

THE BRIDGE SHOP
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WASHINGTON, D.C. 20004

BRIDGE DIRECTING COMPLETE

In Minutes

FORWARDED BY
The Author

Australian Bridge Federation Report:

As instructed, I have read the manuscript of a proposed book relating to Tournament Direction by Ian McKinnon. I have been aware that for some considerable time that there is not sufficient attention given to some details by most of the other books on the subject. As in bridge itself, new ideas in movements have barely seen the light of day.

The manuscript puts all that in the past. It is without doubt, the most concisely written book on the subject and brings up to date all known movements and for good measure throws in new ideas that have not had an airing.

The presentation of the material is done admirably and while there are approximately 100 pages of appendices which I have not seen, I feel sure that these will be readily understandable by the average Director, as is the text of the script.

I therefore formally move that the Federation supports to its utmost that the manuscript be printed as soon as possible.

Mike Hopper,

for the A.B.F.

BRIDGE DIRECTING COMPLETE

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Ian McKinnon

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FOREWORD

When it comes to duplicate bridge directing, I can claim without fear of contradiction to be a complete duffer. It is a constant source of amazement to me that complex movements and unusual instructions to the players nevertheless work out all right in the end.

This book explains how and why.

Ian McKinnon, for many years the top tournament director in Australia, has produced this most comprehensive treatise on the art of being a successful director. For the experienced director, the book provides all the information needed to run any type of competition and also explains how the oft burdensome tasks of directing can be alleviated. For the novice director, there are lengthy explanations and easy-to-follow instructions so that confidence is quickly gained and the novice can soon manage more difficult assignments.

This is easily the best book of its kind yet written and will soon become the standard text for bridge directors, bridge clubs, and congress and other tournament organisers.

The most amazing aspect was that an absolute tyro like me could read it, understand it easily and feel competent enough to conduct a difficult tournament. After you have read it, you will also feel you have the capabilities to be a professional director.

Ron Klinger

1978

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INTRODUCTION

OVERVIEW

This book seeks to cover all aspects of Tournament Bridge directing. It is possible for those who have never directed a bridge tournament to learn both the rudiments and advanced methods of directing with the help of this book. At the same time the experienced director will find the book invaluable in all areas, including the provision of the best movements and scoring methods for all types of tournaments.

MOVEMENTS

The approach taken is to supply all the useful movements for teams, pairs, teams of pairs and individuals together with all modifications of these that can prove useful. As comprehensiveness is one of the aims, movements are included which are useful only in rare cases.

All tournament directors should be encouraged to understand the principles and mathematics behind movements, so that a movement can be changed at the last minute with the minimum of trouble. Equally important is the confidence instilled in the players through their awareness of the director's ability to organise their events smoothly and quickly.

The director's primary considerations at all times should be player comfort and accuracy of scores. The major factors in achieving these are simplicity of movements (within the bounds of the tournament), playing of all boards by all contestants in the event and adequate player comparison on all boards.

Wherever possible, simple movements should be a sine qua non for the director, as the players are there to play bridge, not to solve bridge movement problems. In other words the director should choose the movement that gives the desired results (one winner or two, etc.) with minimum fuss and maximum accuracy.

All contestants should play the same boards for two reasons:

- to enable scoring over the entire field (for pairs events)
- to allow players to compare their results with their friends even when they have not played in the same section (i.e. in a pairs event where the tournament has been scored sectionally)

The problem of player comparisons is a major factor in all pairs events. For most local events "adequate" player comparison is sufficient ("adequate" implies about 80% comparison. See Howell movements, comparison of players, for further treatment of this subject).

SCORING

Scoring is of course a vital and integral part of tournament directing and as such is treated thoroughly in those sections.

As there are several methods of scoring available, it is important that the director be aware of the pros and cons of those under consideration. Quite often there may be no choice, such as in a match-pointed pairs event, but even here there are easy and difficult methods and outmoded methods should be rejected or simplified.

The mathematics of some scoring methods leave much to be desired and the director should be aware of these deficiencies. For example, the choice of Victory Point scales in teams events.

As always, a major consideration for the director is to ensure that every aspect of a tournament is easily understood by the players.

DIRECTING

This subject incorporates all aspects of directing that do not come under the titles of movements or scoring.

Examples of these are general organisational problems such as the stationery required for an event and areas where movements break down. For an event to be run efficiently and successfully these details require just as much attention as all others.

DUPLICATE BRIDGE

1

INTRODUCTION

The term *Duplicate Bridge* may apply to any bridge where the hands are played more than once. This can be a pairs event, teams event or an individuals event. That is, it is distinct from rubber bridge where the hand record is destroyed during the first playing. For a hand to be played more than once the cards cannot be gathered into the centre of the table during play as the hand has to be retained for use by other tables.

In duplicate bridge the cards are played by placing the card being played immediately in front of the player and face up on the table. After the trick is completed the card is turned over and placed in front of the player, near the edge of the table, "pointing" in the direction of the pair winning the trick. Subsequent tricks overlap the previous ones so as to give an accurate record of the play of the hand.

After the completion of the hand the cards are placed in a "Board" (this was originally called a Duplicate Tray) with each player's hand inserted in the slot reserved for the player sitting at that compass position at the table.

A duplicate board may be made of various materials, the most common being aluminium, plastic, wood and cardboard. A board may be a solid piece of equipment as with aluminium, wood and hard plastic, or a soft wallet type of equipment with soft plastic or cardboard. Aluminium is certainly the most durable material but is also the most expensive at the initial outlay. The disadvantage of aluminium is that it is very wearing on cheaper cards. Thus it is almost imperative to use the more expensive plastic cards with these boards, but for long term use this combination is certainly the most economical, lasting for many years even with regular daily use. For low volume use the plastic wallet coupled with good quality cardboard cards is an ideal compromise.

DUPLICATE BOARDS

The markings on the boards indicate the dealer and the vulnerability for that deal. The standard ordering of the dealer and vulnerability as used by the World Bridge Federation as well as most countries is the following:

Dealer: North on Board 1, East on 2, South on 3 and West on 4. This pattern continues for all subsequent sets of four boards.

Vulnerability: starting from board 1, in order:

Nil N-S E-W All

N-S E-W All Nil

E-W All Nil N-S

All Nil N-S E-W

As an aid to memory, use *ONEB*:

O N E B

N E B O

E B O N

B O N E

Where O = zero or Nil; B = both or All; N = N-S and E = E-W.

This pattern continues for each set of 16 boards. The British pattern is the same except that the dealer is offset by 180° with South the dealer on board 1.

PREPARING THE HANDS

The hands to be played in a tournament may be dealt by the players at the start of play or prior to the start of play, but in the latter case, under the scrutiny of the director. Another method of preparation by the players is to record the hands to be played on paper slips which are handed out to the players for preparation on the first round. Of course these hands will not be played by the players preparing them. This method is popular where the hands have been dealt by computer. In addition, the players may be required to prepare more than one copy of each hand so that several sections may play the same hands. This method allows each half of the field to play the same hands; each half prepares the hands with duplicate copies as necessary for the other half.

The hands can also be prepared before the start of play by the director and his assistants especially for barometer type of tournaments where the same hands are played by all the players on the same round. Of course the security of the hands is vital and is always the responsibility of the director.

If hand records have not been prepared in advance, then the hands should be recorded by the players after playing them on the first round.

Even though it is occasionally not adhered to, the dealing of hands at duplicate still requires that the cards be dealt one at a time in rotation.

The standard scoring table used in rubber bridge applies equally to duplicate bridge except for the game and part score bonuses and the elimination of bonuses for "honours".

SCORING

TRICK SCORE

(Scored by declarer's side, if the contract is fulfilled).

If Trumps are: ♣ ♦ ♥ ♠

For each odd trick bid and made:

Undoubled	20	20	30	30
Doubled	40	40	60	60
Redoubled	80	80	120	120

If a No-trump contract:

	1st Trick	Extra tricks
Undoubled	40	30
Doubled	80	60
Redoubled	160	120

For each overtrick:

	Not Vul.	Vul.
Undoubled	Trick value	Trick value
Doubled	100	200
Redoubled	200	400

PREMIUM SCORE

(Scored by declarer's side).

For making a slam:

	Not Vul.	Vul.
Small Slam	500	750
Grand Slam	1000	1500

For making game:

	Not Vul.	Vul.
	300	500

For making any part score: 50

For making any doubled or redoubled contract: 50

UNDERTRICK PENALTIES

(Scored by the defending side).

	Not Vul			Vul		
		Doubled	Re-doubled		Doubled	Re-doubled
1st undertrick:	50	100	200	100	200	400
Subsequent undertricks:	50	200	400	100	300	600

After the score has been calculated it is entered on the score sheet supplied by the director. The score sheet used will depend on the type of tournament being conducted.

The above score sheet is an example of a score sheet that would be used in a standard pairs tournament using a Mitchell type of movement. The important columns on this sheet are the contract and declarer, N-S plus score, E-W plus score, N-S pair number, E-W pair number and the N-S match points. These are the only essential entries on a score sheet for match-pointed pairs. Other entries which are sometimes included on score sheets are "number of tricks made" or "result". "N-S result plus or minus" (as an alternative to the separate N-S and E-W score columns), "E-W initials" (to indicate the checking of the score), "E-W match points" and "the opening lead". Of these the most important entries that could be included are the number of tricks made and the E-W match-points.

The number of tricks made is useful for checking the validity of a score provided the players remember to write in this entry. The E-W match-point field is handy for the players to check their scores at a later date or if the director uses this field for his scoring (see the section on scoring). Using the "N-S result plus or minus" as an alternative to two entries is not recommended as it makes the match-pointing more difficult for the scorers. The "E-W initials" column is a good idea provided the players fill it out conscientiously which they generally do not do.

The "opening lead" field is not very useful for anything except more thorough post-mortems. The more basic the score sheet, the better it is for the players and the scorers: the space for writing is larger, it is easier to read and players are less prone to make mistakes. The score sheet with the N-S pair numbers pre-printed is slightly superior to those without them and is mandatory if the scorer is not using a recap sheet when tallying the scores (see the section on scoring for clarification).

**HOWELL PAIRS
TRAVELLING SCORE SHEET**

DECL. & CONTR.	TRICKS MADE	N-S+	E-W+	N-S NO.	E-W NO.	MP	do not use
				1			
				2			
				3			
				4			
				5			
				6			
				7			
				8			
				9			
				10			
				11			

BOARD NO. _____

DEALER _____

VUL. _____

♠ _____

♥ _____

♦ _____

♣ _____

♠ _____

♥ _____

♦ _____

♣ _____

♠ _____

♥ _____

♦ _____

♣ _____

♠ _____

♥ _____

♦ _____

♣ _____

Above is an example of a Howell pairs score sheet. This is basically the same as that used in a Mitchell type event except that having the N-S pair numbers pre-printed is very useful (the players have to be very careful in entering their scores). The E-W match-point column is more useful in scoring this event.

The best use for the last column is for the total N-S match-points for each set of boards (the group of boards played on each round), thus facilitating the scoring (see section on scoring).

There are many other types of score sheets in common use and these will be dealt with in the section on scoring.

PROCEDURE

In duplicate bridge the purpose of a tournament (whether pairs, teams or individuals) is to produce a winning unit by playing all the boards (in most events) against as many opponents as the event defines. To attain this end a movement is required.

MOVEMENT PURPOSES

In choosing a particular movement the director has four major factors to consider.

- The number of players
- The type of event (pairs, teams, individuals)
- The number of winners
- The number of boards to be played (which a time limit directly affects)

Broadly speaking pairs movements can be divided into two basic types of movements: Mitchell movements (named after John T. Mitchell) which generally produce two winners and Howell movements (named after Edwin C. Howell) which produce one winner.

Teams movement can be broken down into three basic types of movements: round robin, multiple teams and swiss (elevator) movements.

Individual movements do not appear to conform to any particular pattern with each number of tables requiring separate treatment except for the Mitchell and Howell like movements.

COMPARISON OF PLAYERS

A major consideration of a tournament must be the comparison of the players with each other. Obviously the comparison of two teams playing against each other must be perfect with each board being played in the N-S and E-W direction by each team. In an event where there is more than one team the comparison of teams will remain equal so long as the same number of boards are played in each match.

In an individual movement the comparison of players is rarely equal because of other more important considerations such as playing with all other other players. In fact, because of the nature of the event, an individual result is affected by many factors other than the movement.

In a pairs event the comparison of players is a far more important consideration of the director. In the Howell type tournament the comparison of pairs is a very complicated subject and is dealt with thoroughly under Howell movements. In the Mitchell event the comparison of pairs is perfect within each group (N-S and E-W fields being treated as separate groups) so long as all the N-S pairs play all the E-W pairs over an equal number of boards and play all the boards in the event. The consideration of comparison of pairs applies only to the pairs with which a pair is being compared (i.e. the pairs sitting in the same direction as the pair being considered in a Mitchell movement) and does not apply to the opponents. Obviously for all things to be equal and fair each pair should play an equal number of boards against the same set of opponents.

THE DIRECTOR 2

THE DIRECTOR'S DUTIES

The director's duties are many and varied. He must be proficient in all aspects to make the games under his supervision successful. As well as possessing the necessary skills and knowledge to conduct the game, he must be prepared to go out of his way to make all his tournaments as pleasant as possible for everyone involved. For the success of the game he must be outwardly happy at all times and constantly instil in the players a confidence in his abilities. This is not always easy and may involve unpleasant duties from time to time such as asking unpleasant players not to attend your weekly duplicate. One such person may well be keeping several tables away. A regular routine and a generally pleasant game will do more towards improving the attendance than will such aspects as the best (but complicated) movements.

ORGANISATIONAL REQUIREMENTS

When organising a duplicate and in particular when starting a bridge group for the first time, there are many details that require attention.

The selection of the room is a very important aspect. It must be well lit with adequate ventilation as cigarette smokers tend to flourish when playing bridge. The tables should be standard card table size (.65 to 1.00 ms. square) with a good playing surface such as felt or cloth, preferably in a form that is removable for cleaning yet is fixed firmly in place during play. The chairs should be as comfortable as the budget will allow preferably with arm rests. During play the tables tend to become cluttered with cigarette packets, matches, pencils, coffee cups and ash trays. For greater comfort it is desirable to have small side tables for these things. A better alternative is to provide tables with small slide-out shelves on each side. Players can place their coffee cups on these shelves which are also convenient for handbags.

The amount of space required for the tables is the next problem. The absolute minimum is 6.25 square metres for each table i.e. spaced with 2.50 metre centres. A more comfortable arrangement is 3 metre centres and ideally 3.50 metre centres should be available for each table. Well-spaced tables prevent players overhearing the bidding at adjacent tables and also eliminate the possibility of accidentally seeing hands still to be played.

Another desirable feature is the placement of the tables square to each other and in a straight row with North in the same direction at each table. The result of this setting is that if say South looks past his partner, then, if he sees any hand at all, he can see only the hand that is held by South at the next table.

The following items are required to conduct the average duplicate event:

- Set of boards
- Set of table numbers
- A supply of travelling score sheets
- Ash trays
- Enough playing cards for the boards
- A set of Howell guide cards
- Recap sheets
- Pencils for the players
- Scoring pens for the scorers
- Tables and chairs

The set of boards is usually numbered from 1 to 32, but sets can be purchased numbered from 1 to any number up to 36 or even higher. The set of table numbers must naturally cope with the expected attendance but two or more sets of table numbers may be required if the tournament is to be divided into more than one section. While Howell guide cards will be needed for 3 to 6 tables at least, most directors have available guide cards for 7 and 8 tables. These guide cards can be made up from the schedules in this book or can be purchased from tournament bridge suppliers. Recap sheets are not always needed but less experienced scorers cannot manage without them and some types of tournaments dictate their use.

Other items may be needed as the occasion demands or if the attendances are higher particularly for congress events. These include:

- Teams score sheets
- Silent bidding slips or bidding boxes
- Hand record slips for predealt hands
- System cards
- Master result sheets
- Players name sheets for pair number assignment
- Set of round robin draw sheets for teams events
- Individual event guide cards
- Pick-up score slips

These items are only needed for specialised applications and their uses are covered in various sections of this book.

It is very important always to start the game on time as this will deter players from arriving late. Before the game starts the director or an assistant may assign the places and pair numbers, and at the same time the table money may be collected. Whether or not this has been done the players should be asked to take their seats at least one minute before the starting time to counteract the normal milling around, where players stand around, talking, looking at scores etc. Once the players are seated, and their attention gained, there are invariably some announcements to be made. If the table money has not already been collected, then the amount and method of collection should be announced. Any other general announcements for the event at hand should now be made. Other announcements may be delayed to some more appropriate time (such as supper time if held, or preceding the last round, especially if the announcements pertain to the next week's duplicate).

STARTING THE GAME

The announcements that need to be made at the start of play relate to the present event. If the pair numbers have not already been assigned, then these should be given. In a Howell movement these can be extracted from the guide cards. If the movement is a Mitchell it is usual to announce that the pair number assignment is the same as the table numbers. If the Mitchell is a scrambled movement, the E-W pairs add their table number to the number of the highest numbered table to obtain their pair number. The type and method of movement and also the scoring method such as match-pointed pairs, total point scoring etc. should be announced. If the method is match-pointed pairs, the "Top" and the type of match pointing should be announced.

If the pair names are to be entered on a separate sheet or on the travelling score sheet of the first board, or if the hands are to be recorded on the travelling score sheets, such requirements should also be announced. It is desirable to keep the game tight by having a time limit on each round. The players should be informed of the time allotted per round. On those occasions when the boards have been predealt, the players need to be told to prevent their shuffling and dealing the boards.

It is needlessly risky to place predealt boards on the tables before the first round is ready to start. Where the boards have not been dealt, the players are requested to do so.

As a resume the following points may have to be raised:

- Pair number assignment
- Type of movement
- Scoring method
- Pair names
- Time limits
- Shuffle and deal
- Record the hands

CALLING THE CHANGE

The calling of the change is done by simply saying "E-W move please" if the event is a Mitchell movement and "move please" if the event is a Howell. In a pairs event the change should be called when $\frac{3}{4}$ of the field has finished play. When a time limit has been placed on each round the change call should be called promptly on the time run out. This time limit varies but recommended limits are for 2 boards 15 minutes, 3 boards 20 minutes and 4 boards 25 minutes.

If the object of the event is to get through as many boards as possible, the changes for 2 board rounds can be reduced to 13½ minutes or to a slightly more leisurely 14 minutes. For a high number of boards, in particular for teams events, around 6 to 6½ minutes a board is an adequate time limit. When time limits are first introduced to the players, there is usually some reaction, but after a couple of weeks the players become used to it. Even when the time limit is low (such as 13½ minute changes for 2 boards) the players become accustomed to the routine and except for a few slow pairs, the limit can gradually be cut back even further.

When time limits are in use a warning that time is running out should be issued. For example, with two boards per round a warning should be given 1 to 2 minutes before the change is called. If the players have not finished when the call for the change has been made, some sanction should apply. If the opening lead has not been made then play on

the hand should be terminated. It is possible to play the board later sometimes or otherwise an average score should be awarded (but remember that this is not fair to the rest of the field). The numbers of any pairs who are still playing after the change has been called should be noted.

To be fair to all pairs, some form of slow play fining method should be in force. A method that seems to work is as follows; the first two occurrences of slow play are ignored (but the players are warned); for the next a 20%-of-a-top fine is applied; the next 30% and so on. This way the continually slow pairs are certainly punished, while the pairs who are slow only against the slow pairs will not be fined at all. The players should of course still have the right to appeal to the director for leniency by calling the director to the table when their opponents are being slow. In this case the director should be summoned during the play and the case put forward in front of their opponents. Deliberately slow play should be looked upon as a serious offence.

Just before the change is called, the volume of conversation increases rapidly and it is important that the director keep this chatter down for the comfort of the people still playing. A quietly run duplicate is always a pleasure to return to and players will encourage friends to attend.

A procedure that the director should instil into the players is always to call the director even for the most minor infringement.

When the director has been called to the table he should listen to both sides of the story, establish the facts and obtain agreement. The rights of both pairs should be clearly and thoroughly explained. The ruling should be given promptly and correctly and preferably from the rule book. Even if you (as director) do not know all the rules by rote, it is important that you know where to find the particular rules for quick reference.

All the players (in particular strangers to the club) should be aware of any local rules and the fact that they are local rules. One of the more common local rules applies to a card played from dummy, because the international rules give two alternatives; naming or picking up the desired card.

All players should be made aware of the proprieties and be expected to maintain the level of etiquette the game deserves.

One section of the proprieties that generally covers all etiquette is part 3:

GENERAL PROCEDURES AND ETIQUETTE

"A player should maintain at all times a courteous attitude towards his partner and opponents. He should carefully avoid any remark or action that might cause annoyance or embarrassment to another player, or might interfere with the enjoyment of the game."

The players should be aware that they can appeal for a review of any ruling made by a director where he has had to exercise discretionary powers.

THE MITCHELL MOVEMENT

3

INTRODUCTION

Every pairs tournament movement has three basic components; the boards, the tables and the pairs. The tables are a trivial component as they are stationary.

In a Mitchell movement, the pairs comprise two components, the N-S pairs and the E-W pairs.

Therefore the four components of a Mitchell movement are N-S pairs, E-W pairs, boards and tables. The number of tables equals the number of N-S pairs equals the number of E-W pairs. The number of boards is a multiple of the number of tables. Is it also possible for N-S pairs to equal E-W pairs minus 1 or E-W pairs plus 1 (the half table movement).

The object of the Mitchell movement is all the N-S pairs meet all the E-W pairs while all pairs play all the boards.

Except for a slight modification with an even number of tables, this is achieved by one component remaining stationary (together with the tables), while another component moves up one table and the final component moves down one table.

The normal procedure is for the N-S pairs to remain stationary, the E-W pairs to move up one table, and the boards to move down one table.

The advantage of moving the boards, instead of their remaining stationary, is that there is less movement of people around the room at change time.

With the boards stationary and both groups of pairs moving, the advantages are that the boards will never be misplaced, and the pair numbers (both N-S and E-W) are in sequence and errors are obvious in entering pair numbers.

Too much movement during the change tends to spoil the event. On the other hand, if a movement is using more than one room, then keeping the boards stationary is highly recommended (also see "switch Mitchell").

As it is quite clear that no pair meets another pair sitting in the same direction, there will be two winners. Mathematically, this does produce the ideal situation: each pair being compared with the same set of pairs on each board and all pairs playing all boards. *This movement is then said to have perfect comparisons.* The following schedules will help clarify these points.

This is the very simple case of a three table Mitchell. The N-S and E-W pairs are shown, for example, as 2-3 respectively. The board set 1 indicates a set of boards numbered 1 through 8 or 1 through 9 etc., depending on the number of boards in the movement (24 and 27 in these two cases).

Table	1	2	3
Round 1	1-1	2-2	3-3
Board set	1	2	3
Round 2	1-3	2-1	3-2
Board set	2	3	1
Round 3	1-2	2-3	3-1
Board set	3	1	2

EVEN NUMBER OF TABLES

There are two ways of organising the movement for an even number of tables: the SKIP Mitchell and the RELAY Mitchell. See the whist movement and multiple teams movements for even tables for other solutions to this problem.

SKIP MITCHELL

The skip Mitchell was devised by E.T. Baker circa 1892. It proceeds the same way as the standard Mitchell with the exception that after the half way round, the E-W pairs skip one table by proceeding up two tables rather than one. The boards move the same as the standard Mitchell throughout.

Clearly, the E-W pairs will reach the table before the one at which they started, one round before the end. If the last round is played, the E-W pairs will play the pairs against whom they started: called the *revenge* round. Note that the E-W pairs do not play the N-S pair that they skip at the halfway mark. This means that the comparison of players is not equal, but on the other hand the movement is very hard to foul up, whereas the relay Mitchell has many areas in which things may go wrong.

Where there is an even number of tables and an incomplete Mitchell (curtailed Mitchell) is needed, then the skip Mitchell must be used. This can be terminated at any point during the movement and all the boards will have been played an equal number of times.

It was pointed out that the skip should occur just after the half way point in the tournament. This means, for example, that in a 14 table Mitchell, the skip would occur after the 7th round has been played.

It is also possible to skip earlier than this point. This is handy if you have two or more sections of even tables, but of different sizes, and all sections are going to play the same number of rounds. This means that the skip can be announced for all sections at the same point. The formula for finding the earliest round at which the skip can be announced is:

$$E=R-T/2*$$

where:

E = the earliest round

R = the number of rounds to be played

T = the number of tables in a section

* Supplied by "Bridge Director's Manual" by George W. Beynon.

If, for example, you have two sections, one of 14 tables and one of 16 tables and you want to play 13 rounds, making a 26 board tournament, then clearly, the skip for the 14 table section will be made after the 7th round. The play will finish when the E-W pairs have played the table just before the one at which they started. In the 16 table section the earliest round at which the skip may occur is:

$$E = 13-16/2 = 5$$

Therefore the skip may also be called after round seven in the 16 table section.

Further curtailing of the movement is possible if desired, such as terminating after 12 rounds in the above example.

If the early skip has been used it is also possible to continue the movement right to the end if it is decided not to terminate the movement early. All that is changed is the pair against whom the revenge round is played. If the skip is made one round earlier than the normal skip point, then the E-W pairs remain at the table of the second last round and only the boards move for the change into the last round.

If the skip was made 2 rounds before the normal change point, then the E-W pairs play against the same N-S pair for the 3rd last and the 2nd last rounds and move normally into the last round. With the skip three rounds before normal, the repeat occurs on the 3rd and 4th last rounds and so forth.

In the example above, the 16 table movement could continue normally to the 15th round: then for the last round, only the boards would move.

An alternative procedure for the skip Mitchell could be called the REPEAT Mitchell. The movement is basically the same as the normal Mitchell movement, but instead of the skip at half way, the E-W pairs repeat play against the same pair. For example, in a 14 table Mitchell the move after the 7th round is:

- N-S remain stationary
- E-W remain stationary
- boards move down (up) 1 table

This procedure eliminates the skip and moves the repeat play from the first pair played to the middle pair.

THE RELAY MITCHELL

The relay Mitchell adopts the same movement procedure as the standard Mitchell, with the N-S pair stationary and the E-W pairs moving up one table and the boards moving down one table. The difference lies in the arrangement of the tables and the distribution of the boards. The boards are distributed as usual, with set one on table one, set two on table two and so on until exactly half the sets of boards have been distributed.

The next set is placed on a relay table, at which there are no players and which is usually a small side table placed there for this specific reason. The rest of the sets of boards are distributed normally with the next available set going on the next table in play and so forth.

With the director starting out with the same number of sets of boards as there are tables, it is obvious that there will not be a set for the last table as one set is on the relay table. This last table (without a set of boards) will share boards with the first table for the duration of the movement.

The boards still move down one table at each change except that now the boards that were shared at table one and the last table move down to the second last table. With N = the number of tables in the movement, the boards on table $N/2+1$ will move on to the relay table and the boards on the relay table will move on to the table $N/2$.

RELAY MITCHELL PROBLEMS

There are several areas in this movement that need close attention. The first of these is the moving of the boards on and off the relay table. The second is the placement of the relay table in the correct position; occasionally even the most experienced director slips up. If this does happen, then it is possible to correct the error by the following procedure. If the byestand table is misplaced, hopefully it will only be by one table higher or lower than the correct position.

If the byestand table has been placed one position too low then the players will notice the boards are incorrect on the $(N/2+1)$ th round at which point the correction will have to take place.

With the change into the $(N/2+1)$ th round having been made:

- Move the byestand up one position to its correct position
- Exchange the sets of boards on the byestand and the $N/2$ th table (Board set one now will be on the byestand)
- Have the N-S pairs at tables N and $N/2$ swap places for this round only, returning to their original tables for the rest of the movement
- For this round $(N/2+1)$ and subsequent rounds the highest numbered table (N) should share boards with the second highest table (N-1) rather than table 1

If the byestand has been originally placed one position too high it will also be noticed on the $(N/2+1)$ th round at which point the correction will have to take place.

With the change into the $(N/2+1)$ th round having been made:

- Move the byestand down one position to its correct position
- Exchange the sets of boards on the byestand and the $(N/2+1)$ th table (Board set one will now be on the byestand)
- For this round and subsequent rounds table 1 will share boards with table 2 rather than the highest numbered table (N)
- On the last round have the N-S pairs at tables 1 and $N/2+1$ swap places

In defining the standard movement for the Mitchell it was pointed out that it is possible to have stationary boards. As this is occasionally needed or desired (see switch Mitchell) then the method for having stationary boards with an even number of tables is as follows.

**EVEN TABLE MITCHELL
ORGANISATION**

With the share and relay it is not possible to have stationary boards as this requires the share and relay of a pair! On the other hand the SKIP Mitchell lends itself to this quite well. The pairs move normally (for example N-S up one table E-W down one table) up to the half way point at which the N-S pairs continue to move as usual and the E-W pairs skip one table. For the last round the E-W pairs move to the table which they skipped with the N-S pairs still moving normally. Unfortunately *therevengeround* still occurs in this movement.

When arranging the tables for Mitchell movements the horse-shoe pattern is usually adopted for this takes any burden off the players as to their next table when they reach the highest numbered table in the movement. This arrangement is also very useful in the share and relay movement as the positions of the share and relay tables are clearly defined.

Examples:

7 table Mitchell:	1	2	3	4
		7	6	5
8 table Mitchell:	1	2	3	4
	share			relay
	8	7	6	5

HALF TABLE CONSIDERATIONS

The standard Mitchell movement caters for half tables quite well. The table at which the odd pair is sitting (usually the last table) is treated as a full table for the purposes of distributing boards and determining the type of movement that is to be used. For example an 8½ table movement is treated as a 9 table movement, with three boards placed on each table making a total of 27 boards. Making the N-S pair at table 9 the phantom pair, the E-W pair at that table sits out on each round so that the movement proceeds quite normally to the end. All the N-S pairs will have played 27 boards while all the E-W pairs will have played 24 boards. Note that if you are using stationary boards, the phantom pair should be an E-W pair to facilitate the scoring.

With an even number of tables (including the half table) then the standard SKIP Mitchell should not be used as the pair that sits out on the first round will also have to sit out on the last round. On the other hand, if the movement is to be curtailed before the last round, then it is possible to use this movement. Remember that this method introduces score factoring problems. If the movement is to be curtailed, the rover Mitchell (see below) should be used.

Another alternative with the even number of tables is the standard RELAY Mitchell. Here the odd pair is placed E-W at the highest numbered table (one of the share tables) and all the E-W pairs sit out there. The advantage of this movement is that the relay is effectively removed from the game as the boards being shared are not being played at one of the share tables.

This is also known as the bump Mitchell. It is an early attempt at the rover Mitchell and does work quite effectively. For this movement to work a basic Mitchell plus a pair is needed. The SKIP Mitchell is used with an even number of tables.

DISPLACEMENT MITCHELL

The basic Mitchell proceeds normally (including the skip at the halfway point in the SKIP Mitchell) and only the odd pair needs any special consideration. After the first round the extra pair, (which is assigned the N-S number one higher than the highest numbered table in the movement) replaces the N-S pair at table 1 while that pair sits out for the second round. The highest numbered pair remains at that table as N-S for the rest of the session. On the third round the N-S pair 1 replaces the N-S pair at table 2 and stays there for the rest of the event. This pattern is followed for the rest of the event with each sit-out pair returning to the next higher numbered table. It is important that the N-S pairs keep the same pair number throughout the event.

The disadvantage with this movement is the last round of the event cannot be played, as the majority of the pairs will have played the boards on their table on the last round. When scoring care must be taken that the scores of the pairs who sat out are adjusted to those of the pairs who did not.

This movement can be altered so that the last round can be played. The trouble is all but two N-S pairs will repeat play against one pair in an odd table movement and all but three pairs will repeat against two pairs in an even table movement. In this case the movement is the same as before except that the sit out pair replaces the next lower numbered N-S pair, rather than the next higher numbered pair.

The replacement Mitchell (now called the rover Mitchell) was originally devised by D.A. Sweet of Chicago and was applicable only to movements with a prime number of tables, plus the odd pair. (A prime number is a number only divisible by itself and one) i.e. the movement is useful for $5\frac{1}{2}$, $7\frac{1}{2}$, $11\frac{1}{2}$, $13\frac{1}{2}$, $17\frac{1}{2}$, $19\frac{1}{2}$, $23\frac{1}{2}$, $29\frac{1}{2}$ and $31\frac{1}{2}$ tables.

ROVER MITCHELL

The base movement is set up as though the $\frac{1}{2}$ table does not exist. All boards are always in play with one set of boards on each table.

The odd pair is assigned a pair number one higher than the highest numbered table. They sit out on the first round and enter the movement on the second round by replacing one of the N-S pairs in the movement (usually N-S table 2) but only for that round. After this round the original N-S pair return to their table and the "roving" pair move on by going up two tables (or down two tables, but preferably in the same direction that the E-W pairs are moving). This procedure, of moving up by two tables, is continued to the completion of the movement, or the curtailment of the movement, whichever is first.

The real advantage of using rover Mitchells is that all boards are played the same number of times, and as such, the *Top* is always the same on all boards.

The obvious extension of this movement to other numbers of tables was devised by Sam Gold in 1961. The simple case of this extension is for an even number of tables, but not those divisible by 3, plus the half table i.e. $4\frac{1}{2}$ (but see below), $8\frac{1}{2}$, $10\frac{1}{2}$, $14\frac{1}{2}$, $16\frac{1}{2}$, $20\frac{1}{2}$, $22\frac{1}{2}$, $26\frac{1}{2}$, $28\frac{1}{2}$ and $32\frac{1}{2}$. With the SKIP Mitchell being used for the basic movement and the odd pair sitting out on the first round, they enter the movement on the second round by displacing the N-S pair at table 2, but only for that round. The rover pair then move up 2 tables at each change until the round when SKIP is called. When the skip is called the rover pair *moves to table 3* and proceeds normally for the rest of the movement by moving up two tables at each change. The SKIP Mitchell can proceed to the last round where the normal revenge round is played and the rover pair will repeat against their first opponents (E-W pair 1).

The next type of rover is for movements where the base is divisible by 3. i.e. $6\frac{1}{2}$, $9\frac{1}{2}$, $12\frac{1}{2}$, $15\frac{1}{2}$, $18\frac{1}{2}$, $21\frac{1}{2}$, $24\frac{1}{2}$, $27\frac{1}{2}$ and $30\frac{1}{2}$. Unfortunately there is no set pattern for these rover Mitchells and consequently it is necessary to supply the roving pair with a guide card to use the movement.

The following rover guide list assumes that in even table movements the N-S pairs are stationary, while the E-W pairs move up 1 table and skip after the half way round. The boards move down one table.

Occasionally the roving pair will have to repeat against one E-W pair. This is shown by an asterisk(*) next to the number of the table at which the pair will be met the second time. It should be noted that the movement cannot always be completed. To do so the rover would have to repeat displacement of a N-S pair.

The roving pair is assumed to have sat out for the first round and the guides start at the table at which the rover displaces the N-S pair on round 2.

9 Tables:

2 4 6 9 3 5 7 8*

12 Tables:

2 10 8 6 4 1 11 9 5 3

15 Tables:

2 13 11 9 7 5 1 14 12 10 8 4 (curtailed at 13 rounds)

15 Tables:

2 13 11 9 7 5 1 14 15* 10 6 4 8* (curtailed at 14 rounds)

18 Tables:

2 16 14 12 10 8 6 3 1 17 15 13 11 9 7* 4*

18 Tables:

2 16 14 12 10 8 6 3 1 17 15 13 11 9 5 (curtailed at 16 rounds)

The following list is for even tables using the share and relay method, again with the guide starting at round 2.

4 Tables:

1 4 2

6 Tables:

5 3 6 4

8 Tables:

1 6 2 7 3 8 4

10 Tables:

1 7 2 8 3 9 4 10 5

12 Tables:

3 9 4 10 5 11 6 12 7 1 8

14 Tables:

1 9 2 10 3 11 4 12 5 13 6 14 7

16 Tables:

1 10 2 11 3 12 4 13 5 14 6 15 7 16 8

18 Tables:

4 13 5 14 6 15 7 16 8 17 9 18 10 1 11 2 12

This movement is a very useful movement when the previous movements for half table Mitchells produce events of cumbersome or unsuitable length. For example the 10½ table event can be run as straight Mitchell with 22 or 33 boards in play, or as a rover Mitchell on base 10 with 20 or 30 boards in play. When using the 1½ table appendix Mitchell the number of boards in play is 27.

1½ TABLE
APPENDIX MITCHELL

To construct this movement, first of all subtract $1\frac{1}{2}$ tables from the number you have, and set up a Mitchell for that number. The SKIP version is used for even numbers of tables. The $1\frac{1}{2}$ tables are then appended on to this base by placing the whole table next to table 1, so that they are in a position to share boards. In the $10\frac{1}{2}$ table example above, the base is 9 tables long, with 3 boards on each table, and table 10 shares boards with table 1 while the $\frac{1}{2}$ table pair takes number 11 as their pair number and sit out for the first round. The move as far as the pairs are concerned is the same as if they were in a straight 11 table Mitchell, moving up one table at each change and going to table 1 after the bye table. The boards on the other hand, move as though they were in a standard 9 table Mitchell, moving down one table at each change, *going to table 9 after table 1*. When the base is an even number of tables, the SKIP occurs after the round number which is equal to half the number of tables in the *base*. Also the number of rounds in the event is equal to the number of tables in the base and, delightfully there is no revenge round.

SMALL MOVEMENTS AND HALF TABLES

When the number of tables is low and you still require a Mitchell movement when you have a half table, there is one problem; the sit-out pairs have to sit out for a large number of boards. With $3\frac{1}{2}$ tables a Howell is the only movement that should be used. With $4\frac{1}{2}$, $5\frac{1}{2}$ and $6\frac{1}{2}$ tables, the appendix Howell is still the best, with the possible exception of $5\frac{1}{2}$ tables where there is either 22 or 33 boards in play in the Howell. With these last three using standard Mitchells the minimum number of boards that a pair sits out for is 4 (at least half an hour). The same thing happens with rover Mitchells. However if you do not have Howell guide cards, this problem can be solved the following way.

Set up a Mitchell for the base number of tables (i.e. 4, 5, or 6 tables) using the share and relay version with the even tables. Use only an even number of boards per table (i.e. place 4 or 6 boards on each table). This basic movement will be run as a standard SWITCH Mitchell (see below). The extra pair will play as a roving pair, with the exception that they start play after the first pair they are going to replace, has played *half* the boards in play on the first round. From then on the roving pair replaces the N-S pair for half the boards on each round and the E-W pair for the other half of the boards. This way the sit-out pairs only sit out for 2 or 3 boards. Care must be taken with the scoring as one pair does not sit out at all so that factoring of scores is required.

The following schedules show the tables that the roving pairs move to on each round (with the E-W pair they replace after half the boards, shown in brackets). The E-W pairs are assigned a pair number equal to their original table number plus the number of tables in the movement.

In the movements the N-S pairs are assumed to remain stationary, the E-W pairs move up one table and the boards down one table.

4 Tables:

2, 3(6), 1(7), 4(5)*

5 Tables:

1, 3(7), 5(8), 2(9), 4(10)*

6 Tables:

1, 3(8), 5(9), 2(11), 4(12)*, 6(7)*

* These are switch rounds and the pairs are replaced in reverse order.

The roving pair in these movements will be assigned a pair number equal to $2N+1$ where N = the number of tables in the base.

For further treatment of half table problems see the section on appendix Mitchells. For $3\frac{1}{2}$ tables see extra board movements.

SWITCHED MITCHELL (SCRAMBLED MITCHELL)

As already pointed out in a Mitchell movement there are two fields (N-S and E-W) and as such the movement produces two winners. Where one winner is needed and a Howell movement is not suitable because of the size of the movement, the solution is to have a switched Mitchell. The switched Mitchell is the same as an ordinary Mitchell in that there are two fields (N-S and E-W) in the movement and they only play against each other. The difference arises in the comparison of the scores with the N-S pairs playing as E-W on some of the rounds. This is usually achieved by switching the board through 90 degrees rather than the players changing positions. The comparison of the scores can never be perfect in this movement. (See Howell Movements for further treatment of balanced movements).

There are a few methods of conducting switched Mitchells. In the first the director announces each round where boards are to be arrow-switched, as it occurs. This means the board is played with the N position of the board pointing E or W on that round so that the E-W pair is playing as N-S. This also means that the E-W pairs cannot have the same pair number as their original table number as this would confuse their results with their first N-S opponents. This can be avoided by adding the highest-numbered table number to the pair number of each E-W pair. For example in a 7 table movement all the E-W pairs would add 7 to their original table number to determine their pair number.

The recommended rounds where the switches are: (the even table movements are share and relay type)

TABLES	SWITCH ON ROUND
4	3
5	4, 5
6	3, 5, 6
7	4, 6, 7
8	3, 4, 5, 8
9	4, 5, 6, 9
10	3, 4, 5, 8, 10
11	4, 5, 6, 8, 11
12	4, 5, 6, 7, 9, 12
13	4, 5, 6, 7, 9, 13
14	4, 5, 7, 10, 11, 12, 14
15	5, 7, 10, 11, 13, 14, 15
16	5, 6, 7, 9, 10, 13, 15, 16
17	3, 4, 5, 7, 8, 9, 14, 17
18	5, 6, 7, 10, 12, 13, 14, 15, 18
19	5, 7, 8, 12, 14, 15, 16, 18, 19
20	5, 6, 7, 10, 12, 15, 16, 18, 19, 20
21	5, 7, 8, 11, 13, 14, 15, 16, 20, 21
23	5, 6, 8, 11, 12, 13, 17, 18, 21, 22, 23
25	5, 7, 8, 9, 13, 14, 17, 18, 19, 21, 22, 25
27	5, 7, 10, 11, 12, 15, 17, 18, 19, 23, 24, 26, 27
29	6, 7, 9, 12, 13, 14, 18, 20, 21, 24, 25, 26, 28, 29
31	5, 6, 7, 9, 13, 14, 17, 19, 20, 21, 22, 26, 27, 30, 31

A second method of conducting the switched Mitchell (for an odd number of tables) is called the Boufos Mitchell (after the town in Sweden from where the switched Mitchell, and in particular this movement, originated).

The field is divided into two groups (but not a N-S group and an E-W group). With N tables in the movement, where N is odd, the pairs in group one are numbered from 1 to N and in group two from N+1 to 2N. Call the first group "A" and the second "B". The above schedule for switching is then used to seat group "A". For example in a 5 table movement, pairs 1, 2, 3 sit at N-S 1, 2 and 3 respectively, and pairs 4 and 5 sit E-W at 4 and 5. Group "B" fill in the remaining positions. When the change is called, group "A" move *up 1 table*, occupying the position vacated by the pair in group "A" at that table. Group "B" follow

pairs in group "B" while moving *down 3 tables*. The boards move *down 1 table*. The Boufos Mitchell is particularly useful (with guide cards for the pairs) in the combined Howell-Mitchell.

As the above schedules for table switching do not produce perfect comparisons, and in particular as there is invariably one table that "forgets" to switch, it is not necessary to have the best available switching. In fact this next method of switching is easily the most practical, and is recommended for the skip Mitchell. Adequate comparison of pairs is obtained by switching the last one third of the rounds in the event. To determine the number of rounds divide by 3 and round $\frac{1}{3}$ down and $\frac{2}{3}$ up. For example 7 tables, $7/3 = 2\frac{1}{3}$ so switch last two rounds; 8 tables, $8/3 = 2\frac{2}{3}$ so switch last 3 rounds. The advantage of this is that once the switch has been announced, there is no returning to the original direction; in fact the pairs can physically change directions. This method is ideal when used with stationary boards, since there is no problem with switching, as the pairs do in fact change directions. All pairs keep moving in the same direction as that before the switch. Care must be taken when scoring a switched Mitchell and it is particularly important that the pair sitting N-S should enter the score on the score sheet next to their number.

This movement has two advantages:

- a predetermined number of boards can be played irrespective of the number of tables (within a given number)
- a large number of tables can be accommodated with a relatively low number of boards

The disadvantages are that many pairs are moving, and the large amount of board sharing tends to slow the movement down.

An appendix table is a table added on to a basic movement without changing the movement of the boards. This table shares boards with one of the tables in the movement (the appendage table).

The Beynon Appendix Mitchell will only work where the basic Mitchell movement has a prime number of tables (N). From one (see rover table in preference) to N (see twin Mitchell in preference) tables can be appended on to the base.

First of all a standard Mitchell of 5, 7, 11, 13, 17 or 19 tables is set up. More than this is impractical because of the large number of boards, even if they are twinned to alleviate sharing. The first appendix table is positioned next to table 1 and so becomes appended to it. The second is appended to table 2 and so on. These appendix tables are numbered N+1, N+2 etc. It is not critical for the appendix tables to be appended in order from table 1, but for ease of instructions to the pairs on their

**BEYNON
APPENDIX MITCHELL**

movement, that setting is recommended. Both the appended and the appendage tables contain one stationary pair, but one must be a N-S pair and the other an E-W pair.

For the sake of describing the rest of the movement we will assume that the N-S pairs in the base movement, and the E-W pairs at the corresponding appended tables, are stationary.

Apart from these stationary pairs, the rest of the pairs and the boards are moving. The boards as usual move down one table, but remember they stay within the base movement, never actually "moving to" the appendix tables, only going there when in "share". The N-S (or E-W) pairs move up one table, and the E-W (or N-S) pairs move either up two tables or down two tables. The latter choice is better as that group can be given the responsibility of moving the boards ("E-W move down two tables, dropping the boards off one table down"). The N-S pairs move up one table at each change, proceed through the appendix tables then switch over to the next available N-S place in the base movement. The E-W pairs on the other hand move down two tables, staying within the base movement throughout the event.

With a half table, the odd pair is placed at the last of the appendix tables as a moving pair, but remember to keep the N-S pair stationary at the appendage table. A scrambled appendix Mitchell is possible, with the switching of the last third of the rounds. The players can change directions at the switch round, but continue to move in the same direction as before the switch.

As with any Mitchell movement, the appendix Mitchell can be played in two stanzas, playing half the boards in the first half and repeating the movement for the second half, while the director scores the first half. This works only for a small number of tables as there must be at least two boards in play on each round for sharing purposes. This means that each pair plays four boards against each other pair so that the largest size base possible is seven tables.

With a low number of tables (for example a five table base) the half table again becomes a problem, with that pair required to sit out for at least five boards. Even the 7 table base appendix movement with a half table is not attractive as they would normally have to sit out for 4 boards. The switching rover can again be used by having the rover pair replace the N-S pair for half the boards and the E-W pair for the other half of the boards. The rover pair only moves within the base movement, sits out for the first half round and replaces the N-S pair at table 1 for the second half of the first round. The roving pair then moves up two tables (assuming the other pairs are moving down two tables; if not it will be vice-versa) first replacing N-S, then E-W. For example, in a movement with a 7 table base, the roving pair moves 1, 3, 5, 7, 2, 4, 6. This is usually only used in conjunction with the switch Mitchell.

ROVER TABLE MITCHELL

This is a modification and extension of the principles involved in the rover (replacement) Mitchell. This movement works only where there is a prime number of tables (N) in the base. 1 to N-1 tables can be appended to this base, but for practical considerations it is best not to have more than N/3 appendix tables. The standard base movement is set up and conducted as normal: N-S stationary, E-W move up one table at the change, and the boards move down one table. At the appendix table the N-S pair remains stationary. The E-W pair from the appendix table proceeds as a roving pair, replacing an E-W pair at one of the tables in the base. The replaced pair then moves to the appendix table and plays there as the E-W pair. The appendix table always shares boards with the table at which the roving pair is sitting. The roving pair then moves up 2 tables (or down 2 tables) at each change. The replaced pairs continue moving normally and move from the appendix table as though they had played at the table from where they were replaced. Several appendix tables can be added by this method with each roving pair starting at a different table. A half table rover can also be accommodated, with it starting at yet another table in the base, and proceeding as a normal rover.

This movement can further be improved with the base movement moving with an American whist movement. (N-S stationary and E-W move up two tables, dropping the boards off one table up). This way the roving pairs will move down one table at each change. Another alternative (slightly better, as there is less congestion) is the inverted whist: E-W up one table and the boards up two tables and the rovers down one table.

**BOWMAN-EWING
MITCHELL**

This movement is named after Mr. Bowman and Mr. W. Ewing of U.K.

It is an extension of the 1½ table Mitchell to a Mitchell with two appendix tables rather than 1. It has the advantage over previous appendix movements of not needing a prime number of tables in the base.

After setting up the base movement, with two tables less than the total number, the first appendix table (with a table number two more than the highest table in the base) is placed so as to share boards with the highest numbered table in the base. The other appendix table (with a number one more than the highest table in the base) shares boards with the second highest table in the base for the first round and then sharing two tables further down at each change. For example on a 5 table base, table 7 shares with 5 throughout and table 6 shares first with 4 then 2, 5, 3, 1. On a 6 table base, table 7 shares with 5, 3, 1, 5, 3, 1 and 8 with 6 throughout. Note the repeated share tables with an even base, and the three way share in one round with the odd base.

As with the $1\frac{1}{2}$ table Appendix Mitchell the pair movement for E-W is a pure Mitchell, moving up one table at each change; 5, 6, 7, 1, 2 etc. for a 5 table base movement. The only problem with this movement is the positioning of the second highest table to minimise the problem of the roving share. The boards move down one table at a time but always remain in the base.

SHARE AND RELAY ROVER TABLE MITCHELL

This movement follows the general principles of the rover table movement, by having the basic movement with one or more appendix tables sharing with different tables on different rounds. There are unfortunately several restrictions on this movement.

The number of tables in the base must be divisible by 4. The base movement is set up as a share and relay SWITCH Mitchell (switching the last $\frac{1}{3}$ of the rounds usually being adequate). With N tables the number in the base, then up to $N/2$ rover tables can be accommodated. It is normal for the first rover table to share with table N-1 and then move down two tables at a time until sharing with table $N/2+1$. After this they share with table $N/2$ and they again move down two tables at a time so that they traverse the same circuit again.

For example

4 tables: 3, 2, 3, 2

8 tables: 7, 5, 4, 2, 7, 5, 4, 2

12 tables: 11, 9, 7, 6, 4, 2, 11, 9, 7, 6, 4, 2

Second and subsequent rovers share on the first round with any one of the other tables in the circuit and then proceed twice around the circuit in the same order as given above. On the second encounter of the tables the rover table pairs exchange roles, thus in the same instance performing a switch.

CRISS-CROSS MITCHELL

This movement was first published by G.S.Coffin (U.S.A.) with the E-W pairs moving in two directions and the boards moving in two directions. This meant that the director had to move the boards and at best it required guide cards. When using stationary boards this movement becomes quite useful. It is applicable to all Mitchells with an even number of tables, but is best for movements where the number of tables is divisible by 4.

The modulus 4 case will be dealt with first. The movement is set up with one set of boards on each table as in a standard Mitchell. The move instructions are as follows:

- The boards remain stationary.

- The odd numbered N-S pairs move down one table for the whole movement.
- The even numbered N-S pairs move up one table for the whole movement.
- The odd numbered E-W pairs move up one table for the first $N/2$ rounds (i.e. $N/2-1$ changes where N = number of tables) and then move up $N/2$ tables after which they move down one table for the rest of the event.
- The even numbered E-W pairs move down one table for the first $N/2$ rounds and then move up (or down) $N/2$ tables after which they then move up one table for the rest of the event.

Of course the director does not bother the players with the details of the later moves at the start, but announces the unusual change at half time as in a skip Mitchell. For example, in an 8 table movement the director announces "All E-W pairs move up 4 tables" after the fourth round. After the 5th round the instructions for the rest of the movement are given. Alternatively, guide cards can be provided as players are notoriously poor listeners when instructions are given and there are invariably one or two pairs who "didn't hear".

Where the number of tables is not divisible by 4, but is even, the changes are the same until the half-way point when the change for the E-W pairs is to move up $N/2-1$ tables rather than $N/2$. The moves for the second half for the E-W pairs is still the same except that it is not possible to play the last round with the standard move. This ultimate move is the same as the halfway move of up $N/2-1$ tables. Even when using this move into the last round, the E-W pairs must repeat against one pair as in the skip Mitchell.

Any Mitchell can have extra sets of boards inserted in the movement by placing them on bystand tables at the correct positions.

EXTRA BOARD MITCHELL

The advantages of these are they lengthen the game without changing the basic movement and with an even number of tables they eliminate the share or the skip, and yet all E-W meet all N-S.

The disadvantage is that the E-W pairs meet some N-S pairs twice and in some cases three times.

There are three different cases:

- odd table movements
- even table movements
- movements divisible by 4

ODD TABLES

The standard Mitchell is set up and an even number of sets of boards are placed on a relay at the end of the movement (or for that matter anywhere in the movement). For example, in a 5 table Mitchell (with 2 extra sets to make a 28 board movement) set 1 (boards 1-4) is placed on table 1, set 2 (5-8) on table 2, ...set 5 (17-20) on table 5, and set 6 (21-24) and 7 (25-28) on the relay. The move is exactly the same as a standard Mitchell, N-S stationary, E-W up 1 table and the boards down 1 table, moving through the relay after table 1.

Unfortunately there is always one special move round. With 2 sets on the relay, the E-W pairs on the ultimate round find the table to move to by subtracting their pair number from $N+1$ (where N = number of tables in the movement). The boards still move normally.

With 4 sets on the relay, they subtract their pair number from N to find their seats on the penultimate round and then move normally (up 1) into the last round. With 6 sets, subtract their pair number from $N-1$ for the table on the ante-penultimate round, and then return to normal, moving up 1.

When the E-W pairs subtract their pair number from N , for one pair (highest numbered pair) zero is the answer; they must subtract their number from $2N$. In the $N-1$ case, for two pairs (N and $N-1$) the answer is less than 1. They then subtract from $2N-1$. These pairs should be given their instructions separately before or after general announcement.

In the example given above for 5 tables, the E-W pairs will be instructed to subtract their pair number from 6 to find the table at which to sit on the last round.

This extra board movement supplies us with a Mitchell for $3\frac{1}{2}$ tables. The movement is set up with three standard tables plus four extra board sets at the end so that there are 7 sets of boards in play. As there are seven pairs, a rover movement can be used and each pair can sit out for one set. Original N-S pairs are numbered 1, 2 and 3; the E-W pairs 4, 5, 6; the rover pair number is 7. A switch is needed at the 6th round, but as this is the round of subtracting their pair number from 3 (*pair number minus 3* for E-W i.e. 6 minus pair number) to get their table numbers, the pairs can also be asked to change directions at the tables. The N-S pairs are stationary throughout (except for the switch round) and the E-W move up 1. The rover pair sits out on the first round. They then go to table 1 replacing N-S pair 1 on round 2, and E-W pair 5 on round 3. Then 7 goes to table 2 replacing N-S pair 2 on round 4 and E-W pair 4 on round 5. Then to table 3 (after the switch has been called) replacing the N-S pair 3 on round 6 and E-W pair 3 on the last round.

Therefore the rover guide card is:

Round 1	2	3	4	5	6	7
Table sit	1	1	2	2	3	3
out						
Displace	NS1	EW5	NS2	EW4	NS6	EW3

A similar movement is available for 5½ table Mitchell with 11 rounds (i.e. 2-board sit-out).

Six relay sets are placed after the last table. E-W up 1 and boards down 1, through the relay. Pair 11 is a rover.

rover guide card:

Round	1	2	3	4	5	6	7	8	9	10	11
Table	1	3	5	2	4	1	3	sit	5	2	4
								out			
Displace	EW1	EW2	EW3	EW4	EW5	NS1	NS3		NS5	NS2	NS4

The unusual change occurs after round 8.

EVEN TABLES

Any even number of tables movement (including those divisible by 4) can be extended by placing an odd number of sets at the end relay and the same number of sets at a half-way point relay (or for that matter anywhere in the movement in opposite positions). For example in a 6-table movement, one set is placed between tables 1 and 6 and one set between 3 and 4. The movement is normal (E-W up 1, boards down 1, moving through the relays) with *no skip*.

The special move rounds are:

- With 2 one-set relays, the E-W pairs subtract their pair number from N + 1 to find their seats for the ultimate round
- With 2 three-set relays, the E-W pairs subtract their numbers from N-1 to find their seats for the ante-penultimate round, and then they move normally again, up 1 table

It is worth pointing out that with 4 and 6 tables other procedures with 2 three-set relays are possible. With 4 tables it is possible to omit the move on the ante-penultimate round and the E-W pairs subtract their numbers from N-1 on the ultimate round. With 6 tables simply omit all special rounds; they are not necessary.

Remember the number of rounds is equal to the number of sets of boards; not the number of tables.

TABLES DIVISIBLE BY 4

This extra board movement does not in fact lengthen the game but it does eliminate the share or skip and does give perfect comparisons of pairs.

A one-set relay is placed between each pair of tables. For example with 4 tables it is set up as 1 R 2 R 3 R 4 R, with one set on each table and each relay. As can be readily seen this does not increase the number of boards; for example instead of 4 x 6 boards, there are 8 x 3 boards. Each E-W pair plays against each N-S pair twice without a skip and without a special round. The movement is standard with the N-S pairs stationary, the E-W pairs moving up 1 table, and the boards down one *station* (i.e. table or relay) at each change.

If a half table is added to this movement and a switch is incorporated, the best procedure is to use a rover pair.

Rover pair guide card:

Round	1	2	3	4	5	6	7	8
Table	sit out	4	3	2	1	3	2	3
Replace		NS4	NS3	EW3	EW1	EW2	NS2	EW4

N-S 1 does not sit out. Rover play is repeated against NS3.

FATTENED MOVEMENT

This idea originated from Al Oszy (U.S.A.) and is a very simple method of lengthening a game without disrupting the current movement.

The director takes the next available board not in play and then on any round, the board is played by all tables. The board is moved as soon as it is finished by each table, and is played immediately a table receives it. This of course can be done for more than one board.

The director can score such boards immediately the round has finished as they have been played at all tables. This may require the board to be duplicated by the director.

ROVER BOARDS

This idea originated from H.O. Worger (Great Britain) and is used to add one extra set of board to any movement with a prime number of tables. The standard movement is set up and conducted the normal way. An extra set of boards then roves through the movement (like the rover pair) replacing the set of boards currently in play at the table at which the set arrives. The set starts at table 1 and then goes up two tables at each change. For the last round the players play the set of boards which they did not play on the round in which they played the rover boards. They play them against the same opponents against whom they played the rover boards.

For example with a 7-table Mitchell with 3 boards per table (1-3 on table 1, 4-6 on table 2, etc.) the rover set is boards 22-24 which are played on table 1 on round 1 instead of boards 1-3 and then move up two tables at each change (1,3,5,7,2,4,6). The replaced boards return to the movement and move as though they have been played at the table at which they were replaced.

With E-W moving up one table and the boards down 1 table, the last (8th) round sees E-W pairs move:

- 1 to table 1 playing 1-3
- 2 to table 3 playing 10-12
- 3 to table 5 playing 19-21
- 4 to table 7 playing 7-9
- 5 to table 2 playing 16-18
- 6 to table 4 playing 4-6
- 7 to table 6 playing 13-15

The players can be asked of course, to note the boards they miss and the opponents against whom they are to play the missed boards.

BAROMETERS FOR FEW TABLES

With a small number of tables to be run as a Mitchell (say 3, 4 or 5 tables) it is possible to have one set of boards played by all tables on a round simply by sharing all the boards of the set among all tables. For example 5-board sets can be shared among 4 tables quite easily. At the end of the round, the E-W pairs move up one table and all tables play the next set of boards by sharing them while the director scores the previous set. The scores for each preceding round can be announced during the play.

The number of sets to be played is limited only by time and play can stop after any round. In the above example 15, 20, 25, 30 or 35 boards can be played in 3, 4, 5, 6 or 7 rounds. The use of the Flower Howell movement can improve this concept.

E.E.Blandon was the first to publish this movement under this name (Bridge Magazine, Feb. 1973).

This is not a true Mitchell in that the E-W pairs sit as N-S on one round. Using switches at other tables however, it is unnoticed, for the movement is then effectively a switched Mitchell.

This movement is based on the share and relay Mitchell with one table removed (one of the sharing tables). The number of tables is always odd and the number of rounds (and the number of sets of boards) is equal to one more than the number of tables.

HESITATION MITCHELL

The movement is set up as a normal Mitchell, with one set of boards on each table. The only exception is the insertion of a relay table (with one set of boards on it) placed at $N/2$ (N = number of tables in the movement), i.e. with 3 tables at $3/2$ (1.5) or between tables 1 and 2; with 5 tables between 2 and 3, etc. The movement is along standard Mitchell principles, E-W up one table and boards down one table, not forgetting the relay table. The only complication is in the movement of the E-W pairs, for when they have played as E-W at the highest numbered table, they switch to N-S at the same table, to play there for one round before moving to E-W at table one for the next round.

This movement has very few real applications, but one use is in combination with the Block Mitchell principle to produce a movement useful for 12 to 24 tables. See "large pairs movements".

TWIN MITCHELLS

Even though this movement belongs strictly in large pairs movements it has some uses in smaller Mitchells. For small Mitchells, with an even number of tables where half the number is odd (6, 10 and 14 tables) this can be very useful. The movement is divided into two sections of standard Mitchells with one section having tables 1 to $N/2$ and the other $N/2+1$ to N . Tables 1 and $N/2+1$ share boards, 2 and $N/2+2$ share boards, etc.

The two sections move independently, so that when the E-W pairs and the boards reach one end of the row, they go to the other end of the same row. Only half the boards are in play for when the E-W pairs have played all the N-S pairs in that section (thereby also having played all the boards), they swap places with the E-W pairs in the other section and a new set of boards is introduced into play and the same procedure as before is followed. There are two advantages with this movement:

- no relay tables (to misplace) and no skip
- half the boards can be scored by the end of the event

The disadvantage is that there are shares throughout the event but this can be overcome by duplicated boards. Extra boards can be added by using standard extra board methods.

Where the number of tables is such that half the number is even, the same procedure can be followed by placing the share and relays of the two sections opposite each other (see "large pairs movements" for more details). Better still, use the modified multiple teams movement that follows.

STAGGER MITCHELL

Two rows of tables are set up beside each other so that board sharing is possible. For example with 8 and 10 tables the arrangement is:

1	2	3	4	1	2	3	4	5
5	6	7	8	6	7	8	9	10

The pairs move as in a whist movement; boards up 1 table, E-W up 2 tables (or down 1 and 2 respectively) and because there is sharing, the boards do not need to stay on the one side of the movement. The E-W pairs must be careful when they reach the end of a row as they must swap rows *and go to the other end*.

When the boards have been played (i.e. after N/2 rounds), they are removed and a new set introduced; at the same time the E-W pairs move up 1 table. The movement then continues as before while the director scores the first half. The advantages of this movement are exactly the same as those in the standard twin Mitchell, with the added advantage that it works for all even numbers of tables.

**BLOCK MITCHELL
(or TRISECT MITCHELL)**

This movement has been published under the two names:

- Block Mitchell by E.E. Blandon
- Trisect Mitchell by G.S. Coffin

The advantages apply when a large number of tables are spread over several rooms, as they can be run as one movement with a minimum of fuss; if the number of tables is odd and *not* prime, a rover pair or rover tables can be accommodated quite easily.

The principle involved in the Block Mitchell is much the same as the trisect and is covered more thoroughly in the section on large pairs movements.

The principle behind the trisect is to divide the movement into a number of groups of tables. 9 tables, for example, is 3 x 3, 12 tables is 3 x 4, and 15 tables is 3 x 5.

As conducting a Mitchell (including rovers) for 3, 4 or 5 tables has been covered, the organisation of the groups of movements is as follows.

The first sub-Mitchell has N-S pairs N1 playing against E-W pairs E1 with boards B1 over rounds R1. Similarly the second group have N2, E2, B2 and R2 and so on. So for the movement with three blocks of tables the schedule is:

N-S remain stationary.

Rounds	N1	N2	N3
R1	E1/B1	E2/B2	E3/B3
R2	E3/B2	E1/B3	E2/B1
R3	E2/B3	E3/B1	E1/B2

The rover tables in a 9 table movement use the following guide to decide which tables share boards:

rover 1 - 1, 4, 7, 5, 8, 2, 9, 3, 6

rover 2 - 4, 7, 1, 8, 2, 5, 3, 6, 9

rover 3 - 7, 1, 4, 2, 5, 8, 6, 9, 3

A rover pair can use the schedule for one of these, sitting out on the first round, and entering as E-W at the second table in the list.

Using the same principle it is possible to divide movements into different sizes and numbers of groups. For example 12 tables can be made into 4 groups of 3 tables.

WEB MITCHELL

This movement was devised by John "Spider" Harris (as supplied by George Coffin) and hence the name "Web". This is useful for a medium to large one-session event where a Mitchell type of tournament is required. An even number of tables is required in the whole field.

This field is broken down into two groups of tables for the purpose of board moving, and stay as one group for the purpose of moving the pairs.

An odd number of sets of boards is required (for example 7 sets of 3 or 4 boards, 9 sets of 3 boards, 11 sets of 2 boards, 13 sets of 2 boards). The tables are numbered from 1 to 2N and there must be 2 copies of each board in play. The duplication of the boards can be done by the players or they can be preduplicated.

Tables 1 to N/2 play the first set of boards and tables N/2+1 to 2N play the second set of boards. In the first group of tables the first board set goes on table 1, the second on 2, etc., with the excess sets on a relay table at the end. In the second set of tables the highest numbered set goes on table 2N, set 1 goes on table 2N-1, set 2 goes on table 2N-2, etc., with the excess again on a relay table. For example with 7 sets of boards and 10 tables the following arrangement can be made:

Tables:	1	2	3	4	5		
Boards:	1	2	3	4	5	6	7
Tables:	6	7	8	9	10		
Boards:	4	3	2	1	7	6	5

In the first group, the boards move down one table at each change so that tables 1 through 5 play the boards in ascending order.

In the second group the boards move down one table also, but tables 6 through 10 play the boards in descending order.

The E-W pairs always move up 1 table ignoring any sectional boundaries and irrespective of the number of tables (*never skip*).

All players play all boards in this event but all N-Ss do not meet all E-Ws. As such, if this is used in qualifying events, the seeding of pairs is necessary for the starting positions so that all seeded pairs N-S meet all seeded pairs E-W.

THE HOWELL MOVEMENT

4

INTRODUCTION

A Howell movement is used when it is desired to have all pairs meet all other pairs and play all boards; as a consequence only one winner will be produced.

The degree of accuracy in the movement can vary dramatically, and the number of variations in the types of Howell movements is quite large. To understand a Howell movement, study the following schedule closely.

Note that all pairs meet all other pairs, all pairs play all boards and all pairs play in all rounds. The number of the sets of boards is equal to the number of pairs less 1. There is an even number of pairs.

In this schedule the opposing pairs are shown by numbers connected by a dash and the board set played by them is shown by a number underneath the pairs.

A set represents a number of boards, which together with the number of rounds dictates the length of the event.

In this example each set of boards would normally consist of 4 boards producing a movement of a total of 28 boards. 3-board sets would make a 21-board movement and 5-board sets a 35 board movement.

Round	Table 1 NS-EW	Table 2 NS-EW	Table 3 NS-EW	Table 4 NS-EW
1	8-1 1	6-3 4	7-2 6	4-5 7
2	8-2 2	7-4 5	1-3 7	5-6 1
3	8-3 3	1-5 6	2-4 1	6-7 2
4	8-4 4	2-6 7	3-5 2	7-1 3
5	8-5 5	3-7 1	4-6 3	1-2 4
6	8-6 6	4-1 2	5-7 4	2-3 5
7	8-7 7	5-2 3	6-1 5	3-4 6

It is important to notice that after each round, each pair (except 8 or in the general case the highest numbered pair) moves to the spot vacated by the pair with the number immediately below their own. The boards also move in a very orderly fashion, moving to the next lower numbered table except where there is a relay table. The relays in the above movement are between tables 1 and 2, where there are two sets of boards, and between tables 2 and 3, where there is one set of boards.

As the movement is orderly after the first round, the above schedule could be shown in a shorthand method such as:

8-1 R R 6-3 R 7-2 4-5

or even better:

8-1 2R 6-3 R 7-2 4-5

All the essential information is available. The board sets are numbered from 1 to 7 from the left. The tables are numbered from 1 to 4 from the left. The sets of boards on the relays are shown by R.

So that the pairs will know their moves, guide cards, which can be extracted from the first schedule, have to be supplied. As an example, pair 1 would have a guide card as follows:

Round	Pair No. 1 Table	Sit	Opponent	Boards
1	1	EW	8	1-4
2	3	NS	3	25-28
3	2	NS	5	21-24
4	4	EW	7	9-12
5	4	NS	2	13-16
6	2	EW	4	5-8
7	3	EW	6	17-20

As producing one guide card per pair is a tedious process (not to mention what some players do to guide cards), table guide cards are usually preferred. These can be constructed from the shorthand description of the movement. As an example, the table 2 guide card could be as follows:

TABLE 2

Starting pairs: NS - 6

EW - 3

Starting boards: 13-16

- NS move to EW at 4
- EW move to EW at 3

By expanding the above movement in a different way, it is possible to examine the comparison of pairs with each other, throughout the event.

COMPARISONS OF PAIRS

Board sets:	1	2	3	4	5	6	7
Rounds							
1	8-1			6-3		7-2	4-5
2	5-6	8-2			7-4		1-3
3	2-4	6-7	8-3			1-5	
4		3-5	7-1	8-4			2-6
5	3-7		4-6	1-2	8-5		
6		4-1		5-7	2-3	8-6	
7			5-2		6-1	3-4	8-7

In the case of pair 1 it can be seen that on set one of the boards, they are compared with pairs 6,4and7. On set 2 with 2,7and5 etc.

Note that each pair is compared with all 7 other pairs and there are 7 sets of boards. Each pair is compared with 3 other pairs on each set of boards. Therefore, for the comparisons to be equal, each pair should be compared with every other pair 3 times.

A movement where each pair is compared with every other pair the same number of times is called a *balanced* Howell. This is the case with the above movement and can be checked by the reader quite easily. For example, pair 1 is compared with pair 6 on sets 1, 3 and 4.

For a shorthand method of testing the comparisons, it is necessary to examine the shorthand representation of the Howell.

Eliminating any reference to the placement of the boards, the resultant diagram is called a skeleton.

8-1 6-3 7-2 4-5

or by re-arranging the result is:

N-S	8	7	6	5
E-W	1	2	3	4

The perfect sequence of numbers should be noted (pairs 6 and 3 are repositioned and pairs 4 and 5 are switched) but it also should be realised that this perfect ordering is not necessary, and in general, is not there. Note the switching of 4 and 5 makes the movement unbalanced.

The quality that is essential for this to be a valid skeleton is that the algebraic differences between each pair of numbers are themselves different. The highest numbered pair and pair 1 are ignored for these purposes (i.e. 8 and 1 in this case).

5 minus 4 equals 1

6 minus 3 equals 3

7 minus 2 equals 5

Note that the difference between 7 and 2 is actually 2 (the numbers run in sequence 6, 7, 1, 2, 3...), so the three differences are 1, 2 and 3. These are all different.

Examining the expansion of the movement given for the comparisons, it is possible to find a second skeleton under board set 1.

N-S	5	2	3
E-W	6	4	7
Diff's:	1	2	3

It is this vertical skeleton that has to be examined to determine if in fact the Howell is balanced, not the horizontal skeleton. Notice that the table with pairs 4 and 5 was switched in the diagram of the first (horizontal) skeleton. This means that the 5-6 couple must be also switched (the 5-6 couple is also difference 1) in the vertical skeleton.

The resultant skeleton (eliminating the highest numbered pair as it is not used here) would be:

N-S		6	2	3
E-W	1	5	4	7

Taking all the algebraic differences of the N-S pairs, and all the algebraic differences of the E-W pairs, it is possible to determine if the movement is balanced or not.

N-S differences: $6-2=4$; $6-3=3$; $3-2=1$

E-W differences: $5-1=4$; $4-1=3$; $7-1=6$; $5-4=1$; $7-5=2$; $7-4=3$

As a difference of 1 is equivalent to a difference of 6 etc., the total number of occurrences of each difference would be:

differences:	1 & 6	2 & 5	3 & 4
totals:	3	1	5

These are not equal; therefore the movement is not balanced. Switching the 6 and 5 back the result is:

N-S		5	2	3
E-W	1	6	4	7

N-S differences: $5-2=3$; $5-3=2$; $3-2=1$.

E-W differences: $6-1=5$; $4-1=3$; $7-6=1$; $6-4=2$; $7-1=6$; $7-4=3$

This gives:

differences:	1 & 6	2 & 5	3 & 4
totals:	3	3	3

All the totals are equal, therefore the movement is balanced. Unfortunately this is only possible for an even number of tables, where these totals will always be equal to $T-1$ where T = the number of tables.

For an odd number of tables to be balanced, these totals must be equal to T or T minus 2. Even then, the balance is not perfect, for if it were, it would be necessary for the totals to equal $T-1$ and this is not possible.

It is possible on the other hand, to find a Howell for an odd number of tables where the switching of the pairs at one table will reverse the comparisons. This means that if half the boards at that table are played N-S on each round, and the other half are played E-W, then the resultant movement will be balanced. For example, switching table 4 in the following 5 table movement will achieve this effect.

10-1 8-9 6-4 4R 7x3 2-5

Having already observed that the Howell movement has a horizontal skeleton and a vertical skeleton, it may be intuitively reasoned that if all the skeletons can be found, then all the Howell movements can be found. As the horizontal skeleton defines the starting positions of the pairs, this skeleton will be called the super-skeleton (SS). The vertical skeleton must be balanced and is the foundation of the movement, and so will be called the base-skeleton (BS)

DERIVING HOWELL MOVEMENTS

Any skeleton can act as a SS or as a BS. That is, the super-imposing of any skeleton upon another produces a Howell movement. The result will not necessarily be a good Howell (a Howell where no tables share boards) and only occasionally will it be a perfect Howell (a Howell with all the relay boards on one relay when the number of tables is odd; and on two relays when the number of tables is even - see the 4 and 5 table examples given above).

It should be noted that any balanced BS is in fact a Barometer or Butler-scoring-method movement. In these movements, all the tables play all the boards for each round at the same time. This is the trivial case of superimposing a BS on itself (or BS = SS). The next problem is to derive all the skeletons. This is a relatively simple process. The first thing to do is to set up a table of all combinations of the different "differences" of the pairs (ignoring the highest numbered pair and 1)

First write down the trivial situation numbering from left to right and back again.

e.g. 7-2 6-3 5-4

Then add 1 to both the N-S and E-W pairs, reduce modulus $2T-1$ (i.e. divide by $2T-1$ and use the remainder), ignore the pairings where pair 1 occurs, and then enter it as the next entry in that column. The number of rows in each column will always be equal to $2T-3$ (T = number of tables).

e.g. for 4 tables the differences are:

	2	3	1
	7-2	6-3	5-4
	2-4	7-4	6-5
	3-5	2-6	7-6
	4-6	3-7	3-2
	5-7	5-2	4-3

To extract the skeletons from this table, one pair of numbers is taken from each column such that no number is mentioned twice.

Therefore, all the skeletons for 4 tables are:

- a) 8-1 7-2 6-3 5-4
- b) 8-1 2-4 3-7 6-5
- c) 8-1 5-7 2-6 4-3

By eliminating the first row in the difference table, and placing an imaginary mirror between the middle two rows like this:

2-4	7-4	6-5
3-5	2-6	7-6

4-6	3-7	3-2
5-7	5-2	4-3

it can be seen that the skeleton (c) is in fact a mirror image of skeleton (b). This situation always exists irrespective of the number of tables.

**PRODUCING
HOWELL MOVEMENTS
FROM SKELETONS**

Taking the 4 table example above we will first of all use the skeleton (a) as a BS. The first step is to balance this base. When doing this, firstly test for balance, then switch one pair of numbers, then test for balance etc., until a balanced case is found. When switching, do not switch the first pair of numbers (8-1) as this is the same as switching all other pairings. The order of switching should follow a pattern so that no one combination will be forgotten.

For simplicity, the recommended pattern is:

1, 2, 1, 3, 1, 2, 1.

For higher numbers of tables just add the next number and repeat the previous pattern:

1, 2, 1, 3, 1, 2, 1, 4, 1, 2, 1, 3, 1, 2, 1.

So the balanced base is (switching groups 1 and 2):

8-1 2-7 3-6 5-4

The next step in deriving a Howell is to superimpose a skeleton on the base. We will take, for example skeleton (b). The first and second groups of pairs must be switched to be the same as the base, so that now we have:

8-1 4-2 7-3 6-5

Assuming pairs 8-1 are to be seated at table 1, then the tables for the other pairs are found by the calculation:

$$1 + [N-S(SS)] - [N-S(BS)]$$

$$\text{or } 1 + [E-W(SS)] - [E-W(BS)]$$

If the result is negative it is added to (2T-1), which is 7 in the case of 4 tables. As an example take the pairs 4-2 (SS) and 2-7 (BS)

$$1 + 4(N-S) - 2(N-S) = 3$$

i.e. 4-2 will be at table 3.

7-3 (SS) and 3-6 (BS) gives:

$$1 + 3 - 6 = -2$$

As this is negative, add this to 7 giving 5.

The last set is $1 + 6-5 = 2$. Therefore the complete Howell is:

8-1	4-2	7-3	6-5
1	3	5	2

Or in the shorthand method:

8-1 6-5 4-2 R 7-3 2R

As an exercise it is suggested that the reader derive all the 4 table Howell movements via this method.

4 TABLE HOWELL

The following list has all the 4 table Howell movements, but as a BS can be balanced in more than one way (i.e. by switching different tables) they are not unique, even though the board movements will always be the same.

- BS (a) 8-1 2-7 3-6 5-4
 - SS (b) 8-1 6-5 4-2 R 7-3 2R
 - SS (c) 8-1 2R 6-2 R 7-5 4-3
- BS (b) 8-1 4-2 3-7 6-5
 - SS (a) 8-1 2R 6-3 R 2-7 5-4
 - SS (c) 8-1 2R 7-5 R 4-3 2-6
- BS (c) 8-1 5-7 2-6 4-3
 - SS (a) 8-1 5-4 7-2 R 6-3 2R
 - SS (b) 8-1 3-7 6-5 R 2-4 2R

Further investigation reveals that (b) on (a) is a mirror of (a) on (b) etc., so that the only unique cases are (b) and (c) on (a), and (c) on (b).

It should be noticed that all the 4 table Howell movements are perfect. For 5 or more tables this is not the case.

5 TABLE HOWELL

Following is a complete treatment of 5 table Howell movements, but as there are Howell movements with shares between tables, they will be shown 5-7/2-6. For the sake of convention the first table shown is thus considered to be the lower numbered table.

