	-13<=h<=13, -19<=k<=19, -33<=l<=31	
Reflections collected	28281	
Independent reflections	4483 [R(int) = 0.0583]	
Completeness to theta = 27.90°	99.6 %	
Max. and min. transmission	0.7442 and 0.5195	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	4483 / 0 / 217	
Goodness-of-fit on F^2	1.081	
Final R indices [I>2sigma(I)]	R1 = 0.0327, wR2 = 0.0846	
R indices (all data)	R1 = 0.0648, wR2 = 0.1289	
Largest diff. peak and hole	1.909 and -2.418 $e.Å^{-3}$	

Atomic coordinates (x 10^4) and equivalent isotropic displacement parameters ($Å^2$x 10^3) for mes1021. U(eq) is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	U(eq)
Ta(1)	1230(1)	1666(1)	3726(1)	24(1)
Cl(1)	-115(2)	3063(1)	3720(1)	36(1)
N(1)	2102(5)	721(3)	3199(2)	30(1)
C(1)	1629(6)	1149(4)	2767(2)	29(1)
Cl(2)	3137(2)	2602(1)	3840(1)	38(1)
N(2)	1235(5)	1991(4)	2911(2)	29(1)
C(2)	567(6)	2561(4)	2521(2)	36(2)
Cl(3)	-738(2)	777(1)	3617(1)	49(1)
C(3)	1096(7)	2357(6)	1970(3)	41(2)
N(3)	1482(6)	783(4)	2287(2)	38(1)
C(4)	941(7)	1335(6)	1848(3)	43(2)
C(5)	1757(8)	-193(5)	2212(3)	47(2)
C(6)	1586(8)	-689(5)	2732(3)	52(2)
C(7)	2312(8)	-272(5)	3172(3)	45(2)
C(8)	1636(7)	1135(5)	4696(3)	33(2)
N(4)	2141(6)	744(4)	4257(2)	33(1)
N(5)	746(6)	1772(4)	4542(2)	34(1)
C(9)	82(6)	2305(5)	4947(2)	32(1)
N(6)	1980(5)	962(4)	5189(2)	33(1)
C(10)	999(6)	2433(5)	5419(3)	34(2)
C(11)	1449(7)	1508(5)	5626(3)	37(2)
C(12)	2917(7)	229(5)	5318(2)	36(2)
C(13)	3242(7)	-323(5)	4831(3)	37(2)
C(14)	3384(6)	263(5)	4342(3)	36(2)

Bond lengths [Å] and angles [°] for mes1021.

Ta(1)-N(2)	2.109(5)
Ta(1)-N(4)	2.114(5)
Ta(1)-N(1)	2.115(5)
Ta(1)-N(5)	2.119(5)
Ta(1)-Cl(2)	2.3953(17)
Ta(1)-Cl(3)	2.4067(19)
Ta(1)-Cl(1)	2.4631(17)
Ta(1)-C(1)	2.566(6)
Ta(1)-C(8)	2.598(6)
N(1)-C(1)	1.345(8)
N(1)-C(7)	1.470(8)
C(1)-N(3)	1.333(8)
C(1)-N(2)	1.347(8)
N(2)-C(2)	1.458(7)
C(2)-C(3)	1.520(9)
C(2)-H(2A)	0.9900
C(2)-H(2B)	0.9900
C(3)-C(4)	1.535(10)
C(3)-H(3A)	0.9900
C(3)-H(3B)	0.9900
N(3)-C(5)	1.468(9)
N(3)-C(4)	1.475(9)
C(4)-H(4A)	0.9900
C(4)-H(4B)	0.9900
C(5)-C(6)	1.510(10)
C(5)-H(5A)	0.9900
C(5)-H(5B)	0.9900
C(6)-C(7)	1.467(10)
C(6)-H(6A)	0.9900
C(6)-H(6B)	0.9900
C(7)-H(7A)	0.9900
C(7)-H(7B)	0.9900
C(8)-N(6)	1.315(8)
C(8)-N(4)	1.348(8)

C(8)-N(5)	1.357(8)
N(4)-C(14)	1.466(8)
N(5)-C(9)	1.453(8)
C(9)-C(10)	1.523(8)
C(9)-H(15A)	0.9900
C(9)-H(15B)	0.9900
N(6)-C(11)	1.466(8)
N(6)-C(12)	1.472(8)
C(10)-C(11)	1.523(9)
C(10)-H(13A)	0.9900
C(10)-H(13B)	0.9900
C(11)-H(12A)	0.9900
C(11)-H(12B)	0.9900
C(12)-C(13)	1.506(9)
C(12)-H(11A)	0.9900
C(12)-H(11B)	0.9900
C(13)-C(14)	1.510(9)
C(13)-H(10A)	0.9900
C(13)-H(10B)	0.9900
C(14)-H(9A)	0.9900
C(14)-H(9B)	0.9900

N(2)-Ta(1)-N(4)	139.4(2)
N(2)-Ta(1)-N(1)	62.2(2)
N(4)-Ta(1)-N(1)	78.2(2)
N(2)-Ta(1)-N(5)	158.2(2)
N(4)-Ta(1)-N(5)	62.3(2)
N(1)-Ta(1)-N(5)	139.1(2)
N(2)-Ta(1)-Cl(2)	89.14(15)
N(4)-Ta(1)-Cl(2)	86.19(16)
N(1)-Ta(1)-Cl(2)	96.23(16)
N(5)-Ta(1)-Cl(2)	91.78(18)
N(2)-Ta(1)-Cl(3)	90.69(15)
N(4)-Ta(1)-Cl(3)	95.38(17)
N(1)-Ta(1)-Cl(3)	85.65(16)
N(5)-Ta(1)-Cl(3)	87.55(18)

Cl(2)-Ta(1)-Cl(3)	177.77(6)
N(2)-Ta(1)-Cl(1)	78.85(15)
N(4)-Ta(1)-Cl(1)	141.15(14)
N(1)-Ta(1)-Cl(1)	140.61(14)
N(5)-Ta(1)-Cl(1)	79.43(15)
Cl(2)-Ta(1)-Cl(1)	88.66(6)
Cl(3)-Ta(1)-Cl(1)	89.13(7)
N(2)-Ta(1)-C(1)	31.6(2)
N(4)-Ta(1)-C(1)	109.8(2)
N(1)-Ta(1)-C(1)	31.6(2)
N(5)-Ta(1)-C(1)	166.5(2)
Cl(2)-Ta(1)-C(1)	98.79(15)
Cl(3)-Ta(1)-C(1)	82.19(15)
Cl(1)-Ta(1)-C(1)	109.05(15)
N(2)-Ta(1)-C(8)	169.6(2)
N(4)-Ta(1)-C(8)	31.1(2)
N(1)-Ta(1)-C(8)	109.2(2)
N(5)-Ta(1)-C(8)	31.4(2)
Cl(2)-Ta(1)-C(8)	85.96(16)
Cl(3)-Ta(1)-C(8)	94.55(16)
Cl(1)-Ta(1)-C(8)	110.10(15)
C(1)-Ta(1)-C(8)	140.7(2)
C(1)-N(1)-C(7)	118.4(5)
C(1)-N(1)-Ta(1)	93.1(4)
C(7)-N(1)-Ta(1)	137.4(4)
N(3)-C(1)-N(1)	126.0(6)
N(3)-C(1)-N(2)	125.4(6)
N(1)-C(1)-N(2)	108.4(5)
N(3)-C(1)-Ta(1)	163.1(5)
N(1)-C(1)-Ta(1)	55.4(3)
N(2)-C(1)-Ta(1)	55.1(3)
C(1)-N(2)-C(2)	118.8(5)
C(1)-N(2)-Ta(1)	93.3(4)
C(2)-N(2)-Ta(1)	141.7(4)
N(2)-C(2)-C(3)	109.7(5)
N(2)-C(2)-H(2A)	109.7

C(3)-C(2)-H(2A)	109.7
N(2)-C(2)-H(2B)	109.7
C(3)-C(2)-H(2B)	109.7
H(2A)-C(2)-H(2B)	108.2
C(2)-C(3)-C(4)	109.8(6)
C(2)-C(3)-H(3A)	109.7
C(4)-C(3)-H(3A)	109.7
C(2)-C(3)-H(3B)	109.7
C(4)-C(3)-H(3B)	109.7
H(3A)-C(3)-H(3B)	108.2
C(1)-N(3)-C(5)	119.1(6)
C(1)-N(3)-C(4)	120.1(6)
C(5)-N(3)-C(4)	120.6(6)
N(3)-C(4)-C(3)	110.2(6)
N(3)-C(4)-H(4A)	109.6
C(3)-C(4)-H(4A)	109.6
N(3)-C(4)-H(4B)	109.6
C(3)-C(4)-H(4B)	109.6
H(4A)-C(4)-H(4B)	108.1
N(3)-C(5)-C(6)	109.6(6)
N(3)-C(5)-H(5A)	109.8
C(6)-C(5)-H(5A)	109.8
N(3)-C(5)-H(5B)	109.8
C(6)-C(5)-H(5B)	109.8
H(5A)-C(5)-H(5B)	108.2
C(7)-C(6)-C(5)	113.5(7)
C(7)-C(6)-H(6A)	108.9
C(5)-C(6)-H(6A)	108.9
C(7)-C(6)-H(6B)	108.9
C(5)-C(6)-H(6B)	108.9
H(6A)-C(6)-H(6B)	107.7
C(6)-C(7)-N(1)	111.9(6)
C(6)-C(7)-H(7A)	109.2
N(1)-C(7)-H(7A)	109.2
C(6)-C(7)-H(7B)	109.2
N(1)-C(7)-H(7B)	109.2

H(7A)-C(7)-H(7B)	107.9
N(6)-C(8)-N(4)	126.2(6)
N(6)-C(8)-N(5)	125.6(6)
N(4)-C(8)-N(5)	108.1(5)
N(6)-C(8)-Ta(1)	171.4(5)
N(4)-C(8)-Ta(1)	54.2(3)
N(5)-C(8)-Ta(1)	54.4(3)
C(8)-N(4)-C(14)	114.5(5)
C(8)-N(4)-Ta(1)	94.6(4)
C(14)-N(4)-Ta(1)	141.1(4)
C(8)-N(5)-C(9)	118.5(5)
C(8)-N(5)-Ta(1)	94.2(4)
C(9)-N(5)-Ta(1)	146.1(4)
N(5)-C(9)-C(10)	109.2(5)
N(5)-C(9)-H(15A)	109.8
C(10)-C(9)-H(15A)	109.8
N(5)-C(9)-H(15B)	109.8
C(10)-C(9)-H(15B)	109.8
H(15A)-C(9)-H(15B)	108.3
C(8)-N(6)-C(11)	120.4(6)
C(8)-N(6)-C(12)	121.5(5)
C(11)-N(6)-C(12)	118.0(5)
C(9)-C(10)-C(11)	110.1(6)
C(9)-C(10)-H(13A)	109.6
C(11)-C(10)-H(13A)	109.6
C(9)-C(10)-H(13B)	109.6
C(11)-C(10)-H(13B)	109.6
H(13A)-C(10)-H(13B)	108.2
N(6)-C(11)-C(10)	109.7(6)
N(6)-C(11)-H(12A)	109.7
C(10)-C(11)-H(12A)	109.7
N(6)-C(11)-H(12B)	109.7
C(10)-C(11)-H(12B)	109.7
H(12A)-C(11)-H(12B)	108.2
N(6)-C(12)-C(13)	110.7(5)
N(6)-C(12)-H(11A)	109.5

C(13)-C(12)-H(11A)	109.5
N(6)-C(12)-H(11B)	109.5
C(13)-C(12)-H(11B)	109.5
H(11A)-C(12)-H(11B)	108.1
C(12)-C(13)-C(14)	112.4(5)
C(12)-C(13)-H(10A)	109.1
C(14)-C(13)-H(10A)	109.1
C(12)-C(13)-H(10B)	109.1
C(14)-C(13)-H(10B)	109.1
H(10A)-C(13)-H(10B)	107.9
N(4)-C(14)-C(13)	108.0(5)
N(4)-C(14)-H(9A)	110.1
C(13)-C(14)-H(9A)	110.1
N(4)-C(14)-H(9B)	110.1
C(13)-C(14)-H(9B)	110.1
H(9A)-C(14)-H(9B)	108.4

Anisotropic displacement parameters ($Å^2 x\ 10^3$)for mes1021. The anisotropic displacement factor exponent takes the form: $-2\pi^2[\ h^2 a^{*2} U^{11} + ... + 2\ h\ k\ a^*\ b^*\ U^{12}\ ]$

	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
Ta(1)	29(1)	23(1)	20(1)	2(1)	0(1)	3(1)
Cl(1)	43(1)	35(1)	30(1)	4(1)	1(1)	16(1)
N(1)	40(3)	23(3)	27(3)	-1(2)	3(2)	3(2)
C(1)	31(3)	28(3)	27(3)	-5(3)	0(3)	-3(3)
Cl(2)	34(1)	37(1)	43(1)	-3(1)	-7(1)	-3(1)
N(2)	39(3)	27(3)	19(3)	6(2)	-4(2)	6(2)
C(2)	46(4)	36(4)	25(3)	2(3)	-3(3)	5(3)
Cl(3)	40(1)	49(1)	57(1)	-4(1)	7(1)	-15(1)
C(3)	44(4)	55(5)	23(3)	6(3)	-3(3)	12(3)
N(3)	50(3)	41(4)	23(3)	-4(3)	-4(2)	3(3)
C(4)	49(4)	54(5)	27(4)	-4(3)	-8(3)	3(4)
C(5)	54(4)	41(4)	45(4)	-20(3)	5(4)	-14(4)
C(6)	68(5)	30(4)	57(5)	-9(4)	-11(4)	1(4)
C(7)	69(5)	28(4)	39(4)	-6(3)	4(4)	5(4)
C(8)	44(4)	30(4)	27(3)	9(3)	6(3)	5(3)
N(4)	44(3)	32(3)	22(3)	4(2)	4(2)	10(2)
N(5)	46(3)	36(3)	21(3)	2(2)	1(2)	15(3)
C(9)	35(3)	35(3)	26(3)	-3(3)	3(3)	5(3)
N(6)	37(3)	40(3)	23(3)	7(2)	5(2)	8(3)
C(10)	32(3)	40(4)	28(3)	-2(3)	5(3)	0(3)
C(11)	41(4)	46(5)	24(3)	2(3)	3(3)	0(3)
C(12)	40(4)	40(4)	29(3)	13(3)	0(3)	6(3)
C(13)	38(4)	34(4)	40(4)	8(3)	1(3)	6(3)
C(14)	40(4)	41(4)	28(3)	4(3)	0(3)	13(3)

Hydrogen coordinates (x 10^4) and isotropic displacement parameters ($Å^2$x 10^3)
for mes1021.

	x	y	z	U(eq)
H(2A)	709	3214	2607	43
H(2B)	-388	2439	2532	43
H(3A)	2034	2528	1951	49
H(3B)	611	2721	1704	49
H(4A)	0	1188	1800	52
H(4B)	1407	1186	1515	52
H(5A)	2666	-274	2082	56
H(5B)	1151	-450	1944	56
H(6A)	641	-703	2823	62
H(6B)	1883	-1329	2689	62
H(7A)	3260	-397	3128	54
H(7B)	2026	-553	3511	54
H(15A)	-725	1985	5063	38
H(15B)	-171	2907	4802	38
H(13A)	537	2770	5704	40
H(13B)	1771	2797	5309	40
H(12A)	2131	1595	5901	44
H(12B)	699	1184	5790	44
H(11A)	2533	-175	5592	44
H(11B)	3730	500	5464	44
H(10A)	2540	-779	4771	45
H(10B)	4071	-659	4893	45
H(9A)	4105	708	4391	43
H(9B)	3591	-123	4030	43

Torsion angles [°] for mes1021.

N(2)-Ta(1)-N(1)-C(1)	-10.9(4)
N(4)-Ta(1)-N(1)-C(1)	178.6(4)
N(5)-Ta(1)-N(1)-C(1)	163.3(4)
Cl(2)-Ta(1)-N(1)-C(1)	-96.7(4)
Cl(3)-Ta(1)-N(1)-C(1)	82.2(4)
Cl(1)-Ta(1)-N(1)-C(1)	-1.1(5)
C(8)-Ta(1)-N(1)-C(1)	175.5(4)
N(2)-Ta(1)-N(1)-C(7)	-150.6(7)
N(4)-Ta(1)-N(1)-C(7)	38.9(7)
N(5)-Ta(1)-N(1)-C(7)	23.7(9)
Cl(2)-Ta(1)-N(1)-C(7)	123.7(7)
Cl(3)-Ta(1)-N(1)-C(7)	-57.5(7)
Cl(1)-Ta(1)-N(1)-C(7)	-140.8(6)
C(1)-Ta(1)-N(1)-C(7)	-139.7(9)
C(8)-Ta(1)-N(1)-C(7)	35.8(7)
C(7)-N(1)-C(1)-N(3)	-9.3(10)
Ta(1)-N(1)-C(1)-N(3)	-159.4(6)
C(7)-N(1)-C(1)-N(2)	166.2(6)
Ta(1)-N(1)-C(1)-N(2)	16.1(5)
C(7)-N(1)-C(1)-Ta(1)	150.1(7)
N(2)-Ta(1)-C(1)-N(3)	-97.9(18)
N(4)-Ta(1)-C(1)-N(3)	99.3(18)
N(1)-Ta(1)-C(1)-N(3)	100.8(19)
N(5)-Ta(1)-C(1)-N(3)	47(2)
Cl(2)-Ta(1)-C(1)-N(3)	-171.6(18)
Cl(3)-Ta(1)-C(1)-N(3)	6.3(18)
Cl(1)-Ta(1)-C(1)-N(3)	-80.0(18)
C(8)-Ta(1)-C(1)-N(3)	94.0(18)
N(2)-Ta(1)-C(1)-N(1)	161.3(6)
N(4)-Ta(1)-C(1)-N(1)	-1.5(4)
N(5)-Ta(1)-C(1)-N(1)	-53.4(10)
Cl(2)-Ta(1)-C(1)-N(1)	87.6(4)
Cl(3)-Ta(1)-C(1)-N(1)	-94.4(4)
Cl(1)-Ta(1)-C(1)-N(1)	179.2(3)

C(8)-Ta(1)-C(1)-N(1)	-6.8(6)
N(4)-Ta(1)-C(1)-N(2)	-162.8(4)
N(1)-Ta(1)-C(1)-N(2)	-161.3(6)
N(5)-Ta(1)-C(1)-N(2)	145.2(8)
Cl(2)-Ta(1)-C(1)-N(2)	-73.7(4)
Cl(3)-Ta(1)-C(1)-N(2)	104.3(4)
Cl(1)-Ta(1)-C(1)-N(2)	17.9(4)
C(8)-Ta(1)-C(1)-N(2)	-168.1(4)
N(3)-C(1)-N(2)-C(2)	1.2(10)
N(1)-C(1)-N(2)-C(2)	-174.2(5)
Ta(1)-C(1)-N(2)-C(2)	-158.1(6)
N(3)-C(1)-N(2)-Ta(1)	159.4(6)
N(1)-C(1)-N(2)-Ta(1)	-16.1(5)
N(4)-Ta(1)-N(2)-C(1)	25.3(5)
N(1)-Ta(1)-N(2)-C(1)	10.9(4)
N(5)-Ta(1)-N(2)-C(1)	-158.9(6)
Cl(2)-Ta(1)-N(2)-C(1)	108.4(3)
Cl(3)-Ta(1)-N(2)-C(1)	-73.8(4)
Cl(1)-Ta(1)-N(2)-C(1)	-162.8(4)
C(8)-Ta(1)-N(2)-C(1)	46.7(13)
N(4)-Ta(1)-N(2)-C(2)	173.5(6)
N(1)-Ta(1)-N(2)-C(2)	159.1(8)
N(5)-Ta(1)-N(2)-C(2)	-10.7(11)
Cl(2)-Ta(1)-N(2)-C(2)	-103.4(7)
Cl(3)-Ta(1)-N(2)-C(2)	74.4(7)
Cl(1)-Ta(1)-N(2)-C(2)	-14.6(7)
C(1)-Ta(1)-N(2)-C(2)	148.2(9)
C(8)-Ta(1)-N(2)-C(2)	-165.1(10)
C(1)-N(2)-C(2)-C(3)	-32.6(8)
Ta(1)-N(2)-C(2)-C(3)	-175.7(6)
N(2)-C(2)-C(3)-C(4)	56.5(7)
N(1)-C(1)-N(3)-C(5)	4.9(10)
N(2)-C(1)-N(3)-C(5)	-169.8(6)
Ta(1)-C(1)-N(3)-C(5)	-83.8(19)
N(1)-C(1)-N(3)-C(4)	179.7(6)
N(2)-C(1)-N(3)-C(4)	5.0(10)

Ta(1)-C(1)-N(3)-C(4)	91.0(18)
C(1)-N(3)-C(4)-C(3)	20.8(9)
C(5)-N(3)-C(4)-C(3)	-164.5(6)
C(2)-C(3)-C(4)-N(3)	-50.6(8)
C(1)-N(3)-C(5)-C(6)	25.1(9)
C(4)-N(3)-C(5)-C(6)	-149.7(7)
N(3)-C(5)-C(6)-C(7)	-51.4(9)
C(5)-C(6)-C(7)-N(1)	48.1(9)
C(1)-N(1)-C(7)-C(6)	-18.0(9)
Ta(1)-N(1)-C(7)-C(6)	114.7(7)
N(2)-Ta(1)-C(8)-N(6)	69(4)
N(4)-Ta(1)-C(8)-N(6)	96(3)
N(1)-Ta(1)-C(8)-N(6)	102(3)
N(5)-Ta(1)-C(8)-N(6)	-93(3)
Cl(2)-Ta(1)-C(8)-N(6)	7(3)
Cl(3)-Ta(1)-C(8)-N(6)	-171(3)
Cl(1)-Ta(1)-C(8)-N(6)	-80(3)
C(1)-Ta(1)-C(8)-N(6)	106(3)
N(2)-Ta(1)-C(8)-N(4)	-27.4(14)
N(1)-Ta(1)-C(8)-N(4)	5.9(4)
N(5)-Ta(1)-C(8)-N(4)	170.6(7)
Cl(2)-Ta(1)-C(8)-N(4)	-89.3(4)
Cl(3)-Ta(1)-C(8)-N(4)	92.9(4)
Cl(1)-Ta(1)-C(8)-N(4)	-176.4(4)
C(1)-Ta(1)-C(8)-N(4)	9.6(6)
N(2)-Ta(1)-C(8)-N(5)	162.0(11)
N(4)-Ta(1)-C(8)-N(5)	-170.6(7)
N(1)-Ta(1)-C(8)-N(5)	-164.7(4)
Cl(2)-Ta(1)-C(8)-N(5)	100.1(4)
Cl(3)-Ta(1)-C(8)-N(5)	-77.7(4)
Cl(1)-Ta(1)-C(8)-N(5)	13.0(5)
C(1)-Ta(1)-C(8)-N(5)	-161.0(4)
N(6)-C(8)-N(4)-C(14)	-15.8(10)
N(5)-C(8)-N(4)-C(14)	161.6(6)
Ta(1)-C(8)-N(4)-C(14)	153.6(6)
N(6)-C(8)-N(4)-Ta(1)	-169.3(6)

N(5)-C(8)-N(4)-Ta(1)	8.0(6)
N(2)-Ta(1)-N(4)-C(8)	172.7(4)
N(1)-Ta(1)-N(4)-C(8)	-174.3(4)
N(5)-Ta(1)-N(4)-C(8)	-5.5(4)
Cl(2)-Ta(1)-N(4)-C(8)	88.5(4)
Cl(3)-Ta(1)-N(4)-C(8)	-89.9(4)
Cl(1)-Ta(1)-N(4)-C(8)	5.4(6)
C(1)-Ta(1)-N(4)-C(8)	-173.5(4)
N(2)-Ta(1)-N(4)-C(14)	32.9(9)
N(1)-Ta(1)-N(4)-C(14)	45.9(7)
N(5)-Ta(1)-N(4)-C(14)	-145.3(8)
Cl(2)-Ta(1)-N(4)-C(14)	-51.3(7)
Cl(3)-Ta(1)-N(4)-C(14)	130.3(7)
Cl(1)-Ta(1)-N(4)-C(14)	-134.4(6)
C(1)-Ta(1)-N(4)-C(14)	46.7(8)
C(8)-Ta(1)-N(4)-C(14)	-139.8(10)
N(6)-C(8)-N(5)-C(9)	-1.3(11)
N(4)-C(8)-N(5)-C(9)	-178.7(5)
Ta(1)-C(8)-N(5)-C(9)	-170.7(7)
N(6)-C(8)-N(5)-Ta(1)	169.4(6)
N(4)-C(8)-N(5)-Ta(1)	-8.0(6)
N(2)-Ta(1)-N(5)-C(8)	-171.4(5)
N(4)-Ta(1)-N(5)-C(8)	5.5(4)
N(1)-Ta(1)-N(5)-C(8)	22.4(6)
Cl(2)-Ta(1)-N(5)-C(8)	-79.3(4)
Cl(3)-Ta(1)-N(5)-C(8)	102.9(4)
Cl(1)-Ta(1)-N(5)-C(8)	-167.6(5)
C(1)-Ta(1)-N(5)-C(8)	62.3(11)
N(2)-Ta(1)-N(5)-C(9)	-6.2(13)
N(4)-Ta(1)-N(5)-C(9)	170.7(9)
N(1)-Ta(1)-N(5)-C(9)	-172.4(7)
Cl(2)-Ta(1)-N(5)-C(9)	85.9(8)
Cl(3)-Ta(1)-N(5)-C(9)	-91.9(8)
Cl(1)-Ta(1)-N(5)-C(9)	-2.4(8)
C(1)-Ta(1)-N(5)-C(9)	-132.5(9)
C(8)-Ta(1)-N(5)-C(9)	165.2(11)

C(8)-N(5)-C(9)-C(10)	31.6(9)
Ta(1)-N(5)-C(9)-C(10)	-131.5(7)
N(4)-C(8)-N(6)-C(11)	173.4(7)
N(5)-C(8)-N(6)-C(11)	-3.5(11)
Ta(1)-C(8)-N(6)-C(11)	84(3)
N(4)-C(8)-N(6)-C(12)	-5.7(11)
N(5)-C(8)-N(6)-C(12)	177.4(7)
Ta(1)-C(8)-N(6)-C(12)	-95(3)
N(5)-C(9)-C(10)-C(11)	-56.6(7)
C(8)-N(6)-C(11)-C(10)	-22.9(8)
C(12)-N(6)-C(11)-C(10)	156.3(5)
C(9)-C(10)-C(11)-N(6)	52.1(7)
C(8)-N(6)-C(12)-C(13)	-7.1(9)
C(11)-N(6)-C(12)-C(13)	173.7(6)
N(6)-C(12)-C(13)-C(14)	39.5(8)
C(8)-N(4)-C(14)-C(13)	46.6(8)
Ta(1)-N(4)-C(14)-C(13)	-178.4(5)
C(12)-C(13)-C(14)-N(4)	-59.3(8)

Observed and calculated structure factors for $Ta(hpp)_2Cl_3$.

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
4	0	0	5218	5122	30	4	15	0	267	239	116	7	6	1	117	126	29	2	14	1	493	477	20	10	3	2	0	104	1
8	0	0	2155	2040	39	6	15	0	272	2	79	8	6	1	0	17	1	3	14	1	892	877	17	11	3	2	296	304	38
12	0	0	1130	1051	43	8	15	0	0	50	1	9	6	1	235	220	29	4	14	1	1094	1086	22	12	3	2	71	9	71
2	1	0	6645	6498	29	0	16	0	656	604	141	10	6	1	165	190	48	5	14	1	695	731	18	13	3	2	0	88	1
4	1	0	674	616	6	2	16	0	0	223	1	11	6	1	217	165	70	6	14	1	85	146	85	0	4	2	213	240	11
6	1	0	4073	3930	21	4	16	0	919	914	50	12	6	1	120	177	119	7	14	1	818	849	21	1	4	2	664	688	4
8	1	0	496	508	11	6	16	0	283	268	89	1	7	1	663	657	6	8	14	1	1088	1041	21	2	4	2	163	178	12
10	1	0	2056	1936	31	2	17	0	1664	1578	30	2	7	1	1063	1077	7	9	14	1	424	453	47	3	4	2	1727	1708	7
12	1	0	210	83	81	4	17	0	0	56	1	3	7	1	295	336	12	1	15	1	1275	1260	20	4	4	2	134	122	15
0	2	0	295	3290	97	6	17	0	892	957	41	4	7	1	938	936	8	2	15	1	1393	1351	14	5	4	2	876	883	8
2	2	0	3120	3003	12	0	18	0	866	927	40	5	7	1	1046	1038	6	3	15	1	769	778	18	6	4	2	201	217	18
4	2	0	2003	1961	11	2	18	0	0	5	1	6	7	1	1047	1047	8	4	15	1	132	10	132	7	4	2	1487	1464	9
6	2	0	281	322	9	4	18	0	1505	1425	51	7	7	1	1166	1139	9	5	15	1	659	703	24	8	4	2	80	90	79
8	2	0	1735	1704	12	2	19	0	1137	1135	30	8	7	1	383	385	20	6	15	1	1060	1048	20	9	4	2	1057	1050	10
10	2	0	576	564	19	1	1	1	0	1854	1	9	7	1	591	597	14	7	15	1	739	733	22	10	4	2	145	169	61
12	2	0	608	675	36	2	1	1	3276	3227	8	10	7	1	196	262	59	8	15	1	115	179	115	11	4	2	741	757	19
2	3	0	109	10	20	3	1	1	1396	1359	5	11	7	1	324	396	55	0	16	1	965	949	21	12	4	2	0	122	1
4	3	0	2810	2684	15	4	1	1	1328	1315	5	12	7	1	141	45	140	1	16	1	632	650	17	13	4	2	365	338	55
6	3	0	726	748	10	5	1	1	1266	1243	8	0	8	1	1528	1643	22	2	16	1	118	112	117	1	5	2	3059	3025	11
8	3	0	354	371	17	6	1	1	1252	1229	6	1	8	1	1717	1734	10	3	16	1	1068	1022	17	2	5	2	40	13	40
10	3	0	0	69	1	7	1	1	78	108	78	2	8	1	431	415	8	4	16	1	924	925	20	3	5	2	3019	2993	12
12	3	0	365	348	64	8	1	1	72	42	71	3	8	1	1994	1960	11	5	16	1	551	584	25	4	5	2	113	10	28
0	4	0	883	924	7	9	1	1	522	582	16	4	8	1	1803	1795	11	6	16	1	0	134	1	5	5	2	1859	1802	8
2	4	0	419	402	9	10	1	1	977	940	12	5	8	1	1313	1295	9	7	16	1	712	739	31	6	5	2	93	99	33
4	4	0	2634	2577	16	11	1	1	423	408	30	6	8	1	90	70	89	1	17	1	614	606	21	7	5	2	1939	1887	9
6	4	0	625	659	9	12	1	1	189	168	75	7	8	1	1254	1222	12	2	17	1	716	710	21	8	5	2	143	73	34
8	4	0	1547	1467	14	13	1	1	173	270	173	8	8	1	1310	1284	11	3	17	1	547	530	29	9	5	2	1509	1466	11
10	4	0	163	127	69	0	2	1	0	4862	1	9	8	1	458	487	25	4	17	1	245	188	65	10	5	2	112	13	112
12	4	0	573	587	38	1	2	1	3632	3574	14	10	8	1	126	196	125	5	17	1	178	120	117	11	5	2	448	505	26
2	5	0	5265	5194	62	2	2	1	51	43	50	11	8	1	477	510	35	6	17	1	379	496	52	12	5	2	237	138	93
4	5	0	210	176	77	3	2	1	1676	1635	6	12	8	1	762	762	35	0	18	1	88	32	87	0	6	2	418	429	10
6	5	0	2619	2504	15	4	2	1	3822	3714	12	1	9	1	1756	1748	10	1	18	1	0	54	1	1	6	2	2446	2465	9
8	5	0	146	104	51	5	2	1	1891	1853	7	2	9	1	2191	2178	11	2	18	1	0	18	1	2	6	2	167	175	13
10	5	0	1113	1101	25	6	2	1	780	791	6	3	9	1	1373	1377	13	3	18	1	47	69	46	3	6	2	4478	4337	22
12	5	0	174	166	174	7	2	1	1171	1155	7	4	9	1	107	157	67	4	18	1	147	30	147	4	6	2	297	315	7
0	6	0	2117	2158	18	8	2	1	1431	1398	9	5	9	1	1898	1831	11	1	19	1	145	302	145	5	6	2	1777	1749	8
2	6	0	728	715	13	9	2	1	1081	1048	14	6	9	1	1991	1896	12	2	19	1	409	419	52	6	6	2	20	39	20
4	6	0	3430	3343	25	10	2	1	126	78	72	7	9	1	833	815	11	0	0	2	0	256	1	7	6	2	2802	2673	14
6	6	0	105	30	38	11	2	1	987	975	15	8	9	1	252	300	26	1	0	2	52	5194	52	8	6	2	183	210	29
8	6	0	3396	3169	23	12	2	1	847	807	22	9	9	1	859	895	16	2	0	2	349	328	6	9	6	2	1326	1258	15
10	6	0	186	56	87	13	2	1	422	417	45	10	9	1	1212	1179	36	3	0	2	1244	1242	6	10	6	2	265	280	34
12	6	0	1348	1222	43	1	3	1	3259	3207	8	11	9	1	816	748	25	4	0	2	883	868	7	11	6	2	890	898	25
2	7	0	3099	3138	28	2	3	1	4303	4209	13	0	10	1	2853	2776	19	5	0	2	3654	3624	18	12	6	2	123	49	123
4	7	0	133	141	97	3	3	1	3945	3907	13	1	10	1	1629	1626	11	6	0	2	254	254	8	1	7	2	3623	3598	14
6	7	0	2696	2596	21	4	3	1	657	601	6	2	10	1	382	372	13	7	0	2	1975	1909	12	2	7	2	116	106	19
8	7	0	314	335	44	5	3	1	2169	2116	8	3	10	1	971	963	12	8	0	2	291	274	31	3	7	2	2293	2262	13
10	7	0	1153	1132	34	6	3	1	2686	2601	18	4	10	1	1745	1703	15	9	0	2	1263	1223	15	4	7	2	89	96	27
12	7	0	218	188	103	7	3	1	1174	1184	13	5	10	1	1163	1119	12	10	0	2	253	256	42	5	7	2	1436	1402	7
0	8	0	2316	2295	22	8	3	1	0	66	1	6	10	1	407	399	19	11	0	2	1417	1404	19	6	7	2	121	135	28
2	8	0	926	938	12	9	3	1	931	932	14	7	10	1	945	930	14	12	0	2	88	79	88	7	7	2	1652	1602	10
4	8	0	1175	1161	13	10	3	1	1451	1413	14	8	10	1	781	766	21	13	0	2	647	702	39	8	7	2	108	133	107
6	8	0	272	276	21	11	3	1	704	690	16	9	10	1	508	544	20	1	1	2	82	4221	47	9	7	2	1524	1459	13
8	8	0	1491	1422	15	12	3	1	250	259	52	10	10	1	0	81	1	2	1	2	301	278	4	10	7	2	236	211	37
10	8	0	0	24	1	13	3	1	607	654	37	11	10	1	661	697	28	3	1	2	823	857	4	11	7	2	464	473	33
12	8	0	553	578	48	0	4	1	1809	1790	8	1	11	1	675	679	10	4	1	2	159	146	9	12	7	2	0	63	1
2	9	0	0	27	1	1	4	1	1873	1868	6	2	11	1	857	869	10	5	1	2	2668	2585	9	0	8	2	381	355	15
4	9	0	1701	1657	16	2	4	1	699	698	6	3	11	1	932	954	20	6	1	2	360	343	5	1	8	2	1202	1210	8
6	9	0	274	257	31	3	4	1	3428	3343	12	4	11	1	118	28	63	7	1	2	2047	1998	9	2	8	2	255	245	12
8	9	0	0	49	1	4	4	1	3269	3230	12	5	11	1	1024	1036	14	8	1	2	0	22	1	3	8	2	1139	1123	9
10	9	0	69	21	69	5	4	1	1002	1038	9	6	11	1	850	864	13	9	1	2	1961	1869	12	4	8	2	138	167	23
0	10	0	1690	1671	20	6	4	1	367	332	18	7	11	1	154	135	67	10	1	2	112	121	78	5	8	2	1173	1153	8
2	10	0	394	405	21	7	4	1	1481	1427	10	8	11	1	195	212	51	11	1	2	1021	976	17	6	8	2	224	267	48
4	10	0	1822	1772	23	8	4	1	1866	1762	13	9	11	1	289	255	45	12	1	2	0	28	1	7	8	2	1548	1495	11
6	10	0	295	315	55	9	4	1	1009	994	10	10	11	1	639	638	28	13	1	2	452	514	35	8	8	2	187	161	41
8	10	0	522	558	26	10	4	1	0	24	1	11	11	1	396	372	52	0	2	2	110	119	110	9	8	2	752	732	15
10	10	0	54	129	53	11	4	1	581	595	20	0	12	1	216	281	34	1	2	2	2174	2119	6	10	8	2	0	69	1
2	11	0	2453	2376	19	12	4	1	960	967	32	1	12	1	362	361	17	2	2	2	292	281	5	11	8	2	591	583	28
4	11	0	275	291	76	13	4	1	295	309	70	2	12	1	314	310	17	3	2	2	1953	1909	7	12	8	2	71	43	70
6	11	0	1785	1744	22	1	5	1	186	192	7	3	12	1	64	50	64	4	2	2	237	223	6	1	9	2	1508	1500	9
8	11	0	273	269	57	2	5	1	1942	1903	8	4	12	1	379	427	28	5	2	2	1503	1504	6	2	9	2	84	8	83
10	11	0	1773	1625	34	3	5	1	647	693	6	5	12	1	36	43	35	6	2	2	98	105	24	3	9	2	82	115	42
0	12	0	3577	3463	35	4	5	1	778	743	5	6	12	1	121	159	121	7	2	2	886	872	7	4	9	2	131	167	75
2	12	0	0	96	1	5	5	1	1750	1690	8	7	12	1	304	313	31	8	2	2	90	35	40	5	9	2	419	445	11
4	12	0	2705	2586	27	6	5	1	971	967	12	8	12	1	153	156	94	9	2	2	60	154	59	6	9	2	222	263	23
6	12	0	462	459	40	7	5	1	679	702	7	9	12	1	209	90	70	10	2	2	74	42	74	7	9	2	129	112	50
8	12	0	1267	1264	36	8	5	1	188	186	22	10	12	1	98	190	98	11	2	2	435	467	21	8	9	2	175	148	42
10	12	0	182	259	182	9	5	1	511	534	13	1	13	1	1293	1263	12	12	2	2	206	173	69	9	9	2	0	82	1

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
2	13	0	2083	2030	19	10	5	1	678	681	15	2	13	1	819	821	20	13	2	2	461	414	36	10	9	2	183	92	66
4	13	0	537	556	26	11	5	1	410	439	34	3	13	1	459	500	20	1	3	2	928	916	4	11	9	2	0	218	1
6	13	0	1655	1603	24	12	5	1	199	185	87	4	13	1	453	412	25	2	3	2	719	718	3	0	10	2	0	7	1
8	13	0	0	83	1	0	6	1	1085	1064	8	5	13	1	256	170	35	3	3	2	1458	1387	6	1	10	2	1489	1473	12
0	14	0	1423	1356	27	1	6	1	364	379	9	6	13	1	668	677	24	4	3	2	252	256	7	2	10	2	74	42	74
2	14	0	0	131	1	2	6	1	95	80	30	7	13	1	266	308	56	5	3	2	130	99	12	3	10	2	1025	1003	11
4	14	0	963	956	30	3	6	1	276	254	12	8	13	1	224	171	63	6	3	2	327	320	9	4	10	2	215	189	27
6	14	0	305	345	58	4	6	1	484	465	11	9	13	1	512	487	29	7	3	2	1095	1072	7	5	10	2	697	686	13
8	14	0	661	654	42	5	6	1	266	269	16	0	14	1	1462	1383	25	8	3	2	93	59	42	6	10	2	114	144	114
2	15	0	277	235	53	6	6	1	391	408	10	1	14	1	877	875	13	9	3	2	247	265	29	7	10	2	421	449	25
8	10	2	159	116	60	1	2	3	1112	1085	4	10	8	3	0	192	1	6	17	3	337	415	64	0	6	4	4270	4228	21
9	10	2	285	326	35	2	2	3	64	59	52	11	8	3	624	627	30	0	18	3	0	54	1	1	6	4	471	479	8
10	10	2	169	8	94	3	2	3	1270	1280	5	12	8	3	666	668	31	1	18	3	149	135	149	2	6	4	773	770	8
11	10	2	695	693	36	4	2	3	2491	2497	8	1	9	3	2224	2176	11	2	18	3	0	33	1	3	6	4	0	56	1
1	11	2	1631	1613	11	5	2	3	1788	1792	6	2	9	3	2239	2193	10	3	18	3	119	215	118	4	6	4	3414	3340	14
2	11	2	0	47	1	6	2	3	915	881	7	3	9	3	1641	1618	10	4	18	3	55	32	54	5	6	4	132	125	38
3	11	2	1488	1455	12	7	2	3	1468	1444	9	4	9	3	232	237	17	1	19	3	376	361	48	6	6	4	248	288	16
4	11	2	106	133	78	8	2	3	1142	1147	8	5	9	3	1585	1548	11	0	0	4	4767	4651	37	7	6	4	208	249	19
5	11	2	2100	2025	15	9	2	3	1342	1294	10	6	9	3	1980	1897	12	1	0	4	97	126	97	8	6	4	3321	3119	18
6	11	2	181	104	43	10	2	3	0	62	1	7	9	3	1045	1013	12	2	0	4	1366	1300	6	9	6	4	71	151	71
7	11	2	540	579	17	11	2	3	1147	1073	19	8	9	3	189	282	39	3	0	4	859	840	5	10	6	4	118	163	117
8	11	2	0	19	1	12	2	3	744	767	25	9	9	3	1046	1032	17	4	0	4	3267	3244	19	11	6	4	211	93	71
9	11	2	1076	1033	18	13	2	3	364	377	41	10	9	3	1063	1029	18	5	0	4	218	220	11	12	6	4	1323	1232	28
10	11	2	89	7	89	1	3	3	1066	1065	4	11	9	3	603	601	29	6	0	4	453	425	10	1	7	4	113	121	26
0	12	2	194	74	47	2	3	3	3694	3650	14	0	10	3	2387	2399	16	7	0	4	312	317	16	2	7	4	4446	4365	16
1	12	2	2070	2059	13	3	3	3	2627	2609	10	1	10	3	1692	1673	10	8	0	4	2564	2479	16	3	7	4	136	159	21
2	12	2	35	30	34	4	3	3	313	278	5	2	10	3	102	72	59	9	0	4	354	362	29	4	7	4	576	597	9
3	12	2	1595	1552	13	5	3	3	2728	2649	9	3	10	3	856	853	11	10	0	4	624	607	31	5	7	4	237	244	17
4	12	2	168	104	44	6	3	3	1926	1914	8	4	10	3	1836	1815	25	11	0	4	320	258	45	6	7	4	2246	2169	12
5	12	2	1483	1443	14	7	3	3	1490	1454	8	5	10	3	1258	1224	16	12	0	4	1278	1227	28	7	7	4	540	538	13
6	12	2	107	117	106	8	3	3	66	58	66	6	10	3	351	387	19	13	0	4	257	162	93	8	7	4	188	248	30
7	12	2	1085	1080	17	9	3	3	1137	1117	11	7	10	3	1094	1085	16	1	1	4	312	291	11	9	7	4	132	63	83
8	12	2	25	22	25	10	3	3	1166	1136	12	8	10	3	743	753	16	2	1	4	1906	1938	5	10	7	4	1118	1107	15
9	12	2	1021	947	22	11	3	3	871	851	17	9	10	3	759	733	18	3	1	4	635	636	21	11	7	4	0	137	1
10	12	2	0	92	1	12	3	3	43	214	43	10	10	3	174	149	125	4	1	4	361	332	7	12	7	4	31	221	30
1	13	2	1445	1457	13	13	3	3	785	805	29	11	10	3	867	863	33	5	1	4	38	26	37	0	8	4	2619	2642	15
2	13	2	0	91	1	0	4	3	983	1012	7	1	11	3	727	754	10	6	1	4	3800	3698	14	1	8	4	250	246	11
3	13	2	1219	1191	15	1	4	3	2723	2707	9	2	11	3	820	831	12	7	1	4	199	204	10	2	8	4	1112	1125	7
4	13	2	114	23	114	2	4	3	207	218	7	3	11	3	575	595	13	8	1	4	427	426	14	3	8	4	70	56	69
5	13	2	1655	1585	16	3	4	3	2766	2702	10	4	11	3	170	202	38	9	1	4	149	73	37	4	8	4	965	946	7
6	13	2	0	8	1	4	4	3	2662	2617	9	5	11	3	1228	1208	14	10	1	4	2020	1907	15	5	8	4	407	408	24
7	13	2	1022	1029	18	5	4	3	1287	1282	7	6	11	3	893	878	14	11	1	4	0	37	1	6	8	4	0	73	1
8	13	2	0	98	1	6	4	3	425	414	8	7	11	3	338	395	27	12	1	4	226	125	54	7	8	4	19	33	19
9	13	2	992	958	33	7	4	3	1395	1359	10	8	11	3	0	14	1	13	1	4	0	96	1	8	8	4	1340	1285	13
0	14	2	293	320	37	8	4	3	1379	1357	9	9	11	3	350	461	44	0	2	4	4022	3900	14	9	8	4	169	51	99
1	14	2	1074	1050	12	9	4	3	1048	979	21	10	11	3	571	588	29	1	2	4	96	47	27	10	8	4	0	39	1
2	14	2	69	103	68	10	4	3	0	28	1	0	12	3	0	34	1	2	2	4	1649	1599	6	11	8	4	0	130	1
3	14	2	1014	1029	21	11	4	3	735	742	19	1	12	3	174	78	31	3	2	4	823	795	3	12	8	4	359	423	63
4	14	2	171	181	81	12	4	3	848	853	21	2	12	3	420	450	13	4	2	4	1743	1754	7	1	9	4	136	82	32
5	14	2	609	633	20	13	4	3	455	443	44	3	12	3	344	349	18	5	2	4	618	590	5	2	9	4	252	193	14
6	14	2	171	63	87	1	5	3	234	251	7	4	12	3	327	339	24	6	2	4	1359	1348	6	3	9	4	193	203	18
7	14	2	324	324	41	2	5	3	2128	2116	8	5	12	3	175	127	52	7	2	4	0	60	1	4	9	4	762	770	12
8	14	2	67	106	66	3	5	3	2516	2439	11	6	12	3	149	48	71	8	2	4	1165	1128	8	5	9	4	0	61	1
9	14	2	383	396	66	4	5	3	456	442	6	7	12	3	247	231	70	9	2	4	113	166	65	6	9	4	27	34	26
1	15	2	115	36	114	5	5	3	752	761	6	8	12	3	168	158	82	10	2	4	378	394	20	7	9	4	212	223	42
2	15	2	59	32	59	6	5	3	662	656	8	9	12	3	0	107	1	11	2	4	151	117	80	8	9	4	119	176	119
3	15	2	246	193	49	7	5	3	646	670	16	10	12	3	0	100	1	12	2	4	641	626	23	9	9	4	221	204	46
4	15	2	84	31	83	8	5	3	86	20	85	1	13	3	1066	1053	11	13	2	4	0	20	1	10	9	4	160	140	74
5	15	2	175	185	60	9	5	3	454	466	15	2	13	3	780	761	25	1	3	4	126	130	13	11	9	4	107	12	106
6	15	2	0	39	1	10	5	3	439	499	22	3	13	3	361	381	21	2	3	4	106	69	15	0	10	4	1644	1628	14
7	15	2	421	421	35	11	5	3	521	546	24	4	13	3	228	277	31	3	3	4	373	367	6	1	10	4	136	24	32
8	15	2	210	75	97	12	5	3	0	81	1	5	13	3	420	439	22	4	3	4	568	584	5	2	10	4	891	910	9
0	16	2	247	223	50	0	6	3	0	28	1	6	13	3	513	503	34	5	3	4	138	165	14	3	10	4	97	122	59
1	16	2	473	494	21	1	6	3	179	169	10	7	13	3	198	177	63	6	3	4	383	370	6	4	10	4	1883	1814	12
2	16	2	158	38	77	2	6	3	385	372	12	8	13	3	152	185	107	7	3	4	123	128	30	5	10	4	62	49	62
3	16	2	748	756	20	3	6	3	193	196	19	9	13	3	343	416	47	8	3	4	121	118	64	6	10	4	0	74	1
4	16	2	113	12	112	4	6	3	323	321	7	0	14	3	1539	1525	18	9	3	4	0	81	1	7	10	4	95	88	94
5	16	2	270	335	52	5	6	3	206	193	11	1	14	3	643	633	15	10	3	4	197	248	49	8	10	4	534	551	24
6	16	2	245	170	77	6	6	3	164	186	15	2	14	3	382	415	19	11	3	4	0	7	1	9	10	4	0	68	1
7	16	2	584	613	40	7	6	3	116	146	41	3	14	3	918	912	14	12	3	4	383	423	36	10	10	4	59	124	59
1	17	2	767	778	18	8	6	3	227	224	23	4	14	3	1041	1035	23	13	3	4	0	63	1	11	10	4	0	39	1
2	17	2	0	32	1	9	6	3	138	181	58	5	14	3	876	872	20	0	4	4	2375	2342	12	1	11	4	122	93	56
3	17	2	1161	1171	24	10	6	3	345	322	39	6	14	3	0	124	1	1	4	4	316	308	4	2	11	4	2311	2263	12
4	17	2	98	48	97	11	6	3	21	98	21	7	14	3	889	876	20	2	4	4	1326	1298	8	3	11	4	95	62	95
5	17	2	1072	1068	42	12	6	3	0	54	1	8	14	3	990	965	25	3	4	4	167	138	9	4	11	4	0	28	1
6	17	2	0	88	1	1	7	3	756	738	7	9	14	3	447	490	60	4	4	4	1930	1936	8	5	11	4	0	55	1
0	18	2	220	58	147	2	7	3	1463	1452	8	1	15	3	1104	1090	16	5	4	4	675	648	6	6	11	4	2163	2074	15
1	18	2	1001	1006	29	3	7	3	350	370	8	2	15	3	1566	1561	15	6	4	4	968	929	8	7	11	4	178	187	62
2	18	2	0	89	1	4	7	3	570	549	8	3	15	3	1000	980	17	7	4	4	345	364	12	8	11	4	0	57	1

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
3	18	2	1269	1253	22	5	7	3	442	471	6	4	15	3	0	7	1	8	4	4	1617	1562	10	9	11	4	114	123	113
4	18	2	156	63	156	6	7	3	1340	1320	9	5	15	3	694	719	21	9	4	4	157	92	35	10	11	4	1508	1434	33
1	19	2	767	760	45	7	7	3	1091	1075	9	6	15	3	1061	1052	20	10	4	4	52	140	52	0	12	4	3123	3047	21
2	19	2	213	21	94	8	7	3	268	286	30	7	15	3	772	779	27	11	4	4	93	29	92	1	12	4	0	42	1
1	1	3	1774	1761	6	9	7	3	901	868	15	8	15	3	164	111	163	12	4	4	613	619	24	2	12	4	264	277	17
2	1	3	266	249	5	10	7	3	441	473	23	0	16	3	978	948	21	13	4	4	0	5	1	3	12	4	119	57	65
3	1	3	1730	1716	5	11	7	3	237	281	54	1	16	3	713	702	29	1	5	4	173	171	13	4	12	4	2737	2621	17
4	1	3	418	401	4	12	7	3	0	50	1	2	16	3	201	279	54	2	5	4	5008	4947	20	5	12	4	136	151	96
5	1	3	1183	1194	6	0	8	3	2834	2751	17	3	16	3	833	846	19	3	5	4	348	355	6	6	12	4	135	174	83
6	1	3	851	852	9	1	8	3	1982	1986	9	4	16	3	898	937	20	4	5	4	253	244	8	7	12	4	181	69	180
7	1	3	101	117	40	2	8	3	122	127	31	5	16	3	587	621	29	5	5	4	73	89	48	8	12	4	1357	1318	18
8	1	3	373	380	16	3	8	3	1990	1933	11	6	16	3	0	48	1	6	5	4	2347	2308	14	9	12	4	0	73	1
9	1	3	526	547	11	4	8	3	2007	1967	10	7	16	3	712	750	34	7	5	4	349	393	12	10	12	4	241	243	65
10	1	3	923	939	18	5	8	3	1474	1450	8	1	17	3	300	312	34	8	5	4	236	265	28	1	13	4	124	104	53
11	1	3	394	405	23	6	8	3	168	204	25	2	17	3	782	769	21	9	5	4	225	214	25	2	13	4	1815	1790	12
12	1	3	190	187	65	7	8	3	1098	1106	14	3	17	3	398	427	31	10	5	4	1262	1235	15	3	13	4	244	181	28
13	1	3	207	276	74	8	8	3	1249	1196	12	4	17	3	150	171	149	11	5	4	176	231	81	4	13	4	248	268	30
0	2	3	2746	2701	11	9	8	3	345	365	25	5	17	3	248	192	66	12	5	4	349	327	39	5	13	4	118	55	117
6	13	4	1715	1641	17	5	4	5	864	874	6	7	11	5	497	482	21	1	2	6	3083	3006	9	11	8	6	307	305	50
7	13	4	111	74	110	6	4	5	54	36	53	8	11	5	204	157	87	2	2	6	492	505	4	1	9	6	762	764	8
8	13	4	96	38	96	7	4	5	1144	1130	7	9	11	5	267	281	43	3	2	6	1700	1677	5	2	9	6	456	469	11
9	13	4	0	8	1	8	4	5	1988	1910	15	10	11	5	706	673	23	4	2	6	341	335	4	3	9	6	99	90	36
0	14	4	925	945	17	9	4	5	702	695	12	0	12	5	647	598	16	5	2	6	1550	1531	8	4	9	6	28	19	27
1	14	4	71	29	70	10	4	5	176	152	52	1	12	5	0	20	1	6	2	6	362	372	9	5	9	6	964	961	11
2	14	4	102	121	101	11	4	5	707	741	22	2	12	5	501	515	15	7	2	6	950	954	8	6	9	6	0	47	1
3	14	4	115	24	114	12	4	5	1069	1004	27	3	12	5	213	188	31	8	2	6	548	583	12	7	9	6	103	90	103
4	14	4	909	916	17	1	5	5	230	260	6	4	12	5	105	22	105	9	2	6	159	165	32	8	9	6	121	13	120
5	14	4	147	152	92	2	5	5	2475	2437	9	5	12	5	171	174	59	10	2	6	46	7	45	9	9	6	268	281	33
6	14	4	337	361	32	3	5	5	2167	2136	9	6	12	5	30	58	29	11	2	6	403	455	30	10	9	6	198	148	63
7	14	4	0	125	1	4	5	5	158	165	15	7	12	5	244	260	58	12	2	6	0	19	1	11	9	6	294	257	55
8	14	4	929	921	29	5	5	5	444	455	7	8	12	5	213	173	53	13	2	6	224	268	82	0	10	6	175	200	30
9	14	4	156	18	155	6	5	5	1094	1074	11	9	12	5	0	37	1	1	3	6	610	598	10	1	10	6	1694	1698	9
1	15	4	92	95	92	7	5	5	297	322	20	10	12	5	0	16	1	2	3	6	134	127	11	2	10	6	0	33	1
2	15	4	251	150	34	8	5	5	265	251	23	1	13	5	1059	1047	13	3	3	6	658	645	5	3	10	6	1580	1544	11
3	15	4	71	35	71	9	5	5	197	194	42	2	13	5	955	920	15	4	3	6	78	100	29	4	10	6	138	155	41
4	15	4	180	212	63	10	5	5	525	537	20	3	13	5	675	682	20	5	3	6	183	194	15	5	10	6	938	943	18
5	15	4	173	84	78	11	5	5	328	287	37	4	13	5	249	237	28	6	3	6	32	22	32	6	10	6	0	90	1
6	15	4	32	94	31	12	5	5	0	43	1	5	13	5	358	415	24	7	3	6	499	523	11	7	10	6	745	769	16
7	15	4	0	5	1	0	6	5	647	634	15	6	13	5	861	833	17	8	3	6	80	108	79	8	10	6	244	217	44
8	15	4	171	37	170	1	6	5	109	82	20	7	13	5	394	365	33	9	3	6	384	405	17	9	10	6	435	439	24
0	16	4	648	655	35	2	6	5	495	469	7	8	13	5	32	152	32	10	3	6	83	27	82	10	10	6	146	11	146
1	16	4	127	97	126	3	6	5	215	218	10	9	13	5	361	386	48	11	3	6	0	159	1	11	10	6	674	679	34
2	16	4	96	16	96	4	6	5	286	314	16	0	14	5	1921	1882	23	12	3	6	0	15	1	1	11	6	2017	1980	11
3	16	4	115	17	115	5	6	5	75	76	74	1	14	5	764	769	12	13	3	6	114	32	113	2	11	6	28	41	28
4	16	4	1141	1130	26	6	6	5	128	124	29	2	14	5	348	352	29	0	4	6	487	484	8	3	11	6	2041	2023	21
5	16	4	170	42	169	7	6	5	216	239	20	3	14	5	944	941	18	1	4	6	225	226	14	4	11	6	175	128	43
6	16	4	460	442	32	8	6	5	316	337	18	4	14	5	1292	1277	17	2	4	6	48	50	47	5	11	6	2288	2195	15
7	16	4	0	38	1	9	6	5	223	234	34	5	14	5	824	806	18	3	4	6	1527	1519	6	6	11	6	29	134	28
1	17	4	112	11	112	10	6	5	254	234	31	6	14	5	73	105	73	4	4	6	392	390	6	7	11	6	1037	1046	17
2	17	4	1569	1560	20	11	6	5	0	94	1	7	14	5	948	949	19	5	4	6	896	894	6	8	11	6	155	86	154
3	17	4	120	70	119	12	6	5	0	26	1	8	14	5	984	1001	21	6	4	6	147	163	31	9	11	6	896	900	25
4	17	4	351	332	71	1	7	5	1346	1327	7	9	14	5	504	544	148	7	4	6	1424	1386	8	10	11	6	267	221	64
5	17	4	0	67	1	2	7	5	2124	2101	9	1	15	5	1136	1119	19	8	4	6	263	277	21	0	12	6	0	39	1
6	17	4	1040	1058	42	3	7	5	497	521	6	2	15	5	1814	1736	18	9	4	6	1184	1141	13	1	12	6	2303	2249	12
0	18	4	1272	1225	30	4	7	5	444	467	9	3	15	5	1047	1033	18	10	4	6	164	92	52	2	12	6	0	91	1
1	18	4	159	54	158	5	7	5	608	628	9	4	15	5	124	83	123	11	4	6	641	669	21	3	12	6	1738	1694	16
2	18	4	177	152	98	6	7	5	1388	1378	9	5	15	5	633	658	22	12	4	6	140	71	139	4	12	6	192	242	39
3	18	4	112	84	111	7	7	5	771	791	15	6	15	5	1204	1189	23	1	5	6	2399	2415	9	5	12	6	1958	1875	16
4	18	4	1531	1482	24	8	7	5	198	266	34	7	15	5	684	656	30	2	5	6	0	42	1	6	12	6	140	141	123
1	19	4	0	58	1	9	7	5	760	750	16	8	15	5	0	133	1	3	5	6	2847	2817	11	7	12	6	1069	1055	23
1	1	5	1446	1400	5	10	7	5	389	424	25	0	16	5	922	976	25	4	5	6	755	755	6	8	12	6	0	154	1
2	1	5	910	887	4	11	7	5	277	246	48	1	16	5	578	547	21	5	5	6	1097	1098	7	9	12	6	1114	1071	20
3	1	5	1123	1122	4	12	7	5	321	134	53	2	16	5	171	109	72	6	5	6	197	215	15	10	12	6	118	36	117
4	1	5	306	308	7	0	8	5	2677	2669	16	3	16	5	792	788	27	7	5	6	1647	1605	11	1	13	6	1390	1337	11
5	1	5	1389	1368	7	1	8	5	2171	2149	9	4	16	5	920	913	23	8	5	6	242	260	29	2	13	6	152	195	61
6	1	5	1427	1414	7	2	8	5	263	248	10	5	16	5	523	554	38	9	5	6	1611	1526	18	3	13	6	1309	1262	13
7	1	5	356	373	9	3	8	5	1361	1331	8	6	16	5	121	16	120	10	5	6	138	178	82	4	13	6	239	222	33
8	1	5	0	24	1	4	8	5	2104	2086	12	7	16	5	722	758	43	11	5	6	580	552	24	5	13	6	1500	1471	16
9	1	5	431	452	18	5	8	5	1240	1254	12	1	17	5	394	394	32	12	5	6	0	125	1	6	13	6	110	77	109
10	1	5	1035	1001	18	6	8	5	433	457	12	2	17	5	558	559	24	0	6	6	242	258	10	7	13	6	1131	1060	17
11	1	5	216	279	40	7	8	5	897	894	11	3	17	5	454	445	34	1	6	6	2558	2584	15	8	13	6	169	118	97
12	1	5	252	259	44	8	8	5	1570	1498	13	4	17	5	135	18	134	2	6	6	254	248	15	9	13	6	1065	1063	27
13	1	5	349	310	43	9	8	5	423	415	22	5	17	5	219	269	80	3	6	6	2938	2934	12	0	14	6	0	13	1
0	2	5	3694	3577	14	10	8	5	231	154	67	0	18	5	0	71	1	4	6	6	217	243	14	1	14	6	969	965	12
1	2	5	1851	1811	5	11	8	5	486	570	32	1	18	5	0	120	1	5	6	6	1820	1793	9	2	14	6	198	200	41
2	2	5	30	24	30	12	8	5	818	820	39	2	18	5	0	68	1	6	6	6	0	116	1	3	14	6	737	732	15
3	2	5	2139	2105	7	1	9	5	1741	1733	9	3	18	5	82	26	81	7	6	6	2288	2190	12	4	14	6	141	70	140
4	2	5	3217	3198	10	2	9	5	2359	2327	11	4	18	5	60	17	60	8	6	6	164	178	41	5	14	6	454	476	27
5	2	5	1367	1369	7	3	9	5	1313	1335	9	1	0	6	3958	3834	15	9	6	6	1338	1308	14	6	14	6	0	114	1

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
6	2	5	907	879	6	4	9	5	204	214	23	2	0	6	563	514	4	10	6	6	94	42	93	7	14	6	453	424	30
7	2	5	1490	1457	8	5	9	5	1413	1384	11	3	0	6	2224	2201	10	11	6	6	895	888	21	8	14	6	138	162	138
8	2	5	1388	1349	9	6	9	5	2245	2171	14	4	0	6	271	273	7	12	6	6	204	178	74	1	15	6	239	170	32
9	2	5	1028	1017	10	7	9	5	1073	1076	15	5	0	6	3460	3407	17	1	7	6	2487	2514	10	2	15	6	0	47	1
10	2	5	147	191	60	8	9	5	67	67	66	6	0	6	492	493	17	2	7	6	271	282	8	3	15	6	271	333	31
11	2	5	774	771	21	9	9	5	829	814	21	7	0	6	2370	2301	16	3	7	6	1966	1960	10	4	15	6	0	20	1
12	2	5	932	926	21	10	9	5	1245	1189	18	8	0	6	331	341	24	4	7	6	194	194	19	5	15	6	201	236	72
13	2	5	252	301	65	11	9	5	621	594	29	9	0	6	1055	1042	15	5	7	6	891	912	10	6	15	6	0	21	1
1	3	5	1474	1466	5	0	10	5	2370	2330	15	10	0	6	343	366	36	6	7	6	340	368	13	7	15	6	177	215	100
2	3	5	3720	3699	11	1	10	5	1444	1476	9	11	0	6	1733	1604	32	7	7	6	2052	1959	12	8	15	6	194	56	120
3	3	5	2176	2182	8	2	10	5	82	121	82	12	0	6	0	45	1	8	7	6	139	145	53	0	16	6	269	281	60
4	3	5	192	148	8	3	10	5	1008	979	10	13	0	6	674	646	40	9	7	6	1147	1118	14	1	16	6	657	644	18
5	3	5	2364	2306	8	4	10	5	2047	1988	13	1	1	6	4325	4190	12	10	7	6	0	25	1	2	16	6	127	71	126
6	3	5	2393	2348	9	5	10	5	1305	1313	12	2	1	6	419	406	4	11	7	6	669	619	44	3	16	6	777	705	28
7	3	5	902	904	7	6	10	5	186	136	45	3	1	6	1200	1204	5	12	7	6	0	89	1	4	16	6	0	62	1
8	3	5	167	152	25	7	10	5	605	607	17	4	1	6	662	646	4	0	8	6	332	366	16	5	16	6	391	396	38
9	3	5	1087	1058	12	8	10	5	930	927	18	5	1	6	2974	2882	12	1	8	6	198	208	12	6	16	6	0	7	1
10	3	5	1691	1607	14	9	10	5	633	640	18	6	1	6	175	193	13	2	8	6	88	81	46	7	16	6	515	497	38
11	3	5	760	726	25	10	10	5	0	80	1	7	1	6	2062	1997	11	3	8	6	575	601	12	1	17	6	710	735	22
12	3	5	266	242	50	11	10	5	612	572	31	8	1	6	0	100	1	4	8	6	44	29	44	2	17	6	0	155	1
13	3	5	584	626	35	1	11	5	389	381	14	9	1	6	2057	1959	13	5	8	6	1375	1336	10	3	17	6	1183	1176	21
0	4	5	1292	1333	7	2	11	5	471	493	12	10	1	6	184	143	47	6	8	6	6	17	6	4	17	6	0	114	1
1	4	5	1571	1553	7	3	11	5	389	412	14	11	1	6	950	857	16	7	8	6	998	992	12	5	17	6	916	912	28
2	4	5	1071	1077	6	4	11	5	169	160	38	12	1	6	258	240	43	8	8	6	177	211	52	0	18	6	90	109	90
3	4	5	1944	1919	8	5	11	5	842	803	14	13	1	6	534	575	41	9	8	6	974	937	19	1	18	6	985	973	21
4	4	5	3175	3085	12	6	11	5	805	768	16	0	2	6	302	320	6	10	8	6	0	25	1	2	18	6	115	15	115
3	18	6	1051	1097	32	9	7	7	844	871	24	2	16	7	140	127	140	9	5	8	308	294	29	4	13	8	149	137	72
4	18	6	0	123	1	10	7	7	501	490	24	3	16	7	904	905	32	10	5	8	1325	1293	18	5	13	8	147	154	99
1	1	7	1880	1820	8	11	7	7	170	343	101	4	16	7	824	824	26	11	5	8	154	144	102	6	13	8	1459	1386	17
2	1	7	1346	1354	5	12	7	7	204	60	107	5	16	7	586	620	28	12	5	8	258	348	58	7	13	8	68	68	67
3	1	7	1249	1237	5	0	8	7	2546	2560	15	6	16	7	0	53	1	0	6	8	2807	2880	14	8	13	8	0	52	1
4	1	7	282	310	6	1	8	7	1533	1549	7	1	17	7	449	468	31	1	6	8	1017	1003	8	9	13	8	154	104	153
5	1	7	1679	1640	7	2	8	7	329	335	11	2	17	7	509	504	34	2	6	8	196	205	9	0	14	8	1263	1268	17
6	1	7	1280	1266	7	3	8	7	1782	1769	9	3	17	7	327	354	47	3	6	8	611	604	8	1	14	8	148	93	69
7	1	7	343	362	11	4	8	7	1511	1506	10	4	17	7	227	195	72	4	6	8	2947	2922	13	2	14	8	219	226	34
8	1	7	308	319	18	5	8	7	939	955	9	5	17	7	263	233	63	5	6	8	115	42	43	3	14	8	246	218	37
9	1	7	357	394	18	6	8	7	160	100	37	0	18	7	83	296	83	6	6	8	185	162	19	4	14	8	781	797	18
10	1	7	526	531	19	7	8	7	1645	1587	12	1	18	7	165	91	164	7	6	8	0	39	1	5	14	8	62	46	62
11	1	7	194	266	59	8	8	7	1114	1078	13	2	18	7	0	91	1	8	6	8	3006	2857	16	6	14	8	297	314	37
12	1	7	103	162	103	9	8	7	431	450	22	3	18	7	229	45	87	9	6	8	249	283	27	7	14	8	250	44	57
13	1	7	354	290	50	10	8	7	107	211	107	0	0	8	6177	6001	50	10	6	8	355	385	25	8	14	8	638	638	34
0	2	7	1823	1807	9	11	8	7	596	659	27	1	0	8	590	582	9	11	6	8	82	41	82	1	15	8	0	107	1
1	2	7	1334	1336	5	1	9	7	1692	1682	11	2	0	8	1696	1651	9	12	6	8	1359	1279	21	2	15	8	0	6	1
2	2	7	536	552	4	2	9	7	1964	1960	10	3	0	8	141	62	37	1	7	8	292	326	9	3	15	8	146	4	146
3	2	7	1591	1563	6	3	9	7	1470	1483	9	4	0	8	3074	3062	14	2	7	8	3635	3610	14	4	15	8	0	119	1
4	2	7	2381	2350	8	4	9	7	206	177	21	5	0	8	412	422	10	3	7	8	0	80	1	5	15	8	212	174	64
5	2	7	1801	1774	10	5	9	7	1937	1867	13	6	0	8	777	791	9	4	7	8	508	481	13	6	15	8	0	34	1
6	2	7	203	225	9	6	9	7	1939	1883	14	7	0	8	284	311	19	5	7	8	173	152	25	7	15	8	143	24	142
7	2	7	1378	1355	8	7	9	7	1035	1040	13	8	0	8	2129	2032	16	6	7	8	2434	2359	13	0	16	8	584	612	35
8	2	7	1310	1307	9	8	9	7	0	26	1	9	0	8	420	473	21	7	7	8	98	56	97	1	16	8	139	191	138
9	2	7	1225	1174	11	9	9	7	884	889	16	10	0	8	418	454	31	8	7	8	342	350	20	2	16	8	169	75	84
10	2	7	0	33	1	10	9	7	998	967	18	11	0	8	0	25	1	9	7	8	205	168	46	3	16	8	0	125	1
11	2	7	1137	1112	16	11	9	7	749	745	25	12	0	8	1018	1020	27	10	7	8	1147	1123	16	4	16	8	961	954	36
12	2	7	796	801	22	0	10	7	1709	1705	20	13	0	8	299	33	98	11	7	8	87	107	86	5	16	8	69	135	68
13	2	7	325	345	64	1	10	7	1587	1579	9	1	1	8	946	921	5	12	7	8	82	207	82	6	16	8	194	351	194
1	3	7	1451	1449	6	2	10	7	0	48	1	2	1	8	2182	2200	7	0	8	8	1933	1963	15	1	17	8	0	51	1
2	3	7	2499	2509	9	3	10	7	1029	1035	10	3	1	8	283	281	5	1	8	8	258	261	15	2	17	8	1586	1550	25
3	3	7	2240	2237	8	4	10	7	1872	1843	17	4	1	8	277	267	8	2	8	8	986	1008	12	3	17	8	0	81	1
4	3	7	306	303	8	5	10	7	1923	1874	14	5	1	8	80	49	33	3	8	8	55	122	55	4	17	8	255	68	58
5	3	7	2303	2253	8	6	10	7	0	48	1	6	1	8	3197	3117	14	4	8	8	1414	1416	11	5	17	8	247	196	69
6	3	7	1728	1709	8	7	10	7	740	716	17	7	1	8	44	51	44	5	8	8	145	147	36	0	18	8	1195	1258	30
7	3	7	933	942	12	8	10	7	794	829	19	8	1	8	137	84	33	6	8	8	95	78	94	1	18	8	244	192	69
8	3	7	149	146	32	9	10	7	867	850	23	9	1	8	62	29	61	7	8	8	0	33	1	2	18	8	226	209	105
9	3	7	1329	1303	13	10	10	7	83	16	83	10	1	8	1779	1659	14	8	8	8	1523	1432	13	3	18	8	220	218	171
10	3	7	1428	1384	14	11	10	7	528	573	38	11	1	8	0	58	1	9	8	8	0	73	1	1	1	9	811	838	5
11	3	7	762	731	19	1	11	7	542	546	12	12	1	8	0	107	1	10	8	8	103	12	103	2	1	9	1201	1254	5
12	3	7	172	167	109	2	11	7	716	737	10	13	1	8	590	46	323	11	8	8	0	111	1	3	1	9	854	863	5
0	4	7	821	850	10	3	11	7	1047	1034	11	0	2	8	4030	3926	22	1	9	8	260	293	24	4	1	9	298	338	9
1	4	7	2363	2336	8	4	11	7	178	162	31	1	2	8	329	324	4	2	9	8	214	183	23	5	1	9	1031	1040	6
2	4	7	394	391	7	5	11	7	960	946	15	2	2	8	182	182	9	3	9	8	350	333	14	6	1	9	1675	1639	9
3	4	7	2359	2337	13	6	11	7	794	786	14	3	2	8	282	317	8	4	9	8	580	599	13	7	1	9	586	601	11
4	4	7	2346	2357	9	7	11	7	314	294	31	4	2	8	547	573	6	5	9	8	361	388	21	8	1	9	375	400	13
5	4	7	739	751	7	8	11	7	0	35	1	5	2	8	340	342	8	6	9	8	334	366	31	9	1	9	371	388	31
6	4	7	231	210	13	9	11	7	188	172	88	6	2	8	862	851	11	7	9	8	79	3	79	10	1	9	908	893	18
7	4	7	1248	1214	8	10	11	7	508	555	31	7	2	8	288	306	17	8	9	8	79	84	78	11	1	9	245	250	44
8	4	7	1377	1353	13	0	12	7	282	249	29	8	2	8	1226	1208	9	9	9	8	145	104	75	12	1	9	240	140	59
9	4	7	714	719	16	1	12	7	0	36	1	9	2	8	0	33	1	10	9	8	0	126	1	0	2	9	2651	2668	22

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
10	4	7	144	76	85	2	12	7	660	654	15	10	2	8	342	339	25	11	9	8	203	31	75	1	2	9	1063	1085	6
11	4	7	745	759	25	3	12	7	180	178	38	11	2	8	0	28	1	0	10	8	1289	1262	14	2	2	9	517	458	19
12	4	7	866	779	24	4	12	7	0	24	1	12	2	8	566	587	44	1	10	8	170	187	28	3	2	9	1528	1522	7
1	5	7	195	212	10	5	12	7	239	268	40	1	3	8	703	690	5	2	10	8	359	366	15	4	2	9	3469	3374	11
2	5	7	1255	1287	7	6	12	7	0	27	1	2	3	8	534	494	46	3	10	8	127	165	52	5	2	9	1115	1114	8
3	5	7	1660	1673	11	7	12	7	237	162	49	3	3	8	146	139	11	4	10	8	1513	1503	13	6	2	9	624	642	6
4	5	7	0	14	1	8	12	7	209	251	60	4	3	8	937	916	6	5	10	8	128	46	81	7	2	9	1200	1175	9
5	5	7	687	719	6	9	12	7	48	9	48	5	3	8	809	803	6	6	10	8	194	220	41	8	2	9	1393	1397	10
6	5	7	813	817	8	10	12	7	84	31	84	6	3	8	168	163	19	7	10	8	109	205	109	9	2	9	731	738	15
7	5	7	717	737	9	1	13	7	1407	1396	11	7	3	8	49	9	49	8	10	8	433	508	27	10	2	9	204	188	37
8	5	7	141	156	36	2	13	7	918	895	14	8	3	8	285	293	18	9	10	8	0	124	1	11	2	9	797	754	23
9	5	7	381	385	25	3	13	7	353	353	21	9	3	8	151	113	66	10	10	8	186	63	80	12	2	9	743	725	24
10	5	7	477	516	20	4	13	7	188	195	48	10	3	8	85	31	84	11	10	8	0	132	1	1	3	9	1657	1638	8
11	5	7	429	467	28	5	13	7	582	560	18	11	3	8	83	78	82	1	11	8	497	515	13	2	3	9	1838	34901837	
12	5	7	196	154	106	6	13	7	569	635	20	12	3	8	356	419	45	2	11	8	1888	1840	11	3	3	9	2416	2399	10
0	6	7	296	292	12	7	13	7	460	460	34	0	4	8	1489	1501	12	3	11	8	485	496	15	4	3	9	208	189	10
1	6	7	541	516	7	8	13	7	212	136	78	1	4	8	325	312	6	4	11	8	706	713	12	5	3	9	1519	1503	8
2	6	7	337	339	6	9	13	7	443	466	47	2	4	8	193	149	13	5	11	8	199	239	40	6	3	9	2198	2158	9
3	6	7	0	13	1	0	14	7	1401	1368	16	3	4	8	191	185	9	6	11	8	2079	1984	15	7	3	9	897	909	7
4	6	7	217	209	11	1	14	7	915	906	14	4	4	8	2270	2217	9	7	11	8	77	112	77	8	3	9	65	78	65
5	6	7	137	152	18	2	14	7	186	198	43	5	4	8	152	161	22	8	11	8	73	32	72	9	3	9	964	942	12
6	6	7	281	292	14	3	14	7	987	985	14	6	4	8	669	676	9	9	11	8	62	29	62	10	3	9	1401	1382	16
7	6	7	0	91	1	4	14	7	928	940	20	7	4	8	56	85	55	10	11	8	1391	1358	28	11	3	9	522	533	22
8	6	7	22	22	22	5	14	7	835	865	19	8	4	8	1524	1478	16	0	12	8	2942	2870	20	12	3	9	176	171	111
9	6	7	308	350	23	6	14	7	69	119	69	9	4	8	148	51	58	1	12	8	0	43	1	0	4	9	2272	2202	14
10	6	7	181	182	62	7	14	7	930	968	20	10	4	8	84	54	84	2	12	8	0	14	1	1	4	9	2024	2015	9
11	6	7	0	53	1	8	14	7	936	916	25	11	4	8	0	185	1	3	12	8	217	231	30	2	4	9	1584	1514	8
12	6	7	0	15	1	1	15	7	1436	1369	14	12	4	8	615	603	29	4	12	8	2611	2516	18	3	4	9	1608	1622	7
1	7	7	782	797	6	2	15	7	1399	1362	16	1	5	8	127	125	17	5	12	8	267	264	37	4	4	9	2461	2472	9
2	7	7	887	904	9	3	15	7	1061	1027	17	2	5	8	3819	3829	15	6	12	8	209	239	51	5	4	9	1389	1363	10
3	7	7	855	872	14	4	15	7	211	219	72	3	5	8	205	202	10	7	12	8	185	208	79	6	4	9	70	19	69
4	7	7	277	297	10	5	15	7	662	688	23	4	5	8	263	265	9	8	12	8	1320	1308	19	7	4	9	1002	1002	10
5	7	7	537	549	9	6	15	7	836	892	23	5	5	8	490	484	13	9	12	8	309	350	49	8	4	9	1426	1383	15
6	7	7	1002	998	12	7	15	7	896	872	23	6	5	8	2182	2121	12	1	13	8	211	208	30	9	4	9	999	965	13
7	7	7	873	895	12	0	16	7	816	803	27	7	5	8	179	196	18	2	13	8	2134	2060	16	10	4	9	78	119	78
8	7	7	160	206	52	1	16	7	933	890	17	8	5	8	486	483	15	3	13	8	202	232	43	11	4	9	693	708	25
12	4	9	1057	1040	23	6	12	9	156	166	76	6	3	10	519	561	12	8	10	10	191	211	59	1	3	11	2503	2417	11
1	5	9	471	488	6	7	12	9	154	219	108	7	3	10	344	358	11	9	10	10	309	359	41	2	3	11	3001	2918	11
2	5	9	1985	1993	9	8	12	9	0	124	1	8	3	10	302	298	24	10	10	10	160	138	159	3	3	11	3231	3133	13
3	5	9	1228	1232	7	9	12	9	0	19	1	9	3	10	474	496	17	1	11	10	1065	1069	12	4	3	11	152	147	21
4	5	9	264	281	9	1	13	9	654	668	15	10	3	10	404	441	39	2	11	10	585	613	22	5	3	11	2476	2403	10
5	5	9	827	824	6	2	13	9	670	647	14	11	3	10	244	323	68	3	11	10	781	771	18	6	3	11	1879	1812	10
6	5	9	433	459	14	3	13	9	165	138	63	12	3	10	0	19	1	4	11	10	176	162	44	7	3	11	1032	1007	10
7	5	9	422	447	15	4	13	9	190	192	59	0	4	10	1109	1057	9	5	11	10	2263	2187	19	8	3	11	0	25	1
8	5	9	189	278	31	5	13	9	0	115	1	1	4	10	1523	1516	10	6	11	10	273	284	32	9	3	11	1120	1133	16
9	5	9	492	504	27	6	13	9	948	918	18	2	4	10	241	248	7	7	11	10	762	762	20	10	3	11	1093	1043	20
10	5	9	605	627	16	7	13	9	226	264	57	3	4	10	1697	1670	11	8	11	10	0	63	1	11	3	11	800	777	25
11	5	9	399	411	31	8	13	9	0	52	1	4	4	10	435	428	6	9	11	10	921	968	22	12	3	11	147	179	147
12	5	9	0	95	1	9	13	9	290	365	63	5	4	10	1150	1142	8	10	11	10	220	191	84	0	4	11	2975	2910	22
0	6	9	1139	1082	10	0	14	9	1726	1662	19	6	4	10	228	247	19	0	12	10	567	604	21	1	4	11	2885	2780	12
1	6	9	483	483	7	1	14	9	441	460	19	7	4	10	1221	1186	11	1	12	10	1503	1499	13	2	4	11	689	668	5
2	6	9	126	90	19	2	14	9	411	452	22	8	4	10	121	154	47	2	12	10	298	328	22	3	4	11	2902	2843	12
3	6	9	92	3	32	3	14	9	686	680	19	9	4	10	959	909	13	3	12	10	1618	1566	14	4	4	11	2359	2285	9
4	6	9	0	19	1	4	14	9	1178	1169	19	10	4	10	0	122	1	4	12	10	526	516	19	5	4	11	1137	1101	6
5	6	9	236	218	19	5	14	9	425	464	29	11	4	10	456	497	30	5	12	10	1330	1270	16	6	4	11	294	329	13
6	6	9	530	534	19	6	14	9	157	125	99	12	4	10	0	42	1	6	12	10	354	389	33	7	4	11	1350	1328	10
7	6	9	107	123	77	7	14	9	791	743	28	1	5	10	2965	2920	13	7	12	10	1106	1077	18	8	4	11	1054	1052	11
8	6	9	145	146	54	8	14	9	1181	1106	25	2	5	10	798	806	7	8	12	10	0	194	1	9	4	11	768	776	14
9	6	9	344	360	22	1	15	9	961	952	22	3	5	10	3009	2926	12	9	12	10	968	957	23	10	4	11	0	40	1
10	6	9	96	190	96	2	15	9	1633	1577	17	4	5	10	237	243	14	1	13	10	1329	1331	16	11	4	11	727	750	22
11	6	9	146	91	109	3	15	9	750	751	35	5	5	10	1649	1629	9	2	13	10	479	470	18	12	4	11	691	691	26
12	6	9	57	37	57	4	15	9	0	13	1	6	5	10	446	457	17	3	13	10	1319	1317	15	1	5	11	195	215	10
1	7	9	744	748	10	5	15	9	316	348	46	7	5	10	1587	1532	11	4	13	10	158	108	70	2	5	11	1747	1706	9
2	7	9	2159	2112	9	6	15	9	1157	1159	34	8	5	10	46	27	46	5	13	10	1148	1121	22	3	5	11	1607	1578	8
3	7	9	384	399	8	7	15	9	470	534	37	9	5	10	1401	1388	13	6	13	10	0	92	1	4	5	11	355	340	8
4	7	9	184	204	21	0	16	9	1235	1246	33	10	5	10	237	218	38	7	13	10	952	917	30	5	5	11	1228	1209	9
5	7	9	712	709	9	1	16	9	561	572	32	11	5	10	560	540	23	8	13	10	0	19	1	6	5	11	485	503	11
6	7	9	918	913	13	2	16	9	145	26	144	12	5	10	0	103	1	9	13	10	786	817	30	7	5	11	479	504	15
7	7	9	300	348	19	3	16	9	577	543	27	0	6	10	620	648	10	0	14	10	0	83	1	8	5	11	0	95	1
8	7	9	545	538	14	4	16	9	926	895	22	1	6	10	2793	2740	12	1	14	10	1009	1005	14	9	5	11	529	549	20
9	7	9	578	612	17	5	16	9	611	585	26	2	6	10	363	372	10	2	14	10	172	94	59	10	5	11	646	663	18
10	7	9	383	459	25	6	16	9	275	152	58	3	6	10	3050	2971	12	3	14	10	690	697	24	11	5	11	591	557	44
11	7	9	307	251	40	1	17	9	449	436	30	4	6	10	224	236	13	4	14	10	191	113	80	12	5	11	167	146	167
0	8	9	2676	2623	16	2	17	9	688	674	30	5	6	10	1666	1608	9	5	14	10	595	578	22	0	6	11	867	873	13
1	8	9	1477	1472	8	3	17	9	487	492	34	6	6	10	481	475	12	6	14	10	0	43	1	1	6	11	0	15	1
2	8	9	127	103	28	4	17	9	269	146	56	7	6	10	2387	2278	13	7	14	10	253	243	108	2	6	11	168	192	16
3	8	9	958	935	8	5	17	9	226	64	88	8	6	10	345	350	19	8	14	10	227	150	87	3	6	11	112	128	36
4	8	9	1832	1788	13	0	18	9	0	70	1	9	6	10	1113	1070	17	1	15	10	0	49	1	4	6	11	204	212	23
5	8	9	895	893	10	1	18	9	195	204	135	10	6	10	177	197	65	2	15	10	183	185	65	5	6	11	202	193	23

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
6	8	9	83	104	83	2	18	9	0	58	1	11	6	10	977	1028	21	3	15	10	0	89	1	6	6	11	441	464	13
7	8	9	976	979	12	3	18	9	0	15	1	12	6	10	170	232	169	4	15	10	241	93	45	7	6	11	0	28	1
8	8	9	1560	1523	13	1	0	10	2863	2825	15	1	7	10	2961	2930	12	5	15	10	182	219	155	8	6	11	191	202	37
9	8	9	389	351	26	2	0	10	1040	1032	7	2	7	10	221	218	12	6	15	10	0	151	1	9	6	11	199	128	46
10	8	9	101	211	101	3	0	10	3513	3394	14	3	7	10	2374	2325	11	7	15	10	298	274	55	10	6	11	144	71	77
11	8	9	536	569	28	4	0	10	803	790	7	4	7	10	454	459	14	0	16	10	46	135	46	11	6	11	0	151	1
1	9	9	1017	1029	9	5	0	10	3432	3319	17	5	7	10	961	964	9	1	16	10	397	374	32	1	7	11	1234	1188	9
2	9	9	2474	2449	12	6	0	10	612	616	9	6	7	10	442	431	15	2	16	10	0	119	1	2	7	11	910	891	8
3	9	9	985	992	10	7	0	10	2044	1987	20	7	7	10	1376	1340	15	3	16	10	661	675	23	3	7	11	775	767	12
4	9	9	228	257	18	8	0	10	164	173	82	8	7	10	162	170	57	4	16	10	291	240	42	4	7	11	230	259	14
5	9	9	1575	1563	14	9	0	10	1277	1242	22	9	7	10	1346	1319	17	5	16	10	287	297	46	5	7	11	380	361	15
6	9	9	2260	2155	18	10	0	10	283	262	48	10	7	10	215	216	84	6	16	10	0	19	1	6	7	11	632	670	16
7	9	9	864	861	14	11	0	10	1076	1018	43	11	7	10	451	496	30	1	17	10	777	775	25	7	7	11	939	934	12
8	9	9	242	281	33	12	0	10	249	41	101	0	8	10	788	771	21	2	17	10	0	238	1	8	7	11	160	149	47
9	9	9	755	759	17	1	1	10	4210	4075	14	1	8	10	440	463	14	3	17	10	1146	1151	23	9	7	11	873	857	26
10	9	9	1185	1153	17	2	1	10	682	664	4	2	8	10	60	118	60	4	17	10	0	98	1	10	7	11	391	413	40
11	9	9	548	564	27	3	1	10	1112	1125	5	3	8	10	1033	1043	11	0	18	10	186	160	186	11	7	11	268	313	51
0	10	9	2454	2413	17	4	1	10	155	177	9	4	8	10	144	95	29	1	18	10	1165	1138	27	0	8	11	1767	1754	13
1	10	9	873	872	9	5	1	10	2598	2508	13	5	8	10	1010	1011	11	2	18	10	0	135	1	1	8	11	2377	2337	11
2	10	9	329	343	18	6	1	10	170	159	16	6	8	10	81	34	80	1	1	11	1814	1786	8	2	8	11	98	46	44
3	10	9	974	969	10	7	1	10	2162	2078	10	7	8	10	1243	1238	12	2	1	11	1702	1686	7	3	8	11	1676	1644	10
4	10	9	2353	2278	14	8	1	10	0	18	1	8	8	10	0	76	1	3	1	11	954	967	4	4	8	11	1258	1228	13
5	10	9	995	980	14	9	1	10	1670	1585	12	9	8	10	687	676	19	4	1	11	246	212	9	5	8	11	1134	1137	12
6	10	9	423	448	21	10	1	10	0	43	1	10	8	10	0	108	1	5	1	11	2027	1966	8	6	8	11	71	143	71
7	10	9	712	704	17	11	1	10	824	812	19	11	8	10	428	417	31	6	1	11	1152	1124	7	7	8	11	1203	1186	12
8	10	9	826	855	18	12	1	10	0	16	1	1	9	10	362	379	12	7	1	11	490	502	11	8	8	11	846	839	14
9	10	9	446	404	25	0	2	10	211	191	13	2	9	10	481	472	12	8	1	11	93	111	62	9	8	11	425	451	33
10	10	9	114	11	114	1	2	10	3529	3396	14	3	9	10	890	889	10	9	1	11	265	291	25	10	8	11	109	220	109
1	11	9	141	186	41	2	2	10	279	258	5	4	9	10	100	116	98	10	1	11	427	457	25	11	8	11	528	590	34
2	11	9	909	932	13	3	2	10	1051	1056	6	5	9	10	73	39	73	11	1	11	240	257	50	1	9	11	1955	1930	10
3	11	9	566	596	15	4	2	10	125	87	23	6	9	10	178	136	44	12	1	11	95	31	94	2	9	11	1350	1334	10
4	11	9	133	161	70	5	2	10	1321	1313	9	7	9	10	177	200	50	0	2	11	1654	1611	14	3	9	11	1202	1224	11
5	11	9	819	820	16	6	2	10	194	215	13	8	9	10	0	122	1	1	2	11	1939	1923	9	4	9	11	325	347	19
6	11	9	921	897	15	7	2	10	806	780	13	9	9	10	120	16	120	2	2	11	243	228	7	5	9	11	1634	1603	14
7	11	9	323	332	32	8	2	10	161	214	28	10	9	10	74	66	74	3	2	11	2253	2163	9	6	9	11	1523	1501	14
8	11	9	0	78	1	9	2	10	226	217	26	11	9	10	201	180	201	4	2	11	2535	2485	10	7	9	11	988	954	17
9	11	9	247	263	58	10	2	10	0	138	1	0	10	10	305	229	55	5	2	11	1786	1746	10	8	9	11	188	144	68
10	11	9	573	567	46	11	2	10	534	526	22	1	10	10	1421	1397	10	6	2	11	159	186	27	9	9	11	897	899	16
0	12	9	234	217	46	12	2	10	0	83	1	2	10	10	0	71	1	7	2	11	1465	1434	9	10	9	11	880	867	18
1	12	9	576	590	11	1	3	10	118	147	17	3	10	10	990	994	12	8	2	11	1349	1288	11	0	10	11	1495	1451	14
2	12	9	407	408	22	2	3	10	853	845	7	4	10	10	350	393	19	9	2	11	1125	1103	19	1	10	11	562	568	16
3	12	9	131	139	127	3	3	10	571	572	9	5	10	10	697	682	21	10	2	11	136	137	106	2	10	11	316	332	22
4	12	9	239	230	40	4	3	10	96	108	20	6	10	10	161	129	55	11	2	11	929	919	20	3	10	11	1256	1250	11
5	12	9	180	212	68	5	3	10	421	413	6	7	10	10	446	455	24	12	2	11	539	605	30	4	10	11	1398	1375	13
5	10	11	1089	1072	15	12	1	12	136	25	135	2	9	12	35	106	35	4	2	13	2904	2843	11	8	9	13	220	228	51
6	10	11	142	113	79	0	2	12	3370	3257	21	3	9	12	245	291	20	5	2	13	981	979	7	9	9	13	727	727	22
7	10	11	1051	1039	22	1	2	12	293	287	11	4	9	12	414	422	16	6	2	13	724	702	9	10	9	13	1032	1050	39
8	10	11	582	636	21	2	2	12	254	226	14	5	9	12	0	52	1	7	2	13	911	902	10	0	10	13	2017	1974	18
9	10	11	784	805	21	3	2	12	697	671	6	6	9	12	67	66	66	8	2	13	1164	1161	11	1	10	13	1435	1419	11
10	10	11	0	39	1	4	2	12	1850	1829	9	7	9	12	0	61	1	9	2	13	614	613	14	2	10	13	273	305	28
1	11	11	659	663	15	5	2	12	35	89	34	8	9	12	123	137	123	10	2	13	0	87	1	3	10	13	1118	1128	13
2	11	11	555	566	14	6	2	12	249	310	15	9	9	12	0	66	1	11	2	13	481	505	39	4	10	13	1967	1911	16
3	11	11	602	619	15	7	2	12	504	519	15	10	9	12	160	161	89	12	2	13	848	828	22	5	10	13	902	874	19
4	11	11	212	235	32	8	2	12	1275	1247	12	0	10	12	958	953	26	1	3	13	1258	1238	7	6	10	13	341	391	27
5	11	11	866	856	18	9	2	12	53	130	52	1	10	12	0	86	1	2	3	13	3421	3335	14	7	10	13	479	521	22
6	11	11	747	749	17	10	2	12	423	431	29	2	10	12	415	421	13	3	3	13	1581	1579	11	8	10	13	950	934	27
7	11	11	250	255	43	11	2	12	0	75	1	3	10	12	478	508	16	4	3	13	406	386	8	9	10	13	362	356	38
8	11	11	0	54	1	12	2	12	483	552	33	4	10	12	1490	1446	13	5	3	13	1556	1500	8	10	10	13	0	31	1
9	11	11	267	279	50	1	3	12	70	87	61	5	10	12	0	37	1	6	3	13	2100	2045	11	1	11	13	486	497	16
10	11	11	468	411	36	2	3	12	361	332	6	6	10	12	207	324	50	7	3	13	546	541	12	2	11	13	1039	1037	12
0	12	11	195	163	71	3	3	12	830	833	13	7	10	12	389	387	27	8	3	13	148	214	48	3	11	13	417	447	19
1	12	11	498	517	17	4	3	12	377	376	9	8	10	12	502	540	25	9	3	13	700	740	14	4	11	13	0	150	1
2	12	11	237	266	34	5	3	12	480	465	7	9	10	12	248	206	67	10	3	13	1538	1478	17	5	11	13	688	705	37
3	12	11	59	94	59	6	3	12	319	318	13	10	10	12	0	165	1	11	3	13	564	537	25	6	11	13	756	783	17
4	12	11	160	192	68	7	3	12	413	415	14	1	11	12	336	370	19	12	3	13	123	167	122	7	11	13	381	416	32
5	12	11	82	24	81	8	3	12	503	526	14	2	11	12	1837	1808	13	0	4	13	1692	1694	23	8	11	13	196	89	72
6	12	11	0	43	1	9	3	12	111	83	110	3	11	12	295	277	23	1	4	13	1029	1025	8	9	11	13	225	250	75
7	12	11	313	378	42	10	3	12	0	78	1	4	11	12	390	393	21	2	4	13	409	437	5	0	12	13	101	86	101
8	12	11	160	127	159	11	3	12	113	7	113	5	11	12	276	312	54	3	4	13	1212	1205	8	1	12	13	126	196	57
9	12	11	0	56	1	12	3	12	149	190	148	6	11	12	1723	1681	16	4	4	13	2827	2750	11	2	12	13	494	539	17
1	13	11	1015	1005	13	0	4	12	1472	1472	11	7	11	12	144	83	143	5	4	13	626	629	15	3	12	13	0	14	1
2	13	11	677	688	16	1	4	12	712	695	7	8	11	12	130	143	129	6	4	13	367	389	12	4	12	13	221	237	40
3	13	11	158	246	63	2	4	12	713	678	8	9	11	12	177	53	136	7	4	13	921	922	11	5	12	13	78	12	78
4	13	11	0	41	1	3	4	12	187	205	13	0	12	12	2455	2383	21	8	4	13	1614	1570	12	6	12	13	116	51	115
5	13	11	658	666	22	4	4	12	1524	1507	8	1	12	12	124	113	76	9	4	13	659	668	16	7	12	13	0	105	1
6	13	11	390	401	47	5	4	12	185	159	16	2	12	12	140	16	64	10	4	13	0	44	1	8	12	13	89	69	89
7	13	11	286	307	58	6	4	12	260	267	16	3	12	12	63	84	63	11	4	13	590	564	29	9	12	13	220	48	125
8	13	11	0	139	1	7	4	12	87	117	86	4	12	12	2326	2269	18	12	4	13	1081	1017	27	1	13	13	456	482	20
0	14	11	691	708	23	8	4	12	1182	1154	12	5	12	12	229	167	47	1	5	13	726	741	10	2	13	13	638	643	17

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
1	14	11	931	935	16	9	4	12	130	98	71	6	12	12	228	247	44	2	5	13	2054	2026	10	3	13	13	319	360	30
2	14	11	526	502	20	10	4	12	200	149	77	7	12	12	220	200	76	3	5	13	1158	1179	8	4	13	13	0	83	1
3	14	11	840	813	17	11	4	12	237	223	57	8	12	12	1300	1237	28	4	5	13	665	655	10	5	13	13	194	145	60
4	14	11	760	731	23	12	4	12	382	472	44	9	12	12	203	243	103	5	5	13	839	828	9	6	13	13	712	777	24
5	14	11	784	814	21	1	5	12	389	366	11	1	13	12	294	292	35	6	5	13	1054	1039	10	7	13	13	301	266	49
6	14	11	0	151	1	2	5	12	3840	3782	15	2	13	12	1844	1775	16	7	5	13	91	84	91	8	13	13	0	96	1
7	14	11	877	876	22	3	5	12	280	304	12	3	13	12	369	405	23	8	5	13	53	14	52	0	14	13	1790	1770	25
8	14	11	888	844	44	4	5	12	0	125	1	4	13	12	224	301	69	9	5	13	93	182	93	1	14	13	419	428	24
1	15	11	1179	1151	18	5	5	12	366	388	12	5	13	12	214	67	81	10	5	13	509	601	24	2	14	13	241	214	58
2	15	11	1143	1131	21	6	5	12	1721	1670	11	6	13	12	1476	1413	19	11	5	13	227	186	79	3	14	13	758	745	22
3	15	11	926	913	19	7	5	12	489	531	14	7	13	12	91	54	91	0	6	13	210	179	25	4	14	13	1066	1020	32
4	15	11	56	135	56	8	5	12	16	132	15	8	13	12	170	58	169	1	6	13	0	28	1	5	14	13	411	443	35
5	15	11	789	806	35	9	5	12	281	298	35	0	14	12	1297	1266	22	2	6	13	371	352	12	6	14	13	256	103	57
6	15	11	724	742	25	10	5	12	1103	1117	15	1	14	12	71	84	71	3	6	13	332	374	10	7	14	13	637	674	30
7	15	11	719	751	31	11	5	12	102	156	102	2	14	12	64	151	64	4	6	13	547	562	9	1	15	13	902	898	20
0	16	11	946	952	45	12	5	12	270	168	72	3	14	12	289	291	33	5	6	13	65	99	64	2	15	13	1539	1474	19
1	16	11	985	969	31	0	6	12	3719	3696	23	4	14	12	849	816	24	6	6	13	239	260	24	3	15	13	756	779	24
2	16	11	135	103	135	1	6	12	710	695	9	5	14	12	167	14	94	7	6	13	69	77	69	4	15	13	36	31	36
3	16	11	908	890	23	2	6	12	523	525	9	6	14	12	257	187	57	8	6	13	0	167	1	5	15	13	444	446	38
4	16	11	674	671	41	3	6	12	790	775	9	7	14	12	0	98	1	9	6	13	103	124	102	6	15	13	967	989	26
5	16	11	651	688	33	4	6	12	2456	2388	14	1	15	12	23	9	23	10	6	13	284	242	44	0	16	13	1192	1151	32
6	16	11	125	51	124	5	6	12	142	138	40	2	15	12	137	169	136	11	6	13	0	9	1	1	16	13	398	403	36
1	17	11	489	510	31	6	6	12	83	95	82	3	15	12	98	129	97	1	7	13	815	816	13	2	16	13	0	39	1
2	17	11	546	532	31	7	6	12	231	228	28	4	15	12	178	33	119	2	7	13	1238	1231	12	3	16	13	536	526	31
3	17	11	557	533	40	8	6	12	2475	2323	14	5	15	12	176	188	176	3	7	13	131	174	40	4	16	13	881	885	68
4	17	11	40	182	40	9	6	12	14	113	13	6	15	12	0	12	1	4	7	13	351	347	16	5	16	13	388	389	59
0	18	11	369	151	98	10	6	12	181	240	56	0	16	12	465	508	46	5	7	13	472	466	14	1	17	13	239	342	78
1	18	11	47	112	46	11	6	12	0	120	1	1	16	12	147	106	113	6	7	13	854	873	12	2	17	13	549	570	43
0	0	12	6356	6223	53	1	7	12	0	65	1	2	16	12	240	106	63	7	7	13	365	396	18	3	17	13	316	353	73
1	0	12	157	105	16	2	7	12	3075	3026	15	3	16	12	0	70	1	8	7	13	382	372	21	1	0	14	3001	2891	17
2	0	12	626	576	11	3	7	12	351	370	17	4	16	12	745	780	30	9	7	13	413	437	23	2	0	14	724	710	9
3	0	12	405	416	10	4	7	12	145	116	46	5	16	12	178	63	139	10	7	13	380	358	56	3	0	14	1949	1939	12
4	0	12	4165	3969	18	5	7	12	470	463	11	1	17	12	158	60	158	11	7	13	0	153	1	4	0	14	965	963	9
5	0	12	412	425	10	6	7	12	2009	1938	14	2	17	12	1356	1364	26	0	8	13	2176	2157	18	5	0	14	2329	2282	14
6	0	12	154	148	30	7	7	12	394	393	25	3	17	12	153	238	152	1	8	13	1011	1007	9	6	0	14	157	140	38
7	0	12	655	643	15	8	7	12	208	202	40	4	17	12	0	36	1	2	8	13	64	14	64	7	0	14	1786	1733	15
8	0	12	2330	2209	19	9	7	12	263	306	37	1	1	13	598	591	7	3	8	13	772	783	12	8	0	14	705	750	16
9	0	12	334	324	28	10	7	12	1096	1063	18	2	1	13	1498	1470	8	4	8	13	1634	1614	13	9	0	14	856	859	20
10	0	12	431	470	47	11	7	12	277	258	61	3	1	13	963	945	6	5	8	13	665	698	13	10	0	14	105	182	104
11	0	12	251	317	71	0	8	12	1887	1882	15	4	1	13	330	339	6	6	8	13	81	119	80	11	0	14	1094	1082	29
12	0	12	1013	1002	29	1	8	12	151	178	33	5	1	13	667	693	6	7	8	13	663	676	28	12	0	14	230	66	230
1	1	12	1107	1069	6	2	8	12	1180	1186	9	6	1	13	1278	1263	10	8	8	13	1431	1377	17	1	1	14	2748	2694	11
2	1	12	3513	3426	13	3	8	12	221	197	18	7	1	13	571	593	10	9	8	13	258	288	51	2	1	14	549	562	10
3	1	12	494	498	6	4	8	12	1009	1012	12	8	1	13	168	143	38	10	8	13	178	136	87	3	1	14	1198	1198	6
4	1	12	443	422	9	5	8	12	389	386	15	9	1	13	220	268	44	11	8	13	545	556	57	4	1	14	852	866	6
5	1	12	278	283	9	6	8	12	50	64	49	10	1	13	783	778	27	1	9	13	1164	1176	12	5	1	14	1886	1821	10
6	1	12	3555	3384	13	7	8	12	40	50	40	11	1	13	253	285	57	2	9	13	2147	2112	16	6	1	14	476	502	9
7	1	12	230	217	17	8	8	12	1267	1228	13	12	1	13	298	250	60	3	9	13	719	705	12	7	1	14	1541	1507	10
8	1	12	436	452	13	9	8	12	166	88	88	0	2	13	3472	3326	22	4	9	13	168	115	43	8	1	14	54	126	54
9	1	12	257	266	28	10	8	12	213	31	52	1	2	13	1491	1467	9	5	9	13	1228	1210	14	9	1	14	1523	1447	15
10	1	12	1595	1499	24	11	8	12	203	113	84	2	2	13	163	132	10	6	9	13	1956	1896	16	10	1	14	313	382	32
11	1	12	186	105	72	1	9	12	130	180	23	3	2	13	1716	1671	8	7	9	13	752	711	23	11	1	14	869	788	21
12	1	14	0	137	1	6	9	14	278	320	37	3	3	15	2308	2320	11	3	11	15	921	917	16	0	4	16	998	1037	12
0	2	14	371	360	15	7	9	14	259	251	38	4	3	15	245	253	16	4	11	15	314	298	47	1	4	16	330	352	15
1	2	14	1504	1493	8	8	9	14	0	131	1	5	3	15	2279	2226	11	5	11	15	906	904	26	2	4	16	169	129	30
2	2	14	105	91	21	9	9	14	0	54	1	6	3	15	1230	1203	10	6	11	15	472	493	24	3	4	16	72	34	71
3	2	14	1120	1111	7	10	9	14	94	82	94	7	3	15	1320	1322	11	7	11	15	0	236	1	4	4	16	1559	1528	11
4	2	14	140	142	23	0	10	14	232	279	50	8	3	15	105	175	105	8	11	15	0	31	1	5	4	16	247	274	19
5	2	14	1160	1145	8	1	10	14	780	789	10	9	3	15	1062	1045	14	9	11	15	285	286	70	6	4	16	547	548	12
6	2	14	86	84	75	2	10	14	0	4	1	10	3	15	767	762	19	0	12	15	218	187	59	7	4	16	72	103	72
7	2	14	739	729	16	3	10	14	862	852	13	11	3	15	814	782	25	1	12	15	160	188	88	8	4	16	1103	1074	13
8	2	14	824	831	13	4	10	14	264	221	42	0	4	15	1185	1193	13	2	12	15	181	196	50	9	4	16	154	129	107
9	2	14	284	283	25	5	10	14	576	535	23	1	4	15	1866	1865	10	3	12	15	186	127	55	10	4	16	223	200	51
10	2	14	0	36	1	6	10	14	0	52	1	2	4	15	144	170	20	4	12	15	114	127	114	11	4	16	230	240	71
11	2	14	289	339	42	7	10	14	418	449	33	3	4	15	2118	2077	10	5	12	15	178	142	82	1	5	16	115	99	32
12	2	14	262	226	68	8	10	14	287	289	40	4	4	15	1656	1627	9	6	12	15	0	86	1	2	5	16	2908	2870	14
1	3	14	314	322	8	9	10	14	389	416	35	5	4	15	1014	1005	12	7	12	15	0	23	1	3	5	16	113	99	69
2	3	14	574	575	7	1	11	14	1371	1338	13	6	4	15	646	642	13	8	12	15	260	280	82	4	5	16	74	72	73
3	3	14	594	599	8	2	11	14	352	357	31	7	4	15	1142	1132	11	1	13	15	1139	1123	22	5	5	16	543	566	13
4	3	14	150	134	17	3	11	14	1589	1560	15	8	4	15	806	832	13	2	13	15	583	609	20	6	5	16	2179	2117	14
5	3	14	0	36	1	4	11	14	346	363	26	9	4	15	795	800	20	3	13	15	375	381	31	7	5	16	518	515	20
6	3	14	138	179	34	5	11	14	1498	1412	17	10	4	15	0	92	1	4	13	15	40	98	39	8	5	16	62	128	62
7	3	14	256	289	22	6	11	14	279	348	37	11	4	15	779	803	23	5	13	15	351	377	41	9	5	16	431	459	27
8	3	14	18	61	17	7	11	14	767	764	19	1	5	15	420	426	12	6	13	15	282	350	68	10	5	16	1036	1047	18
9	3	14	0	86	1	8	11	14	0	168	1	2	5	15	864	866	7	7	13	15	477	501	43	11	5	16	261	289	59
10	3	14	249	265	53	9	11	14	588	648	30	3	5	15	1483	1471	10	0	14	15	770	799	31	0	6	16	2962	2928	24
11	3	14	161	111	113	0	12	14	408	401	30	4	5	15	128	148	28	1	14	15	905	891	32	1	6	16	1010	983	9
0	4	14	1018	1005	19	1	12	14	1810	1757	23	5	5	15	800	822	9	2	14	15	219	114	61	2	6	16	271	286	19
1	4	14	884	898	11	2	12	14	0	23	1	6	5	15	588	594	12	3	14	15	820	814	24	3	6	16	577	562	14

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
2	4	14	314	315	16	3	12	14	1463	1440	18	7	5	15	636	625	17	4	14	15	693	707	26	4	6	16	2776	2697	16
3	4	14	1424	1429	8	4	12	14	464	450	28	8	5	15	209	222	43	5	14	15	813	849	24	5	6	16	441	435	15
4	4	14	389	389	12	5	12	14	1302	1246	32	9	5	15	385	440	23	6	14	15	0	76	1	6	6	16	0	38	1
5	4	14	636	631	14	6	12	14	151	202	151	10	5	15	367	392	31	1	15	15	1126	1063	23	7	6	16	88	133	87
6	4	14	189	216	23	7	12	14	847	842	44	11	5	15	474	448	34	2	15	15	1050	1034	31	8	6	16	2221	2106	23
7	4	14	1177	1152	10	8	12	14	316	283	47	0	6	15	341	381	22	3	15	15	700	696	29	9	6	16	110	98	109
8	4	14	0	81	1	1	13	14	1172	1134	16	1	6	15	182	190	23	4	15	15	242	263	127	10	6	16	0	112	1
9	4	14	657	662	20	2	13	14	262	276	38	2	6	15	225	229	21	5	15	15	629	642	35	1	7	16	286	261	17
10	4	14	0	109	1	3	13	14	994	957	22	3	6	15	64	17	63	0	16	15	572	601	42	2	7	16	2700	2617	15
11	4	14	691	691	26	4	13	14	227	164	56	4	6	15	270	279	18	1	16	15	592	619	35	3	7	16	241	242	26
1	5	14	2449	2432	12	5	13	14	1176	1144	20	5	6	15	200	176	23	2	16	15	286	179	57	4	7	16	463	470	16
2	5	14	803	791	5	6	13	14	0	90	1	6	6	15	21	93	21	3	16	15	688	686	42	5	7	16	264	276	24
3	5	14	1977	1969	10	7	13	14	772	747	41	7	6	15	263	259	28	4	16	15	567	632	38	6	7	16	1845	1801	15
4	5	14	544	538	8	8	13	14	0	31	1	8	6	15	181	89	181	1	17	15	335	296	59	7	7	16	485	468	27
5	5	14	1434	1415	10	0	14	14	173	340	172	9	6	15	208	260	60	0	0	16	4821	4680	38	8	7	16	118	101	117
6	5	14	669	679	14	1	14	14	808	767	19	10	6	15	0	197	1	1	0	16	71	68	71	9	7	16	308	298	34
7	5	14	1183	1146	12	2	14	14	0	16	1	11	6	15	221	13	82	2	0	16	875	852	16	10	7	16	841	876	24
8	5	14	59	49	59	3	14	14	645	639	21	1	7	15	846	839	8	3	0	16	352	360	27	0	8	16	1618	1555	17
9	5	14	1322	1286	15	4	14	14	96	90	95	2	7	15	596	614	16	4	0	16	2336	2328	15	1	8	16	437	430	30
10	5	14	234	211	50	5	14	14	359	440	38	3	7	15	628	650	11	5	0	16	925	911	12	2	8	16	195	228	32
11	5	14	311	398	51	6	14	14	0	69	1	4	7	15	290	270	19	6	0	16	129	33	47	3	8	16	148	200	52
0	6	14	793	769	16	7	14	14	327	346	57	5	7	15	616	616	14	7	0	16	707	741	25	4	8	16	809	787	13
1	6	14	2170	2149	11	1	15	14	0	20	1	6	7	15	887	859	20	8	0	16	2191	2086	22	5	8	16	501	509	22
2	6	14	361	362	15	2	15	14	89	27	89	7	7	15	712	733	15	9	0	16	698	672	21	6	8	16	168	185	63
3	6	14	2646	2613	14	3	15	14	198	209	155	8	7	15	0	83	1	10	0	16	335	388	51	7	8	16	151	28	151
4	6	14	666	669	11	4	15	14	0	53	1	9	7	15	751	747	19	11	0	16	214	313	213	8	8	16	1000	954	16
5	6	14	1450	1413	11	5	15	14	139	134	138	10	7	15	475	442	30	1	1	16	1089	1072	7	9	8	16	0	116	1
6	6	14	468	456	23	6	15	14	0	68	1	0	8	15	1888	1875	15	2	1	16	2689	2635	12	10	8	16	75	107	74
7	6	14	2027	1954	18	0	16	14	426	325	57	1	8	15	1618	1558	11	3	1	16	673	676	7	1	9	16	218	221	39
8	6	14	263	345	36	1	16	14	570	595	30	2	8	15	189	164	26	4	1	16	473	450	8	2	9	16	154	162	53
9	6	14	1048	1017	18	2	16	14	154	10	154	3	8	15	1773	1725	14	5	1	16	150	169	22	3	9	16	234	275	33
10	6	14	153	110	152	3	16	14	604	560	33	4	8	15	1356	1338	13	6	1	16	2423	2341	12	4	9	16	470	468	25
11	6	14	842	885	34	4	16	14	276	282	86	5	8	15	1280	1256	14	7	1	16	348	361	28	5	9	16	180	247	56
1	7	14	2623	2595	14	1	17	14	641	671	38	6	8	15	35	39	34	8	1	16	402	401	33	6	9	16	0	23	1
2	7	14	545	561	13	2	17	14	418	350	59	7	8	15	1248	1228	15	9	1	16	340	352	25	7	9	16	0	99	1
3	7	14	1428	1420	10	1	1	15	1331	1306	7	8	8	15	541	583	20	10	1	16	1415	1361	20	8	9	16	0	20	1
4	7	14	335	360	19	2	1	15	1150	1145	7	9	8	15	524	532	25	11	1	16	0	34	1	9	9	16	0	9	1
5	7	14	1466	1461	18	3	1	15	1076	1082	8	10	8	15	0	131	1	0	2	16	2813	2741	18	0	10	16	1527	1506	21
6	7	14	558	566	23	4	1	15	292	271	11	1	9	15	1835	1761	13	1	2	16	0	95	1	1	10	16	160	154	54
7	7	14	1458	1389	18	5	1	15	1226	1207	9	2	9	15	1486	1456	16	2	2	16	431	410	14	2	10	16	323	358	29
8	7	14	234	260	34	6	1	15	405	420	15	3	9	15	1751	1683	13	3	2	16	554	547	7	3	10	16	304	324	26
9	7	14	1184	1179	15	7	1	15	226	262	32	4	9	15	226	253	39	4	2	16	1203	1190	8	4	10	16	1491	1464	16
10	7	14	271	347	62	8	1	15	393	364	16	5	9	15	1499	1477	15	5	2	16	0	36	1	5	10	16	0	57	1
11	7	14	402	449	41	9	1	15	575	626	33	6	9	15	1132	1124	15	6	2	16	532	547	15	6	10	16	0	105	1
0	8	14	1157	1146	14	10	1	15	318	355	33	7	9	15	904	905	16	7	2	16	584	597	12	7	10	16	217	249	56
1	8	14	965	952	10	11	1	15	409	423	32	8	9	15	0	47	1	8	2	16	928	940	14	8	10	16	468	504	36
2	8	14	139	105	48	0	2	15	1573	1557	18	9	9	15	731	793	21	9	2	16	91	217	91	9	10	16	154	73	153
3	8	14	1224	1214	12	1	2	15	1923	1902	11	10	9	15	562	608	35	10	2	16	204	248	99	1	11	16	516	502	20
4	8	14	305	326	31	2	2	15	104	155	28	0	10	15	1415	1385	20	11	2	16	0	44	1	2	11	16	2176	2096	17
5	8	14	1024	1006	13	3	2	15	1653	1627	7	1	10	15	1553	1498	14	1	3	16	180	178	24	3	11	16	584	574	18
6	8	14	110	109	109	4	2	15	1445	1446	9	2	10	15	245	261	34	2	3	16	99	75	27	4	11	16	87	106	86
7	8	14	1094	1056	14	5	2	15	1708	1695	10	3	10	15	1024	996	13	3	3	16	212	213	20	5	11	16	229	268	59
8	8	14	0	24	1	6	2	15	299	312	15	4	10	15	1018	988	14	4	3	16	239	250	14	6	11	16	1448	1409	18
9	8	14	561	572	20	7	2	15	1310	1312	11	5	10	15	1376	1315	23	5	3	16	682	670	9	7	11	16	130	42	130
10	8	14	93	98	93	8	2	15	784	786	12	6	10	15	93	15	93	6	3	16	165	184	43	8	11	16	153	61	152
1	9	14	1052	1065	12	9	2	15	1221	1173	20	7	10	15	879	914	17	7	3	16	172	157	55	0	12	16	2306	2187	32
2	9	14	205	229	48	10	2	15	170	161	117	8	10	15	582	587	31	8	3	16	114	170	113	1	12	16	194	57	54
3	9	14	347	362	19	11	2	15	980	958	22	9	10	15	658	679	24	9	3	16	190	115	71	2	12	16	151	151	75
4	9	14	124	50	53	1	3	15	1782	1761	9	1	11	15	570	581	20	10	3	16	0	60	1	3	12	16	216	203	46
5	9	14	489	484	20	2	3	15	1964	1952	9	2	11	15	587	578	18	11	3	16	133	130	132	4	12	16	1959	1870	20
5	12	16	242	256	64	4	6	17	222	246	30	4	0	18	497	514	13	3	8	18	451	496	30	8	3	19	38	15	38
6	12	16	89	68	88	5	6	17	0	79	1	5	0	18	1834	1786	15	4	8	18	0	65	1	9	3	19	858	875	19
7	12	16	262	355	56	6	6	17	139	23	54	6	0	18	769	736	16	5	8	18	667	680	24	10	3	19	607	644	25
8	12	16	1062	1095	29	7	6	17	112	93	112	7	0	18	1599	1502	20	6	8	18	171	209	60	0	4	19	900	924	15
1	13	16	122	159	122	8	6	17	131	210	130	8	0	18	464	469	38	7	8	18	743	724	19	1	4	19	1373	1363	10
2	13	16	1544	1499	18	9	6	17	0	61	1	9	0	18	723	711	25	8	8	18	182	27	85	2	4	19	106	78	87
3	13	16	343	299	34	10	6	17	254	144	70	10	0	18	0	134	1	9	8	18	421	381	50	3	4	19	1780	1709	11
4	13	16	176	196	175	1	7	17	711	710	14	11	0	18	850	904	36	1	9	18	262	211	29	4	4	19	1209	1183	10
5	13	16	0	175	1	2	7	17	1357	1341	12	1	1	18	2219	2156	11	2	9	18	538	545	18	5	4	19	1045	1036	12
6	13	16	1131	1148	21	3	7	17	328	341	27	2	1	18	973	960	8	3	9	18	208	165	47	6	4	19	264	278	25
7	13	16	186	145	185	4	7	17	263	305	26	3	1	18	875	887	8	4	9	18	137	160	86	7	4	19	933	957	14
0	14	16	839	816	31	5	7	17	704	715	18	4	1	18	407	434	10	5	9	18	559	559	24	8	4	19	512	570	19
1	14	16	151	27	151	6	7	17	1035	1036	14	5	1	18	1344	1310	9	6	9	18	47	75	47	9	4	19	839	838	21
2	14	16	103	82	102	7	7	17	303	352	29	6	1	18	354	362	22	7	9	18	143	96	142	10	4	19	0	17	1
3	14	16	115	202	115	8	7	17	197	261	53	7	1	18	1385	1321	13	8	9	18	0	9	1	1	5	19	101	121	53
4	14	16	657	700	28	9	7	17	231	285	73	8	1	18	169	173	70	9	9	18	174	52	173	2	5	19	383	403	16
5	14	16	0	17	1	10	7	17	274	362	52	9	1	18	1448	1383	18	0	10	18	0	68	1	3	5	19	921	921	12
6	14	16	0	120	1	0	8	17	2018	1972	22	10	1	18	229	210	53	1	10	18	1090	1097	17	4	5	19	139	83	53
1	15	16	252	146	103	1	8	17	988	984	18	11	1	18	590	573	32	2	10	18	13	113	13	5	5	19	1084	1100	12

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
2	15	16	214	191	70	2	8	17	68	13	67	0	2	18	167	89	36	3	10	18	910	884	24	6	5	19	370	386	21
3	15	16	0	13	1	3	8	17	782	790	14	1	2	18	810	790	10	4	10	18	395	415	27	7	5	19	535	558	19
4	15	16	99	164	98	4	8	17	1799	1753	16	2	2	18	350	342	13	5	10	18	539	566	25	8	5	19	148	68	115
5	15	16	147	220	147	5	8	17	1059	1054	14	3	2	18	1147	1139	10	6	10	18	48	216	47	9	5	19	197	294	75
0	16	16	623	597	51	6	8	17	175	170	59	4	2	18	493	510	10	7	10	18	484	467	27	10	5	19	406	403	37
1	16	16	248	245	113	7	8	17	383	410	26	5	2	18	989	979	9	8	10	18	135	234	135	0	6	19	179	228	36
2	16	16	101	96	100	8	8	17	1238	1214	18	6	2	18	0	6	1	1	11	18	1195	1198	18	1	6	19	142	166	42
3	16	16	190	151	190	9	8	17	380	401	33	7	2	18	761	795	23	2	11	18	518	512	27	2	6	19	44	92	44
1	1	17	232	254	11	10	8	17	168	95	168	8	2	18	545	555	19	3	11	18	1349	1323	16	3	6	19	97	81	97
2	1	17	697	690	10	1	9	17	807	827	12	9	2	18	311	333	37	4	11	18	185	179	80	4	6	19	0	51	1
3	1	17	630	639	9	2	9	17	2065	2006	17	10	2	18	73	162	72	5	11	18	1262	1252	20	5	6	19	25	168	25
4	1	17	216	205	23	3	9	17	869	916	22	11	2	18	391	407	46	6	11	18	308	254	46	6	6	19	0	93	1
5	1	17	243	240	15	4	9	17	216	278	38	1	3	18	409	379	11	7	11	18	484	518	30	7	6	19	0	126	1
6	1	17	1076	1052	10	5	9	17	882	918	17	2	3	18	547	547	13	8	11	18	0	51	1	8	6	19	184	98	88
7	1	17	243	264	24	6	9	17	1639	1584	25	3	3	18	307	318	13	0	12	18	390	437	49	9	6	19	0	37	1
8	1	17	221	300	30	7	9	17	547	576	22	4	3	18	149	122	31	1	12	18	1461	1434	21	10	6	19	77	76	76
9	1	17	445	437	28	8	9	17	169	142	91	5	3	18	0	95	1	2	12	18	175	149	156	1	7	19	954	971	15
10	1	17	1011	959	18	9	9	17	439	497	39	6	3	18	84	132	83	3	12	18	1412	1381	19	2	7	19	0	168	1
11	1	17	295	281	58	0	10	17	1789	1705	24	7	3	18	318	306	20	4	12	18	478	469	37	3	7	19	522	503	21
0	2	17	2331	2301	17	1	10	17	1119	1083	21	8	3	18	178	123	45	5	12	18	960	964	22	4	7	19	0	95	1
1	2	17	902	896	8	2	10	17	221	187	39	9	3	18	141	117	91	6	12	18	261	298	56	5	7	19	560	614	18
2	2	17	123	60	32	3	10	17	606	617	17	10	3	18	190	262	75	7	12	18	1005	1003	31	6	7	19	576	633	17
3	2	17	1170	1155	8	4	10	17	1556	1514	17	11	3	18	178	28	177	1	13	18	1059	1041	22	7	7	19	905	918	18
4	2	17	2384	2326	12	5	10	17	332	396	66	0	4	18	727	711	25	2	13	18	469	462	47	8	7	19	182	93	145
5	2	17	539	549	12	6	10	17	231	217	65	1	4	18	390	402	16	3	13	18	872	889	21	9	7	19	512	591	28
6	2	17	649	667	13	7	10	17	398	505	36	2	4	18	144	189	25	4	13	18	0	90	1	0	8	19	1190	1189	22
7	2	17	753	750	17	8	10	17	888	865	25	3	4	18	945	934	9	5	13	18	1120	1118	35	1	8	19	1134	1133	13
8	2	17	1291	1267	19	9	10	17	212	158	121	4	4	18	296	303	19	6	13	18	78	180	78	2	8	19	0	22	1
9	2	17	407	454	32	1	11	17	30	96	29	5	4	18	531	556	12	0	14	18	107	61	107	3	8	19	1518	1506	16
10	2	17	0	163	1	2	11	17	572	615	23	6	4	18	131	123	52	1	14	18	692	632	37	4	8	19	912	936	20
11	2	17	322	388	59	3	11	17	279	318	31	7	4	18	827	894	24	2	14	18	239	11	65	5	8	19	1080	1092	15
1	3	17	1022	1015	9	4	11	17	167	168	100	8	4	18	132	35	132	3	14	18	649	643	29	6	8	19	0	131	1
2	3	17	2927	2876	14	5	11	17	574	554	26	9	4	18	580	623	29	4	14	18	179	153	145	7	8	19	1111	1128	18
3	3	17	1174	1184	9	6	11	17	579	593	25	10	4	18	258	237	65	5	14	18	546	568	57	8	8	19	381	483	36
4	3	17	158	120	24	7	11	17	222	228	93	1	5	18	1595	1603	12	1	15	18	140	112	140	9	8	19	530	579	34
5	3	17	1146	1129	9	8	11	17	0	114	1	2	5	18	338	337	15	2	15	18	144	103	143	1	9	19	1543	1538	16
6	3	17	2051	1991	12	0	12	17	680	695	31	3	5	18	1660	1650	12	3	15	18	173	29	173	2	9	19	969	986	16
7	3	17	703	729	21	1	12	17	202	18	55	4	5	18	530	516	12	4	15	18	0	3	1	3	9	19	1243	1229	16
8	3	17	47	24	47	2	12	17	310	222	65	5	5	18	1280	1249	12	0	16	18	99	246	99	4	9	19	0	115	1
9	3	17	448	444	26	3	12	17	0	31	1	6	5	18	551	570	15	1	16	18	310	426	68	5	9	19	1216	1206	18
10	3	17	1306	1252	18	4	12	17	0	141	1	7	5	18	1281	1249	15	1	1	19	959	923	11	6	9	19	876	897	17
11	3	17	343	392	51	5	12	17	196	151	79	8	5	18	101	146	101	2	1	19	879	874	9	7	9	19	824	796	19
0	4	17	1534	1483	23	6	12	17	127	11	126	9	5	18	879	909	21	3	1	19	1102	1094	10	8	9	19	179	153	179
1	4	17	867	871	9	7	12	17	0	148	1	10	5	18	365	378	39	4	1	19	152	175	25	9	9	19	878	923	26
2	4	17	533	538	8	1	13	17	548	559	29	0	6	18	640	613	18	5	1	19	774	752	12	0	10	19	830	849	25
3	4	17	821	820	11	2	13	17	850	840	21	1	6	18	1614	1623	12	6	1	19	492	500	15	1	10	19	1163	1160	17
4	4	17	2449	2392	13	3	13	17	404	411	27	2	6	18	295	311	21	7	1	19	219	240	37	2	10	19	393	368	30
5	4	17	842	839	12	4	13	17	0	156	1	3	6	18	1708	1707	17	8	1	19	131	89	130	3	10	19	855	863	21
6	4	17	128	102	57	5	13	17	192	47	119	4	6	18	444	451	17	9	1	19	449	459	25	4	10	19	854	851	19
7	4	17	647	624	20	6	13	17	684	719	24	5	6	18	1554	1572	13	10	1	19	205	300	79	5	10	19	909	903	25
8	4	17	1432	1380	13	7	13	17	348	319	63	6	6	18	449	464	23	0	2	19	792	817	13	6	10	19	140	71	140
9	4	17	708	690	25	0	14	17	1648	1625	34	7	6	18	1410	1362	15	1	2	19	1680	1633	12	7	10	19	892	905	22
10	4	17	141	59	141	1	14	17	404	424	33	8	6	18	489	540	23	2	2	19	234	253	16	8	10	19	460	539	37
11	4	17	411	448	39	2	14	17	329	254	45	9	6	18	1004	990	17	3	2	19	1059	1047	9	1	11	19	553	565	24
1	5	17	692	697	11	3	14	17	701	727	41	10	6	18	0	171	1	4	2	19	1058	1061	9	2	11	19	590	547	27
2	5	17	1569	1491	9	4	14	17	1074	1059	26	1	7	18	1738	1740	13	5	2	19	1253	1243	10	3	11	19	719	749	22
3	5	17	829	817	10	5	14	17	431	444	57	2	7	18	269	311	25	6	2	19	0	10	1	4	11	19	0	106	1
4	5	17	213	232	21	6	14	17	0	22	1	3	7	18	1320	1324	14	7	2	19	983	960	25	5	11	19	488	541	43
5	5	17	492	499	17	1	15	17	775	777	28	4	7	18	235	171	35	8	2	19	880	856	15	6	11	19	537	558	27
6	5	17	899	879	11	2	15	17	1237	1224	24	5	7	18	863	874	18	9	2	19	797	783	25	7	11	19	235	244	65
7	5	17	32	102	31	3	15	17	542	504	38	6	7	18	665	688	16	10	2	19	0	19	1	0	12	19	238	42	101
8	5	17	206	121	47	4	15	17	193	166	192	7	7	18	1214	1188	16	1	3	19	1233	1206	9	1	12	19	119	38	119
9	5	17	206	205	51	0	16	17	903	936	45	8	7	18	0	61	1	2	3	19	1377	1382	9	2	12	19	248	211	46
10	5	17	562	622	25	1	16	17	307	343	102	9	7	18	909	882	20	3	3	19	2059	2010	12	3	12	19	0	87	1
0	6	17	139	115	95	2	16	17	0	124	1	10	7	18	79	258	79	4	3	19	139	111	35	4	12	19	99	230	98
1	6	17	100	122	53	1	0	18	2748	2682	17	0	8	18	624	588	24	5	3	19	1727	1676	12	5	12	19	0	6	1
2	6	17	462	473	13	2	0	18	538	552	17	1	8	18	716	715	13	6	3	19	950	953	12	6	12	19	0	62	1
3	6	17	194	141	33	3	0	18	1527	1490	14	2	8	18	0	2	1	7	3	19	986	961	17	7	12	19	0	186	1
1	13	19	863	844	24	9	6	20	82	90	81	4	3	21	374	379	17	3	13	21	225	264	157	4	8	22	172	165	80
2	13	19	648	636	28	1	7	20	470	487	16	5	3	21	745	742	21	4	13	21	0	29	1	5	8	22	549	541	22
3	13	19	303	345	53	2	7	20	1868	1864	17	6	3	21	1932	1842	17	5	13	21	107	43	107	6	8	22	230	121	59
4	13	19	0	69	1	3	7	20	225	51	37	7	3	21	488	523	22	0	14	21	1340	1325	62	7	8	22	583	640	42
5	13	19	399	452	50	4	7	20	138	188	79	8	3	21	0	26	1	1	14	21	375	366	48	8	8	22	142	101	141
6	13	19	82	159	82	5	7	20	513	543	26	9	3	21	417	409	58	2	14	21	345	198	58	1	9	22	253	280	45
0	14	19	523	546	58	6	7	20	1694	1648	21	10	3	21	1102	1134	27	3	14	21	283	349	82	2	9	22	315	329	36
1	14	19	897	885	27	7	7	20	354	417	40	0	4	21	1450	1400	17	1	0	22	2214	2115	18	3	9	22	0	174	1
2	14	19	228	222	75	8	7	20	129	133	129	1	4	21	412	407	14	2	0	22	664	660	22	4	9	22	0	25	1
3	14	19	763	782	37	9	7	20	362	371	83	2	4	21	333	332	18	3	0	22	1900	1817	25	5	9	22	324	315	37
4	14	19	435	428	46	0	8	20	1511	1471	24	3	4	21	690	704	15	4	0	22	693	678	22	6	9	22	0	34	1

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
5	14	19	723	749	42	1	8	20	344	348	26	4	4	21	2175	2060	14	5	0	22	1759	1699	22	7	9	22	152	215	152
1	15	19	1037	979	26	2	8	20	345	354	25	5	4	21	751	748	18	6	0	22	334	373	41	0	10	22	0	175	1
2	15	19	582	607	34	3	8	20	0	27	1	6	4	21	244	299	36	7	0	22	1517	1476	37	1	10	22	558	600	25
3	15	19	702	715	40	4	8	20	605	640	21	7	4	21	601	618	22	8	0	22	658	696	32	2	10	22	0	51	1
0	0	20	4151	3978	38	5	8	20	270	259	64	8	4	21	1144	1114	23	9	0	22	739	747	33	3	10	22	701	646	28
1	0	20	37	90	37	6	8	20	179	92	69	9	4	21	613	601	96	10	0	22	70	36	70	4	10	22	273	367	69
2	0	20	529	533	15	7	8	20	213	75	76	10	4	21	0	43	1	1	1	22	2027	1949	12	5	10	22	426	397	32
3	0	20	86	112	85	8	8	20	925	939	23	1	5	21	262	259	23	2	1	22	827	802	11	6	10	22	281	214	54
4	0	20	2171	2099	25	9	8	20	0	103	1	2	5	21	905	922	17	3	1	22	1397	1359	13	7	10	22	381	434	45
5	0	20	449	459	24	1	9	20	251	197	37	3	5	21	361	387	19	4	1	22	270	253	27	1	11	22	788	779	31
6	0	20	638	676	24	2	9	20	273	243	38	4	5	21	370	347	18	5	1	22	1238	1185	18	2	11	22	575	604	27
7	0	20	486	531	36	3	9	20	358	403	26	5	5	21	718	741	15	6	1	22	481	484	21	3	11	22	946	965	24
8	0	20	1643	1579	29	4	9	20	296	339	38	6	5	21	622	634	19	7	1	22	1205	1191	20	4	11	22	0	180	1
9	0	20	506	510	74	5	9	20	94	97	93	7	5	21	198	203	76	8	1	22	247	111	75	5	11	22	991	1052	24
10	0	20	153	221	152	6	9	20	0	102	1	8	5	21	58	27	58	9	1	22	1078	1084	37	6	11	22	345	329	50
1	1	20	839	815	10	7	9	20	150	185	149	9	5	21	123	200	122	10	1	22	260	196	93	0	12	22	555	521	48
2	1	20	2209	2117	12	8	9	20	0	85	1	0	6	21	711	724	21	0	2	22	166	52	57	1	12	22	1240	1196	26
3	1	20	647	633	12	0	10	20	687	654	33	1	6	21	112	49	64	1	2	22	1135	1099	10	2	12	22	77	111	77
4	1	20	205	272	28	1	10	20	0	82	1	2	6	21	165	187	47	2	2	22	329	329	22	3	12	22	1033	1064	26
5	1	20	0	61	1	2	10	20	138	222	138	3	6	21	0	59	1	3	2	22	763	762	12	4	12	22	627	663	43
6	1	20	1989	1905	20	3	10	20	438	392	33	4	6	21	0	27	1	4	2	22	146	160	64	5	12	22	796	824	46
7	1	20	0	139	1	4	10	20	1125	1109	27	5	6	21	0	45	1	5	2	22	1027	1008	16	1	13	22	842	850	29
8	1	20	189	234	59	5	10	20	0	131	1	6	6	21	292	255	35	6	2	22	103	18	102	2	13	22	522	502	36
9	1	20	217	103	65	6	10	20	246	261	49	7	6	21	162	84	80	7	2	22	662	644	23	3	13	22	835	863	43
10	1	20	1033	1037	23	7	10	20	320	332	45	8	6	21	222	250	61	8	2	22	491	498	40	4	13	22	167	31	167
0	2	20	898	880	19	8	10	20	482	505	39	9	6	21	195	180	195	9	2	22	330	344	43	0	14	22	0	56	1
1	2	20	59	54	59	1	11	20	463	497	31	1	7	21	532	513	22	1	3	22	0	11	1	1	14	22	312	429	57
2	2	20	395	382	18	2	11	20	1554	1523	20	2	7	21	1199	1202	16	2	3	22	232	229	26	2	14	22	0	22	1
3	2	20	502	514	11	3	11	20	595	528	36	3	7	21	0	83	1	3	3	22	361	374	20	1	1	23	923	906	11
4	2	20	994	957	10	4	11	20	0	77	1	4	7	21	253	193	38	4	3	22	215	196	37	2	1	23	638	630	14
5	2	20	103	103	102	5	11	20	347	345	41	5	7	21	520	529	21	5	3	22	164	230	53	3	1	23	866	845	13
6	2	20	194	184	42	6	11	20	1052	1098	20	6	7	21	985	980	19	6	3	22	304	327	45	4	1	23	77	98	76
7	2	20	179	283	59	7	11	20	154	64	153	7	7	21	215	215	62	7	3	22	0	116	1	5	1	23	872	888	14
8	2	20	909	919	17	0	12	20	1724	1624	35	8	7	21	79	212	79	8	3	22	164	162	100	6	1	23	238	265	50
9	2	20	107	189	106	1	12	20	296	327	46	9	7	21	203	207	143	9	3	22	170	105	104	7	1	23	404	390	32
10	2	20	167	96	166	2	12	20	117	209	116	0	8	21	1701	1574	28	0	4	22	985	922	16	8	1	23	0	134	1
1	3	20	227	259	18	3	12	20	319	337	42	1	8	21	550	578	22	1	4	22	1178	1154	11	9	1	23	264	365	65
2	3	20	749	765	12	4	12	20	1594	1555	27	2	8	21	412	433	21	2	4	22	110	72	67	0	2	23	661	666	22
3	3	20	0	61	1	5	12	20	302	327	52	3	8	21	368	409	25	3	4	22	887	873	16	1	2	23	1417	1361	11
4	3	20	169	172	32	6	12	20	138	73	137	4	8	21	1635	1595	22	4	4	22	602	624	15	2	2	23	263	284	23
5	3	20	375	404	18	1	13	20	345	363	46	5	8	21	613	595	35	5	4	22	663	637	16	3	2	23	1520	1448	13
6	3	20	217	208	31	2	13	20	1228	1238	28	6	8	21	30	110	29	6	4	22	131	12	131	4	2	23	862	830	14
7	3	20	58	100	57	3	13	20	458	428	36	7	8	21	379	385	35	7	4	22	506	520	27	5	2	23	1023	983	25
8	3	20	0	30	1	4	13	20	207	75	102	8	8	21	1285	1275	23	8	4	22	0	53	1	6	2	23	96	72	96
9	3	20	157	89	90	5	13	20	0	191	1	1	9	21	531	527	23	9	4	22	423	378	35	7	2	23	1025	1018	27
10	3	20	0	14	1	0	14	20	756	719	40	2	9	21	1958	1882	24	1	5	22	1729	1691	13	8	2	23	619	632	25
0	4	20	1644	1646	16	1	14	20	186	22	144	3	9	21	469	481	23	2	5	22	688	692	15	9	2	23	719	679	33
1	4	20	814	808	11	2	14	20	0	14	1	4	9	21	125	21	124	3	5	22	1213	1203	13	1	3	23	1433	1386	12
2	4	20	114	162	74	3	14	20	157	267	157	5	9	21	651	639	21	4	5	22	554	529	14	2	3	23	1110	1094	12
3	4	20	167	149	34	4	14	20	602	626	53	6	9	21	1547	1503	26	5	5	22	1247	1246	15	3	3	23	1577	1521	13
4	4	20	1345	1323	11	1	15	20	0	81	1	7	9	21	511	533	30	6	5	22	457	492	23	4	3	23	91	72	90
5	4	20	544	563	17	2	15	20	239	13	120	8	9	21	316	246	51	7	5	22	1072	1026	20	5	3	23	1817	1745	16
6	4	20	213	167	33	1	1	21	240	269	22	0	10	21	1813	1769	35	8	5	22	112	150	111	6	3	23	875	873	18
7	4	20	142	92	142	2	1	21	1827	1804	12	1	10	21	594	637	22	9	5	22	732	782	36	7	3	23	783	759	24
8	4	20	925	916	18	3	1	21	568	585	13	2	10	21	115	123	115	0	6	22	856	807	22	8	3	23	0	36	1
9	4	20	0	53	1	4	1	21	589	587	13	3	10	21	552	542	27	1	6	22	1250	1204	14	9	3	23	869	865	25
10	4	20	192	109	127	5	1	21	335	344	19	4	10	21	1338	1341	22	2	6	22	128	123	85	0	4	23	919	893	37
1	5	20	378	377	17	6	1	21	796	815	16	5	10	21	414	421	33	3	6	22	1671	1646	15	1	4	23	1535	1479	12
2	5	20	2506	2472	15	7	1	21	292	372	32	6	10	21	279	232	47	4	6	22	409	421	23	2	4	23	0	72	1
3	5	20	225	271	25	8	1	21	0	47	1	7	10	21	261	364	97	5	6	22	1209	1159	15	3	4	23	1626	1563	15
4	5	20	0	82	1	9	1	21	244	346	65	1	11	21	0	129	1	6	6	22	109	19	109	4	4	23	1102	1103	14
5	5	20	616	612	14	10	1	21	576	588	37	2	11	21	728	783	22	7	6	22	1310	1311	19	5	4	23	828	811	17
6	5	20	1779	1718	16	0	2	21	2635	2541	27	3	11	21	278	303	50	8	6	22	312	315	66	6	4	23	308	272	34
7	5	20	655	634	19	1	2	21	1217	1218	10	4	11	21	135	84	135	9	6	22	844	845	30	7	4	23	887	906	19
8	5	20	0	36	1	2	2	21	305	306	16	5	11	21	260	246	58	1	7	22	1688	1652	17	8	4	23	532	553	52
9	5	20	406	429	50	3	2	21	932	907	14	6	11	21	558	550	30	2	7	22	480	445	26	9	4	23	670	648	31
10	5	20	921	952	27	4	2	21	2333	2266	16	7	11	21	212	328	212	3	7	22	967	956	25	1	5	23	575	559	15
0	6	20	2521	2452	24	5	2	21	590	619	17	0	12	21	387	402	75	4	7	22	341	347	26	2	5	23	615	644	16
1	6	20	920	877	13	6	2	21	230	225	45	1	12	21	274	262	72	5	7	22	924	931	17	3	5	23	968	997	14
2	6	20	573	613	14	7	2	21	579	567	43	2	12	21	149	77	148	6	7	22	474	463	25	4	5	23	195	195	54
3	6	20	842	831	13	8	2	21	1059	1016	23	3	12	21	169	123	144	7	7	22	981	952	21	5	5	23	847	840	16
4	6	20	2064	2038	15	9	2	21	277	320	44	4	12	21	240	180	76	8	7	22	0	120	1	6	5	23	453	490	24
5	6	20	348	353	24	10	2	21	0	27	1	5	12	21	136	166	135	0	8	22	825	873	25	7	5	23	345	315	41
6	6	20	189	173	47	1	3	21	932	920	10	6	12	21	49	17	49	1	8	22	757	754	24	8	5	23	0	97	1
7	6	20	395	384	46	2	3	21	2462	2363	13	1	13	21	170	235	170	2	8	22	92	11	91	9	5	23	404	374	49
8	6	20	1812	1746	20	3	3	21	1332	1339	11	2	13	21	614	651	28	3	8	22	622	622	19	0	6	23	0	12	1
1	6	23	170	195	92	8	3	24	76	52	76	4	3	25	0	176	1	8	2	26	484	454	40	7	4	27	691	717	30
2	6	23	150	98	83	9	3	24	0	109	1	5	3	25	719	700	19	1	3	26	222	236	34	1	5	27	357	364	32
3	6	23	128	50	90	0	4	24	575	578	27	6	3	25	1531	1448	23	2	3	26	210	217	47	2	5	27	290	345	51

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
4	6	23	213	242	41	1	4	24	368	359	19	7	3	25	298	213	84	3	3	26	93	113	93	3	5	27	907	898	18
5	6	23	0	40	1	2	4	24	159	101	54	8	3	25	182	121	182	4	3	26	104	56	104	4	5	27	137	43	136
6	6	23	0	108	1	3	4	24	162	199	74	0	4	25	1827	1742	32	5	3	26	245	268	50	5	5	27	644	714	24
7	6	23	0	137	1	4	4	24	807	805	19	1	4	25	449	444	22	6	3	26	232	107	91	6	5	27	236	224	79
8	6	23	256	99	92	5	4	24	348	342	26	2	4	25	315	314	25	7	3	26	143	42	142	0	6	27	0	94	1
1	7	23	686	685	25	6	4	24	139	111	138	3	4	25	422	456	23	8	3	26	0	45	1	1	6	27	0	45	1
2	7	23	100	218	100	7	4	24	187	48	99	4	4	25	1962	1898	25	0	4	26	661	660	24	2	6	27	172	25	79
3	7	23	465	461	20	8	4	24	680	665	32	5	4	25	417	447	46	1	4	26	590	633	17	3	6	27	0	7	1
4	7	23	41	113	41	1	5	24	205	253	38	6	4	25	97	172	97	2	4	26	127	150	102	4	6	27	0	18	1
5	7	23	355	410	40	2	5	24	1590	1564	14	7	4	25	405	383	33	3	4	26	861	862	16	5	6	27	137	13	136
6	7	23	407	417	33	3	5	24	185	228	42	8	4	25	1001	980	27	4	4	26	362	388	34	6	6	27	172	91	171
7	7	23	397	436	41	4	5	24	157	32	87	1	5	25	496	520	24	5	4	26	316	397	39	1	7	27	872	847	21
8	7	23	110	78	110	5	5	24	534	513	19	2	5	25	1284	1273	18	6	4	26	0	10	1	2	7	27	0	133	1
0	8	23	1000	1006	30	6	5	24	1348	1323	19	3	5	25	569	580	21	7	4	26	756	720	27	3	7	27	432	460	36
1	8	23	1059	1058	19	7	5	24	377	335	47	4	5	25	100	71	100	1	5	26	1384	1339	16	4	7	27	0	40	1
2	8	23	28	38	27	8	5	24	176	102	174	5	5	25	119	229	119	2	5	26	608	642	20	5	7	27	327	359	77
3	8	23	1036	1046	18	0	6	24	2300	2218	27	6	5	25	703	743	27	3	5	26	1064	1059	25	6	7	27	334	298	62
4	8	23	650	672	31	1	6	24	865	833	21	7	5	25	153	84	153	4	5	26	301	290	70	0	8	27	729	704	35
5	8	23	789	821	21	2	6	24	145	132	67	8	5	25	146	160	146	5	5	26	1110	1103	19	1	8	27	819	858	24
6	8	23	190	13	91	3	6	24	488	509	19	0	6	25	158	17	157	6	5	26	725	719	24	2	8	27	0	62	1
7	8	23	864	887	23	4	6	24	1773	1710	17	1	6	25	59	126	58	7	5	26	533	579	50	3	8	27	949	962	24
1	9	23	1236	1254	20	5	6	24	250	297	56	2	6	25	253	277	53	0	6	26	1031	1056	24	4	8	27	396	489	45
2	9	23	715	706	32	6	6	24	0	65	1	3	6	25	0	11	1	1	6	26	1531	1478	26	5	8	27	585	679	41
3	9	23	1235	1192	19	7	6	24	290	250	86	4	6	25	133	200	133	2	6	26	134	168	134	1	9	27	1119	1112	25
4	9	23	247	226	50	8	6	24	1267	1271	27	5	6	25	0	15	1	3	6	26	1224	1207	38	2	9	27	685	672	28
5	9	23	1020	1036	24	1	7	24	450	451	28	6	6	25	0	71	1	4	6	26	734	758	21	3	9	27	929	927	44
6	9	23	658	657	27	2	7	24	1795	1779	20	7	6	25	101	26	101	5	6	26	1102	1062	22	4	9	27	0	64	1
7	9	23	610	610	46	3	7	24	109	202	109	1	7	25	375	386	30	6	6	26	271	266	54	0	10	27	450	464	64
0	10	23	590	665	45	4	7	24	139	184	102	2	7	25	981	985	20	7	6	26	974	998	27	1	10	27	847	825	29
1	10	23	900	923	24	5	7	24	443	426	30	3	7	25	124	152	123	1	7	26	1440	1423	22	2	10	27	148	107	147
2	10	23	290	116	45	6	7	24	1360	1319	22	4	7	25	0	66	1	2	7	26	560	618	28	3	10	27	879	891	34
3	10	23	879	899	27	7	7	24	385	401	59	5	7	25	288	332	45	3	7	26	1012	1018	26	1	11	27	335	382	73
4	10	23	598	590	31	0	8	24	1182	1142	33	6	7	25	710	691	39	4	7	26	0	110	1	0	0	28	1686	1714	37
5	10	23	794	802	42	1	8	24	328	345	35	7	7	25	0	28	1	5	7	26	895	892	29	1	0	28	216	283	67
6	10	23	71	45	71	2	8	24	113	163	113	0	8	25	1781	1699	33	6	7	26	629	677	31	2	0	28	270	261	63
1	11	23	293	370	54	3	8	24	139	84	117	1	8	25	545	557	26	0	8	26	634	615	63	3	0	28	661	654	25
2	11	23	415	446	38	4	8	24	655	669	22	2	8	25	0	31	1	1	8	26	626	597	26	4	0	28	1554	1529	27
3	11	23	576	643	41	5	8	24	271	350	53	3	8	25	233	231	72	2	8	26	0	89	1	5	0	28	585	581	36
4	11	23	0	185	1	6	8	24	225	111	81	4	8	25	1288	1288	21	3	8	26	659	689	27	6	0	28	44	201	43
5	11	23	596	595	29	7	8	24	164	43	163	5	8	25	202	315	202	4	8	26	316	249	57	7	0	28	618	659	42
0	12	23	184	272	183	1	9	24	0	66	1	6	8	25	52	117	52	5	8	26	520	576	33	1	1	28	753	728	17
1	12	23	0	75	1	2	9	24	0	67	1	1	9	25	403	413	46	6	8	26	37	71	36	2	1	28	1539	1473	20
2	12	23	264	97	67	3	9	24	323	361	37	2	9	25	1742	1687	24	1	9	26	98	147	98	3	1	28	520	522	20
3	12	23	174	72	174	4	9	24	0	36	1	3	9	25	501	458	33	2	9	26	266	239	55	4	1	28	0	16	1
4	12	23	209	133	163	5	9	24	181	88	101	4	9	25	134	33	133	3	9	26	192	113	104	5	1	28	341	342	35
1	13	23	723	706	34	6	9	24	195	208	195	5	9	25	474	525	39	4	9	26	0	51	1	6	1	28	1280	1259	20
2	13	23	0	280	1	0	10	24	650	674	39	6	9	25	1209	1249	25	5	9	26	0	101	1	7	1	28	241	281	83
3	13	23	0	131	1	1	10	24	209	202	136	0	10	25	1307	1271	57	0	10	26	0	71	1	0	2	28	1151	1122	22
0	0	24	2365	2293	28	2	10	24	0	122	1	1	10	25	615	559	30	1	10	26	455	501	45	1	2	28	185	169	62
1	0	24	365	335	37	3	10	24	363	329	42	2	10	25	126	97	126	2	10	26	101	47	100	2	2	28	88	39	87
2	0	24	828	777	22	4	10	24	701	756	26	3	10	25	583	573	33	3	10	26	444	535	37	3	2	28	332	309	32
3	0	24	498	517	27	5	10	24	55	134	55	4	10	25	1445	1418	36	4	10	26	226	339	114	4	2	28	623	633	40
4	0	24	1671	1638	20	6	10	24	0	248	1	5	10	25	342	390	53	1	11	26	755	745	30	5	2	28	0	82	1
5	0	24	428	455	69	1	11	24	419	427	39	1	11	25	0	109	1	2	11	26	439	466	67	6	2	28	0	14	1
6	0	24	205	128	103	2	11	24	1319	1309	27	2	11	25	773	782	46	3	11	26	849	864	40	7	2	28	391	445	47
7	0	24	749	740	37	3	11	24	441	456	35	3	11	25	233	230	233	1	1	27	615	621	17	1	3	28	135	51	134
8	0	24	1644	1603	29	4	11	24	195	270	128	4	11	25	0	54	1	2	1	27	555	584	23	2	3	28	0	158	1
9	0	24	423	418	60	5	11	24	313	345	62	0	12	25	0	189	1	3	1	27	653	654	16	3	3	28	220	216	43
1	1	24	988	975	12	0	12	24	1458	1416	58	1	12	25	297	108	63	4	1	27	156	176	76	4	3	28	183	159	81
2	1	24	2032	1947	15	1	12	24	116	218	116	2	12	25	0	162	1	5	1	27	785	763	37	5	3	28	170	233	109
3	1	24	521	508	15	2	12	24	0	27	1	1	0	26	1384	1343	18	6	1	27	348	348	39	6	3	28	0	65	1
4	1	24	346	375	24	3	12	24	358	428	79	2	0	26	378	369	44	7	1	27	335	371	66	0	4	28	945	918	27
5	1	24	208	237	55	4	12	24	1188	1318	57	3	0	26	1700	1652	24	0	2	27	488	510	29	1	4	28	362	351	43
6	1	24	1648	1574	29	1	13	24	395	334	48	4	0	26	621	604	24	1	2	27	1137	1149	16	2	4	28	0	15	1
7	1	24	246	305	55	1	1	25	177	192	43	5	0	26	1053	1064	26	2	2	27	0	10	1	3	4	28	132	137	132
8	1	24	322	318	44	2	1	25	798	801	17	6	0	26	172	139	171	3	2	27	1289	1274	15	4	4	28	659	641	22
9	1	24	119	314	118	3	1	25	331	316	23	7	0	26	1205	1159	29	4	2	27	628	616	22	5	4	28	60	172	59
0	2	24	2201	2136	20	4	1	25	276	277	32	8	0	26	555	567	50	5	2	27	906	880	21	6	4	28	120	47	120
1	2	24	0	100	1	5	1	25	300	298	36	1	1	26	1637	1594	14	6	2	27	0	40	1	1	5	28	268	317	41
2	2	24	289	236	30	6	1	25	849	908	30	2	1	26	794	764	15	7	2	27	960	920	30	2	5	28	1275	1290	23
3	2	24	613	586	16	7	1	25	204	331	95	3	1	26	738	739	19	1	3	27	1120	1128	19	3	5	28	142	220	141
4	2	24	974	971	16	8	1	25	0	22	1	4	1	26	335	338	31	2	3	27	778	803	19	4	5	28	150	123	150
5	2	24	210	186	41	0	2	25	1564	1533	18	5	1	26	913	935	19	3	3	27	1489	1427	16	5	5	28	417	409	38
6	2	24	121	154	121	1	2	25	474	498	17	6	1	26	413	431	48	4	3	27	0	53	1	6	5	28	1044	989	26
7	2	24	432	419	39	2	2	25	175	7	61	7	1	26	930	940	27	5	3	27	1461	1417	21	0	6	28	1885	1801	39
8	2	24	693	703	36	3	2	25	806	807	13	8	1	26	36	20	36	6	3	27	437	458	39	1	6	28	617	618	31
9	2	24	63	189	63	4	2	25	1794	1708	16	0	2	26	211	210	62	7	3	27	649	679	42	2	6	28	217	250	64
1	3	24	68	128	68	5	2	25	270	208	42	1	2	26	767	787	15	0	4	27	832	818	24	3	6	28	461	405	55
2	3	24	232	252	30	6	2	25	347	349	40	2	2	26	219	176	35	1	4	27	1303	1292	23	4	6	28	1208	1195	22

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
3	3	24	220	225	33	7	2	25	519	544	28	3	2	26	596	608	16	2	4	27	0	81	1	5	6	28	341	421	55
4	3	24	177	75	46	8	2	25	1068	1014	25	4	2	26	229	254	47	3	4	27	1058	1077	16	1	7	28	293	306	43
5	3	24	399	386	27	1	3	25	606	586	15	5	2	26	628	624	23	4	4	27	661	649	20	2	7	28	1359	1328	21
6	3	24	0	58	1	2	3	25	2196	2121	14	6	2	26	209	14	65	5	4	27	798	814	22	3	7	28	134	111	134
7	3	24	0	94	1	3	3	25	465	476	18	7	2	26	483	513	34	6	4	27	204	187	73	4	7	28	0	12	1
5	7	28	272	286	150	4	3	29	30	64	30	1	9	29	330	339	78	1	5	30	992	1014	23	2	4	31	0	69	1
0	8	28	919	931	39	5	3	29	382	371	36	1	0	30	876	875	34	2	5	30	590	567	26	3	4	31	744	776	30
1	8	28	258	249	63	6	3	29	1171	1199	24	2	0	30	323	295	192	3	5	30	742	776	34	1	5	31	137	227	136
2	8	28	147	235	147	0	4	29	1183	1164	25	3	0	30	1149	1124	25	4	5	30	0	46	1	2	5	31	251	235	73
3	8	28	0	32	1	1	4	29	340	388	50	4	0	30	712	658	32	0	6	30	838	782	52	3	5	31	513	508	35
4	8	28	547	539	43	2	4	29	281	326	50	5	0	30	914	945	37	1	6	30	974	980	24	0	6	31	257	205	121
1	9	28	94	91	94	3	4	29	247	243	53	1	1	30	911	940	18	2	6	30	159	134	158	1	6	31	127	24	126
2	9	28	0	19	1	4	4	29	1382	1333	22	2	1	30	624	660	25	3	6	30	701	755	36	2	6	31	95	39	94
3	9	28	284	133	80	5	4	29	228	323	79	3	1	30	692	697	19	1	7	30	889	935	31	0	0	32	1590	1541	39
0	10	28	467	506	145	1	5	29	191	239	74	4	1	30	166	216	113	2	7	30	325	342	56	1	0	32	282	265	81
1	10	28	276	136	62	2	5	29	706	724	24	5	1	30	643	667	32	0	8	30	329	457	190	2	0	32	232	159	106
1	1	29	126	82	126	3	5	29	229	244	64	0	2	30	200	278	91	1	8	30	368	350	53	3	0	32	464	384	58
2	1	29	724	751	23	4	5	29	140	73	140	1	2	30	520	532	24	1	1	31	359	404	32	1	1	32	503	531	27
3	1	29	228	247	50	5	5	29	120	265	119	2	2	30	86	129	85	2	1	31	338	333	73	2	1	32	1194	1169	21
4	1	29	73	127	73	0	6	29	252	122	96	3	2	30	349	345	38	3	1	31	444	462	33	3	1	32	328	298	57
5	1	29	0	87	1	1	6	29	219	171	85	4	2	30	0	190	1	4	1	31	0	78	1	0	2	32	763	759	33
6	1	29	718	736	31	2	6	29	216	221	71	5	2	30	493	492	37	0	2	31	89	261	89	1	2	32	0	67	1
0	2	29	1165	1151	25	3	6	29	132	102	132	1	3	30	112	138	111	1	2	31	940	931	20	2	2	32	230	230	74
1	2	29	277	296	41	4	6	29	126	198	125	2	3	30	75	189	74	2	2	31	199	15	71	3	2	32	70	139	69
2	2	29	90	88	90	1	7	29	259	310	71	3	3	30	0	41	1	3	2	31	872	942	25	1	3	32	0	5	1
3	2	29	434	424	39	2	7	29	583	646	31	4	3	30	0	206	1	4	2	31	471	447	39	2	3	32	131	64	131
4	2	29	1495	1457	39	3	7	29	0	114	1	5	3	30	0	65	1	1	3	31	893	901	22	0	4	32	632	630	49
5	2	29	134	159	133	4	7	29	78	124	77	0	4	30	509	448	38	2	3	31	468	482	36	1	4	32	470	482	33
6	2	29	0	120	1	0	8	29	1275	1266	35	1	4	30	542	570	49	3	3	31	1204	1223	24	2	4	32	121	19	121
1	3	29	305	357	35	1	8	29	276	263	57	2	4	30	101	111	101	4	3	31	208	15	103	1	1	33	180	84	104
2	3	29	1659	1571	21	2	8	29	195	44	132	3	4	30	528	530	30	0	4	31	494	500	41						
3	3	29	423	419	35	3	8	29	308	309	62	4	4	30	261	367	80	1	4	31	924	900	29						

APPENDIX E

CRYSTALLOGRAPHIC DATA FOR $(C_5Me_5)Ta(hpp)Cl_3$

Identification code	mes109	
Empirical formula	C17 H27 N3 Cl3 Ta1	
Formula weight	560.72	
Temperature	150(2) K	
Wavelength	0.71073 Å	
Crystal system	Monoclinic	
Space group	C2/c	
Unit cell dimensions	a = 29.858(3) Å	α= 90°.
	b = 8.7229(10) Å	β= 98.529(5)°.
	c = 30.672(4) Å	γ = 90°.
Volume	7900.1(16) $Å^3$	
Z	16	
Density (calculated)	1.886 Mg/m^3	
Absorption coefficient	5.976 mm^{-1}	
F(000)	4384	
Crystal size	0.16 x 0.16 x 0.10 mm^3	
Theta range for data collection	1.34 to 27.88°.	
Index ranges	-39<=h<=39, -11<=k<=11, -40<=l<=40	
Reflections collected	33458	
Independent reflections	9421 [R(int) = 0.0420]	
Completeness to theta = 27.88°	99.8 %	
Max. and min. transmission	0.9290 and 0.8898	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	9421 / 0 / 413	
Goodness-of-fit on F^2	1.155	
Final R indices [I>2sigma(I)]	R1 = 0.0420, wR2 = 0.1057	
R indices (all data)	R1 = 0.0606, wR2 = 0.1322	
Extinction coefficient	0.00061(3)	
Largest diff. peak and hole	4.367 and -2.457 $e.Å^{-3}$	

Atomic coordinates (x 10^4) and equivalent isotropic displacement parameters ($Å^2$x 10^3) for mes109. U(eq) is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	U(eq)
Ta(1)	1303(1)	8189(1)	1635(1)	20(1)
Cl(1)	1751(1)	9389(2)	1124(1)	40(1)
N(3)	463(2)	6862(6)	606(2)	28(1)
C(1)	769(2)	7362(7)	938(2)	26(1)
Ta(2)	1145(1)	2974(1)	3970(1)	21(1)
Cl(2)	879(1)	6084(2)	1920(1)	41(1)
N(2)	1162(2)	6723(6)	1067(2)	26(1)
C(7)	1282(2)	5295(8)	877(2)	34(2)
Cl(3)	1948(1)	6492(2)	1813(1)	43(1)
N(1)	716(2)	8607(6)	1199(2)	29(1)
C(6)	853(3)	4422(8)	702(2)	41(2)
Cl(4)	1491(1)	4379(2)	4641(1)	35(1)
N(23)	1906(2)	-61(7)	4662(2)	37(1)
C(5)	544(2)	5425(8)	393(2)	34(2)
Cl(5)	425(1)	3400(2)	4227(1)	34(1)
N(22)	1728(2)	1632(6)	4050(2)	29(1)
C(4)	47(2)	7703(9)	455(2)	37(2)
Cl(6)	761(1)	829(2)	3549(1)	33(1)
N(21)	1208(2)	1229(6)	4471(2)	27(1)
C(3)	65(3)	9288(10)	662(2)	44(2)
C(2)	259(2)	9262(9)	1151(2)	38(2)
C(8)	954(2)	9609(7)	2186(2)	24(1)
C(9)	1127(3)	10749(7)	1918(2)	34(2)
C(10)	1596(3)	10666(9)	1988(3)	43(2)
C(11)	1732(2)	9500(10)	2295(3)	44(2)
C(12)	1336(2)	8845(7)	2423(2)	32(2)
C(13)	479(2)	9398(10)	2271(3)	46(2)
C(14)	863(3)	12026(10)	1663(3)	61(3)
C(15)	1897(4)	11895(12)	1813(4)	72(3)
C(16')	2236(5)	9404(18)	2437(5)	36(3)
C(16)	2194(5)	8900(20)	2567(5)	41(4)

C(17)	1326(4)	7761(10)	2786(2)	60(3)
C(21)	1623(2)	862(7)	4409(2)	27(1)
C(22)	2170(3)	1336(11)	3916(3)	54(2)
C(23)	2517(4)	1013(15)	4303(4)	89(3)
C(24)	2370(3)	-318(12)	4575(3)	62(3)
C(25)	1765(3)	-813(9)	5048(2)	44(2)
C(26)	1264(3)	-658(8)	5055(2)	38(2)
C(27)	1088(2)	931(8)	4905(2)	32(1)
C(28)	1570(2)	4845(8)	3605(2)	30(1)
C(29)	1190(3)	5655(8)	3720(2)	37(2)
C(30)	794(2)	5087(8)	3470(2)	36(2)
C(31)	922(2)	3936(8)	3189(2)	32(1)
C(32)	1394(2)	3764(8)	3273(2)	30(1)
C(33)	2053(3)	5254(10)	3758(3)	54(2)
C(34)	1208(3)	7034(10)	4015(3)	60(2)
C(35)	327(3)	5723(13)	3441(3)	74(3)
C(36)	611(3)	3237(10)	2809(3)	51(2)
C(37)	1651(3)	2803(10)	2982(3)	50(2)

Bond lengths [Å] and angles [°] for mes109.

Ta(1)-N(1)	2.074(5)
Ta(1)-N(2)	2.153(5)
Ta(1)-Cl(3)	2.4257(16)
Ta(1)-Cl(1)	2.4429(17)
Ta(1)-C(8)	2.447(6)
Ta(1)-Cl(2)	2.4628(17)
Ta(1)-C(12)	2.470(6)
Ta(1)-C(9)	2.480(6)
Ta(1)-C(11)	2.505(7)
Ta(1)-C(10)	2.514(7)
Ta(1)-C(1)	2.574(6)
N(3)-C(1)	1.338(8)

N(3)-C(5)	1.450(8)
N(3)-C(4)	1.458(8)
C(1)-N(2)	1.305(8)
C(1)-N(1)	1.372(8)
Ta(2)-N(22)	2.082(5)
Ta(2)-N(21)	2.151(5)
Ta(2)-Cl(5)	2.4236(15)
Ta(2)-C(28)	2.441(6)
Ta(2)-Cl(6)	2.4595(16)
Ta(2)-C(32)	2.465(6)
Ta(2)-C(29)	2.472(7)
Ta(2)-Cl(4)	2.4841(16)
Ta(2)-C(30)	2.524(6)
Ta(2)-C(31)	2.533(6)
Ta(2)-C(21)	2.584(6)
N(2)-C(7)	1.443(8)
C(7)-C(6)	1.516(10)
C(7)-H(2A)	0.9900
C(7)-H(2B)	0.9900
N(1)-C(2)	1.466(8)
C(6)-C(5)	1.502(10)
C(6)-H(3A)	0.9900
C(6)-H(3B)	0.9900
N(23)-C(21)	1.329(8)
N(23)-C(24)	1.466(9)
N(23)-C(25)	1.470(9)
C(5)-H(4A)	0.9900
C(5)-H(4B)	0.9900
N(22)-C(21)	1.367(8)
N(22)-C(22)	1.464(8)
C(4)-C(3)	1.518(11)
C(4)-H(5A)	0.9900
C(4)-H(5B)	0.9900
N(21)-C(21)	1.320(8)
N(21)-C(27)	1.452(8)
C(3)-C(2)	1.526(9)

C(3)-H(6A)	0.9900
C(3)-H(6B)	0.9900
C(2)-H(7A)	0.9900
C(2)-H(7B)	0.9900
C(8)-C(12)	1.424(9)
C(8)-C(9)	1.434(9)
C(8)-C(13)	1.492(9)
C(9)-C(10)	1.386(11)
C(9)-C(14)	1.514(11)
C(10)-C(11)	1.404(12)
C(10)-C(15)	1.545(12)
C(11)-C(12)	1.419(10)
C(11)-C(16')	1.506(16)
C(11)-C(16)	1.590(17)
C(12)-C(17)	1.464(10)
C(13)-H(13A)	0.9800
C(13)-H(13B)	0.9800
C(13)-H(13C)	0.9800
C(14)-H(14A)	0.9800
C(14)-H(14B)	0.9800
C(14)-H(14C)	0.9800
C(15)-H(15A)	0.9800
C(15)-H(15B)	0.9800
C(15)-H(15C)	0.9800
C(16')-C(16)	0.617(19)
C(17)-H(17A)	0.9800
C(17)-H(17B)	0.9800
C(17)-H(17C)	0.9800
C(22)-C(23)	1.482(14)
C(22)-H(19A)	0.9900
C(22)-H(19B)	0.9900
C(23)-C(24)	1.531(14)
C(23)-H(20A)	0.9900
C(23)-H(20B)	0.9900
C(24)-H(21A)	0.9900
C(24)-H(21B)	0.9900

C(25)-C(26)	1.506(11)
C(25)-H(22A)	0.9900
C(25)-H(22B)	0.9900
C(26)-C(27)	1.529(9)
C(26)-H(23A)	0.9900
C(26)-H(23B)	0.9900
C(27)-H(24A)	0.9900
C(27)-H(24B)	0.9900
C(28)-C(29)	1.424(10)
C(28)-C(32)	1.428(9)
C(28)-C(33)	1.492(10)
C(29)-C(30)	1.402(11)
C(29)-C(34)	1.502(11)
C(30)-C(31)	1.414(10)
C(30)-C(35)	1.489(11)
C(31)-C(32)	1.402(9)
C(31)-C(36)	1.509(10)
C(32)-C(37)	1.514(9)
C(33)-H(30A)	0.9800
C(33)-H(30B)	0.9800
C(33)-H(30C)	0.9800
C(34)-H(31A)	0.9800
C(34)-H(31B)	0.9800
C(34)-H(31C)	0.9800
C(35)-H(32A)	0.9800
C(35)-H(32B)	0.9800
C(35)-H(32C)	0.9800
C(36)-H(33A)	0.9800
C(36)-H(33B)	0.9800
C(36)-H(33C)	0.9800
C(37)-H(34A)	0.9800
C(37)-H(34B)	0.9800
C(37)-H(34C)	0.9800

N(1)-Ta(1)-N(2)	62.37(19)
N(1)-Ta(1)-Cl(3)	144.93(15)

N(2)-Ta(1)-Cl(3)	82.67(14)
N(1)-Ta(1)-Cl(1)	90.06(16)
N(2)-Ta(1)-Cl(1)	78.14(16)
Cl(3)-Ta(1)-Cl(1)	85.05(7)
N(1)-Ta(1)-C(8)	87.2(2)
N(2)-Ta(1)-C(8)	143.8(2)
Cl(3)-Ta(1)-C(8)	124.00(15)
Cl(1)-Ta(1)-C(8)	123.76(15)
N(1)-Ta(1)-Cl(2)	85.94(17)
N(2)-Ta(1)-Cl(2)	78.13(16)
Cl(3)-Ta(1)-Cl(2)	84.15(7)
Cl(1)-Ta(1)-Cl(2)	154.97(6)
C(8)-Ta(1)-Cl(2)	80.76(15)
N(1)-Ta(1)-C(12)	119.9(2)
N(2)-Ta(1)-C(12)	154.7(2)
Cl(3)-Ta(1)-C(12)	90.39(16)
Cl(1)-Ta(1)-C(12)	125.64(17)
C(8)-Ta(1)-C(12)	33.7(2)
Cl(2)-Ta(1)-C(12)	76.98(16)
N(1)-Ta(1)-C(9)	82.2(2)
N(2)-Ta(1)-C(9)	142.4(2)
Cl(3)-Ta(1)-C(9)	132.36(18)
Cl(1)-Ta(1)-C(9)	90.19(16)
C(8)-Ta(1)-C(9)	33.8(2)
Cl(2)-Ta(1)-C(9)	113.65(16)
C(12)-Ta(1)-C(9)	55.2(2)
N(1)-Ta(1)-C(11)	136.3(2)
N(2)-Ta(1)-C(11)	160.2(2)
Cl(3)-Ta(1)-C(11)	78.70(18)
Cl(1)-Ta(1)-C(11)	93.5(2)
C(8)-Ta(1)-C(11)	55.3(2)
Cl(2)-Ta(1)-C(11)	106.4(2)
C(12)-Ta(1)-C(11)	33.1(2)
C(9)-Ta(1)-C(11)	54.3(2)
N(1)-Ta(1)-C(10)	109.5(3)
N(2)-Ta(1)-C(10)	150.8(2)

Cl(3)-Ta(1)-C(10)	102.4(2)
Cl(1)-Ta(1)-C(10)	73.73(17)
C(8)-Ta(1)-C(10)	54.9(2)
Cl(2)-Ta(1)-C(10)	130.75(17)
C(12)-Ta(1)-C(10)	54.5(2)
C(9)-Ta(1)-C(10)	32.2(2)
C(11)-Ta(1)-C(10)	32.5(3)
N(1)-Ta(1)-C(1)	32.1(2)
N(2)-Ta(1)-C(1)	30.43(19)
Cl(3)-Ta(1)-C(1)	112.84(15)
Cl(1)-Ta(1)-C(1)	85.24(14)
C(8)-Ta(1)-C(1)	116.1(2)
Cl(2)-Ta(1)-C(1)	78.29(14)
C(12)-Ta(1)-C(1)	143.9(2)
C(9)-Ta(1)-C(1)	113.9(2)
C(11)-Ta(1)-C(1)	168.2(2)
C(10)-Ta(1)-C(1)	137.0(3)
C(1)-N(3)-C(5)	118.8(5)
C(1)-N(3)-C(4)	122.1(6)
C(5)-N(3)-C(4)	119.0(5)
N(2)-C(1)-N(3)	125.0(6)
N(2)-C(1)-N(1)	109.8(5)
N(3)-C(1)-N(1)	125.2(6)
N(2)-C(1)-Ta(1)	56.7(3)
N(3)-C(1)-Ta(1)	173.6(5)
N(1)-C(1)-Ta(1)	53.5(3)
N(22)-Ta(2)-N(21)	62.3(2)
N(22)-Ta(2)-Cl(5)	144.53(15)
N(21)-Ta(2)-Cl(5)	82.26(14)
N(22)-Ta(2)-C(28)	86.9(2)
N(21)-Ta(2)-C(28)	143.6(2)
Cl(5)-Ta(2)-C(28)	126.38(17)
N(22)-Ta(2)-Cl(6)	87.13(17)
N(21)-Ta(2)-Cl(6)	79.78(15)
Cl(5)-Ta(2)-Cl(6)	85.50(6)
C(28)-Ta(2)-Cl(6)	120.03(16)

N(22)-Ta(2)-C(32)	84.4(2)
N(21)-Ta(2)-C(32)	144.2(2)
Cl(5)-Ta(2)-C(32)	129.47(16)
C(28)-Ta(2)-C(32)	33.8(2)
Cl(6)-Ta(2)-C(32)	86.20(16)
N(22)-Ta(2)-C(29)	119.0(2)
N(21)-Ta(2)-C(29)	152.7(2)
Cl(5)-Ta(2)-C(29)	92.77(18)
C(28)-Ta(2)-C(29)	33.7(2)
Cl(6)-Ta(2)-C(29)	126.81(18)
C(32)-Ta(2)-C(29)	55.1(2)
N(22)-Ta(2)-Cl(4)	86.71(16)
N(21)-Ta(2)-Cl(4)	77.06(15)
Cl(5)-Ta(2)-Cl(4)	86.30(6)
C(28)-Ta(2)-Cl(4)	82.49(16)
Cl(6)-Ta(2)-Cl(4)	156.26(6)
C(32)-Ta(2)-Cl(4)	115.95(16)
C(29)-Ta(2)-Cl(4)	75.81(17)
N(22)-Ta(2)-C(30)	138.2(2)
N(21)-Ta(2)-C(30)	159.3(2)
Cl(5)-Ta(2)-C(30)	77.14(16)
C(28)-Ta(2)-C(30)	55.2(2)
Cl(6)-Ta(2)-C(30)	96.71(18)
C(32)-Ta(2)-C(30)	54.6(2)
C(29)-Ta(2)-C(30)	32.6(2)
Cl(4)-Ta(2)-C(30)	103.11(18)
N(22)-Ta(2)-C(31)	113.2(2)
N(21)-Ta(2)-C(31)	153.3(2)
Cl(5)-Ta(2)-C(31)	97.84(16)
C(28)-Ta(2)-C(31)	54.9(2)
Cl(6)-Ta(2)-C(31)	73.63(16)
C(32)-Ta(2)-C(31)	32.5(2)
C(29)-Ta(2)-C(31)	53.9(2)
Cl(4)-Ta(2)-C(31)	129.65(16)
C(30)-Ta(2)-C(31)	32.5(2)
N(22)-Ta(2)-C(21)	31.8(2)

N(21)-Ta(2)-C(21)	30.66(19)
Cl(5)-Ta(2)-C(21)	112.85(15)
C(28)-Ta(2)-C(21)	115.5(2)
Cl(6)-Ta(2)-C(21)	84.84(15)
C(32)-Ta(2)-C(21)	115.9(2)
C(29)-Ta(2)-C(21)	141.7(2)
Cl(4)-Ta(2)-C(21)	77.91(14)
C(30)-Ta(2)-C(21)	170.0(2)
C(31)-Ta(2)-C(21)	140.9(2)
C(1)-N(2)-C(7)	120.7(5)
C(1)-N(2)-Ta(1)	92.9(4)
C(7)-N(2)-Ta(1)	144.1(4)
N(2)-C(7)-C(6)	109.3(6)
N(2)-C(7)-H(2A)	109.8
C(6)-C(7)-H(2A)	109.8
N(2)-C(7)-H(2B)	109.8
C(6)-C(7)-H(2B)	109.8
H(2A)-C(7)-H(2B)	108.3
C(1)-N(1)-C(2)	115.9(5)
C(1)-N(1)-Ta(1)	94.4(3)
C(2)-N(1)-Ta(1)	144.8(4)
C(5)-C(6)-C(7)	109.7(6)
C(5)-C(6)-H(3A)	109.7
C(7)-C(6)-H(3A)	109.7
C(5)-C(6)-H(3B)	109.7
C(7)-C(6)-H(3B)	109.7
H(3A)-C(6)-H(3B)	108.2
C(21)-N(23)-C(24)	121.5(6)
C(21)-N(23)-C(25)	120.5(6)
C(24)-N(23)-C(25)	118.0(6)
N(3)-C(5)-C(6)	110.4(5)
N(3)-C(5)-H(4A)	109.6
C(6)-C(5)-H(4A)	109.6
N(3)-C(5)-H(4B)	109.6
C(6)-C(5)-H(4B)	109.6
H(4A)-C(5)-H(4B)	108.1

C(21)-N(22)-C(22)	117.6(5)
C(21)-N(22)-Ta(2)	94.8(4)
C(22)-N(22)-Ta(2)	147.2(5)
N(3)-C(4)-C(3)	110.5(5)
N(3)-C(4)-H(5A)	109.6
C(3)-C(4)-H(5A)	109.6
N(3)-C(4)-H(5B)	109.6
C(3)-C(4)-H(5B)	109.6
H(5A)-C(4)-H(5B)	108.1
C(21)-N(21)-C(27)	117.0(5)
C(21)-N(21)-Ta(2)	93.1(4)
C(27)-N(21)-Ta(2)	140.7(4)
C(4)-C(3)-C(2)	112.5(6)
C(4)-C(3)-H(6A)	109.1
C(2)-C(3)-H(6A)	109.1
C(4)-C(3)-H(6B)	109.1
C(2)-C(3)-H(6B)	109.1
H(6A)-C(3)-H(6B)	107.8
N(1)-C(2)-C(3)	108.5(6)
N(1)-C(2)-H(7A)	110.0
C(3)-C(2)-H(7A)	110.0
N(1)-C(2)-H(7B)	110.0
C(3)-C(2)-H(7B)	110.0
H(7A)-C(2)-H(7B)	108.4
C(12)-C(8)-C(9)	106.8(6)
C(12)-C(8)-C(13)	124.3(6)
C(9)-C(8)-C(13)	128.2(6)
C(12)-C(8)-Ta(1)	74.1(3)
C(9)-C(8)-Ta(1)	74.3(4)
C(13)-C(8)-Ta(1)	124.9(4)
C(10)-C(9)-C(8)	108.4(6)
C(10)-C(9)-C(14)	123.8(7)
C(8)-C(9)-C(14)	127.0(7)
C(10)-C(9)-Ta(1)	75.3(4)
C(8)-C(9)-Ta(1)	71.8(3)
C(14)-C(9)-Ta(1)	127.0(5)

C(9)-C(10)-C(11)	109.1(6)
C(9)-C(10)-C(15)	122.3(8)
C(11)-C(10)-C(15)	127.7(8)
C(9)-C(10)-Ta(1)	72.5(4)
C(11)-C(10)-Ta(1)	73.4(4)
C(15)-C(10)-Ta(1)	129.0(6)
C(10)-C(11)-C(12)	107.9(6)
C(10)-C(11)-C(16')	114.3(9)
C(12)-C(11)-C(16')	137.4(10)
C(10)-C(11)-C(16)	136.9(9)
C(12)-C(11)-C(16)	114.6(9)
C(16')-C(11)-C(16)	22.8(7)
C(10)-C(11)-Ta(1)	74.1(4)
C(12)-C(11)-Ta(1)	72.1(4)
C(16')-C(11)-Ta(1)	125.2(7)
C(16)-C(11)-Ta(1)	125.0(7)
C(11)-C(12)-C(8)	107.9(6)
C(11)-C(12)-C(17)	125.6(7)
C(8)-C(12)-C(17)	125.8(7)
C(11)-C(12)-Ta(1)	74.8(4)
C(8)-C(12)-Ta(1)	72.3(3)
C(17)-C(12)-Ta(1)	126.3(5)
C(8)-C(13)-H(13A)	109.5
C(8)-C(13)-H(13B)	109.5
H(13A)-C(13)-H(13B)	109.5
C(8)-C(13)-H(13C)	109.5
H(13A)-C(13)-H(13C)	109.5
H(13B)-C(13)-H(13C)	109.5
C(9)-C(14)-H(14A)	109.5
C(9)-C(14)-H(14B)	109.5
H(14A)-C(14)-H(14B)	109.5
C(9)-C(14)-H(14C)	109.5
H(14A)-C(14)-H(14C)	109.5
H(14B)-C(14)-H(14C)	109.5
C(10)-C(15)-H(15A)	109.5
C(10)-C(15)-H(15B)	109.5

H(15A)-C(15)-H(15B)	109.5
C(10)-C(15)-H(15C)	109.5
H(15A)-C(15)-H(15C)	109.5
H(15B)-C(15)-H(15C)	109.5
C(16)-C(16')-C(11)	86(2)
C(16')-C(16)-C(11)	71(2)
C(12)-C(17)-H(17A)	109.5
C(12)-C(17)-H(17B)	109.5
H(17A)-C(17)-H(17B)	109.5
C(12)-C(17)-H(17C)	109.5
H(17A)-C(17)-H(17C)	109.5
H(17B)-C(17)-H(17C)	109.5
N(21)-C(21)-N(23)	126.3(6)
N(21)-C(21)-N(22)	109.2(5)
N(23)-C(21)-N(22)	124.5(6)
N(21)-C(21)-Ta(2)	56.2(3)
N(23)-C(21)-Ta(2)	171.7(5)
N(22)-C(21)-Ta(2)	53.4(3)
N(22)-C(22)-C(23)	111.2(7)
N(22)-C(22)-H(19A)	109.4
C(23)-C(22)-H(19A)	109.4
N(22)-C(22)-H(19B)	109.4
C(23)-C(22)-H(19B)	109.4
H(19A)-C(22)-H(19B)	108.0
C(22)-C(23)-C(24)	110.9(9)
C(22)-C(23)-H(20A)	109.5
C(24)-C(23)-H(20A)	109.5
C(22)-C(23)-H(20B)	109.5
C(24)-C(23)-H(20B)	109.5
H(20A)-C(23)-H(20B)	108.0
N(23)-C(24)-C(23)	109.8(7)
N(23)-C(24)-H(21A)	109.7
C(23)-C(24)-H(21A)	109.7
N(23)-C(24)-H(21B)	109.7
C(23)-C(24)-H(21B)	109.7
H(21A)-C(24)-H(21B)	108.2

N(23)-C(25)-C(26)	112.0(6)
N(23)-C(25)-H(22A)	109.2
C(26)-C(25)-H(22A)	109.2
N(23)-C(25)-H(22B)	109.2
C(26)-C(25)-H(22B)	109.2
H(22A)-C(25)-H(22B)	107.9
C(25)-C(26)-C(27)	112.0(6)
C(25)-C(26)-H(23A)	109.2
C(27)-C(26)-H(23A)	109.2
C(25)-C(26)-H(23B)	109.2
C(27)-C(26)-H(23B)	109.2
H(23A)-C(26)-H(23B)	107.9
N(21)-C(27)-C(26)	108.5(6)
N(21)-C(27)-H(24A)	110.0
C(26)-C(27)-H(24A)	110.0
N(21)-C(27)-H(24B)	110.0
C(26)-C(27)-H(24B)	110.0
H(24A)-C(27)-H(24B)	108.4
C(29)-C(28)-C(32)	106.4(6)
C(29)-C(28)-C(33)	124.8(7)
C(32)-C(28)-C(33)	128.1(7)
C(29)-C(28)-Ta(2)	74.3(4)
C(32)-C(28)-Ta(2)	74.0(4)
C(33)-C(28)-Ta(2)	124.0(5)
C(30)-C(29)-C(28)	109.2(6)
C(30)-C(29)-C(34)	124.3(7)
C(28)-C(29)-C(34)	126.1(7)
C(30)-C(29)-Ta(2)	75.8(4)
C(28)-C(29)-Ta(2)	72.0(4)
C(34)-C(29)-Ta(2)	124.7(5)
C(29)-C(30)-C(31)	107.4(6)
C(29)-C(30)-C(35)	127.5(8)
C(31)-C(30)-C(35)	124.3(8)
C(29)-C(30)-Ta(2)	71.6(4)
C(31)-C(30)-Ta(2)	74.1(4)
C(35)-C(30)-Ta(2)	127.5(5)

C(32)-C(31)-C(30)	108.7(6)
C(32)-C(31)-C(36)	125.9(7)
C(30)-C(31)-C(36)	124.5(7)
C(32)-C(31)-Ta(2)	71.1(3)
C(30)-C(31)-Ta(2)	73.4(4)
C(36)-C(31)-Ta(2)	130.0(5)
C(31)-C(32)-C(28)	108.2(6)
C(31)-C(32)-C(37)	122.3(7)
C(28)-C(32)-C(37)	128.4(7)
C(31)-C(32)-Ta(2)	76.4(4)
C(28)-C(32)-Ta(2)	72.1(3)
C(37)-C(32)-Ta(2)	127.0(5)
C(28)-C(33)-H(30A)	109.5
C(28)-C(33)-H(30B)	109.5
H(30A)-C(33)-H(30B)	109.5
C(28)-C(33)-H(30C)	109.5
H(30A)-C(33)-H(30C)	109.5
H(30B)-C(33)-H(30C)	109.5
C(29)-C(34)-H(31A)	109.5
C(29)-C(34)-H(31B)	109.5
H(31A)-C(34)-H(31B)	109.5
C(29)-C(34)-H(31C)	109.5
H(31A)-C(34)-H(31C)	109.5
H(31B)-C(34)-H(31C)	109.5
C(30)-C(35)-H(32A)	109.5
C(30)-C(35)-H(32B)	109.5
H(32A)-C(35)-H(32B)	109.5
C(30)-C(35)-H(32C)	109.5
H(32A)-C(35)-H(32C)	109.5
H(32B)-C(35)-H(32C)	109.5
C(31)-C(36)-H(33A)	109.5
C(31)-C(36)-H(33B)	109.5
H(33A)-C(36)-H(33B)	109.5
C(31)-C(36)-H(33C)	109.5
H(33A)-C(36)-H(33C)	109.5
H(33B)-C(36)-H(33C)	109.5

C(32)-C(37)-H(34A)	109.5
C(32)-C(37)-H(34B)	109.5
H(34A)-C(37)-H(34B)	109.5
C(32)-C(37)-H(34C)	109.5
H(34A)-C(37)-H(34C)	109.5
H(34B)-C(37)-H(34C)	109.5

Anisotropic displacement parameters ($Å^2 x\ 10^3$)for mes109. The anisotropic displacement factor exponent takes the form: $-2\pi^2[\ h^2 a^{*2} U^{11} + ... + 2\ h\ k\ a^*\ b^*\ U^{12}\ ]$

	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
Ta(1)	16(1)	22(1)	22(1)	-3(1)	0(1)	2(1)
Cl(1)	43(1)	51(1)	28(1)	-5(1)	14(1)	-12(1)
N(3)	24(3)	32(3)	25(3)	0(2)	-1(2)	-1(2)
C(1)	23(3)	30(3)	22(3)	4(3)	-1(2)	-3(2)
Ta(2)	19(1)	25(1)	19(1)	1(1)	5(1)	2(1)
Cl(2)	55(1)	22(1)	50(1)	-3(1)	18(1)	-8(1)
N(2)	22(3)	29(3)	26(3)	-9(2)	-6(2)	8(2)
C(7)	40(4)	34(4)	27(3)	-3(3)	-1(3)	11(3)
Cl(3)	36(1)	55(1)	34(1)	-9(1)	-9(1)	26(1)
N(1)	20(2)	30(3)	34(3)	-3(2)	-4(2)	10(2)
C(6)	60(5)	25(4)	34(4)	-4(3)	-5(3)	3(3)
Cl(4)	42(1)	40(1)	23(1)	-3(1)	3(1)	-10(1)
N(23)	37(3)	43(4)	32(3)	5(3)	4(2)	14(3)
C(5)	42(4)	34(4)	24(3)	-7(3)	2(3)	-12(3)
Cl(5)	26(1)	46(1)	33(1)	1(1)	11(1)	8(1)
N(22)	25(3)	37(3)	26(3)	7(2)	10(2)	10(2)
C(4)	29(3)	54(5)	28(4)	3(3)	-3(3)	2(3)
Cl(6)	41(1)	29(1)	29(1)	-2(1)	5(1)	-7(1)
N(21)	28(3)	31(3)	22(3)	8(2)	5(2)	6(2)
C(3)	33(4)	61(5)	35(4)	6(3)	-6(3)	19(3)
C(2)	29(3)	50(4)	33(4)	-3(3)	-3(3)	12(3)
C(8)	26(3)	24(3)	23(3)	-5(2)	6(2)	1(2)
C(9)	56(4)	21(3)	26(3)	-3(2)	11(3)	-2(3)
C(10)	50(4)	43(4)	42(4)	-26(3)	23(4)	-25(4)
C(11)	29(4)	62(5)	39(4)	-30(4)	-2(3)	7(3)
C(12)	47(4)	23(3)	23(3)	-7(2)	-1(3)	0(3)
C(13)	26(3)	61(5)	55(5)	-22(4)	19(3)	-11(3)
C(17)	110(8)	39(4)	24(4)	3(3)	-9(4)	-8(5)
C(21)	26(3)	27(3)	27(3)	1(2)	2(2)	4(2)
C(22)	38(4)	78(6)	52(5)	21(5)	23(4)	29(4)
C(24)	44(5)	82(7)	62(6)	23(5)	12(4)	36(5)

C(25)	64(5)	38(4)	30(4)	7(3)	10(3)	18(4)
C(26)	60(5)	28(4)	25(3)	3(3)	4(3)	-8(3)
C(27)	32(3)	42(4)	22(3)	8(3)	7(3)	-5(3)
C(28)	31(3)	36(4)	25(3)	5(3)	4(3)	-7(3)
C(29)	59(5)	27(3)	27(3)	3(3)	16(3)	3(3)
C(30)	41(4)	39(4)	28(3)	13(3)	6(3)	13(3)
C(31)	38(4)	30(3)	27(3)	8(3)	5(3)	-4(3)
C(32)	37(4)	30(3)	25(3)	4(3)	15(3)	1(3)
C(33)	54(5)	63(6)	43(5)	17(4)	0(4)	-29(4)
C(35)	67(6)	91(8)	64(6)	33(6)	14(5)	46(6)
C(36)	55(5)	60(5)	34(4)	14(4)	-7(4)	-19(4)
C(37)	65(6)	51(5)	39(4)	-1(4)	26(4)	10(4)

Hydrogen coordinates (x 10^4) and isotropic displacement parameters ($Å^2$x 10^3)
for mes109.

	x	y	z	U(eq)
H(2A)	1472	4675	1103	41
H(2B)	1457	5501	633	41
H(3A)	931	3490	545	49
H(3B)	698	4100	951	49
H(4A)	684	5631	126	40
H(4B)	253	4890	302	40
H(5A)	-215	7131	536	45
H(5B)	6	7800	130	45
H(6A)	-245	9722	627	53
H(6B)	253	9965	505	53
H(7A)	272	10316	1272	46
H(7B)	64	8635	1316	46
H(13A)	420	10096	2506	69
H(13B)	436	8337	2361	69
H(13C)	269	9623	2002	69
H(14A)	846	12908	1857	92
H(14B)	557	11666	1551	92
H(14C)	1016	12329	1414	92
H(15A)	1953	12731	2027	108
H(15B)	1742	12300	1532	108
H(15C)	2185	11434	1767	108
H(17A)	1344	8325	3064	89
H(17B)	1584	7059	2800	89
H(17C)	1043	7174	2735	89
H(19A)	2264	2239	3756	65
H(19B)	2147	449	3712	65
H(20A)	2565	1940	4490	107
H(20B)	2808	753	4202	107
H(21A)	2384	-1291	4411	75
H(21B)	2577	-399	4857	75

H(22A)	1932	-353	5320	52
H(22B)	1845	-1914	5046	52
H(23A)	1200	-848	5358	46
H(23B)	1101	-1443	4859	46
H(24A)	755	972	4893	38
H(24B)	1225	1718	5116	38
H(30A)	2151	6027	3560	81
H(30B)	2242	4336	3756	81
H(30C)	2083	5667	4058	81
H(31A)	1225	7966	3840	90
H(31B)	1476	6970	4242	90
H(31C)	935	7068	4157	90
H(32A)	285	6536	3218	110
H(32B)	284	6147	3728	110
H(32C)	106	4906	3358	110
H(33A)	598	3903	2550	77
H(33B)	307	3128	2889	77
H(33C)	726	2226	2740	77
H(34A)	1706	3407	2726	74
H(34B)	1473	1892	2883	74
H(34C)	1942	2486	3150	74

Torsion angles [°] for mes109.

C(5)-N(3)-C(1)-N(2)	6.1(10)
C(4)-N(3)-C(1)-N(2)	-174.7(6)
C(5)-N(3)-C(1)-N(1)	-172.8(6)
C(4)-N(3)-C(1)-N(1)	6.4(10)
C(5)-N(3)-C(1)-Ta(1)	-97(4)
C(4)-N(3)-C(1)-Ta(1)	82(4)
N(1)-Ta(1)-C(1)-N(2)	172.3(6)
Cl(3)-Ta(1)-C(1)-N(2)	-8.0(4)
Cl(1)-Ta(1)-C(1)-N(2)	74.6(4)
C(8)-Ta(1)-C(1)-N(2)	-159.9(4)
Cl(2)-Ta(1)-C(1)-N(2)	-86.4(4)
C(12)-Ta(1)-C(1)-N(2)	-134.1(4)
C(9)-Ta(1)-C(1)-N(2)	162.7(4)
C(11)-Ta(1)-C(1)-N(2)	158.8(11)
C(10)-Ta(1)-C(1)-N(2)	134.5(4)
N(1)-Ta(1)-C(1)-N(3)	-80(4)
N(2)-Ta(1)-C(1)-N(3)	107(5)
Cl(3)-Ta(1)-C(1)-N(3)	99(4)
Cl(1)-Ta(1)-C(1)-N(3)	-178(100)
C(8)-Ta(1)-C(1)-N(3)	-53(4)
Cl(2)-Ta(1)-C(1)-N(3)	21(4)
C(12)-Ta(1)-C(1)-N(3)	-27(5)
C(9)-Ta(1)-C(1)-N(3)	-90(4)
C(11)-Ta(1)-C(1)-N(3)	-94(5)
C(10)-Ta(1)-C(1)-N(3)	-118(4)
N(2)-Ta(1)-C(1)-N(1)	-172.3(6)
Cl(3)-Ta(1)-C(1)-N(1)	179.7(3)
Cl(1)-Ta(1)-C(1)-N(1)	-97.7(4)
C(8)-Ta(1)-C(1)-N(1)	27.7(4)
Cl(2)-Ta(1)-C(1)-N(1)	101.2(4)
C(12)-Ta(1)-C(1)-N(1)	53.6(5)
C(9)-Ta(1)-C(1)-N(1)	-9.7(5)
C(11)-Ta(1)-C(1)-N(1)	-13.5(13)
C(10)-Ta(1)-C(1)-N(1)	-37.9(5)

N(3)-C(1)-N(2)-C(7)	-5.6(10)
N(1)-C(1)-N(2)-C(7)	173.4(6)
Ta(1)-C(1)-N(2)-C(7)	166.9(7)
N(3)-C(1)-N(2)-Ta(1)	-172.5(6)
N(1)-C(1)-N(2)-Ta(1)	6.5(5)
N(1)-Ta(1)-N(2)-C(1)	-4.6(4)
Cl(3)-Ta(1)-N(2)-C(1)	172.6(4)
Cl(1)-Ta(1)-N(2)-C(1)	-101.0(4)
C(8)-Ta(1)-N(2)-C(1)	31.4(6)
Cl(2)-Ta(1)-N(2)-C(1)	87.0(4)
C(12)-Ta(1)-N(2)-C(1)	97.4(6)
C(9)-Ta(1)-N(2)-C(1)	-26.4(6)
C(11)-Ta(1)-N(2)-C(1)	-167.4(7)
C(10)-Ta(1)-N(2)-C(1)	-85.1(6)
N(1)-Ta(1)-N(2)-C(7)	-165.1(9)
Cl(3)-Ta(1)-N(2)-C(7)	12.0(8)
Cl(1)-Ta(1)-N(2)-C(7)	98.5(8)
C(8)-Ta(1)-N(2)-C(7)	-129.1(7)
Cl(2)-Ta(1)-N(2)-C(7)	-73.5(8)
C(12)-Ta(1)-N(2)-C(7)	-63.1(10)
C(9)-Ta(1)-N(2)-C(7)	173.0(7)
C(11)-Ta(1)-N(2)-C(7)	32.1(13)
C(10)-Ta(1)-N(2)-C(7)	114.3(8)
C(1)-Ta(1)-N(2)-C(7)	-160.6(10)
C(1)-N(2)-C(7)-C(6)	-25.3(9)
Ta(1)-N(2)-C(7)-C(6)	132.0(7)
N(2)-C(1)-N(1)-C(2)	-168.5(6)
N(3)-C(1)-N(1)-C(2)	10.5(10)
Ta(1)-C(1)-N(1)-C(2)	-161.7(7)
N(2)-C(1)-N(1)-Ta(1)	-6.8(6)
N(3)-C(1)-N(1)-Ta(1)	172.3(6)
N(2)-Ta(1)-N(1)-C(1)	4.4(4)
Cl(3)-Ta(1)-N(1)-C(1)	-0.5(6)
Cl(1)-Ta(1)-N(1)-C(1)	80.9(4)
C(8)-Ta(1)-N(1)-C(1)	-155.3(4)
Cl(2)-Ta(1)-N(1)-C(1)	-74.4(4)

C(12)-Ta(1)-N(1)-C(1)	-146.8(4)
C(9)-Ta(1)-N(1)-C(1)	171.1(4)
C(11)-Ta(1)-N(1)-C(1)	176.0(4)
C(10)-Ta(1)-N(1)-C(1)	153.6(4)
N(2)-Ta(1)-N(1)-C(2)	155.1(9)
Cl(3)-Ta(1)-N(1)-C(2)	150.2(7)
Cl(1)-Ta(1)-N(1)-C(2)	-128.4(8)
C(8)-Ta(1)-N(1)-C(2)	-4.6(8)
Cl(2)-Ta(1)-N(1)-C(2)	76.3(8)
C(12)-Ta(1)-N(1)-C(2)	3.9(9)
C(9)-Ta(1)-N(1)-C(2)	-38.2(8)
C(11)-Ta(1)-N(1)-C(2)	-33.3(10)
C(10)-Ta(1)-N(1)-C(2)	-55.7(9)
C(1)-Ta(1)-N(1)-C(2)	150.7(11)
N(2)-C(7)-C(6)-C(5)	53.9(8)
C(1)-N(3)-C(5)-C(6)	24.8(8)
C(4)-N(3)-C(5)-C(6)	-154.4(6)
C(7)-C(6)-C(5)-N(3)	-53.9(8)
N(21)-Ta(2)-N(22)-C(21)	-4.9(4)
Cl(5)-Ta(2)-N(22)-C(21)	-6.7(6)
C(28)-Ta(2)-N(22)-C(21)	154.9(4)
Cl(6)-Ta(2)-N(22)-C(21)	-84.8(4)
C(32)-Ta(2)-N(22)-C(21)	-171.3(4)
C(29)-Ta(2)-N(22)-C(21)	144.0(4)
Cl(4)-Ta(2)-N(22)-C(21)	72.2(4)
C(30)-Ta(2)-N(22)-C(21)	178.3(4)
C(31)-Ta(2)-N(22)-C(21)	-155.7(4)
N(21)-Ta(2)-N(22)-C(22)	-176.1(11)
Cl(5)-Ta(2)-N(22)-C(22)	-177.9(9)
C(28)-Ta(2)-N(22)-C(22)	-16.4(10)
Cl(6)-Ta(2)-N(22)-C(22)	103.9(10)
C(32)-Ta(2)-N(22)-C(22)	17.5(10)
C(29)-Ta(2)-N(22)-C(22)	-27.2(11)
Cl(4)-Ta(2)-N(22)-C(22)	-99.0(10)
C(30)-Ta(2)-N(22)-C(22)	7.1(12)
C(31)-Ta(2)-N(22)-C(22)	33.1(11)

C(21)-Ta(2)-N(22)-C(22)	-171.2(12)
C(1)-N(3)-C(4)-C(3)	10.8(9)
C(5)-N(3)-C(4)-C(3)	-170.1(6)
N(22)-Ta(2)-N(21)-C(21)	5.0(4)
Cl(5)-Ta(2)-N(21)-C(21)	-176.0(4)
C(28)-Ta(2)-N(21)-C(21)	-30.5(6)
Cl(6)-Ta(2)-N(21)-C(21)	97.2(4)
C(32)-Ta(2)-N(21)-C(21)	28.6(6)
C(29)-Ta(2)-N(21)-C(21)	-95.0(6)
Cl(4)-Ta(2)-N(21)-C(21)	-88.1(4)
C(30)-Ta(2)-N(21)-C(21)	179.1(6)
C(31)-Ta(2)-N(21)-C(21)	91.9(6)
N(22)-Ta(2)-N(21)-C(27)	146.6(7)
Cl(5)-Ta(2)-N(21)-C(27)	-34.5(7)
C(28)-Ta(2)-N(21)-C(27)	111.0(7)
Cl(6)-Ta(2)-N(21)-C(27)	-121.3(7)
C(32)-Ta(2)-N(21)-C(27)	170.1(6)
C(29)-Ta(2)-N(21)-C(27)	46.5(9)
Cl(4)-Ta(2)-N(21)-C(27)	53.5(7)
C(30)-Ta(2)-N(21)-C(27)	-39.4(11)
C(31)-Ta(2)-N(21)-C(27)	-126.6(7)
C(21)-Ta(2)-N(21)-C(27)	141.5(9)
N(3)-C(4)-C(3)-C(2)	-42.8(8)
C(1)-N(1)-C(2)-C(3)	-41.4(8)
Ta(1)-N(1)-C(2)-C(3)	171.5(6)
C(4)-C(3)-C(2)-N(1)	58.4(8)
N(1)-Ta(1)-C(8)-C(12)	166.7(4)
N(2)-Ta(1)-C(8)-C(12)	135.3(4)
Cl(3)-Ta(1)-C(8)-C(12)	3.9(4)
Cl(1)-Ta(1)-C(8)-C(12)	-105.1(4)
Cl(2)-Ta(1)-C(8)-C(12)	80.4(4)
C(9)-Ta(1)-C(8)-C(12)	-113.0(6)
C(11)-Ta(1)-C(8)-C(12)	-37.1(4)
C(10)-Ta(1)-C(8)-C(12)	-77.0(4)
C(1)-Ta(1)-C(8)-C(12)	152.4(4)
N(1)-Ta(1)-C(8)-C(9)	-80.3(4)

N(2)-Ta(1)-C(8)-C(9)	-111.7(5)
Cl(3)-Ta(1)-C(8)-C(9)	117.0(4)
Cl(1)-Ta(1)-C(8)-C(9)	7.9(4)
Cl(2)-Ta(1)-C(8)-C(9)	-166.6(4)
C(12)-Ta(1)-C(8)-C(9)	113.0(6)
C(11)-Ta(1)-C(8)-C(9)	76.0(5)
C(10)-Ta(1)-C(8)-C(9)	36.1(4)
C(1)-Ta(1)-C(8)-C(9)	-94.6(4)
N(1)-Ta(1)-C(8)-C(13)	45.7(6)
N(2)-Ta(1)-C(8)-C(13)	14.3(8)
Cl(3)-Ta(1)-C(8)-C(13)	-117.1(6)
Cl(1)-Ta(1)-C(8)-C(13)	133.9(6)
Cl(2)-Ta(1)-C(8)-C(13)	-40.6(6)
C(12)-Ta(1)-C(8)-C(13)	-121.0(8)
C(9)-Ta(1)-C(8)-C(13)	126.0(8)
C(11)-Ta(1)-C(8)-C(13)	-158.1(7)
C(10)-Ta(1)-C(8)-C(13)	162.1(7)
C(1)-Ta(1)-C(8)-C(13)	31.4(7)
C(12)-C(8)-C(9)-C(10)	0.6(7)
C(13)-C(8)-C(9)-C(10)	170.7(6)
Ta(1)-C(8)-C(9)-C(10)	-67.0(5)
C(12)-C(8)-C(9)-C(14)	-169.3(7)
C(13)-C(8)-C(9)-C(14)	0.7(11)
Ta(1)-C(8)-C(9)-C(14)	123.1(7)
C(12)-C(8)-C(9)-Ta(1)	67.5(4)
C(13)-C(8)-C(9)-Ta(1)	-122.4(7)
N(1)-Ta(1)-C(9)-C(10)	-148.0(5)
N(2)-Ta(1)-C(9)-C(10)	-128.5(5)
Cl(3)-Ta(1)-C(9)-C(10)	25.5(5)
Cl(1)-Ta(1)-C(9)-C(10)	-58.0(4)
C(8)-Ta(1)-C(9)-C(10)	115.5(6)
Cl(2)-Ta(1)-C(9)-C(10)	129.9(4)
C(12)-Ta(1)-C(9)-C(10)	77.0(5)
C(11)-Ta(1)-C(9)-C(10)	36.2(4)
C(1)-Ta(1)-C(9)-C(10)	-142.8(4)
N(1)-Ta(1)-C(9)-C(8)	96.6(4)

N(2)-Ta(1)-C(9)-C(8)	116.0(4)
Cl(3)-Ta(1)-C(9)-C(8)	-89.9(4)
Cl(1)-Ta(1)-C(9)-C(8)	-173.4(4)
Cl(2)-Ta(1)-C(9)-C(8)	14.5(4)
C(12)-Ta(1)-C(9)-C(8)	-38.4(4)
C(11)-Ta(1)-C(9)-C(8)	-79.3(4)
C(10)-Ta(1)-C(9)-C(8)	-115.5(6)
C(1)-Ta(1)-C(9)-C(8)	101.7(4)
N(1)-Ta(1)-C(9)-C(14)	-26.6(7)
N(2)-Ta(1)-C(9)-C(14)	-7.1(9)
Cl(3)-Ta(1)-C(9)-C(14)	146.9(6)
Cl(1)-Ta(1)-C(9)-C(14)	63.5(7)
C(8)-Ta(1)-C(9)-C(14)	-123.1(9)
Cl(2)-Ta(1)-C(9)-C(14)	-108.7(7)
C(12)-Ta(1)-C(9)-C(14)	-161.5(8)
C(11)-Ta(1)-C(9)-C(14)	157.6(8)
C(10)-Ta(1)-C(9)-C(14)	121.4(9)
C(1)-Ta(1)-C(9)-C(14)	-21.4(7)
C(8)-C(9)-C(10)-C(11)	-0.1(8)
C(14)-C(9)-C(10)-C(11)	170.2(7)
Ta(1)-C(9)-C(10)-C(11)	-64.8(5)
C(8)-C(9)-C(10)-C(15)	-169.8(7)
C(14)-C(9)-C(10)-C(15)	0.5(11)
Ta(1)-C(9)-C(10)-C(15)	125.5(7)
C(8)-C(9)-C(10)-Ta(1)	64.7(4)
C(14)-C(9)-C(10)-Ta(1)	-125.0(7)
N(1)-Ta(1)-C(10)-C(9)	33.9(5)
N(2)-Ta(1)-C(10)-C(9)	101.9(5)
Cl(3)-Ta(1)-C(10)-C(9)	-161.0(4)
Cl(1)-Ta(1)-C(10)-C(9)	118.0(4)
C(8)-Ta(1)-C(10)-C(9)	-37.9(4)
Cl(2)-Ta(1)-C(10)-C(9)	-68.0(5)
C(12)-Ta(1)-C(10)-C(9)	-79.5(4)
C(11)-Ta(1)-C(10)-C(9)	-116.9(6)
C(1)-Ta(1)-C(10)-C(9)	54.1(5)
N(1)-Ta(1)-C(10)-C(11)	150.7(4)

N(2)-Ta(1)-C(10)-C(11)	-141.3(5)
Cl(3)-Ta(1)-C(10)-C(11)	-44.1(4)
Cl(1)-Ta(1)-C(10)-C(11)	-125.2(5)
C(8)-Ta(1)-C(10)-C(11)	78.9(4)
Cl(2)-Ta(1)-C(10)-C(11)	48.8(5)
C(12)-Ta(1)-C(10)-C(11)	37.4(4)
C(9)-Ta(1)-C(10)-C(11)	116.9(6)
C(1)-Ta(1)-C(10)-C(11)	170.9(4)
N(1)-Ta(1)-C(10)-C(15)	-83.9(8)
N(2)-Ta(1)-C(10)-C(15)	-15.9(11)
Cl(3)-Ta(1)-C(10)-C(15)	81.3(8)
Cl(1)-Ta(1)-C(10)-C(15)	0.2(8)
C(8)-Ta(1)-C(10)-C(15)	-155.7(9)
Cl(2)-Ta(1)-C(10)-C(15)	174.2(7)
C(12)-Ta(1)-C(10)-C(15)	162.8(9)
C(9)-Ta(1)-C(10)-C(15)	-117.7(10)
C(11)-Ta(1)-C(10)-C(15)	125.4(10)
C(1)-Ta(1)-C(10)-C(15)	-63.6(9)
C(9)-C(10)-C(11)-C(12)	-0.5(8)
C(15)-C(10)-C(11)-C(12)	168.6(7)
Ta(1)-C(10)-C(11)-C(12)	-64.7(5)
C(9)-C(10)-C(11)-C(16')	-173.8(8)
C(15)-C(10)-C(11)-C(16')	-4.8(12)
Ta(1)-C(10)-C(11)-C(16')	122.0(8)
C(9)-C(10)-C(11)-C(16)	-171.1(11)
C(15)-C(10)-C(11)-C(16)	-2.1(16)
Ta(1)-C(10)-C(11)-C(16)	124.7(11)
C(9)-C(10)-C(11)-Ta(1)	64.2(5)
C(15)-C(10)-C(11)-Ta(1)	-126.8(8)
N(1)-Ta(1)-C(11)-C(10)	-41.9(6)
N(2)-Ta(1)-C(11)-C(10)	115.8(7)
Cl(3)-Ta(1)-C(11)-C(10)	136.1(4)
Cl(1)-Ta(1)-C(11)-C(10)	51.8(4)
C(8)-Ta(1)-C(11)-C(10)	-77.6(4)
Cl(2)-Ta(1)-C(11)-C(10)	-143.5(4)
C(12)-Ta(1)-C(11)-C(10)	-115.3(6)

C(9)-Ta(1)-C(11)-C(10)	-35.9(4)
C(1)-Ta(1)-C(11)-C(10)	-31.5(14)
N(1)-Ta(1)-C(11)-C(12)	73.4(6)
N(2)-Ta(1)-C(11)-C(12)	-128.9(7)
Cl(3)-Ta(1)-C(11)-C(12)	-108.6(4)
Cl(1)-Ta(1)-C(11)-C(12)	167.2(4)
C(8)-Ta(1)-C(11)-C(12)	37.7(4)
Cl(2)-Ta(1)-C(11)-C(12)	-28.2(4)
C(9)-Ta(1)-C(11)-C(12)	79.4(4)
C(10)-Ta(1)-C(11)-C(12)	115.3(6)
C(1)-Ta(1)-C(11)-C(12)	83.8(13)
N(1)-Ta(1)-C(11)-C(16')	-150.7(9)
N(2)-Ta(1)-C(11)-C(16')	7.0(15)
Cl(3)-Ta(1)-C(11)-C(16')	27.3(10)
Cl(1)-Ta(1)-C(11)-C(16')	-56.9(10)
C(8)-Ta(1)-C(11)-C(16')	173.6(11)
Cl(2)-Ta(1)-C(11)-C(16')	107.7(10)
C(12)-Ta(1)-C(11)-C(16')	135.9(12)
C(9)-Ta(1)-C(11)-C(16')	-144.7(11)
C(10)-Ta(1)-C(11)-C(16')	-108.8(11)
C(1)-Ta(1)-C(11)-C(16')	-140.3(11)
N(1)-Ta(1)-C(11)-C(16)	-178.6(9)
N(2)-Ta(1)-C(11)-C(16)	-20.9(15)
Cl(3)-Ta(1)-C(11)-C(16)	-0.6(9)
Cl(1)-Ta(1)-C(11)-C(16)	-84.9(10)
C(8)-Ta(1)-C(11)-C(16)	145.7(11)
Cl(2)-Ta(1)-C(11)-C(16)	79.8(10)
C(12)-Ta(1)-C(11)-C(16)	108.0(11)
C(9)-Ta(1)-C(11)-C(16)	-172.6(11)
C(10)-Ta(1)-C(11)-C(16)	-136.7(11)
C(1)-Ta(1)-C(11)-C(16)	-168.2(11)
C(10)-C(11)-C(12)-C(8)	0.8(7)
C(16')-C(11)-C(12)-C(8)	171.8(11)
C(16)-C(11)-C(12)-C(8)	173.8(8)
Ta(1)-C(11)-C(12)-C(8)	-65.2(4)
C(10)-C(11)-C(12)-C(17)	-170.0(7)

C(16')-C(11)-C(12)-C(17)	1.0(15)
C(16)-C(11)-C(12)-C(17)	3.0(11)
Ta(1)-C(11)-C(12)-C(17)	124.0(7)
C(10)-C(11)-C(12)-Ta(1)	66.0(5)
C(16')-C(11)-C(12)-Ta(1)	-123.0(12)
C(16)-C(11)-C(12)-Ta(1)	-121.0(8)
C(9)-C(8)-C(12)-C(11)	-0.8(7)
C(13)-C(8)-C(12)-C(11)	-171.4(6)
Ta(1)-C(8)-C(12)-C(11)	66.9(5)
C(9)-C(8)-C(12)-C(17)	169.9(6)
C(13)-C(8)-C(12)-C(17)	-0.6(10)
Ta(1)-C(8)-C(12)-C(17)	-122.3(7)
C(9)-C(8)-C(12)-Ta(1)	-67.7(4)
C(13)-C(8)-C(12)-Ta(1)	121.7(6)
N(1)-Ta(1)-C(12)-C(11)	-130.2(4)
N(2)-Ta(1)-C(12)-C(11)	141.8(5)
Cl(3)-Ta(1)-C(12)-C(11)	68.4(4)
Cl(1)-Ta(1)-C(12)-C(11)	-15.8(5)
C(8)-Ta(1)-C(12)-C(11)	-114.9(6)
Cl(2)-Ta(1)-C(12)-C(11)	152.3(4)
C(9)-Ta(1)-C(12)-C(11)	-76.3(5)
C(10)-Ta(1)-C(12)-C(11)	-36.6(4)
C(1)-Ta(1)-C(12)-C(11)	-159.8(4)
N(1)-Ta(1)-C(12)-C(8)	-15.4(5)
N(2)-Ta(1)-C(12)-C(8)	-103.3(5)
Cl(3)-Ta(1)-C(12)-C(8)	-176.8(4)
Cl(1)-Ta(1)-C(12)-C(8)	99.1(4)
Cl(2)-Ta(1)-C(12)-C(8)	-92.8(4)
C(9)-Ta(1)-C(12)-C(8)	38.6(4)
C(11)-Ta(1)-C(12)-C(8)	114.9(6)
C(10)-Ta(1)-C(12)-C(8)	78.3(4)
C(1)-Ta(1)-C(12)-C(8)	-44.9(5)
N(1)-Ta(1)-C(12)-C(17)	106.4(7)
N(2)-Ta(1)-C(12)-C(17)	18.5(10)
Cl(3)-Ta(1)-C(12)-C(17)	-55.0(7)
Cl(1)-Ta(1)-C(12)-C(17)	-139.2(7)

C(8)-Ta(1)-C(12)-C(17)	121.8(9)
Cl(2)-Ta(1)-C(12)-C(17)	28.9(7)
C(9)-Ta(1)-C(12)-C(17)	160.4(8)
C(11)-Ta(1)-C(12)-C(17)	-123.3(9)
C(10)-Ta(1)-C(12)-C(17)	-160.0(8)
C(1)-Ta(1)-C(12)-C(17)	76.9(8)
C(10)-C(11)-C(16')-C(16)	175(2)
C(12)-C(11)-C(16')-C(16)	5(3)
Ta(1)-C(11)-C(16')-C(16)	-98(2)
C(10)-C(11)-C(16)-C(16')	-6(3)
C(12)-C(11)-C(16)-C(16')	-177(2)
Ta(1)-C(11)-C(16)-C(16')	99(2)
C(27)-N(21)-C(21)-N(23)	16.6(10)
Ta(2)-N(21)-C(21)-N(23)	170.4(6)
C(27)-N(21)-C(21)-N(22)	-161.0(6)
Ta(2)-N(21)-C(21)-N(22)	-7.2(5)
C(27)-N(21)-C(21)-Ta(2)	-153.7(6)
C(24)-N(23)-C(21)-N(21)	-176.4(8)
C(25)-N(23)-C(21)-N(21)	1.4(11)
C(24)-N(23)-C(21)-N(22)	0.8(11)
C(25)-N(23)-C(21)-N(22)	178.6(6)
C(24)-N(23)-C(21)-Ta(2)	-72(4)
C(25)-N(23)-C(21)-Ta(2)	106(3)
C(22)-N(22)-C(21)-N(21)	-177.9(7)
Ta(2)-N(22)-C(21)-N(21)	7.5(5)
C(22)-N(22)-C(21)-N(23)	4.5(10)
Ta(2)-N(22)-C(21)-N(23)	-170.2(6)
C(22)-N(22)-C(21)-Ta(2)	174.7(8)
N(22)-Ta(2)-C(21)-N(21)	-171.5(6)
Cl(5)-Ta(2)-C(21)-N(21)	4.3(4)
C(28)-Ta(2)-C(21)-N(21)	160.5(4)
Cl(6)-Ta(2)-C(21)-N(21)	-78.6(4)
C(32)-Ta(2)-C(21)-N(21)	-161.9(4)
C(29)-Ta(2)-C(21)-N(21)	132.5(4)
Cl(4)-Ta(2)-C(21)-N(21)	85.0(4)
C(30)-Ta(2)-C(21)-N(21)	-178.1(12)

C(31)-Ta(2)-C(21)-N(21)	-134.6(4)
N(22)-Ta(2)-C(21)-N(23)	78(3)
N(21)-Ta(2)-C(21)-N(23)	-110(4)
Cl(5)-Ta(2)-C(21)-N(23)	-106(3)
C(28)-Ta(2)-C(21)-N(23)	50(3)
Cl(6)-Ta(2)-C(21)-N(23)	171(3)
C(32)-Ta(2)-C(21)-N(23)	88(3)
C(29)-Ta(2)-C(21)-N(23)	22(4)
Cl(4)-Ta(2)-C(21)-N(23)	-25(3)
C(30)-Ta(2)-C(21)-N(23)	72(4)
C(31)-Ta(2)-C(21)-N(23)	115(3)
N(21)-Ta(2)-C(21)-N(22)	171.5(6)
Cl(5)-Ta(2)-C(21)-N(22)	175.8(4)
C(28)-Ta(2)-C(21)-N(22)	-28.0(5)
Cl(6)-Ta(2)-C(21)-N(22)	92.9(4)
C(32)-Ta(2)-C(21)-N(22)	9.6(5)
C(29)-Ta(2)-C(21)-N(22)	-56.0(5)
Cl(4)-Ta(2)-C(21)-N(22)	-103.5(4)
C(30)-Ta(2)-C(21)-N(22)	-6.6(15)
C(31)-Ta(2)-C(21)-N(22)	36.9(5)
C(21)-N(22)-C(22)-C(23)	-33.2(11)
Ta(2)-N(22)-C(22)-C(23)	136.9(9)
N(22)-C(22)-C(23)-C(24)	55.6(12)
C(21)-N(23)-C(24)-C(23)	22.0(12)
C(25)-N(23)-C(24)-C(23)	-155.8(8)
C(22)-C(23)-C(24)-N(23)	-49.5(12)
C(21)-N(23)-C(25)-C(26)	11.4(10)
C(24)-N(23)-C(25)-C(26)	-170.7(7)
N(23)-C(25)-C(26)-C(27)	-39.7(8)
C(21)-N(21)-C(27)-C(26)	-44.0(8)
Ta(2)-N(21)-C(27)-C(26)	-179.8(5)
C(25)-C(26)-C(27)-N(21)	55.6(7)
N(22)-Ta(2)-C(28)-C(29)	-162.7(4)
N(21)-Ta(2)-C(28)-C(29)	-131.7(4)
Cl(5)-Ta(2)-C(28)-C(29)	4.1(5)
Cl(6)-Ta(2)-C(28)-C(29)	112.4(4)

C(32)-Ta(2)-C(28)-C(29)	112.7(6)
Cl(4)-Ta(2)-C(28)-C(29)	-75.6(4)
C(30)-Ta(2)-C(28)-C(29)	36.1(4)
C(31)-Ta(2)-C(28)-C(29)	76.0(4)
C(21)-Ta(2)-C(28)-C(29)	-148.3(4)
N(22)-Ta(2)-C(28)-C(32)	84.6(4)
N(21)-Ta(2)-C(28)-C(32)	115.6(4)
Cl(5)-Ta(2)-C(28)-C(32)	-108.6(4)
Cl(6)-Ta(2)-C(28)-C(32)	-0.3(4)
C(29)-Ta(2)-C(28)-C(32)	-112.7(6)
Cl(4)-Ta(2)-C(28)-C(32)	171.7(4)
C(30)-Ta(2)-C(28)-C(32)	-76.6(4)
C(31)-Ta(2)-C(28)-C(32)	-36.7(4)
C(21)-Ta(2)-C(28)-C(32)	98.9(4)
N(22)-Ta(2)-C(28)-C(33)	-41.0(7)
N(21)-Ta(2)-C(28)-C(33)	-9.9(8)
Cl(5)-Ta(2)-C(28)-C(33)	125.8(6)
Cl(6)-Ta(2)-C(28)-C(33)	-125.9(6)
C(32)-Ta(2)-C(28)-C(33)	-125.6(8)
C(29)-Ta(2)-C(28)-C(33)	121.7(8)
Cl(4)-Ta(2)-C(28)-C(33)	46.1(6)
C(30)-Ta(2)-C(28)-C(33)	157.8(7)
C(31)-Ta(2)-C(28)-C(33)	-162.3(7)
C(21)-Ta(2)-C(28)-C(33)	-26.6(7)
C(32)-C(28)-C(29)-C(30)	0.3(7)
C(33)-C(28)-C(29)-C(30)	171.9(6)
Ta(2)-C(28)-C(29)-C(30)	-67.3(5)
C(32)-C(28)-C(29)-C(34)	-172.1(7)
C(33)-C(28)-C(29)-C(34)	-0.5(11)
Ta(2)-C(28)-C(29)-C(34)	120.3(7)
C(32)-C(28)-C(29)-Ta(2)	67.6(4)
C(33)-C(28)-C(29)-Ta(2)	-120.8(7)
N(22)-Ta(2)-C(29)-C(30)	135.8(4)
N(21)-Ta(2)-C(29)-C(30)	-139.1(5)
Cl(5)-Ta(2)-C(29)-C(30)	-60.7(4)
C(28)-Ta(2)-C(29)-C(30)	116.0(6)

Cl(6)-Ta(2)-C(29)-C(30)	25.8(5)
C(32)-Ta(2)-C(29)-C(30)	77.2(4)
Cl(4)-Ta(2)-C(29)-C(30)	-146.2(4)
C(31)-Ta(2)-C(29)-C(30)	37.0(4)
C(21)-Ta(2)-C(29)-C(30)	165.8(4)
N(22)-Ta(2)-C(29)-C(28)	19.8(5)
N(21)-Ta(2)-C(29)-C(28)	104.9(5)
Cl(5)-Ta(2)-C(29)-C(28)	-176.7(4)
Cl(6)-Ta(2)-C(29)-C(28)	-90.2(4)
C(32)-Ta(2)-C(29)-C(28)	-38.8(4)
Cl(4)-Ta(2)-C(29)-C(28)	97.8(4)
C(30)-Ta(2)-C(29)-C(28)	-116.0(6)
C(31)-Ta(2)-C(29)-C(28)	-79.0(4)
C(21)-Ta(2)-C(29)-C(28)	49.8(5)
N(22)-Ta(2)-C(29)-C(34)	-102.1(7)
N(21)-Ta(2)-C(29)-C(34)	-17.0(10)
Cl(5)-Ta(2)-C(29)-C(34)	61.4(7)
C(28)-Ta(2)-C(29)-C(34)	-121.9(9)
Cl(6)-Ta(2)-C(29)-C(34)	147.9(6)
C(32)-Ta(2)-C(29)-C(34)	-160.7(8)
Cl(4)-Ta(2)-C(29)-C(34)	-24.0(7)
C(30)-Ta(2)-C(29)-C(34)	122.1(9)
C(31)-Ta(2)-C(29)-C(34)	159.1(8)
C(21)-Ta(2)-C(29)-C(34)	-72.1(8)
C(28)-C(29)-C(30)-C(31)	-1.2(8)
C(34)-C(29)-C(30)-C(31)	171.4(7)
Ta(2)-C(29)-C(30)-C(31)	-66.0(5)
C(28)-C(29)-C(30)-C(35)	-171.5(7)
C(34)-C(29)-C(30)-C(35)	1.1(12)
Ta(2)-C(29)-C(30)-C(35)	123.7(8)
C(28)-C(29)-C(30)-Ta(2)	64.8(5)
C(34)-C(29)-C(30)-Ta(2)	-122.6(7)
N(22)-Ta(2)-C(30)-C(29)	-66.3(5)
N(21)-Ta(2)-C(30)-C(29)	121.7(6)
Cl(5)-Ta(2)-C(30)-C(29)	116.7(4)
C(28)-Ta(2)-C(30)-C(29)	-37.4(4)

Cl(6)-Ta(2)-C(30)-C(29)	-159.5(4)
C(32)-Ta(2)-C(30)-C(29)	-79.0(4)
Cl(4)-Ta(2)-C(30)-C(29)	33.7(4)
C(31)-Ta(2)-C(30)-C(29)	-115.0(6)
C(21)-Ta(2)-C(30)-C(29)	-61.1(14)
N(22)-Ta(2)-C(30)-C(31)	48.8(6)
N(21)-Ta(2)-C(30)-C(31)	-123.3(6)
Cl(5)-Ta(2)-C(30)-C(31)	-128.3(4)
C(28)-Ta(2)-C(30)-C(31)	77.7(4)
Cl(6)-Ta(2)-C(30)-C(31)	-44.5(4)
C(32)-Ta(2)-C(30)-C(31)	36.0(4)
C(29)-Ta(2)-C(30)-C(31)	115.0(6)
Cl(4)-Ta(2)-C(30)-C(31)	148.7(4)
C(21)-Ta(2)-C(30)-C(31)	53.9(15)
N(22)-Ta(2)-C(30)-C(35)	170.1(7)
N(21)-Ta(2)-C(30)-C(35)	-1.9(12)
Cl(5)-Ta(2)-C(30)-C(35)	-6.9(8)
C(28)-Ta(2)-C(30)-C(35)	-161.0(9)
Cl(6)-Ta(2)-C(30)-C(35)	76.9(8)
C(32)-Ta(2)-C(30)-C(35)	157.4(9)
C(29)-Ta(2)-C(30)-C(35)	-123.6(10)
Cl(4)-Ta(2)-C(30)-C(35)	-89.9(8)
C(31)-Ta(2)-C(30)-C(35)	121.4(10)
C(21)-Ta(2)-C(30)-C(35)	175.3(11)
C(29)-C(30)-C(31)-C(32)	1.6(8)
C(35)-C(30)-C(31)-C(32)	172.3(7)
Ta(2)-C(30)-C(31)-C(32)	-62.8(5)
C(29)-C(30)-C(31)-C(36)	-168.1(6)
C(35)-C(30)-C(31)-C(36)	2.6(11)
Ta(2)-C(30)-C(31)-C(36)	127.5(6)
C(29)-C(30)-C(31)-Ta(2)	64.4(5)
C(35)-C(30)-C(31)-Ta(2)	-124.9(8)
N(22)-Ta(2)-C(31)-C(32)	-29.9(5)
N(21)-Ta(2)-C(31)-C(32)	-104.0(5)
Cl(5)-Ta(2)-C(31)-C(32)	167.7(4)
C(28)-Ta(2)-C(31)-C(32)	38.2(4)

Cl(6)-Ta(2)-C(31)-C(32)	-109.4(4)
C(29)-Ta(2)-C(31)-C(32)	80.0(4)
Cl(4)-Ta(2)-C(31)-C(32)	76.0(4)
C(30)-Ta(2)-C(31)-C(32)	117.1(6)
C(21)-Ta(2)-C(31)-C(32)	-50.1(5)
N(22)-Ta(2)-C(31)-C(30)	-147.0(4)
N(21)-Ta(2)-C(31)-C(30)	138.9(5)
Cl(5)-Ta(2)-C(31)-C(30)	50.6(4)
C(28)-Ta(2)-C(31)-C(30)	-78.9(4)
Cl(6)-Ta(2)-C(31)-C(30)	133.5(4)
C(32)-Ta(2)-C(31)-C(30)	-117.1(6)
C(29)-Ta(2)-C(31)-C(30)	-37.1(4)
Cl(4)-Ta(2)-C(31)-C(30)	-41.1(5)
C(21)-Ta(2)-C(31)-C(30)	-167.1(4)
N(22)-Ta(2)-C(31)-C(36)	91.6(7)
N(21)-Ta(2)-C(31)-C(36)	17.5(10)
Cl(5)-Ta(2)-C(31)-C(36)	-70.9(7)
C(28)-Ta(2)-C(31)-C(36)	159.7(8)
Cl(6)-Ta(2)-C(31)-C(36)	12.1(7)
C(32)-Ta(2)-C(31)-C(36)	121.5(9)
C(29)-Ta(2)-C(31)-C(36)	-158.6(8)
Cl(4)-Ta(2)-C(31)-C(36)	-162.6(6)
C(30)-Ta(2)-C(31)-C(36)	-121.5(9)
C(21)-Ta(2)-C(31)-C(36)	71.4(8)
C(30)-C(31)-C(32)-C(28)	-1.4(7)
C(36)-C(31)-C(32)-C(28)	168.1(6)
Ta(2)-C(31)-C(32)-C(28)	-65.7(4)
C(30)-C(31)-C(32)-C(37)	-170.4(6)
C(36)-C(31)-C(32)-C(37)	-0.9(10)
Ta(2)-C(31)-C(32)-C(37)	125.3(7)
C(30)-C(31)-C(32)-Ta(2)	64.3(5)
C(36)-C(31)-C(32)-Ta(2)	-126.2(7)
C(29)-C(28)-C(32)-C(31)	0.7(7)
C(33)-C(28)-C(32)-C(31)	-170.6(7)
Ta(2)-C(28)-C(32)-C(31)	68.5(4)
C(29)-C(28)-C(32)-C(37)	168.8(7)

C(33)-C(28)-C(32)-C(37)	-2.4(12)
Ta(2)-C(28)-C(32)-C(37)	-123.4(7)
C(29)-C(28)-C(32)-Ta(2)	-67.8(4)
C(33)-C(28)-C(32)-Ta(2)	121.0(7)
N(22)-Ta(2)-C(32)-C(31)	152.6(4)
N(21)-Ta(2)-C(32)-C(31)	131.7(4)
Cl(5)-Ta(2)-C(32)-C(31)	-15.9(5)
C(28)-Ta(2)-C(32)-C(31)	-114.6(6)
Cl(6)-Ta(2)-C(32)-C(31)	65.1(4)
C(29)-Ta(2)-C(32)-C(31)	-76.0(4)
Cl(4)-Ta(2)-C(32)-C(31)	-123.8(4)
C(30)-Ta(2)-C(32)-C(31)	-35.9(4)
C(21)-Ta(2)-C(32)-C(31)	147.5(4)
N(22)-Ta(2)-C(32)-C(28)	-92.8(4)
N(21)-Ta(2)-C(32)-C(28)	-113.6(5)
Cl(5)-Ta(2)-C(32)-C(28)	98.7(4)
Cl(6)-Ta(2)-C(32)-C(28)	179.7(4)
C(29)-Ta(2)-C(32)-C(28)	38.6(4)
Cl(4)-Ta(2)-C(32)-C(28)	-9.2(4)
C(30)-Ta(2)-C(32)-C(28)	78.7(4)
C(31)-Ta(2)-C(32)-C(28)	114.6(6)
C(21)-Ta(2)-C(32)-C(28)	-97.9(4)
N(22)-Ta(2)-C(32)-C(37)	32.2(7)
N(21)-Ta(2)-C(32)-C(37)	11.4(9)
Cl(5)-Ta(2)-C(32)-C(37)	-136.3(6)
C(28)-Ta(2)-C(32)-C(37)	125.0(8)
Cl(6)-Ta(2)-C(32)-C(37)	-55.3(6)
C(29)-Ta(2)-C(32)-C(37)	163.6(8)
Cl(4)-Ta(2)-C(32)-C(37)	115.8(6)
C(30)-Ta(2)-C(32)-C(37)	-156.3(8)
C(31)-Ta(2)-C(32)-C(37)	-120.4(8)
C(21)-Ta(2)-C(32)-C(37)	27.1(7)

Observed and calculated structure factors for $(C_5Me_5)Ta(hpp)Cl_3$

h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s
2	0	0	0	153	1	20	4	0	17	16	15	6	10	0	112	103	3	36	2	1	160	156	5	-15	5	1	314	316	2
4	0	0	34	1658	11	22	4	0	165	170	2	8	10	0	214	207	3	38	2	1	40	10	18	-13	5	1	104	109	2
6	0	0	93	84	1	24	4	0	48	52	7	10	10	0	114	108	4	-37	3	1	32	45	31	-11	5	1	218	222	1
8	0	0	727	665	5	26	4	0	87	89	4	12	10	0	127	127	4	-35	3	1	123	121	3	-9	5	1	24	37	3
10	0	0	126	138	1	28	4	0	38	41	17	14	10	0	93	77	10	-33	3	1	16	17	16	-7	5	1	174	174	1
12	0	0	678	655	4	30	4	0	77	81	5	16	10	0	103	104	5	-31	3	1	107	112	5	-5	5	1	152	162	1
14	0	0	190	196	2	32	4	0	36	41	15	18	10	0	81	80	7	-29	3	1	0	10	1	-3	5	1	255	256	1
16	0	0	571	571	4	34	4	0	98	99	4	1	11	0	98	93	7	-27	3	1	171	162	4	-1	5	1	9	18	9
18	0	0	70	64	3	36	4	0	38	37	29	3	11	0	124	117	5	-25	3	1	45	41	4	1	5	1	198	197	1
20	0	0	413	415	3	1	5	0	174	175	1	5	11	0	72	62	6	-23	3	1	199	193	2	3	5	1	119	124	1
22	0	0	37	29	9	3	5	0	4	20	4	7	11	0	117	109	4	-21	3	1	18	3	17	5	5	1	157	154	1
24	0	0	346	343	5	5	5	0	154	153	1	9	11	0	15	28	15	-19	3	1	269	260	1	7	5	1	64	61	3
26	0	0	155	162	3	7	5	0	133	137	2	-37	1	1	17	9	16	-17	3	1	111	104	2	9	5	1	190	188	2
28	0	0	71	88	7	9	5	0	161	162	1	-35	1	1	177	185	3	-15	3	1	463	446	2	11	5	1	25	32	4
30	0	0	20	50	20	11	5	0	141	150	1	-33	1	1	32	25	12	-13	3	1	260	258	1	13	5	1	153	154	1
32	0	0	47	46	8	13	5	0	244	239	2	-31	1	1	307	288	3	-11	3	1	516	502	3	15	5	1	100	111	3
34	0	0	54	54	10	15	5	0	274	276	1	-29	1	1	42	42	6	-9	3	1	182	189	1	17	5	1	64	64	2
36	0	0	64	53	7	17	5	0	289	295	2	-27	1	1	517	491	3	-7	3	1	393	390	2	19	5	1	160	161	2
38	0	0	39	40	38	19	5	0	391	379	3	-25	1	1	94	88	2	-5	3	1	35	34	1	21	5	1	137	143	2
1	1	0	8	50	4	21	5	0	328	323	2	-23	1	1	596	561	3	-3	3	1	57	59	1	23	5	1	29	16	11
3	1	0	225	226	7	23	5	0	385	366	3	-21	1	1	196	187	1	-1	3	1	124	128	1	25	5	1	143	137	3
5	1	0	241	224	1	25	5	0	199	196	3	-19	1	1	712	677	3	1	3	1	133	133	1	27	5	1	28	44	16
7	1	0	133	156	1	27	5	0	404	380	5	-17	1	1	202	194	1	3	3	1	134	145	1	29	5	1	90	89	4
9	1	0	24	33	2	29	5	0	65	72	6	-15	1	1	875	812	4	5	3	1	113	128	1	31	5	1	115	124	5
11	1	0	26	30	2	31	5	0	359	338	3	-13	1	1	232	231	1	7	3	1	196	182	2	33	5	1	28	21	28
13	1	0	81	73	1	33	5	0	27	25	27	-11	1	1	703	668	3	9	3	1	11	10	10	-32	6	1	126	129	4
15	1	0	100	116	1	0	6	0	251	233	2	-9	1	1	254	249	1	11	3	1	168	164	1	-30	6	1	56	49	7
17	1	0	185	179	1	2	6	0	44	39	2	-7	1	1	653	618	3	13	3	1	132	130	1	-28	6	1	137	142	3
19	1	0	286	281	1	4	6	0	218	225	1	-5	1	1	322	298	2	15	3	1	64	65	2	-26	6	1	38	37	10
21	1	0	100	95	2	6	6	0	55	62	2	-3	1	1	1038	882	49	17	3	1	136	133	2	-24	6	1	156	164	2
23	1	0	231	239	2	8	6	0	263	266	1	-1	1	1	0	635	1	19	3	1	69	70	2	-22	6	1	20	6	19
25	1	0	110	116	3	10	6	0	62	72	3	1	1	1	0	851	1	21	3	1	58	62	3	-20	6	1	116	118	2
27	1	0	174	170	2	12	6	0	456	449	4	3	1	1	584	535	6	23	3	1	19	24	19	-18	6	1	82	88	4
29	1	0	144	136	2	14	6	0	19	12	13	5	1	1	204	206	1	25	3	1	55	61	4	-16	6	1	50	49	3
31	1	0	154	145	4	16	6	0	283	280	2	7	1	1	88	75	1	27	3	1	32	25	10	-14	6	1	197	205	3
33	1	0	75	70	4	18	6	0	88	81	3	9	1	1	348	344	1	29	3	1	75	81	3	-12	6	1	57	62	6
35	1	0	135	134	3	20	6	0	113	113	2	11	1	1	82	76	1	31	3	1	90	94	3	-10	6	1	247	243	2
37	1	0	27	47	27	22	6	0	87	95	4	13	1	1	132	133	2	33	3	1	83	89	5	-8	6	1	115	126	1
0	2	0	344	348	2	24	6	0	133	133	3	15	1	1	38	47	2	35	3	1	120	127	4	-6	6	1	197	205	1
2	2	0	160	147	1	26	6	0	77	84	5	17	1	1	90	96	3	37	3	1	70	66	7	-4	6	1	247	255	2
4	2	0	676	617	5	28	6	0	127	117	5	19	1	1	169	169	1	-36	4	1	137	145	6	-2	6	1	180	188	1
6	2	0	134	148	1	30	6	0	117	120	5	21	1	1	134	132	1	-34	4	1	234	229	3	0	6	1	414	404	2
8	2	0	686	655	4	32	6	0	38	45	16	23	1	1	147	157	2	-32	4	1	138	133	5	2	6	1	223	208	1
10	2	0	173	179	1	1	7	0	72	69	3	25	1	1	116	119	2	-30	4	1	217	214	3	4	6	1	408	405	2
12	2	0	677	639	3	3	7	0	95	94	2	27	1	1	219	219	2	-28	4	1	190	195	3	6	6	1	149	151	1
14	2	0	146	154	1	5	7	0	241	233	4	29	1	1	188	186	2	-26	4	1	61	61	4	8	6	1	354	350	2
16	2	0	449	445	2	7	7	0	95	94	3	31	1	1	329	324	2	-24	4	1	113	115	3	10	6	1	35	44	3
18	2	0	172	172	1	9	7	0	242	232	4	33	1	1	104	115	3	-22	4	1	23	30	9	12	6	1	286	278	2
20	2	0	196	202	1	11	7	0	46	48	4	35	1	1	263	253	3	-20	4	1	32	29	4	14	6	1	16	27	15
22	2	0	102	104	2	13	7	0	168	163	2	37	1	1	93	97	5	-18	4	1	56	56	2	16	6	1	375	364	3
24	2	0	150	155	2	15	7	0	62	70	4	-38	2	1	134	135	4	-16	4	1	0	13	1	18	6	1	58	63	4
26	2	0	104	109	2	17	7	0	133	137	5	-36	2	1	92	86	5	-14	4	1	17	18	7	20	6	1	358	352	3
28	2	0	35	42	7	19	7	0	135	135	2	-34	2	1	134	139	4	-12	4	1	58	61	2	22	6	1	83	83	5
30	2	0	14	12	14	21	7	0	133	131	5	-32	2	1	136	133	3	-10	4	1	37	45	2	24	6	1	297	287	2
32	2	0	22	24	22	23	7	0	173	166	3	-30	2	1	142	150	3	-8	4	1	330	320	1	26	6	1	123	123	3
34	2	0	24	29	23	25	7	0	59	53	6	-28	2	1	219	216	2	-6	4	1	42	46	2	28	6	1	221	212	3
36	2	0	58	60	8	27	7	0	129	131	4	-26	2	1	173	179	2	-4	4	1	377	379	2	30	6	1	101	105	5
38	2	0	0	10	1	29	7	0	0	41	1	-24	2	1	97	99	3	-2	4	1	280	275	1	32	6	1	146	149	4
1	3	0	96	96	1	0	8	0	520	494	5	-22	2	1	288	284	2	0	4	1	570	559	2	-29	7	1	96	93	13
3	3	0	208	209	1	2	8	0	0	12	1	-20	2	1	86	87	1	2	4	1	31	17	6	-27	7	1	220	219	4
5	3	0	28	30	1	4	8	0	442	420	3	-18	2	1	144	141	1	4	4	1	936	846	4	-25	7	1	103	105	4
7	3	0	382	381	2	6	8	0	33	41	10	-16	2	1	0	7	1	6	4	1	217	225	1	-23	7	1	226	217	3
9	3	0	58	59	1	8	8	0	367	351	3	-14	2	1	36	39	2	8	4	1	860	786	4	-21	7	1	80	77	4
11	3	0	371	375	2	10	8	0	31	28	7	-12	2	1	265	260	1	10	4	1	18	18	4	-19	7	1	274	271	2
13	3	0	393	383	2	12	8	0	315	314	3	-10	2	1	157	154	1	12	4	1	876	815	4	-17	7	1	47	39	4
15	3	0	523	501	2	14	8	0	72	68	4	-8	2	1	478	459	2	14	4	1	59	60	2	-15	7	1	416	400	3
17	3	0	192	187	1	16	8	0	239	229	3	-6	2	1	159	157	1	16	4	1	706	671	3	-13	7	1	125	127	2
19	3	0	435	432	3	18	8	0	66	68	6	-4	2	1	337	340	2	18	4	1	19	41	10	-11	7	1	387	367	2
21	3	0	47	62	3	20	8	0	190	186	5	-2	2	1	144	156	1	20	4	1	563	542	3	-9	7	1	179	170	2
23	3	0	415	399	2	22	8	0	21	16	21	0	2	1	409	387	2	22	4	1	28	38	9	-7	7	1	278	274	2
25	3	0	210	211	2	24	8	0	119	125	7	2	2	1	13	19	2	24	4	1	505	479	3	-5	7	1	134	134	2
27	3	0	397	382	3	26	8	0	0	6	1	4	2	1	520	503	2	26	4	1	62	71	5	-3	7	1	340	342	3
29	3	0	135	135	3	1	9	0	177	166	2	6	2	1	112	124	1	28	4	1	330	328	3	-1	7	1	78	81	4
31	3	0	365	347	4	3	9	0	192	177	3	8	2	1	593	556	3	30	4	1	101	110	7	1	7	1	274	275	2
33	3	0	32	43	24	5	9	0	192	183	2	10	2	1	302	291	1	32	4	1	214	206	3	3	7	1	0	10	1
35	3	0	308	288	3	7	9	0	123	112	3	12	2	1	532	527	2	34	4	1	54	48	8	5	7	1	235	238	2
37	3	0	82	82	6	9	9	0	139	132	4	14	2	1	81	71	1	36	4	1	144	145	4	7	7	1	97	94	2

h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s
0	4	0	139	143	1	11	9	0	33	31	10	16	2	1	534	515	4	-35	5	1	32	37	19	9	7	1	273	262	4
2	4	0	18	12	5	13	9	0	59	62	5	18	2	1	259	263	1	-33	5	1	128	126	4	11	7	1	52	57	4
4	4	0	24	12	7	15	9	0	59	45	6	20	2	1	320	316	2	-31	5	1	69	68	5	13	7	1	190	189	4
6	4	0	32	39	4	17	9	0	95	89	5	22	2	1	49	59	5	-29	5	1	66	70	7	15	7	1	51	51	4
8	4	0	124	124	2	19	9	0	109	113	4	24	2	1	314	310	2	-27	5	1	97	97	6	17	7	1	51	45	4
10	4	0	76	92	2	21	9	0	72	74	6	26	2	1	81	87	3	-25	5	1	37	47	9	19	7	1	109	109	3
12	4	0	19	7	5	23	9	0	99	102	6	28	2	1	262	255	2	-23	5	1	35	40	7	21	7	1	54	56	5
14	4	0	117	115	1	0	10	0	223	212	4	30	2	1	2	16	1	-21	5	1	116	114	3	23	7	1	130	133	3
16	4	0	15	15	14	2	10	0	3	35	3	32	2	1	177	172	5	-19	5	1	109	107	2	25	7	1	0	24	1
18	4	0	184	178	1	4	10	0	255	235	3	34	2	1	32	9	26	-17	5	1	100	106	3	27	7	1	171	175	4
29	7	1	36	43	20	-28	0	2	327	314	5	-8	2	2	44	50	2	16	4	2	53	49	3	-15	7	2	308	299	2
-26	8	1	70	74	10	-26	0	2	465	447	8	-6	2	2	50	45	1	18	4	2	12	11	12	-13	7	2	93	92	2
-24	8	1	92	85	5	-24	0	2	463	454	4	-4	2	2	42	41	1	20	4	2	46	52	3	-11	7	2	333	324	5
-22	8	1	159	157	4	-22	0	2	349	343	3	-2	2	2	126	135	1	22	4	2	54	56	4	-9	7	2	30	27	8
-20	8	1	120	107	4	-20	0	2	410	413	3	0	2	2	204	205	1	24	4	2	119	120	3	-7	7	2	212	203	2
-18	8	1	176	171	4	-18	0	2	558	542	6	2	2	2	301	297	1	26	4	2	22	6	21	-5	7	2	143	147	2
-16	8	1	41	31	6	-16	0	2	530	503	3	4	2	2	239	239	1	28	4	2	0	18	1	-3	7	2	264	260	2
-14	8	1	151	151	4	-14	0	2	374	355	2	6	2	2	317	309	1	30	4	2	23	19	23	-1	7	2	134	129	2
-12	8	1	26	14	12	-12	0	2	164	185	1	8	2	2	131	145	1	32	4	2	25	27	24	1	7	2	338	333	3
-10	8	1	201	195	2	-10	0	2	155	164	2	10	2	2	231	240	1	34	4	2	28	40	28	3	7	2	35	32	4
-8	8	1	36	33	5	-8	0	2	384	379	2	12	2	2	484	466	2	36	4	2	0	44	1	5	7	2	319	311	3
-6	8	1	168	160	3	-6	0	2	119	116	2	14	2	2	151	154	1	-35	5	2	40	32	15	7	7	2	189	184	2
-4	8	1	4	1	4	-4	0	2	0	58	1	16	2	2	663	638	3	-33	5	2	27	5	24	9	7	2	124	131	5
-2	8	1	98	96	3	-2	0	2	0	11	1	18	2	2	132	145	3	-31	5	2	50	47	9	11	7	2	295	289	2
0	8	1	22	17	16	0	0	2	0	49	1	20	2	2	417	410	2	-29	5	2	46	51	6	13	7	2	0	11	1
2	8	1	186	185	2	2	0	2	8	123	8	22	2	2	10	16	10	-27	5	2	162	172	3	15	7	2	240	232	3
4	8	1	24	7	11	4	0	2	429	427	8	24	2	2	243	243	2	-25	5	2	0	26	1	17	7	2	33	35	9
6	8	1	208	205	3	6	0	2	42	14	3	26	2	2	28	25	8	-23	5	2	338	332	3	19	7	2	189	184	3
8	8	1	114	122	2	8	0	2	156	143	2	28	2	2	336	322	2	-21	5	2	20	29	15	21	7	2	67	73	4
10	8	1	0	8	1	10	0	2	123	127	1	30	2	2	41	41	6	-19	5	2	351	346	3	23	7	2	151	152	3
12	8	1	145	136	2	12	0	2	277	288	2	32	2	2	322	306	4	-17	5	2	41	44	10	25	7	2	76	57	6
14	8	1	58	57	5	14	0	2	130	132	4	34	2	2	54	63	6	-15	5	2	328	330	2	27	7	2	111	102	7
16	8	1	91	89	3	16	0	2	543	553	4	36	2	2	243	241	3	-13	5	2	20	13	5	29	7	2	16	22	15
18	8	1	48	54	8	18	0	2	25	41	7	-37	3	2	88	79	7	-11	5	2	462	447	2	-28	8	2	175	167	7
20	8	1	31	41	12	20	0	2	707	677	5	-35	3	2	38	35	11	-9	5	2	6	15	6	-26	8	2	195	193	6
22	8	1	85	81	7	22	0	2	71	78	4	-33	3	2	98	97	4	-7	5	2	670	642	3	-24	8	2	193	185	4
24	8	1	23	16	22	24	0	2	640	617	5	-31	3	2	37	12	9	-5	5	2	42	42	2	-22	8	2	146	143	6
26	8	1	111	98	8	26	0	2	40	21	7	-29	3	2	40	36	6	-3	5	2	756	709	5	-20	8	2	116	120	4
-23	9	1	253	250	4	28	0	2	634	592	6	-27	3	2	114	112	3	-1	5	2	218	220	1	-18	8	2	136	126	3
-21	9	1	53	53	8	30	0	2	47	52	9	-25	3	2	22	31	12	1	5	2	791	733	4	-16	8	2	75	77	4
-19	9	1	215	214	3	32	0	2	443	417	4	-23	3	2	239	248	2	3	5	2	394	378	2	-14	8	2	149	139	3
-17	9	1	59	62	6	34	0	2	0	24	1	-21	3	2	110	115	3	5	5	2	594	564	3	-12	8	2	85	81	5
-15	9	1	213	207	5	36	0	2	270	261	4	-19	3	2	370	364	2	7	5	2	377	368	2	-10	8	2	116	113	3
-13	9	1	65	58	5	38	0	2	62	53	16	-17	3	2	90	87	2	9	5	2	371	376	2	-8	8	2	103	102	3
-11	9	1	299	284	5	-37	1	2	21	14	21	-15	3	2	525	512	2	11	5	2	267	264	1	-6	8	2	59	63	7
-9	9	1	108	108	4	-35	1	2	64	56	6	-13	3	2	163	161	1	13	5	2	357	354	2	-4	8	2	88	99	3
-7	9	1	291	286	3	-33	1	2	17	26	17	-11	3	2	715	680	3	15	5	2	221	218	1	-2	8	2	73	66	3
-5	9	1	155	153	3	-31	1	2	4	31	4	-9	3	2	305	303	1	17	5	2	223	231	1	0	8	2	8	8	8
-3	9	1	192	187	2	-29	1	2	20	6	19	-7	3	2	793	741	4	19	5	2	155	157	2	2	8	2	38	34	6
-1	9	1	177	175	2	-27	1	2	17	22	17	-5	3	2	172	179	1	21	5	2	124	125	2	4	8	2	131	130	2
1	9	1	117	121	4	-25	1	2	63	68	3	-3	3	2	811	748	4	23	5	2	105	106	3	6	8	2	33	26	9
3	9	1	141	140	3	-23	1	2	102	108	2	-1	3	2	225	221	1	25	5	2	32	52	9	8	8	2	205	208	3
5	9	1	79	74	3	-21	1	2	56	61	3	1	3	2	562	534	2	27	5	2	61	65	4	10	8	2	46	52	9
7	9	1	33	49	7	-19	1	2	89	100	1	3	3	2	528	507	3	29	5	2	0	3	1	12	8	2	226	222	2
9	9	1	59	56	4	-17	1	2	10	10	10	5	3	2	514	515	3	31	5	2	0	8	1	14	8	2	44	38	8
11	9	1	23	9	23	-15	1	2	198	216	1	7	3	2	329	318	3	33	5	2	0	9	1	16	8	2	247	237	3
13	9	1	7	9	7	-13	1	2	96	92	1	9	3	2	691	658	3	-32	6	2	109	121	4	18	8	2	42	32	10
15	9	1	0	21	1	-11	1	2	595	559	2	11	3	2	144	154	1	-30	6	2	166	175	5	20	8	2	273	255	3
17	9	1	34	22	12	-9	1	2	431	420	2	13	3	2	587	560	2	-28	6	2	108	111	3	22	8	2	53	44	8
19	9	1	17	6	17	-7	1	2	104	114	1	15	3	2	260	256	1	-26	6	2	157	157	3	24	8	2	308	296	5
21	9	1	56	65	11	-5	1	2	189	180	1	17	3	2	335	327	2	-24	6	2	51	69	5	26	8	2	0	22	1
23	9	1	82	80	7	-3	1	2	423	394	4	19	3	2	79	79	2	-22	6	2	127	126	3	-23	9	2	0	32	1
-18	10	1	188	175	3	-1	1	2	0	179	1	21	3	2	228	230	2	-20	6	2	78	86	3	-21	9	2	223	207	3
-16	10	1	70	63	8	1	1	2	114	479	16	23	3	2	17	11	16	-18	6	2	227	224	2	-19	9	2	0	6	1
-14	10	1	114	110	6	3	1	2	277	275	1	25	3	2	136	143	4	-16	6	2	116	116	2	-17	9	2	177	164	3
-12	10	1	99	96	13	5	1	2	561	532	2	27	3	2	22	23	17	-14	6	2	310	304	2	-15	9	2	18	10	18
-10	10	1	120	101	5	7	1	2	168	174	1	29	3	2	27	26	14	-12	6	2	97	101	4	-13	9	2	131	127	3
-8	10	1	107	105	7	9	1	2	319	314	1	31	3	2	50	53	9	-10	6	2	215	216	2	-11	9	2	29	6	12
-6	10	1	141	132	3	11	1	2	83	80	1	33	3	2	19	27	18	-8	6	2	81	87	2	-9	9	2	118	120	4
-4	10	1	101	94	4	13	1	2	78	83	1	35	3	2	127	121	4	-6	6	2	338	327	2	-7	9	2	0	5	1
-2	10	1	130	121	5	15	1	2	104	109	1	37	3	2	23	6	23	-4	6	2	82	79	1	-5	9	2	25	15	12
0	10	1	95	100	6	17	1	2	27	18	5	-36	4	2	37	29	37	-2	6	2	252	249	1	-3	9	2	88	86	5
2	10	1	109	104	3	19	1	2	143	141	1	-34	4	2	50	44	8	0	6	2	97	104	1	-1	9	2	30	31	10
4	10	1	94	88	4	21	1	2	72	74	2	-32	4	2	38	48	11	2	6	2	137	137	1	1	9	2	158	157	2
6	10	1	74	57	8	23	1	2	27	21	9	-30	4	2	25	20	16	4	6	2	157	158	2	3	9	2	19	12	19
8	10	1	84	89	6	25	1	2	46	50	7	-28	4	2	59	67	4	6	6	2	121	117	1	5	9	2	113	111	5
10	10	1	10	6	10	27	1	2	15	27	15	-26	4	2	9	18	9	8	6	2	150	157	2	7	9	2	79	74	4
12	10	1	113	117	4	29	1	2	0	7	1	-24	4	2	74	78	6	10	6	2	135	132	2	9	9	2	93	92	4
14	10	1	24	9	24	31	1	2	13	11	12	-22	4	2	22	4	12	12	6	2	228	227	1	11	9	2	84	80	6