Table of differences for 5 tables:

2	4	3	1
9-2	8-3	7-4	6-5
2-4	9-4	8-5	7-6
3-5	2-6	9-6	8-7
4-6	3-7	2-8	9-8
5-7	4-8	3-9	3-2

6-8	5-9	5-2	4-3
7-9	7-2	6-3	5-4

Table of skeletons:

a.	10-1	9-2	8-3	7-4	6-5
b.	10-1	2-4	5-9	6-3	8-7
c.	10-1	3-5	9-4	2-8	7-6
d.	10-1	3-5	2-6	7-4	9-8
e.	10-1	4-6	3-7	5-2	9-8
f.	10-1	5-7	4-8	9-6	3-2
g.	10-1	6-8	5-9	7-4	3-2
h.	10-1	6-8	7-2	3-9	5-4
i.	10-1	7-9	2-6	8-5	4-3

All 5 table Howell movements:

A balanced version of the BS is shown at the start of each set.

- a • 10-1 2-9 8-3 7-4 6-5
- b • 10-1 R 4-2/8-7 3R 5-9 R 6-3
- c • 10-1 9-4/7-6 R 5-3 2-8 4R
- d • 10-1/7-4 2R 5-3/2-6/9-8 5R
- e • 10-1 2R 9-8 6-4/3-7 2R 5-2 R
- f • 10-1 R 9-6 2R 7-5/4-8 3-2 2R
- g • 10-1/7-4 5R 5-9/8-6/3-2 2R
- h • 10-1 4R 3-9 8-6 R 5-4/7-2
- i • 10-1 8-5 R 2-6 3R 9-7/4-3 R
- b • 10-1 4-2 5-9 6-3 8-7
- c • 10-1 5-3 2R 9-4 2-8 2R 7-6
- d • 10-1 5-3/7-4/9-8 4R 2-6 2R
- e • 10-1 9-8 6-4 4R 3-7 5-2
- f • 10-1 2R 7-5/9-6 R 3-2 2R 4-8
- g • 10-1/5-9 7-4 2R 8-6/3-2 4R
- h • 10-1 R 7-2 R 8-6 R 3-9/5-4 2R
- i • 10-1 R 8-5 2R 4-3/9-7 2-6 2R

- c • 10-1 3-5 9-4 2-8 7-6
- d • 10-1/3-5 R 2-6/9-8 2R 7-4 3R
- e • 10-1 4-6 9-8 3-7/5-2 5R
- f • 10-1 R 5-7 R 4-8 3-2 R 9-6 R
- g • 10-1 2R 6-8 R 5-9/7-4/3-2 3R
- h • 10-1 3-9 R 6-8 3R 5-4/7-2 R
- i • 10-1 R 2-6 R 7-9 R 8-5/4-3 2R
- d • 10-1 3-5 2-6 7-4 9-8
- e • 10-1/9-8 4-6/3-7 5R 5-2 R
- f • 10-1 R 5-7/4-8/9-6 3-2 5R
- g • 10-1/7-4 2R 6-8/5-9/3-2 5R
- h • 10-1 2R 6-8 R 7-2/3-9/5-4 3R
- i • 10-1/2-6 8-5 2R 7-9/4-3 4R
- e • 10-1 4-6 3-7 5-2 9-8
- f • 10-1 5-7/4-8 R 3-2 9-6 4R
- g • 10-1 R 6-8/5-9/7-4 3-2 5R
- h • 10-1 R 6-8 R 7-2 5-4 R 3-9 R
- i • 10-1 2R 7-9/8-5 4-3 3R 2-6
- f • 10-1 5-7 4-8 9-6 3-2
- g • 10-1/3-2 6-8/5-9 5R 7-4 R
- h • 10-1 6-8 5-4 7-2/3-9 5R
- i • 10-1 4-3 7-9 4R 2-6 8-5
- g • 10-1 6-8 5-9 7-4 3-2
- h • 10-1/6-8 R 7-2/5-4 2R 3-9 3R
- i • 10-1 7-9/8-5/4-3 4R 2-6 2R
- h • 10-1 6-8 7-2 3-9 5-4
- i • 10-1 7-9 2R 2-6 8-5 2R 4-3

Upon examining these 5 table Howell movements, it becomes clear that there are movements for particular applications.

(e) on (b) for example is the best starting position for the standard Howell as all the bye-stand boards are in one group and only one relay table is required. In this movement it is suggested that board set 1 starts at table 3 so that after 5 rounds it comes out of the movement first and so can be scored. This is the earliest time (5 rounds) that the boards will come out without board sharing in the movement.

If the scores were required earlier the best choice would be (e) on (d) where most sets (all but 3) would be scored by the last round. As there is sharing of boards between tables, this movement needs 3 boards per round so as not to slow the movement down.

Any Howell can be played with stationary boards, with one set per table. A movement of this type would expand to a schedule the same as the "comparison of pairs" schedule shown earlier, with each board set number the same as the table number. If you need a stationary board movement for 5 tables, then the choice would be (f) on (c) as the players are spread over the entire length of the movement. This means that it is less likely that the players will overhear each other during the bidding and play.

To summarize the 5 table Howell movements, the following movements are recommended.

Standard movement.

10-1 8-9 6-4 4R 7x3 2-5

Note that table 4 is shown by 7x3. This means that the switching of this table reverses the comparisons. For checking purposes, the base skeleton is:

10-1 4-2 9x5 3-6 7-8

It would be more convenient to arrange the switch at table 1 where there is a stationary pair, but this is impossible with 5 tables (cf 7 and 9 tables).

An alternative:

10-1 4-3 9x7 4R 6-2 5-8

Early scoring movement.

10-1 8x6 5-4 2-7/9-3 5R

Spread movement (stationary boards).

10-1 R 5x7 R 8-4 3-2 R 9-6 R

The switching is difficult in this last movement when using stationary boards as it occurs at a different table on each round (and there are different pairs at the switching table on each round).

3 TABLE HOWELL

As there is only one skeleton possible for 3 tables, it is clear there cannot be a Howell of the desirable form. There are of course other solutions to this problem.

The first solution is based on the use of the only skeleton available and using it as a round robin draw with all tables playing the same boards on each round.

Round	Boards*	Table 1	Table 2	Table 3
1	1-6	6-1	5-2	4-3
2	7-12	6-2	1-3	5-4
3	13-18	6-3	2-4	1-5
4	19-24	6-4	3-5	2-1
5	25-30	6-5	4-1	3-2

* Five board sets may be used.

This movement, as such, is not balanced, but by playing half the boards in each direction at table 2 or 3 gives perfect comparisons. Table 3 is the better choice as one of the pairs goes into the next round at that table. The advantage of this method is the boards can be scored after each round (barometer scoring).

This second movement is better in that there is less board sharing. However the board movement is not orderly. On the other hand it is not as unordered as those in the third movement. The major objection to this second movement is that the comparison of pairs is not equal, but this can be improved by switching the boards on table 1.

Round	Table 1	Table 2	Table 3
1	6-1 1	5-2 4	4-3 2
2	6-2 2	1-3 4	5-4 3
3	6-3 3	2-4 1	1-5 2
4	6-4 4	3-5 1	2-1 3
5	6-5 5	4-1 5	3-2 5

The board sets are shown under the pairings, these sets usually consisting of 4 to 6 boards.

The third movement has perfect comparison of players, and has no board sharing, but the disadvantage is the board moving.

Round	1	2	3	4	5
Table 1	6-1	6-2	6-3	6-4	6-5
Boards	1&2	3&4	5&6	7&8	9&10
Table 2	4-3	5-4	1-5	2-1	3-2
Boards	3&9	1&5	3&7	5&9	1&7
Table 3	5-2	1-3	2-4	3-5	4-1
Boards	6&8	8&10	10&2	2&4	4&6

The boards shown above refer to sets of 2 or 3 boards.

For the reader interested in constructing Howell movements it is suggested that the aid of a computer is obtained for more than 5 tables. The following table indicates why this is so.

Number Tables	Number Skeletons	Number Howells	Number good Howells
3	1	0	0
4	3	6	6
5	9	72	12
6	25	600	80
7	133	17,556	1,760
8	631	397,530	5,958
9	3,857	14,872,592	?

6 TABLE HOWELL

Standard Movement.

12-1 11-4 4R 10-8 5-2 R 9-3 6-7

Note that, as with all movements of an even number of tables, the relays are not all on one table, in contrast with an odd number of tables.

Alternative:

12-1/11-7 9-10 6-4 6R 3-8 5-2

This movement eliminates the odd relay table but does introduce a share. As the share is at the table with the stationary pair it is not too much trouble to control.

Early scoring.

12-1/9-8 5-7/3-11 8R 2-6/4-10

This movement is particularly useful when playing 3 boards per round so that the sharing of the boards is not a burden. Thus scoring can start after 3 rounds and all but three sets can be scored by the last round.

Spread movement (stationary boards).

12-1 3-5 R 11-8 10-4 R 2-9 R 7-6 2R

With an even number of tables the spread movement cannot be perfect (table-relay-table-relay etc.) but involves one extra pair of tables and one pair of relays.

7 TABLE HOWELL

Standard Movement.

14x1 4-6 10-13 2-7 6R 3-12 5-11 8-9

Alternative:

14x1 7-6 10-4 12-3 6R 13-8 5-2 11-9

Note the table switching, if used, occurs at the table with the stationary pair.

Early scoring.

14x1 8-6 7R 5-13/4-7 3-12 10-11 2-9 (one share one relay)

14x1/8-5 8R 2-6 4-10/13-12 7-9 11-3 (two share one relay)

14x1/8-10 8R 5-9/2-7 13-12 R 6-3/11-4 (three share two relay)

Spread movement (stationary boards).

14-1 R 7-11 R 4-6 R 12-5 2x10 R 13-3 R 8-9 R

Unfortunately it is impossible to switch boards at the table occupied by the highest pair (14) and still retain alternating of the relay tables.

If switching is to be used the following movement is slightly better as pair 14 is always involved in the switching.

14x1 R 5-7 R 10-2 13-9 R 3-4 R 8-11 2R 6-12

8 TABLE HOWELL

Standard Movement.

16-1 13-7 9-12 3-2 6-8 14-10 R 15-5 4-11 6R

Alternative:

16-1 7-11 10-13 R 6-8 3-2 9-15 6R 12-5 14-4

Early scores (one relay table).

16-1/13-9 8-15 7-12 6-3 8R 5-14 2-4 10-11

Spread Movement.

16-1 10-11 R 14-2 R 7-9 6-12 R 5-13 R 3-8 R 4-15 2R

9 TABLE HOWELL

With 9 or more tables it is assumed that board sharing is not possible and only the standard and spread movements are given.

18x1 9-10 6-4 16-8 2-14 8R 7-13 3-17 5-12 11-15

18-1 R 5-13 R 11-6 R 4-10 R 14-7 17-2 R 3-16 R 9-8 15-12 R

10 TABLE HOWELL

20-1 9-14 17-16 19-10 4-6 15-3 R 12-18 11-7 13-2 8R 5-8

20-1 7-13 R 6-16 R 15-4 R 14-9 8-5 R 19-2 R 17-10 R 18-3 R
12-11 2R

11 TABLE HOWELL

22-1 11-6 15-14 18-9 20-3 12-5 10R 19-4 13-10 16-8 21-2 7-17

• It is not possible to have the switch at table 1

22-1 R 13-5 R 20-3 R 8-15 R 6-16 R 17-14 21-2 R 9-18 R 12-7 R
11-10 R 19-4 R

12 TABLE HOWELL

24-1 17-8 14-13 R 21-4 15-10 12-9 20-5 22-3 10R 18-11 6-16 23-2
7-19

24-1 18-11 R 7-19 R 14-13 R 22-3 R 21-4 12-9 R 15-10 R 20-5 R
6-16 R 23-2 R 17-8 2R

13 TABLE HOWELL

26-1 21-12 15-8 11-10 16-6 24-3 5-22 12R 4-23 20-9 18-13 25-2
19-7 17-14

26-1 R 23-4 R 19-7 R 18-13 R 21-12 R 24-3 R 17-10 22-5 R 15-14
R 11-8 R 2-25 R 6-16 R 20-9

14 TABLE HOWELL

28-1 17-10 4-25 R 14-11 20-9 24-5 18-13 8-22 3-26 12R 7-19 16-15
27-2 23-6 21-12

28-1 18-13 R 7-19 R 24-5 R 16-15 R 8-22 R 4-25 23-6 R 17-10 R
14-11 R 20-9 R 26-3 R 2-27 R 21-12 2R

15 TABLE HOWELL

30-1 15-14 10-23 21-18 13-24 27-4 25-6 17-12 14R 9-16 20-11 19-7
3-28 8-22 2-29 26-5

30-1 R 20-11 R 19-7 R 23-10 R 24-13 R 22-8 R 26-5 R 4-27 17-12
R 16-9 R 15-14 R 28-3 R 2-29 R 25-6 R 21-18

16 TABLE HOWELL

32-1 18-11 9-25 R 26-7 20-17 27-6 16-15 19-14 28-5 30-3 14R 8-22
24-13 21-12 23-10 2-31 4-29

32-1 24-13 R 18-11 R 9-25 R 23-10 R 7-26 R 8-22 R 6-27 19-14 R
29-4 R 28-5 R 16-15 R 21-12 R 2-31 R 20-17 R 3-30 2R

17 TABLE HOWELL

34-1 20-21 30-5 27-14 25-9 18-13 15-24 3-32 8-22 16R 4-31 16-19
11-26 17-10 23-12 7-28 33-2 29-6

34-1 R 27-14 R 19-10 R 26-11 R 22-8 R 21-20 R 7-28 R 31-4 R
25-9 30-5 R 18-15 R 6-29 R 17-12 R 23-16 R 24-13 R 3-32 R 2-33
R

18 TABLE HOWELL

36-1 29-8 27-14 R 22-17 10-28 33-4 18-15 32-5 9-25 24-13 30-7
16R 34-3 23-16 21-12 26-11 6-31 35-2 20-19

36-1 20-15 R 21-12 R 26-11 R 18-17 R 29-8 R 4-33 R 9-25 R 30-7
5-32 R 31-6 R 27-14 R 24-13 R 22-19 R 23-16 R 10-28 R 3-34 R
2-35 2R

19 TABLE HOWELL

38-1 33-6 30-15 29-12 27-16 26-13 35-4 24-17 32-7 9-25 18R 34-5
23-22 20-11 19-14 10-28 36-3 31-8 37-2 21-18

20 TABLE HOWELL

40-1 11-31 20-17 R 24-13 26-19 29-12 5-36 8-33 35-6 23-18 28-10
34-7 18R 25-16 37-4 22-21 27-14 38-3 32-9 2-39 30-15

**BAROMETER
AND ROUND ROBIN
MOVEMENTS**

These movements are really a type of a Howell, with the base skeleton superimposed upon itself, so that all the tables play the same boards on each round.

The round robin events (which quite often are scored as Butler scoring) involve rounds of fairly extensive length. With, for example, two boards per table in a 7 table movement, there are 14 boards in play and the boards are passed around the tables until all the boards have been played. The players then move to the position for the next round and a new set of boards is introduced.

For a Barometer pairs event there are usually duplicated boards involved so that the complete round robin can be played in one or two sessions. In this event the scoring is done by scorers in the round following the play, and the scores are posted immediately they are known.

The standard balanced base skeleton is all that is needed for this movement, with the switching of one table necessary for thoroughness in the odd table movement.

4 TABLE BAROMETER

An expanded movement for 4 tables is:

Round/Table	1	2	3	4	Board set
1	8-1	5-6	2-4	3-7	1
2	8-2	6-7	3-5	4-1	2
3	8-3	7-1	4-6	5-2	3
4	8-4	1-2	5-7	6-3	4
5	8-5	2-3	6-1	7-4	5
6	8-6	3-4	7-2	1-5	6
7	8-7	4-5	1-3	2-6	7

In a shorthand representation this is simply shown as:

8-1 5-6 2-4 3-7

The other recommended movements are:

5 TABLE BAROMETER

10-1 4-2 9x5 3-6 7-8

6 TABLE BAROMETER

12-1 4-2 9-6 11-5 10-3 7-8

7 TABLE BAROMETER

14x1 6-5 8-2 9-13 3-11 7-4 12-10

8 TABLE BAROMETER

16-1 15-2 7-3 10-4 13-6 14-9 5-8 11-12

9 TABLE BAROMETER

18x1 4-2 12-16 11-17 13-5 7-14 15-10 6-3 8-9

10 TABLE BAROMETER

20-1 19-2 3-18 4-17 16-5 15-6 14-7 13-8 9-12 11-10

11 TABLE BAROMETER

22-1 2-21 3-20 4-19 13-5 6-16 9-18 8-15 12-7 17-14 11-10

12 TABLE BAROMETER

24-1 2-23 3-22 4-21 5-20 19-6 7-18 17-8 9-16 10-15 14-11 13-12

13 TABLE BAROMETER

26-1 25-2 24-3 23-4 5-22 6-16 7-19 9-20 21-12 10-17 18-13 11-8
15-14

14 TABLE BAROMETER

28-1 27-2 26-3 4-25 24-5 6-23 7-22 21-8 20-9 19-10 18-11 17-12
16-13 15-14

15 TABLE BAROMETER

30-1 2-29 28-3 27-4 26-5 6-25 7-24 23-8 22-9 21-10 20-11 19-12
18-13 17-14 16-15

16 TABLE BAROMETER

32-1 31-2 30-3 29-4 5-28 27-6 7-26 8-25 24-9 23-10 22-11 21-12
20-13 19-14 18-15 17-16

17 TABLE BAROMETER

34-1 33-2 32-3 31-4 5-30 29-6 7-28 8-27 26-9 25-10 24-11 23-12
22-13 21-14 20-15 19-16 18-17

18 TABLE BAROMETER

36-1 2-35 34-3 33-4 5-32 31-6 7-30 29-8 28-9 27-10 11-26 12-25
24-13 23-14 22-15 21-16 20-17 19-18

19 TABLE BAROMETER

38-1 2-37 36-3 35-4 34-5 6-33 32-7 8-31 9-30 29-10 28-11 27-12
26-13 25-14 24-15 23-16 22-17 21-18 20-19

20 TABLE BAROMETER

40-1 2-39 38-3 4-37 36-5 35-6 7-34 8-33 32-9 31-10 30-11 12-29
28-13 14-27 26-15 25-16 24-17 23-18 22-19 21-20

21 TABLE BAROMETER

42-1 2-41 40-3 39-4 38-5 37-6 7-36 8-35 9-34 10-33 32-11 31-12
30-13 29-14 28-15 27-16 26-17 25-18 24-19 23-20 22-21

22 TABLE BAROMETER

44-1 2-43 42-3 41-4 5-40 39-6 7-38 37-8 9-36 35-10 34-11 33-12
13-32 14-31 30-15 29-16 28-17 27-18 26-19 25-20 24-21 23-22

23 TABLE BAROMETER

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

24 TABLE BAROMETER

48-1 2-47 3-46 45-4 44-5 43-6 7-42 8-41 40-9 10-39 11-38 37-12
36-13 14-35 34-15 16-33 32-17 18-31 30-19 29-20 28-21 27-22
26-23 25-24

25 TABLE BAROMETER

50-1 2-49 3-48 4-47 46-5 45-6 7-44 43-8 42-9 41-10 11-40 39-12
13-38 14-37 36-15 35-16 34-17 33-18 32-19 31-20 30-21 29-22
28-23 27-24 26-25

26 TABLE BAROMETER

52-1 51-2 3-50 49-4 48-5 47-6 46-7 45-8 9-44 10-43 11-42 12-41
 40-13 39-14 38-15 37-16 36-17 35-18 34-19 33-20 32-21 31-22
 30-23 29-24 28-25 27-26

27 TABLE BAROMETER

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

28 TABLE BAROMETER

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

29 TABLE BAROMETER

58-1 57-2 56-3 4-55 5-54 53-6 52-7 51-8 9-50 10-49 48-11 12-47
 46-13 45-14 44-15 16-43 42-17 18-41 19-40 39-20 38-21 37-22
 36-23 35-24 34-25 33-26 32-27 31-28 30-29

30 TABLE BAROMETER

60-1 59-2 3-58 57-4 56-5 55-6 54-7 53-8 9-52 10-51 11-5 49-12
 13-48 14-47 46-15 45-16 44-17 43-18 42-19 41-20 40-21 39-22
 38-23 37-24 36-25 35-26 34-27 33-28 32-29 31-30

31 TABLE BAROMETER

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

32 TABLE BAROMETER

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

33 TABLE BAROMETER

66-1 2-65 64-3 4-63 62-5 61-6 60-7 59-8 58-9 10-57 11-56 12-55
 54-13 14-53 15-52 51-16 50-17 49-18 48-19 47-20 46-21 45-22
 44-23 43-24 42-25 41-26 40-27 39-28 38-29 37-30 36-31 35-32
 34-33

34 TABLE BAROMETER

68-1 67-2 3-66 65-4 64-5 63-6 62-7 61-8 60-9 59-10 11-58 12-57
13-56 14-55 15-54 16-53 52-17 51-18 50-19 49-20 48-21 47-22
46-23 45-24 44-25 43-26 42-27 41-28 40-29 39-30 38-31 37-32
36-33 35-34

35 TABLE BAROMETER

70-1 2-69 3-68 67-4 66-5 65-6 64-7 63-8 62-9 61-10 11-60 12-59
13-58 14-57 15-56 16-55 54-17 53-18 52-19 51-20 50-21 49-22
48-23 47-24 46-25 45-26 44-27 43-28 42-29 41-30 40-31 39-32
38-33 37-34 36-35

36 TABLE BAROMETER

72-1 71-2 3-70 69-4 5-68 67-6 66-7 65-8 64-9 63-10 11-62 12-61
13-60 59-14 15-58 16-57 56-17 55-18 54-19 53-20 52-21 51-22
50-23 49-24 48-25 47-26 46-27 45-28 44-29 43-30 42-31 41-32
40-33 39-34 38-35 37-36

37 TABLE BAROMETER

74-1 2-73 72-3 4-71 70-5 69-6 68-7 67-8 66-9 65-10 11-64 12-63
62-13 14-61 15-60 16-59 17-58 57-18 56-19 55-20 54-21 53-22
52-23 51-24 50-25 49-26 48-27 47-28 46-29 45-30 44-31 43-32
42-33 41-34 40-35 39-36 38-37

38 TABLE BAROMETER

76-1 75-2 3-74 4-73 72-5 71-6 70-7 69-8 68-9 67-10 66-11 12-65
13-64 14-63 15-62 16-61 17-60 59-18 58-19 57-20 56-21 55-22
54-23 53-24 52-25 51-26 50-27 49-28 48-29 47-30 46-31 45-32
44-33 43-34 42-35 41-36 40-37 39-38

39 TABLE BAROMETER

78-1 2-77 3-76 75-4 74-5 73-6 72-7 71-8 70-9 69-10 11-68 67-12
13-66 14-65 15-64 16-63 17-62 18-61 60-19 59-20 58-21 57-22
56-23 55-24 54-25 53-26 52-27 51-28 50-29 49-30 48-31 47-32
46-33 45-34 44-35 43-36 42-37 41-38 40-39

40 TABLE BAROMETER

80-1 79-2 3-78 77-4 5-76 75-6 74-7 73-8 72-9 71-10 70-11 12-69
13-68 67-14 15-66 16-65 17-64 18-63 62-19 61-20 60-21 59-22
58-23 57-24 56-25 55-26 54-27 53-28 52-29 51-30 50-31 49-32
48-33 47-34 46-35 45-36 44-37 43-38 42-39 41-40

41 TABLE BAROMETER

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

42 TABLE BAROMETER

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

43 TABLE BAROMETER

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

DOUBLE HOWELL

There are as many sets of boards in a Howell movement as there are pairs minus one (equal to the number of rounds). There are only as many sets in play as there are tables (using a standard Howell with no shares). There are some (the number of table minus one) sets of boards not in play on each round.

If a second Howell movement is placed on this set of boards, using the boards out of play in the first Howell, then only 1 table needs to share boards to allow 2 Howell movements of the same number of tables using the same boards.

This movement is valuable in a two session event where the field is divided into 2 groups of pairs and in the first session a Mitchell movement is used so that the two groups meet each other. In the second session the double Howell is used so that each group meets the pairs in its group.

An examination of the list of all the 4 table Howell movements reveals that the first two Howell movements will combine to give a double Howell.

Board sets	1	2	3	4	5	6	7
Howell 1	8-1	6-5	4-2		7-4		
Howell 2	1-8			2-6		5-7	3-4
Table	1&1A	2	3	4	5	6	7

Full expansions:

Table:	1&1A	2	3	4	5	6	7
Round							
1	8-1 1 1-8	6-5 2	4-2 3		7-3 4 5		6 7 3-4
2	8-2 2 2-8	7-6 3	5-3 4		1-4 5 6		7 1 4-5
3	8-3 3 3-8	1-7 4	6-4 5		2-5 6 7		1 2 5-6
4	8-4 4 4-8	2-1 5	7-5 6		3-6 7 1		2 3 6-7
5	8-5 5 5-8	3-2 6	1-6 7		4-7 1 2		3 4 7-1
6	8-6 6 6-8	4-3 7	2-7 1		5-1 2 3		4 5 1-2
7	8-7 7 7-8	5-4 1	3-1 2		6-2 3 4		5 6 2-3

The other useful double Howell movements are:

DOUBLE 5 TABLE HOWELL

10-1 9-8 6-4 4R 3-7 5-2

3R 3-7 5-2 1-10 9-8 6-4 R

Unfortunately it is impossible for the 2 tables with the stationary pairs to share boards in a 5 table double Howell.

DOUBLE 6 TABLE HOWELL

12-1 R 10-7 3R 5-4 9-11 3-8 R 6-2

1-12 11-7 R 5-10 2-4 9-8 3R 6-3 R

DOUBLE 7 TABLE HOWELL

14-1 5R 2-8 12-11 5-7 9-4 3-13 R 6-10
 14-1 10-7 4-12 8-6 3-2 9-13 5R 11-5 R

DOUBLE 8 TABLE HOWELL

16-1 5-9 7-13 15-10 3-2 14-11 6-8 2R 4-12 5R
 1-16 6R 7-9 13-2 R 8-14 6-3 5-15 4-12 11-10

DOUBLE 9 TABLE HOWELL

18-1 12-7 6-16 3-5 9-17 14-13 5R 4-10 15-2 11-8 3R
 1-18 5R 6-8 11-15 7-13 4-16 3-2 3R 17-10 12-9 14-5

DOUBLE 10 TABLE HOWELL

20-1 9-17 16-11 3-5 2R 19-10 14-13 6-18 8-12 15-2 7-4 7R
 1-20 3R 16-11 5-7 6R 17-8 4-3 12-18 9-2 15-19 6-14 13-10

An alternative approach to the double Howell is to place two Howell movements beside each other so that they share boards throughout the movement. The advantage of this is that the scoring can be done during play as the boards come out after the same number of rounds as in a standard Howell.

For example, a 5 Table Howell (doubled up):

10-1	8-9	6-4	4R	7-3	2-5
1-10	3-4	9-7	4R	2-6	8-5

By using this in the interwoven movement, the problem of 2 groups of 9 pairs is solved. The Mitchell skips the first round and these pairs meet each other at table 1 in the double Howell.

With the one particular Howell for 6 tables that has 3 shares, it is possible (when playing 33 boards) to have 2 or 3 consecutive Howell movements while still using only one set of boards. The arrangement is as follows:

movement 1	movement 2	movement 3
10-6 12-1 5-7	30-26 32-21 25-27	50-46 52-41 45-47
R		R
4-9 3-2 8-11	24-29 23-22 28-31	44-49 43-42 48-51

Each Howell moves within itself, while the boards move as normal, down one table. The director has to be careful to change the score sheets (when scoring each section separately) as the boards move from one section to another (especially when there is no relay table where the sheets can be exchanged). The advantage of this movement is the low number of boards needed and the possibility of scoring all three sections after 3 rounds when scoring the sections separately.

A similar, though not as effective, movement for 5 tables is:

movement 1					movement 2			
5-2	R	10-1	4-6	R	2-5	R	1-10	6-4
		9-8	3-7				8-9	7-3

Any Howell can have one or more tables appended to it without greatly disrupting the movement. An appended table does corrupt the balance of the movement however, and the resulting movement is not a true Howell as all the pairs do not meet all other pairs.

APPENDIX TABLES

TABLE APPENDING

Any table in a Howell movement (which does not have a stationary pair) can act as an appendage table. Selecting one of these tables, a table is placed next to it so that it is possible for the two tables to share boards.

One of the pairs from the appendage table is moved to the appendix table, keeping the same pair number and direction originally assigned. The vacant positions are then filled with two pairs who will be stationary for the whole event. These pairs are assigned pair numbers 1 and 2 more than the highest numbered pair in the movement.

The moving pairs at these tables move as though they have played against each other. The new moving pairs who arrive at the appendage table will either sit in the vacant position, or be directed by the stationary pair who occupies their seat, to move to the appendix table.

THREE-QUARTER HOWELL MOVEMENT

Any appendix Howell movement is in effect a $\frac{3}{4}$ Howell movement as all pairs do not meet all other pairs.

Even so, there are more effective $\frac{3}{4}$ Howell movements than the appendix table versions: these eliminate the sharing of boards. The method of derivation of the $\frac{3}{4}$ Howell is the same as for the ordinary Howell with the proviso that the base skeleton and the super skeleton include more than one idle pair as in the case of the standard Howell where pair 1 is the only idle pair in the skeleton (being positioned opposite a stationary pair).

For example base skeleton:

(14)-1 5-7 4-3 12-6 10-2 9-13 (15)-8 (16)-11

Super Skeleton:

(14)-1 6-8 3-2 10-4 7-12 5-9 (15)-11 (16)-13

SS - BS give the following starting positions respectively:

1 2 13 12 11 10 4 3

Giving the following $\frac{3}{4}$ Howell:

14-1 6-8 16-13 15-11 5R 5-9 7-12 10-4 3-2

Or one round later for neatness:

16-1 15-12 5R 6-10 8-13 11-5 4-3 14-2 7-9

Note 14, 15 and 16 are stationary.

The advantage of the $\frac{3}{4}$ Howell is that there can be a predetermined number of boards in play irrespective of the number of tables up to a number equal to the number of sets of boards less one. If the number of tables equals the number of sets of boards then the movement could then be called a half Howell and is in fact a Mitchell movement.

13 ROUND $\frac{3}{4}$ HOWELL

The following set of $\frac{3}{4}$ Howell movements completes the $\frac{3}{4}$ Howell movements based on the 26 board movement of the 7 table Howell. It is possible with these movements for the event to start as 7 tables, and before the change into the second round is executed, to grow from 7 tables to 12 tables without disrupting the players greatly. The number of boards is constant, only the pair numbers have to be changed.

• 7 TABLE $\frac{3}{4}$ HOWELL

3-12 5-11 8-9 14-1 4-6 10-13 2-7 6R

• 8 TABLE $\frac{3}{4}$ HOWELL

6-10 8-13 11-5 4-3 14-2 7-9 16-1 15-12 5R

These movements were first devised by Sam Gold. As the balancing of $\frac{3}{4}$ Howell movements is not of much purpose, it is not necessary to put any more effort into devising better movements than the originals. Pair numbers 14 and higher are stationary.

• 9 TABLE $\frac{3}{4}$ HOWELL

18-1 17-12 8-5 2-10 13-9 7-16 15-6 11-4 3-14 4R

• 10 TABLE $\frac{3}{4}$ HOWELL

20-1 6-19 18-8 13-17 3-7 16-12 15-2 11-5 10-14 9-4 3R

• 11 TABLE $\frac{3}{4}$ HOWELL

7-8 22-1 21-3 20-5 2-19 10-18 12-17 4-16 15-11 14-13 6-9 2R

• 12 TABLE $\frac{3}{4}$ HOWELL

7-8 22-1 21-3 20-5 2-19 10-18 12-17 4-16 15-11 14-13 6-23/24-9 2R

Note the share in the last movement.

The comparisons are improved by switching the stationary pairs according to a matrix as follows. The highest numbered pair usually remains stationary, while one line from the matrix is selected for each other stationary pair. The lines of least switches are normally chosen for convenience. It should be noted that this matrix is set up for 16 rounds. The matrix is complete for that number, but it can be truncated at any point up to that number.

This matrix can also be used in Butler or Barometer events where all the boards up to 16 are played per round. 8 rows are selected to give the switching of the boards for the 8 tables. In fact if rows 1, 3, 4, 7, 8, 9, 13 and 14 are selected, then all pairs have equal dealer vulnerability opportunities using a standard set of boards. N-S direction is shown by + and E-W as -.

1.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
2.	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+
3.	+	+	-	-	+	+	-	-	+	+	-	-	+	+	-
4.	+	-	-	+	+	-	-	+	+	-	-	+	+	-	+
5.	+	+	+	+	-	-	-	-	+	+	+	+	-	-	-
6.	+	-	+	-	-	+	-	+	+	-	+	-	-	+	+
7.	+	+	-	-	-	-	+	+	+	+	-	-	-	-	+
8.	+	-	-	+	-	+	+	-	+	-	-	+	-	+	+
9.	+	+	+	+	+	+	+	-	-	-	-	-	-	-	-
10.	+	-	+	-	+	-	-	+	-	+	-	+	-	+	+
11.	+	+	-	-	+	+	-	-	-	-	+	+	-	-	+
12.	+	-	-	+	+	-	-	+	-	+	+	-	-	+	+
13.	+	+	+	+	-	-	-	-	-	-	-	-	-	+	+
14.	+	-	+	-	-	+	-	+	-	+	-	+	+	-	+
15.	+	+	-	-	-	-	+	+	-	-	+	+	+	+	-
16.	+	-	-	+	-	+	+	-	-	+	+	-	+	-	+

11 ROUND 3/4 HOWELL

The following 3/4 Howell movements are based on 11 rounds, and usually 22 boards. They will grow from the 6 table Howell. Pair numbers 12 and higher are stationary.

• 7 TABLE 3/4 HOWELL

14-1 4-6 9-10 7-3 12-2 11-13 5-8 4R

• 8 TABLE 3/4 HOWELL

16-1 4-15 11-13 14-10 9-8 5-7 3-12 2-6 3R

• 9 TABLE 3/4 HOWELL

18-1 17-5 16-11 2-10 15-9 7-8 6-14 4-13 3-12 2R

• 10 TABLE 3/4 HOWELL

18-1 17-5 16-11 19-10/20-2 9-15 7-8 6-14 4-13 3-12 2R

Other useful 3/4 Howell Movements are the following:

6 ROUND $\frac{3}{4}$ HOWELL

Pair numbers 7 and higher are stationary.

- 4 TABLE $\frac{3}{4}$ HOWELL

8-1 R 7-5/4-6 2-3 2R (note share)

- 5 TABLE $\frac{3}{4}$ HOWELL

10-1 R 9-6 8-5 4-3 7-2

7 ROUND $\frac{3}{4}$ HOWELL

Pair numbers 8 and higher are stationary.

• 4 TABLE $\frac{3}{4}$ HOWELL (included to show how a 4 table Howell can grow from 4 tables to 6 tables)

8-1 2R 7-5 R 3-4 6-2

- 5 TABLE $\frac{3}{4}$ HOWELL

10-1 R 6-7 3-5 R 8-4 9-2

- 6 TABLE $\frac{3}{4}$ HOWELL

12-1 R 11-7/10-2 6-5 R 8-4 9-3 (note share)

8 ROUND $\frac{3}{4}$ HOWELL

Pair numbers 9 and higher are stationary.

- 5 TABLE $\frac{3}{4}$ HOWELL

10-1 3R 9-6 8-2 4-5 3-7

- 6 TABLE $\frac{3}{4}$ HOWELL

3-2 R R 12-1 11-18 10-6 9-5 7-4

- 7 TABLE $\frac{3}{4}$ HOWELL

14-1 R 13-6 12-2 11-4 7-8 10-3 9-5

Note that these movements grow from one to another and ultimately grow to an 8 table skip Mitchell.

9 ROUND $\frac{3}{4}$ HOWELL

Pair numbers 10 and higher are stationary.

Starting with a 5 Table Howell:

7-3 2-5 10-1 8-9 6-4 4R

- 6 TABLE $\frac{3}{4}$ HOWELL

12-1 11-4 10-8 2-7 9-6 5-3 3R

- 7 TABLE $\frac{3}{4}$ HOWELL

12-8 2-3 11-6 10-9 4-7 14-1 R 13-5 R

- 8 TABLE $\frac{3}{4}$ HOWELL

16-1 15-6 14-2 13-7 12-3 11-8 R 4-5/10-9 R (note share)

Again these grow merely by changing pair numbers and adding tables to the end of the movement.

HALF TABLES IN HOWELL MOVEMENTS

A half table can be treated as a full table in the Howell Movement so that each pair has a bye on one round. The usual procedure with this movement is to treat the stationary pair as the phantom pair so that all pairs sit out at the same table.

If the movement is already under way, a pair can be added at virtually any stage during the game by placing the pair at any table where there is not a stationary pair. The pair currently sitting in that direction at the table is displaced. The last pair then remains stationary at that table and as pairs move to that position occupied by the extra pair they sit out for that round and proceed to the next round as though they have played at that table.

In the $\frac{3}{4}$ Howell the half table is not convenient as not all the players sit out and so the scores have to be factored up for the pairs sitting out.

ENDLESS HOWELL MOVEMENT (FLOWER HOWELL)

With the normal Howell the board movement is very orderly and the player movement usually requires the use of a guide card. The endless Howell simply reverses this process, so that the players move in an orderly fashion and each board requires a schedule.

The tables are numbered from 1 to N and the pairs are assigned numbers in some orderly manner. The N-S pair at table 1 remains stationary throughout the movement, while the N-S pairs move up 1 table at each change and the E-W pairs move down 1 table. When the E-W pairs reach table 1 they switch to N-S at table 2 after playing as E-W at table 1. The N-S pairs swivel to E-W at the highest numbered table after playing at that table as N-S (hence it is known as the swivel table).

If the number of boards being played on each round is not less than the number of tables in the movement, then the boards can be shared throughout the movement on each round (for example 4 table Howell playing 4 boards per round). Duplication of boards also can be used to overcome this problem.

On the other hand the boards can be selected from a centre table according to a schedule given to each table. When the starting set of boards is known for a table the boards then can be played in order at that table. For example in a 4 table Howell, table 2 might start with set 3 and on subsequent rounds the boards played are sets 4, 5, 6, 7, 1, 2.

4 TABLE ENDLESS HOWELL

Player starting positions

8-1 7-2 6-3 5-4

Board sets round 1

1 3 5 2

Generally speaking these movements are not balanced, though they can be balanced by switching one or more tables so that the players are required to swap directions at that table whenever they play there. (This is only perfect for even tables again, as board switching is needed with odd numbers of tables).

As the assignment of pair numbers is not important, they are not shown in the following schedules. The board sets (the starting set at each table) and the table at which the pairs should switch (in brackets) are shown.

4 tables

1 3 5 2 (none)

5 tables

1 4 2 5 2 (note share) (3)

6 tables

1 6 2 5 10 4 (3)

7 tables

1 11 9 5 13 8 12 (3,5,6,7)

8 tables

1 7 11 2 8 12 9 3 (5,6,7,8)

9 tables

1 13 9 5 17 15 11 16 7 (2,7)

10 tables

1 8 13 7 17 11 18 15 6 9 (5,8,9,10)

11 tables

1 19 15 12 8 11 13 7 16 14 21 (2,3,4)

12 tables

1 13 8 6 21 23 17 14 12 22 9 4 (3,4,7,9)

13 tables

1 7 9 25 20 14 19 3 6 11 2 4 17 (2,4)

**EXTRA BOARD
HOWELL MOVEMENT**

Just as the Mitchell movement can be extended in length by using the roving board movement, so can the Howell. The major difference is that the Howell does not have the same ease of use of the orderly movement of the roving board.

In the simplest case (the 4 table Howell) consider the two following movements which have the same starting positions.

Board sets	1	2	3	4	5	6	7
1	8-1			6-3		7-2	4-5
2	5-6	8-2			7-4		1-3
3	2-4	6-7	8-3			1-5	
4		3-5	7-1	8-4			2-6
5	3-7		4-6	1-2	8-5		
6		4-1		5-7	2-3	8-6	
7			5-3		6-1	3-4	8-7

Board sets	1	2	3	4	5	6	7
1	8-1	5-4	7-2	6-3			
2		8-2	6-5	1-3		7-4	
3			8-3	7-6	2-4		1-5
4	2-6			8-4	1-7	3-5	
5		3-7			8-5	2-1	4-6
6	5-7		4-1			8-6	3-2
7	4-3	6-1		5-2			8-7

If each vertical column of this expansion is considered as an extra set of boards in the first movement, then it can be readily seen at which tables the extra set of boards is to be placed on which rounds. Set 1 goes to table 1 on round 1, displacing set 1 of the original set of boards (pairs 8-1). Table 2 on round 4 displacing set 7 (2-6). Table 3 on round 6 displacing set 4 (5-7). Table 4 on round 7 displacing set 6 (4-3). Column 2 of the second movement can be used to determine the second roving sets movement, and so forth. More than 2 roving sets would be unusual. For the 8th round the seating positions would be as under the first column of the second movement. The pairs play the boards which were displaced on the round when they previously met. For the 9th round column 2 is used, and so on.

A short hand method of showing this is:

rover set 1

Round	1	4	16	7
Table	1	2	3	4
Set	1	7	4	6
Pairs	8-1	2-6	5-7	4-3

rover set 2

Round	1	2	5	7
Table	4	1	2	3
Set	7	2	1	5
Pairs	5-4	8-2	3-7	6-1

5 TABLE HOWELL WITH EXTRA BOARDS

Using Howell:

10-1 8-9 6-4 4R 7-3 2-5

With 2nd Howell:

10-1 R 2-5 R 8-9 7-3 R 6-4 R

rover set 1

Round	1	3	5	6	8
Table	1	3	4	2	5
Set	1	5	3	7	7
Pairs	10-1	8-6	2-7	4-5	9-3

rover set 2

Round	2	4	6	7	9
Table	1	3	4	2	6
Set	2	6	4	8	8
Pairs	10-2	9-7	3-8	5-6	1-4

Note the shares in rounds 10 and 11.

6 TABLE HOWELL WITH EXTRA BOARDS

Using Howell:

12-1 11-10 R 9-6 4-8 7-2 3R 3-5 R

With 2nd Howell

12-1 R 9-6 3R 3-5 7-2 11-10 R 4-8

rover set 1

Round	1	2	4	5	6	10
Table	1	4	2	5	6	3
Set	1	6	5	10	4	2
Pairs	12-1	5-9	3-2	11-6	8-10	7-4

rover set 2

Round	2	3	5	6	7	11
Table	1	4	2	5	6	3
Set	2	7	6	11	5	3
Pairs	12-2	6-10	4-3	1-7	9-11	8-5

7 TABLE HOWELL WITH EXTRA BOARDS

Using Howell:

14-1 10-5 8-7 13-2 R 12-3 9-6 2R 11-4 3R

With 2nd Howell:

14-1 3R 9-6 2R 13-2 11-4 R 8-7 10-5 12-3

rover set 1

Round	1	2	3	4	6	7	10
Table	1	5	2	3	7	4	6
Set	1	7	4	6	2	10	3
Pairs	14-1	13-4	12-7	11-10	3-9	6-8	5-2

rover set 2

Round	2	3	4	5	7	8	11
Table	1	5	2	3	7	4	6
Set	2	8	5	7	3	11	4
Pairs	14-2	1-5	13-8	12-11	4-10	7-9	6-3

8 TABLE HOWELL WITH EXTRA BOARDS

Using Howell:

16-1 R 15-2 10-7 R 14-13 8-3 6-12 11-4 5R 5-9

With 2nd Howell:

16-1 R 11-4 8-3 R 15-2 5-9 14-13 6-12 5R 10-7

rover set 1

Round	1	2	8	9	10	11	13	14
Table	1	3	6	4	8	2	5	7
Set	1	5	15	14	9	13	4	7
Pairs	16-1	11-8	13-4	7-6	14-3	10-12	5-15	9-2

rover set 2

Round	2	3	9	10	11	12	14	15
Table	1	3	6	4	8	2	5	7
Set	2	6	16	15	10	14	5	8
Pairs	16-2	12-9	14-5	8-7	15-4	11-13	6-1	10-3

THE AMERICAN WHIST LEAGUE MOVEMENT

5

Even though this particular movement was the first one used for duplicate play of cards (devised in the 19th century for use in whist tournaments), it is still of great value in both pairs and teams tournaments in bridge.

The whist movement has the same basic properties as the Mitchell movement: two fields (N-S and E-W), the N-S pairs remaining stationary (by convention) while the E-W pairs move (as do the boards). The balance of comparison of the pairs is perfect when the movement is completed.

The whist movement is useful in pairs events (but usually only when the number of tables is odd) as it may greatly simplify the scoring (see the section on scoring for further information). It is also invaluable in multiple teams events where the number of tables is odd.

Many of the gadgets used in Mitchell Movements can also be used in the whist movement. For example rover pairs, rover boards, rover tables, board switching, twinning of the movement etc.

As in the Mitchell, this movement has the same four basic components. N-S pairs, E-W pairs, boards and tables. As the movement completely loses its character if the components move other than in the conventional manner, only that procedure will be outlined. The N-S pairs remain stationary throughout the event and the E-W pairs move down (up) two tables at each change while the boards move down (up) one table. The tables should be arranged in the normal sequential manner, either in one long row or in the horseshoe pattern.

INTRODUCTION

ODD TABLES

Instruct the E-W pairs to move the boards as they are moving to simplify the change procedure. In the Mitchell movement the N-S pairs usually take on this responsibility, and this creates problems in getting the boards from one end of the movement to the other when the tables are arranged in a straight line.

The biggest problem with this movement is the players' habit of discussing hands they have just played, during the change. These discussions will always be about the hands the new opponents will be playing in the very next round. The usual problem of overhearing the bidding at the next table is still there, but this can be overcome by using the double whist move at each change; i.e. boards down (up) two tables and the E-W pairs down (up) 4 tables. The E-W pairs should not move to a table that is still in play, for the boards being played will be those that are to be played by the moving pair on the next round.

EVEN TABLES

This movement is of no use in teams events and of limited use in pairs. The disadvantage with this movement is that all the E-W pairs do not meet all the N-S pairs (see the stagger Mitchell as that does overcome this problem while still having a whist type move).

The movement for an even number of tables is the same as that for an odd number of tables except that after the half way round, the E-W pairs must move an extra table (down 3 instead of two tables) while the boards move normally. The last round cannot be played (like the skip Mitchell) because the boards at the last table will have been played by the E-W pairs.

To overcome this problem the move by the E-W pairs will be different on the last round, while the boards will move as normal. Where the number of tables in the movement is equal to N , and the E-W pairs are moving down two tables, then the move into the last round for the E-W pairs will be down $N/2-2$ tables. For example, with 10 tables: $10/2-2=3$; i.e. down 3 tables.

HALF TABLES IN THE WHIST MOVEMENT

This problem only arises in pairs events obviously, but it can be dealt with much the same way as in the Mitchell movement. The extra pair can be treated as an extra table so that all the E-W pairs will have one bye round at that table.

Where this extra table makes the numbers even this method is not particularly good as one E-W pair would be required to sit out twice; if the movement is curtailed early, then some pairs will not have sat out. The rover pair is the best solution to this problem.

WHIST ROVER PAIRS

For more information on rover pairs, see the section on rovers in the Mitchell movement. Here the procedure is the same, except that the rover moves in a different pattern.

Where the number of tables is prime, the roving pair starts at table 2 on the second round and moves up one table at each change (this assumes that the boards are moving down one table).

Where the number of tables is even, but not divisible by 3, then the rover starts at table 2 and moves up one table at each change, skipping one table at the same time the E-W pairs skip a table (i.e. after $N/2$ rounds).

Where the number of tables is divisible by three, the movement is irregular so that guide cards are necessary.

It should be noted that the rovers must repeat against some E-W pairs so that there is no repetition of the N-S pairs displaced. As the even numbered table movements have the revenge round in the last round, this feature of the rover is not as undesirable as it would first appear.

The real advantage of the rover movement is in having all the boards played an equal number of times. In all the schedules given below, the roving pair sits out for the first round, and after that replaces the N-S pair at the table shown in the schedule. The displaced N-S pair return to their own table at the end of that sit out round. The whist movement assumed to be in use is: E-W pairs down 2 and the boards down one.

6 Tables: 1,2,4,5,6*

9 Tables: 1,2,3,5,7,4,9,6*

12 Tables: 1,2,3,4,5*,6,8,9,10,11,12*

15 Tables: 1,2,3,4,5,7,8,10,11,6*,13,14,9*,15

18 Tables: 1,2,3,4,5,6,8,9,10,11,12,13,14,15,16*,18

* Indicates a repeat against an E-W pair.

In the last movement, for 18 rounds to be played the roving pair must displace an E-W pair at table 15 or 1, but note the N-S pairs at these tables have been displaced on previous rounds. Used in conjunction with a switched movement this is not noticeable.

INVERTED WHIST MOVEMENT

This movement has the same basic qualities of the whist movement. The only difference is that the movement of the boards and the E-W pairs are reversed. This is, E-W move up (down) one table and the boards move up (down) two tables. The E-W pairs should be given the responsibility of pushing the boards up one table further as they move. The only real problem arises when the tables are not arranged in a circular pattern as the boards must move to the other end of the movement when the E-W pairs do not. The director may need to assist when that is the case.

The advantage is the boards originate from a different table than the one at which the pairs are waiting for the play to finish, on the previous round. For example, in the standard whist move, the E-W pair moving from table one to table 3 may need wait for the completion of the last board there before starting the next round. The board being completed there will be played by that pair at table 5 on the next round. The other advantage is that there is less player movement. The disadvantage is the movement does not work as a multiple teams movement.

MULTIPLE TEAMS OF FOUR MOVEMENTS

6

INTRODUCTION

The organisation of multiple teams tournaments can be a simple process or a very complex one, depending on the requirements of the event. The number of sessions of play is important when considered with the number of teams competing. As there is only a certain number of boards that can be played in one session, it may be found that the number of boards divided by the number of teams is too low to make the event feasible. To overcome this an incomplete draw can be used or even better, a "Swiss" teams draw can be used. If fewer than four rounds per session are to be played, the best approach is head to head matches which are scored as they are completed.

With four or more rounds per session it would be more normal to use multiple teams movements. The choice of the size of the sections and types of movements will depend largely on the number of sessions available. Basically the only movements required for these types of events are:

- American whist league movement
- New England relay movement
- Twin Mitchell movement

There are other movements (which are explained later) available for specific numbers of tables but the above movements will cater for all sizes of sections. The twin Mitchell can be replaced by the twin whist (making all three whist movements), though the first is usually used for the reduced player movement.

**THE AMERICAN
WHIST LEAGUE
MOVEMENT**

This movement only works for an odd number of tables when used for teams. The mechanics of the movement have been explained in the section on the whist movement for general use.

i.e. E-W move up (down) 2 tables and boards up (down) one table.

The teams are seated at the table with the same number as their team number and the play commences after the first move (each pair not playing its team mates). This means that the number of rounds is equal to one less than the number of tables.

Once the event as outlined above is started, the event must be completed in the one session. This can be overcome for the two session event quite simply. The E-W pairs are instructed to move a number of tables on the first change and then the movement proceeds normally until approximately half way, when the scoring can be done for the first half. For the second half of the event the E-W pairs return to the last table played and then move normally until the rest of the teams have been played. When the E-W pairs encounter their team mates they make a second move on that change.

The special initial move for the E-W pairs is a certain number of tables (T) up (down) where $T=(N+1)/2$ and N= the number of teams in the event. If this resultant value of T is odd, then add one (1). The number of rounds of play is also equal to T (T-1 when odd).

For example with 13 tables.

- $T=(13+1)/2=7$ (as this is odd: $T+1 = 8$).
- Therefore 8 is the starting move.
- For the number of rounds before half way stopping point subtract 1: $7-1=6$.

If it is known at the start of the event that the number of rounds is to be less than the normal N-1, it is possible to arrange for this. An example of a situation of this type is where there are two sections with 13 and 15 tables. Because of time restrictions it is necessary to play only 12 rounds. The 13 table section is straightforward while it is necessary to reduce the number of rounds for the 15 table section by two.

For every extra change at the start (i.e. for every two tables the E-W pairs move) the event is reduced by two tables. Therefore with 15 tables as in the above example, the E-W pairs move 4 tables on the first change (rather than 2) and end one round earlier than normal and play 12 teams.

SAME BOARD WHIST

Where there is a large whist movement and the number of rounds is to be reduced to a number less than the maximum number possible, then it may be desirable that all the teams play the same boards. This is possible for certain combinations of tables and numbers of rounds desired.

The number of teams involved is T and must be odd. The number of rounds is R and is an even number. The standard whist league movement is used, E-W up (down) two, boards up (down) one. With the teams seated at their own table to start with, the E-W pairs move down $R-1$ tables (or up $T-R+1$ tables) for the first move and their first table of play. This will only work where $T \text{ Modulus } R = 1$ (i.e. T/R has a remainder of 1).

The boards must be duplicated and the number of sets "S" required depends on the number of rounds; $S = T/R$.

Given that these board sets are numbered 1,2,... R then the board sets are distributed, starting at table 1, as follows:

1,2,... R ,1,2,... R ,...1,2,... R , $R+1$.

Note one extra set of boards ($R+1$) is required to complete the movement.

For example with 13 tables and 4 rounds the board sets (say 6 board sets) would be distributed:

Table:	1	2	3	4	5	6	7	8	9	10	11	12	13
Sets:	1	2	3	4	1	2	3	4	1	2	3	4	5

The initial move by the E-W pairs is down 3 tables.

This movement is useful for only some combinations of tables and rounds.

For example:

- 17 teams and 8 rounds
- 21, 31, 41... teams and 10 rounds
- 25, 37, 49... teams and 12 rounds
- 19 teams and 6 rounds

Every team plays all sets except one at the end of the movement (i.e. after R rounds).

Another similar movement works where $T \text{ modulus } (R+1) = 1$. Here the number of board sets common is one less.

The sets are distributed similar to the first method:

1,2,... $R+1$,1,2,... $R+1$,...1,2,... $R+1$, $R+2$

This movement is useful for:

- 15 teams and 6 rounds
- 19 teams and 8 rounds
- 23, 34, 45... teams and 10 rounds

This method can be extended as follows:

$$T \text{ Modulus } (R + 2) = 1$$

$$T \text{ Modulus } (R + 3) = 1 \text{ etc.}$$

but each additional set of boards in the movement tends to defeat the purpose of the movement.

NEW ENGLAND RELAY MOVEMENT

This teams movement is only applicable for even numbers of tables.

It has an advantage over other movements for even numbers of teams as the movement is regular for the whole event and there is no need for a break in play as in the stagger movement.

The disadvantage is that there is continual board sharing between pairs of tables (but note there is no movement for an even number of teams that does not require some boards sharing or duplication). This is normally not a problem as the number of boards in play on each round is quite often 3 or more. If the number is less than three the movement allows for board duplication by the players on the first round very easily. Preduplication of the boards eliminates this problem completely.

The tables are arranged in two equal parallel rows. The tables next to each other share boards for the whole movement. A small relay table or chair should be placed between the tables on each side of the movement.

For example, 8 tables are arranged as follows:

1	R	2	R	3	R	4	R
5	R	6	R	7	R	8	R

Note that the arrangement is not the standard horseshoe type but that the lowest numbered tables in each row are at the same end. Tables 1 and 5 share boards as do 2 and 6 etc.

The boards are distributed with set 1 on table 1, set 2 on the relay table between tables 1 and 2, set 3 on table 2, set 4 on the next relay etc. As there is sharing throughout the movement, half the boards can be placed on the other side of the movement. In the above example, with 4 boards per round, boards (1&2) go on table 1, (3&4) on table 5, (5&6) and (7&8) on the relays, (9&10) on table 2, (11&12) on table 6 and so on.

With each team starting at the table with the same number as their team number, the N-S pairs remain stationary and the E-W pairs move up one table. During the move the E-W pairs are required to move the boards by placing the boards they have just played on the next relay and taking the boards from the relay to be played on the next round.

It should be pointed out to the moving pairs that when they reach the end of a row they are required to go to the *other* end of the *other* row to find their next table. It may help to place a guide card on the end table: "East-West go to table..."

The movement also works with the pairs moving down one table and the boards moving down one station.

If duplication of the boards is required (as for example in a 16 table movement where the sharing of boards would slow down the movement) it can be done as follows.

Start with two copies of each board on each table and each relay.

For example table 1 will have two copies of board 1, and the table next to it (sharing) two copies of board 2 (table 9 in the 16 table example).

Before the first change each team deals and duplicates the board on their table. The copies are then exchanged between the sharing tables. The first move is made. The boards on the relay tables now move into play and are dealt, played and duplicated and the copies exchanged. All boards are now duplicated and there will be no further sharing.

As with the whist movement, if the number of rounds is to be reduced below the complete movement, the E-W pairs simply move an extra table on the first round for every two less rounds. They will of course finish one table earlier for every extra table moved at the start.

If a break is desired at the half way point (i.e. a 2 session event) then the stagger movement should be used.

**TWIN MITCHELL MOVEMENT
(or MIRROR MITCHELL
or BARCLAY MOVEMENT)**

This movement is only applicable to an even number of teams. Only half the teams are met in this movement but the rest of the teams can be met if a whist movement is used for the second half of the tournament. Not only must the number of teams be even, but half the number must be odd to eliminate the share and relay problem.

The tables are arranged in two parallel rows of equal numbers of tables. The lowest numbered tables in each row are at the same end of the movement. The tables next to each other share throughout the movement unless the boards are duplicated.

For example 14 tables are arranged:

1	2	3	4	5	6	7
8	9	10	11	12	13	14

Each team is seated at their home table and the E-W pairs in each row exchange places. In the above example E-W pairs 1 and 8 exchange places as do 2 and 9 etc. Play commences and the boards are shared between opposite tables so that each match is completed in one round. The move is then a standard Mitchell move in each row with the boards moving down one table. In one row the N-S pairs move up 1 table and in the other row the E-W pairs move up 1 table. This really means that some teams move and the rest remain stationary. The moving pairs move to the other end of the same row when they reach the end of the row.

The whist movement can be used in each row with the same effect so long as the N-S pairs move in one row and the E-W pairs in the other.

When each row has an odd number of tables, the second half of the event can be run as two whist movements (in the example above tables 1-7 are one movement and 8-14 the other). The boards are usually shared between the two rows in the second half for aesthetic reasons (for discussion of the boards after play) as well as giving all teams an equal chance of having the same swings.

This movement in the complete form is known as the Hasler Movement.

THE STAGGER MOVEMENT This movement applies only to an even number of teams and normally would only be used for a 2 session event. The advantage over the previous movement is that the movement of the players is a standard whist move for most of the event. Boards are shared throughout with a break in play at approximately half way. The scoring can be done at this point. The play then continues with the current set of boards redealt or a new set of boards introduced.

The tables are arranged in two parallel rows of equal numbers of teams with the lowest numbered tables at the same end of the movement. The tables next to each other share boards throughout the movement (i.e. tables 1 and 5 in the following example).

For example 8 tables are arranged:

1	2	3	4
5	6	7	8

The movement consists of two parts (A and B) of which part A may precede part B or vice versa. Which order will depend greatly on the number of boards to be played in the respective sessions. Part A has the *even* numbered teams playing the *odd* numbers and vice versa. Part B has the *odd* numbers meeting the *odd* and the *even* meeting the *even*.

This movement can be useful in three session events where part A is used with a whist movement (with an odd number of tables).

For example with 25 teams, the field is broken into three groups of equal numbers of teams plus one: 1-8; 9-16; 17-24 and 25.

Then:

Session:	1	2	3
Movement 1 (part A stagger)	1-8 v 9-16	17-24 v 1-8	9-16 v 17-24
Movement 2 (9 table whist)	17-24 + 25	9-16 + 25	1-8 + 25

In movement 1, one group of 8 teams sit at odd tables and the other 8 at even tables.

PART A STAGGER MOVEMENT

Starting with the teams sitting at their own table, the N-S pairs remain stationary throughout the movement. On the first move the E-W pairs move up 1 table and play commences. It should be pointed out to the moving pairs that when they reach the end of a row that they must go to the other end of the other row to find their next table. In all subsequent moves the E-W pairs move up two tables and the boards up one table (i.e. the standard whist move). Moving in the opposite direction will of course work equally well.

When the moving pairs reach the table just before their team mates, this is the last round in this half of the movement. The E-W pairs then move up one table to their team mates. The scoring can be done at this point. With the teams sitting at their own table, the second half of the movement then begins.

PART B STAGGER MOVEMENT

N-S pairs remain stationary. E-W pairs move up (or down) two tables and the boards move up (or down) one table. This move continues for the rest of the event until E-W pairs return to their team mates. The scoring is done at this point. If this half of the event is used first, then play proceeds into the next half of the event (Part A).

STAGGER MOVEMENT FOR PAIRS

Part B of this movement can be used effectively as a pairs movement when it is required that the pairs only meet $\frac{1}{4}$ of the field. One particular application is with 12 tables over 4 sessions. The field is broken into 4 groups of 6 pairs: 1-6; 7-12; 13-18 and 19-24. The groups are placed at alternating tables and rotated so that they meet all other pairs. Part B of the stagger movement (with play taking place at the first table of course) then has all pairs meeting all other pairs only once.

The starting seating positions for each session are:

Tables	1 & 7	2 & 8	3 & 9	4 & 10	5 & 11	6 & 12
Session 1:	1-7	13-19	2-8	14-20	3-9	15-21
	4-10	16-22	5-11	17-23	6-12	18-24
Session 2:	1-19	7-13	2-20	8-14	3-21	9-15
	4-22	10-16	5-23	11-17	6-24	12-18
Session 3:	1-13	7-19	2-14	8-20	3-15	9-21
	4-16	10-22	5-17	11-23	6-18	12-24

Session 4: Use four 3-table Howell movements with the boards being shared within each Howell on each round and the boards moving from Howell to Howell on each change. Each Howell has 6 pairs: 1-6; 7-12; 13-18; and 19-24.

HOWELL MOVEMENT FOR TEAMS

This movement is also known as the Patton schedule. It is only useful for an even number of teams, as with an odd number there will always be one team sitting out. The disadvantages with this movement are that guide cards are required and boards are shared between both movements throughout.

The moving of the boards can also be a problem as in any Howell. With all the pairs moving it is difficult to assign this task to any particular pairs and so it is preferable that the director does it. If the matches are sufficiently long, the boards can be redealt before each match and can remain stationary throughout.

Alternatively, if there is enough space in the playing area, stationary board Howell movements can be used so that only the players are required to move. Note with stationary boards one table is required for each set of boards in play. Where the boards are being redealt before each round it is better to use the endless Howell movement to eliminate the need for guide cards.

When arranging a movement for N teams, two Howell movements of N/2 tables in each are set up side by side. The same Howell movement is used in each Howell except that the seating positions are switched at each table.

For example 10 teams:

Howell 1	10-1	4-3	9-7	4R	6-2	5-8
Howell 2	1-10	3-4	7-9	4R	2-6	9-5

The sharing of the boards between the tables next to each other is necessary for each match to be completed on each round.

As in standard Howell movements, the highest numbered team remains stationary for the entire movement.

**DOUBLE HOWELL
FOR TEAMS**

The double Howell has the same effect as the Howell movement for teams but the number of tables sharing boards is less. For many of the movements guide cards can be dispensed with as the movement of the pairs is quite regular. The disadvantage of having all the pairs (less 2) moving is still there, but the boards can be made stationary so that this is not a problem.

When stationary boards are used though, the problem of a roving share arises. Even when the regular movement can be defined, the starting position of the teams is not regular, and a starting position schedule needs to be posted at the start of the event.

8 TEAMS

By examining the expansion of the double 4 table Howell movement for pairs it can be seen that the team consisting of the two pairs with the same number play the same boards against opponents of the same number.

This movement in the short-hand form is:

8-1/1-8 6-5 4-2 2-6 7-3 5-7 3-4

This is the starting position with the tables being numbered from 1 to 7 from the left, with the table sharing with table 1 (pairs 1 & 8) being called 8 (or 1A).

The movement after the first round is:

- Team 8 stays
- N-S pairs: move down 3 tables (moving from 4 to 8 and then 8 to 5)
- E-W pairs: move down 2 tables (ignoring table 8)
- Boards down 1 table (ignoring table 8)

With stationary boards (i.e. with sets 1 to 7 on tables 1 to 7 for the entire movement) the movement after the first round is:

- Team 8: E-W table 8 stay; N-S move up 1 table and share boards with their team mates on each round
- N-S pairs: move down 2 tables (staying in 1 to 7) and playing at table 8 when they are displaced by N-S 8
- E-W pairs: move down 1 table (staying in 1 to 7)

12 TEAMS

- 12-1/1-12 11-4 10-7 9-10 8-2 7-5 6-8 5-11 4-3 3-6 2-9
- Team 12 stays
- N-S pairs: move up 1 table (using 12 or 1A instead of 1)
- E-W pairs: move down 4 tables (ignoring table 12)
- Boards down one table (ignoring table 12)

With stationary boards:

- Team 12: E-W table 12 stay; N-S move up 1 table sharing with 12
- N-S pairs: move up 2 tables playing at 12 only when displaced by N-S 12
- E-W pairs: move down 3 tables (ignoring table 12)

14 TEAMS

- 14-1/1-14 13-4 12-7 11-10 10-13 9-3 8-6 7-9 6-12 5-2 4-5 3-8 2-11
- Team 14 stays
- N-S pairs: move up 1 table (using 14 instead of 1)
- E-W pairs: move up 4 tables (ignoring table 14)
- Boards down one table (ignoring table 14)

With stationary boards:

- Team 14: E-W table 14 stay; N-S move up one table sharing with 14
- N-S pairs: move up 2 tables playing at 14 only when displaced by N-S 14
- E-W pairs: move up 5 tables (ignoring table 14)

It can be seen that the movements for 10 and 16 teams have not been included in the above schedules. These double Howell movements do not have a regular movement for the N-S and the E-W pairs (note that one less than the number of teams (N-1) is not a prime number). Standard pairs movement guide cards are necessary as the pairs must play in both N-S and E-W directions. The guide cards can be extracted from the full expansion of the following starting position.

One group of pairs stay in the set of tables 1 to 5 and the other in 6 to 10.

10 TEAMS

3-5 1-9 10-8 7-4 6-2/9-7 4-5 3-10 8-2 6-1 (team 10 stationary)

16 TEAMS

One group of pairs move in the set of tables 1A, 3 to 5, 9 to 11 and 15. The other group, in the rest.

9-13/13-9 7-2 7-4 10-3 1-14 16-1 14-5 10-11 12-11 8-2 6-16 6-8 12-4 15-3 15-5 (Team 16 stationary)

This teams movement is for an even number of teams where the number of teams less one is a prime number (i.e. 6, 8, 12... etc teams). The movement is based on the appendix principle with one table being appended to American whist league movements of prime numbers.

THURNER MOVEMENT

The advantages are:

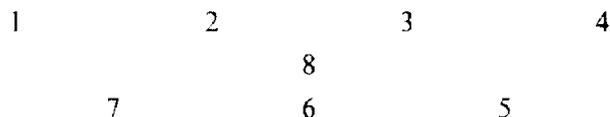
- There are only two tables sharing at any one time
- N-S pairs remain stationary
- The movement of the E-W pairs is in a regular pattern

The disadvantages of the movement are:

- The movement does not work for all even numbers of teams
- The starting positions of the players are not in a regular pattern
- There are two different tables sharing on each round

Where there are N teams, the tables are arranged in a horse-shoe pattern of N-1 tables with the highest numbered table (N) in the centre so that it can share boards conveniently with the other tables.

For example 8 tables:



After the pairs have taken their starting positions, all the N-S pairs remain stationary and the E-W pairs at tables 1 to N-1 move up 1 table and the boards (sets 1 to N-1 on tables 1 to N-1) move down one table.

There is a problem with the movement of the highest numbered team. N-S remains stationary at the highest numbered table and shares boards with their E-W pair which moves in a particular pattern. This roving E-W pair displaces different pairs on each round, the displaced pairs moving to the highest numbered table as E-W, playing there for one round and moving normally after that as though they have played at the table from which they have been displaced.

The starting positions are listed below. It is assumed that the tables are numbered from 1 to N from the left, where table N will be centrally situated.

6 TEAMS

1-6 2-3 3-5 4-2 5-4 6-1

E-W 6 moves up 2 tables i.e. 1, 3, 5, 2, 4.

8 TEAMS

1-8 2-4 3-7 4-3 5-6 6-2 7-5 8-1

E-W 8 moves down 2 tables i.e. 1, 6, 4, 2, 7, 5, 3.

12 TEAMS

1-12 2-6 3-11 4-5 5-10 6-4 7-9 8-3 9-8 10-2 11-7 12-1

E-W 12 moves up 4 tables i.e. 1, 5, 9, 2, 6, 10, 3, 7, 11, 4, 8.

14 TEAMS

1-14 2-7 3-13 4-6 5-12 6-5 7-11 8-4 9-10 10-3 11-9 12-2 13-8 14-1

E-W 14 moves down 4 tables i.e 1, 10, 6, 2, 11, 7, 3, 12, 8, 4 13, 9, 5.

From these examples the pattern develops as follows:

Tables 1 and N are always treated in the same way.

The E-W pairs are positioned as:

- Table 2 has E-W pair number $N/2$ and each subsequent even numbered table has the next lower numbered pair
- Table 3 has E-W pair number $N-1$ and each subsequent odd numbered table has the next lower numbered pair
- The roving E-W pair N moves $N/3$ (rounded down) tables - up if $N/2$ is even - down if $N/2$ is odd

The N-S pairs are the same as their table numbers.

Numbers of teams higher than 16 can be worked out by this method; but N-1 must be prime.

HALF ODD MOVEMENT

This movement only works where half the number of teams is odd. It has an advantage over the stagger movement in that there is no break in play at the half way point and the movement of the players is the same for the whole event. The disadvantage is that the two rows of tables must share throughout the event.

The tables are arranged in two parallel rows numbered from 1 to $N/2$ and from $N/2+1$ to N.

For example with 10 teams the tables are arranged:

1	2	3	4	5
6	7	8	9	10

The tables next to each other share boards throughout the event with the sets 1 to $N/2$ being placed initially on tables 1 to $N/2$. The rest of the sets of boards are placed on a relay table just after table $N/2$ from where they will move into play on table $N/2$. At each change the boards move down one table (and from table 1 to the relay table and from the relay table to table $N/2$). The N-S pairs remain stationary and the E-W pairs move up ($N/2-2$) tables.

There is one complication. At the start of the event, with each team sitting at its own table, the E-W pairs at every second table in each row are required to exchange places. In the above example E-W pairs 2 and 7, and pairs 4 and 9 would need to exchange places. The first move is then made and the movement proceeds normally to the half way point when these mentioned pairs having returned to their team mates must change back for one round. They then *return* and proceed as before.

If this movement is used for pairs events, the E-W pairs only need to move up 1 table at all times rather than ($N/2-2$). The exchanging of the E-W pairs is not necessary. If a rover pair is used, they can move up ($N/2-2$) but must exchange sides of the movement after $N/2$ rounds.

This movement is good for 6 and 10 teams, but 14 and 18 teams require the sharing of two boards between two tables slowing down the movement. This can be overcome by preduplication of boards or by having the players duplicate the boards via the following method.

Sets 1 to N are placed on tables 1 to N . Sets 1 to $N/2$ can be shuffled, dealt, recorded and duplicated immediately.

Sets $N/2+1$ to N can be played as though it was round $N/2$. The E-W pairs next to each other exchange positions for this match (the tables sharing boards). These sets of boards can also be duplicated at this point. The E-W pairs return for the change into the second round. The movement now proceeds normally without any further complications except that there is a double move after round $N/2-1$ as round $N/2$ has already been played.

As sixteen teams do not constitute an unusually large number of teams, **SIXTEEN TEAMS MOVEMENT** and is clumsy number for the previous movements, this movement may prove useful.

There is a problem with the New England relay and the Stagger movements. 8 tables are required in two parallel rows while many rooms do not easily accommodate this arrangement. The Thurner and Half-odd movements do not work with this number of teams.

The tables are arranged in three groups of five tables, two of which must be parallel to each other.

For example:

1	2	3	4	5	(A)
6	7	8	9	10	(B)
11	12	13	14	15	(C)
		16			

Team 16 is placed convenient to the third set of five tables as shown in the arrangement above.

On the first stanza the groups (A) and (B) play each other using a twin Mitchell movement. Group C and team 16 play each other over 5 rounds via (usually) a Thurner movement. The boards must be redealt after five rounds.

The move by the teams after they have scored the first five matches is: group (A) moves to the tables 6-10 occupied by group (B) which moves to tables 11-15 and group (C) to tables 1-5. After the next five matches the groups again move up one set of tables for the third stanza.

From a practical point of view a better move after the first five matches is: Team 16 is moved close to (A) to form a Thurner movement. (B) and (C) form the twin Mitchell.

After the next five matches, groups (A) and (B) swap places. Group (B) and team 16 now forms the Thurner movement.

ROUND ROBIN EVENTS

The barometer type movements for pairs can be used for assigning the draw for any even number of teams as well as for an odd number where there is to be a bye. Obviously there is no balancing problem so that the standard flower Howell can be used.

The first round is found by numbering the teams from left to right until half the number of teams and then back to the first. On subsequent rounds one must be added to each team number except the highest.

For example 8 teams:

1v8	2v7	3v6	4v5
2v8	3v1	4v7	5v6
3v8	4v2	5v1	6v7
4v8	5v3	6v2	7v1
8v5	6v4	7v3	1v2
8v6	7v5	1v4	2v3
8v7	1v6	2v5	3v4

The first named team can be the home team and would be required to sit first if their opponents so desired. Note the switching of team 8 from away to home for the last three rounds.

Team 8 would be the bye round if there were only 7 teams. If the bye is not desired with an odd number of teams then a multiple teams movement can be used or the following method applied.

A draw is used where three teams play two half matches on each round rather than one full match which the rest of the teams are playing. After two rounds these three teams will have completed two full matches.

The three tables playing the two half matches are arranged in a row so that a simple Mitchell movement can be conducted. The first change is E-W move up one table and play the first half match; the next move is E-W up one table and the boards down one table to play the second half match.

The number of boards on each table is the same as half the boards used in one full match. If two rounds are played in one session then the number of boards on each table is equal to the number in each match. The draw used does not have a pattern about it, but is not difficult to devise. The draws for 7, 9 and 11 tables follow, with the first three named teams being the ones involved in the half matches.

7 TEAMS ROUND ROBIN

1v2v3 7v4 6v5
1v2v3 4v6 5v7
1v4v5 2v6 3v7
1v4v5 7v2 6v3
1v6v7 2v4 3v5
1v6v7 5v2 4v3

9 TEAMS ROUND ROBIN

1v2v3 6v5 4v8 7v9
1v2v3 5v8 7v4 9v6
1v4v5 8v7 2v6 3v9
1v4v5 9v2 6v8 3v7
1v6v7 4v3 2v8 5v9
1v6v7 5v2 9v4 8v3
1v8v9 7v2 4v6 3v5
1v8v9 2v4 5v7 6v3

11 TEAMS ROUND ROBIN

1v2v3 6v5 11v4 7v9 8v10

1v2v3 4v6 9v11 8v5 10v7

1v4v5 8v7 11v2 10v3 9v6

1v4v5 2v8 3v9 6v10 7v11

1v6v7 2v4 3v5 10v9 11v8

1v6v7 9v2 4v8 10v5 3v11

1v8v9 4v3 5v7 2v10 11v6

1v8v9 7v2 6v3 4v10 5v11

1v10v11 5v2 3v7 6v8 9v4

1v10v11 5v9 2v6 8v3 7v4

There is one problem with this draw; it is difficult to assign the away and home teams, particularly in the three way matches. This can be overcome by having team 1 away to one team on the first half and home to it in the other half. The other two teams are at home and then away to each other (or vice versa) in the two halves.

**SWISS TEAMS MOVEMENT
(ELEVATOR TEAMS)**

This method was derived from chess events where it was impossible to conduct complete round robins in the time available and yet it was necessary to produce a single winner with the result being reasonably reliable.

After each round the draw is determined by the performance of the teams. The leading team plays the team running second, 3rd and 4th play each other, 5th and 6th play each other and so on. The only other restriction on this is that no two teams ever meet twice in the event. The draw is resolved from the top positions such that if first place has played second already, then they would play third place, provided always that they have not met previously. If they have, then fourth place etc.

The overall effect of this draw is that the good teams (i.e. those performing well) generally play the good teams and the medium teams the medium and the weakest teams play the weakest.

Generally speaking the field is left in one section even though it is possible to divide it into two or more sections for various purposes.

For the first round, the field is usually seeded with the best teams at the top of the list and the weakest teams at the bottom. The draw is then made according to this order, and can be made quite a number of ways.

- The first team plays team number $N/2 + 1$, the second $N/2 + 2$ etc. down to $N/2$ playing N where N is the number of teams (and is also an even number). The effect of this draw is that generally all teams have an equally easy match. This is the recommended draw for the first round.
- The first team plays the last, the second plays the second last etc., to the $(N/2)$ th playing the $(N/2 + 1)$ th team. The reasoning behind this is that the seeding of the centre teams is more difficult and so their results should be determined by play off.

There are many other methods available but it is interesting to note that under a mathematical model it has been found that the method used to conduct the first round does not make any significant difference; therefore the most aesthetically pleasing method should be the one chosen.

As anyone conducting a swiss teams event will discover, the determining of the draw becomes more difficult as the number of round increases, because the teams have more frequently met their potential opponents. It is therefore recommended that if the number of rounds approaches $\frac{1}{2}$ to $\frac{2}{3}$ the number of teams, then a complete round robin should be preferred (naturally with fewer boards per match).

The minimum number of rounds can be determined more accurately as there is a minimum number of rounds which must be played before it is guaranteed that two teams who have been continually winning meet each other. This number of rounds, $R = \log_2 N$ (rounded up).

The recommended minimum number of rounds is

$$R = \log_2 N + 2 \text{ (rounded up)}$$

i.e. The following numbers of teams are shown with the recommended minimum number of rounds:

9-16 (6)

17-32 (7)

33-64 (8)

65-128 (9)

ODD NUMBER OF TEAMS

As it is almost impossible to have a bye for the odd team in a Swiss teams draw, the odd number of teams event must be handled differently. Ideally it would be best to have a spare team available to cater for an odd number of teams.

It may also be possible to break up the last entered team to make 5th members of other teams or to compile another team from 5th members of other teams, but this is rarely acceptable to the players involved.