h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s
16	10	1	135	129	4	33	1	2	12	10	12	-20	4	2	52	57	2	14	6	2	82	88	2	13	9	2	79	74	4
18	10	1	0	4	1	35	1	2	30	21	15	-18	4	2	167	161	1	16	6	2	340	327	2	15	9	2	59	54	5
-11	11	1	96	96	6	37	1	2	35	30	14	-16	4	2	78	84	2	18	6	2	81	83	3	17	9	2	91	84	4
-9	11	1	98	82	9	-38	2	2	194	195	6	-14	4	2	158	162	1	20	6	2	187	184	2	19	9	2	109	90	4
-7	11	1	92	90	5	-36	2	2	170	169	3	-12	4	2	154	156	1	22	6	2	52	60	4	21	9	2	116	113	6
-5	11	1	90	81	10	-34	2	2	212	201	3	-10	4	2	27	24	3	24	6	2	113	116	3	23	9	2	115	117	6
-3	11	1	40	40	10	-32	2	2	178	176	3	-8	4	2	155	147	1	26	6	2	10	24	10	-18	10	2	48	26	14
-1	11	1	96	90	5	-30	2	2	250	253	2	-6	4	2	143	143	1	28	6	2	190	191	3	-16	10	2	136	129	4
1	11	1	20	20	19	-28	2	2	174	168	2	-4	4	2	14	12	5	30	6	2	44	11	11	-14	10	2	41	31	12
3	11	1	153	145	3	-26	2	2	276	266	2	-2	4	2	221	211	1	32	6	2	193	191	4	-12	10	2	145	132	4
5	11	1	11	15	10	-24	2	2	238	239	2	0	4	2	160	152	1	-31	7	2	37	42	37	-10	10	2	20	21	19
7	11	1	188	183	3	-22	2	2	166	166	2	2	4	2	208	211	1	-29	7	2	126	121	6	-8	10	2	106	97	3
9	11	1	65	62	6	-20	2	2	336	334	2	4	4	2	91	97	1	-27	7	2	13	28	13	-6	10	2	88	79	4
-38	0	2	271	246	6	-18	2	2	251	240	1	6	4	2	225	226	1	-25	7	2	147	144	5	-4	10	2	0	18	1
-36	0	2	231	218	5	-16	2	2	418	415	2	8	4	2	108	104	1	-23	7	2	41	34	10	-2	10	2	136	138	3
-34	0	2	323	307	4	-14	2	2	192	191	1	10	4	2	204	198	2	-21	7	2	124	122	4	0	10	2	38	25	7
-32	0	2	247	233	3	-12	2	2	349	347	1	12	4	2	92	99	1	-19	7	2	198	190	3	2	10	2	100	98	6
-30	0	2	476	441	4	-10	2	2	73	70	1	14	4	2	51	57	2	-17	7	2	69	65	3	4	10	2	45	48	8
6	10	2	75	68	5	22	2	3	152	150	1	-23	5	3	20	53	20	19	7	3	166	164	5	-38	0	4	41	35	41
8	10	2	94	93	4	24	2	3	234	227	4	-21	5	3	82	80	4	21	7	3	198	191	3	-36	0	4	0	5	1
10	10	2	80	74	6	26	2	3	91	94	3	-19	5	3	0	25	1	23	7	3	100	103	4	-34	0	4	28	28	28
12	10	2	100	100	15	28	2	3	240	244	3	-17	5	3	157	159	3	25	7	3	218	209	4	-32	0	4	0	9	1
14	10	2	113	104	5	30	2	3	52	57	5	-15	5	3	12	26	12	27	7	3	82	89	6	-30	0	4	161	173	3
16	10	2	103	103	4	32	2	3	208	214	2	-13	5	3	173	177	2	29	7	3	176	170	5	-28	0	4	43	40	13
18	10	2	101	96	7	34	2	3	30	28	15	-11	5	3	85	84	2	-28	8	3	57	45	10	-26	0	4	328	329	3
-11	11	2	141	153	7	36	2	3	189	195	3	-9	5	3	244	234	1	-26	8	3	61	39	8	-24	0	4	174	180	2
-9	11	2	107	89	8	-37	3	3	14	7	13	-7	5	3	80	76	2	-24	8	3	70	84	8	-22	0	4	374	369	2
-7	11	2	142	144	4	-35	3	3	124	118	4	-5	5	3	367	359	2	-22	8	3	66	70	14	-20	0	4	514	508	4
-5	11	2	82	88	9	-33	3	3	35	20	13	-3	5	3	120	118	1	-20	8	3	0	4	1	-18	0	4	316	303	3
-3	11	2	122	116	5	-31	3	3	94	98	3	-1	5	3	179	178	2	-18	8	3	105	101	3	-16	0	4	248	274	2
-1	11	2	50	57	9	-29	3	3	0	10	1	1	5	3	246	241	1	-16	8	3	90	87	4	-14	0	4	700	665	4
1	11	2	124	125	3	-27	3	3	64	73	5	3	5	3	169	166	1	-14	8	3	72	72	4	-12	0	4	265	274	2
3	11	2	30	31	15	-25	3	3	70	76	3	5	5	3	67	69	1	-12	8	3	86	87	4	-10	0	4	965	853	9
5	11	2	135	146	4	-23	3	3	58	60	3	7	5	3	92	99	1	-10	8	3	23	28	10	-8	0	4	379	378	2
7	11	2	24	19	24	-21	3	3	268	263	2	9	5	3	138	133	1	-8	8	3	169	167	3	-6	0	4	989	848	6
9	11	2	161	165	4	-19	3	3	30	30	4	11	5	3	106	108	1	-6	8	3	102	105	3	-4	0	4	1330	1006	12
-39	1	3	230	228	9	-17	3	3	332	328	1	13	5	3	288	291	2	-4	8	3	182	182	2	-2	0	4	17	1109	17
-37	1	3	72	70	7	-15	3	3	85	86	3	15	5	3	31	26	5	-2	8	3	153	146	2	0	0	4	0	1021	1
-35	1	3	250	234	3	-13	3	3	138	142	1	17	5	3	227	228	2	0	8	3	113	111	3	2	0	4	1005	840	25
-33	1	3	94	98	4	-11	3	3	184	182	1	19	5	3	75	77	4	2	8	3	176	176	2	4	0	4	445	414	3
-31	1	3	249	242	3	-9	3	3	87	95	1	21	5	3	75	68	3	4	8	3	112	108	2	6	0	4	411	391	3
-29	1	3	69	75	4	-7	3	3	293	294	1	23	5	3	104	98	3	6	8	3	233	221	2	8	0	4	522	512	3
-27	1	3	187	199	2	-5	3	3	142	141	1	25	5	3	117	115	3	8	8	3	124	117	2	10	0	4	309	302	4
-25	1	3	10	13	10	-3	3	3	132	142	1	27	5	3	25	17	22	10	8	3	267	257	4	12	0	4	596	581	3
-23	1	3	41	48	4	-1	3	3	20	15	2	29	5	3	113	109	3	12	8	3	37	54	7	14	0	4	319	314	2
-21	1	3	94	96	2	1	3	3	82	94	1	31	5	3	34	31	14	14	8	3	161	152	3	16	0	4	440	425	3
-19	1	3	23	20	3	3	3	3	35	33	1	33	5	3	82	85	6	16	8	3	0	21	1	18	0	4	76	65	3
-17	1	3	161	166	1	5	3	3	353	357	3	-32	6	3	20	22	20	18	8	3	168	158	3	20	0	4	289	282	2
-15	1	3	37	35	3	7	3	3	12	11	7	-30	6	3	227	224	3	20	8	3	33	24	13	22	0	4	54	56	4
-13	1	3	94	88	2	9	3	3	644	609	4	-28	6	3	41	49	8	22	8	3	133	131	4	24	0	4	223	227	5
-11	1	3	371	367	1	11	3	3	194	186	1	-26	6	3	250	245	2	24	8	3	0	23	1	26	0	4	17	26	16
-9	1	3	179	167	1	13	3	3	509	493	2	-24	6	3	147	148	3	26	8	3	85	84	7	28	0	4	29	22	11
-7	1	3	464	447	2	15	3	3	206	215	1	-22	6	3	282	275	2	-23	9	3	22	39	21	30	0	4	43	44	11
-5	1	3	35	34	1	17	3	3	212	211	1	-20	6	3	302	293	3	-21	9	3	0	3	1	32	0	4	159	149	4
-3	1	3	427	833	427	19	3	3	153	158	1	-18	6	3	298	290	2	-19	9	3	53	39	7	34	0	4	18	9	18
-1	1	3	89	312	89	21	3	3	60	62	2	-16	6	3	268	266	2	-17	9	3	0	15	1	36	0	4	114	120	5
1	1	3	1112	944	34	23	3	3	202	203	2	-14	6	3	268	266	2	-15	9	3	66	61	6	38	0	4	36	2	35
3	1	3	123	130	1	25	3	3	30	28	10	-12	6	3	254	251	2	-13	9	3	30	31	10	-39	1	4	140	134	5
5	1	3	936	817	4	27	3	3	110	123	4	-10	6	3	208	205	1	-11	9	3	97	94	3	-37	1	4	81	79	6
7	1	3	279	268	1	29	3	3	39	21	8	-8	6	3	383	373	2	-9	9	3	6	22	6	-35	1	4	126	115	3
9	1	3	593	568	2	31	3	3	115	119	3	-6	6	3	104	103	1	-7	9	3	180	178	3	-33	1	4	82	80	4
11	1	3	185	190	1	33	3	3	13	36	12	-4	6	3	344	338	2	-5	9	3	48	47	9	-31	1	4	81	85	5
13	1	3	768	727	3	35	3	3	99	110	5	-2	6	3	148	157	1	-3	9	3	257	258	2	-29	1	4	83	93	3
15	1	3	348	360	2	-36	4	3	126	121	4	0	6	3	273	280	1	-1	9	3	19	17	18	-27	1	4	150	149	2
17	1	3	633	598	3	-34	4	3	170	173	3	2	6	3	200	207	1	1	9	3	250	248	3	-25	1	4	66	64	3
19	1	3	306	314	1	-32	4	3	155	159	3	4	6	3	222	228	1	3	9	3	81	84	5	-23	1	4	122	130	2
21	1	3	483	462	2	-30	4	3	286	274	3	6	6	3	42	48	2	5	9	3	277	270	3	-21	1	4	106	117	1
23	1	3	228	232	2	-28	4	3	228	222	4	8	6	3	226	220	2	7	9	3	129	121	3	-19	1	4	122	121	1
25	1	3	364	352	2	-26	4	3	411	392	3	10	6	3	91	90	2	9	9	3	260	249	3	-17	1	4	7	9	7
27	1	3	226	216	2	-24	4	3	376	353	2	12	6	3	51	53	3	11	9	3	104	108	4	-15	1	4	50	50	1
29	1	3	289	275	2	-22	4	3	416	400	2	14	6	3	99	108	5	13	9	3	222	217	3	-13	1	4	150	146	1
31	1	3	142	143	2	-20	4	3	288	280	2	16	6	3	51	55	4	15	9	3	100	93	7	-11	1	4	26	15	2
33	1	3	117	119	3	-18	4	3	382	380	2	18	6	3	153	147	3	17	9	3	234	235	5	-9	1	4	60	57	1
35	1	3	53	61	6	-16	4	3	374	359	2	20	6	3	150	152	2	19	9	3	140	135	5	-7	1	4	133	131	1
37	1	3	68	83	7	-14	4	3	434	426	2	22	6	3	141	143	3	21	9	3	235	234	4	-5	1	4	20	8	1
-38	2	3	160	168	3	-12	4	3	592	567	3	24	6	3	177	179	5	23	9	3	138	142	4	-3	1	4	251	244	1
-36	2	3	153	142	4	-10	4	3	528	512	2	26	6	3	65	64	5	-18	10	3	85	89	7	-1	1	4	154	152	1
-34	2	3	184	169	3	-8	4	3	424	419	2	28	6	3	189	182	3	-16	10	3	91	82	7	1	1	4	407	392	2
-32	2	3	101	108	3	-6	4	3	610	587	3	30	6	3	0	23	1	-14	10	3	90	88	4	3	1	4	56	51	1

h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s
-30	2	3	133	134	3	-4	4	3	312	304	1	32	6	3	133	146	4	-12	10	3	78	86	6	5	1	4	169	182	1
-28	2	3	167	156	2	-2	4	3	171	164	1	-31	7	3	117	115	8	-10	10	3	99	96	5	7	1	4	128	119	1
-26	2	3	266	260	2	0	4	3	303	316	2	-29	7	3	130	133	4	-8	10	3	48	59	7	9	1	4	523	492	2
-24	2	3	217	215	2	2	4	3	39	30	1	-27	7	3	106	108	5	-6	10	3	143	138	3	11	1	4	38	31	3
-22	2	3	345	342	3	4	4	3	256	256	1	-25	7	3	101	92	9	-4	10	3	0	5	1	13	1	4	366	368	3
-20	2	3	194	181	1	6	4	3	110	113	1	-23	7	3	11	19	11	-2	10	3	221	215	3	15	1	4	191	188	1
-18	2	3	358	347	1	8	4	3	147	152	1	-21	7	3	107	106	4	0	10	3	0	9	1	17	1	4	188	187	1
-16	2	3	241	240	1	10	4	3	117	116	1	-19	7	3	51	45	5	2	10	3	247	233	4	19	1	4	202	206	1
-14	2	3	390	389	1	12	4	3	120	125	1	-17	7	3	133	129	2	4	10	3	0	10	1	21	1	4	148	148	1
-12	2	3	435	424	2	14	4	3	14	9	14	-15	7	3	114	112	4	6	10	3	226	205	3	23	1	4	86	94	2
-10	2	3	414	408	2	16	4	3	25	33	5	-13	7	3	144	146	2	8	10	3	33	40	10	25	1	4	261	257	2
-8	2	3	478	455	2	18	4	3	37	38	5	-11	7	3	188	183	4	10	10	3	169	151	4	27	1	4	26	25	8
-6	2	3	159	151	1	20	4	3	203	202	2	-9	7	3	213	210	3	12	10	3	52	45	8	29	1	4	227	232	3
-4	2	3	188	197	1	22	4	3	16	17	15	-7	7	3	196	201	2	14	10	3	135	136	4	31	1	4	48	53	7
-2	2	3	395	389	2	24	4	3	247	249	2	-5	7	3	233	222	2	16	10	3	97	92	6	33	1	4	104	110	3
0	2	3	201	190	1	26	4	3	22	26	21	-3	7	3	149	152	3	18	10	3	162	159	4	35	1	4	33	30	10
2	2	3	65	65	1	28	4	3	284	279	2	-1	7	3	155	160	2	-9	11	3	136	125	5	37	1	4	80	93	6
4	2	3	134	141	1	30	4	3	35	39	19	1	7	3	276	275	2	-7	11	3	112	106	11	-38	2	4	0	6	1
6	2	3	165	165	1	32	4	3	314	300	3	3	7	3	122	127	3	-5	11	3	97	98	6	-36	2	4	25	24	19
8	2	3	208	200	2	34	4	3	83	82	6	5	7	3	360	350	2	-3	11	3	134	136	4	-34	2	4	0	15	1
10	2	3	83	94	1	-35	5	3	0	36	1	7	7	3	138	142	2	-1	11	3	57	60	10	-32	2	4	0	5	1
12	2	3	266	265	1	-33	5	3	103	108	4	9	7	3	378	377	3	1	11	3	120	128	4	-30	2	4	112	113	4
14	2	3	27	25	3	-31	5	3	16	19	15	11	7	3	198	203	2	3	11	3	0	20	1	-28	2	4	16	31	16
16	2	3	129	141	2	-29	5	3	146	142	6	13	7	3	347	337	3	5	11	3	160	152	4	-26	2	4	225	224	2
18	2	3	169	172	1	-27	5	3	31	23	9	15	7	3	232	224	2	7	11	3	4	14	4	-24	2	4	19	27	18
20	2	3	200	204	1	-25	5	3	68	65	5	17	7	3	241	240	3	9	11	3	171	153	5	-22	2	4	318	312	2
-20	2	4	83	94	2	6	4	4	16	5	8	-23	7	4	148	139	3	-2	10	4	181	164	3	16	2	5	510	492	2
-18	2	4	449	432	2	8	4	4	189	188	1	-21	7	4	52	54	5	0	10	4	176	164	3	18	2	5	156	146	1
-16	2	4	251	251	4	10	4	4	54	57	1	-19	7	4	213	217	3	2	10	4	122	113	3	20	2	5	337	340	3
-14	2	4	612	571	2	12	4	4	90	94	1	-17	7	4	174	171	3	4	10	4	216	201	4	22	2	5	179	178	3
-12	2	4	308	310	1	14	4	4	119	117	1	-15	7	4	89	89	3	6	10	4	100	96	6	24	2	5	217	219	2
-10	2	4	516	498	2	16	4	4	73	71	2	-13	7	4	188	179	2	8	10	4	231	214	3	26	2	5	261	249	2
-8	2	4	393	383	2	18	4	4	107	116	2	-11	7	4	40	52	4	10	10	4	0	41	1	28	2	5	189	188	3
-6	2	4	546	521	2	20	4	4	86	94	2	-9	7	4	287	277	4	12	10	4	173	167	3	30	2	5	74	86	5
-4	2	4	470	451	2	22	4	4	160	155	2	-7	7	4	77	80	2	14	10	4	5	6	4	32	2	5	89	90	3
-2	2	4	492	463	2	24	4	4	39	54	7	-5	7	4	288	279	2	16	10	4	125	109	6	34	2	5	76	73	5
0	2	4	613	564	6	26	4	4	158	156	3	-3	7	4	0	11	1	18	10	4	0	3	1	36	2	5	21	22	21
2	2	4	471	460	2	28	4	4	26	11	17	-1	7	4	173	169	1	-9	11	4	146	138	5	-37	3	5	100	104	4
4	2	4	728	662	3	30	4	4	121	125	3	1	7	4	39	47	3	-7	11	4	0	16	1	-35	3	5	71	67	7
6	2	4	198	188	1	32	4	4	38	36	14	3	7	4	164	164	2	-5	11	4	163	158	5	-33	3	5	102	93	4
8	2	4	567	561	2	34	4	4	72	81	7	5	7	4	103	101	2	-3	11	4	0	5	1	-31	3	5	118	128	5
10	2	4	250	251	1	-35	5	4	217	222	6	7	7	4	208	199	2	-1	11	4	156	140	4	-29	3	5	112	111	2
12	2	4	526	512	2	-33	5	4	134	137	4	9	7	4	200	197	3	1	11	4	15	32	15	-27	3	5	208	208	2
14	2	4	131	141	1	-31	5	4	277	271	4	11	7	4	101	95	2	3	11	4	99	92	9	-25	3	5	153	149	2
16	2	4	251	252	1	-29	5	4	122	126	4	13	7	4	220	218	4	5	11	4	72	61	7	-23	3	5	174	174	2
18	2	4	74	78	2	-27	5	4	347	327	3	15	7	4	0	9	1	7	11	4	81	79	6	-21	3	5	164	175	2
20	2	4	86	91	2	-25	5	4	81	78	4	17	7	4	204	198	2	9	11	4	78	81	6	-19	3	5	144	139	1
22	2	4	84	92	2	-23	5	4	387	375	3	19	7	4	12	8	11	-39	1	5	127	123	4	-17	3	5	127	134	1
24	2	4	38	38	6	-21	5	4	109	107	2	21	7	4	200	192	4	-37	1	5	155	155	4	-15	3	5	265	255	1
26	2	4	32	26	7	-19	5	4	320	311	2	23	7	4	44	49	14	-35	1	5	203	201	4	-13	3	5	24	19	3
28	2	4	0	4	1	-17	5	4	133	134	2	25	7	4	132	139	4	-33	1	5	215	210	3	-11	3	5	357	362	1
30	2	4	49	56	6	-15	5	4	294	292	2	27	7	4	110	99	5	-31	1	5	269	259	2	-9	3	5	156	165	1
32	2	4	68	71	6	-13	5	4	0	2	1	29	7	4	125	127	5	-29	1	5	369	346	3	-7	3	5	323	310	1
34	2	4	0	37	1	-11	5	4	327	325	2	-28	8	4	80	82	6	-27	1	5	380	364	2	-5	3	5	86	85	1
36	2	4	89	88	5	-9	5	4	141	142	1	-26	8	4	72	76	6	-25	1	5	318	316	4	-3	3	5	341	338	2
-37	3	4	131	137	4	-7	5	4	167	170	2	-24	8	4	96	101	5	-23	1	5	533	497	2	-1	3	5	152	150	1
-35	3	4	272	266	3	-5	5	4	114	109	1	-22	8	4	116	129	4	-21	1	5	248	248	1	1	3	5	114	112	1
-33	3	4	143	137	3	-3	5	4	116	118	1	-20	8	4	148	149	3	-19	1	5	727	668	3	3	3	5	393	387	4
-31	3	4	325	309	4	-1	5	4	61	67	1	-18	8	4	157	157	5	-17	1	5	328	327	1	5	3	5	68	71	1
-29	3	4	158	158	2	1	5	4	311	304	2	-16	8	4	199	202	4	-15	1	5	769	712	3	7	3	5	452	429	2
-27	3	4	462	441	3	3	5	4	21	32	1	-14	8	4	281	275	2	-13	1	5	411	406	2	9	3	5	56	58	1
-25	3	4	167	170	2	5	5	4	238	253	1	-12	8	4	261	255	2	-11	1	5	769	711	3	11	3	5	125	126	1
-23	3	4	377	370	2	7	5	4	26	22	4	-10	8	4	357	348	3	-9	1	5	36	40	2	13	3	5	79	84	1
-21	3	4	174	172	1	9	5	4	230	228	2	-8	8	4	302	293	4	-7	1	5	657	608	3	15	3	5	9	20	8
-19	3	4	266	263	2	11	5	4	13	29	13	-6	8	4	339	326	3	-5	1	5	185	185	1	17	3	5	55	59	2
-17	3	4	107	108	1	13	5	4	333	327	3	-4	8	4	314	312	3	-3	1	5	745	658	3	19	3	5	88	93	2
-15	3	4	350	347	2	15	5	4	28	28	5	-2	8	4	304	290	3	-1	1	5	27	29	1	21	3	5	123	127	2
-13	3	4	39	33	2	17	5	4	452	441	2	0	8	4	296	287	2	1	1	5	507	480	4	23	3	5	42	38	4
-11	3	4	214	228	1	19	5	4	92	87	2	2	8	4	265	263	3	3	1	5	86	94	1	25	3	5	187	187	2
-9	3	4	142	142	1	21	5	4	490	468	3	4	8	4	234	223	3	5	1	5	184	177	1	27	3	5	27	35	11
-7	3	4	84	83	2	23	5	4	148	152	2	6	8	4	282	275	2	7	1	5	101	105	1	29	3	5	169	175	3
-5	3	4	160	160	1	25	5	4	402	393	4	8	8	4	193	188	2	9	1	5	75	73	1	31	3	5	32	4	18
-3	3	4	29	31	1	27	5	4	225	218	3	10	8	4	182	184	2	11	1	5	24	29	3	33	3	5	188	176	3
-1	3	4	51	51	1	29	5	4	297	286	3	12	8	4	143	147	3	13	1	5	26	15	2	35	3	5	67	65	6
1	3	4	105	116	1	31	5	4	201	206	4	14	8	4	91	90	4	15	1	5	102	101	1	-36	4	5	0	9	1
3	3	4	106	98	2	33	5	4	226	229	4	16	8	4	156	157	6	17	1	5	283	280	1	-34	4	5	161	173	6
5	3	4	488	478	2	-32	6	4	174	164	4	18	8	4	86	84	4	19	1	5	62	61	2	-32	4	5	55	54	6
7	3	4	60	67	1	-30	6	4	39	22	9	20	8	4	138	145	3	21	1	5	211	210	1	-30	4	5	163	166	3
9	3	4	556	532	2	-28	6	4	144	148	3	22	8	4	62	69	10	23	1	5	7	21	6	-28	4	5	66	72	5

h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s
11	3	4	28	25	2	-26	6	4	60	68	5	24	8	4	73	68	7	25	1	5	288	288	2	-26	4	5	58	68	4
13	3	4	584	550	3	-24	6	4	161	167	2	26	8	4	0	40	1	27	1	5	115	115	2	-24	4	5	20	6	20
15	3	4	161	162	1	-22	6	4	101	99	3	-23	9	4	5	18	5	29	1	5	391	381	2	-22	4	5	22	21	9
17	3	4	477	463	2	-20	6	4	196	199	2	-21	9	4	136	127	5	31	1	5	153	156	2	-20	4	5	68	69	2
19	3	4	298	298	1	-18	6	4	205	208	2	-19	9	4	0	19	1	33	1	5	303	291	3	-18	4	5	27	27	7
21	3	4	419	417	2	-16	6	4	210	207	2	-17	9	4	154	140	4	35	1	5	118	122	4	-16	4	5	15	14	14
23	3	4	178	171	2	-14	6	4	237	229	2	-15	9	4	0	7	1	37	1	5	204	204	3	-14	4	5	55	53	2
25	3	4	436	418	2	-12	6	4	242	240	2	-13	9	4	125	118	3	-38	2	5	158	152	4	-12	4	5	59	66	2
27	3	4	122	129	2	-10	6	4	161	159	1	-11	9	4	16	10	15	-36	2	5	24	46	24	-10	4	5	305	297	1
29	3	4	327	319	2	-8	6	4	289	296	2	-9	9	4	148	137	3	-34	2	5	123	127	3	-8	4	5	343	327	2
31	3	4	200	203	3	-6	6	4	72	68	3	-7	9	4	28	32	17	-32	2	5	74	67	5	-6	4	5	574	546	2
33	3	4	233	233	3	-4	6	4	286	290	3	-5	9	4	206	185	2	-30	2	5	193	200	4	-4	4	5	333	339	1
35	3	4	166	170	4	-2	6	4	231	232	2	-3	9	4	0	2	1	-28	2	5	0	16	1	-2	4	5	767	714	5
-36	4	4	84	91	5	0	6	4	271	264	2	-1	9	4	237	228	3	-26	2	5	185	181	2	0	4	5	531	515	3
-34	4	4	40	48	14	2	6	4	307	305	2	1	9	4	18	29	17	-24	2	5	16	20	15	2	4	5	693	659	3
-32	4	4	106	102	3	4	6	4	235	227	1	3	9	4	287	278	3	-22	2	5	12	15	11	4	4	5	603	566	3
-30	4	4	0	29	1	6	6	4	185	190	1	5	9	4	12	8	12	-20	2	5	84	85	3	6	4	5	538	512	2
-28	4	4	28	26	14	8	6	4	220	220	1	7	9	4	271	251	3	-18	2	5	50	42	2	8	4	5	465	457	2
-26	4	4	16	17	15	10	6	4	265	263	3	9	9	4	23	7	17	-16	2	5	41	46	2	10	4	5	547	521	2
-24	4	4	70	74	4	12	6	4	211	208	1	11	9	4	151	138	3	-14	2	5	332	325	2	12	4	5	460	443	2
-22	4	4	69	73	3	14	6	4	279	275	2	13	9	4	13	7	12	-12	2	5	223	226	1	14	4	5	482	476	2
-20	4	4	104	107	2	16	6	4	22	15	10	15	9	4	115	109	4	-10	2	5	436	428	2	16	4	5	465	447	2
-18	4	4	153	145	2	18	6	4	171	171	2	17	9	4	0	12	1	-8	2	5	464	445	2	18	4	5	382	364	2
-16	4	4	96	93	1	20	6	4	84	84	3	19	9	4	103	103	4	-6	2	5	328	316	1	20	4	5	394	386	2
-14	4	4	87	93	2	22	6	4	191	182	2	21	9	4	27	47	26	-4	2	5	140	139	1	22	4	5	306	300	3
-12	4	4	15	19	7	24	6	4	0	3	1	23	9	4	18	25	18	-2	2	5	112	105	1	24	4	5	280	278	2
-10	4	4	126	134	3	26	6	4	138	138	3	-18	10	4	166	162	10	0	2	5	49	57	1	26	4	5	148	149	2
-8	4	4	78	72	1	28	6	4	30	21	18	-16	10	4	43	41	17	2	2	5	106	119	1	28	4	5	243	233	3
-6	4	4	110	111	1	30	6	4	73	62	8	-14	10	4	118	123	5	4	2	5	691	636	3	30	4	5	55	54	7
-4	4	4	146	143	1	32	6	4	97	95	9	-12	10	4	54	60	10	6	2	5	584	542	2	32	4	5	154	158	3
-2	4	4	147	144	1	-31	7	4	96	110	4	-10	10	4	164	158	3	8	2	5	434	440	2	34	4	5	74	79	5
0	4	4	43	39	1	-29	7	4	61	61	6	-8	10	4	93	92	4	10	2	5	690	656	3	-35	5	5	129	132	7
2	4	4	107	115	1	-27	7	4	93	87	8	-6	10	4	227	214	3	12	2	5	320	319	1	-33	5	5	68	58	8
4	4	4	172	179	1	-25	7	4	0	19	1	-4	10	4	136	132	4	14	2	5	356	352	2	-31	5	5	104	113	6
-29	5	5	54	53	5	13	7	5	98	108	3	9	11	5	52	46	12	-20	2	6	39	43	3	6	4	6	208	196	2
-27	5	5	120	117	3	15	7	5	160	155	2	-38	0	6	413	370	6	-18	2	6	246	253	1	8	4	6	133	127	3
-25	5	5	54	67	5	17	7	5	147	144	4	-36	0	6	0	32	1	-16	2	6	104	110	1	10	4	6	269	270	1
-23	5	5	145	141	2	19	7	5	147	141	3	-34	0	6	407	386	5	-14	2	6	180	192	1	12	4	6	21	31	5
-21	5	5	46	52	4	21	7	5	47	67	7	-32	0	6	99	97	10	-12	2	6	161	169	1	14	4	6	78	84	1
-19	5	5	97	105	2	23	7	5	121	119	4	-30	0	6	467	423	4	-10	2	6	20	13	3	16	4	6	16	12	10
-17	5	5	234	236	4	25	7	5	118	117	4	-28	0	6	53	29	6	-8	2	6	23	9	2	18	4	6	23	14	7
-15	5	5	132	139	2	27	7	5	71	66	6	-26	0	6	323	320	3	-6	2	6	78	85	1	20	4	6	81	84	3
-13	5	5	100	105	2	29	7	5	189	192	4	-24	0	6	91	82	3	-4	2	6	76	85	1	22	4	6	40	45	5
-11	5	5	71	72	2	-28	8	5	84	95	7	-22	0	6	377	364	3	-2	2	6	111	107	1	24	4	6	58	63	5
-9	5	5	88	99	1	-26	8	5	0	5	1	-20	0	6	59	66	3	0	2	6	97	100	1	26	4	6	20	24	20
-7	5	5	13	12	5	-24	8	5	192	186	5	-18	0	6	720	681	4	2	2	6	290	298	1	28	4	6	34	27	12
-5	5	5	259	255	1	-22	8	5	23	9	23	-16	0	6	12	11	11	4	2	6	209	199	1	30	4	6	0	28	1
-3	5	5	31	40	2	-20	8	5	246	239	4	-14	0	6	420	414	3	6	2	6	445	439	2	32	4	6	44	49	11
-1	5	5	349	349	2	-18	8	5	97	99	4	-12	0	6	299	297	2	8	2	6	75	81	1	34	4	6	45	7	11
1	5	5	90	90	2	-16	8	5	173	173	4	-10	0	6	97	83	1	10	2	6	377	366	1	-35	5	6	28	5	28
3	5	5	111	109	1	-14	8	5	206	200	5	-8	0	6	482	458	3	12	2	6	256	257	1	-33	5	6	89	92	7
5	5	5	52	54	3	-12	8	5	112	116	3	-6	0	6	98	91	1	14	2	6	396	392	2	-31	5	6	25	57	25
7	5	5	98	102	1	-10	8	5	115	121	2	-4	0	6	33	22	1	16	2	6	324	317	2	-29	5	6	185	184	3
9	5	5	66	78	4	-8	8	5	149	144	3	-2	0	6	191	175	1	18	2	6	364	364	2	-27	5	6	129	140	3
11	5	5	203	198	2	-6	8	5	74	78	4	0	0	6	68	80	1	20	2	6	247	241	1	-25	5	6	223	222	2
13	5	5	62	61	3	-4	8	5	66	69	4	2	0	6	512	491	3	22	2	6	260	265	2	-23	5	6	275	273	2
15	5	5	221	219	1	-2	8	5	48	49	4	4	0	6	662	601	6	24	2	6	273	271	2	-21	5	6	239	239	3
17	5	5	55	62	3	0	8	5	67	63	3	6	0	6	252	252	2	26	2	6	268	264	2	-19	5	6	296	289	2
19	5	5	185	182	2	2	8	5	91	93	4	8	0	6	521	508	3	28	2	6	302	296	2	-17	5	6	263	259	2
21	5	5	58	67	4	4	8	5	91	90	3	10	0	6	258	262	2	30	2	6	194	196	3	-15	5	6	362	355	2
23	5	5	161	152	2	6	8	5	80	80	3	12	0	6	357	352	6	32	2	6	257	248	2	-13	5	6	273	270	2
25	5	5	26	13	18	8	8	5	48	37	6	14	0	6	670	653	4	34	2	6	106	108	4	-11	5	6	500	490	3
27	5	5	85	93	4	10	8	5	0	29	1	16	0	6	383	365	3	36	2	6	189	183	6	-9	5	6	307	307	3
29	5	5	78	88	5	12	8	5	110	93	3	18	0	6	638	621	4	-37	3	6	0	10	1	-7	5	6	595	569	2
31	5	5	81	87	6	14	8	5	28	17	11	20	0	6	389	375	3	-35	3	6	76	88	6	-5	5	6	292	282	1
33	5	5	78	87	6	16	8	5	46	50	15	22	0	6	380	373	3	-33	3	6	29	19	15	-3	5	6	629	606	4
-32	6	5	33	44	17	18	8	5	0	7	1	24	0	6	286	289	3	-31	3	6	70	69	5	-1	5	6	301	300	2
-30	6	5	63	69	5	20	8	5	95	86	4	26	0	6	385	380	3	-29	3	6	71	85	4	1	5	6	724	675	5
-28	6	5	67	82	4	22	8	5	68	70	7	28	0	6	452	435	5	-27	3	6	158	163	2	3	5	6	203	197	1
-26	6	5	51	53	8	24	8	5	124	109	5	30	0	6	291	289	4	-25	3	6	204	201	2	5	5	6	560	537	4
-24	6	5	70	77	5	26	8	5	95	94	6	32	0	6	301	298	4	-23	3	6	307	306	2	7	5	6	123	121	1
-22	6	5	22	3	22	-23	9	5	179	174	5	34	0	6	155	168	4	-21	3	6	220	217	1	9	5	6	493	483	2
-20	6	5	32	42	6	-21	9	5	118	119	7	36	0	6	185	180	5	-19	3	6	271	271	1	11	5	6	89	99	2
-18	6	5	101	100	3	-19	9	5	193	190	5	-39	1	6	4	11	4	-17	3	6	275	273	2	13	5	6	459	450	2
-16	6	5	16	10	16	-17	9	5	100	100	6	-37	1	6	0	2	1	-15	3	6	355	351	2	15	5	6	20	10	16
-14	6	5	196	190	2	-15	9	5	238	227	4	-35	1	6	70	66	7	-13	3	6	332	330	1	17	5	6	198	201	2
-12	6	5	19	8	9	-13	9	5	113	113	3	-33	1	6	24	2	23	-11	3	6	727	689	3	19	5	6	17	13	17
-10	6	5	231	226	2	-11	9	5	298	285	3	-31	1	6	52	49	5	-9	3	6	252	255	2	21	5	6	12	14	11
-8	6	5	125	123	2	-9	9	5	88	86	3	-29	1	6	19	28	19	-7	3	6	806	752	3	23	5	6	9	14	8

h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s
-6	6	5	308	310	2	-7	9	5	274	268	3	-27	1	6	44	56	5	-5	3	6	364	356	2	25	5	6	16	15	15
-4	6	5	19	13	11	-5	9	5	15	6	15	-25	1	6	79	85	2	-3	3	6	664	620	3	27	5	6	31	15	13
-2	6	5	382	383	2	-3	9	5	216	209	3	-23	1	6	133	144	2	-1	3	6	480	459	3	29	5	6	51	45	8
0	6	5	110	121	3	-1	9	5	34	30	10	-21	1	6	71	71	3	1	3	6	844	766	6	31	5	6	46	36	10
2	6	5	399	389	2	1	9	5	146	143	3	-19	1	6	194	202	1	3	3	6	26	27	2	33	5	6	69	76	7
4	6	5	269	276	2	3	9	5	37	41	7	-17	1	6	107	113	1	5	3	6	711	667	3	-32	6	6	18	33	17
6	6	5	350	352	2	5	9	5	85	86	3	-15	1	6	405	390	1	7	3	6	96	106	1	-30	6	6	183	177	6
8	6	5	330	315	2	7	9	5	74	70	4	-13	1	6	337	323	1	9	3	6	403	403	3	-28	6	6	92	100	4
10	6	5	308	302	2	9	9	5	21	16	21	-11	1	6	432	432	2	11	3	6	220	208	1	-26	6	6	216	214	3
12	6	5	369	360	2	11	9	5	0	17	1	-9	1	6	299	296	1	13	3	6	389	406	2	-24	6	6	32	44	11
14	6	5	190	189	2	13	9	5	50	42	6	-7	1	6	221	218	1	15	3	6	30	42	3	-22	6	6	173	169	4
16	6	5	273	271	2	15	9	5	53	61	6	-5	1	6	489	469	2	17	3	6	288	289	1	-20	6	6	65	67	4
18	6	5	130	134	4	17	9	5	69	55	8	-3	1	6	167	168	1	19	3	6	86	83	2	-18	6	6	240	233	2
20	6	5	233	229	2	19	9	5	9	11	9	-1	1	6	37	41	1	21	3	6	103	107	2	-16	6	6	146	144	2
22	6	5	107	112	2	21	9	5	120	114	7	1	1	6	420	417	4	23	3	6	108	112	2	-14	6	6	219	215	2
24	6	5	234	230	3	-18	10	5	47	42	14	3	1	6	117	132	1	25	3	6	12	28	12	-12	6	6	136	131	2
26	6	5	78	69	5	-16	10	5	167	167	4	5	1	6	393	370	1	27	3	6	0	9	1	-10	6	6	51	61	2
28	6	5	202	198	3	-14	10	5	0	8	1	7	1	6	117	110	1	29	3	6	55	60	4	-8	6	6	267	271	2
30	6	5	53	43	10	-12	10	5	176	174	4	9	1	6	131	143	1	31	3	6	36	23	13	-6	6	6	141	133	1
32	6	5	110	111	19	-10	10	5	15	13	14	11	1	6	80	84	1	33	3	6	105	100	4	-4	6	6	293	286	2
-31	7	5	180	184	3	-8	10	5	160	157	4	13	1	6	153	146	1	35	3	6	101	99	5	-2	6	6	116	124	3
-29	7	5	70	70	7	-6	10	5	45	23	9	15	1	6	4	9	3	-36	4	6	0	25	1	0	6	6	154	149	1
-27	7	5	214	214	5	-4	10	5	118	112	9	17	1	6	190	194	1	-34	4	6	25	22	24	2	6	6	103	112	2
-25	7	5	92	99	4	-2	10	5	0	8	1	19	1	6	33	37	4	-32	4	6	0	17	1	4	6	6	57	53	2
-23	7	5	253	247	4	0	10	5	111	108	5	21	1	6	115	112	2	-30	4	6	36	33	8	6	6	6	118	124	2
-21	7	5	85	90	3	2	10	5	52	56	6	23	1	6	24	15	8	-28	4	6	53	51	5	8	6	6	136	146	3
-19	7	5	292	287	2	4	10	5	127	127	3	25	1	6	68	72	3	-26	4	6	57	51	4	10	6	6	61	64	3
-17	7	5	147	147	3	6	10	5	85	82	4	27	1	6	0	6	1	-24	4	6	40	42	7	12	6	6	202	198	2
-15	7	5	365	362	2	8	10	5	123	120	3	29	1	6	31	25	11	-22	4	6	19	32	18	14	6	6	168	162	2
-13	7	5	205	203	3	10	10	5	77	83	5	31	1	6	16	6	15	-20	4	6	194	194	2	16	6	6	254	248	2
-11	7	5	317	313	2	12	10	5	70	74	5	33	1	6	71	72	4	-18	4	6	52	58	6	18	6	6	138	137	2
-9	7	5	181	183	3	14	10	5	85	84	5	35	1	6	80	79	5	-16	4	6	210	213	1	20	6	6	175	173	3
-7	7	5	287	284	2	16	10	5	42	54	14	37	1	6	43	60	10	-14	4	6	56	62	2	22	6	6	101	108	4
-5	7	5	164	158	2	-9	11	5	0	39	1	-38	2	6	217	220	4	-12	4	6	113	113	2	24	6	6	119	119	3
-3	7	5	298	300	2	-7	11	5	75	76	6	-36	2	6	21	11	20	-10	4	6	13	6	8	26	6	6	146	145	4
-1	7	5	139	148	2	-5	11	5	70	65	11	-34	2	6	269	258	3	-8	4	6	122	121	1	28	6	6	140	140	4
1	7	5	227	235	2	-3	11	5	0	25	1	-32	2	6	36	27	8	-6	4	6	48	49	3	30	6	6	166	168	4
3	7	5	101	104	2	-1	11	5	91	90	6	-30	2	6	367	350	3	-4	4	6	355	346	3	-31	7	6	41	39	13
5	7	5	108	114	2	1	11	5	17	24	17	-28	2	6	21	28	18	-2	4	6	73	67	2	-29	7	6	121	122	4
7	7	5	143	139	3	3	11	5	118	105	8	-26	2	6	457	431	3	0	4	6	252	234	1	-27	7	6	76	74	10
9	7	5	36	31	7	5	11	5	68	63	11	-24	2	6	37	45	5	2	4	6	94	100	1	-25	7	6	130	134	4
11	7	5	145	142	3	7	11	5	158	151	4	-22	2	6	406	398	3	4	4	6	182	195	1	-23	7	6	39	29	8
-21	7	6	171	169	2	2	10	6	114	115	3	24	2	7	108	111	3	-21	5	7	75	74	3	25	7	7	175	175	4
-19	7	6	146	154	2	4	10	6	36	21	11	26	2	7	185	191	2	-19	5	7	188	188	2	27	7	7	94	97	6
-17	7	6	234	225	2	6	10	6	112	117	4	28	2	7	100	100	5	-17	5	7	170	170	4	29	7	7	105	127	12
-15	7	6	245	254	4	8	10	6	0	16	1	30	2	7	189	191	3	-15	5	7	107	116	2	-26	8	7	0	9	1
-13	7	6	184	183	2	10	10	6	141	135	6	32	2	7	193	197	3	-13	5	7	65	63	2	-24	8	7	35	50	18
-11	7	6	182	175	2	12	10	6	0	20	1	34	2	7	113	124	4	-11	5	7	169	168	3	-22	8	7	47	52	12
-9	7	6	141	146	2	14	10	6	124	124	5	36	2	7	199	198	3	-9	5	7	170	167	1	-20	8	7	9	28	9
-7	7	6	176	172	2	16	10	6	24	35	24	-37	3	7	17	18	17	-7	5	7	248	241	2	-18	8	7	75	79	4
-5	7	6	172	170	2	-9	11	6	16	38	16	-35	3	7	65	60	6	-5	5	7	200	202	1	-16	8	7	56	62	16
-3	7	6	277	274	2	-7	11	6	140	140	5	-33	3	7	43	48	7	-3	5	7	326	327	2	-14	8	7	14	18	13
-1	7	6	139	138	2	-5	11	6	57	58	11	-31	3	7	78	80	4	-1	5	7	109	109	1	-12	8	7	69	78	3
1	7	6	250	242	2	-3	11	6	137	139	12	-29	3	7	88	94	4	1	5	7	258	255	1	-10	8	7	0	8	1
3	7	6	80	76	2	-1	11	6	112	106	6	-27	3	7	108	103	3	3	5	7	257	258	1	-8	8	7	129	127	2
5	7	6	293	283	2	1	11	6	146	144	4	-25	3	7	70	77	3	5	5	7	139	137	2	-6	8	7	74	80	3
7	7	6	123	119	2	3	11	6	124	121	6	-23	3	7	134	133	2	7	5	7	16	16	6	-4	8	7	210	202	2
9	7	6	259	259	2	5	11	6	113	120	5	-21	3	7	121	122	2	9	5	7	54	66	4	-2	8	7	31	28	5
11	7	6	230	218	2	7	11	6	111	108	5	-19	3	7	125	131	2	11	5	7	22	13	5	0	8	7	239	230	3
13	7	6	105	103	3	-39	1	7	118	112	4	-17	3	7	223	228	1	13	5	7	126	131	3	2	8	7	0	6	1
15	7	6	147	140	3	-37	1	7	217	200	3	-15	3	7	67	66	2	15	5	7	91	95	2	4	8	7	297	280	2
17	7	6	36	29	9	-35	1	7	107	103	4	-13	3	7	184	184	1	17	5	7	95	89	3	6	8	7	51	60	6
19	7	6	120	114	3	-33	1	7	166	163	3	-11	3	7	240	244	1	19	5	7	86	93	3	8	8	7	318	300	3
21	7	6	101	105	3	-31	1	7	49	41	6	-9	3	7	82	84	2	21	5	7	28	39	7	10	8	7	148	138	3
23	7	6	143	135	3	-29	1	7	109	119	3	-7	3	7	375	371	2	23	5	7	145	146	3	12	8	7	172	171	3
25	7	6	52	64	12	-27	1	7	81	90	3	-5	3	7	131	139	2	25	5	7	58	74	8	14	8	7	175	162	3
27	7	6	87	78	6	-25	1	7	69	62	2	-3	3	7	367	359	2	27	5	7	134	140	3	16	8	7	84	87	15
29	7	6	29	6	29	-23	1	7	25	17	6	-1	3	7	353	331	3	29	5	7	75	78	5	18	8	7	97	91	4
-28	8	6	32	15	31	-21	1	7	20	9	6	1	3	7	473	466	2	31	5	7	87	89	5	20	8	7	125	130	5
-26	8	6	166	178	5	-19	1	7	106	100	2	3	3	7	439	431	2	33	5	7	17	17	17	22	8	7	57	72	10
-24	8	6	28	9	27	-17	1	7	38	38	2	5	3	7	375	360	2	-32	6	7	103	119	5	24	8	7	45	69	12
-22	8	6	142	152	4	-15	1	7	85	95	1	7	3	7	356	356	1	-30	6	7	203	204	3	-23	9	7	23	31	23
-20	8	6	22	18	22	-13	1	7	283	280	1	9	3	7	429	420	2	-28	6	7	90	93	4	-21	9	7	17	37	17
-18	8	6	157	151	3	-11	1	7	295	303	1	11	3	7	55	56	2	-26	6	7	210	208	3	-19	9	7	43	28	14
-16	8	6	29	23	9	-9	1	7	456	440	2	13	3	7	286	285	1	-24	6	7	69	80	8	-17	9	7	44	43	11
-14	8	6	119	117	2	-7	1	7	576	544	2	15	3	7	52	56	2	-22	6	7	348	339	3	-15	9	7	67	70	15
-12	8	6	39	44	5	-5	1	7	106	102	1	17	3	7	268	267	1	-20	6	7	34	36	6	-13	9	7	90	97	10
-10	8	6	62	62	6	-3	1	7	308	325	3	19	3	7	12	1	12	-18	6	7	467	452	3	-11	9	7	138	136	12
-8	8	6	30	41	7	-1	1	7	454	451	2	21	3	7	252	250	2	-16	6	7	9	15	8	-9	9	7	186	192	3

h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s
-6	8	6	0	5	1	1	1	7	514	496	2	23	3	7	0	10	1	-14	6	7	475	457	3	-7	9	7	194	185	3
-4	8	6	22	30	10	3	1	7	321	313	2	25	3	7	200	194	2	-12	6	7	88	90	2	-5	9	7	226	219	3
-2	8	6	34	38	5	5	1	7	754	699	3	27	3	7	67	80	4	-10	6	7	363	355	2	-3	9	7	216	219	5
0	8	6	78	71	3	7	1	7	79	83	1	29	3	7	96	104	3	-8	6	7	126	126	1	-1	9	7	131	128	4
2	8	6	110	115	2	9	1	7	741	704	3	31	3	7	99	103	4	-6	6	7	287	286	3	1	9	7	242	243	3
4	8	6	202	196	2	11	1	7	230	242	1	33	3	7	71	74	12	-4	6	7	153	158	3	3	9	7	80	81	4
6	8	6	155	151	3	13	1	7	798	749	3	35	3	7	89	84	9	-2	6	7	177	183	2	5	9	7	290	275	3
8	8	6	232	234	3	15	1	7	310	298	1	-36	4	7	49	50	15	0	6	7	100	97	2	7	9	7	113	109	3
10	8	6	229	221	3	17	1	7	670	642	3	-34	4	7	287	277	6	2	6	7	78	91	1	9	9	7	270	252	4
12	8	6	228	221	3	19	1	7	38	38	3	-32	4	7	31	43	18	4	6	7	55	57	3	11	9	7	126	121	7
14	8	6	296	281	3	21	1	7	350	346	3	-30	4	7	354	347	3	6	6	7	53	59	4	13	9	7	255	249	3
16	8	6	239	223	3	23	1	7	69	70	2	-28	4	7	72	72	4	8	6	7	34	40	5	15	9	7	96	97	3
18	8	6	239	225	3	25	1	7	297	286	2	-26	4	7	585	546	4	10	6	7	0	15	1	17	9	7	258	240	5
20	8	6	238	218	6	27	1	7	99	101	2	-24	4	7	61	64	4	12	6	7	44	48	4	19	9	7	57	49	7
22	8	6	171	167	5	29	1	7	243	233	2	-22	4	7	541	513	3	14	6	7	161	157	2	21	9	7	215	208	4
24	8	6	201	200	7	31	1	7	39	35	9	-20	4	7	155	165	1	16	6	7	0	4	1	-18	10	7	94	105	15
26	8	6	180	188	4	33	1	7	78	87	4	-18	4	7	398	391	2	18	6	7	223	214	4	-16	10	7	47	57	21
-23	9	6	146	148	6	35	1	7	21	15	21	-16	4	7	106	115	3	20	6	7	16	4	16	-14	10	7	122	127	6
-21	9	6	106	100	6	37	1	7	46	42	9	-14	4	7	547	531	3	22	6	7	167	166	3	-12	10	7	71	66	7
-19	9	6	150	145	5	-38	2	7	174	176	4	-12	4	7	115	114	1	24	6	7	43	45	7	-10	10	7	117	117	7
-17	9	6	102	98	6	-36	2	7	38	28	11	-10	4	7	593	573	3	26	6	7	128	126	8	-8	10	7	112	114	5
-15	9	6	116	116	7	-34	2	7	184	178	3	-8	4	7	167	177	1	28	6	7	141	139	4	-6	10	7	84	83	6
-13	9	6	49	46	8	-32	2	7	34	32	9	-6	4	7	432	428	3	30	6	7	143	147	4	-4	10	7	195	189	4
-11	9	6	109	106	5	-30	2	7	217	216	2	-4	4	7	25	10	6	-29	7	7	123	134	4	-2	10	7	114	109	8
-9	9	6	0	5	1	-28	2	7	57	67	5	-2	4	7	347	349	2	-27	7	7	65	62	5	0	10	7	155	147	4
-7	9	6	19	20	18	-26	2	7	374	364	3	0	4	7	42	31	1	-25	7	7	79	78	5	2	10	7	115	110	4
-5	9	6	96	102	3	-24	2	7	55	68	3	2	4	7	265	268	2	-23	7	7	63	68	6	4	10	7	159	155	4
-3	9	6	28	20	17	-22	2	7	431	414	2	4	4	7	21	10	7	-21	7	7	30	34	8	6	10	7	89	83	4
-1	9	6	155	156	3	-20	2	7	48	53	4	6	4	7	11	21	11	-19	7	7	131	129	2	8	10	7	186	175	6
1	9	6	29	33	9	-18	2	7	357	362	3	8	4	7	121	124	2	-17	7	7	0	0	1	10	10	7	73	64	6
3	9	6	148	146	2	-16	2	7	39	35	2	10	4	7	27	30	3	-15	7	7	168	166	4	12	10	7	150	148	5
5	9	6	42	54	9	-14	2	7	634	596	3	12	4	7	35	25	3	-13	7	7	93	98	3	14	10	7	45	37	8
7	9	6	173	170	5	-12	2	7	21	12	2	14	4	7	32	31	3	-11	7	7	271	268	2	16	10	7	145	134	4
9	9	6	30	16	12	-10	2	7	544	525	2	16	4	7	68	71	2	-9	7	7	75	79	6	-9	11	7	84	83	27
11	9	6	191	175	3	-8	2	7	315	310	1	18	4	7	154	154	2	-7	7	7	325	312	6	-7	11	7	0	22	1
13	9	6	0	15	1	-6	2	7	279	290	1	20	4	7	315	310	2	-5	7	7	44	44	4	-5	11	7	137	144	6
15	9	6	154	142	3	-4	2	7	302	292	1	22	4	7	283	274	2	-3	7	7	266	264	2	-3	11	7	42	31	14
17	9	6	0	7	1	-2	2	7	570	537	3	24	4	7	288	292	2	-1	7	7	142	142	2	-1	11	7	156	150	9
19	9	6	166	156	4	0	2	7	277	278	2	26	4	7	270	260	5	1	7	7	340	334	2	1	11	7	87	86	8
21	9	6	0	8	1	2	2	7	330	318	1	28	4	7	189	188	3	3	7	7	172	174	2	3	11	7	138	123	8
-18	10	6	91	85	12	4	2	7	162	170	1	30	4	7	220	217	3	5	7	7	393	385	2	5	11	7	116	117	5
-16	10	6	97	89	7	6	2	7	121	101	1	32	4	7	236	237	3	7	7	7	115	113	4	7	11	7	86	84	5
-14	10	6	68	68	9	8	2	7	267	274	1	34	4	7	160	161	4	9	7	7	326	314	2	-38	0	8	55	32	36
-12	10	6	102	102	6	10	2	7	97	106	1	-35	5	7	53	41	9	11	7	7	222	217	2	-36	0	8	14	29	13
-10	10	6	18	20	18	12	2	7	153	156	2	-33	5	7	105	103	4	13	7	7	306	290	5	-34	0	8	141	135	6
-8	10	6	117	117	7	14	2	7	146	152	2	-31	5	7	61	69	7	15	7	7	187	185	2	-32	0	8	52	58	9
-6	10	6	95	88	6	16	2	7	102	97	1	-29	5	7	120	111	6	17	7	7	291	283	3	-30	0	8	220	219	4
-4	10	6	86	85	5	18	2	7	127	119	1	-27	5	7	54	55	5	19	7	7	120	117	3	-28	0	8	197	198	7
-2	10	6	154	144	5	20	2	7	186	190	1	-25	5	7	86	83	4	21	7	7	220	214	3	-26	0	8	304	297	3
0	10	6	0	8	1	22	2	7	116	115	1	-23	5	7	109	110	2	23	7	7	91	86	5	-24	0	8	129	121	3
-22	0	8	570	557	4	0	2	8	145	139	1	26	4	8	92	97	3	3	7	8	222	213	3	-39	1	9	66	23	28
-20	0	8	42	45	3	2	2	8	1111	964	5	28	4	8	121	129	3	5	7	8	23	31	7	-37	1	9	287	278	3
-18	0	8	754	721	4	4	2	8	80	84	1	30	4	8	68	64	6	7	7	8	228	218	3	-35	1	9	29	42	29
-16	0	8	215	205	2	6	2	8	397	391	2	32	4	8	73	79	6	9	7	8	151	155	4	-33	1	9	384	362	3
-14	0	8	997	913	6	8	2	8	172	182	1	34	4	8	45	45	10	11	7	8	180	172	4	-31	1	9	53	62	6
-12	0	8	136	138	4	10	2	8	282	299	2	-35	5	8	80	91	6	13	7	8	186	188	3	-29	1	9	426	403	3
-10	0	8	1188	1015	7	12	2	8	77	76	1	-33	5	8	233	235	4	15	7	8	179	176	2	-27	1	9	40	26	6
-8	0	8	43	40	1	14	2	8	189	191	1	-31	5	8	121	127	3	17	7	8	160	154	2	-25	1	9	550	515	3
-6	0	8	903	793	5	16	2	8	76	86	2	-29	5	8	244	240	2	19	7	8	140	137	4	-23	1	9	231	226	3
-4	0	8	80	78	1	18	2	8	92	95	2	-27	5	8	115	120	4	21	7	8	109	102	3	-21	1	9	559	533	2
-2	0	8	538	539	7	20	2	8	0	8	1	-25	5	8	296	288	3	23	7	8	48	51	8	-19	1	9	254	244	1
0	0	8	141	150	3	22	2	8	0	1	1	-23	5	8	79	85	3	25	7	8	165	164	4	-17	1	9	752	698	3
2	0	8	731	669	4	24	2	8	10	16	9	-21	5	8	277	271	2	27	7	8	0	15	1	-15	1	9	143	134	1
4	0	8	118	128	1	26	2	8	38	39	6	-19	5	8	23	19	16	-26	8	8	150	175	5	-13	1	9	801	741	3
6	0	8	589	583	3	28	2	8	30	14	8	-17	5	8	272	272	2	-24	8	8	0	35	1	-11	1	9	349	334	1
8	0	8	88	90	4	30	2	8	124	120	3	-15	5	8	135	140	2	-22	8	8	208	204	5	-9	1	9	571	549	2
10	0	8	679	650	5	32	2	8	42	29	15	-13	5	8	132	139	3	-20	8	8	10	15	9	-7	1	9	371	367	2
12	0	8	145	162	4	34	2	8	102	111	4	-11	5	8	223	222	2	-18	8	8	277	276	4	-5	1	9	330	332	1
14	0	8	561	534	3	36	2	8	69	68	6	-9	5	8	90	92	1	-16	8	8	7	10	6	-3	1	9	220	210	1
16	0	8	213	212	2	-37	3	8	268	252	7	-7	5	8	61	66	1	-14	8	8	416	402	4	-1	1	9	305	290	1
18	0	8	35	28	6	-35	3	8	99	107	5	-5	5	8	196	183	1	-12	8	8	68	79	6	1	1	9	173	175	1
20	0	8	268	266	2	-33	3	8	237	226	3	-3	5	8	212	221	1	-10	8	8	423	411	4	3	1	9	17	20	2
22	0	8	59	70	4	-31	3	8	97	93	4	-1	5	8	296	292	1	-8	8	8	80	76	2	5	1	9	142	141	1
24	0	8	133	133	3	-29	3	8	350	341	3	1	5	8	295	286	2	-6	8	8	391	377	3	7	1	9	31	38	1
26	0	8	44	56	9	-27	3	8	150	144	2	3	5	8	263	259	2	-4	8	8	33	13	6	9	1	9	214	223	1
28	0	8	188	200	3	-25	3	8	434	411	6	5	5	8	345	345	2	-2	8	8	350	336	3	11	1	9	27	27	3
30	0	8	98	89	4	-23	3	8	139	148	2	7	5	8	171	163	1	0	8	8	23	35	9	13	1	9	183	185	1
32	0	8	164	167	4	-21	3	8	243	244	2	9	5	8	338	335	2	2	8	8	337	323	3	15	1	9	246	243	1
34	0	8	151	152	6	-19	3	8	23	28	6	11	5	8	194	189	1	4	8	8	52	58	4	17	1	9	207	221	2

h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s
36	0	8	100	108	6	-17	3	8	153	157	1	13	5	8	341	338	2	6	8	8	269	265	3	19	1	9	352	338	2
-39	1	8	52	38	11	-15	3	8	56	64	2	15	5	8	261	261	2	8	8	8	23	20	15	21	1	9	282	288	2
-37	1	8	112	113	4	-13	3	8	84	95	1	17	5	8	441	420	2	10	8	8	193	189	4	23	1	9	136	143	2
-35	1	8	13	5	13	-11	3	8	19	29	3	19	5	8	204	203	2	12	8	8	23	18	14	25	1	9	377	370	2
-33	1	8	111	103	4	-9	3	8	73	65	1	21	5	8	438	415	2	14	8	8	157	161	3	27	1	9	98	104	3
-31	1	8	59	45	5	-7	3	8	236	239	1	23	5	8	124	127	2	16	8	8	16	13	15	29	1	9	377	368	2
-29	1	8	137	129	2	-5	3	8	72	71	1	25	5	8	316	315	4	18	8	8	134	132	3	31	1	9	145	149	6
-27	1	8	39	40	6	-3	3	8	116	110	1	27	5	8	73	79	6	20	8	8	5	5	5	33	1	9	344	334	5
-25	1	8	75	80	3	-1	3	8	66	74	1	29	5	8	295	284	4	22	8	8	53	69	11	35	1	9	86	91	4
-23	1	8	152	152	1	1	3	8	189	200	1	31	5	8	42	55	16	24	8	8	45	44	19	-38	2	9	82	89	6
-21	1	8	52	54	2	3	3	8	272	284	2	-32	6	8	103	111	5	-23	9	8	95	84	11	-36	2	9	61	69	8
-19	1	8	199	200	1	5	3	8	497	483	2	-30	6	8	77	95	6	-21	9	8	83	63	10	-34	2	9	14	9	14
-17	1	8	58	60	2	7	3	8	355	338	1	-28	6	8	50	54	8	-19	9	8	130	137	6	-32	2	9	128	130	6
-15	1	8	151	153	1	9	3	8	416	425	3	-26	6	8	135	144	4	-17	9	8	148	139	5	-30	2	9	21	10	21
-13	1	8	142	146	1	11	3	8	221	222	1	-24	6	8	26	32	14	-15	9	8	124	133	6	-28	2	9	107	115	2
-11	1	8	104	104	1	13	3	8	375	372	1	-22	6	8	264	262	2	-13	9	8	177	167	3	-26	2	9	0	13	1
-9	1	8	58	60	1	15	3	8	200	198	1	-20	6	8	37	29	8	-11	9	8	143	127	6	-24	2	9	66	65	6
-7	1	8	419	396	2	17	3	8	578	557	2	-18	6	8	266	254	4	-9	9	8	126	124	6	-22	2	9	131	127	4
-5	1	8	260	251	1	19	3	8	156	168	1	-16	6	8	35	36	5	-7	9	8	181	173	3	-20	2	9	97	103	1
-3	1	8	13	11	5	21	3	8	563	535	3	-14	6	8	199	201	2	-5	9	8	140	137	5	-18	2	9	192	191	1
-1	1	8	205	203	2	23	3	8	191	197	2	-12	6	8	68	61	2	-3	9	8	141	139	3	-16	2	9	20	15	3
1	1	8	181	185	1	25	3	8	391	372	3	-10	6	8	270	271	3	-1	9	8	140	134	5	-14	2	9	236	236	1
3	1	8	28	30	1	27	3	8	160	163	3	-8	6	8	90	99	2	1	9	8	149	141	3	-12	2	9	94	95	1
5	1	8	346	341	1	29	3	8	338	331	2	-6	6	8	291	290	2	3	9	8	113	102	3	-10	2	9	508	492	2
7	1	8	170	168	1	31	3	8	57	72	8	-4	6	8	54	51	3	5	9	8	247	236	3	-8	2	9	42	35	1
9	1	8	492	484	2	33	3	8	288	281	3	-2	6	8	448	440	2	7	9	8	137	125	3	-6	2	9	552	536	3
11	1	8	185	176	2	35	3	8	18	41	17	0	6	8	131	128	2	9	9	8	175	168	3	-4	2	9	43	46	1
13	1	8	277	275	1	-36	4	8	97	96	5	2	6	8	417	408	2	11	9	8	111	105	3	-2	2	9	150	148	1
15	1	8	255	254	1	-34	4	8	49	27	11	4	6	8	19	14	6	13	9	8	62	60	6	0	2	9	98	98	1
17	1	8	267	270	1	-32	4	8	88	93	8	6	6	8	177	177	1	15	9	8	26	38	17	2	2	9	695	648	5
19	1	8	25	34	5	-30	4	8	0	6	1	8	6	8	52	54	3	17	9	8	50	61	11	4	2	9	137	139	1
21	1	8	218	221	2	-28	4	8	40	40	8	10	6	8	145	147	2	19	9	8	0	3	1	6	2	9	917	835	4
23	1	8	21	12	21	-26	4	8	0	5	1	12	6	8	239	233	2	21	9	8	0	25	1	8	2	9	40	35	2
25	1	8	187	189	2	-24	4	8	78	85	3	14	6	8	183	184	2	-18	10	8	120	144	10	10	2	9	540	525	3
27	1	8	74	75	3	-22	4	8	37	31	4	16	6	8	193	182	2	-16	10	8	0	63	1	12	2	9	81	84	1
29	1	8	141	145	3	-20	4	8	218	214	2	18	6	8	60	66	5	-14	10	8	151	151	6	14	2	9	476	463	2
31	1	8	33	24	10	-18	4	8	19	5	9	20	6	8	175	167	3	-12	10	8	0	18	1	16	2	9	11	13	11
33	1	8	136	136	4	-16	4	8	99	97	2	22	6	8	78	75	4	-10	10	8	200	195	6	18	2	9	457	446	2
35	1	8	0	18	1	-14	4	8	88	95	2	24	6	8	110	115	5	-8	10	8	17	16	16	20	2	9	60	50	9
-38	2	8	0	17	1	-12	4	8	36	37	3	26	6	8	17	36	16	-6	10	8	231	217	7	22	2	9	303	297	2
-36	2	8	67	68	6	-10	4	8	139	135	2	28	6	8	84	86	5	-4	10	8	0	9	1	24	2	9	22	19	11
-34	2	8	70	75	5	-8	4	8	61	67	1	30	6	8	41	31	18	-2	10	8	202	201	4	26	2	9	222	217	3
-32	2	8	43	47	7	-6	4	8	192	197	2	-29	7	8	76	87	7	0	10	8	34	29	18	28	2	9	42	42	6
-30	2	8	113	116	3	-4	4	8	13	9	6	-27	7	8	89	89	7	2	10	8	204	189	3	30	2	9	128	130	3
-28	2	8	116	115	5	-2	4	8	57	54	1	-25	7	8	56	28	56	4	10	8	18	26	17	32	2	9	0	17	1
-26	2	8	220	231	2	0	4	8	192	192	1	-23	7	8	187	189	3	6	10	8	199	195	4	34	2	9	64	63	9
-24	2	8	180	184	2	2	4	8	100	91	1	-21	7	8	49	53	5	8	10	8	72	69	7	-37	3	9	138	128	7
-22	2	8	362	358	2	4	4	8	227	228	1	-19	7	8	264	255	5	10	10	8	127	129	4	-35	3	9	21	36	21
-20	2	8	124	124	1	6	4	8	122	114	1	-17	7	8	16	3	15	12	10	8	125	119	5	-33	3	9	147	150	3
-18	2	8	422	425	2	8	4	8	128	132	2	-15	7	8	126	124	3	14	10	8	48	57	10	-31	3	9	0	12	1
-16	2	8	156	156	1	10	4	8	0	3	1	-13	7	8	67	64	4	16	10	8	99	101	5	-29	3	9	213	206	2
-14	2	8	414	418	2	12	4	8	143	145	2	-11	7	8	110	115	3	-7	11	8	103	110	14	-27	3	9	46	52	4
-12	2	8	157	150	1	14	4	8	69	75	2	-9	7	8	107	99	2	-5	11	8	75	82	10	-25	3	9	281	281	2
-10	2	8	590	566	2	16	4	8	92	92	3	-7	7	8	146	147	2	-3	11	8	131	128	6	-23	3	9	76	70	3
-8	2	8	199	193	1	18	4	8	33	34	5	-5	7	8	149	143	3	-1	11	8	56	46	20	-21	3	9	263	258	2
-6	2	8	863	785	4	20	4	8	90	91	4	-3	7	8	120	119	2	1	11	8	120	120	6	-19	3	9	107	103	2
-4	2	8	112	110	1	22	4	8	20	16	17	-1	7	8	216	212	3	3	11	8	0	7	1	-17	3	9	114	107	2
-2	2	8	1376	1138	7	24	4	8	138	140	2	1	7	8	22	28	10	5	11	8	124	120	8	-15	3	9	138	139	1
-13	3	9	45	49	3	17	5	9	159	156	3	10	8	9	42	46	7	26	0	10	425	421	4	-23	3	10	56	60	3
-11	3	9	23	28	3	19	5	9	21	22	10	12	8	9	63	67	4	28	0	10	78	85	5	-21	3	10	532	518	3
-9	3	9	136	143	1	21	5	9	176	176	2	14	8	9	34	29	9	30	0	10	414	412	7	-19	3	10	120	125	2
-7	3	9	274	275	1	23	5	9	46	57	4	16	8	9	61	57	6	32	0	10	5	56	4	-17	3	10	396	389	2
-5	3	9	70	73	1	25	5	9	115	122	3	18	8	9	0	19	1	34	0	10	292	284	4	-15	3	10	149	158	1
-3	3	9	272	280	1	27	5	9	28	29	28	20	8	9	100	82	5	36	0	10	0	46	1	-13	3	10	635	610	3
-1	3	9	58	68	1	29	5	9	139	134	9	22	8	9	41	44	14	-37	1	10	50	19	10	-11	3	10	123	128	2
1	3	9	257	269	1	31	5	9	32	52	20	24	8	9	146	145	5	-35	1	10	53	53	7	-9	3	10	851	794	5
3	3	9	48	44	1	-32	6	9	0	12	1	-23	9	9	0	24	1	-33	1	10	73	67	5	-7	3	10	239	246	2
5	3	9	203	197	1	-30	6	9	56	69	8	-21	9	9	231	230	4	-31	1	10	84	85	4	-5	3	10	907	827	5
7	3	9	154	162	1	-28	6	9	85	87	6	-19	9	9	57	64	8	-29	1	10	101	100	3	-3	3	10	220	220	1
9	3	9	31	31	3	-26	6	9	34	44	9	-17	9	9	209	218	4	-27	1	10	0	25	1	-1	3	10	868	797	6
11	3	9	185	183	1	-24	6	9	133	126	5	-15	9	9	106	112	9	-25	1	10	188	197	2	1	3	10	341	341	3
13	3	9	49	58	3	-22	6	9	26	9	25	-13	9	9	233	233	5	-23	1	10	72	67	2	3	3	10	705	668	7
15	3	9	64	62	2	-20	6	9	143	142	3	-11	9	9	139	140	5	-21	1	10	176	174	1	5	3	10	254	248	1
17	3	9	75	81	2	-18	6	9	141	137	2	-9	9	9	190	183	6	-19	1	10	136	140	1	7	3	10	449	440	4
19	3	9	92	91	2	-16	6	9	102	100	5	-7	9	9	125	123	4	-17	1	10	206	204	1	9	3	10	48	46	2
21	3	9	170	173	2	-14	6	9	164	166	2	-5	9	9	88	93	4	-15	1	10	159	151	1	11	3	10	260	266	1
23	3	9	177	174	4	-12	6	9	137	142	2	-3	9	9	97	95	4	-13	1	10	314	304	1	13	3	10	81	86	2
25	3	9	122	130	2	-10	6	9	194	191	3	-1	9	9	35	54	7	-11	1	10	29	21	3	15	3	10	177	183	2
27	3	9	192	192	4	-8	6	9	170	166	4	1	9	9	20	28	20	-9	1	10	491	481	2	17	3	10	115	115	2

h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s
29	3	9	119	124	3	-6	6	9	286	290	4	3	9	9	66	67	6	-7	1	10	145	152	1	19	3	10	69	68	2
31	3	9	95	92	5	-4	6	9	173	177	3	5	9	9	31	10	9	-5	1	10	231	235	1	21	3	10	84	87	3
33	3	9	81	96	5	-2	6	9	372	368	4	7	9	9	30	21	13	-3	1	10	38	39	1	23	3	10	5	18	4
35	3	9	11	35	10	0	6	9	128	130	2	9	9	9	0	10	1	-1	1	10	33	41	1	25	3	10	109	105	5
-36	4	9	56	57	7	2	6	9	438	435	2	11	9	9	84	90	4	1	1	10	327	334	1	27	3	10	37	40	7
-34	4	9	98	98	5	4	6	9	22	18	5	13	9	9	0	10	1	3	1	10	120	130	1	29	3	10	62	66	4
-32	4	9	0	14	1	6	6	9	521	508	3	15	9	9	105	109	4	5	1	10	341	331	2	31	3	10	40	48	8
-30	4	9	96	90	4	8	6	9	81	84	2	17	9	9	66	73	7	7	1	10	130	123	1	33	3	10	141	139	4
-28	4	9	73	77	7	10	6	9	512	485	3	19	9	9	61	75	8	9	1	10	169	161	1	-36	4	10	0	12	1
-26	4	9	47	47	5	12	6	9	73	76	2	21	9	9	132	126	6	11	1	10	166	173	1	-34	4	10	31	7	30
-24	4	9	43	48	4	14	6	9	367	354	2	-18	10	9	136	136	7	13	1	10	45	46	2	-32	4	10	33	20	13
-22	4	9	93	103	2	16	6	9	29	15	7	-16	10	9	126	117	23	15	1	10	210	202	1	-30	4	10	68	71	9
-20	4	9	3	14	3	18	6	9	249	250	2	-14	10	9	116	114	7	17	1	10	0	6	1	-28	4	10	11	7	10
-18	4	9	186	183	1	20	6	9	75	75	4	-12	10	9	138	132	5	19	1	10	123	123	1	-26	4	10	68	66	3
-16	4	9	42	44	3	22	6	9	181	180	3	-10	10	9	91	91	7	21	1	10	41	41	4	-24	4	10	59	61	3
-14	4	9	260	260	2	24	6	9	98	103	5	-8	10	9	91	87	7	23	1	10	0	25	1	-22	4	10	99	98	2
-12	4	9	160	157	1	26	6	9	108	108	4	-6	10	9	94	91	7	25	1	10	0	16	1	-20	4	10	122	122	3
-10	4	9	643	619	3	28	6	9	71	80	6	-4	10	9	55	53	9	27	1	10	14	20	13	-18	4	10	120	128	3
-8	4	9	169	170	1	30	6	9	70	72	8	-2	10	9	108	103	5	29	1	10	17	15	16	-16	4	10	184	176	1
-6	4	9	798	741	5	-29	7	9	200	212	4	0	10	9	26	9	26	31	1	10	27	12	20	-14	4	10	42	37	3
-4	4	9	102	98	2	-27	7	9	28	38	27	2	10	9	177	171	4	33	1	10	107	111	3	-12	4	10	150	149	1
-2	4	9	844	792	5	-25	7	9	270	261	4	4	10	9	27	20	26	35	1	10	20	22	19	-10	4	10	51	49	2
0	4	9	103	104	1	-23	7	9	93	101	6	6	10	9	181	173	3	-38	2	10	114	118	5	-8	4	10	171	161	1
2	4	9	768	727	4	-21	7	9	247	244	3	8	10	9	16	17	15	-36	2	10	218	196	3	-6	4	10	13	15	13
4	4	9	130	127	1	-19	7	9	144	144	3	10	10	9	127	118	4	-34	2	10	175	182	3	-4	4	10	258	245	2
6	4	9	719	683	3	-17	7	9	294	289	3	12	10	9	29	39	17	-32	2	10	214	204	3	-2	4	10	37	26	3
8	4	9	104	116	1	-15	7	9	28	37	9	14	10	9	92	91	5	-30	2	10	213	202	3	0	4	10	109	112	1
10	4	9	542	522	2	-13	7	9	348	341	5	-7	11	9	124	126	6	-28	2	10	248	233	2	2	4	10	42	42	2
12	4	9	16	13	8	-11	7	9	40	37	5	-5	11	9	19	32	19	-26	2	10	299	289	3	4	4	10	163	161	1
14	4	9	598	569	3	-9	7	9	277	266	2	-3	11	9	127	129	8	-24	2	10	208	211	2	6	4	10	45	44	2
16	4	9	191	197	1	-7	7	9	49	49	3	-1	11	9	86	62	15	-22	2	10	249	244	2	8	4	10	249	240	2
18	4	9	516	498	2	-5	7	9	251	249	3	1	11	9	97	96	9	-20	2	10	81	82	2	10	4	10	21	22	4
20	4	9	125	132	2	-3	7	9	0	12	1	3	11	9	70	55	8	-18	2	10	94	99	1	12	4	10	172	181	1
22	4	9	288	282	2	-1	7	9	211	208	2	5	11	9	87	88	11	-16	2	10	11	10	10	14	4	10	42	45	3
24	4	9	23	32	12	1	7	9	62	61	3	-38	0	10	258	261	7	-14	2	10	34	37	3	16	4	10	50	52	3
26	4	9	181	181	2	3	7	9	73	79	2	-36	0	10	304	289	6	-12	2	10	65	69	1	18	4	10	65	66	4
28	4	9	0	8	1	5	7	9	25	23	6	-34	0	10	278	259	9	-10	2	10	40	42	1	20	4	10	57	58	4
30	4	9	154	147	3	7	7	9	32	33	7	-32	0	10	289	264	4	-8	2	10	35	41	1	22	4	10	92	99	3
32	4	9	31	35	31	9	7	9	182	179	2	-30	0	10	183	173	8	-6	2	10	19	23	3	24	4	10	0	4	1
34	4	9	51	67	50	11	7	9	0	11	1	-28	0	10	214	210	8	-4	2	10	221	210	1	26	4	10	25	35	14
-35	5	9	93	114	6	13	7	9	228	227	2	-26	0	10	199	191	3	-2	2	10	267	267	2	28	4	10	52	57	6
-33	5	9	50	38	10	15	7	9	25	33	13	-24	0	10	108	106	4	0	2	10	351	349	2	30	4	10	0	30	1
-31	5	9	36	47	15	17	7	9	181	174	3	-22	0	10	377	364	3	2	2	10	361	345	4	32	4	10	39	60	11
-29	5	9	76	70	8	19	7	9	36	32	9	-20	0	10	104	106	2	4	2	10	193	186	1	-35	5	10	50	38	41
-27	5	9	8	7	7	21	7	9	157	159	3	-18	0	10	297	281	2	6	2	10	401	412	2	-33	5	10	146	155	4
-25	5	9	127	124	3	23	7	9	30	17	30	-16	0	10	341	329	2	8	2	10	91	100	1	-31	5	10	67	69	5
-23	5	9	79	83	4	25	7	9	165	163	4	-14	0	10	316	317	2	10	2	10	356	355	1	-29	5	10	184	186	3
-21	5	9	165	169	2	27	7	9	55	59	9	-12	0	10	63	63	1	12	2	10	26	26	5	-27	5	10	46	59	5
-19	5	9	54	54	4	-26	8	9	37	70	36	-10	0	10	197	207	2	14	2	10	411	413	2	-25	5	10	283	279	6
-17	5	9	77	81	3	-24	8	9	121	128	11	-8	0	10	253	252	1	16	2	10	14	9	11	-23	5	10	42	39	6
-15	5	9	80	81	3	-22	8	9	100	102	6	-6	0	10	316	310	3	18	2	10	453	448	2	-21	5	10	470	451	9
-13	5	9	28	36	9	-20	8	9	202	202	4	-4	0	10	168	170	1	20	2	10	26	14	9	-19	5	10	20	22	11
-11	5	9	9	6	9	-18	8	9	44	42	7	-2	0	10	697	644	4	22	2	10	488	470	3	-17	5	10	586	562	7
-9	5	9	63	59	1	-16	8	9	222	225	5	0	0	10	253	237	3	24	2	10	0	5	1	-15	5	10	49	45	2
-7	5	9	26	29	3	-14	8	9	18	9	17	2	0	10	533	524	4	26	2	10	401	392	2	-13	5	10	606	584	5
-5	5	9	185	187	3	-12	8	9	151	149	4	4	0	10	537	525	3	28	2	10	23	9	14	-11	5	10	209	206	1
-3	5	9	116	125	1	-10	8	9	49	37	5	6	0	10	683	653	4	30	2	10	301	293	2	-9	5	10	639	605	3
-1	5	9	281	277	2	-8	8	9	138	132	4	8	0	10	154	151	1	32	2	10	67	67	5	-7	5	10	331	328	3
1	5	9	111	110	1	-6	8	9	20	12	20	10	0	10	933	857	5	34	2	10	135	148	4	-5	5	10	511	499	4
3	5	9	134	137	2	-4	8	9	122	119	3	12	0	10	139	135	1	-37	3	10	96	94	17	-3	5	10	268	267	4
5	5	9	81	78	1	-2	8	9	133	138	4	14	0	10	994	904	6	-35	3	10	38	27	27	-1	5	10	517	499	4
7	5	9	119	129	1	0	8	9	80	82	2	16	0	10	247	259	2	-33	3	10	155	159	3	1	5	10	161	155	1
9	5	9	168	168	1	2	8	9	63	70	3	18	0	10	701	671	5	-31	3	10	36	41	9	3	5	10	459	445	2
11	5	9	233	231	2	4	8	9	68	69	3	20	0	10	50	65	5	-29	3	10	204	207	2	5	5	10	160	164	2
13	5	9	135	136	1	6	8	9	18	12	17	22	0	10	478	458	3	-27	3	10	39	51	5	7	5	10	366	373	2
15	5	9	147	139	3	8	8	9	28	13	8	24	0	10	100	110	10	-25	3	10	431	421	3	9	5	10	236	227	3
11	5	10	222	226	1	4	8	10	0	8	1	29	1	11	57	62	7	-16	4	11	317	315	2	26	6	11	193	186	4
13	5	10	271	272	2	6	8	10	260	257	2	31	1	11	62	68	7	-14	4	11	339	318	2	28	6	11	0	5	1
15	5	10	101	102	2	8	8	10	55	57	4	33	1	11	39	32	38	-12	4	11	288	285	2	-29	7	11	37	20	17
17	5	10	100	101	3	10	8	10	325	316	3	35	1	11	17	7	17	-10	4	11	473	460	3	-27	7	11	79	81	13
19	5	10	41	32	5	12	8	10	107	105	3	-38	2	11	74	74	6	-8	4	11	164	162	1	-25	7	11	23	31	23
21	5	10	16	12	15	14	8	10	362	340	4	-36	2	11	162	155	3	-6	4	11	289	294	2	-23	7	11	0	27	1
23	5	10	73	78	4	16	8	10	97	101	4	-34	2	11	135	134	3	-4	4	11	100	95	2	-21	7	11	88	92	8
25	5	10	21	39	20	18	8	10	330	308	4	-32	2	11	178	180	3	-2	4	11	122	125	1	-19	7	11	77	78	5
27	5	10	60	57	8	20	8	10	16	15	16	-30	2	11	166	157	2	0	4	11	134	152	1	-17	7	11	144	152	3
29	5	10	95	99	7	22	8	10	267	255	4	-28	2	11	342	322	2	2	4	11	42	36	2	-15	7	11	86	86	3
31	5	10	39	59	31	24	8	10	0	10	1	-26	2	11	271	265	2	4	4	11	108	118	1	-13	7	11	205	198	4
-32	6	10	132	139	6	-23	9	10	59	67	13	-24	2	11	372	357	2	6	4	11	197	195	1	-11	7	11	56	58	4
-30	6	10	0	14	1	-21	9	10	0	41	1	-22	2	11	366	358	2	8	4	11	7	10	7	-9	7	11	308	305	5

h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s
-28	6	10	214	215	6	-19	9	10	79	76	7	-20	2	11	156	151	1	10	4	11	212	211	1	-7	7	11	134	133	2
-26	6	10	72	82	4	-17	9	10	25	14	25	-18	2	11	248	246	1	12	4	11	47	46	3	-5	7	11	362	365	3
-24	6	10	168	171	3	-15	9	10	77	76	7	-16	2	11	189	194	1	14	4	11	194	192	1	-3	7	11	172	171	2
-22	6	10	84	81	5	-13	9	10	17	49	16	-14	2	11	325	306	2	16	4	11	52	56	3	-1	7	11	353	349	2
-20	6	10	161	154	5	-11	9	10	59	57	14	-12	2	11	543	524	2	18	4	11	429	412	2	1	7	11	145	146	2
-18	6	10	30	26	11	-9	9	10	82	77	8	-10	2	11	98	101	1	20	4	11	13	9	12	3	7	11	306	301	2
-16	6	10	169	162	2	-7	9	10	19	27	19	-8	2	11	476	464	2	22	4	11	451	430	3	5	7	11	128	133	2
-14	6	10	143	138	2	-5	9	10	0	11	1	-6	2	11	88	90	1	24	4	11	69	75	4	7	7	11	313	307	2
-12	6	10	112	105	5	-3	9	10	104	99	5	-4	2	11	315	309	1	26	4	11	357	339	3	9	7	11	74	72	4
-10	6	10	93	90	1	-1	9	10	0	28	1	-2	2	11	387	366	1	28	4	11	71	77	5	11	7	11	338	324	2
-8	6	10	149	146	4	1	9	10	99	96	5	0	2	11	165	153	1	30	4	11	312	308	7	13	7	11	30	21	8
-6	6	10	91	91	2	3	9	10	72	69	7	2	2	11	317	317	3	32	4	11	25	3	24	15	7	11	340	329	2
-4	6	10	279	269	2	5	9	10	82	76	10	4	2	11	17	21	4	-33	5	11	0	11	1	17	7	11	22	20	21
-2	6	10	145	147	2	7	9	10	121	117	3	6	2	11	61	65	1	-31	5	11	123	119	3	19	7	11	301	284	3
0	6	10	93	92	1	9	9	10	124	114	6	8	2	11	40	18	9	-29	5	11	24	30	23	21	7	11	43	40	34
2	6	10	195	201	2	11	9	10	164	158	3	10	2	11	124	139	1	-27	5	11	145	135	4	23	7	11	216	211	4
4	6	10	0	12	1	13	9	10	112	101	4	12	2	11	23	16	4	-25	5	11	12	16	12	25	7	11	0	17	1
6	6	10	186	190	2	15	9	10	158	148	4	14	2	11	162	163	3	-23	5	11	200	197	3	27	7	11	141	143	7
8	6	10	68	63	3	17	9	10	107	101	4	16	2	11	32	40	3	-21	5	11	64	64	4	-26	8	11	34	41	25
10	6	10	218	213	2	19	9	10	120	114	4	18	2	11	197	205	2	-19	5	11	272	269	2	-24	8	11	0	8	1
12	6	10	64	74	3	-16	10	10	21	50	21	20	2	11	26	32	10	-17	5	11	58	59	3	-22	8	11	87	90	7
14	6	10	243	239	2	-14	10	10	89	68	9	22	2	11	302	296	2	-15	5	11	168	172	2	-20	8	11	0	12	1
16	6	10	9	6	8	-12	10	10	67	69	8	24	2	11	14	4	13	-13	5	11	58	63	2	-18	8	11	114	118	6
18	6	10	276	273	2	-10	10	10	71	58	20	26	2	11	200	205	2	-11	5	11	96	93	2	-16	8	11	25	33	25
20	6	10	25	9	11	-8	10	10	121	120	6	28	2	11	24	13	20	-9	5	11	60	57	1	-14	8	11	0	50	1
22	6	10	213	214	2	-6	10	10	0	29	1	30	2	11	237	228	3	-7	5	11	178	173	2	-12	8	11	108	112	3
24	6	10	54	35	7	-4	10	10	158	152	4	32	2	11	36	48	11	-5	5	11	102	105	4	-10	8	11	30	29	21
26	6	10	232	234	3	-2	10	10	72	63	11	34	2	11	229	233	3	-3	5	11	103	97	4	-8	8	11	74	76	4
28	6	10	50	58	9	0	10	10	97	100	15	-37	3	11	21	29	21	-1	5	11	217	219	4	-6	8	11	127	125	3
30	6	10	195	187	5	2	10	10	121	121	5	-35	3	11	0	32	1	1	5	11	69	70	2	-4	8	11	95	95	4
-29	7	10	95	111	6	4	10	10	79	80	7	-33	3	11	74	83	4	3	5	11	218	214	3	-2	8	11	162	163	4
-27	7	10	107	116	5	6	10	10	129	123	12	-31	3	11	57	64	5	5	5	11	22	7	6	0	8	11	214	200	3
-25	7	10	131	134	7	8	10	10	126	113	3	-29	3	11	70	76	3	7	5	11	19	23	8	2	8	11	114	126	4
-23	7	10	74	83	7	10	10	10	160	155	3	-27	3	11	41	47	6	9	5	11	28	24	6	4	8	11	216	208	3
-21	7	10	184	193	3	12	10	10	44	55	9	-25	3	11	6	8	5	11	5	11	60	65	3	6	8	11	101	99	3
-19	7	10	65	63	7	14	10	10	172	163	3	-23	3	11	108	109	2	13	5	11	13	9	12	8	8	11	190	180	2
-17	7	10	258	258	5	-5	11	10	157	171	22	-21	3	11	84	87	3	15	5	11	128	130	2	10	8	11	15	22	14
-15	7	10	0	21	1	-3	11	10	0	5	1	-19	3	11	95	96	1	17	5	11	14	11	14	12	8	11	173	163	5
-13	7	10	152	153	8	-1	11	10	185	184	6	-17	3	11	168	164	1	19	5	11	104	105	4	14	8	11	61	63	5
-11	7	10	0	13	1	1	11	10	23	1	23	-15	3	11	112	111	2	21	5	11	24	12	18	16	8	11	150	137	4
-9	7	10	167	166	3	3	11	10	157	159	13	-13	3	11	264	277	1	23	5	11	125	130	5	18	8	11	0	7	1
-7	7	10	8	15	8	-37	1	11	208	188	6	-11	3	11	88	95	1	25	5	11	81	86	4	20	8	11	132	125	5
-5	7	10	224	218	2	-35	1	11	49	42	14	-9	3	11	227	234	1	27	5	11	181	181	3	22	8	11	39	17	13
-3	7	10	110	109	3	-33	1	11	102	102	3	-7	3	11	111	108	1	29	5	11	66	56	7	24	8	11	75	76	11
-1	7	10	137	130	2	-31	1	11	55	54	5	-5	3	11	445	445	2	31	5	11	71	86	10	-23	9	11	0	20	1
1	7	10	211	206	2	-29	1	11	17	29	17	-3	3	11	71	73	1	-32	6	11	207	210	5	-21	9	11	47	50	23
3	7	10	44	38	3	-27	1	11	0	16	1	-1	3	11	517	509	4	-30	6	11	92	99	7	-19	9	11	75	66	11
5	7	10	255	247	2	-25	1	11	25	20	8	1	3	11	75	84	1	-28	6	11	226	220	4	-17	9	11	91	109	5
7	7	10	0	27	1	-23	1	11	75	77	2	3	3	11	419	425	3	-26	6	11	115	126	7	-15	9	11	31	27	31
9	7	10	267	252	2	-21	1	11	216	212	1	5	3	11	94	95	1	-24	6	11	226	220	3	-13	9	11	186	193	7
11	7	10	20	14	20	-19	1	11	21	19	6	7	3	11	135	142	1	-22	6	11	166	179	3	-11	9	11	0	3	1
13	7	10	75	70	5	-17	1	11	324	321	2	9	3	11	22	18	5	-20	6	11	272	275	5	-9	9	11	255	253	4
15	7	10	50	48	5	-15	1	11	23	28	3	11	3	11	26	31	6	-18	6	11	234	233	4	-7	9	11	0	3	1
17	7	10	78	70	4	-13	1	11	436	416	2	13	3	11	114	118	1	-16	6	11	271	267	2	-5	9	11	261	263	3
19	7	10	70	68	5	-11	1	11	0	4	1	15	3	11	105	109	1	-14	6	11	276	273	6	-3	9	11	64	59	7
21	7	10	141	144	3	-9	1	11	605	588	2	17	3	11	171	172	2	-12	6	11	190	193	2	-1	9	11	248	245	13
23	7	10	69	65	6	-7	1	11	163	164	1	19	3	11	222	218	2	-10	6	11	261	258	3	1	9	11	130	127	4
25	7	10	85	84	6	-5	1	11	623	602	3	21	3	11	181	182	2	-8	6	11	112	111	3	3	9	11	272	266	4
27	7	10	101	95	8	-3	1	11	193	234	46	23	3	11	147	148	2	-6	6	11	199	194	1	5	9	11	90	85	3
-26	8	10	74	82	8	-1	1	11	793	735	4	25	3	11	147	143	2	-4	6	11	48	45	2	7	9	11	323	302	3
-24	8	10	103	110	10	1	1	11	43	53	1	27	3	11	38	40	7	-2	6	11	85	95	1	9	9	11	83	79	4
-22	8	10	126	129	5	3	1	11	859	800	5	29	3	11	108	106	3	0	6	11	165	157	2	11	9	11	285	278	3
-20	8	10	62	69	7	5	1	11	136	151	1	31	3	11	48	35	12	2	6	11	32	31	4	13	9	11	136	134	3
-18	8	10	115	114	5	7	1	11	851	795	3	33	3	11	42	48	9	4	6	11	156	148	1	15	9	11	197	193	5
-16	8	10	69	78	9	9	1	11	380	376	1	-36	4	11	288	273	17	6	6	11	39	40	3	17	9	11	157	145	5
-14	8	10	65	69	6	11	1	11	820	764	4	-34	4	11	147	142	8	8	6	11	139	141	2	19	9	11	123	120	4
-12	8	10	52	63	8	13	1	11	283	287	1	-32	4	11	275	265	4	10	6	11	22	31	16	-16	10	11	136	140	7
-10	8	10	28	55	27	15	1	11	525	515	2	-30	4	11	182	183	3	12	6	11	146	152	2	-14	10	11	0	10	1
-8	8	10	0	18	1	17	1	11	251	259	1	-28	4	11	323	311	3	14	6	11	149	154	2	-12	10	11	163	154	6
-6	8	10	208	207	3	19	1	11	221	224	1	-26	4	11	229	220	4	16	6	11	104	103	3	-10	10	11	15	20	15
-4	8	10	38	42	5	21	1	11	149	156	2	-24	4	11	436	421	3	18	6	11	150	156	2	-8	10	11	176	177	7
-2	8	10	218	211	5	23	1	11	217	211	3	-22	4	11	227	222	2	20	6	11	127	128	3	-6	10	11	63	54	13
0	8	10	19	9	16	25	1	11	96	101	3	-20	4	11	425	410	3	22	6	11	123	124	4	-4	10	11	171	168	6
2	8	10	207	199	2	27	1	11	173	173	2	-18	4	11	294	289	2	24	6	11	56	56	8	-2	10	11	53	60	9
0	10	11	149	153	5	-34	2	12	0	15	1	-4	4	12	67	67	1	-21	7	12	102	111	4	-33	1	13	341	317	3
2	10	11	64	60	8	-32	2	12	157	163	6	-2	4	12	147	141	1	-19	7	12	122	120	4	-31	1	13	211	200	3
4	10	11	167	159	7	-30	2	12	0	15	1	0	4	12	146	157	2	-17	7	12	48	51	7	-29	1	13	308	296	3
6	10	11	77	79	6	-28	2	12	236	237	3	2	4	12	245	254	1	-15	7	12	132	130	3	-27	1	13	272	262	2
8	10	11	194	172	5	-26	2	12	71	75	3	4	4	12	77	77	1	-13	7	12	0	17	1	-25	1	13	397	374	2

h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s
10	10	11	56	61	9	-24	2	12	323	315	2	6	4	12	138	140	1	-11	7	12	114	110	3	-23	1	13	212	212	2
12	10	11	146	142	4	-22	2	12	244	240	2	8	4	12	147	149	2	-9	7	12	8	25	7	-21	1	13	431	417	2
14	10	11	37	50	30	-20	2	12	381	369	2	10	4	12	75	78	2	-7	7	12	138	132	3	-19	1	13	226	225	1
-3	11	11	63	71	9	-18	2	12	303	312	2	12	4	12	233	231	1	-5	7	12	129	138	2	-17	1	13	465	443	2
-1	11	11	135	140	7	-16	2	12	435	429	2	14	4	12	71	70	2	-3	7	12	186	179	3	-15	1	13	317	310	1
1	11	11	0	9	1	-14	2	12	184	193	1	16	4	12	118	125	2	-1	7	12	328	315	3	-13	1	13	558	529	2
-38	0	12	56	7	41	-12	2	12	457	452	2	18	4	12	53	60	3	1	7	12	211	210	2	-11	1	13	92	93	2
-36	0	12	120	132	8	-10	2	12	358	357	1	20	4	12	36	24	6	3	7	12	274	261	3	-9	1	13	525	499	2
-34	0	12	145	139	5	-8	2	12	275	286	1	22	4	12	54	61	4	5	7	12	120	114	2	-7	1	13	17	22	3
-32	0	12	204	196	7	-6	2	12	497	477	3	24	4	12	134	134	4	7	7	12	162	162	2	-5	1	13	132	131	1
-30	0	12	114	117	14	-4	2	12	434	425	2	26	4	12	28	35	12	9	7	12	0	7	1	-3	1	13	86	90	1
-28	0	12	278	271	4	-2	2	12	562	543	3	28	4	12	114	114	3	11	7	12	217	213	2	-1	1	13	30	19	2
-26	0	12	125	128	4	0	2	12	498	481	2	30	4	12	42	35	10	13	7	12	44	46	5	1	1	13	122	113	2
-24	0	12	391	376	6	2	2	12	391	380	2	32	4	12	0	41	1	15	7	12	206	209	2	3	1	13	86	85	1
-22	0	12	245	248	2	4	2	12	237	232	2	-33	5	12	219	216	6	17	7	12	30	23	12	5	1	13	114	108	1
-20	0	12	619	588	4	6	2	12	293	295	1	-31	5	12	73	71	5	19	7	12	143	144	6	7	1	13	149	157	1
-18	0	12	326	322	2	8	2	12	65	60	3	-29	5	12	223	216	5	21	7	12	38	36	11	9	1	13	76	78	3
-16	0	12	755	707	4	10	2	12	147	152	1	-27	5	12	72	74	7	23	7	12	117	131	7	11	1	13	294	296	1
-14	0	12	396	398	2	12	2	12	49	49	2	-25	5	12	205	198	2	25	7	12	141	138	4	13	1	13	87	97	1
-12	0	12	783	721	4	14	2	12	109	109	2	-23	5	12	85	82	5	-26	8	12	106	117	5	15	1	13	357	351	2
-10	0	12	721	676	5	16	2	12	93	97	3	-21	5	12	136	138	3	-24	8	12	199	209	4	17	1	13	20	17	10
-8	0	12	578	550	4	18	2	12	36	41	5	-19	5	12	36	37	8	-22	8	12	102	115	5	19	1	13	444	432	2
-6	0	12	583	553	5	20	2	12	102	111	3	-17	5	12	129	133	4	-20	8	12	208	217	4	21	1	13	141	153	2
-4	0	12	483	462	4	22	2	12	12	29	11	-15	5	12	61	67	2	-18	8	12	135	146	4	23	1	13	339	334	2
-2	0	12	233	235	2	24	2	12	70	67	5	-13	5	12	19	18	8	-16	8	12	242	243	4	25	1	13	166	169	3
0	0	12	361	381	2	26	2	12	80	81	3	-11	5	12	130	134	3	-14	8	12	162	170	4	27	1	13	363	353	3
2	0	12	297	302	3	28	2	12	32	40	10	-9	5	12	70	70	3	-12	8	12	265	260	5	29	1	13	130	124	4
4	0	12	400	385	3	30	2	12	122	125	3	-7	5	12	94	93	2	-10	8	12	147	158	3	31	1	13	388	364	3
6	0	12	617	597	3	32	2	12	63	63	5	-5	5	12	183	187	2	-8	8	12	267	271	6	33	1	13	118	128	6
8	0	12	294	287	2	34	2	12	145	148	3	-3	5	12	26	31	3	-6	8	12	191	187	4	-38	2	13	0	6	1
10	0	12	462	468	3	-37	3	12	212	210	4	-1	5	12	241	240	1	-4	8	12	241	242	5	-36	2	13	72	54	7
12	0	12	285	296	2	-35	3	12	106	109	7	1	5	12	23	28	4	-2	8	12	208	205	6	-34	2	13	0	5	1
14	0	12	183	191	2	-33	3	12	212	200	4	3	5	12	383	378	2	0	8	12	196	192	4	-32	2	13	33	28	11
16	0	12	22	19	10	-31	3	12	131	128	3	5	5	12	27	33	4	2	8	12	198	201	2	-30	2	13	74	73	5
18	0	12	113	123	2	-29	3	12	255	245	3	7	5	12	472	458	2	4	8	12	129	119	3	-28	2	13	18	23	18
20	0	12	17	6	16	-27	3	12	184	180	2	9	5	12	41	36	3	6	8	12	178	174	2	-26	2	13	86	81	2
22	0	12	230	233	4	-25	3	12	286	276	4	11	5	12	545	513	3	8	8	12	119	125	3	-24	2	13	163	155	2
24	0	12	148	157	10	-23	3	12	123	122	2	13	5	12	104	110	4	10	8	12	136	131	3	-22	2	13	31	19	6
26	0	12	160	167	3	-21	3	12	160	164	2	15	5	12	489	464	3	12	8	12	124	123	3	-20	2	13	145	149	1
28	0	12	18	6	18	-19	3	12	121	121	3	17	5	12	192	184	2	14	8	12	51	46	7	-18	2	13	97	96	2
30	0	12	246	238	4	-17	3	12	59	63	2	19	5	12	364	349	3	16	8	12	103	96	4	-16	2	13	66	74	1
32	0	12	45	65	10	-15	3	12	16	20	10	21	5	12	171	174	2	18	8	12	26	25	26	-14	2	13	137	138	1
34	0	12	272	255	5	-13	3	12	30	36	2	23	5	12	267	264	5	20	8	12	81	78	9	-12	2	13	328	314	2
-37	1	12	80	76	6	-11	3	12	43	38	2	25	5	12	97	104	3	22	8	12	67	63	6	-10	2	13	274	281	1
-35	1	12	18	28	17	-9	3	12	194	196	1	27	5	12	263	260	4	-21	9	12	26	45	25	-8	2	13	617	584	3
-33	1	12	99	99	4	-7	3	12	0	7	1	29	5	12	137	131	5	-19	9	12	177	178	6	-6	2	13	381	381	2
-31	1	12	56	60	6	-5	3	12	255	267	1	31	5	12	183	193	4	-17	9	12	27	47	26	-4	2	13	534	515	4
-29	1	12	114	106	3	-3	3	12	107	106	1	-32	6	12	54	57	11	-15	9	12	269	263	5	-2	2	13	469	459	3
-27	1	12	102	100	2	-1	3	12	280	279	3	-30	6	12	80	102	12	-13	9	12	38	30	14	0	2	13	435	421	3
-25	1	12	164	164	2	1	3	12	99	112	2	-28	6	12	88	85	7	-11	9	12	258	247	3	2	2	13	549	533	3
-23	1	12	37	36	4	3	3	12	523	515	5	-26	6	12	90	97	5	-9	9	12	0	6	1	4	2	13	447	433	4
-21	1	12	67	62	4	5	3	12	157	147	2	-24	6	12	127	133	4	-7	9	12	224	223	3	6	2	13	496	486	4
-19	1	12	103	112	2	7	3	12	574	558	2	-22	6	12	257	252	4	-5	9	12	14	32	13	8	2	13	298	296	1
-17	1	12	29	39	3	9	3	12	107	111	2	-20	6	12	114	121	6	-3	9	12	187	184	3	10	2	13	132	131	1
-15	1	12	113	111	1	11	3	12	410	396	2	-18	6	12	246	235	3	-1	9	12	24	24	24	12	2	13	288	286	1
-13	1	12	86	97	1	13	3	12	130	132	1	-16	6	12	160	158	2	1	9	12	145	148	12	14	2	13	146	150	2
-11	1	12	220	222	1	15	3	12	450	440	2	-14	6	12	79	92	3	3	9	12	33	54	32	16	2	13	289	286	1
-9	1	12	119	122	2	17	3	12	222	217	2	-12	6	12	238	235	3	5	9	12	149	139	8	18	2	13	159	161	1
-7	1	12	119	110	1	19	3	12	540	515	3	-10	6	12	132	137	2	7	9	12	51	52	9	20	2	13	238	226	2
-5	1	12	263	253	2	21	3	12	213	205	4	-8	6	12	248	253	2	9	9	12	142	138	3	22	2	13	53	61	4
-3	1	12	109	120	1	23	3	12	399	383	2	-6	6	12	214	226	3	11	9	12	0	5	1	24	2	13	104	102	4
-1	1	12	120	135	1	25	3	12	108	107	3	-4	6	12	309	304	2	13	9	12	71	70	5	26	2	13	63	74	4
1	1	12	15	17	3	27	3	12	331	329	2	-2	6	12	172	174	2	15	9	12	36	30	11	28	2	13	31	39	13
3	1	12	294	284	1	29	3	12	123	124	3	0	6	12	323	320	2	17	9	12	0	26	1	30	2	13	73	74	5
5	1	12	51	48	2	31	3	12	251	246	3	2	6	12	164	168	2	19	9	12	9	29	9	32	2	13	56	35	6
7	1	12	335	331	3	33	3	12	82	97	5	4	6	12	215	216	1	-16	10	12	187	189	11	34	2	13	33	44	17
9	1	12	57	56	1	-36	4	12	31	51	31	6	6	12	27	14	5	-14	10	12	140	154	6	-37	3	13	49	42	49
11	1	12	193	190	1	-34	4	12	95	93	6	8	6	12	196	189	2	-12	10	12	168	164	6	-35	3	13	139	146	8
13	1	12	22	32	4	-32	4	12	59	63	6	10	6	12	69	67	3	-10	10	12	163	159	11	-33	3	13	73	73	5
15	1	12	222	223	1	-30	4	12	87	79	4	12	6	12	214	205	2	-8	10	12	127	131	5	-31	3	13	179	171	4
17	1	12	44	40	3	-28	4	12	109	118	3	14	6	12	51	46	4	-6	10	12	131	134	5	-29	3	13	170	175	2
19	1	12	179	181	2	-26	4	12	41	44	5	16	6	12	127	128	2	-4	10	12	105	104	6	-27	3	13	87	85	3
21	1	12	54	52	4	-24	4	12	113	112	2	18	6	12	0	6	1	-2	10	12	141	139	10	-25	3	13	217	218	3
23	1	12	194	190	2	-22	4	12	97	96	2	20	6	12	108	112	5	0	10	12	87	85	9	-23	3	13	22	33	12
25	1	12	54	54	4	-20	4	12	112	113	2	22	6	12	32	22	13	2	10	12	132	128	5	-21	3	13	315	303	2
27	1	12	89	92	3	-18	4	12	0	2	1	24	6	12	125	132	3	4	10	12	85	84	7	-19	3	13	25	36	9
29	1	12	99	91	3	-16	4	12	67	68	2	26	6	12	68	78	6	6	10	12	123	113	7	-17	3	13	243	237	1
31	1	12	76	84	4	-14	4	12	89	86	1	28	6	12	92	88	5	8	10	12	60	33	13	-15	3	13	44	49	2
33	1	12	78	82	5	-12	4	12	73	80	2	-29	7	12	114	112	5	10	10	12	120	114	5	-13	3	13	145	150	1

h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s
35	1	12	51	63	8	-10	4	12	37	42	2	-27	7	12	93	91	7	12	10	12	64	57	21	-11	3	13	50	42	2
-38	2	12	39	23	12	-8	4	12	100	106	1	-25	7	12	106	113	5	-37	1	13	262	253	3	-9	3	13	88	94	1
-36	2	12	114	112	4	-6	4	12	74	70	2	-23	7	12	126	127	5	-35	1	13	191	190	4	-7	3	13	149	142	2
-5	3	13	154	151	1	-32	6	13	10	12	9	-15	9	13	51	51	10	-1	1	14	313	314	1	-34	4	14	32	31	32
-3	3	13	111	123	1	-30	6	13	93	97	6	-13	9	13	223	225	4	1	1	14	25	28	2	-32	4	14	50	62	10
-1	3	13	133	140	2	-28	6	13	43	56	15	-11	9	13	19	20	18	3	1	14	268	266	2	-30	4	14	71	76	5
1	3	13	94	83	2	-26	6	13	103	105	5	-9	9	13	111	119	7	5	1	14	119	129	2	-28	4	14	45	43	7
3	3	13	28	29	2	-24	6	13	95	103	4	-7	9	13	0	11	1	7	1	14	166	168	1	-26	4	14	104	106	3
5	3	13	58	58	1	-22	6	13	84	95	4	-5	9	13	45	61	10	9	1	14	35	35	2	-24	4	14	0	18	1
7	3	13	190	193	2	-20	6	13	198	199	3	-3	9	13	22	5	21	11	1	14	0	14	1	-22	4	14	107	112	2
9	3	13	99	100	1	-18	6	13	60	63	5	-1	9	13	40	46	8	13	1	14	119	128	2	-20	4	14	0	29	1
11	3	13	163	165	1	-16	6	13	271	268	2	1	9	13	0	16	1	15	1	14	101	113	1	-18	4	14	218	214	2
13	3	13	115	116	1	-14	6	13	6	12	5	3	9	13	26	19	26	17	1	14	84	87	3	-16	4	14	54	59	3
15	3	13	201	197	1	-12	6	13	247	238	3	5	9	13	46	33	14	19	1	14	98	106	3	-14	4	14	232	232	2
17	3	13	55	51	4	-10	6	13	122	121	2	7	9	13	43	34	10	21	1	14	113	114	2	-12	4	14	77	77	3
19	3	13	201	202	2	-8	6	13	260	250	3	9	9	13	54	55	8	23	1	14	126	134	2	-10	4	14	162	159	2
21	3	13	21	15	12	-6	6	13	158	164	2	11	9	13	133	118	5	25	1	14	39	54	7	-8	4	14	120	124	2
23	3	13	193	194	2	-4	6	13	317	316	2	13	9	13	0	17	1	27	1	14	55	54	5	-6	4	14	218	216	2
25	3	13	0	5	1	-2	6	13	222	226	1	15	9	13	148	145	5	29	1	14	22	25	22	-4	4	14	64	63	2
27	3	13	182	190	3	0	6	13	291	296	2	17	9	13	26	34	25	31	1	14	49	64	6	-2	4	14	93	95	1
29	3	13	36	39	11	2	6	13	227	230	1	-16	10	13	53	28	13	33	1	14	26	36	25	0	4	14	70	71	1
31	3	13	56	70	7	4	6	13	238	240	2	-14	10	13	150	141	6	-36	2	14	249	232	4	2	4	14	61	69	2
33	3	13	39	53	33	6	6	13	257	251	2	-12	10	13	0	35	1	-34	2	14	23	3	23	4	4	14	0	16	1
-36	4	13	52	60	9	8	6	13	223	218	2	-10	10	13	147	152	6	-32	2	14	211	200	3	6	4	14	64	66	2
-34	4	13	0	7	1	10	6	13	322	307	2	-8	10	13	0	31	1	-30	2	14	17	8	16	8	4	14	35	42	3
-32	4	13	32	21	14	12	6	13	233	226	2	-6	10	13	130	133	7	-28	2	14	193	183	2	10	4	14	130	123	1
-30	4	13	18	29	18	14	6	13	274	265	2	-4	10	13	67	67	7	-26	2	14	103	107	2	12	4	14	46	59	4
-28	4	13	41	59	21	16	6	13	73	86	3	-2	10	13	95	100	6	-24	2	14	108	106	2	14	4	14	20	12	7
-26	4	13	33	35	7	18	6	13	195	196	2	0	10	13	102	100	5	-22	2	14	108	101	4	16	4	14	77	79	5
-24	4	13	90	85	3	20	6	13	19	10	19	2	10	13	100	102	5	-20	2	14	66	72	2	18	4	14	62	61	3
-22	4	13	138	144	2	22	6	13	141	149	4	4	10	13	105	106	10	-18	2	14	50	48	2	20	4	14	32	41	8
-20	4	13	228	219	3	24	6	13	27	19	23	6	10	13	77	90	12	-16	2	14	27	29	3	22	4	14	50	63	6
-18	4	13	212	211	2	26	6	13	103	114	6	8	10	13	94	90	12	-14	2	14	111	105	1	24	4	14	0	3	1
-16	4	13	344	337	2	28	6	13	37	45	15	10	10	13	30	35	29	-12	2	14	73	68	9	26	4	14	58	66	6
-14	4	13	225	222	1	-29	7	13	204	197	10	12	10	13	126	122	6	-10	2	14	264	262	1	28	4	14	64	72	6
-12	4	13	600	587	7	-27	7	13	164	164	6	-38	0	14	46	22	45	-8	2	14	273	261	1	30	4	14	21	35	21
-10	4	13	294	296	2	-25	7	13	249	249	7	-36	0	14	385	360	6	-6	2	14	80	83	1	-33	5	14	93	112	10
-8	4	13	586	560	4	-23	7	13	106	110	6	-34	0	14	62	48	11	-4	2	14	406	386	3	-31	5	14	155	164	4
-6	4	13	346	349	2	-21	7	13	262	264	10	-32	0	14	307	277	4	-2	2	14	18	30	3	-29	5	14	109	118	4
-4	4	13	270	275	1	-19	7	13	76	87	5	-30	0	14	23	27	22	0	2	14	382	377	2	-27	5	14	169	180	4
-2	4	13	224	219	2	-17	7	13	189	189	3	-28	0	14	325	315	4	2	2	14	194	197	2	-25	5	14	146	152	6
0	4	13	394	393	2	-15	7	13	148	151	3	-26	0	14	36	39	9	4	2	14	419	406	4	-23	5	14	267	257	5
2	4	13	368	379	4	-13	7	13	142	147	6	-24	0	14	375	355	5	6	2	14	327	332	1	-21	5	14	330	329	3
4	4	13	647	628	3	-11	7	13	175	176	3	-22	0	14	14	21	14	8	2	14	429	421	2	-19	5	14	318	312	3
6	4	13	485	468	2	-9	7	13	103	106	6	-20	0	14	113	120	2	10	2	14	338	337	1	-17	5	14	421	417	5
8	4	13	509	487	2	-7	7	13	151	162	3	-18	0	14	46	50	6	12	2	14	308	311	2	-15	5	14	304	304	3
10	4	13	414	401	2	-5	7	13	67	73	3	-16	0	14	0	6	1	14	2	14	188	186	2	-13	5	14	557	534	5
12	4	13	282	276	1	-3	7	13	172	169	2	-14	0	14	62	62	4	16	2	14	397	389	2	-11	5	14	198	196	3
14	4	13	466	444	2	-1	7	13	72	79	6	-12	0	14	67	55	2	18	2	14	295	287	2	-9	5	14	586	563	7
16	4	13	222	214	1	1	7	13	136	133	2	-10	0	14	21	8	5	20	2	14	299	296	2	-7	5	14	150	155	1
18	4	13	384	371	2	3	7	13	3	7	2	-8	0	14	282	272	2	22	2	14	329	317	2	-5	5	14	416	399	5
20	4	13	115	115	2	5	7	13	82	81	3	-6	0	14	452	425	3	24	2	14	217	219	2	-3	5	14	170	167	3
22	4	13	176	174	2	7	7	13	107	110	2	-4	0	14	320	310	2	26	2	14	227	231	4	-1	5	14	310	298	3
24	4	13	120	118	4	9	7	13	132	122	4	-2	0	14	398	387	5	28	2	14	138	147	4	1	5	14	150	148	1
26	4	13	70	81	5	11	7	13	105	109	3	0	0	14	675	643	5	30	2	14	167	169	3	3	5	14	357	349	2
28	4	13	134	132	3	13	7	13	100	88	3	2	0	14	69	62	2	32	2	14	64	74	5	5	5	14	16	10	10
30	4	13	66	72	11	15	7	13	162	169	4	4	0	14	825	766	7	-35	3	14	142	144	4	7	5	14	290	290	2
32	4	13	15	42	14	17	7	13	71	74	3	6	0	14	324	312	7	-33	3	14	159	160	4	9	5	14	63	64	3
-33	5	13	47	48	11	19	7	13	201	195	5	8	0	14	591	554	3	-31	3	14	136	137	5	11	5	14	196	199	2
-31	5	13	4	36	3	21	7	13	126	129	4	10	0	14	630	613	5	-29	3	14	231	228	3	13	5	14	77	79	3
-29	5	13	34	26	25	23	7	13	192	187	5	12	0	14	642	625	4	-27	3	14	230	225	2	15	5	14	59	64	3
-27	5	13	51	25	9	25	7	13	113	116	6	14	0	14	467	459	4	-25	3	14	349	343	2	17	5	14	48	58	7
-25	5	13	94	100	4	-26	8	13	120	124	5	16	0	14	514	502	3	-23	3	14	338	329	2	19	5	14	47	40	4
-23	5	13	0	13	1	-24	8	13	47	73	11	18	0	14	402	386	3	-21	3	14	436	420	2	21	5	14	63	63	5
-21	5	13	152	157	3	-22	8	13	105	117	5	20	0	14	324	322	3	-19	3	14	154	157	3	23	5	14	101	97	5
-19	5	13	35	47	15	-20	8	13	84	82	6	22	0	14	393	385	3	-17	3	14	449	443	2	25	5	14	23	7	22
-17	5	13	0	8	1	-18	8	13	153	154	8	24	0	14	195	193	3	-15	3	14	288	282	1	27	5	14	123	120	4
-15	5	13	199	205	2	-16	8	13	116	113	5	26	0	14	325	319	3	-13	3	14	588	578	3	29	5	14	12	12	12
-13	5	13	31	37	9	-14	8	13	124	135	3	28	0	14	268	267	3	-11	3	14	490	485	3	-32	6	14	95	102	6
-11	5	13	124	128	2	-12	8	13	86	89	6	30	0	14	281	278	4	-9	3	14	715	671	4	-30	6	14	93	104	6
-9	5	13	72	81	3	-10	8	13	113	109	6	32	0	14	155	162	8	-7	3	14	283	277	2	-28	6	14	115	112	8
-7	5	13	92	93	2	-8	8	13	90	99	17	34	0	14	224	224	4	-5	3	14	549	526	3	-26	6	14	28	47	17
-5	5	13	50	58	3	-6	8	13	37	56	22	-37	1	14	43	35	10	-3	3	14	146	155	2	-24	6	14	101	110	4
-3	5	13	235	236	1	-4	8	13	176	190	3	-35	1	14	51	48	7	-1	3	14	509	500	3	-22	6	14	20	36	19
-1	5	13	0	7	1	-2	8	13	42	58	9	-33	1	14	74	74	6	1	3	14	291	284	1	-20	6	14	48	44	11
1	5	13	207	214	3	0	8	13	127	136	6	-31	1	14	57	70	6	3	3	14	614	578	4	-18	6	14	166	159	4
3	5	13	0	2	1	2	8	13	66	76	4	-29	1	14	140	138	3	5	3	14	156	148	2	-16	6	14	0	8	1
5	5	13	223	219	1	4	8	13	27	10	13	-27	1	14	140	142	2	7	3	14	277	269	1	-14	6	14	145	145	5
7	5	13	151	152	3	6	8	13	80	79	3	-25	1	14	201	197	4	9	3	14	72	65	1	-12	6	14	0	4	1

h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s
9	5	13	374	362	3	8	8	13	27	32	10	-23	1	14	142	140	2	11	3	14	92	105	2	-10	6	14	85	101	4
11	5	13	78	88	3	10	8	13	83	77	7	-21	1	14	183	179	2	13	3	14	84	93	2	-8	6	14	46	56	4
13	5	13	234	229	2	12	8	13	28	23	11	-19	1	14	42	47	2	15	3	14	121	124	2	-6	6	14	196	196	3
15	5	13	75	85	3	14	8	13	75	74	4	-17	1	14	84	90	2	17	3	14	53	51	3	-4	6	14	75	77	2
17	5	13	70	71	3	16	8	13	79	72	5	-15	1	14	16	25	6	19	3	14	38	38	5	-2	6	14	251	243	4
19	5	13	73	80	3	18	8	13	44	55	10	-13	1	14	151	153	1	21	3	14	54	55	4	0	6	14	123	123	2
21	5	13	62	68	4	20	8	13	84	84	6	-11	1	14	145	143	1	23	3	14	167	170	3	2	6	14	172	172	1
23	5	13	49	58	7	22	8	13	131	124	8	-9	1	14	286	279	3	25	3	14	65	57	4	4	6	14	148	151	2
25	5	13	87	96	6	-21	9	13	133	151	11	-7	1	14	98	98	1	27	3	14	103	104	4	6	6	14	296	288	2
27	5	13	95	106	4	-19	9	13	96	104	15	-5	1	14	319	311	2	29	3	14	52	55	10	8	6	14	104	117	2
29	5	13	13	34	13	-17	9	13	217	223	10	-3	1	14	148	145	1	31	3	14	147	142	4	10	6	14	298	291	2
12	6	14	142	137	2	-4	10	14	104	103	6	-19	3	15	67	67	2	23	5	15	60	59	5	-13	9	15	164	167	5
14	6	14	119	117	3	-2	10	14	45	54	12	-17	3	15	136	138	2	25	5	15	137	140	8	-11	9	15	148	157	4
16	6	14	279	271	3	0	10	14	140	134	5	-15	3	15	154	155	1	27	5	15	0	16	1	-9	9	15	197	198	8
18	6	14	108	112	4	2	10	14	0	24	1	-13	3	15	44	57	5	29	5	15	146	142	4	-7	9	15	128	148	3
20	6	14	195	199	2	4	10	14	196	187	5	-11	3	15	338	341	2	-30	6	15	39	27	16	-5	9	15	194	202	3
22	6	14	152	154	3	6	10	14	70	65	12	-9	3	15	38	33	4	-28	6	15	254	252	8	-3	9	15	126	138	5
24	6	14	160	162	9	8	10	14	212	211	8	-7	3	15	420	419	4	-26	6	15	46	7	14	-1	9	15	210	215	6
26	6	14	100	101	9	10	10	14	101	98	7	-5	3	15	80	86	2	-24	6	15	237	243	4	1	9	15	152	161	4
28	6	14	154	156	5	-37	1	15	73	75	9	-3	3	15	122	127	2	-22	6	15	26	34	25	3	9	15	232	235	4
-29	7	14	63	51	13	-35	1	15	0	38	1	-1	3	15	260	277	2	-20	6	15	197	199	5	5	9	15	171	173	12
-27	7	14	157	163	12	-33	1	15	21	14	21	1	3	15	60	50	2	-18	6	15	0	14	1	7	9	15	243	235	4
-25	7	14	88	104	5	-31	1	15	0	11	1	3	3	15	342	343	1	-16	6	15	174	174	3	9	9	15	117	112	5
-23	7	14	130	142	5	-29	1	15	42	28	7	5	3	15	60	65	1	-14	6	15	94	98	3	11	9	15	223	217	5
-21	7	14	92	103	4	-27	1	15	32	27	7	7	3	15	242	240	2	-12	6	15	183	191	2	13	9	15	17	33	17
-19	7	14	161	167	3	-25	1	15	0	9	1	9	3	15	11	8	10	-10	6	15	141	140	4	15	9	15	183	178	4
-17	7	14	94	103	3	-23	1	15	188	182	2	11	3	15	174	181	1	-8	6	15	182	185	3	17	9	15	35	17	17
-15	7	14	98	100	3	-21	1	15	173	166	2	13	3	15	13	19	12	-6	6	15	107	113	3	-14	10	15	130	129	7
-13	7	14	124	130	3	-19	1	15	337	331	2	15	3	15	181	186	1	-4	6	15	76	83	3	-12	10	15	84	101	8
-11	7	14	20	21	19	-17	1	15	300	290	2	17	3	15	0	9	1	-2	6	15	124	130	2	-10	10	15	125	125	8
-9	7	14	165	171	5	-15	1	15	353	346	1	19	3	15	248	249	2	0	6	15	86	86	4	-8	10	15	100	107	5
-7	7	14	0	27	1	-13	1	15	399	387	2	21	3	15	72	77	3	2	6	15	160	156	1	-6	10	15	126	123	7
-5	7	14	257	254	3	-11	1	15	362	357	2	23	3	15	118	122	3	4	6	15	157	158	3	-4	10	15	56	58	9
-3	7	14	45	44	6	-9	1	15	641	619	3	25	3	15	56	63	5	6	6	15	101	102	2	-2	10	15	158	148	4
-1	7	14	244	239	2	-7	1	15	299	291	1	27	3	15	19	33	18	8	6	15	206	197	2	0	10	15	53	35	8
1	7	14	149	156	5	-5	1	15	886	810	5	29	3	15	24	53	23	10	6	15	0	20	1	2	10	15	144	139	4
3	7	14	147	142	2	-3	1	15	305	313	1	31	3	15	17	39	16	12	6	15	169	165	4	4	10	15	37	28	14
5	7	14	180	174	2	-1	1	15	571	549	4	-34	4	15	75	78	9	14	6	15	81	79	8	6	10	15	141	137	6
7	7	14	118	128	4	1	1	15	564	556	2	-32	4	15	305	294	6	16	6	15	185	183	2	8	10	15	50	38	13
9	7	14	114	105	3	3	1	15	686	659	3	-30	4	15	49	46	6	18	6	15	88	91	3	10	10	15	168	160	5
11	7	14	106	107	3	5	1	15	335	333	1	-28	4	15	300	294	3	20	6	15	214	208	2	-36	0	16	209	198	6
13	7	14	83	77	6	7	1	15	756	711	3	-26	4	15	93	92	3	22	6	15	118	120	6	-34	0	16	89	84	8
15	7	14	20	26	20	9	1	15	148	139	1	-24	4	15	422	405	3	24	6	15	207	193	3	-32	0	16	303	287	6
17	7	14	129	133	4	11	1	15	597	572	3	-22	4	15	0	13	1	26	6	15	147	148	4	-30	0	16	61	60	11
19	7	14	0	39	1	13	1	15	187	188	1	-20	4	15	501	477	4	-29	7	15	116	101	31	-28	0	16	281	274	6
21	7	14	128	121	4	15	1	15	393	392	2	-18	4	15	76	69	3	-27	7	15	0	7	1	-26	0	16	176	170	6
23	7	14	47	50	10	17	1	15	118	123	2	-16	4	15	466	447	5	-25	7	15	85	99	6	-24	0	16	421	412	5
25	7	14	83	103	8	19	1	15	314	314	2	-14	4	15	5	13	5	-23	7	15	34	35	21	-22	0	16	219	224	6
-26	8	14	48	40	30	21	1	15	0	5	1	-12	4	15	466	450	3	-21	7	15	145	141	4	-20	0	16	645	604	8
-24	8	14	129	139	6	23	1	15	167	170	2	-10	4	15	32	36	4	-19	7	15	30	37	13	-18	0	16	158	148	2
-22	8	14	31	11	21	25	1	15	42	43	6	-8	4	15	225	228	2	-17	7	15	171	173	4	-16	0	16	584	570	4
-20	8	14	109	109	7	27	1	15	82	84	5	-6	4	15	47	61	5	-15	7	15	55	68	4	-14	0	16	64	64	2
-18	8	14	0	12	1	29	1	15	0	10	1	-4	4	15	88	87	3	-13	7	15	156	164	5	-12	0	16	660	619	5
-16	8	14	53	69	16	31	1	15	45	19	8	-2	4	15	31	28	1	-11	7	15	158	170	2	-10	0	16	261	253	2
-14	8	14	17	17	16	33	1	15	41	36	10	0	4	15	196	196	1	-9	7	15	265	264	5	-8	0	16	884	805	12
-12	8	14	21	33	21	-36	2	15	216	203	3	2	4	15	69	77	2	-7	7	15	185	190	2	-6	0	16	211	223	1
-10	8	14	66	86	5	-34	2	15	44	33	9	4	4	15	79	85	2	-5	7	15	382	373	6	-4	0	16	636	623	7
-8	8	14	141	147	3	-32	2	15	285	280	4	6	4	15	108	109	3	-3	7	15	204	206	3	-2	0	16	130	134	5
-6	8	14	148	159	3	-30	2	15	68	67	4	8	4	15	323	316	1	-1	7	15	367	362	5	0	0	16	441	436	3
-4	8	14	177	166	3	-28	2	15	420	398	3	10	4	15	189	183	1	1	7	15	214	220	6	2	0	16	29	13	3
-2	8	14	178	170	2	-26	2	15	144	144	2	12	4	15	301	291	2	3	7	15	330	322	4	4	0	16	524	518	3
0	8	14	163	164	13	-24	2	15	460	443	3	14	4	15	156	152	1	5	7	15	142	137	2	6	0	16	254	248	2
2	8	14	114	119	3	-22	2	15	86	90	2	16	4	15	306	290	2	7	7	15	304	296	3	8	0	16	171	176	4
4	8	14	218	216	3	-20	2	15	248	243	1	18	4	15	216	212	2	9	7	15	93	93	4	10	0	16	0	7	1
6	8	14	119	122	2	-18	2	15	15	15	14	20	4	15	271	259	2	11	7	15	190	185	3	12	0	16	116	122	2
8	8	14	217	218	3	-16	2	15	196	198	3	22	4	15	200	209	2	13	7	15	165	165	3	14	0	16	122	125	2
10	8	14	124	131	4	-14	2	15	92	98	1	24	4	15	255	253	2	15	7	15	208	200	2	16	0	16	0	16	1
12	8	14	246	239	3	-12	2	15	384	377	2	26	4	15	215	201	4	17	7	15	135	141	3	18	0	16	77	72	4
14	8	14	202	191	3	-10	2	15	46	50	1	28	4	15	204	209	3	19	7	15	175	187	5	20	0	16	101	105	3
16	8	14	215	212	4	-8	2	15	232	231	2	30	4	15	197	194	3	21	7	15	106	108	4	22	0	16	121	123	4
18	8	14	229	216	5	-6	2	15	46	50	2	-33	5	15	118	123	6	23	7	15	97	107	5	24	0	16	174	170	3
20	8	14	199	187	4	-4	2	15	93	94	3	-31	5	15	59	50	12	-24	8	15	44	57	17	26	0	16	133	139	4
22	8	14	184	178	4	-2	2	15	54	60	5	-29	5	15	122	113	5	-22	8	15	55	70	8	28	0	16	196	198	3
-21	9	14	37	44	37	0	2	15	50	55	2	-27	5	15	93	91	4	-20	8	15	77	82	5	30	0	16	80	78	6
-19	9	14	0	7	1	2	2	15	87	84	1	-25	5	15	68	68	5	-18	8	15	59	74	8	32	0	16	252	232	9
-17	9	14	37	17	20	4	2	15	89	85	1	-23	5	15	71	70	5	-16	8	15	31	41	30	-37	1	16	41	21	11
-15	9	14	0	26	1	6	2	15	41	46	2	-21	5	15	186	190	3	-14	8	15	117	125	3	-35	1	16	97	95	6
-13	9	14	0	52	1	8	2	15	202	203	1	-19	5	15	41	44	8	-12	8	15	26	26	26	-33	1	16	84	90	7
-11	9	14	29	25	25	10	2	15	99	98	2	-17	5	15	235	234	2	-10	8	15	166	169	3	-31	1	16	119	120	3