The best solution to this problem is to run a three way match between the three bottom teams. This is similar to the method suggested for round robins where the bye has been eliminated. The three teams play one half match on each round so that after two rounds the three teams have played two complete matches against the other two teams.

The results of these three teams are not used for compiling the draw except every second round when the matches are complete. An even number of rounds is necessary for this method. If this is not possible then the last two half matches should be scored as half matches on a modified VP scale.

A slight problem with this method is that the draw for the three bottom teams is complicated. Each team should not have met either of its opponents.

A second solution, similar to the previous one, is to have two half matches on each round scored on a reduced VP scale or scored as one result for each team. The result is included in the next round's draw. The problem with this is that there are many teams playing a different number of teams and the draw can become particularly difficult by the end of the event. This method is recommended only where there is a large number of teams and a low number of rounds.

ORGANISATIONAL SUGGESTIONS

Each team should be assigned a table with a number equal to the number of the team. When two teams are playing each other the E-W pairs should exchange places and the match then commences. The number of boards played in each match will depend on the time available which will in turn depend on the number of rounds.

It would be normal to have between one and 5 matches per session so that each match would consist of about 6 to 30 boards. Each match would start with half the boards for the match on each table and after these have been completed the tables would exchange boards.

There is one problem when two opposing teams are situated next to each other where they may overhear the bidding at the next table. This can be overcome by making some spare tables available for use when this situation arises.

The home and away teams are not easily assignable. One solution to this problem is for the lower numbered teams to be the home team on the first round (odd numbered round) and the higher numbered teams the home teams on the second (even numbered) rounds.

Another solution is for the home team to be the higher scoring team or the lower numbered team in the case of the tie.

As it is imperative to have the results of the matches to determine the draw for the next round, it is necessary to set time limits on matches. Once the time has expired play is to cease after the current hand is completed and the result determined immediately (say 5 minutes to do this). Any hands not completed by both tables should be eliminated from the match.

Results of each match are entered on a special form for this purpose and handed to the director.

A suggested form:

	Team no.	Result in IMPs	Result in VPs	Previous VP total	New VP total	Signatures
Winner						
Loser						

As the compilation of the draw can be tedious, the following method is suggested to make it as speedy as possible. A separate card (say a 10cm x 15cm system card) is prepared for each team for use by the director to keep a record of the results, and help determine the draw.

The two cards for each match are placed together and laid out for easy reference so that as the results of the matches come to hand each result can be entered on the cards. These are sorted into order of net total ready for determining the draw for the next round. When sorting the cards the first consideration is given to the total VPs. If this is equal to that of another team, the total IMPs are considered and if a tie still exists, then the team number is used (i.e. the seeding order).

With all results in, the cards are ordered from top to bottom in the order of performance, the leading teams at the top and the last team at the bottom of the pile. The top card is then selected and compared with the next team to see if the two teams have played each other. If they have, then the second card is put aside for the moment and the first card is compared with the third and so on until an unplayed opponent has been found for the first.

This process is then continued until all teams have opponents they have not played. If the number of teams is large then it is possible to determine the draw from the bottom of the deck of cards as well as from the top thereby speeding the process.

An example of the suggested card is:

TEAM NO. 1

CAPTAIN J. SMITH

Round	Opponent	IMP Result	Net IMPs	VP Result	Net VPs
1	25	+28	+28	10	10
2	7	-3	+25	5	15
3	16	+10	+35	8	23
4	3				

These paired-off cards are then used to announce the next round's draw. At the same time this draw can be written up on a notice board for later reference.

DISADVANTAGES

Because of the nature of the event it is possible for a team that is not leading to win the event in the last round by having a maximum win while all the leaders have drawn matches. At the same time this team may not have played any of the leaders.

It is possible for the leading teams (who cannot be beaten) to manipulate their results in the late rounds to suit their purposes. It is highly desirable for the organisers to eliminate such opportunities.

A method of overcoming this problem is first place play second; third place play fourth; etc. irrespective of whether these teams have played each other or not. This should be automatic for the last 1 to 3 rounds, depending on the total number of rounds.

Where a team is in an unassailable position, it should be drawn against a team near the bottom of the draw so that manipulation of their results cannot affect the outcome of the tournament. In the last few rounds, as far as possible teams out of contention should not be drawn against teams in contention.

This method of draw by rank (ignoring rematches) is known as Danish Swiss. The only disadvantage is that teams may play each other two, three or even more times.

TEAMS OF THREE

This is a purely promotional type of event where a club wishes to encourage weaker players to participate in teams events.

Entries are called for teams of three players. The fourth member of the team is assigned by ballot from a group of volunteer championship players who will play with all three members of the team (say three nights - one for each player).

The experienced players will be asked to explain the tactics of teams bridge and to isolate and analyse the mistakes in their game. A limit on master points should restrict the entries to the people at whom the event is aimed.

INDIVIDUAL MOVEMENTS

7

INTRODUCTION

Individuals are generally fun events, and are not taken particularly seriously by either the players or the organisers. On the other hand this event is a particularly sociable one and is usually enjoyed by all those taking part.

Several problems arise in the organisation of this event, and the director must be prepared for them. For all the players to meet each other, usually guide cards must be used. These are either player guide cards or table guide cards, depending on the type of movement used.

The travelling score sheets need to cater for four player-numbers rather than the usual two required in a pairs event. The entering of the players' numbers is a slow process and for this reason it is better if the director enters these before the start of the event.

The scoring of the event takes longer than a pairs event as twice as many scores must be calculated for an equivalent number of tables. The bidding systems used by the players are usually restricted by the organising body. This is to speed up the game by eliminating a lot of the discussion at the start of each round.

Individual movements can be divided into three different types.

The simplest form is the rainbow movement which is similar to a Mitchell movement with each player playing at only one compass point throughout the session, and the movement being regular for each player.

The second type is similar to the Howell movement in that the players move to the position occupied by the next lower numbered player and the boards move down one table. Usually table guide cards are sufficient to make this movement run smoothly.

The third type is difficult to define. The players generally move haphazardly and quite often the session is divided into several stanzas with one set of boards being played in each stanza. Individual player guide cards are needed with this type of movement.

MITCHELL TYPE INDIVIDUAL MOVEMENTS

This movement only applies to a prime number of tables in the simplest form but can be used as a basis for other numbers of tables by applying the appendix principle for extra tables.

This movement was originally devised by the late Geoffrey Mott-Smith and was known as the Jacoby movement at that time. It was later to become known as the rainbow movement for the simple reason that the groups of moving players were assigned a colour. The reason for assigning these colours is not obvious, for they can be nominated by referring to the compass directions.

The major disadvantage with this movement is that all the players do not meet one another. The advantage is that the movement is regular and guide cards are not necessary. Quite a number of the irregular movements (type three) use this type as a skeleton for the overall movement.

In the Mitchell movement there are four components, the N-S and E-W pairs, the boards and the tables (see the Mitchell movements for further treatment). This movement is similar except that there are 6 components to be considered. These are North, South, East, West, boards and tables.

With the number of tables prime and greater than 3, one of these components remains stationary together with the tables, while the others move up one table, down one table, up two tables and down two tables. The normal and best component to leave stationary is the boards. The players then move thus: North up one table, South down one table, East up two tables and West down two tables.

The numbering of the players must be given some consideration so that no two players have the same number. For example the North players in a 7 table movement might be numbered 1-7, East 8-14, South 15-21 and West 22-28. Either a special score sheet with slots for four player numbers for each entry is used or the local pairs score sheet can be modified to suit the purpose.

For example two lines can be used on a pairs score sheet, so that the North number is above the South number with one on one line and the other on the line below it. The players can be asked to rule lines across the score sheet at every two lines at the start of the event so that the end result will also be a lot neater. It makes it easier for the players to remember to use two lines for each entry.

Clearly when using this movement, all the players cannot meet one another, but the movement can be modified so as to double the number of rounds or even treble them. As this movement can be curtailed at any point, there is good control over the number of boards played.

The number of rounds can be doubled by having two players of opposite partnerships exchange places after having played half the boards on the table. For example, with four boards on a table, the first partnership plays two boards and then East and South exchange places and the other two boards are played.

Three partnerships per round can be attained by having three players at each table rotate around the fourth, playing one third of the boards with each partnership. For example North can remain stationary while East moves to West, West to South and South to East after each of the three partnerships.

The designation of the moves at the start of the event (up one table etc.) should be made before any rotation of the players so there will be no confusion as to whom the instructions apply. It should be pointed out to the players that they should always start at the same compass position at each new table.

For ease of scoring it is better if the boards are played in numerical order at each table, particularly if the boards are being played in pairs for each partnership.

APPENDIX INDIVIDUAL MOVEMENTS

This movement was first used by Paul N. Marks of Chicago. As with the appendix Mitchell, this only works for prime numbers of tables. Only one table generally can be appended to the movement. Even where more can be appended, it is not normal to have more than one.

The disadvantage is there can only be as many partnerships as there are rounds, so it is not possible to rotate the East, South and West players about North. The advantage is that no guide cards are required to conduct the event.

The basic (prime) movement is set up with the appendix table positioned separately. One set of boards is placed on each table including the appendix table.

The players are logically broken up into five groups. North, South, East and West players in the basic movement make up four of the groups. The fifth group consists of four roving, displacing players.

Any players trying to occupy the seats of these rovers are sent to the appendix table for that round and continue normally after that as though they have played at the table from which they were displaced.

All the boards remain stationary at all times. The basic movement moves normally within itself (i.e. as if not using the appendix table) and the appendix table is used only by the displaced players.

The players displaced sit at the appendix table one compass position away from the normal. That is: East, West and South players rotate about North one position, but for that round only.

The suggested movements for the players are: North up 2 tables; South up 3 tables; East down 1 table; West down 2 tables. The rovers move up 1 table starting at North table 1, East table 2, South table 3 and West table 4. These 4 displaced players start at the appendix table.

Care must be taken in the numbering of the players so that no numbers are repeated. The rovers are usually assigned the top 4 numbers. For example with 8 tables the arrangement is:

- Base movement is 7 tables
- North number 1 to 7
- East number 8 to 14
- South number 15 to 21
- West number 22 to 28
- The four displacing rovers are 29 to 32
- Table 8 starts with players 1, 9, 17, 25

HOWELL TYPE INDIVIDUAL MOVEMENTS

The advantages of this movement are that the players move regularly, the boards move regularly and all players meet all other players.

It is suggested that the reader study the method of derivation of the Howell movements for a more thorough understanding of the following movements.

The type of Howell pairs movement selected for an individual is an *even numbered table movement* with all tables involved in *pairs of shares*. The best example of this is the early scoring movement supplied for a 6 table Howell. This is used as a three table individual movement.

That movement is repeated below for convenience, but it has been modified for an individual movement with the numbers reading from left to right at each table representing North, South, East and West. The same general short hand method has been retained for describing this movement.

3 TABLE INDIVIDUAL MOVEMENT

- 12-1-9-8 5-7-3-11 8R 2-6-4-10

Player 12 remains stationary as does the highest numbered player in all cases. All other players follow the next lower numbered player. The boards move down one table, with set one usually starting at table 2 and coming out of play after three rounds. All but three sets will have been scored by the end of the last round.

2 TABLE INDIVIDUAL MOVEMENT

It is quite clear from studying all the 4 table Howell movements available, that there are no 2 table Howell Individual movements of the type explained above. Therefore sharing of the boards between the two tables is required.

- 8-1-6-2/5-7-3-4 6R

Clearly any 4 table Howell skeleton can be used to derive a 2 table individual movement. The board sets would consist of either 3 or 4 boards, making 21 or 28 boards in all.

4 TABLE INDIVIDUAL MOVEMENT

The movements for 4, 5 and 6 tables unfortunately do not have all the relays on one table.

- 16-1-13-6 3-5-15-4 14-11-10-9 9R 2-8-12-7 2R

5 TABLE INDIVIDUAL MOVEMENT

- 20-1-5-13 7-17-16-9 8R 15-12-8-14 2-18-4-3 4R 15-19-11-6 2R

6 TABLES INDIVIDUAL MOVEMENT

- 24-1-21-4 2R 19-16-15-14 3R 13-2-3-17 R 9-11-8-12 3R 10-18-20-7 6-22-5-23 8R

By combining 2 table movement with other two table movements it is possible to have 8, 16, 24, 32, 40, 48 and 56 player movements in which they all play the same boards and yet 7 rounds of 21 or 28 boards are played.

A similar approach can be used with three table movements to produce movements for 12, 24, or 36 players all playing the same boards and playing 11 rounds for 22 or 33 boards.

When this method is used, each group of players must be numbered separately such as 1 to 8, 11 to 18 and 21 to 28 etc. In the case of 12 players 1 to 12, 21 to 32 etc.

9 PLAYER INDIVIDUAL MOVEMENT

Movements similar to Howell movements are possible for 9 or 10 players. In these movements there is no stationary player but the players all follow the player with the number one less than their own. In the 9 player movement everyone sits out once and there are 9 rounds of usually 3 boards per round. Sharing is always carried out between the two tables, and by combining 2 or more movements it is possible to have events for 9, 18, 27... players.

The possible starting positions for 9 players are:

- 9-8-4-7/2-6-3-5 player 1 sits out on the first round
- 6-8-5-9/2-3-4-7 player 1 out
- 4-8-5-7/3-2-9-6 player 1 out
- 4-3-5-8/2-6-7-9 Player 1 out

10 PLAYER INDIVIDUAL MOVEMENT

In the 10 player movement the procedure is the same as that for 9 players, but it would be unusual to have multiple sections for there is a movement available for 20 players.

Each player sits out twice and there are 10 rounds of 2 or 3 boards. The boards are shared throughout the movement between each set of two tables. Clearly there are many possible movements for 10 players, therefore those included below are the ones previously published.

- 1-5-2-4/9-6-8-7 players 3 and 10 out
- 4-8-3-2/5-10-9-6 players 1 and 7 out

13 PLAYER INDIVIDUAL MOVEMENT

Another very effective movement for an odd number of players is the following one for 13 players.

This is derived from the following 7 table Howell:

- 14-1/13-10/9-8 3-5/12-7 10R 2-6/11-4

This gives:

- 2-6-11-4 13-10-9-8 3-5-12-7 10R player 1 out

There are 13 rounds with each player sitting out once. The sitout player can kibitz the table 2 game. With set 1 starting at table 3 it will have been played three times (i.e. finished) after three rounds and so the scoring can start at this point.

Clearly this movement can be used in multiples, with each additional movement following the previous one on the same set of boards so that the movement is suitable for 13, 26, 39 or 52 players.

If the 4 sections are called A, B, C and D then the arrangement would be:

Board sets: 1 2 3 4 5 6 7 8 9 10 11 12 13
 Section: A A A B B B C C C D D D -

As the same movement is used for each section, they simply start with a different set of boards. This is similar to what can be done with the previous 12 player movement except that this can accommodate 4 sections rather than three. By using player guide cards this movement can be used with stationary boards, which would be clearly better for 52 players as only one table is not in play.

14 PLAYER INDIVIDUAL MOVEMENT

By using the above 7 table Howell movement it is possible to have a 13 round 14 player movement, the disadvantages being that each player sits out twice, and 14 never sits out. Player 14 sits stationary throughout the movement.

- 2-6-11-4 14-1-9-8 3-5-7-12 10R players 13 and 10 out

17 PLAYER INDIVIDUAL MOVEMENT

Using the following Howell movement it is possible to derive a good 17 player individual movement.

- 18-1/12-7/13-10 5R 6-8/11-17 5R 16-9/4-3 3R 15-2/14-5

This gives:

- 12-7-13-10 5R 6-8-11-17 5R 16-9-4-3 3R 15-2-14-5 player 1 out

There is no stationary player and each player follows the next lower numbered player (1 following 17).

18 PLAYER INDIVIDUAL MOVEMENT

Using the above Howell the following movement is derived but the movement is not perfect as player 18 remains stationary throughout and all other players sit out for two rounds. There are only 17 rounds.

- 18-1-12-7 5R 6-8-11-17 5R 16-9-4-3 3R 15-2-14-5 players 13 and 10 out

21 PLAYER INDIVIDUAL MOVEMENT

The same principles apply as in the above movement when using the following:

- 20-3-8-18 R 19-16-13-12 R 4-6-9-17 12R 15-21-11-2 R 14-7-10-5 R player 1 out

22 PLAYER INDIVIDUAL MOVEMENT

- 22-1-20-3 R 19-16-13-12 R 4-6-9-17 12R 15-21-11-2 R 14-7-10-5 R 22 stationary; players 8 and 18 out

IRREGULAR INDIVIDUAL MOVEMENTS

16 PLAYER MOVEMENT

This movement has advantages when the particular qualities of the movement are needed. The boards come out of play every three rounds. There is restricted player movement with the players rotating around the fourth for three rounds. The disadvantage is that tables 2 and 3 must share boards.

After each round East, South and West rotate around the North player (as in the rainbow movement) and the boards move down one table (from 4 to the share at 2 and 3, and then to table one and then 4 etc). After three rounds new boards are introduced or the current boards are redealt. Only the starting positions for rounds 1, 4, 7, 10 and 13 are given, for the rotations follow automatically.

1	1-3-2-4	5-8-7-6	9-10-11-12	13-14-16-15
4	1-9-5-13	2-14-10-6	3-7-15-11	4-8-16-12
7	1-12-6-15	7-9-14-4	10-13-8-3	16-11-2-5
10	1-10-7-16	8-9-15-2	11-13-6-4	14-12-3-5
13	1-11-8-14	6-9-16-3	12-13-7-2	15-10-4-5

THE SHOMATE INDIVIDUAL MOVEMENTS

These movements are similar to the above movement for 16 players in that the players sitting in the East, South and West seats rotate about the North player, playing one of the 3 boards with each player. All players move and the boards remain stationary throughout the movement.

There are three boards per table and the number of partnerships is equal to the number of boards. The number of changes (i.e. the number of moves from one table to another) depends on the number of tables. Guide cards are needed for the players to move from one change to the next, but the rotations follow automatically.

The players are divided into four groups in each movement, while the players within each group do not meet one another. For example, in the 32 player movement the groups are 1-8, 9-16, 17-24 and 25-32.

The movement can be completed by having these meet by using 4 x 8-player movements on the same sets of boards. Similarly for 4 x 9 and 4 x 10 for 36 and 40 players respectively.

32 PLAYER SHOMATE INDIVIDUAL MOVEMENT

See appendix D

36 PLAYER SHOMATE INDIVIDUAL MOVEMENT

See appendix D

40 PLAYER SHOMATE INDIVIDUAL MOVEMENT

See appendix D

20 PLAYER; 4 STANZA INDIVIDUAL MOVEMENT

See appendix D

24/25 PLAYER; 5 STANZA INDIVIDUAL MOVEMENT

See appendix D

28 PLAYER; 4 STANZA INDIVIDUAL MOVEMENT

See appendix D

32 PLAYER; 24 BOARD INDIVIDUAL MOVEMENT

See appendix D

**COMBINATION
INDIVIDUAL MOVEMENTS**

The McKenney-Baldwin movement is the first movement in this category. It is similar to the approach used in pair's movements of the same name. This is a 5 session movement and the field is divided into five sections.

The base is a prime number movement (without player rotation) to which is appended a smaller individual movement. The number of rounds played in each stanza is equal to the number of tables in the prime number movement. The arrangement is very similar to that used in the combined Howell-Mitchell movement.

36 PLAYER INDIVIDUAL MOVEMENT

This movement consists of a 7 table prime number movement to which is appended an 8 player individual movement. The highest numbered player (number 36 in this case) usually remains in the 8 player movement throughout as the stationary player. The other players are divided into five groups.

(A) 1 to 7; (B) 8 to 14; (C) 15 to 21; (D) 22 to 28; (E) 29 to 35.

The two tables in the 8 player movement share boards with table 1 of the prime number movement throughout. Therefore at least 3 boards are required in each set, consequently at least 21 boards per session and at least 105 boards overall.

The major advantage with this movement is that no guide cards are needed with the exception of table guide cards in the 8 player movement. The five groups of players occupy the five positions in rotation, a different position on each session.

In the prime number movement the positions are North, South, East and West and in the 8 player movement for the fifth position. If stationary boards are to be used, the 8 player movement shares boards with the tables in the prime number movement, in ascending order.

Session:	1	2	3	4	5
South-prime:	A	E	D	C	B
East-prime:	B	A	E	D	C
8 Player:	C	B	A	E	D
West-prime:	D	C	B	A	E
North-prime:	E	D	C	B	A

56 PLAYER INDIVIDUAL MOVEMENT

The same principles apply as in the 36 player movement. A prime table base of 11 tables is used. The 12 player movement is appended with table 1 sharing with table 1, 2 with 2 and 3 with table 11 of the prime number movement (assuming moving boards are being used).

The players are divided into 5 groups of 11 and the highest numbered player is stationary in the 12 player movement. The same rotating of the groups is used as in the 36 player movement. As only two tables ever share boards only two boards per set are needed.

i.e. 22 boards per session or overall 110 boards. If the boards are duplicated, then obviously the number of boards per set can be one.

52 PLAYER INDIVIDUAL MOVEMENT

This is the second type of combination movement, and 52 is the only useful number of players to which it applies. Clearly the number of tables being 13, the prime number movement applies if 13 or 26 rounds are required. Also with 39 boards in one session, 39 partnerships can be played. If 51 rounds are required the following procedure can be applied.

- 1st session

A prime number movement for 13 tables is set up with the players being assigned numbers North 1-13, East 14-26, South 27-39 and West 40-52. Two boards per table are distributed. Conducting a standard prime number movement with the South and East players swapping places after each board so that after 26 boards there have been 26 partnerships.

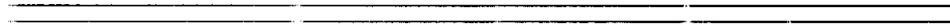
- 2nd session

The players take their seats as for the original starting positions. Only one board per table is distributed. The South and West players swap places. There is no play at the first table (see the 3rd session) and the players move on to the second round as in the prime table movement. After 12 rounds of play the session is completed.

- 3rd session

Using the 13 player movement given earlier, the four groups of 13 players meet each other within the groups. A new set of 13 boards is used for this session (presumably boards 14 to 26 of the set distributed in session 2, when boards 1 to 13 would have been distributed).

The 4 sitout players in this session are the same players that started as groups of four at tables 1 through 13 in session 2. They can play sets 1 to 13 from session 2 rather than sitting out.



MOVEMENTS FOR TEAMS OF MORE THAN TWO PAIRS

8

INTRODUCTION

This type of movement is usually used to match two or more teams (usually representing their club) against each other without meeting the members of their own team. As well as the inter-club events, it is possible to conduct events within a club as novelty events or in conjunction with standard pairs events simply by having the scoring done in a second way.

The outline of the movements given below is broken into two major types; those for two teams and those for multiple numbers of teams. Special considerations have to be given to odd or even numbers of pairs in the teams, and odd or even number of teams.

The usual scoring methods apply to this type of event, with match point, total point and Butler method being most popular.

In the U.S.A. competitions between two teams of pairs started to come into popularity in the early 1930's when matches between two cities, or two business firms were arranged. To cater for the needs of the day the Gruenther relay movement was devised by Major General A.M. Gruenther with the help of Major L.R. Gracy (U.S.A. Army). This movement is both simple and effective.

TWO TEAMS OF PAIRS

TWO TEAMS OF EVEN NUMBERS OF PAIRS

The tables are set up as two rows of equal numbers, parallel to each other so as to facilitate the sharing of the boards between the two rows. The number of tables in each row should be equal to half the number of pairs in each team.

HALF THE NUMBER OF PAIRS IS ODD

Half the pairs in the first team sit as N-S at the tables in the first row and the other half sit as E-W in the second row. The second team sit in the vacant places opposite the first team. The movement then proceeds as a normal twin Mitchell with the boards being shared between the two rows of tables throughout the event.

One team remains stationary throughout the event with the other team moving up one table at each change. The pairs stay in the same row throughout the event and the boards move down 1 table. After N rounds the first half of the event is finished (where N = the number of tables in each row).

The home (moving) team then swaps places, the N-S pairs moving to the positions occupied by the E-W pairs and the E-W pairs vice-versa. New boards are introduced (or the old ones redealt) and the second half proceeds just as the first half did.

HALF THE NUMBER OF PAIRS IS EVEN

Where there is an even number of tables in each row the twin Mitchell movement introduces new problems. The skip Mitchell may be used, with the players repeating the play against their first pair and failing to play against the pair they skip at half-way.

The Gruenther method was to have share and relay movements in use but the share and relays were placed at different points in each row. This would only need 3 boards per round rather than 4. Clearly it is best to have the share of one row opposite the relay of the other to reduce the number of boards needed to only two.

A simpler version of this movement was devised in England by Mr. R.G. Doig (in 1952). The skip movement is used and proceeds normally until the round when the pairs meet the same opponents for the second time (the last round of the first half). The N-S and E-W pairs of the moving team then swap places on this round. The last round of the first half is then played with these new opponents.

For play in the second half, the players no longer have to swap sides, but the moving players have to move to the table opposite the table they skipped in the first half of the event (i.e. up $N/2$ tables where N = the number of tables in each row). The play then proceeds normally (with the boards having been redealt) with a skip after $N/2$ rounds.

For the last round the moving pairs again have to swap sides to meet the one remaining pair they have not met.

THE STAGGER MOVEMENT

Part A of the stagger movement (see multiple teams movements) can be used when half the number of pairs is *odd or even* with no disadvantages over the previous two methods. One team sits at the even numbered tables and the other at the odd numbered tables.

As explained in the stagger movement this movement is used for the even numbered tables to meet the odd numbers. The E-W pairs start by moving up (or down) one table and then move up (or down) two tables, changing sides of the movement as needed.

If it is required that all the pairs of one team meet all the pairs of the other team then for the second session have one team swap its N-S and E-W pairs about at each table and then repeat the movement.

TWO TEAMS OF AN ODD NUMBER OF PAIRS

This movement was suggested by Col. R.L. Telfer (England). The problem is: each board played by the team has to be played the same number of times N-S as E-W and with an odd number of pairs, the result of the Nth pair has no result to compare or compensate with. This method overcomes this problem. Unfortunately each pair misses one pair from the opposing team.

The number of tables in the movement is equal to the number of pairs in each team. The away team (visiting team) is asked to sit as N-S at the odd numbered tables, and E-W at the even numbered tables. The home team then occupies the vacant places. The boards may be dealt at this stage but no play takes place before the change into the first round.

The away team remains stationary for the whole event while the home team moves up one table at each change with the boards moving down one table. The moving pairs occupy the seats vacated by their team mates.

The only real complication exists at table 1 where the stationary pair from the away team is required to switch after each round, including the first round change. This means that this pair plays as E-W on the first round of play, N-S on the second, E-W on the third etc. The event can be improved by having the event divided into two halves, with the home team moving in the first half and the away team moving in the second half.

The organisation of this type of event is only difficult if the number of pairs in the teams is odd. Even then it is possible to get a movement, but generally they are not good and should be avoided if possible. **MULTIPLE TEAMS OF PAIRS**

At the start of the event the director assigns a team letter to each team and the pairs in the team are then assigned numbers according to the table at which they start play, with the E-W pairs taking the same number as the N-S pair. Alternatively have the highest numbered table

number added to their number for distinction. Pairs might have numbers such as A2 or B6 etc., the letter indicating the team and the number the pair.

The pairs are then asked to take their seats with two pairs from the same team sitting at one table. The tables are assigned to the teams in rotating order until all tables are used. For example if there are three teams of 12 players (i.e. 6 pairs or 3 tables of four), and the first is called A1 the second A2, and the third A3, then the 9 tables are filled as follows:

A1, B1, C1, A2, B2, C2, A3, B3, C3

There is no play on the first round. The movement proceeds as a standard whist teams movement from there on, with the exception that no play takes place on the rounds when the members of the same team are sitting opposite to each other. This situation arises once every N rounds (where N = the number of teams). For example if there are 3 teams, then two rounds are played between each double move.

The above movement (i.e. the whist movement) only applies where the number of teams times the number of fours is odd (i.e. where the number of tables is odd). Where this is even the stagger movement is used, still making the extra move on the same rounds.

The Mitchell movement can also be utilised for the event in a similar fashion to the whist movement. This was first pointed out by A.Groner. The seating of the players is assigned in the exact same way as for the whist movement, with the exception that with an even number of tables, the tables are arranged in one row rather than two as in the stagger movement.

The movement is a standard Mitchell move throughout (E-W up 1, boards down 1) with the exception that the E-W pairs have to make an extra move on the occasions when they meet their team mates (which is at the same frequency as that for the whist movement). The total number of rounds of play is equal to the number of tables less the number of fours in each team.

Where the number of pairs in a team is odd, and the number of teams is also odd, then there are many problems, the most obvious one being the half table. Where the number of teams is even then the following can be done.

By assigning special starting positions the Mitchell movement can be used, but with special moves. For teams of 3 pairs this method is reasonable, but with more than that, the movement becomes unbalanced and only the first round move is a standard move.

FOUR TEAMS OF THREE PAIRS

Starting positions:

A1-D3 B1-A2 C1-B3 D1-C2 A3-D2 B2-C3

Movement:

- N-S remain stationary
- E-W up 1 for first two moves
- Then after 3rd round skip one table
- Then after 4th round skip one table
- Then after 5th round skip two tables

FOUR TEAMS OF FIVE PAIRS

Starting positions:

A1-D5 B1-A4 C1-B3 D1-C5 A2-D4 B2-A5 C2-B4 D2-C3 A3-D3
C4-B5

Movement:

- N-S pairs remain stationary throughout
- E-W pairs move after each of the first 9 rounds respectively:
UP 1, 3, 4, 2, 4 DOWN 3, 3, UP 2, 4
- Boards always move down 1 table

By using the Telfer movement for two teams of an odd number of pairs, it is possible to have a reasonably balanced result. A round robin type of event is conducted, with each head to head match using the Telfer movement. For example with four teams of 5 pairs, assign the teams the letter A, B, C, and D. The tables are arranged in two rows of 5 tables. Two boards a round would be played, with the two rows of tables sharing boards.

- Session 1: In the first row A v B and in the second row C v D. There are four rounds in each match, i.e. 8 boards are played
- Session 2: A v C and D v B
- Session 3: A v D and B v C

The total length of this event would be 24 boards.

TEAMS OF EIGHT PLAYERS This number of players is being treated separately for the simple reason that this number is frequently used, and when there are only two teams, the movement does not follow normal procedures.

TWO TEAMS OF EIGHT

The two teams will be assigned four pair numbers such as: A1, A2, A3, and A4. Opposing B1, B2, B3, and B4.

Round	Table 1	Table 2	Table 3	Table 4	Boards
1	A1-B1	B2-A2	A3-B3	B4-A4	1-8
2	A1-B2	B1-A2	A3-B4	B3-A4	9-16
3	A1-B3	B4-A2	A3-B1	B2-A4	17-24
4	A1-B4	B3-A2	A3-B2	B1-A4	25-32

Team A is stationary. The eight boards played on each round are shared between the four tables. The N-S pair is shown first in the the above schedule. More or fewer boards can be used than those shown.

Following is an alternative board movement which makes the use of less boards easier to accommodate. On round 1 tables 1 and 2 share boards 1-8 (or 1-6 etc.) and tables 3 and 4 share 9-16. For the second round these two sets are swapped over so that 1 and 2 share 9-16 and 3 and 4 share 1-8. Similarly for rounds 3 and 4.

If stationary boards are desirable then the following movement is to be used:

Round	Table 1	Table 2	Table 3	Table 4
	(set 1)	(set 2)	(set 3)	(set 4)
1	A1-B1	A2-B3	B2-A4	B4-A3
2	A2-B2	A1-B4	B1-A3	B3-14
3	B3-A3	B1-A4	A2-B4	A1-B2
4	B4-A4	B2-A3	A1-B3	A2-B1

(This idea originating from Dr. H.G. Hudson, England)

MULTIPLE TEAMS OF EIGHT

Quite often the easiest way to handle this type of event is to run the movement in two or three stages. The field can be treated as two movements of multiple teams of four. This can be best illustrated by an example with say 7 teams of eight. Two parrallel rows of 7 tables each, are set up. Each team occupies the two sharing tables in both rows.

For example team 1 sits at table 1 next to each other.

Two separate multiple teams of four whist movements are run (one on each row of tables) with two boards per round. The two rows share boards throughout (or the boards can be duplicated to eliminate the sharing). After 6 rounds this stage is complete.

With the teams back at their home tables, the E-W pairs in the two rows swap places. The above movement is then repeated.

For a stage three, the E-W pairs in one row swap with their N-S team mates in the other row and the movement repeated yet again. By varying the number of boards per round and playing a number of sessions best suited to the event's needs, the director has good control over the length of the event.

Where the number of tables in each movement is even, the same principles apply, only a stagger movement is used in both sections. In section 1, Part A of the stagger movement is used first, then part B. In section 2 it is vice versa. This means the boards used in part A of section 1 can be used in part A of section 2. Similarly with the boards for part B (see the stagger movement for further details).

TEAMS-SCORED PAIRS

9

TEAMS SCORING IN PAIRS

This type of event is usually run to see how pairs perform as teams players without having a team of four involved. It is also used simply as a novelty event or just as a change from the normal match pointed pairs events. A good example of its use is in the selection of a representative team where all the entries are on a pairs basis.

There are three main types of events to be considered in this section:

- (a) The standard pairs event using the normal movements such as Mitchell, Howell and pairs whist
- (b) The barometer type of event where the scoring is done round by round and all the pairs are playing the same boards on a given round
- (c) Simultaneous teams movement where each pair plays with each other pair as team mates against all other combinations of two pairs

The scoring of types (a) and (b) are the same. Each pair's scores are compared to a par result which is predetermined by a mathematical formula which is applied to all the results on the given board. A popular method is to have all the results on the board averaged and the answer rounded to the nearest 10 with 5 rounding up. Before the average is taken, quite often the one or two extreme scores in each direction (say around 10% of the scores) are deleted. This is thought to give a more accurate average result.

Another possible score for comparison is the median score (i.e. the middle score) which is always a more realistic result as it can be achieved at the table. It also has the advantage that there is no calculation required to find it. With an even number of tables, usually the $(N/2 + 1)$ th result for N-S is the "datum" score.

Median score is valid only with separate fields. That is as long as N-S and E-W pairs stay as separate fields throughout the event.

Another method is to select the most frequently occurring score (mode) on the board. With a low number of scores on a board (as with the previous method) this result can be most unrealistic. With a large number of scores this can be used, but consideration must be given to ties in the number of scores.

The scores obtained by comparison with this score are usually converted to an IMP result and the result of the match between the two pairs is a net of the total IMPs.

When a Mitchell movement is used it is possible to have the field divided into two sections (N-S and E-W) and then total point scoring can be used, and even honours can count. This of course produces two winners.

Also see Hybrid Match Point scoring for an alternative scoring method.

The scoring of the type (c) movements is virtually the same as normal teams scoring as there are results coming from two or more tables for comparison.

MOVEMENTS TYPE A

The movements used are standard. The various sections within this book dealing with the selected movement should be consulted. Scoring of this type of event is usually done by the director, but it can be done by the players after the "datum" results have been calculated. When this result is posted it should represent the N-S result as + or -. This scoring method has a few problems, the biggest one being the balancing or checking of the results, as the conversion of the net result to IMPs is open to human error.

MOVEMENTS TYPE B

The movements used are those suggested in the Howell section on barometer movements. The reason these should be used rather than standard Howell movements is that the balancing of the movement is different.

In this type of movement the play usually is over a longer period (though this is not necessary) and quite often only one or two matches are played in one session. This means that the boards are shared amongst the tables (e.g. 14 boards per match in a seven table event, giving two rounds per session) or the boards have been duplicated so that there are enough boards for all the tables. The movements are balanced so that by the end of all the rounds, each pair has been compared with each other pair over an equal number of boards.

Where the number of boards in a match is high (say of the order of 14 to 16 boards) the problem of being compared with many strong pairs comes forward. This means that a pair playing a weak pair who is being compared with a large number of good pairs has an advantage over the pair playing a strong pair under similar circumstances.

To overcome this problem the principle of board switching can be introduced. This leads to all pairs being compared with all other pairs over the one match. It does introduce problems into the scoring as the pairs (or the scorer) need to keep close track of their directions of play.

A board switching matrix is given in the section on $\frac{3}{4}$ Howell movements. This applies to up to 16 tables and up to 16 boards per round. Any one row can be chosen for the table, but a different row should be chosen for each table. For further details consult the notes given with the matrix.

The largest problem with board switching is having the players remember when the boards are to be switched. Guide cards on the tables usually are not adequate as the players still forget. Having a scorer who places the board on the table in the right direction is the best solution, but this is not always possible. Travelling guide cards with each board is another suggestion. Note each pair plays a unique set of boards in each match.

MOVEMENTS TYPE C

This movement is designed so that each pair in the event plays against each pair over an equal number of boards; plays with each pair as team mates over equal numbers of boards; plays against all pairs of pairs (i.e. teams of four) over equal numbers of boards. This type of movement is only useful for low numbers of tables as the number of combinations gets very large even with 4 tables. For this reason only movements for 2 and 3 tables are given below.

The one major disadvantage with this movement is that the scores achieved on any board (either good or bad as they may be) is multiplied by the number of matches in which the board is involved. This should in theory even out over a large number of boards, but in practice this is not always the case. The results tend to be very swingy and the choice of a good VP scale becomes very important.

The only other real objection to this movement is each pair plays a unique set of hands.

TWO TABLES

The boards are shared between the two tables throughout.

Table 1:	1-2	1-2	1-3	1-3	1-4	1-4
Table 2:	3-4	4-3	4-2	2-4	2-3	3-2
Round:	1	2	3	4	5	6

THREE TABLES

This movement is structurally different to the 2 table version. There is a total of 15 rounds in the event. Each pair plays against each other pair three times. The boards are shared by all three tables.

Each round has a multiple of four boards. This will be called a "set" of boards. A quarter of a set is called a "Unit". Two units will make up one match. As there are four units in a round then each round will make up 6 (i.e. $4C2$ or $4!/(2! \times 2!)$) matches of which each pair is involved in 4. Board switching is used to generate the different matches.

The draw has a further higher level of breakdown as there are three distinct round robins. On each round robin the same pattern of board switching is used.

As an example say the event is to run over three sessions of 20 boards. 4 boards will be played on each round and each unit is one board and each match will be over two boards (i.e. two units). As each match is in effect repeated (for example pairs 6 and 3 play against 1 and 5 when 6 plays against 1 and also when 6 plays against 5 etc.) the total number of boards in a complete match is 4 units (four boards in this case).

ROUND ROBIN FOR SESSION 1

Round	Table 1	Table 2	Table 3	Board set
1	6-1	5-3	4-2	1
2	6-2	1-4	5-3	2
3	6-3	2-5	1-4	3
4	6-4	3-1	2-5	4
5	6-5	4-2	3-1	5

Board switching pattern used in session 1:

Unit No	Table 1	Table 2	Table 3
1	NS	NS	NS
2	EW	NS	NS
3	NS	EW	NS
4	EW	EW	NS

To help clarify the movement we will take a look at round 1 of session one, keeping in mind the board switching. Assume each unit number is the same as the board numbers used.

Match 1: 6 plays with 3 against 1 & 5 over boards 1 and 4.

Match 2: 6 plays with 5 against 1 & 3 over boards 2 and 3.

Match 3: 6 plays with 4 against 1 & 2 over boards 2 and 4.

Match 4: 6 plays with 2 against 1 & 4 over boards 1 and 3.

Match 5: 5 plays with 2 against 3 & 4 over boards 1 and 2.

Match 6: 5 plays with 4 against 3 & 2 over boards 3 and 4.

Only the first round, which determines the round robin (Howell movement style) need be given for the next two sessions.

ROUND ROBIN FOR SESSION 2

	6-1	5-4	3-2
With board switching:			
	NS	NS	NS
	NS	NS	EW
	EW	NS	NS
	EW	NS	EW

ROUND ROBIN FOR SESSION 3

	6-1	5-2	4-3
With board switching:			
	NS	NS	NS
	NS	EW	NS
	NS	NS	EW
	NS	EW	EW

This three table movement originated from Dr. G. Havas of Canberra.

BAROMETER MOVEMENTS

10

With most pairs events the scores are calculated at the end of the event or at a point when all the scores are available on the travelling score sheet.

To facilitate the immediate scoring of the round just played, all players must play the same boards so that all the scores for those boards are available. This is possible when the boards in play are shared by all the tables in the event, but only where the number of boards in play on any round is at least as large as the number of tables in the event. Another solution is to have the boards duplicated several times so that there are enough boards available.

Once this situation exists, the whole character of the event is changed. The scores can be done round by round. The running totals of all pairs can be displayed during the play of the next round, in other words the *BAROMETER*.

Nevertheless this does introduce many organisational problems which need attention.

The movements used for this type of event are very similar to the standard Howell movement except that the movement of the boards no longer applies. The most important consideration in this event is the balancing of the comparisons of the scores. This is fully explained (with the recommended movements) in the section on Howell movements.

The following individual barometer movements are those recommended. The highest numbered player remains stationary while all other players move to the position vacated by the player with the next lower number. Player 1 follows the second highest numbered player. The player numbers

INTRODUCTION

BAROMETER PAIRS MOVEMENT

BAROMETER INDIVIDUAL MOVEMENT

at each table are in the order N-S-E-W.

2 Tables: 8-1-3-7 2-4-6-5

3 Tables: 12-1-9-8 2-10-4-6 3-7-5-11

4 Tables: 16-1-13-6 14-3-2-4 12-9-8-7 15-10-5-11

5 Tables: 20-1-5-13 6-16-15-8 19-2-17-4 10-7-12-11 18-3-14-9

For 6 Tables and above, double the number of tables and select the corresponding barometer pairs movement, using the tables in pairs to get the appropriate individual movement.

For example 6 Tables (using the 12 table Barometer movement):

24-1-2-23 3-22-4-21 5-20-19-6 7-18-17-8 9-16-10-15 14-11-13--

Although these movements are not perfectly balanced for individuals movements, they are still quite adequate.

BOARDS AND DUPLICATION

Quite clearly the number of boards needed in this type of event can be very large. This will not prove a problem if the supply of standard boards available is adequate, even if borrowing is needed. Otherwise boards may need to be printed on cardboard and folded in a similar fashion as with the normal plastic wallet board. This is the cheapest way of providing large quantities of boards which are to be used only a few times. Sometimes these can be sold to the public after the event. Another method is to preset and store the hands in envelopes until they are transferred to the boards which become available after the preceding sessions have finished.

Personnel to duplicate the boards is required. The hands must be predealt. Usually hand records are printed (using standard duplicator printers) so that they can be distributed to the players after play. Care has to be taken when dealing large numbers of hands with one deck, for the hands become biased very quickly. The best method is to shuffle the deck thoroughly and deal the hand. Then without sorting record the hands. The deck is then reshuffled and the process repeated. Ideally computer dealing should be used but this does introduce controversies.

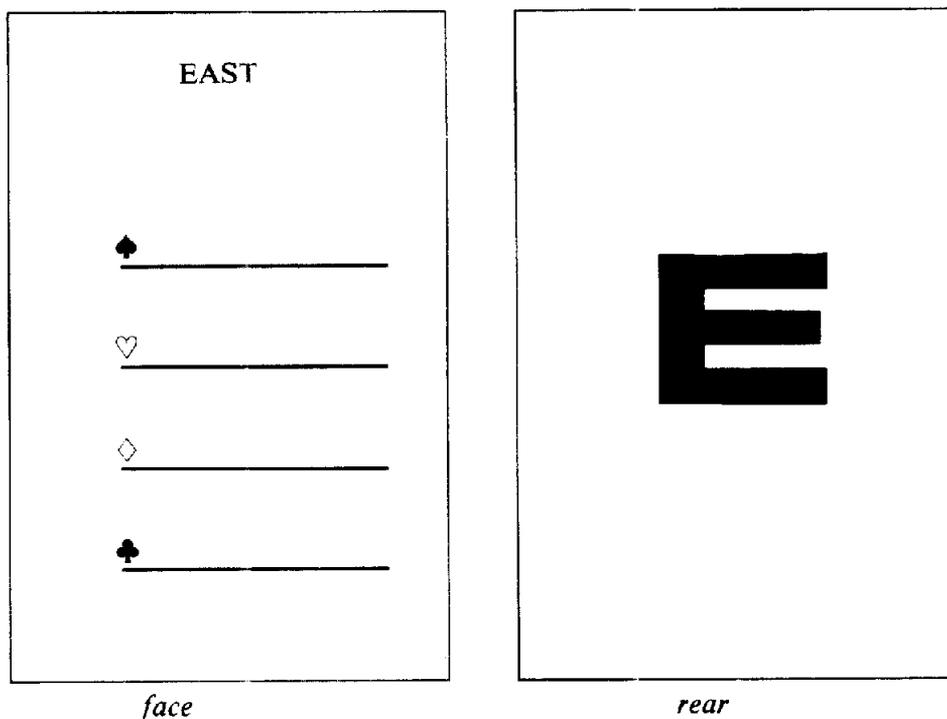
The best method of duplicating hands involves four people. Before starting all the boards are flushed (i.e. sorted into suits). Then all copies of the board currently being duplicated are placed on the table (for example 6 copies of board 1). The four suits are removed from each board. Each person is responsible for only one suit for all boards. This is the fastest method as each person becomes familiar with the distribution of the suit very quickly. After a couple of boards they are able to process the remainder without consulting the hand record. This is both faster and more accurate.

If the number of boards is extremely large, it is better to sort the cards into rank and suit (separate from the boards) and place all the same cards in one pile (for example all aces of spades in one pile). Then all the boards of the same number are placed in a row (for example 20 board 1s are placed along a table). The first person then takes a handful of Spade Aces (for example) while the person with the hand record indicates into which hand the card is to be placed. The number of helpers required for this procedure, of course, is much higher.

At a different stage in the procedure a special slip with the hand record on it should be placed in the four slots of each board. These slips are called curtain cards, and are used by the players to check their hand (accuracy of duplication) when the hand is first played. This prevents hands being played several times with the wrong cards in it or with two hands interchanged.

EXAMPLE OF A CURTAIN CARD

The dimensions are approximately the same as a playing card.



In barometer events it should be realised that if the event is over several sessions, the number of boards needed to be duplicated is reduced.

For example without barometer methods, an event is a three session, 5 table pairs event, and it is conducted with a Howell movement. Then 9 rounds would be played in each session, each round being over 3 boards.

Using a barometer movement, only three rounds are played in each session and no duplication is required. 9 boards are played each round, and as these must be shared among only 5 tables, each table but one shuffles and deals two boards while the 5th table prepares only one board. In other words the more boards per round the less duplication required.

SCORING

If there is only one copy of each board in play then a travelling score slip must stay with the board, and the match pointing is done on that slip. If there are several copies of each board it becomes more difficult to compile the scores for match pointing.

Usually pick up slips are used in these cases. These can be of several types, plain paper with the particular columns printed on them, or paper slips backed with glue which needs moistening or even label type strips with protective backing paper which lifts off to reveal self-sticking glue.

The first type is not easy to use as there needs to be some way of attaching the slips to the sheet which represents all the results for the board. The other two are much the same, with the last one being dearer but slightly better. With the moistening type, a glue should be used (widely available) which does not readily stick to clammy hands.

With the label type, non-permanent glue should be used as it is then easier to lift the slip from wrongly entered positions. This type is also best handled in rolls (say of 1,000) with perforations between each slip so that the players can be given enough slips at the start of the session and they then tear one off each time one is needed. With the backing paper on them, these are easy to handle by the slip collectors and the scorers.

Generally speaking it is best to keep the amount of information on the slips to a minimum. The more fields to be completed the more chances there are for errors.

The basic fields required are:

- Board number
- Contract and declarer
- N-S pair number
- E-W pair number
- N-S plus score

BRD NO.	CONTR. & DECL	N-S NO.	E-W NO.	N-S+	E-W+

When the pick-up slips are collected, they are sorted into either the order of the scores, to facilitate easy scoring, or into table number order. The latter is better when there are several boards played on each round as the cross totalling of scores of one set is easier if all the scores of each table are on the one line of the score sheets.

One of the biggest problems with this type of event is the provision of sufficient manpower to make the event run smoothly. The number of people required will, of course, depend on the number of tables in the event.

Persons needed:

- Board duplicators
- Scorers
- Pick-up slip collectors
- Board distributors
- Assistant directors

Two or more of these are normally handled by one person.

As a barometer event requires a board for displaying the results, it is a most important item. The simplest form is a plain blackboard with the pairs names and/or numbers on it with the current totals shown along side. The last round's scores may also be shown beside that.

An improvement on this is to have the current scores indicated by a moving strip that moves out from the players' names listed on the side of the board. This indicates at a glance the relative positions of all the pairs in the event. The actual score can also be displayed in writing (with possibly the last round's score). Unfortunately this is usually not large enough to be seen from a distance. As the scores become larger the origin of the scores can move up to the lowest pair's score rather than the original zero score.

The best type of moving strips are those made of elastic (say 15mm. wide black elastic on white boards). These can be attached to the rear of the board and then pass around the end and under the pairs' names to appear to emerge from there. The origin should represent a zero score and

RESULT BOARDS

the match pointing should be done with an average of zero (see the scoring section). This means that when an elastic strip is extended the pair is scoring above average. The strip remains at zero so long as the pair is on or below average.

LARGE PAIRS MOVEMENTS

11

INTRODUCTION

Small pairs' movements are those where the number of tables is of the order of 5 tables. Standard or medium size is of the order of 13 tables and large pairs' movements are those around 18 tables and more. Many of the movements in previous sections cover large pairs' movements as well as the medium to small, particularly the Mitchell based movements such as the appendix Mitchell, rover Mitchell, curtailed Mitchell, twin Mitchell, and the Web Mitchell.

Large pairs movements arise for several different reasons. The local club may simply have a large number of tables on each night. The event may be a multi-night tournament. The event could be a congress.

The type of movement used will depend largely on the following criteria:

- 1 or 2 winners
- Number of sessions in the event
- Are players required to play all boards?
- Must each pair play all other pairs?
- Is the scoring to be done over the whole field or can it be scored section by section?
- Are the boards preduplicated or can the players do them?

It is up to the tournament director to determine all the requirements and choose the movement accordingly.

MULTIPLE SECTION CONGRESS MOVEMENTS

In this type of event the tables are divided into multiple sections of the same size. This means that all the pairs in one section play only pairs in that section. If the sections are Mitchell movements, then the pairs only meet half the pairs in the section. If the sections are Howell movements, then they usually meet all the pairs in the section. If the boards have been preduplicated, it is possible to score the event over the entire field, but it would still be preferable to score the sections independently, as this would be much faster with a scorer being assigned to each section.

Computerised scoring would of course simplify scoring across the field.

The preduplication of the boards would therefore appear to be unnecessary, except where the scoring is to be done over the entire field. However, the playing of the same boards over the whole field is appreciated as the players can discuss the hands after play. This attractive feature can be incorporated easily enough by having the players duplicate the boards. This can be done by two methods.

MITCHELL CONGRESS MOVEMENTS

Each section is set up as an even numbered table Mitchell movement, all the sections usually being the same size. All the hands are predealt either by hand or with the aid of a computer. Each table is given one set of boards and the slips of paper on which are printed the hands to be set.

For example, with 14 table sections, two boards per table would be distributed together with the hand records for those hands. Table 1 would get boards 1 and 2, table 2 boards 3 and 4 etc., until all 28 boards have been exhausted. A standard skip Mitchell would be used with no play taking place at the first table as the players set those boards. The last round is played against the pair with whom they duplicated the boards. When the pair is skipped at half way the boards duplicated by the players are skipped. This means that each pair plays a large majority of the boards in the set.

This type of event produces two winners in each section, except when switch Mitchells are used. This is best used in qualifying events where the winners go to the finals.

HOWELL CONGRESS MOVEMENTS

The "flower Howell" Movement is the type of Howell movement referred to in this section. It means the number of tables can be even or odd, no guide cards are needed and the movement can be curtailed whenever needed. All the tables in each section play the same boards on each round (i.e. with duplicate copies in play). The movement is the standard type of flower Howell movement, but the boards move down (up) one *section*.

Consider 50 tables. These would be arranged in 10 rows of 5 tables, giving 10 sections A,B,C...J. Each table in section A would initially be given boards 1 through 3 and the printed hand records for boards 1, 2 and 3. Each table would then duplicate these boards. Similarly for boards 4, 5, and 6 in section B; and so on to boards 28, 29 and 30 in section J. Then without the players moving, the boards are passed down one section (C to B; B to A; A to J; etc.) and the play commences. After each round the boards are passed down one section and the players move normally as in a flower Howell. After 9 rounds all the players in each section will have met each other and everybody will have played all the boards except those which they duplicated.

Of course the number of tables in the event will not always be a convenient number such as 50. Because the number of tables in the flower Howell does not change the movement, a table can be added on to any section and that table plus the one next to it will have to share boards. The sections with the extra table will still play the same number of rounds as the other sections.

Where the number of boards to be played is the primary consideration then the following method can be applied. 27 boards seem ideal. Consider 46 tables. Nine five-table sections are set up, with one table added to one section, as suggested above. Nine sets of 3 board groups are distributed, one to each section. The tenth set is set up by the Director (or his assistants) and is placed ready to go into play at section 1. This in effect introduces a buffer set of boards between the sections at each end of the room, thus eliminating the delay in getting the boards from the first to the ninth section.

Where the number of sessions is greater than one, this movement can be modified accordingly.

For example:

- 48 tables
- three sessions
- one winner required for each section

Six rows of 8 tables are set up. Five rounds per session of 30 boards (or 25) are played. Each table is still required to duplicate only three boards as two adjacent tables can share the 6 boards in play each round.

Generally speaking the number of combinations available in this type of movement is only restricted by the imagination of the tournament director.

BLOCK MITCHELL

As an introduction to this section, the chapter on tri-sect Mitchell movements is recommended. This movement is useful for premises where there is not one large room. There may be several floors or several large rooms to be used. These rooms, however, may not always be of the same size. This movement allows for three groups of tables ranging from 3:4:4 up to 8:8:8 except that there cannot be more than one three table section.

Each section plays 4 rounds (as a separate movement) before there is any major movement between sections. In each section there are only 4 migrating pairs irrespective of the number of tables in it. When the first four rounds are complete, the boards move down one section or block, and the migrating pairs move up one section. This again occurs after the next 4 rounds. With this number of migrating pairs and a number of tables greater than 12, it can be seen that the amount of inter-room movement is less than there would be with other movements.

The next problem is movements for 3 through 8 tables which have 4 rounds and 4 migrating pairs. These are dealt with systematically below.

THREE TABLES

Use the hesitation Mitchell for 3 tables, with the N-S pairs at tables 1 and 2 remaining stationary for the event. The other 4 pairs are the migrating pairs.

Board sets:	1	2	3	4
Pairs:	1-M	R	2-M	M-M

Where R = Relay and M = Migrating pair.

FOUR TABLES

Use the standard share and relay Mitchell for 4 tables. The N-S pairs are the stationary pairs and the E-W pairs are the migrating pairs.

Board sets:	1	2	3	4
Pairs:	1-M	R	2-M	3-M 4-M

FIVE TABLES

The above four table movement is used with a rover table added to it in the following fashion. Two additional resident pairs are placed at table 5 (resident pairs 5 and 6). They play each other on round 1 sharing boards with table 1. On round 2 pair 6 goes to table 2, displacing the E-W pair which moves to the roving table and shares boards with table 2. On round 3 pair 6 goes to table 1, displacing the E-W pair as in round 2. On round 4 pair 6 displaces N-S at table 2 similarly. Therefore table 5 shares boards alternatively with tables 1 and 2.

For the second lap the resident pairs rotate about each other in order not to play each other a second time. Pairs 1 and 2 move to N-S at tables 3 and 4; 3 and 4 move to the rover table; 5 and 6 move to N-S at tables 1 and 2. For the last lap they rotate again: 5 and 6 to tables 3 and 4; 1 and 2 to rover; 3 and 4 to tables 1 and 2.

Board sets:	1	2	3	4
Pairs:	1-M	R	2-M	3-M
	5-6			4-M

SIX TABLES

To the five table movement is added yet another rover table with the resident pairs 7 and 8. On the first round they play each other sharing boards with table 2. For the rest of the movement pair 7 stays at table 6 as N-S and pair 8 displaces the pairs at tables 1 and 2 alternatively, displacing the moving pairs on the first visit in each lap, and the stationary pairs on the second visit. Table 6 always shares boards with the table at which pair 8 is sitting.

Board sets:	1	2	3	4
Pairs:	1-M	R	2-M	3-M
	5-6		7-8	4-M

SEVEN TABLES

Twin Mitchells are set up, one of them a hesitation 3 table movement and the other a 4 table movement.

Board sets:	1	2	3	4
Pairs:	1-M	R	2-M	3-M
				5-M
	4-7	F-8	6-9	R

If one mentally exchanges the pairs represented above as F and 5, it can be readily seen that there is a pattern. There are three groups of pairs: 1, 2, 3; 4, 5, 6; and 7, 8, 9. At the end of each lap these groups rotate about each other. i.e. 1, 2, 3 replace 7, 8, 9; 7, 8, 9 replace 4, 5, 6; and 4, 5, 6 replace 1,2, 3.

Similarly for the next lap. So that pairs do not meet each other twice it is necessary to introduce a type of fixed resident (F). This pair always starts a lap at N-S table 2 in the hesitation Mitchell, the pair so displaced moving to N-S at table 4 in the Mitchell and staying there for this lap. As table 2 in the hesitation Mitchell is the table at which the E-W pairs switch directions (or hesitate for one round) the fixed resident is only fixed in the sense that that pair always start at that position, but move as a normal E-W pair on each lap.

EIGHT TABLES

This is run similarly to the seven table movement except that the twinned movements are standard 4 table Mitchells: Pairs 1-4; 5-8; 9-12 are the rotating groups of resident pairs.

Board sets:	1	2	3	4
Pairs:	1-M	R	2-M	3-M
				4-M
	5-9	6-10	8-12	R
		7-11		

**BOWMAN
FOR LARGE PAIRS
MOVEMENTS**

This movement has been derived from the basic Bowman-Ewing Mitchell movement. This is also known as the Super-Bowman Movement. Preduplication of the boards while not necessary is desirable (see below). The movement is similar to the Web Mitchell in that the boards move in two directions. There is always a base set of tables, equal to the number of rounds in the event, and tables are appended in pairs to this base. Therefore an odd base gives an odd number of rounds and will only work for an odd number of tables up to three times the number in the base. An even number in the base gives an even number of rounds and will only work for an even number of tables up to three times the number in the base.

The movement of the players is basically simple and Mitchell-like, with no player displacement. No sharing of boards is required except where the boards have not been duplicated. Any number of tables greater than the base and less than three times the base is catered for; particularly if the choice between an even or odd number of rounds is flexible (for example 12 or 13 rounds).

As an example, the following 6 table base movement expanded to 18 tables is illustrated. It is assumed that there are three sets of boards the same, having been preduplicated.

Boards A; set nos:	1	2	3	4	5	6
Tables:	1A	2A	3A	4A	5A	6A
Boards B; set nos:	6	1	2	3	4	5
Tables:	1B	2B	3B	4B	5B	6B
Boards C; set nos:	1	2	3	4	5	6
Tables:	1C	2C	3C	4C	5C	6C

The base is the set of A tables. Tables may be deleted from this movement in pairs, taking one from row B and one from row C, starting at the higher end. Therefore 6B and 6C are the first pair of tables to come out. The board sets on these tables must remain in play however, only they will now be on relay tables.

All N-S pairs remain stationary. Board sets A and C move down one table (from 2A to 1A to 6A etc.). Board set B moves up one table (from 5B to 6B to 1B etc.).

All East-West pairs move up one table at each change but the word "up" needs some qualification.

E-W moves: 1A, 1B, 1C, 2C, 2B, 2A, 3A, etc. until all B and C pairs are eliminated and then they move one table at a time through the base movement. Note, as this movement contains an even number of rounds, a skip is required after half the rounds. If tables 1B and 1C were the only appended tables then the movement would be 1A, 1B, 1C, 2A, 3A, etc.

The movement of the E-W pairs can be 1A, 1B, 1C, 2A, 2B, 2C, 3A, 3B, 3C etc. if so desired.

If only two sets of boards are available then sharing of boards between sections A and C is possible.

For example

Set No:	1	2	3	4	5	6
A set:	1A	2A	3A	4A	5A	6A
	1C	2C				
B set:	2B	R	R	R	R	1B

Preduplication may not be necessary with the above arrangement, as the tables in row A can make duplicate copies as they play the first round. Play would then start late in row B, particularly at 2B where there may not be a spare board to use. 1B can share with table 6A.

Of course, this movement is more likely to be used when the number of tables in the base is higher and the number of boards being played on each round is only 2. Sharing is then not so convenient. Where the number of tables in the B and C rows is large it is possible for the players to set the hands, and to skip the first round as far as play is concerned. Instead of a 13 table base, the 14 table is used, and one round is not played.

Most useful for:

- 12 table base (up to 36 tables)
- 13 table base (up to 39 tables)
- 14 table base (up to 42 tables)

COMBINED HOWELL-MITCHELL MOVEMENT

This movement is particularly useful for obtaining one winner from a large field, especially if the event is conducted over 3 sessions.

The principle is to append a Howell movement to a Mitchell movement. There are two basic forms of the movement. In the perfect form all pairs play all other pairs and play all boards in the event. In the imperfect forms, one or both of the above qualities is missing, but other numbers of tables are accommodated.

PERFECT HOWELL-MITCHELL

This applies to numbers of tables where T (the total number of tables) is restricted by $T \text{ Modulus } 3 = 2$ (i.e. $T/3$ has a remainder of 2) and the number of tables is greater than 7. i.e. 8, 11, 14...

The event consists of two distinct movements, one a Mitchell and the other a Howell. These two movements play the same boards; either through shared or duplicated boards.

The number of tables in the Mitchell

$$= (2T-1)/3$$

= the number of rounds

The number of tables in the Howell = $(T-2)/3 + 1$

i.e.

- For an 8 table movement: 5 table Mitchell + 3 table Howell
- For an 11 table movement: 7 table Mitchell + 4 table Howell
- For an 14 table movement: 9 table Mitchell + 5 table Howell

The field is divided into three distinct groups plus one other pair. The number of pairs in each group is equal to the number of tables in the Mitchell movement. The one odd pair always plays in the Howell movement as the stationary pair.

As the event is conducted over three sessions, the three groups play once each in the positions:

- N-S field in the Mitchell
- E-W field in the Mitchell
- Howell movement

For example with the three groups A, B, and C:

	N-S field	E-W field	Howell
Session 1:	A	B	C+1
Session 2:	C	A	B+1
Session 3:	B	C	A+1

As there are as many tables in the Mitchell movement as there are board sets in the Howell movement, then by positioning the Howell movement tables correctly beside the Mitchell, the board movement in the Howell will be done automatically by the Mitchell movement as long as the boards are always passed back to the Mitchell after each round.

For example With 11 tables:

7 table Mitchell:	1	2	3	4	5	6	7
4 table Howell:	8-1	6-5	4-2	R	7-3	R	R

The Mitchell is a standard movement with N-S stationary and E-W moving up one while the boards move down one. The Howell movement is standard with the exception that the boards are moved down one by the players in the Mitchell movement.

For better comparisons of the results it is preferable to use a switch Mitchell.

Note that with the 8 table movement, the 3 table Howell is used and therefore sharing between these three tables and one of the tables in the Mitchell is necessary. Therefore the minimum number of boards in each set is 4, preferably higher. With duplicated boards (with one set for each movement) this problem does not arise.

STATIONARY BOARDS HOWELL-MITCHELL

This is the most desirable form of the Howell-Mitchell movement. Even though the procedure just described of moving the boards appears to be straightforward, boards are still misplaced and sometimes not moved at all. This movement overcomes that problem.

Two rows of tables of equal length are set up parallel to each other. One row is the Mitchell and the other a stationary board Howell. The boards are distributed on the Mitchell tables and the Howell shares boards with these tables as they are needed.

After each round the boards are returned to the Mitchell tables so that they will be available for the next round in the Mitchell. Even if they are not returned, there is no real problem for when the pairs arrive for the next round and find they are lacking some boards they simply retrieve them from the Howell table next to them.

In this movement the N-S pairs on the Mitchell move up one table and the E-W pairs move down one table. All pairs move in the Howell (see stationary board Howell movement).

The disadvantage with this movement is that more tables are required than are being used, but this usually does not present a problem.

Another advantage with this form is in the use of board switching in the Mitchell. The recommended method is the N-S and E-W pairs swap directions for the last third of the event. This eliminates many of the problems associated with board switching.

Be sure to advise the pairs to move in the same direction as they originally were moving. If the N-S pairs were moving up one table, then after the switch they still will be moving up one table as E-W.

IMPERFECT HOWELL-MITCHELL

There are several methods of adding tables to the combined Howell-Mitchell movement in order to cater for numbers of tables which the perfect form does not.

By adding one table to the movement the number of tables catered for is where $T \text{ Modulus } 3 = 0$ (i.e. 9, 12, 15,....).

- The first method is to add one table to the Mitchell movement, so that now there will be an even number of tables. This means that there is one more round in the Mitchell than in the Howell.

This can be handled in one of two ways:

- For the first round the Howell does not play, and the Mitchell shuffles and deals and then duplicates the boards without playing them. A set of boards is then passed to the Howell for playing (less one set of boards) and the Mitchell moves as in a skip Mitchell, skipping after half way and playing the last set of boards against the pair with whom they dealt and duplicated the first set of boards. This way all pairs play the same number of boards. One set of boards is only played in the Mitchell and ~~must~~ be factored up to the "TOP" on all other boards.
- The Mitchell plays the first set of boards, and having done so, duplicates the boards for use in the Howell. The Mitchell movement used is the share and relay type. In this method the Mitchell plays one more set of boards than the Howell movement and the Howell pairs' scores are factored up accordingly.

The three groups of pairs are all the same size and equal to the number of tables in the Mitchell. Therefore, there is no stationary pair in the Howell movement.

- The second method is to add one table to the Howell via the standard appendix method. When using this method there is no need to factor scores, for all pairs play the same number of boards.

The two extra pairs in the Howell remain there for the whole event occupying the same seats at all times. This means that the three groups of pairs that rotate after each session remain the same as in the perfect form.

When using this method the duplication of the boards only becomes necessary when the number of boards in each set is less than 3, for then the sharing of boards between three tables is not possible.

By using a combination of both methods described above, it is possible to add two tables to the movement so that numbers of tables where $T \text{ Modulus } 3 = 1$ are catered for (i.e. 10,13,16...).

The recommended method is to add one table to the Mitchell and append one table to the Howell. The three groups of pairs are equal to the number of tables in the Mitchell. The stationary pairs in the Howell (those at the appendix table) are the only ones that play at the same positions throughout the event.

The share and relay movement probably should be used. The players in the Mitchell play the first round before duplicating the boards for the Howell movement.

DOUBLE HOWELL-MITCHELL (INTERWOVEN) MOVEMENT

This movement is very useful for two session events. The advantage is that all players meet all others, all play the same boards and the comparisons are at least adequate.

The first session of the event is a standard Mitchell movement. Two slightly different methods are used depending on whether the number of tables in the Mitchell is odd or even.

EVEN TABLE MITCHELL

The standard share and relay Mitchell is used with the N-S field meeting the whole E-W field. A switch Mitchell should be used for better comparisons of scores. If the number of rounds is too high for the comfortable completion of the movement the skip Mitchell should be used and curtailed at a point suitable for the event. This does mean that not all pairs will have met.

The second session of the event will then be a double Howell with the pairs from the N-S field making up one of the Howells and the pairs from the E-W field the other.

The number of rounds in the double Howell will be one less than the number in the Mitchell movement. For example with 10 tables the first session would be a share and relay Mitchell for 10 tables with 10 rounds. The second session would be a double 5 table Howell which has 9 rounds.

ODD TABLES MITCHELL

A standard odd table Mitchell is set up but no play takes place on the first round. The pairs who do not play each other on this round will meet at table 1 of the double Howell (or the table with the non-existent stationary pairs). Therefore, the number of rounds played in the Howell will be one more than that played in the Mitchell.

For example with 9 tables in the Mitchell, the first round is not played and so there are only 8 rounds of play. The double Howell would be a double 5 table Howell with 9 rounds. In the case of 5 tables the standard Double Howells are not applicable because the tables with the stationary pairs are not sharing boards (see double Howell movements). Any one of the following six Howells can be used with another Howell from a different group.

Group A

10-1	5-3	2R	9-4	2-8	2R	7-6
10-1	7-9	2R	2-6	8-5	2R	4-3

Group B

10-1	9-8	6-4	4R	3-7	5-2
10-1	4-3	7-9	4R	2-6	8-5

Group C

10-1	R	5-7	R	4-8	3-2	R	9-6	R
10-1	R	6-8	R	7-2	5-4	R	3-9	R

For example

10-1	5-3	R	R	9-4	2-8	R	R	7-6
1-10	9-8	6-4	R	R	R	R	3-7	5-2

Note there are two lots of board sharing, apart from board set 1 (i.e. at board sets 2 and 9). As pairs 10 in both Howells are non-existent, there is only one pair at table 1 in both movements so the two pairs "1" play against each other on the first round at table 1 (this is the round skipped at the start of the Mitchell movement). The pairs originally numbered 2 meet on the second round and 3 on the third etc.

See "double Howell" for an alternative solution.

DOUBLE MITCHELL-HOWELL MOVEMENT

This movement is an extension of the combined Howell-Mitchell movement, but whereas that movement is designed for three session events, this is used in five session events. It provides an orderly arrangement and movement of the pairs so that all pairs play each other and they play all boards.

The standard Howell-Mitchell is set up and to this is added one more Mitchell movement. The normal table arrangement would be one row of Mitchell tables, one row of Howell tables and then another Mitchell. The use of the stationary-board Howell-Mitchell is recommended so that the number of tables in the Howell row is the same as the number in the Mitchell rows.

The same principles apply to this movement as those of the Howell-Mitchell with the extension of three rows sharing boards instead of only two. If the boards have been duplicated then sharing is eliminated. Where the sharing is between the three rows then obviously at least three boards must be played on each round and preferably more than three.

Therefore, when there is board sharing the movement is only useful for 36 or 46 pairs. Another possibility is 26 pairs, but at least 5 boards per round are required as the Howell for 3 tables needs to share boards, so that a 5-way share is required.

Where there are 3 groups of pairs in the Howell-Mitchell, there are 5 groups in this movement. Each such group has as many pairs as there are tables in the Mitchell movements. There is one stationary pair in the Howell. One group is placed in the Howell and each of the other groups is placed as either N-S or E-W in a Mitchell.

The 5 groups can be shown diagrammatically as:

	Mitchell 1	Mitchell 2	Howell
N-S	G1	G2	G3 + 1
E-W	G5	G4	

After each session the groups are rotated about each other; G1 moves to the position occupied by G2, G2 to that of group G3 etc. After 5 sessions all pairs will have met each other.

The scrambled Mitchell (or possibly the Boufos Mitchell) should be used for the Mitchells in this movement.

**DOUBLE COMBINED
HOWELL-MITCHELL
MOVEMENT**

This movement has very few uses, but it is included here as an example of what can be done with previous movements with a little bit of thought.

It can be used when two Howell-Mitchell movements are being used in two separate sections, while there is a restriction on the amount of space available in the playing room.

A standard stationary board Howell-Mitchell is set up. Obviously there are several tables not in use in the Howell. By placing another Howell-Mitchell on the other side of the movement, these spare tables can be used in the Howell of the second movement. There is unfortunately one table lacking.

For example, a 7 table Mitchell plus a 4 table Howell has only 7 tables in the stationary board Howell. Therefore if the two Howells are using the same tables, one more table must be added to give a situation similar to the Double Howell.

Continuing with the 7 + 4 table example the tables would be arranged as:

Mitchell A:		1	2	3	4	5	6	7
Howells:	1	8	2	3	4	5	6	7
Mitchell B:		1	2	3	4	5	6	7

Table 8, in effect, is another table 1 (it could be called table 1A).

Consider the following two 4 table Howells:

8-1	5-6	4-2	R	7-3	R	R
8-1*	R	R	6-2	R	7-5	3-4

* Table 8 on the first round.

The tables in Mitchell "A" are in section 1 and those in Mitchell "B" are in section 2. Board sets 1 through 7 are on tables 1 through 7 of the Mitchells and the two sets of boards are not necessarily duplicated. The boards remain stationary throughout the event, with the Mitchell players moving N-S up 1 and E-W down 1.

Board switching is desirable, therefore the pairs in the Mitchell movements would change directions for the last two rounds to give adequate comparisons. Guide cards are necessary for the Howell movements. They share boards with the respective Mitchell movement with which they are associated.

Tables of the same number are sharing, so that if section 1 pairs are occupying the Howell table they share with the table of the same number in the Mitchell movement A. Similarly for section 2.

The only problem arises with table 8. On round 1 table 8 shares with 1B. The table numbers 2 and 8 are then exchanged, the N-S pair on table 8 move up one table (staying with table 8) and then share with table 2B. After the second round table numbers 3 and 8 are exchanged and so on. The duty of exchanging the table numbers can be assigned to the N-S pair at table 8, for they remain at that table. The N-S pair in Howell movement 1, at table 1, are simply required to move up one table at each change.

PAIRS SCORING

12

INTRODUCTION

The scoring of pairs events can be done in one of four different ways:

- Match point
- Butler method
- Instant point
- Total point

Match point scoring is clearly the most popular method, requiring a different style of game from the other three methods. The Butler method is closely related to teams scoring while the other two methods require tactics similar to teams or rubber bridge, even though instant points appears to be similar to match point scoring.

This method of tournament bridge scoring was originally published in the first book on Tournament organisation, written in 1892 by J.T. Mitchell. It was intended for use in whist tournaments rather than bridge, but the same method has been used ever since in whist, auction bridge and contract bridge.

The most important aspect of this form of scoring is that every board is of the same potential worth to all pairs playing it, irrespective of the contracts available on the board. No pair can score more than the maximum score (a *top*) on a board, just as no pair can score less than the minimum score (a *bottom*). There are the same number of points allocated to each board for pro-rata allocation to the pairs who play the board.

There are three basic methods of allocating match points even though the same principles apply to each one. These are "double match-pointing", "single match-pointing", and "signed match-pointing".

MATCH POINT SCORING

All the scores for any board must be available before scoring match point style can commence. The only scores that need not be available are an average score assigned to a table or a score missing because the pair sat out at a half table.

The scoring can only commence at the end of the event except for:

- The Barometer type of event where the same boards are played by all players on the same round through the duplication of the boards
- Movements where the boards are completed before the end of the movement

The following explanation of match pointing will assume the use of double match-pointing with the single match-pointing methods shown in brackets alongside. Signed match-pointing will be treated separately later.

Each score on a board is treated as a separate entity and is ranked with all other scores as to its relative performance. Each pair is assigned a match point score of 2 (1) for every other pair they outscore and 1 ($\frac{1}{2}$) for every other pair with whom they tie. They receive zero (0) where they are outscored by other pairs.

The sum of all these scores for all pairs gives the final match point scores and so determines the winner(s) of the event and the relative performance of all other pairs in the event.

DOUBLE MATCH-POINTING VERSUS SINGLE MATCH-POINTING

In double match point scoring the numbers are generally larger when adding up the totals, however the first column (say the hundreds column) usually has very few digits in it for addition.

As the $\frac{1}{2}$ is an awkward character to write repeatedly a special character needs to be introduced for ease of entry. The most common substitute characters are 'x' and '-'. The '-' can be confused with the minus sign by the novice and the 'x' must be explained to all newcomers to the duplicate bridge scene as meaning a half ("Why have I got an 'x' next to my score?").

For the average to large size duplicate, the match point scores entered next to the actual scores on the boards generally require less writing if double match-pointing is used. Compare 11 $\frac{1}{2}$ with 23.

It is generally easier to miss a $\frac{1}{2}$ (whether written $\frac{1}{2}$, 'x' or '-') on a recap sheet (or in simply adding up the totals) than any other figure.

The recommended method of match-pointing is double match-pointing. If you are just learning to match-point then that is the method to use. If you are an experienced match-pointer then it would still be worthwhile switching.

MATCH-POINTING EXAMPLE

The following example of a score sheet has been match-pointed using double match-pointing. The scores have been ranked in order from the highest score N-S down to the lowest score, which is the largest E-W score. It is observable that the recommended score sheets have a N-S score field as well as an E-W score field. This means that the scores are sorted to some extent by having some in the N-S column and some in the E-W column. At the time of match-pointing the further sorting of the scores must be done mentally by the scorer, but this is a skill which improves with practice.

N-S plus	E-W plus	N-S M-P	E-W M-P
1430		20	0
690		18	2
680		14	6
680		14	6
680		14	6
660		9	11
660		9	11
650		6	14
	100	3	17
	100	3	17
	200	0	20
Totals:		110	110

Note the following points on the above score sheet.

- The sum of all match points assigned to N-S equals those given to E-W
- The sum of the N-S match points and the E-W match points given to each score is always equal to 20 (which is the maximum score possible on the board; a "TOP")
- The match points given to each E-W is merely the "complement" of the N-S match points (i.e. subtracting the N-S match points from the "top" gives the E-W match points)
- The check sum of all the match points assigned to N-S (or E-W) is equal to the number of times the board is played times the average on the board
- The average score on the board is equal to half the maximum possible score (10 in this case)
- The TOP on the board is equal to $2x(\text{the number of times the board is played}) - 2$ (i.e. $[2 \times 11] - 2 = 20$)

PRACTICAL MATCH-POINTING

Clearly the theoretical methods of match-pointing do not lend themselves to speedy posting of results therefore the following methods are suggested.

One obvious place to start match-pointing a board is at the highest score (which would be given the TOP); the next score two points less etc.

The other is the lowest score (the highest and lowest scores here refer to those in the N-S field) which is given 0 and the next score from the bottom is given 2 etc.

The second method has the advantage that the TOP can be an unknown value and the match-pointing can proceed without reference to this TOP. The first method has the disadvantage of the need to know the TOP before one can start match-pointing, but has the automatic check at the end of the board of zero as the last score. Either method is quite valid, although the recommended convention is to start at the highest score.

Using the above example the scoring proceeds as follows. There are 11 scores on the score sheet; therefore the TOP is 20. The highest score (+1430 N-S) is given 20 MP. The next score (+690 N-S) is given 2 points less (i. e. $20-2=18$). The next score is tied three ways (+680) and between them receive $16+14+12$ which totals 42 MP. This is then divided by the number of scores (3) to get the average MP score of 14. The next score gets 6 (+650), the next two scores tie (-100) and receive $(4+2)/2$ or 3 MP. The last score (-200) gets 0 MP.

The E-W match points are assigned by subtracting each N-S MP score from 20.