h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s
-9	9	14	50	65	8	12	2	15	18	21	8	-15	5	15	20	28	20	-8	8	15	0	12	1	-29	1	16	38	26	8
-7	9	14	0	21	1	14	2	15	107	107	1	-13	5	15	87	82	4	-6	8	15	192	186	3	-27	1	16	222	208	4
-5	9	14	22	30	22	16	2	15	101	108	2	-11	5	15	62	62	2	-4	8	15	0	10	1	-25	1	16	37	25	6
-3	9	14	59	63	7	18	2	15	174	173	1	-9	5	15	154	155	1	-2	8	15	223	218	5	-23	1	16	112	120	2
-1	9	14	31	31	15	20	2	15	370	359	2	-7	5	15	21	10	8	0	8	15	132	132	3	-21	1	16	0	1	1
1	9	14	139	134	3	22	2	15	262	257	3	-5	5	15	127	133	3	2	8	15	165	157	5	-19	1	16	56	55	6
3	9	14	0	4	1	24	2	15	239	244	2	-3	5	15	53	53	5	4	8	15	71	71	4	-17	1	16	54	52	2
5	9	14	165	156	4	26	2	15	167	166	2	-1	5	15	33	32	2	6	8	15	133	133	4	-15	1	16	71	80	1
7	9	14	27	0	27	28	2	15	134	134	5	1	5	15	59	64	2	8	8	15	14	35	13	-13	1	16	12	23	11
9	9	14	192	178	5	30	2	15	136	145	3	3	5	15	53	57	2	10	8	15	94	104	6	-11	1	16	62	68	1
11	9	14	27	21	26	32	2	15	135	140	3	5	5	15	107	108	3	12	8	15	121	112	8	-9	1	16	43	41	3
13	9	14	212	201	3	-35	3	15	29	1	28	7	5	15	158	163	2	14	8	15	75	71	7	-7	1	16	292	282	1
15	9	14	33	49	32	-33	3	15	61	67	9	9	5	15	70	74	2	16	8	15	114	115	4	-5	1	16	177	180	2
17	9	14	181	164	4	-31	3	15	75	60	5	11	5	15	78	84	3	18	8	15	61	59	8	-3	1	16	217	209	1
-14	10	14	86	80	8	-29	3	15	48	56	6	13	5	15	172	170	3	20	8	15	81	66	13	-1	1	16	172	184	3
-12	10	14	63	66	9	-27	3	15	139	137	2	15	5	15	33	34	6	-21	9	15	18	33	18	1	1	16	205	212	1
-10	10	14	71	76	9	-25	3	15	28	31	7	17	5	15	118	119	3	-19	9	15	152	155	4	3	1	16	274	268	1
-8	10	14	91	82	7	-23	3	15	145	145	2	19	5	15	85	88	8	-17	9	15	98	96	11	5	1	16	129	121	1
-6	10	14	79	82	6	-21	3	15	60	56	2	21	5	15	65	69	4	-15	9	15	161	162	4	7	1	16	53	56	3
9	1	16	25	27	3	-24	4	16	82	80	4	24	6	16	0	12	1	-23	1	17	479	457	3	13	3	17	295	288	2
11	1	16	21	26	5	-22	4	16	44	42	6	26	6	16	186	180	6	-21	1	17	192	188	2	15	3	17	126	131	2
13	1	16	22	13	8	-20	4	16	0	11	1	-27	7	16	8	9	7	-19	1	17	380	363	2	17	3	17	207	198	2
15	1	16	115	122	1	-18	4	16	51	53	4	-25	7	16	109	121	5	-17	1	17	118	116	1	19	3	17	109	110	2
17	1	16	185	185	2	-16	4	16	89	93	2	-23	7	16	16	4	16	-15	1	17	230	222	1	21	3	17	116	117	4
19	1	16	222	216	3	-14	4	16	68	72	2	-21	7	16	75	79	5	-13	1	17	84	82	1	23	3	17	153	152	3
21	1	16	182	185	3	-12	4	16	40	48	3	-19	7	16	36	38	9	-11	1	17	206	202	1	25	3	17	54	51	5
23	1	16	161	159	4	-10	4	16	0	22	1	-17	7	16	101	110	4	-9	1	17	157	164	1	27	3	17	138	141	3
25	1	16	30	41	9	-8	4	16	34	40	7	-15	7	16	112	110	3	-7	1	17	176	182	1	29	3	17	24	19	23
27	1	16	75	84	4	-6	4	16	29	36	5	-13	7	16	127	133	3	-5	1	17	70	75	1	31	3	17	136	142	5
29	1	16	0	14	1	-4	4	16	183	180	2	-11	7	16	144	141	3	-3	1	17	0	6	1	-34	4	17	41	2	21
31	1	16	76	78	6	-2	4	16	108	112	2	-9	7	16	83	78	3	-1	1	17	90	93	1	-32	4	17	68	79	10
33	1	16	0	21	1	0	4	16	251	235	3	-7	7	16	190	190	2	1	1	17	85	89	1	-30	4	17	39	10	39
-36	2	16	77	89	7	2	4	16	140	151	1	-5	7	16	12	32	11	3	1	17	21	27	4	-28	4	17	94	102	7
-34	2	16	149	148	4	4	4	16	27	36	5	-3	7	16	341	328	3	5	1	17	196	190	1	-26	4	17	22	37	22
-32	2	16	204	199	3	6	4	16	143	141	1	-1	7	16	91	86	5	7	1	17	224	223	1	-24	4	17	119	118	3
-30	2	16	133	131	3	8	4	16	31	38	4	1	7	16	316	298	3	9	1	17	245	236	1	-22	4	17	165	169	3
-28	2	16	226	222	3	10	4	16	216	214	3	3	7	16	50	59	5	11	1	17	386	386	2	-20	4	17	286	282	3
-26	2	16	145	146	3	12	4	16	75	81	2	5	7	16	84	78	4	13	1	17	205	202	1	-18	4	17	132	136	2
-24	2	16	354	347	2	14	4	16	200	197	2	7	7	16	48	56	5	15	1	17	339	342	2	-16	4	17	484	472	3
-22	2	16	101	101	2	16	4	16	21	25	11	9	7	16	81	86	3	17	1	17	216	208	2	-14	4	17	51	49	3
-20	2	16	528	514	3	18	4	16	69	65	3	11	7	16	151	155	3	19	1	17	331	335	2	-12	4	17	552	531	5
-18	2	16	99	98	1	20	4	16	23	26	23	13	7	16	84	98	5	21	1	17	180	176	3	-10	4	17	161	161	2
-16	2	16	509	502	3	22	4	16	37	44	7	15	7	16	181	177	2	23	1	17	374	366	3	-8	4	17	467	456	3
-14	2	16	92	92	1	24	4	16	81	88	5	17	7	16	53	51	5	25	1	17	137	141	3	-6	4	17	121	120	2
-12	2	16	493	487	2	26	4	16	63	70	5	19	7	16	154	156	6	27	1	17	320	311	2	-4	4	17	338	339	3
-10	2	16	146	143	1	28	4	16	53	42	8	21	7	16	0	6	1	29	1	17	170	172	4	-2	4	17	20	20	8
-8	2	16	585	564	4	30	4	16	0	14	1	23	7	16	182	168	4	31	1	17	269	264	3	0	4	17	430	433	2
-6	2	16	20	7	3	-33	5	16	42	75	22	-24	8	16	216	231	6	-36	2	17	49	35	12	2	4	17	74	70	2
-4	2	16	515	487	2	-31	5	16	144	146	13	-22	8	16	75	88	8	-34	2	17	0	33	1	4	4	17	640	613	3
-2	2	16	51	63	2	-29	5	16	99	100	5	-20	8	16	261	258	4	-32	2	17	0	15	1	6	4	17	0	4	1
0	2	16	373	377	2	-27	5	16	126	130	3	-18	8	16	44	44	11	-30	2	17	0	7	1	8	4	17	603	577	3
2	2	16	91	90	1	-25	5	16	94	95	5	-16	8	16	250	244	3	-28	2	17	103	106	3	10	4	17	58	51	2
4	2	16	307	295	2	-23	5	16	78	82	13	-14	8	16	7	22	7	-26	2	17	14	7	13	12	4	17	398	380	3
6	2	16	96	102	1	-21	5	16	102	99	5	-12	8	16	252	255	3	-24	2	17	128	121	2	14	4	17	26	25	15
8	2	16	206	211	2	-19	5	16	77	79	4	-10	8	16	38	15	9	-22	2	17	81	80	3	16	4	17	294	290	2
10	2	16	65	61	1	-17	5	16	33	22	7	-8	8	16	269	273	3	-20	2	17	153	148	2	18	4	17	37	22	6
12	2	16	30	33	3	-15	5	16	125	121	4	-6	8	16	27	20	11	-18	2	17	29	25	5	20	4	17	158	160	3
14	2	16	34	42	4	-13	5	16	77	81	2	-4	8	16	290	286	5	-16	2	17	236	240	2	22	4	17	21	26	20
16	2	16	34	47	5	-11	5	16	149	145	2	-2	8	16	36	57	10	-14	2	17	24	25	4	24	4	17	96	103	4
18	2	16	90	95	2	-9	5	16	100	106	2	0	8	16	257	257	4	-12	2	17	310	308	2	26	4	17	26	13	16
20	2	16	66	65	3	-7	5	16	141	142	2	2	8	16	42	42	7	-10	2	17	184	182	1	28	4	17	57	65	7
22	2	16	20	22	16	-5	5	16	111	117	2	4	8	16	222	217	3	-8	2	17	560	543	2	30	4	17	24	42	24
24	2	16	88	91	3	-3	5	16	132	126	2	6	8	16	0	14	1	-6	2	17	128	123	2	-33	5	17	53	17	25
26	2	16	108	116	3	-1	5	16	198	195	2	8	8	16	115	129	4	-4	2	17	621	597	4	-31	5	17	56	48	28
28	2	16	137	135	4	1	5	16	225	217	3	10	8	16	26	36	13	-2	2	17	30	29	5	-29	5	17	0	3	1
30	2	16	85	98	4	3	5	16	317	318	2	12	8	16	71	67	5	0	2	17	600	574	4	-27	5	17	0	15	1
32	2	16	146	156	3	5	5	16	423	404	2	14	8	16	69	71	5	2	2	17	135	136	1	-25	5	17	23	23	23
-35	3	16	204	195	4	7	5	16	476	466	3	16	8	16	0	5	1	4	2	17	526	520	5	-23	5	17	59	67	7
-33	3	16	65	77	7	9	5	16	308	299	2	18	8	16	108	91	13	6	2	17	74	78	1	-21	5	17	21	33	20
-31	3	16	176	170	4	11	5	16	514	497	3	20	8	16	55	54	12	8	2	17	268	260	1	-19	5	17	117	123	3
-29	3	16	23	13	23	13	5	16	201	195	3	-19	9	16	59	65	9	10	2	17	17	15	7	-17	5	17	99	106	3
-27	3	16	219	215	2	15	5	16	411	390	3	-17	9	16	154	154	5	12	2	17	199	200	1	-15	5	17	178	176	3
-25	3	16	54	58	7	17	5	16	124	129	4	-15	9	16	114	125	6	14	2	17	9	18	9	-13	5	17	200	201	3
-23	3	16	192	187	2	19	5	16	341	328	2	-13	9	16	147	148	7	16	2	17	305	306	2	-11	5	17	220	214	2
-21	3	16	83	91	2	21	5	16	99	102	4	-11	9	16	158	152	3	18	2	17	48	48	4	-9	5	17	91	97	2
-19	3	16	59	72	2	23	5	16	281	272	3	-9	9	16	143	138	9	20	2	17	180	187	5	-7	5	17	104	112	2
-17	3	16	44	48	3	25	5	16	78	82	5	-7	9	16	125	125	6	22	2	17	18	23	17	-5	5	17	143	151	2
-15	3	16	57	60	2	27	5	16	240	233	6	-5	9	16	144	148	6	24	2	17	9	24	9	-3	5	17	13	16	13
-13	3	16	73	74	2	29	5	16	46	70	16	-3	9	16	120	121	4	26	2	17	27	30	11	-1	5	17	147	143	3

h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s
-11	3	16	8	34	8	-30	6	16	24	6	24	-1	9	16	79	90	11	28	2	17	35	45	10	1	5	17	20	18	7
-9	3	16	124	123	2	-28	6	16	147	151	4	1	9	16	45	60	9	30	2	17	31	39	13	3	5	17	150	150	3
-7	3	16	247	252	2	-26	6	16	33	7	13	3	9	16	40	50	9	32	2	17	21	22	21	5	5	17	80	80	3
-5	3	16	271	274	2	-24	6	16	195	194	7	5	9	16	43	16	42	-35	3	17	127	129	8	7	5	17	248	246	3
-3	3	16	219	216	2	-22	6	16	37	47	17	7	9	16	0	42	1	-33	3	17	37	14	27	9	5	17	90	96	2
-1	3	16	354	356	2	-20	6	16	293	287	5	9	9	16	11	34	11	-31	3	17	184	177	3	11	5	17	211	213	3
1	3	16	163	163	1	-18	6	16	27	25	10	11	9	16	22	25	22	-29	3	17	13	35	13	13	5	17	23	24	10
3	3	16	443	436	2	-16	6	16	235	235	4	13	9	16	0	27	1	-27	3	17	129	132	3	15	5	17	79	78	5
5	3	16	326	316	2	-14	6	16	129	133	2	15	9	16	21	25	21	-25	3	17	84	89	3	17	5	17	86	85	3
7	3	16	581	554	3	-12	6	16	218	215	5	-12	10	16	202	218	21	-23	3	17	156	156	2	19	5	17	40	25	7
9	3	16	287	275	3	-10	6	16	145	153	4	-10	10	16	5	18	4	-21	3	17	155	156	2	21	5	17	21	6	21
11	3	16	408	400	2	-8	6	16	319	312	2	-8	10	16	144	157	6	-19	3	17	198	201	2	23	5	17	88	89	4
13	3	16	207	212	1	-6	6	16	85	79	6	-6	10	16	9	10	9	-17	3	17	169	168	2	25	5	17	23	30	23
15	3	16	384	369	2	-4	6	16	281	278	2	-4	10	16	130	129	11	-15	3	17	248	246	1	27	5	17	76	80	6
17	3	16	276	272	3	-2	6	16	114	114	2	-2	10	16	77	73	24	-13	3	17	117	123	2	-30	6	17	74	79	7
19	3	16	436	416	2	0	6	16	258	257	3	0	10	16	90	93	8	-11	3	17	94	104	1	-28	6	17	39	8	19
21	3	16	163	160	2	2	6	16	148	151	2	2	10	16	66	70	12	-9	3	17	67	71	2	-26	6	17	98	101	6
23	3	16	324	316	3	4	6	16	209	204	3	4	10	16	62	57	11	-7	3	17	0	29	1	-24	6	17	84	89	6
25	3	16	85	96	4	6	6	16	123	119	2	6	10	16	65	54	10	-5	3	17	154	160	2	-22	6	17	117	134	3
27	3	16	237	234	3	8	6	16	139	141	2	8	10	16	43	28	21	-3	3	17	75	79	2	-20	6	17	147	153	3
29	3	16	72	88	6	10	6	16	133	128	3	-37	1	17	33	23	33	-1	3	17	116	116	1	-18	6	17	215	211	6
31	3	16	194	193	4	12	6	16	41	53	5	-35	1	17	370	347	4	1	3	17	62	63	1	-16	6	17	234	232	2
-34	4	16	76	77	11	14	6	16	95	102	3	-33	1	17	81	78	5	3	3	17	34	42	5	-14	6	17	149	150	2
-32	4	16	0	17	1	16	6	16	59	68	5	-31	1	17	358	339	4	5	3	17	122	121	1	-12	6	17	334	330	4
-30	4	16	118	126	5	18	6	16	9	26	8	-29	1	17	92	84	4	7	3	17	135	139	2	-10	6	17	64	70	4
-28	4	16	58	67	6	20	6	16	42	38	7	-27	1	17	390	370	3	9	3	17	124	120	1	-8	6	17	431	424	6
-26	4	16	105	111	5	22	6	16	127	118	5	-25	1	17	85	80	3	11	3	17	50	52	2	-6	6	17	47	46	4
-4	6	17	472	468	4	-4	10	17	154	153	5	-14	2	18	86	81	1	28	4	18	0	3	1	-18	8	18	11	35	11
-2	6	17	81	89	3	-2	10	17	26	13	25	-12	2	18	92	97	3	-31	5	18	217	231	7	-16	8	18	81	80	9
0	6	17	422	418	4	0	10	17	101	116	13	-10	2	18	186	182	1	-29	5	18	0	17	1	-14	8	18	33	18	14
2	6	17	76	83	2	2	10	17	17	33	17	-8	2	18	269	257	3	-27	5	18	292	285	7	-12	8	18	95	113	5
4	6	17	307	302	2	4	10	17	107	105	8	-6	2	18	251	246	2	-25	5	18	0	19	1	-10	8	18	37	45	9
6	6	17	0	6	1	6	10	17	85	70	8	-4	2	18	433	430	4	-23	5	18	386	372	4	-8	8	18	134	141	4
8	6	17	296	288	2	-36	0	18	196	179	6	-2	2	18	151	148	1	-21	5	18	52	49	5	-6	8	18	28	32	12
10	6	17	51	66	4	-34	0	18	155	151	5	0	2	18	466	453	2	-19	5	18	460	449	5	-4	8	18	214	212	3
12	6	17	273	269	2	-32	0	18	190	190	5	2	2	18	102	98	1	-17	5	18	127	133	2	-2	8	18	70	72	4
14	6	17	118	113	2	-30	0	18	170	161	5	4	2	18	481	459	2	-15	5	18	450	439	5	0	8	18	299	283	3
16	6	17	179	177	3	-28	0	18	209	199	4	6	2	18	53	55	2	-13	5	18	184	184	2	2	8	18	61	76	5
18	6	17	128	126	4	-26	0	18	240	225	6	8	2	18	540	527	4	-11	5	18	470	455	3	4	8	18	279	267	3
20	6	17	96	95	4	-24	0	18	198	181	3	10	2	18	92	94	2	-9	5	18	155	159	2	6	8	18	45	49	11
22	6	17	91	94	4	-22	0	18	57	45	4	12	2	18	516	492	3	-7	5	18	430	416	4	8	8	18	242	239	3
24	6	17	0	41	1	-20	0	18	91	83	3	14	2	18	182	179	1	-5	5	18	157	159	2	10	8	18	0	15	1
26	6	17	31	59	31	-18	0	18	229	216	2	16	2	18	464	442	2	-3	5	18	356	341	3	12	8	18	250	246	4
-27	7	17	211	217	4	-16	0	18	242	250	6	18	2	18	22	8	9	-1	5	18	197	201	2	14	8	18	25	39	25
-25	7	17	38	25	13	-14	0	18	159	156	2	20	2	18	339	332	2	1	5	18	198	196	1	16	8	18	256	247	4
-23	7	17	244	244	8	-12	0	18	240	230	2	22	2	18	63	67	4	3	5	18	230	228	2	18	8	18	0	3	1
-21	7	17	43	51	8	-10	0	18	51	56	2	24	2	18	220	225	3	5	5	18	128	138	2	-19	9	18	5	5	5
-19	7	17	203	206	6	-8	0	18	411	396	4	26	2	18	55	68	7	7	5	18	112	107	2	-17	9	18	18	19	17
-17	7	17	34	24	12	-6	0	18	41	29	4	28	2	18	142	155	3	9	5	18	25	33	7	-15	9	18	38	8	35
-15	7	17	158	158	3	-4	0	18	589	567	5	30	2	18	30	29	17	11	5	18	0	7	1	-13	9	18	29	22	18
-13	7	17	0	7	1	-2	0	18	341	322	3	-35	3	18	202	197	7	13	5	18	45	42	6	-11	9	18	74	81	11
-11	7	17	172	176	3	0	0	18	609	586	4	-33	3	18	0	23	1	15	5	18	51	61	7	-9	9	18	0	23	1
-9	7	17	12	20	11	2	0	18	354	358	3	-31	3	18	292	284	3	17	5	18	69	61	4	-7	9	18	99	103	4
-7	7	17	108	120	4	4	0	18	535	521	5	-29	3	18	60	54	5	19	5	18	43	57	7	-5	9	18	19	25	18
-5	7	17	44	54	7	6	0	18	141	148	1	-27	3	18	347	331	3	21	5	18	73	75	7	-3	9	18	71	88	6
-3	7	17	103	106	6	8	0	18	722	676	4	-25	3	18	32	7	9	23	5	18	107	105	7	-1	9	18	94	96	4
-1	7	17	134	137	3	10	0	18	54	60	6	-23	3	18	435	423	4	25	5	18	74	80	5	1	9	18	102	103	12
1	7	17	100	106	4	12	0	18	671	640	4	-21	3	18	43	49	4	27	5	18	122	131	8	3	9	18	130	130	4
3	7	17	130	127	4	14	0	18	64	65	4	-19	3	18	494	478	4	-30	6	18	61	71	9	5	9	18	89	98	4
5	7	17	61	59	6	16	0	18	572	534	4	-17	3	18	198	196	2	-28	6	18	34	29	17	7	9	18	153	139	4
7	7	17	131	125	3	18	0	18	20	24	18	-15	3	18	562	531	3	-26	6	18	75	87	7	9	9	18	80	83	6
9	7	17	20	11	19	20	0	18	479	464	4	-13	3	18	130	137	1	-24	6	18	0	5	1	11	9	18	159	155	12
11	7	17	161	158	2	22	0	18	35	44	10	-11	3	18	569	547	4	-22	6	18	111	108	3	13	9	18	153	140	5
13	7	17	5	30	4	24	0	18	431	404	7	-9	3	18	85	82	3	-20	6	18	55	43	6	-10	10	18	67	77	19
15	7	17	157	159	3	26	0	18	0	30	1	-7	3	18	378	377	2	-18	6	18	109	111	5	-8	10	18	73	81	8
17	7	17	72	81	7	28	0	18	266	271	10	-5	3	18	147	151	2	-16	6	18	74	81	4	-6	10	18	86	86	6
19	7	17	242	232	3	30	0	18	0	4	1	-3	3	18	246	251	2	-14	6	18	151	148	3	-4	10	18	27	56	26
21	7	17	85	90	6	32	0	18	152	168	6	-1	3	18	152	151	1	-12	6	18	51	56	4	-2	10	18	95	101	7
23	7	17	250	243	7	-37	1	18	42	50	18	1	3	18	337	331	2	-10	6	18	73	75	3	0	10	18	105	110	5
-24	8	17	0	21	1	-35	1	18	73	77	7	3	3	18	64	69	1	-8	6	18	133	135	2	2	10	18	74	82	11
-22	8	17	96	105	6	-33	1	18	8	18	8	5	3	18	205	202	1	-6	6	18	19	27	14	4	10	18	180	171	5
-20	8	17	30	26	30	-31	1	18	136	130	4	7	3	18	97	98	1	-4	6	18	304	296	4	-35	1	19	33	9	23
-18	8	17	133	142	5	-29	1	18	0	24	1	9	3	18	86	92	4	-2	6	18	35	37	5	-33	1	19	31	35	30
-16	8	17	36	16	23	-27	1	18	189	192	5	11	3	18	64	59	2	0	6	18	247	244	4	-31	1	19	90	87	4
-14	8	17	151	148	6	-25	1	18	0	11	1	13	3	18	70	64	2	2	6	18	65	70	4	-29	1	19	26	29	26
-12	8	17	15	6	14	-23	1	18	262	252	4	15	3	18	38	36	5	4	6	18	251	246	4	-27	1	19	124	118	4
-10	8	17	103	105	7	-21	1	18	15	7	14	17	3	18	12	15	11	6	6	18	112	113	4	-25	1	19	59	64	4
-8	8	17	49	60	6	-19	1	18	106	112	2	19	3	18	154	154	2	8	6	18	297	291	2	-23	1	19	268	260	2
-6	8	17	92	97	4	-17	1	18	31	22	4	21	3	18	117	120	2	10	6	18	0	20	1	-21	1	19	98	102	4

h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s
-4	8	17	126	129	3	-15	1	18	43	45	3	23	3	18	191	189	3	12	6	18	235	234	2	-19	1	19	529	511	3
-2	8	17	45	46	7	-13	1	18	27	23	4	25	3	18	47	55	7	14	6	18	116	117	3	-17	1	19	36	45	5
0	8	17	105	118	5	-11	1	18	172	165	1	27	3	18	125	138	3	16	6	18	191	193	5	-15	1	19	530	506	3
2	8	17	69	76	5	-9	1	18	131	131	1	29	3	18	47	42	17	18	6	18	61	65	6	-13	1	19	13	11	13
4	8	17	11	32	11	-7	1	18	284	289	4	-34	4	18	46	21	46	20	6	18	200	195	4	-11	1	19	610	581	3
6	8	17	70	79	8	-5	1	18	136	139	2	-32	4	18	64	80	11	22	6	18	0	9	1	-9	1	19	176	180	1
8	8	17	38	46	26	-3	1	18	254	254	1	-30	4	18	0	32	1	24	6	18	161	158	4	-7	1	19	775	734	4
10	8	17	74	76	5	-1	1	18	113	108	1	-28	4	18	66	62	9	-27	7	18	142	151	6	-5	1	19	261	261	1
12	8	17	62	61	6	1	1	18	252	255	1	-26	4	18	59	68	8	-25	7	18	24	12	24	-3	1	19	717	688	4
14	8	17	124	126	4	3	1	18	91	104	2	-24	4	18	0	21	1	-23	7	18	160	170	4	-1	1	19	142	147	1
16	8	17	0	1	1	5	1	18	126	136	2	-22	4	18	42	34	6	-21	7	18	14	12	13	1	1	19	621	600	6
18	8	17	168	154	4	7	1	18	45	41	2	-20	4	18	70	77	4	-19	7	18	168	173	3	3	1	19	142	152	1
20	8	17	5	7	5	9	1	18	18	11	8	-18	4	18	43	41	6	-17	7	18	40	38	7	5	1	19	522	521	2
-19	9	17	157	166	5	11	1	18	17	10	11	-16	4	18	151	155	3	-15	7	18	138	151	6	7	1	19	239	245	1
-17	9	17	88	106	7	13	1	18	0	11	1	-14	4	18	125	125	2	-13	7	18	79	84	4	9	1	19	387	372	2
-15	9	17	111	120	5	15	1	18	25	21	6	-12	4	18	67	71	2	-11	7	18	105	121	3	11	1	19	191	198	2
-13	9	17	34	54	13	17	1	18	7	18	6	-10	4	18	220	217	2	-9	7	18	203	202	3	13	1	19	312	298	2
-11	9	17	48	61	22	19	1	18	119	123	2	-8	4	18	32	26	6	-7	7	18	178	184	3	15	1	19	156	159	2
-9	9	17	31	11	14	21	1	18	78	80	3	-6	4	18	255	254	2	-5	7	18	209	211	2	17	1	19	191	196	1
-7	9	17	52	54	7	23	1	18	129	133	2	-4	4	18	7	17	7	-3	7	18	142	144	2	19	1	19	198	201	4
-5	9	17	0	37	1	25	1	18	66	78	4	-2	4	18	156	150	3	-1	7	18	163	161	3	21	1	19	103	111	2
-3	9	17	34	32	13	27	1	18	94	92	5	0	4	18	63	58	3	1	7	18	28	31	11	23	1	19	92	89	6
-1	9	17	31	26	12	29	1	18	0	22	1	2	4	18	15	13	14	3	7	18	110	114	3	25	1	19	31	49	11
1	9	17	29	32	15	31	1	18	41	56	9	4	4	18	50	55	4	5	7	18	41	32	12	27	1	19	18	18	17
3	9	17	36	39	10	-36	2	18	150	141	5	6	4	18	51	49	3	7	7	18	80	85	4	29	1	19	28	30	14
5	9	17	73	83	7	-34	2	18	136	125	4	8	4	18	0	6	1	9	7	18	6	15	6	31	1	19	0	22	1
7	9	17	39	62	21	-32	2	18	102	99	7	10	4	18	60	59	4	11	7	18	112	109	4	-36	2	19	94	93	8
9	9	17	124	122	5	-30	2	18	40	18	13	12	4	18	21	15	12	13	7	18	81	84	4	-34	2	19	195	189	4
11	9	17	125	116	6	-28	2	18	57	54	5	14	4	18	36	33	5	15	7	18	55	71	6	-32	2	19	181	173	3
13	9	17	91	82	9	-26	2	18	35	34	17	16	4	18	66	63	4	17	7	18	151	146	5	-30	2	19	207	203	5
15	9	17	174	154	9	-24	2	18	126	118	2	18	4	18	36	44	9	19	7	18	20	22	20	-28	2	19	129	129	3
-12	10	17	94	106	12	-22	2	18	31	39	7	20	4	18	22	16	18	21	7	18	144	142	5	-26	2	19	261	258	3
-10	10	17	0	44	1	-20	2	18	144	142	2	22	4	18	0	14	1	-24	8	18	0	9	1	-24	2	19	110	111	3
-8	10	17	136	146	4	-18	2	18	5	12	5	24	4	18	21	20	20	-22	8	18	62	75	10	-22	2	19	269	259	2
-6	10	17	45	20	13	-16	2	18	18	15	9	26	4	18	60	60	5	-20	8	18	9	22	9	-20	2	19	141	138	3
-18	2	19	149	151	2	24	4	19	294	289	3	-20	8	19	38	58	12	-9	1	20	114	130	2	-30	4	20	91	83	7
-16	2	19	133	127	1	26	4	19	0	21	1	-18	8	19	32	10	31	-7	1	20	72	81	2	-28	4	20	30	31	30
-14	2	19	159	157	1	28	4	19	284	279	4	-16	8	19	106	113	5	-5	1	20	59	55	2	-26	4	20	99	106	5
-12	2	19	144	148	1	-31	5	19	92	93	8	-14	8	19	91	95	5	-3	1	20	115	118	1	-24	4	20	0	8	1
-10	2	19	65	68	2	-29	5	19	91	102	15	-12	8	19	127	119	4	-1	1	20	146	153	1	-22	4	20	0	12	1
-8	2	19	150	145	1	-27	5	19	34	29	18	-10	8	19	163	166	6	1	1	20	175	176	1	-20	4	20	23	5	12
-6	2	19	91	93	2	-25	5	19	73	85	5	-8	8	19	71	76	4	3	1	20	146	141	1	-18	4	20	10	8	9
-4	2	19	48	44	2	-23	5	19	21	43	21	-6	8	19	159	160	5	5	1	20	136	142	1	-16	4	20	57	65	3
-2	2	19	46	42	5	-21	5	19	94	87	4	-4	8	19	55	58	7	7	1	20	11	8	11	-14	4	20	23	20	9
0	2	19	223	225	2	-19	5	19	134	139	8	-2	8	19	194	191	4	9	1	20	74	78	2	-12	4	20	46	46	3
2	2	19	237	242	1	-17	5	19	63	65	4	0	8	19	42	40	10	11	1	20	102	111	1	-10	4	20	54	57	3
4	2	19	230	236	1	-15	5	19	73	81	3	2	8	19	189	174	3	13	1	20	123	126	1	-8	4	20	35	41	5
6	2	19	24	11	6	-13	5	19	87	88	3	4	8	19	39	46	10	15	1	20	113	116	2	-6	4	20	58	57	3
8	2	19	163	159	1	-11	5	19	69	75	3	6	8	19	91	101	5	17	1	20	258	257	2	-4	4	20	109	107	2
10	2	19	14	26	13	-9	5	19	73	82	4	8	8	19	44	42	8	19	1	20	86	88	2	-2	4	20	6	10	6
12	2	19	135	131	1	-7	5	19	112	116	2	10	8	19	115	116	4	21	1	20	197	192	2	0	4	20	96	100	1
14	2	19	37	37	4	-5	5	19	80	83	2	12	8	19	19	5	18	23	1	20	33	32	8	2	4	20	72	76	2
16	2	19	314	304	2	-3	5	19	47	52	6	14	8	19	159	157	7	25	1	20	93	97	3	4	4	20	25	24	6
18	2	19	97	94	4	-1	5	19	53	47	6	16	8	19	18	27	17	27	1	20	0	5	1	6	4	20	92	91	2
20	2	19	422	403	3	1	5	19	54	58	3	18	8	19	105	101	5	29	1	20	89	97	4	8	4	20	61	60	3
22	2	19	48	54	6	3	5	19	29	30	4	-17	9	19	0	10	1	-34	2	20	213	204	4	10	4	20	105	105	4
24	2	19	282	281	2	5	5	19	162	174	5	-15	9	19	250	250	6	-32	2	20	82	72	5	12	4	20	81	81	2
26	2	19	29	15	28	7	5	19	80	82	2	-13	9	19	13	26	13	-30	2	20	279	265	5	14	4	20	120	116	3
28	2	19	181	181	9	9	5	19	232	228	2	-11	9	19	259	253	3	-28	2	20	111	107	3	16	4	20	28	39	11
30	2	19	0	1	1	11	5	19	59	61	4	-9	9	19	28	35	27	-26	2	20	289	286	3	18	4	20	115	116	3
-35	3	19	46	22	15	13	5	19	189	182	3	-7	9	19	231	230	6	-24	2	20	161	165	3	20	4	20	41	52	10
-33	3	19	58	59	9	15	5	19	109	115	4	-5	9	19	33	38	12	-22	2	20	354	343	2	22	4	20	101	106	4
-31	3	19	72	66	8	17	5	19	140	142	2	-3	9	19	246	244	5	-20	2	20	180	185	2	24	4	20	0	7	1
-29	3	19	94	98	4	19	5	19	27	36	23	-1	9	19	40	50	11	-18	2	20	352	348	2	26	4	20	65	77	13
-27	3	19	175	172	3	21	5	19	101	102	5	1	9	19	277	273	4	-16	2	20	224	222	1	28	4	20	0	12	1
-25	3	19	58	59	7	23	5	19	56	64	6	3	9	19	96	93	6	-14	2	20	403	394	2	-31	5	20	129	136	7
-23	3	19	128	130	4	25	5	19	93	95	9	5	9	19	206	211	3	-12	2	20	272	271	1	-29	5	20	35	12	34
-21	3	19	30	32	7	27	5	19	86	96	8	7	9	19	70	79	9	-10	2	20	392	386	4	-27	5	20	131	124	5
-19	3	19	86	89	4	-30	6	19	157	157	7	9	9	19	147	149	5	-8	2	20	304	300	3	-25	5	20	24	38	24
-17	3	19	29	36	13	-28	6	19	163	169	4	11	9	19	86	77	8	-6	2	20	182	179	3	-23	5	20	43	46	10
-15	3	19	157	163	1	-26	6	19	151	154	4	-6	10	19	114	119	5	-4	2	20	181	179	4	-21	5	20	129	135	3
-13	3	19	91	93	2	-24	6	19	159	159	4	-4	10	19	0	41	1	-2	2	20	46	53	2	-19	5	20	54	76	6
-11	3	19	284	287	2	-22	6	19	113	121	4	-2	10	19	107	109	6	0	2	20	205	211	1	-17	5	20	112	112	3
-9	3	19	64	69	3	-20	6	19	134	134	3	0	10	19	89	80	7	2	2	20	1	16	1	-15	5	20	166	164	4
-7	3	19	261	259	2	-18	6	19	42	56	11	2	10	19	99	105	6	4	2	20	238	241	2	-13	5	20	21	28	10
-5	3	19	0	6	1	-16	6	19	144	148	2	-36	0	20	7	13	6	6	2	20	51	51	3	-11	5	20	232	228	2
-3	3	19	296	297	2	-14	6	19	29	35	13	-34	0	20	321	301	6	8	2	20	136	140	2	-9	5	20	32	20	6
-1	3	19	194	199	3	-12	6	19	150	155	3	-32	0	20	74	89	8	10	2	20	27	15	5	-7	5	20	359	354	4
1	3	19	207	211	1	-10	6	19	32	46	8	-30	0	20	287	279	5	12	2	20	0	13	1	-5	5	20	41	44	5

h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s
3	3	19	150	154	1	-8	6	19	163	169	4	-28	0	20	161	152	5	14	2	20	29	24	14	-3	5	20	457	438	6
5	3	19	221	225	2	-6	6	19	52	62	5	-26	0	20	380	365	4	16	2	20	18	27	18	-1	5	20	24	32	13
7	3	19	132	133	1	-4	6	19	69	77	4	-24	0	20	286	273	4	18	2	20	103	108	3	1	5	20	522	493	3
9	3	19	234	231	1	-2	6	19	160	163	4	-22	0	20	558	526	5	20	2	20	135	129	3	3	5	20	40	42	4
11	3	19	58	62	2	0	6	19	0	17	1	-20	0	20	481	457	4	22	2	20	32	35	10	5	5	20	558	536	3
13	3	19	167	177	2	2	6	19	184	183	5	-18	0	20	568	541	5	24	2	20	172	182	2	7	5	20	102	105	2
15	3	19	129	129	2	4	6	19	97	108	4	-16	0	20	315	309	7	26	2	20	35	22	13	9	5	20	468	448	3
17	3	19	55	63	4	6	6	19	130	130	2	-14	0	20	337	338	3	28	2	20	181	191	6	11	5	20	128	127	5
19	3	19	57	58	4	8	6	19	201	192	2	-12	0	20	301	291	4	30	2	20	25	37	25	13	5	20	386	372	3
21	3	19	0	20	1	10	6	19	112	115	3	-10	0	20	381	376	3	-35	3	20	157	166	10	15	5	20	125	122	4
23	3	19	0	11	1	12	6	19	226	225	2	-8	0	20	613	574	4	-33	3	20	24	38	24	17	5	20	319	314	3
25	3	19	31	48	14	14	6	19	84	89	3	-6	0	20	382	387	3	-31	3	20	132	125	9	19	5	20	101	108	3
27	3	19	14	6	14	16	6	19	260	254	2	-4	0	20	506	492	3	-29	3	20	45	67	12	21	5	20	246	240	3
29	3	19	0	26	1	18	6	19	51	50	6	-2	0	20	341	340	3	-27	3	20	96	76	7	23	5	20	129	130	7
-34	4	19	254	238	7	20	6	19	248	242	5	0	0	20	301	295	5	-25	3	20	12	23	12	25	5	20	187	188	4
-32	4	19	181	185	6	22	6	19	38	46	13	2	0	20	243	230	2	-23	3	20	70	65	5	-28	6	20	98	109	6
-30	4	19	258	252	5	24	6	19	251	234	4	4	0	20	229	236	2	-21	3	20	60	58	4	-26	6	20	101	114	4
-28	4	19	194	192	6	-27	7	19	93	105	6	6	0	20	36	33	4	-19	3	20	32	27	8	-24	6	20	94	92	7
-26	4	19	292	278	4	-25	7	19	84	81	10	8	0	20	28	32	5	-17	3	20	35	43	12	-22	6	20	152	157	4
-24	4	19	267	262	3	-23	7	19	138	148	4	10	0	20	46	53	4	-15	3	20	59	67	3	-20	6	20	114	118	3
-22	4	19	215	215	2	-21	7	19	90	99	5	12	0	20	168	167	2	-13	3	20	76	83	2	-18	6	20	165	165	3
-20	4	19	304	288	4	-19	7	19	168	175	3	14	0	20	67	73	3	-11	3	20	170	170	2	-16	6	20	71	67	5
-18	4	19	197	195	2	-17	7	19	104	113	3	16	0	20	99	106	3	-9	3	20	68	72	2	-14	6	20	199	205	2
-16	4	19	222	212	2	-15	7	19	200	202	4	18	0	20	105	109	3	-7	3	20	372	365	3	-12	6	20	82	83	3
-14	4	19	274	269	2	-13	7	19	25	41	25	20	0	20	95	103	3	-5	3	20	27	23	5	-10	6	20	224	225	3
-12	4	19	80	88	2	-11	7	19	235	234	4	22	0	20	66	76	9	-3	3	20	422	411	2	-8	6	20	131	144	4
-10	4	19	217	219	2	-9	7	19	26	34	14	24	0	20	220	213	3	-1	3	20	124	130	3	-6	6	20	203	200	3
-8	4	19	0	18	1	-7	7	19	349	340	5	26	0	20	78	80	6	1	3	20	422	415	2	-4	6	20	33	39	11
-6	4	19	31	29	5	-5	7	19	91	90	4	28	0	20	253	245	4	3	3	20	89	84	3	-2	6	20	171	169	4
-4	4	19	25	17	13	-3	7	19	384	380	3	30	0	20	68	92	9	5	3	20	608	576	3	0	6	20	58	59	9
-2	4	19	14	20	13	-1	7	19	45	49	5	-35	1	20	68	76	7	7	3	20	108	102	2	2	6	20	209	203	6
0	4	19	34	36	3	1	7	19	352	346	3	-33	1	20	0	6	1	9	3	20	492	472	4	4	6	20	27	38	9
2	4	19	159	162	1	3	7	19	32	40	8	-31	1	20	63	67	7	11	3	20	111	110	3	6	6	20	195	193	4
4	4	19	246	240	2	5	7	19	293	278	3	-29	1	20	54	60	9	13	3	20	398	381	2	8	6	20	31	34	7
6	4	19	188	186	1	7	7	19	41	55	7	-27	1	20	39	42	7	15	3	20	74	76	3	10	6	20	162	164	2
8	4	19	362	353	2	9	7	19	211	211	3	-25	1	20	123	120	3	17	3	20	413	395	3	12	6	20	55	60	5
10	4	19	116	123	2	11	7	19	34	46	13	-23	1	20	25	25	12	19	3	20	84	89	3	14	6	20	98	100	3
12	4	19	401	384	3	13	7	19	173	172	2	-21	1	20	152	151	2	21	3	20	317	309	3	16	6	20	37	40	9
14	4	19	41	46	6	15	7	19	36	44	9	-19	1	20	47	49	4	23	3	20	110	119	3	18	6	20	30	38	13
16	4	19	369	363	3	17	7	19	131	135	3	-17	1	20	135	139	2	25	3	20	169	178	5	20	6	20	86	89	5
18	4	19	31	43	8	19	7	19	0	11	1	-15	1	20	71	77	2	27	3	20	73	76	6	22	6	20	70	71	6
20	4	19	371	359	3	21	7	19	106	114	4	-13	1	20	41	49	2	29	3	20	162	170	6	24	6	20	124	129	5
22	4	19	18	9	18	-22	8	19	33	33	33	-11	1	20	51	55	2	-32	4	20	57	61	56	-25	7	20	57	61	8
-23	7	20	0	5	1	23	1	21	135	132	3	8	4	21	313	307	2	19	7	21	34	52	34	7	1	22	98	97	1
-21	7	20	36	46	15	25	1	21	344	329	3	10	4	21	191	192	2	-22	8	21	79	73	11	9	1	22	18	13	17
-19	7	20	0	18	1	27	1	21	48	75	9	12	4	21	114	112	2	-20	8	21	38	59	16	11	1	22	31	27	5
-17	7	20	139	148	4	29	1	21	265	263	3	14	4	21	214	208	2	-18	8	21	84	86	8	13	1	22	40	53	4
-15	7	20	25	38	16	-34	2	21	48	54	12	16	4	21	39	44	6	-16	8	21	90	103	6	15	1	22	0	17	1
-13	7	20	256	245	7	-32	2	21	0	14	1	18	4	21	165	161	2	-14	8	21	91	98	6	17	1	22	57	51	4
-11	7	20	115	130	3	-30	2	21	89	96	5	20	4	21	31	39	11	-12	8	21	48	41	9	19	1	22	29	14	9
-9	7	20	156	150	4	-28	2	21	99	100	4	22	4	21	16	20	16	-10	8	21	52	61	6	21	1	22	85	82	4
-7	7	20	138	147	3	-26	2	21	106	103	3	24	4	21	25	21	25	-8	8	21	33	30	11	23	1	22	25	33	24
-5	7	20	104	103	3	-24	2	21	65	71	4	26	4	21	0	18	1	-6	8	21	40	49	8	25	1	22	66	85	5
-3	7	20	176	179	4	-22	2	21	190	184	2	-31	5	21	42	62	28	-4	8	21	26	22	17	27	1	22	36	50	12
-1	7	20	86	95	3	-20	2	21	174	171	2	-29	5	21	25	27	24	-2	8	21	27	39	27	29	1	22	19	45	18
1	7	20	163	163	3	-18	2	21	230	227	2	-27	5	21	43	37	17	0	8	21	51	45	8	-34	2	22	125	132	6
3	7	20	31	24	9	-16	2	21	283	272	2	-25	5	21	89	100	6	2	8	21	0	24	1	-32	2	22	50	52	11
5	7	20	120	119	5	-14	2	21	261	255	1	-23	5	21	49	64	12	4	8	21	68	65	23	-30	2	22	46	55	11
7	7	20	0	9	1	-12	2	21	118	117	1	-21	5	21	89	101	4	6	8	21	38	43	15	-28	2	22	0	15	1
9	7	20	163	169	3	-10	2	21	409	395	2	-19	5	21	36	32	6	8	8	21	84	92	5	-26	2	22	38	44	9
11	7	20	20	19	20	-8	2	21	134	138	3	-17	5	21	159	168	3	10	8	21	46	44	12	-24	2	22	61	56	6
13	7	20	193	190	4	-6	2	21	301	302	3	-15	5	21	18	24	18	12	8	21	105	113	6	-22	2	22	0	5	1
15	7	20	90	89	4	-4	2	21	240	233	4	-13	5	21	248	248	2	14	8	21	116	108	14	-20	2	22	98	95	2
17	7	20	105	113	4	-2	2	21	275	269	1	-11	5	21	73	85	3	16	8	21	96	99	6	-18	2	22	134	132	2
19	7	20	134	133	3	0	2	21	143	147	2	-9	5	21	170	171	4	-15	9	21	67	69	8	-16	2	22	29	31	8
21	7	20	71	83	7	2	2	21	399	396	3	-7	5	21	0	15	1	-13	9	21	22	15	21	-14	2	22	182	183	2
-22	8	20	227	228	9	4	2	21	105	109	1	-5	5	21	173	163	3	-11	9	21	0	18	1	-12	2	22	46	47	4
-20	8	20	173	174	5	6	2	21	296	300	5	-3	5	21	116	124	2	-9	9	21	0	10	1	-10	2	22	228	224	2
-18	8	20	237	229	4	8	2	21	210	206	3	-1	5	21	187	182	2	-7	9	21	20	16	20	-8	2	22	116	113	2
-16	8	20	167	180	3	10	2	21	72	77	2	1	5	21	17	16	17	-5	9	21	0	10	1	-6	2	22	439	419	5
-14	8	20	194	193	3	12	2	21	214	209	2	3	5	21	140	148	2	-3	9	21	16	9	16	-4	2	22	299	297	2
-12	8	20	146	151	3	14	2	21	103	104	2	5	5	21	91	90	2	-1	9	21	0	10	1	-2	2	22	410	391	2
-10	8	20	175	170	3	16	2	21	148	149	2	7	5	21	107	112	2	1	9	21	84	88	6	0	2	22	154	156	2
-8	8	20	149	155	3	18	2	21	134	140	2	9	5	21	48	61	9	3	9	21	30	43	30	2	2	22	394	380	4
-6	8	20	170	177	3	20	2	21	61	53	5	11	5	21	108	105	2	5	9	21	195	181	4	4	2	22	135	143	2
-4	8	20	119	127	5	22	2	21	41	46	10	13	5	21	86	88	3	7	9	21	54	39	10	6	2	22	358	347	3
-2	8	20	196	199	3	24	2	21	29	33	12	15	5	21	22	30	21	9	9	21	183	176	6	8	2	22	268	265	2
0	8	20	78	86	5	26	2	21	70	58	6	17	5	21	0	33	1	-34	0	22	183	183	6	10	2	22	380	375	2
2	8	20	202	200	4	28	2	21	0	31	1	19	5	21	36	27	8	-32	0	22	0	5	1	12	2	22	306	299	3

h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s
4	8	20	47	54	9	-33	3	21	31	59	30	21	5	21	59	69	11	-30	0	22	106	108	6	14	2	22	235	232	2
6	8	20	97	101	5	-31	3	21	134	125	5	23	5	21	91	96	5	-28	0	22	41	32	17	16	2	22	203	201	3
8	8	20	27	6	19	-29	3	21	100	98	7	25	5	21	32	54	32	-26	0	22	142	128	4	18	2	22	167	167	2
10	8	20	0	33	1	-27	3	21	106	114	4	-28	6	21	27	27	27	-24	0	22	32	41	23	20	2	22	188	185	2
12	8	20	0	32	1	-25	3	21	59	71	5	-26	6	21	113	128	6	-22	0	22	74	70	8	22	2	22	100	100	5
14	8	20	0	4	1	-23	3	21	115	112	3	-24	6	21	0	16	1	-20	0	22	48	46	6	24	2	22	151	151	3
16	8	20	73	80	7	-21	3	21	52	54	9	-22	6	21	207	211	3	-18	0	22	282	279	3	26	2	22	51	66	12
-17	9	20	132	137	5	-19	3	21	167	176	2	-20	6	21	40	32	10	-16	0	22	33	11	7	28	2	22	115	116	4
-15	9	20	22	59	22	-17	3	21	48	55	3	-18	6	21	295	296	6	-14	0	22	263	253	3	-33	3	22	165	166	5
-13	9	20	160	155	7	-15	3	21	201	197	2	-16	6	21	24	31	24	-12	0	22	30	37	6	-31	3	22	242	232	9
-11	9	20	34	35	15	-13	3	21	16	23	16	-14	6	21	342	336	5	-10	0	22	235	228	2	-29	3	22	154	167	4
-9	9	20	135	137	4	-11	3	21	90	96	2	-12	6	21	104	119	4	-8	0	22	45	39	4	-27	3	22	228	220	4
-7	9	20	0	13	1	-9	3	21	138	145	2	-10	6	21	366	354	3	-6	0	22	416	410	4	-25	3	22	247	235	4
-5	9	20	143	143	4	-7	3	21	88	97	2	-8	6	21	203	207	2	-4	0	22	112	111	3	-23	3	22	267	260	4
-3	9	20	0	23	1	-5	3	21	117	122	3	-6	6	21	327	327	4	-2	0	22	450	431	3	-21	3	22	258	249	4
-1	9	20	126	130	4	-3	3	21	124	130	2	-4	6	21	220	221	3	0	0	22	209	218	5	-19	3	22	396	387	3
1	9	20	23	13	23	-1	3	21	123	122	2	-2	6	21	278	285	3	2	0	22	399	392	3	-17	3	22	138	137	2
3	9	20	57	64	9	1	3	21	93	102	1	0	6	21	226	223	7	4	0	22	321	314	2	-15	3	22	386	373	3
5	9	20	0	34	1	3	3	21	54	54	5	2	6	21	213	216	2	6	0	22	506	492	5	-13	3	22	189	193	2
7	9	20	0	7	1	5	3	21	85	83	4	4	6	21	201	202	2	8	0	22	473	467	3	-11	3	22	348	339	4
9	9	20	61	55	8	7	3	21	91	91	2	6	6	21	134	139	3	10	0	22	418	413	4	-9	3	22	209	209	4
11	9	20	26	17	26	9	3	21	98	97	2	8	6	21	157	166	2	12	0	22	366	349	2	-7	3	22	291	281	2
-35	1	21	250	232	4	11	3	21	64	67	3	10	6	21	90	99	3	14	0	22	293	284	2	-5	3	22	67	73	2
-33	1	21	208	204	4	13	3	21	149	147	2	12	6	21	162	166	3	16	0	22	241	232	2	-3	3	22	177	175	3
-31	1	21	268	257	4	15	3	21	21	19	17	14	6	21	34	41	8	18	0	22	314	307	3	-1	3	22	149	149	3
-29	1	21	140	145	4	17	3	21	153	149	2	16	6	21	162	156	3	20	0	22	379	361	3	1	3	22	109	108	1
-27	1	21	319	302	3	19	3	21	0	6	1	18	6	21	0	30	1	22	0	22	256	257	7	3	3	22	151	149	2
-25	1	21	118	123	2	21	3	21	160	154	3	20	6	21	112	114	3	24	0	22	252	250	3	5	3	22	164	159	1
-23	1	21	398	372	3	23	3	21	56	58	8	22	6	21	48	35	12	26	0	22	158	166	7	7	3	22	56	60	4
-21	1	21	47	49	5	25	3	21	108	110	6	-25	7	21	131	135	5	28	0	22	77	75	26	9	3	22	32	33	5
-19	1	21	310	292	3	27	3	21	82	91	8	-23	7	21	115	128	4	-35	1	22	43	47	20	11	3	22	0	7	1
-17	1	21	15	9	14	-32	4	21	52	41	52	-21	7	21	166	164	4	-33	1	22	63	77	8	13	3	22	96	96	3
-15	1	21	115	123	2	-30	4	21	96	112	7	-19	7	21	127	128	3	-31	1	22	130	119	4	15	3	22	146	140	2
-13	1	21	71	70	2	-28	4	21	50	48	21	-17	7	21	128	139	4	-29	1	22	36	38	15	17	3	22	177	175	2
-11	1	21	185	186	1	-26	4	21	200	191	4	-15	7	21	67	79	5	-27	1	22	101	102	5	19	3	22	101	98	4
-9	1	21	43	44	2	-24	4	21	14	17	13	-13	7	21	85	93	5	-25	1	22	33	48	33	21	3	22	247	238	5
-7	1	21	122	116	1	-22	4	21	317	308	3	-11	7	21	61	72	7	-23	1	22	111	109	3	23	3	22	44	40	7
-5	1	21	35	37	4	-20	4	21	58	56	4	-9	7	21	52	39	7	-21	1	22	116	109	5	25	3	22	202	204	3
-3	1	21	106	109	1	-18	4	21	324	316	2	-7	7	21	4	6	3	-19	1	22	207	207	2	27	3	22	90	95	5
-1	1	21	25	28	4	-16	4	21	215	208	4	-5	7	21	57	56	5	-17	1	22	65	69	3	-32	4	22	80	80	11
1	1	21	143	151	2	-14	4	21	374	354	3	-3	7	21	108	124	4	-15	1	22	261	258	2	-30	4	22	0	3	1
3	1	21	124	119	1	-12	4	21	235	235	2	-1	7	21	144	134	9	-13	1	22	95	95	2	-28	4	22	64	71	9
5	1	21	261	268	1	-10	4	21	434	417	4	1	7	21	105	103	4	-11	1	22	174	169	5	-26	4	22	48	52	9
7	1	21	27	24	4	-8	4	21	235	240	2	3	7	21	154	154	4	-9	1	22	43	47	3	-24	4	22	71	66	5
9	1	21	506	484	2	-6	4	21	427	418	3	5	7	21	108	113	4	-7	1	22	153	147	1	-22	4	22	29	25	15
11	1	21	106	108	1	-4	4	21	383	373	2	7	7	21	123	127	3	-5	1	22	38	32	6	-20	4	22	67	58	6
13	1	21	453	428	2	-2	4	21	279	277	2	9	7	21	172	172	3	-3	1	22	61	62	2	-18	4	22	9	35	8
15	1	21	66	77	3	0	4	21	375	369	3	11	7	21	86	89	7	-1	1	22	163	163	1	-16	4	22	131	130	2
17	1	21	366	358	2	2	4	21	343	340	3	13	7	21	188	179	3	1	1	22	20	27	19	-14	4	22	76	80	4
19	1	21	88	85	4	4	4	21	393	385	2	15	7	21	53	55	9	3	1	22	258	249	2	-12	4	22	125	127	4
21	1	21	387	377	3	6	4	21	339	329	2	17	7	21	204	197	3	5	1	22	0	9	1	-10	4	22	138	137	2
-8	4	22	109	108	5	7	7	22	98	96	5	6	2	23	261	267	2	5	5	23	66	84	5	-22	0	24	555	523	9
-6	4	22	101	105	3	9	7	22	21	10	20	8	2	23	131	133	2	7	5	23	119	126	2	-20	0	24	102	95	7
-4	4	22	76	89	2	11	7	22	158	156	4	10	2	23	259	253	2	9	5	23	69	63	4	-18	0	24	585	558	5
-2	4	22	95	89	2	13	7	22	38	37	21	12	2	23	201	201	2	11	5	23	140	139	3	-16	0	24	84	96	12
0	4	22	26	29	13	15	7	22	186	186	4	14	2	23	219	211	2	13	5	23	45	34	5	-14	0	24	434	421	3
2	4	22	122	127	3	17	7	22	58	71	7	16	2	23	223	223	4	15	5	23	153	157	3	-12	0	24	132	135	4
4	4	22	62	65	2	19	7	22	111	113	3	18	2	23	222	221	2	17	5	23	11	11	10	-10	0	24	506	490	4
6	4	22	74	80	3	-20	8	22	74	77	11	20	2	23	205	204	4	19	5	23	131	128	3	-8	0	24	93	89	3
8	4	22	38	42	6	-18	8	22	53	62	11	22	2	23	184	185	4	21	5	23	0	12	1	-6	0	24	546	526	5
10	4	22	0	9	1	-16	8	22	86	84	5	24	2	23	163	166	3	23	5	23	99	101	15	-4	0	24	56	57	3
12	4	22	36	36	9	-14	8	22	110	115	4	26	2	23	106	111	7	-26	6	23	166	185	5	-2	0	24	318	320	3
14	4	22	37	29	7	-12	8	22	31	39	13	-33	3	23	81	79	8	-24	6	23	51	55	9	0	0	24	100	97	2
16	4	22	65	69	5	-10	8	22	126	129	4	-31	3	23	0	4	1	-22	6	23	170	172	11	2	0	24	176	171	2
18	4	22	24	28	22	-8	8	22	36	45	18	-29	3	23	128	126	5	-20	6	23	72	76	9	4	0	24	65	69	5
20	4	22	0	17	1	-6	8	22	143	145	3	-27	3	23	12	32	12	-18	6	23	132	135	3	6	0	24	51	51	4
22	4	22	31	43	16	-4	8	22	86	95	5	-25	3	23	156	154	3	-16	6	23	112	116	4	8	0	24	66	71	6
24	4	22	0	8	1	-2	8	22	199	194	3	-23	3	23	23	12	23	-14	6	23	34	36	9	10	0	24	180	184	4
26	4	22	16	27	15	0	8	22	169	164	4	-21	3	23	124	127	3	-12	6	23	103	121	3	12	0	24	120	111	3
-29	5	22	203	202	5	2	8	22	208	205	3	-19	3	23	0	16	1	-10	6	23	25	17	11	14	0	24	234	232	5
-27	5	22	251	246	7	4	8	22	168	173	4	-17	3	23	166	158	3	-8	6	23	49	64	8	16	0	24	24	34	23
-25	5	22	251	248	7	6	8	22	222	223	3	-15	3	23	136	140	2	-6	6	23	43	57	6	18	0	24	111	122	4
-23	5	22	279	268	4	8	8	22	190	187	4	-13	3	23	108	110	2	-4	6	23	56	65	5	20	0	24	44	39	12
-21	5	22	222	223	3	10	8	22	160	163	6	-11	3	23	242	240	2	-2	6	23	78	91	3	22	0	24	196	185	4
-19	5	22	303	299	3	12	8	22	135	143	14	-9	3	23	63	67	3	0	6	23	71	74	4	24	0	24	161	153	5
-17	5	22	133	141	3	14	8	22	141	147	14	-7	3	23	255	256	2	2	6	23	163	162	2	26	0	24	248	245	5
-15	5	22	297	293	5	-13	9	22	78	92	8	-5	3	23	45	57	6	4	6	23	12	2	12	-33	1	24	0	9	1
-13	5	22	173	174	2	-11	9	22	37	1	16	-3	3	23	212	222	2	6	6	23	239	226	2	-31	1	24	24	6	24
-11	5	22	331	321	3	-9	9	22	136	134	4	-1	3	23	38	45	3	8	6	23	66	63	6	-29	1	24	0	33	1

h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s
-9	5	22	166	171	2	-7	9	22	32	36	21	1	3	23	113	117	4	10	6	23	277	258	9	-27	1	24	16	33	16
-7	5	22	343	334	3	-5	9	22	101	106	6	3	3	23	28	34	6	12	6	23	76	75	3	-25	1	24	0	11	1
-5	5	22	79	84	2	-3	9	22	0	2	1	5	3	23	176	178	2	14	6	23	259	248	3	-23	1	24	49	45	11
-3	5	22	292	285	2	-1	9	22	141	142	4	7	3	23	0	9	1	16	6	23	85	92	7	-21	1	24	16	31	16
-1	5	22	48	57	4	1	9	22	0	25	1	9	3	23	182	185	2	18	6	23	178	180	3	-19	1	24	114	114	2
1	5	22	200	203	2	3	9	22	177	170	6	11	3	23	32	22	6	20	6	23	134	130	4	-17	1	24	39	31	5
3	5	22	64	70	8	5	9	22	37	47	15	13	3	23	150	150	4	-23	7	23	133	147	12	-15	1	24	86	87	4
5	5	22	124	126	2	7	9	22	166	152	4	15	3	23	49	59	5	-21	7	23	86	109	6	-13	1	24	86	90	2
7	5	22	68	75	3	-33	1	23	136	129	6	17	3	23	28	20	13	-19	7	23	217	219	14	-11	1	24	36	35	4
9	5	22	55	56	4	-31	1	23	89	80	5	19	3	23	33	40	11	-17	7	23	132	138	6	-9	1	24	95	96	3
11	5	22	30	26	9	-29	1	23	143	137	3	21	3	23	81	84	6	-15	7	23	242	241	6	-7	1	24	0	16	1
13	5	22	97	97	3	-27	1	23	122	128	3	23	3	23	37	54	9	-13	7	23	120	119	3	-5	1	24	52	52	4
15	5	22	38	43	6	-25	1	23	137	139	5	25	3	23	30	52	26	-11	7	23	217	217	4	-3	1	24	153	155	2
17	5	22	111	109	3	-23	1	23	203	192	3	-32	4	23	29	23	29	-9	7	23	120	123	5	-1	1	24	20	30	12
19	5	22	12	14	12	-21	1	23	324	313	2	-30	4	23	352	326	6	-7	7	23	219	220	6	1	1	24	187	185	2
21	5	22	160	155	3	-19	1	23	361	346	3	-28	4	23	43	59	13	-5	7	23	117	125	3	3	1	24	75	80	3
23	5	22	10	22	10	-17	1	23	389	378	3	-26	4	23	278	279	4	-3	7	23	185	188	6	5	1	24	232	227	3
-28	6	22	79	87	8	-15	1	23	396	380	3	-24	4	23	84	82	7	-1	7	23	137	141	8	7	1	24	140	149	2
-26	6	22	0	22	1	-13	1	23	335	326	4	-22	4	23	229	228	4	1	7	23	157	154	3	9	1	24	261	258	2
-24	6	22	127	134	4	-11	1	23	385	378	3	-20	4	23	56	50	4	3	7	23	179	181	3	11	1	24	54	61	3
-22	6	22	14	47	13	-9	1	23	367	359	3	-18	4	23	124	119	4	5	7	23	171	173	4	13	1	24	174	172	4
-20	6	22	100	113	3	-7	1	23	524	507	6	-16	4	23	26	21	25	7	7	23	152	132	7	15	1	24	43	45	7
-18	6	22	0	17	1	-5	1	23	307	309	2	-14	4	23	90	92	3	9	7	23	154	166	4	17	1	24	106	117	5
-16	6	22	148	149	7	-3	1	23	544	534	3	-12	4	23	98	99	3	11	7	23	63	73	5	19	1	24	56	65	5
-14	6	22	0	19	1	-1	1	23	159	169	1	-10	4	23	72	87	3	13	7	23	65	82	9	21	1	24	76	76	5
-12	6	22	149	154	2	1	1	23	463	454	2	-8	4	23	37	37	4	15	7	23	84	79	8	23	1	24	27	14	17
-10	6	22	55	66	6	3	1	23	171	172	2	-6	4	23	33	36	12	17	7	23	45	54	9	25	1	24	51	40	7
-8	6	22	176	175	3	5	1	23	467	447	2	-4	4	23	20	18	20	-20	8	23	47	72	17	27	1	24	32	47	31
-6	6	22	254	254	5	7	1	23	102	103	3	-2	4	23	203	211	3	-18	8	23	0	13	1	-32	2	24	100	101	6
-4	6	22	247	245	3	9	1	23	344	340	2	0	4	23	50	44	4	-16	8	23	145	146	5	-30	2	24	268	256	5
-2	6	22	217	218	2	11	1	23	48	40	4	2	4	23	278	274	2	-14	8	23	19	4	19	-28	2	24	78	75	6
0	6	22	144	151	2	13	1	23	164	166	3	4	4	23	19	26	11	-12	8	23	201	197	3	-26	2	24	246	248	3
2	6	22	119	121	6	15	1	23	30	24	8	6	4	23	282	273	2	-10	8	23	29	51	25	-24	2	24	112	119	4
4	6	22	115	114	2	17	1	23	165	164	4	8	4	23	68	63	2	-8	8	23	154	159	6	-22	2	24	310	299	3
6	6	22	165	173	3	19	1	23	0	10	1	10	4	23	296	281	2	-6	8	23	60	64	6	-20	2	24	51	61	6
8	6	22	151	152	3	21	1	23	136	139	3	12	4	23	260	250	2	-4	8	23	105	116	4	-18	2	24	340	335	3
10	6	22	191	185	2	23	1	23	4	8	4	14	4	23	209	215	3	-2	8	23	73	81	5	-16	2	24	51	52	5
12	6	22	103	113	3	25	1	23	43	48	8	16	4	23	248	238	4	0	8	23	113	122	4	-14	2	24	366	359	3
14	6	22	158	157	3	27	1	23	44	24	10	18	4	23	307	297	3	2	8	23	91	89	5	-12	2	24	137	143	2
16	6	22	64	69	4	-34	2	23	210	205	5	20	4	23	172	178	5	4	8	23	81	85	6	-10	2	24	330	321	3
18	6	22	148	147	3	-32	2	23	15	14	15	22	4	23	298	283	3	6	8	23	58	71	7	-8	2	24	85	84	2
20	6	22	88	83	5	-30	2	23	164	157	5	24	4	23	216	208	3	8	8	23	63	68	8	-6	2	24	279	280	2
22	6	22	139	132	4	-28	2	23	0	9	1	-29	5	23	40	33	17	10	8	23	96	88	9	-4	2	24	70	77	3
-25	7	22	44	65	11	-26	2	23	106	107	4	-27	5	23	117	117	6	12	8	23	71	78	7	-2	2	24	90	102	3
-23	7	22	121	118	7	-24	2	23	39	41	9	-25	5	23	55	54	14	-11	9	23	131	140	4	0	2	24	70	76	3
-21	7	22	84	96	6	-22	2	23	215	213	3	-23	5	23	69	77	6	-9	9	23	136	142	4	2	2	24	106	114	1
-19	7	22	143	151	5	-20	2	23	20	25	19	-21	5	23	17	30	17	-7	9	23	152	159	4	4	2	24	76	78	5
-17	7	22	105	116	5	-18	2	23	237	229	5	-19	5	23	52	61	5	-5	9	23	114	125	4	6	2	24	51	57	3
-15	7	22	161	170	4	-16	2	23	0	5	1	-17	5	23	30	16	12	-3	9	23	226	226	4	8	2	24	79	76	3
-13	7	22	0	11	1	-14	2	23	112	116	3	-15	5	23	68	70	4	-1	9	23	85	95	5	10	2	24	28	28	7
-11	7	22	196	196	3	-12	2	23	0	6	1	-13	5	23	71	82	3	1	9	23	221	227	7	12	2	24	47	54	4
-9	7	22	60	56	5	-10	2	23	33	34	4	-11	5	23	99	106	4	3	9	23	51	45	11	14	2	24	102	104	3
-7	7	22	158	157	4	-8	2	23	91	98	3	-9	5	23	30	35	8	5	9	23	146	157	4	16	2	24	34	41	8
-5	7	22	47	55	8	-6	2	23	54	63	2	-7	5	23	213	207	4	-34	0	24	231	225	6	18	2	24	150	149	5
-3	7	22	101	102	7	-4	2	23	85	79	2	-5	5	23	124	128	2	-32	0	24	187	182	8	20	2	24	95	100	4
-1	7	22	104	103	8	-2	2	23	41	45	2	-3	5	23	151	151	3	-30	0	24	361	349	8	22	2	24	201	195	3
1	7	22	70	73	5	0	2	23	345	344	2	-1	5	23	92	91	3	-28	0	24	55	45	11	24	2	24	116	122	7
3	7	22	119	123	3	2	2	23	73	79	3	1	5	23	5	19	4	-26	0	24	418	392	5	26	2	24	172	177	4
5	7	22	28	30	14	4	2	23	245	245	4	3	5	23	96	97	4	-24	0	24	34	37	16	-31	3	24	48	58	13
-29	3	24	42	48	17	-16	6	24	43	31	10	17	1	25	282	274	3	16	4	25	63	66	5	-28	0	26	65	57	9
-27	3	24	52	56	12	-14	6	24	150	159	3	19	1	25	173	173	3	18	4	25	79	87	6	-26	0	26	0	1	1
-25	3	24	21	15	21	-12	6	24	14	23	14	21	1	25	327	315	4	20	4	25	0	6	1	-24	0	26	40	41	9
-23	3	24	15	36	14	-10	6	24	163	161	3	23	1	25	150	146	10	22	4	25	44	42	9	-22	0	26	26	46	25
-21	3	24	48	53	6	-8	6	24	22	26	18	25	1	25	299	287	4	-27	5	25	80	71	15	-20	0	26	121	108	4
-19	3	24	47	46	6	-6	6	24	117	122	3	-32	2	25	54	51	15	-25	5	25	122	117	5	-18	0	26	163	164	3
-17	3	24	132	133	3	-4	6	24	85	88	3	-30	2	25	136	141	5	-23	5	25	118	130	5	-16	0	26	99	93	4
-15	3	24	239	243	3	-2	6	24	0	24	1	-28	2	25	48	27	9	-21	5	25	109	110	5	-14	0	26	277	264	9
-13	3	24	164	168	2	0	6	24	148	148	2	-26	2	25	137	125	4	-19	5	25	47	58	8	-12	0	26	80	80	3
-11	3	24	214	215	6	2	6	24	80	79	8	-24	2	25	65	62	7	-17	5	25	0	30	1	-10	0	26	301	290	3
-9	3	24	248	245	2	4	6	24	120	125	5	-22	2	25	171	175	3	-15	5	25	27	44	10	-8	0	26	250	233	3
-7	3	24	221	217	2	6	6	24	125	131	6	-20	2	25	51	63	5	-13	5	25	31	35	8	-6	0	26	506	478	5
-5	3	24	298	287	2	8	6	24	107	108	3	-18	2	25	402	381	3	-11	5	25	91	93	5	-4	0	26	219	220	3
-3	3	24	385	381	5	10	6	24	0	15	1	-16	2	25	19	24	19	-9	5	25	115	123	4	-2	0	26	593	569	5
-1	3	24	279	268	2	12	6	24	138	137	3	-14	2	25	470	455	5	-7	5	25	127	139	2	0	0	26	25	30	13
1	3	24	472	451	3	14	6	24	41	39	9	-12	2	25	107	109	2	-5	5	25	68	80	4	2	0	26	545	516	3
3	3	24	285	275	2	16	6	24	118	121	4	-10	2	25	315	312	3	-3	5	25	150	149	3	4	0	26	31	16	8
5	3	24	388	382	2	18	6	24	37	45	25	-8	2	25	103	106	4	-1	5	25	47	55	4	6	0	26	599	568	7
7	3	24	273	264	2	20	6	24	91	100	6	-6	2	25	240	226	3	1	5	25	64	68	4	8	0	26	128	127	9
9	3	24	376	363	2	-23	7	24	34	53	22	-4	2	25	0	14	1	3	5	25	104	103	3	10	0	26	494	473	5

h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s
11	3	24	129	134	3	-21	7	24	101	103	5	-2	2	25	290	287	3	5	5	25	11	17	10	12	0	26	158	163	3
13	3	24	366	355	3	-19	7	24	47	63	12	0	2	25	12	15	12	7	5	25	31	44	16	14	0	26	326	318	6
15	3	24	140	140	3	-17	7	24	161	165	3	2	2	25	278	279	2	9	5	25	53	64	6	16	0	26	88	90	5
17	3	24	297	280	4	-15	7	24	82	87	6	4	2	25	47	55	3	11	5	25	0	4	1	18	0	26	360	342	7
19	3	24	162	155	4	-13	7	24	221	218	5	6	2	25	317	307	2	13	5	25	109	104	3	20	0	26	0	7	1
21	3	24	214	214	3	-11	7	24	0	0	1	8	2	25	11	20	11	15	5	25	0	14	1	22	0	26	278	280	17
23	3	24	66	71	5	-9	7	24	179	175	3	10	2	25	220	215	3	17	5	25	84	87	8	24	0	26	0	3	1
25	3	24	151	154	4	-7	7	24	13	29	12	12	2	25	24	37	13	19	5	25	0	15	1	-33	1	26	108	105	7
-30	4	24	23	19	22	-5	7	24	109	109	4	14	2	25	114	121	3	21	5	25	95	94	5	-31	1	26	39	15	38
-28	4	24	82	78	10	-3	7	24	25	34	18	16	2	25	46	58	7	-26	6	25	94	107	12	-29	1	26	79	79	7
-26	4	24	37	25	15	-1	7	24	95	84	4	18	2	25	47	53	6	-24	6	25	127	125	10	-27	1	26	20	3	20
-24	4	24	55	40	8	1	7	24	86	99	4	20	2	25	59	53	6	-22	6	25	168	174	6	-25	1	26	72	80	6
-22	4	24	24	19	24	3	7	24	97	95	6	22	2	25	0	12	1	-20	6	25	137	136	6	-23	1	26	39	32	7
-20	4	24	10	1	10	5	7	24	157	162	6	24	2	25	0	34	1	-18	6	25	183	191	4	-21	1	26	222	215	2
-18	4	24	39	33	16	7	7	24	94	111	4	26	2	25	26	22	26	-16	6	25	136	148	4	-19	1	26	62	69	4
-16	4	24	0	7	1	9	7	24	194	189	4	-31	3	25	80	69	11	-14	6	25	255	253	4	-17	1	26	321	305	2
-14	4	24	88	96	3	11	7	24	92	99	5	-29	3	25	146	145	5	-12	6	25	130	128	4	-15	1	26	63	58	6
-12	4	24	107	114	3	13	7	24	143	143	4	-27	3	25	0	20	1	-10	6	25	301	294	6	-13	1	26	223	222	2
-10	4	24	0	4	1	15	7	24	32	18	31	-25	3	25	112	118	4	-8	6	25	72	81	4	-11	1	26	15	15	15
-8	4	24	162	159	2	-18	8	24	264	269	5	-23	3	25	0	13	1	-6	6	25	247	248	3	-9	1	26	60	63	3
-6	4	24	67	76	3	-16	8	24	33	51	32	-21	3	25	70	74	5	-4	6	25	29	17	15	-7	1	26	22	42	22
-4	4	24	153	154	3	-14	8	24	200	206	3	-19	3	25	50	54	6	-2	6	25	204	217	7	-5	1	26	0	12	1
-2	4	24	63	63	3	-12	8	24	55	58	10	-17	3	25	7	14	6	0	6	25	110	109	3	-3	1	26	50	48	4
0	4	24	55	60	3	-10	8	24	153	154	4	-15	3	25	138	132	2	2	6	25	213	212	2	-1	1	26	60	64	3
2	4	24	88	93	3	-8	8	24	42	44	16	-13	3	25	88	96	5	4	6	25	91	101	3	1	1	26	60	59	6
4	4	24	78	82	3	-6	8	24	113	124	5	-11	3	25	144	140	2	6	6	25	178	181	3	3	1	26	70	69	3
6	4	24	66	69	3	-4	8	24	29	24	18	-9	3	25	90	96	5	8	6	25	44	52	7	5	1	26	42	38	4
8	4	24	100	96	2	-2	8	24	111	119	4	-7	3	25	33	30	7	10	6	25	127	143	9	7	1	26	9	5	9
10	4	24	20	22	19	0	8	24	38	24	12	-5	3	25	64	67	3	12	6	25	45	64	12	9	1	26	23	12	12
12	4	24	125	116	3	2	8	24	47	46	10	-3	3	25	0	3	1	14	6	25	59	76	11	11	1	26	37	44	8
14	4	24	34	41	8	4	8	24	41	49	13	-1	3	25	141	150	3	16	6	25	85	85	8	13	1	26	35	50	12
16	4	24	81	79	3	6	8	24	20	26	20	1	3	25	76	83	3	18	6	25	40	37	11	15	1	26	27	33	14
18	4	24	108	106	4	8	8	24	51	34	12	3	3	25	153	154	3	-21	7	25	165	176	4	17	1	26	77	76	6
20	4	24	51	58	8	10	8	24	70	62	8	5	3	25	25	33	6	-19	7	25	16	20	15	19	1	26	21	19	21
22	4	24	67	69	5	12	8	24	24	32	24	7	3	25	154	149	2	-17	7	25	123	134	4	21	1	26	58	67	6
24	4	24	0	33	1	-9	9	24	40	54	11	9	3	25	45	60	6	-15	7	25	34	35	13	23	1	26	0	14	1
-29	5	24	24	33	24	-7	9	24	34	48	34	11	3	25	61	64	6	-13	7	25	47	70	10	25	1	26	63	77	7
-27	5	24	66	72	9	-5	9	24	63	69	7	13	3	25	132	138	4	-11	7	25	53	56	6	-32	2	26	0	22	1
-25	5	24	0	10	1	-3	9	24	45	52	8	15	3	25	84	82	4	-9	7	25	0	22	1	-30	2	26	95	96	7
-23	5	24	17	40	16	-1	9	24	102	99	4	17	3	25	198	193	3	-7	7	25	84	83	4	-28	2	26	0	5	1
-21	5	24	57	77	14	1	9	24	32	49	21	19	3	25	70	77	5	-5	7	25	35	36	11	-26	2	26	0	10	1
-19	5	24	22	20	21	3	9	24	0	4	1	21	3	25	132	133	3	-3	7	25	128	132	3	-24	2	26	0	24	1
-17	5	24	164	173	7	-33	1	25	299	280	6	23	3	25	58	68	21	-1	7	25	54	52	5	-22	2	26	32	40	12
-15	5	24	75	76	4	-31	1	25	87	78	19	25	3	25	105	115	5	1	7	25	145	150	3	-20	2	26	137	141	3
-13	5	24	174	173	2	-29	1	25	236	230	3	-30	4	25	150	146	5	3	7	25	49	49	12	-18	2	26	119	127	3
-11	5	24	152	157	2	-27	1	25	138	137	4	-28	4	25	107	109	8	5	7	25	185	181	5	-16	2	26	182	177	2
-9	5	24	261	254	4	-25	1	25	233	221	4	-26	4	25	249	236	5	7	7	25	83	89	6	-14	2	26	160	166	2
-7	5	24	259	255	5	-23	1	25	143	136	6	-24	4	25	135	137	6	9	7	25	211	208	3	-12	2	26	143	139	2
-5	5	24	334	322	4	-21	1	25	221	209	2	-22	4	25	243	230	3	11	7	25	106	123	7	-10	2	26	280	277	5
-3	5	24	287	283	5	-19	1	25	143	142	4	-20	4	25	143	151	4	13	7	25	194	196	4	-8	2	26	132	130	2
-1	5	24	323	310	5	-17	1	25	109	108	2	-18	4	25	315	306	3	15	7	25	92	98	5	-6	2	26	339	331	3
1	5	24	341	328	4	-15	1	25	49	48	5	-16	4	25	86	95	3	-16	8	25	81	96	6	-4	2	26	216	204	2
3	5	24	241	232	3	-13	1	25	75	78	2	-14	4	25	394	381	3	-14	8	25	60	57	20	-2	2	26	361	353	4
5	5	24	321	309	3	-11	1	25	2	5	2	-12	4	25	60	66	4	-12	8	25	32	28	31	0	2	26	227	219	3
7	5	24	179	181	2	-9	1	25	30	30	4	-10	4	25	438	425	3	-10	8	25	70	89	5	2	2	26	346	329	3
9	5	24	307	292	3	-7	1	25	0	8	1	-8	4	25	124	126	2	-8	8	25	31	31	16	4	2	26	81	83	2
11	5	24	165	165	2	-5	1	25	111	120	2	-6	4	25	603	577	5	-6	8	25	52	50	8	6	2	26	352	340	2
13	5	24	284	278	2	-3	1	25	68	67	2	-4	4	25	85	93	6	-4	8	25	25	5	25	8	2	26	28	29	12
15	5	24	149	149	5	-1	1	25	207	210	3	-2	4	25	568	542	3	-2	8	25	23	32	23	10	2	26	340	326	3
17	5	24	282	270	4	1	1	25	147	144	2	0	4	25	79	79	5	0	8	25	40	33	12	12	2	26	51	46	5
19	5	24	73	82	5	3	1	25	179	176	3	2	4	25	434	419	3	2	8	25	29	43	28	14	2	26	274	259	4
21	5	24	249	243	4	5	1	25	253	252	3	4	4	25	45	36	27	4	8	25	106	108	4	16	2	26	7	25	7
-26	6	24	108	126	13	7	1	25	250	240	2	6	4	25	226	231	2	6	8	25	0	28	1	18	2	26	206	201	2
-24	6	24	61	72	14	9	1	25	389	372	2	8	4	25	0	3	1	8	8	25	117	106	5	20	2	26	23	23	23
-22	6	24	170	171	5	11	1	25	292	282	2	10	4	25	182	185	2	10	8	25	0	20	1	22	2	26	145	147	3
-20	6	24	93	104	4	13	1	25	300	291	2	12	4	25	43	37	5	-32	0	26	23	24	22	24	2	26	0	9	1
-18	6	24	206	203	4	15	1	25	248	244	3	14	4	25	167	167	2	-30	0	26	36	11	23	-31	3	26	36	40	20
-29	3	26	288	282	6	-6	6	26	234	234	3	4	2	27	142	141	2	-24	6	27	0	33	1	-5	1	28	163	162	2
-27	3	26	46	22	11	-4	6	26	30	40	13	6	2	27	296	284	2	-22	6	27	166	167	6	-3	1	28	46	60	10
-25	3	26	304	284	4	-2	6	26	173	180	2	8	2	27	151	154	3	-20	6	27	0	20	1	-1	1	28	166	160	2
-23	3	26	33	8	13	0	6	26	71	73	4	10	2	27	336	321	2	-18	6	27	106	108	6	1	1	28	53	59	3
-21	3	26	336	329	3	2	6	26	131	133	3	12	2	27	21	24	21	-16	6	27	31	28	22	3	1	28	193	192	2
-19	3	26	76	83	5	4	6	26	66	63	5	14	2	27	304	294	6	-14	6	27	0	37	1	5	1	28	22	27	21
-17	3	26	307	304	3	6	6	26	166	164	6	16	2	27	0	8	1	-12	6	27	39	49	18	7	1	28	285	277	2
-15	3	26	156	151	3	8	6	26	43	47	10	18	2	27	216	213	7	-10	6	27	28	43	20	9	1	28	11	7	11
-13	3	26	264	258	3	10	6	26	196	200	6	20	2	27	15	27	15	-8	6	27	95	97	4	11	1	28	201	193	3
-11	3	26	100	105	4	12	6	26	25	23	24	22	2	27	159	157	4	-6	6	27	54	65	6	13	1	28	0	6	1
-9	3	26	290	281	4	14	6	26	152	158	3	24	2	27	26	5	26	-4	6	27	114	121	5	15	1	28	75	76	4
-7	3	26	89	94	3	16	6	26	25	17	24	-29	3	27	51	53	10	-2	6	27	54	70	6	17	1	28	0	24	1

h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s
-5	3	26	236	239	3	-21	7	26	165	169	8	-27	3	27	82	87	7	0	6	27	129	135	3	19	1	28	2	28	1
-3	3	26	36	33	8	-19	7	26	60	51	17	-25	3	27	112	118	4	2	6	27	90	106	7	21	1	28	11	11	11
-1	3	26	155	152	2	-17	7	26	150	158	7	-23	3	27	74	82	5	4	6	27	134	132	5	23	1	28	14	14	13
1	3	26	59	59	3	-15	7	26	75	79	5	-21	3	27	172	173	3	6	6	27	190	189	5	-30	2	28	89	86	6
3	3	26	49	51	6	-13	7	26	117	127	4	-19	3	27	55	57	6	8	6	27	111	108	6	-28	2	28	210	198	9
5	3	26	26	34	6	-11	7	26	121	124	3	-17	3	27	255	245	3	10	6	27	247	240	4	-26	2	28	131	127	5
7	3	26	29	38	6	-9	7	26	43	53	9	-15	3	27	47	48	7	12	6	27	128	128	5	-24	2	28	236	230	3
9	3	26	62	71	4	-7	7	26	84	86	9	-13	3	27	227	221	2	14	6	27	221	215	4	-22	2	28	158	159	3
11	3	26	42	44	5	-5	7	26	0	5	1	-11	3	27	109	114	2	16	6	27	52	66	10	-20	2	28	233	233	3
13	3	26	171	171	3	-3	7	26	78	79	9	-9	3	27	213	215	6	-19	7	27	25	24	24	-18	2	28	206	208	3
15	3	26	18	33	18	-1	7	26	30	11	30	-7	3	27	163	168	3	-17	7	27	251	262	5	-16	2	28	111	117	3
17	3	26	210	201	3	1	7	26	137	144	4	-5	3	27	146	154	3	-15	7	27	42	63	12	-14	2	28	195	193	2
19	3	26	127	125	4	3	7	26	52	46	7	-3	3	27	21	29	21	-13	7	27	211	213	5	-12	2	28	37	39	5
21	3	26	182	177	3	5	7	26	111	99	5	-1	3	27	191	194	4	-11	7	27	49	57	9	-10	2	28	220	212	2
23	3	26	143	142	4	7	7	26	78	87	9	1	3	27	25	27	18	-9	7	27	188	186	3	-8	2	28	84	87	4
-30	4	26	74	53	27	9	7	26	53	44	10	3	3	27	144	145	2	-7	7	27	53	34	13	-6	2	28	175	169	3
-28	4	26	96	100	8	11	7	26	148	147	6	5	3	27	79	81	3	-5	7	27	174	181	3	-4	2	28	41	45	14
-26	4	26	59	64	17	13	7	26	51	59	9	7	3	27	54	61	4	-3	7	27	52	61	8	-2	2	28	39	40	14
-24	4	26	139	137	4	-14	8	26	136	139	8	9	3	27	175	180	3	-1	7	27	151	159	3	0	2	28	40	35	5
-22	4	26	42	56	9	-12	8	26	32	30	16	11	3	27	33	26	7	1	7	27	10	21	9	2	2	28	0	19	1
-20	4	26	84	87	4	-10	8	26	121	130	4	13	3	27	128	128	3	3	7	27	179	179	4	4	2	28	0	24	1
-18	4	26	15	6	15	-8	8	26	43	49	12	15	3	27	23	29	22	5	7	27	0	21	1	6	2	28	20	36	20
-16	4	26	71	71	7	-6	8	26	162	163	5	17	3	27	86	81	4	7	7	27	193	189	4	8	2	28	138	136	2
-14	4	26	15	24	14	-4	8	26	51	31	10	19	3	27	91	86	9	9	7	27	0	23	1	10	2	28	107	116	4
-12	4	26	135	134	3	-2	8	26	216	218	8	21	3	27	0	10	1	11	7	27	113	125	11	12	2	28	154	150	3
-10	4	26	21	36	21	0	8	26	17	21	16	23	3	27	70	64	13	-12	8	27	135	140	4	14	2	28	193	187	4
-8	4	26	59	67	4	2	8	26	254	250	4	-28	4	27	179	181	11	-10	8	27	52	66	8	16	2	28	53	66	10
-6	4	26	0	13	1	4	8	26	34	28	14	-26	4	27	106	103	6	-8	8	27	123	135	6	18	2	28	175	170	5
-4	4	26	35	41	7	6	8	26	282	274	13	-24	4	27	147	156	4	-6	8	27	26	9	26	20	2	28	90	78	7
-2	4	26	0	6	1	8	8	26	0	27	1	-22	4	27	74	70	6	-4	8	27	125	129	4	22	2	28	212	206	5
0	4	26	75	74	4	-31	1	27	64	45	13	-20	4	27	67	71	5	-2	8	27	31	26	30	-29	3	28	14	16	14
2	4	26	87	94	3	-29	1	27	239	229	8	-18	4	27	33	38	11	0	8	27	148	150	4	-27	3	28	39	27	21
4	4	26	31	54	12	-27	1	27	19	11	18	-16	4	27	26	8	13	2	8	27	6	12	5	-25	3	28	71	83	7
6	4	26	91	92	3	-25	1	27	270	270	3	-14	4	27	21	4	21	4	8	27	123	132	5	-23	3	28	0	5	1
8	4	26	29	33	6	-23	1	27	13	16	12	-12	4	27	0	21	1	6	8	27	37	64	19	-21	3	28	124	131	4
10	4	26	63	64	4	-21	1	27	380	367	4	-10	4	27	0	17	1	-30	0	28	196	190	6	-19	3	28	7	10	6
12	4	26	76	79	3	-19	1	27	24	13	14	-8	4	27	42	41	10	-28	0	28	304	286	7	-17	3	28	282	279	5
14	4	26	68	79	4	-17	1	27	438	412	3	-6	4	27	27	45	24	-26	0	28	206	205	4	-15	3	28	33	45	9
16	4	26	80	85	4	-15	1	27	43	49	5	-4	4	27	67	77	4	-24	0	28	330	315	6	-13	3	28	343	326	3
18	4	26	0	18	1	-13	1	27	389	377	2	-2	4	27	223	230	3	-22	0	28	209	198	4	-11	3	28	0	16	1
20	4	26	29	52	18	-11	1	27	51	50	3	0	4	27	4	17	4	-20	0	28	391	369	4	-9	3	28	318	306	3
22	4	26	0	23	1	-9	1	27	509	485	3	2	4	27	272	269	3	-18	0	28	260	247	4	-7	3	28	28	35	18
-27	5	26	37	36	21	-7	1	27	77	79	4	4	4	27	54	55	4	-16	0	28	299	287	4	-5	3	28	429	409	4
-25	5	26	329	322	5	-5	1	27	532	510	3	6	4	27	261	250	3	-14	0	28	201	188	4	-3	3	28	94	82	5
-23	5	26	50	59	21	-3	1	27	164	161	2	8	4	27	51	56	5	-12	0	28	297	294	3	-1	3	28	471	450	4
-21	5	26	256	254	5	-1	1	27	369	355	2	10	4	27	274	263	4	-10	0	28	122	128	9	1	3	28	86	97	8
-19	5	26	69	80	6	1	1	27	200	196	3	12	4	27	0	13	1	-8	0	28	202	200	5	3	3	28	420	397	4
-17	5	26	215	219	3	3	1	27	276	272	2	14	4	27	341	329	3	-6	0	28	165	152	4	5	3	28	0	17	1
-15	5	26	99	96	6	5	1	27	110	107	3	16	4	27	36	45	18	-4	0	28	55	44	7	7	3	28	369	355	2
-13	5	26	221	223	5	7	1	27	253	245	2	18	4	27	352	336	4	-2	0	28	122	114	4	9	3	28	149	144	3
-11	5	26	62	66	4	9	1	27	62	63	9	20	4	27	65	78	7	0	0	28	108	113	3	11	3	28	312	303	5
-9	5	26	235	236	4	11	1	27	96	98	3	-27	5	27	110	108	7	2	0	28	90	86	12	13	3	28	170	167	5
-7	5	26	101	112	3	13	1	27	0	12	1	-25	5	27	19	32	18	4	0	28	66	71	7	15	3	28	261	251	3
-5	5	26	158	163	3	15	1	27	66	63	5	-23	5	27	74	68	10	6	0	28	33	24	8	17	3	28	47	52	8
-3	5	26	124	130	3	17	1	27	21	6	20	-21	5	27	70	77	9	8	0	28	35	16	18	19	3	28	206	197	9
-1	5	26	52	63	6	19	1	27	46	50	8	-19	5	27	28	26	28	10	0	28	173	179	4	21	3	28	54	40	14
1	5	26	83	80	5	21	1	27	0	30	1	-17	5	27	68	77	7	12	0	28	118	124	11	-28	4	28	0	21	1
3	5	26	21	10	21	23	1	27	13	24	13	-15	5	27	39	57	19	14	0	28	209	198	4	-26	4	28	0	15	1
5	5	26	13	14	13	-30	2	27	69	75	9	-13	5	27	21	28	21	16	0	28	89	91	6	-24	4	28	35	23	29
7	5	26	47	49	7	-28	2	27	70	77	7	-11	5	27	68	61	4	18	0	28	186	172	7	-22	4	28	12	31	11
9	5	26	43	39	9	-26	2	27	16	28	15	-9	5	27	124	135	3	20	0	28	23	39	23	-20	4	28	23	32	23
11	5	26	50	52	5	-24	2	27	101	103	5	-7	5	27	30	27	10	22	0	28	259	251	6	-18	4	28	33	44	32
13	5	26	82	86	4	-22	2	27	102	105	3	-5	5	27	194	194	3	-31	1	28	4	4	3	-16	4	28	45	47	8
15	5	26	112	112	4	-20	2	27	125	125	5	-3	5	27	28	35	11	-29	1	28	46	49	11	-14	4	28	90	108	4
17	5	26	97	101	6	-18	2	27	82	84	4	-1	5	27	96	100	3	-27	1	28	0	26	1	-12	4	28	0	14	1
19	5	26	160	157	3	-16	2	27	69	66	5	1	5	27	85	88	3	-25	1	28	16	15	15	-10	4	28	101	104	4
-24	6	26	109	99	7	-14	2	27	72	78	6	3	5	27	104	112	3	-23	1	28	29	47	19	-8	4	28	111	116	3
-22	6	26	53	70	12	-12	2	27	21	36	20	5	5	27	64	78	5	-21	1	28	0	25	1	-6	4	28	55	65	6
-20	6	26	8	34	7	-10	2	27	67	72	5	7	5	27	86	87	4	-19	1	28	61	53	5	-4	4	28	89	87	8
-18	6	26	107	108	5	-8	2	27	36	41	9	9	5	27	71	76	5	-17	1	28	109	104	5	-2	4	28	44	53	8
-16	6	26	0	9	1	-6	2	27	102	107	3	11	5	27	0	40	1	-15	1	28	44	49	11	0	4	28	70	70	4
-14	6	26	125	135	5	-4	2	27	60	67	3	13	5	27	67	76	5	-13	1	28	166	163	2	2	4	28	27	35	11
-12	6	26	48	54	7	-2	2	27	220	221	2	15	5	27	56	61	11	-11	1	28	80	79	2	4	4	28	133	138	3
-10	6	26	174	177	3	0	2	27	52	44	3	17	5	27	36	50	10	-9	1	28	104	105	4	6	4	28	4	36	4
-8	6	26	35	28	8	2	2	27	292	287	4	19	5	27	69	84	8	-7	1	28	21	11	13	8	4	28	90	97	3
10	4	28	60	58	6	9	1	29	22	26	15	-13	5	29	21	16	21	1	1	30	40	39	8	-13	5	30	188	189	4
12	4	28	70	70	5	11	1	29	426	405	3	-11	5	29	111	111	3	3	1	30	18	3	14	-11	5	30	33	37	30
14	4	28	11	8	10	13	1	29	37	35	10	-9	5	29	0	13	1	5	1	30	88	95	6	-9	5	30	145	143	4
16	4	28	90	88	4	15	1	29	344	320	3	-7	5	29	110	112	4	7	1	30	20	20	20	-7	5	30	0	14	1

h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s
18	4	28	43	43	11	17	1	29	75	78	5	-5	5	29	12	13	12	9	1	30	20	20	19	-5	5	30	103	102	4
20	4	28	62	64	8	19	1	29	295	281	4	-3	5	29	79	79	4	11	1	30	34	28	9	-3	5	30	37	27	15
-25	5	28	65	58	38	21	1	29	108	99	4	-1	5	29	48	41	6	13	1	30	89	80	5	-1	5	30	13	19	13
-23	5	28	29	50	28	-30	2	29	58	44	12	1	5	29	114	120	5	15	1	30	93	97	6	1	5	30	7	10	7
-21	5	28	115	119	6	-28	2	29	152	149	5	3	5	29	9	10	9	17	1	30	62	63	13	3	5	30	51	59	7
-19	5	28	61	73	9	-26	2	29	27	32	26	5	5	29	59	64	5	19	1	30	72	75	6	5	5	30	24	8	23
-17	5	28	168	166	4	-24	2	29	161	164	8	7	5	29	69	75	6	21	1	30	15	20	15	7	5	30	64	73	8
-15	5	28	62	64	8	-22	2	29	19	30	18	9	5	29	36	37	16	-28	2	30	0	32	1	9	5	30	31	49	30
-13	5	28	221	222	3	-20	2	29	249	244	3	11	5	29	112	115	4	-26	2	30	9	9	9	11	5	30	139	147	7
-11	5	28	65	60	5	-18	2	29	156	153	5	13	5	29	60	48	14	-24	2	30	101	105	4	13	5	30	38	37	22
-9	5	28	345	332	6	-16	2	29	331	311	3	15	5	29	0	47	1	-22	2	30	15	20	15	15	5	30	194	192	4
-7	5	28	36	34	12	-14	2	29	248	233	3	-22	6	29	0	35	1	-20	2	30	215	214	3	-20	6	30	57	75	15
-5	5	28	415	394	3	-12	2	29	233	230	2	-20	6	29	184	196	5	-18	2	30	26	1	18	-18	6	30	76	88	11
-3	5	28	0	37	1	-10	2	29	128	125	3	-18	6	29	35	46	19	-16	2	30	244	241	3	-16	6	30	124	130	9
-1	5	28	376	360	3	-8	2	29	168	167	9	-16	6	29	216	210	5	-14	2	30	36	30	9	-14	6	30	106	113	7
1	5	28	76	78	5	-6	2	29	147	148	6	-14	6	29	88	100	6	-12	2	30	247	240	2	-12	6	30	67	79	6
3	5	28	291	282	6	-4	2	29	173	170	3	-12	6	29	214	219	4	-10	2	30	52	51	7	-10	6	30	119	118	6
5	5	28	72	66	14	-2	2	29	214	212	3	-10	6	29	133	131	5	-8	2	30	263	249	3	-8	6	30	51	51	9
7	5	28	280	271	3	0	2	29	147	145	2	-8	6	29	172	176	3	-6	2	30	32	37	11	-6	6	30	71	77	16
9	5	28	75	77	9	2	2	29	131	129	2	-6	6	29	126	132	5	-4	2	30	321	306	3	-4	6	30	90	103	4
11	5	28	250	248	4	4	2	29	167	167	2	-4	6	29	128	130	4	-2	2	30	128	137	3	-2	6	30	69	80	5
13	5	28	88	98	5	6	2	29	128	127	2	-2	6	29	177	173	4	0	2	30	272	260	2	0	6	30	119	123	3
15	5	28	225	220	3	8	2	29	153	149	2	0	6	29	62	64	10	2	2	30	187	182	2	2	6	30	79	76	13
17	5	28	103	107	6	10	2	29	133	128	3	2	6	29	198	197	4	4	2	30	251	239	4	4	6	30	145	152	4
-22	6	28	50	55	31	12	2	29	97	95	7	4	6	29	58	63	13	6	2	30	192	190	5	6	6	30	76	78	7
-20	6	28	183	188	11	14	2	29	0	18	1	6	6	29	134	145	10	8	2	30	210	201	2	8	6	30	198	195	4
-18	6	28	66	87	9	16	2	29	75	83	7	8	6	29	0	29	1	10	2	30	197	187	3	10	6	30	118	107	6
-16	6	28	93	100	6	18	2	29	73	68	6	10	6	29	56	67	8	12	2	30	134	131	4	-13	7	30	103	116	8
-14	6	28	83	82	6	20	2	29	0	8	1	12	6	29	0	20	1	14	2	30	201	186	5	-11	7	30	20	36	19
-12	6	28	78	81	5	-29	3	29	81	73	11	-17	7	29	9	10	8	16	2	30	70	75	8	-9	7	30	57	70	19
-10	6	28	23	33	23	-27	3	29	33	1	29	-15	7	29	93	82	12	18	2	30	128	122	4	-7	7	30	53	55	7
-8	6	28	159	162	4	-25	3	29	74	76	7	-13	7	29	21	44	21	20	2	30	108	113	5	-5	7	30	12	17	11
-6	6	28	5	9	5	-23	3	29	49	51	8	-11	7	29	95	105	5	-27	3	30	132	135	5	-3	7	30	88	99	12
-4	6	28	106	121	7	-21	3	29	0	26	1	-9	7	29	20	37	19	-25	3	30	186	183	5	-1	7	30	30	47	19
-2	6	28	38	51	13	-19	3	29	52	69	8	-7	7	29	82	90	6	-23	3	30	163	157	4	1	7	30	159	161	8
0	6	28	111	105	3	-17	3	29	7	11	7	-5	7	29	76	73	5	-21	3	30	224	221	3	3	7	30	20	47	20
2	6	28	48	56	6	-15	3	29	140	142	4	-3	7	29	34	31	17	-19	3	30	159	161	3	5	7	30	124	123	5
4	6	28	117	116	5	-13	3	29	0	3	1	-1	7	29	144	136	5	-17	3	30	277	267	3	-29	1	31	147	141	6
6	6	28	33	53	18	-11	3	29	123	121	3	1	7	29	42	27	16	-15	3	30	74	69	6	-27	1	31	209	208	4
8	6	28	37	45	11	-9	3	29	33	47	9	3	7	29	145	151	4	-13	3	30	187	184	3	-25	1	31	205	203	6
10	6	28	109	118	4	-7	3	29	97	96	3	5	7	29	0	32	1	-11	3	30	83	84	3	-23	1	31	202	197	3
12	6	28	25	22	25	-5	3	29	12	13	12	7	7	29	208	215	4	-9	3	30	171	164	3	-21	1	31	213	198	3
14	6	28	143	140	4	-3	3	29	70	70	5	-30	0	30	53	78	45	-7	3	30	50	64	19	-19	1	31	242	226	3
-17	7	28	17	48	17	-1	3	29	85	86	5	-28	0	30	127	131	10	-5	3	30	172	169	3	-17	1	31	237	228	3
-15	7	28	113	116	10	1	3	29	81	90	5	-26	0	30	18	6	17	-3	3	30	22	10	21	-15	1	31	209	197	3
-13	7	28	87	107	5	3	3	29	188	185	4	-24	0	30	122	131	18	-1	3	30	12	3	12	-13	1	31	316	302	3
-11	7	28	36	57	18	5	3	29	65	76	5	-22	0	30	23	21	23	1	3	30	37	43	11	-11	1	31	146	148	3
-9	7	28	136	148	4	7	3	29	190	186	2	-20	0	30	103	114	9	3	3	30	93	101	5	-9	1	31	313	296	4
-7	7	28	44	47	11	9	3	29	16	3	15	-18	0	30	62	79	6	5	3	30	44	46	10	-7	1	31	202	199	5
-5	7	28	127	127	6	11	3	29	198	189	3	-16	0	30	226	215	3	7	3	30	71	75	4	-5	1	31	321	305	3
-3	7	28	31	35	31	13	3	29	70	75	6	-14	0	30	70	73	5	9	3	30	22	12	22	-3	1	31	78	84	3
-1	7	28	123	121	4	15	3	29	151	149	3	-12	0	30	271	267	5	11	3	30	139	144	4	-1	1	31	290	275	4
1	7	28	9	2	8	17	3	29	49	46	8	-10	0	30	210	206	5	13	3	30	34	39	12	1	1	31	11	12	10
3	7	28	163	172	5	19	3	29	148	145	12	-8	0	30	505	473	6	15	3	30	200	186	3	3	1	31	220	213	2
5	7	28	61	67	7	-26	4	29	123	118	6	-6	0	30	254	239	4	17	3	30	24	28	24	5	1	31	53	50	7
7	7	28	165	170	4	-24	4	29	228	227	7	-4	0	30	592	550	13	19	3	30	172	165	13	7	1	31	134	136	3
9	7	28	86	71	10	-22	4	29	111	111	5	-2	0	30	317	298	8	-26	4	30	111	109	6	9	1	31	44	38	6
-10	8	28	67	73	8	-20	4	29	301	294	5	0	0	30	368	348	8	-24	4	30	54	51	9	11	1	31	16	43	16
-8	8	28	84	94	8	-18	4	29	176	177	3	2	0	30	277	265	3	-22	4	30	80	98	6	13	1	31	10	16	9
-6	8	28	54	83	11	-16	4	29	316	297	3	4	0	30	291	275	2	-20	4	30	64	70	7	15	1	31	0	20	1
-4	8	28	15	34	15	-14	4	29	176	164	3	6	0	30	202	198	3	-18	4	30	43	24	9	17	1	31	25	11	24
-2	8	28	30	41	30	-12	4	29	340	324	3	8	0	30	351	333	5	-16	4	30	77	93	5	19	1	31	44	40	10
0	8	28	17	7	17	-10	4	29	170	172	3	10	0	30	168	166	5	-14	4	30	47	52	17	-28	2	31	85	100	7
2	8	28	0	22	1	-8	4	29	402	381	6	12	0	30	278	262	11	-12	4	30	84	91	6	-26	2	31	21	10	21
-29	1	29	190	186	6	-6	4	29	302	284	3	14	0	30	149	144	9	-10	4	30	17	46	17	-24	2	31	55	59	10
-27	1	29	20	34	20	-4	4	29	341	328	9	16	0	30	168	153	6	-8	4	30	32	13	22	-22	2	31	21	8	20
-25	1	29	155	153	6	-2	4	29	284	269	4	18	0	30	135	134	5	-6	4	30	9	3	9	-20	2	31	71	77	7
-23	1	29	68	62	5	0	4	29	216	217	6	20	0	30	119	117	6	-4	4	30	34	8	12	-18	2	31	0	7	1
-21	1	29	174	162	3	2	4	29	83	85	4	-29	1	30	31	64	30	-2	4	30	0	15	1	-16	2	31	16	30	15
-19	1	29	15	4	15	4	4	29	149	153	5	-27	1	30	88	92	8	0	4	30	85	90	5	-14	2	31	78	78	10
-17	1	29	93	98	4	6	4	29	72	88	4	-25	1	30	45	29	10	2	4	30	30	3	14	-12	2	31	86	89	4
-15	1	29	46	33	15	8	4	29	63	72	12	-23	1	30	109	104	7	4	4	30	64	76	13	-10	2	31	118	120	5
-13	1	29	41	53	6	10	4	29	109	118	6	-21	1	30	86	76	5	6	4	30	79	73	5	-8	2	31	56	61	5
-11	1	29	0	12	1	12	4	29	11	25	11	-19	1	30	87	86	4	8	4	30	33	14	32	-6	2	31	77	76	6
-9	1	29	148	150	4	14	4	29	55	53	6	-17	1	30	115	113	4	10	4	30	65	70	10	-4	2	31	127	129	4
-7	1	29	86	90	7	16	4	29	13	10	13	-15	1	30	70	75	6	12	4	30	0	11	1	-2	2	31	37	40	10
-5	1	29	303	305	4	18	4	29	0	3	1	-13	1	30	62	62	5	14	4	30	66	64	11	0	2	31	229	224	3
-3	1	29	90	94	3	-25	5	29	0	4	1	-11	1	30	62	66	5	16	4	30	15	24	14	2	2	31	45	43	15
-1	1	29	342	336	3	-23	5	29	146	142	7	-9	1	30	39	9	6	-23	5	30	84	97	11	4	2	31	222	217	2

h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s
1	1	29	15	8	15	-21	5	29	0	4	1	-7	1	30	61	67	9	-21	5	30	208	209	5	6	2	31	49	43	17
3	1	29	265	259	2	-19	5	29	56	60	9	-5	1	30	2	6	1	-19	5	30	108	111	6	8	2	31	199	187	3
5	1	29	41	38	5	-17	5	29	0	25	1	-3	1	30	18	4	18	-17	5	30	236	236	4	10	2	31	155	144	3
7	1	29	331	318	2	-15	5	29	18	20	17	-1	1	30	0	11	1	-15	5	30	65	74	7	12	2	31	176	169	3
14	2	31	176	170	4	-28	0	32	314	302	10	9	3	32	111	113	5	2	2	33	0	4	1	8	0	34	331	314	8
16	2	31	143	142	8	-26	0	32	112	99	14	11	3	32	256	244	3	4	2	33	62	62	3	10	0	34	0	16	1
18	2	31	75	74	5	-24	0	32	285	271	7	13	3	32	94	93	5	6	2	33	31	10	11	12	0	34	270	256	9
-27	3	31	59	75	10	-22	0	32	54	92	53	15	3	32	170	163	9	8	2	33	89	87	5	14	0	34	82	68	9
-25	3	31	51	59	11	-20	0	32	271	254	7	-22	4	32	61	62	10	10	2	33	29	24	29	16	0	34	184	172	10
-23	3	31	147	148	6	-18	0	32	55	30	15	-20	4	32	27	32	26	12	2	33	26	35	17	-25	1	34	32	15	31
-21	3	31	161	160	4	-16	0	32	279	271	4	-18	4	32	69	66	6	14	2	33	114	110	10	-23	1	34	75	73	8
-19	3	31	195	187	3	-14	0	32	84	92	10	-16	4	32	41	26	12	16	2	33	0	31	1	-21	1	34	31	38	31
-17	3	31	184	191	4	-12	0	32	214	204	3	-14	4	32	61	50	7	-23	3	33	0	15	1	-19	1	34	27	42	26
-15	3	31	163	164	5	-10	0	32	34	25	12	-12	4	32	51	49	7	-21	3	33	76	80	9	-17	1	34	52	58	7
-13	3	31	133	139	3	-8	0	32	75	73	10	-10	4	32	96	96	4	-19	3	33	45	48	10	-15	1	34	0	13	1
-11	3	31	93	92	6	-6	0	32	0	11	1	-8	4	32	39	12	28	-17	3	33	35	15	16	-13	1	34	38	40	9
-9	3	31	100	103	4	-4	0	32	28	25	28	-6	4	32	95	93	4	-15	3	33	59	80	8	-11	1	34	84	86	5
-7	3	31	41	53	25	-2	0	32	49	37	7	-4	4	32	0	3	1	-13	3	33	25	13	25	-9	1	34	28	20	14
-5	3	31	132	140	3	0	0	32	28	22	17	-2	4	32	107	97	5	-11	3	33	82	81	5	-7	1	34	139	139	4
-3	3	31	71	84	5	2	0	32	28	8	24	0	4	32	28	21	16	-9	3	33	35	23	10	-5	1	34	0	6	1
-1	3	31	144	145	4	4	0	32	0	24	1	2	4	32	124	119	5	-7	3	33	53	59	7	-3	1	34	56	50	6
1	3	31	61	62	5	6	0	32	0	32	1	4	4	32	52	59	21	-5	3	33	0	14	1	-1	1	34	0	13	1
3	3	31	118	112	10	8	0	32	110	112	6	6	4	32	138	130	11	-3	3	33	75	71	5	1	1	34	57	56	4
5	3	31	18	43	17	10	0	32	16	20	15	8	4	32	60	59	8	-1	3	33	49	70	21	3	1	34	13	15	13
7	3	31	47	52	6	12	0	32	216	210	6	10	4	32	70	58	12	1	3	33	153	144	9	5	1	34	32	23	12
9	3	31	80	79	5	14	0	32	88	92	7	12	4	32	2	8	1	3	3	33	134	142	4	7	1	34	15	20	14
11	3	31	43	42	7	16	0	32	219	206	5	14	4	32	33	15	33	5	3	33	169	167	6	9	1	34	35	26	13
13	3	31	68	66	5	18	0	32	177	164	6	-21	5	32	67	73	17	7	3	33	166	161	4	11	1	34	85	85	5
15	3	31	21	20	21	-27	1	32	57	53	16	-19	5	32	117	133	5	9	3	33	128	128	8	13	1	34	0	8	1
17	3	31	49	46	20	-25	1	32	0	8	1	-17	5	32	85	85	9	11	3	33	114	116	5	15	1	34	129	124	5
-24	4	31	75	78	6	-23	1	32	70	71	7	-15	5	32	215	213	4	13	3	33	53	61	6	-24	2	34	88	99	6
-22	4	31	0	30	1	-21	1	32	0	12	1	-13	5	32	139	138	12	15	3	33	61	73	15	-22	2	34	108	99	5
-20	4	31	92	82	4	-19	1	32	88	90	6	-11	5	32	258	247	3	-22	4	33	78	78	8	-20	2	34	132	140	4
-18	4	31	0	16	1	-17	1	32	83	85	9	-9	5	32	171	175	4	-20	4	33	293	285	4	-18	2	34	130	129	7
-16	4	31	19	13	19	-15	1	32	76	73	8	-7	5	32	237	227	4	-18	4	33	115	122	4	-16	2	34	204	200	4
-14	4	31	47	56	9	-13	1	32	180	171	4	-5	5	32	239	225	4	-16	4	33	388	367	4	-14	2	34	114	112	4
-12	4	31	102	104	5	-11	1	32	40	46	7	-3	5	32	180	172	4	-14	4	33	133	129	5	-12	2	34	228	219	4
-10	4	31	34	35	34	-9	1	32	158	158	3	-1	5	32	280	266	5	-12	4	33	340	328	4	-10	2	34	115	116	3
-8	4	31	88	100	6	-7	1	32	53	51	10	1	5	32	134	136	5	-10	4	33	75	71	5	-8	2	34	233	222	3
-6	4	31	44	23	10	-5	1	32	162	159	3	3	5	32	285	274	4	-8	4	33	261	249	7	-6	2	34	80	82	5
-4	4	31	135	147	4	-3	1	32	133	126	2	5	5	32	98	118	8	-6	4	33	28	8	28	-4	2	34	253	246	4
-2	4	31	153	149	3	-1	1	32	123	122	5	7	5	32	247	225	8	-4	4	33	259	250	4	-2	2	34	0	21	1
0	4	31	243	235	5	1	1	32	145	136	2	9	5	32	93	103	9	-2	4	33	0	22	1	0	2	34	302	291	4
2	4	31	209	207	4	3	1	32	95	97	6	11	5	32	194	200	5	0	4	33	203	198	6	2	2	34	33	19	32
4	4	31	267	258	6	5	1	32	126	119	2	-16	6	32	109	104	11	2	4	33	0	1	1	4	2	34	299	279	4
6	4	31	143	138	4	7	1	32	110	111	4	-14	6	32	55	57	9	4	4	33	123	126	4	6	2	34	30	43	10
8	4	31	282	260	5	9	1	32	57	70	5	-12	6	32	59	55	12	6	4	33	0	7	1	8	2	34	245	234	3
10	4	31	150	142	4	11	1	32	105	101	4	-10	6	32	125	125	6	8	4	33	75	93	22	10	2	34	0	11	1
12	4	31	288	267	4	13	1	32	52	56	8	-8	6	32	63	57	10	10	4	33	0	16	1	12	2	34	150	154	5
14	4	31	191	189	5	15	1	32	38	53	12	-6	6	32	110	114	5	12	4	33	23	47	23	14	2	34	27	10	26
16	4	31	241	235	4	17	1	32	39	40	38	-4	6	32	45	45	19	-19	5	33	81	75	8	-23	3	34	190	188	7
-21	5	31	66	75	9	-26	2	32	27	13	26	-2	6	32	36	52	36	-17	5	33	54	45	10	-21	3	34	68	43	16
-19	5	31	76	86	8	-24	2	32	212	208	4	0	6	32	21	7	20	-15	5	33	0	54	1	-19	3	34	232	223	5
-17	5	31	84	88	5	-22	2	32	31	8	30	2	6	32	86	76	14	-13	5	33	105	106	9	-17	3	34	48	55	8
-15	5	31	21	40	20	-20	2	32	248	248	5	4	6	32	24	41	24	-11	5	33	51	61	7	-15	3	34	172	174	3
-13	5	31	33	34	18	-18	2	32	38	4	22	6	6	32	111	115	19	-9	5	33	110	116	9	-13	3	34	28	31	17
-11	5	31	20	46	19	-16	2	32	201	192	4	-25	1	33	0	14	1	-7	5	33	52	51	10	-11	3	34	77	82	9
-9	5	31	41	8	12	-14	2	32	59	45	7	-23	1	33	58	68	9	-5	5	33	43	62	10	-9	3	34	31	21	31
-7	5	31	120	120	4	-12	2	32	111	109	3	-21	1	33	0	32	1	-3	5	33	32	36	21	-7	3	34	79	82	7
-5	5	31	6	13	6	-10	2	32	43	43	7	-19	1	33	18	2	17	-1	5	33	86	84	11	-5	3	34	45	44	9
-3	5	31	128	125	5	-8	2	32	72	78	6	-17	1	33	83	80	6	1	5	33	38	20	38	-3	3	34	22	18	22
-1	5	31	12	23	11	-6	2	32	32	25	11	-15	1	33	79	81	10	3	5	33	129	136	9	-1	3	34	35	34	11
1	5	31	106	107	5	-4	2	32	48	64	7	-13	1	33	33	8	11	5	5	33	0	8	1	1	3	34	66	71	7
3	5	31	47	11	8	-2	2	32	62	71	6	-11	1	33	130	140	3	7	5	33	124	130	6	3	3	34	89	93	4
5	5	31	143	148	13	0	2	32	54	53	6	-9	1	33	127	128	5	9	5	33	70	67	10	5	3	34	87	95	8
7	5	31	0	10	1	2	2	32	23	27	20	-7	1	33	185	192	4	-14	6	33	36	12	35	7	3	34	95	95	5
9	5	31	96	95	11	4	2	32	119	123	3	-5	1	33	155	153	3	-12	6	33	205	195	7	9	3	34	95	98	7
11	5	31	34	4	21	6	2	32	18	20	18	-3	1	33	232	230	5	-10	6	33	0	7	1	11	3	34	139	137	4
13	5	31	39	42	17	8	2	32	197	193	5	-1	1	33	198	189	3	-8	6	33	215	217	6	13	3	34	113	119	3
-18	6	31	80	80	8	10	2	32	59	72	5	1	1	33	178	178	2	-6	6	33	0	8	1	-20	4	34	0	30	1
-16	6	31	0	4	1	12	2	32	186	184	4	3	1	33	218	213	3	-4	6	33	161	159	5	-18	4	34	86	84	11
-14	6	31	48	62	12	14	2	32	30	39	18	5	1	33	176	169	2	-2	6	33	0	22	1	-16	4	34	51	49	11
-12	6	31	65	63	13	16	2	32	159	152	4	7	1	33	253	243	2	0	6	33	136	137	8	-14	4	34	72	85	8
-10	6	31	0	39	1	18	2	32	63	67	12	9	1	33	221	210	3	2	6	33	22	50	22	-12	4	34	0	11	1
-8	6	31	151	156	5	-25	3	32	65	71	8	11	1	33	295	281	4	4	6	33	100	108	14	-10	4	34	66	61	6
-6	6	31	0	13	1	-23	3	32	65	77	10	13	1	33	173	166	4	-24	0	34	131	144	8	-8	4	34	4	34	3
-4	6	31	182	183	9	-21	3	32	85	108	7	15	1	33	288	275	9	-22	0	34	93	88	14	-6	4	34	20	6	19
-2	6	31	0	9	1	-19	3	32	128	131	9	17	1	33	114	106	8	-20	0	34	104	117	9	-4	4	34	45	55	8
0	6	31	189	192	6	-17	3	32	162	164	4	-24	2	33	169	174	4	-18	0	34	162	169	7	-2	4	34	31	22	30

h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s	h	k	l	Fo	Fc	s
2	6	31	20	12	19	-15	3	32	236	226	6	-22	2	33	69	68	6	-16	0	34	199	200	6	0	4	34	52	53	8
4	6	31	177	178	8	-13	3	32	226	212	5	-20	2	33	188	185	3	-14	0	34	114	120	6	2	4	34	16	6	16
6	6	31	62	63	7	-11	3	32	190	186	3	-18	2	33	50	50	8	-12	0	34	345	331	6	4	4	34	6	15	5
8	6	31	176	173	11	-9	3	32	181	173	5	-16	2	33	255	240	3	-10	0	34	123	121	3	6	4	34	59	39	38
-11	7	31	73	96	25	-7	3	32	155	155	3	-14	2	33	25	13	24	-8	0	34	460	435	15	8	4	34	26	17	26
-9	7	31	166	172	7	-5	3	32	228	226	3	-12	2	33	220	209	3	-6	0	34	207	199	3	10	4	34	11	40	10
-7	7	31	101	113	9	-3	3	32	162	164	3	-10	2	33	14	22	14	-4	0	34	443	411	5	-17	5	34	81	86	11
-5	7	31	149	156	5	-1	3	32	318	302	4	-8	2	33	218	212	3	-2	0	34	137	139	6	-15	5	34	121	131	7
-3	7	31	113	114	8	1	3	32	176	168	4	-6	2	33	36	45	9	0	0	34	370	346	4	-13	5	34	99	103	5
-1	7	31	114	129	5	3	3	32	280	258	6	-4	2	33	248	244	3	2	0	34	23	32	23	-11	5	34	39	52	11
1	7	31	82	93	8	5	3	32	137	135	6	-2	2	33	0	20	1	4	0	34	297	282	4	-9	5	34	49	65	10
3	7	31	84	99	10	7	3	32	258	238	3	0	2	33	138	138	3	6	0	34	42	25	10	-7	5	34	20	2	19
-5	5	34	30	21	30	-1	3	35	133	137	7	-1	1	36	22	32	22	-11	1	37	200	202	3	-17	1	38	14	17	14
-3	5	34	34	50	25	1	3	35	24	30	24	1	1	36	146	131	4	-9	1	37	20	18	20	-15	1	38	49	42	29
-1	5	34	42	51	11	3	3	35	124	124	4	3	1	36	16	6	16	-7	1	37	206	208	5	-13	1	38	32	15	32
1	5	34	42	61	13	5	3	35	15	31	14	5	1	36	34	36	12	-5	1	37	4	46	3	-11	1	38	66	72	6
3	5	34	22	55	22	7	3	35	38	39	17	7	1	36	46	51	7	-3	1	37	234	228	5	-9	1	38	7	27	6
5	5	34	91	102	7	9	3	35	0	12	1	9	1	36	57	44	11	-1	1	37	30	17	26	-7	1	38	58	60	7
7	5	34	0	47	1	11	3	35	30	10	21	11	1	36	30	46	14	1	1	37	284	271	4	-5	1	38	58	52	7
-8	6	34	72	85	19	-18	4	35	42	11	15	-20	2	36	95	106	7	3	1	37	43	48	14	-3	1	38	15	6	15
-6	6	34	46	31	19	-16	4	35	49	36	10	-18	2	36	114	117	7	5	1	37	291	284	4	-1	1	38	10	8	10
-4	6	34	127	131	7	-14	4	35	80	78	8	-16	2	36	70	78	6	7	1	37	31	53	31	1	1	38	95	98	5
-2	6	34	30	32	29	-12	4	35	113	113	4	-14	2	36	62	65	7	9	1	37	275	271	4	3	1	38	19	19	18
-23	1	35	271	256	6	-10	4	35	106	110	4	-12	2	36	0	30	1	-18	2	37	166	168	4	5	1	38	91	93	6
-21	1	35	0	7	1	-8	4	35	135	138	6	-10	2	36	0	19	1	-16	2	37	79	83	7	7	1	38	26	27	26
-19	1	35	305	283	4	-6	4	35	92	100	7	-8	2	36	9	37	8	-14	2	37	168	164	4	-16	2	38	65	36	9
-17	1	35	30	45	30	-4	4	35	189	194	4	-6	2	36	60	64	6	-12	2	37	113	106	8	-14	2	38	199	192	6
-15	1	35	310	289	4	-2	4	35	83	90	6	-4	2	36	0	35	1	-10	2	37	159	159	4	-12	2	38	122	110	7
-13	1	35	115	116	3	0	4	35	273	269	8	-2	2	36	117	109	4	-8	2	37	116	110	9	-10	2	38	207	196	4
-11	1	35	283	267	3	2	4	35	55	70	28	0	2	36	15	26	14	-6	2	37	201	198	4	-8	2	38	127	131	5
-9	1	35	76	71	7	4	4	35	269	255	5	2	2	36	103	86	6	-4	2	37	138	129	4	-6	2	38	203	197	4
-7	1	35	305	292	3	6	4	35	124	128	6	4	2	36	94	100	4	-2	2	37	120	124	5	-4	2	38	134	131	5
-5	1	35	59	62	7	8	4	35	297	274	5	6	2	36	54	50	13	0	2	37	33	53	16	-2	2	38	185	169	6
-3	1	35	233	222	4	-13	5	35	0	27	1	8	2	36	143	143	4	2	2	37	31	11	18	0	2	38	178	166	5
-1	1	35	92	86	15	-11	5	35	29	36	28	10	2	36	70	80	5	4	2	37	42	27	41	2	2	38	125	128	6
1	1	35	123	119	3	-9	5	35	91	71	7	-19	3	36	175	173	7	6	2	37	40	9	40	4	2	38	114	122	9
3	1	35	20	24	20	-7	5	35	25	36	24	-17	3	36	0	29	1	8	2	37	35	26	17	-13	3	38	31	20	31
5	1	35	93	93	3	-5	5	35	0	47	1	-15	3	36	278	270	6	-17	3	37	41	47	40	-11	3	38	0	13	1
7	1	35	0	6	1	-3	5	35	40	57	19	-13	3	36	44	3	10	-15	3	37	64	67	13	-9	3	38	0	11	1
9	1	35	23	29	23	-1	5	35	49	24	49	-11	3	36	283	259	3	-13	3	37	44	37	10	-7	3	38	25	6	25
11	1	35	32	36	13	1	5	35	76	69	13	-9	3	36	23	25	23	-11	3	37	95	105	6	-5	3	38	34	13	33
13	1	35	54	55	15	3	5	35	15	24	15	-7	3	36	258	248	4	-9	3	37	37	45	17	-3	3	38	37	43	22
-22	2	35	32	19	31	-22	0	36	122	139	12	-5	3	36	37	36	37	-7	3	37	125	126	6	-1	3	38	23	29	23
-20	2	35	18	17	17	-20	0	36	104	106	9	-3	3	36	311	295	4	-5	3	37	68	75	14	1	3	38	116	122	6
-18	2	35	0	30	1	-18	0	36	66	87	28	-1	3	36	79	73	11	-3	3	37	161	170	4	-13	1	39	96	101	33
-16	2	35	59	74	9	-16	0	36	250	220	8	1	3	36	230	230	5	-1	3	37	52	55	11	-11	1	39	245	215	7
-14	2	35	63	66	6	-14	0	36	37	19	25	3	3	36	33	53	33	1	3	37	138	141	6	-9	1	39	0	46	1
-12	2	35	95	104	6	-12	0	36	125	122	10	5	3	36	202	193	4	3	3	37	41	42	17	-7	1	39	141	147	5
-10	2	35	12	19	12	-10	0	36	0	17	1	7	3	36	52	13	21	5	3	37	132	138	5	-5	1	39	52	48	9
-8	2	35	23	56	23	-8	0	36	0	11	1	9	3	36	251	223	6	-12	4	37	147	130	5	-3	1	39	126	120	6
-6	2	35	10	13	10	-6	0	36	73	59	7	-16	4	36	0	17	1	-10	4	37	133	128	5	-1	1	39	0	20	1
-4	2	35	112	117	4	-4	0	36	22	20	21	-14	4	36	55	54	9	-8	4	37	82	92	13	1	1	39	79	72	15
-2	2	35	80	84	6	-2	0	36	0	21	1	-12	4	36	30	40	30	-6	4	37	94	96	10	3	1	39	37	22	36
0	2	35	217	207	9	0	0	36	85	91	5	-10	4	36	38	50	15	-4	4	37	90	86	7	-12	2	39	15	28	15
2	2	35	81	78	7	2	0	36	59	40	8	-8	4	36	74	71	14	-2	4	37	99	94	6	-10	2	39	78	84	6
4	2	35	176	172	9	4	0	36	193	196	14	-6	4	36	90	74	6	0	4	37	95	89	6	-8	2	39	49	36	9
6	2	35	0	16	1	6	0	36	35	44	34	-4	4	36	26	40	26	2	4	37	0	42	1	-6	2	39	73	94	13
8	2	35	165	158	3	8	0	36	163	170	4	-2	4	36	77	76	8	-18	0	38	293	285	11	-4	2	39	67	76	13
10	2	35	0	7	1	10	0	36	137	139	5	0	4	36	29	30	29	-16	0	38	48	52	47	-2	2	39	170	159	12
12	2	35	238	226	4	12	0	36	230	223	13	2	4	36	111	113	7	-14	0	38	350	327	11	0	2	39	80	75	15
-21	3	35	12	17	12	-21	1	36	22	8	22	4	4	36	0	10	1	-12	0	38	168	156	9	-10	0	40	0	18	1
-19	3	35	144	155	4	-19	1	36	103	98	17	-9	5	36	29	1	29	-10	0	38	326	305	10	-8	0	40	44	29	43
-17	3	35	0	4	1	-17	1	36	2	11	1	-7	5	36	224	212	5	-8	0	38	147	145	10	-9	1	40	80	83	24
-15	3	35	141	151	4	-15	1	36	125	126	4	-5	5	36	0	18	1	-6	0	38	287	272	12	-7	1	40	64	64	15
-13	3	35	0	19	1	-13	1	36	34	4	12	-3	5	36	244	232	6	-4	0	38	94	104	11	-5	1	40	56	55	15
-11	3	35	130	131	10	-11	1	36	112	110	5	-1	5	36	77	74	9	-2	0	38	294	267	5	-3	1	40	109	98	7
-9	3	35	0	27	1	-9	1	36	17	4	17	-19	1	37	34	31	34	0	0	38	131	124	5						
-7	3	35	85	98	5	-7	1	36	120	126	4	-17	1	37	73	74	10	2	0	38	275	254	5						
-5	3	35	104	110	13	-5	1	36	10	28	10	-15	1	37	80	90	8	4	0	38	163	162	5						
-3	3	35	49	61	11	-3	1	36	201	192	4	-13	1	37	74	71	5	6	0	38	189	180	4						

APPENDIX F

CRYSTALLOGRAPHIC DATA FOR $(C_5Me_5)Ta(hpp)Cl_2$

Identification code	mes1022	
Empirical formula	C17 H27 Cl2 N3 Ta	
Formula weight	525.27	
Temperature	190(2) K	
Wavelength	0.71073 Å	
Crystal system	Triclinic	
Space group	P1	
Unit cell dimensions	a = 8.7191(10) Å	α= 83.847(5)°.
	b = 9.2140(10) Å	β= 73.764(5)°.
	c = 13.0122(14) Å	γ = 71.654(5)°.
Volume	952.46(18) $Å^3$	
Z	2	
Density (calculated)	1.832 Mg/m^3	
Absorption coefficient	6.053 mm^{-1}	
F(000)	514	
Crystal size	0.12 x 0.07 x 0.03 mm^3	
Theta range for data collection	1.63 to 27.91°.	
Index ranges	-11<=h<=11, -12<=k<=12, -17<=l<=16	
Reflections collected	8387	
Independent reflections	8387 [R(int) = 0.0000]	
Completeness to theta = 27.91°	99.4 %	
Max. and min. transmission	0.8393 and 0.5303	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	8387 / 3 / 341	
Goodness-of-fit on F^2	1.099	
Final R indices [I>2sigma(I)]	R1 = 0.0416, wR2 = 0.1070	
R indices (all data)	R1 = 0.0634, wR2 = 0.1478	
Absolute structure parameter	0.50(3)	
Largest diff. peak and hole	2.610 and -2.591 $e.Å^{-3}$	

Atomic coordinates (x 10^4) and equivalent isotropic displacement parameters ($Å^2$x 10^3) for mes1022. U(eq) is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	U(eq)
Ta(1)	3088(1)	8217(1)	3030(1)	24(1)
Cl(1)	2522(15)	5820(11)	3558(8)	38(2)
N(1)	5180(30)	8560(30)	1870(20)	26(5)
C(1)	6250(30)	7520(30)	2342(19)	16(5)
Ta(2)	227(1)	3724(1)	8304(1)	25(1)
Cl(2)	1914(13)	8278(13)	1536(8)	41(3)
C(2)	6500(20)	6010(20)	3862(13)	39(4)
N(2)	5520(30)	7040(30)	3220(20)	19(4)
Cl(3)	786(16)	6167(13)	7807(8)	39(3)
C(3)	8247(16)	5705(16)	3506(11)	27(3)
N(3)	7960(40)	7010(30)	1800(20)	28(7)
Cl(4)	1455(14)	3616(11)	9773(7)	38(2)
C(4)	9030(40)	5860(40)	2430(30)	69(11)
C(5)	8520(40)	7570(30)	750(20)	26(6)
C(6)	7210(30)	8050(30)	130(20)	20(4)
C(7)	5580(40)	9190(30)	820(30)	28(7)
C(8)	2990(50)	10180(30)	3990(30)	25(7)
C(9)	1860(30)	10830(30)	3270(20)	14(4)
C(10)	540(30)	10260(40)	3660(30)	32(8)
C(11)	680(40)	9370(40)	4540(30)	29(8)
C(12)	2240(40)	9360(30)	4800(30)	45(8)
C(13)	4400(40)	10730(40)	4060(30)	41(7)
C(14)	2130(40)	12010(30)	2450(30)	54(11)
C(15)	-1020(20)	10870(20)	3298(16)	42(5)
C(16)	-640(50)	8640(40)	5250(30)	60(10)
C(17)	3070(50)	8500(40)	5660(20)	55(11)
N(21)	-1770(40)	3240(30)	9450(20)	30(8)
C(21)	-3040(40)	4310(30)	9100(20)	35(7)
N(22)	-2160(40)	4710(40)	8020(20)	40(7)
C(22)	-3073(18)	6313(18)	7584(12)	28(3)
N(23)	-4550(30)	4910(30)	9530(20)	31(7)

C(23)	-4810(30)	6750(30)	8017(17)	65(5)
C(24)	-5650(30)	6100(30)	9050(20)	34(6)
C(25)	-5260(50)	4250(50)	10620(30)	54(11)
C(26)	-3930(50)	3720(40)	11190(30)	66(10)
C(27)	-2390(50)	2760(40)	10610(30)	46(11)
C(28)	350(40)	1620(40)	7350(30)	29(7)
C(29)	1410(50)	1020(40)	7910(30)	46(8)
C(30)	2880(50)	1650(40)	7590(30)	27(9)
C(31)	2560(40)	2750(30)	6720(20)	31(7)
C(32)	1020(30)	2780(30)	6574(19)	15(4)
C(33)	-1300(40)	1320(40)	7480(30)	34(7)
C(34)	1280(40)	-80(30)	8890(20)	43(9)
C(35)	4380(20)	1440(20)	8052(14)	33(4)
C(36)	3690(30)	3580(30)	6140(30)	26(5)
C(37)	370(40)	3540(30)	5660(20)	33(6)

Bond lengths [Å] and angles [°] for mes1022.

Ta(1)-N(2)	2.13(3)
Ta(1)-N(1)	2.10(3)
Ta(1)-C(8)	2.28(3)
Ta(1)-C(9)	2.33(3)
Ta(1)-Cl(1)	2.400(10)
Ta(1)-Cl(2)	2.425(9)
Ta(1)-C(10)	2.42(3)
Ta(1)-C(12)	2.46(3)
Ta(1)-C(11)	2.47(3)
Ta(1)-C(1)	2.54(2)
N(1)-C(1)	1.35(3)
N(1)-C(7)	1.42(4)
C(1)-N(2)	1.25(4)
C(1)-N(3)	1.41(4)
Ta(2)-N(21)	2.08(3)
Ta(2)-N(22)	2.12(3)
Ta(2)-C(32)	2.34(2)
Ta(2)-C(28)	2.37(3)
Ta(2)-Cl(4)	2.419(9)
Ta(2)-C(29)	2.43(3)
Ta(2)-Cl(3)	2.434(11)
Ta(2)-C(31)	2.47(3)
Ta(2)-C(30)	2.50(4)
Ta(2)-C(21)	2.64(3)
C(2)-C(3)	1.41(2)
C(2)-N(2)	1.43(3)
C(2)-H(2A)	0.9500
C(3)-C(4)	1.39(4)
C(3)-H(3A)	0.9500
N(3)-C(5)	1.42(4)
N(3)-C(4)	1.51(4)
C(4)-H(4A)	0.9900
C(4)-H(4B)	0.9900
C(5)-C(6)	1.51(3)

C(5)-H(5A)	0.9900
C(5)-H(5B)	0.9900
C(6)-C(7)	1.58(4)
C(6)-H(6A)	0.9900
C(6)-H(6B)	0.9900
C(7)-H(7A)	0.9900
C(7)-H(7B)	0.9900
C(8)-C(12)	1.36(5)
C(8)-C(13)	1.49(5)
C(8)-C(9)	1.50(4)
C(9)-C(10)	1.37(4)
C(9)-C(14)	1.46(4)
C(10)-C(11)	1.34(5)
C(10)-C(15)	1.48(3)
C(11)-C(12)	1.49(4)
C(11)-C(16)	1.55(5)
C(12)-C(17)	1.51(5)
C(13)-H(13A)	0.9800
C(13)-H(13B)	0.9800
C(13)-H(13C)	0.9800
C(14)-H(14A)	0.9800
C(14)-H(14B)	0.9800
C(14)-H(14C)	0.9800
C(15)-H(15A)	0.9800
C(15)-H(15B)	0.9800
C(15)-H(15C)	0.9800
C(16)-H(16A)	0.9800
C(16)-H(16B)	0.9800
C(16)-H(16C)	0.9800
C(17)-H(17A)	0.9800
C(17)-H(17B)	0.9800
C(17)-H(17C)	0.9800
N(21)-C(21)	1.38(4)
N(21)-C(27)	1.53(4)
C(21)-N(23)	1.25(4)
C(21)-N(22)	1.48(4)

N(22)-C(22)	1.56(4)
C(22)-C(23)	1.40(3)
C(22)-H(22A)	0.9900
C(22)-H(22B)	0.9900
N(23)-C(24)	1.43(4)
N(23)-C(25)	1.53(4)
C(23)-C(24)	1.50(3)
C(23)-H(23A)	0.9500
C(24)-H(24A)	0.9500
C(25)-C(26)	1.47(5)
C(25)-H(25A)	0.9900
C(25)-H(25B)	0.9900
C(26)-C(27)	1.41(5)
C(26)-H(26A)	0.9900
C(26)-H(26B)	0.9900
C(27)-H(27A)	0.9900
C(27)-H(27B)	0.9900
C(28)-C(29)	1.28(5)
C(28)-C(33)	1.51(4)
C(28)-C(32)	1.52(4)
C(29)-C(30)	1.50(5)
C(29)-C(34)	1.55(4)
C(30)-C(31)	1.47(5)
C(30)-C(35)	1.54(4)
C(31)-C(32)	1.40(4)
C(31)-C(36)	1.44(4)
C(32)-C(37)	1.48(4)
C(33)-H(33A)	0.9800
C(33)-H(33B)	0.9800
C(33)-H(33C)	0.9800
C(34)-H(34A)	0.9800
C(34)-H(34B)	0.9800
C(34)-H(34C)	0.9800
C(35)-H(35A)	0.9800
C(35)-H(35B)	0.9800
C(35)-H(35C)	0.9800

C(36)-H(36A)	0.9800
C(36)-H(36B)	0.9800
C(36)-H(36C)	0.9800
C(37)-H(37A)	0.9800
C(37)-H(37B)	0.9800
C(37)-H(37C)	0.9800

N(2)-Ta(1)-N(1)	61.1(10)
N(2)-Ta(1)-C(8)	89.5(12)
N(1)-Ta(1)-C(8)	90.2(11)
N(2)-Ta(1)-C(9)	123.0(9)
N(1)-Ta(1)-C(9)	91.7(9)
C(8)-Ta(1)-C(9)	38.0(10)
N(2)-Ta(1)-Cl(1)	85.1(7)
N(1)-Ta(1)-Cl(1)	126.7(7)
C(8)-Ta(1)-Cl(1)	132.2(9)
C(9)-Ta(1)-Cl(1)	141.4(7)
N(2)-Ta(1)-Cl(2)	130.0(8)
N(1)-Ta(1)-Cl(2)	85.6(7)
C(8)-Ta(1)-Cl(2)	129.5(9)
C(9)-Ta(1)-Cl(2)	91.7(7)
Cl(1)-Ta(1)-Cl(2)	87.2(4)
N(2)-Ta(1)-C(10)	145.8(10)
N(1)-Ta(1)-C(10)	122.8(11)
C(8)-Ta(1)-C(10)	57.8(12)
C(9)-Ta(1)-C(10)	33.4(9)
Cl(1)-Ta(1)-C(10)	108.5(9)
Cl(2)-Ta(1)-C(10)	82.9(8)
N(2)-Ta(1)-C(12)	91.3(11)
N(1)-Ta(1)-C(12)	119.7(10)
C(8)-Ta(1)-C(12)	33.1(11)
C(9)-Ta(1)-C(12)	58.2(10)
Cl(1)-Ta(1)-C(12)	99.4(8)
Cl(2)-Ta(1)-C(12)	138.7(8)
C(10)-Ta(1)-C(12)	56.2(11)
N(2)-Ta(1)-C(11)	123.2(10)

N(1)-Ta(1)-C(11)	145.2(9)
C(8)-Ta(1)-C(11)	56.9(12)
C(9)-Ta(1)-C(11)	55.8(10)
Cl(1)-Ta(1)-C(11)	87.3(8)
Cl(2)-Ta(1)-C(11)	105.6(8)
C(10)-Ta(1)-C(11)	31.9(11)
C(12)-Ta(1)-C(11)	35.2(10)
N(2)-Ta(1)-C(1)	29.3(9)
N(1)-Ta(1)-C(1)	32.0(9)
C(8)-Ta(1)-C(1)	92.1(11)
C(9)-Ta(1)-C(1)	112.0(8)
Cl(1)-Ta(1)-C(1)	104.8(6)
Cl(2)-Ta(1)-C(1)	108.7(6)
C(10)-Ta(1)-C(1)	145.2(9)
C(12)-Ta(1)-C(1)	108.7(10)
C(11)-Ta(1)-C(1)	144.0(9)
C(1)-N(1)-C(7)	126(3)
C(1)-N(1)-Ta(1)	92.2(18)
C(7)-N(1)-Ta(1)	139(2)
N(2)-C(1)-N(1)	112(2)
N(2)-C(1)-N(3)	128(3)
N(1)-C(1)-N(3)	120(2)
N(2)-C(1)-Ta(1)	56.7(15)
N(1)-C(1)-Ta(1)	55.8(15)
N(3)-C(1)-Ta(1)	169(2)
N(21)-Ta(2)-N(22)	64.0(11)
N(21)-Ta(2)-C(32)	119.9(10)
N(22)-Ta(2)-C(32)	85.0(10)
N(21)-Ta(2)-C(28)	86.9(12)
N(22)-Ta(2)-C(28)	85.0(12)
C(32)-Ta(2)-C(28)	37.7(10)
N(21)-Ta(2)-Cl(4)	86.1(8)
N(22)-Ta(2)-Cl(4)	136.3(9)
C(32)-Ta(2)-Cl(4)	138.7(6)
C(28)-Ta(2)-Cl(4)	126.6(9)
N(21)-Ta(2)-C(29)	89.2(13)

N(22)-Ta(2)-C(29)	113.6(12)
C(32)-Ta(2)-C(29)	56.6(9)
C(28)-Ta(2)-C(29)	31.0(11)
Cl(4)-Ta(2)-C(29)	96.0(8)
N(21)-Ta(2)-Cl(3)	129.3(9)
N(22)-Ta(2)-Cl(3)	88.7(9)
C(32)-Ta(2)-Cl(3)	97.4(6)
C(28)-Ta(2)-Cl(3)	135.0(9)
Cl(4)-Ta(2)-Cl(3)	86.7(3)
C(29)-Ta(2)-Cl(3)	141.5(9)
N(21)-Ta(2)-C(31)	144.7(11)
N(22)-Ta(2)-C(31)	115.9(10)
C(32)-Ta(2)-C(31)	33.6(8)
C(28)-Ta(2)-C(31)	58.8(12)
Cl(4)-Ta(2)-C(31)	106.9(7)
C(29)-Ta(2)-C(31)	57.5(11)
Cl(3)-Ta(2)-C(31)	84.9(8)
N(21)-Ta(2)-C(30)	120.8(12)
N(22)-Ta(2)-C(30)	139.3(12)
C(32)-Ta(2)-C(30)	56.8(10)
C(28)-Ta(2)-C(30)	56.8(12)
Cl(4)-Ta(2)-C(30)	82.8(9)
C(29)-Ta(2)-C(30)	35.4(11)
Cl(3)-Ta(2)-C(30)	107.9(9)
C(31)-Ta(2)-C(30)	34.5(11)
N(21)-Ta(2)-C(21)	31.2(10)
N(22)-Ta(2)-C(21)	33.9(10)
C(32)-Ta(2)-C(21)	109.9(8)
C(28)-Ta(2)-C(21)	91.5(11)
Cl(4)-Ta(2)-C(21)	107.9(6)
C(29)-Ta(2)-C(21)	108.3(11)
Cl(3)-Ta(2)-C(21)	107.3(7)
C(31)-Ta(2)-C(21)	143.6(9)
C(30)-Ta(2)-C(21)	143.7(11)
C(3)-C(2)-N(2)	117.0(16)
C(3)-C(2)-H(2A)	121.5

N(2)-C(2)-H(2A)	121.5
C(1)-N(2)-C(2)	119(2)
C(1)-N(2)-Ta(1)	94.1(19)
C(2)-N(2)-Ta(1)	146.7(17)
C(4)-C(3)-C(2)	121.1(18)
C(4)-C(3)-H(3A)	119.7
C(2)-C(3)-H(3A)	119.2
C(1)-N(3)-C(5)	119(3)
C(1)-N(3)-C(4)	114(3)
C(5)-N(3)-C(4)	126(3)
C(3)-C(4)-N(3)	115(2)
C(3)-C(4)-H(4A)	108.8
N(3)-C(4)-H(4A)	109.3
C(3)-C(4)-H(4B)	108.0
N(3)-C(4)-H(4B)	107.7
H(4A)-C(4)-H(4B)	107.5
N(3)-C(5)-C(6)	114(3)
N(3)-C(5)-H(5A)	108.8
C(6)-C(5)-H(5A)	109.6
N(3)-C(5)-H(5B)	108.2
C(6)-C(5)-H(5B)	108.2
H(5A)-C(5)-H(5B)	107.7
C(5)-C(6)-C(7)	109(2)
C(5)-C(6)-H(6A)	109.4
C(7)-C(6)-H(6A)	109.1
C(5)-C(6)-H(6B)	110.3
C(7)-C(6)-H(6B)	110.8
H(6A)-C(6)-H(6B)	108.5
N(1)-C(7)-C(6)	109(2)
N(1)-C(7)-H(7A)	110.4
C(6)-C(7)-H(7A)	108.8
N(1)-C(7)-H(7B)	110.2
C(6)-C(7)-H(7B)	110.3
H(7A)-C(7)-H(7B)	108.2
C(12)-C(8)-C(13)	123(3)
C(12)-C(8)-C(9)	109(3)

C(13)-C(8)-C(9)	126(3)
C(12)-C(8)-Ta(1)	80.7(18)
C(13)-C(8)-Ta(1)	128(2)
C(9)-C(8)-Ta(1)	72.6(16)
C(10)-C(9)-C(14)	132(3)
C(10)-C(9)-C(8)	105(3)
C(14)-C(9)-C(8)	123(2)
C(10)-C(9)-Ta(1)	77.0(18)
C(14)-C(9)-Ta(1)	125(2)
C(8)-C(9)-Ta(1)	69.4(15)
C(11)-C(10)-C(9)	112(3)
C(11)-C(10)-C(15)	125(3)
C(9)-C(10)-C(15)	122(3)
C(11)-C(10)-Ta(1)	76.3(19)
C(9)-C(10)-Ta(1)	69.6(16)
C(15)-C(10)-Ta(1)	133(2)
C(10)-C(11)-C(12)	108(3)
C(10)-C(11)-C(16)	127(3)
C(12)-C(11)-C(16)	125(3)
C(10)-C(11)-Ta(1)	71.8(19)
C(12)-C(11)-Ta(1)	71.8(17)
C(16)-C(11)-Ta(1)	128(2)
C(8)-C(12)-C(17)	123(3)
C(8)-C(12)-C(11)	105(3)
C(17)-C(12)-C(11)	131(3)
C(8)-C(12)-Ta(1)	66.2(18)
C(17)-C(12)-Ta(1)	119(2)
C(11)-C(12)-Ta(1)	72.9(17)
C(8)-C(13)-H(13A)	109.8
C(8)-C(13)-H(13B)	109.4
H(13A)-C(13)-H(13B)	109.5
C(8)-C(13)-H(13C)	109.2
H(13A)-C(13)-H(13C)	109.5
H(13B)-C(13)-H(13C)	109.5
C(9)-C(14)-H(14A)	109.9
C(9)-C(14)-H(14B)	109.3

H(14A)-C(14)-H(14B)	109.5
C(9)-C(14)-H(14C)	109.2
H(14A)-C(14)-H(14C)	109.5
H(14B)-C(14)-H(14C)	109.5
C(10)-C(15)-H(15A)	110.5
C(10)-C(15)-H(15B)	108.9
H(15A)-C(15)-H(15B)	109.5
C(10)-C(15)-H(15C)	109.1
H(15A)-C(15)-H(15C)	109.5
H(15B)-C(15)-H(15C)	109.5
C(11)-C(16)-H(16A)	108.1
C(11)-C(16)-H(16B)	110.7
H(16A)-C(16)-H(16B)	109.5
C(11)-C(16)-H(16C)	109.6
H(16A)-C(16)-H(16C)	109.5
H(16B)-C(16)-H(16C)	109.5
C(12)-C(17)-H(17A)	109.8
C(12)-C(17)-H(17B)	109.8
H(17A)-C(17)-H(17B)	109.5
C(12)-C(17)-H(17C)	108.8
H(17A)-C(17)-H(17C)	109.5
H(17B)-C(17)-H(17C)	109.5
C(21)-N(21)-C(27)	111(3)
C(21)-N(21)-Ta(2)	97(2)
C(27)-N(21)-Ta(2)	145(2)
N(23)-C(21)-N(21)	133(3)
N(23)-C(21)-N(22)	124(3)
N(21)-C(21)-N(22)	102(3)
N(23)-C(21)-Ta(2)	165(3)
N(21)-C(21)-Ta(2)	51.5(17)
N(22)-C(21)-Ta(2)	53.2(16)
C(21)-N(22)-C(22)	114(2)
C(21)-N(22)-Ta(2)	93(2)
C(22)-N(22)-Ta(2)	134.2(19)
C(23)-C(22)-N(22)	113.0(18)
C(23)-C(22)-H(22A)	109.0

N(22)-C(22)-H(22A)	109.0
C(23)-C(22)-H(22B)	109.0
N(22)-C(22)-H(22B)	108.9
H(22A)-C(22)-H(22B)	107.8
C(21)-N(23)-C(24)	125(3)
C(21)-N(23)-C(25)	116(3)
C(24)-N(23)-C(25)	119(3)
C(22)-C(23)-C(24)	123(2)
C(22)-C(23)-H(23A)	118.4
C(24)-C(23)-H(23A)	118.2
N(23)-C(24)-C(23)	115(2)
N(23)-C(24)-H(24A)	122.6
C(23)-C(24)-H(24A)	122.6
C(26)-C(25)-N(23)	109(3)
C(26)-C(25)-H(25A)	108.8
N(23)-C(25)-H(25A)	109.5
C(26)-C(25)-H(25B)	110.8
N(23)-C(25)-H(25B)	110.7
H(25A)-C(25)-H(25B)	108.2
C(27)-C(26)-C(25)	116(3)
C(27)-C(26)-H(26A)	109.3
C(25)-C(26)-H(26A)	109.2
C(27)-C(26)-H(26B)	107.4
C(25)-C(26)-H(26B)	107.7
H(26A)-C(26)-H(26B)	107.3
C(26)-C(27)-N(21)	116(3)
C(26)-C(27)-H(27A)	109.6
N(21)-C(27)-H(27A)	107.8
C(26)-C(27)-H(27B)	107.6
N(21)-C(27)-H(27B)	108.3
H(27A)-C(27)-H(27B)	107.5
C(29)-C(28)-C(33)	127(3)
C(29)-C(28)-C(32)	107(3)
C(33)-C(28)-C(32)	126(3)
C(29)-C(28)-Ta(2)	77(2)
C(33)-C(28)-Ta(2)	115(2)

C(32)-C(28)-Ta(2)	70.0(15)
C(28)-C(29)-C(30)	112(3)
C(28)-C(29)-C(34)	129(4)
C(30)-C(29)-C(34)	118(3)
C(28)-C(29)-Ta(2)	72(2)
C(30)-C(29)-Ta(2)	75(2)
C(34)-C(29)-Ta(2)	115(2)
C(31)-C(30)-C(29)	105(3)
C(31)-C(30)-C(35)	121(3)
C(29)-C(30)-C(35)	134(3)
C(31)-C(30)-Ta(2)	71.5(18)
C(29)-C(30)-Ta(2)	69.6(19)
C(35)-C(30)-Ta(2)	119(2)
C(32)-C(31)-C(30)	107(3)
C(32)-C(31)-C(36)	129(3)
C(30)-C(31)-C(36)	124(3)
C(32)-C(31)-Ta(2)	68.1(16)
C(30)-C(31)-Ta(2)	74.0(19)
C(36)-C(31)-Ta(2)	124(2)
C(31)-C(32)-C(37)	124(2)
C(31)-C(32)-C(28)	109(2)
C(37)-C(32)-C(28)	126(2)
C(31)-C(32)-Ta(2)	78.3(16)
C(37)-C(32)-Ta(2)	126.5(17)
C(28)-C(32)-Ta(2)	72.2(16)
C(28)-C(33)-H(33A)	109.1
C(28)-C(33)-H(33B)	109.7
H(33A)-C(33)-H(33B)	109.5
C(28)-C(33)-H(33C)	109.6
H(33A)-C(33)-H(33C)	109.5
H(33B)-C(33)-H(33C)	109.5
C(29)-C(34)-H(34A)	109.0
C(29)-C(34)-H(34B)	109.8
H(34A)-C(34)-H(34B)	109.5
C(29)-C(34)-H(34C)	109.6
H(34A)-C(34)-H(34C)	109.5

H(34B)-C(34)-H(34C)	109.5
C(30)-C(35)-H(35A)	109.3
C(30)-C(35)-H(35B)	109.5
H(35A)-C(35)-H(35B)	109.5
C(30)-C(35)-H(35C)	109.6
H(35A)-C(35)-H(35C)	109.5
H(35B)-C(35)-H(35C)	109.5
C(31)-C(36)-H(36A)	111.3
C(31)-C(36)-H(36B)	109.3
H(36A)-C(36)-H(36B)	109.5
C(31)-C(36)-H(36C)	107.7
H(36A)-C(36)-H(36C)	109.5
H(36B)-C(36)-H(36C)	109.5
C(32)-C(37)-H(37A)	109.0
C(32)-C(37)-H(37B)	110.3
H(37A)-C(37)-H(37B)	109.5
C(32)-C(37)-H(37C)	109.1
H(37A)-C(37)-H(37C)	109.5
H(37B)-C(37)-H(37C)	109.5

Anisotropic displacement parameters ($Å^2 x\ 10^3$)for mes1022. The anisotropic displacement factor exponent takes the form: $-2\pi^2[\ h^2 a^{*2} U^{11} + ... + 2\ h\ k\ a^*\ b^*\ U^{12}\ ]$

	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
Ta(1)	24(1)	26(1)	23(1)	3(1)	-7(1)	-8(1)
Cl(1)	49(6)	28(5)	40(5)	6(4)	-7(5)	-20(4)
Ta(2)	26(1)	26(1)	23(1)	3(1)	-8(1)	-7(1)
Cl(2)	35(5)	60(7)	40(6)	3(5)	-19(4)	-23(5)
N(2)	11(8)	22(8)	20(9)	4(7)	-3(6)	-3(6)
Cl(3)	43(7)	38(5)	35(5)	6(4)	-8(5)	-15(5)
N(3)	20(15)	22(11)	38(17)	-2(11)	-2(13)	-4(10)
Cl(4)	52(6)	43(5)	25(4)	4(4)	-20(4)	-17(4)
C(4)	41(15)	78(19)	61(19)	18(14)	-31(13)	30(12)
C(8)	37(11)	17(9)	20(9)	-7(7)	-9(6)	-5(7)
C(10)	7(7)	49(11)	32(10)	-4(6)	-3(5)	0(5)
C(11)	18(14)	30(16)	34(16)	-11(12)	10(11)	-13(12)
C(12)	61(14)	41(14)	39(10)	-19(9)	-18(8)	-10(10)
C(13)	34(11)	32(11)	44(16)	-19(9)	16(9)	-10(8)
C(14)	42(16)	51(18)	50(20)	14(14)	-18(15)	17(13)
C(16)	80(20)	70(20)	37(14)	-10(13)	12(15)	-46(18)
C(17)	50(20)	80(20)	23(14)	-8(13)	-23(14)	3(17)
N(21)	23(9)	40(12)	26(9)	18(6)	-9(6)	-10(7)
C(21)	49(13)	40(12)	19(10)	9(7)	-10(8)	-21(8)
N(22)	40(13)	45(14)	23(10)	0(8)	-6(8)	3(9)
N(23)	13(11)	52(17)	19(14)	5(12)	-2(10)	-3(10)
C(24)	23(11)	60(15)	22(8)	14(8)	-6(7)	-20(11)
C(25)	36(11)	80(20)	34(11)	9(9)	8(7)	-26(10)
C(26)	69(15)	80(20)	33(10)	1(11)	7(8)	-26(13)
C(27)	44(15)	57(15)	41(14)	30(10)	-15(10)	-26(10)
C(29)	62(13)	26(10)	38(16)	1(9)	-8(10)	-2(7)
C(31)	44(15)	28(11)	19(9)	10(7)	-18(9)	-3(10)
C(33)	26(13)	51(14)	30(12)	-11(9)	-12(11)	-12(11)
C(34)	60(20)	16(12)	41(17)	-1(11)	2(14)	-18(12)
C(36)	12(6)	30(9)	25(10)	-9(7)	11(6)	-2(6)
C(37)	36(13)	24(10)	31(13)	1(8)	0(10)	-8(9)

Hydrogen coordinates (x 10^4) and isotropic displacement parameters ($Å^2$x 10^3)
for mes1022.

	x	y	z	U(eq)
H(2A)	5990	5558	4503	47
H(3A)	8902	5381	4009	33
H(4A)	9410	4855	2098	82
H(4B)	10038	6175	2385	82
H(5A)	9502	6772	352	31
H(5B)	8901	8465	798	31
H(6A)	6956	7136	-35	23
H(6B)	7633	8549	-559	23
H(7A)	5768	10189	845	34
H(7B)	4642	9357	487	34
H(13A)	3963	11600	4533	61
H(13B)	4948	11035	3342	61
H(13C)	5204	9897	4340	61
H(14A)	1475	13019	2745	81
H(14B)	1773	11853	1831	81
H(14C)	3320	11938	2229	81
H(15A)	-1810	11694	3770	63
H(15B)	-1517	10051	3320	63
H(15C)	-750	11276	2563	63
H(16A)	-1439	9381	5783	91
H(16B)	-82	7728	5618	91
H(16C)	-1234	8359	4806	91
H(17A)	2603	9088	6316	82
H(17B)	4280	8360	5412	82
H(17C)	2874	7502	5792	82
H(22A)	-2621	7091	7755	33
H(22B)	-2828	6282	6795	33
H(23A)	-5486	7504	7639	78

H(24A)	-6826	6456	9355	41
H(25A)	-6221	5039	11041	64
H(25B)	-5646	3379	10533	64
H(26A)	-3727	4632	11403	79
H(26B)	-4342	3174	11856	79
H(27A)	-2500	1717	10620	56
H(27B)	-1529	2691	10987	56
H(33A)	-1127	451	7048	51
H(33B)	-2080	2232	7244	51
H(33C)	-1765	1097	8236	51
H(34A)	1783	-1144	8653	64
H(34B)	100	78	9271	64
H(34C)	1875	115	9372	64
H(35A)	5309	567	7716	49
H(35B)	4059	1254	8827	49
H(35C)	4736	2368	7906	49
H(36A)	4509	2969	5544	39
H(36B)	4283	3788	6623	39
H(36C)	3067	4550	5864	39
H(37A)	923	2896	5028	49
H(37B)	609	4528	5502	49
H(37C)	-837	3713	5833	49

Torsion angles [°] for mes1022.

N(2)-Ta(1)-N(1)-C(1)	4.2(15)
C(8)-Ta(1)-N(1)-C(1)	93.5(17)
C(9)-Ta(1)-N(1)-C(1)	131.5(15)
Cl(1)-Ta(1)-N(1)-C(1)	-53.7(17)
Cl(2)-Ta(1)-N(1)-C(1)	-136.9(15)
C(10)-Ta(1)-N(1)-C(1)	144.4(15)
C(12)-Ta(1)-N(1)-C(1)	77.6(18)
C(11)-Ta(1)-N(1)-C(1)	112(2)
N(2)-Ta(1)-N(1)-C(7)	166(3)
C(8)-Ta(1)-N(1)-C(7)	-105(3)
C(9)-Ta(1)-N(1)-C(7)	-67(3)
Cl(1)-Ta(1)-N(1)-C(7)	108(3)
Cl(2)-Ta(1)-N(1)-C(7)	25(3)
C(10)-Ta(1)-N(1)-C(7)	-54(3)
C(12)-Ta(1)-N(1)-C(7)	-121(3)
C(11)-Ta(1)-N(1)-C(7)	-86(3)
C(1)-Ta(1)-N(1)-C(7)	162(4)
C(7)-N(1)-C(1)-N(2)	-172(3)
Ta(1)-N(1)-C(1)-N(2)	-7(2)
C(7)-N(1)-C(1)-N(3)	3(4)
Ta(1)-N(1)-C(1)-N(3)	168(2)
C(7)-N(1)-C(1)-Ta(1)	-165(3)
N(1)-Ta(1)-C(1)-N(2)	172(3)
C(8)-Ta(1)-C(1)-N(2)	85(2)
C(9)-Ta(1)-C(1)-N(2)	118.6(19)
Cl(1)-Ta(1)-C(1)-N(2)	-49.4(19)
Cl(2)-Ta(1)-C(1)-N(2)	-141.5(17)
C(10)-Ta(1)-C(1)-N(2)	113(2)
C(12)-Ta(1)-C(1)-N(2)	56(2)
C(11)-Ta(1)-C(1)-N(2)	57(3)
N(2)-Ta(1)-C(1)-N(1)	-172(3)
C(8)-Ta(1)-C(1)-N(1)	-87.2(17)
C(9)-Ta(1)-C(1)-N(1)	-53.9(17)
Cl(1)-Ta(1)-C(1)-N(1)	138.1(14)

Cl(2)-Ta(1)-C(1)-N(1)	46.0(16)
C(10)-Ta(1)-C(1)-N(1)	-59(2)
C(12)-Ta(1)-C(1)-N(1)	-116.4(17)
C(11)-Ta(1)-C(1)-N(1)	-115.6(19)
N(2)-Ta(1)-C(1)-N(3)	119(11)
N(1)-Ta(1)-C(1)-N(3)	-69(10)
C(8)-Ta(1)-C(1)-N(3)	-156(10)
C(9)-Ta(1)-C(1)-N(3)	-123(10)
Cl(1)-Ta(1)-C(1)-N(3)	69(10)
Cl(2)-Ta(1)-C(1)-N(3)	-23(10)
C(10)-Ta(1)-C(1)-N(3)	-128(10)
C(12)-Ta(1)-C(1)-N(3)	175(10)
C(11)-Ta(1)-C(1)-N(3)	176(10)
N(1)-C(1)-N(2)-C(2)	-175(2)
N(3)-C(1)-N(2)-C(2)	10(4)
Ta(1)-C(1)-N(2)-C(2)	178(3)
N(1)-C(1)-N(2)-Ta(1)	7(2)
N(3)-C(1)-N(2)-Ta(1)	-168(3)
C(3)-C(2)-N(2)-C(1)	5(3)
C(3)-C(2)-N(2)-Ta(1)	-178(3)
N(1)-Ta(1)-N(2)-C(1)	-4.5(17)
C(8)-Ta(1)-N(2)-C(1)	-95(2)
C(9)-Ta(1)-N(2)-C(1)	-76(2)
Cl(1)-Ta(1)-N(2)-C(1)	132.5(18)
Cl(2)-Ta(1)-N(2)-C(1)	50(2)
C(10)-Ta(1)-N(2)-C(1)	-111(2)
C(12)-Ta(1)-N(2)-C(1)	-128.1(19)
C(11)-Ta(1)-N(2)-C(1)	-143.9(17)
N(1)-Ta(1)-N(2)-C(2)	179(4)
C(8)-Ta(1)-N(2)-C(2)	88(3)
C(9)-Ta(1)-N(2)-C(2)	107(3)
Cl(1)-Ta(1)-N(2)-C(2)	-44(3)
Cl(2)-Ta(1)-N(2)-C(2)	-127(3)
C(10)-Ta(1)-N(2)-C(2)	72(4)
C(12)-Ta(1)-N(2)-C(2)	55(3)
C(11)-Ta(1)-N(2)-C(2)	39(4)

C(1)-Ta(1)-N(2)-C(2)	-177(5)
N(2)-C(2)-C(3)-C(4)	-24(3)
N(2)-C(1)-N(3)-C(5)	173(3)
N(1)-C(1)-N(3)-C(5)	-2(4)
Ta(1)-C(1)-N(3)-C(5)	61(11)
N(2)-C(1)-N(3)-C(4)	-7(4)
N(1)-C(1)-N(3)-C(4)	179(3)
Ta(1)-C(1)-N(3)-C(4)	-119(10)
C(2)-C(3)-C(4)-N(3)	27(4)
C(1)-N(3)-C(4)-C(3)	-11(4)
C(5)-N(3)-C(4)-C(3)	169(3)
C(1)-N(3)-C(5)-C(6)	-28(3)
C(4)-N(3)-C(5)-C(6)	152(3)
N(3)-C(5)-C(6)-C(7)	52(3)
C(1)-N(1)-C(7)-C(6)	23(4)
Ta(1)-N(1)-C(7)-C(6)	-134(2)
C(5)-C(6)-C(7)-N(1)	-49(3)
N(2)-Ta(1)-C(8)-C(12)	-93(2)
N(1)-Ta(1)-C(8)-C(12)	-154(2)
C(9)-Ta(1)-C(8)-C(12)	113(3)
Cl(1)-Ta(1)-C(8)-C(12)	-10(3)
Cl(2)-Ta(1)-C(8)-C(12)	121.3(19)
C(10)-Ta(1)-C(8)-C(12)	76(2)
C(11)-Ta(1)-C(8)-C(12)	38(2)
C(1)-Ta(1)-C(8)-C(12)	-122(2)
N(2)-Ta(1)-C(8)-C(13)	31(3)
N(1)-Ta(1)-C(8)-C(13)	-30(3)
C(9)-Ta(1)-C(8)-C(13)	-122(4)
Cl(1)-Ta(1)-C(8)-C(13)	114(3)
Cl(2)-Ta(1)-C(8)-C(13)	-114(3)
C(10)-Ta(1)-C(8)-C(13)	-159(4)
C(12)-Ta(1)-C(8)-C(13)	124(4)
C(11)-Ta(1)-C(8)-C(13)	163(4)
C(1)-Ta(1)-C(8)-C(13)	2(3)
N(2)-Ta(1)-C(8)-C(9)	153.5(18)
N(1)-Ta(1)-C(8)-C(9)	92.4(18)

Cl(1)-Ta(1)-C(8)-C(9)	-123.5(15)
Cl(2)-Ta(1)-C(8)-C(9)	8(2)
C(10)-Ta(1)-C(8)-C(9)	-37.2(17)
C(12)-Ta(1)-C(8)-C(9)	-113(3)
C(11)-Ta(1)-C(8)-C(9)	-75.2(19)
C(1)-Ta(1)-C(8)-C(9)	124.3(17)
C(12)-C(8)-C(9)-C(10)	-4(3)
C(13)-C(8)-C(9)-C(10)	-165(3)
Ta(1)-C(8)-C(9)-C(10)	70(2)
C(12)-C(8)-C(9)-C(14)	168(3)
C(13)-C(8)-C(9)-C(14)	6(5)
Ta(1)-C(8)-C(9)-C(14)	-119(3)
C(12)-C(8)-C(9)-Ta(1)	-73(2)
C(13)-C(8)-C(9)-Ta(1)	125(3)
N(2)-Ta(1)-C(9)-C(10)	-143.8(19)
N(1)-Ta(1)-C(9)-C(10)	160.0(19)
C(8)-Ta(1)-C(9)-C(10)	-112(3)
Cl(1)-Ta(1)-C(9)-C(10)	-13(2)
Cl(2)-Ta(1)-C(9)-C(10)	74.3(18)
C(12)-Ta(1)-C(9)-C(10)	-75.6(19)
C(11)-Ta(1)-C(9)-C(10)	-33.4(18)
C(1)-Ta(1)-C(9)-C(10)	-174.6(17)
N(2)-Ta(1)-C(9)-C(14)	84(2)
N(1)-Ta(1)-C(9)-C(14)	28(2)
C(8)-Ta(1)-C(9)-C(14)	116(3)
Cl(1)-Ta(1)-C(9)-C(14)	-145(2)
Cl(2)-Ta(1)-C(9)-C(14)	-58(2)
C(10)-Ta(1)-C(9)-C(14)	-132(3)
C(12)-Ta(1)-C(9)-C(14)	152(3)
C(11)-Ta(1)-C(9)-C(14)	-165(3)
C(1)-Ta(1)-C(9)-C(14)	53(2)
N(2)-Ta(1)-C(9)-C(8)	-32(2)
N(1)-Ta(1)-C(9)-C(8)	-88.2(19)
Cl(1)-Ta(1)-C(9)-C(8)	98.4(18)
Cl(2)-Ta(1)-C(9)-C(8)	-173.9(18)
C(10)-Ta(1)-C(9)-C(8)	112(3)

C(12)-Ta(1)-C(9)-C(8)	36.1(18)
C(11)-Ta(1)-C(9)-C(8)	78(2)
C(1)-Ta(1)-C(9)-C(8)	-62.9(19)
C(14)-C(9)-C(10)-C(11)	-170(3)
C(8)-C(9)-C(10)-C(11)	1(4)
Ta(1)-C(9)-C(10)-C(11)	65(3)
C(14)-C(9)-C(10)-C(15)	-3(5)
C(8)-C(9)-C(10)-C(15)	168(3)
Ta(1)-C(9)-C(10)-C(15)	-128(3)
C(14)-C(9)-C(10)-Ta(1)	126(3)
C(8)-C(9)-C(10)-Ta(1)	-64.1(18)
N(2)-Ta(1)-C(10)-C(11)	-59(3)
N(1)-Ta(1)-C(10)-C(11)	-144.3(17)
C(8)-Ta(1)-C(10)-C(11)	-78(2)
C(9)-Ta(1)-C(10)-C(11)	-120(3)
Cl(1)-Ta(1)-C(10)-C(11)	50.9(19)
Cl(2)-Ta(1)-C(10)-C(11)	135.5(18)
C(12)-Ta(1)-C(10)-C(11)	-38.2(17)
C(1)-Ta(1)-C(10)-C(11)	-112(2)
N(2)-Ta(1)-C(10)-C(9)	62(3)
N(1)-Ta(1)-C(10)-C(9)	-24(2)
C(8)-Ta(1)-C(10)-C(9)	42.5(18)
Cl(1)-Ta(1)-C(10)-C(9)	171.3(15)
Cl(2)-Ta(1)-C(10)-C(9)	-104.1(17)
C(12)-Ta(1)-C(10)-C(9)	82.1(19)
C(11)-Ta(1)-C(10)-C(9)	120(3)
C(1)-Ta(1)-C(10)-C(9)	9(3)
N(2)-Ta(1)-C(10)-C(15)	176(2)
N(1)-Ta(1)-C(10)-C(15)	91(3)
C(8)-Ta(1)-C(10)-C(15)	157(4)
C(9)-Ta(1)-C(10)-C(15)	115(4)
Cl(1)-Ta(1)-C(10)-C(15)	-74(3)
Cl(2)-Ta(1)-C(10)-C(15)	10(3)
C(12)-Ta(1)-C(10)-C(15)	-163(3)
C(11)-Ta(1)-C(10)-C(15)	-125(4)
C(1)-Ta(1)-C(10)-C(15)	123(2)

C(9)-C(10)-C(11)-C(12)	2(4)
C(15)-C(10)-C(11)-C(12)	-164(3)
Ta(1)-C(10)-C(11)-C(12)	63(2)
C(9)-C(10)-C(11)-C(16)	174(3)
C(15)-C(10)-C(11)-C(16)	8(5)
Ta(1)-C(10)-C(11)-C(16)	-125(3)
C(9)-C(10)-C(11)-Ta(1)	-61(2)
C(15)-C(10)-C(11)-Ta(1)	133(3)
N(2)-Ta(1)-C(11)-C(10)	145.0(18)
N(1)-Ta(1)-C(11)-C(10)	59(3)
C(8)-Ta(1)-C(11)-C(10)	81(2)
C(9)-Ta(1)-C(11)-C(10)	35.1(18)
Cl(1)-Ta(1)-C(11)-C(10)	-132.6(19)
Cl(2)-Ta(1)-C(11)-C(10)	-46.2(19)
C(12)-Ta(1)-C(11)-C(10)	117(3)
C(1)-Ta(1)-C(11)-C(10)	116(2)
N(2)-Ta(1)-C(11)-C(12)	28(2)
N(1)-Ta(1)-C(11)-C(12)	-58(3)
C(8)-Ta(1)-C(11)-C(12)	-35.8(18)
C(9)-Ta(1)-C(11)-C(12)	-81.9(18)
Cl(1)-Ta(1)-C(11)-C(12)	110.5(17)
Cl(2)-Ta(1)-C(11)-C(12)	-163.1(16)
C(10)-Ta(1)-C(11)-C(12)	-117(3)
C(1)-Ta(1)-C(11)-C(12)	-1(3)
N(2)-Ta(1)-C(11)-C(16)	-92(3)
N(1)-Ta(1)-C(11)-C(16)	-178(3)
C(8)-Ta(1)-C(11)-C(16)	-156(4)
C(9)-Ta(1)-C(11)-C(16)	158(3)
Cl(1)-Ta(1)-C(11)-C(16)	-10(3)
Cl(2)-Ta(1)-C(11)-C(16)	76(3)
C(10)-Ta(1)-C(11)-C(16)	123(4)
C(12)-Ta(1)-C(11)-C(16)	-120(4)
C(1)-Ta(1)-C(11)-C(16)	-122(3)
C(13)-C(8)-C(12)-C(17)	-20(5)
C(9)-C(8)-C(12)-C(17)	178(3)
Ta(1)-C(8)-C(12)-C(17)	110(3)

C(13)-C(8)-C(12)-C(11)	167(3)
C(9)-C(8)-C(12)-C(11)	5(3)
Ta(1)-C(8)-C(12)-C(11)	-63(2)
C(13)-C(8)-C(12)-Ta(1)	-130(3)
C(9)-C(8)-C(12)-Ta(1)	68(2)
C(10)-C(11)-C(12)-C(8)	-4(3)
C(16)-C(11)-C(12)-C(8)	-177(3)
Ta(1)-C(11)-C(12)-C(8)	59(2)
C(10)-C(11)-C(12)-C(17)	-176(3)
C(16)-C(11)-C(12)-C(17)	11(5)
Ta(1)-C(11)-C(12)-C(17)	-113(3)
C(10)-C(11)-C(12)-Ta(1)	-63(2)
C(16)-C(11)-C(12)-Ta(1)	125(3)
N(2)-Ta(1)-C(12)-C(8)	87(2)
N(1)-Ta(1)-C(12)-C(8)	30(2)
C(9)-Ta(1)-C(12)-C(8)	-42(2)
Cl(1)-Ta(1)-C(12)-C(8)	172(2)
Cl(2)-Ta(1)-C(12)-C(8)	-91(2)
C(10)-Ta(1)-C(12)-C(8)	-82(2)
C(11)-Ta(1)-C(12)-C(8)	-116(3)
C(1)-Ta(1)-C(12)-C(8)	63(2)
N(2)-Ta(1)-C(12)-C(17)	-29(3)
N(1)-Ta(1)-C(12)-C(17)	-86(3)
C(8)-Ta(1)-C(12)-C(17)	-116(4)
C(9)-Ta(1)-C(12)-C(17)	-157(3)
Cl(1)-Ta(1)-C(12)-C(17)	57(3)
Cl(2)-Ta(1)-C(12)-C(17)	153(2)
C(10)-Ta(1)-C(12)-C(17)	163(3)
C(11)-Ta(1)-C(12)-C(17)	128(4)
C(1)-Ta(1)-C(12)-C(17)	-53(3)
N(2)-Ta(1)-C(12)-C(11)	-156.8(18)
N(1)-Ta(1)-C(12)-C(11)	146.2(17)
C(8)-Ta(1)-C(12)-C(11)	116(3)
C(9)-Ta(1)-C(12)-C(11)	74.4(18)
Cl(1)-Ta(1)-C(12)-C(11)	-71.5(18)
Cl(2)-Ta(1)-C(12)-C(11)	25(2)

C(10)-Ta(1)-C(12)-C(11)	34.5(18)
C(1)-Ta(1)-C(12)-C(11)	179.3(17)
N(22)-Ta(2)-N(21)-C(21)	-12.1(19)
C(32)-Ta(2)-N(21)-C(21)	-79(2)
C(28)-Ta(2)-N(21)-C(21)	-98(2)
Cl(4)-Ta(2)-N(21)-C(21)	135(2)
C(29)-Ta(2)-N(21)-C(21)	-129(2)
Cl(3)-Ta(2)-N(21)-C(21)	52(2)
C(31)-Ta(2)-N(21)-C(21)	-111(2)
C(30)-Ta(2)-N(21)-C(21)	-145.9(19)
N(22)-Ta(2)-N(21)-C(27)	-157(5)
C(32)-Ta(2)-N(21)-C(27)	136(4)
C(28)-Ta(2)-N(21)-C(27)	117(4)
Cl(4)-Ta(2)-N(21)-C(27)	-10(4)
C(29)-Ta(2)-N(21)-C(27)	86(4)
Cl(3)-Ta(2)-N(21)-C(27)	-92(4)
C(31)-Ta(2)-N(21)-C(27)	104(4)
C(30)-Ta(2)-N(21)-C(27)	69(4)
C(21)-Ta(2)-N(21)-C(27)	-145(5)
C(27)-N(21)-C(21)-N(23)	-2(6)
Ta(2)-N(21)-C(21)-N(23)	-162(4)
C(27)-N(21)-C(21)-N(22)	175(3)
Ta(2)-N(21)-C(21)-N(22)	16(3)
C(27)-N(21)-C(21)-Ta(2)	159(3)
N(21)-Ta(2)-C(21)-N(23)	115(9)
N(22)-Ta(2)-C(21)-N(23)	-85(9)
C(32)-Ta(2)-C(21)-N(23)	-130(8)
C(28)-Ta(2)-C(21)-N(23)	-163(8)
Cl(4)-Ta(2)-C(21)-N(23)	67(8)
C(29)-Ta(2)-C(21)-N(23)	170(8)
Cl(3)-Ta(2)-C(21)-N(23)	-25(9)
C(31)-Ta(2)-C(21)-N(23)	-130(8)
C(30)-Ta(2)-C(21)-N(23)	170(8)
N(22)-Ta(2)-C(21)-N(21)	160(3)
C(32)-Ta(2)-C(21)-N(21)	115(2)
C(28)-Ta(2)-C(21)-N(21)	82(2)

Cl(4)-Ta(2)-C(21)-N(21)	-48(2)
C(29)-Ta(2)-C(21)-N(21)	55(2)
Cl(3)-Ta(2)-C(21)-N(21)	-140(2)
C(31)-Ta(2)-C(21)-N(21)	115(2)
C(30)-Ta(2)-C(21)-N(21)	55(3)
N(21)-Ta(2)-C(21)-N(22)	-160(3)
C(32)-Ta(2)-C(21)-N(22)	-45(2)
C(28)-Ta(2)-C(21)-N(22)	-79(2)
Cl(4)-Ta(2)-C(21)-N(22)	151.8(17)
C(29)-Ta(2)-C(21)-N(22)	-105(2)
Cl(3)-Ta(2)-C(21)-N(22)	59.7(19)
C(31)-Ta(2)-C(21)-N(22)	-46(3)
C(30)-Ta(2)-C(21)-N(22)	-106(2)
N(23)-C(21)-N(22)-C(22)	20(4)
N(21)-C(21)-N(22)-C(22)	-158(2)
Ta(2)-C(21)-N(22)-C(22)	-142(3)
N(23)-C(21)-N(22)-Ta(2)	162(3)
N(21)-C(21)-N(22)-Ta(2)	-16(3)
N(21)-Ta(2)-N(22)-C(21)	11.2(19)
C(32)-Ta(2)-N(22)-C(21)	138.0(19)
C(28)-Ta(2)-N(22)-C(21)	100(2)
Cl(4)-Ta(2)-N(22)-C(21)	-41(2)
C(29)-Ta(2)-N(22)-C(21)	88(2)
Cl(3)-Ta(2)-N(22)-C(21)	-124.5(18)
C(31)-Ta(2)-N(22)-C(21)	151.8(17)
C(30)-Ta(2)-N(22)-C(21)	119(2)
N(21)-Ta(2)-N(22)-C(22)	140(3)
C(32)-Ta(2)-N(22)-C(22)	-94(3)
C(28)-Ta(2)-N(22)-C(22)	-132(3)
Cl(4)-Ta(2)-N(22)-C(22)	88(3)
C(29)-Ta(2)-N(22)-C(22)	-144(2)
Cl(3)-Ta(2)-N(22)-C(22)	4(3)
C(31)-Ta(2)-N(22)-C(22)	-80(3)
C(30)-Ta(2)-N(22)-C(22)	-113(3)
C(21)-Ta(2)-N(22)-C(22)	128(4)
C(21)-N(22)-C(22)-C(23)	-28(3)

Ta(2)-N(22)-C(22)-C(23)	-149(2)
N(21)-C(21)-N(23)-C(24)	175(3)
N(22)-C(21)-N(23)-C(24)	-2(5)
Ta(2)-C(21)-N(23)-C(24)	72(9)
N(21)-C(21)-N(23)-C(25)	-7(6)
N(22)-C(21)-N(23)-C(25)	176(3)
Ta(2)-C(21)-N(23)-C(25)	-110(8)
N(22)-C(22)-C(23)-C(24)	21(3)
C(21)-N(23)-C(24)-C(23)	-7(4)
C(25)-N(23)-C(24)-C(23)	175(3)
C(22)-C(23)-C(24)-N(23)	-4(4)
C(21)-N(23)-C(25)-C(26)	32(4)
C(24)-N(23)-C(25)-C(26)	-150(3)
N(23)-C(25)-C(26)-C(27)	-51(4)
C(25)-C(26)-C(27)-N(21)	44(4)
C(21)-N(21)-C(27)-C(26)	-16(4)
Ta(2)-N(21)-C(27)-C(26)	126(4)
N(21)-Ta(2)-C(28)-C(29)	-94(2)
N(22)-Ta(2)-C(28)-C(29)	-158(3)
C(32)-Ta(2)-C(28)-C(29)	114(3)
Cl(4)-Ta(2)-C(28)-C(29)	-11(3)
Cl(3)-Ta(2)-C(28)-C(29)	119(2)
C(31)-Ta(2)-C(28)-C(29)	78(2)
C(30)-Ta(2)-C(28)-C(29)	37(2)
C(21)-Ta(2)-C(28)-C(29)	-124(2)
N(21)-Ta(2)-C(28)-C(33)	31(3)
N(22)-Ta(2)-C(28)-C(33)	-33(3)
C(32)-Ta(2)-C(28)-C(33)	-121(3)
Cl(4)-Ta(2)-C(28)-C(33)	114(2)
C(29)-Ta(2)-C(28)-C(33)	125(4)
Cl(3)-Ta(2)-C(28)-C(33)	-116(2)
C(31)-Ta(2)-C(28)-C(33)	-157(3)
C(30)-Ta(2)-C(28)-C(33)	162(3)
C(21)-Ta(2)-C(28)-C(33)	0(3)
N(21)-Ta(2)-C(28)-C(32)	152.5(17)
N(22)-Ta(2)-C(28)-C(32)	88.3(17)

Cl(4)-Ta(2)-C(28)-C(32)	-124.7(13)
C(29)-Ta(2)-C(28)-C(32)	-114(3)
Cl(3)-Ta(2)-C(28)-C(32)	5(2)
C(31)-Ta(2)-C(28)-C(32)	-36.1(14)
C(30)-Ta(2)-C(28)-C(32)	-77.1(18)
C(21)-Ta(2)-C(28)-C(32)	121.6(15)
C(33)-C(28)-C(29)-C(30)	-177(3)
C(32)-C(28)-C(29)-C(30)	0(4)
Ta(2)-C(28)-C(29)-C(30)	-65(3)
C(33)-C(28)-C(29)-C(34)	-4(6)
C(32)-C(28)-C(29)-C(34)	172(3)
Ta(2)-C(28)-C(29)-C(34)	108(3)
C(33)-C(28)-C(29)-Ta(2)	-112(4)
C(32)-C(28)-C(29)-Ta(2)	64(2)
N(21)-Ta(2)-C(29)-C(28)	85(2)
N(22)-Ta(2)-C(29)-C(28)	24(3)
C(32)-Ta(2)-C(29)-C(28)	-42(2)
Cl(4)-Ta(2)-C(29)-C(28)	171(2)
Cl(3)-Ta(2)-C(29)-C(28)	-96(2)
C(31)-Ta(2)-C(29)-C(28)	-82(2)
C(30)-Ta(2)-C(29)-C(28)	-120(3)
C(21)-Ta(2)-C(29)-C(28)	60(2)
N(21)-Ta(2)-C(29)-C(30)	-155(2)
N(22)-Ta(2)-C(29)-C(30)	144(2)
C(32)-Ta(2)-C(29)-C(30)	78(2)
C(28)-Ta(2)-C(29)-C(30)	120(3)
Cl(4)-Ta(2)-C(29)-C(30)	-69(2)
Cl(3)-Ta(2)-C(29)-C(30)	24(3)
C(31)-Ta(2)-C(29)-C(30)	38(2)
C(21)-Ta(2)-C(29)-C(30)	-179.6(19)
N(21)-Ta(2)-C(29)-C(34)	-40(3)
N(22)-Ta(2)-C(29)-C(34)	-101(2)
C(32)-Ta(2)-C(29)-C(34)	-168(3)
C(28)-Ta(2)-C(29)-C(34)	-126(4)
Cl(4)-Ta(2)-C(29)-C(34)	46(2)
Cl(3)-Ta(2)-C(29)-C(34)	138(2)

C(31)-Ta(2)-C(29)-C(34)	152(3)
C(30)-Ta(2)-C(29)-C(34)	114(3)
C(21)-Ta(2)-C(29)-C(34)	-66(3)
C(28)-C(29)-C(30)-C(31)	-1(4)
C(34)-C(29)-C(30)-C(31)	-174(3)
Ta(2)-C(29)-C(30)-C(31)	-63(2)
C(28)-C(29)-C(30)-C(35)	174(3)
C(34)-C(29)-C(30)-C(35)	0(6)
Ta(2)-C(29)-C(30)-C(35)	111(4)
C(28)-C(29)-C(30)-Ta(2)	63(3)
C(34)-C(29)-C(30)-Ta(2)	-111(3)
N(21)-Ta(2)-C(30)-C(31)	144.2(18)
N(22)-Ta(2)-C(30)-C(31)	59(3)
C(32)-Ta(2)-C(30)-C(31)	36.5(16)
C(28)-Ta(2)-C(30)-C(31)	82(2)
Cl(4)-Ta(2)-C(30)-C(31)	-134.8(19)
C(29)-Ta(2)-C(30)-C(31)	114(3)
Cl(3)-Ta(2)-C(30)-C(31)	-50.6(19)
C(21)-Ta(2)-C(30)-C(31)	115(2)
N(21)-Ta(2)-C(30)-C(29)	30(2)
N(22)-Ta(2)-C(30)-C(29)	-55(3)
C(32)-Ta(2)-C(30)-C(29)	-78(2)
C(28)-Ta(2)-C(30)-C(29)	-32.2(19)
Cl(4)-Ta(2)-C(30)-C(29)	111(2)
Cl(3)-Ta(2)-C(30)-C(29)	-164.8(18)
C(31)-Ta(2)-C(30)-C(29)	-114(3)
C(21)-Ta(2)-C(30)-C(29)	1(3)
N(21)-Ta(2)-C(30)-C(35)	-99(2)
N(22)-Ta(2)-C(30)-C(35)	175.6(19)
C(32)-Ta(2)-C(30)-C(35)	153(3)
C(28)-Ta(2)-C(30)-C(35)	-162(3)
Cl(4)-Ta(2)-C(30)-C(35)	-18(2)
C(29)-Ta(2)-C(30)-C(35)	-130(4)
Cl(3)-Ta(2)-C(30)-C(35)	66(3)
C(31)-Ta(2)-C(30)-C(35)	116(3)
C(21)-Ta(2)-C(30)-C(35)	-129(2)

C(29)-C(30)-C(31)-C(32)	2(3)
C(35)-C(30)-C(31)-C(32)	-174(3)
Ta(2)-C(30)-C(31)-C(32)	-60.5(19)
C(29)-C(30)-C(31)-C(36)	-177(3)
C(35)-C(30)-C(31)-C(36)	8(5)
Ta(2)-C(30)-C(31)-C(36)	121(3)
C(29)-C(30)-C(31)-Ta(2)	62(2)
C(35)-C(30)-C(31)-Ta(2)	-113(3)
N(21)-Ta(2)-C(31)-C(32)	56(2)
N(22)-Ta(2)-C(31)-C(32)	-25(2)
C(28)-Ta(2)-C(31)-C(32)	40.6(17)
Cl(4)-Ta(2)-C(31)-C(32)	163.6(14)
C(29)-Ta(2)-C(31)-C(32)	77.3(18)
Cl(3)-Ta(2)-C(31)-C(32)	-111.4(15)
C(30)-Ta(2)-C(31)-C(32)	116(3)
C(21)-Ta(2)-C(31)-C(32)	1(3)
N(21)-Ta(2)-C(31)-C(30)	-61(3)
N(22)-Ta(2)-C(31)-C(30)	-141.5(19)
C(32)-Ta(2)-C(31)-C(30)	-116(3)
C(28)-Ta(2)-C(31)-C(30)	-76(2)
Cl(4)-Ta(2)-C(31)-C(30)	47(2)
C(29)-Ta(2)-C(31)-C(30)	-38.9(19)
Cl(3)-Ta(2)-C(31)-C(30)	132.4(19)
C(21)-Ta(2)-C(31)-C(30)	-115(2)
N(21)-Ta(2)-C(31)-C(36)	179(2)
N(22)-Ta(2)-C(31)-C(36)	98(3)
C(32)-Ta(2)-C(31)-C(36)	124(3)
C(28)-Ta(2)-C(31)-C(36)	164(3)
Cl(4)-Ta(2)-C(31)-C(36)	-73(2)
C(29)-Ta(2)-C(31)-C(36)	-159(3)
Cl(3)-Ta(2)-C(31)-C(36)	12(2)
C(30)-Ta(2)-C(31)-C(36)	-120(3)
C(21)-Ta(2)-C(31)-C(36)	125(2)
C(30)-C(31)-C(32)-C(37)	-169(3)
C(36)-C(31)-C(32)-C(37)	9(5)
Ta(2)-C(31)-C(32)-C(37)	126(2)

C(30)-C(31)-C(32)-C(28)	-2(3)
C(36)-C(31)-C(32)-C(28)	177(3)
Ta(2)-C(31)-C(32)-C(28)	-66.4(19)
C(30)-C(31)-C(32)-Ta(2)	64(2)
C(36)-C(31)-C(32)-Ta(2)	-117(3)
C(29)-C(28)-C(32)-C(31)	2(4)
C(33)-C(28)-C(32)-C(31)	178(3)
Ta(2)-C(28)-C(32)-C(31)	70.4(19)
C(29)-C(28)-C(32)-C(37)	169(3)
C(33)-C(28)-C(32)-C(37)	-15(5)
Ta(2)-C(28)-C(32)-C(37)	-123(2)
C(29)-C(28)-C(32)-Ta(2)	-69(3)
C(33)-C(28)-C(32)-Ta(2)	107(3)
N(21)-Ta(2)-C(32)-C(31)	-146.6(16)
N(22)-Ta(2)-C(32)-C(31)	157.3(18)
C(28)-Ta(2)-C(32)-C(31)	-114(2)
Cl(4)-Ta(2)-C(32)-C(31)	-24(2)
C(29)-Ta(2)-C(32)-C(31)	-80.1(19)
Cl(3)-Ta(2)-C(32)-C(31)	69.2(16)
C(30)-Ta(2)-C(32)-C(31)	-37.4(17)
C(21)-Ta(2)-C(32)-C(31)	-179.4(16)
N(21)-Ta(2)-C(32)-C(37)	90(2)
N(22)-Ta(2)-C(32)-C(37)	34(2)
C(28)-Ta(2)-C(32)-C(37)	122(3)
Cl(4)-Ta(2)-C(32)-C(37)	-147.8(18)
C(29)-Ta(2)-C(32)-C(37)	156(3)
Cl(3)-Ta(2)-C(32)-C(37)	-54(2)
C(31)-Ta(2)-C(32)-C(37)	-124(3)
C(30)-Ta(2)-C(32)-C(37)	-161(3)
C(21)-Ta(2)-C(32)-C(37)	57(2)
N(21)-Ta(2)-C(32)-C(28)	-32(2)
N(22)-Ta(2)-C(32)-C(28)	-88.3(18)
Cl(4)-Ta(2)-C(32)-C(28)	90.3(17)
C(29)-Ta(2)-C(32)-C(28)	34.3(18)
Cl(3)-Ta(2)-C(32)-C(28)	-176.3(16)
C(31)-Ta(2)-C(32)-C(28)	114(2)

C(30)-Ta(2)-C(32)-C(28)	77.0(19)
C(21)-Ta(2)-C(32)-C(28)	-64.9(18)

Observed and calculated structure factors for $(C_5Me_5)Ta(hpp)Cl_2$.

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
-4	-2	-17	378	378	17	-4	-2	-15	362	383	16	2	-4	-14	365	345	35	-6	-8	-13	0	52	1	1	-1	-13	195	152	28
-3	-2	-17	320	315	19	-3	-2	-15	318	340	17	-8	-3	-14	321	306	33	-5	-8	-13	223	241	26	2	-1	-13	282	259	21
-4	-1	-17	137	164	50	-2	-2	-15	79	52	50	-7	-3	-14	459	443	28	-4	-8	-13	156	192	31	3	-1	-13	104	185	74
-3	-1	-17	76	129	76	-1	-2	-15	306	293	20	-6	-3	-14	211	201	16	-3	-8	-13	0	36	1	4	-1	-13	46	69	45
-2	-1	-17	310	303	29	0	-2	-15	406	394	17	-5	-3	-14	0	38	1	-2	-8	-13	0	186	1	-8	0	-13	50	35	49
-3	0	-17	322	315	27	1	-2	-15	208	215	22	-4	-3	-14	360	373	16	-8	-7	-13	124	149	37	-7	0	-13	335	338	25
-5	-5	-16	217	225	26	-7	-1	-15	0	33	1	-3	-3	-14	334	318	15	-7	-7	-13	129	115	33	-6	0	-13	370	357	25
-4	-5	-16	373	360	21	-6	-1	-15	321	316	27	-2	-3	-14	145	88	32	-6	-7	-13	230	231	21	-5	0	-13	68	93	67
-3	-5	-16	190	169	26	-5	-1	-15	432	411	28	-1	-3	-14	386	391	16	-5	-7	-13	61	124	61	-4	0	-13	226	214	10
-6	-4	-16	286	272	18	-4	-1	-15	362	384	14	0	-3	-14	518	521	27	-4	-7	-13	162	222	28	-3	0	-13	621	603	13
-5	-4	-16	323	325	20	-3	-1	-15	82	74	40	1	-3	-14	172	214	38	-3	-7	-13	333	338	30	-2	0	-13	271	281	12
-4	-4	-16	0	37	1	-2	-1	-15	247	280	19	2	-3	-14	173	126	41	-2	-7	-13	362	345	29	-1	0	-13	146	150	16
-3	-4	-16	254	210	22	-1	-1	-15	280	284	18	-8	-2	-14	416	381	26	-1	-7	-13	0	49	1	0	0	-13	480	464	14
-2	-4	-16	250	265	23	0	-1	-15	74	56	73	-7	-2	-14	74	45	73	0	-7	-13	131	222	69	1	0	-13	474	452	14
-1	-4	-16	116	95	44	1	-1	-15	313	311	19	-6	-2	-14	353	357	24	-9	-6	-13	98	147	39	2	0	-13	35	112	35
-6	-3	-16	65	89	64	2	-1	-15	355	375	26	-5	-2	-14	367	390	15	-8	-6	-13	304	298	19	3	0	-13	296	275	25
-5	-3	-16	146	188	24	-7	0	-15	313	338	34	-4	-2	-14	245	268	16	-7	-6	-13	346	352	18	-8	1	-13	401	406	29
-4	-3	-16	417	445	19	-6	0	-15	463	391	28	-3	-2	-14	214	239	18	-6	-6	-13	0	99	1	-7	1	-13	316	303	31
-3	-3	-16	275	293	19	-5	0	-15	110	92	110	-2	-2	-14	493	502	15	-5	-6	-13	192	221	25	-6	1	-13	0	87	1
-2	-3	-16	0	74	1	-4	0	-15	237	232	31	-1	-2	-14	381	382	23	-4	-6	-13	345	359	18	-5	1	-13	348	332	23
-1	-3	-16	258	265	20	-3	0	-15	368	382	15	0	-2	-14	0	34	1	-3	-6	-13	179	206	23	-4	1	-13	256	277	21
-6	-2	-16	362	354	32	-2	0	-15	89	70	35	1	-2	-14	286	280	18	-2	-6	-13	84	113	84	-3	1	-13	65	58	44
-5	-2	-16	440	429	30	-1	0	-15	225	224	19	2	-2	-14	387	391	18	-1	-6	-13	422	398	28	-2	1	-13	555	543	14
-4	-2	-16	229	220	18	0	0	-15	383	380	17	3	-2	-14	191	171	38	0	-6	-13	271	287	39	-1	1	-13	617	598	15
-3	-2	-16	149	182	24	1	0	-15	315	302	31	-8	-1	-14	219	186	32	1	-6	-13	134	139	60	0	1	-13	460	447	13
-2	-2	-16	340	334	18	-6	1	-15	266	214	34	-7	-1	-14	470	479	25	-9	-5	-13	380	388	17	1	1	-13	58	106	57
-1	-2	-16	244	250	22	-5	1	-15	430	408	29	-6	-1	-14	442	414	26	-8	-5	-13	238	264	19	2	1	-13	388	375	23
0	-2	-16	102	55	52	-4	1	-15	370	343	26	-5	-1	-14	0	138	1	-7	-5	-13	58	23	57	3	1	-13	384	379	27
-6	-1	-16	199	240	38	-3	1	-15	58	14	57	-4	-1	-14	267	258	12	-6	-5	-13	370	351	15	4	1	-13	76	15	76
-5	-1	-16	0	29	1	-2	1	-15	356	327	15	-3	-1	-14	381	374	15	-5	-5	-13	367	357	17	-6	2	-13	381	375	28
-4	-1	-16	330	323	28	-1	1	-15	423	410	15	-2	-1	-14	65	62	64	-4	-5	-13	58	39	57	-5	2	-13	199	197	27
-3	-1	-16	313	328	19	0	1	-15	192	195	18	-1	-1	-14	185	184	19	-3	-5	-13	275	264	18	-4	2	-13	114	186	46
-2	-1	-16	71	74	71	1	1	-15	192	190	42	0	-1	-14	447	431	15	-2	-5	-13	475	436	23	-3	2	-13	538	536	12
-1	-1	-16	156	156	33	2	1	-15	394	439	30	1	-1	-14	232	238	23	-1	-5	-13	305	240	29	-2	2	-13	586	562	14
0	-1	-16	260	251	20	-6	2	-15	485	494	27	2	-1	-14	20	44	20	0	-5	-13	0	158	1	-1	2	-13	94	46	26
-6	0	-16	223	255	33	-5	2	-15	193	178	33	3	-1	-14	305	332	30	1	-5	-13	124	237	63	0	2	-13	407	377	13
-5	0	-16	359	341	28	-4	2	-15	0	126	1	-8	0	-14	441	410	26	2	-5	-13	211	247	40	1	2	-13	608	581	14
-4	0	-16	306	281	26	-3	2	-15	444	440	25	-7	0	-14	234	200	28	-9	-4	-13	0	56	1	2	2	-13	321	337	15
-3	0	-16	100	68	32	-2	2	-15	280	305	16	-6	0	-14	169	167	45	-8	-4	-13	245	245	14	3	2	-13	0	44	1
-2	0	-16	323	304	17	-1	2	-15	50	47	49	-5	0	-14	359	348	24	-7	-4	-13	460	447	16	4	2	-13	274	259	22
-1	0	-16	203	238	23	0	2	-15	318	317	24	-4	0	-14	305	315	11	-6	-4	-13	254	251	18	-5	3	-13	285	297	26
0	0	-16	41	40	40	1	2	-15	485	405	23	-3	0	-14	20	74	20	-5	-4	-13	0	48	1	-4	3	-13	425	410	23
-5	1	-16	46	92	45	2	2	-15	152	154	60	-2	0	-14	378	377	15	-4	-4	-13	348	349	14	-3	3	-13	221	191	23
-4	1	-16	274	255	30	-5	3	-15	393	361	28	-1	0	-14	353	360	15	-3	-4	-13	279	279	18	-2	3	-13	224	232	14
-3	1	-16	403	400	26	-4	3	-15	459	408	28	0	0	-14	199	173	16	-2	-4	-13	0	35	1	-1	3	-13	533	486	14
-2	1	-16	239	258	20	-3	3	-15	177	182	32	1	0	-14	225	217	19	-1	-4	-13	306	341	27	0	3	-13	406	384	11
-1	1	-16	102	117	41	-2	3	-15	215	203	26	2	0	-14	408	380	27	0	-4	-13	403	425	25	1	3	-13	129	122	44
0	1	-16	310	304	32	-1	3	-15	356	359	22	3	0	-14	238	250	34	1	-4	-13	123	131	55	2	3	-13	219	225	26
-4	2	-16	455	426	30	0	3	-15	191	174	25	-7	1	-14	355	344	31	2	-4	-13	121	147	59	3	3	-13	338	344	24
-3	2	-16	0	85	1	1	3	-15	0	97	1	-6	1	-14	403	415	29	3	-4	-13	292	339	30	4	3	-13	50	83	49
-2	2	-16	190	170	44	-1	4	-15	0	46	1	-5	1	-14	171	133	43	-9	-3	-13	330	366	29	-2	4	-13	389	391	15
-1	2	-16	334	358	22	0	4	-15	315	305	24	-4	1	-14	221	211	32	-8	-3	-13	313	366	32	-1	4	-13	121	114	22
-6	-6	-15	0	26	1	-7	-7	-14	161	221	29	-3	1	-14	488	486	15	-7	-3	-13	58	46	57	0	4	-13	214	222	24
-5	-6	-15	252	284	22	-6	-7	-14	0	34	1	-2	1	-14	245	253	14	-6	-3	-13	370	375	13	1	4	-13	428	425	22
-4	-6	-15	326	346	21	-5	-7	-14	240	289	23	-1	1	-14	183	207	16	-5	-3	-13	320	325	13	2	4	-13	324	324	23
-3	-6	-15	94	159	87	-4	-7	-14	232	206	23	0	1	-14	553	530	15	-4	-3	-13	104	81	36	3	4	-13	0	50	1
-2	-6	-15	0	103	1	-3	-7	-14	139	70	77	1	1	-14	540	505	16	-3	-3	-13	326	361	14	4	4	-13	258	304	31
-7	-5	-15	176	193	25	-2	-7	-14	244	222	34	2	1	-14	190	191	30	-2	-3	-13	667	653	17	-1	5	-13	456	442	22
-6	-5	-15	351	310	19	-8	-6	-14	102	121	74	3	1	-14	219	162	34	-1	-3	-13	410	403	15	0	5	-13	509	510	21
-5	-5	-15	317	310	20	-7	-6	-14	232	217	23	-7	2	-14	175	201	43	0	-3	-13	0	24	1	1	5	-13	208	192	24
-4	-5	-15	41	73	40	-6	-6	-14	316	317	20	-6	2	-14	0	68	1	1	-3	-13	306	308	29	2	5	-13	139	170	36
-3	-5	-15	210	217	24	-5	-6	-14	234	230	23	-5	2	-14	448	422	26	2	-3	-13	351	368	30	3	5	-13	327	324	24
-2	-5	-15	248	221	30	-4	-6	-14	123	74	41	-4	2	-14	425	401	23	3	-3	-13	150	162	47	-1	6	-13	267	272	18
-1	-5	-15	29	75	28	-3	-6	-14	289	294	20	-3	2	-14	142	116	33	-9	-2	-13	0	89	1	0	6	-13	74	16	73
-8	-4	-15	355	318	35	-2	-6	-14	375	327	32	-2	2	-14	375	370	14	-8	-2	-13	41	156	40	1	6	-13	461	414	23
-7	-4	-15	371	388	31	-1	-6	-14	46	76	45	-1	2	-14	508	498	24	-7	-2	-13	439	447	26	2	6	-13	406	405	23
-6	-4	-15	186	166	26	0	-6	-14	106	178	106	0	2	-14	327	326	15	-6	-2	-13	317	303	10	-6	-9	-12	68	53	67
-5	-4	-15	0	124	1	-8	-5	-14	290	331	19	1	2	-14	87	18	65	-5	-2	-13	91	43	26	-5	-9	-12	268	285	18
-4	-4	-15	347	365	19	-7	-5	-14	432	454	18	2	2	-14	364	346	26	-4	-2	-13	417	415	14	-4	-9	-12	332	299	32
-3	-4	-15	253	255	19	-6	-5	-14	164	200	22	-5	3	-14	261	260	30	-3	-2	-13	465	420	14	-3	-9	-12	0	70	1
-2	-4	-15	68	80	67	-5	-5	-14	119	121	30	-4	3	-14	79	57	78	-2	-2	-13	179	170	21	-2	-9	-12	0	127	1
-1	-4	-15	327	341	22	-4	-5	-14	320	314	17	-3	3	-14	362	336	24	-1	-2	-13	289	291	16	-8	-8	-12	116	146	57
0	-4	-15	280	290	21	-3	-5	-14	247	253	19	-2	3	-14	322	312	15	0	-2	-13	582	558	15	-7	-8	-12	131	135	39
-8	-3	-15	208	204	55	-2	-5	-14	112	109	38	-1	3	-14	0	35	1	1	-2	-13	338	352	25	-6	-8	-12	249	248	21
-7	-3	-15	123	134	58	-1	-5	-14	396	361	28	0	3	-14	374	330	24	2	-2	-13	0	40	1	-5	-8	-12	121	152	36
-6	-3	-15	319	362	16	0	-5	-14	239	261	34	1	3	-14	410	405	24	3	-2	-13	295	252	32	-4	-8	-12	182	167	22
-5	-3	-15	392	402	17	1	-5	-14	0	115	1	2	3	-14	234	222	20	4	-2	-13	159	221	49	-3	-8	-12	342	338	33

-4	-3-15	65	88	64	-8	-4-14	287	277	30	3	3-14	89	113	89	-9	-1-13	338	364	31	-2	-8-12	269	293	33
-3	-3-15	338	327	17	-7	-4-14	65	53	64	-2	4-14	206	210	26	-8	-1-13	459	445	27	-1	-8-12	0	77	1
-2	-3-15	401	390	17	-6	-4-14	327	332	15	-1	4-14	344	323	24	-7	-1-13	225	220	27	0	-8-12	175	171	48
-1	-3-15	263	286	19	-5	-4-14	338	333	16	0	4-14	354	346	17	-6	-1-13	265	224	27	-9	-7-12	50	54	49
0	-3-15	76	111	76	-4	-4-14	0	40	1	1	4-14	74	33	73	-5	-1-13	409	406	11	-8	-7-12	249	245	24
1	-3-15	384	362	20	-3	-4-14	309	299	17	2	4-14	333	318	26	-4	-1-13	509	515	13	-7	-7-12	223	250	22
-8	-2-15	272	332	34	-2	-4-14	342	341	17	-1	5-14	41	89	40	-3	-1-13	55	89	54	-6	-7-12	110	19	45
-7	-2-15	485	485	27	-1	-4-14	201	188	21	0	5-14	191	220	33	-2	-1-13	454	438	14	-5	-7-12	256	236	23
-6	-2-15	254	282	31	0	-4-14	221	216	32	1	5-14	456	434	26	-1	-1-13	408	410	19	-4	-7-12	338	340	14
-5	-2-15	0	35	1	1	-4-14	307	358	30	-7	-8-13	164	214	30	0	-1-13	226	256	17	-3	-7-12	91	108	40
-2	-7-12	191	171	46	-6	0-12	139	170	32	-5	-8-11	314	297	15	-1	-2-11	172	176	14	3	5-11	526	500	22
-1	-7-12	399	389	28	-5	0-12	481	454	21	-4	-8-11	346	360	17	0	-2-11	637	622	21	4	5-11	381	369	24
0	-7-12	283	267	38	-4	0-12	406	406	12	-3	-8-11	196	177	21	2	-2-11	106	127	77	5	5-11	35	9	35
1	-7-12	0	62	1	-3	0-12	55	71	54	-2	-8-11	58	104	57	3	-2-11	295	299	23	-2	6-11	617	588	22
-9	-6-12	349	344	19	-2	0-12	488	419	11	-1	-8-11	290	271	37	5	-2-11	0	136	1	-1	6-11	479	460	20
-8	-6-12	156	176	24	-1	0-12	658	651	15	0	-8-11	206	145	44	-9	-1-11	245	269	31	0	6-11	68	49	67
-7	-6-12	104	115	36	0	0-12	418	391	13	1	-8-11	139	68	138	-8	-1-11	401	404	23	1	6-11	340	324	20
-6	-6-12	377	365	15	1	0-12	173	167	17	-9	-7-11	302	296	19	-7	-1-11	265	244	27	2	6-11	447	446	22
-5	-6-12	335	329	16	2	0-12	368	357	14	-8	-7-11	110	154	39	-6	-1-11	276	260	21	3	6-11	217	223	26
-4	-6-12	74	24	73	3	0-12	237	258	16	-7	-7-11	68	141	67	-5	-1-11	795	775	11	4	6-11	161	180	39
-3	-6-12	340	350	27	4	0-12	0	91	1	-6	-7-11	341	331	16	-4	-1-11	606	613	13	5	6-11	406	377	23
-2	-6-12	583	537	25	5	0-12	252	264	32	-5	-7-11	272	254	17	-3	-1-11	136	164	11	-1	7-11	146	147	28
-1	-6-12	320	294	26	-8	1-12	0	97	1	-4	-7-11	29	49	28	-2	-1-11	420	407	9	0	7-11	378	352	23
0	-6-12	114	150	113	-7	1-12	232	243	31	-3	-7-11	403	370	15	-1	-1-11	745	725	13	1	7-11	272	289	22
1	-6-12	282	247	30	-6	1-12	356	371	22	-2	-7-11	419	421	16	0	-1-11	320	333	13	2	7-11	65	34	64
2	-6-12	203	223	45	-5	1-12	0	66	1	-1	-7-11	215	204	18	1	-1-11	201	189	24	3	7-11	344	303	26
-9	-5-12	55	36	54	-4	1-12	256	276	19	0	-7-11	183	205	36	2	-1-11	469	416	18	4	7-11	256	265	29
-8	-5-12	256	276	17	-3	1-12	786	791	16	1	-7-11	304	289	34	3	-1-11	284	300	22	-1	8-11	356	371	19
-7	-5-12	481	450	16	-2	1-12	508	516	13	2	-7-11	219	212	44	4	-1-11	106	44	52	0	8-11	129	155	42
-6	-5-12	213	251	16	-1	1-12	20	48	20	-10	-6-11	217	237	21	5	-1-11	304	309	29	1	8-11	119	80	40
-5	-5-12	199	220	16	0	1-12	517	477	13	-9	-6-11	0	39	1	-9	0-11	327	337	27	2	8-11	315	284	26
-4	-5-12	582	577	15	1	1-12	736	723	17	-8	-6-11	274	273	16	-8	0-11	0	35	1	-7	-10-10	285	320	20
-3	-5-12	368	375	16	2	1-12	304	292	13	-7	-6-11	406	377	16	-7	0-11	377	356	22	-6	-10-10	276	295	18
-2	-5-12	162	161	31	3	1-12	0	103	1	-6	-6-11	145	124	25	-6	0-11	519	524	21	-5	-10-10	129	153	42
-1	-5-12	278	285	25	4	1-12	442	460	32	-5	-6-11	410	379	15	-5	0-11	148	146	26	-4	-10-10	170	185	29
0	-5-12	389	366	26	5	1-12	288	302	35	-4	-6-11	636	663	15	-4	0-11	376	382	9	-3	-10-10	336	339	24
1	-5-12	145	169	49	-6	2-12	76	71	76	-3	-6-11	414	411	15	-3	0-11	927	918	13	-2	-10-10	197	236	27
2	-5-12	96	107	95	-5	2-12	419	432	21	-2	-6-11	0	21	1	-2	0-11	582	561	13	-8	-9-10	317	285	24
3	-5-12	277	286	30	-4	2-12	487	509	20	-1	-6-11	342	332	15	-1	0-11	104	105	17	-7	-9-10	245	241	21
-10	-4-12	183	195	44	-3	2-12	211	218	11	0	-6-11	454	419	23	0	0-11	399	379	12	-6	-9-10	0	59	1
-9	-4-12	421	411	26	-2	2-12	487	488	12	1	-6-11	134	156	52	1	0-11	525	505	14	-5	-9-10	360	351	19
-8	-4-12	370	341	15	-1	2-12	720	687	15	2	-6-11	100	180	100	2	0-11	170	148	17	-4	-9-10	442	385	18
-7	-4-12	98	107	24	0	2-12	474	465	13	3	-6-11	296	286	35	3	0-11	346	329	20	-3	-9-10	172	171	25
-6	-4-12	444	422	13	1	2-12	82	105	32	-10	-5-11	195	219	21	4	0-11	512	528	24	-2	-9-10	142	100	31
-5	-4-12	470	443	15	2	2-12	379	379	13	-9	-5-11	317	344	18	5	0-11	327	362	29	-1	-9-10	263	256	22
-4	-4-12	100	143	32	3	2-12	480	417	22	-8	-5-11	219	219	16	6	0-11	0	11	1	0	-9-10	61	156	61
-3	-4-12	305	324	16	4	2-12	199	180	28	-7	-5-11	148	140	21	-7	1-11	356	320	23	-9	-8-10	271	293	23
-2	-4-12	546	530	15	5	2-12	100	148	100	-6	-5-11	562	565	15	-6	1-11	84	130	84	-8	-8-10	0	95	1
-1	-4-12	485	445	22	-4	3-12	71	75	71	-5	-5-11	635	625	15	-5	1-11	457	461	19	-7	-8-10	234	254	21
0	-4-12	68	56	67	-3	3-12	493	499	21	-4	-5-11	224	248	15	-4	1-11	351	363	19	-6	-8-10	423	418	13
1	-4-12	273	296	31	-2	3-12	665	642	15	-3	-5-11	343	324	19	-3	1-11	296	286	7	-5	-8-10	374	387	14
2	-4-12	333	344	27	-1	3-12	300	305	9	-2	-5-11	568	543	14	-2	1-11	655	635	10	-4	-8-10	0	64	1
-10	-3-12	331	361	31	0	3-12	118	132	19	-1	-5-11	500	500	14	-1	1-11	749	721	11	-3	-8-10	287	258	18
-9	-3-12	175	185	53	1	3-12	427	428	13	0	-5-11	0	20	1	0	1-11	373	359	9	-2	-8-10	277	286	18
-8	-3-12	160	154	37	2	3-12	351	322	19	1	-5-11	284	266	32	1	1-11	170	173	17	-1	-8-10	35	125	35
-7	-3-12	316	306	11	3	3-12	134	80	35	2	-5-11	360	343	28	2	1-11	628	615	11	0	-8-10	150	149	27
-6	-3-12	232	240	13	4	3-12	337	337	26	3	-5-11	0	57	1	3	1-11	531	508	14	1	-8-10	74	222	73
-5	-3-12	244	233	13	5	3-12	232	210	31	-10	-4-11	386	417	26	4	1-11	127	127	27	-10	-7-10	230	235	21
-4	-3-12	533	506	14	-2	4-12	58	68	22	-9	-4-11	108	168	73	5	1-11	237	264	18	-9	-7-10	0	49	1
-3	-3-12	471	482	14	-1	4-12	520	480	13	-8	-4-11	267	227	14	6	1-11	338	409	36	-8	-7-10	237	251	19
-2	-3-12	186	206	16	0	4-12	421	415	13	-7	-4-11	437	401	13	-6	2-11	573	518	23	-7	-7-10	349	351	17
-1	-3-12	365	361	20	1	4-12	68	121	67	-6	-4-11	281	284	13	-5	2-11	224	228	26	-6	-7-10	87	55	45
0	-3-12	584	574	23	2	4-12	242	249	23	-5	-4-11	224	238	14	-4	2-11	228	210	23	-5	-7-10	247	269	13
1	-3-12	232	250	24	3	4-12	399	406	24	-4	-4-11	588	592	14	-3	2-11	586	579	9	-4	-7-10	500	493	15
2	-3-12	100	50	78	4	4-12	238	205	34	-3	-4-11	589	573	13	-2	2-11	815	798	15	-3	-7-10	333	321	14
3	-3-12	318	340	29	5	4-12	0	97	1	-2	-4-11	253	242	20	-1	2-11	197	204	12	-2	-7-10	68	146	61
4	-3-12	331	324	29	-2	5-12	588	553	15	-1	-4-11	302	286	10	0	2-11	338	326	11	-1	-7-10	377	359	16
-9	-2-12	364	359	29	-1	5-12	359	340	17	0	-4-11	509	489	20	1	2-11	593	588	13	0	-7-10	377	355	16
-8	-2-12	383	364	25	0	5-12	74	106	73	1	-4-11	0	73	1	2	2-11	344	366	13	1	-7-10	0	49	1
-7	-2-12	58	104	57	1	5-12	472	444	21	2	-4-11	100	115	78	3	2-11	65	79	64	2	-7-10	263	253	36
-6	-2-12	317	306	11	2	5-12	433	433	23	3	-4-11	357	393	24	4	2-11	443	428	21	-10	-6-10	146	184	33
-5	-2-12	542	528	13	3	5-12	112	81	51	4	-4-11	372	343	27	5	2-11	284	351	27	-9	-6-10	292	276	18
-4	-2-12	432	440	13	4	5-12	331	319	30	-10	-3-11	100	38	100	6	2-11	166	163	56	-8	-6-10	84	101	49
-3	-2-12	239	257	13	-1	6-12	431	393	19	-9	-3-11	302	332	26	-4	3-11	706	666	23	-7	-6-10	232	218	18
-2	-2-12	740	711	16	0	6-12	491	470	22	-8	-3-11	327	311	11	-3	3-11	505	525	7	-6	-6-10	590	573	16
-1	-2-12	697	674	16	1	6-12	360	353	23	-7	-3-11	65	15	44	-2	3-11	76	91	22	-5	-6-10	553	547	16
0	-2-12	302	286	12	2	6-12	96	51	66	-6	-3-11	383	358	11	-1	3-11	529	502	12	-4	-6-10	188	165	16
1	-2-12	166	175	30	3	6-12	347	325	23	-5	-3-11	603	608	13	0	3-11	491	459	12	-3	-6-10	335	317	13
2	-2-12	334	315	23	4	6-12	315	313	26	-4	-3-11	304	305	10	1	3-11	201	194	12	-2	-6-10	568	533	15
4	-2-12	157	58	60	-1	7-12	403	412	19	-3	-3-11	311	303	10	2	3-11	366	347	12	-1	-6-10	263	287	15
-9	-1-12	248	237	33	0	7-12	152	110	27	-2	-3-11	608	603	13	4	3-11	242	247	25	0	-6-10	98	96	26

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
-8	-1	-12	116	44	50	1	7	-12	194	194	27	-1	-3	-11	667	657	21	5	3	-11	219	195	35	1	-6	-10	416	381	14
-7	-1	-12	460	440	24	2	7	-12	322	291	23	0	-3	-11	91	89	45	6	3	-11	323	263	31	2	-6	-10	361	398	28
-6	-1	-12	446	435	25	-5	-10	-11	262	316	27	1	-3	-11	438	413	19	-2	4	-11	580	561	17	3	-6	-10	0	64	1
-5	-1	-12	35	44	35	-4	-10	-11	282	308	25	2	-3	-11	433	404	23	-1	4	-11	383	378	11	-10	-5	-10	302	312	18
-4	-1	-12	383	368	10	-8	-9	-11	0	31	1	3	-3	-11	196	229	36	0	4	-11	35	74	35	-9	-5	-10	20	36	20
-3	-1	-12	777	756	15	-7	-9	-11	232	291	24	4	-3	-11	143	180	47	1	4	-11	345	329	13	-8	-5	-10	324	320	15
-2	-1	-12	496	489	13	-6	-9	-11	346	351	15	5	-3	-11	316	329	29	2	4	-11	392	357	21	-7	-5	-10	545	523	15
-1	-1	-12	41	78	40	-5	-9	-11	123	199	35	-10	-2	-11	241	319	36	3	4	-11	121	111	36	-6	-5	-10	295	274	15
0	-1	-12	404	387	13	-4	-9	-11	148	116	35	-9	-2	-11	205	208	40	4	4	-11	401	410	22	-5	-5	-10	307	310	13
1	-1	-12	494	482	20	-3	-9	-11	359	345	19	-8	-2	-11	172	122	41	5	4	-11	450	452	25	-4	-5	-10	786	769	15
3	-1	-12	260	281	25	-2	-9	-11	221	279	38	-7	-2	-11	377	374	22	6	4	-11	179	193	60	-3	-5	-10	687	689	14
4	-1	-12	339	365	29	-1	-9	-11	129	69	64	-6	-2	-11	354	342	10	-2	5	-11	0	24	1	-2	-5	-10	277	253	13
5	-1	-12	121	155	80	-9	-8	-11	0	45	1	-5	-2	-11	239	237	11	-1	5	-11	425	416	15	-1	-5	-10	289	274	12
-9	0	-12	253	205	29	-8	-8	-11	271	253	20	-4	-2	-11	670	672	11	0	5	-11	560	520	19	0	-5	-10	523	491	14
-8	0	-12	452	432	27	-7	-8	-11	268	268	22	-3	-2	-11	832	807	12	1	5	-11	166	168	21	1	-5	-10	127	161	23
-7	0	-12	421	411	21	-6	-8	-11	0	51	1	-2	-2	-11	412	402	10	2	5	-11	232	224	21	2	-5	-10	87	103	86
3	-5	-10	389	367	30	0	1	-10	565	539	9	-5	-9	-9	388	391	18	-3	-3	-9	0	40	1	-2	3	-9	375	386	10
4	-5	-10	245	280	36	1	1	-10	606	578	10	-4	-9	-9	65	77	64	-2	-3	-9	426	423	11	-1	3	-9	675	657	9
-10	-4	-10	50	69	49	2	1	-10	272	266	11	-3	-9	-9	302	287	22	-1	-3	-9	467	443	9	0	3	-9	705	681	9
-9	-4	-10	380	378	14	3	1	-10	179	189	13	-2	-9	-9	311	271	17	0	-3	-9	0	41	1	1	3	-9	371	359	7
-8	-4	-10	337	325	13	4	1	-10	522	528	23	-1	-9	-9	0	103	1	1	-3	-9	551	532	12	2	3	-9	289	276	7
-7	-4	-10	20	24	20	5	1	-10	454	489	23	0	-9	-9	110	151	68	2	-3	-9	577	558	13	3	3	-9	610	601	12
-6	-4	-10	547	524	13	6	1	-10	71	90	71	1	-9	-9	252	267	27	3	-3	-9	562	562	15	4	3	-9	502	497	20
-5	-4	-10	710	683	12	-6	2	-10	0	27	1	-9	-8	-9	123	101	33	4	-3	-9	116	49	54	5	3	-9	112	64	61
-4	-4	-10	360	360	10	-5	2	-10	555	570	20	-8	-8	-9	356	374	18	5	-3	-9	331	350	27	6	3	-9	168	245	44
-3	-4	-10	146	172	14	-4	2	-10	701	702	20	-7	-8	-9	381	389	16	6	-3	-9	279	287	30	7	3	-9	277	260	28
-2	-4	-10	410	404	11	-3	2	-10	430	424	7	-6	-8	-9	0	48	1	-10	-2	-9	229	232	28	-3	4	-9	240	229	5
-1	-4	-10	485	482	12	-2	2	-10	313	312	7	-5	-8	-9	140	162	30	-9	-2	-9	237	242	12	-2	4	-9	551	551	15
0	-4	-10	0	22	1	-1	2	-10	528	519	9	-4	-8	-9	461	457	16	-8	-2	-9	195	197	12	-1	4	-9	485	467	10
1	-4	-10	515	494	13	0	2	-10	521	507	9	-3	-8	-9	304	317	18	-7	-2	-9	562	542	12	0	4	-9	84	89	16
2	-4	-10	365	404	26	1	2	-10	0	55	1	-2	-8	-9	0	49	1	-6	-2	-9	683	665	13	1	4	-9	491	494	10
3	-4	-10	116	124	54	2	2	-10	614	617	13	-1	-8	-9	308	296	16	-5	-2	-9	238	249	7	2	4	-9	565	573	13
4	-4	-10	201	185	37	3	2	-10	755	733	15	0	-8	-9	256	243	20	-4	-2	-9	500	492	9	3	4	-9	71	92	71
5	-4	-10	307	368	34	4	2	-10	336	360	20	1	-8	-9	29	41	28	-3	-2	-9	737	722	13	4	4	-9	274	307	21
-10	-3	-10	331	338	29	5	2	-10	102	111	102	2	-8	-9	197	231	40	-2	-2	-9	383	383	11	5	4	-9	476	461	23
-9	-3	-10	172	197	32	6	2	-10	297	295	29	-10	-7	-9	179	184	29	-1	-2	-9	96	88	21	6	4	-9	250	238	27
-8	-3	-10	165	167	14	7	2	-10	247	232	29	-9	-7	-9	362	351	19	0	-2	-9	857	860	15	7	4	-9	55	59	54
-7	-3	-10	402	384	12	-4	3	-10	20	49	20	-8	-7	-9	157	192	22	1	-2	-9	856	846	21	-3	5	-9	500	465	13
-6	-3	-10	375	361	11	-3	3	-10	338	332	17	-7	-7	-9	20	75	20	2	-2	-9	71	63	17	-2	5	-9	225	214	13
-5	-3	-10	58	77	37	-2	3	-10	914	885	15	-6	-7	-9	450	459	15	3	-2	-9	219	203	12	-1	5	-9	465	441	17
-4	-3	-10	551	562	10	-1	3	-10	333	341	8	-5	-7	-9	431	421	12	4	-2	-9	512	512	23	0	5	-9	482	495	16
-3	-3	-10	668	659	11	0	3	-10	0	35	1	-4	-7	-9	79	153	50	5	-2	-9	286	327	27	1	5	-9	322	303	16
-2	-3	-10	153	157	17	1	3	-10	348	356	11	-3	-7	-9	262	270	14	-9	-1	-9	274	268	30	2	5	-9	170	183	23
-1	-3	-10	266	280	18	2	3	-10	409	407	11	-2	-7	-9	397	395	14	-8	-1	-9	570	548	23	3	5	-9	682	663	19
0	-3	-10	664	647	12	3	3	-10	20	78	20	-1	-7	-9	170	146	22	-7	-1	-9	283	294	5	4	5	-9	504	514	21
1	-3	-10	293	288	9	4	3	-10	318	327	20	0	-7	-9	191	169	19	-6	-1	-9	257	247	5	5	5	-9	136	173	35
2	-3	-10	50	81	49	5	3	-10	387	423	25	1	-7	-9	361	350	18	-5	-1	-9	784	750	10	6	5	-9	302	269	27
3	-3	-10	504	463	22	6	3	-10	153	166	46	2	-7	-9	310	304	20	-4	-1	-9	869	866	13	7	5	-9	324	289	32
4	-3	-10	467	425	25	7	3	-10	96	122	95	3	-7	-9	0	24	1	-3	-1	-9	322	324	7	-3	6	-9	143	152	17
-10	-2	-10	0	77	1	-2	4	-10	274	275	12	-10	-6	-9	265	237	18	-2	-1	-9	305	312	7	-2	6	-9	507	481	19
-9	-2	-10	261	278	29	-1	4	-10	492	460	11	-9	-6	-9	84	80	49	-1	-1	-9	603	602	9	-1	6	-9	469	454	19
-8	-2	-10	334	328	11	0	4	-10	467	455	12	-8	-6	-9	356	364	16	0	-1	-9	557	538	12	0	6	-9	55	67	54
-7	-2	-10	50	71	21	1	4	-10	136	147	14	-7	-6	-9	489	475	15	1	-1	-9	311	305	16	1	6	-9	487	461	19
-6	-2	-10	289	288	9	2	4	-10	275	265	20	-6	-6	-9	298	301	14	2	-1	-9	694	676	14	2	6	-9	661	636	22
-5	-2	-10	814	784	12	3	4	-10	553	529	21	-5	-6	-9	228	250	11	3	-1	-9	611	593	12	3	6	-9	456	472	21
-4	-2	-10	562	565	9	4	4	-10	316	313	22	-4	-6	-9	669	639	15	4	-1	-9	199	211	25	4	6	-9	87	83	58
-3	-2	-10	0	13	1	5	4	-10	55	21	54	-3	-6	-9	461	474	13	5	-1	-9	225	212	32	5	6	-9	349	337	23
-2	-2	-10	563	578	9	6	4	-10	278	282	28	-2	-6	-9	29	53	28	6	-1	-9	260	308	30	6	6	-9	324	357	32
-1	-2	-10	692	662	11	-2	5	-10	562	536	17	-1	-6	-9	487	456	20	-8	0	-9	55	26	54	-2	7	-9	327	327	17
0	-2	-10	278	265	17	-1	5	-10	364	331	15	0	-6	-9	645	602	16	-7	0	-9	529	527	19	-1	7	-9	119	118	30
1	-2	-10	380	400	19	0	5	-10	137	132	19	1	-6	-9	317	323	15	-6	0	-9	815	829	22	0	7	-9	442	439	19
2	-2	-10	481	478	20	1	5	-10	438	445	17	2	-6	-9	119	115	32	-5	0	-9	681	694	19	1	7	-9	452	449	19
3	-2	-10	573	563	22	2	5	-10	534	489	19	3	-6	-9	380	422	28	-4	0	-9	102	96	3	2	7	-9	0	80	1
4	-2	-10	20	65	20	3	5	-10	143	151	27	4	-6	-9	290	262	41	-3	0	-9	617	629	11	3	7	-9	296	286	19
5	-2	-10	312	315	29	4	5	-10	351	343	23	-10	-5	-9	112	93	29	-2	0	-9	718	686	9	4	7	-9	493	458	25
6	-2	-10	223	211	36	5	5	-10	546	544	25	-9	-5	-9	390	380	15	-1	0	-9	210	194	9	5	7	-9	139	208	57
-9	-1	-10	248	237	33	6	5	-10	266	288	30	-8	-5	-9	282	272	14	0	0	-9	436	432	8	6	7	-9	104	73	68
-8	-1	-10	84	126	84	-2	6	-10	165	184	16	-7	-5	-9	91	123	33	1	0	-9	608	599	9	-2	8	-9	171	176	25
-7	-1	-10	591	564	21	-1	6	-10	306	297	16	-6	-5	-9	722	701	14	2	0	-9	114	149	18	-1	8	-9	397	389	19
-6	-1	-10	666	646	21	0	6	-10	586	544	21	-5	-5	-9	731	722	12	3	0	-9	161	163	5	0	8	-9	150	183	26
-5	-1	-10	278	281	5	1	6	-10	327	349	17	-4	-5	-9	380	363	9	4	0	-9	637	592	15	1	8	-9	134	154	29
-4	-1	-10	580	572	11	2	6	-10	0	81	1	-3	-5	-9	193	200	13	5	0	-9	376	416	25	2	8	-9	393	350	21
-3	-1	-10	872	843	11	3	6	-10	479	466	23	-2	-5	-9	524	525	13	6	0	-9	55	26	54	3	8	-9	275	282	27
-2	-1	-10	618	610	10	4	6	-10	448	433	23	-1	-5	-9	441	443	12	7	0	-9	170	193	50	4	8	-9	82	32	81
-1	-1	-10	146	126	12	5	6	-10	134	144	47	0	-5	-9	98	78	68	-7	1	-9	414	393	20	5	8	-9	225	249	34
0	-1	-10	547	538	10	6	6	-10	61	115	61	1	-5	-9	478	477	14	-6	1	-9	118	73	46	-1	9	-9	100	21	59
1	-1	-10	602	584	17	-2	7	-10	338	331	18	2	-5	-9	492	460	15	-5	1	-9	401	426	17	0	9	-9	320	317	21
2	-1	-10	145	131	30	-1	7	-10	423	432	17	3	-5	-9	181	178	20	-4	1	-9	728	700	18	1	9	-9	337	352	23
3	-1	-10	208	241	26	0	7	-10	201	184	21	4	-5	-9	55	123	54	-3	1	-9	235	244	5	2	9	-9	146	130	38

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
4	-1	-10	498	495	22	1	7	-10	204	197	22	-11	-4	-9	185	211	21	-2	1	-9	293	277	7	3	9	-9	236	212	34
5	-1	-10	282	318	25	2	7	-10	395	372	22	-10	-4	-9	354	367	16	-1	1	-9	608	591	9	-6	-11	-8	0	36	1
6	-1	-10	0	22	1	3	7	-10	282	271	24	-9	-4	-9	102	109	23	0	1	-9	480	491	8	-5	-11	-8	153	163	37
-8	0	-10	423	428	24	4	7	-10	0	75	1	-8	-4	-9	293	294	13	1	1	-9	156	163	11	-4	-11	-8	281	219	25
-7	0	-10	311	328	20	5	7	-10	318	290	29	-7	-4	-9	546	540	13	2	1	-9	710	714	13	-3	-11	-8	68	37	67
-6	0	-10	223	203	24	-1	8	-10	0	17	1	-6	-4	-9	575	564	11	3	1	-9	773	761	9	-8	-10	-8	108	42	67
-5	0	-10	622	615	19	0	8	-10	326	282	21	-5	-4	-9	87	92	15	4	1	-9	338	330	18	-7	-10	-8	219	248	21
-4	0	-10	643	628	8	1	8	-10	247	239	23	-4	-4	-9	455	444	10	5	1	-9	250	217	21	-6	-10	-8	354	376	15
-3	0	-10	438	451	9	2	8	-10	0	37	1	-3	-4	-9	668	648	11	6	1	-9	520	462	23	-5	-10	-8	192	222	30
-2	0	-10	244	235	7	3	8	-10	259	259	25	-2	-4	-9	245	272	10	7	1	-9	302	265	35	-4	-10	-8	41	106	40
-1	0	-10	579	576	9	4	8	-10	310	323	27	-1	-4	-9	309	323	11	-5	2	-9	548	565	17	-3	-10	-8	329	339	19
0	0	-10	277	276	9	0	9	-10	191	139	32	0	-4	-9	536	528	13	-4	2	-9	96	137	42	-2	-10	-8	237	252	26
1	0	-10	340	348	11	1	9	-10	127	158	43	1	-4	-9	311	321	12	-3	2	-9	340	333	15	-1	-10	-8	29	63	28
2	0	-10	615	605	20	-7	-10	-9	192	196	21	2	-4	-9	68	90	48	-2	2	-9	807	798	13	0	-10	-8	238	229	23
3	0	-10	491	468	21	-6	-10	-9	96	91	50	3	-4	-9	405	394	14	-1	2	-9	121	113	10	-9	-9	-8	61	131	61
4	0	-10	0	29	1	-5	-10	-9	275	260	23	4	-4	-9	298	300	27	0	2	-9	444	449	8	-8	-9	-8	414	401	18
6	0	-10	351	402	31	-4	-10	-9	311	326	20	5	-4	-9	55	118	54	1	2	-9	753	743	11	-7	-9	-8	304	327	14
-7	1	-10	278	273	23	-3	-10	-9	0	49	1	-10	-3	-9	102	49	34	2	2	-9	564	559	11	-6	-9	-8	71	43	71
-6	1	-10	586	601	22	-2	-10	-9	157	184	54	-9	-3	-9	433	427	13	3	2	-9	65	99	29	-5	-9	-8	234	219	22
-5	1	-10	349	340	18	-1	-10	-9	260	284	26	-8	-3	-9	414	427	13	4	2	-9	449	415	11	-4	-9	-8	447	434	17
-4	1	-10	259	235	17	-9	-9	-9	216	240	26	-7	-3	-9	235	223	11	5	2	-9	412	427	21	-3	-9	-8	243	223	21
-3	1	-10	522	517	7	-8	-9	-9	0	30	1	-6	-3	-9	234	226	11	6	2	-9	208	226	26	-2	-9	-8	46	134	45
-2	1	-10	662	649	10	-7	-9	-9	353	346	15	-5	-3	-9	646	631	10	7	2	-9	179	105	39	-1	-9	-8	335	357	20
-1	1	-10	65	65	23	-6	-9	-9	470	469	15	-4	-3	-9	540	528	11	-3	3	-9	667	648	19	0	-9	-8	318	329	20
1	-9	-8	126	75	42	-4	-3	-8	140	153	10	7	2	-8	302	282	30	-5	-10	-7	247	251	22	-6	-4	-7	665	631	11
-10	-8	-8	213	244	26	-3	-3	-8	550	546	9	8	2	-8	0	109	1	-4	-10	-7	313	317	20	-5	-4	-7	282	281	8
-9	-8	-8	408	380	17	-2	-3	-8	193	191	7	-3	3	-8	463	453	15	-3	-10	-7	100	96	50	-4	-4	-7	357	364	8
-8	-8	-8	280	280	18	-1	-3	-8	282	283	8	-2	3	-8	790	769	11	-2	-10	-7	245	260	24	-3	-4	-7	779	774	11
-7	-8	-8	76	127	76	0	-3	-8	852	829	13	-1	3	-8	616	607	8	-1	-10	-7	401	365	21	-2	-4	-7	392	405	8
-6	-8	-8	499	474	13	1	-3	-8	760	723	13	0	3	-8	152	150	7	0	-10	-7	310	294	22	-1	-4	-7	250	254	8
-5	-8	-8	451	442	15	2	-3	-8	0	30	1	1	3	-8	839	843	9	-9	-9	-7	277	289	22	0	-4	-7	650	627	17
-4	-8	-8	217	236	18	3	-3	-8	383	385	12	2	3	-8	841	818	9	-8	-9	-7	204	222	24	1	-4	-7	556	535	12
-3	-8	-8	306	272	15	4	-3	-8	515	504	15	3	3	-8	219	207	7	-7	-9	-7	108	176	31	2	-4	-7	172	152	16
-2	-8	-8	371	357	16	5	-3	-8	245	260	16	4	3	-8	255	239	19	-6	-9	-7	425	421	13	3	-4	-7	319	302	12
-1	-8	-8	244	209	18	6	-3	-8	116	112	69	5	3	-8	436	428	19	-5	-9	-7	276	258	20	4	-4	-7	442	415	13
0	-8	-8	98	112	44	-10	-2	-8	0	31	1	6	3	-8	263	270	23	-4	-9	-7	112	88	29	5	-4	-7	104	79	32
1	-8	-8	333	275	17	-9	-2	-8	358	329	11	7	3	-8	162	101	52	-3	-9	-7	408	391	17	6	-4	-7	204	210	24
2	-8	-8	212	209	27	-8	-2	-8	560	570	13	8	3	-8	165	274	49	-2	-9	-7	483	484	17	-11	-3	-7	238	230	22
3	-8	-8	0	18	1	-7	-2	-8	372	376	9	-3	4	-8	639	652	10	-1	-9	-7	221	237	21	-10	-3	-7	74	47	44
-10	-7	-8	289	260	18	-6	-2	-8	98	98	11	-2	4	-8	272	282	11	0	-9	-7	96	146	50	-9	-3	-7	502	499	13
-9	-7	-8	35	23	35	-5	-2	-8	817	793	11	-1	4	-8	700	682	12	1	-9	-7	294	304	22	-8	-3	-7	689	668	13
-8	-7	-8	395	393	16	-4	-2	-8	691	680	9	0	4	-8	672	670	11	2	-9	-7	282	268	24	-7	-3	-7	557	558	9
-7	-7	-8	520	493	15	-3	-2	-8	0	45	1	1	4	-8	503	481	9	-10	-8	-7	226	235	35	-6	-3	-7	100	101	13
-6	-7	-8	316	324	11	-2	-2	-8	699	714	10	2	4	-8	35	36	35	-9	-8	-7	0	85	1	-5	-3	-7	751	736	10
-5	-7	-8	106	105	24	-1	-2	-8	729	735	12	3	4	-8	514	504	13	-8	-8	-7	389	405	17	-4	-3	-7	557	564	9
-4	-7	-8	499	467	13	0	-2	-8	478	474	12	4	4	-8	529	504	21	-7	-8	-7	552	531	12	-3	-3	-7	50	81	29
-3	-7	-8	352	341	14	1	-2	-8	307	302	8	5	4	-8	106	62	45	-6	-8	-7	211	224	14	-2	-3	-7	749	758	10
-2	-7	-8	98	118	30	2	-2	-8	900	864	15	6	4	-8	293	321	23	-5	-8	-7	153	188	22	-1	-3	-7	804	790	11
-1	-7	-8	467	443	15	3	-2	-8	725	721	14	7	4	-8	311	377	27	-4	-8	-7	516	498	15	0	-3	-7	282	295	8
0	-7	-8	588	560	16	4	-2	-8	195	203	15	8	4	-8	160	103	51	-3	-8	-7	456	438	15	1	-3	-7	291	286	10
1	-7	-8	315	303	16	5	-2	-8	188	192	16	-3	5	-8	116	123	13	-2	-8	-7	71	77	71	2	-3	-7	775	745	13
2	-7	-8	123	124	35	6	-2	-8	374	377	28	-2	5	-8	397	409	13	-1	-8	-7	344	360	15	3	-3	-7	546	537	13
3	-7	-8	375	374	19	-9	-1	-8	324	313	12	-1	5	-8	559	531	12	0	-8	-7	474	477	17	4	-3	-7	29	23	28
4	-7	-8	213	220	39	-8	-1	-8	106	125	12	0	5	-8	401	389	11	1	-8	-7	179	206	23	5	-3	-7	304	351	14
-10	-6	-8	126	131	25	-7	-1	-8	633	645	9	1	5	-8	610	618	13	2	-8	-7	82	108	81	6	-3	-7	398	386	17
-9	-6	-8	396	388	15	-6	-1	-8	889	896	11	2	5	-8	749	775	20	3	-8	-7	284	259	22	7	-3	-7	89	193	89
-8	-6	-8	351	356	15	-5	-1	-8	607	607	8	3	5	-8	401	405	17	-10	-7	-7	230	248	21	-11	-2	-7	129	139	39
-7	-6	-8	58	29	57	-4	-1	-8	300	294	8	4	5	-8	205	223	27	-9	-7	-7	489	456	16	-10	-2	-7	332	368	19
-6	-6	-8	507	474	14	-3	-1	-8	900	901	11	5	5	-8	524	506	23	-8	-7	-7	521	471	15	-9	-2	-7	449	435	14
-5	-6	-8	493	484	14	-2	-1	-8	821	800	11	6	5	-8	341	375	27	-7	-7	-7	94	95	36	-8	-2	-7	102	139	19
-4	-6	-8	214	226	14	-1	-1	-8	89	95	12	7	5	-8	0	59	1	-6	-7	-7	295	281	11	-7	-2	-7	544	511	9
-3	-6	-8	412	416	12	0	-1	-8	764	752	11	-3	6	-8	399	383	17	-5	-7	-7	352	353	13	-6	-2	-7	686	678	9
-2	-6	-8	634	616	14	1	-1	-8	1076	1066	15	-2	6	-8	164	153	16	-4	-7	-7	221	220	14	-5	-2	-7	425	421	7
-1	-6	-8	386	340	12	2	-1	-8	393	409	5	-1	6	-8	290	266	15	-3	-7	-7	478	450	13	-4	-2	-7	496	486	7
0	-6	-8	162	173	17	3	-1	-8	46	34	25	0	6	-8	784	726	22	-2	-7	-7	637	600	14	-3	-2	-7	814	813	10
1	-6	-8	637	575	15	4	-1	-8	633	615	13	1	6	-8	491	495	17	-1	-7	-7	284	279	15	-2	-2	-7	567	549	7
2	-6	-8	638	582	17	5	-1	-8	350	329	18	2	6	-8	0	33	1	0	-7	-7	119	140	32	-1	-2	-7	136	133	7
3	-6	-8	258	266	17	6	-1	-8	0	5	1	3	6	-8	528	525	20	1	-7	-7	511	447	17	0	-2	-7	1096	1076	12
4	-6	-8	108	119	47	7	-1	-8	162	210	45	4	6	-8	621	587	21	2	-7	-7	487	436	17	1	-2	-7	1062	1066	13
5	-6	-8	196	230	46	-7	0	-8	521	499	19	5	6	-8	234	261	24	3	-7	-7	129	84	35	2	-2	-7	465	442	10
-11	-5	-8	206	233	21	-6	0	-8	0	27	1	6	6	-8	29	94	28	4	-7	-7	211	198	27	3	-2	-7	314	318	11
-10	-5	-8	295	304	16	-5	0	-8	570	554	17	-3	7	-8	0	40	1	-11	-6	-7	300	298	27	4	-2	-7	658	658	14
-9	-5	-8	0	33	1	-4	0	-8	925	911	20	-2	7	-8	411	385	16	-10	-6	-7	308	330	17	5	-2	-7	399	379	14
-8	-5	-8	438	416	14	-3	0	-8	397	404	7	-1	7	-8	595	581	18	-9	-6	-7	94	95	36	6	-2	-7	41	30	40
-7	-5	-8	614	607	14	-2	0	-8	247	231	6	0	7	-8	201	194	21	-8	-6	-7	314	292	13	7	-2	-7	301	326	29
-6	-5	-8	614	580	11	-1	0	-8	766	760	10	1	7	-8	293	279	20	-7	-6	-7	674	630	15	-10	-1	-7	127	98	21
-5	-5	-8	89	100	18	0	0	-8	738	707	9	2	7	-8	612	584	21	-6	-6	-7	442	428	12	-9	-1	-7	219	248	16
-4	-5	-8	549	527	9	1	0	-8	150	150	10	3	7	-8	544	491	21	-5	-6	-7	201	197	12	-8	-1	-7	731	709	15
-3	-5	-8	718	718	13	2	0	-8	715	687	13	4	7	-8	110	134	45	-4	-6	-7	422	411	12	-7	-1	-7	346	357	10

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
-2	-5	-8	294	286	10	3	0	-8	400	396	10	5	7	-8	191	196	38	-3	-6	-7	530	515	13	-6	-1	-7	127	120	6
-1	-5	-8	421	424	11	4	0	-8	412	419	11	6	7	-8	283	298	31	-2	-6	-7	100	94	20	-5	-1	-7	718	705	9
0	-5	-8	689	674	14	5	0	-8	314	324	13	7	7	-8	84	113	84	-1	-6	-7	570	565	13	-4	-1	-7	793	791	12
1	-5	-8	532	520	13	6	0	-8	489	498	17	-3	8	-8	431	408	19	0	-6	-7	883	827	16	-3	-1	-7	247	245	5
2	-5	-8	76	16	40	7	0	-8	224	253	35	-2	8	-8	305	327	19	1	-6	-7	549	506	14	-2	-1	-7	875	886	9
3	-5	-8	343	342	16	-6	1	-8	657	620	21	-1	8	-8	0	31	1	2	-6	-7	29	37	28	-1	-1	-7	1245	1243	12
4	-5	-8	308	319	16	-5	1	-8	632	661	19	0	8	-8	377	367	18	3	-6	-7	429	425	16	0	-1	-7	1111	1076	14
5	-5	-8	0	119	1	-4	1	-8	271	274	13	1	8	-8	416	398	19	4	-6	-7	340	332	17	1	-1	-7	74	95	24
-11	-4	-8	126	164	25	-3	1	-8	563	560	6	2	8	-8	176	195	28	5	-6	-7	114	130	43	2	-1	-7	700	688	9
-10	-4	-8	79	66	78	-2	1	-8	572	576	10	3	8	-8	199	188	27	-11	-5	-7	74	74	73	3	-1	-7	478	455	10
-9	-4	-8	587	576	16	-1	1	-8	142	135	7	4	8	-8	435	419	25	-10	-5	-7	79	110	50	4	-1	-7	379	389	11
-8	-4	-8	568	576	15	0	1	-8	575	575	8	5	8	-8	243	235	29	-9	-5	-7	524	483	15	5	-1	-7	194	219	14
-7	-4	-8	223	210	12	1	1	-8	939	912	12	6	8	-8	0	85	1	-8	-5	-7	527	504	14	6	-1	-7	427	442	15
-6	-4	-8	310	284	11	2	1	-8	526	528	10	-2	9	-8	179	222	26	-7	-5	-7	50	40	49	7	-1	-7	241	237	33
-5	-4	-8	743	732	11	3	1	-8	91	89	7	-1	9	-8	321	300	22	-6	-5	-7	419	405	10	8	-1	-7	139	96	59
-4	-4	-8	527	525	9	4	1	-8	473	462	10	0	9	-8	189	176	28	-5	-5	-7	732	714	11	-9	0	-7	427	435	18
-3	-4	-8	106	105	14	5	1	-8	508	486	13	1	9	-8	150	148	29	-4	-5	-7	296	288	7	-8	0	-7	183	183	14
-2	-4	-8	560	548	9	6	1	-8	118	64	63	2	9	-8	418	408	23	-3	-5	-7	307	291	9	-7	0	-7	444	455	9
-1	-4	-8	633	619	12	7	1	-8	219	258	36	3	9	-8	368	383	22	-2	-5	-7	929	894	14	-6	0	-7	680	696	8
0	-4	-8	76	69	26	8	1	-8	310	339	25	4	9	-8	129	117	74	-1	-5	-7	753	744	14	-5	0	-7	705	714	18
1	-4	-8	397	387	11	-5	2	-8	432	447	17	5	9	-8	238	243	34	0	-5	-7	124	124	20	-4	0	-7	0	54	1
2	-4	-8	579	572	14	-4	2	-8	701	717	19	1	10	-8	394	388	24	1	-5	-7	504	505	12	-3	0	-7	840	834	9
3	-4	-8	370	348	14	-3	2	-8	365	361	13	2	10	-8	229	219	26	2	-5	-7	661	636	15	-2	0	-7	892	896	9
4	-4	-8	110	104	28	-2	2	-8	212	213	7	-7	11	-7	100	160	54	3	-5	-7	320	314	15	-1	0	-7	201	205	6
6	-4	-8	260	289	33	-1	2	-8	809	817	10	-6	11	-7	257	282	27	4	-5	-7	110	139	33	0	0	-7	211	239	7
-11	-3	-8	160	183	30	0	2	-8	1007	985	11	-5	11	-7	146	177	36	5	-5	-7	280	267	21	1	0	-7	1012	977	12
-10	-3	-8	383	364	15	1	2	-8	313	319	5	-4	11	-7	0	124	1	6	-5	-7	280	285	37	2	0	-7	630	637	7
-9	-3	-8	353	329	13	2	2	-8	540	531	7	-3	11	-7	281	263	25	-11	-4	-7	267	282	24	3	0	-7	214	219	5
-8	-3	-8	234	219	12	3	2	-8	839	833	11	-2	11	-7	162	210	43	-10	-4	-7	454	426	16	4	0	-7	419	417	7
-7	-3	-8	580	573	12	4	2	-8	689	701	13	-8	10	-7	234	278	19	-9	-4	-7	314	319	13	5	0	-7	432	438	13
-6	-3	-8	801	774	11	5	2	-8	0	72	1	-7	10	-7	277	249	18	-8	-4	-7	256	246	14	6	0	-7	94	49	29
-5	-3	-8	380	382	8	6	2	-8	277	291	26	-6	10	-7	100	54	38	-7	-4	-7	689	676	13	7	0	-7	354	348	17
8	0	-7	327	373	39	4	7	-7	515	493	22	2	-7	-6	98	119	36	-1	-2	-6	1224	1211	13	-5	3	-6	439	445	6
-8	1	-7	428	470	13	5	7	-7	306	291	24	3	-7	-6	399	403	18	0	-2	-6	879	846	10	-3	3	-6	571	582	8
-6	1	-7	260	274	18	6	7	-7	20	47	20	4	-7	-6	213	223	22	1	-2	-6	192	199	8	-2	3	-6	1124	1101	16
-5	1	-7	325	313	15	7	7	-7	329	322	27	5	-7	-6	114	24	113	2	-2	-6	704	673	12	-1	3	-6	788	803	8
-4	1	-7	728	718	18	-3	8	-7	104	129	32	-11	-6	-6	121	119	47	3	-2	-6	698	690	13	0	3	-6	110	110	8
-3	1	-7	263	292	13	-2	8	-7	245	256	16	-10	-6	-6	100	131	32	4	-2	-6	114	109	27	1	3	-6	875	891	9
-2	1	-7	560	538	9	-1	8	-7	557	513	20	-9	-6	-6	427	400	14	5	-2	-6	338	348	13	2	3	-6	969	961	10
-1	1	-7	949	927	11	0	8	-7	388	385	19	-8	-6	-6	403	391	13	6	-2	-6	461	465	15	3	3	-6	375	365	5
0	1	-7	933	928	11	1	8	-7	89	101	47	-7	-6	-6	142	159	20	7	-2	-6	258	285	19	4	3	-6	308	300	11
1	1	-7	320	319	6	2	8	-7	350	335	22	-6	-6	-6	383	362	13	8	-2	-6	35	49	35	5	3	-6	626	664	19
2	1	-7	496	506	7	3	8	-7	397	375	23	-5	-6	-6	417	399	9	-11	-1	-6	146	143	33	6	3	-6	493	472	18
3	1	-7	659	640	11	4	8	-7	55	88	54	-4	-6	-6	65	82	64	-10	-1	-6	364	339	17	7	3	-6	0	22	1
4	1	-7	403	391	11	5	8	-7	208	254	29	-3	-6	-6	403	417	11	-9	-1	-6	470	456	15	8	3	-6	272	259	31
5	1	-7	278	283	11	6	8	-7	310	289	29	-2	-6	-6	908	855	15	-8	-1	-6	152	162	12	9	3	-6	223	293	36
6	1	-7	489	481	13	7	8	-7	0	135	1	-1	-6	-6	566	533	12	-7	-1	-6	355	357	8	-6	4	-6	394	417	14
7	1	-7	344	360	15	-3	9	-7	214	251	24	0	-6	-6	50	18	49	-6	-1	-6	579	582	8	-5	4	-6	20	46	20
8	1	-7	139	126	57	-2	9	-7	253	278	21	1	-6	-6	685	650	15	-5	-1	-6	338	331	7	-4	4	-6	626	612	11
-4	2	-7	65	90	44	-1	9	-7	0	33	1	2	-6	-6	700	616	16	-4	-1	-6	795	780	9	-3	4	-6	718	733	11
-3	2	-7	540	575	16	0	9	-7	335	315	21	3	-6	-6	252	266	17	-3	-1	-6	1139	1115	11	-2	4	-6	282	268	7
-2	2	-7	692	689	9	1	9	-7	431	392	23	4	-6	-6	201	198	23	-2	-1	-6	1169	1169	11	-1	4	-6	481	457	8
-1	2	-7	306	300	5	2	9	-7	206	234	29	5	-6	-6	328	345	22	-1	-1	-6	172	188	5	0	4	-6	817	815	11
0	2	-7	522	517	6	3	9	-7	91	138	91	-11	-5	-6	289	297	24	0	-1	-6	538	523	7	1	4	-6	783	766	11
1	2	-7	1318	1292	13	4	9	-7	355	344	24	-10	-5	-6	386	365	15	1	-1	-6	1121	1116	13	2	4	-6	50	64	29
2	2	-7	950	948	9	5	9	-7	309	296	27	-9	-5	-6	249	269	14	2	-1	-6	759	757	11	3	4	-6	315	318	10
3	2	-7	159	165	7	6	9	-7	55	60	54	-8	-5	-6	169	190	15	3	-1	-6	68	78	22	4	4	-6	338	333	11
4	2	-7	221	243	11	-1	10	-7	296	292	22	-7	-5	-6	569	563	11	4	-1	-6	583	571	11	5	4	-6	50	90	49
5	2	-7	677	686	22	0	10	-7	305	285	25	-6	-5	-6	421	406	9	5	-1	-6	450	453	19	6	4	-6	503	487	20
6	2	-7	223	243	23	1	10	-7	41	56	40	-5	-5	-6	0	69	1	6	-1	-6	106	107	24	7	4	-6	461	472	22
7	2	-7	165	167	33	2	10	-7	324	335	25	-4	-5	-6	614	605	10	7	-1	-6	256	289	18	8	4	-6	250	253	31
8	2	-7	340	301	29	3	10	-7	399	421	26	-3	-5	-6	946	940	13	8	-1	-6	335	361	18	9	4	-6	0	28	1
-2	3	-7	0	29	1	4	10	-7	230	185	38	-2	-5	-6	372	374	10	-10	0	-6	171	191	20	-6	5	-6	186	192	14
-1	3	-7	877	877	9	-7	11	-6	253	265	25	-1	-5	-6	345	365	11	-9	0	-6	185	165	19	-5	5	-6	450	463	14
0	3	-7	1124	1107	11	-6	11	-6	0	24	1	0	-5	-6	562	546	13	-8	0	-6	585	573	20	-3	5	-6	155	147	10
1	3	-7	643	657	7	-5	11	-6	245	218	25	1	-5	-6	532	506	12	-7	0	-6	465	486	17	-2	5	-6	549	537	11
2	3	-7	65	69	10	-4	11	-6	281	264	21	2	-5	-6	35	65	35	-6	0	-6	175	170	5	-1	5	-6	635	625	12
3	3	-7	571	561	8	-3	11	-6	89	49	89	3	-5	-6	331	345	14	-5	0	-6	379	401	6	0	5	-6	157	151	10
4	3	-7	609	594	13	-2	11	-6	184	186	31	4	-5	-6	448	433	16	-4	0	-6	1048	1060	21	1	5	-6	342	330	11
5	3	-7	194	189	21	-1	11	-6	270	297	27	5	-5	-6	160	146	25	-3	0	-6	368	387	5	2	5	-6	691	690	14
6	3	-7	348	314	22	-8	10	-6	84	153	84	6	-5	-6	150	168	32	-2	0	-6	442	426	7	3	5	-6	445	455	15
7	3	-7	398	389	21	-7	10	-6	0	97	1	-11	-4	-6	274	222	26	-1	0	-6	1254	1233	11	4	5	-6	221	239	19
8	3	-7	0	123	1	-6	10	-6	297	288	21	-10	-4	-6	121	112	29	0	0	-6	973	967	8	5	5	-6	571	568	21
-3	4	-7	331	336	7	-5	10	-6	110	136	42	-9	-4	-6	487	464	13	1	0	-6	383	363	7	6	5	-6	438	445	21
-2	4	-7	720	725	15	-4	10	-6	91	130	70	-8	-4	-6	612	604	14	2	0	-6	283	280	4	7	5	-6	29	72	28
-1	4	-7	830	818	11	-3	10	-6	326	323	19	-7	-4	-6	360	348	11	3	0	-6	506	486	6	8	5	-6	224	252	29
0	4	-7	0	51	1	-2	10	-6	395	378	19	-6	-4	-6	269	274	8	4	0	-6	223	219	6	-5	6	-6	126	123	19
1	4	-7	725	695	11	-1	10	-6	123	124	43	-5	-4	-6	817	792	11	5	0	-6	356	361	9	-4	6	-6	307	307	13
2	4	-7	755	759	11	0	10	-6	226	236	26	-4	-4	-6	625	648	8	6	0	-6	479	468	13	-3	6	-6	450	415	15