MATCH-POINTING TIED SCORES

The calculation of the match points received on tied scores in practice is not done as shown above. The mental processes proceed as follows. The MP scores are assigned from the top as 20.... 18....16....(note the tied score)..14....12....(no more ties); as there are 3 scores select the middle score as the MP score given to these scores (i.e. 14).

- RULE: If the number of tied scores is *odd* then select the middle score as the final MP score assigned

Then still continuing as above...10... (note tied score)...8... (no more ties); as there are two scores use the score in the middle of the two MP scores noted (i.e. 9).

- RULE: If the number of tied scores is *even* then select the number between the middle two scores as the final MP score assigned

These two methods work well provided that the number of scores being considered is not too large, for it is necessary to keep track mentally of the middle match points.

Another method is to note the match point score of the first occurrence of the score (with the +680 scores above this would then be 16) then proceed counting down two points at a time until the last score of that value and then note the match point score (12 in this case). The last score is added to the first (16 + 12 here) and the result halved (i.e. 28 is halved) to give 14... the final result. This method works for an odd or even number of scores in the tie and is particularly simple for a large number of tied scores.

This method was first published in Tavlingsledaren (1954) by Boe, Elwin and Jannersten.

It is only suggested for use where the number of scores being match-pointed is very high. This is without doubt the only algorithm to adopt when using computerised scoring. Quite a lot of work must be done before starting the match-pointing, but once that has been done the actual match-pointing is simple. The scores must be sorted into order of magnitude and from this the number of occurrences of each score can be determined.

The match points then assigned any score (working up from the bottom score N-S) is found by

$$M = L + P + O$$

Where:

M = match points assigned this score

L = match points given to the last score

P = number of occurrences of previous score

O = number of occurrences of this score

NOTE: Subtract one if the score is the first score considered.

If the match-pointing is to be done working from the highest score (N-S) then:

$$M = L - P - O$$

The TOP+1 is the starting number used for the first score, just as -1 is the base when working from the bottom.

SWEDISH MATCH-POINTING

This method is illustrated with the same score sheet as before:

N-S Score	Occurrences	N-S MP	Calculations
+1430	1	20	$18 + 1 + 1 = 20$
+690	1	18	$14 + 3 + 1 = 18$
+680	3	14	$9 + 2 + 3 = 14$
+660	2	9	$6 + 1 + 2 = 9$
+650	1	6	$3 + 2 + 1 = 6$
-100	2	3	$0 + 1 + 2 = 3$
-200	1	0	$-1 + 1 = 0$

(calculations start here)

SIGNED MATCH-POINTING

Most of the principles applying to double match-pointing apply to this method also. Theoretically signed match-pointing can be considered the same as double match-pointing with the average subtracted from each score. This means that the scores given in the example above (which range from 20 to 0) would range from 10 down to -10.

One of the most important aspects of this method is that the average (of a board, or a session, or an entire event) is always ZERO.

- *All check totals are ZERO*

This is the recommended method of scoring for Barometer events where the performance of the players is shown immediately by their current score: their score relative to average (zero).

The final scores in this method are lower (for arithmetic purposes) and so additions are faster.

There are no problems with the calculations of the E-W match points (i.e. in determining the complements) for they are the same as the N-S scores: *only the sign is changed*.

The TOP score is always equal to the number of scores less 1. The BOTTOM is the same value with a negative sign.

The biggest problem with this method is the entering of the signs as the scoring is being done. They require more writing and they can be missed in the additions. To overcome this the suggested procedure is to use two pens while scoring. A black pen is used for positive scores and a red pen for negative scores.

- *NO SIGNS ARE EVER USED*

The black scores are added up and then the red scores. The difference is then taken for the net result. This is then entered with the pen of the appropriate colour.

When calculating the E-W scores, the RED scores are the positive scores and the BLACK are the negative scores. There is no need to complement the answer.

When the Swedish method is being used the top starting score is equal to the number of scores (instead of TOP+1), and the bottom score, if you are starting there, is minus the same value (instead of -1).

ASSIGNING AVERAGE SCORES

When an average score has been assigned by the tournament director, he has determined that both pairs at the table are responsible for the hand not being played correctly, and that each pair should receive the same score (the average on the board).

To effect this, the average score is assigned to the results in question and the TOP on the board is reduced by 1 for each such score (the BOTTOM is also increased by 1). The rest of the scoring procedure is the same as normal.

The effect of the above procedure is to assign an average to two pairs at the expense of taking one point off all pairs whose scores are above average on the board, and to add one point to all those below average.

The check total on the board and the final check total are not affected using this method.

ASSIGNING ADJUSTED SCORES

When an adjusted score is assigned by the director, he may assign non-complementary scores to N-S and E-W (for example N-S may be given 60% on a board while the E-W is given zero).

The adjusted score should not effect the other scores on the board and should never be considered in calculating the match-point scores.

Initially the board is scored as though an average has been assigned to the score, the board match-pointed and then the match points due to each pair concerned are awarded. The check totals of the board and the final check totals need to be adjusted accordingly.

FACTORING SCORES

Generally the half table does not introduce any problems into the scoring. For example with the Howell movement, where the half table sits out at the stationary pair's table, or in a Mitchell movement where all the E-W pairs sit out at the same table, all boards are played the same number of times. As well, no pair plays more boards than any other pair with whom they are being compared. Note that where there is a half table in a Mitchell movement the E-W pairs play one less set of boards than the N-S pairs. As these two fields of players are treated separately, no compensations are necessary.

When the rover is used, factoring of scores is required. Consider the case of a 13 table Mitchell movement where there is a rover which starts play on the second round and displaces a N-S pair on each round that it plays. After the full 13 rounds of the event one N-S pair will not have been displaced and will have played 13 rounds while all other N-S pairs (including the rover pair) will have played only 12 rounds.

As all the boards will have been played an equal number of times the factoring of scores will only be required after all the scores have been compiled. The scores of all pairs who have played 12 rounds must be factored up by $1/12$ th to make their scores equivalent to 13 rounds. The decimal fractions must be included in their scores, but as to whether there is to be any rounding at tie-breaking time is determined by the local ruling body. Generally it would be considered unfair if a pair won or lost a tie break through an adjusted score where the difference was less than the normal unit of scoring (1 in double match-pointing and $\frac{1}{2}$ in single).

The above factoring is also required in movements where there is a sit-out table and the movement, for some reason, has to be terminated before the end when not all the E-W pairs will have sat out.

This introduces another problem: not all the boards are played the same number of times. The set(s) of boards that have not "sat out" will have been played once more than the others.

The boards in this case are all scored with their correct TOP according to the number of times the board has been played. For example one board may have been played 11 times and would then have a TOP of 20; while another may have been played 10 times for a TOP of 18.

All the totals for all pairs should be tabulated, with scores for boards of one TOP together and scores for boards with the other TOP separate. The scores for the boards with the lower TOP should then be factored up the requisite amount (in the above example it would be $[20-18]/18$ or $1/9$ th) before adding it to the other scores. If the factoring is done board by board not only is more work required, rounding errors are compounded across all the boards to give a larger error factor.

The factoring of scores of the E-W pairs who have sat out is only done after the factoring for the board difference

If a share and relay Mitchell is terminated before the end of the movement for some unforeseen reason, extra factoring of the board value would be necessary. As well, in the case of a half table, players' scores would also require factoring. Some boards will have been played N times, some N-1 and yet others N+1 where N is the number of rounds played.

In multi-session events the value of the boards played in each session should be considered carefully. A good example of this is the 28 player individual movement where in the first three sessions the boards are played 7 times each and in the last session the boards are played only 6 times (there are only 27 rounds). Clearly the last sets of boards cannot be of any less value than the previous sets, otherwise the pairs who do well on the last session are at a great disadvantage. Scores in these sets should have th of their value added to them ($(12-10)/10$).

Where there are many different TOPS, and many different numbers of times boards are being played, it is quite often better to treat each score separately and express it as a percentage of the maximum possible score available to that pair. The percentage tables supplied in the appendices may be used

Once the match-pointing has been completed the next task is to compute all the scores of the pairs. Over the years of tournament bridge many different techniques have been used in the tabulating of scores, and obviously they have been refined to a great extent. The following methods which illustrate the general improvements found, allow the director the option of adopting the methods most suited to his needs and abilities. As the techniques required for Howell movements are different from those for the Mitchell type of movement, they are to be treated separately.

TALLYING THE SCORES

HOWELL SCORING

With a score sheet where there are N-S and E-W pair number columns with no preprinted numbers in them, the board is match pointed with N-S and the E-W match points shown (under the columns N-S MP and E-W MP).

These scores are checked for subtotals on each column and then entered on a full recapitulation sheet (recap) with (usually) the pair numbers shown on the left hand side of the sheet and columns drawn at equal intervals across the sheet, each column representing one board. After all boards have been entered the scores are tallied and a check total made.

As the entering of each board is rather tedious, a better method is to match-point only the N-S column initially, then add these in groups of boards equivalent to each set of boards as played on each round. If the boards have been played in groups of three, then clearly the first entry on the sheets will represent the scores obtained by the two pairs playing the boards on the first round. Similarly for subsequent entries.

These N-S match points having been added across the sets, now represent the complementary scores of the E-W pairs over the three boards. These E-W scores are now entered in the E-W match points column on the last score sheet of the set. These match point scores are now entered on the recap, however each column on the recap represents a board set rather than a board. If the scorer is generally reliable the only check totals required are the board set column on the recap and the final grand total.

The preprinted numbering of the N-S pair number column on the score sheets will speed up the scoring appreciably (see illustration 1). With the N-S pairs entering the scores, they select the line on the score sheet which has their pair number in the N-S column. Each board is match pointed in the N-S column only. The score sheets of each set of boards are then placed so that they overlap each other (see illustration 1) and the N-S match points are then added across into the last column.

The E-W match points are then calculated (using the complementing method; in this example subtracting the N-S MP from 24) and then entered on the line representing their pair number. The check total on the N-S match points should be taken before calculating the E-W scores. Note that the use of signed match-pointing in Howell movements does ease the burden of complementing the scores.

These scores in the last column can now be entered on the recap for adding. This method is improved by placing all the score sheets with the total match points on them, one upon the other so that all the scores are showing (and only those scores) and adding them across placing the totals on a separate sheet. Line one on each score sheet represents the score for pair 1, line two pair 2 etc. so that each line can be added across to give each pair's score.

HOWELL SCORE SHEET				BOARD 1		BOARD 2		BOARD 3	
N-S PLUS	E-W PLUS	N-S NO.	E-W NO.	N-S MP	SET TOTAL	N-S MP	SET TOTAL	N-S MP	SET TOTAL
		1							14
		2							14
140		3	7	7		3		8	18
		4							14
90		5	2	2		8		0	10
	110	6	4	0		6		4	10
		7							6
		8							12
140		9	8	7		3		2	12
120		10	1	4		0		6	10
		11							
								<i>total</i>	120

Illustration I

HOWELL SCORE SHEET				BOARD 1		BOARD 2		BOARD 3	
N-S PLUS	E-W PLUS	N-S NO.	E-W NO.	N-S MP	SET TOTAL	N-S MP	SET TOTAL	N-S MP	SET TOTAL
620		1	1	12		0		1	13
	100	2	9	1		12		12	25
630		3	8	16		3		9	28
600		4	7	8		14		9	31
620		5	6	12		9		14	35
	100	6	5	1		16		6	23
620		7	4	12		9		4	25
170		8	3	4		6		16	26
180		9	2	6		3		1	10
									216

Illustration II

board sets:	1	2	3	4	5	6	7	8	9	total
N-S 1	13	24	23	22	15	10	19	23	18	167
N-S 2	25	27	10	29	23	29	14	25	15	197
N-S 3	28	9	28	11	30	24	24	26	23	203
N-S 4	31	24	23	22	29	35	27	10	28	229
N-S 5	35	34	14	34	25	31	10	34	9	226
N-S 6	23	32	35	15	33	27	39	32	40	276
N-S 7	25	27	26	25	28	6	22	27	21	207
N-S 8	26	26	24	23	21	30	28	26	29	233
N-S 9	10	13	33	35	12	24	33	13	33	206
N-S										

1944

Illustration III

Bridge Directing Complete

board sets:	1	2	3	4	5	6	7	8	9	total scores	
E-W	13	9	14	25	12	29	27	32	29	190	242
E-W	10	27	23	15	21	10	24	34	21	185	247
E-W	26	24	28	34	28	24	14	10	40	228	204
E-W	25	13	10	22	33	30	19	26	9	187	245
E-W	23	26	23	11	25	6	33	25	28	200	232
E-W	35	27	33	29	29	27	28	23	23	254	178
E-W	31	32	24	22	30	31	22	13	15	220	212
E-W	28	34	26	35	23	35	39	26	18	264	168
E-W	25	24	35	23	15	24	10	27	33	216	216
E-W											

Illustration IV

E-W pairs:	1	2	3	4	5	6	7	8	9	N-S
N-S 1	13*	10	24	19	23	23	22	18	15	167
N-S 2	29	27	14	10	25	29	15	23	25*	197
N-S 3	9	24	28	26	11	23	30	28*	24	203
N-S 4	27	23	10	22	28	29	31*	35	24	229
N-S 5	14	34	34	9	25	35*	31	34	10	226
N-S 6	32	15	40	33	23*	27	32	39	35	276
N-S 7	25	21	28	25*	6	27	22	26	27	207
N-S 8	29	21	26*	30	26	28	24	26	23	233
N-S 9	12	10*	24	13	33	33	13	35	33	206
E-W	190	185	228	187	200	254	220	264	216	1944
E-W scores	242	247	202	245	232	178	212	168	216	1944
(432-X)										

Illustration V

	set1 N-SE-W	set2 E-W	set3 E-W	set4 E-W	set5 E-W	set6 E-W	set7 E-W	set8 E-W	set9 E-W
1	1	3	5	7	9	2	4	6	8
2	9	2	4	6	8	1	3	5	7
3	8	1	3	5	7	9	2	4	6
4	7	9	2	4	6	8	1	3	5
5	6	8	1	3	5	7	9	2	4
6	5	7	9	2	4	6	8	1	3
7	4	6	8	1	3	5	7	9	2
8	3	5	7	9	2	4	6	8	1
9	2	4	6	8	1	3	5	7	9

Illustration VI

	set1 E-W	set6 E-W	set2 E-W	set7 E-W	set3 E-W	set8 E-W	set4 E-W	set9 E-W	set5 E-W
1	2	3	4	5	6	7	8	9	
9	1	2	3	4	5	6	7	8	
8	9	1	2	3	4	5	6	7	
7	8	9	1	2	3	4	5	6	
6	7	8	9	1	2	3	4	5	
5	6	7	8	8	1	2	3	4	
4	5	6	7	8	9	1	2	3	
3	4	5	6	7	8	9	1	2	
2	3	4	5	6	7	8	9	1	

Illustration VII

E-W										E-W	E-W	E-W
set1	set6	set2	set7	set3	set8	set4	set9	set5	set5	total	no.	score
13*	10	24	19	23	23	22	18	15	15	216	9	216
25	29*	27	14	10	25	29	15	23	23	264	8	168
28	24	9*	24	28	26	11	23	30	30	220	7	212
31	35	24	27*	23	10	22	28	29	29	254	6	178
35	31	34	10	14*	34	34	9	25	25	200	5	232
23	27	32	39	35	32*	15	40	33	33	187	4	245
25	6	27	22	26	27	25*	21	28	28	228	3	204
26	30	26	28	24	26	23	29*	21	21	185	2	247
10	24	13	33	33	13	35	33	12*	12*	190	1	242

Illustration VIII

MITCHELL SCORING

As with the Howell movement the very basic method is to match point the N-S pairs and the E-W pairs and enter the board values under the appropriate column on the recap (one recap for N-S pairs and one for the E-W pairs). Check totals are made on the N-S MPs on each board and on the final grand totals for both E-W and N-S pairs.

A refinement is to add the groups of the board sets together after having match-pointed the N-S pairs. The check total of the MPs is made for each set and then entered on the recaps, one for N-S pairs and one for the E-W pairs (see illustrations II, III and IV). The complementing of the scores is only done when all the scores have been added.

The use of two recaps is not necessary, as the scoring of Mitchells can be done on the one recap as shown in illustration V. A matrix of N-S pairs on one side and E-W pairs on the other is used similar to the two recaps with the exception that the scores do not need to be entered twice. This last method does introduce one problem in that finding errors in the scores can be more difficult. If the totals of each board set are made before entering them on the recap, the only errors that occur are transcription errors when the scores are being entered on the recap. If the same check total is found for both the N-S pairs and the E-W pairs, then the error is most unlikely to be an addition error.

The scores must then be checked on the recap. This can be done by redoing the entering visually, or by adding (probably only the units of the numbers need checking rather than adding up the whole numbers) the scores on the recap if the pattern of the scores on the sheet is known. Note that in the example given the whist movement rather than the ordinary Mitchell is used.

With the whist it tends to be easier to enter scores as they appear diagonally on the recap sheet (see illustration *V*). For the very experienced scorer it is quite often only necessary to make the check total at the grand total stage and only then, if there is an error, are the board sets totals checked; and then only until the error is found. It is important to examine the size of the error, for this may lead to a speedy spotting of the error. For example if single match-pointing is in use, and the grand total is out by $\frac{1}{2}$, one checks that all the halves have been transcribed correctly.

The pattern on the Mitchell recap sheet is not as easy to check as that on the whist, particularly in the case of the share and relay Mitchell. The following method may be more satisfactory for this type of movement as well as for the odd tabled movements.

After the N-S match points for each set of boards are totaled, assuming there is enough room on the score sheet, the E-W match points (not complemented as yet) are entered in order on the score sheet immediately under the N-S match points. Then, as in the Howell scoring, the sheets are placed upon each other with the set totals showing down the side (the N-S pair numbers being pre-printed). All the scores are added across without the use of a recap sheet.

GENERAL HINTS

Care must be taken when the movement calls for sharing of boards, for then the adding across of the set totals is not so simple. The sharing tables play the boards of the same set in different order and if the score sheet is not pre-numbered in the N-S pair column the scores will be ordered differently. The pre-numbered score sheet has many advantages.

Where board-switching is being used the scoring can be still done Mitchell-style, as well as Howell-style. After the scores are added across for the sets, the switched tables are complemented (for example like 28/20) so that the scores down the side of the score sheet still reflect the scores of all the N-S pairs in order. These same values are used in tabulating for the E-W pairs, and only when the sum of the *complemented* E-W scores and the N-S scores are known, will the check total be valid.

The complementing of the E-W scores is not strictly necessary. If the scores are left as they are then the winner N-S will have the highest score in the N-S field and the winner of the E-W field will be the pair with the lowest E-W score. This method is popular in Northern Europe. It is also called the California scoring method.

If the movement is an odd tabled whist type, the ordering of the E-W pairs is sequential. See illustration *VI* for the numbering of the E-W pairs in the 9 table example scored there. If these board sets are reordered as in illustration *VII* the E-W pairs become diagonally aligned.

By using this technique it is possible to score the movement without a recap and without repeating the E-W scores beneath the N-S scores (see illustration *VIII*).

The score sheets are placed so as to overlap each other, in the correct order. The additions across the horizontal lines produce the N-S pairs' totals and by adding diagonally the E-W pairs' scores are found (shown in the example by "*" next to E-W pair 1 scores).

If the score sheets are not pre-numbered in the N-S pair number field, this method can be used, adding by one diagonal for the N-S pairs, and by the other diagonal for the E-W pairs.

This technique is also possible with the standard Mitchell movement when the Waldman modification is used. This involves assigning the E-W pair numbers in a sequence different from the normal Mitchell. On any score sheet used in a Mitchell movement it can be seen that the order of the E-W pair numbers is such: 1, 3, 5, 7, 9, 2, 4, 6, 8. If the pairs are assigned their numbers differently, it is possible for the E-W pair numbers to run 1, 2, 3, 4, 5...

The allocation of the numbers, starting at table one, are:

5 Tables:

1, 4, 2, 5, 3.

7 Tables:

1, 5, 2, 6, 3, 7, 4.

9 Tables:

1, 6, 2, 7, 3, 8, 4, 9, 5.

11 Tables:

1, 7, 2, 8, 3, 9, 4, 10, 5, 11, 6.

13 Tables:

1, 8, 2, 9, 3, 10, 4, 11, 5, 12, 6, 13, 7.

15 Tables:

1, 9, 2, 10, 3, 11, 4, 12, 5, 13, 6, 14, 7, 15, 8.

At the second table the E-W pair's number is equal to the number of the middle table plus 1. The assignment of numbers follows in sequence, at every alternate table, thereafter.

The following suggestion applies where the movement is in two sections (for example twin Mitchells or combined Howell-Mitchell). If the boards are being shared between the movements, a score sheet with a line through the centre should be used, with one section scored above the line and the other below it. If the score sheet is pre-numbered in the N-S pair

column the sections should be assigned different numbers so that the scores are again separated. This of course does not affect the match-pointing of the boards, but does facilitate the addition of scores.

If pick-up slips are used, they should be positioned on the master sheet for each board in the order of the tables, or the order of the N-S pairs if a Mitchell movement is being used. This again assists in adding the scores.

When conducting a duplicate for a beginners' group, one may consider match-pointing the boards during the last or second last round. The scores for the last round are then assigned the match points for the nearest score. This is reasonable since the players, as yet, do not fully understand match-pointing and are still overawed by other aspects of the game. It allows the director to post the scores almost immediately the event is finished, thus making himself available to answer all those other questions that the players have.

CARRY-OVER SCORES

When an event includes qualifying and final rounds, the points earned in the qualifying rounds (significant though they may be) are not, in general, as important as the points scored in the final rounds. The qualifying rounds tend to be larger fields and as a consequence generally weaker.

If there is no reduction in the size of the field, the whole score from the qualifying rounds should be carried forward. Some people claim that the whole score should be carried forward at all times, but as the spread of the scores in the qualifying rounds (taken to the extreme) can be greater than the points available in the finals, this may not be a valid claim.

The American Contract Bridge League has a regulation formula which is to be used in events under their control.

$$\text{Carry forward} = \text{MABQ}^2/\text{ES}$$

Where

M = The pairs match point score in the qualifying rounds

A = Average match point score in the finals

B = Boards played in the qualifying rounds

Q = Number of qualifiers

E = Total number of entries in the entire field

S = Sum of the scores made by all qualifiers

For further details on this formula consult the A.C.B.L. Handbook of Rules and Regulations.

The following formula is another possibility. The object of the formula is to allocate pro-rata scores according to performance in the qualifying rounds. It also takes into consideration the ratio of the number of rounds in the qualifying rounds to those in the finals.

$$\text{Carry forward} = KT \times (S-L)/(H-L)$$

Where:

$$K = Q+Q/F$$

And:

Q = Number of sessions in the qualifying rounds

F = Number of sessions in the final rounds

T = The value of a TOP in the finals

S = The pair's match point score in the qualifying rounds

L = The lowest qualifiers' score in the section

H = The highest qualifying score in the section

It is, of course, desirable that all sections in the qualifying rounds play the same boards when carry-forward scores are used.

Another method which is very simple is to decide upon a number that is to be the difference between the top qualifier and the last qualifier. This number should be a multiple of the TOP in the final. The points awarded as carry-forward scores are then allocated such that there is an equal number of points between each qualifier, with the top place getting the maximum carry-over and the last qualifier getting zero.

For example with 5 qualifiers in each section and maximum carry-forward decided at 2 TOPS (20): the first qualifier would get 20, then 15, 10, 5 and the last getting zero.

This method of scoring is basically aimed at pairs events where the qualifiers are to play in teams events (i.e. selecting a team from many pairs).

HYBRID MATCH-POINTING

Essentially the successful pairs should be those who are consistently in the par spot; who bid and make partials where that is the par; who bid and make games or slams where that is the par; who defeat opposition partials, games or slams.

The following method of scoring is designed to place greater emphasis on playing in the safe contract, overtricks being meaningless; the aim is to reward par and to encourage pairs to take the correct teams approach in each aspect of the game, including sacrificing over games or slams.

Another feature of the following method is that each hand carries equal weight in the event. One board cannot win or lose the match or event (cf. Butler scoring), while the fortuitous circumstance of vulnerability is eliminated.

The method is to give equal weight to all scores within the same zone, paying no attention to insignificant differences. Scores are grouped together using a predetermined scale and after the scores are rated according to the given scale, the board is match-pointed in the normal fashion.

The scale is in two parts, non-vulnerable and vulnerable, since the significant zones differ according to the vulnerability. Basically there are more vulnerable zones than non-vulnerable, but the same zone number applies to the same areas (a game is always zone 4).

Before match-pointing, the scorer converts the actual score to the zone number. Normally, it will be simplest to enter these values as N-S positive and E-W as negative for the purposes of match-pointing. It would be even easy enough for the players to enter the zone value in a column on the score sheet for this purpose, at the same time as they enter the score. These zone values are the ones match-pointed, equal values being ties for the match-pointing.

SCORE ZONE DEFINITION

zone number	zone definition	vul scores	non-vul scores
0	Passed in	0	0
1	Part score	50-210	50-210
2	* Minor part score dbled	220-290	220-290
3	Dbl'd p/s + o'trick	300-490	
4	Game	500-720	300-520
5	Doubled game	730-810	530-610
6	Redoubled game	820-109	620-890
7	Doubled game + 2 o'tricks	1100-1290	
8	Small slam	1300-1500	900-1100
9	* Dbl'd small slam	1510-1700	1110-1290
10	Doubled s/slam +	1710-1990	
11	Grand slam	2000-2300	1300-1590
12	Doubled grand slam	2310-2510	1600-1890
13	Redoubled grand slam	2520-2990	1900-2300
14	The rest	3000 +	2310 +

* Where a part score of 1NT, 2C, or 2D is doubled and succeeds it could be considered that this should score more than a simple part score. To achieve this difference it is necessary to make the bonus for making a doubled score, 100 rather than 50. The same modification is needed for the doubled small slams in the minors, for without this the defenders could double for lead directing purposes without any risk being involved. Basically, changing the "insult" bonus to 100 stops "free" doubles.

In this scoring method, in all areas of play the making of overtricks is of no importance, for you can never score more from them. The aim is to emphasise making the contract and a side benefit will be that the play can be curtailed early on many hands. Similarly for the defenders the emphasis is on defeating the contract. Notice that in the part score area the "match-point" style double is not encouraged with 200 scoring the same as the part score (and equal to defeating the part score undoubled).

Where a pair sacrifices against a game there is no vital difference between -300 v -420 v -500 (non-vulnerable) and -500 v -620 v -700 (vulnerable). Hence all these scores are given the same value. A similar principle applies to the slam zones.

This method generally has the advantage that scoring is very simple (cf Butler scoring) and the results obtained tend to be more reliable than in other methods.

Unfortunately one further consideration detracts from this otherwise attractive scoring approach. In teams bridge it is common knowledge that the vulnerable game is to be bid when the odds of its success is approximately 40% or better. It can be readily seen that with this method of scoring the odds are the same as for the non-vulnerable game (both in fact 50%). To offset this it is possible that vulnerable games be awarded 10% more of all match points available on the board than those received normally. The vulnerable small slam and grand slam will also require the same bonuses to keep their odds on the same percentage over the game as in teams scoring.

The disadvantages are:

- Balancing the scores is not so easy
- The match points available to some pairs are greater than those available to others.

The following board is given as an example of this scoring method (North-South are vulnerable).

Contract & Declarer	N-S +	E-W +	Zone No.	N-S MP	E-W MP
4HS		100	-1	-1	9
4SxE	300		3	4	6
4HS	620		4	8+1	2-1
4HS	620		4	8+1	2-1
4HS		100	-1	1	9
4HN	620		4	8+1	2-1

Note the subtraction of the 10% of the TOP from the E-W SCORES, to encourage the save against the vulnerable game as much as it should be. The use of signed match-pointing in this method is better, particularly with the addition and subtraction of bonuses.

It should also be realised that the use of this bonus method is not imperative, as the results of the scoring method will always produce the pairs who perform closest to par, *but the players should be made aware of the fact that all games are a 50% chance.*

Another area which could be considered is the one-off-doubled-in-the-part-score area. Since players who go down one for -200 have risked -500, some people believe that the first trick should be -250 (rather than -200) to place this score in the next zone. The second trick down should also receive -250 and thence -300 as usual to return to normal scoring figures. This is also by no means imperative.

This method of scoring derives its name from Geoffrey L. Butler of Great Britain. It was first introduced to overcome some of the problems with the then available methods of scoring. It does not give a large and disproportionate return for small differences in scores as does match-point scoring and so encourages normal teams tactics in the the play and bidding of the hands.

On the other hand it does have the disadvantage of not giving all hands the same value so that the "gift" hand from the opponents or the lucky or unlucky "big" hand tends to distort the results of many sessions or matches.

All scores of the pairs who play a board are considered in producing a datum value with which each score is compared to produce a difference which is then converted into an IMP result. For example if a pair scores +620 on a board and the datum value is +570 then the difference is 50 which is then converted to 2 IMPs. The score would be + 2 to the pair scoring +620 and their opponents would receive -2.

A major disadvantage of this method of scoring is in balancing the scores or, in other words, determining the check totals of the scores when the scoring is done by the director or his assistants. The conversion of the scores to IMPs is virtually impossible to do without some errors; and the errors are very difficult to eliminate. Therefore, the best method of doing this scoring is to have the datum scores posted for the players to see and have them do their own scoring. Their scores can then be cross checked with those of their opponents to eliminate the errors. Where the head to head match method is used, the players can even compare their scores with those of their opponents before handing the result to the director.

Scoring by total points is simple and straight-forward. Each board is scored according to the laws of duplicate contract bridge. The score of any one pair is the total of all their scores in the event. Honours usually count.

Unfortunately for several reasons this method is unsatisfactory. It is more tedious when the scoring is done by the director and the balancing of the scores is nearly impossible without considerably more work. The worst feature is the influence of big scores on occasional hands either by pairs bidding bad slams which make or through pairs being set by large amounts. The use of Butler scoring reduces this factor.

Another method of limiting this influence is by "limitation of bonuses". The following scale lists the maximum scores any pair can obtain on any hand, depending on the contracts made in the same direction in which they are sitting (including the contract made by the pair).

BUTLER SCORING

TOTAL POINT SCORING

Contract made this direction	Not vulnerable	Vulnerable
No part score	200	300
Part score	300	400
Game	600	800
Small slam	1200	1700
Grand slam	1700	2500

INSTANT POINTS

Instant points is one of the most recent methods of scoring devised. It has the advantage of being both simple and fast.

The tactics required to play in this type of event are similar to those of total point scoring except that the odds of bidding slams, and in particular grand slams, are reduced dramatically. In fact it is just not worthwhile bidding any grand slams (see the scale below). With this in mind it is no wonder that this type of scoring has not been popular with players.

The major advantage to the player is that they do their own scoring and at the end of the session can compare scores immediately with all other pairs. The director also is aided. All that is required at the end of the session is the score of any pair who considers that they have done well. This is announced and any pairs doing better are asked to come forward (or any pairs coming close to that same score). The director is then only required to check the scores of the leading pairs to find the ultimate winner and the placings.

Each table in the event is furnished with a score ready reckoner, similar to that shown below, so that the scoring can be done during play.

Bridge Directing Complete

points scored	instant + pair	points - pair	points scored	instant + pair	points - pair
0	40	40	580-590	61	19
50	41	39	600-620	62	18
70	42	38	630-650	63	17
80	43	37	660-680	64	16
90	44	36	690-710	65	15
100-110	45	35	720-740	66	14
120-140	46	34	750-830	67	13
150-170	47	33	840-910	68	12
180-200	48	32	920-1020	69	11
210-230	49	31	1030-1130	70	10
240-260	50	30	1140-1240	71	9
270-290	51	29	1250-1350	72	8
300-320	52	28	1360-1520	73	7
330-350	53	27	1530-1700	74	6
360-390	54	26	1710-1900	75	5
400-420	55	25	1910-2100	76	4
430-450	56	24	2110-2300	77	3
460-480	57	23	2310-2500	78	2
490-510	58	22	2510-2700	79	1
520-540	59	21	2710-&	80	0
550-570	60	20			

"Law 96. A board is considered to be "fouled" if the Director determines that one or more cards were misplaced in the board, in such a manner that contestants who should have had a direct score comparison did not play the board in identical form. In such cases the Director determines as closely as possible which scores were made on the board in its correct form, and which in the incorrect form. He divides the score on that basis into two groups, and rates each group separately as provided in the succeeding sections:

"(a) In pair or individual events, he awards each player or pair the match-points allotted under Law 74, plus 1 match-point for each score in the other group.

"(b)..."

As much as this is the rule as specified by the International code, the local ruling bodies quite often use other methods of overcoming these problems. Note: the W.B.F. has qualifications to this law in the W.B.F. regulations at the rear of the Laws of Contract Duplicate Bridge.

The following alternative method of scoring fouled boards should not be used unless the local ruling body has endorsed its use.

FOULED BOARD

This method originated from Col. Russell J. Baldwin (U.S.A.). The fouled board is scored in two groups as outlined in the above rule without the adjustment of 1 MP for each score in the other group. The scores are then applied to the following formula to give the final match point score.

Single match-pointing formula: $M = A (2X+1)/N$

Double match-pointing formula: $M = A (X+1)/N$

Where:

M = Final match point score

A = The normal match point average on the board (assuming it had not been fouled)

X = Match point score calculated in the first part

N = Number of scores in the group under consideration

The method outlined in law 96 (a) will generally produce the same results as this formula, it is only when the final placings are close that this formula need be applied.

PAR POINT SCORING

This is more a type of event rather than a scoring method. Here the result on a hand is compared with a predetermined par result instead of (as in a normal pairs event) the results produced by the other pairs in the event. There is no luck involved, for the play by your opponents is performed under instruction.

There are certain point awards given for the bidding on the deal. The set bidding is then supplied, the contract to be played is given (which may have no bearing on the supplied auction) and the opening lead is usually supplied. If the declarer is under test points are awarded on the line of the play adopted; if the defence is being tested, then points are awarded in like manner for the line of defense produced.

The setting of the hands is difficult and most exacting. The play is very slow as a lot of thought is usually required for no player really knows whether he is under test. As there is only a finite number of themes in the hands, it is very difficult to put much variety into the event.

TEAMS SCORING

13

INTRODUCTION

The scoring of teams matches can be done in one of three different ways: total point scoring, board-a-match scoring or international match point (IMP) scoring.

Total point scoring was the first method ever adopted and is not such a bad method where two teams are playing a straight head-to-head match. It does have the one disadvantage of giving the odd large swing hand disproportionate significance. This method lost favour when the IMP scale method of scoring was introduced.

The IMP scale according to the Official Encyclopedia of Bridge, "...appears to have been invented in Vienna, and was first used at the International level in the 1938 European Championship in Oslo. IMPs were first used in a World Championship in 1951.

"The original name was EMP, or European Match Points. The original scale provided for a maximum gain of 12 points, as follows:

Point diff.	EMP	Point diff.	EMP
10-30	1	400-490	7
40-60	2	500-590	8
70-100	3	600-740	9
110-180	4	750-1490	10
190-290	5	1500-1990	11
300-390	6	2000 & OVER	12

"A revised scale was adopted..." in 1948, and this was further revised in 1961. Finally the scale devised in 1962 and effective from the 1st September that year was introduced and is still current today.

1962 INTERNATIONAL MATCH POINT SCALE

Point Diff.	IMP	Point Diff.	IMP	Point Diff.	IMP
20-40	1	370-420	9	1500-1740	17
50-80	2	430-490	10	1750-1990	18
90-120	3	500-590	11	2000-2240	19
130-160	4	600-740	12	2250-2490	20
170-210	5	750-890	13	2500-2990	21
220-260	6	900-1090	14	3000-3490	22
270-310	7	1100-1290	15	3500-3990	23
320-360	8	1300-1490	16	4000& +	24

Board-a-match (known as point-a-board in Europe) scoring is really a simplified version of match pointing with only the results of the two teams being considered, used in the actual scoring. This means a win on a board receives 2 (1) match points; a tie receives 1 ($\frac{1}{2}$) match point and a loss 0 (zero) match points. This method is only useful in multiple teams events and has the marked disadvantage of giving the part score hands dramatic importance. As such it is not popular and has lost favour to the IMP scoring method.

The English Bridge Union has developed a form of scoring which combines the point-a-board scoring with Total Point scoring to give what is known as Hybrid scoring. This only applies to matches of 3, 4 or 5 boards. In each case there are 2 points a board available through normal point-a-board scoring (2=win; 1=draw; 0=loss). The aggregate scoring is then used to give the rest of the victory points for each match.

3 Board matches:

0-240	2 - 2	
250-490	3 - 1	
500 & over	4 - 0	Max. win = 10

4 Board matches:

0-340	2 $\frac{1}{2}$ - 2 $\frac{1}{2}$	
350-590	3 - 2	
600-990	4 - 1	
1000 & over	5 - 0	Max. win = 13

5 Board Matches:

0-440	3 - 3	
450-740	4 - 2	
750-1240	5 - 1	
1250 & over	6 - 0	Max win = 16

If all the boards in the event are not played by all contestants the following method can be used to determine the VPs awarded on aggregate scores.

The net scores for all the boards in the match are totalled, disregarding the sign on the score, to obtain the absolute total aggregate score. The total aggregate score is then found, using the sign of the scores in this case. The percentage of the total aggregate score over the absolute total aggregate score is found by calculation and this figure is then converted to VPs according to:

0-5%	2 - 2
5. - 10%	2½ - 1½
10. - 15%	3 - 1
15. - 25%	3½ - ½
25+ & over	4 - 0

When there are multiple teams matches in an event which may be run as a round robin or multiple teams event, the IMP results are normally converted to a victory point (VP) result rather than keeping the result in the IMP form. This tends to be fairer in that each match is then of equal value.

VICTORY POINT SCALES

Victory point scales come in several different forms, some ranging from a maximum value to zero and others imposing negative scores on the losers if their loss was in excess of a predetermined value.

The major factor to be considered in the scale is the number of boards in the match. This affects the cut off point of the scale for the maximum win. The next problem is the allocation of the points between the maximum win and the tie, and whether this should be linear or logarithmic. One of the most unfortunate aspects of some victory point scales is the fact that some IMPs are of more significance than others. Consider the VP scale used by the W.B.F. in many world championships.

IMP DIFFERENCE	WINNER'S VPs	LOSER'S VPs
0-2	10	10
3-4	11	9
5-6	12	8
7-8	13	7
9-10	14	6
11-12	15	5
13-14	16	4
15-16	17	3
17-18	18	2
19-20	19	1
21-30	20	0
31-40	20	-2
41-50	20	-3
51-60	20	-4
61 & over	20	-5

It can be seen that the third IMP is worth 1 VP while the fourth is not worth anything. Similarly for the rest of the scale. The above scale is intended for a 16 to 20 board match. Clearly the persons drawing up this scale considered that the maximum win should be awarded if the winner averaged 1 to 1¼ IMPs over the 16 boards. Over a lower number of boards this would not be the case, as illustrated in the case of a 4 board match. There a win of 4 or 5 IMPs would not be adequate as a reliable gauge to a win. In fact, it is observable that the performance of good teams varies as the square root of the number of boards in the match.

In search of a reliable VP scale the results of a significant number of of boards in a Butler scored event in quality fields were studied. The standard deviation from the average score (see Butler scoring) was found to be approximately equal to 5.

Therefore it can be deduced that the cut off point for Butler scored events should be equal to $5\sqrt{n}$. (where n = number of boards in the event). To derive the cut-off in a teams event (where the result is not compared with an average, but instead is compared with the result at the other table) the ratio of the values should be $\sqrt{2}$. As $7/5$ approximately equals $\sqrt{2}$ the cut-off for teams events should be $7\sqrt{n}$.

As there is no reason to convert the score from the IMP result, the VP result should be the same as the IMP result with the cut-off at the above values (this scoring method was devised by W. Wallace of Sydney). It is then suggested that the IMPs over this cut-off point be divided by 10 and added to this result with a further cut-off at 10% above the first cut-off for the winner and 20% for the loser. An example is given below for a 16 board teams match.

The cut-off is equal to $7\sqrt{16} = 28$ IMP.

10% = 2.8

Therefore:

0 to 28 IMP 1 VP = 1 IMP
29 to 56 IMP 1 VP = 10 IMPs

(And for the loser) 57 to 84 IMP 1 VP = 10 IMPs

Maximum win is 30.8 VP and worst loss -33.6 VP.

Consider the following results:

Winning by	Winner VPs	Loser VPs
10 IMP	10	-10
32 IMP	28.4	-28.4
61 IMP	30.8	-31.3

One of the side benefits of this method is that the number of ties is reduced with the decimalisation of the scores.

Some other Victory Point scales that have been used over the years, with varying degrees of success and validity are now considered.

An early European Championships scale was:

IMPs	Winner VPs	Loser VPs
0-3	3	3
4-10	4	2
11-20	5	1
over 20	6	0

1964 World Bridge Olympiad:

IMPs	Winner's VPs	Loser's VPs	(Women's Olympiad)
0-3*	4	3	0-5*
4-9	5	2	6-14
10-17	6	1	15-28
over 17	7	0	over 28

* If there is a tie in IMPs then the 4 VPs are awarded to the team earning points on the greater number of boards. If still tied, then the aggregate scores are used to determine the winner of the 4 VPs.

The following VP scale was devised by Victor Zirinsky of Hong Kong. It attempts to take into consideration the ratio of the winner's and loser's scores as well as the difference.

$$V = 4 + 6 (W-L)/L$$

$$\text{or } V = 6W/L - 2 \text{ when simplified.}$$

Where:

W = Winner's IMP score

L = Loser's IMP score

V = VPs for the winner (maximum win is 8)

The loser's score in VPs = 8 - V.

Unfortunately this scale does not take into consideration the number of boards in the match. Therefore a Modified Zirinsky scale is :

$$V = 4 + [7/4][W/L][(W-L)/N]$$

Where V, W and L are as before and N = number of boards.

As the scoring methods above tend to require the players to be qualified mathematicians, the following VP scales are given as simple and reliable methods. One of the first five IMP scales is selected and coupled with one of the five VP scales. For example in four board matches, the choice may be a 14 IMP maximum win (see above, 7√4). The second IMP scale would then be used with the 4th VP scale.

i.e.

	0-1						4-4				
	2-4						5-3				
	5-8						6-2				
	9-13						7-1				
	14&+						8-0				
	IMP					VP					
	0	0-1	0-2	0-3	0-4	1-1	2-2	3-3	4-4	5-5	6-6
	1-2	2-4	3-6	4-8	5-10	2-0	3-1	4-2	5-3	6-4	7-5
	3-5	5-8	7-11	9-14	11-17		4-0	5-1	6-2	7-3	8-4
	6-9	9-13	12-17	15-21	18-25			6-0	7-1	8-2	9-3
	10-14	14-19	18-24	22-29	26-34				8-0	9-1	10-2
	15-20	20-26	25-32	30-38	35-44					10-0	11-1
	21+	27+	33+	39+	45+						12-0

One of the problems in round robin teams events is that the teams not doing very well in the event tend to lose interest. To overcome this, a suggestion from South Africa (J. Butkow of Johannesburg) can be implemented. Instead of completing each match on each round it is possible to play only, perhaps, 90% of the boards. All the matches on the last session are completed by playing a multiple teams event, each round comprising enough boards to make up the balance of the boards for each full match. Only at that stage are the final results of each match known and the winners determined.

APPENDICES

APPENDIX A

PAIRS MOVEMENTS READY RECKONER

In the following schedule each number of tables is shown with a list of movements that should be considered for use. The list tends to be in the order of preference, but any two or more entries next to each other may be of equal merit. The selection of a movement will tend to be based on the number of rounds to be played, and the number of winners desired.

The number of rounds needed to complete the movement is shown in brackets next to each entry. If there is more than one possibility, they are separated by a comma. A two session event is shown as 10+11. Three sessions of equal size is shown as 7x3.

N.B. The length of an event (i.e. total number of boards) is found by multiplying the number of rounds by the number of boards in each set.

3 TABLES

Howell (5); hesitation switch Mitchell (4); whist (3); Mitchell (3)

3½ TABLES

Howell (7); extra board Mitchell rover (7).

4 TABLES

Howell (7); extra board Mitchell (8); share and relay Mitchell (4); skip Mitchell (3).

4½ TABLES

Howell (9); extra board Mitchell rover (8); switch Mitchell rover (4).

5 TABLES

Howell (9); whist (5); Mitchell (5); hesitation switch Mitchell (6); appendix Mitchell (3); extra board Mitchell (7,9).

5½ TABLES

Howell (11); extra board Mitchell rover (11); share and relay Mitchell (6); whist rover (5); Mitchell rover (5); 1½ table Mitchell (4).

6 TABLES

Howell (11); share and relay Mitchell (6); half-odd movement (6); twin Mitchell (6); ¾ Howell (9); skip Mitchell (5); twin Mitchell (3); extra board Mitchell (8,12).

6½ TABLES

Howell (13); share and relay Mitchell rover (6); whist (7); Mitchell (7); 1½ table Mitchell (5); appendix Howell (9,11).

7 TABLES

whist (7); Howell (13); Mitchell (7); hesitation switch Mitchell (8); interwoven (6+7) appendix Mitchell (5); appendix Howell (9,11); ¾ Howell (8,9,11); extra board Mitchell (9,11).

7½ TABLES

share and relay Mitchell (8); Howell (15); whist rover (7); Mitchell rover (7); 1½ table Mitchell (6); appendix Mitchell (5,7); appendix Howell (11,13).

8 TABLES

share and relay Mitchell (8); Howell (15); interwoven (8+7); combined Howell-Mitchell (5x3); extra board Mitchell (10,14); ¾ Howell (9,11,13); appendix Mitchell (5,7); appendix Howell (11,13); bowman Mitchell (6); skip Mitchell (7); twin Mitchell (4,8).

8½ TABLES

whist (9); Mitchell (9); share and relay Mitchell rover (8); Howell (17); 1½ table Mitchell (7); appendix Mitchell (5,7); appendix Howell (13,15); appendix Howell (9,11); ¾ Howell (11,13).

9 TABLES

whist (9); Mitchell (9); Howell (17); interwoven (8+9); extra board Mitchell (11,13,15); appendix Howell (9,11); ¾ Howell (11,13); hesitation switch Mitchell (10); appendix Mitchell (5,7); bowman Mitchell (7).

9½ TABLES

whist rover (9); Mitchell rover (9); share and relay Mitchell (10); Howell (19); 1½ table Mitchell (8); appendix Howell (13,15); appendix Mitchell (5,7).

10 TABLES

share and relay Mitchell (10); Howell (19); appendix Mitchell (7); half-odd movement (10); twin Mitchell (10); extra board Mitchell (12,16); appendix Howell (13,15); interwoven (10+9); ¾ Howell (11,13); appendix Howell (11,17); bowman Mitchell (8).

10½ TABLES

share and relay Mitchell rover (10); Mitchell (21); 1½ table Howell (9); half-odd movement rover (10); appendix Mitchell (7); appendix Howell (13,15); appendix Howell (17,19).

11 TABLES

whist (11); Mitchell (11); Howell (21); extra board Mitchell (13); hesitation switch Mitchell (12); combined Howell-Mitchell (7); share and relay (3); interwoven (10+11); bowman Mitchell (9); appendix Mitchell (7); ¾ Howell (13); appendix Howell (13,15); appendix Howell (17,19).

11½ TABLES

share and relay Mitchell (12); Howell (23); whist rover (11); Mitchell rover (11); 1½ table Mitchell (10); appendix Mitchell (7); ¾ Howell (13); appendix Howell (13,15); appendix Howell (17,19); appendix Howell (21).

12 TABLES

share and relay Mitchell (12); Howell (23); extra board Mitchell (14); interwoven (12+11); skip Mitchell (11); bowman Mitchell (10); appendix Mitchell (7,11); stagger Mitchell (6+6); double Howell (11); ¾ Howell (13); appendix Howell (13,15); appendix Howell (17,19); appendix Howell (21).

12½ TABLES

whist (13); Mitchell (13); share and relay rover Mitchell (12); Howell (25); 1½ table Mitchell (11); appendix Mitchell (7,11); appendix Howell (23).

13 TABLES

whist (13); Mitchell (13); Howell (25); interwoven (12+13); hesitation switch Mitchell (14); extra board Mitchell (15); curtailed Mitchell.

13½ TABLES

rover whist (13); rover Mitchell (13); Howell (27); 1½ table Mitchell (12); share and relay Mitchell (14); appendix Mitchell (11,13); appendix Howell (25).

14 TABLES

share and relay Mitchell (14); Howell (27); interwoven (14+13); combined Howell-Mitchell (9x3); appendix Mitchell (11,13); bowman Mitchell (12); skip Mitchell (13); extra board Mitchell (16); curtailed skip Mitchell; stagger Mitchell (7+7); double Howell (13); half-odd movement (14); twin Mitchell (7).

14½ TABLES

share and relay Mitchell rover (14); 1½ table Mitchell (13); whist (15); Mitchell (15); Howell (29); appendix Mitchell (11,13).

15 TABLES

whist (15); Mitchell (15); interwoven (14+15); curtailed Mitchell; appendix Mitchell (11,13); Howell (29); hesitation switch Mitchell (16); extra board Mitchell (17).

15½ TABLES

rover whist (15); rover Mitchell (15); share and relay Mitchell (16); appendix Mitchell (13); 1½ table Mitchell (14); Howell (31); appendix Howell (25,27).

16 TABLES

share and relay Mitchell (16); interwoven (16+17); double Howell (15); stagger Mitchell (8+8); curtailed skip Mitchell; half-odd movement (16); twin Mitchell (8); extra board Mitchell (18,22); Howell (31); appendix Howell (25,27).

16½ TABLES

share and relay rover Mitchell (16); appendix Mitchell (11,13); 1½ table Mitchell (15); whist (17); Mitchell (17); Howell (33).

17 TABLES

whist (17); Mitchell (17); combined Howell-Mitchell (11x3); interwoven (16+17); appendix Mitchell (11,13); Howell (33); hesitation switch Mitchell (18); appendix Mitchell (19,23); curtailed Mitchell.

17½ TABLES

rover whist (17); rover Mitchell (17); appendix Mitchell (13); 1½ table Mitchell (16); share and relay Mitchell (18); Howell (35); curtailed rover Mitchell.

18 TABLES

share and relay Mitchell (18); interwoven (18+17); curtailed skip Mitchell; half-odd movement (18); stagger Mitchell (9+9); double Howell (17); Howell (35); twin Mitchell (9); appendix Mitchell (13,17); extra board Mitchell (20,24).

18½ TABLES

share and relay rover Mitchell (18); 1½ table Mitchell (17); curtailed Mitchell; whist (19); Mitchell (19); appendix Mitchell (13,17); Howell (37).

19 TABLES

whist (19); Mitchell (19); curtailed Mitchell; extra board Mitchell (21,25); hesitation switch Mitchell (20); appendix Mitchell (13,17); interwoven (18+15); Howell (37).

19½ TABLES

share and relay Mitchell (20); curtailed skip Mitchell; rover whist (19); rover Mitchell (19); 1½ table Mitchell (18); appendix Mitchell (13,17); Howell (39).

20 TABLES

share and relay Mitchell (20); combined Howell-Mitchell (13x3); interwoven (20+19); extra board Mitchell (22,26); curtailed skip Mitchell; appendix Howell (13,17); stagger Mitchell (10+11); double Howell (19); twin Mitchell (10); Howell (39).

APPENDIX B

PERCENTAGE TABLES

The scores shown down the left hand side of the table have been converted to a percentage of the maximum possible score shown across the top of each page. All the data in these tables were generated by a Honeywell Series 60 Computer.

	120	144	160	168	176	180	192	200	208	210	216
24	20.000	16.667	15.000	14.286	13.636	13.333	12.500	12.000	11.538	11.429	11.111
25	20.833	17.361	15.625	14.881	14.205	13.889	13.021	12.500	12.019	11.905	11.574
26	21.667	18.056	16.250	15.476	14.773	14.444	13.542	13.000	12.500	12.381	12.037
27	22.500	18.750	16.875	16.071	15.341	15.000	14.063	13.500	12.981	12.857	12.500
28	23.333	19.444	17.500	16.667	15.909	15.556	14.583	14.000	13.462	13.333	12.963
29	24.167	20.139	18.125	17.262	16.477	16.111	15.104	14.500	13.942	13.810	13.426
30	25.000	20.833	18.750	17.857	17.045	16.667	15.625	15.000	14.423	14.286	13.889
31	25.833	21.528	19.375	18.452	17.614	17.222	16.146	15.500	14.904	14.762	14.352
32	26.667	22.222	20.000	19.048	18.182	17.778	16.667	16.000	15.385	15.238	14.815
33	27.500	22.917	20.625	19.643	18.750	18.333	17.188	16.500	15.865	15.714	15.278
34	28.333	23.611	21.250	20.238	19.318	18.889	17.708	17.000	16.346	16.190	15.741
35	29.167	24.306	21.875	20.833	19.886	19.444	18.229	17.500	16.827	16.667	16.204
36	30.000	25.000	22.500	21.429	20.455	20.000	18.750	18.000	17.308	17.143	16.667
37	30.833	25.694	23.125	22.024	21.023	20.556	19.271	18.500	17.788	17.619	17.130
38	31.667	26.389	23.750	22.619	21.591	21.111	19.792	19.000	18.269	18.095	17.593
39	32.500	27.083	24.375	23.214	22.159	21.667	20.313	19.500	18.750	18.571	18.056
40	33.333	27.778	25.000	23.810	22.727	22.222	20.833	20.000	19.231	19.048	18.519
41	34.167	28.472	25.625	24.405	23.295	22.778	21.354	20.500	19.712	19.524	18.981
42	35.000	29.167	26.250	25.000	23.864	23.333	21.875	21.000	20.192	20.000	19.444
43	35.833	29.861	26.875	25.595	24.432	23.889	22.396	21.500	20.673	20.476	19.907
44	36.667	30.556	27.500	26.190	25.000	24.444	22.917	22.000	21.154	20.952	20.370
45	37.500	31.250	28.125	26.786	25.568	25.000	23.438	22.500	21.635	21.429	20.833
46	38.333	31.944	28.750	27.381	26.136	25.556	23.958	23.000	22.115	21.905	21.296
47	39.167	32.639	29.375	27.976	26.705	26.111	24.479	23.500	22.596	22.381	21.759
48	40.000	33.333	30.000	28.571	27.273	26.667	25.000	24.000	23.077	22.857	22.222
49	40.833	34.028	30.625	29.167	27.841	27.222	25.521	24.500	23.558	23.333	22.685
50	41.667	34.722	31.250	29.762	28.409	27.778	26.042	25.000	24.038	23.810	23.148
51	42.500	35.417	31.875	30.357	28.977	28.333	26.563	25.500	24.519	24.286	23.611
52	43.333	36.111	32.500	30.952	29.545	28.889	27.083	26.000	25.000	24.762	24.074
53	44.167	36.806	33.125	31.548	30.114	29.444	27.604	26.500	25.481	25.238	24.537
54	45.000	37.500	33.750	32.143	30.682	30.000	28.125	27.000	25.962	25.714	25.000
55	45.833	38.194	34.375	32.738	31.250	30.556	28.646	27.500	26.442	26.190	25.463
56	46.667	38.889	35.000	33.333	31.818	31.111	29.167	28.000	26.923	26.667	25.926
57	47.500	39.583	35.625	33.929	32.386	31.667	29.688	28.500	27.404	27.143	26.389
58	48.333	40.278	36.250	34.524	32.955	32.222	30.208	29.000	27.885	27.619	26.852
59	49.167	40.972	36.875	35.119	33.523	32.778	30.729	29.500	28.365	28.095	27.315
60	50.000	41.667	37.500	35.714	34.091	33.333	31.250	30.000	28.846	28.571	27.778
61	50.833	42.361	38.125	36.310	34.659	33.889	31.771	30.500	29.327	29.048	28.241
62	51.667	43.056	38.750	36.905	35.227	34.444	32.292	31.000	29.808	29.524	28.704
63	52.500	43.750	39.375	37.500	35.795	35.000	32.813	31.500	30.288	30.000	29.167
64	53.333	44.444	40.000	38.095	36.364	35.556	33.333	32.000	30.769	30.476	29.630
65	54.167	45.139	40.625	38.690	36.932	36.111	33.854	32.500	31.250	30.952	30.093
66	55.000	45.833	41.250	39.286	37.500	36.667	34.375	33.000	31.731	31.429	30.556
67	55.833	46.528	41.875	39.881	38.068	37.222	34.896	33.500	32.212	31.905	31.019
68	56.667	47.222	42.500	40.476	38.636	37.778	35.417	34.000	32.692	32.381	31.481
69	57.500	47.917	43.125	41.071	39.205	38.333	35.938	34.500	33.173	32.857	31.944
70	58.333	48.611	43.750	41.667	39.773	38.889	36.458	35.000	33.654	33.333	32.407
71	59.167	49.306	44.375	42.262	40.341	39.444	36.979	35.500	34.135	33.810	32.870
72	60.000	50.000	45.000	42.857	40.909	40.000	37.500	36.000	34.615	34.286	33.333
73	60.833	50.694	45.625	43.452	41.477	40.556	38.021	36.500	35.096	34.762	33.796
74	61.667	51.389	46.250	44.048	42.045	41.111	38.542	37.000	35.577	35.238	34.259
75	62.500	52.083	46.875	44.643	42.614	41.667	39.063	37.500	36.058	35.714	34.722
76	63.333	52.778	47.500	45.238	43.182	42.222	39.583	38.000	36.538	36.190	35.185
77	64.167	53.472	48.125	45.833	43.750	42.778	40.104	38.500	37.019	36.667	35.648
78	65.000	54.167	48.750	46.429	44.318	43.333	40.625	39.000	37.500	37.143	36.111
79	65.833	54.861	49.375	47.024	44.886	43.889	41.146	39.500	37.981	37.619	36.574
80	66.667	55.556	50.000	47.619	45.455	44.444	41.667	40.000	38.462	38.095	37.037
81	67.500	56.250	50.625	48.214	46.023	45.000	42.188	40.500	38.942	38.571	37.500
82	68.333	56.944	51.250	48.810	46.591	45.556	42.708	41.000	39.423	39.048	37.963
83	69.167	57.639	51.875	49.405	47.159	46.111	43.229	41.500	39.904	39.524	38.426
84	70.000	58.333	52.500	50.000	47.727	46.667	43.750	42.000	40.385	40.000	38.889
85	70.833	59.028	53.125	50.595	48.295	47.222	44.271	42.500	40.865	40.476	39.352
86	71.667	59.722	53.750	51.190	48.864	47.778	44.792	43.000	41.346	40.952	39.815
87	72.500	60.417	54.375	51.786	49.432	48.333	45.313	43.500	41.827	41.429	40.278
88	73.333	61.111	55.000	52.381	50.000	48.889	45.833	44.000	42.308	41.905	40.741
89	74.167	61.806	55.625	52.976	50.568	49.444	46.354	44.500	42.788	42.381	41.204
90	75.000	62.500	56.250	53.571	51.136	50.000	46.875	45.000	43.269	42.857	41.667
91	75.833	63.194	56.875	54.167	51.705	50.556	47.396	45.500	43.750	43.333	42.130
92	76.667	63.889	57.500	54.762	52.273	51.111	47.917	46.000	44.231	43.810	42.593
93	77.500	64.583	58.125	55.357	52.841	51.667	48.438	46.500	44.712	44.286	43.056
94	78.333	65.278	58.750	55.952	53.409	52.222	48.958	47.000	45.192	44.762	43.519
95	79.167	65.972	59.375	56.548	53.977	52.778	49.479	47.500	45.673	45.238	43.981
96	80.000	66.667	60.000	57.143	54.545	53.333	50.000	48.000	46.154	45.714	44.444
97	80.833	67.361	60.625	57.738	55.114	53.889	50.521	48.500	46.635	46.190	44.907
98	81.667	68.056	61.250	58.333	55.682	54.444	51.042	49.000	47.115	46.667	45.370

	120	144	160	168	176	180	192	200	208	210	216
99	82.500	68.750	61.875	58.929	56.250	55.000	51.563	49.580	47.596	47.143	45.833
100	83.333	69.444	62.500	59.524	56.818	55.556	52.083	50.000	48.077	47.619	46.296
101	84.167	70.139	63.125	60.119	57.386	56.111	52.604	50.500	48.558	48.095	46.759
102	85.000	70.833	63.750	60.714	57.955	56.667	53.125	51.000	49.038	48.571	47.222
103	85.833	71.528	64.375	61.310	58.523	57.222	53.646	51.500	49.519	49.048	47.685
104	86.667	72.222	65.000	61.905	59.091	57.778	54.167	52.000	50.000	49.524	48.148
105	87.500	72.917	65.625	62.500	59.659	58.333	54.688	52.500	50.481	50.000	48.611
106	88.333	73.611	66.250	63.095	60.227	58.889	55.208	53.000	50.962	50.476	49.074
107	89.167	74.306	66.875	63.690	60.795	59.444	55.729	53.500	51.442	50.952	49.537
108	90.000	75.000	67.500	64.286	61.364	60.000	56.250	54.000	51.923	51.429	50.000
109	90.833	75.694	68.125	64.881	61.932	60.556	56.771	54.500	52.404	51.905	50.463
110	91.667	76.389	68.750	65.476	62.500	61.111	57.292	55.000	52.885	52.381	50.926
111	92.500	77.083	69.375	66.071	63.068	61.667	57.813	55.500	53.365	52.857	51.389
112	93.333	77.778	70.000	66.667	63.636	62.222	58.333	56.000	53.846	53.333	51.852
113	94.167	78.472	70.625	67.262	64.205	62.778	58.854	56.500	54.327	53.810	52.315
114	95.000	79.167	71.250	67.857	64.773	63.333	59.375	57.000	54.808	54.286	52.778
115	95.833	79.861	71.875	68.452	65.341	63.889	59.896	57.500	55.288	54.762	53.241
116	96.667	80.556	72.500	69.048	65.909	64.444	60.417	58.000	55.769	55.238	53.704
117	97.500	81.250	73.125	69.643	66.477	65.000	60.938	58.500	56.250	55.714	54.167
118	98.333	81.944	73.750	70.238	67.045	65.556	61.458	59.000	56.731	56.190	54.630
119	99.167	82.639	74.375	70.833	67.614	66.111	61.979	59.500	57.212	56.667	55.093
120	*****	83.333	75.000	71.429	68.182	66.667	62.500	60.000	57.692	57.143	55.556
121		84.028	75.625	72.024	68.750	67.222	63.021	60.500	58.173	57.619	56.019
122		84.722	76.250	72.619	69.318	67.778	63.542	61.000	58.654	58.095	56.481
123		85.417	76.875	73.214	69.886	68.333	64.063	61.500	59.135	58.571	56.944
124		86.111	77.500	73.810	70.455	68.889	64.583	62.000	59.615	59.048	57.407
125		86.806	78.125	74.405	71.023	69.444	65.104	62.500	60.096	59.524	57.870
126		87.500	78.750	75.000	71.591	70.000	65.625	63.000	60.577	60.000	58.333
127		88.194	79.375	75.595	72.159	70.556	66.146	63.500	61.058	60.476	58.796
128		88.889	80.000	76.190	72.727	71.111	66.667	64.000	61.538	60.952	59.259
129		89.583	80.625	76.786	73.295	71.667	67.188	64.500	62.019	61.429	59.722
130		90.278	81.250	77.381	73.864	72.222	67.708	65.000	62.500	61.905	60.185
131		90.972	81.875	77.976	74.432	72.778	68.229	65.500	62.981	62.381	60.648
132		91.667	82.500	78.571	75.000	73.333	68.750	66.000	63.462	62.857	61.111
133		92.361	83.125	79.167	75.568	73.889	69.271	66.500	63.942	63.333	61.574
134		93.056	83.750	79.762	76.136	74.444	69.792	67.000	64.423	63.810	62.037
135		93.750	84.375	80.357	76.705	75.000	70.313	67.500	64.904	64.286	62.500
136		94.444	85.000	80.952	77.273	75.556	70.833	68.000	65.385	64.762	62.963
137		95.139	85.625	81.548	77.841	76.111	71.354	68.500	65.865	65.238	63.426
138		95.833	86.250	82.143	78.409	76.667	71.875	69.000	66.346	65.714	63.889
139		96.528	86.875	82.738	78.977	77.222	72.396	69.500	66.827	66.190	64.352
140		97.222	87.500	83.333	79.545	77.778	72.917	70.000	67.308	66.667	64.815
141		97.917	88.125	83.929	80.114	78.333	73.438	70.500	67.788	67.143	65.278
142		98.611	88.750	84.524	80.682	78.889	73.958	71.000	68.269	67.619	65.741
143		99.306	89.375	85.119	81.250	79.444	74.479	71.500	68.750	68.095	66.204
144		*****	90.000	85.714	81.818	80.000	75.000	72.000	69.231	68.571	66.667
145			90.625	86.310	82.386	80.556	75.521	72.500	69.712	69.048	67.130
146			91.250	86.905	82.955	81.111	76.042	73.000	70.192	69.524	67.593
147			91.875	87.500	83.523	81.667	76.563	73.500	70.673	70.000	68.056
148			92.500	88.095	84.091	82.222	77.083	74.000	71.154	70.476	68.519
149			93.125	88.690	84.659	82.778	77.604	74.500	71.635	70.952	68.981
150			93.750	89.286	85.227	83.333	78.125	75.000	72.115	71.429	69.444
151			94.375	89.881	85.795	83.889	78.646	75.500	72.596	71.905	69.907
152			95.000	90.476	86.364	84.444	79.167	76.000	73.077	72.381	70.370
153			95.625	91.071	86.932	85.000	79.688	76.500	73.558	72.857	70.833
154			96.250	91.667	87.500	85.556	80.208	77.000	74.038	73.333	71.296
155			96.875	92.262	88.068	86.111	80.729	77.500	74.519	73.810	71.759
156			97.500	92.857	88.636	86.667	81.250	78.000	75.000	74.286	72.222
157			98.125	93.452	89.205	87.222	81.771	78.500	75.481	74.762	72.685
158			98.750	94.048	89.773	87.778	82.292	79.000	75.962	75.238	73.148
159			99.375	94.643	90.341	88.333	82.813	79.500	76.442	75.714	73.611
160			*****	95.238	90.909	88.889	83.333	80.000	76.923	76.190	74.074
161				95.833	91.477	89.444	83.854	80.500	77.404	76.667	74.537
162				96.429	92.045	90.000	84.375	81.000	77.885	77.143	75.000
163				97.024	92.614	90.556	84.896	81.500	78.365	77.619	75.463
164				97.619	93.182	91.111	85.417	82.000	78.846	78.095	75.926
165				98.214	93.750	91.667	85.938	82.500	79.327	78.571	76.389
166				98.810	94.318	92.222	86.458	83.000	79.808	79.048	76.852
167				99.405	94.886	92.778	86.979	83.500	80.288	79.524	77.315
168				*****	95.455	93.333	87.500	84.000	80.769	80.000	77.778
169					96.023	93.889	88.021	84.500	81.250	80.476	78.241
170					96.591	94.444	88.542	85.000	81.731	80.952	78.704
171					97.159	95.000	89.063	85.500	82.212	81.429	79.167

	220	224	240	252	256	260	264	270	288	300	308
44	20.000	19.643	18.333	17.460	17.188	16.923	16.667	16.296	15.278	14.667	14.286
45	20.455	20.089	18.750	17.857	17.578	17.308	17.045	16.667	15.625	15.000	14.610
46	20.909	20.536	19.167	18.254	17.969	17.692	17.424	17.037	15.972	15.333	14.935
47	21.364	20.982	19.583	18.651	18.359	18.077	17.803	17.407	16.319	15.667	15.260
48	21.818	21.429	20.000	19.048	18.750	18.462	18.182	17.778	16.667	16.000	15.584
49	22.273	21.875	20.417	19.444	19.141	18.846	18.561	18.148	17.014	16.333	15.909
50	22.727	22.321	20.833	19.841	19.531	19.231	18.939	18.519	17.361	16.667	16.234
51	23.182	22.768	21.250	20.238	19.922	19.615	19.318	18.889	17.708	17.000	16.558
52	23.636	23.214	21.667	20.635	20.313	20.000	19.697	19.259	18.056	17.333	16.883
53	24.091	23.661	22.083	21.032	20.703	20.385	20.076	19.630	18.403	17.667	17.208
54	24.545	24.107	22.500	21.429	21.094	20.769	20.455	20.000	18.750	18.000	17.532
55	25.000	24.554	22.917	21.825	21.484	21.154	20.833	20.370	19.097	18.333	17.857
56	25.455	25.000	23.333	22.222	21.875	21.538	21.212	20.741	19.444	18.667	18.182
57	25.909	25.446	23.750	22.619	22.266	21.923	21.591	21.111	19.792	19.000	18.506
58	26.364	25.893	24.167	23.016	22.656	22.308	21.970	21.481	20.139	19.333	18.831
59	26.818	26.339	24.583	23.413	23.047	22.692	22.348	21.852	20.486	19.667	19.156
60	27.273	26.786	25.000	23.810	23.438	23.077	22.727	22.222	20.833	20.000	19.481
61	27.727	27.232	25.417	24.206	23.828	23.462	23.106	22.593	21.181	20.333	19.805
62	28.182	27.679	25.833	24.603	24.219	23.846	23.485	22.963	21.528	20.667	20.130
63	28.636	28.125	26.250	25.000	24.609	24.231	23.864	23.333	21.875	21.000	20.455
64	29.091	28.571	26.667	25.397	25.000	24.615	24.242	23.704	22.222	21.333	20.779
65	29.545	29.018	27.083	25.794	25.391	25.000	24.621	24.074	22.569	21.667	21.104
66	30.000	29.464	27.500	26.190	25.781	25.385	25.000	24.444	22.917	22.000	21.429
67	30.455	29.911	27.917	26.587	26.172	25.769	25.379	24.815	23.264	22.333	21.753
68	30.909	30.357	28.333	26.984	26.563	26.154	25.758	25.185	23.611	22.667	22.078
69	31.364	30.804	28.750	27.381	26.953	26.538	26.136	25.556	23.958	23.000	22.403
70	31.818	31.250	29.167	27.778	27.344	26.923	26.515	25.926	24.306	23.333	22.727
71	32.273	31.696	29.583	28.175	27.734	27.308	26.894	26.296	24.653	23.667	23.052
72	32.727	32.143	30.000	28.571	28.125	27.692	27.273	26.667	25.000	24.000	23.377
73	33.182	32.589	30.417	28.968	28.516	28.077	27.652	27.037	25.347	24.333	23.701
74	33.636	33.036	30.833	29.365	28.906	28.462	28.030	27.407	25.694	24.667	24.026
75	34.091	33.482	31.250	29.762	29.297	28.846	28.409	27.778	26.042	25.000	24.351
76	34.545	33.929	31.667	30.159	29.688	29.231	28.788	28.148	26.389	25.333	24.675
77	35.000	34.375	32.083	30.556	30.078	29.615	29.167	28.519	26.736	25.667	25.000
78	35.455	34.821	32.500	30.952	30.469	30.000	29.545	28.889	27.083	26.000	25.325
79	35.909	35.268	32.917	31.349	30.859	30.385	29.924	29.259	27.431	26.333	25.649
80	36.364	35.714	33.333	31.746	31.250	30.769	30.303	29.630	27.778	26.667	25.974
81	36.818	36.161	33.750	32.143	31.641	31.154	30.682	30.000	28.125	27.000	26.299
82	37.273	36.607	34.167	32.540	32.031	31.538	31.061	30.370	28.472	27.333	26.623
83	37.727	37.054	34.583	32.937	32.422	31.923	31.439	30.741	28.819	27.667	26.948
84	38.182	37.500	35.000	33.333	32.813	32.308	31.818	31.111	29.167	28.000	27.273
85	38.636	37.946	35.417	33.730	33.203	32.692	32.197	31.481	29.514	28.333	27.597
86	39.091	38.393	35.833	34.127	33.594	33.077	32.576	31.852	29.861	28.667	27.922
87	39.545	38.839	36.250	34.524	33.984	33.462	32.955	32.222	30.208	29.000	28.247
88	40.000	39.286	36.667	34.921	34.375	33.846	33.333	32.593	30.556	29.333	28.571
89	40.455	39.732	37.083	35.317	34.766	34.231	33.712	32.963	30.903	29.667	28.896
90	40.909	40.179	37.500	35.714	35.156	34.615	34.091	33.333	31.250	30.000	29.221
91	41.364	40.625	37.917	36.111	35.547	35.000	34.470	33.704	31.597	30.333	29.545
92	41.818	41.071	38.333	36.508	35.938	35.385	34.848	34.074	31.944	30.667	29.870
93	42.273	41.518	38.750	36.905	36.328	35.769	35.227	34.444	32.292	31.000	30.195
94	42.727	41.964	39.167	37.302	36.719	36.154	35.606	34.815	32.639	31.333	30.519
95	43.182	42.411	39.583	37.698	37.109	36.538	35.985	35.185	32.986	31.667	30.844
96	43.636	42.857	40.000	38.095	37.500	36.923	36.364	35.556	33.333	32.000	31.169
97	44.091	43.304	40.417	38.492	37.891	37.308	36.742	35.926	33.681	32.333	31.494
98	44.545	43.750	40.833	38.889	38.281	37.692	37.121	36.296	34.028	32.667	31.818
99	45.000	44.196	41.250	39.286	38.672	38.077	37.500	36.667	34.375	33.000	32.143
100	45.455	44.643	41.667	39.683	39.063	38.462	37.879	37.037	34.722	33.333	32.468
101	45.909	45.089	42.083	40.079	39.453	38.846	38.258	37.407	35.069	33.667	32.792
102	46.364	45.536	42.500	40.476	39.844	39.231	38.636	37.778	35.417	34.000	33.117
103	46.818	45.982	42.917	40.873	40.234	39.615	39.015	38.148	35.764	34.333	33.442
104	47.273	46.429	43.333	41.270	40.625	40.000	39.394	38.519	36.111	34.667	33.766
105	47.727	46.875	43.750	41.667	41.016	40.385	39.773	38.889	36.458	35.000	34.091
106	48.182	47.321	44.167	42.063	41.406	40.769	40.152	39.250	36.806	35.333	34.416
107	48.636	47.768	44.583	42.460	41.797	41.154	40.530	39.630	37.153	35.667	34.740
108	49.091	48.214	45.000	42.857	42.188	41.538	40.909	40.000	37.500	36.000	35.065
109	49.545	48.661	45.417	43.254	42.578	41.923	41.288	40.370	37.847	36.333	35.390
110	50.000	49.107	45.833	43.651	42.969	42.308	41.667	40.741	38.194	36.667	35.714
111	50.455	49.554	46.250	44.048	43.359	42.692	42.045	41.111	38.542	37.000	36.039
112	50.909	50.000	46.667	44.444	43.750	43.077	42.424	41.481	38.889	37.333	36.364
113	51.364	50.446	47.083	44.841	44.141	43.462	42.803	41.852	39.236	37.667	36.688
114	51.818	50.893	47.500	45.238	44.531	43.846	43.182	42.222	39.583	38.000	37.013
115	52.273	51.339	47.917	45.635	44.922	44.231	43.561	42.593	39.931	38.333	37.338
116	52.727	51.786	48.333	46.032	45.313	44.615	43.939	42.963	40.278	38.667	37.662
117	53.182	52.232	48.750	46.429	45.703	45.000	44.318	43.333	40.625	39.000	37.987
118	53.636	52.679	49.167	46.825	46.094	45.385	44.697	43.704	40.972	39.333	38.312