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
3	4	-7	315	327	11	1	-10	-6	300	289	25	-3	-4	-6	0	48	1	7	0	-6	315	327	15	-2	6	-6	302	291	13
4	4	-7	162	193	14	-9	-9	-6	74	63	73	-2	-4	-6	960	939	12	8	0	-6	46	34	45	-1	6	-6	114	111	13
5	4	-7	593	557	20	-8	-9	-6	278	268	18	-1	-4	-6	1020	1017	13	-9	1	-6	494	517	19	0	6	-6	833	800	15
6	4	-7	262	244	23	-7	-9	-6	316	331	14	0	-4	-6	628	600	11	-8	1	-6	423	422	15	1	6	-6	489	473	12
7	4	-7	164	87	32	-6	-9	-6	0	47	1	1	-4	-6	0	67	1	-7	1	-6	0	67	1	2	6	-6	87	45	51
8	4	-7	297	342	32	-5	-9	-6	329	335	17	2	-4	-6	448	455	12	-6	1	-6	391	403	7	3	6	-6	382	399	17
-5	5	-7	199	196	9	-4	-9	-6	517	501	17	3	-4	-6	333	323	13	-5	1	-6	511	541	15	4	6	-6	636	602	21
-4	5	-7	348	346	13	-3	-9	-6	312	330	18	4	-4	-6	104	136	30	-4	1	-6	172	163	16	5	6	-6	358	349	18
-3	5	-7	359	326	12	-2	-9	-6	98	122	44	5	-4	-6	338	360	15	-3	1	-6	625	676	15	6	6	-6	165	161	30
-2	5	-7	65	61	23	-1	-9	-6	461	439	17	6	-4	-6	318	345	19	-2	1	-6	819	860	9	7	6	-6	404	424	25
-1	5	-7	314	301	9	0	-9	-6	527	474	18	7	-4	-6	71	134	71	-1	1	-6	383	393	6	8	6	-6	423	435	29
0	5	-7	763	755	14	1	-9	-6	89	122	67	-11	-3	-6	256	218	21	0	1	-6	126	133	6	-5	7	-6	322	330	19
1	5	-7	399	424	11	2	-9	-6	134	92	34	-10	-3	-6	514	465	21	1	1	-6	972	922	9	-4	7	-6	405	381	14
2	5	-7	68	72	26	-10	-8	-6	327	268	25	-9	-3	-6	540	550	14	2	1	-6	601	613	8	-3	7	-6	0	57	1
3	5	-7	573	573	19	-9	-8	-6	456	457	17	-8	-3	-6	61	31	61	3	1	-6	110	101	12	-2	7	-6	447	438	17
4	5	-7	461	462	19	-8	-8	-6	313	340	18	-7	-3	-6	504	495	9	4	1	-6	325	330	10	-1	7	-6	757	750	21
5	5	-7	150	140	27	-7	-8	-6	61	43	61	-6	-3	-6	600	604	11	5	1	-6	763	770	15	0	7	-6	659	645	18
6	5	-7	315	324	24	-6	-8	-6	368	366	11	-5	-3	-6	445	416	7	6	1	-6	155	150	25	1	7	-6	161	174	26
7	5	-7	454	460	25	-5	-8	-6	392	398	14	-4	-3	-6	485	465	7	7	1	-6	296	293	15	2	7	-6	455	425	17
-4	6	-7	316	306	13	-4	-8	-6	196	190	16	-3	-3	-6	682	681	7	8	1	-6	403	402	16	3	7	-6	527	537	21
-3	6	-7	98	98	18	-3	-8	-6	386	379	15	-2	-3	-6	549	556	8	9	1	-6	245	282	32	4	7	-6	162	146	25
-2	6	-7	504	490	16	-2	-8	-6	645	612	16	-1	-3	-6	140	118	7	-8	2	-6	296	300	13	5	7	-6	242	240	21
-1	6	-7	581	588	17	-1	-8	-6	293	300	15	0	-3	-6	726	718	10	-7	2	-6	590	622	18	6	7	-6	424	417	23
0	6	-7	68	56	26	0	-8	-6	84	57	49	1	-3	-6	716	700	12	-6	2	-6	320	327	6	7	7	-6	271	197	33
1	6	-7	445	453	13	1	-8	-6	357	321	16	2	-3	-6	194	201	12	-4	2	-6	654	650	17	8	7	-6	168	87	54
2	6	-7	738	741	21	2	-8	-6	291	320	19	3	-3	-6	452	437	12	-3	2	-6	554	554	15	-4	8	-6	168	168	26
3	6	-7	589	613	19	3	-8	-6	58	27	57	4	-3	-6	547	559	14	-2	2	-6	362	344	5	-3	8	-6	463	457	20
4	6	-7	91	71	40	4	-8	-6	226	199	29	5	-3	-6	255	255	15	-1	2	-6	930	935	9	-2	8	-6	440	432	19
5	6	-7	423	394	21	-10	-7	-6	381	376	16	6	-3	-6	55	80	54	0	2	-6	1107	1122	11	-1	8	-6	118	82	35
6	6	-7	430	412	21	-9	-7	-6	148	132	24	7	-3	-6	388	391	16	1	2	-6	778	774	8	0	8	-6	359	366	19
7	6	-7	133	163	55	-8	-7	-6	193	215	18	-11	-2	-6	272	261	22	2	2	-6	565	549	7	1	8	-6	557	530	21
8	6	-7	234	121	40	-7	-7	-6	681	665	16	-10	-2	-6	127	143	34	3	2	-6	886	875	11	2	8	-6	316	342	20
-4	7	-7	336	316	15	-6	-7	-6	385	380	11	-9	-2	-6	168	160	18	4	2	-6	412	407	10	3	8	-6	0	32	1
-3	7	-7	419	421	19	-5	-7	-6	166	185	19	-8	-2	-6	664	630	13	5	2	-6	238	244	13	4	8	-6	414	399	21
-2	7	-7	371	335	15	-4	-7	-6	439	435	13	-7	-2	-6	421	407	7	6	2	-6	496	470	19	5	8	-6	276	237	27
-1	7	-7	74	116	38	-3	-7	-6	526	529	14	-6	-2	-6	100	113	8	7	2	-6	451	472	23	6	8	-6	61	54	61
0	7	-7	746	701	19	-2	-7	-6	76	34	48	-5	-2	-6	550	553	8	8	2	-6	173	235	36	7	8	-6	301	303	30
1	7	-7	555	521	20	-1	-7	-6	416	422	13	-4	-2	-6	764	742	9	9	2	-6	192	101	53	-3	9	-6	104	106	54
2	7	-7	319	326	20	0	-7	-6	566	537	15	-3	-2	-6	87	94	10	-7	3	-6	0	21	1	-2	9	-6	96	121	37
3	7	-7	183	182	24	1	-7	-6	316	316	15	-2	-2	-6	876	891	9	-6	3	-6	482	479	9	-1	9	-6	389	396	22
0	9	-6	381	375	22	-1	-6	-5	430	420	13	-10	-1	-5	269	278	20	1	3	-5	724	754	9	7	8	-5	212	220	29
1	9	-6	0	77	1	0	-6	-5	526	516	13	-9	-1	-5	50	33	49	2	3	-5	236	239	7	8	8	-5	155	62	68
2	9	-6	289	237	20	1	-6	-5	447	442	13	-8	-1	-5	517	531	19	3	3	-5	709	716	10	-4	9	-5	98	24	68
3	9	-6	311	356	23	2	-6	-5	121	139	22	-7	-1	-5	214	201	7	4	3	-5	730	711	14	-3	9	-5	342	362	22
4	9	-6	50	72	49	3	-6	-5	454	459	14	-6	-1	-5	79	92	11	5	3	-5	357	364	15	-2	9	-5	384	347	21
5	9	-6	255	281	30	4	-6	-5	395	388	16	-5	-1	-5	522	508	7	6	3	-5	500	485	18	-1	9	-5	208	226	24
6	9	-6	383	357	27	5	-6	-5	181	166	23	-4	-1	-5	1122	1126	11	7	3	-5	491	486	19	0	9	-5	150	189	27
-1	10	-6	110	69	49	6	-6	-5	142	158	31	-3	-1	-5	419	429	5	8	3	-5	247	249	25	1	9	-5	450	471	22
0	10	-6	219	224	34	-11	-5	-5	252	275	33	-2	-1	-5	553	580	6	9	3	-5	0	69	1	2	9	-5	172	188	35
1	10	-6	454	420	25	-10	-5	-5	84	46	43	-1	-1	-5	1528	1506	16	-8	4	-5	333	298	17	3	9	-5	0	40	1
2	10	-6	256	259	23	-9	-5	-5	284	301	15	0	-1	-5	1227	1216	13	-7	4	-5	100	74	29	4	9	-5	362	351	24
3	10	-6	0	11	1	-8	-5	-5	419	396	12	1	-1	-5	212	202	5	-6	4	-5	383	378	15	5	9	-5	322	336	25
4	10	-6	318	294	31	-7	-5	-5	116	87	15	2	-1	-5	489	483	8	-5	4	-5	667	652	20	6	9	-5	68	69	67
5	10	-6	319	340	29	-6	-5	-5	644	600	11	3	-1	-5	759	753	11	-4	4	-5	419	409	13	7	9	-5	232	225	34
-7	11	-5	0	95	1	-5	-5	-5	771	738	9	4	-1	-5	323	346	7	-3	4	-5	369	373	11	-2	10	-5	0	83	1
-6	11	-5	256	269	23	-4	-5	-5	467	420	9	5	-1	-5	271	270	12	-2	4	-5	1101	1093	15	-1	10	-5	332	302	24
-5	11	-5	211	179	27	-3	-5	-5	94	102	14	6	-1	-5	516	482	14	-1	4	-5	1040	1032	13	0	10	-5	324	340	25
-4	11	-5	0	82	1	-2	-5	-5	1063	1008	14	7	-1	-5	394	378	15	0	4	-5	616	599	9	1	10	-5	89	77	61
-3	11	-5	247	261	25	-1	-5	-5	1052	984	16	8	-1	-5	108	42	43	1	4	-5	118	110	11	2	10	-5	265	281	25
-2	11	-5	225	244	24	0	-5	-5	406	394	11	-10	0	-5	333	297	18	2	4	-5	837	820	12	3	10	-5	402	393	26
-1	11	-5	79	74	78	1	-5	-5	223	211	12	-9	0	-5	498	507	22	3	4	-5	298	312	10	4	10	-5	216	253	30
0	11	-5	169	186	39	2	-5	-5	614	594	18	-8	0	-5	404	433	20	4	4	-5	234	255	12	5	10	-5	124	131	53
-9	10	-5	0	26	1	3	-5	-5	454	438	13	-7	0	-5	335	330	9	5	4	-5	507	506	17	6	10	-5	329	344	32
-8	10	-5	195	211	31	4	-5	-5	0	83	1	-6	0	-5	510	526	8	6	4	-5	610	629	21	1	11	-5	297	326	31
-7	10	-5	239	235	17	5	-5	-5	340	292	17	-5	0	-5	625	626	10	7	4	-5	0	65	1	2	11	-5	313	303	29
-6	10	-5	89	43	89	6	-5	-5	356	394	19	-4	0	-5	118	108	3	8	4	-5	294	265	24	3	11	-5	146	114	49
-5	10	-5	199	231	24	7	-5	-5	208	127	46	-3	0	-5	1151	1166	12	9	4	-5	273	326	30	-4	12	-4	0	84	1
-4	10	-5	406	378	17	-11	-4	-5	201	218	27	-2	0	-5	1309	1347	14	-7	5	-5	368	368	20	-7	11	-4	230	294	26
-3	10	-5	170	171	26	-10	-4	-5	435	444	23	-1	0	-5	720	706	7	-6	5	-5	460	460	19	-6	11	-4	126	108	43
-2	10	-5	0	75	1	-9	-4	-5	420	392	12	0	0	-5	140	135	7	-5	5	-5	156	142	12	-5	11	-4	206	191	29
-1	10	-5	362	352	22	-8	-4	-5	35	28	35	1	0	-5	763	755	7	-4	5	-5	312	308	13	-4	11	-4	287	302	22
0	10	-5	320	313	21	-7	-4	-5	439	430	11	2	0	-5	662	649	6	-3	5	-5	634	615	12	-3	11	-4	162	180	36
1	10	-5	0	45	1	-6	-4	-5	698	657	10	3	0	-5	145	132	7	-2	5	-5	496	495	11	-2	11	-4	29	61	28
-9	-9	-5	326	328	34	-5	-4	-5	123	127	10	4	0	-5	516	501	8	-1	5	-5	87	65	13	-1	11	-4	219	235	29
-8	-9	-5	186	181	20	-4	-4	-5	754	758	9	5	0	-5	610	597	9	0	5	-5	645	644	12	0	11	-4	232	224	27
-7	-9	-5	0	97	1	-3	-4	-5	1149	1130	13	6	0	-5	245	236	14	1	5	-5	584	591	11	-9	10	-4	270	267	34
-6	-9	-5	404	380	13	-2	-4	-5	1067	1063	12	7	0	-5	114	170	29	2	5	-5	65	64	23	-8	10	-4	118	181	40
-5	-9	-5	285	303	17	-1	-4	-5	46	65	45	8	0	-5	314	334	14	3	5	-5	520	522	16	-7	10	-4	0	102	1
-4	-9	-5	82	82	46	0	-4	-5	379	385	10	9	0	-5	208	214	21	4	5	-5	508	498	17	-6	10	-4	355	364	13

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
-3	-9	-5	428	423	17	1	-4	-5	633	622	12	-10	1	-5	284	274	21	5	5	-5	169	177	22	-5	-10	-4	320	320	18
-2	-9	-5	554	537	16	2	-4	-5	136	141	14	-9	1	-5	133	60	22	6	5	-5	278	281	20	-4	-10	-4	20	69	20
-1	-9	-5	356	333	16	3	-4	-5	266	273	13	-8	1	-5	355	374	16	7	5	-5	603	553	20	-3	-10	-4	265	273	22
0	-9	-5	82	43	81	4	-4	-5	505	507	14	-7	1	-5	792	752	17	8	5	-5	390	420	26	-2	-10	-4	253	274	21
1	-9	-5	325	337	19	5	-4	-5	142	153	28	-6	1	-5	357	354	11	9	5	-5	74	82	73	-1	-10	-4	165	193	29
2	-9	-5	287	285	22	6	-4	-5	110	87	33	-5	1	-5	296	294	5	-6	6	-5	181	155	20	0	-10	-4	173	189	25
3	-9	-5	71	95	71	7	-4	-5	310	328	21	-4	1	-5	918	945	18	-5	6	-5	437	435	17	1	-10	-4	348	361	21
-10	-8	-5	319	299	29	-11	-3	-5	409	371	24	-3	1	-5	670	691	17	-4	6	-5	511	490	16	2	-10	-4	206	225	32
-9	-8	-5	0	53	1	-10	-3	-5	0	61	1	-2	1	-5	388	372	5	-3	6	-5	20	20	20	-9	-9	-4	0	34	1
-8	-8	-5	286	301	16	-9	-3	-5	247	239	13	-1	1	-5	652	658	7	-2	6	-5	459	439	11	-8	-9	-4	328	265	31
-7	-8	-5	518	511	11	-8	-3	-5	702	670	14	0	1	-5	836	857	8	-1	6	-5	698	692	13	-7	-9	-4	277	286	14
-6	-8	-5	311	320	14	-7	-3	-5	550	554	10	1	1	-5	886	873	9	0	6	-5	511	500	11	-6	-9	-4	150	153	17
-5	-8	-5	283	289	15	-6	-3	-5	74	90	15	2	1	-5	612	621	7	1	6	-5	183	199	12	-5	-9	-4	268	303	20
-4	-8	-5	621	606	16	-5	-3	-5	723	702	8	3	1	-5	860	849	11	2	6	-5	652	641	13	-4	-9	-4	622	598	17
-3	-8	-5	667	657	15	-4	-3	-5	977	969	10	4	1	-5	259	246	9	3	6	-5	444	461	15	-3	-9	-4	567	551	17
-2	-8	-5	205	218	16	-3	-3	-5	274	251	5	5	1	-5	155	153	15	4	6	-5	55	48	54	-2	-9	-4	41	62	40
-1	-8	-5	349	338	14	-2	-3	-5	493	489	7	6	1	-5	536	541	20	5	6	-5	485	477	19	-1	-9	-4	317	333	18
0	-8	-5	461	405	16	-1	-3	-5	1000	1029	11	7	1	-5	570	583	22	6	6	-5	711	701	24	0	-9	-4	478	455	17
1	-8	-5	253	237	17	0	-3	-5	741	736	10	8	1	-5	217	235	18	7	6	-5	283	281	28	1	-9	-4	129	157	31
2	-8	-5	116	93	41	1	-3	-5	157	155	10	9	1	-5	143	159	32	8	6	-5	159	63	48	2	-9	-4	0	127	1
3	-8	-5	360	328	19	2	-3	-5	636	627	11	-9	2	-5	465	431	19	9	6	-5	257	280	34	3	-9	-4	324	346	23
4	-8	-5	235	230	27	3	-3	-5	556	560	12	-8	2	-5	414	428	16	-6	7	-5	277	302	21	-10	-8	-4	137	155	55
-10	-7	-5	196	183	32	4	-3	-5	0	25	1	-7	2	-5	84	76	19	-5	7	-5	29	71	28	-9	-8	-4	355	354	26
-9	-7	-5	431	420	15	5	-3	-5	450	462	13	-6	2	-5	467	463	12	-4	7	-5	293	313	18	-8	-8	-4	236	268	18
-8	-7	-5	364	357	13	6	-3	-5	427	398	14	-5	2	-5	491	487	7	-3	7	-5	719	704	23	-7	-8	-4	104	118	24
-7	-7	-5	159	140	16	7	-3	-5	183	218	28	-4	2	-5	247	239	4	-2	7	-5	528	486	18	-6	-8	-4	555	527	11
-6	-7	-5	425	426	10	8	-3	-5	0	64	1	-3	2	-5	665	679	15	-1	7	-5	29	32	28	-5	-8	-4	763	736	16
-5	-7	-5	555	548	13	-11	-2	-5	140	106	44	-2	2	-5	890	935	10	0	7	-5	595	594	15	-4	-8	-4	272	274	15
-4	-7	-5	247	243	13	-10	-2	-5	362	360	19	-1	2	-5	738	754	7	1	7	-5	770	747	20	-3	-8	-4	296	288	14
-3	-7	-5	267	262	14	-9	-2	-5	491	475	19	0	2	-5	368	347	5	2	7	-5	386	393	17	-2	-8	-4	584	563	15
-2	-7	-5	618	588	13	-8	-2	-5	257	236	11	1	2	-5	725	761	7	3	7	-5	181	186	27	-1	-8	-4	554	527	14
-1	-7	-5	502	485	19	-7	-2	-5	349	324	8	2	2	-5	1060	1029	10	4	7	-5	673	647	21	0	-8	-4	94	82	39
0	-7	-5	35	38	35	-6	-2	-5	685	660	10	3	2	-5	259	244	7	5	7	-5	440	425	20	1	-8	-4	366	333	16
1	-7	-5	385	386	15	-5	-2	-5	176	189	5	4	2	-5	552	549	11	6	7	-5	0	71	1	2	-8	-4	336	330	17
2	-7	-5	384	382	15	-4	-2	-5	604	586	7	5	2	-5	887	869	11	7	7	-5	317	303	24	3	-8	-4	168	193	26
3	-7	-5	134	121	28	-3	-2	-5	1032	1047	10	6	2	-5	615	610	19	8	7	-5	340	351	27	4	-8	-4	134	177	47
4	-7	-5	247	265	22	-2	-2	-5	960	944	11	7	2	-5	35	33	35	-5	8	-5	329	315	20	-10	-7	-4	372	351	26
5	-7	-5	368	386	21	-1	-2	-5	143	159	7	8	2	-5	291	314	24	-4	8	-5	412	406	22	-9	-7	-4	172	183	19
-11	-6	-5	298	294	27	0	-2	-5	863	850	12	9	2	-5	366	356	26	-3	8	-5	124	133	35	-8	-7	-4	229	241	15
-10	-6	-5	400	405	16	1	-2	-5	1041	990	12	-8	3	-5	216	210	17	-2	8	-5	308	257	19	-7	-7	-4	615	574	14
-9	-6	-5	307	304	14	2	-2	-5	394	373	9	-7	3	-5	399	423	15	-1	8	-5	614	605	22	-6	-7	-4	519	507	11
-8	-6	-5	91	97	30	3	-2	-5	383	341	10	-6	3	-5	351	350	13	0	8	-5	633	616	20	-5	-7	-4	0	64	1
-7	-6	-5	470	434	13	4	-2	-5	815	804	15	-5	3	-5	199	190	7	1	8	-5	98	63	47	-4	-7	-4	520	520	13
-6	-6	-5	431	418	9	5	-2	-5	670	650	15	-4	3	-5	788	772	11	2	8	-5	199	232	21	-3	-7	-4	776	748	16
-5	-6	-5	127	157	12	6	-2	-5	214	208	16	-3	3	-5	1118	1109	14	3	8	-5	461	405	19	-2	-7	-4	415	401	13
-4	-6	-5	438	446	11	7	-2	-5	223	267	18	-2	3	-5	249	263	6	4	8	-5	225	220	29	-1	-7	-4	157	142	17
-3	-6	-5	790	779	13	8	-2	-5	410	400	18	-1	3	-5	587	604	7	5	8	-5	302	301	22	0	-7	-4	478	457	13
-2	-6	-5	201	218	12	-11	-1	-5	363	345	24	0	3	-5	976	990	12	6	8	-5	437	388	23	1	-7	-4	328	309	15
2	-7	-4	217	230	18	-4	-2	-4	977	932	9	3	2	-4	1211	1204	13	2	7	-4	535	509	17	-10	-8	-3	223	226	38
3	-7	-4	377	412	17	-3	-2	-4	608	622	7	4	2	-4	931	898	11	3	7	-4	646	608	19	-9	-8	-3	129	20	47
4	-7	-4	339	350	18	-2	-2	-4	106	113	7	5	2	-4	305	301	7	4	7	-4	261	252	21	-8	-8	-3	360	343	22
5	-7	-4	68	59	67	-1	-2	-4	1019	1037	11	6	2	-4	599	577	11	5	7	-4	322	335	22	-7	-8	-3	599	564	15
-11	-6	-4	340	290	29	0	-2	-4	399	410	7	7	2	-4	677	647	20	6	7	-4	610	599	22	-6	-8	-3	347	351	11
-10	-6	-4	29	27	28	1	-2	-4	315	301	6	8	2	-4	293	326	22	7	7	-4	417	388	21	-5	-8	-3	186	180	17
-9	-6	-4	311	294	15	2	-2	-4	999	969	11	9	2	-4	0	22	1	8	7	-4	68	10	67	-4	-8	-3	667	657	15
-8	-6	-4	390	392	13	3	-2	-4	971	961	15	-9	3	-4	273	289	24	9	7	-4	173	218	59	-3	-8	-3	690	691	16
-7	-6	-4	74	84	32	4	-2	-4	435	398	10	-8	3	-4	272	306	20	-5	8	-4	136	212	43	-2	-8	-3	206	223	16
-6	-6	-4	540	519	10	5	-2	-4	380	381	12	-7	3	-4	89	37	35	-4	8	-4	127	157	27	-1	-8	-3	170	196	18
-5	-6	-4	740	702	9	6	-2	-4	587	549	15	-6	3	-4	591	587	17	-3	8	-4	549	545	22	0	-8	-3	670	637	15
-4	-6	-4	333	334	8	7	-2	-4	438	455	17	-5	3	-4	650	646	12	-2	8	-4	514	504	20	1	-8	-3	406	393	15
-3	-6	-4	76	63	26	8	-2	-4	0	19	1	-4	3	-4	359	358	11	-1	8	-4	236	197	23	2	-8	-3	104	140	36
-2	-6	-4	736	725	13	-11	-1	-4	0	30	1	-3	3	-4	457	449	13	0	8	-4	263	286	20	3	-8	-3	320	318	18
-1	-6	-4	745	714	13	-10	-1	-4	250	243	20	-2	3	-4	1308	1300	14	1	8	-4	759	731	21	4	-8	-3	332	346	20
0	-6	-4	0	32	1	-9	-1	-4	376	385	18	-1	3	-4	1024	1015	11	2	8	-4	400	385	18	5	-8	-3	50	88	49
1	-6	-4	394	409	12	-8	-1	-4	304	328	15	0	3	-4	143	143	5	3	8	-4	118	73	33	-10	-7	-3	89	100	89
2	-6	-4	656	654	14	-7	-1	-4	383	386	9	1	3	-4	605	633	8	4	8	-4	454	436	20	-9	-7	-3	408	360	23
3	-6	-4	370	379	14	-6	-1	-4	647	660	9	2	3	-4	1254	1246	13	5	8	-4	463	464	22	-8	-7	-3	412	407	13
4	-6	-4	84	90	49	-5	-1	-4	428	441	7	3	3	-4	313	331	7	6	8	-4	98	141	78	-7	-7	-3	0	45	1
5	-6	-4	364	361	18	-4	-1	-4	225	227	5	4	3	-4	427	418	11	7	8	-4	137	196	69	-6	-7	-3	538	510	11
6	-6	-4	327	354	27	-3	-1	-4	1606	1563	14	5	3	-4	703	674	10	8	8	-4	270	259	30	-5	-7	-3	908	870	15
-11	-5	-4	114	143	51	-2	-1	-4	1485	1485	13	6	3	-4	894	870	15	-4	9	-4	342	351	22	-4	-7	-3	515	530	9
-10	-5	-4	348	370	22	-1	-1	-4	676	687	8	7	3	-4	234	211	20	-3	9	-4	311	264	24	-3	-7	-3	71	35	35
-9	-5	-4	254	254	13	0	-1	-4	596	613	9	8	3	-4	205	243	26	-2	9	-4	46	75	45	-2	-7	-3	546	540	13
-8	-5	-4	35	59	35	1	-1	-4	1091	1073	13	9	3	-4	300	309	27	-1	9	-4	245	264	25	-1	-7	-3	485	477	13
-7	-5	-4	327	310	11	2	-1	-4	907	878	12	-8	4	-4	114	136	37	0	9	-4	391	369	22	0	-7	-3	35	71	35
-6	-5	-4	617	590	10	3	-1	-4	0	62	1	-7	4	-4	399	376	17	1	9	-4	136	97	43	1	-7	-3	406	421	14
-5	-5	-4	29	44	28	4	-1	-4	806	811	14	-6	4	-4	359	378	17	2	9	-4	341	322	21	2	-7	-3	507	482	15
-4	-5	-4	762	736	9	5	-1	-4	823	785	12	-5	4	-4	106	124	16	3	9	-4	394	367	20	3	-7	-3	224	222	17
-3	-5	-4	1088	1047	13	6	-1	-4	326	318	17	-4	4	-4	672	665	14	4	9	-4	188	198	34	4	-7	-3	118	130	40

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
-2	-5	-4	735	743	10	7	-1	-4	68	37	67	-3	4	-4	1077	1047	16	5	9	-4	192	247	32	5	-7	-3	416	366	28
-1	-5	-4	172	146	12	8	-1	-4	278	270	24	-2	4	-4	702	677	11	6	9	-4	416	382	25	6	-7	-3	199	220	47
0	-5	-4	652	663	12	9	-1	-4	243	238	30	-1	4	-4	191	164	6	7	9	-4	337	349	32	-11	-6	-3	265	174	37
1	-5	-4	615	584	12	-10	0	-4	254	222	24	0	4	-4	771	772	10	8	9	-4	0	39	1	-10	-6	-3	411	350	25
2	-5	-4	89	103	27	-9	0	-4	58	36	57	1	4	-4	756	754	13	-2	10	-4	313	306	25	-9	-6	-3	235	253	14
3	-5	-4	476	433	13	-8	0	-4	443	421	15	2	4	-4	286	291	7	-1	10	-4	232	217	24	-8	-6	-3	87	104	25
4	-5	-4	667	662	15	-7	0	-4	660	651	13	3	4	-4	753	726	11	0	10	-4	100	131	54	-7	-6	-3	480	466	11
5	-5	-4	297	309	15	-6	0	-4	157	157	7	4	4	-4	643	672	13	1	10	-4	420	380	23	-6	-6	-3	536	530	9
6	-5	-4	55	33	54	-5	0	-4	725	718	9	5	4	-4	137	158	27	2	10	-4	206	223	28	-5	-6	-3	169	187	8
7	-5	-4	253	229	29	-4	0	-4	1139	1187	13	6	4	-4	194	213	19	3	10	-4	0	43	1	-4	-6	-3	478	471	9
-11	-4	-4	417	375	24	-3	0	-4	949	979	10	7	4	-4	527	533	21	4	10	-4	315	333	26	-3	-6	-3	586	578	9
-10	-4	-4	114	57	40	-2	0	-4	245	243	3	8	4	-4	341	302	25	5	10	-4	496	497	26	-2	-6	-3	367	372	11
-9	-4	-4	309	303	13	-1	0	-4	654	677	7	9	4	-4	119	48	97	6	10	-4	169	197	58	-1	-6	-3	285	280	11
-8	-4	-4	600	549	12	0	0	-4	1287	1288	16	-8	5	-4	302	343	21	0	11	-4	305	350	32	0	-6	-3	758	730	13
-7	-4	-4	262	261	7	1	0	-4	580	579	5	-7	5	-4	225	233	22	1	11	-4	169	166	36	1	-6	-3	445	457	13
-6	-4	-4	383	369	7	2	0	-4	593	583	11	-6	5	-4	216	229	17	2	11	-4	206	194	33	2	-6	-3	35	51	35
-5	-4	-4	1310	1221	11	3	0	-4	942	903	13	-5	5	-4	735	708	21	3	11	-4	338	346	29	3	-6	-3	511	474	14
-4	-4	-4	1080	1055	9	4	0	-4	629	641	17	-4	5	-4	626	611	15	4	11	-4	366	373	28	4	-6	-3	625	598	16
-3	-4	-4	511	487	8	5	0	-4	121	175	22	-3	5	-4	98	114	18	5	11	-4	0	65	1	5	-6	-3	277	263	17
-2	-4	-4	802	742	10	6	0	-4	457	464	13	-2	5	-4	592	573	11	-5	12	-3	217	276	43	6	-6	-3	165	148	38
-1	-4	-4	1146	1080	13	7	0	-4	483	499	14	-1	5	-4	770	782	14	-4	12	-3	334	336	24	-11	-5	-3	368	342	26
0	-4	-4	851	846	11	8	0	-4	116	125	31	0	5	-4	467	468	10	-3	12	-3	208	185	30	-10	-5	-3	160	94	30
1	-4	-4	372	339	11	9	0	-4	170	197	25	1	5	-4	114	114	13	-7	11	-3	160	142	35	-9	-5	-3	269	290	15
2	-4	-4	687	666	12	-10	1	-4	276	224	24	2	5	-4	679	688	11	-6	11	-3	347	385	22	-8	-5	-3	457	437	11
3	-4	-4	567	532	12	-9	1	-4	444	434	20	3	5	-4	449	433	15	-5	11	-3	330	351	22	-7	-5	-3	172	178	11
4	-4	-4	65	82	44	-8	1	-4	416	424	17	4	5	-4	0	74	1	-4	11	-3	87	87	86	-6	-5	-3	404	403	8
5	-4	-4	335	336	14	-7	1	-4	235	212	13	5	5	-4	505	506	16	-3	11	-3	210	205	29	-5	-5	-3	984	968	11
6	-4	-4	386	379	24	-6	1	-4	614	601	11	6	5	-4	656	631	19	-2	11	-3	265	269	22	-4	-5	-3	810	805	9
7	-4	-4	153	201	30	-5	1	-4	1054	1034	20	7	5	-4	119	165	40	-1	11	-3	140	136	39	-3	-5	-3	215	202	5
-11	-3	-4	131	109	41	-4	1	-4	634	627	7	8	5	-4	179	218	31	0	11	-3	118	139	50	-2	-5	-3	849	827	11
-10	-3	-4	470	458	21	-3	1	-4	768	777	10	9	5	-4	356	337	28	-9	10	-3	126	38	76	-1	-5	-3	859	845	13
-9	-3	-4	424	392	17	-2	1	-4	986	1039	19	-7	6	-4	215	205	22	-8	10	-3	305	278	21	0	-5	-3	364	368	10
-8	-3	-4	124	149	18	-1	1	-4	1081	1081	12	-6	6	-4	393	370	19	-7	10	-3	259	327	23	1	-5	-3	383	368	11
-7	-3	-4	533	535	11	0	1	-4	20	46	20	-5	6	-4	126	128	30	-6	10	-3	177	196	17	2	-5	-3	877	861	15
-6	-3	-4	887	864	10	1	1	-4	496	488	5	-4	6	-4	315	290	15	-5	10	-3	181	128	51	3	-5	-3	699	696	15
-5	-3	-4	375	372	6	2	1	-4	639	649	8	-3	6	-4	680	664	18	-4	10	-3	367	354	19	4	-5	-3	140	188	22
-4	-3	-4	386	375	5	3	1	-4	50	34	21	-2	6	-4	544	536	11	-3	10	-3	296	327	17	5	-5	-3	278	254	15
-3	-3	-4	903	914	9	4	1	-4	569	588	10	-1	6	-4	0	12	1	-2	10	-3	0	43	1	6	-5	-3	367	384	17
-2	-3	-4	1359	1372	14	5	1	-4	925	893	15	0	6	-4	587	570	13	-1	10	-3	272	259	21	7	-5	-3	50	197	49
-1	-3	-4	0	55	1	6	1	-4	461	431	12	1	6	-4	596	588	12	0	10	-3	293	301	21	-11	-4	-3	65	93	64
0	-3	-4	913	890	11	7	1	-4	94	25	87	2	6	-4	136	139	14	1	10	-3	76	33	76	-10	-4	-3	395	358	21
1	-3	-4	845	817	11	8	1	-4	426	424	15	3	6	-4	760	744	18	2	10	-3	199	211	31	-9	-4	-3	252	245	24
2	-3	-4	406	387	9	9	1	-4	353	336	27	4	6	-4	815	829	20	-9	-9	-3	273	262	27	-8	-4	-3	110	129	18
3	-3	-4	470	462	10	-10	2	-4	311	336	21	5	6	-4	603	598	19	-8	-9	-3	169	175	25	-7	-4	-3	604	578	10
4	-3	-4	716	717	13	-9	2	-4	186	161	21	6	6	-4	84	86	84	-7	-9	-3	145	164	23	-6	-4	-3	845	828	10
5	-3	-4	520	510	13	-8	2	-4	243	255	16	7	6	-4	527	495	22	-6	-9	-3	474	462	13	-5	-4	-3	279	295	6
6	-3	-4	104	120	27	-7	2	-4	660	651	19	8	6	-4	413	401	25	-5	-9	-3	572	552	17	-4	-4	-3	682	656	7
7	-3	-4	308	346	17	-6	2	-4	206	223	9	9	6	-4	143	183	42	-4	-9	-3	119	180	32	-3	-4	-3	959	935	10
8	-3	-4	370	378	26	-5	2	-4	112	127	9	-6	7	-4	0	53	1	-3	-9	-3	312	336	16	-2	-4	-3	1496	1480	15
-11	-2	-4	471	403	23	-4	2	-4	778	807	16	-5	7	-4	367	368	20	-2	-9	-3	527	539	16	-1	-4	-3	65	67	23
-10	-2	-4	291	313	22	-3	2	-4	1280	1238	15	-4	7	-4	399	406	17	-1	-9	-3	383	373	16	0	-4	-3	951	920	11
-9	-2	-4	100	108	32	-2	2	-4	168	183	3	-3	7	-4	119	130	32	0	-9	-3	41	49	40	1	-4	-3	845	849	13
-8	-2	-4	520	508	16	-1	2	-4	478	503	5	-2	7	-4	464	471	16	1	-9	-3	441	432	18	2	-4	-3	542	533	11
-7	-2	-4	419	443	8	0	2	-4	1089	1098	10	-1	7	-4	749	737	14	2	-9	-3	313	339	20	3	-4	-3	357	358	11
-6	-2	-4	82	71	11	1	2	-4	404	431	5	0	7	-4	600	575	14	3	-9	-3	100	182	93	4	-4	-3	740	696	13
-5	-2	-4	704	709	7	2	2	-4	673	677	7	1	7	-4	131	134	17	4	-9	-3	65	145	64	5	-4	-3	419	423	14
6	-4	-3	82	68	61	-7	1	-3	989	944	17	0	5	-3	600	571	11	4	11	-3	206	224	34	3	-6	-2	404	394	14
7	-4	-3	275	292	19	-6	1	-3	242	223	9	1	5	-3	766	745	11	5	11	-3	439	422	30	4	-6	-2	91	112	33
8	-4	-3	242	287	39	-5	1	-3	322	308	8	2	5	-3	242	250	8	-5	12	-2	225	230	42	5	-6	-2	333	342	17
-11	-3	-3	392	347	26	-4	1	-3	1037	1047	12	3	5	-3	654	662	19	-4	12	-2	0	17	1	6	-6	-2	347	349	29
-10	-3	-3	245	175	25	-3	1	-3	1333	1352	14	4	5	-3	680	664	17	-3	12	-2	219	260	34	7	-6	-2	41	94	40
-9	-3	-3	311	301	17	-2	1	-3	579	566	6	5	5	-3	430	439	17	-7	11	-2	365	355	22	-11	-5	-2	55	77	54
-8	-3	-3	679	627	19	-1	1	-3	262	247	4	6	5	-3	58	76	57	-6	11	-2	188	210	28	-10	-5	-2	315	348	24
-7	-3	-3	671	662	13	0	1	-3	851	875	8	7	5	-3	593	582	21	-5	11	-2	133	137	38	-9	-5	-2	292	266	26
-6	-3	-3	58	60	16	1	1	-3	397	385	5	8	5	-3	346	351	20	-4	11	-2	298	284	20	-8	-5	-2	55	88	54
-5	-3	-3	1145	1091	10	2	1	-3	733	729	9	9	5	-3	71	42	71	-3	11	-2	211	224	27	-7	-5	-2	467	438	9
-4	-3	-3	1044	1032	9	3	1	-3	1158	1140	13	10	5	-3	190	214	42	-2	11	-2	0	28	1	-6	-5	-2	676	667	12
-3	-3	-3	412	403	5	4	1	-3	874	862	13	-7	6	-3	195	222	24	-1	11	-2	247	248	23	-5	-5	-2	258	267	8
-2	-3	-3	165	175	7	5	1	-3	118	113	12	-6	6	-3	91	96	45	0	11	-2	265	257	26	-4	-5	-2	466	449	9
-1	-3	-3	982	995	11	6	1	-3	531	519	13	-5	6	-3	474	450	21	1	11	-2	79	53	78	-3	-5	-2	676	684	8
0	-3	-3	448	462	7	7	1	-3	575	568	19	-4	6	-3	599	590	21	-9	10	-2	333	345	35	-2	-5	-2	472	473	6
1	-3	-3	314	312	7	8	1	-3	307	325	24	-3	6	-3	343	346	12	-8	10	-2	189	194	32	-1	-5	-2	403	394	7
2	-3	-3	810	770	13	9	1	-3	146	189	28	-2	6	-3	242	238	11	-7	10	-2	76	57	76	0	-5	-2	949	940	15
3	-3	-3	837	804	14	10	1	-3	403	376	27	-1	6	-3	621	588	13	-6	10	-2	329	338	19	1	-5	-2	1021	994	15
4	-3	-3	300	284	11	-10	2	-3	98	93	51	0	6	-3	193	206	11	-5	10	-2	492	462	18	2	-5	-2	422	419	11
5	-3	-3	400	374	12	-9	2	-3	281	282	21	1	6	-3	373	367	10	-4	10	-2	214	207	22	3	-5	-2	402	396	12
6	-3	-3	434	416	13	-8	2	-3	373	345	19	2	6	-3	689	704	13	-3	10	-2	143	139	32	4	-5	-2	722	696	15
7	-3	-3	324	316	22	-7	2	-3	0	31	1	3	6	-3	788	775	20	-2	10	-2	316	322	19	5	-5	-2	460	474	15
-11	-2	-3	0	16	1	-6	2	-3	766	737	15	4	6	-3	20	42	20	-1	10	-2	183	178	23	6	-5	-2	87	31	45

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
-10	-2	-3	338	304	22	-5	2	-3	710	692	11	5	6	-3	416	436	19	0	-10	-2	148	145	27	7	-5	-2	193	197	49
-9	-2	-3	396	393	19	-4	2	-3	553	559	8	6	6	-3	639	635	21	1	-10	-2	376	395	21	-11	-4	-2	226	265	30
-8	-2	-3	131	141	30	-3	2	-3	156	149	7	7	6	-3	448	455	20	2	-10	-2	302	281	31	-10	-4	-2	76	60	76
-7	-2	-3	487	486	9	-2	2	-3	951	945	13	8	6	-3	192	111	38	-9	-9	-2	112	51	71	-9	-4	-2	285	288	21
-6	-2	-3	834	855	11	-1	2	-3	896	871	10	9	6	-3	283	295	27	-8	-9	-2	269	258	22	-8	-4	-2	617	602	19
-5	-2	-3	782	782	7	0	2	-3	436	425	5	-6	7	-3	357	302	22	-7	-9	-2	427	376	17	-7	-4	-2	530	524	9
-4	-2	-3	76	66	9	1	2	-3	1145	1191	10	-5	7	-3	199	146	24	-6	-9	-2	194	229	14	-6	-4	-2	0	50	1
-3	-2	-3	607	631	6	2	2	-3	1004	1017	12	-4	7	-3	282	261	21	-5	-9	-2	153	191	22	-5	-4	-2	1074	1062	13
-2	-2	-3	922	899	10	3	2	-3	165	166	5	-3	7	-3	582	572	20	-4	-9	-2	548	533	16	-4	-4	-2	1076	1049	11
-1	-2	-3	29	67	28	4	2	-3	568	562	8	-2	7	-3	537	516	18	-3	-9	-2	474	437	16	-3	-4	-2	165	161	6
0	-2	-3	1116	1115	13	5	2	-3	957	943	13	-1	7	-3	0	45	1	-2	-9	-2	0	68	1	-2	-4	-2	271	294	5
1	-2	-3	1086	1085	12	6	2	-3	641	648	11	0	7	-3	506	482	12	-1	-9	-2	344	359	16	-1	-4	-2	1131	1131	13
2	-2	-3	812	771	10	7	2	-3	102	78	41	1	7	-3	824	773	15	0	-9	-2	591	548	16	0	-4	-2	837	868	10
3	-2	-3	571	558	10	8	2	-3	392	414	20	2	7	-3	456	458	17	1	-9	-2	294	314	19	1	-4	-2	204	195	8
4	-2	-3	940	905	14	9	2	-3	383	400	24	3	7	-3	276	319	17	2	-9	-2	159	162	26	2	-4	-2	725	716	11
5	-2	-3	907	887	15	10	2	-3	94	152	93	4	7	-3	832	789	22	3	-9	-2	353	355	34	3	-4	-2	820	803	13
6	-2	-3	235	231	14	-9	3	-3	121	143	33	5	7	-3	753	712	21	4	-9	-2	236	323	41	4	-4	-2	245	259	13
7	-2	-3	79	116	44	-8	3	-3	136	145	33	6	7	-3	236	241	25	-10	-8	-2	0	133	1	5	-4	-2	263	229	13
8	-2	-3	360	349	17	-7	3	-3	372	387	18	7	7	-3	263	247	24	-9	-8	-2	360	339	29	6	-4	-2	326	376	26
9	-2	-3	232	204	31	-6	3	-3	370	332	14	8	7	-3	322	312	26	-8	-8	-2	245	268	25	7	-4	-2	265	223	27
-11	-1	-3	361	328	26	-5	3	-3	71	78	20	9	7	-3	179	184	39	-7	-8	-2	0	15	1	8	-4	-2	61	61	61
-10	-1	-3	327	308	23	-4	3	-3	789	776	12	-5	8	-3	254	279	25	-6	-8	-2	459	448	11	-11	-3	-2	0	87	1
-9	-1	-3	91	70	55	-3	3	-3	1059	1044	14	-4	8	-3	390	395	20	-5	-8	-2	721	686	16	-10	-3	-2	397	375	19
-8	-1	-3	319	319	13	-2	3	-3	100	121	8	-3	8	-3	257	224	20	-4	-8	-2	338	353	9	-9	-3	-2	405	384	20
-7	-1	-3	491	486	11	-1	3	-3	399	415	6	-2	8	-3	230	217	18	-3	-8	-2	249	265	14	-8	-3	-2	100	41	32
-6	-1	-3	50	37	29	0	3	-3	929	930	11	-1	8	-3	496	466	19	-2	-8	-2	690	681	15	-7	-3	-2	642	667	11
-5	-1	-3	659	656	9	1	3	-3	449	469	7	0	8	-3	448	450	19	-1	-8	-2	483	464	14	-6	-3	-2	992	988	11
-4	-1	-3	1006	1011	9	2	3	-3	50	44	21	1	8	-3	41	53	40	0	-8	-2	155	172	20	-5	-3	-2	854	859	8
-3	-1	-3	852	849	7	3	3	-3	1259	1226	14	2	8	-3	469	464	18	1	-8	-2	443	422	15	-4	-3	-2	65	69	10
-2	-1	-3	416	434	5	4	3	-3	1256	1229	17	3	8	-3	669	642	19	2	-8	-2	473	485	16	-3	-3	-2	509	542	5
-1	-1	-3	1116	1128	13	5	3	-3	504	501	9	4	8	-3	256	265	20	3	-8	-2	282	259	20	-2	-3	-2	1028	1018	10
0	-1	-3	571	575	7	6	3	-3	247	248	9	5	8	-3	29	79	28	4	-8	-2	116	105	69	-1	-3	-2	50	53	14
1	-1	-3	322	313	6	7	3	-3	461	436	17	6	8	-3	340	350	21	5	-8	-2	256	240	32	0	-3	-2	888	877	11
2	-1	-3	725	713	9	8	3	-3	285	348	22	7	8	-3	360	338	22	-10	-7	-2	289	280	28	1	-3	-2	1205	1216	14
3	-1	-3	1380	1356	15	9	3	-3	65	34	64	8	8	-3	106	36	85	-9	-7	-2	205	192	32	2	-3	-2	702	692	12
4	-1	-3	700	697	11	10	3	-3	243	254	33	9	8	-3	173	208	69	-8	-7	-2	342	298	20	3	-3	-2	133	127	16
5	-1	-3	46	66	45	-9	4	-3	195	203	34	-4	9	-3	0	73	1	-7	-7	-2	729	680	13	4	-3	-2	630	603	12
6	-1	-3	634	616	11	-8	4	-3	324	290	21	-3	9	-3	199	221	31	-6	-7	-2	593	571	11	5	-3	-2	548	523	19
7	-1	-3	502	485	14	-7	4	-3	104	98	30	-2	9	-3	463	440	23	-5	-7	-2	183	197	9	6	-3	-2	0	76	1
8	-1	-3	0	103	1	-6	4	-3	435	427	17	-1	9	-3	287	267	22	-4	-7	-2	383	386	9	7	-3	-2	332	342	14
9	-1	-3	201	200	33	-5	4	-3	777	749	14	0	9	-3	87	44	65	-3	-7	-2	551	539	9	8	-3	-2	424	405	26
-10	0	-3	221	233	29	-4	4	-3	668	655	12	1	9	-3	413	402	21	-2	-7	-2	338	359	11	-11	-2	-2	323	303	29
-9	0	-3	372	388	19	-3	4	-3	55	47	24	2	9	-3	245	252	22	-1	-7	-2	238	237	13	-10	-2	-2	320	276	23
-8	0	-3	247	231	20	-2	4	-3	1058	1000	15	3	9	-3	0	11	1	0	-7	-2	599	589	13	-9	-2	-2	179	171	25
-7	0	-3	306	307	10	-1	4	-3	908	914	11	4	9	-3	353	335	22	1	-7	-2	513	501	13	-8	-2	-2	543	517	17
-6	0	-3	839	817	13	0	4	-3	671	667	9	5	9	-3	454	456	23	2	-7	-2	100	76	29	-7	-2	-2	716	674	13
-5	0	-3	1109	1098	15	1	4	-3	386	406	7	6	9	-3	179	149	31	3	-7	-2	197	236	23	-6	-2	-2	317	307	7
-4	0	-3	414	398	5	2	4	-3	802	843	10	7	9	-3	0	143	1	4	-7	-2	415	424	15	-5	-2	-2	298	295	6
-3	0	-3	866	878	10	3	4	-3	687	685	10	8	9	-3	283	279	28	5	-7	-2	160	153	37	-4	-2	-2	886	875	7
-2	0	-3	1480	1491	14	4	4	-3	68	53	26	-3	10	-3	234	262	29	6	-7	-2	142	181	52	-3	-2	-2	610	592	6
-1	0	-3	720	740	9	5	4	-3	390	420	17	-2	10	-3	0	26	1	-11	-6	-2	295	306	36	-2	-2	-2	345	297	5
0	0	-3	46	37	10	6	4	-3	585	584	18	-1	10	-3	210	190	27	-10	-6	-2	0	47	1	-1	-2	-2	1382	1355	15
1	0	-3	1213	1185	14	7	4	-3	136	135	29	0	10	-3	287	280	25	-9	-6	-2	383	331	21	0	-2	-2	668	668	9
2	0	-3	1096	1090	15	8	4	-3	203	206	27	1	10	-3	79	98	78	-8	-6	-2	557	535	13	1	-2	-2	944	868	11
3	0	-3	302	304	9	9	4	-3	304	317	25	2	10	-3	336	348	26	-7	-6	-2	311	321	11	2	-2	-2	763	728	9
4	0	-3	500	492	13	10	4	-3	235	238	43	3	10	-3	367	389	24	-6	-6	-2	221	218	10	3	-2	-2	1375	1302	16
5	0	-3	667	665	19	-8	5	-3	20	73	20	4	10	-3	304	322	24	-5	-6	-2	613	590	9	4	-2	-2	513	514	10
6	0	-3	293	302	19	-7	5	-3	349	367	20	5	10	-3	0	12	1	-4	-6	-2	729	728	13	5	-2	-2	259	249	11
7	0	-3	46	27	45	-6	5	-3	469	457	20	6	10	-3	383	381	28	-3	-6	-2	61	70	15	6	-2	-2	634	592	13
8	0	-3	372	365	15	-5	5	-3	142	163	20	7	10	-3	351	376	29	-2	-6	-2	527	507	13	7	-2	-2	463	432	15
9	0	-3	230	245	16	-4	5	-3	287	305	16	0	11	-3	79	27	78	-1	-6	-2	559	584	12	8	-2	-2	0	34	1
-10	1	-3	271	227	25	-3	5	-3	706	670	13	1	11	-3	299	316	27	0	-6	-2	134	143	18	9	-2	-2	359	269	27
-9	1	-3	55	40	54	-2	5	-3	745	717	13	2	11	-3	378	354	30	1	-6	-2	562	556	13	-11	-1	-2	106	73	52
-8	1	-3	439	406	15	-1	5	-3	76	85	18	3	11	-3	96	82	95	2	-6	-2	751	737	15	-10	-1	-2	249	213	23
-9	-1	-2	421	433	20	-4	3	-2	687	639	11	-5	8	-2	325	306	26	-7	-8	-1	495	484	16	8	-4	-1	356	340	26
-8	-1	-2	206	169	18	-3	3	-2	76	86	15	-4	8	-2	41	7	40	-6	-8	-1	407	386	12	-11	-3	-1	250	258	34
-7	-1	-2	148	157	16	-2	3	-2	981	925	12	-3	8	-2	371	354	20	-5	-8	-1	79	80	38	-10	-3	-1	152	162	37
-6	-1	-2	819	824	13	-1	3	-2	601	598	8	-2	8	-2	489	482	19	-4	-8	-1	488	494	13	-9	-3	-1	262	277	20
-5	-1	-2	909	906	11	0	3	-2	76	61	9	-1	8	-2	250	211	18	-3	-8	-1	579	571	13	-8	-3	-1	691	668	21
-4	-1	-2	82	75	8	1	3	-2	1091	1090	12	0	8	-2	313	305	17	-2	-8	-1	153	177	18	-7	-3	-1	749	704	19
-3	-1	-2	601	605	6	2	3	-2	1501	1513	17	1	8	-2	636	663	20	-1	-8	-1	404	383	14	-6	-3	-1	337	351	7
-2	-1	-2	696	691	6	3	3	-2	859	878	10	2	8	-2	601	594	19	0	-8	-1	775	757	16	-5	-3	-1	540	536	7
-1	-1	-2	1276	1262	14	4	3	-2	104	135	13	3	8	-2	162	204	31	1	-8	-1	632	613	16	-4	-3	-1	851	862	10
0	-1	-2	631	636	8	5	3	-2	629	622	10	5	8	-2	450	416	21	2	-8	-1	89	64	47	-3	-3	-1	600	595	7
1	-1	-2	1185	1170	13	6	3	-2	685	676	13	6	8	-2	285	268	22	3	-8	-1	102	157	44	-2	-3	-1	65	57	10
2	-1	-2	1096	1088	11	7	3	-2	134	142	15	7	8	-2	76	100	76	4	-8	-1	320	325	33	-1	-3	-1	1408	1380	14
3	-1	-2	324	321	7	8	3	-2	127	191	34	8	8	-2	294	326	35	5	-8	-1	162	133	76	0	-3	-1	822	849	10
4	-1	-2	784	747	12	9	3	-2	458	449	22	9	8	-2	104	138	104	-10	-7	-1	162	145	56	1	-3	-1	118	107	9
5	-1	-2	748	732	13	10	3	-2	229	204	32	-4	9	-2	318	378	29	-9	-7	-1	419	394	23	2	-3	-1	584	545	9

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
6	-1	-2	334	318	10	-9	4	-2	123	162	46	-3	9	-2	342	347	23	-8	-7	-1	601	582	24	3	-3	-1	747	717	12
7	-1	-2	29	38	28	-8	4	-2	0	66	1	-2	9	-2	134	105	47	-7	-7	-1	250	255	10	4	-3	-1	335	333	10
8	-1	-2	357	372	16	-7	4	-2	388	391	21	-1	9	-2	288	273	24	-6	-7	-1	232	214	9	5	-3	-1	311	310	12
9	-1	-2	302	264	24	-6	4	-2	564	578	17	0	9	-2	403	375	21	-5	-7	-1	614	599	11	6	-3	-1	481	460	13
-10	0	-2	203	203	29	-5	4	-2	0	60	1	1	9	-2	129	169	33	-4	-7	-1	611	582	13	7	-3	-1	295	310	18
-9	0	-2	82	31	52	-4	4	-2	311	329	10	2	9	-2	357	351	21	-3	-7	-1	0	69	1	8	-3	-1	0	53	1
-8	0	-2	465	463	18	-3	4	-2	839	840	14	3	9	-2	454	456	20	-2	-7	-1	515	529	12	9	-3	-1	293	293	31
-7	0	-2	763	725	15	-2	4	-2	647	658	11	4	9	-2	342	355	22	-1	-7	-1	579	558	13	-11	-2	-1	0	27	1
-6	0	-2	373	359	9	-1	4	-2	330	329	7	5	9	-2	0	67	1	0	-7	-1	278	286	13	-10	-2	-1	292	332	24
-5	0	-2	496	498	10	0	4	-2	944	944	11	6	9	-2	237	281	27	1	-7	-1	331	332	14	-9	-2	-1	577	546	21
-4	0	-2	1082	1080	12	1	4	-2	1145	1124	13	7	9	-2	293	314	26	2	-7	-1	626	593	15	-8	-2	-1	288	307	18
-3	0	-2	727	768	7	2	4	-2	496	472	9	8	9	-2	0	66	1	3	-7	-1	236	240	15	-7	-2	-1	305	313	11
-2	0	-2	35	32	6	3	4	-2	449	453	8	-3	10	-2	55	112	54	4	-7	-1	0	67	1	-6	-2	-1	877	866	14
-1	0	-2	1033	1080	11	4	4	-2	773	778	13	-2	10	-2	335	312	25	5	-7	-1	267	292	30	-5	-2	-1	1160	1156	13
0	0	-2	1773	1725	22	5	4	-2	538	543	15	-1	10	-2	256	240	25	6	-7	-1	331	284	33	-4	-2	-1	250	261	5
1	0	-2	789	793	11	6	4	-2	110	147	36	0	10	-2	129	24	37	-10	-6	-1	507	436	24	-3	-2	-1	265	292	5
2	0	-2	397	388	7	7	4	-2	432	437	17	1	10	-2	239	267	23	-9	-6	-1	318	323	24	-2	-2	-1	145	144	4
3	0	-2	1115	1092	16	8	4	-2	360	332	20	2	10	-2	372	354	23	-8	-6	-1	0	20	1	-1	-2	-1	1181	1163	13
4	0	-2	821	830	18	9	4	-2	82	51	81	3	10	-2	0	40	1	-7	-6	-1	518	488	13	0	-2	-1	753	776	9
5	0	-2	240	253	14	10	4	-2	230	261	39	4	10	-2	277	271	27	-6	-6	-1	752	716	11	1	-2	-1	1092	1118	13
6	0	-2	403	383	16	-8	5	-2	370	379	25	5	10	-2	430	415	26	-5	-6	-1	440	442	8	2	-2	-1	793	786	10
7	0	-2	414	409	9	-7	5	-2	259	286	21	6	10	-2	257	261	33	-4	-6	-1	219	197	12	3	-2	-1	219	209	7
8	0	-2	302	294	15	-6	5	-2	108	104	47	7	10	-2	91	98	91	-3	-6	-1	600	578	11	4	-2	-1	635	623	11
9	0	-2	186	204	17	-5	5	-2	657	629	21	-1	11	-2	186	228	39	-2	-6	-1	314	292	11	5	-2	-1	697	684	12
10	0	-2	394	371	28	-4	5	-2	736	705	21	0	11	-2	285	308	30	-1	-6	-1	291	297	11	6	-2	-1	190	181	17
-10	1	-2	182	192	35	-3	5	-2	397	389	11	1	11	-2	201	223	31	0	-6	-1	531	522	12	7	-2	-1	192	210	18
-9	1	-2	341	359	21	-2	5	-2	311	314	10	2	11	-2	155	167	38	1	-6	-1	793	780	14	8	-2	-1	461	453	16
-8	1	-2	324	325	19	-1	5	-2	769	766	13	3	11	-2	412	392	28	2	-6	-1	217	235	14	9	-2	-1	276	307	26
-7	1	-2	84	51	26	0	5	-2	516	506	11	4	11	-2	433	420	30	3	-6	-1	359	354	13	-10	-1	-1	310	292	22
-6	1	-2	912	875	15	1	5	-2	252	245	8	5	11	-2	139	159	54	4	-6	-1	492	500	15	-9	-1	-1	41	22	40
-5	1	-2	1106	1046	16	2	5	-2	811	797	11	6	11	-2	179	199	62	5	-6	-1	284	289	18	-8	-1	-1	425	382	17
-4	1	-2	845	802	10	3	5	-2	996	982	15	-4	-12	-1	303	291	22	6	-6	-1	58	84	57	-7	-1	-1	569	563	17
-3	1	-2	148	145	5	4	5	-2	160	171	19	-3	-12	-1	169	170	41	7	-6	-1	303	260	35	-6	-1	-1	429	418	10
-2	1	-2	887	900	12	5	5	-2	303	308	18	-2	-12	-1	0	51	1	-11	-5	-1	300	304	30	-5	-1	-1	160	171	9
-1	1	-2	891	914	10	7	5	-2	262	228	21	-7	-11	-1	152	110	37	-10	-5	-1	65	73	64	-4	-1	-1	1148	1092	12
0	1	-2	35	24	6	8	5	-2	183	226	28	-6	-11	-1	314	303	29	-9	-5	-1	263	282	24	-3	-1	-1	540	535	7
1	1	-2	1048	1054	9	9	5	-2	380	428	25	-5	-11	-1	373	379	19	-8	-5	-1	614	592	20	-2	-1	-1	499	475	5
2	1	-2	845	858	9	10	5	-2	320	307	26	-4	-11	-1	82	159	81	-7	-5	-1	537	533	9	-1	-1	-1	20	1132	20
3	1	-2	484	479	7	-7	6	-2	292	294	25	-3	-11	-1	181	197	27	-6	-5	-1	82	63	20	0	-1	-1	41	1611	40
4	1	-2	371	355	7	-6	6	-2	495	480	21	-2	-11	-1	337	352	20	-5	-5	-1	521	500	9	1	-1	-1	612	569	7
5	1	-2	724	696	13	-5	6	-2	331	325	19	-1	-11	-1	214	257	26	-4	-5	-1	702	677	9	2	-1	-1	578	559	8
6	1	-2	396	376	11	-4	6	-2	114	95	34	0	-11	-1	20	25	20	-3	-5	-1	0	42	1	3	-1	-1	1300	1233	13
7	1	-2	232	242	21	-3	6	-2	481	494	14	1	-11	-1	263	239	37	-2	-5	-1	598	612	9	4	-1	-1	814	790	13
8	1	-2	471	459	20	-2	6	-2	527	511	13	-8	-10	-1	261	287	24	-1	-5	-1	1038	1036	10	5	-1	-1	0	47	1
9	1	-2	401	399	22	-1	6	-2	35	55	35	-7	-10	-1	381	377	20	0	-5	-1	557	530	11	6	-1	-1	559	543	10
10	1	-2	50	124	49	0	6	-2	515	493	11	-6	-10	-1	314	311	22	1	-5	-1	289	274	10	7	-1	-1	612	565	15
-10	2	-2	318	312	24	1	6	-2	726	709	13	-5	-10	-1	0	32	1	2	-5	-1	985	957	15	8	-1	-1	313	312	15
-9	2	-2	118	122	35	2	6	-2	271	279	11	-4	-10	-1	313	318	18	3	-5	-1	741	745	15	9	-1	-1	152	141	51
-8	2	-2	208	222	21	3	6	-2	372	371	16	-3	-10	-1	287	293	18	4	-5	-1	281	307	13	10	-1	-1	292	277	32
-7	2	-2	584	582	18	4	6	-2	1024	963	22	-2	-10	-1	123	42	31	5	-5	-1	309	296	14	-10	0	-1	177	199	31
-6	2	-2	552	528	11	5	6	-2	676	710	20	-1	-10	-1	317	348	20	6	-5	-1	415	444	15	-9	0	-1	440	454	21
-5	2	-2	121	118	10	6	6	-2	149	159	24	0	-10	-1	372	363	19	7	-5	-1	265	216	25	-8	0	-1	399	382	17
-4	2	-2	766	725	10	7	6	-2	384	394	19	1	-10	-1	223	187	26	8	-5	-1	91	30	91	-7	0	-1	74	23	32
-3	2	-2	1008	1001	11	8	6	-2	457	434	23	2	-10	-1	55	145	54	-11	-4	-1	127	85	78	-6	0	-1	716	691	13
-2	2	-2	76	83	9	9	6	-2	160	167	53	3	-10	-1	221	295	47	-10	-4	-1	421	388	26	-5	0	-1	932	924	14
-1	2	-2	660	641	9	10	6	-2	0	95	1	-9	-9	-1	263	310	30	-9	-4	-1	315	301	22	-4	0	-1	412	405	7
0	2	-2	591	605	7	-6	7	-2	100	71	78	-8	-9	-1	247	273	21	-8	-4	-1	82	76	52	-3	0	-1	700	703	9
1	2	-2	669	656	8	-5	7	-2	245	256	21	-7	-9	-1	94	82	44	-7	-4	-1	581	567	17	-2	0	-1	1207	1198	11
2	2	-2	263	248	6	-4	7	-2	436	433	19	-6	-9	-1	226	239	19	-6	-4	-1	914	894	11	-1	0	-1	0	1555	1
3	2	-2	1019	1030	9	-3	7	-2	259	224	20	-5	-9	-1	448	441	15	-5	-4	-1	481	471	8	0	0	-1	20	373	20
4	2	-2	1135	1105	11	-2	7	-2	213	240	19	-4	-9	-1	153	153	22	-4	-4	-1	349	341	5	1	0	-1	832	830	11
5	2	-2	394	380	7	-1	7	-2	602	599	15	-3	-9	-1	274	294	18	-3	-4	-1	1118	1079	14	2	0	-1	1637	1610	20
6	2	-2	425	430	11	0	7	-2	344	352	13	-2	-9	-1	525	519	15	-2	-4	-1	875	851	11	3	0	-1	1345	1314	17
7	2	-2	546	531	13	1	7	-2	150	154	27	-1	-9	-1	413	410	17	-1	-4	-1	168	166	9	4	0	-1	275	273	9
8	2	-2	377	397	21	2	7	-2	731	714	19	0	-9	-1	71	13	71	0	-4	-1	921	923	11	5	0	-1	496	484	11
9	2	-2	61	109	61	3	7	-2	903	880	21	1	-9	-1	352	370	18	1	-4	-1	1331	1307	16	6	0	-1	351	362	15
10	2	-2	313	321	27	4	7	-2	274	280	20	2	-9	-1	452	454	17	2	-4	-1	708	700	17	7	0	-1	205	212	10
-9	3	-2	199	225	36	5	7	-2	217	202	20	3	-9	-1	172	193	42	3	-4	-1	46	63	45	8	0	-1	440	430	15
-8	3	-2	365	350	19	6	7	-2	506	525	21	4	-9	-1	211	159	38	4	-4	-1	488	471	12	9	0	-1	386	398	15
-7	3	-2	162	175	26	7	7	-2	526	502	23	-10	-8	-1	208	249	36	5	-4	-1	614	572	14	10	0	-1	0	83	1
-6	3	-2	496	485	13	8	7	-2	0	16	1	-9	-8	-1	221	186	32	6	-4	-1	0	111	1	-10	1	-1	278	250	25
-5	3	-2	427	416	10	9	7	-2	243	230	31	-8	-8	-1	313	297	23	7	-4	-1	362	345	24	-9	1	-1	50	49	49
-8	1	-1	442	454	19	4	5	-1	615	635	16	5	11	-1	343	368	30	5	-6	0	459	457	15	-4	-1	0	96	91	11
-7	1	-1	788	745	14	5	5	-1	524	523	16	6	11	-1	322	310	31	6	-6	0	454	466	26	-3	-1	0	987	982	13
-6	1	-1	736	722	14	7	5	-1	544	524	19	-4	-12	0	50	26	49	7	-6	0	166	215	50	-2	-1	0	1065	1089	10
-5	1	-1	152	131	9	8	5	-1	435	431	21	-3	-12	0	305	281	27	-10	-5	0	467	430	27	-1	-1	0	972	1418	21
-4	1	-1	878	846	10	9	5	-1	170	177	40	-7	-11	0	316	338	25	-9	-5	0	397	384	24	0	-1	0	0	398	1
-3	1	-1	1138	1125	12	10	5	-1	206	227	33	-6	-11	0	170	190	29	-8	-5	0	170	211	26	1	-1	0	808	811	9
-2	1	-1	625	624	8	-7	6	-1	299	316	27	-5	-11	0	58	134	57	-7	-5	0	381	358	11	2	-1	0	1215	1223	14

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
-1	1	-1	854	850	9	-6	6	-1	58	72	57	-4	-11	0	310	333	22	-6	-5	0	650	639	11	3	-1	0	472	461	7
1	1	-1	927	964	10	-5	6	-1	412	369	20	-3	-11	0	359	374	21	-5	-5	0	372	369	7	4	-1	0	575	572	9
2	1	-1	35	33	6	-4	6	-1	526	487	19	-2	-11	0	94	26	65	-4	-5	0	395	380	7	5	-1	0	901	886	13
3	1	-1	537	536	7	-3	6	-1	457	467	15	-1	-11	0	278	293	23	-3	-5	0	995	961	14	6	-1	0	420	417	9
4	1	-1	1036	1020	9	-2	6	-1	179	175	16	0	-11	0	358	364	37	-2	-5	0	637	613	9	7	-1	0	65	52	44
5	1	-1	234	228	6	-1	6	-1	657	646	13	1	-11	0	275	205	45	-1	-5	0	102	101	13	8	-1	0	487	493	12
6	1	-1	268	277	6	0	6	-1	278	276	12	-8	-10	0	383	359	21	0	-5	0	815	802	10	9	-1	0	509	445	23
7	1	-1	505	546	19	1	6	-1	127	148	13	-7	-10	0	0	70	1	1	-5	0	1093	1103	16	10	-1	0	100	108	100
8	1	-1	320	312	19	2	6	-1	853	818	15	-6	-10	0	208	197	25	2	-5	0	511	518	11	-10	0	0	347	288	24
9	1	-1	110	156	42	3	6	-1	865	854	22	-5	-10	0	440	425	18	3	-5	0	412	394	11	-9	0	0	29	94	28
10	1	-1	335	365	28	4	6	-1	313	299	16	-4	-10	0	131	175	30	4	-5	0	461	459	13	-8	0	0	410	406	18
-9	2	-1	372	353	25	5	6	-1	434	428	16	-3	-10	0	104	132	46	5	-5	0	652	629	15	-7	0	0	617	618	19
-8	2	-1	493	484	19	6	6	-1	654	608	20	-2	-10	0	373	357	17	6	-5	0	0	46	1	-6	0	0	412	417	11
-7	2	-1	94	153	32	7	6	-1	462	472	21	-1	-10	0	301	302	20	7	-5	0	360	337	25	-5	0	0	295	306	9
-6	2	-1	426	403	15	8	6	-1	110	160	73	0	-10	0	0	44	1	8	-5	0	342	326	29	-4	0	0	1058	1011	14
-5	2	-1	632	628	12	9	6	-1	372	373	26	1	-10	0	286	297	30	-10	-4	0	228	197	33	-3	0	0	622	611	9
-4	2	-1	645	636	9	10	6	-1	358	352	29	2	-10	0	336	328	34	-9	-4	0	273	268	22	-2	0	0	96	80	6
-3	2	-1	152	119	7	-6	7	-1	374	351	24	3	-10	0	84	131	84	-8	-4	0	544	516	19	1	0	0	29	1268	8
-2	2	-1	798	793	8	-5	7	-1	349	330	22	-9	-9	0	199	220	39	-7	-4	0	570	554	17	2	0	0	71	80	9
-1	2	-1	938	912	13	-4	7	-1	46	72	45	-8	-9	0	191	163	38	-6	-4	0	0	28	1	3	0	0	636	611	7
0	2	-1	177	175	4	-3	7	-1	422	422	21	-7	-9	0	305	326	19	-5	-4	0	658	657	10	4	0	0	1068	1011	13
1	2	-1	764	764	9	-2	7	-1	500	469	17	-6	-9	0	221	235	23	-4	-4	0	691	694	8	5	0	0	304	306	10
2	2	-1	1337	1331	14	-1	7	-1	114	148	22	-5	-9	0	29	36	28	-3	-4	0	307	299	7	6	0	0	419	417	9
3	2	-1	656	656	7	0	7	-1	507	499	17	-4	-9	0	461	500	15	-2	-4	0	688	697	9	7	0	0	665	618	13
4	2	-1	257	255	5	1	7	-1	768	748	19	-3	-9	0	473	457	16	-1	-4	0	1385	1333	14	8	0	0	406	406	14
5	2	-1	935	914	11	2	7	-1	639	599	17	-2	-9	0	35	59	35	0	-4	0	1296	1309	12	9	0	0	161	94	33
6	2	-1	604	595	11	3	7	-1	0	46	1	-1	-9	0	336	344	16	1	-4	0	384	379	7	10	0	0	319	288	29
7	2	-1	65	70	35	4	7	-1	755	724	21	0	-9	0	633	616	17	2	-4	0	806	792	13	-10	1	0	137	108	44
8	2	-1	401	410	18	5	7	-1	608	566	19	1	-9	0	369	386	16	3	-4	0	822	813	13	-9	1	0	425	445	24
9	2	-1	656	628	23	6	7	-1	205	218	28	2	-9	0	61	60	61	4	-4	0	193	187	13	-8	1	0	506	493	20
-9	3	-1	181	178	28	7	7	-1	206	182	23	3	-9	0	317	329	37	5	-4	0	190	173	14	-7	1	0	0	52	1
-8	3	-1	0	23	1	8	7	-1	598	557	23	4	-9	0	399	360	30	6	-4	0	575	542	15	-6	1	0	426	417	11
-7	3	-1	361	394	17	9	7	-1	331	332	27	-10	-8	0	0	76	1	7	-4	0	382	376	24	-5	1	0	924	886	15
-6	3	-1	716	708	15	10	7	-1	0	34	1	-9	-8	0	299	289	30	8	-4	0	0	32	1	-4	1	0	562	572	11
-5	3	-1	55	92	54	-5	8	-1	157	191	39	-8	-8	0	484	474	25	-10	-3	0	360	347	27	-3	1	0	464	461	8
-4	3	-1	269	269	8	-4	8	-1	364	332	22	-7	-8	0	20	115	20	-9	-3	0	517	510	21	-2	1	0	1227	1223	18
-3	3	-1	711	700	9	-3	8	-1	213	225	22	-6	-8	0	230	215	11	-8	-3	0	228	221	22	-1	1	0	817	811	8
-2	3	-1	179	204	7	-2	8	-1	124	149	32	-5	-8	0	444	435	13	-7	-3	0	440	439	16	0	1	0	0	398	1
-1	3	-1	701	690	9	-1	8	-1	540	554	20	-4	-8	0	216	221	16	-6	-3	0	861	854	20	1	1	0	891	1418	19
0	3	-1	1391	1412	14	0	8	-1	696	680	20	-3	-8	0	289	276	13	-5	-3	0	832	818	9	2	1	0	1070	1089	10
1	3	-1	1127	1166	12	1	8	-1	221	203	19	-2	-8	0	709	720	16	-4	-3	0	50	59	14	3	1	0	984	982	9
2	3	-1	412	400	7	2	8	-1	433	426	17	-1	-8	0	709	678	16	-3	-3	0	1048	1033	10	4	1	0	76	91	5
3	3	-1	719	716	9	3	8	-1	722	696	21	0	-8	0	318	307	16	-2	-3	0	1483	1494	16	5	1	0	834	810	10
4	3	-1	1015	1002	12	4	8	-1	530	546	20	1	-8	0	273	271	16	-1	-3	0	861	818	10	6	1	0	544	510	9
5	3	-1	613	595	9	5	8	-1	0	19	1	2	-8	0	566	536	17	0	-3	0	481	470	5	7	1	0	104	126	13
6	3	-1	94	94	14	6	8	-1	283	282	22	3	-8	0	283	291	18	1	-3	0	959	967	11	8	1	0	502	483	19
7	3	-1	499	492	12	7	8	-1	371	370	24	4	-8	0	0	36	1	2	-3	0	840	861	11	9	1	0	533	561	21
8	3	-1	416	404	20	8	8	-1	0	88	1	5	-8	0	270	290	36	3	-3	0	205	220	8	10	1	0	217	226	31
9	3	-1	175	137	31	9	8	-1	156	219	49	-10	-7	0	348	360	29	4	-3	0	367	364	15	-9	2	0	124	179	42
-8	4	-1	381	361	23	-4	9	-1	114	153	51	-9	-7	0	263	252	25	5	-3	0	538	524	13	-8	2	0	102	124	44
-7	4	-1	322	295	22	-3	9	-1	189	172	27	-8	-7	0	172	129	30	6	-3	0	35	68	35	-7	2	0	564	546	19
-6	4	-1	148	135	23	-2	9	-1	463	426	23	-7	-7	0	578	553	25	7	-3	0	379	374	15	-6	2	0	675	683	15
-5	4	-1	693	688	20	-1	9	-1	368	331	21	-6	-7	0	658	645	11	8	-3	0	452	432	23	-5	2	0	280	258	10
-4	4	-1	567	558	12	0	9	-1	76	63	76	-5	-7	0	367	337	9	9	-3	0	354	312	26	-4	2	0	603	592	11
-3	4	-1	91	98	12	1	9	-1	406	386	21	-4	-7	0	382	378	12	-10	-2	0	289	293	26	-3	2	0	952	910	11
-2	4	-1	753	741	13	2	9	-1	496	512	21	-3	-7	0	735	714	14	-9	-2	0	131	127	44	-2	2	0	538	545	7
-1	4	-1	933	926	12	3	9	-1	221	222	21	-2	-7	0	534	526	13	-8	-2	0	415	424	19	-1	2	0	497	474	6
0	4	-1	848	837	11	4	9	-1	176	174	28	-1	-7	0	133	146	7	-7	-2	0	686	679	19	0	2	0	1137	1162	13
1	4	-1	340	349	6	5	9	-1	298	318	25	0	-7	0	531	541	13	-6	-2	0	432	444	11	1	2	0	1033	1014	11
2	4	-1	1372	1374	16	6	9	-1	177	213	42	1	-7	0	648	638	14	-5	-2	0	121	115	12	2	2	0	454	451	7
3	4	-1	1257	1257	14	7	9	-1	116	149	54	2	-7	0	225	248	16	-4	-2	0	935	941	9	3	2	0	734	739	7
4	4	-1	330	336	9	8	9	-1	394	391	27	3	-7	0	193	211	16	-3	-2	0	731	739	9	4	2	0	949	941	9
5	4	-1	338	335	15	9	9	-1	263	217	44	4	-7	0	376	346	15	-2	-2	0	454	451	5	5	2	0	84	115	13
6	4	-1	573	561	17	-3	10	-1	291	320	34	5	-7	0	140	175	53	-1	-2	0	1032	1014	11	6	2	0	454	444	10
7	4	-1	250	269	21	-2	10	-1	35	94	35	6	-7	0	84	75	84	0	-2	0	1153	1162	13	7	2	0	678	679	14
8	4	-1	127	130	45	-1	10	-1	164	257	47	-10	-6	0	126	63	55	1	-2	0	510	474	9	8	2	0	409	424	19
9	4	-1	459	442	23	0	10	-1	383	380	24	-9	-6	0	383	383	23	2	-2	0	544	545	7	9	2	0	98	127	98
10	4	-1	250	275	36	1	10	-1	219	241	34	-8	-6	0	672	667	24	3	-2	0	952	910	11	-9	3	0	268	312	26
-8	5	-1	0	18	1	2	10	-1	20	106	20	-7	-6	0	434	421	14	4	-2	0	619	592	11	-8	3	0	463	432	20
-7	5	-1	465	426	24	3	10	-1	431	415	23	-6	-6	0	35	56	35	5	-2	0	263	258	9	-7	3	0	397	374	19
-6	5	-1	608	594	23	4	10	-1	388	407	25	-5	-6	0	484	471	8	6	-2	0	687	683	15	-6	3	0	102	68	28
-5	5	-1	272	289	16	5	10	-1	0	18	1	-4	-6	0	753	709	14	7	-2	0	577	546	13	-5	3	0	532	524	13
-4	5	-1	41	73	40	6	10	-1	213	268	28	-3	-6	0	214	239	13	8	-2	0	104	124	50	-4	3	0	343	364	9
-3	5	-1	756	750	16	7	10	-1	400	362	30	-2	-6	0	515	516	11	9	-2	0	137	179	45	-3	3	0	199	220	7
-2	5	-1	802	795	13	8	10	-1	205	181	38	-1	-6	0	786	808	13	-10	-1	0	191	226	42	-2	3	0	858	861	9
-1	5	-1	149	153	13	-1	11	-1	186	200	35	0	-6	0	443	435	7	-9	-1	0	572	561	22	-1	3	0	962	967	11
0	5	-1	766	733	12	0	11	-1	0	55	1	1	-6	0	126	149	15	-8	-1	0	505	483	19	0	3	0	476	470	7
1	5	-1	1177	1159	14	2	11	-1	469	461	25	2	-6	0	666	661	14	-7	-1	0	68	126	61	1	3	0	848	818	10
2	5	-1	625	612	10	3	11	-1	140	160	46	3	-6	0	419	429	13	-6	-1	0	536	510	12	2	3	0	1488	1494	15

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
3	5	-1	0	62	1	4	11	-1	134	115	50	4	-6	0	106	135	30	-5	-1	0	845	810	13	3	3	0	1056	1033	11
4	3	0	20	59	20	3	8	0	252	276	20	-1	-8	1	199	203	9	-3	-3	1	720	716	7	3	1	1	549	535	5
5	3	0	832	818	12	4	8	0	238	221	20	0	-8	1	692	680	11	-2	-3	1	418	400	7	4	1	1	1150	1092	11
6	3	0	861	854	13	5	8	0	429	435	21	1	-8	1	547	554	15	-1	-3	1	1150	1166	13	5	1	1	161	171	6
7	3	0	435	439	11	6	8	0	201	215	31	2	-8	1	89	149	35	0	-3	1	1371	1412	14	6	1	1	427	418	8
8	3	0	196	221	24	7	8	0	87	115	86	3	-8	1	223	225	32	1	-3	1	707	690	7	7	1	1	592	563	12
9	3	0	498	510	22	8	8	0	486	474	25	4	-8	1	373	332	27	2	-3	1	193	204	6	8	1	1	381	382	12
10	3	0	300	347	31	9	8	0	247	289	34	5	-8	1	171	191	46	3	-3	1	696	700	10	9	1	1	55	22	54
-8	4	0	0	32	1	10	8	0	0	76	1	-10	-7	1	50	34	49	4	-3	1	270	269	10	10	1	1	278	292	29
-7	4	0	364	376	22	-4	9	0	343	359	23	-9	-7	1	274	332	32	5	-3	1	121	92	16	-9	2	1	287	307	29
-6	4	0	529	542	20	-3	9	0	324	329	26	-8	-7	1	608	557	23	6	-3	1	746	708	15	-8	2	1	460	453	22
-5	4	0	204	173	14	-2	9	0	102	60	52	-7	-7	1	112	182	71	7	-3	1	389	394	13	-7	2	1	210	210	24
-4	4	0	184	187	14	-1	9	0	414	386	19	-6	-7	1	208	218	16	8	-3	1	20	23	20	-6	2	1	227	181	20
-3	4	0	833	813	11	0	9	0	643	616	22	-5	-7	1	590	566	11	-10	-2	1	217	265	39	-5	2	1	695	684	13
-2	4	0	795	792	10	1	9	0	319	344	22	-4	-7	1	749	724	15	-9	-2	1	633	628	23	-4	2	1	595	623	15
-1	4	0	375	379	7	2	9	0	104	59	40	-3	-7	1	20	46	20	-8	-2	1	416	410	19	-3	2	1	210	209	9
0	4	0	1306	1309	15	3	9	0	504	457	21	-2	-7	1	611	599	13	-7	-2	1	55	70	54	-2	2	1	785	786	10
1	4	0	1373	1333	14	4	9	0	493	500	20	-1	-7	1	781	748	14	-6	-2	1	593	595	17	-1	2	1	1098	1118	12
2	4	0	707	697	9	5	9	0	0	36	1	0	-7	1	496	499	9	-5	-2	1	941	914	15	0	2	1	743	776	7
3	4	0	286	299	7	6	9	0	252	235	25	1	-7	1	179	148	16	-4	-2	1	254	255	9	1	2	1	1176	1163	13
4	4	0	671	694	11	7	9	0	309	326	29	2	-7	1	481	469	13	-3	-2	1	640	656	11	2	2	1	148	144	5
5	4	0	663	657	16	8	9	0	110	163	63	3	-7	1	416	422	15	-2	-2	1	1328	1331	12	3	2	1	277	292	4
6	4	0	0	28	1	9	9	0	221	220	35	4	-7	1	0	72	1	-1	-2	1	770	764	10	4	2	1	260	261	6
7	4	0	543	554	18	-3	10	0	94	131	93	5	-7	1	318	330	31	0	-2	1	175	175	4	5	2	1	1158	1156	16
8	4	0	496	516	18	-2	10	0	320	328	26	6	-7	1	313	351	38	1	-2	1	940	912	9	6	2	1	883	866	14
9	4	0	191	268	28	-1	10	0	375	297	26	-10	-6	1	380	352	28	2	-2	1	781	793	8	7	2	1	310	313	15
10	4	0	237	197	34	0	10	0	35	44	35	-9	-6	1	386	373	24	3	-2	1	114	119	9	8	2	1	320	307	17
-8	5	0	307	326	30	1	10	0	272	302	30	-8	-6	1	100	160	50	4	-2	1	646	636	9	9	2	1	536	546	22
-7	5	0	355	337	23	2	10	0	349	357	23	-7	-6	1	496	472	19	5	-2	1	634	628	11	-9	3	1	293	293	28
-6	5	0	0	46	1	3	10	0	126	132	43	-6	-6	1	621	608	10	6	-2	1	423	403	11	-8	3	1	98	53	62
-5	5	0	641	629	21	4	10	0	134	175	38	-5	-6	1	439	428	8	7	-2	1	145	153	18	-7	3	1	287	310	20
-4	5	0	461	459	13	5	10	0	429	425	25	-4	-6	1	299	299	11	8	-2	1	481	484	22	-6	3	1	467	460	18
-3	5	0	406	394	9	6	10	0	179	197	31	-3	-6	1	868	854	14	9	-2	1	396	353	28	-5	3	1	305	310	13
-2	5	0	520	518	11	7	10	0	102	70	102	-2	-6	1	838	818	13	-10	-1	1	360	365	24	-4	3	1	295	333	11
-1	5	0	1114	1103	16	8	10	0	392	359	31	-1	-6	1	157	148	14	-9	-1	1	181	156	28	-3	3	1	746	717	9
0	5	0	849	802	14	-1	11	0	260	205	34	0	-6	1	262	276	7	-8	-1	1	325	312	18	-2	3	1	565	545	7
1	5	0	82	101	17	0	11	0	383	364	28	1	-6	1	680	646	9	-7	-1	1	564	546	19	-1	3	1	94	107	6
2	5	0	628	613	9	1	11	0	270	293	29	2	-6	1	179	175	14	-6	-1	1	256	277	16	0	3	1	824	849	9
3	5	0	1014	961	14	2	11	0	87	26	86	3	-6	1	493	467	13	-5	-1	1	216	228	13	1	3	1	1414	1380	15
4	5	0	413	380	15	3	11	0	393	374	29	4	-6	1	493	487	14	-4	-1	1	1043	1020	14	2	3	1	46	57	16
5	5	0	340	369	15	4	11	0	293	333	30	5	-6	1	393	369	22	-3	-1	1	537	536	9	3	3	1	599	595	8
6	5	0	657	639	21	5	11	0	149	134	64	6	-6	1	84	72	84	-2	-1	1	29	33	28	4	3	1	867	862	10
7	5	0	369	358	16	6	11	0	234	190	35	7	-6	1	239	316	38	-1	-1	1	935	964	11	5	3	1	537	536	9
8	5	0	185	211	25	7	11	0	307	338	37	-10	-5	1	196	227	34	0	-1	1	20	2153	20	6	3	1	338	351	9
9	5	0	397	384	21	3	12	0	256	281	33	-9	-5	1	176	177	43	1	-1	1	854	850	8	7	3	1	714	704	13
10	5	0	460	430	25	4	12	0	0	26	1	-8	-5	1	423	431	19	2	-1	1	636	624	6	8	3	1	709	668	22
-7	6	0	250	215	25	-6	11	1	326	310	20	-7	-5	1	533	524	21	3	-1	1	1147	1125	9	9	3	1	243	277	23
-6	6	0	472	466	23	-5	11	1	372	368	22	-6	-5	1	20	61	20	4	-1	1	874	846	9	-8	4	1	323	340	24
-5	6	0	470	457	21	-4	11	1	65	115	64	-5	-5	1	533	523	9	5	-1	1	133	131	13	-7	4	1	313	345	22
-4	6	0	110	135	30	-3	11	1	145	160	34	-4	-5	1	644	635	8	6	-1	1	749	722	10	-6	4	1	108	111	40
-3	6	0	425	429	17	-2	11	1	461	461	21	-3	-5	1	46	62	45	7	-1	1	782	745	16	-5	4	1	593	572	18
-2	6	0	669	661	15	-1	11	1	342	310	36	-2	-5	1	619	612	11	8	-1	1	437	454	11	-4	4	1	487	471	13
-1	6	0	139	149	15	0	11	1	149	55	57	-1	-5	1	1138	1159	16	9	-1	1	0	49	1	-3	4	1	0	63	1
0	6	0	439	435	11	1	11	1	203	200	46	0	-5	1	755	733	13	10	-1	1	269	250	29	-2	4	1	708	700	10
1	6	0	802	808	15	-8	10	1	134	181	55	1	-5	1	145	153	8	-10	0	1	87	83	86	-1	4	1	1316	1307	13
2	6	0	511	516	16	-7	10	1	390	362	21	2	-5	1	796	795	14	-9	0	1	410	398	21	0	4	1	917	923	11
4	6	0	718	709	19	-6	10	1	273	268	20	3	-5	1	743	750	14	-8	0	1	458	430	19	1	4	1	181	166	8
5	6	0	470	471	15	-5	10	1	0	18	1	4	-5	1	50	73	49	-7	0	1	219	212	18	2	4	1	880	851	11
6	6	0	0	56	1	-4	10	1	396	407	18	5	-5	1	291	289	13	-6	0	1	373	362	11	3	4	1	1112	1079	14
7	6	0	437	421	18	-3	10	1	390	415	17	6	-5	1	621	594	25	-5	0	1	484	484	11	4	4	1	349	341	9
8	6	0	676	667	25	-2	10	1	0	106	1	7	-5	1	399	426	27	-4	0	1	280	273	8	5	4	1	472	471	16
9	6	0	369	383	24	-1	10	1	245	241	24	8	-5	1	50	18	49	-3	0	1	1353	1314	17	6	4	1	935	894	20
10	6	0	50	63	49	0	10	1	370	380	19	-10	-4	1	293	275	30	-2	0	1	1621	1610	20	7	4	1	577	567	17
-6	7	0	50	75	49	1	10	1	274	257	30	-9	-4	1	449	442	21	-1	0	1	833	830	11	8	4	1	29	76	28
-5	7	0	179	175	26	2	10	1	148	94	63	-8	-4	1	110	130	56	0	0	1	0	373	1	9	4	1	259	301	21
-4	7	0	345	346	20	3	10	1	296	320	36	-7	-4	1	260	269	23	1	0	1	0	1555	1	10	4	1	380	388	24
-3	7	0	194	211	22	-9	-9	1	177	217	62	-6	-4	1	562	561	17	2	0	1	1211	1198	13	-8	5	1	116	30	69
-2	7	0	256	248	18	-8	-9	1	366	391	29	-5	-4	1	335	335	15	3	0	1	716	703	8	-7	5	1	221	216	28
-1	7	0	639	638	21	-7	-9	1	121	149	33	-4	-4	1	337	336	6	4	0	1	419	405	7	-6	5	1	456	444	22
0	7	0	535	541	18	-6	-9	1	194	213	24	-3	-4	1	1267	1257	14	5	0	1	927	924	11	-5	5	1	285	296	18
1	7	0	106	146	35	-5	-9	1	319	318	17	-2	-4	1	1387	1374	15	6	0	1	705	691	12	-4	5	1	310	307	16
2	7	0	542	526	17	-4	-9	1	177	174	18	-1	-4	1	351	349	7	7	0	1	0	23	1	-3	5	1	738	745	12
3	7	0	732	714	21	-3	-9	1	228	222	18	0	-4	1	839	837	11	8	0	1	392	381	10	-2	5	1	985	957	13
4	7	0	357	378	16	-2	-9	1	519	512	15	1	-4	1	939	926	10	9	0	1	434	454	23	-1	5	1	288	274	11
5	7	0	335	337	17	-1	-9	1	376	386	17	2	-4	1	747	741	9	10	0	1	188	199	34	0	5	1	538	530	9
6	7	0	650	645	21	0	-9	1	0	63	1	3	-4	1	96	98	19	-10	1	1	262	277	29	1	5	1	1060	1036	13
7	7	0	599	553	21	1	-9	1	310	331	16	4	-4	1	564	558	11	-9	1	1	164	141	33	2	5	1	586	612	9
8	7	0	145	129	36	2	-9	1	493	426	25	5	-4	1	701	688	14	-8	1	1	317	312	21	3	5	1	35	42	35
9	7	0	249	252	28	3	-9	1	166	172	50	6	-4	1	106	135	24	-7	1	1	586	565	20	4	5	1	699	677	17

10	7	0	399	360	26	4	-9	1	172	153	46	7	-4	1	299	295	24	-6	1	1	555	543	12	5	5	1	505	500	15
-5	8	0	324	290	29	-9	-8	1	216	219	33	8	-4	1	365	361	24	-5	1	1	68	47	26	6	5	1	0	63	1
-4	8	0	0	36	1	-8	-8	1	79	88	78	-10	-3	1	242	258	35	-4	1	1	814	790	13	7	5	1	551	533	18
-3	8	0	319	291	22	-7	-8	1	358	370	15	-9	-3	1	140	137	30	-3	1	1	1289	1233	24	8	5	1	597	592	20
-2	8	0	521	536	21	-6	-8	1	262	282	16	-8	-3	1	418	404	20	-2	1	1	593	559	10	9	5	1	203	282	26
-1	8	0	282	271	20	-5	-8	1	0	19	1	-7	-3	1	495	492	15	-1	1	1	615	569	7	10	5	1	0	73	1
0	8	0	316	307	20	-4	-8	1	559	546	15	-6	-3	1	76	94	31	0	1	1	0	1611	1	-7	6	1	245	260	37
1	8	0	704	678	21	-3	-8	1	726	696	16	-5	-3	1	577	595	17	1	1	1	20	1132	20	-6	6	1	91	84	91
2	8	0	769	720	23	-2	-8	1	420	426	13	-4	-3	1	993	1002	15	2	1	1	492	475	5	-5	6	1	331	289	24
-4	6	1	492	500	21	-3	-11	2	364	392	22	-1	-5	2	236	245	10	6	-1	2	894	875	14	-3	4	2	812	803	11
-3	6	1	396	354	16	-2	-11	2	136	167	37	0	-5	2	520	506	11	7	-1	2	84	51	23	-2	4	2	738	716	9
-2	6	1	224	235	21	-1	-11	2	265	223	35	1	-5	2	786	766	11	8	-1	2	294	325	13	-1	4	2	193	195	6
-1	6	1	789	780	16	0	-11	2	313	308	40	2	-5	2	323	314	7	9	-1	2	355	359	24	0	4	2	844	868	11
0	6	1	520	522	12	1	-11	2	293	228	34	3	-5	2	388	389	11	10	-1	2	153	192	44	1	4	2	1138	1131	13
1	6	1	289	297	11	-7	-10	2	118	98	52	4	-5	2	715	705	15	-10	0	2	393	371	28	2	4	2	261	294	7
2	6	1	272	292	16	-6	-10	2	272	261	20	5	-5	2	626	629	16	-9	0	2	196	204	30	3	4	2	162	161	9
3	6	1	589	578	17	-5	-10	2	422	415	18	6	-5	2	29	104	28	-8	0	2	288	294	22	4	4	2	1075	1049	13
4	6	1	182	197	19	-4	-10	2	260	271	20	7	-5	2	322	286	31	-7	0	2	404	409	19	5	4	2	1066	1062	22
5	6	1	447	442	17	-3	-10	2	35	40	35	8	-5	2	382	379	30	-6	0	2	362	383	16	6	4	2	0	50	1
6	6	1	727	716	19	-2	-10	2	368	354	17	-10	-4	2	224	261	42	-5	0	2	256	253	11	7	4	2	559	524	19
7	6	1	513	488	18	-1	-10	2	239	267	18	-9	-4	2	50	51	49	-4	0	2	833	830	13	8	4	2	608	602	19
8	6	1	0	20	1	0	-10	2	46	24	45	-8	-4	2	272	332	21	-3	0	2	1122	1092	16	9	4	2	239	288	21
9	6	1	340	323	26	1	-10	2	129	240	64	-7	-4	2	474	437	17	-2	0	2	396	388	8	-7	5	2	205	197	32
10	6	1	419	436	28	2	-10	2	322	312	32	-6	-4	2	124	147	35	-1	0	2	791	793	11	-6	5	2	79	31	78
-6	7	1	265	284	27	3	-10	2	102	112	102	-5	-4	2	538	543	16	0	0	2	1684	1725	21	-5	5	2	487	474	20
-5	7	1	307	292	24	-8	-9	2	108	66	108	-4	-4	2	775	778	13	1	0	2	1025	1080	9	-4	5	2	735	696	23
-4	7	1	0	67	1	-7	-9	2	342	314	18	-3	-4	2	454	453	6	2	0	2	29	32	8	-3	5	2	401	396	11
-3	7	1	274	240	21	-6	-9	2	256	281	19	-2	-4	2	480	472	7	3	0	2	734	768	7	-2	5	2	427	419	9
-2	7	1	568	593	20	-5	-9	2	58	67	57	-1	-4	2	1132	1124	12	4	0	2	1083	1080	10	-1	5	2	1012	994	13
-1	7	1	367	332	18	-4	-9	2	372	355	16	0	-4	2	943	944	11	5	0	2	493	498	7	0	5	2	952	940	13
0	7	1	309	286	19	-3	-9	2	413	456	15	1	-4	2	323	329	5	6	0	2	364	359	9	1	5	2	404	394	9
1	7	1	596	558	19	-2	-9	2	350	351	14	2	-4	2	646	658	8	7	0	2	766	725	13	2	5	2	467	473	8
2	7	1	527	529	16	-1	-9	2	123	169	29	3	-4	2	839	840	11	8	0	2	467	463	13	4	5	2	470	449	15
3	7	1	20	69	20	0	-9	2	351	375	15	4	-4	2	303	329	11	9	0	2	0	31	1	5	5	2	256	267	13
4	7	1	584	582	18	1	-9	2	296	273	18	5	-4	2	0	60	1	10	0	2	192	203	37	6	5	2	678	667	17
5	7	1	615	599	19	2	-9	2	94	105	93	6	-4	2	577	578	15	-9	1	2	257	264	29	7	5	2	456	438	18
6	7	1	232	214	21	3	-9	2	344	347	33	7	-4	2	383	391	24	-8	1	2	397	372	20	8	5	2	50	88	49
7	7	1	268	255	20	4	-9	2	376	378	30	8	-4	2	140	66	44	-7	1	2	46	38	45	9	5	2	240	266	29
8	7	1	588	582	26	-9	-8	2	155	138	54	9	-4	2	112	162	111	-6	1	2	326	318	15	10	5	2	340	348	24
9	7	1	412	394	26	-8	-8	2	358	326	29	-10	-3	2	140	205	48	-5	1	2	758	732	14	-7	6	2	0	94	1
10	7	1	100	145	100	-7	-8	2	0	100	1	-9	-3	2	448	449	23	-4	1	2	805	747	14	-6	6	2	356	349	26
-5	8	1	106	133	106	-6	-8	2	237	268	19	-8	-3	2	215	191	22	-3	1	2	345	321	8	-5	6	2	300	342	24
-4	8	1	328	325	26	-5	-8	2	431	416	15	-7	-3	2	150	142	20	-2	1	2	1114	1088	15	-4	6	2	100	112	46
-3	8	1	100	157	59	-4	-8	2	432	437	15	-6	-3	2	696	676	17	-1	1	2	1177	1170	13	-3	6	2	390	394	19
-2	8	1	0	64	1	-3	-8	2	201	204	17	-5	-3	2	622	622	15	0	1	2	636	636	8	-2	6	2	793	737	20
-1	8	1	621	613	21	-2	-8	2	614	594	15	-4	-3	2	143	135	12	1	1	2	1273	1262	13	-1	6	2	579	556	18
0	8	1	776	757	22	-1	-8	2	683	663	15	-3	-3	2	843	878	10	2	1	2	693	691	7	0	6	2	143	143	25
1	8	1	383	383	18	0	-8	2	298	305	10	-2	-3	2	1495	1513	13	3	1	2	598	605	6	1	6	2	564	584	15
2	8	1	164	177	25	1	-8	2	196	211	12	-1	-3	2	1104	1090	12	4	1	2	68	75	9	2	6	2	526	507	16
3	8	1	612	571	20	2	-8	2	494	482	15	0	-3	2	50	61	14	5	1	2	924	906	9	3	6	2	87	70	28
4	8	1	526	494	23	3	-8	2	322	354	24	1	-3	2	605	598	8	6	1	2	826	824	12	4	6	2	746	728	17
5	8	1	65	80	64	4	-8	2	110	7	110	2	-3	2	971	925	10	7	1	2	161	157	12	5	6	2	634	590	18
6	8	1	438	386	21	5	-8	2	263	306	43	3	-3	2	79	86	11	8	1	2	150	169	12	6	6	2	214	218	20
7	8	1	496	484	22	-9	-7	2	238	230	31	4	-3	2	643	639	11	11	1	2	68	73	67	7	6	2	322	321	20
8	8	1	309	297	22	-8	-7	2	0	16	1	5	-3	2	404	416	11	-9	2	2	250	269	26	8	6	2	565	535	21
9	8	1	170	186	40	-7	-7	2	506	502	23	6	-3	2	503	485	13	-8	2	2	35	34	35	9	6	2	317	331	22
10	8	1	232	249	34	-6	-7	2	508	525	14	7	-3	2	186	175	24	-7	2	2	458	432	19	10	6	2	94	47	93
-4	9	1	152	159	39	-5	-7	2	189	202	7	8	-3	2	349	350	26	-6	2	2	647	592	19	-6	7	2	127	181	54
-3	9	1	216	193	35	-4	-7	2	282	280	13	9	-3	2	236	225	34	-5	2	2	227	249	17	-5	7	2	110	153	110
-2	9	1	446	454	23	-3	-7	2	911	880	16	-10	-2	2	327	321	28	-4	2	2	507	514	11	-4	7	2	445	424	23
-1	9	1	419	370	23	-2	-7	2	715	714	14	-9	-2	2	50	109	49	-3	2	2	1401	1302	20	-3	7	2	230	236	28
0	9	1	0	13	1	-1	-7	2	149	154	17	-8	-2	2	398	397	19	-2	2	2	778	728	10	-2	7	2	35	76	35
1	9	1	447	410	20	0	-7	2	355	352	9	-7	-2	2	534	531	19	-1	2	2	977	868	11	-1	7	2	494	501	19
2	9	1	508	519	20	1	-7	2	610	599	10	-6	-2	2	448	430	16	0	2	2	658	668	11	0	7	2	601	589	20
3	9	1	301	294	22	2	-7	2	232	240	16	-5	-2	2	395	380	13	1	2	2	1395	1355	12	1	7	2	216	237	18
4	9	1	124	153	42	3	-7	2	213	224	16	-4	-2	2	1125	1105	16	2	2	2	338	298	5	2	7	2	383	359	15
5	9	1	472	441	21	4	-7	2	440	433	25	-3	-2	2	1012	1030	14	3	2	2	613	592	7	3	7	2	551	539	18
6	9	1	201	239	29	5	-7	2	248	256	29	-2	-2	2	250	248	5	4	2	2	874	875	9	4	7	2	390	386	17
7	9	1	94	82	93	6	-7	2	126	71	126	-1	-2	2	672	656	7	5	2	2	294	295	7	5	7	2	219	197	20
8	9	1	279	273	28	-10	-6	2	181	95	39	0	-2	2	589	605	6	6	2	2	318	307	10	6	7	2	555	571	21
9	9	1	320	310	29	-9	-6	2	250	167	36	1	-2	2	656	641	7	7	2	2	706	674	19	7	7	2	707	680	23
-3	10	1	329	295	26	-8	-6	2	442	434	22	2	-2	2	65	83	6	8	2	2	552	517	19	8	7	2	342	298	20
-2	10	1	112	145	61	-7	-6	2	412	394	19	3	-2	2	1009	1001	9	9	2	2	184	171	25	9	7	2	186	192	33
0	10	1	392	363	24	-6	-6	2	173	159	22	4	-2	2	776	725	10	-8	3	2	476	405	23	10	7	2	228	280	31
1	10	1	364	348	26	-5	-6	2	715	710	14	5	-2	2	100	118	16	-7	3	2	370	342	21	-5	8	2	263	240	36
2	10	1	82	42	81	-4	-6	2	1025	963	13	6	-2	2	527	528	11	-6	3	2	84	76	84	-4	8	2	89	105	89
3	10	1	302	293	28	-3	-6	2	350	371	11	7	-2	2	585	582	13	-5	3	2	532	523	17	-3	8	2	226	259	23
4	10	1	342	318	22	-2	-6	2	259	279	11	8	-2	2	208	222	35	-4	3	2	609	603	13	-2	8	2	505	485	21
5	10	1	0	32	1	-1	-6	2	698	709	13	9	-2	2	149	122	44	-3	3	2	112	127	18	-1	8	2	446	422	19
6	10	1	293	311	30	0	-6	2	499	493	11	10	-2	2	353	312	30	-2	3	2	723	692	11	0	8	2	186	172	24
7	10	1	395	377	26	1	-6	2	0	55	1	-10	-1	2	126	124	52	-1	3	2	1197	1216	14	1	8	2	449	464	18

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
8	10	1	232	287	34	2	-6	2	524	511	9	-9	-1	2	394	399	20	0	3	2	882	877	11	2	8	2	698	681	21
-1	11	1	201	239	47	3	-6	2	494	494	13	-8	-1	2	506	459	20	1	3	2	29	53	28	3	8	2	254	265	21
0	11	1	0	25	1	4	-6	2	89	95	35	-7	-1	2	243	242	18	2	3	2	1036	1018	12	4	8	2	346	353	17
1	11	1	223	257	33	5	-6	2	333	325	26	-6	-1	2	410	376	17	3	3	2	515	542	8	5	8	2	711	686	22
2	11	1	342	352	26	6	-6	2	504	480	26	-5	-1	2	683	696	13	4	3	2	68	69	13	6	8	2	469	448	19
3	11	1	116	197	66	7	-6	2	296	294	29	-4	-1	2	371	355	11	5	3	2	864	859	14	7	8	2	35	15	35
4	11	1	89	159	89	-10	-5	2	271	307	30	-3	-1	2	487	478	9	6	3	2	1021	988	15	8	8	2	282	268	26
5	11	1	373	379	26	-9	-5	2	435	428	23	-2	-1	2	838	858	12	7	3	2	681	667	17	9	8	2	349	339	29
6	11	1	242	303	40	-8	-5	2	199	226	27	-1	-1	2	1039	1054	11	8	3	2	0	41	1	10	8	2	29	133	28
7	11	1	114	110	92	-7	-5	2	255	228	23	0	-1	2	20	24	20	9	3	2	388	384	20	-4	9	2	407	323	28
3	12	1	123	170	68	-6	-5	2	400	385	10	1	-1	2	891	914	8	-8	4	2	0	61	1	-3	9	2	380	355	26
4	12	1	230	291	35	-5	-5	2	294	308	12	2	-1	2	903	900	8	-7	4	2	221	223	32	-2	9	2	119	162	58
-6	-11	2	108	199	108	-4	-5	2	164	171	3	3	-1	2	153	145	5	-6	4	2	388	376	21	-1	9	2	333	314	25
-5	-11	2	131	159	39	-3	-5	2	1000	982	16	4	-1	2	846	802	8	-5	4	2	254	229	20	0	9	2	580	548	22
-4	-11	2	414	420	21	-2	-5	2	802	797	12	5	-1	2	1091	1046	11	-4	4	2	273	259	16	1	9	2	365	359	23
2	9	2	0	68	1	1	-7	3	0	45	1	-4	-2	3	575	562	14	2	2	3	922	899	9	3	7	3	65	35	64
3	9	2	452	437	21	2	-7	3	540	516	10	-3	-2	3	169	166	9	3	2	3	604	631	7	4	7	3	491	530	19
4	9	2	472	533	25	3	-7	3	608	572	15	-2	-2	3	1005	1017	12	4	2	3	71	66	9	5	7	3	925	870	23
5	9	2	176	191	32	4	-7	3	215	261	30	-1	-2	3	1182	1191	11	5	2	3	777	782	10	6	7	3	498	510	20
6	9	2	239	229	26	5	-7	3	137	146	55	0	-2	3	432	425	5	6	2	3	848	855	19	7	7	3	136	45	42
7	9	2	376	376	25	6	-7	3	311	302	31	1	-2	3	894	871	8	7	2	3	483	486	16	8	7	3	393	407	22
8	9	2	230	258	29	-9	-6	3	320	295	24	2	-2	3	943	945	8	8	2	3	148	141	24	9	7	3	366	360	23
9	9	2	123	51	65	-8	-6	3	0	111	1	3	-2	3	148	149	5	9	2	3	427	393	20	10	7	3	0	100	1
-2	10	2	288	281	35	-7	-6	3	452	455	21	4	-2	3	559	559	8	-8	3	3	157	118	41	-5	8	3	106	88	77
-1	10	2	373	395	26	-6	-6	3	657	635	15	5	-2	3	714	692	10	-7	3	3	313	316	26	-4	8	3	331	346	27
0	10	2	145	145	42	-5	-6	3	414	436	19	6	-2	3	765	737	15	-6	3	3	447	416	19	-3	8	3	345	318	25
1	10	2	188	178	30	-4	-6	3	41	42	40	7	-2	3	0	31	1	-5	3	3	375	374	18	-2	8	3	112	140	71
2	10	2	343	322	26	-3	-6	3	800	775	10	8	-2	3	355	345	14	-4	3	3	241	284	20	-1	8	3	360	393	20
3	10	2	76	139	76	-2	-6	3	710	704	12	9	-2	3	298	282	17	-3	3	3	837	804	14	0	8	3	661	637	21
4	10	2	136	207	42	-1	-6	3	367	367	11	10	-2	3	0	93	1	-2	3	3	824	770	9	1	8	3	199	196	21
5	10	2	481	462	24	0	-6	3	196	206	13	-10	-1	3	372	376	26	-1	3	3	333	312	7	2	8	3	210	223	23
6	10	2	360	338	26	1	-6	3	593	588	10	-9	-1	3	206	189	28	0	3	3	447	462	7	3	8	3	693	691	23
7	10	2	0	57	1	2	-6	3	226	238	9	-8	-1	3	263	325	23	1	3	3	995	995	11	4	8	3	663	657	21
8	10	2	221	194	43	3	-6	3	341	346	9	-7	-1	3	584	568	19	2	3	3	161	175	5	5	8	3	146	180	30
9	10	2	392	345	33	4	-6	3	607	590	15	-6	-1	3	511	519	17	3	3	3	425	403	7	6	8	3	362	351	22
-1	11	2	0	53	1	5	-6	3	429	450	25	-5	-1	3	0	113	1	4	3	3	1047	1032	12	7	8	3	537	564	22
0	11	2	249	257	40	6	-6	3	91	96	91	-4	-1	3	882	862	14	5	3	3	1127	1091	16	8	8	3	333	343	22
1	11	2	211	248	39	7	-6	3	182	222	43	-3	-1	3	1166	1140	16	6	3	3	55	60	33	9	8	3	0	20	1
2	11	2	104	28	85	-10	-5	3	179	214	42	-2	-1	3	730	729	11	7	3	3	676	662	18	10	8	3	217	226	32
3	11	2	204	224	46	-9	-5	3	0	42	1	-1	-1	3	387	385	5	8	3	3	681	627	21	-3	9	3	216	182	42
4	11	2	272	284	30	-8	-5	3	360	351	21	0	-1	3	837	875	8	9	3	3	290	301	20	-2	9	3	352	339	24
5	11	2	0	137	1	-7	-5	3	593	582	23	1	-1	3	250	247	3	-8	4	3	260	287	28	-1	9	3	449	432	25
6	11	2	126	210	57	-6	-5	3	123	76	41	2	-1	3	592	566	5	-7	4	3	262	292	27	0	9	3	35	49	35
7	11	2	443	355	30	-5	-5	3	442	439	11	3	-1	3	1347	1352	11	-6	4	3	0	68	1	1	9	3	383	373	24
3	12	2	245	260	44	-4	-5	3	678	664	12	4	-1	3	1048	1047	9	-5	4	3	455	423	17	2	9	3	565	539	22
4	12	2	0	17	1	-3	-5	3	658	662	9	5	-1	3	317	308	7	-4	4	3	713	696	21	3	9	3	341	336	23
5	12	2	250	230	37	-2	-5	3	245	250	7	6	-1	3	234	223	11	-3	4	3	355	358	16	4	9	3	186	180	27
-5	-11	3	450	422	21	-1	-5	3	748	745	11	7	-1	3	994	944	14	-2	4	3	538	533	10	5	9	3	560	552	24
-4	-11	3	179	224	36	0	-5	3	584	571	11	8	-1	3	388	406	13	-1	4	3	871	849	12	6	9	3	485	462	21
-3	-11	3	96	82	95	1	-5	3	84	85	16	9	-1	3	76	40	40	0	4	3	949	920	12	7	9	3	131	164	44
-2	-11	3	335	354	39	2	-5	3	736	717	11	10	-1	3	274	227	31	1	4	3	98	67	13	8	9	3	206	175	30
-1	-11	3	295	316	38	3	-5	3	704	670	11	-9	0	3	228	245	31	2	4	3	1526	1480	16	9	9	3	234	262	30
0	-11	3	0	27	1	4	-5	3	296	305	12	-8	0	3	368	365	22	3	4	3	951	935	12	-2	10	3	205	211	34
-7	-10	3	352	376	21	5	-5	3	170	163	15	-7	0	3	76	27	56	4	4	3	685	656	11	-1	10	3	136	33	73
-6	-10	3	363	381	22	6	-5	3	469	457	23	-6	0	3	337	302	17	5	4	3	294	295	12	0	10	3	285	301	29
-5	-10	3	76	12	76	7	-5	3	367	367	27	-5	0	3	665	665	17	6	4	3	819	828	20	1	10	3	287	259	28
-4	-10	3	349	322	20	8	-5	3	124	73	124	-4	0	3	516	492	12	7	4	3	617	578	18	2	10	3	46	43	45
-3	-10	3	377	389	19	-10	-4	3	230	238	41	-3	0	3	295	304	8	8	4	3	137	129	29	3	10	3	348	327	26
-2	-10	3	318	348	20	-9	-4	3	313	317	28	-2	0	3	1114	1090	14	9	4	3	252	245	24	5	10	3	134	128	57
-1	-10	3	91	98	51	-8	-4	3	219	206	24	-1	0	3	1202	1185	16	-7	5	3	129	197	74	6	10	3	150	196	43
0	-10	3	319	280	31	-7	-4	3	176	135	22	0	0	3	46	37	45	-6	5	3	428	384	21	7	10	3	320	327	27
1	-10	3	119	190	74	-6	-4	3	560	584	17	1	0	3	733	740	7	-5	5	3	275	254	21	8	10	3	230	278	36
2	-10	3	0	26	1	-5	-4	3	433	420	16	2	0	3	1497	1491	12	-4	5	3	140	188	39	9	10	3	110	38	110
3	-10	3	318	262	36	-4	-4	3	46	53	45	3	0	3	876	878	7	-3	5	3	707	696	14	0	11	3	155	139	46
-8	-9	3	303	279	32	-3	-4	3	706	685	11	4	0	3	415	398	5	-2	5	3	880	861	14	1	11	3	91	136	91
-7	-9	3	156	143	27	-2	-4	3	809	843	9	5	0	3	1116	1098	13	-1	5	3	377	368	9	2	11	3	224	269	32
-6	-9	3	137	149	33	-1	-4	3	390	406	6	6	0	3	819	817	13	0	5	3	357	368	9	3	11	3	160	205	42
-5	-9	3	463	456	17	0	-4	3	668	667	7	7	0	3	279	307	10	1	5	3	865	845	12	4	11	3	82	87	81
-4	-9	3	332	335	16	1	-4	3	906	914	10	8	0	3	229	231	13	2	5	3	839	827	13	5	11	3	272	351	33
-3	-9	3	71	11	71	2	-4	3	1068	1000	11	9	0	3	384	388	14	3	5	3	206	202	14	6	11	3	333	385	36
-2	-9	3	269	252	16	3	-4	3	0	47	1	10	0	3	276	233	27	4	5	3	826	805	18	7	11	3	104	142	104
-1	-9	3	392	402	16	4	-4	3	693	655	13	-9	1	3	239	200	37	5	5	3	1017	968	21	3	12	3	161	185	54
0	-9	3	0	44	1	5	-4	3	761	749	15	-8	1	3	82	103	81	6	5	3	406	403	15	4	12	3	324	336	32
1	-9	3	271	267	29	6	-4	3	456	427	19	-7	1	3	516	485	21	7	5	3	160	178	20	5	12	3	274	276	32
2	-9	3	461	440	27	7	-4	3	127	98	69	-6	1	3	632	616	20	8	5	3	447	437	19	-5	-11	4	110	65	60
3	-9	3	182	221	41	8	-4	3	215	290	40	-5	1	3	61	66	61	9	5	3	308	290	24	-4	-11	4	342	373	22
4	-9	3	46	73	45	9	-4	3	239	203	37	-4	1	3	705	697	13	-6	6	3	162	148	38	-3	-11	4	318	346	33
-9	-8	3	304	208	37	-10	-3	3	239	254	32	-3	1	3	1395	1356	19	-5	6	3	279	263	25	-2	-11	4	227	194	40
-8	-8	3	0	36	1	-9	-3	3	0	34	1	-2	1	3	720	713	16	-4	6	3	666	598	21	-1	-11	4	133	166	78

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
-7	-8	3	333	338	17	-8	-3	3	356	348	18	-1	1	3	335	313	6	-3	6	3	480	474	19	0	-11	4	280	350	38
-6	-8	3	331	350	15	-6	-3	3	252	248	20	0	1	3	560	575	7	-2	6	3	61	51	19	-6	-10	4	197	197	28
-5	-8	3	106	79	32	-5	-3	3	498	501	17	1	1	3	1124	1128	13	-1	6	3	496	457	17	-5	-10	4	504	497	19
-4	-8	3	291	265	15	-4	-3	3	1230	1229	24	2	1	3	416	434	4	0	6	3	726	730	19	-4	-10	4	288	333	20
-3	-8	3	682	642	15	-3	-3	3	1274	1226	14	3	1	3	848	849	7	1	6	3	274	280	14	-3	-10	4	20	43	20
-2	-8	3	457	464	13	-2	-3	3	20	44	20	4	1	3	1019	1011	11	2	6	3	345	372	17	-2	-10	4	208	223	22
-1	-8	3	0	53	1	-1	-3	3	459	469	5	5	1	3	648	656	7	3	6	3	604	578	17	-1	-10	4	383	380	27
0	-8	3	447	450	11	0	-3	3	939	930	9	6	1	3	0	37	1	4	6	3	521	471	15	0	-10	4	155	131	72
1	-8	3	494	466	11	1	-3	3	408	415	5	7	1	3	494	486	11	5	6	3	195	187	20	1	-10	4	146	217	59
2	-8	3	199	217	14	2	-3	3	106	121	6	8	1	3	315	319	11	6	6	3	527	530	18	2	-10	4	301	306	38
3	-8	3	232	224	31	3	-3	3	1066	1044	11	9	1	3	71	70	71	7	6	3	479	466	19	-7	-9	4	372	349	19
4	-8	3	364	395	29	4	-3	3	790	776	9	11	1	3	296	328	35	8	6	3	118	104	38	-6	-9	4	404	382	19
5	-8	3	269	279	45	5	-3	3	0	78	1	-9	2	3	175	204	41	9	6	3	237	253	26	-5	-9	4	224	247	20
-9	-7	3	160	184	44	6	-3	3	317	332	11	-8	2	3	371	349	25	10	6	3	300	350	26	-4	-9	4	212	198	24
-8	-7	3	326	312	25	7	-3	3	375	387	22	-7	2	3	102	116	44	-6	7	3	197	220	38	-3	-9	4	359	367	15
-7	-7	3	217	247	29	8	-3	3	164	145	49	-6	2	3	230	231	18	-5	7	3	403	366	24	-2	-9	4	307	322	15
-6	-7	3	241	241	18	9	-3	3	155	143	33	-5	2	3	902	887	22	-4	7	3	116	130	48	-1	-9	4	87	97	58
-5	-7	3	746	712	16	-10	-2	3	149	152	46	-4	2	3	926	905	20	-3	7	3	232	222	22	0	-9	4	353	369	17
-4	-7	3	821	789	11	-9	-2	3	428	400	24	-3	2	3	556	558	11	-2	7	3	496	482	21	1	-9	4	269	264	36
-3	-7	3	320	319	12	-8	-2	3	423	414	19	-2	2	3	808	771	10	-1	7	3	414	421	20	2	-9	4	0	75	1
-2	-7	3	461	458	12	-7	-2	3	114	78	29	-1	2	3	1102	1085	13	0	7	3	82	71	81	3	-9	4	156	264	94
-1	-7	3	808	773	15	-6	-2	3	631	648	18	0	2	3	1118	1115	13	1	7	3	487	477	18	4	-9	4	324	351	34
0	-7	3	486	482	13	-5	-2	3	973	943	21	1	2	3	46	67	16	2	7	3	564	540	19	-8	-8	4	241	259	33
-7	-8	4	232	196	36	-5	-3	4	685	674	19	3	1	4	1597	1563	12	4	6	4	348	334	16	-1	-9	5	469	471	17
-6	-8	4	116	141	31	-4	-3	4	418	418	14	4	1	4	217	227	4	5	6	4	733	702	19	0	-9	5	179	189	39
-5	-8	4	483	464	15	-3	-3	4	326	331	6	5	1	4	419	441	6	6	6	4	526	519	18	1	-9	5	197	226	38
-4	-8	4	416	436	15	-2	-3	4	1263	1246	13	6	1	4	652	660	11	7	6	4	0	84	1	2	-9	5	323	347	34
-3	-8	4	0	73	1	-1	-3	4	617	633	7	7	1	4	372	386	11	8	6	4	403	392	21	3	-9	5	289	362	35
-2	-8	4	392	385	14	0	-3	4	146	143	5	8	1	4	316	328	11	9	6	4	263	294	25	4	-9	5	108	24	108
-1	-8	4	751	731	16	1	-3	4	1014	1015	10	9	1	4	393	385	19	-5	7	4	146	59	67	-8	-8	5	110	62	110
0	-8	4	292	286	14	2	-3	4	1323	1300	11	11	1	4	129	30	67	-4	7	4	329	350	25	-7	-8	5	204	220	37
1	-8	4	184	197	12	3	-3	4	434	449	6	-8	2	4	0	19	1	-3	7	4	418	412	23	-6	-8	5	342	388	19
2	-8	4	527	504	15	4	-3	4	356	358	6	-7	2	4	442	455	21	-2	7	4	188	230	33	-5	-8	5	306	301	15
3	-8	4	551	545	27	5	-3	4	639	646	12	-6	2	4	570	549	21	-1	7	4	324	309	22	-4	-8	5	170	220	22
4	-8	4	126	157	61	6	-3	4	596	587	14	-5	2	4	390	381	16	0	7	4	470	457	23	-3	-8	5	410	405	14
5	-8	4	0	212	1	7	-3	4	0	37	1	-4	2	4	431	398	14	1	7	4	159	142	21	-2	-8	5	228	232	16
-9	-7	4	258	218	42	8	-3	4	324	306	28	-3	2	4	951	961	19	2	7	4	390	401	17	-1	-8	5	65	63	64
-8	-7	4	0	10	1	9	-3	4	263	289	21	-2	2	4	1009	969	15	3	7	4	776	748	22	0	-8	5	631	616	16
-7	-7	4	416	388	21	-9	-2	4	71	22	71	-1	2	4	315	301	7	4	7	4	507	520	18	1	-8	5	603	605	16
-6	-7	4	638	599	15	-8	-2	4	317	326	23	0	2	4	398	410	7	5	7	4	79	64	50	2	-8	5	234	257	16
-5	-7	4	339	335	14	-7	-2	4	685	647	21	1	2	4	1035	1037	14	6	7	4	542	507	19	3	-8	5	100	133	50
-4	-7	4	260	252	14	-6	-2	4	607	577	18	2	2	4	106	113	6	7	7	4	602	574	20	4	-8	5	419	406	30
-3	-7	4	647	608	10	-5	-2	4	298	301	18	3	2	4	610	622	7	8	7	4	262	241	23	5	-8	5	250	315	39
-2	-7	4	516	509	10	-4	-2	4	894	898	19	4	2	4	968	932	9	9	7	4	196	183	34	-8	-7	5	353	351	29
-1	-7	4	114	134	16	-3	-2	4	1217	1204	17	5	2	4	711	709	9	-4	8	4	189	177	34	-7	-7	5	287	303	27
0	-7	4	590	575	13	-2	-2	4	673	677	7	6	2	4	61	71	26	-3	8	4	179	193	33	-6	-7	5	0	71	1
1	-7	4	771	737	13	-1	-2	4	416	431	6	7	2	4	442	443	15	-2	8	4	329	330	23	-5	-7	5	463	425	14
2	-7	4	478	471	11	0	-2	4	1069	1098	11	8	2	4	534	508	17	-1	8	4	349	333	22	-4	-7	5	663	647	15
3	-7	4	119	130	23	1	-2	4	487	503	5	-8	3	4	368	378	26	0	8	4	94	82	53	-3	-7	5	185	186	17
4	-7	4	395	406	28	2	-2	4	171	183	3	-7	3	4	377	346	24	1	8	4	571	527	21	-2	-7	5	377	393	9
5	-7	4	323	368	29	3	-2	4	1314	1238	11	-6	3	4	150	120	27	2	8	4	587	563	21	-1	-7	5	761	747	15
6	-7	4	0	53	1	4	-2	4	814	807	9	-5	3	4	549	510	21	3	8	4	319	288	21	0	-7	5	624	594	14
-9	-6	4	204	183	37	5	-2	4	106	127	7	-4	3	4	707	717	20	4	8	4	271	274	22	1	-7	5	0	32	1
-8	-6	4	419	401	23	6	-2	4	189	223	12	-3	3	4	492	462	15	5	8	4	751	736	23	2	-7	5	485	486	11
-7	-6	4	474	495	22	7	-2	4	676	651	22	-2	3	4	401	387	8	6	8	4	533	527	21	3	-7	5	757	704	16
-6	-6	4	76	86	76	8	-2	4	232	255	18	-1	3	4	847	817	11	7	8	4	96	118	60	4	-7	5	275	313	18
-5	-6	4	602	598	13	9	-2	4	139	161	44	0	3	4	909	890	12	8	8	4	267	268	26	5	-7	5	91	71	91
-4	-6	4	826	829	15	10	-2	4	250	336	37	1	3	4	55	55	18	9	8	4	349	354	24	6	-7	5	284	302	40
-3	-6	4	749	744	10	-9	-1	4	315	336	27	2	3	4	1393	1372	13	10	8	4	0	155	1	-9	-6	5	267	280	34
-2	-6	4	127	139	10	-8	-1	4	386	424	21	3	3	4	914	914	9	-3	9	4	305	346	33	-8	-6	5	0	63	1
-1	-6	4	570	588	10	-7	-1	4	0	25	1	4	3	4	357	375	8	-2	9	4	177	127	46	-7	-6	5	288	281	29
0	-6	4	566	570	11	-6	-1	4	441	431	19	5	3	4	371	372	12	-1	9	4	155	157	36	-6	-6	5	713	701	23
1	-6	4	0	12	1	-5	-1	4	894	893	20	6	3	4	883	864	20	0	9	4	469	455	22	-5	-6	5	493	477	13
2	-6	4	542	536	9	-4	-1	4	566	588	15	7	3	4	526	535	16	1	9	4	368	333	22	-4	-6	5	74	48	38
3	-6	4	683	664	11	-3	-1	4	0	34	1	8	3	4	87	149	37	2	9	4	129	62	39	-3	-6	5	442	461	13
4	-6	4	273	290	13	-2	-1	4	648	649	10	9	3	4	423	392	19	3	9	4	604	551	22	-2	-6	5	656	641	10
5	-6	4	61	128	61	-1	-1	4	494	488	5	-7	4	4	185	201	34	4	9	4	611	598	21	-1	-6	5	185	199	10
6	-6	4	377	370	26	0	-1	4	58	46	7	-6	4	4	377	379	24	6	9	4	175	153	34	0	-6	5	499	500	10
7	-6	4	255	205	32	1	-1	4	1094	1081	9	-5	4	4	331	336	18	7	9	4	268	286	24	1	-6	5	715	692	13
-9	-5	4	314	337	27	2	-1	4	1027	1039	14	-4	4	4	87	82	45	8	9	4	206	265	40	2	-6	5	456	439	10
-8	-5	4	179	218	28	3	-1	4	792	777	7	-3	4	4	559	532	18	9	9	4	82	34	81	3	-6	5	29	20	28
-7	-5	4	143	165	32	4	-1	4	656	627	6	-2	4	4	669	666	13	-2	10	4	203	225	40	4	-6	5	527	490	15
-6	-5	4	655	631	20	5	-1	4	1081	1034	10	-1	4	4	353	339	11	-1	10	4	377	361	31	5	-6	5	417	435	24
-5	-5	4	515	506	13	6	-1	4	608	601	10	0	4	4	850	846	11	0	10	4	172	189	38	6	-6	5	159	155	44
-4	-5	4	76	74	22	7	-1	4	215	212	9	1	4	4	1142	1080	13	1	10	4	193	193	34	7	-6	5	228	211	37
-3	-5	4	427	433	10	8	-1	4	431	424	13	2	4	4	798	742	9	2	10	4	273	274	25	-9	-5	5	0	82	1
-2	-5	4	704	688	9	9	-1	4	452	434	15	3	4	4	509	487	8	3	10	4	278	273	30	-8	-5	5	390	420	26
-1	-5	4	96	114	11	10	-1	4	265	224	31	4	4	4	1110	1055	15	4	10	4	162	69	34	-7	-5	5	536	553	22
0	-5	4	469	468	9	-9	0	4	205	197	37	5	4	4	1313	1221	24	5	10	4	295	320	24	-6	-5	5	261	281	20