	220	224	240	252	256	260	264	270	288	300	308
119	54.091	53.125	49.583	47.222	46.484	45.769	45.076	44.074	41.319	39.667	38.636
120	54.545	53.571	50.000	47.619	46.875	46.154	45.455	44.444	41.667	40.000	38.961
121	55.000	54.818	50.417	48.016	47.266	46.538	45.833	44.815	42.014	40.333	39.286
122	55.455	54.464	50.833	48.413	47.656	46.923	46.212	45.185	42.361	40.667	39.610
123	55.909	54.911	51.250	48.810	48.047	47.308	46.591	45.556	42.708	41.000	39.935
124	56.364	55.357	51.667	49.206	48.438	47.692	46.970	45.926	43.056	41.333	40.260
125	56.818	55.804	52.083	49.603	48.828	48.077	47.348	46.296	43.403	41.667	40.584
126	57.273	56.250	52.500	50.000	49.219	48.462	47.727	46.667	43.750	42.000	40.909
127	57.727	56.696	52.917	50.397	49.609	48.846	48.106	47.037	44.097	42.333	41.234
128	58.182	57.143	53.333	50.794	50.000	49.231	48.485	47.407	44.444	42.667	41.558
129	58.636	57.589	53.750	51.190	50.391	49.615	48.864	47.778	44.792	43.000	41.883
130	59.091	58.036	54.167	51.587	50.781	50.000	49.242	48.148	45.139	43.333	42.208
131	59.545	58.482	54.583	51.984	51.172	50.385	49.621	48.519	45.486	43.667	42.532
132	60.000	58.929	55.000	52.381	51.563	50.769	50.000	48.889	45.833	44.000	42.857
133	60.455	59.375	55.417	52.778	51.953	51.154	50.379	49.259	46.181	44.333	43.182
134	60.909	59.821	55.833	53.175	52.344	51.538	50.758	49.630	46.528	44.667	43.506
135	61.364	60.268	56.250	53.571	52.734	51.923	51.136	50.000	46.875	45.000	43.831
136	61.818	60.714	56.667	53.968	53.125	52.308	51.515	50.370	47.222	45.333	44.156
137	62.273	61.161	57.083	54.365	53.516	52.692	51.894	50.741	47.569	45.667	44.481
138	62.727	61.607	57.500	54.762	53.906	53.077	52.273	51.111	47.917	46.000	44.805
139	63.182	62.054	57.917	55.159	54.297	53.462	52.652	51.481	48.264	46.333	45.130
140	63.636	62.500	58.333	55.556	54.688	53.846	53.030	51.852	48.611	46.667	45.455
141	64.091	62.946	58.750	55.952	55.078	54.231	53.409	52.222	48.958	47.000	45.779
142	64.545	63.393	59.167	56.349	55.469	54.615	53.788	52.593	49.306	47.333	46.104
143	65.000	63.839	59.583	56.746	55.859	55.000	54.167	52.963	49.653	47.667	46.429
144	65.455	64.286	60.000	57.143	56.250	55.385	54.545	53.333	50.000	48.000	46.753
145	65.909	64.732	60.417	57.540	56.641	55.769	54.924	53.704	50.347	48.333	47.078
146	66.364	65.179	60.833	57.937	57.031	56.154	55.303	54.074	50.694	48.667	47.403
147	66.818	65.625	61.250	58.333	57.422	56.538	55.682	54.444	51.042	49.000	47.727
148	67.273	66.071	61.667	58.730	57.813	56.923	56.061	54.815	51.389	49.333	48.052
149	67.727	66.518	62.083	59.127	58.203	57.308	56.439	55.185	51.736	49.667	48.377
150	68.182	66.964	62.500	59.524	58.594	57.692	56.818	55.556	52.083	50.000	48.701
151	68.636	67.411	62.917	59.921	58.984	58.077	57.197	55.926	52.431	50.333	49.026
152	69.091	67.857	63.333	60.317	59.375	58.462	57.576	56.296	52.778	50.667	49.351
153	69.545	68.304	63.750	60.714	59.766	58.846	57.955	56.667	53.125	51.000	49.675
154	70.000	68.750	64.167	61.111	60.156	59.231	58.333	57.037	53.472	51.333	50.000
155	70.455	69.196	64.583	61.508	60.547	59.615	58.712	57.407	53.819	51.667	50.325
156	70.909	69.643	65.000	61.905	60.938	60.000	59.091	57.778	54.167	52.000	50.649
157	71.364	70.089	65.417	62.302	61.328	60.385	59.470	58.148	54.514	52.333	50.974
158	71.818	70.536	65.833	62.698	61.719	60.769	59.848	58.519	54.861	52.667	51.299
159	72.273	70.982	66.250	63.095	62.109	61.154	60.227	58.889	55.208	53.000	51.623
160	72.727	71.429	66.667	63.492	62.500	61.538	60.606	59.259	55.556	53.333	51.948
161	73.182	71.875	67.083	63.889	62.891	61.923	60.985	59.630	55.903	53.667	52.273
162	73.636	72.321	67.500	64.286	63.281	62.308	61.364	60.000	56.250	54.000	52.597
163	74.091	72.768	67.917	64.683	63.672	62.692	61.742	60.370	56.597	54.333	52.922
164	74.545	73.214	68.333	65.079	64.063	63.077	62.121	60.741	56.944	54.667	53.247
165	75.000	73.661	68.750	65.476	64.453	63.462	62.500	61.111	57.292	55.000	53.571
166	75.455	74.107	69.167	65.873	64.844	63.846	62.879	61.481	57.639	55.333	53.896
167	75.909	74.554	69.583	66.270	65.234	64.231	63.258	61.852	57.986	55.667	54.221
168	76.364	75.000	70.000	66.667	65.625	64.615	63.636	62.222	58.333	56.000	54.545
169	76.818	75.446	70.417	67.063	66.016	65.000	64.015	62.593	58.681	56.333	54.870
170	77.273	75.893	70.833	67.460	66.406	65.385	64.394	62.963	59.028	56.667	55.195
171	77.727	76.339	71.250	67.857	66.797	65.769	64.773	63.333	59.375	57.000	55.519
172	78.182	76.786	71.667	68.254	67.188	66.154	65.152	63.704	59.722	57.333	55.844
173	78.636	77.232	72.083	68.651	67.578	66.538	65.530	64.074	60.069	57.667	56.169
174	79.091	77.679	72.500	69.048	67.969	66.923	65.909	64.444	60.417	58.000	56.494
175	79.545	78.125	72.917	69.444	68.359	67.308	66.288	64.815	60.764	58.333	56.818
176	80.000	78.571	73.333	69.841	68.750	67.692	66.667	65.185	61.111	58.667	57.143
177	80.455	79.018	73.750	70.238	69.141	68.077	67.045	65.556	61.458	59.000	57.468
178	80.909	79.464	74.167	70.635	69.531	68.462	67.424	65.926	61.806	59.333	57.792
179	81.364	79.911	74.583	71.032	69.922	68.846	67.803	66.296	62.153	59.667	58.117
180	81.818	80.357	75.000	71.429	70.313	69.231	68.182	66.667	62.500	60.000	58.442
181	82.273	80.804	75.417	71.825	70.703	69.615	68.561	67.037	62.847	60.333	58.766
182	82.727	81.250	75.833	72.222	71.094	70.000	68.939	67.407	63.194	60.667	59.091
183	83.182	81.696	76.250	72.619	71.484	70.385	69.318	67.778	63.542	61.000	59.416
184	83.636	82.143	76.667	73.016	71.875	70.769	69.697	68.148	63.889	61.333	59.740
185	84.091	82.589	77.083	73.413	72.266	71.154	70.076	68.519	64.236	61.667	60.065
186	84.545	83.036	77.500	73.810	72.656	71.538	70.455	68.889	64.583	62.000	60.390
187	85.000	83.482	77.917	74.206	73.047	71.923	70.833	69.259	64.931	62.333	60.714
188	85.455	83.929	78.333	74.603	73.438	72.308	71.212	69.630	65.278	62.667	61.039
189	85.909	84.375	78.750	75.000	73.828	72.692	71.591	70.000	65.625	63.000	61.364
190	86.364	84.821	79.167	75.397	74.219	73.077	71.970	70.370	65.972	63.333	61.688
191	86.818	85.268	79.583	75.794	74.609	73.462	72.348	70.741	66.319	63.667	62.013
192	87.273	85.714	80.000	76.190	75.000	73.846	72.727	71.111	66.667	64.000	62.338
193	87.727	86.161	80.417	76.587	75.391	74.231	73.106	71.481	67.014	64.333	62.662

	220	224	240	252	256	260	264	270	288	300	308
194	88.182	86.607	80.833	76.984	75.781	74.615	73.485	71.852	67.361	64.667	62.987
195	88.636	87.054	81.250	77.381	76.172	75.000	73.864	72.222	67.708	65.000	63.312
196	89.091	87.500	81.667	77.778	76.563	75.385	74.242	72.593	68.056	65.333	63.636
197	89.545	87.946	82.083	78.175	76.953	75.769	74.621	72.963	68.403	65.667	63.961
198	90.000	88.393	82.500	78.571	77.344	76.154	75.000	73.333	68.750	66.000	64.286
199	90.455	88.839	82.917	78.968	77.734	76.538	75.379	73.704	69.097	66.333	64.610
200	90.909	89.286	83.333	79.365	78.125	76.923	75.758	74.074	69.444	66.667	64.935
201	91.364	89.732	83.750	79.762	78.516	77.308	76.136	74.444	69.792	67.000	65.260
202	91.818	90.179	84.167	80.159	78.906	77.692	76.515	74.815	70.139	67.333	65.584
203	92.273	90.625	84.583	80.556	79.297	78.077	76.894	75.185	70.486	67.667	65.909
204	92.727	91.071	85.000	80.952	79.688	78.462	77.273	75.556	70.833	68.000	66.234
205	93.182	91.518	85.417	81.349	80.078	78.846	77.652	75.926	71.181	68.333	66.558
206	93.636	91.964	85.833	81.746	80.469	79.231	78.030	76.296	71.528	68.667	66.883
207	94.091	92.411	86.250	82.143	80.859	79.615	78.409	76.667	71.875	69.000	67.208
208	94.545	92.857	86.667	82.540	81.250	80.000	78.788	77.037	72.222	69.333	67.532
209	95.000	93.304	87.083	82.937	81.641	80.385	79.167	77.407	72.569	69.667	67.857
210	95.455	93.750	87.500	83.333	82.031	80.769	79.545	77.778	72.917	70.000	68.182
211	95.909	94.196	87.917	83.730	82.422	81.154	79.924	78.148	73.264	70.333	68.506
212	96.364	94.643	88.333	84.127	82.813	81.538	80.303	78.519	73.611	70.667	68.831
213	96.818	95.089	88.750	84.524	83.203	81.923	80.682	78.889	73.958	71.000	69.156
214	97.273	95.536	89.167	84.921	83.594	82.308	81.061	79.259	74.306	71.333	69.481
215	97.727	95.982	89.583	85.317	83.984	82.692	81.439	79.639	74.653	71.667	69.805
216	98.182	96.429	90.000	85.714	84.375	83.077	81.818	80.000	75.000	72.000	70.130
217	98.636	96.875	90.417	86.111	84.766	83.462	82.197	80.379	75.347	72.333	70.455
218	99.091	97.321	90.833	86.508	85.156	83.846	82.576	80.741	75.694	72.667	70.779
219	99.545	97.768	91.250	86.905	85.547	84.231	82.955	81.111	76.042	73.000	71.104
220	*****	98.214	91.667	87.302	85.938	84.615	83.333	81.481	76.389	73.333	71.429
221		98.661	92.083	87.698	86.328	85.000	83.712	81.852	76.736	73.667	71.753
222		99.107	92.500	88.095	86.719	85.385	84.091	82.222	77.083	74.000	72.078
223		99.554	92.917	88.492	87.109	85.769	84.470	82.593	77.431	74.333	72.403
224		*****	93.333	88.889	87.500	86.154	84.848	82.964	77.778	74.667	72.727
225			93.750	89.286	87.891	86.538	85.227	83.333	78.125	75.000	73.052
226			94.167	89.683	88.281	86.923	85.606	83.704	78.472	75.333	73.377
227			94.583	90.079	88.672	87.308	85.985	84.074	78.819	75.667	73.701
228			95.000	90.476	89.063	87.692	86.364	84.444	79.167	76.000	74.026
229			95.417	90.873	89.453	88.077	86.742	84.815	79.514	76.333	74.351
230			95.833	91.270	89.844	88.462	87.121	85.185	79.861	76.667	74.675
231			96.250	91.667	90.234	88.846	87.500	85.556	80.208	77.000	75.000
232			96.667	92.063	90.625	89.231	87.879	85.926	80.556	77.333	75.325
233			97.083	92.460	91.016	89.615	88.258	86.296	80.903	77.667	75.649
234			97.500	92.857	91.406	90.000	88.636	86.667	81.250	78.000	75.974
235			97.917	93.254	91.797	90.385	89.015	87.037	81.597	78.333	76.299
236			98.333	93.651	92.188	90.769	89.394	87.407	81.944	78.667	76.623
237			98.750	94.048	92.578	91.154	89.773	87.778	82.292	79.000	76.948
238			99.167	94.444	92.969	91.538	90.152	88.148	82.639	79.333	77.273
239			99.583	94.841	93.359	91.923	90.530	88.519	82.986	79.667	77.597
240			*****	95.238	93.750	92.308	90.909	88.889	83.333	80.000	77.922
241				95.635	94.141	92.692	91.288	89.259	83.681	80.333	78.247
242				96.032	94.531	93.077	91.667	89.630	84.028	80.667	78.571
243				96.429	94.922	93.462	92.045	90.000	84.375	81.000	78.896
244				96.825	95.313	93.846	92.424	90.376	84.722	81.333	79.221
245				97.222	95.703	94.231	92.803	90.741	85.069	81.667	79.545

	312	320	324	330	336	342	360	364	378	384	396
62	19.872	19.375	19.136	18.788	18.452	17.614	17.222	17.033	16.402	16.146	15.657
63	20.192	19.688	19.444	19.091	18.750	17.898	17.500	17.308	16.667	16.406	15.909
64	20.513	20.000	19.753	19.394	19.048	18.182	17.778	17.582	16.931	16.667	16.162
65	20.833	20.313	20.062	19.697	19.345	18.466	18.056	17.857	17.196	16.927	16.414
66	21.154	20.625	20.370	20.000	19.643	18.750	18.333	18.132	17.460	17.188	16.667
67	21.474	20.938	20.679	20.303	19.940	19.034	18.611	18.407	17.725	17.448	16.919
68	21.795	21.250	20.988	20.606	20.238	19.318	18.889	18.681	17.989	17.708	17.172
69	22.115	21.563	21.296	20.909	20.536	19.602	19.167	18.956	18.254	17.969	17.424
70	22.436	21.875	21.605	21.212	20.833	19.886	19.444	19.231	18.519	18.229	17.677
71	22.756	22.188	21.914	21.515	21.131	20.170	19.722	19.505	18.783	18.490	17.929
72	23.077	22.500	22.222	21.818	21.429	20.455	20.000	19.780	19.048	18.750	18.182
73	23.397	22.813	22.531	22.121	21.726	20.739	20.278	20.055	19.312	19.010	18.434
74	23.718	23.125	22.840	22.424	22.024	21.023	20.556	20.330	19.577	19.271	18.687
75	24.038	23.438	23.148	22.727	22.321	21.307	20.833	20.604	19.841	19.531	18.939
76	24.359	23.750	23.457	23.030	22.619	21.591	21.111	20.879	20.106	19.792	19.192
77	24.679	24.063	23.765	23.333	22.917	21.875	21.389	21.154	20.370	20.052	19.444
78	25.000	24.375	24.074	23.636	23.214	22.159	21.667	21.429	20.635	20.313	19.697
79	25.321	24.688	24.383	23.939	23.512	22.443	21.944	21.703	20.899	20.573	19.949
80	25.641	25.000	24.691	24.242	23.810	22.727	22.222	21.978	21.164	20.833	20.202
81	25.962	25.313	25.000	24.545	24.107	23.011	22.500	22.253	21.429	21.094	20.455
82	26.282	25.625	25.309	24.848	24.405	23.295	22.778	22.527	21.693	21.354	20.707
83	26.603	25.938	25.617	25.152	24.702	23.580	23.056	22.802	21.958	21.615	20.960
84	26.923	26.250	25.926	25.455	25.000	23.864	23.333	23.077	22.222	21.875	21.212
85	27.244	26.563	26.235	25.758	25.298	24.148	23.611	23.352	22.487	22.135	21.465
86	27.564	26.875	26.543	26.061	25.595	24.432	23.889	23.626	22.751	22.396	21.717
87	27.885	27.188	26.852	26.364	25.893	24.716	24.167	23.901	23.016	22.656	21.970
88	28.205	27.500	27.160	26.667	26.190	25.000	24.444	24.176	23.280	22.917	22.222
89	28.526	27.813	27.469	26.970	26.488	25.284	24.722	24.451	23.545	23.177	22.475
90	28.846	28.125	27.778	27.273	26.786	25.568	25.000	24.725	23.810	23.438	22.727
91	29.167	28.438	28.086	27.576	27.083	25.852	25.278	25.000	24.074	23.698	22.980
92	29.487	28.750	28.395	27.879	27.381	26.136	25.556	25.275	24.339	23.958	23.232
93	29.808	29.063	28.704	28.182	27.679	26.420	25.833	25.549	24.601	24.219	23.485
94	30.128	29.375	29.012	28.485	27.976	26.705	26.111	25.824	24.868	24.479	23.737
95	30.449	29.688	29.321	28.788	28.274	26.989	26.389	26.099	25.132	24.740	23.990
96	30.769	30.000	29.630	29.091	28.571	27.273	26.667	26.374	25.397	25.000	24.242
97	31.090	30.313	29.938	29.394	28.869	27.557	26.944	26.648	25.661	25.260	24.495
98	31.410	30.625	30.247	29.697	29.167	27.841	27.222	26.923	25.926	25.521	24.747
99	31.731	30.938	30.556	30.000	29.464	28.125	27.500	27.198	26.190	25.781	25.000
100	32.051	31.250	30.864	30.303	29.762	28.409	27.778	27.473	26.455	26.042	25.253
101	32.372	31.563	31.173	30.606	30.060	28.693	28.056	27.747	26.720	26.302	25.505
102	32.692	31.875	31.481	30.909	30.357	28.977	28.333	28.022	26.984	26.563	25.758
103	33.013	32.188	31.790	31.212	30.655	29.261	28.611	28.297	27.249	26.823	26.010
104	33.333	32.500	32.099	31.515	30.952	29.545	28.889	28.571	27.513	27.083	26.263
105	33.654	32.813	32.407	31.818	31.250	29.830	29.167	28.846	27.778	27.344	26.515
106	33.974	33.125	32.716	32.121	31.548	30.114	29.444	29.121	28.042	27.604	26.768
107	34.295	33.438	33.025	32.424	31.845	30.398	29.722	29.396	28.307	27.865	27.020
108	34.615	33.750	33.333	32.727	32.143	30.682	30.000	29.670	28.571	28.125	27.273
109	34.936	34.063	33.642	33.030	32.440	30.966	30.278	29.945	28.836	28.385	27.525
110	35.256	34.375	33.951	33.333	32.738	31.250	30.556	30.220	29.101	28.646	27.778
111	35.577	34.688	34.259	33.636	33.036	31.534	30.833	30.495	29.365	28.906	28.030
112	35.897	35.000	34.568	33.939	33.333	31.818	31.111	30.769	29.630	29.167	28.283
113	36.218	35.313	34.877	34.242	33.631	32.102	31.389	31.044	29.894	29.427	28.535
114	36.538	35.625	35.185	34.545	33.929	32.386	31.667	31.319	30.159	29.688	28.788
115	36.859	35.938	35.494	34.848	34.226	32.670	31.944	31.593	30.423	29.948	29.040
116	37.179	36.250	35.802	35.152	34.524	32.955	32.222	31.868	30.688	30.208	29.293
117	37.500	36.563	36.111	35.455	34.821	33.239	32.500	32.143	30.952	30.469	29.545
118	37.821	36.875	36.420	35.758	35.119	33.523	32.778	32.418	31.217	30.729	29.798
119	38.141	37.188	36.728	36.061	35.417	33.807	33.056	32.692	31.481	30.990	30.051
120	38.462	37.500	37.037	36.364	35.714	34.091	33.333	32.967	31.746	31.250	30.303
121	38.782	37.813	37.346	36.667	36.012	34.375	33.611	33.242	32.011	31.510	30.556
122	39.103	38.125	37.654	36.970	36.310	34.659	33.889	33.516	32.275	31.771	30.808
123	39.423	38.438	37.963	37.273	36.607	34.943	34.167	33.791	32.540	32.031	31.061
124	39.744	38.750	38.272	37.576	36.905	35.227	34.444	34.066	32.804	32.292	31.313
125	40.064	39.063	38.580	37.879	37.202	35.511	34.722	34.341	33.069	32.552	31.566
126	40.385	39.375	38.889	38.182	37.500	35.795	35.000	34.615	33.333	32.813	31.818
127	40.705	39.688	39.198	38.485	37.798	36.080	35.278	34.890	33.598	33.073	32.071
128	41.026	40.000	39.506	38.788	38.095	36.364	35.556	35.165	33.862	33.333	32.323
129	41.346	40.313	39.815	39.091	38.393	36.648	35.833	35.440	34.127	33.594	32.576
130	41.667	40.625	40.123	39.394	38.690	36.932	36.111	35.714	34.392	33.854	32.828
131	41.987	40.938	40.432	39.697	38.988	37.216	36.389	35.989	34.656	34.115	33.081
132	42.308	41.250	40.741	40.000	39.286	37.500	36.667	36.264	34.921	34.375	33.333
133	42.628	41.563	41.049	40.303	39.583	37.784	36.944	36.538	35.185	34.635	33.586
134	42.949	41.875	41.358	40.606	39.881	38.068	37.222	36.813	35.450	34.896	33.838
135	43.269	42.188	41.667	40.909	40.179	38.352	37.500	37.088	35.714	35.156	34.091
136	43.590	42.500	41.975	41.212	40.476	38.636	37.778	37.363	35.979	35.417	34.343

	312	320	324	330	336	352	360	364	378	384	396
137	43.910	42.813	42.284	41.515	40.774	38.920	38.056	37.637	36.243	35.677	34.596
138	44.231	43.125	42.593	41.818	41.071	39.205	38.333	37.912	36.508	35.938	34.848
139	44.551	43.438	42.901	42.121	41.369	39.489	38.611	38.187	36.772	36.198	35.101
140	44.872	43.750	43.210	42.424	41.667	39.773	38.889	38.462	37.037	36.458	35.354
141	45.192	44.063	43.519	42.727	41.964	40.057	39.167	38.736	37.302	36.719	35.606
142	45.513	44.375	43.827	43.030	42.262	40.341	39.444	39.011	37.566	36.979	35.859
143	45.833	44.688	44.136	43.333	42.560	40.625	39.722	39.286	37.831	37.240	36.111
144	46.154	45.000	44.444	43.636	42.857	40.909	40.000	39.560	38.095	37.500	36.364
145	46.474	45.313	44.753	43.939	43.155	41.193	40.278	39.835	38.360	37.760	36.616
146	46.795	45.625	45.062	44.242	43.452	41.477	40.556	40.110	38.624	38.021	36.869
147	47.115	45.938	45.370	44.545	43.750	41.761	40.833	40.385	38.889	38.281	37.121
148	47.436	46.250	45.679	44.848	44.048	42.045	41.111	40.659	39.153	38.542	37.374
149	47.756	46.563	45.988	45.152	44.345	42.330	41.389	40.934	39.418	38.802	37.626
150	48.077	46.875	46.296	45.455	44.643	42.614	41.667	41.209	39.683	39.063	37.879
151	48.397	47.188	46.605	45.758	44.940	42.898	41.944	41.484	39.947	39.323	38.131
152	48.718	47.500	46.914	46.061	45.238	43.182	42.222	41.758	40.212	39.583	38.384
153	49.038	47.813	47.222	46.364	45.536	43.466	42.500	42.033	40.476	39.844	38.636
154	49.359	48.125	47.531	46.667	45.833	43.750	42.778	42.308	40.741	40.104	38.889
155	49.679	48.438	47.840	46.970	46.131	44.034	43.056	42.582	41.005	40.365	39.141
156	50.000	48.750	48.148	47.273	46.429	44.318	43.333	42.857	41.270	40.625	39.394
157	50.321	49.063	48.457	47.576	46.726	44.602	43.611	43.132	41.534	40.885	39.646
158	50.641	49.375	48.765	47.879	47.024	44.886	43.889	43.407	41.799	41.146	39.899
159	50.962	49.688	49.074	48.182	47.321	45.170	44.167	43.681	42.063	41.406	40.152
160	51.282	50.000	49.383	48.485	47.619	45.455	44.444	43.956	42.328	41.667	40.404
161	51.603	50.313	49.691	48.788	47.917	45.739	44.722	44.231	42.593	41.927	40.657
162	51.923	50.625	50.000	49.091	48.214	46.023	45.000	44.505	42.857	42.188	40.909
163	52.244	50.938	50.309	49.394	48.512	46.307	45.278	44.780	43.122	42.448	41.162
164	52.564	51.250	50.617	49.697	48.810	46.591	45.556	45.055	43.386	42.708	41.414
165	52.885	51.563	50.926	50.000	49.107	46.875	45.833	45.330	43.651	42.969	41.667
166	53.205	51.875	51.235	50.303	49.405	47.159	46.111	45.604	43.915	43.229	41.919
167	53.526	52.188	51.543	50.606	49.702	47.443	46.389	45.879	44.180	43.490	42.172
168	53.846	52.500	51.852	50.909	50.000	47.727	46.667	46.154	44.444	43.750	42.424
169	54.167	52.813	52.160	51.212	50.298	48.011	46.944	46.429	44.709	44.010	42.677
170	54.487	53.125	52.469	51.515	50.595	48.295	47.222	46.703	44.974	44.271	42.929
171	54.808	53.438	52.778	51.818	50.893	48.580	47.500	46.978	45.238	44.531	43.182
172	55.128	53.750	53.086	52.121	51.190	48.864	47.778	47.253	45.503	44.792	43.434
173	55.449	54.063	53.395	52.424	51.488	49.148	48.056	47.527	45.767	45.052	43.687
174	55.769	54.375	53.704	52.727	51.786	49.432	48.333	47.802	46.032	45.313	43.939
175	56.090	54.688	54.012	53.030	52.083	49.716	48.611	48.077	46.296	45.573	44.192
176	56.410	55.000	54.321	53.333	52.381	50.000	48.889	48.352	46.561	45.833	44.444
177	56.731	55.313	54.630	53.636	52.679	50.284	49.167	48.626	46.825	46.094	44.697
178	57.051	55.625	54.938	53.939	52.976	50.568	49.444	48.891	47.090	46.354	44.949
179	57.372	55.938	55.247	54.242	53.274	50.852	49.722	49.176	47.354	46.615	45.202
180	57.692	56.250	55.556	54.545	53.571	51.136	50.000	49.451	47.619	46.875	45.455
181	58.013	56.563	55.864	54.848	53.869	51.420	50.278	49.725	47.884	47.135	45.707
182	58.333	56.875	56.173	55.152	54.167	51.705	50.556	50.000	48.148	47.396	45.960
183	58.654	57.188	56.481	55.455	54.464	51.989	50.833	50.275	48.413	47.656	46.212
184	58.974	57.500	56.790	55.758	54.762	52.273	51.111	50.549	48.677	47.917	46.465
185	59.295	57.813	57.099	56.061	55.060	52.557	51.389	50.824	48.942	48.177	46.717
186	59.615	58.125	57.407	56.364	55.357	52.841	51.667	51.099	49.206	48.438	46.970
187	59.936	58.438	57.716	56.667	55.655	53.125	51.944	51.374	49.471	48.698	47.222
188	60.256	58.750	58.025	56.970	55.952	53.409	52.222	51.648	49.735	48.958	47.475
189	60.577	59.063	58.333	57.273	56.250	53.693	52.500	51.923	50.000	49.219	47.727
190	60.897	59.375	58.642	57.576	56.548	53.977	52.778	52.198	50.265	49.479	47.980
191	61.218	59.688	58.951	57.879	56.845	54.261	53.056	52.473	50.529	49.740	48.232
192	61.538	60.000	59.259	58.182	57.143	54.545	53.333	52.747	50.794	50.000	48.485
193	61.859	60.313	59.568	58.485	57.440	54.830	53.611	53.022	51.058	50.260	48.737
194	62.179	60.625	59.877	58.788	57.738	55.114	53.889	53.297	51.323	50.521	48.990
195	62.500	60.938	60.185	59.091	58.036	55.398	54.167	53.571	51.587	50.781	49.242
196	62.821	61.250	60.494	59.394	58.333	55.682	54.444	53.846	51.852	51.042	49.495
197	63.141	61.563	60.802	59.697	58.631	55.966	54.722	54.121	52.116	51.302	49.747
198	63.462	61.875	61.111	60.000	58.929	56.250	55.000	54.396	52.381	51.563	50.000
199	63.782	62.188	61.420	60.303	59.226	56.534	55.278	54.670	52.646	51.823	50.253
200	64.103	62.500	61.728	60.606	59.524	56.818	55.556	54.945	52.910	52.083	50.505
201	64.423	62.813	62.037	60.909	59.821	57.102	55.833	55.220	53.175	52.344	50.758
202	64.744	63.125	62.346	61.212	60.119	57.386	56.111	55.495	53.439	52.604	51.010
203	65.064	63.438	62.654	61.515	60.417	57.670	56.389	55.769	53.704	52.865	51.263
204	65.385	63.750	62.963	61.818	60.714	57.955	56.667	56.044	53.968	53.125	51.515
205	65.705	64.063	63.272	62.121	61.012	58.239	56.944	56.319	54.233	53.385	51.768
206	66.026	64.375	63.580	62.424	61.310	58.523	57.222	56.593	54.497	53.646	52.020
207	66.346	64.688	63.889	62.727	61.607	58.807	57.500	56.868	54.762	53.906	52.273
208	66.667	65.000	64.198	63.030	61.905	59.091	57.778	57.143	55.026	54.167	52.525
209	66.987	65.313	64.506	63.333	62.202	59.375	58.056	57.418	55.291	54.427	52.778
210	67.308	65.625	64.815	63.636	62.500	59.659	58.333	57.692	55.556	54.688	53.030
211	67.628	65.938	65.123	63.939	62.798	59.943	58.611	57.967	55.820	54.948	53.283

	312	320	324	330	336	352	360	364	378	384	396
212	67.949	66.250	65.432	64.242	63.095	60.227	58.889	58.242	56.085	55.208	53.535
213	68.269	66.563	65.741	64.545	63.393	60.511	59.167	58.516	56.349	55.469	53.788
214	68.590	66.875	66.049	64.848	63.690	60.795	59.444	58.791	56.614	55.729	54.040
215	68.910	67.188	66.358	65.152	63.988	61.080	59.722	59.066	56.878	55.990	54.293
216	69.231	67.500	66.667	65.455	64.286	61.364	60.000	59.341	57.143	56.250	54.545
217	69.551	67.813	66.975	65.758	64.583	61.648	60.278	59.615	57.407	56.510	54.798
218	69.872	68.125	67.284	66.061	64.881	61.932	60.556	59.890	57.672	56.771	55.051
219	70.192	68.438	67.593	66.364	65.179	62.216	60.833	60.165	57.937	57.031	55.303
220	70.513	68.750	67.901	66.667	65.476	62.500	61.111	60.440	58.201	57.292	55.556
221	70.833	69.063	68.210	66.970	65.774	62.784	61.389	60.714	58.466	57.552	55.808
222	71.154	69.375	68.519	67.273	66.071	63.068	61.667	60.989	58.730	57.813	56.061
223	71.474	69.688	68.827	67.576	66.369	63.352	61.944	61.264	58.995	58.073	56.313
224	71.795	70.000	69.136	67.879	66.667	63.636	62.222	61.538	59.259	58.333	56.566
225	72.115	70.313	69.444	68.182	66.964	63.920	62.500	61.813	59.524	58.594	56.818
226	72.436	70.625	69.753	68.485	67.262	64.205	62.778	62.088	59.788	58.854	57.071
227	72.756	70.938	70.062	68.788	67.560	64.489	63.056	62.363	60.053	59.115	57.323
228	73.077	71.250	69.091	69.091	67.857	64.773	63.333	62.637	60.317	59.375	57.576
229	73.397	71.563	70.679	69.394	68.155	65.057	63.611	62.912	60.582	59.635	57.828
230	73.718	71.875	70.988	69.697	68.452	65.341	63.889	63.187	60.847	59.896	58.081
231	74.038	72.188	71.296	70.000	68.750	65.625	64.167	63.462	61.111	60.156	58.333
232	74.359	72.500	71.605	70.303	69.048	65.909	64.444	63.736	61.376	60.417	58.586
233	74.679	72.813	71.914	70.606	69.345	66.193	64.722	64.011	61.640	60.677	58.838
234	75.000	73.125	72.222	70.909	69.643	66.477	65.000	64.286	61.905	60.938	59.091
235	75.321	73.438	72.531	71.212	69.940	66.761	65.278	64.560	62.169	61.198	59.343
236	75.641	73.750	72.840	71.515	70.238	67.045	65.556	64.835	62.434	61.458	59.596
237	75.962	74.063	73.148	71.818	70.536	67.330	65.833	65.110	62.698	61.719	59.848
238	76.282	74.375	73.457	72.121	70.833	67.614	66.111	65.385	62.963	61.979	60.101
239	76.603	74.688	73.765	72.424	71.131	67.898	66.389	65.659	63.228	62.240	60.354
240	76.923	75.000	74.074	72.727	71.429	68.182	66.667	65.934	63.492	62.500	60.606
241	77.244	75.313	74.383	73.030	71.726	68.466	66.944	66.209	63.757	62.760	60.859
242	77.564	75.625	74.691	73.333	72.024	68.750	67.222	66.484	64.021	63.021	61.111
243	77.885	75.938	75.000	73.636	72.321	69.034	67.500	66.758	64.286	63.281	61.364
244	78.205	76.250	75.309	73.939	72.619	69.318	67.778	67.033	64.550	63.542	61.616
245	78.526	76.563	75.617	74.242	72.917	69.602	68.056	67.308	64.815	63.802	61.869
246	78.846	76.875	75.926	74.545	73.214	69.886	68.333	67.582	65.079	64.063	62.121
247	79.167	77.188	76.235	74.848	73.512	70.170	68.611	67.857	65.344	64.323	62.374
248	79.487	77.500	76.543	75.152	73.810	70.455	68.889	68.132	65.608	64.583	62.626
249	79.808	77.813	76.852	75.455	74.107	70.739	69.167	68.407	65.873	64.844	62.879
250	80.128	78.125	77.160	75.758	74.405	71.023	69.444	68.681	66.138	65.104	63.131
251	80.449	78.438	77.469	76.061	74.702	71.307	69.722	68.956	66.402	65.365	63.384
252	80.769	78.750	77.778	76.364	75.000	71.591	70.000	69.231	66.667	65.625	63.636
253	81.090	79.063	78.086	76.667	75.298	71.875	70.278	69.505	66.931	65.885	63.889
254	81.410	79.375	78.395	76.970	75.595	72.159	70.556	69.780	67.196	66.146	64.141
255	81.731	79.688	78.704	77.273	75.893	72.443	70.833	70.055	67.460	66.406	64.394
256	82.051	80.000	79.012	77.576	76.190	72.727	71.111	70.330	67.725	66.667	64.646
257	82.372	80.313	79.321	77.879	76.488	73.011	71.389	70.604	67.989	66.927	64.899
258	82.692	80.625	79.630	78.182	76.786	73.295	71.667	70.879	68.254	67.188	65.152
259	83.013	80.938	79.938	78.485	77.083	73.580	71.944	71.154	68.519	67.448	65.404
260	83.333	81.250	80.247	78.788	77.381	73.864	72.222	71.429	68.783	67.708	65.657
261	83.654	81.563	80.556	79.091	77.679	74.148	72.500	71.703	69.048	67.969	65.909
262	83.974	81.875	80.864	79.394	77.976	74.432	72.778	71.978	69.312	68.229	66.162
263	84.295	82.188	81.173	79.697	78.274	74.716	73.056	72.253	69.577	68.490	66.414
264	84.615	82.500	81.481	80.000	78.571	75.000	73.333	72.527	69.841	68.750	66.667
265	84.936	82.813	81.790	80.303	78.869	75.284	73.611	72.801	70.106	69.010	66.919
266	85.256	83.125	82.099	80.606	79.167	75.568	73.889	73.077	70.370	69.271	67.172
267	85.577	83.438	82.407	80.909	79.464	75.852	74.167	73.352	70.635	69.531	67.424
268	85.897	83.750	82.716	81.212	79.762	76.136	74.444	73.626	70.899	69.792	67.677
269	86.218	84.063	83.025	81.515	80.060	76.420	74.722	73.901	71.164	70.052	67.929
270	86.538	84.375	83.333	81.818	80.357	76.705	75.000	74.176	71.429	70.313	68.182
271	86.859	84.688	83.642	82.121	80.655	76.989	75.278	74.451	71.693	70.573	68.434
272	87.179	85.000	83.951	82.424	80.952	77.273	75.556	74.725	71.958	70.833	68.687
273	87.500	85.313	84.259	82.727	81.250	77.557	75.833	75.000	72.222	71.094	68.939
274	87.821	85.625	84.568	83.030	81.548	77.841	76.111	75.275	72.487	71.354	69.192
275	88.141	85.938	84.877	83.333	81.845	78.125	76.389	75.549	72.751	71.615	69.444
276	88.462	86.250	85.185	83.636	82.143	78.409	76.667	75.824	73.016	71.875	69.697
277	88.782	86.563	85.494	83.939	82.440	78.693	76.944	76.099	73.280	72.135	69.949
278	89.103	86.875	85.802	84.242	82.738	78.977	77.222	76.374	73.545	72.396	70.202
279	89.423	87.188	86.111	84.545	83.036	79.261	77.500	76.648	73.810	72.656	70.455
280	89.744	87.500	86.420	84.848	83.333	79.545	77.778	76.923	74.074	72.917	70.707
281	90.064	87.813	86.728	85.152	83.631	79.830	78.056	77.198	74.339	73.177	70.960
282	90.385	88.125	87.037	85.455	83.929	80.114	78.333	77.473	74.603	73.438	71.212
283	90.705	88.438	87.346	85.758	84.226	80.398	78.611	77.747	74.868	73.698	71.465
284	91.026	88.750	87.654	86.061	84.524	80.682	78.889	78.022	75.132	73.958	71.717
285	91.346	89.063	87.963	86.364	84.821	80.966	79.167	78.297	75.397	74.219	71.970
286	91.667	89.375	88.272	86.667	85.119	81.250	79.444	78.571	75.661	74.479	72.222

	312	320	324	330	336	352	360	364	378	384	396
287	91.987	89.688	88.580	86.970	85.417	81.534	79.722	78.846	75.926	74.740	72.475
288	92.308	90.000	88.889	87.273	85.714	81.818	80.000	79.121	76.190	75.000	72.727
289	92.628	90.313	89.198	87.576	86.012	82.102	80.278	79.396	76.455	75.260	72.980
290	92.949	90.625	89.506	87.879	86.310	82.386	80.556	79.670	76.720	75.521	73.232
291	93.269	90.938	89.815	88.182	86.607	82.670	80.833	79.945	76.984	75.781	73.485
292	93.590	91.250	90.123	88.485	86.905	82.955	81.111	80.220	77.249	76.042	73.737
293	93.910	91.563	90.432	88.788	87.202	83.239	81.389	80.495	77.513	76.302	73.990
294	94.231	91.875	90.741	89.091	87.500	83.523	81.667	80.769	77.778	76.563	74.242
295	94.551	92.188	91.049	89.394	87.798	83.807	81.944	81.044	78.042	76.823	74.495
296	94.872	92.500	91.358	89.697	88.095	84.091	82.222	81.319	78.307	77.083	74.747
297	95.192	92.813	91.667	90.000	88.393	84.375	82.500	81.593	78.571	77.344	75.000
298	95.513	93.125	91.975	90.303	88.690	84.659	82.778	81.868	78.836	77.604	75.253
299	95.833	93.438	92.284	90.606	88.988	84.943	83.056	82.143	79.101	77.865	75.505
300	96.154	93.750	92.593	90.909	89.286	85.227	83.333	82.418	79.365	78.125	75.758
301	96.474	94.063	92.901	91.212	89.583	85.511	83.611	82.692	79.630	78.385	76.010
302	96.795	94.375	93.210	91.515	89.881	85.795	83.889	82.967	79.894	78.646	76.263
303	97.115	94.688	93.519	91.818	90.179	86.080	84.167	83.242	80.159	78.906	76.515
304	97.436	95.000	93.827	92.121	90.476	86.364	84.444	83.516	80.423	79.167	76.768
305	97.756	95.313	94.136	92.424	90.774	86.648	84.722	83.791	80.688	79.427	77.020
306	98.077	95.625	94.444	92.727	91.071	86.932	85.000	84.066	80.952	79.688	77.273
307	98.397	95.938	94.753	93.030	91.369	87.216	85.278	84.341	81.217	79.948	77.525
308	98.718	96.250	95.062	93.333	91.667	87.500	85.556	84.615	81.481	80.208	77.778
309	99.038	96.563	95.370	93.636	91.964	87.784	85.833	84.890	81.746	80.469	78.030
310	99.359	96.875	95.679	93.939	92.262	88.068	86.111	85.165	82.011	80.729	78.283
311	99.679	97.188	95.988	94.242	92.560	88.352	86.389	85.440	82.275	80.990	78.535
312	*****	97.500	96.296	94.545	92.857	88.636	86.667	85.714	82.540	81.250	78.788
313		97.813	96.605	94.848	93.155	88.920	86.944	85.989	82.804	81.510	79.040
314		98.125	96.914	95.152	93.452	89.205	87.222	86.264	83.069	81.771	79.293
315		98.438	97.222	95.455	93.750	89.489	87.500	86.538	83.333	82.031	79.545

	416	420	432	440	448	462	468	480	504	512	520
83	19.952	19.762	19.213	18.864	18.527	17.965	17.735	17.292	16.468	16.211	15.962
84	20.192	20.000	19.444	19.091	18.750	18.182	17.949	17.500	16.667	16.406	16.154
85	20.433	20.238	19.676	19.318	18.973	18.398	18.162	17.708	16.865	16.602	16.346
86	20.673	20.476	19.907	19.545	19.196	18.615	18.376	17.917	17.063	16.797	16.538
87	20.913	20.714	20.139	19.773	19.420	18.831	18.590	18.125	17.262	16.992	16.731
88	21.154	20.952	20.370	20.000	19.643	19.048	18.803	18.333	17.460	17.188	16.923
89	21.394	21.190	20.602	20.227	19.866	19.264	19.017	18.542	17.659	17.383	17.115
90	21.635	21.429	20.833	20.455	20.089	19.481	19.231	18.750	17.857	17.578	17.308
91	21.875	21.667	21.065	20.682	20.313	19.697	19.444	18.958	18.056	17.773	17.500
92	22.115	21.905	21.296	20.909	20.536	19.913	19.658	19.167	18.254	17.969	17.692
93	22.356	22.143	21.528	21.136	20.759	20.130	19.872	19.375	18.452	18.164	17.885
94	22.596	22.381	21.759	21.364	20.982	20.346	20.085	19.583	18.651	18.359	18.077
95	22.837	22.619	21.991	21.591	21.205	20.563	20.299	19.792	18.849	18.555	18.269
96	23.077	22.857	22.222	21.818	21.429	20.779	20.513	20.000	19.048	18.750	18.462
97	23.317	23.095	22.454	22.045	21.652	20.996	20.726	20.208	19.246	18.945	18.654
98	23.558	23.333	22.685	22.273	21.875	21.212	20.940	20.417	19.444	19.141	18.846
99	23.798	23.571	22.917	22.500	22.098	21.429	21.154	20.625	19.643	19.336	19.038
100	24.038	23.810	23.148	22.727	22.321	21.645	21.368	20.833	19.841	19.531	19.231
101	24.279	24.048	23.380	22.955	22.545	21.861	21.581	21.042	20.040	19.727	19.423
102	24.519	24.286	23.611	23.182	22.768	22.078	21.795	21.250	20.238	19.922	19.615
103	24.760	24.524	23.843	23.409	22.991	22.294	22.009	21.458	20.437	20.117	19.808
104	25.000	24.762	24.074	23.636	23.214	22.511	22.222	21.667	20.635	20.313	20.000
105	25.240	25.000	24.306	23.864	23.438	22.727	22.436	21.875	20.833	20.508	20.192
106	25.481	25.238	24.537	24.091	23.661	22.944	22.650	22.083	21.032	20.703	20.385
107	25.721	25.476	24.769	24.318	23.884	23.160	22.863	22.292	21.230	20.898	20.577
108	25.962	25.714	25.000	24.545	24.107	23.377	23.077	22.500	21.429	21.094	20.769
109	26.202	25.952	25.231	24.773	24.330	23.593	23.291	22.708	21.627	21.289	20.962
110	26.442	26.190	25.463	25.000	24.554	23.810	23.504	22.917	21.825	21.484	21.154
111	26.683	26.429	25.694	25.227	24.777	24.026	23.718	23.125	22.024	21.680	21.346
112	26.923	26.667	25.926	25.455	25.000	24.242	23.932	23.333	22.222	21.875	21.538
113	27.163	26.905	26.157	25.682	25.223	24.459	24.145	23.542	22.421	22.070	21.731
114	27.404	27.143	26.389	25.909	25.446	24.675	24.359	23.750	22.619	22.266	21.923
115	27.644	27.381	26.620	26.136	25.670	24.892	24.573	23.958	22.817	22.461	22.115
116	27.885	27.619	26.852	26.364	25.893	25.108	24.786	24.167	23.016	22.656	22.308
117	28.125	27.857	27.083	26.591	26.116	25.325	25.000	24.375	23.214	22.852	22.500
118	28.365	28.095	27.315	26.818	26.339	25.541	25.214	24.583	23.413	23.047	22.692
119	28.606	28.333	27.546	27.045	26.563	25.758	25.427	24.792	23.611	23.242	22.885
120	28.846	28.571	27.778	27.273	26.786	25.974	25.641	25.000	23.810	23.438	23.077
121	29.087	28.810	28.009	27.500	27.009	26.190	25.855	25.208	24.008	23.633	23.269
122	29.327	29.048	28.241	27.727	27.232	26.407	26.068	25.417	24.206	23.828	23.462
123	29.567	29.286	28.472	27.955	27.455	26.623	26.282	25.625	24.405	24.023	23.654
124	29.808	29.524	28.704	28.182	27.679	26.840	26.496	25.833	24.603	24.219	23.846
125	30.048	29.762	28.935	28.409	27.902	27.056	26.709	26.042	24.802	24.414	24.038
126	30.288	30.000	29.167	28.636	28.125	27.273	26.923	26.250	25.000	24.609	24.231
127	30.529	30.238	29.398	28.864	28.348	27.489	27.137	26.458	25.198	24.805	24.423
128	30.769	30.476	29.630	29.091	28.571	27.706	27.350	26.667	25.397	25.000	24.615
129	31.010	30.714	29.861	29.318	28.795	27.922	27.564	26.875	25.595	25.195	24.808
130	31.250	30.952	30.093	29.545	29.018	28.139	27.778	27.083	25.794	25.391	25.000
131	31.490	31.190	30.324	29.773	29.241	28.355	27.991	27.292	25.992	25.586	25.192
132	31.731	31.429	30.556	30.000	29.464	28.571	28.205	27.500	26.190	25.781	25.385
133	31.971	31.667	30.787	30.227	29.688	28.788	28.419	27.708	26.389	25.977	25.577
134	32.212	31.905	31.019	30.455	29.911	29.004	28.632	27.917	26.587	26.172	25.769
135	32.452	32.143	31.250	30.682	30.134	29.221	28.846	28.125	26.786	26.367	25.962
136	32.692	32.381	31.481	30.909	30.357	29.437	29.060	28.333	26.984	26.563	26.154
137	32.933	32.619	31.713	31.136	30.580	29.654	29.274	28.542	27.183	26.758	26.346
138	33.173	32.857	31.944	31.364	30.804	29.870	29.487	28.750	27.381	26.953	26.538
139	33.413	33.095	32.176	31.591	31.027	30.087	29.701	28.958	27.579	27.148	26.731
140	33.654	33.333	32.407	31.818	31.250	30.303	29.915	29.167	27.778	27.344	26.923
141	33.894	33.571	32.639	32.045	31.473	30.519	30.128	29.375	27.976	27.539	27.115
142	34.135	33.810	32.870	32.273	31.696	30.736	30.342	29.583	28.175	27.734	27.308
143	34.375	34.048	33.102	32.500	31.920	30.952	30.556	29.792	28.373	27.930	27.500
144	34.615	34.286	33.333	32.727	32.143	31.169	30.769	30.000	28.571	28.125	27.692
145	34.856	34.524	33.565	32.955	32.366	31.385	30.983	30.208	28.770	28.320	27.885
146	35.096	34.762	33.796	33.182	32.589	31.602	31.197	30.417	28.968	28.516	28.077
147	35.337	35.000	34.028	33.409	32.813	31.818	31.410	30.625	29.167	28.711	28.269
148	35.577	35.238	34.259	33.636	33.036	32.035	31.624	30.833	29.365	28.906	28.462
149	35.817	35.476	34.491	33.864	33.259	32.251	31.838	31.042	29.563	29.102	28.654
150	36.058	35.714	34.722	34.091	33.482	32.468	32.051	31.250	29.762	29.297	28.846
151	36.298	35.952	34.954	34.318	33.705	32.684	32.265	31.458	29.960	29.492	29.038
152	36.538	36.190	35.185	34.545	33.929	32.900	32.479	31.667	30.159	29.688	29.231
153	36.779	36.429	35.417	34.773	34.152	33.117	32.692	31.875	30.357	29.883	29.423
154	37.019	36.667	35.648	35.000	34.375	33.333	32.906	32.083	30.556	30.078	29.615
155	37.260	36.905	35.880	35.227	34.598	33.550	33.120	32.292	30.754	30.273	29.808
156	37.500	37.143	36.111	35.455	34.821	33.766	33.333	32.500	30.952	30.469	30.000
157	37.740	37.381	36.343	35.682	35.045	33.983	33.547	32.708	31.151	30.664	30.192

	416	420	432	440	448	462	468	480	504	512	520
158	37.981	37.619	36.574	35.909	35.268	34.199	33.761	32.917	31.349	30.859	30.385
159	38.221	37.857	36.806	36.136	35.491	34.416	33.974	33.125	31.548	31.055	30.577
160	38.462	38.095	37.037	36.364	35.714	34.632	34.188	33.333	31.746	31.250	30.769
161	38.702	38.333	37.269	36.591	35.938	34.848	34.402	33.542	31.944	31.445	30.962
162	38.942	38.571	37.500	36.818	36.161	35.065	34.615	33.750	32.143	31.641	31.154
163	39.183	38.810	37.731	37.045	36.384	35.281	34.829	33.958	32.341	31.836	31.346
164	39.423	39.048	37.963	37.273	36.607	35.498	35.043	34.167	32.540	32.031	31.538
165	39.663	39.286	38.194	37.500	36.830	35.714	35.256	34.375	32.738	32.227	31.731
166	39.904	39.524	38.426	37.727	37.054	35.931	35.470	34.583	32.937	32.422	31.923
167	40.144	39.762	38.657	37.955	37.277	36.147	35.684	34.792	33.135	32.617	32.115
168	40.385	40.000	38.889	38.182	37.500	36.364	35.897	35.000	33.333	32.813	32.308
169	40.625	40.238	39.120	38.409	37.723	36.580	36.111	35.208	33.532	33.008	32.500
170	40.865	40.476	39.352	38.636	37.946	36.797	36.325	35.417	33.730	33.203	32.692
171	41.106	40.714	39.583	38.864	38.170	37.013	36.538	35.625	33.929	33.398	32.885
172	41.346	40.952	39.815	39.091	38.393	37.229	36.752	35.833	34.127	33.594	33.077
173	41.587	41.190	40.046	39.318	38.616	37.446	36.966	36.042	34.325	33.789	33.269
174	41.827	41.429	40.278	39.545	38.839	37.662	37.179	36.250	34.524	33.984	33.462
175	42.067	41.667	40.509	39.773	39.063	37.879	37.393	36.458	34.722	34.180	33.654
176	42.308	41.905	40.741	40.000	39.286	38.095	37.607	36.667	34.921	34.375	33.846
177	42.548	42.143	40.972	40.227	39.509	38.312	37.821	36.875	35.119	34.570	34.038
178	42.788	42.381	41.204	40.455	39.732	38.528	38.034	37.083	35.317	34.766	34.231
179	43.029	42.619	41.435	40.682	39.955	38.745	38.248	37.292	35.516	34.961	34.423
180	43.269	42.857	41.667	40.909	40.179	38.961	38.462	37.500	35.714	35.156	34.615
181	43.510	43.095	41.898	41.136	40.402	39.177	38.675	37.708	35.913	35.352	34.808
182	43.750	43.333	42.130	41.364	40.625	39.394	38.889	37.917	36.111	35.547	35.000
183	43.990	43.571	42.361	41.591	40.848	39.610	39.103	38.125	36.310	35.742	35.192
184	44.231	43.810	42.593	41.818	41.071	39.827	39.316	38.333	36.508	35.938	35.385
185	44.471	44.048	42.824	42.045	41.295	40.043	39.530	38.542	36.706	36.133	35.577
186	44.712	44.286	43.056	42.273	41.518	40.260	39.744	38.750	36.905	36.328	35.769
187	44.952	44.524	43.287	42.500	41.741	40.476	39.957	38.958	37.103	36.523	35.962
188	45.192	44.762	43.519	42.727	41.964	40.693	40.171	39.167	37.302	36.719	36.154
189	45.433	45.000	43.750	42.955	42.188	40.909	40.385	39.375	37.500	36.914	36.346
190	45.673	45.238	43.981	43.182	42.411	41.126	40.598	39.583	37.698	37.109	36.538
191	45.913	45.476	44.213	43.409	42.634	41.342	40.812	39.792	37.897	37.305	36.731
192	46.154	45.714	44.444	43.636	42.857	41.558	41.026	40.000	38.095	37.500	36.923
193	46.394	45.952	44.676	43.864	43.080	41.775	41.239	40.208	38.294	37.695	37.115
194	46.635	46.190	44.907	44.091	43.304	41.991	41.453	40.417	38.492	37.891	37.308
195	46.875	46.429	45.139	44.318	43.527	42.208	41.667	40.625	38.690	38.086	37.500
196	47.115	46.667	45.370	44.545	43.750	42.424	41.880	40.833	38.889	38.281	37.692
197	47.356	46.905	45.602	44.773	43.973	42.641	42.094	41.042	39.087	38.477	37.885
198	47.596	47.143	45.833	45.000	44.196	42.857	42.308	41.250	39.286	38.672	38.077
199	47.837	47.381	46.065	45.227	44.420	43.074	42.521	41.458	39.484	38.867	38.269
200	48.077	47.619	46.296	45.455	44.643	43.290	42.735	41.667	39.683	39.063	38.462
201	48.317	47.857	46.528	45.682	44.866	43.506	42.949	41.875	39.881	39.258	38.654
202	48.558	48.095	46.759	45.909	45.089	43.723	43.162	42.083	40.079	39.453	38.846
203	48.798	48.333	46.991	46.136	45.313	43.939	43.376	42.292	40.278	39.648	39.038
204	49.038	48.571	47.222	46.364	45.536	44.156	43.590	42.500	40.476	39.844	39.231
205	49.279	48.810	47.454	46.591	45.759	44.372	43.803	42.708	40.675	40.039	39.423
206	49.519	49.048	47.685	46.818	45.982	44.589	44.017	42.917	40.873	40.234	39.615
207	49.760	49.286	47.917	47.045	46.205	44.805	44.231	43.125	41.071	40.430	39.808
208	50.000	49.524	48.148	47.273	46.429	45.022	44.444	43.333	41.270	40.625	40.000
209	50.240	49.762	48.380	47.500	46.652	45.238	44.658	43.542	41.468	40.820	40.192
210	50.481	50.000	48.611	47.727	46.875	45.455	44.872	43.750	41.667	41.016	40.385
211	50.721	50.238	48.843	47.955	47.098	45.671	45.085	43.958	41.865	41.211	40.577
212	50.962	50.476	49.074	48.182	47.321	45.887	45.299	44.167	42.063	41.406	40.769
213	51.202	50.714	49.306	48.409	47.545	46.104	45.513	44.375	42.262	41.602	40.962
214	51.442	50.952	49.537	48.636	47.768	46.320	45.726	44.583	42.460	41.797	41.154
215	51.683	51.190	49.769	48.864	47.991	46.537	45.940	44.792	42.659	41.992	41.346
216	51.923	51.429	50.000	49.091	48.214	46.753	46.154	45.000	42.857	42.188	41.538
217	52.163	51.667	50.231	49.318	48.438	46.970	46.368	45.208	43.056	42.383	41.731
218	52.404	51.905	50.463	49.545	48.661	47.186	46.581	45.417	43.254	42.578	41.923
219	52.644	52.143	50.694	49.773	48.884	47.403	46.795	45.625	43.452	42.773	42.115
220	52.885	52.381	50.926	50.000	49.107	47.619	47.009	45.833	43.651	42.969	42.308
221	53.125	52.619	51.157	50.227	49.330	47.835	47.222	46.042	43.849	43.164	42.500
222	53.365	52.857	51.389	50.455	49.554	48.052	47.436	46.250	44.048	43.359	42.692
223	53.606	53.095	51.620	50.682	49.777	48.268	47.650	46.458	44.246	43.555	42.885
224	53.846	53.333	51.852	50.909	50.000	48.485	47.863	46.667	44.444	43.750	43.077
225	54.087	53.571	52.083	51.136	50.223	48.701	48.077	46.875	44.643	43.945	43.269
226	54.327	53.810	52.315	51.364	50.446	48.918	48.291	47.083	44.841	44.141	43.462
227	54.567	54.048	52.546	51.591	50.670	49.134	48.504	47.292	45.040	44.336	43.654
228	54.808	54.286	52.778	51.818	50.893	49.351	48.718	47.500	45.238	44.531	43.846
229	55.048	54.524	53.009	52.045	51.116	49.567	48.932	47.708	45.437	44.727	44.038
230	55.288	54.762	53.241	52.273	51.339	49.784	49.145	47.917	45.635	44.922	44.231
231	55.529	55.000	53.472	52.500	51.563	50.000	49.359	48.125	45.833	45.117	44.423
232	55.769	55.238	53.704	52.727	51.786	50.216	49.573	48.333	46.032	45.313	44.615

	416	420	432	440	448	462	468	480	504	512	520
233	56.010	55.476	53.935	52.955	52.009	50.433	49.786	48.542	46.230	45.508	44.808
234	56.250	55.714	54.167	53.182	52.232	50.649	50.000	48.750	46.429	45.703	45.000
235	56.490	55.952	54.398	53.409	52.455	50.866	50.214	48.958	46.627	45.898	45.192
236	56.731	56.190	54.630	53.636	52.679	51.082	50.427	49.167	46.825	46.094	45.385
237	56.971	56.429	54.861	53.864	52.902	51.299	50.641	49.375	47.024	46.289	45.577
238	57.212	56.667	55.093	54.091	53.125	51.515	50.855	49.583	47.222	46.484	45.769
239	57.452	56.905	55.324	54.318	53.348	51.732	51.068	49.792	47.421	46.680	45.962
240	57.692	57.143	55.556	54.545	53.571	51.948	51.282	50.000	47.619	46.875	46.154
241	57.933	57.381	55.787	54.773	53.795	52.165	51.496	50.208	47.817	47.070	46.346
242	58.173	57.619	56.019	55.000	54.018	52.381	51.709	50.417	48.016	47.266	46.538
243	58.413	57.857	56.250	55.227	54.241	52.597	51.923	50.625	48.214	47.461	46.731
244	58.654	58.095	56.481	55.455	54.464	52.814	52.137	50.833	48.413	47.656	46.923
245	58.894	58.333	56.713	55.682	54.688	53.030	52.350	51.042	48.611	47.852	47.115
246	59.135	58.571	56.944	55.909	54.911	53.247	52.564	51.250	48.810	48.047	47.308
247	59.375	58.810	57.176	56.136	55.134	53.463	52.778	51.458	49.008	48.242	47.500
248	59.615	59.048	57.407	56.364	55.357	53.680	52.991	51.667	49.206	48.438	47.692
249	59.856	59.286	57.639	56.591	55.580	53.896	53.205	51.875	49.405	48.633	47.885
250	60.096	59.524	57.870	56.818	55.804	54.113	53.419	52.083	49.603	48.828	48.077
251	60.337	59.762	58.102	57.045	56.027	54.329	53.632	52.292	49.802	49.023	48.269
252	60.577	60.000	58.333	57.273	56.250	54.545	53.846	52.500	50.000	49.219	48.462
253	60.817	60.238	58.565	57.500	56.473	54.762	54.060	52.708	50.198	49.414	48.654
254	61.058	60.476	58.796	57.727	56.696	54.978	54.274	52.917	50.397	49.609	48.846
255	61.298	60.714	59.028	57.955	56.920	55.195	54.487	53.125	50.595	49.805	49.038
256	61.538	60.952	59.259	58.182	57.143	55.411	54.701	53.333	50.794	50.000	49.231
257	61.779	61.190	59.491	58.409	57.366	55.628	54.915	53.542	50.992	50.195	49.423
258	62.019	61.429	59.722	58.636	57.589	55.844	55.128	53.750	51.190	50.391	49.615
259	62.260	61.667	59.954	58.864	57.813	56.061	55.342	53.958	51.389	50.586	49.808
260	62.500	61.905	60.185	59.091	58.036	56.277	55.556	54.167	51.587	50.781	50.000
261	62.740	62.143	60.417	59.318	58.259	56.494	55.769	54.375	51.786	50.977	50.192
262	62.981	62.381	60.648	59.545	58.482	56.710	55.983	54.583	51.984	51.172	50.385
263	63.221	62.619	60.880	59.773	58.705	56.926	56.197	54.792	52.183	51.367	50.577
264	63.462	62.857	61.111	60.000	58.929	57.143	56.410	55.000	52.381	51.563	50.769
265	63.702	63.095	61.343	60.227	59.152	57.359	56.624	55.208	52.579	51.758	50.962
266	63.942	63.333	61.574	60.455	59.375	57.576	56.838	55.417	52.778	51.953	51.154
267	64.183	63.571	61.806	60.682	59.598	57.792	57.051	55.625	52.976	52.148	51.346
268	64.423	63.810	62.037	60.909	59.821	58.009	57.265	55.833	53.175	52.344	51.538
269	64.663	64.048	62.269	61.136	60.045	58.225	57.479	56.042	53.373	52.539	51.731
270	64.904	64.286	62.500	61.364	60.268	58.442	57.692	56.250	53.571	52.734	51.923
271	65.144	64.524	62.731	61.591	60.491	58.658	57.906	56.458	53.770	52.930	52.115
272	65.385	64.762	62.963	61.818	60.714	58.874	58.120	56.667	53.968	53.125	52.308
273	65.625	65.000	63.194	62.045	60.938	59.091	58.333	56.875	54.167	53.320	52.500
274	65.865	65.238	63.426	62.273	61.161	59.307	58.547	57.083	54.365	53.516	52.692
275	66.106	65.476	63.657	62.500	61.384	59.524	58.761	57.292	54.563	53.711	52.885
276	66.346	65.714	63.889	62.727	61.607	59.740	58.974	57.500	54.762	53.906	53.077
277	66.587	65.952	64.120	62.955	61.830	59.957	59.188	57.708	54.960	54.102	53.269
278	66.827	66.190	64.352	63.182	62.054	60.173	59.402	57.917	55.159	54.297	53.462
279	67.067	66.429	64.583	63.409	62.277	60.390	59.615	58.125	55.357	54.492	53.654
280	67.308	66.667	64.815	63.636	62.500	60.606	59.829	58.333	55.556	54.688	53.846
281	67.548	66.905	65.046	63.864	62.723	60.823	60.043	58.542	55.754	54.883	54.038
282	67.788	67.143	65.278	64.091	62.946	61.039	60.256	58.750	55.952	55.078	54.231
283	68.029	67.381	65.509	64.318	63.170	61.255	60.470	58.958	56.151	55.273	54.423
284	68.269	67.619	65.741	64.545	63.393	61.472	60.684	59.167	56.349	55.469	54.615
285	68.510	67.857	65.972	64.773	63.616	61.688	60.897	59.375	56.548	55.664	54.808
286	68.750	68.095	66.204	65.000	63.839	61.905	61.111	59.583	56.746	55.859	55.000
287	68.990	68.333	66.435	65.227	64.063	62.121	61.325	59.792	56.944	56.055	55.192
288	69.231	68.571	66.667	65.455	64.286	62.338	61.538	60.000	57.143	56.250	55.385
289	69.471	68.810	66.898	65.682	64.509	62.554	61.752	60.208	57.341	56.445	55.577
290	69.712	69.048	67.130	65.909	64.732	62.771	61.966	60.417	57.540	56.641	55.769
291	69.952	69.286	67.361	66.136	64.955	62.987	62.179	60.625	57.738	56.836	55.962
292	70.192	69.524	67.593	66.364	65.179	63.203	62.393	60.833	57.937	57.031	56.154
293	70.433	69.762	67.824	66.591	65.402	63.420	62.607	61.042	58.135	57.227	56.346
294	70.673	70.000	68.056	66.818	65.625	63.636	62.821	61.250	58.333	57.422	56.538
295	70.913	70.238	68.287	67.045	65.848	63.853	63.034	61.458	58.532	57.617	56.731
296	71.154	70.476	68.519	67.273	66.071	64.069	63.248	61.667	58.730	57.813	56.923
297	71.394	70.714	68.750	67.500	66.295	64.286	63.462	61.875	58.929	58.008	57.115
298	71.635	70.952	68.981	67.727	66.518	64.502	63.675	62.083	59.127	58.203	57.308
299	71.875	71.190	69.213	67.955	66.741	64.719	63.889	62.292	59.325	58.398	57.500
300	72.115	71.429	69.444	68.182	66.964	64.935	64.103	62.500	59.524	58.594	57.692
301	72.356	71.667	69.676	68.409	67.188	65.152	64.316	62.708	59.722	58.789	57.885
302	72.596	71.905	69.907	68.636	67.411	65.368	64.530	62.917	59.921	58.984	58.077
303	72.837	72.143	70.139	68.864	67.634	65.584	64.744	63.125	60.119	59.180	58.269
304	73.077	72.381	70.370	69.091	67.857	65.801	64.957	63.333	60.317	59.375	58.462
305	73.317	72.619	70.602	69.318	68.080	66.017	65.171	63.542	60.516	59.570	58.654
306	73.558	72.857	70.833	69.545	68.304	66.234	65.385	63.750	60.714	59.766	58.846
307	73.798	73.095	71.065	69.773	68.527	66.450	65.598	63.958	60.913	59.961	59.038

	416	420	432	440	448	462	468	480	504	512	520
308	74.038	73.333	71.296	70.000	68.750	66.667	65.812	64.167	61.111	60.156	59.231
309	74.279	73.571	71.528	70.227	68.973	66.883	66.026	64.375	61.310	60.352	59.423
310	74.519	73.810	71.759	70.455	69.196	67.100	66.239	64.583	61.508	60.547	59.615
311	74.760	74.048	71.991	70.682	69.420	67.316	66.453	64.792	61.706	60.742	59.808
312	75.000	74.286	72.222	70.909	69.643	67.532	66.667	65.000	61.905	60.938	60.000
313	75.240	74.524	72.454	71.136	69.866	67.749	66.880	65.208	62.103	61.133	60.192
314	75.481	74.762	72.685	71.364	70.089	67.965	67.094	65.417	62.302	61.328	60.385
315	75.721	75.000	72.917	71.591	70.313	68.182	67.308	65.625	62.500	61.523	60.577
316	75.962	75.238	73.148	71.818	70.536	68.398	67.521	65.833	62.698	61.719	60.769
317	76.202	75.476	73.380	72.045	70.759	68.615	67.735	66.042	62.897	61.914	60.962
318	76.442	75.714	73.611	72.273	70.982	68.831	67.949	66.250	63.095	62.109	61.154
319	76.683	75.952	73.843	72.500	71.205	69.048	68.162	66.458	63.294	62.305	61.346
320	76.923	76.190	74.074	72.727	71.429	69.264	68.376	66.667	63.492	62.500	61.538
321	77.163	76.429	74.306	72.955	71.652	69.481	68.590	66.875	63.690	62.695	61.731
322	77.404	76.667	74.537	73.182	71.875	69.697	68.803	67.083	63.889	62.891	61.923
323	77.644	76.905	74.769	73.409	72.098	69.913	69.017	67.292	64.087	63.086	62.115
324	77.885	77.143	75.000	73.636	72.321	70.130	69.231	67.500	64.286	63.281	62.308
325	78.125	77.381	75.231	73.864	72.545	70.346	69.444	67.708	64.484	63.477	62.500
326	78.365	77.619	75.463	74.091	72.768	70.563	69.658	67.917	64.683	63.672	62.692
327	78.606	77.857	75.694	74.318	72.991	70.779	69.872	68.125	64.881	63.867	62.885
328	78.846	78.095	75.926	74.545	73.214	70.996	70.085	68.333	65.079	64.063	63.077
329	79.087	78.333	76.157	74.773	73.438	71.212	70.299	68.542	65.278	64.258	63.269
330	79.327	78.571	76.389	75.000	73.661	71.429	70.513	68.750	65.476	64.453	63.462
331	79.567	78.810	76.620	75.227	73.884	71.645	70.726	68.958	65.675	64.648	63.654
332	79.808	79.048	76.852	75.455	74.107	71.861	70.940	69.167	65.873	64.844	63.846
333	80.048	79.286	77.083	75.682	74.330	72.078	71.154	69.375	66.071	65.039	64.038
334	80.288	79.524	77.315	75.909	74.554	72.294	71.368	69.583	66.270	65.231	64.231
335	80.529	79.762	77.546	76.136	74.777	72.511	71.581	69.792	66.468	65.430	64.423
336	80.769	80.000	77.778	76.364	75.000	72.727	71.795	70.000	66.667	65.625	64.615
337	81.010	80.238	78.009	76.591	75.223	72.944	72.009	70.208	66.865	65.820	64.808
338	81.250	80.476	78.241	76.818	75.446	73.160	72.222	70.417	67.063	66.016	65.000
339	81.490	80.714	78.472	77.045	75.670	73.377	72.436	70.625	67.262	66.211	65.192
340	81.731	80.952	78.704	77.273	75.893	73.593	72.650	70.833	67.460	66.406	65.385
341	81.971	81.190	78.935	77.500	76.116	73.810	72.863	71.042	67.659	66.602	65.577
342	82.212	81.429	79.167	77.727	76.339	74.026	73.077	71.250	67.857	66.797	65.769
343	82.452	81.667	79.398	77.955	76.563	74.242	73.291	71.458	68.056	66.992	65.962
344	82.692	81.905	79.630	78.182	76.786	74.459	73.504	71.667	68.254	67.188	66.154
345	82.933	82.143	79.861	78.409	77.009	74.675	73.718	71.875	68.452	67.383	66.346
346	83.173	82.381	80.093	78.636	77.232	74.892	73.932	72.083	68.651	67.578	66.538
347	83.413	82.619	80.324	78.864	77.455	75.108	74.145	72.292	68.849	67.773	66.731
348	83.654	82.857	80.556	79.091	77.679	75.325	74.359	72.500	69.048	67.969	66.923
349	83.894	83.095	80.787	79.318	77.902	75.541	74.573	72.708	69.246	68.164	67.115
350	84.135	83.333	81.019	79.545	78.125	75.758	74.786	72.917	69.444	68.359	67.308
351	84.375	83.571	81.259	79.773	78.348	75.974	75.000	73.125	69.643	68.555	67.500
352	84.615	83.810	81.481	80.000	78.571	76.190	75.214	73.333	69.841	68.750	67.692
353	84.856	84.048	81.713	80.227	78.795	76.407	75.427	73.542	70.040	68.945	67.885
354	85.096	84.286	81.944	80.455	79.018	76.623	75.641	73.750	70.238	69.141	68.077
355	85.337	84.524	82.176	80.682	79.241	76.840	75.855	73.958	70.437	69.336	68.269
356	85.577	84.762	82.407	80.909	79.464	77.056	76.068	74.167	70.635	69.531	68.462
357	85.817	85.000	82.639	81.136	79.688	77.273	76.282	74.375	70.833	69.727	68.654
358	86.058	85.238	82.870	81.364	79.911	77.489	76.496	74.583	71.032	69.922	68.846
359	86.298	85.476	83.102	81.591	80.134	77.706	76.709	74.792	71.230	70.117	69.038
360	86.538	85.714	83.333	81.818	80.357	77.922	76.923	75.000	71.429	70.313	69.231
361	86.779	85.952	83.565	82.045	80.580	78.139	77.137	75.208	71.627	70.508	69.423
362	87.019	86.190	83.796	82.273	80.804	78.355	77.350	75.417	71.825	70.703	69.615
363	87.260	86.429	84.028	82.500	81.027	78.571	77.564	75.625	72.024	70.898	69.808
364	87.500	86.667	84.259	82.727	81.250	78.788	77.778	75.833	72.222	71.094	70.000
365	87.740	86.905	84.491	82.955	81.473	79.004	77.991	76.042	72.421	71.289	70.192
366	87.981	87.143	84.722	83.182	81.696	79.221	78.205	76.250	72.619	71.484	70.385
367	88.221	87.381	84.954	83.409	81.920	79.437	78.419	76.458	72.817	71.680	70.577
368	88.462	87.619	85.185	83.636	82.143	79.654	78.632	76.667	73.016	71.875	70.769
369	88.702	87.857	85.417	83.864	82.366	79.870	78.846	76.875	73.214	72.070	70.962
370	88.942	88.095	85.648	84.091	82.589	80.087	79.060	77.083	73.413	72.266	71.154
371	89.183	88.333	85.880	84.318	82.813	80.303	79.274	77.292	73.611	72.461	71.346
372	89.423	88.571	86.111	84.545	83.036	80.519	79.487	77.500	73.810	72.656	71.538
373	89.663	88.810	86.343	84.773	83.259	80.736	79.701	77.708	74.008	72.852	71.731
374	89.904	89.048	86.574	85.000	83.482	80.952	79.915	77.917	74.206	73.047	71.923
375	90.144	89.286	86.806	85.227	83.705	81.169	80.128	78.125	74.405	73.242	72.115
376	90.385	89.524	87.037	85.455	83.929	81.385	80.342	78.333	74.603	73.438	72.308
377	90.625	89.762	87.269	85.682	84.152	81.602	80.556	78.542	74.802	73.633	72.500
378	90.865	90.000	87.500	85.909	84.375	81.818	80.769	78.750	75.000	73.828	72.692
379	91.106	90.238	87.731	86.136	84.598	82.035	80.983	78.958	75.198	74.023	72.885
380	91.346	90.476	87.963	86.364	84.821	82.251	81.197	79.167	75.397	74.219	73.077
381	91.587	90.714	88.194	86.591	85.045	82.468	81.410	79.375	75.595	74.414	73.269
382	91.827	90.952	88.426	86.818	85.268	82.684	81.624	79.583	75.794	74.609	73.462

	416	420	432	440	448	462	468	480	504	512	520
383	92.067	91.190	88.657	87.045	85.491	82.900	81.838	79.792	75.992	74.805	73.654
384	92.308	91.429	88.889	87.273	85.714	83.117	82.051	80.000	76.190	75.000	73.846
385	92.548	91.667	89.120	87.500	85.938	83.333	82.265	80.208	76.389	75.195	74.038
386	92.788	91.905	89.352	87.727	86.161	83.550	82.479	80.417	76.587	75.391	74.231
387	93.029	92.143	89.583	87.955	86.384	83.766	82.692	80.625	76.786	75.586	74.423
388	93.269	92.381	89.815	88.182	86.607	83.983	82.906	80.833	76.984	75.781	74.615
389	93.510	92.619	90.046	88.409	86.830	84.199	83.120	81.042	77.183	75.977	74.808
390	93.750	92.857	90.278	88.636	87.054	84.416	83.333	81.250	77.381	76.172	75.000
391	93.990	93.095	90.509	88.864	87.277	84.632	83.547	81.458	77.579	76.367	75.192
392	94.231	93.333	90.741	89.091	87.500	84.848	83.761	81.667	77.778	76.563	75.385
393	94.471	93.571	90.972	89.318	87.723	85.065	83.974	81.875	77.976	76.758	75.577
394	94.712	93.810	91.204	89.545	87.946	85.281	84.188	82.083	78.175	76.953	75.769
395	94.952	94.048	91.435	89.773	88.170	85.498	84.402	82.292	78.373	77.148	75.962
396	95.192	94.286	91.667	90.000	88.393	85.714	84.615	82.500	78.571	77.344	76.154
397	95.433	94.524	91.898	90.227	88.616	85.931	84.829	82.708	78.770	77.539	76.346
398	95.673	94.762	92.130	90.455	88.839	86.147	85.043	82.917	78.968	77.734	76.538
399	95.913	95.000	92.361	90.682	89.063	86.364	85.256	83.125	79.167	77.930	76.731
400	96.154	95.238	92.593	90.909	89.286	86.580	85.470	83.333	79.365	78.125	76.923
401	96.394	95.476	92.824	91.136	89.509	86.797	85.684	83.542	79.563	78.320	77.115
402	96.635	95.714	93.056	91.364	89.732	87.013	85.897	83.750	79.762	78.516	77.308
403	96.875	95.952	93.287	91.591	89.955	87.229	86.111	83.958	79.960	78.711	77.500
404	97.115	96.190	93.519	91.818	90.179	87.446	86.325	84.167	80.159	78.906	77.692
405	97.356	96.429	93.750	92.045	90.402	87.662	86.538	84.375	80.357	79.102	77.885
406	97.596	96.667	93.981	92.273	90.625	87.879	86.752	84.583	80.556	79.297	78.077
407	97.837	96.905	94.213	92.500	90.848	88.095	86.966	84.792	80.754	79.492	78.269
408	98.077	97.143	94.444	92.727	91.071	88.312	87.179	85.000	80.952	79.688	78.462
409	98.317	97.381	94.676	92.955	91.295	88.528	87.393	85.208	81.151	79.883	78.654
410	98.558	97.619	94.907	93.182	91.518	88.745	87.607	85.417	81.349	80.078	78.846
411	98.798	97.857	95.139	93.409	91.741	88.961	87.821	85.625	81.548	80.273	79.038
412	99.038	98.095	95.370	93.636	91.964	89.177	88.034	85.833	81.746	80.469	79.231
413	99.279	98.333	95.602	93.864	92.188	89.394	88.248	86.042	81.944	80.664	79.423
414	99.519	98.571	95.833	94.091	92.411	89.610	88.462	86.250	82.143	80.859	79.615
415	99.760	98.810	96.065	94.318	92.634	89.827	88.675	86.458	82.341	81.055	79.808

	528	540	572	576	594	600	616	624	640	660	672
105	19.886	19.444	18.357	18.229	17.677	17.500	17.045	16.827	16.406	15.909	15.625
106	20.076	19.630	18.531	18.403	17.845	17.667	17.208	16.987	16.563	16.061	15.774
107	20.265	19.815	18.706	18.576	18.013	17.833	17.370	17.147	16.719	16.212	15.923
108	20.455	20.000	18.881	18.750	18.182	18.000	17.532	17.308	16.875	16.364	16.071
109	20.644	20.185	19.056	18.924	18.350	18.167	17.695	17.468	17.031	16.515	16.220
110	20.833	20.370	19.231	19.097	18.519	18.333	17.857	17.628	17.188	16.667	16.369
111	21.023	20.556	19.406	19.271	18.687	18.500	18.019	17.788	17.344	16.818	16.518
112	21.212	20.741	19.580	19.444	18.855	18.667	18.182	17.949	17.500	16.970	16.667
113	21.402	20.926	19.755	19.618	19.024	18.833	18.344	18.109	17.656	17.121	16.815
114	21.591	21.111	19.930	19.792	19.192	19.000	18.506	18.269	17.813	17.273	16.964
115	21.780	21.296	20.105	19.965	19.360	19.167	18.669	18.429	17.969	17.424	17.113
116	21.970	21.481	20.280	20.139	19.529	19.333	18.831	18.590	18.125	17.576	17.262
117	22.159	21.667	20.455	20.313	19.697	19.500	18.994	18.750	18.281	17.727	17.411
118	22.348	21.852	20.629	20.486	19.865	19.667	19.156	18.910	18.438	17.879	17.560
119	22.538	22.037	20.804	20.660	20.034	19.833	19.318	19.071	18.594	18.030	17.708
120	22.727	22.222	20.979	20.833	20.202	20.000	19.481	19.231	18.750	18.182	17.857
121	22.917	22.407	21.154	21.007	20.370	20.167	19.643	19.391	18.906	18.333	18.006
122	23.106	22.593	21.329	21.181	20.539	20.333	19.805	19.551	19.063	18.485	18.155
123	23.295	22.778	21.503	21.354	20.707	20.500	19.968	19.712	19.219	18.636	18.304
124	23.485	22.963	21.678	21.528	20.875	20.667	20.130	19.872	19.375	18.788	18.452
125	23.674	23.148	21.853	21.701	21.044	20.833	20.292	20.032	19.531	18.939	18.601
126	23.864	23.333	22.028	21.875	21.212	21.000	20.455	20.192	19.688	19.091	18.750
127	24.053	23.519	22.203	22.049	21.380	21.167	20.617	20.353	19.844	19.242	18.899
128	24.242	23.704	22.378	22.222	21.549	21.333	20.779	20.513	20.000	19.394	19.048
129	24.432	23.889	22.552	22.396	21.717	21.500	20.942	20.673	20.156	19.545	19.196
130	24.621	24.074	22.727	22.569	21.886	21.667	21.104	20.833	20.313	19.697	19.345
131	24.811	24.259	22.902	22.743	22.054	21.833	21.266	20.994	20.469	19.848	19.494
132	25.000	24.444	23.077	22.917	22.222	22.000	21.429	21.154	20.625	20.000	19.643
133	25.189	24.630	23.252	23.090	22.391	22.167	21.591	21.314	20.781	20.152	19.792
134	25.379	24.815	23.427	23.264	22.559	22.333	21.753	21.474	20.938	20.303	19.940
135	25.568	25.000	23.601	23.438	22.727	22.500	21.916	21.635	21.094	20.455	20.089
136	25.758	25.185	23.776	23.611	22.896	22.667	22.078	21.795	21.250	20.606	20.238
137	25.947	25.370	23.951	23.785	23.064	22.833	22.240	21.955	21.406	20.758	20.387
138	26.136	25.556	24.126	23.958	23.232	23.000	22.403	22.115	21.563	20.909	20.536
139	26.326	25.741	24.301	24.132	23.401	23.167	22.565	22.276	21.719	21.061	20.685
140	26.515	25.926	24.476	24.306	23.569	23.333	22.727	22.436	21.875	21.212	20.833
141	26.705	26.111	24.650	24.479	23.737	23.500	22.890	22.596	22.031	21.364	20.982
142	26.894	26.296	24.825	24.653	23.906	23.667	23.052	22.756	22.188	21.515	21.131
143	27.083	26.481	25.000	24.826	24.074	23.833	23.214	22.917	22.344	21.667	21.280
144	27.273	26.667	25.175	25.000	24.242	24.000	23.377	23.077	22.500	21.818	21.429
145	27.462	26.852	25.350	25.174	24.411	24.167	23.539	23.237	22.656	21.970	21.577
146	27.652	27.037	25.524	25.347	24.579	24.333	23.701	23.397	22.813	22.121	21.726
147	27.841	27.222	25.699	25.521	24.747	24.500	23.864	23.558	22.969	22.273	21.875
148	28.030	27.407	25.874	25.694	24.916	24.667	24.026	23.718	23.125	22.424	22.024
149	28.220	27.593	26.049	25.868	25.084	24.833	24.188	23.878	23.281	22.576	22.173
150	28.409	27.778	26.224	26.042	25.253	25.000	24.351	24.038	23.438	22.727	22.321
151	28.598	27.963	26.399	26.215	25.421	25.167	24.513	24.199	23.594	22.879	22.470
152	28.788	28.148	26.573	26.389	25.589	25.333	24.675	24.359	23.750	23.030	22.619
153	28.977	28.333	26.748	26.563	25.758	25.500	24.838	24.519	23.906	23.182	22.768
154	29.167	28.519	26.923	26.736	25.926	25.667	25.000	24.679	24.063	23.333	22.917
155	29.356	28.704	27.098	26.910	26.094	25.833	25.162	24.840	24.219	23.485	23.065
156	29.545	28.889	27.273	27.083	26.263	26.000	25.325	25.000	24.375	23.636	23.214
157	29.735	29.074	27.448	27.257	26.431	26.167	25.487	25.160	24.531	23.788	23.363
158	29.924	29.259	27.622	27.431	26.599	26.333	25.649	25.321	24.688	23.939	23.512
159	30.114	29.444	27.797	27.604	26.768	26.500	25.812	25.481	24.844	24.091	23.661
160	30.303	29.630	27.972	27.778	26.936	26.667	25.974	25.641	25.000	24.242	23.810
161	30.492	29.815	28.147	27.951	27.104	26.833	26.136	25.801	25.156	24.394	23.958
162	30.682	30.000	28.322	28.125	27.273	27.000	26.299	25.962	25.313	24.545	24.107
163	30.871	30.185	28.497	28.299	27.441	27.167	26.461	26.122	25.469	24.697	24.256
164	31.061	30.370	28.671	28.472	27.609	27.333	26.623	26.282	25.625	24.848	24.405
165	31.250	30.556	28.846	28.646	27.778	27.500	26.786	26.442	25.781	25.000	24.554
166	31.439	30.741	29.021	28.819	27.946	27.667	26.948	26.603	25.938	25.152	24.702
167	31.629	30.926	29.196	28.993	28.114	27.833	27.110	26.763	26.094	25.303	24.851
168	31.818	31.111	29.371	29.167	28.283	28.000	27.273	26.923	26.250	25.455	25.000
169	32.008	31.296	29.545	29.340	28.451	28.167	27.435	27.083	26.406	25.606	25.149
170	32.197	31.481	29.720	29.514	28.620	28.333	27.597	27.244	26.563	25.758	25.298
171	32.386	31.667	29.895	29.688	28.788	28.500	27.760	27.404	26.719	25.909	25.446
172	32.576	31.852	30.070	29.861	28.956	28.667	27.922	27.564	26.875	26.061	25.595
173	32.765	32.037	30.245	30.035	29.125	28.833	28.084	27.724	27.031	26.212	25.744
174	32.955	32.222	30.420	30.208	29.293	29.000	28.247	27.885	27.188	26.364	25.893
175	33.144	32.407	30.594	30.382	29.461	29.167	28.409	28.045	27.344	26.515	26.042
176	33.333	32.593	30.769	30.556	29.630	29.333	28.571	28.205	27.500	26.667	26.190
177	33.523	32.778	30.944	30.729	29.798	29.500	28.734	28.365	27.656	26.818	26.339
178	33.712	32.963	31.119	30.903	29.966	29.667	28.896	28.526	27.813	26.970	26.488
179	33.902	33.148	31.294	31.076	30.135	29.833	29.058	28.686	27.969	27.121	26.637

	528	540	572	576	594	600	616	624	640	660	672
180	34.091	33.333	31.469	31.250	30.303	30.000	29.221	28.846	28.125	27.273	26.786
181	34.280	33.519	31.643	31.424	30.471	30.167	29.383	29.006	28.281	27.424	26.935
182	34.470	33.704	31.818	31.597	30.640	30.333	29.545	29.167	28.438	27.576	27.083
183	34.659	33.889	31.993	31.771	30.808	30.500	29.708	29.327	28.594	27.727	27.232
184	34.848	34.074	32.168	31.944	30.976	30.667	29.870	29.487	28.750	27.879	27.381
185	35.038	34.259	32.343	32.118	31.145	30.833	30.032	29.647	28.906	28.030	27.530
186	35.227	34.444	32.517	32.292	31.313	31.000	30.195	29.808	29.063	28.182	27.679
187	35.417	34.630	32.692	32.465	31.481	31.167	30.357	29.968	29.219	28.333	27.827
188	35.606	34.815	32.867	32.639	31.650	31.333	30.519	30.128	29.375	28.485	27.976
189	35.795	35.000	33.042	32.813	31.818	31.500	30.682	30.288	29.531	28.636	28.125
190	35.985	35.185	33.217	32.986	31.987	31.667	30.844	30.449	29.688	28.788	28.274
191	36.174	35.370	33.392	33.160	32.155	31.833	31.006	30.609	29.844	28.939	28.423
192	36.364	35.556	33.566	33.333	32.323	32.000	31.169	30.769	30.000	29.091	28.571
193	36.553	35.741	33.741	33.507	32.492	32.167	31.331	30.929	30.156	29.242	28.720
194	36.742	35.926	33.916	33.681	32.660	32.333	31.494	31.090	30.313	29.394	28.869
195	36.932	36.111	34.091	33.854	32.828	32.500	31.656	31.250	30.469	29.545	29.018
196	37.121	36.296	34.266	34.028	32.997	32.667	31.818	31.410	30.625	29.697	29.167
197	37.311	36.481	34.441	34.201	33.165	32.833	31.981	31.571	30.781	29.848	29.315
198	37.500	36.667	34.615	34.375	33.333	33.000	32.143	31.731	30.938	30.000	29.464
199	37.689	36.852	34.790	34.549	33.502	33.167	32.305	31.891	31.094	30.152	29.613
200	37.879	37.037	34.965	34.722	33.670	33.333	32.468	32.051	31.250	30.303	29.762
201	38.068	37.222	35.140	34.896	33.838	33.500	32.630	32.212	31.406	30.455	29.911
202	38.258	37.407	35.315	35.069	34.007	33.667	32.792	32.372	31.563	30.606	30.060
203	38.447	37.593	35.490	35.243	34.175	33.833	32.955	32.532	31.719	30.758	30.208
204	38.636	37.778	35.664	35.417	34.343	34.000	33.117	32.692	31.875	30.909	30.357
205	38.826	37.963	35.839	35.590	34.512	34.167	33.279	32.853	32.031	31.061	30.506
206	39.015	38.148	36.014	35.764	34.680	34.333	33.442	33.013	32.188	31.212	30.655
207	39.205	38.333	36.189	35.938	34.848	34.500	33.604	33.173	32.344	31.364	30.804
208	39.394	38.519	36.364	36.111	35.017	34.667	33.766	33.333	32.500	31.515	30.952
209	39.583	38.704	36.538	36.285	35.185	34.833	33.929	33.494	32.656	31.667	31.101
210	39.773	38.889	36.713	36.458	35.354	35.000	34.091	33.654	32.813	31.818	31.250
211	39.962	39.074	36.888	36.632	35.522	35.167	34.253	33.814	32.969	31.970	31.399
212	40.152	39.259	37.063	36.806	35.690	35.333	34.416	33.974	33.125	32.121	31.548
213	40.341	39.444	37.238	36.979	35.859	35.500	34.578	34.135	33.281	32.273	31.696
214	40.530	39.630	37.413	37.153	36.027	35.667	34.740	34.295	33.438	32.424	31.845
215	40.720	39.815	37.587	37.326	36.195	35.833	34.903	34.455	33.594	32.576	31.994
216	40.909	40.000	37.762	37.500	36.364	36.000	35.065	34.615	33.750	32.727	32.143
217	41.098	40.185	37.937	37.674	36.532	36.167	35.227	34.776	33.906	32.879	32.292
218	41.288	40.370	38.112	37.847	36.700	36.333	35.390	34.936	34.063	33.030	32.440
219	41.477	40.556	38.287	38.021	36.869	36.500	35.552	35.096	34.219	33.182	32.589
220	41.667	40.741	38.462	38.194	37.037	36.667	35.714	35.256	34.375	33.333	32.738
221	41.856	40.926	38.636	38.368	37.205	36.833	35.877	35.417	34.531	33.485	32.887
222	42.045	41.111	38.811	38.542	37.374	37.000	36.039	35.577	34.688	33.636	33.036
223	42.235	41.296	38.986	38.715	37.542	37.167	36.201	35.737	34.844	33.788	33.185
224	42.424	41.481	39.161	38.889	37.710	37.333	36.364	35.897	35.000	33.939	33.333
225	42.614	41.667	39.336	39.063	37.879	37.500	36.526	36.058	35.156	34.091	33.482
226	42.803	41.852	39.510	39.236	38.047	37.667	36.688	36.218	35.313	34.242	33.631
227	42.992	42.037	39.685	39.410	38.215	37.833	36.851	36.378	35.469	34.394	33.780
228	43.182	42.222	39.860	39.583	38.384	38.000	37.013	36.538	35.625	34.545	33.929
229	43.371	42.407	40.035	39.757	38.552	38.167	37.175	36.699	35.781	34.697	34.077
230	43.561	42.593	40.210	39.931	38.721	38.333	37.338	36.859	35.938	34.848	34.226
231	43.750	42.778	40.385	40.104	38.889	38.500	37.500	37.019	36.094	35.000	34.375
232	43.939	42.963	40.559	40.278	39.057	38.667	37.662	37.179	36.250	35.152	34.524
233	44.129	43.148	40.734	40.451	39.226	38.833	37.825	37.340	36.406	35.303	34.673
234	44.318	43.333	40.909	40.625	39.394	39.000	37.987	37.500	36.563	35.455	34.821
235	44.508	43.519	41.084	40.799	39.562	39.167	38.149	37.660	36.719	35.606	34.970
236	44.697	43.704	41.259	40.972	39.731	39.333	38.312	37.821	36.875	35.758	35.119
237	44.886	43.889	41.434	41.146	39.899	39.500	38.474	37.981	37.031	35.909	35.268
238	45.076	44.074	41.608	41.319	40.067	39.667	38.636	38.141	37.188	36.061	35.417
239	45.265	44.259	41.783	41.493	40.236	39.833	38.799	38.301	37.344	36.212	35.565
240	45.455	44.444	41.958	41.667	40.404	40.000	38.961	38.462	37.500	36.364	35.714
241	45.644	44.630	42.133	41.840	40.572	40.167	39.123	38.622	37.656	36.515	35.863
242	45.833	44.815	42.308	42.014	40.741	40.333	39.286	38.782	37.813	36.667	36.012
243	46.023	45.000	42.483	42.188	40.909	40.500	39.448	38.942	37.969	36.818	36.161
244	46.212	45.185	42.657	42.361	41.077	40.667	39.610	39.103	38.125	36.970	36.310
245	46.402	45.370	42.832	42.535	41.246	40.833	39.773	39.263	38.281	37.121	36.458
246	46.591	45.556	43.007	42.708	41.414	41.000	39.935	39.423	38.438	37.273	36.607
247	46.780	45.741	43.182	42.882	41.582	41.167	40.097	39.583	38.594	37.424	36.756
248	46.970	45.926	43.357	43.056	41.751	41.333	40.260	39.744	38.750	37.576	36.905
249	47.159	46.111	43.531	43.229	41.919	41.500	40.422	39.904	38.906	37.727	37.054
250	47.348	46.296	43.706	43.403	42.088	41.667	40.584	40.064	39.063	37.879	37.202
251	47.538	46.481	43.881	43.576	42.256	41.833	40.747	40.224	39.219	38.030	37.351
252	47.727	46.667	44.056	43.750	42.424	42.000	40.909	40.385	39.375	38.182	37.500
253	47.917	46.852	44.231	43.924	42.593	42.167	41.071	40.545	39.531	38.333	37.649
254	48.106	47.037	44.406	44.097	42.761	42.333	41.234	40.705	39.688	38.485	37.798

	528	540	572	576	594	600	616	624	640	660	672
255	48.295	47.222	44.580	44.271	42.929	42.500	41.396	40.865	39.844	38.636	37.946
256	48.485	47.407	44.755	44.444	43.098	42.667	41.558	41.026	40.000	38.788	38.095
257	48.674	47.593	44.930	44.618	43.266	42.833	41.721	41.186	40.156	38.939	38.244
258	48.864	47.778	45.105	44.792	43.434	43.000	41.883	41.346	40.313	39.091	38.393
259	49.053	47.963	45.280	44.965	43.603	43.167	42.045	41.506	40.469	39.242	38.542
260	49.242	48.148	45.455	45.139	43.771	43.333	42.208	41.667	40.625	39.394	38.690
261	49.432	48.333	45.629	45.313	43.939	43.500	42.370	41.827	40.781	39.545	38.839
262	49.621	48.519	45.804	45.486	44.108	43.667	42.532	41.987	40.938	39.697	38.988
263	49.811	48.704	45.979	45.660	44.276	43.833	42.695	42.147	41.094	39.848	39.137
264	50.000	48.889	46.154	45.833	44.444	44.000	42.857	42.308	41.250	40.000	39.286
265	50.189	49.074	46.329	46.007	44.613	44.167	43.019	42.468	41.406	40.152	39.435
266	50.379	49.259	46.503	46.181	44.781	44.333	43.182	42.628	41.563	40.303	39.583
267	50.568	49.444	46.678	46.354	44.949	44.500	43.344	42.788	41.719	40.455	39.732
268	50.758	49.630	46.853	46.528	45.118	44.667	43.506	42.949	41.875	40.606	39.881
269	50.947	49.815	47.028	46.701	45.286	44.833	43.669	43.109	42.031	40.758	40.030
270	51.136	50.000	47.203	46.875	45.455	45.000	43.831	43.269	42.188	40.909	40.179
271	51.326	50.185	47.378	47.049	45.623	45.167	43.994	43.429	42.344	41.061	40.327
272	51.515	50.370	47.552	47.222	45.791	45.333	44.156	43.590	42.500	41.212	40.476
273	51.705	50.556	47.727	47.396	45.960	45.500	44.318	43.750	42.656	41.364	40.625
274	51.894	50.741	47.902	47.569	46.128	45.667	44.481	43.910	42.813	41.515	40.774
275	52.083	50.926	48.077	47.743	46.296	45.833	44.643	44.071	42.969	41.667	40.923
276	52.273	51.111	48.252	47.917	46.465	46.000	44.805	44.231	43.125	41.818	41.071
277	52.462	51.296	48.427	48.090	46.633	46.167	44.968	44.391	43.281	41.970	41.220
278	52.652	51.481	48.601	48.264	46.801	46.333	45.130	44.551	43.438	42.121	41.369
279	52.841	51.667	48.776	48.438	46.970	46.500	45.292	44.712	43.594	42.273	41.518
280	53.030	51.852	48.951	48.611	47.138	46.667	45.455	44.872	43.750	42.424	41.667
281	53.220	52.037	49.126	48.785	47.306	46.833	45.617	45.032	43.906	42.576	41.815
282	53.409	52.222	49.301	48.958	47.475	47.000	45.779	45.192	44.063	42.727	41.964
283	53.598	52.407	49.476	49.132	47.643	47.167	45.942	45.353	44.219	42.879	42.113
284	53.788	52.593	49.650	49.306	47.811	47.333	46.104	45.513	44.375	43.030	42.262
285	53.977	52.778	49.825	49.479	47.980	47.500	46.266	45.673	44.531	43.182	42.411
286	54.167	52.963	50.000	49.653	48.148	47.667	46.429	45.833	44.688	43.333	42.560
287	54.356	53.148	50.175	49.826	48.316	47.833	46.591	45.994	44.844	43.485	42.708
288	54.545	53.333	50.350	50.000	48.485	48.000	46.753	46.154	45.000	43.636	42.857
289	54.735	53.519	50.524	50.174	48.653	48.167	46.916	46.314	45.156	43.788	43.006
290	54.924	53.704	50.699	50.347	48.822	48.333	47.078	46.474	45.313	43.939	43.155
291	55.114	53.889	50.874	50.521	48.990	48.500	47.240	46.635	45.469	44.091	43.304
292	55.303	54.074	51.049	50.694	49.158	48.667	47.403	46.795	45.625	44.242	43.452
293	55.492	54.259	51.224	50.868	49.327	48.833	47.565	46.955	45.781	44.394	43.601
294	55.682	54.444	51.399	51.042	49.495	49.000	47.727	47.115	45.938	44.545	43.750
295	55.871	54.630	51.573	51.215	49.663	49.167	47.890	47.276	46.094	44.697	43.899
296	56.061	54.815	51.748	51.389	49.832	49.333	48.052	47.436	46.250	44.848	44.048
297	56.250	55.000	51.923	51.563	50.000	49.500	48.214	47.596	46.406	45.000	44.196
298	56.439	55.185	52.098	51.736	50.168	49.667	48.377	47.756	46.563	45.152	44.345
299	56.629	55.370	52.273	51.910	50.337	49.833	48.539	47.917	46.719	45.303	44.494
300	56.818	55.556	52.448	52.083	50.505	50.000	48.701	48.077	46.875	45.455	44.643
301	57.008	55.741	52.622	52.257	50.673	50.167	48.864	48.237	47.031	45.606	44.792
302	57.197	55.926	52.797	52.431	50.842	50.333	49.026	48.397	47.188	45.758	44.940
303	57.386	56.111	52.972	52.604	51.010	50.500	49.188	48.558	47.344	45.909	45.089
304	57.576	56.296	53.147	52.778	51.178	50.667	49.351	48.718	47.500	46.061	45.238
305	57.765	56.481	53.322	52.951	51.347	50.833	49.513	48.878	47.656	46.212	45.387
306	57.955	56.667	53.497	53.125	51.515	51.000	49.675	49.038	47.813	46.364	45.536
307	58.144	56.852	53.671	53.299	51.684	51.167	49.838	49.199	47.969	46.515	45.685
308	58.333	57.037	53.846	53.472	51.852	51.333	50.000	49.359	48.125	46.667	45.833
309	58.523	57.222	54.021	53.646	52.020	51.500	50.162	49.519	48.281	46.818	45.982
310	58.712	57.407	54.196	53.819	52.189	51.667	50.325	49.679	48.438	46.970	46.131
311	58.902	57.593	54.371	53.993	52.357	51.833	50.487	49.840	48.594	47.121	46.280
312	59.091	57.778	54.545	54.167	52.525	52.000	50.649	50.000	48.750	47.273	46.429
313	59.280	57.963	54.720	54.340	52.694	52.167	50.812	50.160	48.906	47.424	46.577
314	59.470	58.148	54.895	54.514	52.862	52.333	50.974	50.321	49.063	47.576	46.726
315	59.659	58.333	55.070	54.688	53.030	52.500	51.136	50.481	49.219	47.727	46.875
316	59.848	58.519	55.245	54.861	53.199	52.667	51.299	50.641	49.375	47.879	47.024
317	60.038	58.704	55.420	55.035	53.367	52.833	51.461	50.801	49.531	48.030	47.173
318	60.227	58.889	55.594	55.208	53.535	53.000	51.623	50.962	49.688	48.182	47.321
319	60.417	59.074	55.769	55.382	53.704	53.167	51.786	51.122	49.844	48.333	47.470
320	60.606	59.259	55.944	55.556	53.872	53.333	51.948	51.282	50.000	48.485	47.619
321	60.795	59.444	56.119	55.729	54.040	53.500	52.110	51.442	50.156	48.636	47.768
322	60.985	59.630	56.294	55.903	54.209	53.667	52.273	51.603	50.313	48.788	47.917
323	61.174	59.815	56.469	56.076	54.377	53.833	52.435	51.763	50.469	48.939	48.065
324	61.364	60.000	56.643	56.250	54.545	54.000	52.597	51.923	49.091	49.091	48.214
325	61.553	60.185	56.818	56.424	54.714	54.167	52.760	52.083	50.781	49.242	48.363
326	61.742	60.370	56.993	56.597	54.882	54.333	52.922	52.244	50.938	49.394	48.512
327	61.932	60.556	57.168	56.771	55.051	54.500	53.084	52.404	51.094	49.545	48.661
328	62.121	60.741	57.343	56.944	55.219	54.667	53.247	52.564	51.250	49.697	48.810
329	62.311	60.926	57.517	57.118	55.387	54.833	53.409	52.724	51.406	49.848	48.958

	528	540	572	576	594	600	616	624	640	660	672
330	62.500	61.111	57.692	57.292	55.556	55.000	53.571	52.885	51.563	50.000	49.107
331	62.689	61.296	57.867	57.465	55.724	55.167	53.734	53.045	51.719	50.152	49.256
332	62.879	61.481	58.042	57.639	55.892	55.333	53.896	53.205	51.875	50.303	49.405
333	63.068	61.667	58.217	57.813	56.061	55.500	54.058	53.365	52.031	50.455	49.554
334	63.258	61.852	58.392	57.986	56.229	55.667	54.221	53.526	52.188	50.606	49.702
335	63.447	62.037	58.566	58.160	56.397	55.833	54.383	53.686	52.344	50.758	49.851
336	63.636	62.222	58.741	58.333	56.566	56.000	54.545	53.846	52.500	50.909	50.000
337	63.826	62.407	58.916	58.507	56.734	56.167	54.708	54.006	52.656	51.061	50.149
338	64.015	62.593	59.091	58.681	56.902	56.333	54.870	54.167	52.813	51.212	50.298
339	64.205	62.778	59.266	58.854	57.071	56.500	55.032	54.327	52.969	51.364	50.446
340	64.394	62.963	59.441	59.028	57.239	56.667	55.195	54.487	53.125	51.515	50.595
341	64.583	63.148	59.615	59.201	57.407	56.833	55.357	54.647	53.281	51.667	50.744
342	64.773	63.333	59.790	59.375	57.576	57.000	55.519	54.808	53.438	51.818	50.893
343	64.962	63.519	59.965	59.549	57.744	57.167	55.682	54.968	53.594	51.970	51.042
344	65.152	63.704	60.140	59.722	57.912	57.333	55.844	55.128	53.750	52.121	51.190
345	65.341	63.889	60.315	59.896	58.081	57.500	56.006	55.288	53.906	52.273	51.339
346	65.530	64.074	60.490	60.069	58.249	57.667	56.169	55.449	54.063	52.424	51.488
347	65.720	64.259	60.664	60.243	58.418	57.833	56.331	55.609	54.219	52.576	51.637
348	65.909	64.444	60.839	60.417	58.586	58.000	56.494	55.769	54.375	52.727	51.786
349	66.098	64.630	61.014	60.590	58.754	58.167	56.656	55.929	54.531	52.879	51.935
350	66.288	64.815	61.189	60.764	58.923	58.333	56.818	56.090	54.688	53.030	52.083
351	66.477	65.000	61.364	60.938	59.091	58.500	56.981	56.250	54.844	53.182	52.232
352	66.667	65.185	61.538	61.111	59.259	58.667	57.143	56.410	55.000	53.333	52.381
353	66.856	65.370	61.713	61.285	59.428	58.833	57.305	56.571	55.156	53.485	52.530
354	67.045	65.556	61.888	61.458	59.596	59.000	57.468	56.731	55.313	53.636	52.679
355	67.235	65.741	62.063	61.632	59.764	59.167	57.630	56.891	55.469	53.788	52.827
356	67.424	65.926	62.238	61.806	59.933	59.333	57.792	57.051	55.625	53.939	52.976
357	67.614	66.111	62.413	61.979	60.101	59.500	57.955	57.212	55.781	54.091	53.125
358	67.803	66.296	62.587	62.153	60.269	59.667	58.117	57.372	55.938	54.242	53.274
359	67.992	66.481	62.762	62.326	60.438	59.833	58.279	57.532	56.094	54.394	53.423
360	68.182	66.667	62.937	62.500	60.606	60.000	58.442	57.692	56.250	54.545	53.571
361	68.371	66.852	63.112	62.674	60.774	60.167	58.604	57.853	56.406	54.697	53.720
362	68.561	67.037	63.287	62.847	60.943	60.333	58.766	58.013	56.563	54.848	53.869
363	68.750	67.222	63.462	63.021	61.111	60.500	58.929	58.173	56.719	55.000	54.018
364	68.939	67.407	63.636	63.194	61.279	60.667	59.091	58.333	56.875	55.152	54.167
365	69.129	67.593	63.811	63.368	61.448	60.833	59.253	58.494	57.031	55.303	54.315
366	69.318	67.778	63.986	63.542	61.616	61.000	59.416	58.654	57.188	55.455	54.464
367	69.508	67.963	64.161	63.715	61.785	61.167	59.578	58.814	57.344	55.606	54.613
368	69.697	68.148	64.336	63.889	61.953	61.333	59.740	58.974	57.500	55.758	54.762
369	69.886	68.333	64.510	64.063	62.121	61.500	59.903	59.135	57.656	55.909	54.911
370	70.076	68.519	64.685	64.236	62.290	61.667	60.065	59.295	57.813	56.061	55.060
371	70.265	68.704	64.860	64.410	62.458	61.833	60.227	59.455	57.969	56.212	55.208
372	70.455	68.889	65.035	64.583	62.626	62.000	60.390	59.615	58.125	56.364	55.357
373	70.644	69.074	65.210	64.757	62.795	62.167	60.552	59.776	58.281	56.515	55.506
374	70.833	69.259	65.385	64.931	62.963	62.333	60.714	59.936	58.438	56.667	55.655
375	71.023	69.444	65.559	65.104	63.131	62.500	60.877	60.096	58.594	56.818	55.804
376	71.212	69.630	65.734	65.278	63.300	62.667	61.039	60.256	58.750	56.970	55.952
377	71.402	69.815	65.909	65.451	63.468	62.833	61.201	60.417	58.906	57.121	56.101
378	71.591	70.000	66.084	65.625	63.636	63.000	61.364	60.577	59.063	57.273	56.250
379	71.780	70.185	66.259	65.799	63.805	63.167	61.526	60.737	59.219	57.424	56.399
380	71.970	70.370	66.434	65.972	63.973	63.333	61.688	60.897	59.375	57.576	56.548
381	72.159	70.556	66.608	66.146	64.141	63.500	61.851	61.058	59.531	57.727	56.696
382	72.348	70.741	66.783	66.319	64.310	63.667	62.013	61.218	59.688	57.879	56.845
383	72.538	70.926	66.958	66.493	64.478	63.833	62.175	61.378	59.844	58.030	56.994
384	72.727	71.111	67.133	66.667	64.646	64.000	62.338	61.538	59.900	58.182	57.143
385	72.917	71.296	67.308	66.840	64.815	64.167	62.500	61.699	60.156	58.333	57.292
386	73.106	71.481	67.483	67.014	64.983	64.333	62.662	61.859	60.313	58.485	57.440
387	73.295	71.667	67.657	67.188	65.152	64.500	62.825	62.019	60.469	58.636	57.589
388	73.485	71.852	67.832	67.361	65.320	64.667	62.987	62.179	60.625	58.788	57.738
389	73.674	72.037	68.007	67.535	65.488	64.833	63.149	62.340	60.781	58.939	57.887
390	73.864	72.222	68.182	67.708	65.657	65.000	63.312	62.500	60.938	59.091	58.036
391	74.053	72.407	68.357	67.882	65.825	65.167	63.474	62.660	61.094	59.242	58.185
392	74.242	72.593	68.531	68.056	65.993	65.333	63.636	62.821	61.250	59.394	58.333
393	74.432	72.778	68.706	68.229	66.162	65.500	63.799	62.981	61.406	59.545	58.482
394	74.621	72.963	68.881	68.403	66.330	65.667	63.961	63.141	61.563	59.697	58.631
395	74.811	73.148	69.056	68.576	66.498	65.833	64.123	63.301	61.719	59.848	58.780
396	75.000	73.333	69.231	68.750	66.667	66.000	64.286	63.462	61.875	60.000	58.929
397	75.189	73.519	69.406	68.924	66.835	66.167	64.448	63.622	62.031	60.152	59.077
398	75.379	73.704	69.580	69.097	67.003	66.333	64.610	63.782	62.188	60.303	59.226
399	75.568	73.889	69.755	69.271	67.172	66.500	64.773	63.942	62.344	60.455	59.375
400	75.758	74.074	69.930	69.444	67.340	66.667	64.935	64.103	62.500	60.606	59.524
401	75.947	74.259	70.105	69.618	67.508	66.833	65.097	64.263	62.656	60.758	59.673
402	76.136	74.444	70.280	69.792	67.677	67.000	65.260	64.423	62.813	60.909	59.821
403	76.326	74.630	70.455	69.965	67.845	67.167	65.422	64.583	62.969	61.061	59.970
404	76.515	74.815	70.629	70.139	68.013	67.333	65.584	64.744	63.125	61.212	60.119

	528	540	572	576	594	600	616	624	640	660	672
405	76.705	75.000	70.804	70.313	68.182	67.500	65.747	64.904	63.281	61.364	60.268
406	76.894	75.185	70.979	70.486	68.350	67.667	65.909	65.064	63.438	61.515	60.417
407	77.083	75.370	71.154	70.660	68.519	67.833	66.071	65.224	63.594	61.667	60.565
408	77.273	75.556	71.329	70.833	68.687	68.000	66.234	65.385	63.750	61.818	60.714
409	77.462	75.741	71.503	71.007	68.855	68.167	66.396	65.545	63.906	61.970	60.863
410	77.652	75.926	71.678	71.181	69.024	68.333	66.558	65.705	64.063	62.121	61.012
411	77.841	76.111	71.853	71.354	69.192	68.500	66.721	65.865	64.219	62.273	61.161
412	78.030	76.296	72.028	71.528	69.360	68.667	66.883	66.026	64.375	62.424	61.310
413	78.220	76.481	72.203	71.701	69.529	68.833	67.045	66.186	64.531	62.576	61.458
414	78.409	76.667	72.378	71.875	69.697	69.000	67.208	66.346	64.688	62.727	61.607
415	78.598	76.852	72.552	72.049	69.865	69.167	67.370	66.506	64.844	62.879	61.756
416	78.788	77.037	72.727	72.222	70.034	69.333	67.532	66.667	65.000	63.030	61.905
417	78.977	77.222	72.902	72.396	70.202	69.500	67.695	66.827	65.156	63.182	62.054
418	79.167	77.407	73.077	72.569	70.370	69.667	67.857	66.987	65.313	63.333	62.202
419	79.356	77.593	73.252	72.743	70.539	69.833	68.019	67.147	65.469	63.485	62.351
420	79.545	77.778	73.427	72.917	70.707	70.000	68.182	67.308	65.625	63.636	62.500
421	79.735	77.963	73.601	73.090	70.875	70.167	68.344	67.468	65.781	63.788	62.649
422	79.924	78.148	73.776	73.264	71.044	70.333	68.506	67.628	65.938	63.939	62.798
423	80.114	78.333	73.951	73.438	71.212	70.500	68.669	67.788	66.094	64.091	62.946
424	80.303	78.519	74.126	73.611	71.380	70.667	68.831	67.949	66.250	64.242	63.095
425	80.492	78.704	74.301	73.785	71.549	70.833	68.994	68.109	66.406	64.394	63.244
426	80.682	78.889	74.476	73.958	71.717	71.000	69.156	68.269	66.563	64.545	63.393
427	80.871	79.074	74.650	74.132	71.886	71.167	69.318	68.429	66.719	64.697	63.542
428	81.061	79.259	74.825	74.306	72.054	71.333	69.481	68.590	66.875	64.848	63.690
429	81.250	79.444	75.000	74.479	72.222	71.500	69.643	68.750	67.031	65.000	63.839
430	81.439	79.630	75.175	74.653	72.391	71.667	69.805	68.910	67.188	65.152	63.988
431	81.629	79.815	75.350	74.826	72.559	71.833	69.968	69.071	67.344	65.303	64.137
432	81.818	80.000	75.524	75.000	72.727	72.000	70.130	69.231	67.500	65.455	64.286
433	82.008	80.185	75.699	75.174	72.896	72.167	70.292	69.391	67.656	65.606	64.435
434	82.197	80.370	75.874	75.347	73.064	72.333	70.455	69.551	67.813	65.758	64.583
435	82.386	80.556	76.049	75.521	73.232	72.500	70.617	69.712	67.969	65.909	64.732
436	82.576	80.741	76.224	75.694	73.401	72.667	70.779	69.872	68.125	66.061	64.881
437	82.765	80.926	76.399	75.868	73.569	72.833	70.942	70.032	68.281	66.212	65.030
438	82.955	81.111	76.573	76.042	73.737	73.000	71.104	70.192	68.438	66.364	65.179
439	83.144	81.296	76.748	76.215	73.906	73.167	71.266	70.353	68.594	66.515	65.327
440	83.333	81.481	76.923	76.389	74.074	73.333	71.429	70.513	68.750	66.667	65.476
441	83.523	81.667	77.098	76.563	74.242	73.500	71.591	70.671	68.906	66.818	65.625
442	83.712	81.852	77.273	76.736	74.411	73.667	71.753	70.833	69.063	66.970	65.774
443	83.902	82.037	77.448	76.910	74.579	73.833	71.916	70.994	69.219	67.121	65.923
444	84.091	82.222	77.622	77.083	74.747	74.000	72.078	71.154	69.375	67.273	66.071
445	84.280	82.407	77.797	77.257	74.916	74.167	72.240	71.314	69.531	67.424	66.220
446	84.470	82.593	77.972	77.431	75.084	74.333	72.403	71.474	69.688	67.576	66.369
447	84.659	82.778	78.147	77.604	75.253	74.500	72.565	71.635	69.844	67.727	66.518
448	84.848	82.963	78.322	77.778	75.421	74.667	72.727	71.795	70.000	67.879	66.667
449	85.038	83.148	78.497	77.951	75.589	74.833	72.890	71.955	70.156	68.030	66.815
450	85.227	83.333	78.671	78.125	75.758	75.000	73.052	72.115	70.313	68.182	66.964
451	85.417	83.519	78.846	78.299	75.926	75.167	73.214	72.276	70.469	68.333	67.113
452	85.606	83.704	79.021	78.472	76.094	75.333	73.377	72.436	70.625	68.485	67.262
453	85.795	83.889	79.196	78.646	76.263	75.500	73.539	72.596	70.781	68.636	67.411
454	85.985	84.074	79.371	78.819	76.431	75.667	73.701	72.756	70.938	68.788	67.560
455	86.174	84.259	79.545	78.993	76.599	75.833	73.864	72.917	71.094	68.939	67.708
456	86.364	84.444	79.720	79.167	76.768	76.000	74.026	73.077	71.250	69.091	67.857
457	86.553	84.630	79.895	79.340	76.936	76.167	74.188	73.237	71.406	69.242	68.006
458	86.742	84.815	80.070	79.514	77.104	76.333	74.351	73.397	71.563	69.394	68.155
459	86.932	85.000	80.245	79.688	77.273	76.500	74.513	73.558	71.719	69.545	68.304
460	87.121	85.185	80.420	79.861	77.441	76.667	74.675	73.718	71.875	69.697	68.452
461	87.311	85.370	80.594	80.035	77.609	76.833	74.838	73.878	72.031	69.848	68.601
462	87.500	85.556	80.769	80.208	77.778	77.000	75.000	74.038	72.188	70.000	68.750
463	87.689	85.741	80.944	80.382	77.946	77.167	75.162	74.199	72.344	70.152	68.899
464	87.879	85.926	81.119	80.556	78.114	77.333	75.325	74.359	72.500	70.303	69.048
465	88.068	86.111	81.294	80.729	78.283	77.500	75.487	74.519	72.656	70.455	69.196
466	88.258	86.296	81.469	80.903	78.451	77.667	75.649	74.679	72.813	70.606	69.345
467	88.447	86.481	81.643	81.076	78.620	77.833	75.812	74.840	72.969	70.758	69.494
468	88.636	86.667	81.818	81.250	78.788	78.000	75.974	75.000	73.125	70.909	69.643
469	88.826	86.852	81.993	81.424	78.956	78.167	76.136	75.160	73.281	71.061	69.792
470	89.015	87.037	82.168	81.597	79.125	78.333	76.299	75.321	73.438	71.212	69.940
471	89.205	87.222	82.343	81.771	79.293	78.500	76.461	75.481	73.594	71.364	70.089
472	89.394	87.407	82.517	81.944	79.461	78.667	76.623	75.641	73.750	71.515	70.238
473	89.583	87.593	82.692	82.118	79.630	78.833	76.786	75.801	73.906	71.667	70.387
474	89.773	87.778	82.867	82.292	79.798	79.000	76.948	75.962	74.063	71.818	70.536
475	89.962	87.963	83.042	82.465	79.966	79.167	77.110	76.122	74.219	71.970	70.685
476	90.152	88.148	83.217	82.639	80.135	79.333	77.273	76.282	74.375	72.121	70.833
477	90.341	88.333	83.392	82.813	80.303	79.500	77.435	76.442	74.531	72.273	70.982
478	90.530	88.519	83.566	82.986	80.471	79.667	77.597	76.603	74.688	72.424	71.131
479	90.720	88.704	83.741	83.160	80.640	79.833	77.760	76.763	74.844	72.576	71.280

	528	540	572	576	594	600	616	624	640	660	672
480	90.909	88.889	83.916	83.333	80.808	80.000	77.922	76.923	75.000	72.727	71.429
481	91.098	89.074	84.091	83.507	80.976	80.167	78.084	77.083	75.156	72.879	71.577
482	91.288	89.259	84.266	83.681	81.145	80.333	78.247	77.244	75.313	73.070	71.726
483	91.477	89.444	84.441	83.854	81.313	80.500	78.409	77.404	75.469	73.182	71.875
484	91.667	89.630	84.615	84.028	81.481	80.667	78.571	77.564	75.625	73.333	72.024
485	91.856	89.815	84.790	84.201	81.650	80.833	78.734	77.724	75.781	73.485	72.173
486	92.045	90.000	84.965	84.375	81.818	81.000	78.896	77.885	75.938	73.636	72.321
487	92.235	90.185	85.140	84.549	81.987	81.167	79.058	78.045	76.094	73.788	72.470
488	92.424	90.370	85.315	84.722	82.155	81.333	79.221	78.205	76.250	73.939	72.619
489	92.614	90.556	85.490	84.896	82.323	81.500	79.383	78.365	76.406	74.091	72.768
490	92.803	90.741	85.664	85.069	82.492	81.667	79.545	78.526	76.563	74.242	72.917
491	92.992	90.926	85.839	85.243	82.660	81.833	79.708	78.686	76.719	74.394	73.065
492	93.182	91.111	86.014	85.417	82.828	82.000	79.870	78.846	76.875	74.545	73.214
493	93.371	91.296	86.189	85.590	82.997	82.167	80.032	79.006	77.031	74.697	73.363
494	93.561	91.481	86.364	85.764	83.165	82.333	80.195	79.167	77.188	74.848	73.512
495	93.750	91.667	86.538	85.938	83.333	82.500	80.357	79.327	77.344	75.000	73.661
496	93.939	91.852	86.713	86.111	83.502	82.667	80.519	79.487	77.500	75.152	73.810
497	94.129	92.037	86.888	86.285	83.670	82.833	80.682	79.647	77.656	75.303	73.958
498	94.318	92.222	87.063	86.458	83.838	83.000	80.844	79.808	77.813	75.455	74.107
499	94.508	92.407	87.238	86.632	84.007	83.167	81.006	79.968	77.969	75.606	74.256
500	94.697	92.593	87.413	86.806	84.175	83.333	81.169	80.128	78.125	75.758	74.405
501	94.886	92.778	87.587	86.979	84.343	83.500	81.331	80.288	78.281	75.909	74.554
502	95.076	92.963	87.762	87.153	84.512	83.667	81.494	80.449	78.438	76.061	74.702
503	95.265	93.148	87.937	87.326	84.680	83.833	81.656	80.609	78.594	76.212	74.851
504	95.455	93.333	88.112	87.500	84.848	84.000	81.818	80.769	78.750	76.364	75.000
505	95.644	93.519	88.287	87.674	85.017	84.167	81.981	80.929	78.906	76.515	75.149
506	95.833	93.704	88.462	87.847	85.185	84.333	82.143	81.090	79.063	76.667	75.298
507	96.023	93.889	88.636	88.021	85.354	84.500	82.305	81.250	79.219	76.818	75.446
508	96.212	94.074	88.811	88.194	85.522	84.667	82.468	81.410	79.375	76.970	75.595
509	96.402	94.259	88.986	88.368	85.690	84.833	82.630	81.571	79.531	77.121	75.744
510	96.591	94.444	89.161	88.542	85.859	85.000	82.792	81.731	79.688	77.273	75.893
511	96.780	94.630	89.336	88.715	86.027	85.167	82.955	81.891	79.844	77.424	76.042
512	96.970	94.815	89.510	88.889	86.195	85.333	83.117	82.051	80.000	77.576	76.190
513	97.159	95.000	89.685	89.063	86.364	85.500	83.279	82.212	80.156	77.727	76.339
514	97.348	95.185	89.860	89.236	86.532	85.667	83.442	82.372	80.313	77.879	76.488
515	97.538	95.370	90.035	89.410	86.700	85.833	83.604	82.532	80.469	78.030	76.637
516	97.727	95.556	90.210	89.583	86.869	86.000	83.766	82.692	80.625	78.182	76.786
517	97.917	95.741	90.385	89.757	87.037	86.167	83.929	82.853	80.781	78.333	76.935
518	98.106	95.926	90.559	89.931	87.205	86.333	84.091	83.013	80.938	78.485	77.083
519	98.295	96.111	90.734	90.104	87.374	86.500	84.253	83.173	81.094	78.636	77.232
520	98.485	96.296	90.909	90.278	87.542	86.667	84.416	83.333	81.250	78.788	77.381
521	98.674	96.481	91.084	90.451	87.710	86.833	84.578	83.494	81.406	78.939	77.530
522	98.864	96.667	91.259	90.625	87.879	87.000	84.740	83.654	81.563	79.091	77.679
523	99.053	96.852	91.434	90.799	88.047	87.167	84.903	83.814	81.719	79.242	77.827
524	99.242	97.037	91.608	90.972	88.215	87.333	85.065	83.974	81.875	79.394	77.976
525	99.432	97.222	91.783	91.146	88.384	87.500	85.227	84.135	82.031	79.545	78.125
526	99.621	97.407	91.958	91.319	88.552	87.667	85.390	84.295	82.188	79.697	78.274
527	99.811	97.593	92.133	91.493	88.721	87.833	85.552	84.455	82.344	79.848	78.423
528	*****	97.778	92.308	91.667	88.889	88.000	85.714	84.615	82.500	80.000	78.571
529		97.963	92.483	91.840	89.057	88.167	85.877	84.776	82.656	80.152	78.720
530		98.148	92.657	92.014	89.226	88.333	86.039	84.936	82.813	80.303	78.869
531		98.333	92.832	92.188	89.394	88.500	86.201	85.096	82.969	80.455	79.018
532		98.519	93.007	92.361	89.562	88.667	86.364	85.256	83.125	80.606	79.167
533		98.704	93.182	92.535	89.731	88.833	86.526	85.417	83.281	80.758	79.315
534		98.889	93.357	92.708	89.899	89.000	86.688	85.577	83.438	80.909	79.464
535		99.074	93.531	92.882	90.067	89.167	86.851	85.737	83.594	81.061	79.613
536		99.259	93.706	93.056	90.236	89.333	87.013	85.897	83.750	81.212	79.762

	704	720	728	768	780	832	840	896	960	1088
140	19.886	19.444	19.231	18.229	17.949	16.827	16.667	15.625	14.583	12.868
141	20.028	19.583	19.368	18.359	18.077	16.947	16.786	15.737	14.688	12.960
142	20.170	19.722	19.505	18.490	18.205	17.067	16.905	15.848	14.792	13.051
143	20.313	19.861	19.643	18.620	18.333	17.188	17.024	15.960	14.896	13.143
144	20.455	20.000	19.780	18.750	18.462	17.308	17.143	16.071	15.000	13.235
145	20.597	20.139	19.918	18.880	18.590	17.428	17.262	16.183	15.104	13.327
146	20.739	20.278	20.055	19.010	18.718	17.548	17.381	16.295	15.208	13.419
147	20.881	20.417	20.192	19.141	18.846	17.668	17.500	16.406	15.313	13.511
148	21.023	20.556	20.330	19.271	18.974	17.788	17.619	16.518	15.417	13.603
149	21.165	20.694	20.467	19.401	19.103	17.909	17.738	16.629	15.521	13.695
150	21.307	20.833	20.604	19.531	19.231	18.029	17.857	16.741	15.625	13.787
151	21.449	20.972	20.742	19.661	19.359	18.149	17.976	16.853	15.729	13.879
152	21.591	21.111	20.879	19.792	19.487	18.269	18.095	16.964	15.833	13.971
153	21.733	21.250	21.016	19.922	19.615	18.389	18.214	17.076	15.938	14.063
154	21.875	21.389	21.154	20.052	19.744	18.510	18.333	17.188	16.042	14.154
155	22.017	21.528	21.291	20.182	19.872	18.630	18.452	17.299	16.146	14.246
156	22.159	21.667	21.429	20.313	20.000	18.750	18.571	17.411	16.250	14.338
157	22.301	21.806	21.566	20.443	20.128	18.870	18.690	17.522	16.354	14.430
158	22.443	21.944	21.703	20.573	20.256	18.990	18.810	17.634	16.458	14.522
159	22.585	22.083	21.841	20.703	20.385	19.111	18.929	17.746	16.563	14.614
160	22.727	22.222	21.978	20.833	20.513	19.231	19.048	17.857	16.667	14.706
161	22.869	22.361	22.115	20.964	20.641	19.351	19.167	17.969	16.771	14.798
162	23.011	22.500	22.253	21.094	20.769	19.471	19.286	18.080	16.875	14.890
163	23.153	22.639	22.390	21.224	20.897	19.591	19.405	18.192	16.979	14.982
164	23.295	22.778	22.527	21.354	21.026	19.712	19.524	18.304	17.083	15.074
165	23.438	22.917	22.665	21.484	21.154	19.832	19.643	18.415	17.188	15.165
166	23.580	23.056	22.802	21.615	21.282	19.952	19.762	18.527	17.292	15.257
167	23.722	23.194	22.940	21.745	21.410	20.072	19.881	18.638	17.396	15.349
168	23.864	23.333	23.077	21.875	21.538	20.192	20.000	18.750	17.500	15.441
169	24.006	23.472	23.214	22.005	21.667	20.313	20.119	18.862	17.604	15.533
170	24.148	23.611	23.352	22.135	21.795	20.433	20.238	18.973	17.708	15.625
171	24.290	23.750	23.489	22.266	21.923	20.553	20.357	19.085	17.813	15.717
172	24.432	23.889	23.626	22.396	22.051	20.673	20.476	19.196	17.917	15.809
173	24.574	24.028	23.764	22.526	22.179	20.793	20.595	19.308	18.021	15.901
174	24.716	24.167	23.901	22.656	22.308	20.913	20.714	19.420	18.125	15.993
175	24.858	24.306	24.038	22.786	22.436	21.034	20.833	19.531	18.229	16.085
176	25.000	24.444	24.176	22.917	22.564	21.154	20.952	19.643	18.333	16.176
177	25.142	24.583	24.313	23.047	22.692	21.274	21.071	19.754	18.438	16.268
178	25.284	24.722	24.451	23.177	22.821	21.394	21.190	19.866	18.542	16.360
179	25.426	24.861	24.588	23.307	22.949	21.514	21.310	19.978	18.646	16.452
180	25.568	25.000	24.725	23.438	23.077	21.635	21.429	20.089	18.750	16.544
181	25.710	25.139	24.863	23.568	23.205	21.755	21.548	20.201	18.854	16.636
182	25.852	25.278	25.000	23.698	23.333	21.875	21.667	20.313	18.958	16.728
183	25.994	25.417	25.137	23.828	23.462	21.995	21.786	20.424	19.063	16.820
184	26.136	25.556	25.275	23.958	23.590	22.115	21.905	20.536	19.167	16.912
185	26.278	25.694	25.412	24.089	23.718	22.236	22.024	20.647	19.271	17.004
186	26.420	25.833	25.549	24.219	23.846	22.356	22.143	20.759	19.375	17.096
187	26.563	25.972	25.687	24.349	23.974	22.476	22.262	20.871	19.479	17.188
188	26.705	26.111	25.824	24.479	24.103	22.596	22.381	20.982	19.583	17.279
189	26.847	26.250	25.962	24.609	24.231	22.716	22.500	21.094	19.688	17.371
190	26.989	26.389	26.099	24.740	24.359	22.837	22.619	21.205	19.792	17.463
191	27.131	26.528	26.236	24.870	24.487	22.957	22.738	21.317	19.896	17.555
192	27.273	26.667	26.374	25.000	24.615	23.077	22.857	21.429	20.000	17.647
193	27.415	26.806	26.511	25.130	24.744	23.197	22.976	21.540	20.104	17.739
194	27.557	26.944	26.648	25.260	24.872	23.317	23.095	21.652	20.208	17.831
195	27.699	27.083	26.786	25.391	25.000	23.438	23.214	21.763	20.313	17.923
196	27.841	27.222	26.923	25.521	25.128	23.558	23.333	21.875	20.417	18.015
197	27.983	27.361	27.060	25.651	25.256	23.678	23.452	21.987	20.521	18.107
198	28.125	27.500	27.198	25.781	25.385	23.798	23.571	22.098	20.625	18.199
199	28.267	27.639	27.335	25.911	25.513	23.918	23.690	22.210	20.729	18.290
200	28.409	27.778	27.473	26.042	25.641	24.038	23.810	22.321	20.833	18.382
201	28.551	27.917	27.610	26.172	25.769	24.159	23.929	22.433	20.938	18.474
202	28.693	28.056	27.747	26.302	25.897	24.279	24.048	22.545	21.042	18.566
203	28.835	28.194	27.885	26.432	26.026	24.399	24.167	22.656	21.146	18.658
204	28.977	28.333	28.022	26.563	26.154	24.519	24.286	22.768	21.250	18.750
205	29.119	28.472	28.159	26.693	26.282	24.639	24.405	22.879	21.354	18.842
206	29.261	28.611	28.297	26.823	26.410	24.760	24.524	22.991	21.458	18.934
207	29.403	28.750	28.434	26.953	26.538	24.880	24.643	23.103	21.563	19.026
208	29.545	28.889	28.571	27.083	26.667	25.000	24.762	23.214	21.667	19.118
209	29.688	29.028	28.709	27.214	26.795	25.120	24.881	23.326	21.771	19.210
210	29.830	29.167	28.846	27.344	26.923	25.240	25.000	23.438	21.875	19.301
211	29.972	29.306	28.984	27.474	27.051	25.361	25.119	23.549	21.979	19.393
212	30.114	29.444	29.121	27.604	27.179	25.481	25.238	23.661	22.083	19.485
213	30.256	29.583	29.258	27.734	27.308	25.601	25.357	23.772	22.188	19.577
214	30.398	29.722	29.396	27.865	27.436	25.721	25.476	23.884	22.292	19.669

	704	720	728	768	780	832	840	896	960	1088
215	30.540	29.861	29.533	27.995	27.564	25.841	25.595	23.996	22.396	19.761
216	30.682	30.000	29.670	28.125	27.692	25.962	25.714	24.107	22.500	19.853
217	30.824	30.139	29.808	28.255	27.821	26.082	25.833	24.219	22.604	19.945
218	30.966	30.278	29.945	28.385	27.949	26.202	25.952	24.330	22.708	20.037
219	31.108	30.417	30.082	28.516	28.077	26.322	26.071	24.442	22.813	20.129
220	31.250	30.556	30.220	28.646	28.205	26.442	26.190	24.554	22.917	20.221
221	31.392	30.694	30.357	28.776	28.333	26.563	26.310	24.665	23.021	20.313
222	31.534	30.833	30.495	28.906	28.462	26.683	26.429	24.777	23.125	20.404
223	31.676	30.972	30.632	29.036	28.590	26.803	26.548	24.888	23.229	20.496
224	31.818	31.111	30.769	29.167	28.718	26.923	26.667	25.000	23.333	20.588
225	31.960	31.250	30.907	29.297	28.846	27.043	26.786	25.112	23.438	20.680
226	32.102	31.389	31.044	29.427	28.974	27.163	26.905	25.223	23.542	20.772
227	32.244	31.528	31.181	29.557	29.103	27.284	27.024	25.335	23.646	20.864
228	32.386	31.667	31.319	29.688	29.231	27.404	27.143	25.446	23.750	20.956
229	32.528	31.806	31.456	29.818	29.359	27.524	27.262	25.558	23.854	21.048
230	32.670	31.944	31.593	29.948	29.487	27.644	27.381	25.670	23.958	21.140
231	32.813	32.083	31.731	30.078	29.615	27.764	27.500	25.781	24.063	21.232
232	32.955	32.222	31.868	30.208	29.744	27.885	27.619	25.893	24.167	21.324
233	33.097	32.361	32.005	30.339	29.872	28.005	27.738	26.004	24.271	21.415
234	33.239	32.500	32.143	30.469	30.000	28.125	27.857	26.116	24.375	21.507
235	33.381	32.639	32.280	30.599	30.128	28.245	27.976	26.228	24.479	21.599
236	33.523	32.778	32.418	30.729	30.256	28.365	28.095	26.339	24.583	21.691
237	33.665	32.917	32.555	30.859	30.385	28.486	28.214	26.451	24.688	21.783
238	33.807	33.056	32.692	30.990	30.513	28.606	28.333	26.563	24.792	21.875
239	33.949	33.194	32.830	31.120	30.641	28.726	28.452	26.674	24.896	21.967
240	34.091	33.333	32.967	31.250	30.769	28.846	28.571	26.786	25.000	22.059
241	34.233	33.472	33.104	31.380	30.897	28.966	28.690	26.897	25.104	22.151
242	34.375	33.611	33.242	31.510	31.026	29.087	28.810	27.009	25.208	22.243
243	34.517	33.750	33.379	31.641	31.154	29.207	28.929	27.121	25.313	22.335
244	34.659	33.889	33.516	31.771	31.282	29.327	29.048	27.232	25.417	22.427
245	34.801	34.028	33.654	31.901	31.410	29.447	29.167	27.344	25.521	22.518
246	34.943	34.167	33.791	32.031	31.538	29.567	29.286	27.455	25.625	22.610
247	35.085	34.306	33.929	32.161	31.667	29.688	29.405	27.567	25.729	22.702
248	35.227	34.444	34.066	32.292	31.795	29.808	29.524	27.679	25.833	22.794
249	35.369	34.583	34.203	32.422	31.923	29.928	29.643	27.790	25.938	22.886
250	35.511	34.722	34.341	32.552	32.051	30.048	29.762	27.902	26.042	22.978
251	35.653	34.861	34.478	32.682	32.179	30.168	29.881	28.013	26.146	23.070
252	35.795	35.000	34.615	32.813	32.308	30.288	30.000	28.125	26.250	23.162
253	35.938	35.139	34.753	32.943	32.436	30.409	30.119	28.237	26.354	23.254
254	36.080	35.278	34.890	33.073	32.564	30.529	30.238	28.348	26.458	23.346
255	36.222	35.417	35.027	33.203	32.692	30.649	30.357	28.460	26.563	23.438
256	36.364	35.556	35.165	33.333	32.821	30.769	30.476	28.571	26.667	23.529
257	36.506	35.694	35.302	33.464	32.949	30.889	30.595	28.683	26.771	23.621
258	36.648	35.833	35.440	33.594	33.077	31.010	30.714	28.795	26.875	23.713
259	36.790	35.972	35.577	33.724	33.205	31.130	30.833	28.906	26.979	23.805
260	36.932	36.111	35.714	33.854	33.333	31.250	30.952	29.018	27.083	23.897
261	37.074	36.250	35.852	33.984	33.462	31.370	31.071	29.129	27.188	23.989
262	37.216	36.389	35.989	34.115	33.590	31.490	31.190	29.241	27.292	24.081
263	37.358	36.528	36.126	34.245	33.718	31.611	31.310	29.353	27.396	24.173
264	37.500	36.667	36.264	34.375	33.846	31.731	31.429	29.464	27.500	24.265
265	37.642	36.806	36.401	34.505	33.974	31.851	31.548	29.576	27.604	24.357
266	37.784	36.944	36.538	34.635	34.103	31.971	31.667	29.688	27.708	24.449
267	37.926	37.083	36.676	34.766	34.231	32.091	31.786	29.799	27.813	24.540
268	38.068	37.222	36.813	34.896	34.359	32.212	31.905	29.911	27.917	24.632
269	38.210	37.361	36.951	35.026	34.487	32.332	32.024	30.022	28.021	24.724
270	38.352	37.500	37.088	35.156	34.615	32.452	32.143	30.134	28.125	24.816
271	38.494	37.639	37.225	35.286	34.744	32.572	32.262	30.246	28.229	24.908
272	38.636	37.778	37.363	35.417	34.872	32.692	32.381	30.357	28.333	25.000
273	38.778	37.917	37.500	35.547	35.000	32.813	32.500	30.469	28.438	25.092
274	38.920	38.056	37.637	35.677	35.128	32.933	32.619	30.580	28.542	25.184
275	39.063	38.194	37.775	35.807	35.256	33.053	32.738	30.692	28.646	25.276
276	39.205	38.333	37.912	35.938	35.385	33.173	32.857	30.804	28.750	25.368
277	39.347	38.472	38.049	36.068	35.513	33.293	32.976	30.915	28.854	25.460
278	39.489	38.611	38.187	36.198	35.641	33.413	33.095	31.027	28.958	25.551
279	39.631	38.750	38.324	36.328	35.769	33.534	33.214	31.138	29.063	25.643
280	39.773	38.889	38.462	36.458	35.897	33.654	33.333	31.250	29.167	25.735
281	39.915	39.028	38.599	36.589	36.026	33.774	33.452	31.362	29.271	25.827
282	40.057	39.167	38.736	36.719	36.154	33.894	33.571	31.473	29.375	25.919
283	40.199	39.306	38.874	36.849	36.282	34.014	33.690	31.585	29.479	26.011
284	40.341	39.444	39.011	36.979	36.410	34.135	33.810	31.696	29.583	26.103
285	40.483	39.583	39.148	37.109	36.538	34.255	33.929	31.808	29.688	26.195
286	40.625	39.722	39.286	37.240	36.667	34.375	34.048	31.920	29.792	26.287
287	40.767	39.861	39.423	37.370	36.795	34.495	34.167	32.031	29.896	26.379
288	40.909	40.000	39.560	37.500	36.923	34.615	34.286	32.143	30.000	26.471
289	41.051	40.139	39.698	37.630	37.051	34.736	34.405	32.254	30.104	26.563

	704	720	728	768	'80	832	840	896	960	1088
290	41.193	40.278	39.835	37.760	37.179	34.856	34.524	32.366	30.208	26.654
291	41.335	40.417	39.973	37.891	37.308	34.976	34.643	32.478	30.313	26.746
292	41.477	40.556	40.110	38.021	37.436	35.096	34.762	32.589	30.417	26.838
293	41.619	40.694	40.247	38.151	37.564	35.216	34.881	32.701	30.521	26.930
294	41.761	40.833	40.385	38.281	37.692	35.337	35.000	32.813	30.625	27.022
295	41.903	40.972	40.522	38.411	37.821	35.457	35.119	32.924	30.729	27.114
296	42.045	41.111	40.659	38.542	37.949	35.577	35.238	33.036	30.833	27.206
297	42.188	41.250	40.797	38.672	38.077	35.697	35.357	33.147	30.938	27.298
298	42.330	41.389	40.934	38.802	38.205	35.817	35.476	33.259	31.042	27.390
299	42.472	41.528	41.071	38.932	38.333	35.938	35.595	33.371	31.146	27.482
300	42.614	41.667	41.209	39.063	38.462	36.058	35.714	33.482	31.250	27.574
301	42.756	41.806	41.346	39.193	38.590	36.178	35.833	33.594	31.354	27.665
302	42.898	41.944	41.484	39.323	38.718	36.298	35.952	33.705	31.458	27.757
303	43.040	42.083	41.621	39.453	38.846	36.418	36.071	33.817	31.563	27.849
304	43.182	42.222	41.758	39.583	38.974	36.538	36.190	33.929	31.667	27.941
305	43.324	42.361	41.896	39.714	39.103	36.659	36.310	34.040	31.771	28.033
306	43.466	42.500	42.033	39.844	39.231	36.779	36.429	34.152	31.875	28.125
307	43.608	42.639	42.170	39.974	39.359	36.899	36.548	34.263	31.979	28.217
308	43.750	42.778	42.308	40.104	39.487	37.019	36.667	34.375	32.083	28.309
309	43.892	42.917	42.445	40.234	39.615	37.139	36.786	34.487	32.188	28.401
310	44.034	43.056	42.582	40.365	39.744	37.260	36.905	34.598	32.292	28.493
311	44.176	43.194	42.720	40.495	39.872	37.380	37.024	34.710	32.396	28.585
312	44.318	43.333	42.857	40.625	40.000	37.500	37.143	34.821	32.500	28.676
313	44.460	43.472	42.995	40.755	40.128	37.620	37.262	34.933	32.604	28.768
314	44.602	43.611	43.132	40.885	40.256	37.740	37.381	35.045	32.708	28.860
315	44.744	43.750	43.269	41.016	40.385	37.861	37.500	35.156	32.813	28.952
316	44.886	43.889	43.407	41.146	40.513	37.981	37.619	35.268	32.917	29.044
317	45.028	44.028	43.544	41.276	40.641	38.101	37.738	35.379	33.021	29.136
318	45.170	44.167	43.681	41.406	40.769	38.221	37.857	35.491	33.125	29.228
319	45.313	44.306	43.819	41.536	40.897	38.341	37.976	35.603	33.229	29.320
320	45.455	44.444	43.956	41.667	41.026	38.462	38.095	35.714	33.333	29.412
321	45.597	44.583	44.093	41.797	41.154	38.582	38.214	35.826	33.438	29.504
322	45.739	44.722	44.231	41.927	41.282	38.702	38.333	35.938	33.542	29.596
323	45.881	44.861	44.368	42.057	41.410	38.822	38.452	36.049	33.646	29.688
324	46.023	45.000	44.505	42.188	41.538	38.942	38.571	36.161	33.750	29.779
325	46.165	45.139	44.643	42.318	41.667	39.063	38.690	36.272	33.854	29.871
326	46.307	45.278	44.780	42.448	41.795	39.183	38.810	36.384	33.958	29.963
327	46.449	45.417	44.918	42.578	41.923	39.303	38.929	36.496	34.063	30.055
328	46.591	45.556	45.055	42.708	42.051	39.423	39.048	36.607	34.167	30.147
329	46.733	45.694	45.192	42.839	42.179	39.543	39.167	36.719	34.271	30.239
330	46.875	45.833	45.330	42.969	42.308	39.663	39.286	36.830	34.375	30.331
331	47.017	45.972	45.467	43.099	42.436	39.784	39.405	36.942	34.479	30.423
332	47.159	46.111	45.604	43.229	42.564	39.904	39.524	37.054	34.583	30.515
333	47.301	46.250	45.742	43.359	42.692	40.024	39.643	37.165	34.688	30.607
334	47.443	46.389	45.879	43.490	42.821	40.144	39.762	37.277	34.792	30.699
335	47.585	46.528	46.016	43.620	42.949	40.264	39.881	37.388	34.896	30.790
336	47.727	46.667	46.154	43.750	43.077	40.385	40.000	37.500	35.000	30.882
337	47.869	46.806	46.291	43.880	43.205	40.505	40.119	37.612	35.104	30.974
338	48.011	46.944	46.429	44.010	43.333	40.625	40.238	37.723	35.208	31.066
339	48.153	47.083	46.566	44.141	43.462	40.745	40.357	37.835	35.313	31.158
340	48.295	47.222	46.703	44.271	43.590	40.865	40.476	37.946	35.417	31.250
341	48.438	47.361	46.841	44.401	43.718	40.986	40.595	38.058	35.521	31.342
342	48.580	47.500	46.978	44.531	43.846	41.106	40.714	38.170	35.625	31.434
343	48.722	47.639	47.115	44.661	43.974	41.226	40.833	38.281	35.729	31.526
344	48.864	47.778	47.253	44.792	44.103	41.346	40.952	38.393	35.833	31.618
345	49.006	47.917	47.390	44.922	44.231	41.466	41.071	38.504	35.938	31.710
346	49.148	48.056	47.527	45.052	44.359	41.587	41.190	38.616	36.042	31.801
347	49.290	48.194	47.665	45.182	44.487	41.707	41.310	38.728	36.146	31.893
348	49.432	48.333	47.802	45.313	44.615	41.827	41.429	38.839	36.250	31.985
349	49.574	48.472	47.940	45.443	44.744	41.947	41.548	38.951	36.354	32.077
350	49.716	48.611	48.077	45.573	44.872	42.067	41.667	39.063	36.458	32.169
351	49.858	48.750	48.214	45.703	45.000	42.188	41.786	39.174	36.563	32.261
352	50.000	48.889	48.352	45.833	45.128	42.308	41.905	39.286	36.667	32.353
353	50.142	49.028	48.489	45.964	45.256	42.428	42.024	39.397	36.771	32.445
354	50.284	49.167	48.626	46.094	45.385	42.548	42.143	39.509	36.875	32.537
355	50.426	49.306	48.764	46.224	45.513	42.668	42.262	39.621	36.979	32.629
356	50.568	49.444	48.901	46.354	45.641	42.788	42.381	39.732	37.083	32.721
357	50.710	49.583	49.038	46.484	45.769	42.909	42.500	39.844	37.188	32.813
358	50.852	49.722	49.176	46.615	45.897	43.029	42.619	39.955	37.292	32.904
359	50.994	49.861	49.313	46.745	46.026	43.149	42.738	40.067	37.396	32.996
360	51.136	50.000	49.451	46.875	46.154	43.269	42.857	40.179	37.500	33.088
361	51.278	50.139	49.588	47.005	46.282	43.389	42.976	40.290	37.604	33.180
362	51.420	50.278	49.725	47.135	46.410	43.510	43.095	40.402	37.708	33.272
363	51.563	50.417	49.863	47.266	46.538	43.630	43.214	40.513	37.813	33.364
364	51.705	50.556	50.000	47.396	46.667	43.750	43.333	40.625	37.917	33.456

	704	720	728	768	780	832	840	896	960	1088
365	51.847	50.694	50.137	47.526	46.795	43.870	43.452	40.737	38.021	33.548
366	51.989	50.833	50.275	47.656	46.923	43.990	43.571	40.848	38.125	33.640
367	52.131	50.972	50.412	47.786	47.051	44.111	43.690	40.960	38.229	33.732
368	52.273	51.111	50.549	47.917	47.179	44.231	43.810	41.071	38.333	33.824
369	52.415	51.250	50.687	48.047	47.308	44.351	43.929	41.183	38.438	33.915
370	52.557	51.389	50.824	48.177	47.436	44.471	44.048	41.295	38.542	34.007
371	52.699	51.528	50.962	48.307	47.564	44.591	44.167	41.406	38.646	34.099
372	52.841	51.667	51.099	48.438	47.692	44.712	44.286	41.518	38.750	34.191
373	52.983	51.806	51.236	48.568	47.821	44.832	44.405	41.629	38.854	34.283
374	53.125	51.944	51.374	48.698	47.949	44.952	44.524	41.741	38.958	34.375
375	53.267	52.083	51.511	48.828	48.077	45.072	44.643	41.853	39.063	34.467
376	53.409	52.222	51.648	48.958	48.205	45.192	44.762	41.964	39.167	34.559
377	53.551	52.361	51.786	49.089	48.333	45.313	44.881	42.076	39.271	34.651
378	53.693	52.500	51.923	49.219	48.462	45.433	45.000	42.188	39.375	34.743
379	53.835	52.639	52.060	49.349	48.590	45.553	45.119	42.299	39.479	34.835
380	53.977	52.778	52.198	49.479	48.718	45.673	45.238	42.411	39.583	34.926
381	54.119	52.917	52.335	49.609	48.846	45.793	45.357	42.522	39.688	35.018
382	54.261	53.056	52.473	49.740	48.974	45.913	45.476	42.634	39.792	35.110
383	54.403	53.194	52.610	49.870	49.103	46.034	45.595	42.746	39.896	35.202
384	54.545	53.333	52.747	50.000	49.231	46.154	45.714	42.857	40.000	35.294
385	54.688	53.472	52.885	50.130	49.359	46.274	45.833	42.969	40.104	35.386
386	54.830	53.611	53.022	50.260	49.487	46.394	45.952	43.080	40.208	35.478
387	54.972	53.750	53.159	50.391	49.615	46.514	46.071	43.192	40.313	35.570
388	55.114	53.889	53.297	50.521	49.744	46.635	46.190	43.304	40.417	35.662
389	55.256	54.028	53.434	50.651	49.872	46.755	46.310	43.415	40.521	35.754
390	55.398	54.167	53.571	50.781	50.000	46.875	46.429	43.527	40.625	35.846
391	55.540	54.306	53.709	50.911	50.128	46.995	46.548	43.638	40.729	35.938
392	55.682	54.444	53.846	51.042	50.256	47.115	46.667	43.750	40.833	36.029
393	55.824	54.583	53.984	51.172	50.385	47.236	46.786	43.862	40.938	36.121
394	55.966	54.722	54.121	51.302	50.513	47.356	46.905	43.973	41.042	36.213
395	56.108	54.861	54.258	51.432	50.641	47.476	47.024	44.085	41.146	36.305
396	56.250	55.000	54.396	51.563	50.769	47.596	47.143	44.196	41.250	36.397
397	56.392	55.139	54.533	51.693	50.897	47.716	47.262	44.308	41.354	36.489
398	56.534	55.278	54.670	51.823	51.026	47.837	47.381	44.420	41.458	36.581
399	56.676	55.417	54.808	51.953	51.154	47.957	47.500	44.531	41.563	36.673
400	56.818	55.556	54.945	52.083	51.282	48.077	47.619	44.643	41.667	36.765
401	56.960	55.694	55.082	52.214	51.410	48.197	47.738	44.754	41.771	36.857
402	57.102	55.833	55.220	52.344	51.538	48.317	47.857	44.866	41.875	36.949
403	57.244	55.972	55.357	52.474	51.667	48.438	47.976	44.978	41.979	37.040
404	57.386	56.111	55.495	52.604	51.795	48.558	48.095	45.089	42.083	37.132
405	57.528	56.250	55.632	52.734	51.923	48.678	48.214	45.201	42.188	37.224
406	57.670	56.389	55.769	52.865	52.051	48.798	48.333	45.313	42.292	37.316
407	57.813	56.528	55.907	52.995	52.179	48.918	48.452	45.424	42.396	37.408
408	57.955	56.667	56.044	53.125	52.308	49.038	48.571	45.536	42.500	37.500
409	58.097	56.806	56.181	53.255	52.436	49.159	48.690	45.647	42.604	37.592
410	58.239	56.944	56.319	53.385	52.564	49.279	48.810	45.759	42.708	37.684
411	58.381	57.083	56.456	53.516	52.692	49.399	48.929	45.871	42.813	37.776
412	58.523	57.222	56.593	53.646	52.821	49.519	49.048	45.982	42.917	37.868
413	58.665	57.361	56.731	53.776	52.949	49.639	49.167	46.094	43.021	37.960
414	58.807	57.500	56.868	53.906	53.077	49.760	49.286	46.205	43.125	38.051
415	58.949	57.639	57.005	54.036	53.205	49.880	49.405	46.317	43.229	38.143
416	59.091	57.778	57.143	54.167	53.333	50.000	49.524	46.429	43.333	38.235
417	59.233	57.917	57.280	54.297	53.462	50.120	49.643	46.540	43.438	38.327
418	59.375	58.056	57.418	54.427	53.590	50.240	49.762	46.652	43.542	38.419
419	59.517	58.194	57.555	54.557	53.718	50.361	49.881	46.763	43.646	38.511
420	59.659	58.333	57.692	54.688	53.846	50.481	50.000	46.875	43.750	38.603
421	59.801	58.472	57.830	54.818	53.974	50.601	50.119	46.987	43.854	38.695
422	59.943	58.611	57.967	54.948	54.103	50.721	50.238	47.098	43.958	38.787
423	60.085	58.750	58.104	55.078	54.231	50.841	50.357	47.210	44.063	38.879
424	60.227	58.889	58.242	55.208	54.359	50.962	50.476	47.321	44.167	38.971
425	60.369	59.028	58.379	55.339	54.487	51.082	50.595	47.433	44.271	39.063
426	60.511	59.167	58.516	55.469	54.615	51.202	50.714	47.545	44.375	39.154
427	60.653	59.306	58.654	55.599	54.744	51.322	50.833	47.656	44.479	39.246
428	60.795	59.444	58.791	55.729	54.872	51.442	50.952	47.768	44.583	39.338
429	60.938	59.583	58.929	55.859	55.000	51.561	51.071	47.879	44.688	39.430
430	61.080	59.722	59.066	55.990	55.128	51.681	51.190	47.991	44.792	39.522
431	61.222	59.861	59.203	56.120	55.256	51.801	51.310	48.103	44.896	39.614
432	61.364	60.000	59.341	56.250	55.385	51.921	51.429	48.214	45.000	39.706
433	61.506	60.139	59.478	56.380	55.513	52.041	51.548	48.326	45.104	39.798
434	61.648	60.278	59.615	56.510	55.641	52.161	51.667	48.438	45.208	39.890
435	61.790	60.417	59.753	56.641	55.769	52.281	51.786	48.549	45.313	39.982
436	61.932	60.556	59.890	56.771	55.897	52.401	51.905	48.661	45.417	40.074
437	62.074	60.694	60.027	56.901	56.026	52.521	52.024	48.772	45.521	40.166
438	62.216	60.833	60.165	57.031	56.154	52.641	52.143	48.884	45.625	40.257
439	62.358	60.972	60.302	57.161	56.282	52.761	52.262	48.996	45.729	40.349