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
1	-5	4	776	782	13	-8	0	4	183	125	28	6	4	4	384	369	15	6	10	4	371	364	26	-5	-5	5	173	177	11
2	-5	4	570	573	9	-7	0	4	483	499	20	7	4	4	240	261	17	7	10	4	108	102	89	-4	-5	5	522	498	12
3	-5	4	94	114	14	-6	0	4	484	464	19	8	4	4	600	549	19	8	10	4	208	181	38	-3	-5	5	544	522	11
4	-5	4	624	611	10	-5	0	4	156	175	21	9	4	4	305	303	22	9	10	4	243	267	36	-2	-5	5	58	64	16
5	-5	4	740	708	25	-4	0	4	644	641	17	-7	5	4	260	229	35	0	11	4	159	224	55	-1	-5	5	600	591	8
6	-5	4	192	229	32	-3	0	4	941	903	14	-6	5	4	108	33	54	1	11	4	258	235	40	0	-5	5	630	644	9
7	-5	4	228	233	41	-2	0	4	604	583	10	-5	5	4	276	309	24	2	11	4	126	61	61	1	-5	5	35	65	35
8	-5	4	339	343	30	-1	0	4	599	579	9	-4	5	4	695	662	23	3	11	4	186	180	53	2	-5	5	479	495	9
-9	-4	4	94	48	93	0	0	4	1288	1288	24	-3	5	4	467	433	17	4	11	4	242	302	33	3	-5	5	652	615	11
-8	-4	4	322	302	26	1	0	4	662	677	7	-2	5	4	104	103	43	5	11	4	183	191	38	4	-5	5	321	308	9
-7	-4	4	549	533	21	2	0	4	247	243	4	-1	5	4	597	584	17	6	11	4	0	108	1	5	-5	5	123	142	24
-6	-4	4	215	213	20	3	0	4	971	979	8	0	5	4	647	663	13	7	11	4	308	294	29	6	-5	5	463	460	24
-5	-4	4	139	158	23	4	0	4	1167	1187	10	1	5	4	142	146	14	4	12	4	140	84	66	7	-5	5	377	368	30
-4	-4	4	661	672	11	5	0	4	712	718	9	2	5	4	757	743	13	-3	11	5	168	114	81	8	-5	5	153	84	79
-3	-4	4	735	726	11	6	0	4	162	157	10	3	5	4	1092	1047	22	-2	11	5	276	303	47	-9	-4	5	318	326	27
-2	-4	4	296	291	6	7	0	4	679	651	14	4	5	4	768	736	20	-1	11	5	315	326	34	-8	-4	5	265	265	25
-1	-4	4	757	754	8	8	0	4	426	421	16	5	5	4	0	44	1	-6	10	5	335	344	22	-7	-4	5	124	65	35
0	-4	4	776	772	8	9	0	4	0	36	1	6	5	4	614	590	17	-5	10	5	96	131	60	-6	-4	5	638	629	21
1	-4	4	159	164	7	10	0	4	185	222	36	7	5	4	337	310	17	-4	10	5	211	253	25	-5	-4	5	519	506	18
2	-4	4	694	677	9	-9	1	4	219	238	34	8	5	4	55	59	54	-3	10	5	360	393	19	-4	-4	5	247	255	7
3	-4	4	1080	1047	11	-8	1	4	313	270	29	9	5	4	204	254	25	-2	10	5	276	281	32	-3	-4	5	314	312	9
4	-4	4	678	665	10	-7	1	4	0	37	1	-6	6	4	351	354	27	-1	10	5	0	77	1	-2	-4	5	860	820	13
5	-4	4	129	124	17	-6	1	4	318	318	21	-5	6	4	318	361	27	0	10	5	284	340	35	-1	-4	5	112	110	8
6	-4	4	409	378	20	-5	1	4	792	785	21	-4	6	4	106	90	52	1	10	5	278	302	40	0	-4	5	609	599	7
7	-4	4	345	376	26	-4	1	4	795	811	20	-3	6	4	393	379	19	2	10	5	0	83	1	1	-4	5	1042	1032	11
8	-4	4	102	136	102	-3	1	4	35	62	35	-2	6	4	640	654	15	-7	-9	5	216	225	24	2	-4	5	1118	1093	13
9	-4	4	194	172	24	-2	1	4	921	878	15	-1	6	4	427	409	10	-6	-9	5	0	69	1	3	-4	5	377	373	7
-9	-3	4	327	309	26	-1	1	4	1092	1073	15	0	6	4	0	32	1	-5	-9	5	333	335	17	4	-4	5	412	409	8
-8	-3	4	212	243	27	0	1	4	601	613	7	1	6	4	709	714	20	-4	-9	5	370	351	17	5	-4	5	679	652	11
-7	-3	4	211	211	23	1	1	4	669	687	8	2	6	4	748	725	18	-3	-9	5	0	40	1	6	-4	5	374	378	19
-6	-3	4	905	870	22	2	1	4	1485	1485	15	3	6	4	20	63	20	-2	-9	5	184	188	29	7	-4	5	0	74	1
8	-4	5	301	298	30	-2	1	5	493	483	11	1	6	5	439	420	17	-7	-8	6	274	303	32	-1	-3	6	878	891	11
9	-4	5	315	342	21	-1	1	5	191	202	11	2	6	5	192	218	16	-6	-8	6	29	54	28	0	-3	6	98	110	8
-9	-3	5	104	69	74	0	1	5	1221	1216	13	3	6	5	832	779	20	-5	-8	6	206	237	18	1	-3	6	778	803	9
-8	-3	5	289	249	24	1	1	5	1534	1506	15	4	6	5	445	446	17	-4	-8	6	419	399	16	2	-3	6	1132	1101	11
-7	-3	5	499	486	19	2	1	5	549	580	7	5	6	5	145	157	27	-3	-8	6	0	32	1	3	-3	6	568	582	7
-6	-3	5	478	485	18	3	1	5	418	429	5	6	6	5	425	418	16	-2	-8	6	296	342	16	4	-3	6	55	77	54
-5	-3	5	339	364	16	4	1	5	1130	1126	9	7	6	5	435	434	19	-1	-8	6	566	530	16	5	-3	6	444	445	5
-4	-3	5	757	711	17	5	1	5	520	508	7	8	6	5	96	97	37	0	-8	6	338	366	23	6	-3	6	487	479	13
-3	-3	5	741	716	9	6	1	5	94	92	11	9	6	5	302	304	22	1	-8	6	87	82	37	7	-3	6	58	21	57
-2	-3	5	240	239	7	7	1	5	181	201	10	-5	7	5	399	386	28	2	-8	6	432	432	16	8	-3	6	332	333	17
-1	-3	5	744	754	8	8	1	5	531	531	13	-4	7	5	262	265	30	3	-8	6	473	457	17	9	-3	6	320	360	31
0	-3	5	969	990	10	9	1	5	0	33	1	-3	7	5	96	121	76	4	-8	6	139	168	30	-9	-2	6	84	101	84
1	-3	5	588	604	6	11	1	5	293	345	35	-2	7	5	392	382	23	5	-8	6	184	199	48	-8	-2	6	225	235	29
2	-3	5	254	263	5	-8	2	5	368	400	28	-1	7	5	400	386	21	-8	-7	6	0	87	1	-7	-2	6	458	472	22
3	-3	5	1144	1109	11	-7	2	5	274	267	22	0	7	5	41	38	40	-7	-7	6	152	197	60	-6	-2	6	505	470	19
4	-3	5	801	772	9	-6	2	5	196	208	26	1	7	5	489	485	18	-6	-7	6	423	417	23	-5	-2	6	267	244	19
5	-3	5	176	190	7	-5	2	5	698	650	21	2	7	5	571	588	19	-5	-7	6	238	240	16	-4	-2	6	404	407	16
6	-3	5	333	350	22	-4	2	5	852	804	21	3	7	5	260	262	20	-4	-7	6	140	146	20	-3	-2	6	881	875	22
7	-3	5	417	423	24	-3	2	5	358	341	16	4	7	5	247	243	19	-3	-7	6	552	537	14	-2	-2	6	570	549	10
8	-3	5	272	210	27	-2	2	5	367	373	13	5	7	5	532	548	17	-2	-7	6	445	425	14	-1	-2	6	790	774	8
9	-3	5	106	121	52	-1	2	5	1045	990	12	6	7	5	425	426	19	-1	-7	6	179	174	18	0	-2	6	1109	1122	9
-9	-2	5	331	356	29	0	2	5	845	850	10	7	7	5	127	140	34	0	-7	6	633	645	14	1	-2	6	928	935	8
-8	-2	5	329	314	21	1	2	5	152	159	7	8	7	5	333	357	21	1	-7	6	764	750	16	2	-2	6	358	344	5
-7	-2	5	0	33	1	2	2	5	984	944	11	9	7	5	419	420	24	2	-7	6	447	438	15	3	-2	6	565	554	11
-6	-2	5	607	610	22	3	2	5	1032	1047	9	-4	8	5	253	230	31	3	-7	6	71	57	71	4	-2	6	657	650	11
-5	-2	5	881	869	21	4	2	5	610	586	7	-3	8	5	348	328	29	4	-7	6	368	381	15	5	-2	6	157	149	12
-4	-2	5	542	549	17	5	2	5	171	189	7	-2	8	5	35	93	35	5	-7	6	335	330	30	6	-2	6	319	327	7
-3	-2	5	274	244	13	6	2	5	675	660	16	-1	8	5	208	237	28	6	-7	6	0	84	1	7	-2	6	619	622	15
-2	-2	5	1064	1029	13	7	2	5	313	324	13	0	8	5	386	405	21	-8	-6	6	440	435	30	8	-2	6	291	300	17
-1	-2	5	745	761	8	8	2	5	252	236	15	1	8	5	331	338	22	-7	-6	6	425	424	25	9	-2	6	58	39	57
0	-2	5	363	347	6	-8	3	5	0	64	1	2	8	5	183	218	24	-6	-6	6	170	161	32	10	-2	6	283	317	32
1	-2	5	738	754	7	-7	3	5	262	218	35	3	8	5	687	657	22	-5	-6	6	337	349	13	-9	-1	6	273	282	35
2	-2	5	909	935	9	-6	3	5	406	398	22	4	8	5	572	606	21	-4	-6	6	652	602	13	-8	-1	6	404	402	25
3	-2	5	715	679	9	-5	3	5	499	462	19	5	8	5	247	289	23	-3	-6	6	409	399	12	-7	-1	6	304	293	24
4	-2	5	235	239	4	-4	3	5	0	25	1	6	8	5	302	320	22	-2	-6	6	79	45	17	-6	-1	6	140	150	26
5	-2	5	504	487	7	-3	3	5	568	560	17	7	8	5	508	511	24	-1	-6	6	469	473	9	-5	-1	6	769	770	22
6	-2	5	470	463	8	-2	3	5	631	627	13	8	8	5	274	301	23	0	-6	6	818	800	15	-4	-1	6	318	330	17
7	-2	5	91	76	30	-1	3	5	148	155	12	9	8	5	71	53	71	1	-6	6	126	111	14	-3	-1	6	58	101	57
8	-2	5	426	428	15	0	3	5	736	736	10	-3	9	5	0	95	1	2	-6	6	282	291	9	-2	-1	6	598	613	14
9	-2	5	436	431	17	1	3	5	1030	1029	12	-2	9	5	293	285	36	3	-6	6	423	415	14	-1	-1	6	979	922	11
10	-2	5	0	130	1	2	3	5	496	489	7	-1	9	5	330	337	29	4	-6	6	294	307	15	0	-1	6	124	133	5
-9	-1	5	116	159	115	3	3	5	268	251	6	0	9	5	0	43	1	5	-6	6	114	123	29	1	-1	6	393	393	4
-8	-1	5	242	235	25	4	3	5	973	969	10	1	9	5	347	333	26	6	-6	6	397	373	28	2	-1	6	831	860	7
-7	-1	5	592	583	20	5	3	5	743	702	15	2	9	5	592	537	24	7	-6	6	263	235	42	3	-1	6	673	676	8
-6	-1	5	540	541	22	6	3	5	119	90	16	3	9	5	421	423	23	-8	-5	6	206	252	35	4	-1	6	157	163	10
-5	-1	5	140	153	24	7	3	5	546	554	16	4	9	5	55	82	54	-7	-5	6	145	72	37	5	-1	6	549	541	9
-4	-1	5	268	246	15	8	3	5	718	670	19	5	9	5	300	303	22	-6	-5	6	421	445	23	6	-1	6	392	403	5
-3	-1	5	851	849	18	-7	4	5	330	328	27	6	9	5	397	380	23	-5	-5	6	564	568	19	7	-1	6	41	67	40

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
-2	-1	5	614	621	11	-6	4	5	94	87	93	7	9	5	126	97	50	-4	-5	6	239	239	9	8	-1	6	435	422	14
-1	-1	5	895	873	9	-5	4	5	197	153	34	8	9	5	182	181	37	-3	-5	6	449	455	11	9	-1	6	505	517	17
0	-1	5	824	857	8	-4	4	5	509	507	21	9	9	5	342	328	31	-2	-5	6	715	690	10	10	-1	6	359	308	19
1	-1	5	652	658	6	-3	4	5	250	273	18	-1	10	5	0	45	1	-1	-5	6	342	330	8	-8	0	6	71	34	71
2	-1	5	386	372	4	-2	4	5	134	141	15	0	10	5	314	313	26	0	-5	6	139	151	9	-7	0	6	336	327	24
3	-1	5	665	691	7	-1	4	5	643	622	13	1	10	5	344	352	30	1	-5	6	650	625	12	-6	0	6	467	468	20
4	-1	5	964	945	11	0	4	5	400	385	11	2	10	5	0	75	1	2	-5	6	546	537	11	-5	0	6	357	361	20
5	-1	5	296	294	5	1	4	5	46	65	45	3	10	5	161	171	36	3	-5	6	137	147	10	-4	0	6	201	219	18
6	-1	5	355	354	6	2	4	5	1091	1063	11	4	10	5	373	378	26	4	-5	6	412	426	13	-3	0	6	481	486	15
7	-1	5	767	752	12	3	4	5	1160	1130	13	5	10	5	219	231	37	5	-5	6	488	463	15	-2	0	6	277	280	13
8	-1	5	366	374	15	4	4	5	772	758	13	6	10	5	20	43	20	6	-5	6	183	192	35	-1	0	6	384	363	8
9	-1	5	0	60	1	5	4	5	84	127	26	7	10	5	298	235	34	7	-5	6	254	237	28	0	0	6	977	967	13
10	-1	5	270	274	31	6	4	5	658	657	17	8	10	5	236	211	42	8	-5	6	274	292	33	1	0	6	1259	1233	11
-9	0	5	162	214	50	7	4	5	432	430	15	9	10	5	20	26	20	-9	-4	6	0	28	1	2	0	6	430	426	6
-8	0	5	344	334	25	8	4	5	87	28	37	0	11	5	116	186	115	-8	-4	6	249	253	32	3	0	6	363	387	4
-7	0	5	145	170	32	9	4	5	386	392	20	1	11	5	29	74	28	-7	-4	6	474	472	22	4	0	6	1072	1060	16
-6	0	5	236	236	25	-6	5	5	374	394	27	2	11	5	214	244	33	-6	-4	6	476	487	21	5	0	6	390	401	6
-5	0	5	620	597	19	-5	5	5	296	292	26	3	11	5	201	261	42	-5	-4	6	74	90	73	6	0	6	161	170	6
-4	0	5	485	501	16	-4	5	5	61	83	61	4	11	5	68	82	67	-4	-4	6	349	333	10	7	0	6	469	486	13
-3	0	5	118	132	23	-3	5	5	461	438	17	5	11	5	152	179	49	-3	-4	6	335	318	7	8	0	6	564	573	15
-2	0	5	660	649	12	-2	5	5	637	594	21	6	11	5	282	269	32	-2	-4	6	58	64	22	9	0	6	131	165	22
-1	0	5	766	755	12	-1	5	5	224	211	18	7	11	5	126	95	126	-1	-4	6	786	766	10	10	0	6	211	191	21
0	0	5	155	135	8	0	5	5	421	394	12	-5	-10	6	316	340	20	0	-4	6	806	815	10	-8	1	6	359	361	33
1	0	5	709	706	7	1	5	5	1054	984	16	-4	-10	6	208	294	47	1	-4	6	475	457	7	-7	1	6	291	289	29
2	0	5	1309	1347	11	2	5	5	1063	1008	13	-3	-10	6	110	11	110	2	-4	6	276	268	7	-6	1	6	102	107	41
3	0	5	1164	1166	9	3	5	5	133	102	20	-2	-10	6	304	259	34	3	-4	6	734	733	9	-5	1	6	457	453	18
4	0	5	102	108	3	4	5	5	487	420	15	-1	-10	6	383	420	33	4	-4	6	623	612	9	-4	1	6	593	571	18
5	0	5	621	626	7	5	5	5	768	738	19	0	-10	6	186	224	67	5	-4	6	0	46	1	-3	1	6	79	78	33
6	0	5	522	526	9	6	5	5	639	600	17	1	-10	6	0	69	1	6	-4	6	435	417	21	-2	1	6	722	757	19
7	0	5	306	330	11	7	5	5	0	87	1	-6	-9	6	336	357	21	7	-4	6	518	500	24	-1	1	6	1129	1116	16
8	0	5	440	433	19	8	5	5	419	396	19	-5	-9	6	248	281	19	8	-4	6	175	173	25	0	1	6	540	523	7
9	0	5	500	507	15	9	5	5	318	301	21	-4	-9	6	96	72	50	-9	-3	6	282	293	31	1	1	6	182	188	5
10	0	5	245	297	31	-6	6	5	129	158	58	-3	-9	6	338	356	17	-8	-3	6	281	259	28	2	1	6	1164	1169	13
-8	1	5	84	42	84	-5	6	5	143	166	45	-2	-9	6	235	237	18	-7	-3	6	123	22	38	3	1	6	1132	1115	9
-7	1	5	399	378	22	-4	6	5	377	388	26	-1	-9	6	159	77	57	-6	-3	6	469	472	19	4	1	6	787	780	8
-6	1	5	480	482	19	-3	6	5	478	459	21	0	-9	6	356	375	28	-5	-3	6	663	664	20	5	1	6	342	331	5
-5	1	5	278	270	19	-2	6	5	134	139	31	1	-9	6	389	396	31	-4	-3	6	303	300	15	6	1	6	575	582	7
-4	1	5	330	346	15	-1	6	5	442	442	9	2	-9	6	0	121	1	-3	-3	6	383	365	7	7	1	6	331	357	16
-3	1	5	749	753	17	0	6	5	540	516	9	3	-9	6	0	106	1	-2	-3	6	980	961	11	8	1	6	161	162	23
9	1	6	456	456	19	1	7	6	383	422	22	0	-7	7	729	701	16	4	-2	7	71	90	20	2	3	7	770	758	13
11	1	6	126	143	76	2	7	6	50	34	49	1	-7	7	123	116	41	5	-2	7	493	496	10	3	3	7	79	81	14
-8	2	6	0	49	1	3	7	6	518	529	20	2	-7	7	348	335	15	6	-2	7	484	450	11	4	3	7	555	564	9
-7	2	6	283	285	27	4	7	6	409	435	18	3	-7	7	428	421	15	7	-2	7	84	61	34	5	3	7	751	736	13
-6	2	6	481	465	22	5	7	6	173	185	24	4	-7	7	304	316	19	8	-2	7	335	345	16	6	3	7	20	101	20
-5	2	6	296	348	20	6	7	6	356	380	19	5	-7	7	87	120	65	9	-2	7	393	347	19	7	3	7	534	558	17
-4	2	6	136	109	35	7	7	6	766	665	26	6	-7	7	332	342	35	-8	-1	7	74	126	73	-6	4	7	123	210	122
-3	2	6	702	690	20	8	7	6	143	215	32	-8	-6	7	0	121	1	-7	-1	7	394	360	24	-5	4	7	0	79	1
-2	2	6	685	673	17	9	7	6	50	132	49	-7	-6	7	71	163	71	-6	-1	7	499	481	21	-4	4	7	399	415	24
-1	2	6	196	199	8	-4	8	6	106	199	106	-6	-6	7	414	412	23	-5	-1	7	318	283	18	-3	4	7	281	302	25
0	2	6	878	846	11	-3	8	6	61	27	61	-5	-6	7	404	394	14	-4	-1	7	394	391	19	-2	4	7	139	152	19
1	2	6	1215	1211	16	-2	8	6	347	320	25	-4	-6	7	91	71	17	-3	-1	7	674	640	17	-1	4	7	563	535	13
2	2	6	899	891	9	-1	8	6	333	321	24	-3	-6	7	608	613	14	-2	-1	7	517	506	15	0	4	7	630	627	13
3	2	6	79	94	11	0	8	6	0	57	1	-2	-6	7	774	741	15	-1	-1	7	317	319	13	1	4	7	257	254	11
4	2	6	756	742	8	1	8	6	279	300	21	-1	-6	7	460	453	9	0	-1	7	941	928	9	2	4	7	367	405	11
5	2	6	560	553	8	2	8	6	617	612	22	0	-6	7	20	56	20	1	-1	7	937	927	9	3	4	7	790	774	11
6	2	6	87	113	18	3	8	6	410	379	21	1	-6	7	577	588	14	2	-1	7	565	538	6	4	4	7	383	364	10
7	2	6	430	407	14	4	8	6	153	190	33	2	-6	7	524	490	21	3	-1	7	269	292	9	5	4	7	285	281	11
8	2	6	654	630	18	5	8	6	403	398	20	3	-6	7	71	98	49	4	-1	7	727	718	10	6	4	7	652	631	18
-7	3	6	356	391	32	6	8	6	344	366	22	4	-6	7	297	306	18	5	-1	7	322	313	9	7	4	7	672	676	20
-6	3	6	0	80	1	7	8	6	0	43	1	5	-6	7	408	421	19	6	-1	7	260	274	10	8	4	7	260	246	19
-5	3	6	245	255	23	9	8	6	452	457	27	6	-6	7	214	167	46	7	-1	7	698	668	15	-6	5	7	304	285	37
-4	3	6	578	559	23	-2	9	6	94	92	93	7	-6	7	206	163	43	8	-1	7	488	470	15	-5	5	7	263	267	36
-3	3	6	428	437	19	-1	9	6	136	122	51	-8	-5	7	284	295	36	9	-1	7	124	123	42	-4	5	7	116	139	54
-2	3	6	221	201	17	0	9	6	518	474	27	-7	-5	7	474	460	26	10	-1	7	143	187	32	-3	5	7	363	314	21
-1	3	6	731	700	12	1	9	6	448	439	23	-6	-5	7	319	324	22	-8	0	7	349	373	32	-2	5	7	672	636	23
0	3	6	714	718	12	2	9	6	106	122	52	-5	-5	7	76	140	76	-7	0	7	340	348	24	-1	5	7	532	505	19
1	3	6	98	118	11	3	9	6	296	330	25	-4	-5	7	494	462	10	-6	0	7	91	49	51	0	5	7	102	124	23
2	3	6	560	556	8	4	9	6	541	501	24	-3	-5	7	588	573	11	-5	0	7	448	438	19	1	5	7	764	744	15
3	3	6	692	681	8	5	9	6	300	335	24	-2	-5	7	61	72	26	-4	0	7	419	417	16	2	5	7	922	894	16
4	3	6	465	465	7	6	9	6	0	47	1	-1	-5	7	436	424	8	-3	0	7	204	219	18	3	5	7	304	291	9
5	3	6	436	416	9	7	9	6	302	331	27	0	-5	7	765	755	12	-2	0	7	628	637	17	4	5	7	289	288	10
6	3	6	612	604	17	8	9	6	277	268	27	1	-5	7	292	301	10	-1	0	7	1015	977	21	5	5	7	759	714	20
7	3	6	503	495	15	9	9	6	123	63	72	2	-5	7	50	61	49	0	0	7	237	239	9	6	5	7	422	405	17
8	3	6	29	31	28	-1	10	6	309	289	35	3	-5	7	340	326	9	1	0	7	196	205	4	7	5	7	35	40	35
-7	4	6	71	134	71	0	10	6	224	236	36	4	-5	7	357	346	15	2	0	7	887	896	8	8	5	7	492	504	19
-6	4	6	322	345	28	1	10	6	119	124	119	5	-5	7	155	196	21	3	0	7	842	834	10	-5	6	7	149	130	54
-5	4	6	337	360	22	2	10	6	417	378	28	6	-5	7	465	445	17	4	0	7	41	54	40	-4	6	7	291	332	33
-4	4	6	205	136	24	3	10	6	295	323	28	7	-5	7	433	467	28	5	0	7	742	714	13	-3	6	7	427	425	26
-3	4	6	333	323	19	4	10	6	127	130	78	8	-5	7	137	174	36	6	0	7	697	696	8	-2	6	7	0	37	1

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
-2	4	6	470	455	13	5	10	6	126	136	46	-8	-4	7	386	342	28	7	0	7	421	455	18	-1	6	7	505	506	21
-1	4	6	50	67	49	6	10	6	289	288	30	-7	-4	7	55	87	54	8	0	7	182	183	16	0	6	7	867	827	22
0	4	6	623	600	12	7	10	6	148	97	46	-6	-4	7	239	244	25	9	0	7	432	435	15	1	6	7	572	565	19
1	4	6	1029	1017	14	8	10	6	137	153	60	-5	-4	7	579	557	19	10	0	7	386	419	19	2	6	7	65	94	18
2	4	6	957	939	15	1	11	6	297	297	38	-4	-4	7	176	193	11	-8	1	7	0	96	1	3	6	7	531	515	11
3	4	6	41	48	40	2	11	6	0	186	1	-3	-4	7	323	327	7	-7	1	7	168	237	41	4	6	7	395	411	16
4	4	6	648	648	10	3	11	6	152	49	53	-2	-4	7	779	759	11	-6	1	7	457	442	23	5	6	7	183	197	22
5	4	6	840	792	18	4	11	6	221	264	37	-1	-4	7	741	695	9	-5	1	7	208	219	22	6	6	7	445	428	18
6	4	6	244	274	15	5	11	6	212	218	39	0	-4	7	35	51	35	-4	1	7	349	389	18	7	6	7	641	630	21
7	4	6	332	348	17	6	11	6	165	24	66	1	-4	7	822	818	11	-3	1	7	438	455	15	8	6	7	274	292	25
8	4	6	604	604	21	7	11	6	260	265	35	2	-4	7	740	725	10	-2	1	7	735	688	17	-4	7	7	179	198	62
-6	5	6	171	168	57	-4	-10	7	160	185	73	3	-4	7	331	336	7	-1	1	7	68	95	67	-3	7	7	35	84	35
-5	5	6	173	146	48	-3	-10	7	361	421	32	4	-4	7	137	184	23	0	1	7	1092	1076	22	-2	7	7	494	436	26
-4	5	6	428	433	23	-2	-10	7	376	335	33	5	-4	7	623	601	15	1	1	7	1278	1243	14	-1	7	7	449	447	25
-3	5	6	333	345	22	-1	-10	7	0	56	1	6	-4	7	326	341	15	2	1	7	887	886	10	0	7	7	139	140	44
-2	5	6	0	65	1	0	-10	7	287	285	36	7	-4	7	0	15	1	3	1	7	261	245	6	1	7	7	300	279	20
-1	5	6	538	506	19	1	-10	7	277	292	45	8	-4	7	302	325	20	4	1	7	786	791	8	2	7	7	623	600	22
0	5	6	540	546	14	-6	-9	7	0	60	1	-8	-3	7	110	123	68	5	1	7	720	705	8	3	7	7	494	450	21
1	5	6	340	365	11	-5	-9	7	257	296	20	-7	-3	7	366	389	23	6	1	7	118	120	7	4	7	7	197	220	22
2	5	6	372	374	7	-4	-9	7	312	344	19	-6	-3	7	282	314	21	7	1	7	351	357	11	5	7	7	380	353	17
3	5	6	976	940	15	-3	-9	7	150	138	45	-5	-3	7	148	189	24	8	1	7	727	709	23	6	7	7	261	281	20
4	5	6	629	605	17	-2	-9	7	258	234	26	-4	-3	7	593	594	17	9	1	7	254	248	25	7	7	7	0	95	1
5	5	6	91	69	37	-1	-9	7	383	392	27	-3	-3	7	571	560	11	11	1	7	221	215	40	8	7	7	450	471	24
6	5	6	448	406	17	0	-9	7	337	315	27	-2	-3	7	76	69	15	-7	2	7	293	326	28	-3	8	7	269	259	29
7	5	6	584	563	16	1	-9	7	41	33	40	-1	-3	7	658	657	9	-6	2	7	20	30	20	-2	8	7	76	108	76
8	5	6	137	190	24	2	-9	7	269	278	42	0	-3	7	1136	1107	11	-5	2	7	381	379	20	-1	8	7	199	206	30
-5	6	6	330	345	33	3	-9	7	182	251	76	1	-3	7	877	877	9	-4	2	7	677	658	21	0	8	7	491	477	25
-4	6	6	240	198	30	-7	-8	7	114	135	113	2	-3	7	0	29	1	-3	2	7	355	318	17	1	8	7	360	360	23
-3	6	6	248	266	25	-6	-8	7	288	289	19	3	-3	7	774	778	15	-2	2	7	440	442	15	2	8	7	143	77	34
-2	6	6	656	616	23	-5	-8	7	214	254	22	4	-3	7	792	760	14	-1	2	7	1091	1066	22	3	8	7	445	438	23
-1	6	6	691	650	25	-4	-8	7	20	88	20	5	-3	7	253	246	14	0	2	7	1094	1076	16	4	8	7	469	498	21
0	6	6	0	18	1	-3	-8	7	390	375	15	6	-3	7	315	295	11	1	2	7	137	133	9	5	8	7	196	188	24
1	6	6	546	533	11	-2	-8	7	330	335	16	7	-3	7	529	548	15	2	2	7	569	549	8	6	8	7	232	224	24
2	6	6	874	855	22	-1	-8	7	50	101	49	8	-3	7	342	349	17	3	2	7	816	814	10	7	8	7	524	531	23
3	6	6	412	417	19	0	-8	7	356	385	24	9	-3	7	96	62	95	4	2	7	500	486	7	8	8	7	404	405	25
4	6	6	0	82	1	1	-8	7	480	513	27	-8	-2	7	322	301	26	5	2	7	406	421	8	-2	9	7	247	268	37
5	6	6	443	399	17	2	-8	7	234	256	17	-7	-2	7	143	167	37	6	2	7	693	678	13	-1	9	7	335	304	29
6	6	6	398	362	18	3	-8	7	168	129	24	-6	-2	7	241	243	29	7	2	7	500	511	15	0	9	7	183	146	36
7	6	6	145	159	27	4	-8	7	373	374	18	-5	-2	7	698	686	21	-7	3	7	168	193	44	1	9	7	219	237	30
8	6	6	396	391	21	5	-8	7	330	304	41	-4	-2	7	234	243	17	-6	3	7	376	386	26	2	9	7	487	484	24
9	6	6	405	400	22	-7	-7	7	318	322	28	-3	-2	7	165	165	18	-5	3	7	370	351	22	3	9	7	465	391	23
-5	7	6	79	24	78	-6	-7	7	0	47	1	-2	-2	7	951	948	14	-4	3	7	84	23	84	4	9	7	46	88	45
-4	7	6	275	223	27	-5	-7	7	305	291	16	-1	-2	7	1331	1292	14	-3	3	7	516	537	19	5	9	7	255	258	29
-3	7	6	353	403	33	-4	-7	7	535	493	15	0	-2	7	516	517	7	-2	3	7	746	745	21	6	9	7	406	421	22
-2	7	6	20	119	20	-3	-7	7	188	182	19	1	-2	7	296	300	5	-1	3	7	274	286	9	7	9	7	145	176	44
-1	7	6	315	315	22	-2	-7	7	342	326	13	2	-2	7	706	689	7	0	3	7	269	295	9	8	9	7	213	222	43
0	7	6	557	537	21	-1	-7	7	549	521	15	3	-2	7	567	575	11	1	3	7	810	790	13	0	10	7	269	294	36
1	10	7	346	365	31	3	-4	8	654	652	9	1	1	8	94	95	4	3	7	8	377	341	22	3	-5	9	490	465	15
2	10	7	226	260	50	4	-4	8	566	556	14	2	1	8	831	800	11	4	7	8	447	467	19	4	-5	9	401	385	15
3	10	7	121	96	59	5	-4	8	116	105	28	3	1	8	925	901	12	5	7	8	79	105	78	5	-5	9	82	79	61
4	10	7	249	317	34	6	-4	8	369	386	13	4	1	8	282	294	6	7	7	8	502	493	21	6	-5	9	304	323	17
5	10	7	256	251	31	7	-4	8	559	527	19	5	1	8	611	607	7	8	7	8	351	393	23	7	-5	9	414	390	16
6	10	7	0	54	1	8	-4	8	230	298	26	6	1	8	901	896	10	-3	8	8	159	18	49	-7	-4	9	0	59	1
7	10	7	224	249	36	-8	-3	8	243	274	34	7	1	8	645	645	15	-2	8	8	245	209	35	-6	-4	9	230	238	29
8	10	7	293	278	31	-7	-3	8	0	101	1	8	1	8	129	125	29	-1	8	8	274	275	29	-5	-4	9	479	461	22
2	11	7	190	210	44	-6	-3	8	263	270	25	9	1	8	302	313	22	0	8	8	112	112	61	-4	-4	9	339	307	20
3	11	7	248	263	40	-5	-3	8	443	428	19	10	1	8	308	326	30	1	8	8	175	209	31	-3	-4	9	79	92	29
4	11	7	46	124	45	-4	-3	8	237	239	19	-7	2	8	179	193	61	2	8	8	347	357	25	-2	-4	9	586	573	11
5	11	7	148	177	49	-3	-3	8	210	207	21	-6	2	8	342	377	26	3	8	8	278	272	23	-1	-4	9	495	494	9
6	11	7	287	282	38	-2	-3	8	836	818	13	-5	2	8	219	192	27	4	8	8	215	236	26	0	-4	9	96	89	11
7	11	7	0	160	1	-1	-3	8	829	843	11	-4	2	8	182	203	34	5	8	8	463	442	24	1	-4	9	461	467	9
-2	-10	8	211	219	41	0	-3	8	143	150	7	-3	2	8	735	721	22	6	8	8	502	474	21	2	-4	9	549	551	9
-1	-10	8	331	388	37	1	-3	8	599	607	7	-2	2	8	841	864	22	7	8	8	169	127	32	3	-4	9	217	229	14
-4	-9	8	166	118	39	2	-3	8	795	769	9	-1	2	8	317	302	15	8	8	8	260	280	28	4	-4	9	255	249	12
-3	-9	8	421	383	28	3	-3	8	467	453	11	0	2	8	481	474	9	-1	9	8	89	75	89	5	-4	9	684	628	13
-2	-9	8	399	408	30	4	-3	8	159	173	13	1	2	8	731	735	11	0	9	8	370	329	30	6	-4	9	493	493	13
-1	-9	8	142	148	45	5	-3	8	746	720	12	2	2	8	733	714	11	1	9	8	380	357	27	7	-4	9	0	46	1
0	-9	8	164	176	42	6	-3	8	564	567	13	3	2	8	0	45	1	2	9	8	96	134	95	8	-4	9	239	255	25
1	-9	8	274	300	36	7	-3	8	145	180	21	4	2	8	694	680	9	3	9	8	287	223	30	-7	-3	9	294	260	29
2	-9	8	168	222	54	8	-3	8	252	261	20	5	2	8	826	793	11	4	9	8	385	434	26	-6	-3	9	214	245	39
-6	-8	8	166	85	44	9	-3	8	234	256	25	6	2	8	100	98	13	5	9	8	225	219	29	-5	-3	9	82	64	81
-5	-8	8	194	235	33	-8	-2	8	0	109	1	7	2	8	362	376	10	6	9	8	0	43	1	-4	-3	9	487	497	21
-4	-8	8	395	419	19	-7	-2	8	215	282	35	-6	3	8	114	112	79	7	9	8	296	327	29	-3	-3	9	575	601	20
-3	-8	8	181	188	22	-6	-2	8	275	291	24	-5	3	8	259	260	28	8	9	8	393	401	31	-2	-3	9	283	276	11
-2	-8	8	214	195	26	-5	-2	8	114	72	51	-4	3	8	493	504	21	0	10	8	171	229	51	-1	-3	9	368	359	7
-1	-8	8	369	398	25	-4	-2	8	702	701	20	-3	3	8	373	385	21	1	10	8	0	63	1	0	-3	9	720	681	9
0	-8	8	335	367	27	-3	-2	8	859	833	20	-2	3	8	58	30	57	2	10	8	269	252	38	1	-3	9	672	657	10
1	-8	8	94	31	93	-2	-2	8	515	531	16	-1	3	8	761	723	14	3	10	8	320	339	30	2	-3	9	394	386	7
2	-8	8	309	327	20	-1	-2	8	305	319	7	0	3	8	857	829	14	4	10	8	124	106	57	3	-3	9	634	648	13

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
3	-8	8	380	408	18	0	-2	8	1006	985	12	1	3	8	298	283	9	5	10	8	240	222	33	4	-3	9	836	801	13
4	-8	8	146	151	46	1	-2	8	824	817	8	2	3	8	169	191	11	6	10	8	376	376	26	5	-3	9	500	515	11
-7	-7	8	68	113	67	2	-2	8	208	213	5	3	3	8	549	546	10	7	10	8	173	248	48	6	-3	9	161	191	16
-6	-7	8	302	298	27	3	-2	8	376	361	11	4	3	8	152	153	9	8	10	8	46	42	45	7	-3	9	399	411	13
-5	-7	8	192	196	21	4	-2	8	720	717	11	5	3	8	384	382	10	3	11	8	106	37	106	8	-3	9	298	322	20
-4	-7	8	123	134	26	5	-2	8	441	447	10	6	3	8	819	774	15	4	11	8	260	219	32	9	-3	9	100	71	71
-3	-7	8	509	491	16	6	-2	8	245	255	11	7	3	8	614	573	18	5	11	8	0	163	1	-7	-2	9	114	105	73
-2	-7	8	581	584	16	7	-2	8	537	506	12	-6	4	8	239	289	32	6	11	8	0	36	1	-6	-2	9	199	226	33
-1	-7	8	265	279	14	8	-2	8	423	430	15	-5	4	8	283	286	34	-2	-9	9	74	130	73	-5	-2	9	438	427	21
0	-7	8	194	194	26	9	-2	8	84	67	56	-4	4	8	55	104	54	-1	-9	9	327	352	33	-4	-2	9	440	415	20
1	-7	8	549	581	25	-8	-1	8	290	339	30	-3	4	8	320	348	23	0	-9	9	278	317	35	-3	-2	9	91	99	40
2	-7	8	340	385	19	-7	-1	8	242	258	35	-2	4	8	582	572	20	1	-9	9	102	21	52	-2	-2	9	547	559	18
3	-7	8	94	40	58	-6	-1	8	108	64	80	-1	4	8	395	387	13	-3	-8	9	283	282	16	-1	-2	9	759	743	13
4	-7	8	299	314	20	-5	-1	8	464	486	21	0	4	8	20	69	20	-2	-8	9	342	350	26	0	-2	9	449	449	8
5	-7	8	454	419	21	-4	-1	8	489	462	19	1	4	8	654	619	13	-1	-8	9	106	154	56	1	-2	9	110	113	12
-7	-6	8	239	277	43	-3	-1	8	68	89	67	2	4	8	588	548	12	0	-8	9	191	183	32	2	-2	9	819	798	9
-6	-6	8	137	94	45	-2	-1	8	527	528	17	3	4	8	89	105	15	1	-8	9	396	389	28	3	-2	9	348	333	11
-5	-6	8	259	261	23	-1	-1	8	956	912	20	4	4	8	520	525	11	2	-8	9	89	176	89	4	-2	9	142	137	14
-4	-6	8	632	587	15	0	-1	8	570	575	7	5	4	8	753	732	13	3	-8	9	100	117	78	5	-2	9	565	565	11
-3	-6	8	540	525	12	1	-1	8	137	135	5	6	4	8	316	284	11	4	-8	9	344	352	22	6	-2	9	669	648	13
-2	-6	8	46	33	45	2	-1	8	570	576	7	7	4	8	228	210	16	-6	-7	9	162	73	41	7	-2	9	212	233	16
-1	-6	8	491	495	13	3	-1	8	567	560	5	-5	5	8	168	119	58	-5	-7	9	148	208	57	8	-2	9	82	118	61
0	-6	8	742	726	15	4	-1	8	254	274	9	-4	5	8	310	319	27	-4	-7	9	425	458	25	9	-2	9	316	276	34
1	-6	8	269	266	22	5	-1	8	670	661	11	-3	5	8	270	342	25	-3	-7	9	268	286	12	-7	-1	9	289	265	37
2	-6	8	172	153	27	6	-1	8	638	620	11	-2	5	8	41	16	40	-2	-7	9	74	80	73	-6	-1	9	507	462	25
3	-6	8	384	383	15	7	-1	8	257	270	12	-1	5	8	522	520	21	-1	-7	9	459	449	21	-5	-1	9	152	217	37
4	-6	8	338	331	16	8	-1	8	186	201	19	0	5	8	720	674	16	0	-7	9	444	439	25	-4	-1	9	332	330	18
5	-6	8	0	7	1	9	-1	8	408	405	17	1	5	8	437	424	13	1	-7	9	137	118	36	-3	-1	9	775	761	20
6	-6	8	334	332	19	10	-1	8	359	335	19	2	5	8	278	286	13	2	-7	9	297	327	27	-2	-1	9	734	714	19
-7	-5	8	0	59	1	-7	0	8	214	253	32	3	5	8	746	718	13	3	-7	9	491	497	18	-1	-1	9	126	163	27
-6	-5	8	329	375	24	-6	0	8	520	498	23	4	5	8	527	527	12	4	-7	9	293	299	20	0	-1	9	505	491	16
-5	-5	8	520	506	23	-5	0	8	305	324	25	5	5	8	116	100	19	5	-7	9	0	45	1	1	-1	9	601	591	9
-4	-5	8	211	223	11	-4	0	8	431	419	19	6	5	8	606	580	17	-6	-6	9	379	357	30	2	-1	9	287	277	6
-3	-5	8	388	405	9	-3	0	8	404	396	17	7	5	8	635	607	22	-5	-6	9	340	337	22	3	-1	9	230	244	5
-2	-5	8	788	775	13	-2	0	8	713	687	19	-5	6	8	242	230	33	-4	-6	9	102	83	56	4	-1	9	718	700	11
-1	-5	8	630	618	10	-1	0	8	149	150	19	-4	6	8	79	119	78	-3	-6	9	475	472	11	5	-1	9	430	426	11
0	-5	8	381	389	9	0	0	8	745	707	17	-3	6	8	238	266	31	-2	-6	9	670	636	11	6	-1	9	74	73	28
1	-5	8	542	531	13	1	0	8	771	760	8	-2	6	8	620	582	27	-1	-6	9	480	461	14	7	-1	9	414	393	12
2	-5	8	409	409	11	2	0	8	250	231	5	-1	6	8	632	575	23	0	-6	9	0	67	1	8	-1	9	395	406	16
3	-5	8	100	123	32	3	0	8	396	404	5	0	6	8	142	173	29	1	-6	9	463	454	23	9	-1	9	74	116	73
4	-5	8	272	281	16	4	0	8	922	911	12	1	6	8	348	340	22	2	-6	9	493	481	22	10	-1	9	0	113	1
5	-5	8	592	562	16	5	0	8	553	554	12	2	6	8	658	616	13	3	-6	9	106	152	38	-7	0	9	102	193	102
6	-5	8	258	275	18	6	0	8	35	27	35	3	6	8	427	416	11	4	-6	9	288	278	20	-6	0	9	0	26	1
7	-5	8	94	101	93	7	0	8	513	499	11	4	6	8	229	226	11	5	-6	9	456	450	19	-5	0	9	407	416	23
-8	-4	8	71	103	71	8	0	8	691	660	17	5	6	8	496	484	17	6	-6	9	272	256	23	-4	0	9	609	592	22
-7	-4	8	379	377	28	9	0	8	208	252	19	6	6	8	505	474	20	-7	-5	9	195	289	44	-3	0	9	148	163	24
-6	-4	8	298	321	24	10	0	8	29	63	28	7	6	8	0	29	1	-6	-5	9	256	269	30	-2	0	9	119	149	30
-5	-4	8	0	62	1	-7	1	8	165	210	40	8	6	8	355	356	23	-5	-5	9	76	173	76	-1	0	9	591	599	17
-4	-4	8	520	504	20	-6	1	8	0	5	1	-4	7	8	190	220	49	-4	-5	9	488	514	23	0	0	9	447	432	14
-3	-4	8	532	504	9	-5	1	8	279	329	27	-3	7	8	397	374	28	-3	-5	9	698	663	12	1	0	9	196	194	4
-2	-4	8	50	36	49	-4	1	8	642	615	21	-2	7	8	102	124	67	-2	-5	9	157	183	12	2	0	9	707	686	8
-1	-4	8	500	481	9	-3	1	8	41	34	40	-1	7	8	313	303	23	-1	-5	9	287	303	9	3	0	9	630	629	7
0	-4	8	659	670	9	-2	1	8	417	409	15	0	7	8	557	560	24	0	-5	9	499	495	11	4	0	9	84	96	5
1	-4	8	669	682	12	-1	1	8	1074	1066	22	1	7	8	473	443	21	1	-5	9	407	441	13	5	0	9	701	694	11
2	-4	8	283	282	7	0	1	8	771	752	20	2	7	8	0	118	1	2	-5	9	172	214	26	6	0	9	856	829	13
7	0	9	521	527	11	-3	7	9	0	24	1	5	-4	10	195	242	19	-6	2	10	194	211	41	3	10	10	324	339	33
8	0	9	0	26	1	-2	7	9	296	304	30	6	-4	10	159	191	20	-5	2	10	278	315	30	4	10	10	148	185	55
9	0	9	309	356	19	-1	7	9	359	350	29	7	-4	10	406	401	16	-4	2	10	0	65	1	5	10	10	157	153	59
10	0	9	279	303	34	0	7	9	203	169	30	8	-4	10	201	221	27	-3	2	10	562	563	23	6	10	10	313	295	31
-7	1	9	287	172	38	1	7	9	121	146	44	-7	-3	10	96	122	95	-2	2	10	524	478	21	-1	-8	11	182	80	45
-6	1	9	304	308	27	2	7	9	414	395	21	-6	-3	10	172	166	35	-1	2	10	434	400	19	0	-8	11	179	155	48
-5	1	9	194	212	27	3	7	9	250	270	12	-5	-3	10	437	423	21	0	2	10	232	265	19	1	-8	11	438	371	25
-4	1	9	194	211	25	4	7	9	118	153	38	-4	-3	10	283	327	22	1	2	10	667	662	20	2	-8	11	238	241	25
-3	1	9	603	593	21	5	7	9	440	421	20	-3	-3	10	126	78	42	2	2	10	566	578	11	-2	-7	11	58	34	57
-2	1	9	663	676	19	6	7	9	470	459	24	-2	-3	10	407	407	17	3	2	10	0	13	1	-1	-7	11	265	289	25
-1	1	9	273	305	16	7	7	9	0	75	1	-1	-3	10	373	356	11	4	2	10	566	565	10	0	-7	11	362	352	30
0	1	9	551	538	15	-2	8	9	188	231	45	0	-3	10	35	35	35	5	2	10	795	784	16	1	-7	11	116	147	38
1	1	9	609	602	17	-1	8	9	0	41	1	1	-3	10	325	341	9	6	2	10	276	288	22	2	-7	11	213	222	23
2	1	9	291	312	7	0	8	9	232	243	40	2	-3	10	922	885	13	7	2	10	35	71	35	3	-7	11	414	416	16
3	1	9	308	324	7	1	8	9	330	296	26	3	-3	10	318	332	13	8	2	10	343	328	22	4	-7	11	344	379	19
4	1	9	885	866	10	2	8	9	0	49	1	4	-3	10	0	49	1	-5	3	10	235	175	41	-2	-6	11	472	446	25
5	1	9	781	750	9	3	8	9	294	317	25	5	-3	10	509	510	11	-4	3	10	454	425	30	-1	-6	11	337	324	21
6	1	9	241	247	5	4	8	9	452	457	23	6	-3	10	616	605	14	-3	3	10	432	463	23	0	-6	11	0	49	1
7	1	9	306	294	15	5	8	9	146	162	31	7	-3	10	227	215	17	-2	3	10	0	81	1	1	-6	11	478	460	17
8	1	9	560	548	21	6	8	9	84	48	84	8	-3	10	149	164	24	-1	3	10	278	288	20	2	-6	11	606	588	18
10	1	9	84	73	84	7	8	9	381	389	25	-7	-2	10	234	232	35	0	3	10	663	647	13	3	-6	11	260	291	17
-6	2	9	0	39	1	-1	9	9	291	267	34	-6	-2	10	261	295	27	1	3	10	282	280	9	4	-6	11	165	153	22
-5	2	9	326	327	26	0	9	9	239	151	41	-5	-2	10	94	111	93	2	3	10	134	157	15	5	-6	11	344	357	17
-4	2	9	531	512	22	1	9	9	20	103	20	-4	-2	10	339	360	20	3	3	10	666	660	13	-5	-5	11	0	9	1

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
-3	2	9	227	203	26	2	9	9	338	271	29	-3	-2	10	725	733	23	4	3	10	561	562	11	-4	-5	11	370	369	24
-2	2	9	108	63	37	3	9	9	257	287	33	-2	-2	10	611	617	21	5	3	10	55	77	54	-3	-5	11	505	500	22
-1	2	9	853	846	20	4	9	9	0	77	1	-1	-2	10	98	55	39	6	3	10	366	361	12	-2	-5	11	227	224	22
0	2	9	877	860	20	5	9	9	379	391	25	0	-2	10	526	507	9	7	3	10	391	384	21	-1	-5	11	160	168	22
1	2	9	74	88	12	6	9	9	472	469	27	1	-2	10	542	519	9	-5	4	10	318	368	32	0	-5	11	524	520	16
2	2	9	387	383	9	7	9	9	321	346	29	2	-2	10	297	312	8	-4	4	10	176	185	36	1	-5	11	396	416	15
3	2	9	740	722	12	1	10	9	268	284	35	3	-2	10	428	424	6	-3	4	10	134	124	45	2	-5	11	20	24	20
4	2	9	496	492	9	2	10	9	131	184	66	4	-2	10	729	702	13	-2	4	10	421	404	25	3	-5	11	463	420	16
5	2	9	242	249	10	3	10	9	20	49	20	5	-2	10	581	570	12	-1	4	10	437	494	22	4	-5	11	477	471	14
6	2	9	693	665	13	4	10	9	412	326	31	6	-2	10	46	27	45	0	4	10	0	22	1	5	-5	11	152	169	23
7	2	9	558	542	22	5	10	9	252	260	35	7	-2	10	256	282	16	1	4	10	485	482	12	6	-5	11	165	175	22
-6	3	9	316	287	31	6	10	9	79	91	78	8	-2	10	263	269	16	2	4	10	380	404	13	-6	-4	11	275	193	36
-5	3	9	307	350	28	7	10	9	29	196	28	9	-2	10	20	93	20	3	4	10	126	172	15	-5	-4	11	492	452	25
-4	3	9	55	49	54	-2	-8	10	65	37	64	-6	-1	10	104	90	74	4	4	10	350	360	11	-4	-4	11	383	410	25
-3	3	9	561	562	21	-1	-8	10	245	239	34	-5	-1	10	480	489	23	5	4	10	704	683	14	-3	-4	11	68	111	67
-2	3	9	567	558	20	1	-8	10	91	17	91	-4	-1	10	531	528	21	6	4	10	536	524	13	-2	-4	11	383	357	15
-1	3	9	540	532	20	2	-8	10	243	268	26	-3	-1	10	156	189	26	7	4	10	0	24	1	-1	-4	11	329	329	13
0	3	9	46	41	45	3	-8	10	412	426	22	-2	-1	10	276	266	19	-4	5	10	232	280	34	0	-4	11	96	74	21
1	3	9	466	443	11	-2	-7	10	393	372	23	-1	-1	10	608	578	19	-3	5	10	366	367	31	1	-4	11	381	378	13
2	3	9	419	423	11	-1	-7	10	185	197	22	0	-1	10	517	539	17	-2	5	10	129	103	44	2	-4	11	569	561	15
3	3	9	0	40	1	0	-7	10	172	184	33	1	-1	10	50	65	14	-1	5	10	165	161	44	3	-4	11	368	332	15
4	3	9	534	528	9	1	-7	10	423	432	27	2	-1	10	658	649	9	0	5	10	514	491	22	4	-4	11	41	50	40
5	3	9	651	631	13	2	-7	10	333	331	26	3	-1	10	521	517	7	1	5	10	272	274	25	5	-4	11	397	390	14
6	3	9	219	226	12	3	-7	10	41	82	40	4	-1	10	232	235	11	2	5	10	247	253	25	6	-4	11	379	411	17
7	3	9	252	223	25	4	-7	10	262	307	23	5	-1	10	331	340	11	3	5	10	707	689	16	7	-4	11	55	72	54
-5	4	9	94	118	93	-6	-6	10	161	115	45	6	-1	10	597	601	13	4	5	10	755	769	17	-6	-3	11	241	263	41
-4	4	9	302	300	23	-5	-6	10	0	144	1	7	-1	10	271	273	14	5	5	10	326	310	13	-5	-3	11	150	195	56
-3	4	9	366	394	23	-4	-6	10	457	433	26	8	-1	10	55	70	54	6	5	10	294	274	14	-4	-3	11	224	247	29
-2	4	9	0	90	1	-3	-6	10	460	466	15	9	-1	10	349	350	18	-3	6	10	20	64	20	-3	-3	11	411	416	23
-1	4	9	326	321	13	-2	-6	10	102	81	31	-6	0	10	400	402	26	-2	6	10	437	398	26	-2	-3	11	337	347	20
0	4	9	529	528	13	-1	-6	10	349	349	15	-5	0	10	362	371	24	-1	6	10	366	381	23	-1	-3	11	164	194	16
1	4	9	315	323	11	0	-6	10	578	544	15	-4	0	10	0	29	1	0	6	10	35	96	35	0	-3	11	491	459	9
2	4	9	249	272	11	1	-6	10	305	297	15	-3	0	10	485	468	21	1	6	10	327	287	21	1	-3	11	499	502	12
3	4	9	639	648	14	2	-6	10	196	184	32	-2	0	10	619	605	21	2	6	10	562	533	24	2	-3	11	61	91	61
4	4	9	451	444	11	3	-6	10	440	441	17	-1	0	10	364	348	18	3	6	10	316	317	12	3	-3	11	535	525	15
5	4	9	94	92	20	4	-6	10	461	453	19	0	0	10	278	276	14	4	6	10	143	165	17	4	-3	11	702	666	13
6	4	9	581	564	13	5	-6	10	137	158	29	1	0	10	575	576	19	5	6	10	551	547	15	5	-3	11	427	452	13
7	4	9	552	540	20	6	-6	10	133	145	41	2	0	10	235	235	6	6	6	10	549	573	22	6	-3	11	58	34	57
-5	5	9	217	259	53	-6	-5	10	284	288	28	3	0	10	452	451	7	-2	7	10	250	253	34	7	-3	11	336	344	16
-4	5	9	139	123	54	-5	-5	10	553	544	26	4	0	10	646	628	7	-1	7	10	0	49	1	8	-3	11	269	289	18
-3	5	9	145	178	40	-4	-5	10	300	343	24	5	0	10	624	615	11	0	7	10	357	355	29	-6	-2	11	91	163	91
-2	5	9	471	460	23	-3	-5	10	152	151	19	6	0	10	201	203	12	1	7	10	392	359	25	-5	-2	11	329	351	26
-1	5	9	468	477	25	-2	-5	10	493	489	11	7	0	10	316	328	11	2	7	10	94	146	93	-4	-2	11	423	428	23
0	5	9	94	78	87	-1	-5	10	449	445	11	8	0	10	431	428	14	3	7	10	310	321	25	-3	-2	11	110	79	42
1	5	9	419	443	12	0	-5	10	110	132	25	9	0	10	190	197	23	4	7	10	518	493	16	-2	-2	11	374	366	19
2	5	9	535	525	13	1	-5	10	345	331	15	10	0	10	137	151	34	5	7	10	219	269	27	-1	-2	11	601	588	17
3	5	9	196	200	13	2	-5	10	536	536	15	-6	1	10	91	22	91	6	7	10	91	55	70	0	-2	11	313	326	13
4	5	9	355	363	11	3	-5	10	212	225	21	-5	1	10	326	318	26	-1	8	10	96	222	95	1	-2	11	219	204	11
5	5	9	773	722	15	4	-5	10	162	192	20	-4	1	10	499	495	23	0	8	10	0	149	1	2	-2	11	817	798	12
6	5	9	715	701	16	5	-5	10	427	404	14	-3	1	10	221	241	25	1	8	10	140	125	46	3	-2	11	581	579	14
7	5	9	98	123	36	6	-5	10	325	350	16	-2	1	10	50	131	49	2	8	10	262	286	30	4	-2	11	206	210	14
-4	6	9	272	262	40	7	-5	10	58	78	57	-1	1	10	581	584	19	3	8	10	237	258	34	5	-2	11	232	228	12
-3	6	9	431	422	28	-6	-4	10	288	282	32	0	1	10	564	538	18	4	8	10	20	64	20	6	-2	11	548	518	13
-2	6	9	124	115	48	-5	-4	10	142	21	41	1	1	10	89	126	31	5	8	10	344	387	23	7	-2	11	268	279	16
-1	6	9	343	323	24	-4	-4	10	278	313	24	2	1	10	620	610	8	6	8	10	395	418	24	8	-2	11	108	93	37
0	6	9	654	602	23	-3	-4	10	557	529	22	3	1	10	860	843	13	0	9	10	156	156	62	-6	-1	11	416	409	29
1	6	9	460	456	19	-2	-4	10	266	265	9	4	1	10	571	572	11	1	9	10	214	256	37	-5	-1	11	232	264	28
2	6	9	87	53	45	-1	-4	10	134	147	11	5	1	10	267	281	7	2	9	10	157	100	63	-4	-1	11	114	127	49
3	6	9	492	474	12	0	-4	10	466	455	12	6	1	10	632	646	15	3	9	10	126	171	57	-3	-1	11	504	508	21
4	6	9	652	639	14	1	-4	10	460	460	9	7	1	10	555	564	15	4	9	10	416	385	30	-2	-1	11	629	615	21
5	6	9	256	250	14	2	-4	10	282	275	13	8	1	10	127	126	78	5	9	10	321	351	31	-1	-1	11	199	173	24
6	6	9	310	301	20	3	-4	10	584	596	16	9	1	10	201	237	36	6	9	10	55	59	54	0	-1	11	372	359	17
7	6	9	456	475	20	4	-4	10	571	561	13	10	1	10	259	297	34	2	10	10	237	236	47	1	-1	11	770	721	21
2	-1	11	641	635	10	4	5	11	239	248	14	-1	-2	12	46	105	45	5	4	12	454	443	22	7	-1	13	283	303	17
3	-1	11	265	286	8	5	5	11	661	625	14	0	-2	12	534	465	19	6	4	12	429	422	23	8	-1	13	414	406	16
4	-1	11	364	363	12	6	5	11	578	565	23	1	-2	12	722	687	21	7	4	12	137	107	58	-4	0	13	268	306	42
5	-1	11	481	461	11	7	5	11	190	140	38	2	-2	12	468	488	13	8	4	12	364	341	28	-3	0	13	243	275	31
6	-1	11	133	130	22	-3	6	11	263	286	38	3	-2	12	223	218	13	-3	5	12	259	286	33	-2	0	13	100	112	65
7	-1	11	299	320	14	-2	6	11	150	180	47	4	-2	12	513	509	15	-2	5	12	89	107	89	-1	0	13	454	452	23
8	-1	11	340	343	15	-1	6	11	161	156	41	5	-2	12	433	432	12	-1	5	12	161	169	43	0	0	13	445	464	21
9	-1	11	0	106	1	0	6	11	387	419	25	6	-2	12	71	71	71	0	5	12	330	366	25	4	0	13	195	214	19
-6	0	11	71	11	71	1	6	11	330	332	26	7	-2	12	273	312	16	1	5	12	297	285	25	5	0	13	74	93	73
-5	0	11	364	362	28	2	6	11	82	21	81	8	-2	12	325	343	18	2	5	12	89	161	89	6	0	13	356	357	12
-4	0	11	511	528	24	3	6	11	402	411	14	-5	-1	12	290	302	38	3	5	12	370	375	22	7	0	13	305	338	15
-3	0	11	304	329	22	4	6	11	685	663	17	-4	-1	12	457	460	26	4	5	12	586	577	15	8	0	13	0	35	1
-2	0	11	124	148	30	5	6	11	380	379	13	-3	-1	12	100	103	59	5	5	12	217	220	24	-4	1	13	0	69	1
-1	0	11	505	505	20	6	6	11	126	124	30	-2	-1	12	279	292	23	6	5	12	276	251	21	-3	1	13	182	185	32
0	0	11	390	379	16	-2	7	11	203	212	44	-1	-1	12	758	723	24	7	5	12	482	450	22	-2	1	13	265	259	31
1	0	11	106	105	24	-1	7	11	227	289	38	0	-1	12	521	477	19	-2	6	12	208	223	40	-1	1	13	119	152	65

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
2	0	11	577	561	9	0	7	11	219	205	37	1	-1	12	0	48	1	-1	6	12	265	247	33	0	1	13	239	256	23
3	0	11	917	918	13	1	7	11	240	204	37	2	-1	12	513	516	11	0	6	12	0	150	1	1	1	13	413	410	21
4	0	11	361	382	8	2	7	11	474	421	25	3	-1	12	791	791	17	1	6	12	282	294	27	4	1	13	491	515	22
5	0	11	148	146	16	3	7	11	352	370	26	4	-1	12	278	276	14	2	6	12	588	537	23	5	1	13	412	406	15
6	0	11	540	524	11	4	7	11	41	49	40	5	-1	12	65	66	64	3	6	12	364	350	16	6	1	13	215	224	18
7	0	11	351	356	12	5	7	11	217	254	16	6	-1	12	399	371	13	4	6	12	0	24	1	7	1	13	183	220	23
8	0	11	0	35	1	6	7	11	305	331	29	7	-1	12	236	243	16	5	6	12	309	329	15	8	1	13	442	445	19
9	0	11	312	337	20	-1	8	11	96	68	95	8	-1	12	102	97	37	6	6	12	404	365	22	9	1	13	346	364	22
-5	1	11	333	309	27	0	8	11	94	145	93	9	-1	12	356	357	17	7	6	12	58	115	57	-4	2	13	177	221	51
-4	1	11	0	44	1	1	8	11	281	271	38	-5	0	12	221	264	35	-1	7	12	0	62	1	-3	2	13	127	252	100
-3	1	11	274	300	23	2	8	11	89	104	89	-4	0	12	133	91	65	0	7	12	315	267	36	-2	2	13	82	40	81
-2	1	11	403	416	21	3	8	11	140	177	53	-3	0	12	249	258	31	1	7	12	412	389	28	-1	2	13	348	352	26
-1	1	11	183	189	24	4	8	11	333	360	27	-2	0	12	351	357	19	2	7	12	155	171	56	0	2	13	546	558	24
0	1	11	329	333	18	5	8	11	314	297	25	-1	0	12	140	167	30	3	7	12	126	108	50	1	2	13	265	291	23
1	1	11	716	725	21	6	8	11	55	51	54	0	0	12	386	391	19	4	7	12	333	340	25	2	2	13	155	170	28
2	1	11	414	407	7	1	9	11	166	69	50	1	0	12	666	651	23	5	7	12	234	236	29	4	2	13	398	415	18
3	1	11	149	164	7	2	9	11	307	279	29	3	0	12	0	71	1	0	8	12	149	171	83	5	2	13	41	43	40
4	1	11	606	613	9	3	9	11	299	345	32	4	0	12	412	406	18	1	8	12	150	77	52	6	2	13	314	303	24
5	1	11	770	775	23	4	9	11	0	116	1	5	0	12	448	454	11	2	8	12	274	293	30	7	2	13	435	447	30
6	1	11	294	260	27	5	9	11	106	199	106	6	0	12	150	170	16	3	8	12	362	338	32	8	2	13	184	156	39
7	1	11	230	244	26	6	9	11	309	351	28	7	0	12	427	411	13	4	8	12	116	167	74	9	2	13	124	89	40
8	1	11	393	404	17	4	10	11	272	308	37	8	0	12	423	432	15	5	8	12	58	152	57	-3	3	13	203	162	37
9	1	11	223	269	32	5	10	11	340	316	39	9	0	12	188	205	21	2	9	12	50	127	49	-2	3	13	383	368	27
10	1	11	114	55	73	-1	-7	12	166	194	48	-5	1	12	153	155	53	3	9	12	108	70	108	-1	3	13	294	308	27
-5	2	11	112	136	93	0	-7	12	157	110	39	-4	1	12	381	365	25	4	9	12	268	299	35	0	3	13	58	24	57
-4	2	11	406	434	30	1	-7	12	434	412	28	-3	1	12	269	281	27	5	9	12	274	285	34	1	3	13	465	403	21
-3	2	11	277	299	25	2	-7	12	396	376	30	-2	1	12	29	117	28	-1	-6	13	455	414	28	2	3	13	665	653	25
-2	2	11	76	127	76	3	-7	12	98	169	78	-1	1	12	444	482	22	0	-6	13	110	16	56	3	3	13	303	361	22
-1	2	11	454	502	22	-1	-6	12	368	353	24	0	1	12	392	387	20	1	-6	13	294	272	27	5	3	13	350	325	24
0	2	11	623	622	21	0	-6	12	502	470	25	1	1	12	79	78	58	2	-6	13	499	484	29	6	3	13	382	375	24
1	2	11	179	176	18	1	-6	12	373	393	24	2	1	12	491	489	19	3	-6	13	273	251	31	7	3	13	0	46	1
2	2	11	387	402	9	2	-6	12	50	59	49	3	1	12	787	756	15	-1	-5	13	199	192	29	8	3	13	406	366	30
3	2	11	822	807	15	3	-6	12	273	304	21	4	1	12	346	368	15	0	-5	13	507	510	25	9	3	13	354	366	28
4	2	11	647	672	14	4	-6	12	423	424	16	5	1	12	0	44	1	1	-5	13	470	442	24	-3	4	13	346	339	34
5	2	11	247	237	11	-2	-5	12	447	433	22	6	1	12	429	435	15	2	-5	13	102	99	81	-2	4	13	87	147	86
6	2	11	333	342	24	-1	-5	12	461	444	21	7	1	12	442	441	15	3	-5	13	239	219	34	-1	4	13	94	131	93
7	2	11	315	374	26	0	-5	12	119	106	61	8	1	12	0	44	1	4	-5	13	284	305	22	0	4	13	453	425	24
8	2	11	136	122	48	1	-5	12	389	340	21	9	1	12	183	237	27	5	-5	13	0	101	1	1	4	13	318	341	24
-5	3	11	314	329	32	2	-5	12	593	553	25	-4	2	12	0	58	1	-1	-4	13	399	425	24	2	4	13	35	35	35
-4	3	11	121	180	59	3	-5	12	319	337	19	-3	2	12	242	248	35	0	-4	13	256	222	23	3	4	13	252	279	27
-3	3	11	250	229	33	4	-5	12	58	38	57	-2	2	12	321	315	24	1	-4	13	87	114	86	4	4	13	337	349	24
-2	3	11	366	404	22	5	-5	12	288	300	18	-1	2	12	177	175	28	2	-4	13	384	391	24	5	4	13	0	48	1
-1	3	11	372	413	29	6	-5	12	259	282	20	0	2	12	265	286	22	3	-4	13	324	295	24	6	4	13	272	251	26
0	3	11	89	89	53	-5	-4	12	55	97	54	1	2	12	731	674	20	4	-4	13	0	43	1	7	4	13	474	447	26
1	3	11	643	657	21	-4	-4	12	169	205	51	2	2	12	725	711	25	5	-4	13	292	316	18	8	4	13	256	245	37
2	3	11	626	603	12	-1	-4	12	119	121	42	3	2	12	256	257	18	6	-4	13	257	279	20	-2	5	13	216	247	38
3	3	11	281	303	11	0	-4	12	404	415	19	5	2	12	505	528	20	0	-3	13	412	384	21	-1	5	13	203	237	40
4	3	11	280	305	13	1	-4	12	472	480	23	6	2	12	351	306	22	1	-3	13	546	486	23	0	5	13	123	158	101
5	3	11	613	608	15	2	-4	12	0	68	1	7	2	12	0	104	1	2	-3	13	226	232	25	1	5	13	234	240	28
6	3	11	390	358	20	3	-4	12	305	330	16	8	2	12	383	364	24	3	-3	13	172	190	32	2	5	13	454	436	27
7	3	11	0	15	1	4	-4	12	378	398	15	-4	3	12	319	324	31	4	-3	13	400	410	17	3	5	13	230	265	23
8	3	11	288	311	32	5	-4	12	150	157	22	-3	3	12	338	340	29	5	-3	13	282	297	15	4	5	13	0	39	1
-4	4	11	317	343	31	6	-4	12	110	164	39	-2	3	12	112	50	61	6	-3	13	58	82	57	5	5	13	391	357	20
-3	4	11	366	393	28	7	-4	12	324	353	19	-1	3	12	238	250	25	7	-3	13	370	353	17	6	5	13	395	351	22
-2	4	11	98	115	68	-5	-3	12	195	210	36	0	3	12	578	574	25	-4	-2	13	228	259	31	7	5	13	0	23	1
-1	4	11	46	73	45	-4	-3	12	364	337	25	1	3	12	351	361	19	-3	-2	13	0	44	1	8	5	13	226	264	30
0	4	11	481	489	24	-3	-3	12	0	80	1	2	3	12	175	206	25	-2	-2	13	318	337	24	-1	6	13	58	139	57
1	4	11	278	286	22	-2	-3	12	310	322	20	3	3	12	500	482	19	2	-2	13	548	562	23	0	6	13	320	287	35
2	4	11	208	242	21	-1	-3	12	422	428	20	4	3	12	549	506	20	3	-2	13	518	536	22	1	6	13	419	398	26
3	4	11	575	573	21	0	-3	12	131	132	26	5	3	12	267	233	21	4	-2	13	188	186	17	2	6	13	41	113	40
4	4	11	586	592	15	1	-3	12	318	305	22	6	3	12	245	240	25	5	-2	13	203	197	16	3	6	13	199	206	19
5	4	11	247	238	13	2	-3	12	636	642	15	7	3	12	312	306	24	6	-2	13	369	375	15	4	6	13	378	359	23
6	4	11	267	284	21	3	-3	12	488	499	15	8	3	12	197	154	44	7	-2	13	304	311	18	5	6	13	201	221	31
7	4	11	427	401	24	4	-3	12	0	75	1	-3	4	12	0	93	1	-4	-1	13	98	15	98	6	6	13	121	99	39
-3	5	11	0	57	1	5	-3	12	288	316	14	-2	4	12	313	344	28	-3	-1	13	346	379	28	7	6	13	419	352	27
-2	5	11	322	343	33	6	-3	12	417	387	15	-1	4	12	297	296	26	-2	-1	13	375	375	22	0	7	13	41	222	40
-1	5	11	181	266	43	7	-3	12	134	153	29	0	4	12	0	56	1	-1	-1	13	131	106	49	1	7	13	110	49	89
0	5	11	0	20	1	-5	-2	12	84	148	84	1	4	12	454	445	21	3	-1	13	108	58	43	2	7	13	363	345	26
1	5	11	496	500	20	-4	-2	12	149	180	40	2	4	12	574	530	21	4	-1	13	256	277	16	3	7	13	350	338	28
2	5	11	538	543	21	-3	-2	12	401	417	22	3	4	12	309	324	20	5	-1	13	332	332	13	2	8	13	175	186	48
3	5	11	304	324	20	-2	-2	12	335	379	26	4	4	12	143	143	23	6	-1	13	71	87	71	3	8	13	166	36	50
0	-5	14	247	220	26	7	-1	14	328	344	22	5	3	14	55	38	54	7	6	14	161	217	41	6	3	15	372	362	29
1	-5	14	106	89	65	-3	0	14	217	250	36	6	3	14	184	201	36	2	7	14	172	222	44	7	3	15	89	134	89
2	-5	14	404	367	28	5	0	14	322	348	29	7	3	14	416	443	29	1	-4	15	118	46	56	5	4	15	148	124	46
3	-5	14	243	279	35	6	0	14	0	167	1	8	3	14	289	306	39	2	-4	15	186	194	51	6	4	15	156	166	41
0	-4	14	295	346	27	7	0	14	190	200	24	-2	4	14	250	345	39	3	-4	15	296	278	38	7	4	15	414	388	28
1	-4	14	338	323	23	8	0	14	386	410	21	-1	4	14	352	358	29	2	-3	15	183	203	47	4	5	15	0	73	1
2	-4	14	124	210	53	-3	1	14	276	332	32	0	4	14	208	216	36	3	-3	15	166	182	38	5	5	15	330	310	26
3	-4	14	143	188	47	-2	1	14	0	44	1	1	4	14	226	188	32	4	-3	15	445	408	28	6	5	15	245	310	34

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
4	-4	14	234	263	24	-1	1	14	221	238	35	5	4	14	382	333	24	5	-3	15	346	361	23	7	5	15	234	193	32
5	-4	14	208	218	28	5	1	14	195	138	32	6	4	14	330	332	29	4	-2	15	0	126	1	5	-1	16	116	92	115
1	-3	14	65	35	64	6	1	14	396	414	26	7	4	14	0	53	1	5	-2	15	165	178	32	5	0	16	315	341	33
2	-3	14	277	312	25	7	1	14	481	479	19	8	4	14	250	277	40	6	-2	15	489	494	22	6	0	16	223	255	36
3	-3	14	310	336	27	8	1	14	161	186	29	-1	5	14	61	115	61	5	-1	15	331	408	34	5	1	16	118	29	66
4	-3	14	0	57	1	-3	2	14	169	171	51	0	5	14	228	261	35	6	-1	15	206	214	42	6	1	16	277	240	36
5	-3	14	266	260	24	-2	2	14	396	391	31	1	5	14	340	361	34	5	0	15	84	92	84	5	2	16	375	429	28
6	-3	14	349	373	23	-1	2	14	260	280	30	4	5	14	294	314	24	6	0	15	406	391	32	6	2	16	349	354	31
2	-2	14	353	370	23	0	2	14	0	34	1	5	5	14	102	121	102	7	0	15	331	338	34	5	3	16	184	188	56
3	-2	14	74	116	73	5	2	14	401	390	25	6	5	14	210	200	30	5	1	15	378	411	33	6	3	16	162	89	64
4	-2	14	351	401	24	6	2	14	348	357	28	7	5	14	507	454	27	6	1	15	302	316	35	5	4	16	345	325	34
5	-2	14	399	422	21	7	2	14	41	45	40	8	5	14	336	331	31	7	1	15	0	33	1	6	4	16	257	272	44
6	-2	14	106	68	52	8	2	14	362	381	19	0	6	14	173	178	47	5	2	15	0	35	1	4	5	16	329	360	27
7	-2	14	155	201	40	-2	3	14	71	126	71	1	6	14	0	76	1	6	2	15	274	282	30	5	5	16	210	225	36
4	-1	14	217	211	29	-1	3	14	204	214	38	2	6	14	327	327	36	7	2	15	505	485	30						
5	-1	14	71	133	71	0	3	14	532	521	27	5	6	14	293	230	29	8	2	15	388	332	31						
6	-1	14	403	415	20	1	3	14	380	391	24	6	6	14	325	317	27	5	3	15	393	402	26						

APPENDIX G

CRYSTALLOGRAPHIC DATA FOR $(C_5Me_4Et)Ta(hpp)Cl_2$

Identification code	mes1010	
Empirical formula	C37 H41 Cl4 N6 Ta2	
Formula weight	1073.46	
Temperature	150(2) K	
Wavelength	0.71073 Å	
Crystal system	Triclinic	
Space group	P1	
Unit cell dimensions	a = 9.0682(14) Å	α= 85.403(5)°.
	b = 9.3280(14) Å	β= 73.210(5)°.
	c = 12.5226(19) Å	γ = 74.062(5)°.
Volume	975.1(3) $Å^3$	
Z	1	
Density (calculated)	1.828 Mg/m^3	
Absorption coefficient	5.915 mm^{-1}	
F(000)	519	
Crystal size	0.16 x 0.13 x 0.05 mm^3	
Theta range for data collection	2.96 to 27.98°.	
Index ranges	-11<=h<=11, -12<=k<=12, -16<=l<=16	
Reflections collected	8346	
Independent reflections	4630 [R(int) = 0.0352]	
Completeness to theta = 27.98°	98.6 %	
Max. and min. transmission	0.7564 and 0.4512	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	4630 / 0 / 218	
Goodness-of-fit on F^2	1.108	
Final R indices [I>2sigma(I)]	R1 = 0.0474, wR2 = 0.1438	
R indices (all data)	R1 = 0.0611, wR2 = 0.1518	
Extinction coefficient	0.0000(10)	
Largest diff. peak and hole	3.224 and -2.067 $e.Å^{-3}$	

Atomic coordinates (x 10^4) and equivalent isotropic displacement parameters ($Å^2$x 10^3) for mes1010. U(eq) is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	U(eq)
Ta(1)	3546(1)	7857(1)	7702(1)	26(1)
Cl(1)	4163(3)	10226(3)	7232(2)	34(1)
Cl(2)	4514(3)	7852(3)	9304(2)	34(1)
N(2)	1507(9)	7450(9)	8837(6)	29(2)
N(1)	1320(9)	8869(9)	7364(6)	30(2)
C(8)	5799(11)	6902(10)	6053(8)	27(2)
C(7)	486(11)	10122(11)	6791(9)	32(2)
C(2)	929(12)	6863(12)	9922(9)	36(2)
C(1)	485(11)	8426(10)	8328(8)	29(2)
N(3)	-1084(9)	8838(10)	8768(7)	31(2)
C(12)	6046(11)	6016(11)	6987(8)	32(2)
C(11)	4774(11)	5316(10)	7394(7)	27(2)
C(4)	-1821(12)	8276(13)	9859(9)	37(2)
C(3)	-655(12)	7897(13)	10562(9)	38(2)
C(5)	-2080(12)	9912(13)	8161(9)	38(2)
C(6)	-1179(12)	9970(13)	6954(9)	39(2)
C(10)	3742(11)	5801(11)	6701(8)	29(2)
C(9)	4373(11)	6778(10)	5883(7)	27(2)
C(15)	2311(12)	5246(12)	6756(9)	37(2)
C(13)	6876(12)	7802(12)	5362(9)	36(2)
C(17)	7498(11)	5698(12)	7405(9)	35(2)
C(14)	3665(12)	7477(13)	4957(8)	37(2)
C(16)	4633(14)	4182(13)	8312(10)	42(2)
C(18)	8720(13)	4262(13)	6881(13)	51(3)

Bond lengths [Å] and angles [°] for mes1010.

Ta(1)-N(2)	2.089(7)
Ta(1)-N(1)	2.128(8)
Ta(1)-C(10)	2.314(9)
Ta(1)-C(11)	2.336(9)
Ta(1)-C(9)	2.394(9)
Ta(1)-Cl(2)	2.410(2)
Ta(1)-Cl(1)	2.413(2)
Ta(1)-C(12)	2.414(9)
Ta(1)-C(8)	2.468(9)
Ta(1)-C(1)	2.569(9)
N(2)-C(1)	1.371(12)
N(2)-C(2)	1.431(12)
N(1)-C(1)	1.328(12)
N(1)-C(7)	1.466(12)
C(8)-C(9)	1.406(13)
C(8)-C(12)	1.413(14)
C(8)-C(13)	1.500(13)
C(7)-C(6)	1.509(14)
C(7)-H(7A)	0.9900
C(7)-H(7B)	0.9900
C(2)-C(3)	1.528(15)
C(2)-H(2A)	0.9900
C(2)-H(2B)	0.9900
C(1)-N(3)	1.325(12)
N(3)-C(4)	1.462(13)
N(3)-C(5)	1.475(13)
C(12)-C(11)	1.427(14)
C(12)-C(17)	1.501(13)
C(11)-C(10)	1.417(12)
C(11)-C(16)	1.501(14)
C(4)-C(3)	1.517(14)
C(4)-H(4A)	0.9900
C(4)-H(4B)	0.9900
C(3)-H(3A)	0.9900

C(3)-H(3B)	0.9900
C(5)-C(6)	1.500(15)
C(5)-H(5A)	0.9900
C(5)-H(5B)	0.9900
C(6)-H(6A)	0.9900
C(6)-H(6B)	0.9900
C(10)-C(9)	1.417(13)
C(10)-C(15)	1.506(13)
C(9)-C(14)	1.504(12)
C(15)-H(13A)	0.9800
C(15)-H(13B)	0.9800
C(15)-H(13C)	0.9800
C(13)-H(16A)	0.9800
C(13)-H(16B)	0.9800
C(13)-H(16C)	0.9800
C(17)-C(18)	1.535(15)
C(17)-H(15A)	0.9900
C(17)-H(15B)	0.9900
C(14)-H(17A)	0.9800
C(14)-H(17B)	0.9800
C(14)-H(17C)	0.9800
C(16)-H(14A)	0.9800
C(16)-H(14B)	0.9800
C(16)-H(14C)	0.9800
C(18)-H(18A)	0.9800
C(18)-H(18B)	0.9800
C(18)-H(18C)	0.9800

N(2)-Ta(1)-N(1)	62.9(3)
N(2)-Ta(1)-C(10)	88.4(3)
N(1)-Ta(1)-C(10)	88.3(3)
N(2)-Ta(1)-C(11)	92.5(3)
N(1)-Ta(1)-C(11)	121.3(3)
C(10)-Ta(1)-C(11)	35.5(3)
N(2)-Ta(1)-C(9)	117.8(3)
N(1)-Ta(1)-C(9)	86.0(3)

C(10)-Ta(1)-C(9)	35.0(3)
C(11)-Ta(1)-C(9)	58.1(3)
N(2)-Ta(1)-Cl(2)	85.8(2)
N(1)-Ta(1)-Cl(2)	133.4(2)
C(10)-Ta(1)-Cl(2)	126.7(2)
C(11)-Ta(1)-Cl(2)	91.9(2)
C(9)-Ta(1)-Cl(2)	140.5(2)
N(2)-Ta(1)-Cl(1)	127.6(2)
N(1)-Ta(1)-Cl(1)	86.9(2)
C(10)-Ta(1)-Cl(1)	135.1(2)
C(11)-Ta(1)-Cl(1)	139.5(2)
C(9)-Ta(1)-Cl(1)	100.1(2)
Cl(2)-Ta(1)-Cl(1)	86.42(9)
N(2)-Ta(1)-C(12)	125.6(3)
N(1)-Ta(1)-C(12)	141.9(3)
C(10)-Ta(1)-C(12)	57.7(3)
C(11)-Ta(1)-C(12)	34.9(3)
C(9)-Ta(1)-C(12)	56.5(3)
Cl(2)-Ta(1)-C(12)	84.1(2)
Cl(1)-Ta(1)-C(12)	104.9(3)
N(2)-Ta(1)-C(8)	145.2(3)
N(1)-Ta(1)-C(8)	115.2(3)
C(10)-Ta(1)-C(8)	57.1(3)
C(11)-Ta(1)-C(8)	57.4(3)
C(9)-Ta(1)-C(8)	33.6(3)
Cl(2)-Ta(1)-C(8)	110.1(2)
Cl(1)-Ta(1)-C(8)	85.3(2)
C(12)-Ta(1)-C(8)	33.6(3)
N(2)-Ta(1)-C(1)	32.2(3)
N(1)-Ta(1)-C(1)	31.1(3)
C(10)-Ta(1)-C(1)	91.3(3)
C(11)-Ta(1)-C(1)	112.4(3)
C(9)-Ta(1)-C(1)	105.9(3)
Cl(2)-Ta(1)-C(1)	109.4(2)
Cl(1)-Ta(1)-C(1)	106.2(2)
C(12)-Ta(1)-C(1)	146.7(3)

C(8)-Ta(1)-C(1)	139.4(3)
C(1)-N(2)-C(2)	121.0(8)
C(1)-N(2)-Ta(1)	93.6(6)
C(2)-N(2)-Ta(1)	143.2(7)
C(1)-N(1)-C(7)	117.7(8)
C(1)-N(1)-Ta(1)	93.2(6)
C(7)-N(1)-Ta(1)	143.5(6)
C(9)-C(8)-C(12)	107.7(8)
C(9)-C(8)-C(13)	126.3(9)
C(12)-C(8)-C(13)	126.0(8)
C(9)-C(8)-Ta(1)	70.3(5)
C(12)-C(8)-Ta(1)	71.1(5)
C(13)-C(8)-Ta(1)	124.5(7)
N(1)-C(7)-C(6)	107.6(8)
N(1)-C(7)-H(7A)	110.2
C(6)-C(7)-H(7A)	110.2
N(1)-C(7)-H(7B)	110.2
C(6)-C(7)-H(7B)	110.2
H(7A)-C(7)-H(7B)	108.5
N(2)-C(2)-C(3)	110.8(8)
N(2)-C(2)-H(2A)	109.5
C(3)-C(2)-H(2A)	109.5
N(2)-C(2)-H(2B)	109.5
C(3)-C(2)-H(2B)	109.5
H(2A)-C(2)-H(2B)	108.1
N(3)-C(1)-N(1)	127.3(8)
N(3)-C(1)-N(2)	123.4(9)
N(1)-C(1)-N(2)	109.3(8)
N(3)-C(1)-Ta(1)	171.6(7)
N(1)-C(1)-Ta(1)	55.8(5)
N(2)-C(1)-Ta(1)	54.2(4)
C(1)-N(3)-C(4)	120.6(8)
C(1)-N(3)-C(5)	119.2(8)
C(4)-N(3)-C(5)	120.1(8)
C(8)-C(12)-C(11)	108.7(8)
C(8)-C(12)-C(17)	126.1(9)

C(11)-C(12)-C(17)	124.7(9)
C(8)-C(12)-Ta(1)	75.3(5)
C(11)-C(12)-Ta(1)	69.6(5)
C(17)-C(12)-Ta(1)	126.8(7)
C(10)-C(11)-C(12)	106.7(8)
C(10)-C(11)-C(16)	126.5(9)
C(12)-C(11)-C(16)	126.6(9)
C(10)-C(11)-Ta(1)	71.4(5)
C(12)-C(11)-Ta(1)	75.5(5)
C(16)-C(11)-Ta(1)	122.4(7)
N(3)-C(4)-C(3)	110.2(8)
N(3)-C(4)-H(4A)	109.6
C(3)-C(4)-H(4A)	109.6
N(3)-C(4)-H(4B)	109.6
C(3)-C(4)-H(4B)	109.6
H(4A)-C(4)-H(4B)	108.1
C(4)-C(3)-C(2)	110.4(9)
C(4)-C(3)-H(3A)	109.6
C(2)-C(3)-H(3A)	109.6
C(4)-C(3)-H(3B)	109.6
C(2)-C(3)-H(3B)	109.6
H(3A)-C(3)-H(3B)	108.1
N(3)-C(5)-C(6)	110.3(8)
N(3)-C(5)-H(5A)	109.6
C(6)-C(5)-H(5A)	109.6
N(3)-C(5)-H(5B)	109.6
C(6)-C(5)-H(5B)	109.6
H(5A)-C(5)-H(5B)	108.1
C(5)-C(6)-C(7)	112.9(9)
C(5)-C(6)-H(6A)	109.0
C(7)-C(6)-H(6A)	109.0
C(5)-C(6)-H(6B)	109.0
C(7)-C(6)-H(6B)	109.0
H(6A)-C(6)-H(6B)	107.8
C(9)-C(10)-C(11)	108.5(8)
C(9)-C(10)-C(15)	125.8(9)

C(11)-C(10)-C(15)	125.5(9)
C(9)-C(10)-Ta(1)	75.6(5)
C(11)-C(10)-Ta(1)	73.1(5)
C(15)-C(10)-Ta(1)	122.0(7)
C(8)-C(9)-C(10)	108.4(8)
C(8)-C(9)-C(14)	126.7(9)
C(10)-C(9)-C(14)	124.9(9)
C(8)-C(9)-Ta(1)	76.1(5)
C(10)-C(9)-Ta(1)	69.4(5)
C(14)-C(9)-Ta(1)	123.0(7)
C(10)-C(15)-H(13A)	109.5
C(10)-C(15)-H(13B)	109.5
H(13A)-C(15)-H(13B)	109.5
C(10)-C(15)-H(13C)	109.5
H(13A)-C(15)-H(13C)	109.5
H(13B)-C(15)-H(13C)	109.5
C(8)-C(13)-H(16A)	109.5
C(8)-C(13)-H(16B)	109.5
H(16A)-C(13)-H(16B)	109.5
C(8)-C(13)-H(16C)	109.5
H(16A)-C(13)-H(16C)	109.5
H(16B)-C(13)-H(16C)	109.5
C(12)-C(17)-C(18)	110.7(9)
C(12)-C(17)-H(15A)	109.5
C(18)-C(17)-H(15A)	109.5
C(12)-C(17)-H(15B)	109.5
C(18)-C(17)-H(15B)	109.5
H(15A)-C(17)-H(15B)	108.1
C(9)-C(14)-H(17A)	109.5
C(9)-C(14)-H(17B)	109.5
H(17A)-C(14)-H(17B)	109.5
C(9)-C(14)-H(17C)	109.5
H(17A)-C(14)-H(17C)	109.5
H(17B)-C(14)-H(17C)	109.5
C(11)-C(16)-H(14A)	109.5
C(11)-C(16)-H(14B)	109.5

H(14A)-C(16)-H(14B)	109.5
C(11)-C(16)-H(14C)	109.5
H(14A)-C(16)-H(14C)	109.5
H(14B)-C(16)-H(14C)	109.5
C(17)-C(18)-H(18A)	109.5
C(17)-C(18)-H(18B)	109.5
H(18A)-C(18)-H(18B)	109.5
C(17)-C(18)-H(18C)	109.5
H(18A)-C(18)-H(18C)	109.5
H(18B)-C(18)-H(18C)	109.5

Anisotropic displacement parameters ($Å^2 x\ 10^3$)for mes1010. The anisotropic displacement factor exponent takes the form: $-2\pi^2[\ h^2 a^{*2} U^{11} + ... + 2\ h\ k\ a^*\ b^*\ U^{12}\ ]$

	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
Ta(1)	24(1)	28(1)	25(1)	4(1)	-9(1)	-7(1)
Cl(1)	39(1)	31(1)	34(1)	5(1)	-10(1)	-13(1)
Cl(2)	35(1)	42(1)	31(1)	3(1)	-16(1)	-10(1)
N(2)	27(4)	36(4)	25(4)	9(3)	-6(3)	-11(3)
N(1)	24(4)	39(5)	24(4)	0(3)	-6(3)	-5(3)
C(8)	25(4)	26(4)	31(5)	-1(4)	-9(4)	-5(3)
C(7)	32(5)	26(5)	37(5)	7(4)	-17(4)	1(4)
C(2)	33(5)	38(6)	39(5)	10(4)	-9(4)	-18(4)
C(1)	26(4)	27(5)	35(5)	2(4)	-15(4)	-4(4)
N(3)	26(4)	38(5)	27(4)	1(3)	-9(3)	-6(3)
C(12)	24(4)	37(5)	35(5)	-6(4)	-10(4)	-3(4)
C(11)	29(4)	26(4)	23(4)	1(3)	-10(3)	0(4)
C(4)	27(5)	43(6)	36(5)	-4(4)	-1(4)	-8(4)
C(3)	36(5)	49(6)	31(5)	5(4)	-11(4)	-15(5)
C(5)	27(5)	43(6)	45(6)	8(5)	-13(4)	-10(4)
C(6)	36(5)	50(6)	35(5)	12(5)	-21(4)	-11(5)
C(10)	31(5)	29(5)	29(5)	0(4)	-12(4)	-8(4)
C(9)	30(4)	26(4)	24(4)	4(3)	-12(4)	-3(4)
C(15)	36(5)	36(5)	43(6)	2(4)	-15(4)	-14(4)
C(13)	33(5)	40(6)	36(5)	6(4)	-5(4)	-19(4)
C(17)	28(5)	36(5)	42(6)	-3(4)	-17(4)	0(4)
C(14)	35(5)	50(6)	29(5)	3(4)	-16(4)	-6(5)
C(16)	40(6)	40(6)	43(6)	2(5)	-10(5)	-11(5)
C(18)	34(6)	34(6)	88(10)	-5(6)	-26(6)	-2(5)

Hydrogen coordinates (x 10^4) and isotropic displacement parameters ($Å^2$x 10^3)
for mes1010.

	x	y	z	U(eq)
H(7A)	1056	10102	5986	39
H(7B)	440	11079	7106	39
H(2A)	1727	6746	10342	43
H(2B)	780	5867	9849	43
H(4A)	-2144	7375	9760	44
H(4B)	-2791	9041	10244	44
H(3A)	-1115	7404	11261	46
H(3B)	-469	8824	10763	46
H(5A)	-2390	10914	8496	45
H(5B)	-3067	9611	8223	45
H(6A)	-1777	10825	6594	47
H(6B)	-1111	9049	6580	47
H(13A)	2643	4369	6275	55
H(13B)	1520	6033	6501	55
H(13C)	1839	4975	7527	55
H(16A)	7680	7183	4756	54
H(16B)	7409	8144	5832	54
H(16C)	6243	8666	5047	54
H(15A)	7181	5592	8227	42
H(15B)	7990	6544	7217	42
H(17A)	4172	6852	4289	56
H(17B)	3847	8470	4791	56
H(17C)	2515	7566	5187	56
H(14A)	5233	3188	8009	62
H(14B)	3506	4202	8639	62
H(14C)	5066	4416	8889	62
H(18A)	9657	4075	7163	76
H(18B)	9045	4373	6068	76
H(18C)	8237	3423	7077	76

Torsion angles [°] for mes1010.

N(1)-Ta(1)-N(2)-C(1)	-6.2(5)
C(10)-Ta(1)-N(2)-C(1)	-95.0(6)
C(11)-Ta(1)-N(2)-C(1)	-130.3(6)
C(9)-Ta(1)-N(2)-C(1)	-75.3(6)
Cl(2)-Ta(1)-N(2)-C(1)	138.0(6)
Cl(1)-Ta(1)-N(2)-C(1)	55.7(6)
C(12)-Ta(1)-N(2)-C(1)	-142.3(6)
C(8)-Ta(1)-N(2)-C(1)	-102.1(7)
N(1)-Ta(1)-N(2)-C(2)	-167.5(13)
C(10)-Ta(1)-N(2)-C(2)	103.6(12)
C(11)-Ta(1)-N(2)-C(2)	68.4(12)
C(9)-Ta(1)-N(2)-C(2)	123.4(11)
Cl(2)-Ta(1)-N(2)-C(2)	-23.4(11)
Cl(1)-Ta(1)-N(2)-C(2)	-105.6(11)
C(12)-Ta(1)-N(2)-C(2)	56.3(13)
C(8)-Ta(1)-N(2)-C(2)	96.5(12)
C(1)-Ta(1)-N(2)-C(2)	-161.4(15)
N(2)-Ta(1)-N(1)-C(1)	6.3(6)
C(10)-Ta(1)-N(1)-C(1)	95.4(6)
C(11)-Ta(1)-N(1)-C(1)	81.7(6)
C(9)-Ta(1)-N(1)-C(1)	130.4(6)
Cl(2)-Ta(1)-N(1)-C(1)	-47.2(7)
Cl(1)-Ta(1)-N(1)-C(1)	-129.3(6)
C(12)-Ta(1)-N(1)-C(1)	120.4(7)
C(8)-Ta(1)-N(1)-C(1)	147.4(6)
N(2)-Ta(1)-N(1)-C(7)	155.2(12)
C(10)-Ta(1)-N(1)-C(7)	-115.7(11)
C(11)-Ta(1)-N(1)-C(7)	-129.4(11)
C(9)-Ta(1)-N(1)-C(7)	-80.8(11)
Cl(2)-Ta(1)-N(1)-C(7)	101.7(10)
Cl(1)-Ta(1)-N(1)-C(7)	19.6(11)
C(12)-Ta(1)-N(1)-C(7)	-90.7(12)
C(8)-Ta(1)-N(1)-C(7)	-63.7(11)
C(1)-Ta(1)-N(1)-C(7)	148.9(14)

N(2)-Ta(1)-C(8)-C(9)	46.3(8)
N(1)-Ta(1)-C(8)-C(9)	-32.0(6)
C(10)-Ta(1)-C(8)-C(9)	37.8(5)
C(11)-Ta(1)-C(8)-C(9)	80.3(6)
Cl(2)-Ta(1)-C(8)-C(9)	159.3(5)
Cl(1)-Ta(1)-C(8)-C(9)	-116.3(5)
C(12)-Ta(1)-C(8)-C(9)	117.6(8)
C(1)-Ta(1)-C(8)-C(9)	-6.7(8)
N(2)-Ta(1)-C(8)-C(12)	-71.3(8)
N(1)-Ta(1)-C(8)-C(12)	-149.6(5)
C(10)-Ta(1)-C(8)-C(12)	-79.8(6)
C(11)-Ta(1)-C(8)-C(12)	-37.3(5)
C(9)-Ta(1)-C(8)-C(12)	-117.6(8)
Cl(2)-Ta(1)-C(8)-C(12)	41.6(6)
Cl(1)-Ta(1)-C(8)-C(12)	126.1(5)
C(1)-Ta(1)-C(8)-C(12)	-124.4(6)
N(2)-Ta(1)-C(8)-C(13)	167.4(7)
N(1)-Ta(1)-C(8)-C(13)	89.1(8)
C(10)-Ta(1)-C(8)-C(13)	158.9(9)
C(11)-Ta(1)-C(8)-C(13)	-158.6(9)
C(9)-Ta(1)-C(8)-C(13)	121.1(10)
Cl(2)-Ta(1)-C(8)-C(13)	-79.6(8)
Cl(1)-Ta(1)-C(8)-C(13)	4.8(8)
C(12)-Ta(1)-C(8)-C(13)	-121.3(10)
C(1)-Ta(1)-C(8)-C(13)	114.4(8)
C(1)-N(1)-C(7)-C(6)	-37.6(12)
Ta(1)-N(1)-C(7)-C(6)	178.0(8)
C(1)-N(2)-C(2)-C(3)	-23.7(13)
Ta(1)-N(2)-C(2)-C(3)	134.4(10)
C(7)-N(1)-C(1)-N(3)	10.7(15)
Ta(1)-N(1)-C(1)-N(3)	170.4(9)
C(7)-N(1)-C(1)-N(2)	-168.8(8)
Ta(1)-N(1)-C(1)-N(2)	-9.1(8)
C(7)-N(1)-C(1)-Ta(1)	-159.7(9)
C(2)-N(2)-C(1)-N(3)	-3.1(15)
Ta(1)-N(2)-C(1)-N(3)	-170.2(9)

C(2)-N(2)-C(1)-N(1)	176.4(9)
Ta(1)-N(2)-C(1)-N(1)	9.3(8)
C(2)-N(2)-C(1)-Ta(1)	167.1(10)
N(2)-Ta(1)-C(1)-N(3)	76(5)
N(1)-Ta(1)-C(1)-N(3)	-114(5)
C(10)-Ta(1)-C(1)-N(3)	161(5)
C(11)-Ta(1)-C(1)-N(3)	132(5)
C(9)-Ta(1)-C(1)-N(3)	-167(5)
Cl(2)-Ta(1)-C(1)-N(3)	31(5)
Cl(1)-Ta(1)-C(1)-N(3)	-61(5)
C(12)-Ta(1)-C(1)-N(3)	141(5)
C(8)-Ta(1)-C(1)-N(3)	-163(5)
N(2)-Ta(1)-C(1)-N(1)	-169.3(9)
C(10)-Ta(1)-C(1)-N(1)	-84.5(6)
C(11)-Ta(1)-C(1)-N(1)	-113.8(6)
C(9)-Ta(1)-C(1)-N(1)	-52.2(6)
Cl(2)-Ta(1)-C(1)-N(1)	145.6(5)
Cl(1)-Ta(1)-C(1)-N(1)	53.6(6)
C(12)-Ta(1)-C(1)-N(1)	-104.6(7)
C(8)-Ta(1)-C(1)-N(1)	-48.4(8)
N(1)-Ta(1)-C(1)-N(2)	169.3(9)
C(10)-Ta(1)-C(1)-N(2)	84.9(6)
C(11)-Ta(1)-C(1)-N(2)	55.5(6)
C(9)-Ta(1)-C(1)-N(2)	117.1(6)
Cl(2)-Ta(1)-C(1)-N(2)	-45.1(6)
Cl(1)-Ta(1)-C(1)-N(2)	-137.0(5)
C(12)-Ta(1)-C(1)-N(2)	64.7(8)
C(8)-Ta(1)-C(1)-N(2)	121.0(6)
N(1)-C(1)-N(3)-C(4)	-178.3(10)
N(2)-C(1)-N(3)-C(4)	1.1(15)
Ta(1)-C(1)-N(3)-C(4)	-70(5)
N(1)-C(1)-N(3)-C(5)	-0.3(15)
N(2)-C(1)-N(3)-C(5)	179.2(9)
Ta(1)-C(1)-N(3)-C(5)	108(5)
C(9)-C(8)-C(12)-C(11)	0.8(11)
C(13)-C(8)-C(12)-C(11)	-178.7(9)

Ta(1)-C(8)-C(12)-C(11)	62.0(6)
C(9)-C(8)-C(12)-C(17)	173.7(9)
C(13)-C(8)-C(12)-C(17)	-5.8(16)
Ta(1)-C(8)-C(12)-C(17)	-125.2(10)
C(9)-C(8)-C(12)-Ta(1)	-61.1(7)
C(13)-C(8)-C(12)-Ta(1)	119.4(10)
N(2)-Ta(1)-C(12)-C(8)	138.3(5)
N(1)-Ta(1)-C(12)-C(8)	47.9(8)
C(10)-Ta(1)-C(12)-C(8)	77.9(6)
C(11)-Ta(1)-C(12)-C(8)	116.9(8)
C(9)-Ta(1)-C(12)-C(8)	36.0(5)
Cl(2)-Ta(1)-C(12)-C(8)	-141.1(5)
Cl(1)-Ta(1)-C(12)-C(8)	-56.4(5)
C(1)-Ta(1)-C(12)-C(8)	102.0(7)
N(2)-Ta(1)-C(12)-C(11)	21.4(7)
N(1)-Ta(1)-C(12)-C(11)	-69.0(8)
C(10)-Ta(1)-C(12)-C(11)	-39.0(5)
C(9)-Ta(1)-C(12)-C(11)	-80.9(6)
Cl(2)-Ta(1)-C(12)-C(11)	102.0(5)
Cl(1)-Ta(1)-C(12)-C(11)	-173.3(5)
C(8)-Ta(1)-C(12)-C(11)	-116.9(8)
C(1)-Ta(1)-C(12)-C(11)	-14.9(9)
N(2)-Ta(1)-C(12)-C(17)	-97.3(9)
N(1)-Ta(1)-C(12)-C(17)	172.3(8)
C(10)-Ta(1)-C(12)-C(17)	-157.7(10)
C(11)-Ta(1)-C(12)-C(17)	-118.7(11)
C(9)-Ta(1)-C(12)-C(17)	160.4(10)
Cl(2)-Ta(1)-C(12)-C(17)	-16.7(9)
Cl(1)-Ta(1)-C(12)-C(17)	68.0(9)
C(8)-Ta(1)-C(12)-C(17)	124.4(12)
C(1)-Ta(1)-C(12)-C(17)	-133.6(8)
C(8)-C(12)-C(11)-C(10)	-0.6(11)
C(17)-C(12)-C(11)-C(10)	-173.6(9)
Ta(1)-C(12)-C(11)-C(10)	65.1(6)
C(8)-C(12)-C(11)-C(16)	174.5(9)
C(17)-C(12)-C(11)-C(16)	1.5(16)

Ta(1)-C(12)-C(11)-C(16)	-119.9(10)
C(8)-C(12)-C(11)-Ta(1)	-65.6(7)
C(17)-C(12)-C(11)-Ta(1)	121.3(9)
N(2)-Ta(1)-C(11)-C(10)	83.7(6)
N(1)-Ta(1)-C(11)-C(10)	24.1(6)
C(9)-Ta(1)-C(11)-C(10)	-37.8(5)
Cl(2)-Ta(1)-C(11)-C(10)	169.6(5)
Cl(1)-Ta(1)-C(11)-C(10)	-103.6(6)
C(12)-Ta(1)-C(11)-C(10)	-113.6(8)
C(8)-Ta(1)-C(11)-C(10)	-77.7(6)
C(1)-Ta(1)-C(11)-C(10)	57.6(6)
N(2)-Ta(1)-C(11)-C(12)	-162.7(6)
N(1)-Ta(1)-C(11)-C(12)	137.7(5)
C(10)-Ta(1)-C(11)-C(12)	113.6(8)
C(9)-Ta(1)-C(11)-C(12)	75.8(6)
Cl(2)-Ta(1)-C(11)-C(12)	-76.8(5)
Cl(1)-Ta(1)-C(11)-C(12)	10.0(7)
C(8)-Ta(1)-C(11)-C(12)	35.9(5)
C(1)-Ta(1)-C(11)-C(12)	171.2(5)
N(2)-Ta(1)-C(11)-C(16)	-38.3(8)
N(1)-Ta(1)-C(11)-C(16)	-97.9(8)
C(10)-Ta(1)-C(11)-C(16)	-122.0(10)
C(9)-Ta(1)-C(11)-C(16)	-159.7(9)
Cl(2)-Ta(1)-C(11)-C(16)	47.6(8)
Cl(1)-Ta(1)-C(11)-C(16)	134.4(7)
C(12)-Ta(1)-C(11)-C(16)	124.4(10)
C(8)-Ta(1)-C(11)-C(16)	160.3(9)
C(1)-Ta(1)-C(11)-C(16)	-64.4(8)
C(1)-N(3)-C(4)-C(3)	27.4(13)
C(5)-N(3)-C(4)-C(3)	-150.6(9)
N(3)-C(4)-C(3)-C(2)	-52.4(12)
N(2)-C(2)-C(3)-C(4)	50.8(12)
C(1)-N(3)-C(5)-C(6)	19.1(13)
C(4)-N(3)-C(5)-C(6)	-162.9(9)
N(3)-C(5)-C(6)-C(7)	-47.9(13)
N(1)-C(7)-C(6)-C(5)	56.9(12)

C(12)-C(11)-C(10)-C(9)	0.1(11)
C(16)-C(11)-C(10)-C(9)	-175.0(9)
Ta(1)-C(11)-C(10)-C(9)	68.0(7)
C(12)-C(11)-C(10)-C(15)	174.4(9)
C(16)-C(11)-C(10)-C(15)	-0.7(16)
Ta(1)-C(11)-C(10)-C(15)	-117.7(10)
C(12)-C(11)-C(10)-Ta(1)	-67.9(6)
C(16)-C(11)-C(10)-Ta(1)	117.0(10)
N(2)-Ta(1)-C(10)-C(9)	148.6(5)
N(1)-Ta(1)-C(10)-C(9)	85.6(5)
C(11)-Ta(1)-C(10)-C(9)	-114.8(8)
Cl(2)-Ta(1)-C(10)-C(9)	-127.9(5)
Cl(1)-Ta(1)-C(10)-C(9)	1.8(7)
C(12)-Ta(1)-C(10)-C(9)	-76.4(6)
C(8)-Ta(1)-C(10)-C(9)	-36.3(5)
C(1)-Ta(1)-C(10)-C(9)	116.5(5)
N(2)-Ta(1)-C(10)-C(11)	-96.6(6)
N(1)-Ta(1)-C(10)-C(11)	-159.6(6)
C(9)-Ta(1)-C(10)-C(11)	114.8(8)
Cl(2)-Ta(1)-C(10)-C(11)	-13.0(6)
Cl(1)-Ta(1)-C(10)-C(11)	116.6(5)
C(12)-Ta(1)-C(10)-C(11)	38.4(5)
C(8)-Ta(1)-C(10)-C(11)	78.5(6)
C(1)-Ta(1)-C(10)-C(11)	-128.7(6)
N(2)-Ta(1)-C(10)-C(15)	25.1(8)
N(1)-Ta(1)-C(10)-C(15)	-37.9(8)
C(11)-Ta(1)-C(10)-C(15)	121.7(10)
C(9)-Ta(1)-C(10)-C(15)	-123.5(10)
Cl(2)-Ta(1)-C(10)-C(15)	108.7(7)
Cl(1)-Ta(1)-C(10)-C(15)	-121.7(7)
C(12)-Ta(1)-C(10)-C(15)	160.1(9)
C(8)-Ta(1)-C(10)-C(15)	-159.8(9)
C(1)-Ta(1)-C(10)-C(15)	-7.0(8)
C(12)-C(8)-C(9)-C(10)	-0.8(11)
C(13)-C(8)-C(9)-C(10)	178.7(9)
Ta(1)-C(8)-C(9)-C(10)	-62.4(6)

C(12)-C(8)-C(9)-C(14)	-177.3(9)
C(13)-C(8)-C(9)-C(14)	2.2(16)
Ta(1)-C(8)-C(9)-C(14)	121.1(10)
C(12)-C(8)-C(9)-Ta(1)	61.6(7)
C(13)-C(8)-C(9)-Ta(1)	-118.9(10)
C(11)-C(10)-C(9)-C(8)	0.4(11)
C(15)-C(10)-C(9)-C(8)	-173.9(9)
Ta(1)-C(10)-C(9)-C(8)	66.7(7)
C(11)-C(10)-C(9)-C(14)	177.1(9)
C(15)-C(10)-C(9)-C(14)	2.8(16)
Ta(1)-C(10)-C(9)-C(14)	-116.6(9)
C(11)-C(10)-C(9)-Ta(1)	-66.3(6)
C(15)-C(10)-C(9)-Ta(1)	119.4(10)
N(2)-Ta(1)-C(9)-C(8)	-152.2(5)
N(1)-Ta(1)-C(9)-C(8)	151.3(6)
C(10)-Ta(1)-C(9)-C(8)	-116.1(8)
C(11)-Ta(1)-C(9)-C(8)	-77.8(6)
Cl(2)-Ta(1)-C(9)-C(8)	-31.5(7)
Cl(1)-Ta(1)-C(9)-C(8)	65.2(5)
C(12)-Ta(1)-C(9)-C(8)	-36.0(5)
C(1)-Ta(1)-C(9)-C(8)	175.4(5)
N(2)-Ta(1)-C(9)-C(10)	-36.1(6)
N(1)-Ta(1)-C(9)-C(10)	-92.6(6)
C(11)-Ta(1)-C(9)-C(10)	38.3(5)
Cl(2)-Ta(1)-C(9)-C(10)	84.6(6)
Cl(1)-Ta(1)-C(9)-C(10)	-178.7(5)
C(12)-Ta(1)-C(9)-C(10)	80.1(6)
C(8)-Ta(1)-C(9)-C(10)	116.1(8)
C(1)-Ta(1)-C(9)-C(10)	-68.5(6)
N(2)-Ta(1)-C(9)-C(14)	82.9(8)
N(1)-Ta(1)-C(9)-C(14)	26.3(8)
C(10)-Ta(1)-C(9)-C(14)	119.0(10)
C(11)-Ta(1)-C(9)-C(14)	157.3(9)
Cl(2)-Ta(1)-C(9)-C(14)	-156.5(6)
Cl(1)-Ta(1)-C(9)-C(14)	-59.8(8)
C(12)-Ta(1)-C(9)-C(14)	-161.0(9)

C(8)-Ta(1)-C(9)-C(14)	-125.0(10)
C(1)-Ta(1)-C(9)-C(14)	50.5(8)
C(8)-C(12)-C(17)-C(18)	-91.8(13)
C(11)-C(12)-C(17)-C(18)	80.0(13)
Ta(1)-C(12)-C(17)-C(18)	169.4(8)

Observed and calculated structure factors for $(C_5Me_4Et)Ta(hpp)Cl_2$.