	704	720	728	768	780	832	840	896	960	1088
440	62.500	61.111	60.440	57.292	56.410	52.885	52.381	49.107	45.833	40.441
441	62.642	61.250	60.577	57.422	56.538	53.005	52.500	49.219	45.938	40.533
442	62.784	61.389	60.714	57.552	56.667	53.125	52.619	49.330	46.042	40.625
443	62.926	61.528	60.852	57.682	56.795	53.245	52.738	49.442	46.146	40.717
444	63.068	61.667	60.989	57.813	56.923	53.365	52.857	49.554	46.250	40.809
445	63.210	61.806	61.126	57.943	57.051	53.486	52.976	49.665	46.354	40.901
446	63.352	61.944	61.264	58.073	57.179	53.606	53.095	49.777	46.458	40.993
447	63.494	62.083	61.401	58.203	57.308	53.726	53.214	49.888	46.563	41.085
448	63.636	62.222	61.538	58.333	57.436	53.846	53.333	50.000	46.667	41.176
449	63.778	62.361	61.676	58.464	57.564	53.966	53.452	50.112	46.771	41.268
450	63.920	62.500	61.813	58.594	57.692	54.087	53.571	50.223	46.875	41.360
451	64.063	62.639	61.951	58.724	57.821	54.207	53.690	50.335	46.979	41.452
452	64.205	62.778	62.088	58.854	57.949	54.327	53.810	50.446	47.083	41.544
453	64.347	62.917	62.225	58.984	58.077	54.447	53.929	50.558	47.188	41.636
454	64.489	63.056	62.363	59.115	58.205	54.567	54.048	50.670	47.292	41.728
455	64.631	63.194	62.500	59.245	58.333	54.688	54.167	50.781	47.396	41.820
456	64.773	63.333	62.637	59.375	58.462	54.808	54.286	50.893	47.500	41.912
457	64.915	63.472	62.775	59.505	58.590	54.928	54.405	51.004	47.604	42.004
458	65.057	63.611	62.912	59.635	58.718	55.048	54.524	51.116	47.708	42.096
459	65.199	63.750	63.049	59.766	58.846	55.168	54.643	51.228	47.813	42.188
460	65.341	63.889	63.187	59.896	58.974	55.288	54.762	51.339	47.917	42.279
461	65.483	64.028	63.324	60.026	59.103	55.409	54.881	51.451	48.021	42.371
462	65.625	64.167	63.462	60.156	59.231	55.529	55.000	51.563	48.125	42.463
463	65.767	64.306	63.599	60.286	59.359	55.649	55.119	51.674	48.229	42.555
464	65.909	64.444	63.736	60.417	59.487	55.769	55.238	51.786	48.333	42.647
465	66.051	64.583	63.874	60.547	59.615	55.889	55.357	51.897	48.438	42.739
466	66.193	64.722	64.011	60.677	59.744	56.010	55.476	52.009	48.542	42.831
467	66.335	64.861	64.148	60.807	59.872	56.130	55.595	52.121	48.646	42.923
468	66.477	65.000	64.286	60.938	60.000	56.250	55.714	52.232	48.750	43.015
469	66.619	65.139	64.423	61.068	60.128	56.370	55.833	52.344	48.854	43.107
470	66.761	65.278	64.560	61.198	60.256	56.490	55.952	52.455	48.958	43.199
471	66.903	65.417	64.698	61.328	60.385	56.611	56.071	52.567	49.063	43.290
472	67.045	65.556	64.835	61.458	60.513	56.731	56.190	52.679	49.167	43.382
473	67.188	65.694	64.973	61.589	60.641	56.851	56.310	52.790	49.271	43.474
474	67.330	65.833	65.110	61.719	60.769	56.971	56.429	52.902	49.375	43.566
475	67.472	65.972	65.247	61.849	60.897	57.091	56.548	53.013	49.479	43.658
476	67.614	66.111	65.385	61.979	61.026	57.212	56.667	53.125	49.583	43.750
477	67.756	66.250	65.522	62.109	61.154	57.332	56.786	53.237	49.688	43.842
478	67.898	66.389	65.659	62.240	61.282	57.452	56.905	53.348	49.792	43.934
479	68.040	66.528	65.797	62.370	61.410	57.572	57.024	53.460	49.896	44.026
480	68.182	66.667	65.934	62.500	61.538	57.692	57.143	53.571	50.000	44.118
481	68.324	66.806	66.071	62.630	61.667	57.813	57.262	53.683	50.104	44.210
482	68.466	66.944	66.209	62.760	61.795	57.933	57.381	53.795	50.208	44.301
483	68.608	67.083	66.346	62.891	61.923	58.053	57.500	53.906	50.313	44.393
484	68.750	67.222	66.484	63.021	62.051	58.173	57.619	54.018	50.417	44.485
485	68.892	67.361	66.621	63.151	62.179	58.293	57.738	54.129	50.521	44.577
486	69.034	67.500	66.758	63.281	62.308	58.413	57.857	54.241	50.625	44.669
487	69.176	67.639	66.896	63.411	62.436	58.534	57.976	54.353	50.729	44.761
488	69.318	67.778	67.033	63.542	62.564	58.654	58.095	54.464	50.833	44.853
489	69.460	67.917	67.170	63.672	62.692	58.774	58.214	54.576	50.938	44.945
490	69.602	68.056	67.308	63.802	62.821	58.894	58.333	54.688	51.042	45.037
491	69.744	68.194	67.445	63.932	62.949	59.014	58.452	54.799	51.146	45.129
492	69.886	68.333	67.582	64.063	63.077	59.135	58.571	54.911	51.250	45.221
493	70.028	68.472	67.720	64.193	63.205	59.255	58.690	55.022	51.354	45.313
494	70.170	68.611	67.857	64.323	63.333	59.375	58.810	55.134	51.458	45.404
495	70.313	68.750	67.995	64.453	63.462	59.495	58.929	55.246	51.563	45.496
496	70.455	68.889	68.132	64.583	63.590	59.615	59.048	55.357	51.667	45.588
497	70.597	69.028	68.269	64.714	63.718	59.736	59.167	55.469	51.771	45.680
498	70.739	69.167	68.407	64.844	63.846	59.856	59.286	55.580	51.875	45.772
499	70.881	69.306	68.544	64.974	63.974	59.976	59.405	55.692	51.979	45.864
500	71.023	69.444	68.681	65.104	64.103	60.096	59.524	55.804	52.083	45.956
501	71.165	69.583	68.819	65.234	64.231	60.216	59.643	55.915	52.188	46.048
502	71.307	69.722	68.956	65.365	64.359	60.337	59.762	56.027	52.292	46.140
503	71.449	69.861	69.093	65.495	64.487	60.457	59.881	56.138	52.396	46.232
504	71.591	70.000	69.231	65.625	64.615	60.577	60.000	56.250	52.500	46.324
505	71.733	70.139	69.368	65.755	64.744	60.697	60.119	56.362	52.604	46.415
506	71.875	70.278	69.505	65.885	64.872	60.817	60.238	56.473	52.708	46.507
507	72.017	70.417	69.643	66.016	65.000	60.938	60.357	56.585	52.813	46.599
508	72.159	70.556	69.780	66.146	65.128	61.058	60.476	56.696	52.917	46.691
509	72.301	70.694	69.918	66.276	65.256	61.178	60.595	56.808	53.021	46.783
510	72.443	70.833	70.055	66.406	65.385	61.298	60.714	56.920	53.125	46.875
511	72.585	70.972	70.192	66.536	65.513	61.418	60.833	57.031	53.229	46.967
512	72.727	71.111	70.330	66.667	65.641	61.538	60.952	57.143	53.333	47.059
513	72.869	71.250	70.467	66.797	65.769	61.659	61.071	57.254	53.438	47.151
514	73.011	71.389	70.604	66.927	65.897	61.779	61.190	57.366	53.542	47.243

	704	720	728	768	780	832	840	896	960	1088
515	73.153	71.528	70.742	67.057	66.026	61.899	61.310	57.478	53.646	47.335
516	73.295	71.667	70.879	67.188	66.154	62.019	61.429	57.589	53.750	47.426
517	73.438	71.806	71.016	67.318	66.282	62.139	61.548	57.701	53.854	47.518
518	73.580	71.944	71.154	67.448	66.410	62.260	61.667	57.813	53.958	47.610
519	73.722	72.083	71.291	67.578	66.538	62.380	61.786	57.924	54.063	47.702
520	73.864	72.222	71.429	67.708	66.667	62.500	61.905	58.036	54.167	47.794
521	74.006	72.361	71.566	67.839	66.795	62.620	62.024	58.147	54.271	47.886
522	74.148	72.500	71.703	67.969	66.923	62.740	62.143	58.259	54.375	47.978
523	74.290	72.639	71.841	68.099	67.051	62.861	62.262	58.371	54.479	48.070
524	74.432	72.778	71.978	68.229	67.179	62.981	62.381	58.482	54.583	48.162
525	74.574	72.917	72.115	68.359	67.308	63.101	62.500	58.594	54.688	48.254
526	74.716	73.056	72.253	68.490	67.436	63.221	62.619	58.705	54.792	48.346
527	74.858	73.194	72.390	68.620	67.564	63.341	62.738	58.817	54.896	48.438
528	75.000	73.333	72.527	68.750	67.692	63.462	62.857	58.929	55.000	48.529
529	75.142	73.472	72.665	68.880	67.821	63.582	62.976	59.040	55.104	48.621
530	75.284	73.611	72.802	69.010	67.949	63.702	63.095	59.152	55.208	48.713
531	75.426	73.750	72.940	69.141	68.077	63.822	63.214	59.263	55.313	48.805
532	75.568	73.889	73.077	69.271	68.205	63.942	63.333	59.375	55.417	48.897
533	75.710	74.028	73.214	69.401	68.333	64.063	63.452	59.487	55.521	48.989
534	75.852	74.167	73.352	69.531	68.462	64.183	63.571	59.598	55.625	49.081
535	75.994	74.306	73.489	69.661	68.590	64.303	63.690	59.710	55.729	49.173
536	76.136	74.444	73.626	69.792	68.718	64.423	63.810	59.821	55.833	49.265
537	76.278	74.583	73.764	69.922	68.846	64.543	63.929	59.933	55.938	49.357
538	76.420	74.722	73.901	70.052	68.974	64.663	64.048	60.045	56.042	49.449
539	76.563	74.861	74.038	70.182	69.103	64.784	64.167	60.156	56.146	49.540
540	76.705	75.000	74.176	70.313	69.231	64.904	64.286	60.268	56.250	49.632
541	76.847	75.139	74.313	70.443	69.359	65.024	64.405	60.379	56.354	49.724
542	76.989	75.278	74.451	70.573	69.487	65.144	64.524	60.491	56.458	49.816
543	77.131	75.417	74.588	70.703	69.615	65.264	64.643	60.603	56.563	49.908
544	77.273	75.556	74.725	70.833	69.744	65.385	64.762	60.714	56.667	50.000
545	77.415	75.694	74.863	70.964	69.872	65.505	64.881	60.826	56.771	50.092
546	77.557	75.833	75.000	71.094	70.000	65.625	65.000	60.938	56.875	50.184
547	77.699	75.972	75.137	71.224	70.128	65.745	65.119	61.049	56.979	50.276
548	77.841	76.111	75.275	71.354	70.256	65.865	65.238	61.161	57.083	50.368
549	77.983	76.250	75.412	71.484	70.385	65.986	65.357	61.272	57.188	50.460
550	78.125	76.389	75.549	71.615	70.513	66.106	65.476	61.384	57.292	50.551
551	78.267	76.528	75.687	71.745	70.641	66.226	65.595	61.496	57.396	50.643
552	78.409	76.667	75.824	71.875	70.769	66.346	65.714	61.607	57.500	50.735
553	78.551	76.806	75.962	72.005	70.897	66.466	65.833	61.719	57.604	50.827
554	78.693	76.944	76.099	72.135	71.026	66.587	65.952	61.830	57.708	50.919
555	78.835	77.083	76.236	72.266	71.154	66.707	66.071	61.942	57.813	51.011
556	78.977	77.222	76.374	72.396	71.282	66.827	66.190	62.054	57.917	51.103
557	79.119	77.361	76.511	72.526	71.410	66.947	66.310	62.165	58.021	51.195
558	79.261	77.500	76.648	72.656	71.538	67.067	66.429	62.277	58.125	51.287
559	79.403	77.639	76.786	72.786	71.667	67.188	66.548	62.388	58.229	51.379
560	79.545	77.778	76.923	72.917	71.795	67.308	66.667	62.500	58.333	51.471
561	79.688	77.917	77.060	73.047	71.923	67.428	66.786	62.612	58.438	51.563
562	79.830	78.056	77.198	73.177	72.051	67.548	66.905	62.723	58.542	51.654
563	79.972	78.194	77.335	73.307	72.179	67.668	67.024	62.835	58.646	51.746
564	80.114	78.333	77.473	73.438	72.308	67.788	67.143	62.946	58.750	51.838
565	80.256	78.472	77.610	73.568	72.436	67.909	67.262	63.058	58.854	51.930
566	80.398	78.611	77.747	73.698	72.564	68.029	67.381	63.170	58.958	52.022
567	80.540	78.750	77.885	73.828	72.692	68.149	67.500	63.281	59.063	52.114
568	80.682	78.889	78.022	73.958	72.821	68.269	67.619	63.393	59.167	52.206
569	80.824	79.028	78.159	74.089	72.949	68.389	67.738	63.504	59.271	52.298
570	80.966	79.167	78.297	74.219	73.077	68.510	67.857	63.616	59.375	52.390
571	81.108	79.306	78.434	74.349	73.205	68.630	67.976	63.728	59.479	52.482
572	81.250	79.444	78.571	74.479	73.333	68.750	68.095	63.839	59.583	52.574
573	81.392	79.583	78.709	74.609	73.462	68.870	68.214	63.951	59.688	52.665
574	81.534	79.722	78.846	74.740	73.590	68.990	68.333	64.063	59.792	52.757
575	81.676	79.861	78.984	74.870	73.718	69.111	68.452	64.174	59.896	52.849
576	81.818	80.000	79.121	75.000	73.846	69.231	68.571	64.286	60.000	52.941
577	81.960	80.139	79.258	75.130	73.974	69.351	68.690	64.397	60.104	53.033
578	82.102	80.278	79.396	75.260	74.103	69.471	68.810	64.509	60.208	53.125
579	82.244	80.417	79.533	75.391	74.231	69.591	68.929	64.621	60.313	53.217
580	82.386	80.556	79.670	75.521	74.359	69.712	69.048	64.732	60.417	53.309
581	82.528	80.694	79.808	75.651	74.487	69.832	69.167	64.844	60.521	53.401
582	82.670	80.833	79.945	75.781	74.615	69.952	69.286	64.955	60.625	53.493
583	82.813	80.972	80.082	75.911	74.744	70.072	69.405	65.067	60.729	53.585
584	82.955	81.111	80.220	76.042	74.872	70.192	69.524	65.179	60.833	53.676
585	83.097	81.250	80.357	76.172	75.000	70.313	69.643	65.290	60.938	53.768
586	83.239	81.389	80.495	76.302	75.128	70.433	69.762	65.402	61.042	53.860
587	83.381	81.528	80.632	76.432	75.256	70.553	69.881	65.513	61.146	53.952
588	83.523	81.667	80.769	76.563	75.385	70.673	70.000	65.625	61.250	54.044
589	83.665	81.806	80.907	76.693	75.513	70.793	70.119	65.737	61.354	54.136

	704	720	728	768	780	832	840	896	960	1088
590	83.807	81.944	81.044	76.823	75.641	78.913	70.238	65.848	61.458	54.228
591	83.949	82.083	81.181	76.953	75.769	71.034	70.357	65.960	61.563	54.320
592	84.091	82.222	81.319	77.083	75.897	71.154	70.476	66.071	61.667	54.412
593	84.233	82.361	81.456	77.214	76.026	71.274	70.595	66.183	61.771	54.504
594	84.375	82.500	81.593	77.344	76.154	71.394	70.714	66.295	61.875	54.596
595	84.517	82.639	81.731	77.474	76.282	71.514	70.833	66.406	61.979	54.688
596	84.659	82.778	81.868	77.604	76.410	71.635	70.952	66.518	62.083	54.779
597	84.801	82.917	82.005	77.734	76.538	71.755	71.071	66.629	62.188	54.871
598	84.943	83.056	82.143	77.865	76.667	71.875	71.190	66.741	62.292	54.963
599	85.085	83.194	82.280	77.995	76.795	71.995	71.310	66.853	62.396	55.055
600	85.227	83.333	82.418	78.125	76.923	72.115	71.429	66.964	62.500	55.147
601	85.369	83.472	82.555	78.255	77.051	72.236	71.548	67.076	62.604	55.239
602	85.511	83.611	82.692	78.385	77.179	72.356	71.667	67.188	62.708	55.331
603	85.653	83.750	82.830	78.516	77.308	72.476	71.786	67.299	62.813	55.423
604	85.795	83.889	82.967	78.646	77.436	72.596	71.905	67.411	62.917	55.515
605	85.938	84.028	83.104	78.776	77.564	72.716	72.024	67.522	63.021	55.607
606	86.080	84.167	83.242	78.906	77.692	72.837	72.143	67.634	63.125	55.699
607	86.222	84.306	83.379	79.036	77.821	72.957	72.262	67.746	63.229	55.790
608	86.364	84.444	83.516	79.167	77.949	73.077	72.381	67.857	63.333	55.882
609	86.506	84.583	83.654	79.297	78.077	73.197	72.500	67.969	63.438	55.974
610	86.648	84.722	83.791	79.427	78.205	73.317	72.619	68.080	63.542	56.066
611	86.790	84.861	83.929	79.557	78.333	73.438	72.738	68.192	63.646	56.158
612	86.932	85.000	84.066	79.688	78.462	73.558	72.857	68.304	63.750	56.250
613	87.074	85.139	84.203	79.818	78.590	73.678	72.976	68.415	63.854	56.342
614	87.216	85.278	84.341	79.948	78.718	73.798	73.095	68.527	63.958	56.434
615	87.358	85.417	84.478	80.078	78.846	73.918	73.214	68.638	64.063	56.526
616	87.500	85.556	84.615	80.208	78.974	74.038	73.333	68.750	64.167	56.618
617	87.642	85.694	84.753	80.339	79.103	74.159	73.452	68.862	64.271	56.710
618	87.784	85.833	84.890	80.469	79.231	74.279	73.571	68.973	64.375	56.801
619	87.926	85.972	85.027	80.599	79.359	74.399	73.690	69.085	64.479	56.893
620	88.068	86.111	85.165	80.729	79.487	74.519	73.810	69.196	64.583	56.985
621	88.210	86.250	85.302	80.859	79.615	74.639	73.929	69.308	64.688	57.077
622	88.352	86.389	85.440	80.990	79.744	74.760	74.048	69.420	64.792	57.169
623	88.494	86.528	85.577	81.120	79.872	74.880	74.167	69.531	64.896	57.261
624	88.636	86.667	85.714	81.250	80.000	75.000	74.286	69.643	65.000	57.353
625	88.778	86.806	85.852	81.380	80.128	75.120	74.405	69.754	65.104	57.445
626	88.920	86.944	85.989	81.510	80.256	75.240	74.524	69.866	65.208	57.537
627	89.063	87.083	86.126	81.641	80.385	75.361	74.643	69.978	65.313	57.629
628	89.205	87.222	86.264	81.771	80.513	75.481	74.762	70.089	65.417	57.721
629	89.347	87.361	86.401	81.901	80.641	75.601	74.881	70.201	65.521	57.813
630	89.489	87.500	86.538	82.031	80.769	75.721	75.000	70.313	65.625	57.904
631	89.631	87.639	86.676	82.161	80.897	75.841	75.119	70.424	65.729	57.996
632	89.773	87.778	86.813	82.292	81.026	75.962	75.238	70.536	65.833	58.088
633	89.915	87.917	86.951	82.422	81.154	76.082	75.357	70.647	65.938	58.180
634	90.057	88.056	87.088	82.552	81.282	76.202	75.476	70.759	66.042	58.272
635	90.199	88.194	87.225	82.682	81.410	76.322	75.595	70.871	66.146	58.364
636	90.341	88.333	87.363	82.813	81.538	76.442	75.714	70.982	66.250	58.456
637	90.483	88.472	87.500	82.943	81.667	76.563	75.833	71.094	66.354	58.548
638	90.625	88.611	87.637	83.073	81.795	76.683	75.952	71.205	66.458	58.640
639	90.767	88.750	87.775	83.203	81.923	76.803	76.071	71.317	66.563	58.732
640	90.909	88.889	87.912	83.333	82.051	76.923	76.190	71.429	66.667	58.824
641	91.051	89.028	88.049	83.464	82.179	77.043	76.310	71.540	66.771	58.915
642	91.193	89.167	88.187	83.594	82.308	77.163	76.429	71.652	66.875	59.007
643	91.335	89.306	88.324	83.724	82.436	77.284	76.548	71.763	66.979	59.099
644	91.477	89.444	88.462	83.854	82.564	77.404	76.667	71.875	67.083	59.191
645	91.619	89.583	88.599	83.984	82.692	77.524	76.786	71.987	67.188	59.283
646	91.761	89.722	88.736	84.115	82.821	77.644	76.905	72.098	67.292	59.375
647	91.903	89.861	88.874	84.245	82.949	77.764	77.024	72.210	67.396	59.467
648	92.045	90.000	89.011	84.375	83.077	77.885	77.143	72.321	67.500	59.559
649	92.188	90.139	89.148	84.505	83.205	78.005	77.262	72.433	67.604	59.651
650	92.330	90.278	89.286	84.635	83.333	78.125	77.381	72.545	67.708	59.743
651	92.472	90.417	89.423	84.766	83.462	78.245	77.500	72.656	67.813	59.835
652	92.614	90.556	89.560	84.896	83.590	78.365	77.619	72.768	67.917	59.926
653	92.756	90.694	89.698	85.026	83.718	78.486	77.738	72.879	68.021	60.018
654	92.898	90.833	89.835	85.156	83.846	78.606	77.857	72.991	68.125	60.110
655	93.040	90.972	89.973	85.286	83.974	78.726	77.976	73.103	68.229	60.202
656	93.182	91.111	90.110	85.417	84.103	78.846	78.095	73.214	68.333	60.294
657	93.324	91.250	90.247	85.547	84.231	78.966	78.214	73.326	68.438	60.386
658	93.466	91.389	90.385	85.677	84.359	79.087	78.333	73.438	68.542	60.478
659	93.608	91.528	90.522	85.807	84.487	79.207	78.452	73.549	68.646	60.570
660	93.750	91.667	90.659	85.938	84.615	79.327	78.571	73.661	68.750	60.662
661	93.892	91.806	90.797	86.068	84.744	79.447	78.690	73.772	68.854	60.754
662	94.034	91.944	90.934	86.198	84.872	79.567	78.810	73.884	68.958	60.846
663	94.176	92.083	91.071	86.328	85.000	79.688	78.929	73.996	69.063	60.938
664	94.318	92.222	91.209	86.458	85.128	79.808	79.048	74.107	69.167	61.029

	704	720	728	768	780	832	840	896	960	1088
665	94.460	92.361	91.346	86.589	85.256	79.928	79.167	74.219	69.271	61.121
666	94.602	92.500	91.484	86.719	85.385	80.048	79.286	74.330	69.375	61.213
667	94.744	92.639	91.621	86.849	85.513	80.168	79.405	74.442	69.479	61.305
668	94.886	92.778	91.758	86.979	85.641	80.288	79.524	74.554	69.583	61.397
669	95.028	92.917	91.896	87.109	85.769	80.409	79.643	74.665	69.688	61.489
670	95.170	93.056	92.033	87.240	85.897	80.529	79.762	74.777	69.792	61.581
671	95.313	93.194	92.170	87.370	86.026	80.649	79.881	74.888	69.896	61.673
672	95.455	93.333	92.308	87.500	86.154	80.769	80.000	75.000	70.000	61.765
673	95.597	93.472	92.445	87.630	86.282	80.889	80.119	75.112	70.104	61.857
674	95.739	93.611	92.582	87.760	86.410	81.010	80.238	75.223	70.208	61.949
675	95.881	93.750	92.720	87.891	86.538	81.130	80.357	75.335	70.313	62.040
676	96.023	93.889	92.857	88.021	86.667	81.250	80.476	75.446	70.417	62.132
677	96.165	94.028	92.995	88.151	86.795	81.370	80.595	75.558	70.521	62.224
678	96.307	94.167	93.132	88.281	86.923	81.490	80.714	75.670	70.625	62.316
679	96.449	94.306	93.269	88.411	87.051	81.611	80.833	75.781	70.729	62.408
680	96.591	94.444	93.407	88.542	87.179	81.731	80.952	75.893	70.833	62.500
681	96.733	94.583	93.544	88.672	87.308	81.851	81.071	76.004	70.938	62.592
682	96.875	94.722	93.681	88.802	87.436	81.971	81.190	76.116	71.042	62.684
683	97.017	94.861	93.819	88.932	87.564	82.091	81.310	76.228	71.146	62.776
684	97.159	95.000	93.956	89.063	87.692	82.212	81.429	76.339	71.250	62.868
685	97.301	95.139	94.093	89.193	87.821	82.332	81.548	76.451	71.354	62.960
686	97.443	95.278	94.231	89.323	87.949	82.452	81.667	76.563	71.458	63.052
687	97.585	95.417	94.368	89.453	88.077	82.572	81.786	76.674	71.563	63.144
688	97.727	95.556	94.505	89.583	88.205	82.692	81.905	76.786	71.667	63.235
689	97.869	95.694	94.643	89.714	88.333	82.813	82.024	76.897	71.771	63.327
690	98.011	95.833	94.780	89.844	88.462	82.933	82.143	77.009	71.875	63.419
691	98.153	95.972	94.918	89.974	88.590	83.053	82.262	77.121	71.979	63.511
692	98.295	96.111	95.055	90.104	88.718	83.173	82.381	77.232	72.083	63.603
693	98.438	96.250	95.192	90.234	88.846	83.293	82.500	77.344	72.188	63.695
694	98.580	96.389	95.330	90.365	88.974	83.413	82.619	77.455	72.292	63.787
695	98.722	96.528	95.467	90.495	89.103	83.534	82.738	77.567	72.396	63.879
696	98.864	96.667	95.604	90.625	89.231	83.654	82.857	77.679	72.500	63.971
697	99.006	96.806	95.742	90.755	89.359	83.774	82.976	77.790	72.604	64.063
698	99.148	96.944	95.879	90.885	89.487	83.894	83.095	77.902	72.708	64.154
699	99.290	97.083	96.016	91.016	89.615	84.014	83.214	78.013	72.813	64.246
700	99.432	97.222	96.154	91.146	89.744	84.135	83.333	78.125	72.917	64.338
701	99.574	97.361	96.291	91.276	89.872	84.255	83.452	78.237	73.021	64.430
702	99.716	97.500	96.429	91.406	90.000	84.375	83.571	78.348	73.125	64.522
703	99.858	97.639	96.566	91.536	90.128	84.495	83.690	78.460	73.229	64.614
704	*****	97.778	96.703	91.667	90.256	84.615	83.810	78.571	73.333	64.706
705		97.917	96.841	91.797	90.385	84.736	83.929	78.683	73.438	64.798
706		98.056	96.978	91.927	90.513	84.856	84.048	78.795	73.542	64.890
707		98.194	97.115	92.057	90.641	84.976	84.167	78.906	73.646	64.982
708		98.333	97.253	92.188	90.769	85.096	84.286	79.018	73.750	65.074
709		98.472	97.390	92.318	90.897	85.216	84.405	79.129	73.854	65.165
710		98.611	97.527	92.448	91.026	85.337	84.524	79.241	73.958	65.257
711		98.750	97.665	92.578	91.154	85.457	84.643	79.353	74.063	65.349
712		98.889	97.802	92.708	91.282	85.577	84.762	79.464	74.167	65.441
713		99.028	97.940	92.839	91.410	85.697	84.881	79.576	74.271	65.533
714		99.167	98.077	92.969	91.538	85.817	85.000	79.688	74.375	65.625
715		99.306	98.214	93.099	91.667	85.938	85.119	79.799	74.479	65.717
716		99.444	98.352	93.229	91.795	86.058	85.238	79.911	74.583	65.809
717		99.583	98.489	93.359	91.923	86.178	85.357	80.022	74.688	65.901
718		99.722	98.626	93.490	92.051	86.298	85.476	80.134	74.792	65.993
719		99.861	98.764	93.620	92.179	86.418	85.595	80.246	74.896	66.085
720		*****	98.901	93.750	92.308	86.538	85.714	80.357	75.000	66.176
721			99.038	93.880	92.436	86.659	85.833	80.469	75.104	66.268
722			99.176	94.010	92.564	86.779	85.952	80.580	75.208	66.360
723			99.313	94.141	92.692	86.899	86.071	80.692	75.313	66.452
724			99.451	94.271	92.821	87.019	86.190	80.804	75.417	66.544
725			99.588	94.401	92.949	87.139	86.310	80.915	75.521	66.636
726			99.725	94.531	93.077	87.260	86.429	81.027	75.625	66.728
727			99.863	94.661	93.205	87.380	86.548	81.138	75.729	66.820
728			*****	94.792	93.333	87.500	86.667	81.250	75.833	66.912
729				94.922	93.462	87.620	86.786	81.362	75.938	67.004
730				95.052	93.590	87.740	86.905	81.473	76.042	67.096
731				95.182	93.718	87.861	87.024	81.585	76.146	67.188
732				95.313	93.846	87.981	87.143	81.696	76.250	67.279
733				95.443	93.974	88.101	87.262	81.808	76.354	67.371
734				95.573	94.103	88.221	87.381	81.920	76.458	67.463
735				95.703	94.231	88.341	87.500	82.031	76.563	67.555
736				95.833	94.359	88.462	87.619	82.143	76.667	67.647
737				95.964	94.487	88.582	87.738	82.254	76.771	67.739
738				96.094	94.615	88.702	87.857	82.366	76.875	67.831
739				96.224	94.744	88.822	87.976	82.478	76.979	67.923

	704	720	728	768	780	832	848	896	960	1088
740				96.354	94.872	88.942	88.095	82.589	77.083	68.015
741				96.484	95.000	89.063	88.214	82.781	77.188	68.107
742				96.615	95.128	89.183	88.333	82.813	77.292	68.199
743				96.745	95.256	89.303	88.452	82.924	77.396	68.290
744				96.875	95.385	89.423	88.571	83.036	77.500	68.382
745				97.005	95.513	89.543	88.690	83.147	77.604	68.474
746				97.135	95.641	89.663	88.810	83.259	77.708	68.566
747				97.266	95.769	89.784	88.929	83.371	77.813	68.658
748				97.396	95.897	89.904	89.048	83.482	77.917	68.750
749				97.526	96.026	90.024	89.167	83.594	78.021	68.842
750				97.656	96.154	90.144	89.286	83.705	78.125	68.934
751				97.786	96.282	90.264	89.405	83.817	78.229	69.026
752				97.917	96.410	90.385	89.524	83.929	78.333	69.118
753				98.047	96.538	90.505	89.643	84.040	78.438	69.210
754				98.177	96.667	90.625	89.762	84.152	78.542	69.301
755				98.307	96.795	90.745	89.881	84.263	78.646	69.393
756				98.438	96.923	90.865	90.000	84.375	78.750	69.485
757				98.568	97.051	90.986	90.119	84.487	78.854	69.577
758				98.698	97.179	91.106	90.238	84.598	78.958	69.669
759				98.828	97.308	91.226	90.357	84.710	79.063	69.761
760				98.958	97.436	91.346	90.476	84.821	79.167	69.853
761				99.089	97.564	91.466	90.595	84.933	79.271	69.945
762				99.219	97.692	91.587	90.714	85.045	79.375	70.037
763				99.349	97.821	91.707	90.833	85.156	79.479	70.129
764				99.479	97.949	91.827	90.952	85.268	79.583	70.221
765				99.609	98.077	91.947	91.071	85.379	79.688	70.313
766				99.740	98.205	92.067	91.190	85.491	79.792	70.404
767				99.870	98.333	92.188	91.310	85.603	79.896	70.496
768				*****	98.462	92.308	91.429	85.714	80.000	70.588
769					98.590	92.428	91.548	85.826	80.104	70.680
770					98.718	92.548	91.667	85.938	80.208	70.772
771					98.846	92.668	91.786	86.049	80.313	70.864
772					98.974	92.788	91.905	86.161	80.417	70.956
773					99.103	92.909	92.024	86.272	80.521	71.048
774					99.231	93.029	92.143	86.384	80.625	71.140
775					99.359	93.149	92.262	86.496	80.729	71.232
776					99.487	93.269	92.381	86.607	80.833	71.324
777					99.615	93.389	92.500	86.719	80.938	71.415
778					99.744	93.510	92.619	86.830	81.042	71.507
779					99.872	93.630	92.738	86.942	81.146	71.599
780					*****	93.750	92.857	87.054	81.250	71.691
781						93.870	92.976	87.165	81.354	71.783
782						93.990	93.095	87.277	81.458	71.875
783						94.111	93.214	87.388	81.563	71.967
784						94.231	93.333	87.500	81.667	72.059
785						94.351	93.452	87.612	81.771	72.151
786						94.471	93.571	87.723	81.875	72.243
787						94.591	93.690	87.835	81.979	72.335
788						94.712	93.810	87.946	82.083	72.426
789						94.832	93.929	88.058	82.188	72.518
790						94.952	94.048	88.170	82.292	72.610
791						95.072	94.167	88.281	82.396	72.702
792						95.192	94.286	88.393	82.500	72.794
793						95.313	94.405	88.504	82.604	72.886
794						95.433	94.524	88.616	82.708	72.978
795						95.553	94.643	88.728	82.813	73.070
796						95.673	94.762	88.839	82.917	73.162
797						95.793	94.881	88.951	83.021	73.254
798						95.913	95.000	89.063	83.125	73.346
799						96.034	95.119	89.174	83.229	73.438
800						96.154	95.238	89.286	83.333	73.529
801						96.274	95.357	89.397	83.438	73.621
802						96.394	95.476	89.509	83.542	73.713
803						96.514	95.595	89.621	83.646	73.805
804						96.635	95.714	89.732	83.750	73.897
805						96.755	95.833	89.844	83.854	73.989
806						96.875	95.952	89.955	83.958	74.081
807						96.995	96.071	90.067	84.063	74.173
808						97.115	96.190	90.179	84.167	74.265
809						97.236	96.310	90.290	84.271	74.357
810						97.356	96.429	90.402	84.375	74.449
811						97.476	96.548	90.513	84.479	74.540
812						97.596	96.667	90.625	84.583	74.632
813						97.716	96.786	90.737	84.688	74.724
814						97.837	96.905	90.848	84.792	74.816

	704	720	728	768	780	832	840	896	960	1088
815						97.957	97.024	90.960	84.896	74.908
816						98.077	97.143	91.071	85.000	75.000
817						98.197	97.262	91.183	85.104	75.092
818						98.317	97.381	91.295	85.208	75.184
819						98.438	97.500	91.406	85.313	75.276
820						98.558	97.619	91.518	85.417	75.368
821						98.678	97.738	91.629	85.521	75.460
822						98.798	97.857	91.741	85.625	75.551
823						98.918	97.976	91.853	85.729	75.643
824						99.038	98.095	91.964	85.833	75.735
825						99.159	98.214	92.076	85.938	75.827
826						99.279	98.333	92.188	86.042	75.919
827						99.399	98.452	92.299	86.146	76.011
828						99.519	98.571	92.411	86.250	76.103
829						99.639	98.690	92.522	86.354	76.195
830						99.760	98.810	92.634	86.458	76.287
831						99.880	98.929	92.746	86.563	76.379
832						*****	99.048	92.857	86.667	76.471
833							99.167	92.969	86.771	76.563
834							99.286	93.080	86.875	76.654
835							99.405	93.192	86.979	76.746
836							99.524	93.304	87.083	76.838
837							99.643	93.415	87.188	76.930
838							99.762	93.527	87.292	77.022
839							99.881	93.638	87.396	77.114
840							*****	93.750	87.500	77.206
841								93.862	87.604	77.298
842								93.973	87.708	77.390
843								94.085	87.813	77.482
844								94.196	87.917	77.574
845								94.308	88.021	77.665
846								94.420	88.125	77.757
847								94.531	88.229	77.849
848								94.643	88.333	77.941
849								94.754	88.438	78.033
850								94.866	88.542	78.125
851								94.978	88.646	78.217
852								95.089	88.750	78.309
853								95.201	88.854	78.401
854								95.313	88.958	78.493
855								95.424	89.063	78.585
856								95.536	89.167	78.676
857								95.647	89.271	78.768
858								95.759	89.375	78.860
859								95.871	89.479	78.952
860								95.982	89.583	79.044
861								96.094	89.688	79.136
862								96.205	89.792	79.228
863								96.317	89.896	79.320
864								96.429	90.000	79.412
865								96.540	90.104	79.504
866								96.652	90.208	79.596
867								96.763	90.313	79.688
868								96.875	90.417	79.779
869								96.987	90.521	79.871

APPENDIX C

4 TABLE HOWELL MOVEMENT

8-1	6-3	7-2	4-5
1	4	6	7
8-2	7-4	1-3	5-6
2	5	7	1
8-3	1-5	2-4	6-7
3	6	1	2
8-4	2-6	3-5	7-1
4	7	2	3
8-5	3-7	4-6	1-2
5	1	3	4
8-6	4-1	5-7	2-3
6	2	4	5
8-7	5-2	6-1	3-4
7	3	5	6

4 TABLE HOWELL MOVEMENT

8-1	6-5	4-2	7-3
1	2	3	5
8-2	7-6	5-3	1-4
2	3	4	6
8-3	1-7	6-4	2-5
3	4	5	7
8-4	2-1	7-5	3-6
4	5	6	1
8-5	3-2	1-6	4-7
5	6	7	2
8-6	4-3	2-7	5-1
6	7	1	3
8-7	5-4	3-1	6-2
7	1	2	4

4 TABLE HOWELL MOVEMENT

8-1	6-2	7-5	4-3
1	4	6	7
8-2	7-3	1-6	5-4
2	5	7	1
8-3	1-4	2-7	6-5
3	6	1	2
8-4	2-5	3-1	7-6
4	7	2	3
8-5	3-6	4-2	1-7
5	1	3	4
8-6	4-7	5-3	2-1
6	2	4	5
8-7	5-1	6-4	3-2
7	3	5	6

4 TABLE HOWELL MOVEMENT

8-1	7-5	4-3	2-6
1	4	6	7
8-2	1-6	5-4	3-7
2	5	7	1
8-3	2-7	6-5	4-1
3	6	1	2
8-4	3-1	7-6	5-2
4	7	2	3
8-5	4-2	1-7	6-3
5	1	3	4
8-6	5-3	2-1	7-4
6	2	4	5
8-7	6-4	3-2	1-5
7	3	5	6

4 TABLE HOWELL MOVEMENT

8-1	5-4	7-2	6-1
1	2	3	5
8-2	6-5	1-3	7-4
2	3	4	6
8-3	7-6	2-4	1-5
3	4	5	7
8-4	1-7	3-5	2-6
4	5	6	1
8-5	2-1	4-6	3-7
5	6	7	2
8-6	3-2	5-7	4-1
6	7	1	3
8-7	4-3	6-1	5-2
7	1	2	4

4 TABLE HOWELL MOVEMENT

8-1	3-7	6-5	2-4
1	2	3	5
8-2	4-1	7-6	3-5
2	3	4	6
8-3	5-2	1-7	4-6
3	4	5	7
8-4	6-3	2-1	5-7
4	5	6	1
8-5	7-4	3-2	6-1
5	6	7	2
8-6	1-5	4-3	7-2
6	7	1	3
8-7	2-6	5-4	1-3
7	1	2	4

5 TABLE HOWELL MOVEMENT

10-1	4-2	8-7	5-9	6-3
1	3	3	7	9
10-2	5-3	9-8	6-1	7-4
2	4	4	8	1
10-3	6-4	1-9	7-2	8-5
3	5	5	9	2
10-4	7-5	2-1	8-3	9-6
4	6	6	1	3
10-5	8-6	3-2	9-4	1-7
5	7	7	2	4
10-6	9-7	4-3	1-5	2-8
6	8	8	3	5
10-7	1-8	5-4	2-6	3-9
7	9	9	4	6
10-8	2-9	6-5	3-7	4-1
8	1	1	5	7
10-9	3-1	7-6	4-8	5-2
9	2	2	6	8

5 TABLE HOWELL MOVEMENT

10-1	9-4	7-6	5-3	2-8
1	2	2	4	5
10-2	1-5	8-7	6-4	3-9
2	3	3	5	6
10-3	2-6	9-8	7-5	4-1
3	4	4	6	7
10-4	3-7	1-9	8-6	5-2
4	5	5	7	8
10-5	4-8	2-1	9-7	6-3
5	6	6	8	9
10-6	5-9	3-2	1-8	7-4
6	7	7	9	1
10-7	6-1	4-3	2-9	8-5
7	8	8	1	2
10-8	7-2	5-4	3-1	9-6
8	9	9	2	3
10-9	8-3	6-5	4-2	1-7
9	1	1	3	4

5 TABLE HOWELL MOVEMENT

10-1	7-4	5-3	2-6	9-8
1	1	4	4	4
10-2	8-5	6-4	3-7	1-9
2	2	5	5	5
10-3	9-6	7-5	4-8	2-1
3	3	6	6	6
10-4	1-7	8-6	5-9	3-2
4	4	7	7	7
10-5	2-8	9-7	6-1	4-3
5	5	8	8	8
10-6	3-9	1-8	7-2	5-4
6	6	9	9	9
10-7	4-1	2-9	8-3	6-5
7	7	1	1	1
10-8	5-2	3-1	9-4	7-6
8	8	2	2	2
10-9	6-3	4-2	1-5	8-7
9	9	3	3	3

5 TABLE HOWELL MOVEMENT

10-1	9-8	6-4	3-7	5-2
1	4	5	5	8
10-2	1-9	7-5	4-8	6-3
2	5	6	6	9
10-3	2-1	8-6	5-9	7-4
3	6	7	7	1
10-4	3-3	9-7	6-1	8-5
4	"	8	8	2
10-5	4-3	1-8	7-2	9-6
5	8	9	9	3
10-6	5-4	2-9	8-3	1-7
6	9	1	1	4
10-7	6-4	3-1	9-4	2-8
7	1	2	2	5
10-8	7-6	4-2	1-5	3-9
8	2	3	3	6
10-9	8-7	5-3	2-6	4-1
9	3	4	4	7

5 TABLE HOWELL MOVEMENT

10-1	9-6	7-5	4-8	3-2
1	3	6	6	7
10-2	1-7	8-6	5-9	4-3
2	4	7	7	8
10-3	2-8	9-7	6-1	5-4
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10-4	3-9	1-8	7-2	6-5
4	6	9	9	1
10-5	4-1	2-9	8-3	7-6
5	7	1	1	2
10-6	5-2	3-1	9-4	8-7
6	8	2	2	3
10-7	6-3	4-2	1-5	9-8
7	9	3	3	4
10-8	7-4	5-3	2-6	1-9
8	1	4	4	5
10-9	8-5	6-4	3-7	2-1
9	2	5	5	6

5 TABLE HOWELL MOVEMENT

10-1	7-4	5-9	8-6	3-2
1	1	7	7	7
10-2	8-5	6-1	9-7	4-3
2	2	8	8	8
10-3	9-6	7-2	1-8	5-4
3	3	9	9	9
10-4	1-7	8-3	2-9	6-5
4	4	1	1	1
10-5	2-8	9-4	3-1	7-6
5	5	2	2	2
10-6	3-9	1-5	4-2	8-7
6	6	3	3	3
10-7	4-1	2-6	5-3	9-8
7	"	4	4	4
10-8	5-2	3-7	6-4	1-9
8	8	5	5	5
10-9	6-3	4-8	7-5	2-1
9	9	6	6	6

5 TABLE HOWELL MOVEMENT

10-1	3-9	8-6	5-4	7-2
1	6	7	9	9
10-2	4-1	9-7	6-5	8-3
2	7	8	1	1
10-3	5-2	1-8	7-6	9-4
3	8	9	2	2
10-4	6-3	2-9	8-7	1-5
4	9	1	3	3
10-5	7-4	3-1	9-8	2-6
5	1	2	4	4
10-6	8-5	4-2	1-9	3-7
6	2	3	5	5
10-7	9-6	5-3	2-1	4-8
7	1	4	6	6
10-8	1-7	6-4	3-2	5-9
8	4	5	7	7
10-9	2-8	7-5	4-3	6-1
9	5	6	8	8

5 TABLE HOWELL MOVEMENT

10-1	8-5	2-6	9-7	4-3
1	2	4	8	8
10-2	9-6	3-7	1-8	5-4
2	3	5	9	9
10-3	1-7	4-8	2-9	6-5
3	4	6	1	1
10-4	2-8	5-9	3-1	7-6
4	5	7	2	2
10-5	3-9	6-1	4-2	8-7
5	6	8	3	3
10-6	4-1	7-2	5-3	9-8
6	7	9	4	4
10-7	5-2	8-3	6-4	1-9
7	8	1	5	5
10-8	6-3	9-4	7-5	2-1
8	9	2	6	6
10-9	7-4	1-5	8-6	3-2
9	1	3	7	7

5 TABLE HOWELL MOVEMENT

10-1	5-3	9-4	2-8	7-6
1	2	5	6	9
10-2	6-4	1-5	3-9	8-7
2	3	6	7	1
10-3	7-5	2-6	4-1	9-8
3	4	7	8	2
10-4	8-6	3-7	5-2	1-9
4	5	8	9	3
10-5	9-7	4-8	6-3	2-1
5	6	9	1	4
10-6	1-8	5-9	7-4	3-2
6	7	1	2	5
10-7	2-9	6-1	8-5	4-3
7	8	2	3	6
10-8	3-1	7-2	9-6	5-4
8	9	3	4	7
10-9	4-2	8-3	1-7	6-5
9	1	4	5	8

5 TABLE HOWELL MOVEMENT

10-1	5-3	7-4	9-8	2-6
1	2	2	2	7
10-2	6-4	8-5	1-9	3-7
2	3	3	3	8
10-3	7-5	9-6	2-1	4-8
3	4	4	4	9
10-4	8-6	1-7	3-2	5-9
4	5	5	5	1
10-5	9-7	2-8	4-3	6-1
5	6	6	6	2
10-6	1-8	3-9	5-4	7-2
6	7	7	7	3
10-7	2-9	4-1	6-5	8-3
7	8	8	8	4
10-8	3-1	5-2	7-6	9-4
8	9	9	9	5
10-9	4-2	6-3	8-7	1-5
9	1	1	1	6

5 TABLE HOWELL MOVEMENT

10-1	9-8	6-4	3-7	5-2
1	2	3	8	9
10-2	1-9	7-5	4-8	6-3
2	3	4	9	1
10-3	2-1	8-6	5-9	7-4
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10-5	4-3	1-8	7-2	9-6
5	6	7	3	4
10-6	5-4	2-9	8-3	1-7
6	7	8	4	5
10-7	6-5	3-1	9-4	2-8
7	8	9	5	6
10-8	7-6	4-2	1-5	3-9
8	9	1	6	7
10-9	8-7	5-3	2-6	4-1
9	1	2	7	8

5 TABLE HOWELL MOVEMENT

10-1	7-5	9-6	3-2	4-8
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10-2	8-6	1-7	4-3	5-9
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10-3	9-7	2-8	5-4	6-1
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10-4	1-8	3-9	5-5	7-2
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10-5	2-9	4-1	7-6	8-3
5	8	8	1	4
10-6	3-1	5-2	4-7	9-4
6	9	9	2	5
10-7	4-2	6-3	4-8	1-5
7	1	1	3	6
10-8	5-3	7-4	1-9	2-6
8	2	2	4	7
10-9	6-4	8-5	2-1	3-7
9	3	3	5	8

5 TABLE HOWELL MOVEMENT

10-1	5-9	7-4	8-6	3-2
1	1	2	5	5
10-2	6-1	8-5	4-7	4-3
2	2	3	6	6
10-3	7-2	9-6	1-8	5-4
3	3	4	7	7
10-4	8-3	1-7	2-9	6-5
4	4	5	8	8
10-5	9-4	2-8	4-1	7-6
5	5	6	9	9
10-6	1-5	3-9	4-2	8-7
6	6	7	1	1
10-7	2-6	4-1	5-3	9-8
7	7	8	2	2
10-8	3-7	5-2	1-4	1-9
8	8	9	3	3
10-9	4-8	6-3	2-5	2-1
9	9	1	4	4

5 TABLE HOWELL MOVEMENT

10-1	7-2	8-6	3-9	5-4
1	3	5	7	7
10-2	8-3	9-7	4-1	6-5
2	4	6	8	8
10-3	9-4	1-8	5-2	7-6
3	5	7	9	9
10-4	1-5	2-9	6-3	8-7
4	6	8	1	1
10-5	2-6	3-1	7-4	9-8
5	7	9	2	2
10-6	3-7	4-2	8-5	1-9
6	8	1	3	3
10-7	4-8	5-3	4-6	2-1
7	9	2	4	4
10-8	5-9	6-4	1-7	3-2
8	1	3	5	5
10-9	6-1	7-5	2-8	4-3
9	2	4	6	6

5 TABLE HOWELL MOVEMENT

10-1	8-5	4-3	9-7	2-6
1	3	6	6	7
10-2	9-6	5-4	1-8	3-7
2	4	7	7	8
10-3	1-7	6-5	2-9	4-8
3	5	8	8	9
10-4	2-8	7-6	3-1	5-9
4	6	9	9	1
10-5	3-9	8-7	4-2	6-1
5	7	1	1	2
10-6	4-1	9-8	5-3	7-2
6	8	2	2	3
10-7	5-2	1-9	6-4	8-3
7	9	3	3	4
10-8	6-3	2-1	7-5	9-4
8	1	4	4	5
10-9	7-4	3-2	8-6	1-5
9	2	5	5	6

5 TABLE HOWELL MOVEMENT

10-1	3-5	2-6	9-8	7-4
1	1	3	3	6
10-2	4-6	3-7	1-9	8-5
2	2	4	4	7
10-3	5-7	4-8	2-1	9-6
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10-4	6-8	5-9	3-2	1-7
4	4	6	6	9
10-5	7-9	6-1	4-3	2-8
5	5	7	7	1
10-6	8-1	7-2	5-4	3-9
6	6	8	8	2
10-7	9-2	8-3	6-5	4-1
7	7	9	9	3
10-8	1-3	9-4	7-6	5-2
8	8	1	1	4
10-9	2-4	1-5	8-7	6-3
9	9	2	2	5

5 TABLE HOWELL MOVEMENT

10-1	4-6	9-8	3-7	5-2
1	2	3	4	4
10-2	5-7	1-9	4-8	6-3
2	3	4	5	5
10-3	6-8	2-1	5-9	7-4
3	4	5	6	6
10-4	7-9	3-2	6-1	8-5
4	5	6	7	7
10-5	8-1	4-3	7-2	9-6
5	6	7	8	8
10-6	9-2	5-4	8-3	1-7
6	7	8	9	9
10-7	1-3	6-5	9-4	2-8
7	8	9	1	1
10-8	2-4	7-6	1-5	3-9
8	9	1	2	2
10-9	3-5	8-7	2-6	4-1
9	1	2	3	3

5 TABLE HOWELL MOVEMENT

10-1	5-7	4-8	3-2	9-6
1	3	5	6	8
10-2	6-8	5-9	4-3	1-7
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3	5	7	8	1
10-4	8-1	7-2	6-5	3-9
4	6	8	9	2
10-5	9-2	8-3	7-6	4-1
5	7	9	1	3
10-6	1-3	9-4	8-7	5-2
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10-7	2-4	1-5	9-8	6-3
7	9	2	3	5
10-8	3-5	2-6	1-9	7-4
8	1	3	4	6
10-9	4-6	3-7	2-1	8-5
9	2	4	5	7

5 TABLE HOWELL MOVEMENT

10-1	6-8	5-9	7-4	3-2
1	4	6	6	6
10-2	7-9	6-1	8-5	4-3
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10-3	8-1	7-2	9-6	5-4
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10-4	9-2	8-3	1-7	6-5
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5	8	1	1	1
10-6	2-4	1-5	3-9	8-7
6	9	2	2	2
10-7	3-5	2-6	4-1	9-8
7	1	3	3	3
10-8	4-6	3-7	5-2	1-9
8	2	4	4	4
10-9	5-7	4-8	6-3	2-1
9	3	5	5	5

5 TABLE HOWELL MOVEMENT

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10-2	4-1	7-9	6-5	8-3
2	3	5	1	9
10-3	5-2	8-1	7-6	9-4
3	4	6	1	1
10-4	6-3	9-2	8-7	1-5
4	5	7	2	2
10-5	7-4	1-3	9-8	2-6
5	6	8	1	3
10-6	8-5	2-4	1-9	3-7
6	7	9	1	4
10-7	9-6	3-5	2-1	4-8
7	8	1	5	5
10-8	1-7	4-6	3-2	5-9
8	9	2	1	6
10-9	2-8	5-7	4-3	6-1
9	1	3	7	7

5 TABLE HOWELL MOVEMENT

10-1	2-6	7-9	8-5	4-3
1	3	5	1	7
10-2	3-7	8-1	9-6	5-4
2	4	6	3	8
10-3	4-8	9-2	1-7	6-5
3	5	7	1	9
10-4	5-9	1-3	2-8	7-6
4	6	8	1	1
10-5	6-1	2-4	3-9	8-7
5	7	9	1	2
10-6	7-2	3-5	4-1	9-8
6	8	1	1	3
10-7	8-3	4-6	5-2	1-9
7	9	2	1	4
10-8	9-4	5-7	6-3	2-1
8	1	3	1	5
10-9	1-5	6-8	7-4	3-2
9	2	4	6	6

5 TABLE HOWELL MOVEMENT

10-1	9-8	4-6	3-7	5-2
1	1	2	1	8
10-2	1-9	5-7	4-8	6-3
2	2	3	1	9
10-3	2-1	6-8	5-9	7-4
3	3	4	1	1
10-4	3-2	7-9	6-1	8-5
4	4	5	1	2
10-5	4-3	8-1	7-2	9-6
5	5	6	1	3
10-6	5-4	9-2	8-3	1-7
6	6	7	1	4
10-7	6-5	1-3	9-4	2-8
7	7	8	1	5
10-8	7-6	2-4	1-5	3-9
8	8	9	1	6
10-9	8-7	3-5	2-6	4-1
9	9	1	1	7

5 TABLE HOWELL MOVEMENT

10-1	5-7	4-8	9-6	3-2
1	3	3	1	4
10-2	6-8	5-9	1-7	4-3
2	4	4	1	5
10-3	7-9	6-1	2-8	5-4
3	5	5	1	6
10-4	8-1	7-2	3-9	6-5
4	6	6	1	7
10-5	9-2	8-3	4-1	7-6
5	7	7	1	8
10-6	1-3	9-4	5-2	8-7
6	8	8	1	9
10-7	2-4	1-5	6-3	9-8
7	9	9	1	1
10-8	3-5	2-6	7-4	1-9
8	1	1	1	2
10-9	4-6	3-7	8-5	2-1
9	2	2	1	3

5 TABLE HOWELL MOVEMENT

10-1	7-4	6-8	5-9	3-2
1	1	4	4	4
10-2	8-5	7-9	6-1	4-3
2	2	5	5	5
10-3	9-6	8-1	7-2	5-4
3	3	6	6	6
10-4	1-7	9-2	8-3	6-5
4	4	7	7	7
10-5	2-3	1-3	9-4	7-6
5	5	8	8	8
10-6	3-9	2-4	1-5	8-7
6	6	9	9	9
10-7	4-1	3-5	5-6	9-8
7	7	1	1	1
10-8	5-1	4-6	1-7	1-9
8	8	2	2	2
10-9	6-1	5-7	4-8	2-1
9	9	3	3	3

5 TABLE HOWELL MOVEMENT

10-1	6-8	7-2	3-9	5-4
1	4	6	6	6
10-2	7-9	8-3	4-1	6-5
2	5	7	7	7
10-3	8-1	9-4	5-2	7-6
3	6	8	8	8
10-4	9-1	1-5	6-3	8-7
4	7	9	9	9
10-5	1-3	2-6	7-4	9-8
5	8	1	1	1
10-6	2-3	3-7	8-5	1-9
6	9	2	2	2
10-7	3-5	4-8	9-6	2-1
7	1	3	3	3
10-8	4-6	5-9	1-7	3-2
8	2	4	4	4
10-9	5-1	6-1	2-8	4-3
9	3	5	5	5

5 TABLE HOWELL MOVEMENT

10-1	2-6	8-5	7-9	4-3
1	1	2	5	5
10-2	3-7	9-6	8-1	5-4
2	2	3	6	6
10-3	4-8	1-7	9-2	6-5
3	3	4	7	7
10-4	5-9	2-8	1-5	7-6
4	4	5	8	8
10-5	6-1	3-9	2-4	8-7
5	5	6	9	9
10-6	7-2	4-1	3-5	9-8
6	6	7	1	1
10-7	8-3	5-2	4-6	1-9
7	7	8	1	2
10-8	9-4	6-3	5-7	2-1
8	8	9	1	3
10-9	1-5	7-4	6-8	3-2
9	9	1	4	4

5 TABLE HOWELL MOVEMENT

10-1	5-7	4-8	3-2	9-6
1	2	2	4	4
10-2	6-8	5-9	4-1	1-7
2	3	3	5	5
10-3	7-9	6-1	5-4	2-8
3	4	4	6	6
10-4	8-1	7-2	6-5	3-9
4	5	5	7	7
10-5	9-2	8-3	7-6	4-1
5	6	6	8	8
10-6	1-3	9-4	8-7	5-2
6	7	7	9	9
10-7	2-4	1-5	9-8	6-3
7	8	8	1	1
10-8	3-5	2-6	1-9	7-4
8	9	9	2	2
10-9	4-6	3-7	2-1	8-5
9	1	1	3	3

5 TABLE HOWELL MOVEMENT

10-1	6-8	5-9	7-4	3-2
1	3	3	3	4
10-2	7-9	6-1	8-5	4-3
2	4	4	4	5
10-3	8-1	7-2	9-6	5-4
3	5	5	5	6
10-4	9-2	8-3	1-7	6-5
4	6	6	6	7
10-5	1-3	9-4	2-8	7-6
5	7	7	7	8
10-6	2-4	1-5	3-9	8-7
6	8	8	8	9
10-7	3-5	2-6	4-1	9-8
7	9	9	9	1
10-8	4-6	3-7	5-2	1-9
8	1	1	1	2
10-9	5-7	4-8	6-3	2-1
9	2	2	2	3

5 TABLE HOWELL MOVEMENT

10-1	6-8	7-2	5-4	3-9
1	3	5	6	8
10-2	7-9	8-3	6-5	4-1
2	4	6	7	9
10-3	8-1	9-4	7-6	5-2
3	5	7	8	1
10-4	9-2	1-5	8-7	6-3
4	6	8	9	2
10-5	1-3	2-6	9-8	7-4
5	7	9	1	3
10-6	2-4	3-7	1-9	8-5
6	8	1	2	4
10-7	3-5	4-8	2-1	9-6
7	9	2	3	5
10-8	4-6	5-9	3-2	1-7
8	1	3	4	6
10-9	5-7	6-1	4-3	2-8
9	2	4	5	7

5 TABLE HOWELL MOVEMENT

10-1	7-9	8-5	4-3	2-6
1	4	4	5	9
10-2	8-1	9-6	5-4	3-7
2	5	5	6	1
10-3	9-2	1-7	6-5	4-8
3	6	6	7	2
10-4	1-3	2-8	7-6	5-9
4	7	7	8	3
10-5	2-4	3-9	8-7	6-1
5	8	8	9	4
10-6	3-5	4-1	9-8	7-2
6	9	9	1	5
10-7	4-6	5-2	1-9	8-3
7	1	1	2	6
10-8	5-7	6-3	2-1	9-4
8	2	2	3	7
10-9	6-8	7-4	3-2	1-5
9	3	3	4	8

5 TABLE HOWELL MOVEMENT

10-1	3-2	6-8	5-9	7-4
1	1	2	2	8
10-2	4-3	7-9	6-1	8-5
2	2	3	3	9
10-3	5-4	8-1	7-2	9-6
3	3	4	4	1
10-4	6-5	9-2	8-3	1-7
4	4	5	5	2
10-5	7-6	1-3	9-4	2-8
5	5	6	6	3
10-6	8-7	2-4	1-5	3-9
6	6	7	7	4
10-7	9-8	3-5	2-6	4-1
7	7	8	8	5
10-8	1-9	4-6	3-7	5-2
8	8	9	9	6
10-9	2-1	5-7	4-8	6-3
9	9	1	1	7

5 TABLE HOWELL MOVEMENT

10-1	6-8	5-4	7-2	3-9
1	2	3	4	4
10-2	7-9	6-5	8-3	4-1
2	3	4	5	5
10-3	8-1	7-6	9-4	5-2
3	4	5	6	6
10-4	9-2	8-7	1-5	6-3
4	5	6	7	7
10-5	1-3	9-8	2-6	7-4
5	6	7	8	8
10-6	2-4	1-9	3-7	8-5
6	7	8	9	9
10-7	3-5	2-1	4-8	9-6
7	8	9	1	1
10-8	4-6	3-2	5-0	1-7
8	9	1	2	2
10-9	5-7	4-3	6-1	2-8
9	1	2	3	3

5 TABLE HOWELL MOVEMENT

10-1	4-3	7-9	2-6	8-5
1	2	3	8	9
10-2	5-4	8-1	3-7	9-6
2	3	4	9	1
10-3	6-5	9-2	4-8	1-7
3	4	5	1	2
10-4	7-6	1-3	5-9	2-8
4	5	6	2	3
10-5	8-7	2-4	6-1	3-9
5	6	7	3	4
10-6	9-8	3-5	7-2	4-1
6	7	8	4	5
10-7	1-9	4-6	8-3	5-2
7	8	9	5	6
10-8	2-1	5-7	9-4	6-3
8	9	1	6	7
10-9	3-2	6-8	1-5	7-4
9	1	2	7	8

5 TABLE HOWELL MOVEMENT

10-1	6-8	7-2	5-4	3-9
1	1	3	3	6
10-2	7-9	8-3	6-5	4-1
2	2	4	4	7
10-3	8-1	9-4	7-6	5-2
3	3	5	5	8
10-4	9-2	1-5	8-7	6-3
4	4	6	6	9
10-5	1-3	2-6	9-8	7-4
5	5	7	7	1
10-6	2-4	3-7	1-9	8-5
6	6	8	8	2
10-7	3-5	4-8	2-1	9-6
7	7	9	9	3
10-8	4-6	5-9	3-2	1-7
8	8	1	1	4
10-9	5-7	6-1	4-3	2-8
9	9	2	2	5

5 TABLE HOWELL MOVEMENT

10-1	7-9	8-5	4-3	2-6
1	2	2	2	7
10-2	8-1	9-6	5-4	3-7
2	3	3	3	8
10-3	9-2	1-7	6-5	4-8
3	4	4	4	9
10-4	1-3	2-8	7-6	5-9
4	5	5	5	1
10-5	2-4	3-9	8-7	6-1
5	6	6	6	2
10-6	3-5	4-1	9-8	7-2
6	7	7	7	3
10-7	4-6	5-2	1-9	8-3
7	8	8	8	4
10-8	5-7	6-3	2-1	9-4
8	9	9	9	5
10-9	6-8	7-4	3-2	1-5
9	1	1	1	6

5 TABLE HOWELL MOVEMENT

10-1	7-9	2-6	8-5	4-3
1	2	5	6	9
10-2	8-1	3-7	9-6	5-4
2	3	6	7	1
10-3	9-2	4-8	1-7	6-5
3	4	7	8	2
10-4	1-3	5-9	2-8	7-6
4	5	8	9	3
10-5	2-4	6-1	3-9	8-7
5	6	9	1	4
10-6	3-5	7-2	4-1	9-8
6	7	1	2	5
10-7	4-6	8-3	5-2	1-9
7	8	2	3	6
10-8	5-7	9-4	6-3	2-1
8	9	3	4	7
10-9	6-8	1-5	7-4	3-2
9	1	4	5	8

6 TABLE HOWELL MOVEMENT

12-1	11-4	10-8	5-2	9-3	6-7
1	2	7	8	10	11
12-2	1-5	11-9	6-3	10-4	7-8
2	3	8	9	11	1
12-3	2-6	1-10	7-4	11-5	8-9
3	4	9	10	1	2
12-4	3-7	2-11	8-5	1-6	9-10
4	5	10	11	2	3
12-5	4-8	3-1	9-6	2-7	10-11
5	6	11	1	3	4
12-6	5-9	4-2	10-7	3-8	11-1
6	7	1	2	4	5
12-7	6-10	5-3	11-8	4-9	1-2
7	8	2	3	5	6
12-8	7-11	6-4	1-9	5-10	2-3
8	9	3	4	6	7
12-9	8-1	7-5	2-10	6-11	3-4
9	10	4	5	7	8
12-10	9-2	8-6	3-11	7-1	4-5
10	11	5	6	8	9
12-11	10-3	9-7	4-1	8-2	5-6
11	1	6	7	9	10

6 TABLE HOWELL MOVEMENT

12-1	9-8	5-7	3-11	2-6	4-10
1	1	2	2	11	11
12-2	10-9	6-8	4-1	3-7	5-11
2	2	3	3	1	1
12-3	11-10	7-9	5-2	4-8	6-1
3	3	4	4	2	2
12-4	1-11	8-10	6-3	5-9	7-2
4	4	5	5	3	3
12-5	2-1	9-11	7-4	6-10	8-3
5	5	6	6	4	4
12-6	3-2	10-1	8-5	7-11	9-4
6	6	7	7	5	5
12-7	4-3	11-2	9-6	8-1	10-5
7	7	8	8	6	6
12-8	5-4	1-3	10-7	9-2	11-6
8	8	9	9	7	7
12-9	6-5	2-4	11-8	10-3	1-7
9	9	10	10	8	8
12-10	7-6	3-5	1-9	11-4	2-8
10	10	11	11	9	9
12-11	8-7	4-6	2-10	1-5	3-9
11	11	1	1	10	10

6 TABLE HOWELL MOVEMENT

12-1	11-7	9-10	6-4	3-8	5-2
1	1	2	3	10	11
12-2	1-8	10-11	7-5	4-9	6-3
2	2	3	4	11	1
12-3	2-9	11-1	8-6	5-10	7-4
3	3	4	5	1	2
12-4	3-10	1-2	9-7	6-11	8-5
4	4	5	6	2	3
12-5	4-11	2-3	10-8	7-1	9-6
5	5	6	7	3	4
12-6	5-1	3-4	11-9	8-2	10-7
6	6	7	8	4	5
12-7	6-2	4-5	1-10	9-3	11-8
7	7	8	9	5	6
12-8	7-3	5-6	2-11	10-4	1-9
8	8	9	10	6	7
12-9	8-4	6-7	3-1	11-5	2-10
9	9	10	11	7	8
12-10	9-5	7-8	4-2	1-6	3-11
10	10	11	1	8	9
12-11	10-6	8-9	5-3	2-7	4-1
11	11	1	2	9	10

6 TABLE HOWELL MOVEMENT

12-1	3-5	11-8	10-4	2-9	7-6
1	2	4	5	7	9
12-2	4-6	1-9	11-5	3-10	8-7
2	3	5	6	8	10
12-3	5-7	2-10	1-6	4-11	9-8
3	4	6	7	9	11
12-4	6-8	3-11	2-7	5-1	10-9
4	5	7	8	10	1
12-5	7-9	4-1	3-8	6-2	11-10
5	6	8	9	11	2
12-6	8-10	5-2	4-9	7-3	1-11
6	7	9	10	1	3
12-7	9-11	6-3	5-10	8-4	2-1
7	8	10	11	2	4
12-8	10-1	7-4	6-11	9-5	3-2
8	9	11	1	3	5
12-9	11-2	8-5	7-1	10-6	4-3
9	10	1	2	4	6
12-10	1-3	9-6	8-2	11-7	5-4
10	11	2	3	5	7
12-11	2-4	10-7	9-3	1-8	6-5
11	1	3	4	6	8

7 TABLE HOWELL MOVEMENT

14-1	4-6	10-13	2-7	3-12	5-11	8-9
1	2	3	4	11	12	13
14-2	5-7	11-1	3-8	4-13	6-12	9-10
2	3	4	5	12	13	1
14-3	6-8	12-2	4-9	5-1	7-13	10-11
3	4	5	6	13	1	2
14-4	7-9	13-3	5-10	6-2	8-1	11-12
4	5	6	7	1	2	3
14-5	8-10	1-4	6-11	7-3	9-2	12-13
5	6	7	8	2	3	4
14-6	9-11	2-5	7-12	8-4	10-3	13-1
6	7	8	9	3	4	5
14-7	10-12	3-6	8-13	9-5	11-4	1-2
7	8	9	10	4	5	6
14-8	11-13	4-7	9-1	10-6	12-5	2-3
8	9	10	11	5	6	7
14-9	12-1	5-8	10-2	11-7	13-6	3-4
9	10	11	12	6	7	8
14-10	13-2	6-9	11-3	12-8	1-7	4-5
10	11	12	13	7	8	9
14-11	1-3	7-10	12-4	13-9	2-8	5-6
11	12	13	1	8	9	10
14-12	2-4	8-11	13-5	1-10	3-9	6-7
12	13	1	2	9	10	11
14-13	3-5	9-12	1-6	2-11	4-10	7-8
13	1	2	3	10	11	12

7 TABLE HOWELL MOVEMENT

14-1	7-6	10-4	12-3	13-8	5-2	11-9
1	2	3	4	11	12	13
14-2	8-7	11-5	13-4	1-9	6-3	12-10
2	3	4	5	12	13	1
14-3	9-8	12-6	1-5	2-10	7-4	13-11
3	4	5	6	13	1	2
14-4	10-9	13-7	2-6	3-11	8-5	1-12
4	5	6	7	1	2	3
14-5	11-10	1-8	3-7	4-12	9-6	2-13
5	6	7	8	2	3	4
14-6	12-11	2-9	4-8	5-13	10-7	3-1
6	7	8	9	3	4	5
14-7	13-12	3-10	5-9	6-1	11-8	4-2
7	8	9	10	4	5	6
14-8	1-13	4-11	6-10	7-2	12-9	5-3
8	9	10	11	5	6	7
14-9	2-1	5-12	7-11	8-3	13-10	6-4
9	10	11	12	6	7	8
14-10	3-2	6-13	8-12	9-4	1-11	7-5
10	11	12	13	7	8	9
14-11	4-3	7-1	9-13	10-5	2-12	8-6
11	12	13	1	8	9	10
14-12	5-4	8-2	10-1	11-6	3-13	9-7
12	13	1	2	9	10	11
14-13	6-5	9-3	11-2	12-7	4-1	10-8
13	1	2	3	10	11	12

7 TABLE HOWELL MOVEMENT

14-1	8-6	5-13	4-7	3-12	10-11	2-9
1	2	10	10	11	12	13
14-2	9-7	6-1	5-8	4-13	11-12	3-10
2	3	11	11	12	13	1
14-3	10-8	7-2	6-9	5-1	12-13	4-11
3	4	12	12	13	1	2
14-4	11-9	8-3	7-10	6-2	13-1	5-12
4	5	13	13	1	2	3
14-5	12-10	9-4	8-11	7-3	1-2	6-13
5	6	1	1	2	3	4
14-6	13-11	10-5	9-12	8-4	2-3	7-1
6	7	2	2	3	4	5
14-7	1-12	11-6	10-13	9-5	3-4	8-2
7	8	3	3	4	5	6
14-8	2-13	12-7	11-1	10-6	4-5	9-3
8	9	4	4	5	6	7
14-9	3-1	13-8	12-2	11-7	5-6	10-4
9	10	5	5	6	7	8
14-10	4-2	1-9	13-3	12-8	6-7	11-5
10	11	6	6	7	8	9
14-11	5-3	2-10	1-4	13-9	7-8	12-6
11	12	7	7	8	9	10
14-12	6-4	3-11	2-5	1-10	8-9	13-7
12	13	8	8	9	10	11
14-13	7-5	4-12	3-6	2-11	9-10	1-8
13	1	9	9	10	11	12

7 TABLE HOWELL MOVEMENT

14-1	8-5	2-6	4-10	13-12	7-9	11-3
1	1	10	11	11	12	13
14-2	9-6	3-7	5-11	1-13	8-10	12-4
2	2	11	12	12	13	1
14-3	10-7	4-8	6-12	2-1	9-11	13-5
3	3	12	13	13	1	2
14-4	11-8	5-9	7-13	3-2	10-12	1-6
4	4	13	1	1	2	3
14-5	12-9	6-10	8-1	4-3	11-13	2-7
5	5	1	2	2	3	4
14-6	13-10	7-11	9-2	5-4	12-1	3-8
6	6	2	3	3	4	5
14-7	1-11	8-12	10-3	6-5	13-2	4-9
7	7	3	4	4	5	6
14-8	2-12	9-13	11-4	7-6	1-3	5-10
8	8	4	5	5	6	7
14-9	3-13	10-1	12-5	8-7	2-4	6-11
9	9	5	6	6	7	8
14-10	4-1	11-2	13-6	9-8	3-5	7-12
10	10	6	7	7	8	9
14-11	5-2	12-3	1-7	10-9	4-6	8-13
11	11	7	8	8	9	10
14-12	6-3	13-4	2-8	11-10	5-7	9-1
12	12	8	9	9	10	11
14-13	7-4	1-5	3-9	12-11	6-8	10-2
13	13	9	10	10	11	12

7 TABLE HOWELL MOVEMENT

14-1	8-10	5-9	2-7	13-12	6-3	11-4
1	1	10	10	11	13	13
14-2	9-11	6-10	3-8	1-13	7-4	12-5
2	2	11	11	12	1	1
14-3	10-12	7-11	4-9	2-1	8-5	13-6
3	3	12	12	13	2	2
14-4	11-13	8-12	5-10	3-2	9-6	1-7
4	4	13	13	1	3	3
14-5	12-1	9-13	6-11	4-3	10-7	2-8
5	5	1	1	2	4	4
14-6	13-2	10-1	7-12	5-4	11-8	3-9
6	6	2	2	3	5	5
14-7	1-3	11-2	8-13	6-5	12-9	4-10
7	7	3	3	4	6	6
14-8	2-4	12-3	9-1	7-6	13-10	5-11
8	8	4	4	5	7	7
14-9	3-5	13-4	10-2	8-7	1-11	6-12
9	9	5	5	6	8	8
14-10	4-6	1-5	11-3	9-8	2-12	7-13
10	10	6	6	7	9	9
14-11	5-7	2-6	12-4	10-9	3-13	8-1
11	11	7	7	8	10	10
14-12	6-8	3-7	13-5	11-10	4-1	9-2
12	12	8	8	9	11	11
14-13	7-9	4-8	1-6	12-11	5-2	10-3
13	13	9	9	10	12	12

7 TABLE HOWELL MOVEMENT

14-1	7-11	4-6	12-5	2-10	13-3	8-9
1	3	5	7	8	10	12
14-2	8-12	5-7	13-6	3-11	1-4	9-10
2	4	6	8	9	11	13
14-3	9-13	6-8	1-7	4-12	2-5	10-11
3	5	7	9	10	12	1
14-4	10-1	7-9	2-8	5-13	3-6	11-12
4	6	8	10	11	13	2
14-5	11-2	8-10	3-9	6-1	4-7	12-13
5	7	9	11	12	1	3
14-6	12-3	9-11	4-10	7-2	5-8	13-1
6	8	10	12	13	2	4
14-7	13-4	10-12	5-11	8-3	6-9	1-2
7	9	11	13	1	3	5
14-8	1-5	11-13	6-12	9-4	7-10	2-3
8	10	12	1	2	4	6
14-9	2-6	12-1	7-13	10-5	8-11	3-4
9	11	13	2	3	5	7
14-10	3-7	13-2	8-1	11-6	9-12	4-5
10	12	1	3	4	6	8
14-11	4-8	1-3	9-2	12-7	10-13	5-6
11	13	2	4	5	7	9
14-12	5-9	2-4	10-3	13-8	11-1	6-7
12	1	3	5	6	8	10
14-13	6-10	3-5	11-4	1-9	12-2	7-8
13	2	4	6	7	9	11

7 TABLE HOWELL MOVEMENT

14-1	5-7	10-2	13-9	3-4	8-11	6-12
1	3	5	6	8	10	13
14-2	6-8	11-3	1-10	4-5	9-12	7-13
2	4	6	7	9	11	1
14-3	7-9	12-4	2-11	5-6	10-13	8-1
3	5	7	8	10	12	2
14-4	8-10	13-5	3-12	6-7	11-1	9-2
4	6	8	9	11	13	3
14-5	9-11	1-6	4-13	7-8	12-2	10-3
5	7	9	10	12	1	4
14-6	10-12	2-7	5-1	8-9	13-3	11-4
6	8	10	11	13	2	5
14-7	11-13	3-8	6-2	9-10	1-4	12-5
7	9	11	12	1	3	6
14-8	12-1	4-9	7-3	10-11	2-5	13-6
8	10	12	13	2	4	7
14-9	13-2	5-10	8-4	11-12	3-6	1-7
9	11	13	1	3	5	8
14-10	1-3	6-11	9-5	12-13	4-7	2-8
10	12	1	2	4	6	9
14-11	2-4	7-12	10-6	13-1	5-8	3-9
11	13	2	3	5	7	10
14-12	3-5	8-13	11-7	1-2	6-9	4-10
12	1	3	4	6	8	11
14-13	4-6	9-1	12-8	2-3	7-10	5-11
13	2	4	5	7	9	12

8 TABLE HOWELL MOVEMENT

16-1	13-7	9-12	3-2	6-8	14-10	15-5	4-11
1	2	3	4	5	6	8	9
16-2	14-8	10-13	4-3	7-9	15-11	1-6	5-12
2	3	4	5	6	7	9	10
16-3	15-9	11-14	5-4	8-10	1-12	2-7	6-13
3	4	5	6	7	8	10	11
16-4	1-10	12-15	6-5	9-11	2-13	3-8	7-14
4	5	6	7	8	9	11	12
16-5	2-11	13-1	7-6	10-12	3-14	4-9	8-15
5	6	7	8	9	10	12	13
16-6	3-12	14-2	8-7	11-13	4-15	5-10	9-1
6	7	8	9	10	11	13	14
16-7	4-13	15-3	9-8	12-14	5-1	6-11	10-2
7	8	9	10	11	12	14	15
16-8	5-14	1-4	10-9	13-15	6-2	7-12	11-3
8	9	10	11	12	13	15	1
16-9	6-15	2-5	11-10	14-1	7-3	8-13	12-4
9	10	11	12	13	14	1	2
16-10	7-1	3-6	12-11	15-2	8-4	9-14	13-5
10	11	12	13	14	15	2	3
16-11	8-2	4-7	13-12	1-3	9-5	10-15	14-6
11	12	13	14	15	1	3	4
16-12	9-3	5-8	14-13	2-4	10-6	11-1	15-7
12	13	14	15	1	2	4	5
16-13	10-4	6-9	15-14	3-5	11-7	12-2	1-8
13	14	15	1	2	3	5	6
16-14	11-5	7-10	1-15	4-6	12-8	13-3	2-9
14	15	1	2	3	4	6	7
16-15	12-6	8-11	2-1	5-7	13-9	14-4	3-10
15	1	2	3	4	5	7	8

8 TABLE HOWELL MOVEMENT

16-1	7-11	10-13	6-8	3-2	9-15	12-5	14-4
1	2	3	5	6	7	14	15
16-2	8-12	11-14	7-9	4-3	10-1	13-6	15-5
2	3	4	6	7	8	15	1
16-3	9-13	12-15	8-10	5-4	11-2	14-7	1-6
3	4	5	7	8	9	1	2
16-4	10-14	13-1	9-11	6-5	12-3	15-8	2-7
4	5	6	8	9	10	2	3
16-5	11-15	14-2	10-12	7-6	13-4	1-9	3-8
5	6	7	9	10	11	3	4
16-6	12-1	15-3	11-13	8-7	14-5	2-10	4-9
6	7	8	10	11	12	4	5
16-7	13-2	1-4	12-14	9-8	15-6	3-11	5-10
7	8	9	11	12	13	5	6
16-8	14-3	2-5	13-15	10-9	1-7	4-12	6-11
8	9	10	12	13	14	6	7
16-9	15-4	3-6	14-1	11-10	2-8	5-13	7-12
9	10	11	13	14	15	7	8
16-10	1-5	4-7	15-2	12-11	3-9	6-14	8-13
10	11	12	14	15	1	8	9
16-11	2-6	5-8	1-3	13-12	4-10	7-15	9-14
11	12	13	15	1	2	9	10
16-12	3-7	6-9	2-4	14-13	5-11	8-1	10-15
12	13	14	1	2	3	10	11
16-13	4-8	7-10	3-5	15-14	6-12	9-2	11-1
13	14	15	2	3	4	11	12
16-14	5-9	8-11	4-6	1-15	7-13	10-3	12-2
14	15	1	3	4	5	12	13
16-15	6-10	9-12	5-7	2-1	8-14	11-4	13-3
15	1	2	4	5	6	13	14