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
2	0	0	115	104	2	5	4	0	721	733	6	0	9	0	614	627	14	2	-8	1	0	56	1	-7	-3	1	402	413	5
3	0	0	690	617	5	6	4	0	151	144	7	1	9	0	500	517	17	3	-8	1	378	388	15	-6	-3	1	68	78	42
4	0	0	1418	1209	9	7	4	0	425	427	10	2	9	0	217	227	21	4	-8	1	276	274	16	-5	-3	1	697	710	7
5	0	0	224	212	7	8	4	0	454	443	7	3	9	0	141	152	103	5	-8	1	137	13	102	-4	-3	1	1073	1093	9
6	0	0	310	296	6	9	4	0	227	227	21	4	9	0	464	469	13	6	-8	1	225	277	21	-3	-3	1	632	662	7
7	0	0	603	549	7	10	4	0	207	233	15	5	9	0	160	181	43	-10	-7	1	0	16	1	-2	-3	1	623	618	5
8	0	0	244	228	17	11	4	0	259	289	20	6	9	0	113	89	26	-9	-7	1	364	358	10	-1	-3	1	1291	1297	13
9	0	0	245	234	21	-8	5	0	312	286	20	7	9	0	261	278	10	-8	-7	1	484	491	8	0	-3	1	1358	1369	11
10	0	0	435	415	11	-7	5	0	416	406	15	8	9	0	219	249	15	-7	-7	1	66	93	47	1	-3	1	446	450	4
11	0	0	226	223	26	-6	5	0	143	146	14	9	9	0	156	134	24	-6	-7	1	407	413	9	2	-3	1	199	206	2
-10	1	0	64	55	64	-5	5	0	490	511	7	-3	10	0	0	73	1	-5	-7	1	689	679	7	3	-3	1	595	616	4
-9	1	0	476	460	8	-4	5	0	604	594	8	-2	10	0	216	220	28	-4	-7	1	639	621	7	4	-3	1	313	319	5
-8	1	0	447	450	7	-3	5	0	542	545	6	-1	10	0	367	367	18	-3	-7	1	218	224	17	5	-3	1	237	261	13
-7	1	0	192	205	7	-2	5	0	200	217	5	0	10	0	321	344	24	-2	-7	1	735	744	7	6	-3	1	755	743	8
-6	1	0	345	358	4	-1	5	0	986	1004	9	1	10	0	0	22	1	-1	-7	1	737	760	7	7	-3	1	302	305	11
-5	1	0	872	905	6	0	5	0	1223	1206	10	2	10	0	312	296	11	0	-7	1	269	271	9	8	-3	1	214	210	12
-4	1	0	646	679	5	1	5	0	393	405	4	3	10	0	351	340	15	1	-7	1	403	410	6	9	-3	1	384	379	12
-3	1	0	449	473	3	2	5	0	398	403	4	4	10	0	88	98	39	2	-7	1	437	443	6	10	-3	1	415	399	18
-2	1	0	1181	1232	7	3	5	0	952	926	8	5	10	0	324	334	12	3	-7	1	276	270	15	-11	-2	1	134	116	23
-1	1	0	912	904	6	4	5	0	579	580	6	6	10	0	256	263	15	4	-7	1	88	80	66	-10	-2	1	198	198	38
2	1	0	1089	1125	15	5	5	0	247	255	5	7	10	0	103	133	48	5	-7	1	364	366	11	-9	-2	1	630	622	16
3	1	0	1026	1046	18	6	5	0	547	567	12	8	10	0	141	188	90	6	-7	1	161	193	22	-8	-2	1	392	398	5
4	1	0	112	111	4	7	5	0	466	461	6	-1	11	0	0	33	1	7	-7	1	57	7	56	-7	-2	1	0	45	1
5	1	0	773	791	10	8	5	0	135	133	13	1	11	0	358	361	13	-10	-6	1	322	328	34	-6	-2	1	715	725	7
6	1	0	474	475	6	9	5	0	388	413	8	2	11	0	238	226	16	-9	-6	1	304	316	12	-5	-2	1	978	993	10
7	1	0	94	96	10	10	5	0	473	464	12	3	11	0	175	216	20	-8	-6	1	0	15	1	-4	-2	1	179	182	4
8	1	0	612	597	7	11	5	0	127	177	75	4	11	0	279	329	15	-7	-6	1	542	524	8	-3	-2	1	715	722	7
9	1	0	657	629	13	-8	6	0	162	168	39	5	11	0	259	257	14	-6	-6	1	542	549	6	-2	-2	1	1202	1249	10
10	1	0	199	179	12	-7	6	0	0	14	1	6	11	0	0	27	1	-5	-6	1	217	238	11	-1	-2	1	799	807	6
11	1	0	193	184	14	-6	6	0	356	372	11	7	11	0	164	221	31	-4	-6	1	585	587	6	0	-2	1	76	62	3
-10	2	0	387	387	13	-5	6	0	492	507	9	1	12	0	0	54	1	-3	-6	1	931	899	8	1	-2	1	1040	1047	7
-9	2	0	366	370	8	-4	6	0	78	86	28	2	12	0	110	176	51	-2	-6	1	641	666	6	2	-2	1	721	730	5
-8	2	0	0	29	1	-3	6	0	320	336	8	3	12	0	312	327	16	-1	-6	1	132	143	7	3	-2	1	117	103	4
-7	2	0	447	441	12	-2	6	0	802	815	7	4	12	0	110	183	110	0	-6	1	521	547	17	4	-2	1	731	751	5
-6	2	0	739	734	7	-1	6	0	336	353	7	5	12	0	140	23	60	1	-6	1	599	613	7	5	-2	1	664	677	8
-5	2	0	218	232	13	0	6	0	123	142	7	-4	12	1	278	230	28	2	-6	1	65	16	49	6	-2	1	81	90	10
-4	2	0	631	635	4	1	6	0	656	654	6	-3	12	1	231	83	27	3	-6	1	548	559	6	7	-2	1	343	350	6
-3	2	0	958	971	9	2	6	0	672	673	6	-2	12	1	272	282	24	4	-6	1	476	495	12	8	-2	1	618	609	21
-2	2	0	863	869	7	3	6	0	70	51	13	-7	11	1	180	160	27	5	-6	1	278	284	10	9	-2	1	394	382	10
-1	2	0	445	463	3	4	6	0	530	529	13	-6	11	1	362	346	15	6	-6	1	375	374	39	10	-2	1	0	13	1
0	2	0	1074	1069	8	5	6	0	561	548	6	-5	11	1	211	204	20	7	-6	1	502	493	17	-11	-1	1	369	311	19
1	2	0	1058	1052	9	6	6	0	111	137	16	-4	11	1	145	140	25	8	-6	1	327	324	23	-10	-1	1	432	413	11
2	2	0	573	592	7	7	6	0	251	243	6	-3	11	1	303	327	13	-11	-5	1	387	376	21	-9	-1	1	204	200	10
3	2	0	876	907	8	8	6	0	702	685	9	-2	11	1	413	433	13	-10	-5	1	140	179	35	-8	-1	1	159	149	16
4	2	0	944	967	18	9	6	0	440	436	10	-1	11	1	84	73	62	-9	-5	1	157	184	14	-7	-1	1	476	482	6
5	2	0	279	296	4	10	6	0	57	5	57	0	11	1	172	206	34	-8	-5	1	454	457	8	-6	-1	1	232	261	4
6	2	0	389	409	5	11	6	0	188	270	42	1	11	1	294	331	23	-7	-5	1	381	395	6	-5	-1	1	305	321	4
7	2	0	661	679	7	-7	7	0	299	300	24	2	11	1	149	165	54	-6	-5	1	190	191	11	-4	-1	1	1063	1078	17
8	2	0	336	339	5	-6	7	0	244	273	17	-8	10	1	295	282	17	-5	-5	1	615	627	6	-3	-1	1	602	626	8
9	2	0	128	90	19	-5	7	0	87	71	87	-7	10	1	331	337	16	-4	-5	1	546	552	6	-2	-1	1	201	216	2
10	2	0	379	395	15	-4	7	0	251	280	18	-6	10	1	0	93	1	-3	-5	1	219	228	6	-1	-1	1	1025	1047	10
11	2	0	460	432	15	-3	7	0	428	455	8	-5	10	1	189	195	18	-2	-5	1	830	839	7	1	-1	1	774	801	5
-9	3	0	172	194	21	-2	7	0	100	105	17	-4	10	1	427	426	10	-1	-5	1	1116	1101	9	2	-1	1	513	518	4
-8	3	0	481	482	9	-1	7	0	539	557	25	-3	10	1	249	251	12	0	-5	1	528	524	5	3	-1	1	1104	1146	8
-7	3	0	452	452	8	0	7	0	543	532	8	-2	10	1	141	78	29	1	-5	1	55	40	10	4	-1	1	812	824	5
-6	3	0	97	116	19	1	7	0	439	448	12	-1	10	1	331	340	11	2	-5	1	984	1003	9	5	-1	1	71	69	11
-5	3	0	328	350	5	2	7	0	201	223	7	0	10	1	266	301	12	3	-5	1	642	659	10	6	-1	1	692	717	7
-4	3	0	426	449	8	3	7	0	695	705	7	1	10	1	144	69	37	4	-5	1	193	200	11	7	-1	1	729	733	8
-3	3	0	53	35	12	4	7	0	586	576	6	3	10	1	245	305	27	5	-5	1	326	341	8	8	-1	1	419	417	6
-2	3	0	770	783	14	5	7	0	68	68	21	4	10	1	122	113	96	6	-5	1	639	636	8	9	-1	1	187	199	15
-1	3	0	1136	1151	8	6	7	0	505	508	16	-9	-9	1	205	245	42	7	-5	1	195	223	14	10	-1	1	395	380	9
0	3	0	696	699	6	7	7	0	542	530	7	-8	-9	1	264	291	25	8	-5	1	181	175	20	-10	0	1	0	24	1
1	3	0	604	591	5	8	7	0	289	279	9	-7	-9	1	0	13	1	-11	-4	1	0	18	1	-9	0	1	427	395	9
2	3	0	1467	1453	14	9	7	0	138	160	20	-6	-9	1	280	295	10	-10	-4	1	266	260	10	-8	0	1	381	365	8
3	3	0	1084	1142	11	10	7	0	315	336	30	-5	-9	1	197	237	12	-9	-4	1	370	376	13	-7	0	1	272	292	7
4	3	0	166	189	3	-6	8	0	62	141	61	-4	-9	1	27	47	26	-8	-4	1	102	78	15	-6	0	1	423	426	4
5	3	0	636	644	6	-5	8	0	242	253	29	-3	-9	1	465	514	8	-7	-4	1	401	401	11	-5	0	1	540	568	10
6	3	0	877	878	12	-4	8	0	74	65	74	-2	-9	1	585	615	16	-6	-4	1	548	530	7	-4	0	1	308	318	5
7	3	0	451	447	5	-3	8	0	199	180	38	-1	-9	1	193	209	11	-5	-4	1	216	219	10	-3	0	1	1102	1135	7
8	3	0	191	192	20	-2	8	0	583	588	7	0	-9	1	191	194	11	-4	-4	1	383	404	7	-2	0	1	1647	1693	12
9	3	0	488	481	9	-1	8	0	652	650	8	1	-9	1	498	498	8	-3	-4	1	1308	1313	11	-1	0	1	891	897	6
10	3	0	433	440	17	0	8	0	137	107	19	2	-9	1	412	443	35	-2	-4	1	1330	1330	11	2	0	1	1308	1352	9
11	3	0	48	42	48	1	8	0	411	412	10	3	-9	1	146	7	26	-1	-4	1	117	131	14	3	0	1	669	688	5
-9	4	0	342	354	14	2	8	0	713	736	10	4	-9	1	271	264	22	0	-4	1	998	987	10	4	0	1	325	327	4
-8	4	0	180	203	19	3	8	0	451	489	7	5	-9	1	318	354	20	1	-4	1	1164	1163	9	5	0	1	798	816	5
-7	4	0	192	224	14	4	8	0	63	53	28	-10	-8	1	214	249	30	2	-4	1	734	748	5	6	0	1	637	651	8
-6	4	0	502	504	10	5	8	0	364	372	15	-9	-8	1	100	158	76	3	-4	1	325	333	4	7	0	1	105	113	13

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
-5	4	0	299	306	6	6	8	0	327	336	7	-8	-8	1	212	220	13	4	-4	1	561	549	5	8	0	1	511	505	12
-4	4	0	168	182	6	7	8	0	110	55	23	-7	-8	1	368	355	19	5	-4	1	418	431	5	9	0	1	549	541	7
-3	4	0	885	903	8	8	8	0	324	343	15	-6	-8	1	181	154	23	6	-4	1	0	4	1	10	0	1	224	210	10
-2	4	0	926	942	8	9	8	0	323	347	12	-5	-8	1	125	135	19	7	-4	1	477	486	9	11	0	1	146	129	19
-1	4	0	74	30	13	10	8	0	131	133	33	-4	-8	1	593	604	7	8	-4	1	394	417	15	-10	1	1	325	289	14
0	4	0	1032	1034	8	-5	9	0	96	118	72	-3	-8	1	458	482	13	9	-4	1	186	193	21	-9	1	1	246	237	18
1	4	0	1375	1360	12	-4	9	0	205	223	19	-2	-8	1	0	40	1	-11	-3	1	301	305	18	-8	1	1	261	259	8
2	4	0	879	876	7	-3	9	0	399	413	12	-1	-8	1	464	463	10	-10	-3	1	272	292	10	-7	1	1	537	481	13
3	4	0	52	69	12	-2	9	0	252	253	13	0	-8	1	743	745	8	-9	-3	1	101	100	20	-6	1	1	571	521	10
4	4	0	623	635	5	-1	9	0	128	126	62	1	-8	1	425	456	13	-8	-3	1	362	356	10	-5	1	1	13	24	13
-4	1	1	899	810	7	0	5	1	118	119	7	2	10	1	181	194	17	4	-7	2	417	431	11	-7	-2	2	591	592	10
-3	1	1	1668	1440	11	1	5	1	701	714	6	3	10	1	132	162	22	5	-7	2	160	133	19	-6	-2	2	446	468	5
-2	1	1	990	844	11	2	5	1	701	725	7	4	10	1	331	376	24	6	-7	2	290	278	13	-5	-2	2	427	443	5
-1	1	1	442	371	6	3	5	1	221	250	4	5	10	1	240	246	19	7	-7	2	357	384	21	-4	-2	2	1059	1081	11
1	1	1	1535	1335	37	4	5	1	473	471	9	6	10	1	110	90	51	-10	-6	2	77	48	76	-3	-2	2	1108	1166	9
2	1	1	606	523	5	5	5	1	499	486	5	7	10	1	298	309	10	-9	-6	2	196	205	14	-2	-2	2	245	253	6
3	1	1	458	394	15	6	5	1	100	113	9	8	10	1	348	362	26	-8	-6	2	487	482	8	-1	-2	2	707	733	5
4	1	1	1217	1056	12	7	5	1	481	489	7	9	10	1	130	108	37	-7	-6	2	200	212	10	0	-2	2	455	454	4
5	1	1	185	171	5	8	5	1	672	642	9	-1	11	1	205	243	32	-6	-6	2	296	303	7	1	-2	2	647	651	9
6	1	1	519	483	15	9	5	1	307	323	13	0	11	1	246	251	29	-5	-6	2	816	802	8	2	-2	2	160	160	3
7	1	1	711	644	8	10	5	1	95	37	37	1	11	1	22	26	21	-4	-6	2	890	898	18	3	-2	2	925	937	6
8	1	1	318	289	15	11	5	1	299	332	31	2	11	1	175	174	27	-3	-6	2	137	157	7	4	-2	2	485	502	4
9	1	1	34	61	34	-7	6	1	322	311	13	3	11	1	240	232	22	-2	-6	2	491	516	5	5	-2	2	210	230	4
10	1	1	476	457	9	-6	6	1	250	236	13	4	11	1	116	106	53	-1	-6	2	759	763	6	6	-2	2	647	668	6
11	1	1	419	389	14	-5	6	1	208	224	14	5	11	1	210	246	27	0	-6	2	406	415	5	7	-2	2	710	718	9
-10	2	1	138	135	22	-4	6	1	483	504	7	6	11	1	340	357	15	1	-6	2	86	52	28	8	-2	2	184	199	9
-9	2	1	159	178	17	-3	6	1	625	637	7	7	11	1	266	285	19	2	-6	2	573	593	19	9	-2	2	159	219	27
-8	2	1	492	475	9	-2	6	1	221	213	22	1	12	1	266	311	18	3	-6	2	242	247	7	10	-2	2	405	383	13
-7	2	1	280	272	23	-1	6	1	463	479	17	2	12	1	239	250	28	4	-6	2	311	311	9	-10	-1	2	53	30	53
-6	2	1	124	94	18	0	6	1	606	640	13	3	12	1	35	30	34	5	-6	2	475	495	9	-9	-1	2	419	412	8
-5	2	1	651	683	8	1	6	1	599	620	6	4	12	1	147	191	35	6	-6	2	494	495	10	-8	-1	2	482	483	19
-4	2	1	949	980	6	2	6	1	72	63	14	5	12	1	278	316	18	7	-6	2	66	133	66	-7	-1	2	183	194	7
-3	2	1	49	45	10	3	6	1	589	583	6	-3	12	2	253	274	27	8	-6	2	144	190	51	-6	-1	2	411	428	5
-2	2	1	438	468	5	4	6	1	469	462	8	-6	11	2	203	36	25	-10	-5	2	258	257	31	-5	-1	2	818	850	8
-1	2	1	742	766	10	5	6	1	215	222	9	-5	11	2	359	345	14	-9	-5	2	369	390	9	-4	-1	2	502	522	5
0	2	1	1062	1098	10	6	6	1	636	636	7	-4	11	2	431	416	18	-8	-5	2	140	155	39	-3	-1	2	281	285	3
1	2	1	1135	1144	11	7	6	1	542	532	6	-3	11	2	367	282	18	-7	-5	2	437	433	9	-2	-1	2	793	834	7
2	2	1	141	133	4	8	6	1	167	154	12	-2	11	2	79	82	79	-6	-5	2	354	345	12	-1	-1	2	927	960	12
3	2	1	290	301	3	9	6	1	245	260	11	-1	11	2	322	343	21	-5	-5	2	259	283	18	0	-1	2	116	114	10
4	2	1	38	26	11	10	6	1	491	498	23	1	11	2	174	72	40	-4	-5	2	252	258	5	1	-1	2	959	966	7
5	2	1	1171	1182	10	11	6	1	303	292	16	2	11	2	153	186	57	-3	-5	2	1015	987	17	2	-1	2	1030	1072	6
6	2	1	801	831	8	-7	7	1	63	100	63	-8	10	2	142	156	33	-2	-5	2	608	627	8	3	-1	2	127	114	3
7	2	1	317	314	5	-6	7	1	164	168	37	-7	10	2	134	100	33	-1	-5	2	47	36	46	4	-1	2	860	879	6
8	2	1	338	369	18	-5	7	1	408	393	15	-6	10	2	354	354	13	0	-5	2	766	752	7	5	-1	2	1144	1162	8
9	2	1	577	580	7	-4	7	1	93	104	24	-5	10	2	346	370	12	1	-5	2	781	793	12	6	-1	2	780	799	7
10	2	1	459	451	8	-3	7	1	0	68	1	-4	10	2	101	69	26	2	-5	2	237	255	9	7	-1	2	55	63	54
11	2	1	104	35	27	-2	7	1	533	549	8	-3	10	2	287	280	16	3	-5	2	473	494	9	8	-1	2	389	397	6
-9	3	1	401	406	19	-1	7	1	633	657	9	-2	10	2	438	450	10	4	-5	2	793	779	8	9	-1	2	479	478	8
-8	3	1	208	220	11	0	7	1	116	91	13	-1	10	2	155	133	19	5	-5	2	500	503	9	10	-1	2	240	215	15
-7	3	1	210	206	14	1	7	1	442	447	5	1	10	2	326	307	20	6	-5	2	77	85	27	11	-1	2	179	113	30
-6	3	1	515	528	20	2	7	1	509	520	7	2	10	2	204	251	28	7	-5	2	467	461	10	-10	0	2	331	334	25
-5	3	1	430	441	5	3	7	1	147	143	12	4	10	2	273	311	29	8	-5	2	498	502	12	-9	0	2	255	253	11
-4	3	1	253	283	8	4	7	1	342	329	10	-9	-9	2	69	124	69	9	-5	2	120	175	40	-8	0	2	264	271	9
-3	3	1	855	869	9	5	7	1	651	652	7	-8	-9	2	202	185	17	-10	-4	2	195	217	23	-7	0	2	407	414	5
-2	3	1	797	806	11	6	7	1	406	392	12	-7	-9	2	341	335	15	-9	-4	2	76	42	27	-6	0	2	374	381	5
-1	3	1	415	408	4	7	7	1	92	23	19	-6	-9	2	161	158	19	-8	-4	2	320	339	7	-5	0	2	49	64	22
0	3	1	477	491	5	8	7	1	473	461	7	-5	-9	2	184	188	16	-7	-4	2	395	402	14	-4	0	2	749	793	12
1	3	1	1475	1489	14	9	7	1	488	481	11	-4	-9	2	401	418	8	-6	-4	2	242	252	6	-3	0	2	1170	1210	13
2	3	1	255	256	3	10	7	1	224	220	15	-3	-9	2	273	283	8	-5	-4	2	604	610	7	-2	0	2	526	550	5
3	3	1	433	431	4	11	7	1	124	81	61	-2	-9	2	98	90	22	-4	-4	2	849	884	15	-1	0	2	470	469	5
4	3	1	761	790	6	-6	8	1	215	207	29	-1	-9	2	349	347	9	-3	-4	2	305	310	3	0	0	2	1728	1745	19
5	3	1	649	662	6	-5	8	1	102	83	102	0	-9	2	382	396	9	-2	-4	2	564	545	4	1	0	2	1134	1127	8
6	3	1	265	288	4	-4	8	1	288	297	21	1	-9	2	25	95	24	-1	-4	2	1189	1203	14	2	0	2	45	28	9
7	3	1	657	660	7	-3	8	1	338	347	10	2	-9	2	293	286	18	0	-4	2	848	863	6	3	0	2	468	494	4
8	3	1	719	728	7	-2	8	1	244	279	13	3	-9	2	413	409	17	1	-4	2	41	17	10	4	0	2	983	1018	9
9	3	1	290	292	12	-1	8	1	277	302	20	4	-9	2	179	243	32	2	-4	2	614	624	5	5	0	2	428	442	4
10	3	1	169	173	27	0	8	1	654	666	9	5	-9	2	0	75	1	3	-4	2	752	762	5	6	0	2	463	470	4
11	3	1	279	279	44	1	8	1	627	617	11	-9	-8	2	208	182	55	4	-4	2	170	200	5	7	0	2	753	761	15
-9	4	1	0	34	1	2	8	1	197	218	24	-8	-8	2	259	276	12	5	-4	2	237	227	9	8	0	2	555	551	8
-8	4	1	218	269	17	3	8	1	327	343	15	-7	-8	2	0	49	1	6	-4	2	705	706	14	9	0	2	38	31	38
-7	4	1	330	333	9	4	8	1	540	545	6	-6	-8	2	379	392	11	7	-4	2	302	292	7	10	0	2	310	306	9
-6	4	1	75	17	75	5	8	1	278	302	7	-5	-8	2	428	431	13	8	-4	2	86	79	35	11	0	2	222	221	29
-5	4	1	455	473	5	6	8	1	216	218	9	-4	-8	2	307	322	6	9	-4	2	273	278	14	-10	1	2	79	109	78
-4	4	1	588	582	7	7	8	1	430	414	7	-3	-8	2	389	393	7	-10	-3	2	161	190	14	-9	1	2	149	171	17
-3	4	1	282	290	5	8	8	1	437	434	7	-2	-8	2	724	730	9	-9	-3	2	350	351	8	-8	1	2	354	351	27
-2	4	1	304	328	5	9	8	1	0	71	1	-1	-8	2	629	662	7	-8	-3	2	118	144	12	-7	1	2	208	215	11
-1	4	1	1311	1348	9	10	8	1	222	213	16	0	-8	2	89	100	29	-7	-3	2	163	189	13	-6	1	2	295	307	4
0	4	1	1070	1086	9	-5	9	1	198	305	36	1	-8	2	421	446	17	-6	-3	2	780	780	9	-5	1	2	874	885	7
1	4	1	184	198	4	-4	9	1	286	290	36	2	-8	2	423	463	13	-5	-3	2	674	686	7	-4	1	2	1012	1036	9

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
2	4	1	650	632	10	-3	9	1	0	37	1	3	-8	2	206	197	14	-4	-3	2	135	144	13	-3	1	2	42	30	42
3	4	1	1171	1174	10	-2	9	1	370	379	8	4	-8	2	161	155	22	-3	-3	2	866	910	17	-2	1	2	712	749	8
4	4	1	472	474	5	-1	9	1	559	556	10	5	-8	2	323	305	41	-2	-3	2	1352	1397	10	-1	1	2	1007	1028	8
5	4	1	140	137	5	0	9	1	320	328	10	6	-8	2	195	232	23	-1	-3	2	1033	1048	18	0	1	2	783	771	8
6	4	1	800	787	7	1	9	1	0	24	1	-10	-7	2	200	220	17	0	-3	2	58	56	7	1	1	2	1095	1087	9
7	4	1	645	638	8	2	9	1	454	441	9	-9	-7	2	106	80	29	1	-3	2	678	701	6	2	1	2	577	590	5
8	4	1	52	44	51	3	9	1	515	540	8	-8	-7	2	137	164	23	2	-3	2	911	905	11	3	1	2	688	710	8
9	4	1	265	291	23	4	9	1	154	135	14	-7	-7	2	571	557	9	3	-3	2	63	89	7	4	1	2	96	88	7
10	4	1	482	480	11	5	9	1	259	256	21	-6	-7	2	462	471	12	4	-3	2	700	701	6	5	1	2	912	914	8
11	4	1	119	114	27	6	9	1	279	283	15	-5	-7	2	19	36	19	5	-3	2	330	332	4	6	1	2	768	789	8
-8	5	1	82	92	81	7	9	1	147	90	19	-4	-7	2	493	500	11	6	-3	2	321	332	5	7	1	2	110	117	15
-7	5	1	63	75	63	8	9	1	69	128	68	-3	-7	2	932	926	8	7	-3	2	434	433	6	8	1	2	314	320	5
-6	5	1	455	444	7	9	9	1	330	349	10	-2	-7	2	458	489	6	8	-3	2	522	489	13	9	1	2	524	507	7
-5	5	1	474	480	6	-3	10	1	304	294	19	-1	-7	2	129	132	9	9	-3	2	193	206	24	10	1	2	306	275	9
-4	5	1	50	19	45	-2	10	1	351	381	21	0	-7	2	412	398	7	10	-3	2	0	26	1	11	1	2	38	48	37
-3	5	1	725	741	7	-1	10	1	93	105	36	1	-7	2	527	539	6	-10	-2	2	307	303	18	-9	2	2	296	269	10
-2	5	1	1181	1189	11	0	10	1	203	212	16	2	-7	2	0	18	1	-9	-2	2	58	56	57	-8	2	2	0	23	1
-1	5	1	587	621	5	1	10	1	338	377	11	3	-7	2	395	406	9	-8	-2	2	365	387	17	-7	2	2	426	380	13
-6	2	2	966	832	10	1	6	2	354	366	5	5	12	2	95	18	95	-7	-5	3	619	619	9	-2	-1	3	783	805	7
-5	2	2	482	426	14	2	6	2	533	517	5	-6	-11	3	273	343	20	-6	-5	3	49	35	48	-1	-1	3	368	375	3
-4	2	2	256	246	8	3	6	2	161	160	6	-5	-11	3	284	306	17	-5	-5	3	444	444	12	0	-1	3	956	960	8
-3	2	2	1445	1229	12	4	6	2	575	569	6	-4	-11	3	65	9	64	-4	-5	3	547	570	6	1	-1	3	226	236	2
-2	2	2	1305	1114	9	5	6	2	623	618	6	-3	-11	3	227	264	18	-3	-5	3	494	512	4	2	-1	3	643	641	7
-1	2	2	1402	1146	10	6	6	2	423	408	10	-2	-11	3	354	390	13	-2	-5	3	375	366	12	3	-1	3	1307	1356	23
0	2	2	976	833	30	7	6	2	176	173	9	-1	-11	3	0	174	1	-1	-5	3	744	757	6	4	-1	3	959	1002	12
1	2	2	1442	1222	23	8	6	2	601	588	12	0	-11	3	117	118	67	0	-5	3	434	458	20	5	-1	3	265	288	6
2	2	2	104	70	4	9	6	2	482	482	9	1	-11	3	239	243	28	1	-5	3	59	56	9	6	-1	3	318	321	3
3	2	2	701	585	6	10	6	2	189	200	16	-7	-10	3	404	378	15	2	-5	3	911	916	9	7	-1	3	1052	1053	10
4	2	2	1012	879	23	11	6	2	235	235	19	-6	-10	3	430	276	13	3	-5	3	609	606	9	8	-1	3	577	576	7
5	2	2	416	384	14	-6	7	2	329	351	22	-5	-10	3	206	202	25	4	-5	3	25	31	24	9	-1	3	0	22	1
6	2	2	308	290	5	-5	7	2	65	47	64	-4	-10	3	353	349	11	5	-5	3	436	430	6	10	-1	3	212	216	16
7	2	2	822	746	9	-4	7	2	298	339	9	-3	-10	3	383	318	10	6	-5	3	660	662	10	11	-1	3	285	251	22
8	2	2	761	675	18	-3	7	2	419	439	9	-2	-10	3	258	185	12	7	-5	3	349	359	13	-10	0	3	26	88	25
9	2	2	245	240	27	-2	7	2	400	403	11	-1	-10	3	274	259	12	8	-5	3	44	25	43	-9	0	3	214	211	11
10	2	2	216	218	12	-1	7	2	163	165	12	1	-10	3	182	22	28	9	-5	3	253	270	17	-8	0	3	398	397	9
11	2	2	401	387	10	0	7	2	393	419	10	2	-10	3	277	269	22	-10	-4	3	269	252	11	-7	0	3	206	234	10
-9	3	2	0	34	1	1	7	2	440	457	5	3	-10	3	354	330	23	-9	-4	3	303	285	8	-6	0	3	184	189	7
-8	3	2	438	411	10	2	7	2	31	40	31	-8	-9	3	173	229	21	-8	-4	3	160	190	12	-5	0	3	772	781	6
-7	3	2	338	341	9	3	7	2	523	539	11	-7	-9	3	108	16	40	-7	-4	3	231	242	11	-4	0	3	599	616	6
-6	3	2	78	102	23	4	7	2	638	627	6	-6	-9	3	274	262	13	-6	-4	3	599	573	7	-3	0	3	0	29	1
-5	3	2	459	472	8	5	7	2	158	166	9	-5	-9	3	452	463	10	-5	-4	3	491	520	6	-2	0	3	867	893	8
-4	3	2	750	751	6	6	7	2	323	327	15	-4	-9	3	170	180	13	-4	-4	3	80	96	32	-1	0	3	1233	1237	10
-3	3	2	538	545	5	7	7	2	692	682	8	-3	-9	3	128	131	20	-3	-4	3	642	672	16	0	0	3	54	45	5
-2	3	2	354	369	3	8	7	2	485	488	16	-2	-9	3	360	385	9	-2	-4	3	745	774	6	1	0	3	548	517	4
-1	3	2	1083	1082	15	9	7	2	54	15	54	-1	-9	3	344	366	9	-1	-4	3	233	251	4	2	0	3	1505	1521	31
0	3	2	789	789	6	10	7	2	195	207	22	0	-9	3	98	99	26	0	-4	3	710	700	9	3	0	3	1008	1032	9
1	3	2	176	183	11	11	7	2	311	288	22	1	-9	3	323	297	16	1	-4	3	894	909	6	4	0	3	352	347	3
2	3	2	904	905	8	-5	8	2	264	305	17	2	-9	3	385	408	15	2	-4	3	983	988	7	5	0	3	1067	1082	8
3	3	2	604	627	6	-4	8	2	264	287	15	3	-9	3	0	22	1	3	-4	3	205	221	4	6	0	3	994	1026	12
4	3	2	186	186	6	-3	8	2	82	42	40	4	-9	3	255	266	26	4	-4	3	696	694	7	7	0	3	350	360	5
5	3	2	629	642	6	-2	8	2	415	402	14	-9	-8	3	65	129	64	5	-4	3	618	636	8	8	0	3	280	282	9
6	3	2	1033	1030	10	-1	8	2	653	645	10	-8	-8	3	69	100	68	6	-4	3	516	527	7	9	0	3	430	426	25
7	3	2	784	773	8	0	8	2	155	150	14	-7	-8	3	384	392	25	7	-4	3	250	264	10	10	0	3	205	224	11
8	3	2	119	144	38	1	8	2	196	175	24	-6	-8	3	302	289	24	8	-4	3	379	360	10	11	0	3	0	35	1
9	3	2	333	351	9	2	8	2	664	672	7	-5	-8	3	72	52	71	9	-4	3	178	170	21	-9	1	3	221	198	14
10	3	2	479	489	10	3	8	2	483	483	6	-4	-8	3	398	398	7	-10	-3	3	238	218	12	-8	1	3	182	153	53
11	3	2	183	167	15	4	8	2	0	50	1	-3	-8	3	558	578	8	-9	-3	3	0	8	1	-7	1	3	522	522	7
-8	4	2	190	201	17	5	8	2	556	546	7	-2	-8	3	164	184	10	-8	-3	3	366	386	6	-6	1	3	773	780	10
-7	4	2	173	182	13	6	8	2	610	597	7	-1	-8	3	299	311	8	-7	-3	3	597	609	8	-5	1	3	369	383	5
-6	4	2	383	386	9	7	8	2	223	239	9	0	-8	3	519	529	12	-6	-3	3	204	194	15	-4	1	3	420	446	6
-5	4	2	536	539	6	8	8	2	131	73	36	1	-8	3	363	369	13	-5	-3	3	355	364	6	-3	1	3	1184	1204	10
-4	4	2	107	93	16	9	8	2	369	359	9	2	-8	3	0	12	1	-4	-3	3	1184	1230	16	-2	1	3	886	893	9
-3	4	2	781	780	8	10	8	2	251	258	37	3	-8	3	457	442	14	-3	-3	3	1250	1272	10	-1	1	3	437	435	4
-2	4	2	823	822	15	-4	9	2	121	183	41	4	-8	3	420	400	14	-2	-3	3	118	111	5	0	1	3	498	502	8
-1	4	2	614	616	9	-3	9	2	340	358	20	5	-8	3	89	135	89	-1	-3	3	468	513	7	1	1	3	1233	1227	9
0	4	2	340	369	4	-2	9	2	380	390	9	6	-8	3	158	220	40	0	-3	3	906	929	29	2	1	3	599	597	8
1	4	2	1157	1185	10	-1	9	2	63	56	63	-9	-7	3	252	252	46	1	-3	3	255	257	7	3	1	3	654	653	6
2	4	2	508	527	6	0	9	2	461	454	10	-8	-7	3	338	335	10	2	-3	3	149	159	4	4	1	3	911	940	17
3	4	2	222	212	4	1	9	2	487	479	13	-7	-7	3	0	97	1	3	-3	3	1046	1027	10	5	1	3	600	620	7
4	4	2	788	789	7	2	9	2	278	299	15	-6	-7	3	363	359	19	4	-3	3	659	686	7	6	1	3	22	16	21
5	4	2	1125	1134	8	3	9	2	115	145	19	-5	-7	3	770	744	9	5	-3	3	196	183	4	7	1	3	573	590	7
6	4	2	220	237	13	4	9	2	513	505	13	-4	-7	3	740	748	7	6	-3	3	451	462	9	8	1	3	402	406	7
7	4	2	440	447	8	5	9	2	460	459	8	-3	-7	3	151	176	20	7	-3	3	529	532	7	9	1	3	186	204	9
8	4	2	647	638	8	6	9	2	0	24	1	-2	-7	3	505	508	7	8	-3	3	0	92	1	10	1	3	298	296	10
9	4	2	378	376	10	7	9	2	279	311	9	-1	-7	3	721	747	8	9	-3	3	207	181	23	11	1	3	391	384	10
10	4	2	85	68	85	8	9	2	353	334	9	0	-7	3	358	377	13	10	-3	3	278	281	16	-9	2	3	117	134	23
11	4	2	223	253	16	9	9	2	119	116	27	1	-7	3	211	228	8	-10	-2	3	118	139	57	-8	2	3	438	440	16
-8	5	2	212	197	26	10	9	2	187	169	26	2	-7	3	494	489	15	-9	-2	3	445	427	10	-7	2	3	266	262	9
-7	5	2	309	299	11	-3	10	2	155	182	45	3	-7	3	343	380	26	-8	-2	3	478	478	6	-6	2	3	0	22	1

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
-6	5	2	38	75	37	-2	10	2	48	28	47	4	-7	3	0	14	1	-7	-2	3	55	29	23	-5	2	3	723	731	8
-5	5	2	358	371	7	-1	10	2	269	290	13	5	-7	3	359	360	11	-6	-2	3	738	743	10	-4	2	3	1133	1153	11
-4	5	2	773	786	7	0	10	2	309	340	12	6	-7	3	248	307	31	-5	-2	3	955	965	8	-3	2	3	872	874	9
-3	5	2	703	712	9	1	10	2	72	44	72	7	-7	3	69	24	68	-4	-2	3	720	741	11	-2	2	3	430	437	4
-2	5	2	54	42	39	2	10	2	212	223	28	-10	-6	3	238	268	15	-3	-2	3	28	54	27	-1	2	3	714	698	8
-1	5	2	559	588	5	3	10	2	304	284	15	-9	-6	3	239	243	16	-2	-2	3	798	831	15	0	2	3	1093	1089	9
0	5	2	1066	1074	10	4	10	2	44	54	44	-8	-6	3	0	26	1	-1	-2	3	1021	1077	23	1	2	3	41	36	12
1	5	2	688	715	6	5	10	2	290	310	15	-7	-6	3	581	563	9	0	-2	3	435	428	3	2	2	3	1001	991	7
2	5	2	287	290	4	6	10	2	370	397	12	-6	-6	3	627	611	13	1	-2	3	878	852	18	3	2	3	651	662	6
3	5	2	670	661	7	7	10	2	251	245	12	-5	-6	3	311	323	22	2	-2	3	823	832	7	4	2	3	311	312	3
4	5	2	703	697	9	8	10	2	0	27	1	-4	-6	3	218	231	8	3	-2	3	176	178	14	5	2	3	811	824	13
5	5	2	33	19	33	9	10	2	257	319	14	-3	-6	3	895	885	8	4	-2	3	711	754	5	6	2	3	927	940	9
6	5	2	589	588	6	-1	11	2	144	183	60	-2	-6	3	551	570	8	5	-2	3	939	959	7	7	2	3	587	584	9
7	5	2	515	510	6	0	11	2	63	73	63	-1	-6	3	144	164	6	6	-2	3	582	594	6	8	2	3	102	27	14
8	5	2	204	235	19	1	11	2	224	257	18	0	-6	3	334	335	13	7	-2	3	77	76	12	9	2	3	402	407	9
9	5	2	193	207	26	2	11	2	162	167	24	1	-6	3	503	499	6	8	-2	3	411	404	9	10	2	3	410	406	8
10	5	2	393	386	18	3	11	2	52	96	52	2	-6	3	47	38	23	9	-2	3	401	391	10	11	2	3	106	20	28
11	5	2	204	219	36	4	11	2	334	329	18	3	-6	3	435	448	8	10	-2	3	145	115	25	-9	3	3	401	379	12
-7	6	2	60	49	60	5	11	2	329	334	16	4	-6	3	699	704	8	-10	-1	3	341	346	13	-8	3	3	235	246	11
-6	6	2	300	322	17	6	11	2	84	59	62	5	-6	3	419	415	7	-9	-1	3	197	181	12	-7	3	3	290	270	9
-5	6	2	569	555	10	7	11	2	174	200	23	6	-6	3	91	83	90	-8	-1	3	318	324	8	-6	3	3	638	562	11
-4	6	2	262	266	8	8	11	2	372	368	17	7	-6	3	349	373	9	-7	-1	3	657	646	15	-5	3	3	751	646	23
-3	6	2	118	123	16	1	12	2	206	86	32	8	-6	3	355	377	21	-6	-1	3	688	705	6	-4	3	3	132	119	9
-2	6	2	647	672	7	2	12	2	145	129	49	-10	-5	3	137	156	33	-5	-1	3	0	35	1	-3	3	3	672	576	6
-1	6	2	810	818	9	3	12	2	277	270	24	-9	-5	3	0	54	1	-4	-1	3	699	702	5	-2	3	3	903	773	7
0	6	2	194	191	6	4	12	2	226	202	30	-8	-5	3	394	411	19	-3	-1	3	1021	1043	8	-1	3	3	802	684	8
0	3	3	69	65	8	10	7	3	243	234	14	2	-9	4	193	190	24	3	-4	4	1206	1189	16	7	0	4	587	587	12
1	3	3	1338	1155	40	11	7	3	103	31	57	3	-9	4	486	453	16	4	-4	4	729	729	7	8	0	4	505	523	5
2	3	3	129	126	7	-5	8	3	163	188	39	4	-9	4	444	359	19	5	-4	4	69	79	18	9	0	4	155	144	12
3	3	3	287	264	8	-4	8	3	188	198	18	5	-9	4	141	82	58	6	-4	4	568	559	7	10	0	4	246	246	24
4	3	3	1041	887	8	-3	8	3	293	301	12	-8	-8	4	281	291	12	7	-4	4	451	428	10	11	0	4	291	310	16
5	3	3	1530	1307	32	-2	8	3	341	348	17	-7	-8	4	50	141	50	8	-4	4	116	118	37	-9	1	4	174	155	17
6	3	3	137	140	10	-1	8	3	100	77	26	-6	-8	4	172	200	76	9	-4	4	222	209	16	-8	1	4	381	358	9
7	3	3	613	543	8	0	8	3	527	515	9	-5	-8	4	470	465	10	-10	-3	4	166	185	22	-7	1	4	238	256	9
8	3	3	850	767	8	1	8	3	377	376	8	-4	-8	4	322	325	10	-9	-3	4	315	318	8	-6	1	4	0	53	1
9	3	3	561	500	13	2	8	3	128	122	24	-3	-8	4	72	34	26	-8	-3	4	282	305	7	-5	1	4	609	610	6
10	3	3	58	18	57	3	8	3	405	397	6	-2	-8	4	442	447	9	-7	-3	4	57	66	57	-4	1	4	828	848	8
11	3	3	298	282	17	4	8	3	753	737	8	-1	-8	4	684	681	10	-6	-3	4	879	890	7	-3	1	4	200	212	4
-8	4	3	256	250	14	5	8	3	551	545	17	0	-8	4	25	67	24	-5	-3	4	667	660	6	-2	1	4	592	616	6
-7	4	3	388	381	25	6	8	3	0	41	1	1	-8	4	338	333	13	-4	-3	4	398	396	5	-1	1	4	1091	1117	9
-6	4	3	197	190	10	7	8	3	458	455	7	2	-8	4	535	524	15	-3	-3	4	274	310	5	0	1	4	805	798	11
-5	4	3	262	269	7	8	8	3	454	459	8	3	-8	4	444	439	15	-2	-3	4	1184	1180	16	1	1	4	400	385	4
-4	4	3	656	640	9	9	8	3	161	176	17	4	-8	4	0	29	1	-1	-3	4	599	625	5	2	1	4	1242	1244	9
-3	4	3	598	595	14	10	8	3	122	92	59	5	-8	4	289	295	20	0	-3	4	125	145	8	3	1	4	1660	1668	19
-2	4	3	256	271	9	-3	9	3	119	86	55	6	-8	4	338	328	21	1	-3	4	943	929	8	4	1	4	443	457	4
-1	4	3	823	838	13	-2	9	3	85	98	48	-9	-7	4	111	166	32	2	-3	4	1169	1175	25	5	1	4	373	386	4
0	4	3	1020	1015	18	-1	9	3	458	441	10	-8	-7	4	81	56	43	3	-3	4	334	357	4	6	1	4	725	740	17
1	4	3	454	444	11	0	9	3	318	304	27	-7	-7	4	426	421	9	4	-3	4	479	487	5	7	1	4	405	416	6
2	4	3	1239	1243	10	1	9	3	53	70	53	-6	-7	4	594	589	11	5	-3	4	705	711	8	8	1	4	266	265	8
3	4	3	1095	1104	9	2	9	3	505	514	13	-5	-7	4	227	224	10	6	-3	4	573	585	9	9	1	4	383	393	8
4	4	3	901	896	8	3	9	3	611	611	8	-4	-7	4	413	410	7	7	-3	4	89	22	17	10	1	4	283	284	8
5	4	3	109	113	9	4	9	3	155	142	20	-3	-7	4	669	665	8	8	-3	4	350	296	14	11	1	4	61	51	61
6	4	3	754	744	7	5	9	3	279	284	21	-2	-7	4	403	424	6	9	-3	4	272	252	17	-9	2	4	365	363	12
7	4	3	723	719	6	6	9	3	443	443	8	-1	-7	4	129	121	11	10	-3	4	48	25	47	-8	2	4	113	120	67
8	4	3	275	299	7	7	9	3	292	314	37	0	-7	4	696	683	10	-10	-2	4	248	267	21	-7	2	4	351	370	9
9	4	3	183	178	14	8	9	3	52	15	51	1	-7	4	631	631	9	-9	-2	4	69	30	69	-6	2	4	754	751	11
10	4	3	300	315	10	9	9	3	245	250	13	2	-7	4	256	290	13	-8	-2	4	312	308	6	-5	2	4	604	621	7
11	4	3	203	191	24	10	9	3	195	185	18	3	-7	4	384	381	13	-7	-2	4	738	726	8	-4	2	4	38	42	38
-8	5	3	178	160	32	-3	10	3	221	239	37	4	-7	4	564	552	15	-6	-2	4	746	748	7	-3	2	4	566	585	5
-7	5	3	72	53	72	-2	10	3	334	348	12	5	-7	4	335	362	17	-5	-2	4	100	95	19	-2	2	4	972	973	8
-6	5	3	339	352	14	-1	10	3	222	232	34	6	-7	4	27	27	26	-4	-2	4	733	750	6	-1	2	4	564	551	5
-5	5	3	579	551	13	0	10	3	131	135	29	7	-7	4	218	246	28	-3	-2	4	1069	1087	13	0	2	4	343	334	5
-4	5	3	264	260	19	1	10	3	214	232	40	-9	-6	4	232	249	18	-2	-2	4	591	615	13	1	2	4	986	1006	8
-3	5	3	287	298	8	2	10	3	231	236	15	-8	-6	4	453	439	9	-1	-2	4	410	415	19	2	2	4	388	396	9
-2	5	3	780	782	15	3	10	3	98	136	72	-7	-6	4	482	484	9	0	-2	4	1093	1098	26	3	2	4	439	443	4
-1	5	3	561	532	7	4	10	3	375	367	26	-6	-6	4	79	99	25	1	-2	4	518	526	4	4	2	4	957	967	8
0	5	3	81	114	10	5	10	3	301	331	11	-5	-6	4	565	566	8	2	-2	4	249	254	2	5	2	4	774	771	6
1	5	3	546	560	5	6	10	3	122	104	28	-4	-6	4	692	696	7	3	-2	4	1381	1383	22	6	2	4	235	240	5
2	5	3	1035	1062	9	7	10	3	213	219	13	-3	-6	4	565	576	6	4	-2	4	764	782	6	7	2	4	361	373	10
3	5	3	197	198	5	8	10	3	309	311	13	-2	-6	4	204	219	13	5	-2	4	37	62	16	8	2	4	573	574	7
4	5	3	582	585	15	9	10	3	224	233	26	-1	-6	4	528	530	8	6	-2	4	253	262	4	9	2	4	198	212	11
5	5	3	928	906	20	-1	11	3	114	157	96	0	-6	4	426	446	10	7	-2	4	939	921	10	10	2	4	204	212	20
6	5	3	664	646	7	0	11	3	218	225	27	1	-6	4	132	113	15	8	-2	4	282	268	13	11	2	4	428	436	14
7	5	3	64	77	28	1	11	3	61	26	60	2	-6	4	670	694	17	9	-2	4	131	158	19	-8	3	4	329	345	13
8	5	3	456	457	6	2	11	3	80	143	80	3	-6	4	565	588	18	10	-2	4	297	311	14	-7	3	4	422	409	10
9	5	3	398	397	7	3	11	3	247	237	19	4	-6	4	0	21	1	-10	-1	4	32	33	32	-6	3	4	254	271	15
10	5	3	93	74	32	4	11	3	191	151	30	5	-6	4	391	385	10	-9	-1	4	404	374	11	-5	3	4	223	240	20
11	5	3	294	296	33	5	11	3	119	163	118	6	-6	4	487	472	8	-8	-1	4	540	539	14	-4	3	4	642	634	11
-7	6	3	325	364	14	6	11	3	353	402	14	7	-6	4	232	252	16	-7	-1	4	205	213	7	-3	3	4	623	628	5

-6	6	3	281	309	22	7	11	3	272	311	28	8	-6	4	0	79	1	-6	-1	4	283	293	9	-2	3	4	184	175	5
-5	6	3	47	20	46	8	11	3	76	80	75	-10	-5	4	291	305	40	-5	-1	4	701	709	8	-1	3	4	834	850	6
-4	6	3	499	508	18	2	12	3	248	256	19	-9	-5	4	422	432	10	-4	-1	4	696	723	6	0	3	4	894	895	9
-3	6	3	690	683	10	3	12	3	0	87	1	-8	-5	4	217	241	11	-3	-1	4	94	121	23	1	3	4	269	254	5
-2	6	3	338	333	8	4	12	3	166	156	45	-7	-5	4	221	215	7	-2	-1	4	645	654	6	2	3	4	1116	1129	9
-1	6	3	38	60	37	5	12	3	340	357	15	-6	-5	4	571	556	8	-1	-1	4	363	370	4	3	3	4	1059	1063	9
0	6	3	665	652	8	-5	-11	4	175	192	28	-5	-5	4	522	508	7	0	-1	4	104	89	12	4	3	4	622	622	7
1	6	3	512	538	7	-4	-11	4	381	378	19	-4	-5	4	73	70	11	1	-1	4	1053	1055	21	5	3	4	140	141	5
2	6	3	110	121	12	-3	-11	4	243	281	16	-3	-5	4	476	482	5	2	-1	4	1111	1118	23	6	3	4	896	905	7
3	6	3	528	528	8	-2	-11	4	91	48	50	-2	-5	4	628	625	12	3	-1	4	816	837	7	7	3	4	838	837	9
4	6	3	686	672	14	-1	-11	4	278	272	21	-1	-5	4	57	52	17	4	-1	4	645	636	5	8	3	4	104	84	15
5	6	3	119	92	10	0	-11	4	259	283	24	0	-5	4	630	647	7	5	-1	4	1168	1187	20	9	3	4	312	312	7
6	6	3	360	356	6	1	-11	4	35	35	34	1	-5	4	817	828	26	6	-1	4	712	732	8	10	3	4	446	458	10
7	6	3	550	539	6	-7	-10	4	70	51	70	2	-5	4	438	447	5	7	-1	4	403	406	6	11	3	4	115	158	27
8	6	3	283	277	18	-6	-10	4	292	299	16	3	-5	4	282	293	6	8	-1	4	479	474	6	-8	4	4	272	274	16
9	6	3	92	91	32	-5	-10	4	471	489	14	4	-5	4	692	698	7	9	-1	4	483	471	10	-7	4	4	81	27	38
10	6	3	296	322	14	-4	-10	4	162	169	23	5	-5	4	750	751	10	10	-1	4	224	225	15	-6	4	4	260	236	10
11	6	3	279	334	17	-3	-10	4	156	125	18	6	-5	4	165	224	21	11	-1	4	35	115	34	-5	4	4	611	518	10
-6	7	3	139	106	44	-2	-10	4	278	271	12	7	-5	4	212	246	25	-9	0	4	260	278	13	-4	4	4	306	267	8
-5	7	3	349	365	9	-1	-10	4	234	264	13	8	-5	4	381	379	12	-8	0	4	0	54	1	-3	4	4	302	256	12
-4	7	3	420	421	14	0	-10	4	0	22	1	9	-5	4	193	204	33	-7	0	4	474	487	6	-2	4	4	687	581	6
-3	7	3	171	186	29	1	-10	4	265	266	21	-10	-4	4	225	209	13	-6	0	4	570	579	8	-1	4	4	185	159	8
-2	7	3	290	312	7	2	-10	4	273	241	22	-9	-4	4	0	8	1	-5	0	4	370	377	8	0	4	4	615	518	8
-1	7	3	460	460	12	3	-10	4	59	42	59	-8	-4	4	360	352	6	-4	0	4	366	369	5	1	4	4	1322	1079	31
0	7	3	197	181	14	-8	-9	4	157	127	27	-7	-4	4	673	663	27	-3	0	4	832	848	8	2	4	4	1356	1140	11
1	7	3	426	440	5	-7	-9	4	372	363	13	-6	-4	4	201	217	12	-2	0	4	566	568	6	3	4	4	57	60	11
2	7	3	649	645	7	-6	-9	4	399	312	13	-5	-4	4	85	61	14	-1	0	4	555	554	6	4	4	4	795	660	7
3	7	3	229	226	6	-5	-9	4	207	126	17	-4	-4	4	612	624	13	0	0	4	1305	1306	11	5	4	4	1545	1274	16
4	7	3	200	207	7	-4	-9	4	287	288	12	-3	-4	4	640	640	6	1	0	4	958	974	8	6	4	4	695	606	6
5	7	3	863	846	8	-3	-9	4	343	296	8	-2	-4	4	351	351	4	2	0	4	163	142	3	7	4	4	94	72	12
6	7	3	751	729	8	-2	-9	4	314	169	9	-1	-4	4	710	746	8	3	0	4	892	915	8	8	4	4	510	463	7
7	7	3	282	285	15	-1	-9	4	262	266	10	0	-4	4	727	762	6	4	0	4	1160	1212	14	9	4	4	454	412	8
8	7	3	249	247	9	0	-9	4	469	415	14	1	-4	4	23	29	23	5	0	4	857	891	6	10	4	4	79	83	34
9	7	3	465	455	18	1	-9	4	323	154	16	2	-4	4	790	810	13	6	0	4	189	182	4	11	4	4	297	295	15
-7	5	4	360	383	13	-2	10	4	0	62	1	-6	-6	5	636	622	12	5	-2	5	609	608	5	10	2	5	467	473	10
-6	5	4	222	202	13	-1	10	4	273	241	21	-5	-6	5	390	398	7	6	-2	5	366	375	6	11	2	5	67	68	67
-5	5	4	0	19	1	0	10	4	353	356	12	-4	-6	5	112	97	13	7	-2	5	0	17	1	-8	3	5	311	321	13
-4	5	4	527	517	9	1	10	4	60	30	60	-3	-6	5	577	556	7	8	-2	5	464	456	7	-7	3	5	0	12	1
-3	5	4	566	575	10	2	10	4	162	157	41	-2	-6	5	634	634	9	9	-2	5	526	492	10	-6	3	5	289	294	8
-2	5	4	176	154	10	3	10	4	376	402	16	-1	-6	5	107	131	12	10	-2	5	124	128	29	-5	3	5	538	544	9
-1	5	4	374	400	5	4	10	4	216	244	16	0	-6	5	614	615	9	-9	-1	5	222	235	35	-4	3	5	266	276	12
0	5	4	879	862	12	5	10	4	79	54	44	1	-6	5	716	706	10	-8	-1	5	29	51	28	-3	3	5	341	358	5
1	5	4	637	622	12	6	10	4	307	319	10	2	-6	5	312	312	12	-7	-1	5	449	446	7	-2	3	5	597	591	6
2	5	4	454	445	8	7	10	4	220	218	20	3	-6	5	164	159	9	-6	-1	5	712	712	9	-1	3	5	191	202	19
3	5	4	915	911	8	8	10	4	67	13	67	4	-6	5	640	628	23	-5	-1	5	171	183	7	0	3	5	368	376	4
4	5	4	943	922	8	9	10	4	147	187	26	5	-6	5	505	470	13	-4	-1	5	65	58	37	1	3	5	1001	1000	10
5	5	4	436	444	4	0	11	4	31	23	30	6	-6	5	60	70	60	-3	-1	5	701	710	7	2	3	5	690	718	6
6	5	4	410	416	7	1	11	4	204	227	30	7	-6	5	286	288	16	-2	-1	5	690	697	6	3	3	5	50	41	16
7	5	4	302	304	7	2	11	4	177	179	55	8	-6	5	232	246	21	-1	-1	5	832	811	8	4	3	5	787	779	7
8	5	4	207	198	7	3	11	4	0	57	1	-9	-5	5	114	61	32	0	-1	5	977	978	7	5	3	5	904	888	8
9	5	4	116	112	19	4	11	4	175	212	39	-8	-5	5	425	419	10	1	-1	5	787	798	6	6	3	5	353	349	7
10	5	4	366	356	14	5	11	4	280	278	29	-7	-5	5	558	562	9	2	-1	5	286	255	3	7	3	5	344	344	12
11	5	4	199	211	16	6	11	4	132	175	41	-6	-5	5	317	320	20	3	-1	5	628	654	6	8	3	5	650	630	8
-7	6	4	65	114	65	7	11	4	90	92	90	-5	-5	5	161	149	10	4	-1	5	1083	1107	10	9	3	5	364	356	7
-6	6	4	197	214	15	8	11	4	314	279	28	-4	-5	5	390	380	15	5	-1	5	426	446	5	10	3	5	86	71	74
-5	6	4	382	382	10	3	12	4	326	317	48	-3	-5	5	323	334	10	6	-1	5	340	328	4	11	3	5	351	338	10
-4	6	4	409	394	13	4	12	4	285	303	43	-2	-5	5	93	106	44	7	-1	5	710	721	8	-7	4	5	378	378	12
-3	6	4	0	43	1	5	12	4	123	89	70	-1	-5	5	598	618	18	8	-1	5	500	488	8	-6	4	5	330	318	10
-2	6	4	456	457	12	-4	-11	5	0	72	1	0	-5	5	531	534	8	9	-1	5	115	96	27	-5	4	5	0	81	1
-1	6	4	502	482	7	-3	-11	5	230	275	24	1	-5	5	63	70	17	10	-1	5	323	324	12	-4	4	5	306	286	9
0	6	4	253	270	14	-2	-11	5	299	322	20	2	-5	5	668	684	9	11	-1	5	399	358	13	-3	4	5	336	341	6
1	6	4	445	458	14	-1	-11	5	186	220	31	3	-5	5	769	780	10	-9	0	5	108	150	34	-2	4	5	66	43	14
2	6	4	810	819	7	0	-11	5	62	64	62	4	-5	5	291	294	18	-8	0	5	354	356	9	-1	4	5	686	706	6
3	6	4	216	238	6	1	-11	5	265	307	27	5	-5	5	227	258	7	-7	0	5	350	377	12	0	4	5	808	827	11
4	6	4	56	71	28	-6	-10	5	251	259	27	6	-5	5	612	591	25	-6	0	5	80	88	19	1	4	5	525	527	5
5	6	4	599	580	6	-5	-10	5	0	21	1	7	-5	5	462	453	19	-5	0	5	472	487	7	2	4	5	549	560	5
6	6	4	727	706	7	-4	-10	5	261	266	20	8	-5	5	0	4	1	-4	0	5	373	371	16	3	4	5	1035	1046	8
7	6	4	142	148	11	-3	-10	5	272	306	13	9	-5	5	245	269	18	-3	0	5	99	90	15	4	4	5	1002	1012	9
8	6	4	350	344	7	-2	-10	5	117	154	30	-9	-4	5	342	362	11	-2	0	5	540	544	6	5	4	5	317	320	6
9	6	4	432	422	13	-1	-10	5	185	222	29	-8	-4	5	315	335	31	-1	0	5	991	984	9	6	4	5	494	481	5
10	6	4	130	119	29	0	-10	5	380	377	17	-7	-4	5	111	81	17	0	0	5	131	140	5	7	4	5	534	534	5
11	6	4	213	180	24	1	-10	5	179	200	29	-6	-4	5	545	538	6	1	0	5	468	467	5	8	4	5	262	242	20
-6	7	4	389	400	16	2	-10	5	70	116	70	-5	-4	5	495	497	14	2	0	5	1166	1190	9	9	4	5	254	255	13
-5	7	4	235	226	40	3	-10	5	282	284	24	-4	-4	5	186	200	7	3	0	5	1343	1355	14	10	4	5	415	406	12
-4	7	4	135	131	25	-7	-9	5	119	174	40	-3	-4	5	322	340	4	4	0	5	71	113	8	11	4	5	313	317	19
-3	7	4	371	374	10	-6	-9	5	117	134	37	-2	-4	5	892	877	9	5	0	5	519	524	4	-7	5	5	138	125	23
-2	7	4	399	411	11	-5	-9	5	361	377	13	-1	-4	5	107	114	16	6	0	5	614	637	6	-6	5	5	174	159	16
-1	7	4	87	75	25	-4	-9	5	258	240	17	0	-4	5	660	656	7	7	0	5	454	455	7	-5	5	5	475	386	10
0	7	4	392	374	10	-3	-9	5	42	58	42	1	-4	5	1046	1071	16	8	0	5	382	401	6	-4	5	5	306	255	14
1	7	4	358	374	7	-2	-9	5	277	281	11	2	-4	5	1103	1088	8	9	0	5	431	435	8	-3	5	5	201	159	11
2	7	4	76	81	37	-1	-9	5	399	418	9	3	-4	5	210	226	15	10	0	5	256	263	12	-2	5	5	603	503	21

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
3	7	4	564	558	13	0	-9	5	85	74	85	4	-4	5	446	447	8	11	0	5	0	54	1	-1	5	5	477	386	5
4	7	4	657	642	11	1	-9	5	334	341	18	5	-4	5	609	614	9	-9	1	5	350	327	75	0	5	5	127	106	12
5	7	4	359	351	11	2	-9	5	358	386	16	6	-4	5	417	430	8	-8	1	5	161	179	24	1	5	5	798	636	12
6	7	4	136	148	12	3	-9	5	262	265	22	7	-4	5	81	97	81	-7	1	5	236	248	9	2	5	5	1469	1239	29
7	7	4	546	542	7	4	-9	5	104	102	88	8	-4	5	360	336	25	-6	1	5	486	491	14	3	5	5	509	454	11
8	7	4	407	393	6	5	-9	5	265	298	29	9	-4	5	249	232	23	-5	1	5	414	422	9	4	5	5	114	95	9
9	7	4	64	17	64	-8	-8	5	175	27	81	-9	-3	5	0	33	1	-4	1	5	122	125	8	5	5	5	642	522	7
10	7	4	193	210	36	-7	-8	5	222	222	18	-8	-3	5	196	194	10	-3	1	5	722	718	8	6	5	5	885	751	7
11	7	4	311	325	18	-6	-8	5	361	318	16	-7	-3	5	484	490	6	-2	1	5	629	633	5	7	5	5	158	147	14
-5	8	4	225	210	29	-5	-8	5	244	181	13	-6	-3	5	431	440	8	-1	1	5	64	63	9	8	5	5	312	279	7
-4	8	4	326	305	25	-4	-8	5	355	359	10	-5	-3	5	198	214	6	0	1	5	1014	1025	9	9	5	5	379	303	13
-3	8	4	122	92	28	-3	-8	5	439	388	9	-4	-3	5	683	692	6	1	1	5	1622	1628	12	10	5	5	104	99	103
-2	8	4	162	163	18	-2	-8	5	425	140	9	-3	-3	5	708	717	17	2	1	5	950	969	7	11	5	5	203	216	27
-1	8	4	362	353	13	-1	-8	5	273	262	9	-2	-3	5	160	165	4	3	1	5	70	58	11	-6	6	5	327	304	18
0	8	4	218	221	12	0	-8	5	839	784	12	-1	-3	5	719	728	13	4	1	5	1014	1025	8	-5	6	5	130	140	129
1	8	4	300	279	21	1	-8	5	741	597	16	0	-3	5	968	1004	25	5	1	5	531	555	5	-4	6	5	230	249	24
2	8	4	651	669	11	2	-8	5	435	157	14	1	-3	5	621	655	5	6	1	5	203	209	5	-3	6	5	575	562	10
3	8	4	638	636	7	3	-8	5	376	360	15	2	-3	5	234	222	5	7	1	5	134	112	9	-2	6	5	485	465	9
4	8	4	139	166	14	4	-8	5	557	521	16	3	-3	5	1242	1210	11	8	1	5	513	500	8	-1	6	5	87	103	86
5	8	4	487	478	7	5	-8	5	407	309	19	4	-3	5	866	881	9	9	1	5	85	37	21	0	6	5	484	479	23
6	8	4	618	607	11	6	-8	5	74	79	74	5	-3	5	207	239	6	10	1	5	298	297	8	1	6	5	762	741	16
7	8	4	436	443	8	-8	-7	5	374	381	20	6	-3	5	372	369	6	11	1	5	385	404	13	2	6	5	345	351	13
8	8	4	58	23	57	-7	-7	5	261	259	11	7	-3	5	496	482	14	-8	2	5	370	351	14	3	6	5	480	500	12
9	8	4	286	270	34	-6	-7	5	152	114	16	8	-3	5	157	155	23	-7	2	5	372	374	8	4	6	5	464	456	6
10	8	4	239	249	13	-5	-7	5	425	409	10	9	-3	5	197	182	23	-6	2	5	104	99	20	5	6	5	337	348	6
-4	9	4	85	41	84	-4	-7	5	587	569	10	10	-3	5	376	356	19	-5	2	5	310	326	18	6	6	5	175	167	13
-3	9	4	280	284	15	-3	-7	5	0	22	1	-9	-2	5	339	371	12	-4	2	5	756	751	12	7	6	5	430	425	6
-2	9	4	289	279	13	-2	-7	5	415	419	8	-8	-2	5	445	448	8	-3	2	5	514	516	6	8	6	5	239	248	8
-1	9	4	89	43	89	-1	-7	5	659	669	10	-7	-2	5	122	146	12	-2	2	5	240	243	4	9	6	5	84	115	84
0	9	4	350	321	15	0	-7	5	420	414	8	-6	-2	5	523	534	6	-1	2	5	893	886	12	10	6	5	391	376	12
1	9	4	483	472	10	1	-7	5	203	239	14	-5	-2	5	596	593	7	0	2	5	1037	1036	8	11	6	5	356	360	14
2	9	4	305	318	21	2	-7	5	627	600	14	-4	-2	5	590	614	7	1	2	5	291	287	5	-5	7	5	149	200	21
3	9	4	144	142	16	3	-7	5	653	673	15	-3	-2	5	190	189	5	2	2	5	744	743	7	-4	7	5	383	372	11
4	9	4	420	419	17	4	-7	5	170	176	25	-2	-2	5	1076	1066	11	3	2	5	987	968	8	-3	7	5	139	133	32
5	9	4	492	508	25	5	-7	5	171	179	25	-1	-2	5	748	776	13	4	2	5	775	782	9	-2	7	5	290	284	29
6	9	4	101	101	23	6	-7	5	292	326	18	0	-2	5	445	435	11	5	2	5	72	63	9	-1	7	5	456	466	10
7	9	4	177	141	31	7	-7	5	0	74	1	1	-2	5	685	715	14	6	2	5	657	652	5	0	7	5	285	305	17
8	9	4	289	289	10	-9	-6	5	313	325	11	2	-2	5	795	823	15	7	2	5	418	426	9	1	7	5	210	228	10
9	9	4	68	162	67	-8	-6	5	58	80	58	3	-2	5	653	657	12	8	2	5	57	66	33	2	7	5	580	579	20
10	9	4	152	157	26	-7	-6	5	276	270	21	4	-2	5	353	360	4	9	2	5	465	470	20	3	7	5	516	521	8
4	7	5	188	187	10	1	-8	6	288	277	15	2	-3	6	1099	1113	12	8	1	6	30	24	30	0	6	6	512	429	24
5	7	5	361	361	7	2	-8	6	540	540	15	3	-3	6	576	589	13	9	1	6	499	492	9	1	6	6	84	100	17
6	7	5	627	624	7	3	-8	6	444	443	17	4	-3	6	120	132	13	10	1	6	413	399	34	2	6	6	790	653	23
7	7	5	194	188	11	4	-8	6	0	117	1	5	-3	6	399	386	5	11	1	6	161	157	29	3	6	6	672	564	7
8	7	5	150	144	43	5	-8	6	268	256	21	6	-3	6	382	376	9	-8	2	6	212	238	16	4	6	6	232	221	7
9	7	5	451	421	17	6	-8	6	336	321	22	7	-3	6	33	68	33	-7	2	6	106	72	30	5	6	6	271	239	7
10	7	5	358	348	18	-8	-7	6	83	75	83	8	-3	6	380	361	15	-6	2	6	394	396	8	6	6	6	642	545	6
11	7	5	0	24	1	-7	-7	6	158	200	46	9	-3	6	373	369	12	-5	2	6	488	495	7	7	6	6	118	87	14
-4	8	5	74	20	73	-6	-7	6	406	355	9	10	-3	6	0	62	1	-4	2	6	52	31	30	8	6	6	257	250	8
-3	8	5	270	266	40	-5	-7	6	319	159	16	-9	-2	6	193	161	65	-3	2	6	521	509	6	9	6	6	518	459	9
-2	8	5	256	272	14	-4	-7	6	279	293	14	-8	-2	6	69	40	68	-2	2	6	904	876	8	10	6	6	278	259	15
-1	8	5	83	65	47	-3	-7	6	636	561	10	-7	-2	6	332	345	19	-1	2	6	770	765	7	11	6	6	53	7	52
0	8	5	289	302	16	-2	-7	6	583	421	9	-6	-2	6	510	499	7	0	2	6	467	477	8	-5	7	6	151	187	28
1	8	5	584	562	10	-1	-7	6	430	98	9	-5	-2	6	188	193	7	1	2	6	1016	1001	9	-4	7	6	123	62	80
2	8	5	268	249	9	0	-7	6	742	728	10	-4	-2	6	379	394	5	2	2	6	1043	1065	8	-3	7	6	370	372	15
3	8	5	245	250	9	1	-7	6	832	706	17	-3	-2	6	851	857	9	3	2	6	281	305	9	-2	7	6	407	387	10
4	8	5	554	538	9	2	-7	6	635	467	15	-2	-2	6	684	696	7	4	2	6	624	625	16	-1	7	6	76	79	48
5	8	5	573	549	7	3	-7	6	189	68	19	-1	-2	6	568	560	9	5	2	6	567	581	6	0	7	6	364	354	8
6	8	5	0	9	1	4	-7	6	536	502	14	0	-2	6	1068	1069	11	6	2	6	331	329	4	1	7	6	579	551	8
7	8	5	376	367	7	5	-7	6	390	305	17	1	-2	6	949	946	12	7	2	6	274	285	15	2	7	6	479	475	6
8	8	5	429	407	8	6	-7	6	125	32	41	2	-2	6	464	472	4	8	2	6	645	619	17	3	7	6	178	199	9
9	8	5	148	161	47	7	-7	6	158	248	41	3	-2	6	468	462	5	9	2	6	230	223	16	4	7	6	404	398	6
10	8	5	103	121	37	-8	-6	6	341	361	16	4	-2	6	693	687	9	10	2	6	86	120	39	5	7	6	299	304	21
-3	9	5	79	72	78	-7	-6	6	388	381	9	5	-2	6	201	217	5	11	2	6	329	336	16	6	7	6	0	79	1
-2	9	5	94	74	93	-6	-6	6	118	97	20	6	-2	6	217	209	7	-8	3	6	255	247	16	7	7	6	674	671	8
-1	9	5	425	423	11	-5	-6	6	360	352	9	7	-2	6	703	696	11	-7	3	6	383	396	24	8	7	6	431	430	8
0	9	5	352	363	16	-4	-6	6	563	572	13	8	-2	6	332	306	7	-6	3	6	263	258	11	9	7	6	42	102	42
1	9	5	104	78	40	-3	-6	6	277	271	7	9	-2	6	122	148	23	-5	3	6	61	63	60	10	7	6	222	223	59
2	9	5	377	367	11	-2	-6	6	139	117	10	10	-2	6	391	386	18	-4	3	6	484	485	13	11	7	6	422	411	15
3	9	5	643	635	19	-1	-6	6	506	501	8	-9	-1	6	235	235	18	-3	3	6	592	600	6	-4	8	6	153	212	30
4	9	5	347	359	8	0	-6	6	682	684	10	-8	-1	6	379	403	25	-2	3	6	45	77	31	-3	8	6	148	124	40
5	9	5	88	36	87	1	-6	6	43	61	42	-7	-1	6	419	425	10	-1	3	6	559	569	9	-2	8	6	219	191	16
6	9	5	262	269	12	2	-6	6	425	388	12	-6	-1	6	70	57	25	0	3	6	920	931	11	-1	8	6	469	437	10
7	9	5	266	268	14	3	-6	6	458	455	12	-5	-1	6	621	611	8	1	3	6	476	488	5	0	8	6	328	319	31
8	9	5	101	41	32	4	-6	6	131	155	24	-4	-1	6	361	383	5	2	3	6	143	152	7	1	8	6	62	68	61
9	9	5	230	247	33	5	-6	6	254	233	15	-3	-1	6	131	127	6	3	3	6	593	590	14	2	8	6	459	465	13
10	9	5	222	229	25	6	-6	6	386	387	10	-2	-1	6	600	619	6	4	3	6	693	690	14	3	8	6	651	641	7
-2	10	5	209	250	27	7	-6	6	289	277	20	-1	-1	6	952	934	10	5	3	6	213	213	7	4	8	6	175	178	25
-1	10	5	248	261	17	8	-6	6	135	76	65	0	-1	6	385	414	4	6	3	6	569	559	7	5	8	6	170	149	21

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
0	10	5	135	115	55	-9	-5	6	372	360	13	1	-1	6	235	249	6	7	3	6	760	749	6	6	8	6	396	383	7
1	10	5	387	364	12	-8	-5	6	252	290	14	2	-1	6	833	851	6	8	3	6	258	273	8	7	8	6	356	359	21
2	10	5	348	318	29	-7	-5	6	0	15	1	3	-1	6	696	727	12	9	3	6	449	438	18	8	8	6	96	25	96
3	10	5	57	120	57	-6	-5	6	329	342	10	4	-1	6	99	80	7	10	3	6	485	486	9	9	8	6	337	332	15
4	10	5	180	177	19	-5	-5	6	484	481	10	5	-1	6	554	560	8	11	3	6	386	381	14	10	8	6	399	378	12
5	10	5	245	260	17	-4	-5	6	198	226	21	6	-1	6	447	457	9	-7	4	6	188	167	34	-3	9	6	230	205	20
6	10	5	167	183	16	-3	-5	6	508	500	9	7	-1	6	160	150	5	-6	4	6	54	101	53	-2	9	6	296	276	16
7	10	5	90	81	39	-2	-5	6	712	707	8	8	-1	6	500	506	7	-5	4	6	373	374	10	-1	9	6	149	124	25
8	10	5	245	259	19	-1	-5	6	348	365	5	9	-1	6	581	560	10	-4	4	6	248	254	11	0	9	6	228	231	15
9	10	5	0	136	1	0	-5	6	207	213	7	10	-1	6	364	358	12	-3	4	6	215	222	12	1	9	6	526	502	11
0	11	5	252	270	19	1	-5	6	716	712	8	11	-1	6	97	22	57	-2	4	6	536	540	8	2	9	6	407	431	13
1	11	5	175	183	53	2	-5	6	490	488	6	-9	0	6	314	332	34	-1	4	6	327	322	5	3	9	6	90	41	90
2	11	5	41	18	40	3	-5	6	58	81	23	-8	0	6	163	187	19	0	4	6	81	110	12	4	9	6	278	278	9
3	11	5	228	248	20	4	-5	6	422	442	8	-7	0	6	149	143	13	1	4	6	754	754	9	5	9	6	450	435	9
4	11	5	246	273	46	5	-5	6	470	464	8	-6	0	6	398	392	7	2	4	6	1114	1135	10	6	9	6	166	187	49
5	11	5	41	45	41	6	-5	6	144	129	38	-5	0	6	337	350	14	3	4	6	388	403	7	7	9	6	182	181	15
6	11	5	190	228	33	7	-5	6	327	327	15	-4	0	6	47	31	30	4	4	6	288	292	5	8	9	6	319	321	11
7	11	5	222	231	16	8	-5	6	422	403	15	-3	0	6	620	625	7	5	4	6	828	811	12	9	9	6	250	242	14
-2	11	6	0	13	1	-9	-4	6	57	133	56	-2	0	6	514	515	6	6	4	6	522	514	7	10	9	6	0	70	1
-1	11	6	205	266	34	-8	-4	6	188	187	17	-1	0	6	224	215	4	7	4	6	123	133	10	-1	10	6	239	243	28
-5	10	6	304	336	22	-7	-4	6	399	398	10	0	0	6	756	764	12	8	4	6	500	486	8	0	10	6	375	375	18
-4	10	6	157	196	35	-6	-4	6	408	404	17	1	0	6	1419	1389	11	9	4	6	553	536	23	1	10	6	249	280	18
-3	10	6	147	146	33	-5	-4	6	43	83	42	2	0	6	712	704	13	10	4	6	267	247	13	2	10	6	79	54	78
-2	10	6	308	337	13	-4	-4	6	384	383	8	3	0	6	145	142	15	11	4	6	172	152	22	3	10	6	278	287	17
-1	10	6	375	361	17	-3	-4	6	310	329	9	4	0	6	1046	1054	9	-6	5	6	188	211	27	4	10	6	303	314	14
0	10	6	105	80	59	-2	-4	6	140	154	32	5	0	6	627	652	7	-5	5	6	74	96	74	5	10	6	115	139	27
1	10	6	216	228	26	-1	-4	6	804	797	11	6	0	6	64	25	63	-4	5	6	314	315	23	6	10	6	153	192	19
2	10	6	250	279	25	0	-4	6	831	840	7	7	0	6	294	297	8	-3	5	6	522	519	8	7	10	6	177	174	46
3	10	6	205	145	37	1	-4	6	446	457	10	8	0	6	628	618	8	-2	5	6	302	288	7	8	10	6	80	36	75
-6	-9	6	217	279	28	2	-4	6	278	280	11	9	0	6	174	154	14	-1	5	6	243	240	7	9	10	6	147	180	26
-5	-9	6	147	134	31	3	-4	6	816	805	7	10	0	6	242	249	14	0	5	6	688	685	12	1	11	6	132	192	57
-4	-9	6	162	163	28	4	-4	6	781	784	7	11	0	6	342	331	13	1	5	6	865	863	22	2	11	6	235	251	19
-3	-9	6	299	319	16	5	-4	6	0	37	1	-8	1	6	269	260	13	2	5	6	182	188	6	3	11	6	175	177	58
-2	-9	6	98	104	31	6	-4	6	488	465	7	-7	1	6	368	378	10	3	5	6	576	595	6	4	11	6	106	123	49
-1	-9	6	118	146	22	7	-4	6	442	426	7	-6	1	6	88	87	21	4	5	6	683	676	7	5	11	6	216	239	35
0	-9	6	482	483	15	8	-4	6	132	149	22	-5	1	6	401	404	24	5	5	6	432	433	5	6	11	6	187	183	20
1	-9	6	386	398	15	9	-4	6	120	132	33	-4	1	6	468	467	6	6	5	6	119	121	10	7	11	6	0	78	1
2	-9	6	0	31	1	-9	-3	6	221	236	40	-3	1	6	291	291	6	7	5	6	435	453	5	-4	-10	7	250	249	24
3	-9	6	243	220	23	-8	-3	6	308	314	38	-2	1	6	542	552	5	8	5	6	340	344	7	-3	-10	7	359	379	18
4	-9	6	373	376	18	-7	-3	6	0	77	1	-1	1	6	1281	1254	11	9	5	6	70	75	34	-2	-10	7	190	218	29
-7	-8	6	240	233	17	-6	-3	6	384	396	6	0	1	6	890	883	8	10	5	6	402	377	12	-1	-10	7	0	84	1
-6	-8	6	0	18	1	-5	-3	6	581	582	7	1	1	6	312	304	4	11	5	6	393	399	12	0	-10	7	385	353	19
-5	-8	6	277	276	18	-4	-3	6	246	260	5	2	1	6	801	802	6	-6	6	6	153	121	22	1	-10	7	247	244	24
-4	-8	6	345	325	15	-3	-3	6	358	354	11	3	1	6	1067	1074	8	-5	6	6	347	261	14	2	-10	7	0	67	1
-3	-8	6	94	108	28	-2	-3	6	979	996	9	4	1	6	980	973	8	-4	6	6	415	347	13	-6	-9	7	0	19	1
-2	-8	6	440	441	9	-1	-3	6	1041	1057	10	5	1	6	125	117	21	-3	6	6	0	20	1	-5	-9	7	288	323	22
-1	-8	6	528	546	9	0	-3	6	0	69	1	6	1	6	513	519	7	-2	6	6	681	537	13	-4	-9	7	266	287	20
0	-8	6	189	164	21	1	-3	6	685	694	6	7	1	6	305	308	7	-1	6	6	1101	869	34	-3	-9	7	86	79	86
-2	-9	7	289	310	11	-7	-3	7	300	315	11	2	1	7	1076	1057	8	-4	6	7	232	262	15	-5	-8	8	255	266	23
-1	-9	7	374	393	15	-6	-3	7	221	244	10	3	1	7	82	101	11	-3	6	7	544	525	12	-4	-8	8	369	391	18
0	-9	7	91	162	66	-5	-3	7	149	176	12	4	1	7	594	590	6	-2	6	7	483	477	14	-3	-8	8	136	161	34
1	-9	7	181	170	25	-4	-3	7	663	658	10	5	1	7	762	777	7	-1	6	7	0	84	1	-2	-8	8	211	221	12
2	-9	7	332	330	18	-3	-3	7	752	734	11	6	1	7	293	304	6	0	6	7	453	436	7	-1	-8	8	415	409	10
3	-9	7	212	225	26	-2	-3	7	195	224	7	7	1	7	189	193	10	1	6	7	685	664	9	0	-8	8	303	313	16
4	-9	7	0	33	1	-1	-3	7	523	520	6	8	1	7	745	723	9	2	6	7	484	494	6	1	-8	8	60	105	60
-7	-8	7	171	159	35	0	-3	7	1046	1057	11	9	1	7	350	346	9	3	6	7	223	211	7	2	-8	8	398	407	15
-6	-8	7	266	261	20	1	-3	7	920	942	14	10	1	7	91	84	85	4	6	7	324	339	9	3	-8	8	353	383	16
-5	-8	7	191	153	26	2	-3	7	138	160	26	11	1	7	281	265	15	5	6	7	377	368	6	4	-8	8	0	91	1
-4	-8	7	240	245	17	3	-3	7	690	677	7	-8	2	7	158	205	24	6	6	7	121	131	15	5	-8	8	234	295	25
-3	-8	7	397	395	15	4	-3	7	773	766	8	-7	2	7	318	322	13	7	6	7	568	559	10	-7	-7	8	145	135	44
-2	-8	7	272	273	10	5	-3	7	343	356	6	-6	2	7	65	89	65	8	6	7	440	446	9	-6	-7	8	299	328	21
-1	-8	7	0	3	1	6	-3	7	211	215	11	-5	2	7	246	253	9	9	6	7	104	122	33	-5	-7	8	259	221	21
0	-8	7	522	455	14	7	-3	7	525	513	7	-4	2	7	741	752	7	10	6	7	229	250	32	-4	-7	8	207	191	21
1	-8	7	513	510	15	8	-3	7	334	325	8	-3	2	7	674	669	6	11	6	7	367	364	27	-3	-7	8	530	493	16
2	-8	7	220	231	18	9	-3	7	113	26	31	-2	2	7	83	91	14	-4	7	7	411	348	33	-2	-7	8	604	578	10
3	-8	7	256	202	19	10	-3	7	361	327	14	-1	2	7	784	777	8	-3	7	7	170	145	19	-1	-7	8	231	254	10
4	-8	7	439	427	16	-8	-2	7	292	286	22	0	2	7	1094	1095	10	-2	7	7	340	306	31	0	-7	8	209	211	10
5	-8	7	238	275	24	-7	-2	7	192	195	32	1	2	7	562	567	5	-1	7	7	736	552	17	1	-7	8	520	514	43
-7	-7	7	275	250	21	-6	-2	7	183	202	11	2	2	7	239	231	5	0	7	7	617	498	18	2	-7	8	358	372	14
-6	-7	7	59	30	59	-5	-2	7	609	612	7	3	2	7	678	684	10	1	7	7	135	145	15	3	-7	8	61	67	61
-5	-7	7	339	306	16	-4	-2	7	434	450	6	4	2	7	622	637	6	2	7	7	388	323	22	4	-7	8	364	347	16
-4	-7	7	514	505	15	-3	-2	7	0	5	1	5	2	7	183	179	7	3	7	7	635	525	15	5	-7	8	454	398	16
-3	-7	7	104	127	37	-2	-2	7	821	825	18	6	2	7	637	648	6	4	7	7	57	46	56	6	-7	8	70	81	70
-2	-7	7	349	345	9	-1	-2	7	1262	1256	24	7	2	7	585	583	7	5	7	7	281	230	12	-7	-6	8	292	262	43
-1	-7	7	554	549	9	0	-2	7	733	729	8	8	2	7	290	280	9	6	7	7	545	451	15	-6	-6	8	104	68	39
0	-7	7	690	674	10	1	-2	7	124	116	14	9	2	7	474	451	8	7	7	7	262	238	9	-5	-6	8	292	261	17
1	-7	7	87	36	27	2	-2	7	625	634	5	10	2	7	515	494	11	8	7	7	197	219	15	-4	-6	8	638	621	16
2	-7	7	444	435	14	3	-2	7	524	553	6	11	2	7	268	248	45	9	7	7	462	437	12	-3	-6	8	565	514	15
3	-7	7	385	388	14	4	-2	7	113	111	6	-7	3	7	62	56	61	10	7	7	489	442	15	-2	-6	8	38	62	38

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
4	-7	7	204	217	19	5	-2	7	543	537	6	-6	3	7	271	287	10	11	7	7	164	135	67	-1	-6	8	485	471	8
5	-7	7	191	194	24	6	-2	7	474	472	5	-5	3	7	444	415	11	-3	8	7	206	187	21	0	-6	8	722	750	11
6	-7	7	351	349	17	7	-2	7	44	27	43	-4	3	7	237	240	15	-2	8	7	291	262	18	1	-6	8	205	209	23
7	-7	7	139	161	43	8	-2	7	409	415	7	-3	3	7	264	270	7	-1	8	7	106	86	35	2	-6	8	148	166	14
-8	-6	7	128	87	33	9	-2	7	520	520	10	-2	3	7	814	797	14	0	8	7	188	212	28	4	-6	8	233	220	17
-7	-6	7	167	170	24	10	-2	7	367	333	13	-1	3	7	657	647	6	1	8	7	383	359	15	5	-6	8	180	149	19
-6	-6	7	454	391	15	-8	-1	7	16	33	16	0	3	7	204	217	5	2	8	7	307	308	9	6	-6	8	440	413	16
-5	-6	7	528	376	11	-7	-1	7	228	225	10	1	3	7	419	431	5	3	8	7	94	102	25	7	-6	8	328	352	20
-4	-6	7	234	50	15	-6	-1	7	473	474	13	2	3	7	707	711	6	4	8	7	482	474	9	-7	-5	8	160	5	22
-3	-6	7	654	620	15	-5	-1	7	301	299	7	3	3	7	198	204	8	5	8	7	465	436	8	-6	-5	8	409	400	11
-2	-6	7	792	724	11	-4	-1	7	241	237	6	4	3	7	405	406	8	6	8	7	76	89	38	-5	-5	8	611	512	11
-1	-6	7	776	503	11	-3	-1	7	685	684	8	5	3	7	926	910	11	7	8	7	388	400	12	-4	-5	8	507	340	18
0	-6	7	169	45	10	-2	-1	7	726	741	7	6	3	7	230	241	13	8	8	7	477	483	8	-3	-5	8	386	353	12
1	-6	7	550	528	9	-1	-1	7	64	48	12	7	3	7	408	404	6	9	8	7	350	346	16	-2	-5	8	719	651	10
2	-6	7	485	420	9	0	-1	7	759	734	8	8	3	7	641	626	7	10	8	7	0	21	1	-1	-5	8	652	541	10
3	-6	7	162	77	16	1	-1	7	856	833	6	9	3	7	740	707	9	-2	9	7	99	20	60	0	-5	8	473	361	6
4	-6	7	332	300	14	2	-1	7	601	598	5	10	3	7	209	194	20	-1	9	7	308	302	23	1	-5	8	531	516	8
5	-6	7	433	375	15	3	-1	7	149	161	5	11	3	7	196	199	31	0	9	7	391	378	12	2	-5	8	392	310	9
6	-6	7	165	54	29	4	-1	7	731	732	8	-7	4	7	265	281	13	1	9	7	196	176	26	3	-5	8	223	110	10
7	-6	7	362	332	18	5	-1	7	409	412	5	-6	4	7	302	282	14	2	9	7	167	178	24	4	-5	8	297	279	11
8	-6	7	364	304	20	6	-1	7	171	184	5	-5	4	7	93	65	33	3	9	7	454	423	9	5	-5	8	657	603	17
-8	-5	7	208	224	24	7	-1	7	673	678	8	-4	4	7	341	343	17	4	9	7	229	233	27	6	-5	8	351	249	11
-7	-5	7	423	397	13	8	-1	7	594	586	16	-3	4	7	470	466	9	5	9	7	77	16	76	7	-5	8	262	207	19
-6	-5	7	288	273	12	9	-1	7	154	162	24	-2	4	7	256	262	7	6	9	7	248	259	14	8	-5	8	437	427	12
-5	-5	7	176	164	22	10	-1	7	199	242	17	-1	4	7	273	269	5	7	9	7	382	370	9	-8	-4	8	40	84	40
-4	-5	7	553	513	26	11	-1	7	356	345	20	0	4	7	737	728	10	8	9	7	23	51	22	-7	-4	8	342	313	13
-3	-5	7	575	542	23	-8	0	7	261	265	13	1	4	7	543	549	6	9	9	7	138	146	44	-6	-4	8	383	330	10
-2	-5	7	11	36	11	-7	0	7	387	415	23	2	4	7	47	29	24	-1	10	7	261	260	19	-5	-4	8	87	31	29
-1	-5	7	452	459	7	-6	0	7	137	172	15	3	4	7	594	592	5	0	10	7	75	26	74	-4	-4	8	482	473	10
0	-5	7	748	762	10	-5	0	7	478	498	10	4	4	7	598	570	5	1	10	7	206	213	33	-3	-4	8	588	601	10
1	-5	7	212	222	8	-4	0	7	402	400	6	5	4	7	0	45	1	2	10	7	383	360	19	-2	-4	8	91	57	15
2	-5	7	145	106	11	-3	0	7	383	392	5	6	4	7	423	428	20	3	10	7	166	181	24	-1	-4	8	425	419	6
3	-5	7	414	421	9	-2	0	7	322	327	5	7	4	7	776	751	16	4	10	7	141	137	25	0	-4	8	654	675	10
4	-5	7	341	350	8	-1	0	7	1037	1037	22	8	4	7	515	496	20	5	10	7	276	269	15	1	-4	8	712	706	7
5	-5	7	264	290	14	0	0	7	466	493	5	9	4	7	60	71	60	6	10	7	267	252	12	2	-4	8	272	273	6
6	-5	7	508	477	14	1	0	7	40	15	40	10	4	7	408	402	21	7	10	7	0	30	1	3	-4	8	684	691	11
7	-5	7	534	509	15	2	0	7	724	746	7	11	4	7	449	443	22	8	10	7	290	286	13	4	-4	8	651	652	12
8	-5	7	0	87	1	3	0	7	964	997	8	-6	5	7	165	125	19	2	11	7	83	71	83	5	-4	8	167	139	17
-8	-4	7	307	322	30	4	0	7	320	330	13	-5	5	7	281	275	37	3	11	7	0	138	1	6	-4	8	471	440	9
-7	-4	7	118	111	22	5	0	7	685	684	9	-4	5	7	277	277	21	4	11	7	149	174	80	7	-4	8	535	533	13
-6	-4	7	251	222	12	6	0	7	716	714	17	-3	5	7	112	76	20	5	11	7	0	26	1	8	-4	8	351	338	14
-5	-4	7	543	531	13	7	0	7	547	546	11	-2	5	7	586	567	14	6	11	7	179	206	25	9	-4	8	85	45	44
-4	-4	7	170	206	11	8	0	7	74	93	27	-1	5	7	778	735	8	7	11	7	257	271	22	-8	-3	8	214	247	16
-3	-4	7	303	307	12	9	0	7	458	443	14	0	5	7	305	320	13	-1	-10	8	358	384	20	-7	-3	8	94	62	56
-2	-4	7	752	727	8	10	0	7	458	458	16	1	5	7	359	368	6	0	-10	8	229	229	23	-6	-3	8	275	251	24
-1	-4	7	731	729	7	11	0	7	265	236	23	2	5	7	843	826	28	1	-10	8	186	85	28	-5	-3	8	478	478	13
0	-4	7	124	131	7	-8	1	7	170	172	22	3	5	7	634	630	7	-5	-9	8	140	194	48	-4	-3	8	366	369	9
1	-4	7	798	779	8	-7	1	7	86	59	49	4	5	7	0	66	1	-4	-9	8	182	164	29	-3	-3	8	50	46	49
2	-4	7	772	781	13	-6	1	7	340	351	12	5	5	7	590	585	11	-3	-9	8	410	389	18	-2	-3	8	648	643	10
3	-4	7	361	384	15	-5	1	7	357	374	6	6	5	7	546	537	8	-2	-9	8	274	301	19	-1	-3	8	837	845	9
4	-4	7	196	210	10	-4	1	7	265	296	7	7	5	7	281	280	6	-1	-9	8	0	33	1	0	-3	8	264	276	11
5	-4	7	591	579	12	-3	1	7	452	454	5	8	5	7	338	347	12	0	-9	8	207	230	24	1	-3	8	502	512	6
6	-4	7	307	311	11	-2	1	7	947	933	9	9	5	7	528	506	9	1	-9	8	278	302	19	2	-3	8	779	767	7
7	-4	7	0	79	1	-1	1	7	601	610	9	10	5	7	205	196	20	2	-9	8	0	79	1	3	-3	8	511	535	18
8	-4	7	516	503	11	0	1	7	597	582	7	11	5	7	0	26	1	3	-9	8	190	224	34	4	-3	8	153	153	10
-8	-3	7	0	23	1	1	1	7	1157	1142	9	-5	6	7	135	65	72	-6	-8	8	0	21	1	5	-3	8	713	699	8
6	-3	8	582	575	12	0	2	8	17	57	17	1	7	8	306	325	15	5	-6	9	503	464	15	9	-1	9	223	239	15
7	-3	8	204	220	11	1	2	8	414	417	5	2	7	8	306	307	6	6	-6	9	232	238	21	10	-1	9	124	68	32
8	-3	8	320	323	11	2	2	8	646	655	6	3	7	8	0	48	1	7	-6	9	135	150	38	-7	0	9	238	297	21
9	-3	8	392	387	11	3	2	8	245	258	18	4	7	8	460	449	7	-7	-5	9	282	284	15	-6	0	9	204	195	17
-8	-2	8	0	24	1	4	2	8	446	452	5	5	7	8	317	324	8	-6	-5	9	301	325	18	-5	0	9	218	248	10
-7	-2	8	274	271	11	5	2	8	814	803	7	6	7	8	57	62	56	-5	-5	9	113	57	31	-4	0	9	565	547	7
-6	-2	8	333	342	11	6	2	8	266	272	7	7	7	8	386	385	8	-4	-5	9	473	440	14	-3	0	9	416	411	5
-5	-2	8	72	90	33	7	2	8	221	226	7	8	7	8	537	525	18	-3	-5	9	613	601	16	-2	0	9	123	152	10
-4	-2	8	534	561	15	8	2	8	554	565	10	9	7	8	268	270	15	-2	-5	9	259	224	14	-1	0	9	358	357	7
-3	-2	8	866	868	11	9	2	8	547	516	8	10	7	8	128	61	30	-1	-5	9	218	216	8	0	0	9	437	449	8
-2	-2	8	721	740	10	10	2	8	100	60	28	-3	8	8	325	248	15	0	-5	9	456	468	7	1	0	9	93	97	9
-1	-2	8	0	25	1	-7	3	8	241	253	20	-2	8	8	92	68	57	1	-5	9	413	410	9	2	0	9	623	625	18
0	-2	8	780	759	7	-6	3	8	259	280	14	-1	8	8	224	195	17	2	-5	9	237	208	27	3	0	9	828	812	10
1	-2	8	726	738	16	-5	3	8	84	51	62	0	8	8	417	321	16	3	-5	9	558	546	37	4	0	9	460	462	6
2	-2	8	230	254	5	-4	3	8	543	552	7	1	8	8	125	81	24	4	-5	9	458	431	27	5	0	9	466	479	8
3	-2	8	241	261	5	-3	3	8	569	555	9	2	8	8	269	227	10	5	-5	9	84	15	46	6	0	9	778	789	14
4	-2	8	640	645	7	-2	3	8	466	464	6	3	8	8	531	436	8	6	-5	9	442	418	10	7	0	9	729	722	9
5	-2	8	418	428	6	-1	3	8	244	241	6	4	8	8	109	90	29	7	-5	9	484	469	16	8	0	9	229	216	15
6	-2	8	199	197	14	0	3	8	719	716	7	5	8	8	194	157	20	8	-5	9	194	194	26	10	0	9	305	327	14
7	-2	8	601	580	11	1	3	8	364	355	6	6	8	8	498	418	21	-7	-4	9	136	89	29	-7	1	9	40	76	39
8	-2	8	512	504	9	2	3	8	0	19	1	7	8	8	516	447	15	-6	-4	9	197	190	17	-6	1	9	297	311	18
9	-2	8	69	29	46	3	3	8	477	483	11	8	8	8	0	49	1	-5	-4	9	459	446	10	-5	1	9	388	393	8
10	-2	8	136	160	29	4	3	8	383	392	19	9	8	8	220	219	44	-4	-4	9	506	385	8	-4	1	9	102	73	102

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
-8	-1	8	293	300	15	5	3	8	116	131	10	10	8	8	360	323	14	-3	-4	9	135	24	16	-3	1	9	282	273	13
-7	-1	8	334	344	12	6	3	8	683	700	8	-1	9	8	175	153	25	-2	-4	9	400	382	7	-2	1	9	654	646	6
-6	-1	8	0	15	1	7	3	8	757	741	12	0	9	8	128	46	35	-1	-4	9	453	403	8	-1	1	9	549	550	6
-5	-1	8	445	446	8	8	3	8	446	434	6	1	9	8	238	251	17	0	-4	9	324	51	20	0	1	9	238	248	6
-4	-1	8	613	619	7	9	3	8	165	163	15	2	9	8	303	281	13	1	-4	9	554	543	10	1	1	9	596	599	6
-3	-1	8	372	376	6	10	3	8	400	389	9	3	9	8	61	61	61	2	-4	9	650	564	7	2	1	9	513	531	11
-2	-1	8	212	213	15	11	3	8	310	310	14	4	9	8	324	335	9	3	-4	9	478	275	10	3	1	9	49	20	49
-1	-1	8	698	686	7	-6	4	8	173	145	24	5	9	8	409	392	9	4	-4	9	329	286	16	4	1	9	632	656	18
0	-1	8	606	619	8	-5	4	8	304	304	14	6	9	8	365	376	9	5	-4	9	714	674	14	5	1	9	819	820	9
1	-1	8	37	35	37	-4	4	8	367	344	11	7	9	8	83	13	56	6	-4	9	625	548	11	6	1	9	465	472	7
2	-1	8	491	499	8	-3	4	8	85	56	27	8	9	8	360	354	10	7	-4	9	212	161	14	7	1	9	39	44	38
3	-1	8	620	641	11	-2	4	8	416	403	7	9	9	8	262	268	34	8	-4	9	329	317	17	8	1	9	535	514	10
4	-1	8	154	162	7	-1	4	8	470	463	5	0	10	8	285	259	18	9	-4	9	354	346	17	9	1	9	388	385	12
5	-1	8	688	712	7	0	4	8	337	340	5	1	10	8	279	232	24	-7	-3	9	264	262	20	10	1	9	0	57	1
6	-1	8	767	775	11	1	4	8	310	318	11	2	10	8	69	50	68	-6	-3	9	372	329	11	11	1	9	206	217	34
7	-1	8	401	392	7	2	4	8	593	580	6	3	10	8	235	218	19	-5	-3	9	97	66	35	-6	2	9	237	211	49
8	-1	8	248	235	14	3	4	8	333	358	5	4	10	8	288	264	14	-4	-3	9	308	308	11	-5	2	9	58	99	58
9	-1	8	511	480	10	4	4	8	259	257	5	5	10	8	52	51	52	-3	-3	9	613	620	14	-4	2	9	526	538	8
10	-1	8	513	467	17	5	4	8	778	759	16	6	10	8	190	206	18	-2	-3	9	350	350	18	-3	2	9	450	451	6
-8	0	8	115	95	40	6	4	8	541	539	6	7	10	8	247	269	14	-1	-3	9	195	181	12	-2	2	9	285	298	6
-7	0	8	129	132	20	7	4	8	108	95	62	8	10	8	115	149	36	0	-3	9	598	585	6	-1	2	9	414	415	6
-6	0	8	476	485	14	8	4	8	419	420	7	3	11	8	134	160	41	1	-3	9	751	778	8	0	2	9	770	763	8
-5	0	8	420	447	7	9	4	8	700	681	8	4	11	8	0	82	1	2	-3	9	248	257	7	1	2	9	397	409	5
-4	0	8	123	125	49	10	4	8	302	296	14	5	11	8	206	207	65	3	-3	9	552	554	7	2	2	9	129	130	8
-3	0	8	372	376	5	11	4	8	0	40	1	-3	-9	9	94	159	93	4	-3	9	821	822	14	3	2	9	635	636	6
-2	0	8	754	728	7	-5	5	8	0	63	1	-2	-9	9	152	151	34	5	-3	9	609	608	8	4	2	9	688	715	10
-1	0	8	344	358	5	-4	5	8	178	175	25	-1	-9	9	315	314	20	6	-3	9	175	161	16	5	2	9	161	169	9
0	0	8	374	373	8	-3	5	8	439	441	18	0	-9	9	197	211	25	7	-3	9	430	414	19	6	2	9	516	526	7
1	0	8	756	769	6	-2	5	8	398	396	8	1	-9	9	0	76	1	8	-3	9	362	384	15	7	2	9	597	589	14
2	0	8	370	365	9	-1	5	8	81	88	27	2	-9	9	206	205	29	9	-3	9	84	26	51	8	2	9	332	344	8
3	0	8	271	287	4	0	5	8	425	420	8	-5	-8	9	240	242	24	-7	-2	9	121	164	27	9	2	9	185	164	15
4	0	8	839	843	9	1	5	8	639	631	10	-4	-8	9	0	48	1	-6	-2	9	108	120	25	10	2	9	263	269	11
5	0	8	696	721	9	2	5	8	110	85	18	-3	-8	9	266	288	20	-5	-2	9	401	420	10	11	2	9	184	198	34
6	0	8	156	173	8	3	5	8	498	476	17	-2	-8	9	327	301	16	-4	-2	9	560	558	8	-6	3	9	185	188	21
7	0	8	379	370	6	4	5	8	641	604	7	-1	-8	9	116	80	24	-3	-2	9	239	236	9	-5	3	9	430	445	15
8	0	8	734	725	11	5	5	8	538	538	6	0	-8	9	241	242	19	-2	-2	9	321	337	8	-4	3	9	393	398	10
9	0	8	446	409	15	6	5	8	161	176	27	1	-8	9	436	408	17	-1	-2	9	587	577	7	-3	3	9	121	117	15
10	0	8	38	16	38	7	5	8	431	421	12	2	-8	9	158	121	30	0	-2	9	443	456	6	-2	3	9	325	324	6
11	0	8	261	313	18	8	5	8	490	490	7	3	-8	9	220	220	23	1	-2	9	81	76	30	-1	3	9	568	546	7
-7	1	8	167	207	18	9	5	8	199	229	11	4	-8	9	508	451	17	2	-2	9	727	720	7	0	3	9	268	290	5
-6	1	8	112	116	45	10	5	8	185	232	21	-6	-7	9	0	43	1	3	-2	9	398	397	14	1	3	9	167	162	8
-5	1	8	284	292	23	11	5	8	273	269	14	-5	-7	9	239	210	21	4	-2	9	0	35	1	2	3	9	503	492	5
-4	1	8	671	668	7	-5	6	8	219	226	42	-4	-7	9	410	414	17	5	-2	9	482	506	8	3	3	9	249	255	13
-3	1	8	403	421	6	-4	6	8	371	371	19	-3	-7	9	269	260	17	6	-2	9	750	763	14	4	3	9	291	304	10
-2	1	8	31	32	30	-3	6	8	131	96	21	-2	-7	9	62	70	62	7	-2	9	322	305	9	5	3	9	631	635	7
-1	1	8	831	823	8	-2	6	8	329	329	16	-1	-7	9	436	435	9	8	-2	9	0	57	1	6	3	9	498	469	7
0	1	8	771	761	9	-1	6	8	708	664	9	0	-7	9	447	458	9	9	-2	9	406	351	19	7	3	9	0	49	1
1	1	8	220	240	11	0	6	8	507	490	8	1	-7	9	89	109	46	10	-2	9	165	265	41	8	3	9	263	279	8
2	1	8	560	545	9	1	6	8	86	83	25	2	-7	9	390	389	13	-7	-1	9	239	225	15	9	3	9	572	569	10
3	1	8	922	936	10	2	6	8	383	373	15	3	-7	9	493	457	15	-6	-1	9	501	509	19	10	3	9	207	186	30
4	1	8	546	577	20	3	6	8	563	547	6	4	-7	9	227	241	22	-5	-1	9	419	445	8	11	3	9	127	168	40
5	1	8	317	315	6	4	6	8	126	138	14	5	-7	9	44	73	43	-4	-1	9	0	13	1	-5	4	9	177	154	20
6	1	8	837	850	14	5	6	8	302	301	17	6	-7	9	340	341	21	-3	-1	9	574	559	10	-4	4	9	0	108	1
7	1	8	693	708	12	6	6	8	618	610	7	-6	-6	9	378	358	19	-2	-1	9	709	702	8	-3	4	9	386	389	14
8	1	8	294	328	17	7	6	8	323	339	18	-5	-6	9	449	423	18	-1	-1	9	357	381	9	-2	4	9	433	427	10
9	1	8	288	294	8	8	6	8	0	120	1	-4	-6	9	140	182	27	0	-1	9	280	295	7	-1	4	9	88	26	17
11	1	8	206	202	19	9	6	8	368	358	17	-3	-6	9	407	393	15	1	-1	9	493	501	7	0	4	9	457	447	5
-7	2	8	84	70	45	10	6	8	258	262	18	-2	-6	9	570	572	16	2	-1	9	319	331	15	1	4	9	380	383	8
-6	2	8	353	350	10	11	6	8	0	46	1	-1	-6	9	423	413	9	3	-1	9	90	128	89	2	4	9	0	17	1
-5	2	8	400	401	8	-4	7	8	0	8	1	0	-6	9	55	36	54	4	-1	9	662	686	10	3	4	9	513	506	7
-4	2	8	33	33	33	-3	7	8	284	296	12	1	-6	9	427	413	10	5	-1	9	450	448	21	4	4	9	698	689	8
-3	2	8	338	328	6	-2	7	8	340	342	14	2	-6	9	387	387	10	6	-1	9	0	15	1	5	4	9	341	346	6
-2	2	8	880	876	8	-1	7	8	184	167	17	3	-6	9	74	89	74	7	-1	9	426	447	10	6	4	9	244	248	9
-1	2	8	802	813	9	0	7	8	196	182	13	4	-6	9	278	270	15	8	-1	9	522	520	10	7	4	9	532	518	9
8	4	9	496	486	7	-1	-8	10	194	220	19	5	-2	10	630	621	11	11	3	10	258	250	36	1	-8	11	448	422	17
9	4	9	208	200	21	0	-8	10	183	222	49	6	-2	10	59	71	58	-5	4	10	286	314	18	2	-8	11	238	260	24
10	4	9	282	280	11	1	-8	10	0	68	1	7	-2	10	285	277	10	-4	4	10	371	374	18	-4	-7	11	209	201	27
11	4	9	244	258	16	2	-8	10	372	335	18	8	-2	10	344	340	11	-3	4	10	103	117	26	-3	-7	11	217	256	25
-5	5	9	275	271	17	3	-8	10	404	416	17	9	-2	10	0	77	1	-2	4	10	99	80	25	-2	-7	11	116	21	48
-4	5	9	337	321	10	4	-8	10	217	184	29	-6	-1	10	0	92	1	-1	4	10	400	389	6	-1	-7	11	309	329	26
-3	5	9	59	112	58	-5	-7	10	237	278	27	-5	-1	10	271	268	9	0	4	10	219	224	10	0	-7	11	388	380	21
-2	5	9	177	161	14	-4	-7	10	127	79	48	-4	-1	10	488	492	9	1	4	10	344	345	7	1	-7	11	196	144	17
-1	5	9	501	485	10	-3	-7	10	208	235	24	-3	-1	10	387	387	17	2	4	10	532	526	7	2	-7	11	305	256	17
0	5	9	226	230	11	-2	-7	10	368	371	17	-2	-1	10	89	59	18	3	4	10	491	492	6	3	-7	11	414	406	16
1	5	9	256	261	7	-1	-7	10	171	182	16	-1	-1	10	392	388	6	4	4	10	0	33	1	4	-7	11	371	389	19
2	5	9	539	541	15	0	-7	10	233	230	13	0	-1	10	555	582	9	5	4	10	493	501	7	-4	-6	11	187	196	32
3	5	9	605	609	6	1	-7	10	462	458	32	1	-1	10	131	151	10	6	4	10	701	680	9	-3	-6	11	183	170	28
4	5	9	167	177	11	2	-7	10	385	369	14	2	-1	10	544	558	9	7	4	10	285	301	10	-2	-6	11	420	436	18
5	5	9	437	444	6	3	-7	10	29	62	29	3	-1	10	568	558	7	8	4	10	92	119	30	-1	-6	11	339	345	40

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
6	5	9	787	771	9	4	-7	10	422	368	17	4	-1	10	379	391	17	9	4	10	384	405	10	0	-6	11	22	28	22
7	5	9	472	475	7	5	-7	10	451	435	18	5	-1	10	227	221	9	10	4	10	310	294	12	1	-6	11	426	401	34
8	5	9	0	23	1	-6	-6	10	159	170	44	6	-1	10	568	605	16	11	4	10	74	17	73	2	-6	11	632	597	15
9	5	9	339	317	14	-5	-6	10	0	66	1	7	-1	10	396	392	11	-4	5	10	0	16	1	3	-6	11	358	323	14
10	5	9	215	229	13	-4	-6	10	399	365	17	8	-1	10	79	80	79	-3	5	10	290	279	30	4	-6	11	107	106	41
11	5	9	0	42	1	-3	-6	10	375	392	16	9	-1	10	324	314	20	-2	5	10	241	224	14	5	-6	11	374	373	15
-4	6	9	0	46	1	-2	-6	10	109	102	39	-6	0	10	374	391	13	-1	5	10	83	57	34	6	-6	11	293	270	19
-3	6	9	352	361	20	-1	-6	10	309	303	8	-5	0	10	459	482	10	0	5	10	392	364	7	-5	-5	11	0	114	1
-2	6	9	374	369	10	0	-6	10	537	526	21	-4	0	10	265	285	8	1	5	10	579	562	12	-4	-5	11	248	267	23
-1	6	9	109	124	56	1	-6	10	292	299	14	-3	0	10	165	166	11	2	5	10	168	186	31	-3	-5	11	395	404	17
0	6	9	221	241	19	2	-6	10	163	141	17	-2	0	10	513	511	7	3	5	10	382	381	7	-2	-5	11	169	215	18
1	6	9	505	500	17	3	-6	10	435	436	14	-1	0	10	321	327	7	4	5	10	754	749	7	-1	-5	11	129	112	26
2	6	9	269	279	7	4	-6	10	431	435	14	0	0	10	109	151	14	5	5	10	694	698	8	0	-5	11	475	466	8
3	6	9	210	189	14	5	-6	10	54	118	53	1	0	10	634	640	9	6	5	10	198	224	10	1	-5	11	426	416	12
4	6	9	620	595	16	6	-6	10	237	213	21	2	0	10	539	572	8	7	5	10	307	298	10	2	-5	11	0	63	1
5	6	9	592	567	8	-6	-5	10	247	212	22	3	0	10	201	193	8	8	5	10	354	358	12	3	-5	11	430	410	47
6	6	9	102	104	22	-5	-5	10	534	494	18	4	0	10	530	534	9	9	5	10	288	261	32	4	-5	11	524	482	14
7	6	9	235	226	20	-4	-5	10	431	419	15	5	0	10	712	708	8	10	5	10	144	178	37	5	-5	11	145	168	27
8	6	9	402	394	10	-3	-5	10	0	38	1	6	0	10	429	439	28	-3	6	10	197	203	19	6	-5	11	206	160	23
9	6	9	242	236	39	-2	-5	10	354	356	14	7	0	10	190	200	19	-2	6	10	141	134	22	7	-5	11	310	305	13
10	6	9	0	86	1	-1	-5	10	372	364	8	8	0	10	452	449	16	-1	6	10	379	375	8	-5	-4	11	300	283	21
11	6	9	75	182	75	0	-5	10	97	82	16	10	0	10	56	49	55	0	6	10	297	296	9	-4	-4	11	353	383	17
-3	7	9	266	279	35	1	-5	10	348	360	6	-6	1	10	208	200	31	1	6	10	0	19	1	-3	-4	11	139	133	22
-2	7	9	97	10	47	2	-5	10	523	513	18	-5	1	10	77	81	77	2	6	10	398	401	7	-2	-4	11	279	273	27
-1	7	9	291	289	30	3	-5	10	207	192	36	-4	1	10	358	364	17	3	6	10	588	574	21	-1	-4	11	391	354	14
0	7	9	345	354	12	4	-5	10	182	209	14	-3	1	10	350	349	18	4	6	10	342	361	7	0	-4	11	137	147	48
1	7	9	227	213	15	5	-5	10	462	454	12	-2	1	10	77	61	23	5	6	10	156	153	14	1	-4	11	388	391	7
2	7	9	256	242	10	6	-5	10	420	418	11	-1	1	10	424	415	6	6	6	10	518	523	9	2	-4	11	610	598	11
3	7	9	404	387	6	7	-5	10	0	22	1	0	1	10	622	611	8	7	6	10	398	409	22	3	-4	11	422	408	20
4	7	9	135	163	20	-6	-4	10	365	365	13	1	1	10	189	180	8	8	6	10	123	144	48	4	-4	11	0	20	1
5	7	9	125	117	17	-5	-4	10	117	154	75	2	1	10	368	376	6	9	6	10	169	150	34	5	-4	11	405	401	13
6	7	9	493	504	8	-4	-4	10	165	135	25	3	1	10	870	879	7	10	6	10	292	304	12	6	-4	11	478	466	11
7	7	9	335	322	15	-3	-4	10	424	422	14	4	1	10	923	917	9	-2	7	10	261	256	14	7	-4	11	200	192	19
8	7	9	0	92	1	-2	-4	10	194	199	17	5	1	10	130	166	17	-1	7	10	178	221	79	8	-4	11	201	232	20
9	7	9	265	262	25	-1	-4	10	106	87	15	6	1	10	429	423	7	0	7	10	106	134	42	-6	-3	11	229	241	16
10	7	9	373	358	12	0	-4	10	419	416	7	7	1	10	668	661	13	1	7	10	325	338	14	-5	-3	11	253	238	39
-2	8	9	225	197	23	1	-4	10	552	529	13	8	1	10	330	341	14	2	7	10	361	379	10	-4	-3	11	107	75	27
-1	8	9	176	155	24	2	-4	10	197	194	8	9	1	10	87	91	87	3	7	10	102	35	25	-3	-3	11	349	352	11
0	8	9	115	60	39	3	-4	10	613	596	18	10	1	10	225	254	26	4	7	10	358	344	7	-2	-3	11	329	339	9
1	8	9	260	235	16	4	-4	10	670	671	44	-6	2	10	158	121	28	5	7	10	425	405	12	-1	-3	11	138	120	15
2	8	9	218	231	33	5	-4	10	420	362	15	-5	2	10	379	400	21	6	7	10	160	177	44	0	-3	11	454	434	26
3	8	9	90	39	31	6	-4	10	167	171	16	-4	2	10	220	239	10	7	7	10	205	183	18	1	-3	11	620	630	16
4	8	9	449	435	8	7	-4	10	493	460	19	-3	2	10	192	195	9	8	7	10	317	299	12	2	-3	11	289	285	7
5	8	9	412	404	30	8	-4	10	303	286	13	-2	2	10	398	412	6	9	7	10	224	234	17	3	-3	11	311	310	7
6	8	9	307	317	19	-6	-3	10	178	17	57	-1	2	10	528	548	7	10	7	10	138	52	31	4	-3	11	647	629	10
7	8	9	141	121	20	-5	-3	10	335	347	10	0	2	10	39	48	38	-1	8	10	0	70	1	5	-3	11	596	599	35
8	8	9	357	354	11	-4	-3	10	397	359	22	1	2	10	516	508	9	0	8	10	239	232	19	6	-3	11	27	89	27
9	8	9	317	307	14	-3	-3	10	257	194	10	2	2	10	714	728	7	1	8	10	86	88	86	7	-3	11	337	320	15
10	8	9	119	75	118	-2	-3	10	306	329	22	3	2	10	422	436	12	2	8	10	151	152	26	8	-3	11	325	319	37
-1	9	9	79	80	78	-1	-3	10	474	367	9	4	2	10	175	173	21	3	8	10	376	355	16	-6	-2	11	123	20	35
0	9	9	292	225	21	0	-3	10	340	90	21	5	2	10	685	687	8	4	8	10	332	301	11	-5	-2	11	224	229	25
1	9	9	155	117	29	1	-3	10	299	307	6	6	2	10	397	405	7	5	8	10	0	6	1	-4	-2	11	405	376	8
2	9	9	107	98	35	2	-3	10	972	908	10	7	2	10	115	113	18	6	8	10	277	257	11	-3	-2	11	338	203	7
3	9	9	410	332	11	3	-3	10	603	459	24	8	2	10	219	237	14	7	8	10	367	372	19	-2	-2	11	297	299	8
4	9	9	453	379	10	4	-3	10	347	85	12	9	2	10	391	365	12	8	8	10	176	174	21	-1	-2	11	686	594	12
5	9	9	0	23	1	5	-3	10	419	432	14	10	2	10	91	50	68	9	8	10	163	155	64	0	-2	11	699	525	11
6	9	9	276	248	14	6	-3	10	685	635	11	-5	3	10	89	154	88	0	9	10	0	16	1	1	-2	11	449	114	9
7	9	9	462	411	10	7	-3	10	400	366	20	-4	3	10	213	231	13	1	9	10	256	235	20	2	-2	11	665	677	11
8	9	9	259	260	15	8	-3	10	99	67	38	-3	3	10	401	411	9	2	9	10	301	303	14	3	-2	11	688	630	9
9	9	9	0	33	1	9	-3	10	249	237	27	-2	3	10	350	366	6	3	9	10	134	134	30	4	-2	11	462	360	10
1	10	9	121	167	54	-7	-2	10	221	223	16	-1	3	10	0	33	1	4	9	10	125	164	125	5	-2	11	142	73	17
2	10	9	295	280	17	-6	-2	10	326	318	13	0	3	10	612	609	6	5	9	10	416	397	10	6	-2	11	477	488	11
3	10	9	207	224	29	-5	-2	10	317	322	10	1	3	10	450	439	14	6	9	10	397	403	10	7	-2	11	315	292	14
4	10	9	0	73	1	-4	-2	10	150	122	34	2	3	10	162	169	12	7	9	10	72	84	71	8	-2	11	0	8	1
5	10	9	273	275	15	-3	-2	10	562	556	7	3	3	10	449	437	7	8	9	10	147	159	28	-6	-1	11	314	329	11
6	10	9	305	328	18	-2	-2	10	642	641	9	4	3	10	724	705	7	3	10	10	305	233	24	-5	-1	11	383	396	13
7	10	9	130	148	32	-1	-2	10	133	157	23	5	3	10	389	402	11	4	10	10	416	353	30	-4	-1	11	38	74	37
0	-9	10	196	197	25	0	-2	10	407	394	7	6	3	10	149	128	13	5	10	10	124	132	55	-3	-1	11	291	305	14
1	-9	10	306	306	22	1	-2	10	569	561	13	7	3	10	393	389	8	6	10	10	0	49	1	-2	-1	11	598	597	9
-4	-8	10	219	269	28	2	-2	10	456	459	5	8	3	10	320	342	12	-2	-8	11	224	235	47	-1	-1	11	279	283	22
-3	-8	10	190	200	28	3	-2	10	187	173	13	9	3	10	0	16	1	-1	-8	11	77	49	76	0	-1	11	167	162	12
-2	-8	10	98	86	59	4	-2	10	634	640	7	10	3	10	309	336	20	0	-8	11	165	180	50	1	-1	11	644	630	15
2	-1	11	819	816	11	-3	5	11	133	130	132	2	-4	12	163	143	31	5	2	12	390	389	14	0	-5	13	376	395	14
3	-1	11	0	12	1	-2	5	11	140	162	27	3	-4	12	269	274	12	6	2	12	349	357	11	1	-5	13	497	440	16
4	-1	11	240	240	10	-1	5	11	322	312	9	4	-4	12	437	411	30	7	2	12	81	115	53	2	-5	13	182	164	18
5	-1	11	446	463	9	0	5	11	256	242	18	5	-4	12	184	236	19	8	2	12	229	257	20	3	-5	13	112	160	47
6	-1	11	226	230	21	1	5	11	243	247	10	6	-4	12	132	96	26	9	2	12	429	398	16	4	-5	13	305	283	16
7	-1	11	312	300	20	2	5	11	454	448	6	7	-4	12	411	395	18	10	2	12	211	212	26	5	-5	13	146	85	30
8	-1	11	419	427	13	3	5	11	651	639	7	-5	-3	12	0	105	1	-4	3	12	143	141	59	-3	-4	13	193	144	22

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
-6	0	11	203	192	22	4	5	11	279	298	9	-4	-3	12	261	275	27	-3	3	12	369	346	14	-2	-4	13	219	206	35
-5	0	11	68	49	62	5	5	11	297	289	8	-3	-3	12	121	100	28	-2	3	12	268	272	18	-1	-4	13	391	389	34
-4	0	11	343	347	10	6	5	11	557	554	9	-2	-3	12	281	293	18	-1	3	12	34	10	34	0	-4	13	335	298	34
-3	0	11	305	304	7	7	5	11	364	383	9	-1	-3	12	505	494	13	0	3	12	459	454	9	1	-4	13	91	15	91
-2	0	11	0	10	1	8	5	11	0	7	1	0	-3	12	349	352	11	1	3	12	604	608	8	2	-4	13	301	285	21
-1	0	11	432	439	18	9	5	11	244	251	12	1	-3	12	128	98	19	2	3	12	238	254	9	3	-4	13	291	280	13
0	0	11	538	533	20	10	5	11	350	351	39	2	-3	12	538	545	9	3	3	12	72	53	36	4	-4	13	129	95	28
1	0	11	96	118	19	-3	6	11	188	182	37	3	-3	12	559	579	8	4	3	12	332	349	11	5	-4	13	308	287	16
2	0	11	347	332	9	-2	6	11	209	228	16	4	-3	12	215	216	12	5	3	12	351	354	7	6	-4	13	339	328	14
3	0	11	882	889	23	-1	6	11	159	137	23	5	-3	12	204	225	14	6	3	12	65	79	64	-4	-3	13	58	13	58
4	0	11	595	632	10	0	6	11	213	210	13	6	-3	12	383	395	36	7	3	12	232	241	12	-3	-3	13	306	318	12
5	0	11	121	73	22	1	6	11	525	508	9	7	-3	12	200	250	20	8	3	12	323	314	10	-2	-3	13	340	334	34
6	0	11	382	384	15	2	6	11	361	357	8	8	-3	12	159	117	43	9	3	12	18	28	18	-1	-3	13	0	58	1
7	0	11	469	469	18	3	6	11	61	45	46	-5	-2	12	203	205	31	10	3	12	284	326	28	0	-3	13	258	255	11
8	0	11	50	146	50	4	6	11	400	400	22	-4	-2	12	0	80	1	-3	4	12	99	136	42	1	-3	13	447	456	11
9	0	11	227	250	21	5	6	11	509	506	9	-3	-2	12	389	404	8	-2	4	12	119	132	37	2	-3	13	290	321	13
10	0	11	403	402	21	6	6	11	164	194	15	-2	-2	12	460	467	11	-1	4	12	349	349	19	3	-3	13	66	56	66
-5	1	11	264	272	15	7	6	11	172	157	33	-1	-2	12	79	110	47	0	4	12	293	298	13	4	-3	13	335	377	19
-4	1	11	200	208	11	8	6	11	270	280	27	0	-2	12	270	271	11	1	4	12	84	46	28	5	-3	13	329	379	22
-3	1	11	68	94	68	9	6	11	187	169	62	1	-2	12	661	652	11	2	4	12	387	379	13	6	-3	13	0	45	1
-2	1	11	399	393	7	10	6	11	98	72	46	2	-2	12	603	627	19	3	4	12	446	449	7	7	-3	13	304	303	26
-1	1	11	278	308	9	-2	7	11	119	8	68	3	-2	12	90	90	90	4	4	12	108	133	27	-4	-2	13	250	248	18
0	1	11	88	96	21	-1	7	11	168	213	39	4	-2	12	337	336	9	5	4	12	244	239	12	-3	-2	13	187	204	36
1	1	11	710	711	9	0	7	11	358	362	13	5	-2	12	400	446	19	6	4	12	524	529	9	-2	-2	13	128	163	34
2	1	11	645	668	8	1	7	11	220	210	14	6	-2	12	120	149	69	7	4	12	172	170	28	-1	-2	13	497	495	11
3	1	11	244	249	9	2	7	11	183	156	17	7	-2	12	192	206	25	8	4	12	151	156	30	0	-2	13	518	536	9
4	1	11	306	290	7	3	7	11	352	331	15	9	-2	12	108	136	108	9	4	12	406	415	12	1	-2	13	263	310	18
5	1	11	762	782	11	4	7	11	229	243	12	-5	-1	12	42	99	42	10	4	12	378	373	22	2	-2	13	283	295	12
6	1	11	470	490	8	5	7	11	110	85	21	-4	-1	12	400	359	19	-2	5	12	196	203	18	3	-2	13	490	502	8
7	1	11	123	36	25	6	7	11	214	210	14	-3	-1	12	369	245	8	-1	5	12	169	126	23	4	-2	13	263	309	13
8	1	11	330	355	11	7	7	11	265	259	22	-2	-1	12	207	92	21	0	5	12	201	203	13	5	-2	13	0	55	1
9	1	11	349	354	15	8	7	11	114	42	37	-1	-1	12	620	614	9	1	5	12	447	440	8	6	-2	13	270	317	28
10	1	11	11	45	11	9	7	11	154	198	29	0	-1	12	731	625	13	2	5	12	232	238	18	7	-2	13	323	348	17
-5	2	11	0	44	1	0	8	11	0	14	1	1	-1	12	616	392	14	3	5	12	46	6	45	8	-2	13	29	39	29
-4	2	11	242	251	15	1	8	11	209	224	18	2	-1	12	242	211	19	4	5	12	379	375	8	-4	-1	13	0	86	1
-3	2	11	313	327	8	2	8	11	346	335	17	3	-1	12	636	633	11	5	5	12	357	369	9	-3	-1	13	228	244	13
-2	2	11	76	92	27	3	8	11	119	167	33	4	-1	12	386	334	14	6	5	12	116	95	27	-2	-1	13	448	466	31
-1	2	11	388	392	6	4	8	11	152	117	19	5	-1	12	169	37	16	7	5	12	305	303	15	-1	-1	13	362	370	12
0	2	11	661	651	7	5	8	11	310	292	12	6	-1	12	331	339	20	8	5	12	352	370	12	0	-1	13	52	61	52
1	2	11	610	606	11	6	8	11	262	246	13	7	-1	12	275	265	16	9	5	12	219	232	28	1	-1	13	379	368	11
2	2	11	68	83	68	7	8	11	75	99	74	8	-1	12	27	17	26	10	5	12	44	82	43	2	-1	13	511	538	9
3	2	11	542	541	7	8	8	11	261	248	21	-5	0	12	217	239	25	-2	6	12	213	121	36	3	-1	13	190	175	16
4	2	11	692	680	7	2	9	11	0	29	1	-4	0	12	225	217	12	-1	6	12	245	249	13	4	-1	13	105	132	67
5	2	11	522	519	6	3	9	11	305	284	14	-3	0	12	113	85	21	0	6	12	405	402	9	5	-1	13	250	300	17
6	2	11	72	107	34	4	9	11	348	345	13	-2	0	12	325	362	8	1	6	12	170	163	16	6	-1	13	163	209	37
7	2	11	339	352	8	5	9	11	143	133	84	-1	0	12	306	300	9	2	6	12	241	250	17	7	-1	13	178	194	27
8	2	11	213	239	16	6	9	11	125	101	32	0	0	12	67	116	67	3	6	12	402	385	10	8	-1	13	420	431	16
9	2	11	54	75	53	7	9	11	319	283	13	1	0	12	496	496	8	4	6	12	319	338	28	-4	0	13	252	256	12
10	2	11	305	315	17	-2	-7	12	321	323	20	2	0	12	557	573	8	5	6	12	0	12	1	-3	0	13	372	345	9
-5	3	11	236	293	32	-1	-7	12	216	221	20	3	0	12	76	137	33	6	6	12	231	269	20	-2	0	13	264	144	12
-4	3	11	302	311	10	0	-7	12	29	56	28	4	0	12	202	214	14	7	6	12	267	281	14	-1	0	13	208	222	12
-3	3	11	0	19	1	1	-7	12	384	385	31	5	0	12	397	435	12	8	6	12	80	63	79	0	0	13	462	432	9
-2	3	11	203	204	16	2	-7	12	449	396	18	6	0	12	353	387	11	9	6	12	202	188	19	1	0	13	402	346	12
-1	3	11	457	460	7	3	-7	12	225	241	21	7	0	12	192	264	30	0	7	12	110	26	36	2	0	13	137	21	42
0	3	11	264	260	9	-3	-6	12	317	347	36	8	0	12	474	464	14	1	7	12	289	275	11	3	0	13	473	462	8
1	3	11	321	325	7	-2	-6	12	59	102	58	9	0	12	368	374	15	2	7	12	363	365	12	4	0	13	335	320	9
2	3	11	639	637	7	-1	-6	12	330	323	13	-4	1	12	225	220	16	3	7	12	261	266	17	5	0	13	135	30	25
3	3	11	559	564	13	0	-6	12	491	476	11	-3	1	12	310	289	9	4	7	12	0	52	1	6	0	13	273	319	14
4	3	11	25	51	25	1	-6	12	431	440	48	-2	1	12	0	58	1	5	7	12	189	213	16	7	0	13	471	453	20
5	3	11	401	397	7	2	-6	12	0	10	1	-1	1	12	374	379	8	6	7	12	137	115	68	8	0	13	125	151	48
6	3	11	425	416	8	3	-6	12	269	268	17	0	1	12	465	457	8	7	7	12	110	111	110	9	0	13	162	192	37
7	3	11	104	119	35	4	-6	12	457	411	16	1	1	12	375	399	7	8	7	12	275	274	15	-3	1	13	91	27	40
8	3	11	228	219	10	5	-6	12	96	106	75	2	1	12	85	80	59	9	7	12	190	231	23	-2	1	13	251	257	11
9	3	11	388	400	18	-4	-5	12	247	274	26	3	1	12	654	652	12	1	8	12	173	205	34	-1	1	13	316	347	10
10	3	11	239	222	14	-3	-5	12	0	0	1	4	1	12	487	503	16	2	8	12	0	3	1	0	1	13	0	60	1
-4	4	11	91	50	48	-2	-5	12	382	354	16	5	1	12	233	277	12	3	8	12	208	175	29	1	1	13	205	177	26
-3	4	11	288	294	15	-1	-5	12	480	478	26	6	1	12	219	245	13	4	8	12	246	258	26	2	1	13	379	390	18
-2	4	11	214	231	11	0	-5	12	252	220	15	7	1	12	481	500	11	5	8	12	82	115	81	3	1	13	288	294	10
-1	4	11	116	115	49	1	-5	12	205	203	12	8	1	12	155	186	42	6	8	12	136	122	44	4	1	13	261	276	11
0	4	11	410	397	6	2	-5	12	520	489	14	9	1	12	94	89	77	7	8	12	176	221	22	5	1	13	414	438	18
1	4	11	491	489	8	3	-5	12	349	343	11	10	1	12	233	301	41	8	8	12	152	90	38	6	1	13	412	438	11
2	4	11	169	168	9	4	-5	12	56	40	55	-4	2	12	0	150	1	4	9	12	117	26	44	7	1	13	0	79	1
3	4	11	242	247	8	5	-5	12	318	277	16	-3	2	12	86	94	50	5	9	12	153	222	31	8	1	13	298	293	17
4	4	11	563	547	8	6	-5	12	321	306	18	-2	2	12	301	305	17	-1	-6	13	444	448	18	9	1	13	388	433	16
5	4	11	470	489	12	-4	-4	12	158	110	72	-1	2	12	423	447	7	0	-6	13	94	130	94	-3	2	13	348	355	27
6	4	11	0	15	1	-3	-4	12	353	354	13	0	2	12	121	157	17	1	-6	13	194	129	35	-2	2	13	251	254	12
7	4	11	345	334	9	-2	-4	12	232	266	16	1	2	12	312	312	12	3	-6	13	243	275	20	-1	2	13	0	80	1
8	4	11	404	407	8	-1	-4	12	0	39	1	2	2	12	625	612	8	4	-6	13	0	12	1	0	2	13	444	442	9
9	4	11	116	126	26	0	-4	12	370	358	16	3	2	12	560	563	11	-2	-5	13	276	274	29	1	2	13	519	533	22

h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s	h	k	l	10Fo	10Fc	10s
10	4	11	317	324	13	1	-4	12	501	483	7	4	2	12	91	58	27	-1	-5	13	62	24	62	2	2	13	262	256	10
3	2	13	136	146	22	5	7	13	99	117	39	1	0	14	174	121	17	5	5	14	265	305	34	7	1	15	238	221	37
4	2	13	389	375	9	6	7	13	128	125	33	2	0	14	326	325	32	6	5	14	153	154	24	-1	2	15	112	33	48
5	2	13	227	242	13	7	7	13	250	270	18	3	0	14	173	144	32	7	5	14	238	246	16	0	2	15	194	218	23
6	2	13	0	101	1	8	7	13	147	97	40	4	0	14	222	210	23	8	5	14	339	374	15	1	2	15	300	303	22
7	2	13	418	433	15	3	8	13	115	161	86	5	0	14	349	377	42	1	6	14	63	172	63	2	2	15	241	185	17
8	2	13	291	301	14	4	8	13	96	26	95	6	0	14	291	352	24	2	6	14	0	67	1	3	2	15	175	163	18
9	2	13	71	88	71	5	8	13	221	209	29	7	0	14	0	18	1	3	6	14	254	276	12	4	2	15	461	459	21
-3	3	13	42	74	42	6	8	13	209	220	20	8	0	14	333	363	20	4	6	14	281	296	12	5	2	15	349	289	15
-2	3	13	217	207	16	0	-5	14	244	255	18	-2	1	14	297	284	12	5	6	14	0	44	1	6	2	15	100	44	54
-1	3	13	455	447	10	1	-5	14	78	40	77	-1	1	14	121	29	27	6	6	14	233	212	29	7	2	15	316	332	17
0	3	13	340	354	12	2	-5	14	265	263	27	0	1	14	293	273	13	7	6	14	366	388	40	0	3	15	244	268	21
1	3	13	0	89	1	3	-5	14	234	229	17	1	1	14	266	259	25	3	7	14	0	125	1	1	3	15	0	19	1
2	3	13	419	411	10	4	-5	14	108	112	55	2	1	14	207	130	14	4	7	14	39	32	39	2	3	15	251	255	14
3	3	13	432	437	9	-2	-4	14	386	391	15	3	1	14	360	338	36	5	7	14	276	298	19	3	3	15	432	421	13
4	3	13	132	131	44	-1	-4	14	158	161	57	4	1	14	443	415	30	6	7	14	209	224	27	4	3	15	144	201	73
5	3	13	99	126	28	0	-4	14	166	192	20	5	1	14	216	149	14	1	-4	15	79	13	79	5	3	15	118	150	29
6	3	13	406	400	12	1	-4	14	259	250	14	6	1	14	227	216	17	2	-4	15	213	181	23	6	3	15	322	327	17
7	3	13	184	191	26	2	-4	14	230	232	20	7	1	14	515	541	28	0	-3	15	120	54	119	7	3	15	331	317	18
8	3	13	223	195	30	3	-4	14	155	160	57	8	1	14	339	361	27	1	-3	15	242	283	19	1	4	15	199	208	21
9	3	13	368	380	15	4	-4	14	274	295	27	-2	2	14	229	235	15	2	-3	15	226	268	31	2	4	15	154	171	27
-2	4	13	354	338	27	5	-4	14	275	302	28	-1	2	14	383	388	9	3	-3	15	0	79	1	3	4	15	129	53	65
-1	4	13	235	230	15	-2	-3	14	87	46	87	0	2	14	314	304	10	4	-3	15	357	395	27	4	4	15	307	326	24
0	4	13	199	177	13	-1	-3	14	278	275	17	1	2	14	0	61	1	5	-3	15	423	489	25	5	4	15	298	313	18
1	4	13	333	318	9	0	-3	14	397	365	22	2	2	14	357	357	17	-1	-2	15	274	264	22	6	4	15	120	134	46
2	4	13	273	259	15	1	-3	14	115	73	41	3	2	14	369	393	11	0	-2	15	327	318	15	7	4	15	43	158	43
3	4	13	0	16	1	2	-3	14	234	216	13	4	2	14	93	52	33	1	-2	15	159	136	27	2	5	15	132	86	84
4	4	13	272	273	9	3	-3	14	366	374	19	5	2	14	264	300	15	2	-2	15	120	180	39	3	5	15	295	283	13
5	4	13	198	208	44	4	-3	14	147	171	48	6	2	14	430	434	27	3	-2	15	411	458	21	4	5	15	189	212	26
6	4	13	41	30	40	5	-3	14	81	184	80	7	2	14	362	353	15	4	-2	15	265	283	27	5	5	15	126	89	125
7	4	13	330	356	13	6	-3	14	371	387	27	8	2	14	132	126	36	5	-2	15	0	27	1	6	5	15	162	283	64
8	4	13	391	424	12	-2	-2	14	362	410	11	-2	3	14	322	353	16	6	-2	15	326	365	32	3	-2	16	145	141	32
9	4	13	212	214	34	-1	-2	14	225	218	25	-1	3	14	154	136	25	-1	-1	15	328	323	12	1	-1	16	281	248	18
-1	5	13	234	213	22	0	-2	14	107	63	36	0	3	14	254	251	12	0	-1	15	160	59	21	2	-1	16	145	69	30
0	5	13	363	359	26	1	-2	14	394	411	13	1	3	14	373	388	9	1	-1	15	265	266	13	3	-1	16	285	308	14
1	5	13	109	124	31	2	-2	14	446	426	36	2	3	14	317	324	15	2	-1	15	322	343	23	4	-1	16	343	357	15
2	5	13	198	202	14	3	-2	14	105	71	29	3	3	14	86	21	61	3	-1	15	178	165	18	1	0	16	0	74	1
3	5	13	324	325	8	4	-2	14	266	294	25	4	3	14	316	338	11	4	-1	15	226	190	15	2	0	16	304	302	14
4	5	13	233	276	12	5	-2	14	448	489	23	5	3	14	173	238	17	5	-1	15	412	398	21	3	0	16	270	245	24
5	5	13	157	159	15	6	-2	14	192	202	47	6	3	14	0	14	1	6	-1	15	262	328	37	4	0	16	141	54	90
6	5	13	437	441	11	7	-2	14	0	59	1	7	3	14	284	300	17	-1	0	15	91	29	90	5	0	16	271	239	20
7	5	13	328	311	12	-3	-1	14	343	346	12	8	3	14	410	429	43	0	0	15	210	199	17	1	1	16	190	196	27
8	5	13	0	70	1	-2	-1	14	124	118	35	-1	4	14	256	259	36	1	0	15	257	252	15	2	1	16	133	83	35
9	5	13	251	252	27	-1	-1	14	237	252	16	0	4	14	270	314	14	2	0	15	0	37	1	3	1	16	207	218	52
0	6	13	0	10	1	0	-1	14	437	445	14	1	4	14	0	110	1	3	0	15	296	297	12	4	1	16	388	408	12
1	6	13	320	312	11	1	-1	14	353	373	10	2	4	14	158	163	18	4	0	15	322	347	12	5	1	16	201	250	83
2	6	13	324	336	14	2	-1	14	0	23	1	3	4	14	320	316	14	5	0	15	131	130	33	6	1	16	0	26	1
3	6	13	0	122	1	3	-1	14	349	363	10	4	4	14	195	202	20	6	0	15	261	275	31	1	2	16	164	86	37
4	6	13	167	166	24	4	-1	14	285	300	11	5	4	14	141	185	56	7	0	15	341	360	27	2	2	16	344	320	12
5	6	13	262	286	10	5	-1	14	0	29	1	6	4	14	429	430	14	-1	1	15	237	278	22	3	2	16	365	379	13
6	6	13	124	172	30	6	-1	14	284	347	31	7	4	14	326	305	16	0	1	15	155	156	24	4	2	16	139	123	24
7	6	13	0	136	1	7	-1	14	390	419	26	8	4	14	68	6	68	1	1	15	115	111	30	5	2	16	94	188	37
8	6	13	270	272	33	8	-1	14	147	204	59	0	5	14	39	15	38	2	1	15	257	298	17	6	2	16	320	351	18
1	7	13	313	300	16	-3	0	14	0	10	1	1	5	14	246	204	14	3	1	15	220	245	15	2	3	16	243	206	18
2	7	13	53	8	53	-2	0	14	319	327	11	2	5	14	231	236	16	4	1	15	167	183	40	3	3	16	146	21	38
3	7	13	171	150	19	-1	0	14	342	354	15	3	5	14	0	88	1	5	1	15	346	382	14	4	3	16	262	315	15
4	7	13	269	285	14	0	0	14	117	95	28	4	5	14	288	295	29	6	1	15	449	463	17	5	3	16	307	333	38