8 TABLE HOWELL MOVEMENT

16-1	13-9	8-15	7-12	6-3	5-14	2-4	10-11
1	1	2	3	4	13	14	15
16-2	14-10	9-1	8-13	7-4	6-15	3-5	11-12
2	2	3	4	5	14	15	1
16-3	15-11	10-2	9-14	8-5	7-1	4-6	12-13
3	3	4	5	6	15	1	2
16-4	1-12	11-3	10-15	9-6	8-2	5-7	13-14
4	4	5	6	7	1	2	3
16-5	2-13	12-4	11-1	10-7	9-3	6-8	14-15
5	5	6	7	8	2	3	4
16-6	3-14	13-5	12-2	11-8	10-4	7-9	15-1
6	6	7	8	9	3	4	5
16-7	4-15	14-6	13-3	12-9	11-5	8-10	1-2
7	7	8	9	10	4	5	6
16-8	5-1	15-7	14-4	13-10	12-6	9-11	2-3
8	8	9	10	11	5	6	7
16-9	6-2	1-8	15-5	14-11	13-7	10-12	3-4
9	9	10	11	12	6	7	8
16-10	7-3	2-9	1-6	15-12	14-8	11-13	4-5
10	10	11	12	13	7	8	9
16-11	8-4	3-10	2-7	1-13	15-9	12-14	5-6
11	11	12	13	14	8	9	10
16-12	9-5	4-11	3-8	2-14	1-10	13-15	6-7
12	12	13	14	15	9	10	11
16-13	10-6	5-12	4-9	3-15	2-11	14-1	7-8
13	13	14	15	1	10	11	12
16-14	11-7	6-13	5-10	4-1	3-12	15-2	8-9
14	14	15	1	2	11	12	13
16-15	12-8	7-14	6-11	5-2	4-13	1-3	9-10
15	15	1	2	3	12	13	14

8 TABLE HOWELL MOVEMENT

16-1	10-11	14-2	7-9	6-12	5-13	3-8	4-15
1	2	4	6	7	9	11	13
16-2	11-12	15-3	8-10	7-13	6-14	4-9	5-1
2	3	5	7	8	10	12	14
16-3	12-13	1-4	9-11	8-14	7-15	5-10	6-2
3	4	6	8	9	11	13	15
16-4	13-14	2-5	10-12	9-15	8-1	6-11	7-3
4	5	7	9	10	12	14	1
16-5	14-15	3-6	11-13	10-1	9-2	7-12	8-4
5	6	8	10	11	13	15	2
16-6	15-1	4-7	12-14	11-2	10-3	8-13	9-5
6	7	9	11	12	14	1	3
16-7	1-2	5-8	13-15	12-3	11-4	9-14	10-6
7	8	10	12	13	15	2	4
16-8	2-3	6-9	14-1	13-4	12-5	10-15	11-7
8	9	11	13	14	1	3	5
16-9	3-4	7-10	15-2	14-5	13-6	11-1	12-8
9	10	12	14	15	2	4	6
16-10	4-5	8-11	1-3	15-6	14-7	12-2	13-9
10	11	13	15	1	3	5	7
16-11	5-6	9-12	2-4	1-7	15-8	13-3	14-10
11	12	14	1	2	4	6	8
16-12	6-7	10-13	1-5	2-8	1-9	14-4	15-11
12	13	15	2	3	5	7	9
16-13	7-8	11-14	4-6	3-9	2-10	15-5	1-12
13	14	1	3	4	6	8	10
16-14	8-9	12-15	5-7	4-10	3-11	1-6	2-13
14	15	2	4	5	7	9	11
16-15	9-10	13-1	6-8	5-11	4-12	2-7	3-14
15	1	3	5	6	8	10	12

9 TABLE HOWELL MOVEMENT

18-1	9-10	6-4	16-8	2-14	7-13	3-17	5-12	11-15
1	2	3	4	5	14	15	16	17
18-2	10-11	7-5	17-9	3-15	8-14	4-1	6-13	12-16
2	3	4	5	6	15	16	17	1
18-3	11-12	8-6	1-10	4-16	9-15	5-2	7-14	13-17
3	4	5	6	7	16	17	1	2
18-4	12-13	9-7	2-11	5-17	10-16	6-3	8-15	14-1
4	5	6	7	8	17	1	2	3
18-5	13-14	10-8	3-12	6-1	11-17	7-4	9-16	15-2
5	6	7	8	9	1	2	3	4
18-6	14-15	11-9	4-13	7-2	12-1	8-5	10-17	16-3
6	7	8	9	10	2	3	4	5
18-7	15-16	12-10	5-14	8-3	13-2	9-6	11-1	17-4
7	8	9	10	11	3	4	5	6
18-8	16-17	13-11	6-15	9-4	14-3	10-7	12-2	1-5
8	9	10	11	12	4	5	6	7
18-9	17-1	14-12	7-16	10-5	15-4	11-8	13-3	2-6
9	10	11	12	13	5	6	7	8
18-10	1-2	15-13	8-17	11-6	16-5	12-9	14-4	3-7
10	11	12	13	14	6	7	8	9
18-11	2-3	16-14	9-1	12-7	17-6	13-10	15-5	4-8
11	12	13	14	15	7	8	9	10
18-12	3-4	17-15	10-2	13-8	1-7	14-11	16-6	5-9
12	13	14	15	16	8	9	10	11
18-13	4-5	1-16	11-3	14-9	2-8	15-12	17-7	6-10
13	14	15	16	17	9	11	11	12
18-14	5-6	2-17	12-4	15-10	3-9	16-13	1-8	7-11
14	15	16	17	1	10	11	12	13
18-15	6-7	3-1	13-5	16-11	4-10	17-14	2-9	8-12
15	16	17	1	2	11	12	13	14
18-16	7-8	4-2	14-6	17-12	5-11	1-15	3-10	9-13
16	17	1	2	3	12	13	14	15
18-17	8-9	5-3	15-7	1-13	6-12	2-16	4-11	10-14
17	1	2	3	4	13	14	15	16

9 TABLE HOWELL MOVEMENT

18-1	5-13	11-6	4-10	14-7	17-2	3-16	9-8	15-12
1	3	5	7	9	10	12	14	16
18-2	6-14	12-7	5-11	15-8	1-3	4-17	10-9	16-13
2	4	6	8	10	11	13	15	17
18-3	7-15	13-8	6-12	16-9	2-4	5-1	11-10	17-14
3	5	7	9	11	12	14	16	1
18-4	8-16	14-9	7-13	17-10	3-5	6-2	12-11	1-15
4	6	8	10	12	13	15	17	2
18-5	9-17	15-10	8-14	1-11	4-6	7-3	13-12	2-16
5	7	9	11	13	14	16	1	3
18-6	10-1	16-11	9-15	2-12	5-7	8-4	14-13	3-17
6	8	10	12	14	15	17	2	4
18-7	11-2	17-12	10-16	3-13	6-8	9-5	15-14	4-1
7	9	11	13	15	16	1	3	5
18-8	12-3	1-13	11-17	4-14	7-9	10-6	16-15	5-2
8	10	12	14	16	17	2	4	6
18-9	13-4	2-14	12-1	5-15	8-10	11-7	17-16	6-3
9	11	13	15	17	1	3	5	7
18-10	14-5	3-15	13-2	6-16	9-11	12-8	1-17	7-4
10	12	14	16	1	2	4	6	8
18-11	15-6	4-16	14-3	7-17	10-12	13-9	2-1	8-5
11	13	15	17	2	3	5	7	9
18-12	16-7	5-17	15-4	8-1	11-13	14-10	3-2	9-6
12	14	16	1	3	4	6	8	10
18-13	17-8	6-1	16-5	9-2	12-14	15-11	4-3	10-7
13	15	17	2	4	5	7	9	11
18-14	1-9	7-2	17-6	10-3	13-15	16-12	5-4	11-8
14	16	1	3	5	6	8	10	12
18-15	2-10	8-3	1-7	11-4	14-16	17-13	6-5	12-9
15	17	2	4	6	7	9	11	13
18-16	3-11	9-4	2-8	12-5	15-17	1-14	7-6	13-10
16	1	3	5	7	8	10	12	14
18-17	4-12	10-5	3-9	13-6	16-1	2-15	8-7	14-11
17	2	4	6	8	9	11	13	15

10 TABLE HOWELL MOVEMENT

20-1	9-14	17-16	19-10	4-6	15-3	12-18	11-7	13-2	5-8
1	2	3	4	5	6	8	9	10	19
20-2	10-15	18-17	1-11	5-7	16-4	13-19	12-8	14-3	6-9
2	3	4	5	6	7	9	10	11	1
20-3	11-16	19-18	2-12	6-8	17-5	14-1	13-9	15-4	7-10
3	4	5	6	7	8	10	11	12	2
20-4	12-17	1-19	3-13	7-9	18-6	15-2	14-10	16-5	8-11
4	5	6	7	8	9	11	12	13	3
20-5	13-18	2-1	4-14	8-10	19-7	16-3	15-11	17-6	9-12
5	6	7	8	9	10	12	13	14	4
20-6	14-19	3-2	5-15	9-11	1-8	17-4	16-12	18-7	10-13
6	7	8	9	10	11	13	14	15	5
20-7	15-1	4-3	6-16	10-12	2-9	18-5	17-13	19-8	11-14
7	8	9	10	11	12	14	15	16	6
20-8	16-2	5-4	7-17	11-13	3-10	19-6	18-14	1-9	12-15
8	9	10	11	12	13	15	16	17	7
20-9	17-3	6-5	8-18	12-14	4-11	1-7	19-15	2-10	13-16
9	10	11	12	13	14	16	17	18	8
20-10	18-4	7-6	9-19	13-15	5-12	2-8	1-16	3-11	14-17
10	11	12	13	14	15	17	18	19	9
20-11	19-5	8-7	10-1	14-16	6-13	3-9	2-17	4-12	15-18
11	12	13	14	15	16	18	19	1	10
20-12	1-6	9-8	11-2	15-17	7-14	4-10	3-18	5-13	16-19
12	13	14	15	16	17	19	1	2	11
20-13	2-7	10-9	12-3	16-18	8-15	5-11	4-19	6-14	17-1
13	14	15	16	17	18	1	2	3	12
20-14	3-8	11-10	13-4	17-19	9-16	6-12	5-1	7-15	18-2
14	15	16	17	18	19	2	3	4	13
20-15	4-9	12-11	14-5	18-1	10-17	7-13	6-2	8-16	19-3
15	16	17	18	19	1	3	4	5	14
20-16	5-10	13-12	15-6	19-2	11-18	8-14	7-3	9-17	1-4
16	17	18	19	1	2	4	5	6	15
20-17	6-11	14-13	16-7	1-3	12-19	9-15	8-4	10-18	2-5
17	18	19	1	2	3	5	6	7	16
20-18	7-12	15-14	17-8	2-4	13-3	10-16	9-5	11-19	3-6
18	19	1	2	3	4	6	7	8	17
20-19	8-13	16-15	18-9	3-5	14-2	11-17	10-6	12-1	4-7
19	1	2	3	4	5	7	8	9	18

10 TABLE HOWELL MOVEMENT

20-1	7-13	6-16	15-4	14-9	8-5	19-2	17-10	18-3	12-11
1	2	4	6	8	9	11	13	15	17
20-2	8-14	7-17	16-5	15-10	9-6	1-3	18-11	19-4	13-12
2	3	5	7	9	10	12	14	16	18
20-3	9-15	8-18	17-6	16-11	10-7	2-4	19-12	1-5	14-13
3	4	6	8	10	11	13	15	17	19
20-4	10-16	9-19	18-7	17-12	11-8	3-5	1-13	2-6	15-14
4	5	7	9	11	12	14	16	18	1
20-5	11-17	10-1	19-8	18-13	12-9	4-6	2-14	3-7	16-15
5	6	8	10	12	13	15	17	19	2
20-6	12-18	11-2	1-9	19-14	13-10	5-7	3-15	4-8	17-16
6	7	9	11	13	14	16	18	1	3
20-7	13-19	12-3	2-10	1-15	14-11	6-8	4-16	5-9	18-17
7	8	10	12	14	15	17	19	2	4
20-8	14-1	13-4	3-11	2-16	15-12	7-9	5-17	6-10	19-18
8	9	11	13	15	16	18	1	3	5
20-9	15-2	14-5	4-12	3-17	16-13	8-10	6-18	7-11	1-19
9	10	12	14	16	17	19	2	4	6
20-10	16-3	15-6	5-13	4-18	17-14	9-11	7-19	8-12	2-1
10	11	13	15	17	18	1	3	5	7
20-11	17-4	16-7	6-14	5-19	18-15	10-12	8-1	9-13	3-2
11	12	14	16	18	19	2	4	6	8
20-12	18-5	17-8	7-15	6-1	19-16	11-13	9-2	10-14	4-3
12	13	15	17	19	1	3	5	7	9
20-13	19-6	18-9	8-16	7-2	1-17	12-14	10-3	11-15	5-4
13	14	16	18	1	2	4	6	8	10
20-14	1-7	19-10	9-17	8-3	2-18	13-15	11-4	12-16	6-5
14	15	17	19	1	2	3	5	7	11
20-15	2-8	1-11	10-18	9-4	3-19	14-16	12-5	13-17	7-6
15	16	18	1	3	4	6	8	10	12
20-16	3-9	2-12	11-19	10-5	4-1	15-17	13-6	14-18	8-7
16	17	19	2	3	5	7	9	11	13
20-17	4-10	3-13	12-1	11-6	5-2	16-18	14-7	15-19	9-8
17	18	1	3	5	6	8	10	12	14
20-18	5-11	4-14	13-2	12-7	6-3	17-19	15-8	16-1	10-9
18	19	2	4	6	7	9	11	13	15
20-19	6-12	5-15	14-3	13-8	7-4	18-1	16-9	17-2	11-10
19	1	3	5	7	8	10	12	14	16

11 TABLE HOWELL MOVEMENT

22-1	11-6	15-14	18-9	20-3	12-5	19-4	13-10	16-8	21-2	7-17
1	2	3	4	5	6	17	18	19	20	21
22-2	12-7	16-15	19-10	21-4	13-6	20-5	14-11	17-9	1-3	8-18
2	3	4	5	6	7	18	19	20	21	1
22-3	13-8	17-16	20-11	1-5	14-7	21-6	15-12	18-10	2-4	9-19
3	4	5	6	7	8	19	20	21	1	2
22-4	14-9	18-17	21-12	2-6	15-8	1-7	16-13	19-11	3-5	10-20
4	5	6	7	8	9	20	21	1	2	3
22-5	15-10	19-18	1-13	3-7	16-9	2-8	17-14	20-12	4-6	11-21
5	6	7	8	9	10	21	1	2	3	4
22-6	16-11	20-19	2-14	4-8	17-10	3-9	18-15	21-13	5-7	12-1
6	7	8	9	10	11	1	2	3	4	5
22-7	17-12	21-20	3-15	5-9	18-11	4-10	19-16	1-14	6-8	13-2
7	8	9	10	11	12	2	3	4	5	6
22-8	18-13	1-21	4-16	6-10	19-12	5-11	20-17	2-15	7-9	14-3
8	9	10	11	12	13	3	4	5	6	7
22-9	19-14	2-1	5-17	7-11	20-13	6-12	21-18	3-16	8-10	15-4
9	10	11	12	13	14	4	5	6	7	8
22-10	20-15	3-2	6-18	8-12	21-14	7-13	1-19	4-17	9-11	16-5
10	11	12	13	14	15	5	6	7	8	9
22-11	21-16	4-3	7-19	9-13	1-15	8-14	2-20	5-18	10-12	17-6
11	12	13	14	15	16	6	7	8	9	10
22-12	1-17	5-4	8-20	10-14	2-16	9-15	3-21	6-19	11-13	18-7
12	13	14	15	16	17	7	8	9	10	11
22-13	2-18	6-5	9-21	11-15	3-17	10-16	4-1	7-20	12-14	19-8
13	14	15	16	17	18	8	9	10	11	12
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22-16	5-21	9-8	12-3	14-18	6-20	13-19	7-4	10-2	15-17	1-11
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22-19	8-3	12-11	15-6	17-21	9-2	16-1	10-7	13-5	18-20	4-14
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22-20	9-4	13-12	16-7	18-1	10-3	17-2	11-8	14-6	19-21	5-15
20	21	1	2	3	4	15	16	17	18	19
22-21	10-5	14-13	17-8	19-2	11-4	18-3	12-9	15-7	20-1	6-16
21	1	2	3	4	5	16	17	18	19	20

11 TABLE HOWELL MOVEMENT

22-1	13-5	28-3	8-15	6-16	17-14	21-2	9-18	12-7	11-10	19-4
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22-2	14-6	21-4	9-16	7-17	18-15	1-3	10-19	13-8	12-11	20-5
2	4	6	8	10	12	13	15	17	19	21
22-3	15-7	1-5	10-17	8-18	19-16	2-4	11-20	14-9	13-12	21-6
3	5	7	9	11	13	14	16	18	20	1
22-4	16-8	2-6	11-18	9-19	20-17	3-5	12-21	15-10	14-13	1-7
4	6	8	10	12	14	15	17	19	21	2
22-5	17-9	3-7	12-19	10-20	21-18	4-6	13-1	16-11	15-14	2-8
5	7	9	11	13	15	16	18	20	1	3
22-6	18-10	4-8	13-20	11-21	1-19	5-7	14-2	17-12	16-15	3-9
6	8	10	12	14	16	17	19	21	2	4
22-7	19-11	5-9	14-21	12-1	2-20	6-8	15-3	18-13	17-16	4-10
7	9	11	13	15	17	18	20	1	3	5
22-8	20-12	6-10	15-1	13-2	3-21	7-9	16-4	19-14	18-17	5-11
8	10	12	14	16	18	19	21	2	4	6
22-9	21-13	7-11	16-2	14-3	4-1	8-10	17-5	20-15	19-18	6-12
9	11	13	15	17	19	20	1	3	5	7
22-10	1-14	8-12	17-3	15-4	5-2	9-11	18-6	21-16	20-19	7-13
10	12	14	16	18	20	21	2	4	6	8
22-11	2-15	9-13	18-4	16-5	6-3	10-12	19-7	1-17	21-20	8-14
11	13	15	17	19	21	1	3	5	7	9
22-12	3-16	10-14	19-5	17-6	7-4	11-13	20-8	2-18	1-21	9-15
12	14	16	18	20	1	2	4	6	8	10
22-13	4-17	11-15	20-6	18-7	8-5	12-14	21-9	3-19	2-1	10-16
13	15	17	19	21	2	3	5	7	9	11
22-14	5-18	12-16	21-7	19-8	9-6	13-15	1-10	4-20	3-2	11-17
14	16	18	20	1	3	4	6	8	10	12
22-15	6-19	13-17	1-8	20-9	10-7	14-16	2-11	5-21	4-3	12-18
15	17	19	21	2	4	5	7	9	11	13
22-16	7-20	14-18	2-9	21-10	11-8	15-17	3-12	6-1	5-4	13-19
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22-17	8-21	15-19	3-10	1-11	12-9	16-18	4-13	7-2	6-5	14-20
17	19	21	2	4	6	7	9	11	13	15
22-18	9-1	16-20	4-11	2-12	13-10	17-19	5-14	8-3	7-6	15-21
18	20	1	3	5	7	8	10	12	14	16
22-19	10-2	17-21	5-12	3-13	14-11	18-20	6-15	9-4	8-7	16-1
19	21	2	4	6	8	9	11	13	15	17
22-20	11-3	18-1	6-13	4-14	15-12	19-21	7-16	10-5	9-8	17-2
20	1	3	5	7	9	10	12	14	16	18
22-21	12-4	19-2	7-14	5-15	16-13	20-1	8-17	11-6	10-9	18-3
21	2	4	6	8	10	11	13	15	17	19

12 TABLE HOWELL MOVEMENT

24-1	17-8	14-13	21-4	15-10	12-9	20-5	22-3	18-11	6-16	23-2	7-19
1	2	3	5	6	7	8	9	20	21	22	23
24-2	18-9	15-14	22-5	16-11	13-10	21-6	23-4	19-12	7-17	1-3	8-20
2	3	4	6	7	8	9	10	21	22	23	1
24-3	19-10	16-15	23-6	17-12	14-11	22-7	1-5	20-13	8-18	2-4	9-21
3	4	5	7	8	9	10	11	22	23	1	2
24-4	20-11	17-16	1-7	18-13	15-12	23-8	2-6	21-14	9-19	3-5	10-22
4	5	6	8	9	10	11	12	23	1	2	3
24-5	21-12	18-17	2-8	19-14	16-13	1-9	3-7	22-15	10-20	4-6	11-23
5	6	7	9	10	11	12	13	1	2	3	4
24-6	22-13	19-18	3-9	20-15	17-14	2-10	4-8	23-16	11-21	5-7	12-1
6	7	8	10	11	12	13	14	2	3	4	5
24-7	23-14	20-19	4-10	21-16	18-15	3-11	5-9	1-17	12-22	6-8	13-2
7	8	9	11	12	13	14	15	3	4	5	6
24-8	1-15	21-20	5-11	22-17	19-16	4-12	6-10	2-18	13-23	7-9	14-3
8	9	10	12	13	14	15	16	4	5	6	7
24-9	2-16	22-21	6-12	23-18	20-17	5-13	7-11	3-19	14-1	8-10	15-4
9	10	11	13	14	15	16	17	5	6	7	8
24-10	3-17	23-22	7-13	1-19	21-18	6-14	8-12	4-20	15-2	9-11	16-5
10	11	12	14	15	16	17	18	6	7	8	9
24-11	4-18	1-23	8-14	2-20	22-19	7-15	9-13	5-21	16-3	10-12	17-6
11	12	13	15	16	17	18	19	7	8	9	10
24-12	5-19	2-1	9-15	3-21	23-20	8-16	10-14	6-22	17-4	11-13	18-7
12	13	14	16	17	18	19	20	8	9	10	11
24-13	6-20	3-2	10-16	4-22	1-21	9-17	11-15	7-23	18-5	12-14	19-8
13	14	15	17	18	19	20	21	9	10	11	12
24-14	7-21	4-3	11-17	5-23	2-22	10-18	12-16	8-1	19-6	13-15	20-9
14	15	16	18	19	20	21	22	10	11	12	13
24-15	8-22	5-4	12-18	6-1	3-23	11-19	13-17	9-2	20-7	14-16	21-10
15	16	17	19	20	21	22	23	11	12	13	14
24-16	9-23	6-5	13-19	7-2	4-1	12-20	14-18	10-3	21-8	15-17	22-11
16	17	18	20	21	22	23	1	12	13	14	15
24-17	10-1	7-6	14-20	8-3	5-2	13-21	15-19	11-4	22-9	16-18	23-12
17	18	19	21	22	23	1	2	13	14	15	16
24-18	11-2	8-7	15-21	9-4	6-3	14-22	16-20	12-5	23-10	17-19	1-13
18	19	20	22	23	1	2	3	14	15	16	17
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19	20	21	23	1	2	3	4	15	16	17	18
24-20	13-4	10-9	17-23	11-6	8-5	16-1	18-22	14-7	2-12	19-21	3-15
20	21	22	1	2	3	4	5	16	17	18	19
24-21	14-5	11-10	18-1	12-7	9-6	17-2	19-23	15-8	3-13	20-22	4-16
21	22	23	2	3	4	5	6	17	18	19	20
24-22	15-6	12-11	19-2	13-8	10-7	18-3	20-1	16-9	4-14	21-23	5-17
22	23	1	3	4	5	6	7	18	19	20	21
24-23	16-7	13-12	20-3	14-9	11-8	19-4	21-2	17-10	5-15	22-1	6-18
23	1	2	4	5	6	7	8	19	20	21	22

12 TABLE HOWELL MOVEMENT

24-1	18-11	7-19	14-13	22-3	21-4	12-9	15-10	20-5	6-16	23-2	17-8
1	2	4	6	8	10	11	13	15	17	19	21
24-2	19-12	8-20	15-14	23-4	22-5	13-10	16-11	21-6	7-17	1-3	18-9
2	3	5	7	9	11	12	14	16	18	20	22
24-3	20-13	9-21	16-15	1-5	23-6	14-11	17-12	22-7	8-18	2-4	19-10
3	4	6	8	10	12	13	15	17	19	21	23
24-4	21-14	10-22	17-16	2-6	1-7	15-12	18-13	23-8	9-19	3-5	20-11
4	5	7	9	11	13	14	16	18	20	22	1
24-5	22-15	11-23	18-17	3-7	2-8	16-13	19-14	1-9	10-20	4-6	21-12
5	6	8	10	12	14	15	17	19	21	23	2
24-6	23-16	12-1	19-18	4-8	3-9	17-14	20-15	2-10	11-21	5-7	22-13
6	7	9	11	13	15	16	18	20	22	1	3
24-7	1-17	13-2	20-19	5-9	4-10	18-15	21-16	3-11	12-22	6-8	23-14
7	8	10	12	14	16	17	19	21	23	2	4
24-8	2-18	14-3	21-20	6-10	5-11	19-16	22-17	4-12	13-23	7-9	1-15
8	9	11	13	15	17	18	20	22	1	3	5
24-9	3-19	15-4	22-21	7-11	6-12	20-17	23-18	5-13	14-1	8-10	2-16
9	10	12	14	16	18	19	21	23	2	4	6
24-10	4-20	16-5	23-22	8-12	7-13	21-18	1-19	6-14	15-2	9-11	3-17
10	11	13	15	17	19	20	22	1	3	5	7
24-11	5-21	17-6	1-23	9-13	8-14	22-19	2-20	7-15	16-3	10-12	4-18
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24-12	6-22	18-7	2-1	10-14	9-15	23-20	3-21	8-16	17-4	11-13	5-19
12	13	15	17	19	21	22	1	3	5	7	9
24-13	7-23	19-8	3-2	11-15	10-16	1-21	4-22	9-17	18-5	12-14	6-20
13	14	16	18	20	22	23	2	4	6	8	10
24-14	8-1	20-9	4-3	12-16	11-17	2-22	5-23	10-18	19-6	13-15	7-21
14	15	17	19	21	23	1	3	5	7	9	11
24-15	9-2	21-10	5-4	13-17	12-18	3-23	6-1	11-19	20-7	14-16	8-22
15	16	18	20	22	1	2	4	6	8	10	12
24-16	10-3	22-11	6-5	14-18	13-19	4-1	7-2	12-20	21-8	15-17	9-23
16	17	19	21	23	2	3	5	7	9	11	13
24-17	11-4	23-12	7-6	15-19	14-20	5-2	8-3	13-21	22-9	16-18	10-1
17	18	20	22	1	3	4	6	8	10	12	14
24-18	12-5	1-13	8-7	16-20	15-21	6-3	9-4	14-22	23-10	17-19	11-2
18	19	21	23	2	4	5	7	9	11	13	15
24-19	13-6	2-14	9-8	17-21	16-22	7-4	10-5	15-23	1-11	18-20	12-3
19	20	22	1	3	5	6	8	10	12	14	16
24-20	14-7	3-15	10-9	18-22	17-23	8-5	11-6	16-1	2-12	19-21	13-4
20	21	23	2	4	6	7	9	11	13	15	17
24-21	15-8	4-16	11-10	19-23	18-1	9-6	12-7	17-2	3-13	20-22	14-5
21	22	1	3	5	7	8	10	12	14	16	18
24-22	16-9	5-17	12-11	20-1	19-2	10-7	13-8	18-3	4-14	21-23	15-6
22	23	2	4	6	8	9	11	13	15	17	19
24-23	17-10	6-18	13-12	21-2	20-3	11-8	14-9	19-4	5-15	22-1	16-7
23	1	3	5	7	9	10	12	14	16	18	20

13 TABLE HOWELL MOVEMENT

26-1	21-12	15-8	11-10	16-6	24-3	5-22	4-23	20-9	18-13	25-2	19-7	17-14
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13 TABLE HOWELL MOVEMENT

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14 TABLE HOWELL MOVEMENT

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14 TABLE HOWELL MOVEMENT

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15 TABLE HOWELL MOVEMENT

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16 TABLE HOWELL MOVEMENT

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19 TABLE HOWELL MOVEMENT

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20 TABLE HOWELL MOVEMENT

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12	13	14	16	17	18	19	20	21	22	23	24	4	5	6	7	8	9	10	11	
40-13	23-4	32-29	36-25	38-31	2-24	17-9	20-6	8-18	35-30	1-22	7-19	37-28	10-16	34-33	39-26	11-15	5-21	14-12	3-27	
13	14	15	17	18	19	20	21	22	23	24	25	5	6	7	8	9	10	11	12	
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40-15	25-6	34-31	38-27	1-33	4-26	19-11	22-8	10-20	37-32	3-24	9-21	39-30	12-18	36-35	2-28	13-17	7-23	16-14	5-29	
15	16	17	19	20	21	22	23	24	25	26	27	7	8	9	10	11	12	13	14	
40-16	26-7	35-32	39-28	2-34	5-27	20-12	23-9	11-21	38-33	4-25	10-22	1-31	13-19	37-36	3-29	14-18	8-24	17-15	6-30	
16	17	18	20	21	22	23	24	25	26	27	28	8	9	10	11	12	13	14	15	
40-17	27-8	36-33	1-29	3-35	6-28	21-13	24-10	12-22	39-34	5-26	11-23	2-32	14-20	38-37	4-30	15-19	9-25	18-16	7-31	
17	18	19	21	22	23	24	25	26	27	28	29	9	10	11	12	13	14	15	16	
40-18	28-9	37-34	2-30	4-36	7-29	22-14	25-11	13-23	1-35	6-27	12-24	3-33	15-21	39-38	5-31	16-20	10-26	19-17	8-32	
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40-19	29-10	38-35	3-31	5-37	8-30	23-15	26-12	14-24	1-36	7-28	13-25	4-34	16-22	1-39	6-32	17-21	11-27	20-18	9-33	
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40-20	30-11	39-36	4-32	6-38	9-31	24-16	27-13	15-25	3-37	8-29	14-26	5-35	17-23	2-1	7-33	18-22	12-28	21-19	10-34	
20	21	22	24	25	26	27	28	29	30	31	32	12	13	14	15	16	17	18	19	
40-21	31-12	1-37	5-33	7-39	10-32	25-17	28-14	16-26	4-38	9-30	15-27	6-36	18-24	3-2	8-34	19-23	13-29	22-20	11-35	
21	22	23	25	26	27	28	29	30	31	32	33	13	14	15	16	17	18	19	20	
40-22	32-13	2-38	6-34	8-1	11-33	26-18	29-15	17-27	5-39	10-31	16-28	7-37	19-25	4-3	9-35	20-24	14-30	23-21	12-36	
22	23	24	26	27	28	29	30	31	32	33	34	14	15	16	17	18	19	20	21	
40-23	33-14	3-39	7-35	9-2	12-34	27-19	30-16	18-28	6-1	11-32	17-29	8-38	20-26	5-4	10-36	21-25	15-31	24-22	13-37	
23	24	25	27	28	29	30	31	32	33	34	35	15	16	17	18	19	20	21	22	
40-24	34-15	4-1	8-36	10-3	13-35	28-20	31-17	19-29	7-2	12-33	18-30	9-39	21-27	6-5	11-37	22-26	16-32	25-23	14-38	
24	25	26	28	29	30	31	32	33	34	35	36	16	17	18	19	20	21	22	23	
40-25	35-16	5-2	9-37	11-4	14-36	29-21	32-18	20-30	8-3	13-34	19-31	10-1	22-28	7-6	12-38	23-27	17-33	26-24	15-39	
25	26	27	29	30	31	32	33	34	35	36	37	17	18	19	20	21	22	23	24	
40-26	36-17	6-3	10-38	12-5	15-37	30-22	33-19	21-31	9-4	14-35	20-32	11-2	23-29	8-7	13-39	24-28	18-34	27-25	16-1	
26	27	28	30	31	32	33	34	35	36	37	38	18	19	20	21	22	23	24	25	
40-27	37-18	7-4	11-39	13-6	16-38	31-23	34-20	22-32	10-5	15-36	21-33	12-3	24-30	9-8	14-1	25-29	19-35	28-26	17-2	
27	28	29	31	32	33	34	35	36	37	38	39	19	20	21	22	23	24	25	26	
40-28	38-19	8-5	12-1	14-7	17-39	32-24	35-21	23-33	11-6	16-37	22-34	13-4	25-31	10-9	15-2	26-30	20-36	29-27	18-3	
28	29	30	32	33	34	35	36	37	38	39	1	20	21	22	23	24	25	26	27	
40-29	39-20	9-6	13-2	15-8	18-1	33-25	36-22	24-34	12-7	17-38	23-35	14-5	26-32	11-10	16-3	27-31	21-37	30-28	19-4	
29	30	31	33	34	35	36	37	38	39	1	2	21	22	23	24	25	26	27	28	
40-30	1-21	10-7	14-3	16-9	19-2	34-26	37-23	25-35	13-8	18-39	24-36	15-6	27-33	12-11	17-4	28-32	22-38	31-29	20-5	
30	31	32	34	35	36	37	38	39	1	2	3	22	23	24	25	26	27	28	29	
40-31	2-22	11-8	15-4	17-10	20-3	35-27	38-24	26-36	14-9	19-1	25-37	16-7	28-34	13-12	18-5	29-33	23-39	32-30	21-6	
31	32	33	35	36	37	38	39	1	2	3	4	23	24	25	26	27	28	29	30	
40-32	3-23	12-9	16-5	18-11	21-4	36-28	39-25	27-37	15-10	20-2	26-38	17-8	29-35	14-13	19-6	30-34	24-1	33-31	22-7	
32	33	34	36	37	38	39	1	2	3	4	5	24	25	26	27	28	29	30	31	
40-33	4-24	13-10	17-6	19-12	22-5	37-29	1-26	28-38	16-11	21-3	27-39	18-9	30-36	15-14	20-7	31-35	25-2	34-32	23-8	
33	34	35	37	38	39	1	2	3	4	5	6	25	26	27	28	29	30	31	32	
40-34	5-25	14-11	18-7	20-13	23-6	38-30	2-27	29-39	17-12	22-4	28-1	19-10	31-37	16-15	21-8	32-36	26-3	35-33	24-9	
34	35	36	38	39	1	2	3	4	5	6	7	26	27	28	29	30	31	32	33	
40-35	6-26	15-12	19-8	21-14	24-7	39-31	3-28	30-1	18-13	23-5	29-2	20-11	32-38	17-16	22-9	33-37	27-4	36-34	25-10	
35	36	37	39	1	2	3	4	5	6	7	8	27	28	29	30	31	32	33	34	
40-36	7-27	16-13	20-9	22-15	25-8	1-32	4-29	31-2	19-14	24-6	30-3	21-12	33-39	18-17	23-10	34-38	28-5	37-35	26-11	
36	37	38	1	2	3	4	5	6	7	8	9	28	29	30	31	32	33	34	35	
40-37	8-28	17-14	21-10																	

8 TABLE 13 ROUND 3/4 HOWELL MOVEMENT

16-1	15-12	6-10	8-13	11-5	4-3	14-2	7-9
1	2	8	9	10	11	12	13
16-2	15-13	7-11	9-1	12-6	5-4	14-3	8-10
2	3	9	10	11	12	13	1
16-3	15-1	8-12	10-2	13-7	6-5	14-4	9-11
3	4	10	11	12	13	1	2
16-4	15-2	9-13	11-3	1-8	7-6	14-5	10-12
4	5	11	12	13	1	2	3
16-5	15-3	10-1	12-4	2-9	8-7	14-6	11-13
5	6	12	13	1	2	3	4
16-6	15-4	11-2	13-5	3-10	9-8	14-7	12-1
6	7	13	1	2	3	4	5
16-7	15-5	12-3	1-6	4-11	10-9	14-8	13-2
7	8	1	2	3	4	5	6
16-8	15-6	13-4	2-7	5-12	11-10	14-9	1-3
8	9	2	3	4	5	6	7
16-9	15-7	1-5	3-8	6-13	12-11	14-10	2-4
9	10	3	4	5	6	7	8
16-10	15-8	2-6	4-9	7-1	13-12	14-11	3-5
10	11	4	5	6	7	8	9
16-11	15-9	3-7	5-10	8-2	1-13	14-12	4-6
11	12	5	6	7	8	9	10
16-12	15-10	4-8	6-11	9-3	2-1	14-13	5-7
12	13	6	7	8	9	10	11
16-13	15-11	5-9	7-12	10-4	3-2	14-1	6-8
13	1	7	8	9	10	11	12

8 TABLE 13 ROUND 3/4 HOWELL MOVEMENT

6-10	8-13	11-5	4-3	14-2	7-9	16-1	15-12
1	2	3	4	5	6	7	8
7-11	9-1	12-6	5-4	14-3	8-10	16-2	15-13
2	3	4	5	6	7	8	9
8-12	10-2	13-7	6-5	14-4	9-11	16-3	15-1
3	4	5	6	7	8	9	10
9-13	11-3	1-8	7-6	14-5	10-12	16-4	15-2
4	5	6	7	8	9	10	11
10-1	12-4	2-9	8-7	14-6	11-13	16-5	15-3
5	6	7	8	9	10	11	12
11-2	13-5	3-10	9-8	14-7	12-1	16-6	15-4
6	7	8	9	10	11	12	13
12-3	1-6	4-11	10-9	14-8	13-2	16-7	15-5
7	8	9	10	11	12	13	1
13-4	2-7	5-12	11-10	14-9	1-3	16-8	15-6
8	9	10	11	12	13	1	2
1-5	3-8	6-13	12-11	14-10	2-4	16-9	15-7
9	10	11	12	13	1	2	3
2-6	4-9	7-1	13-12	14-11	3-5	16-10	15-8
10	11	12	13	1	2	3	4
3-7	5-10	8-2	1-13	14-12	4-6	16-11	15-9
11	12	13	1	2	3	4	5
4-8	6-11	9-3	2-1	14-13	5-7	16-12	15-10
12	13	1	2	3	4	5	6
5-9	7-12	10-4	3-2	14-1	6-8	16-13	15-11
13	1	2	3	4	5	6	7

9 TABLE 13 ROUND 3/4 HOWELL MOVEMENT

18-1	17-12	8-5	2-10	13-9	7-16	15-6	11-4	3-14
1	2	3	4	5	6	7	8	9
18-2	17-13	9-6	3-11	1-10	8-16	15-7	12-5	4-14
2	3	4	5	6	7	8	9	10
18-3	17-1	10-7	4-12	2-11	9-16	15-8	13-6	5-14
3	4	5	6	7	8	9	10	11
18-4	17-2	11-8	5-13	3-12	10-16	15-9	1-7	6-14
4	5	6	7	8	9	10	11	12
18-5	17-3	12-9	6-1	4-13	11-16	15-10	2-8	7-14
5	6	7	8	9	10	11	12	13
18-6	17-4	13-10	7-2	5-1	12-16	15-11	3-9	8-14
6	7	8	9	10	11	12	13	1
18-7	17-5	1-11	8-3	6-2	13-16	15-12	4-10	9-14
7	8	9	10	11	12	13	1	2
18-8	17-6	2-12	9-4	7-3	1-16	15-13	5-11	10-14
8	9	10	11	12	13	1	2	3
18-9	17-7	3-13	10-5	8-4	2-16	15-1	6-12	11-14
9	10	11	12	13	1	2	3	4
18-10	17-8	4-1	11-6	9-5	3-16	15-2	7-13	12-14
10	11	12	13	1	2	3	4	5
18-11	17-9	5-2	12-7	10-6	4-16	15-3	8-1	13-14
11	12	13	1	2	3	4	5	6
18-12	17-10	6-3	13-8	11-7	5-16	15-4	9-2	1-14
12	13	1	2	3	4	5	6	7
18-13	17-11	7-4	1-9	12-8	6-16	15-5	10-3	2-14
13	1	2	3	4	5	6	7	8

10 TABLE 13 ROUND 3/4 HOWELL MOVEMENT

20-1	6-19	18-8	13-17	3-7	16-12	15-2	11-5	10-14	9-4
1	2	3	4	5	6	7	8	9	10
20-2	7-19	18-9	1-17	4-8	16-13	15-3	12-6	11-14	10-5
2	3	4	5	6	7	8	9	10	11
20-3	8-19	18-10	2-17	5-9	16-1	15-4	13-7	12-14	11-6
3	4	5	6	7	8	9	10	11	12
20-4	9-19	18-11	3-17	6-10	16-2	15-5	1-8	13-14	12-7
4	5	6	7	8	9	10	11	12	13
20-5	10-19	18-12	4-17	7-11	16-3	15-6	2-9	1-14	13-8
5	6	7	8	9	10	11	12	13	1
20-6	11-19	18-13	5-17	8-12	16-4	15-7	3-10	2-14	1-9
6	7	8	9	10	11	12	13	1	2
20-7	12-19	18-1	6-17	9-13	16-5	15-8	4-11	3-14	2-10
7	8	9	10	11	12	13	1	2	3
20-8	13-19	18-2	7-17	10-1	16-6	15-9	5-12	4-14	3-11
8	9	10	11	12	13	1	2	3	4
20-9	1-19	18-3	8-17	11-2	16-7	15-10	6-13	5-14	4-12
9	10	11	12	13	1	2	3	4	5
20-10	2-19	18-4	9-17	12-3	16-8	15-11	7-1	6-14	5-13
10	11	12	13	1	2	3	4	5	6
20-11	3-19	18-5	10-17	13-4	16-9	15-12	8-2	7-14	6-1
11	12	13	1	2	3	4	5	6	7
20-12	4-19	18-6	11-17	1-5	16-10	15-13	9-3	8-14	7-2
12	13	1	2	3	4	5	6	7	8
20-13	5-19	18-7	12-17	2-6	16-11	15-1	10-4	9-14	8-3
13	1	2	3	4	5	6	7	8	9

11 TABLE 13 ROUND 3/4 HOWELL MOVEMENT

7-8	22-1	21-3	20-5	2-19	10-18	12-17	4-16	15-11	14-13	6-9
1	2	3	4	5	6	7	8	9	10	11
8-9	22-2	21-4	20-6	3-19	11-18	13-17	5-16	15-12	14-1	7-10
2	3	4	5	6	7	8	9	10	11	12
9-10	22-3	21-5	20-7	4-19	12-18	1-17	6-16	15-13	14-2	8-11
3	4	5	6	7	8	9	10	11	12	13
10-11	22-4	21-6	20-8	5-19	13-18	2-17	7-16	15-1	14-3	9-12
4	5	6	7	8	9	10	11	12	13	1
11-12	22-5	21-7	20-9	6-19	1-18	3-17	8-16	15-2	14-4	10-13
5	6	7	8	9	10	11	12	13	1	2
12-13	22-6	21-8	20-10	7-19	2-18	4-17	9-16	15-3	14-5	11-1
6	7	8	9	10	11	12	13	1	2	3
13-1	22-7	21-9	20-11	8-19	3-18	5-17	10-16	15-4	14-6	12-2
7	8	9	10	11	12	13	1	2	3	4
1-2	22-8	21-10	20-12	9-19	4-18	6-17	11-16	15-5	14-7	13-3
8	9	10	11	12	13	1	2	3	4	5
2-3	22-9	21-11	20-13	10-19	5-18	7-17	12-16	15-6	14-8	1-4
9	10	11	12	13	1	2	3	4	5	6
3-4	22-10	21-12	20-1	11-19	6-18	8-17	13-16	15-7	14-9	2-5
10	11	12	13	1	2	3	4	5	6	7
4-5	22-11	21-13	20-2	12-19	7-18	9-17	1-16	15-8	14-10	3-6
11	12	13	1	2	3	4	5	6	7	8
5-6	22-12	21-1	20-3	13-19	8-18	10-17	2-16	15-9	14-11	4-7
12	13	1	2	3	4	5	6	7	8	9
6-7	22-13	21-2	20-4	1-19	9-18	11-17	3-16	15-10	14-12	5-8
13	1	2	3	4	5	6	7	8	9	10

12 TABLE 13 ROUND 3/4 HOWELL MOVEMENT

7-8	22-1	21-3	20-5	2-19	10-18	12-17	4-16	15-11	14-13	6-23	24-9
1	2	3	4	5	6	7	8	9	10	11	11
8-9	22-2	21-4	20-6	3-19	11-18	13-17	5-16	15-12	14-1	7-23	24-10
2	3	4	5	6	7	8	9	10	11	12	12
9-10	22-3	21-5	20-7	4-19	12-18	1-17	6-16	15-13	14-2	8-23	24-11
3	4	5	6	7	8	9	10	11	12	13	13
10-11	22-4	21-6	20-8	5-19	13-18	2-17	7-16	15-1	14-3	9-23	24-12
4	5	6	7	8	9	10	11	12	13	1	1
11-12	22-5	21-7	20-9	6-19	1-18	3-17	8-16	15-2	14-4	10-23	24-13
5	6	7	8	9	10	11	12	13	1	2	2
12-13	22-6	21-8	20-10	7-19	2-18	4-17	9-16	15-3	14-5	11-23	24-1
6	7	8	9	10	11	12	13	1	2	3	3
13-1	22-7	21-9	20-11	8-19	3-18	5-17	10-16	15-4	14-6	12-23	24-2
7	8	9	10	11	12	13	1	2	3	4	4
1-2	22-8	21-10	20-12	9-19	4-18	6-17	11-16	15-5	14-7	13-23	24-3
8	9	10	11	12	13	1	2	3	4	5	5
2-3	22-9	21-11	20-13	10-19	5-18	7-17	12-16	15-6	14-8	1-23	24-4
9	10	11	12	13	1	2	3	4	5	6	6
3-4	22-10	21-12	20-1	11-19	6-18	8-17	13-16	15-7	14-9	2-23	24-5
10	11	12	13	1	2	3	4	5	6	7	7
4-5	22-11	21-13	20-2	12-19	7-18	9-17	1-16	15-8	14-10	3-23	24-6
11	12	13	1	2	3	4	5	6	7	8	8
5-6	22-12	21-1	20-3	13-19	8-18	10-17	2-16	15-9	14-11	4-23	24-7
12	13	1	2	3	4	5	6	7	8	9	9
6-7	22-13	21-2	20-4	1-19	9-18	11-17	3-16	15-10	14-12	5-23	24-8
13	1	2	3	4	5	6	7	8	9	10	10

7 TABLE 11 ROUND 3/4 HOWELL MOVEMENT

14-1	4-6	9-10	7-3	12-2	11-13	5-8
1	2	3	4	5	6	7
14-2	5-7	10-11	8-4	12-3	1-13	6-9
2	3	4	5	6	7	8
14-3	6-8	11-1	9-5	12-4	2-13	7-10
3	4	5	6	7	8	9
14-4	7-9	1-2	10-6	12-5	3-13	8-11
4	5	6	7	8	9	10
14-5	8-10	2-3	11-7	12-6	4-13	9-1
5	6	7	8	9	10	11
14-6	9-11	3-4	1-8	12-7	5-13	10-2
6	7	8	9	10	11	1
14-7	10-1	4-5	2-9	12-8	6-13	11-3
7	8	9	10	11	1	2
14-8	11-2	5-6	3-10	12-9	7-13	1-4
8	9	10	11	1	2	3
14-9	1-3	6-7	4-11	12-10	8-13	2-5
9	10	11	1	2	3	4
14-10	2-4	7-8	5-1	12-11	9-13	3-6
10	11	1	2	3	4	5
14-11	3-5	8-9	6-2	12-1	10-13	4-7
11	1	2	3	4	5	6

8 TABLE 11 ROUND 3/4 HOWELL MOVEMENT

16-1	4-15	11-13	14-10	9-8	5-7	3-12	2-6
1	2	3	4	5	6	7	8
16-2	5-15	1-13	14-11	10-9	6-8	4-12	3-7
2	3	4	5	6	7	8	9
16-3	6-15	2-13	14-1	11-10	7-9	5-12	4-8
3	4	5	6	7	8	9	10
16-4	7-15	3-13	14-2	1-11	8-10	6-12	5-9
4	5	6	7	8	9	10	11
16-5	8-15	4-13	14-3	2-1	9-11	7-12	6-10
5	6	7	8	9	10	11	1
16-6	9-15	5-13	14-4	3-2	10-1	8-12	7-11
6	7	8	9	10	11	1	2
16-7	10-15	6-13	14-5	4-3	11-2	9-12	8-1
7	8	9	10	11	1	2	3
16-8	11-15	7-13	14-6	5-4	1-3	10-12	9-2
8	9	10	11	1	2	3	4
16-9	1-15	8-13	14-7	6-5	2-4	11-12	10-3
9	10	11	1	2	3	4	5
16-10	2-15	9-13	14-8	7-6	3-5	1-12	11-4
10	11	1	2	3	4	5	6
16-11	3-15	10-13	14-9	8-7	4-6	2-12	1-5
11	1	2	3	4	5	6	7

9 TABLE 11 ROUND 3/4 HOWELL MOVEMENT

18-1	17-5	16-11	2-10	15-9	7-8	6-14	4-13	3-12
1	2	3	4	5	6	7	8	9
18-2	17-6	16-1	3-11	15-10	8-9	7-14	5-13	4-12
2	3	4	5	6	7	8	9	10
18-3	17-7	16-2	4-1	15-11	9-10	8-14	6-13	5-12
3	4	5	6	7	8	9	10	11
18-4	17-8	16-3	5-2	15-1	10-11	9-14	7-13	6-12
4	5	6	7	8	9	10	11	1
18-5	17-9	16-4	6-3	15-2	11-1	10-14	8-13	7-12
5	6	7	8	9	10	11	1	2
18-6	17-10	16-5	7-4	15-3	1-2	11-14	9-13	8-12
6	7	8	9	10	11	1	2	3
18-7	17-11	16-6	8-5	15-4	2-3	1-14	10-13	9-12
7	8	9	10	11	1	2	3	4
18-8	17-1	16-7	9-6	15-5	3-4	2-14	11-13	10-12
8	9	10	11	1	2	3	4	5
18-9	17-2	16-8	10-7	15-6	4-5	3-14	1-13	11-12
9	10	11	1	2	3	4	5	6
18-10	17-3	16-9	11-8	15-7	5-6	4-14	2-13	1-12
10	11	1	2	3	4	5	6	7
18-11	17-4	16-10	1-9	15-8	6-7	5-14	3-13	2-12
11	1	2	3	4	5	6	7	8

10 TABLE 11 ROUND 3/4 HOWELL MOVEMENT

18-1	17-5	16-11	19-10	20-2	9-15	7-8	6-14	4-13	3-12
1	2	3	4	4	5	6	7	8	9
18-2	17-6	16-1	19-11	20-3	10-15	8-9	7-14	5-13	4-12
2	3	4	5	5	6	7	8	9	10
18-3	17-7	16-2	19-1	20-4	11-15	9-10	8-14	6-13	5-12
3	4	5	6	6	7	8	9	10	11
18-4	17-8	16-3	19-2	20-5	1-15	10-11	9-14	7-13	6-12
4	5	6	7	7	8	9	10	11	1
18-5	17-9	16-4	19-3	20-6	2-15	11-1	10-14	8-13	7-12
5	6	7	8	8	9	10	11	1	2
18-6	17-10	16-5	19-4	20-7	3-15	1-2	11-14	9-13	8-12
6	7	8	9	9	10	11	1	2	3
18-7	17-11	16-6	19-5	20-8	4-15	2-3	1-14	10-13	9-12
7	8	9	10	10	11	1	2	3	4
18-8	17-1	16-7	19-6	20-9	5-15	3-4	2-14	11-13	10-12
8	9	10	11	11	1	2	3	4	5
18-9	17-2	16-8	19-7	20-10	6-15	4-5	3-14	1-13	11-12
9	10	11	1	1	2	3	4	5	6
18-10	17-3	16-9	19-8	20-11	7-15	5-6	4-14	2-13	1-12
10	11	1	2	2	3	4	5	6	7
18-11	17-4	16-10	19-9	20-1	8-15	6-7	5-14	3-13	2-12
11	1	2	3	3	4	5	6	7	8

5 TABLE 6 ROUND 3/4 HOWELL MOVEMENT

10-1	9-6	8-5	4-3	7-2
1	3	4	5	6
10-2	9-1	8-6	5-4	7-3
2	4	5	6	1
10-3	9-2	8-1	6-5	7-4
3	5	6	1	2
10-4	9-3	8-2	1-6	7-5
4	6	1	2	3
10-5	9-4	8-3	2-1	7-6
5	1	2	3	4
10-6	9-5	8-4	3-2	7-1
6	2	3	4	5 /

4 TABLE 6 ROUND 3/4 HOWELL MOVEMENT

8-1	7-5	4-6	2-3
1	3	3	4
8-2	7-6	5-1	3-4
2	4	4	5
8-3	7-1	6-2	4-5
3	5	5	6
8-4	7-2	1-3	5-6
4	6	6	1
8-5	7-3	2-4	6-1
5	1	1	2
8-6	7-4	3-5	1-2
6	2	2	3

5 TABLE 7 ROUND 3/4 HOWELL MOVEMENT

10-1	6-7	3-5	8-4	9-2
1	3	4	6	7
10-2	7-1	4-6	8-5	9-3
2	4	5	7	1
10-3	1-2	5-7	8-6	9-4
3	5	6	1	2
10-4	2-3	6-1	8-7	9-5
4	6	7	2	3
10-5	3-4	7-2	8-1	9-6
5	7	1	3	4
10-6	4-5	1-3	8-2	9-7
6	1	2	4	5
10-7	5-6	2-4	8-3	9-1
7	2	3	5	6

6 TABLE 7 ROUND 3/4 HOWELL MOVEMENT

12-1	11-7	10-2	6-5	8-4	9-3
1	3	3	4	6	7
12-2	11-1	10-3	7-6	8-5	9-4
2	4	4	5	7	1
12-3	11-2	10-4	1-7	8-6	9-5
3	5	5	6	1	2
12-4	11-3	10-5	2-1	8-7	9-6
4	6	6	7	2	3
12-5	11-4	10-6	3-2	8-1	9-7
5	7	7	1	3	4
12-6	11-5	10-7	4-3	8-2	9-1
6	1	1	2	4	5
12-7	11-6	10-1	5-4	8-3	9-2
7	2	2	3	5	6

5 TABLE 8 ROUND 3/4 HOWELL MOVEMENT

10-1	9-6	8-2	4-5	3-7
1	5	6	7	8
10-2	9-7	1-3	5-6	4-8
2	6	7	8	1
10-3	9-8	2-4	6-7	5-1
3	7	8	1	2
10-4	9-1	3-5	7-8	6-2
4	8	1	2	3
10-5	9-2	4-6	8-1	7-3
5	1	2	3	4
10-6	9-3	5-7	1-2	8-4
6	2	3	4	5
10-7	9-4	6-8	2-3	1-5
7	3	4	5	6
10-8	9-5	7-1	3-4	2-6
8	4	5	6	7

6 TABLE 8 ROUND 3/4 HOWELL MOVEMENT

3-2	12-1	11-8	10-6	9-5	7-4
1	4	5	6	7	8
4-3	12-2	11-1	10-7	9-6	8-5
2	5	6	7	8	1
5-4	12-3	11-2	10-8	9-7	1-6
3	6	7	8	1	2
6-5	12-4	11-3	10-1	9-8	2-7
4	7	8	1	2	3
7-6	12-5	11-4	10-2	9-1	3-8
5	8	1	2	3	4
8-7	12-6	11-5	10-3	9-2	4-1
6	1	2	3	4	5
1-8	12-7	11-6	10-4	9-3	5-2
7	2	3	4	5	6
2-1	12-8	11-7	10-5	9-4	6-3
8	3	4	5	6	7

7 TABLE 8 ROUND 3/4 HOWELL MOVEMENT

14-1	13-6	12-2	11-4	7-8	10-3	9-5
1	3	4	5	6	7	8
14-2	13-7	12-3	11-5	8-1	10-4	9-6
2	4	5	6	7	8	1
14-3	13-8	12-4	11-6	1-2	10-5	9-7
3	5	6	7	8	1	2
14-4	13-1	12-5	11-7	2-3	10-6	9-8
4	6	7	8	1	2	3
14-5	13-2	12-6	11-8	3-4	10-7	9-1
5	7	8	1	2	3	4
14-6	13-3	12-7	11-1	4-5	10-8	9-2
6	8	1	2	3	4	5
14-7	13-4	12-8	11-2	5-6	10-1	9-3
7	1	2	3	4	5	6
14-8	13-5	12-1	11-3	6-7	10-2	9-4
8	2	3	4	5	6	7

6 TABLE 9 ROUND 3/4 HOWELL MOVEMENT

12-1	11-4	10-8	2-7	9-6	5-3
1	2	3	4	5	6
12-2	11-5	10-9	3-8	1-7	6-4
2	3	4	5	6	7
12-3	11-6	10-1	4-9	2-8	7-5
3	4	5	6	7	8
12-4	11-7	10-2	5-1	3-9	8-6
4	5	6	7	8	9
12-5	11-8	10-3	6-2	4-1	9-7
5	6	7	8	9	1
12-6	11-9	10-4	7-3	5-2	1-8
6	7	8	9	1	2
12-7	11-1	10-5	8-4	6-3	2-9
7	8	9	1	2	3
12-8	11-2	10-6	9-5	7-4	3-1
8	9	1	2	3	4
12-9	11-3	10-7	1-6	8-5	4-2
9	1	2	3	4	5

7 TABLE 9 ROUND 3/4 HOWELL MOVEMENT

12-8	2-3	11-6	10-9	4-7	14-1	13-5
1	2	3	4	5	6	8
12-9	3-4	11-7	10-1	5-8	14-2	13-6
2	3	4	5	6	7	9
12-1	4-5	11-8	10-2	6-9	14-3	13-7
3	4	5	6	7	8	1
12-2	5-6	11-9	10-3	7-1	14-4	13-8
4	5	6	7	8	9	2
12-3	6-7	11-1	10-4	8-2	14-5	13-9
5	6	7	8	9	1	3
12-4	7-8	11-2	10-5	9-3	14-6	13-1
6	7	8	9	1	2	4
12-5	8-9	11-3	10-6	1-4	14-7	13-2
7	8	9	1	2	3	5
12-6	9-1	11-4	10-7	2-5	14-8	13-3
8	9	1	2	3	4	6
12-7	1-2	11-5	10-8	3-6	14-9	13-4
9	1	2	3	4	5	7

8 TABLE 9 ROUND 3/4 HOWELL MOVEMENT

16-1	15-6	14-2	13-7	12-3	11-8	4-5	10-9
1	2	3	4	5	6	8	8
16-2	15-7	14-3	13-8	12-4	11-9	5-6	10-1
2	3	4	5	6	7	9	9
16-3	15-8	14-4	13-9	12-5	11-1	6-7	10-2
3	4	5	6	7	8	1	1
16-4	15-9	14-5	13-1	12-6	11-2	7-8	10-3
4	5	6	7	8	9	2	2
16-5	15-1	14-6	13-2	12-7	11-3	8-9	10-4
5	6	7	8	9	1	3	3
16-6	15-2	14-7	13-3	12-8	11-4	9-1	10-5
6	7	8	9	1	2	4	4
16-7	15-3	14-8	13-4	12-9	11-5	1-2	10-6
7	8	9	1	2	3	5	5
16-8	15-4	14-9	13-5	12-1	11-6	2-3	10-7
8	9	1	2	3	4	6	6
16-9	15-5	14-1	13-6	12-2	11-7	3-4	10-8
9	1	2	3	4	5	7	7

8 TABLE DOUBLE HOWELL MOVEMENT

8-1	9-16	6-5	4-2	10-14	7-3	13-15	11-12
1	1	2	3	4	5	6	7
8-2	10-16	7-6	5-3	11-15	1-4	14-9	12-13
2	2	3	4	5	6	7	1
8-3	11-16	1-7	6-4	12-9	2-5	15-10	13-14
3	3	4	5	6	7	1	2
8-4	12-16	2-1	7-5	13-10	3-6	9-11	14-15
4	4	5	6	7	1	2	3
8-5	13-16	3-2	1-6	14-11	4-7	10-12	15-9
5	5	6	7	1	2	3	4
8-6	14-16	4-3	2-7	15-12	5-1	11-13	9-10
6	6	7	1	2	3	4	5
8-7	15-16	5-4	3-1	9-11	6-2	12-14	10-11
7	7	1	2	3	4	5	6

10 TABLE DOUBLE HOWELL MOVEMENT

10-1	9-8	6-4	13-17	15-12	11-20	19-18	3-7	16-14	5-2
1	2	3	4	5	6	7	8	9	10
10-2	1-9	7-5	14-18	16-13	12-20	11-19	4-8	17-15	6-3
2	3	4	5	6	7	8	9	10	11
10-3	2-1	8-6	15-19	17-14	13-20	12-11	5-9	18-16	7-4
3	4	5	6	7	8	9	10	11	12
10-4	3-2	9-7	16-11	18-15	14-20	13-12	6-1	19-17	8-5
4	5	6	7	8	9	10	11	12	13
10-5	4-3	1-8	17-12	19-16	15-20	14-13	7-2	11-18	9-6
5	6	7	8	9	10	11	12	13	14
10-6	5-4	2-9	18-13	11-17	16-20	15-14	8-3	12-19	1-7
6	7	8	9	10	11	12	13	14	15
10-7	6-5	3-1	19-14	12-18	17-20	16-15	9-4	13-11	2-8
7	8	9	10	11	12	13	14	15	16
10-8	7-6	4-2	11-15	13-19	18-20	17-16	1-5	14-12	3-9
8	9	10	11	12	13	14	15	16	17
10-9	8-7	5-3	12-16	14-11	19-20	18-17	2-6	15-13	4-1
9	10	11	12	13	14	15	16	17	18

12 TABLE DOUBLE HOWELL MOVEMENT

12-1	13-24	23-19	10-7	17-22	14-16	21-20	5-4	9-11	3-8	18-15	6-2
1	1	2	3	4	5	6	7	8	9	10	11
12-2	14-24	13-20	11-8	18-23	15-17	22-21	6-5	10-1	4-9	19-16	7-3
2	2	3	4	5	6	7	8	9	10	11	12
12-3	15-24	14-21	1-9	19-13	16-18	23-22	7-6	11-2	5-10	20-17	8-4
3	3	4	5	6	7	8	9	10	11	12	13
12-4	16-24	15-22	2-10	20-14	17-19	13-23	8-7	1-3	6-11	21-18	9-5
4	4	5	6	7	8	9	10	11	12	13	14
12-5	17-24	16-23	3-11	21-15	18-20	14-13	9-8	2-4	7-1	22-19	10-6
5	5	6	7	8	9	10	11	12	13	14	15
12-6	18-24	17-13	4-1	22-16	19-21	15-14	10-9	3-5	8-2	23-20	11-7
6	6	7	8	9	10	11	12	13	14	15	16
12-7	19-24	18-14	5-2	23-17	20-22	16-15	11-10	4-6	9-3	13-21	1-8
7	7	8	9	10	11	12	13	14	15	16	17
12-8	20-24	19-15	6-3	13-18	21-23	17-16	1-11	5-7	10-4	14-22	2-9
8	8	9	10	11	12	13	14	15	16	17	18
12-9	21-24	20-16	7-4	14-19	22-13	18-17	2-1	6-8	11-5	15-23	3-10
9	9	10	11	12	13	14	15	16	17	18	19
12-10	22-24	21-17	8-5	15-20	23-14	19-18	3-2	7-9	1-6	16-13	4-11
10	10	11	12	13	14	15	16	17	18	19	20
12-11	23-24	22-18	9-6	16-21	13-15	20-19	4-3	8-10	2-7	17-14	5-1
11	11	12	13	14	15	16	17	18	19	20	21

14 TABLE DOUBLE HOWELL MOVEMENT

14-1	15-28	24-21	18-26	22-20	17-16	23-27	2-8	12-11	5-7	9-4	3-13	25-19	6-10
1	1	2	3	4	5	6	7	8	9	10	11	12	13
14-2	16-28	25-22	19-27	23-21	18-17	24-15	3-9	13-12	6-8	10-5	4-1	26-20	7-11
2	2	3	4	5	6	7	8	9	10	11	12	13	14
14-3	17-28	26-23	20-15	24-22	19-18	25-16	4-10	1-13	7-9	11-6	5-2	27-21	8-12
3	3	4	5	6	7	8	9	10	11	12	13	14	15
14-4	18-28	27-24	21-16	25-23	20-19	26-17	5-11	2-1	8-10	12-7	6-3	15-22	9-13
4	4	5	6	7	8	9	10	11	12	13	14	15	16
14-5	19-28	15-25	22-17	26-24	21-20	27-18	6-12	3-2	9-11	13-8	7-4	16-23	10-1
5	5	6	7	8	9	10	11	12	13	14	15	16	17
14-6	20-28	16-26	23-18	27-25	22-21	15-19	7-13	4-3	10-12	1-9	8-5	17-24	11-2
6	6	7	8	9	10	11	12	13	14	15	16	17	18
14-7	21-28	17-27	24-19	15-26	23-22	16-20	8-1	5-4	11-13	2-10	9-6	18-25	12-3
7	7	8	9	10	11	12	13	14	15	16	17	18	19
14-8	22-28	18-15	25-20	16-27	24-23	17-21	9-2	6-5	12-1	3-11	10-7	19-26	13-4
8	8	9	10	11	12	13	14	15	16	17	18	19	20
14-9	23-28	19-16	26-21	17-15	25-24	18-22	10-3	7-6	13-2	4-12	11-8	20-27	1-5
9	9	10	11	12	13	14	15	16	17	18	19	20	21
14-10	24-28	20-17	27-22	18-16	26-25	19-23	11-4	8-7	1-3	5-13	12-9	21-15	2-6
10	10	11	12	13	14	15	16	17	18	19	20	21	22
14-11	25-28	21-18	15-23	19-17	27-26	20-24	12-5	9-8	2-4	6-1	13-10	22-16	3-7
11	11	12	13	14	15	16	17	18	19	20	21	22	23
14-12	26-28	22-19	16-24	20-18	15-27	21-25	13-6	10-9	3-5	7-2	1-11	23-17	4-8
12	12	13	14	15	16	17	18	19	20	21	22	23	24
14-13	27-28	23-20	17-25	21-19	16-15	22-26	1-7	11-10	4-6	8-3	2-12	24-18	5-9
13	13	14	15	16	17	18	19	20	21	22	23	24	25

16 TABLE DOUBLE HOWELL MOVEMENT

16-1	17-32	5-9	7-13	15-10	3-2	14-11	6-8	23-25	29-18	4-12	24-30	22-19	21-31	20-28	27-26
1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16-2	18-32	6-10	8-14	1-11	4-3	15-12	7-9	24-26	30-19	5-13	25-31	23-20	22-17	21-29	28-27
2	2	3	4	5	6	7	8	9	10	11	12	13	14	15	1
16-3	19-32	7-11	9-15	2-12	5-4	1-13	8-10	25-27	31-20	6-14	26-17	24-21	23-18	22-30	29-28
3	3	4	5	6	7	8	9	10	11	12	13	14	15	1	2
16-4	20-32	8-12	10-1	3-13	6-5	2-14	9-11	26-28	17-21	7-15	27-18	25-22	24-19	23-31	30-29
4	4	5	6	7	8	9	10	11	12	13	14	15	1	2	3
16-5	21-32	9-13	11-2	4-14	7-6	3-15	10-12	27-29	18-22	8-1	28-19	26-23	25-20	24-17	31-30
5	5	6	7	8	9	10	11	12	13	14	15	1	2	3	4
16-6	22-32	10-14	12-3	5-15	8-7	4-1	11-13	28-30	19-23	9-2	29-20	27-24	26-21	25-18	17-31
6	6	7	8	9	10	11	12	13	14	15	1	2	3	4	5
16-7	23-32	11-15	13-4	6-1	9-8	5-2	12-14	29-31	20-24	10-3	30-21	28-25	27-22	26-19	18-17
7	7	8	9	10	11	12	13	14	15	1	2	3	4	5	6
16-8	24-32	12-1	14-5	7-2	10-9	6-3	13-15	30-17	21-25	11-4	31-22	29-26	28-23	27-20	19-18
8	8	9	10	11	12	13	14	15	1	2	3	4	5	6	7
16-9	25-32	13-2	15-6	8-3	11-10	7-4	14-1	31-18	22-26	12-5	17-23	30-27	29-24	28-21	20-19
9	9	10	11	12	13	14	15	1	2	3	4	5	6	7	8
16-10	26-32	14-3	1-7	9-4	12-11	8-5	15-2	17-19	23-27	13-6	18-24	31-28	30-25	29-22	21-20
10	10	11	12	13	14	15	1	2	3	4	5	6	7	8	9
16-11	27-32	15-4	2-8	10-5	13-12	9-6	1-3	18-20	24-28	14-7	19-25	17-29	31-26	30-23	22-21
11	11	12	13	14	15	1	2	3	4	5	6	7	8	9	10
16-12	28-32	1-5	3-9	11-6	14-13	10-7	2-4	19-21	25-29	15-8	20-26	18-30	17-27	31-24	23-22
12	12	13	14	15	1	2	3	4	5	6	7	8	9	10	11
16-13	29-32	2-6	4-10	12-7	15-14	11-8	3-5	20-22	26-30	1-9	21-27	19-31	18-28	17-25	24-23
13	13	14	15	1	2	3	4	5	6	7	8	9	10	11	12
16-14	30-32	3-7	5-11	13-8	1-15	12-9	4-6	21-23	27-31	2-10	22-28	20-17	19-29	18-26	25-24
14	14	15	1	2	3	4	5	6	7	8	9	10	11	12	13
16-15	31-32	4-8	6-12	14-9	2-1	13-10	5-7	22-24	28-17	3-11	23-29	21-18	20-30	19-27	26-25
15	15	1	2	3	4	5	6	7	8	9	10	11	12	13	14

18 TABLE DOUBLE HOWELL MOVEMENT

18-1	19-36	12-7	6-16	3-5	9-17	14-13	24-26	29-33	25-31	22-34	21-20	4-10	15-2	11-8	35-28	30-27	32-23
1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
18-2	20-36	13-8	7-17	4-6	10-1	15-14	25-27	30-34	26-32	23-35	22-21	5-11	16-3	12-9	19-29	31-28	33-24
2	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	1
18-3	21-36	14-9	8-1	5-7	11-2	16-15	26-28	31-35	27-33	24-19	23-22	6-12	17-4	13-10	20-30	32-29	34-25
3	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	1	2
18-4	22-36	15-10	9-2	6-8	12-3	17-16	27-29	32-19	28-34	25-20	24-23	7-13	1-5	14-11	21-31	33-30	35-26
4	4	5	6	7	8	9	10	11	12	13	14	15	16	17	1	2	3
18-5	23-36	16-11	10-3	7-9	13-4	1-17	28-30	33-20	29-35	26-21	25-24	8-14	2-6	15-12	22-32	34-31	19-27
5	5	6	7	8	9	10	11	12	13	14	15	16	17	1	2	3	4
18-6	24-36	17-12	11-4	8-10	14-5	2-1	29-31	34-21	30-19	27-22	26-25	9-15	3-7	16-13	23-33	35-32	20-28
6	6	7	8	9	10	11	12	13	14	15	16	17	1	2	3	4	5
18-7	25-36	1-13	12-5	9-11	15-6	3-2	30-32	35-22	31-20	28-23	27-26	10-16	4-8	17-14	24-34	19-33	21-29
7	7	8	9	10	11	12	13	14	15	16	17	1	2	3	4	5	6
18-8	26-36	2-14	13-6	10-12	16-7	4-3	31-33	19-23	32-21	29-24	28-27	11-17	5-9	1-15	25-35	20-34	22-30
8	8	9	10	11	12	13	14	15	16	17	1	2	3	4	5	6	7
18-9	27-36	3-15	14-7	11-13	17-8	5-4	32-34	20-24	33-22	30-25	29-28	12-1	6-10	2-16	26-19	21-35	23-31
9	9	10	11	12	13	14	15	16	17	1	2	3	4	5	6	7	8
18-10	28-36	4-16	15-8	12-14	1-9	6-5	33-35	21-25	34-23	31-26	30-29	13-2	7-11	3-17	27-20	22-19	24-32
10	10	11	12	13	14	15	16	17	1	2	3	4	5	6	7	8	9
18-11	29-36	5-17	16-9	13-15	2-10	7-6	34-19	22-26	35-24	32-27	31-30	14-3	8-12	4-1	28-21	23-20	25-33
11	11	12	13	14	15	16	17	1	2	3	4	5	6	7	8	9	10
18-12	30-36	6-1	17-10	14-16	3-11	8-7	35-20	23-27	19-25	33-28	32-31	15-4	9-13	5-2	29-22	24-21	26-34
12	12	13	14	15	16	17	1	2	3	4	5	6	7	8	9	10	11
18-13	31-36	7-2	1-11	15-17	4-12	9-8	19-21	24-28	20-26	34-29	33-32	16-5	10-14	6-3	30-23	25-22	27-35
13	13	14	15	16	17	1	2	3	4	5	6	7	8	9	10	11	12
18-14	32-36	8-3	2-12	16-1	5-13	10-9	20-22	25-29	21-27	35-30	34-33	17-6	11-15	7-4	31-24	26-23	28-19
14	14	15	16	17	1	2	3	4	5	6	7	8	9	10	11	12	13
18-15	33-36	9-4	3-13	17-2	6-14	11-10	21-23	26-30	22-28	19-31	35-34	1-7	12-16	8-5	32-25	27-24	29-20
15	15	16	17	1	2	3	4	5	6	7	8	9	10	11	12	13	14
18-16	34-36	10-5	4-14	1-3	7-15	12-11	22-24	27-31	23-29	20-32	19-35	2-8	13-17	9-6	33-26	28-25	30-21
16	16	17	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
18-17	35-36	11-6	5-15	2-4	8-16	13-12	23-25	28-32	24-30	21-33	20-19	3-9	14-1	10-7	34-27	29-26	31-22
17	17	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

20 TABLE DOUBLE HOWELL MOVEMENT

20-1	21-40	9-17	16-11	3-5	36-31	25-27	19-10	14-13	6-18	8-12	15-2	7-4	37-28	24-23	32-38	29-22	35-39	26-34	33-30
1	1	2	3	4	6	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20-2	22-40	10-18	17-12	4-6	37-32	26-28	1-11	15-14	7-19	9-13	16-3	8-5	38-29	25-24	33-39	30-23	36-21	27-35	34-31
2	2	3	4	5	8	7	8	9	10	11	12	13	14	15	16	17	18	19	1
20-3	23-40	11-19	18-13	5-7	38-33	27-29	2-12	16-15	8-1	10-14	17-4	9-6	39-30	26-25	34-21	31-24	37-22	28-36	35-32
3	3	4	5	6	9	8	9	10	11	12	13	14	15	16	17	18	19	1	2
20-4	24-40	12-1	19-14	6-8	39-34	28-30	3-13	17-16	9-2	11-15	18-5	10-7	21-31	27-26	35-22	32-25	38-23	29-37	36-33
4	4	5	6	7	10	9	10	11	12	13	14	15	16	17	18	19	1	2	3
20-5	25-40	13-2	1-15	7-9	21-35	29-31	4-14	18-17	10-3	12-16	19-6	11-8	22-32	28-27	36-23	33-26	39-24	30-38	37-34
5	5	6	7	8	11	10	11	12	13	14	15	16	17	18	19	1	2	3	4
20-6	26-40	14-3	2-16	8-10	22-36	30-32	5-15	19-18	11-4	13-17	1-7	12-9	23-33	29-28	37-24	34-27	21-25	31-39	38-35
6	6	7	8	9	12	11	12	13	14	15	16	17	18	19	1	2	3	4	5
20-7	27-40	15-4	3-17	9-11	23-37	31-33	6-16	1-19	12-5	14-18	2-8	13-10	24-34	30-29	38-25	35-28	22-26	32-21	39-36
7	7	8	9	10	14	13	14	15	16	17	18	19	1	2	3	4	5	6	7
20-8	28-40	16-5	4-18	10-12	24-38	32-34	7-17	2-1	13-6	15-19	3-9	14-11	25-35	31-30	39-26	36-29	23-27	33-22	21-37
8	8	9	10	11	15	14	15	16	17	18	19	1	2	3	4	5	6	7	8
20-9	29-40	17-6	5-19	11-13	25-39	33-35	8-18	3-2	14-7	16-1	4-10	15-12	26-36	32-31	21-27	37-30	24-28	34-23	22-38
9	9	10	11	12	16	15	16	17	18	19	1	2	3	4	5	6	7	8	9
20-10	30-40	18-7	6-1	12-14	26-21	34-36	9-19	4-3	15-8	17-2	5-11	16-13	27-37	33-32	22-28	38-31	25-29	35-24	23-39
10	10	11	12	13	17	16	17	18	19	1	2	3	4	5	6	7	8	9	10
20-11	31-40	19-8	7-2	13-15	27-22	35-37	10-1	5-4	16-9	18-3	6-12	17-14	28-38	34-33	23-29	39-32	26-30	36-25	24-21
11	11	12	13	14	18	17	18	19	1	2	3	4	5	6	7	8	9	10	11
20-12	32-40	1-9	8-3	14-16	28-23	36-38	11-2	6-5	17-10	19-4	7-13	18-15	29-39	35-34	24-30	21-33	27-31	37-26	25-22
12	12	13	14	15	19	18	19	1	2	3	4	5	6	7	8	9	10	11	12
20-13	33-40	2-10	9-4	15-17	29-24	37-39	12-3	7-6	18-11	1-5	8-14	19-16	30-21	36-35	25-31	22-34	28-32	38-27	26-23
13	13	14	15	16	20	19	1	2	3	4	5	6	7	8	9	10	11	12	13
20-14	34-40	3-11	10-5	16-18	30-25	38-21	13-4	8-7	19-12	2-6	9-15	1-17	31-22	37-36	26-32	23-35	29-33	39-28	27-24
14	14	15	16	17	21	20	1	2	3	4	5	6	7	8	9	10	11	12	13
20-15	35-40	4-12	11-6	17-19	31-26	39-22	14-5	9-8	1-13	3-7	10-16	2-18	32-23	38-37	27-33	24-36	30-34	21-29	28-25
15	15	16	17	18	22	21	2	3	4	5	6	7	8	9	10	11	12	13	14
20-16	36-40	5-13	12-7	18-1	32-27	21-23	15-6	10-9	2-14	4-8	11-17	3-19	33-24	39-38	28-34	25-37	31-35	22-30	29-26
16	16	17	18	19	23	22	3	4	5	6	7	8	9	10	11	12	13	14	15
20-17	37-40	6-14	13-8	19-2	33-28	22-24	16-7	11-10	3-15	5-9	12-18	4-1	34-25	21-39	29-35	26-38	32-36	23-31	30-27
17	17	18	19	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
20-18	38-40	7-15	14-9	1-3	34-29	23-25	17-8	12-11	4-16	6-10	13-19	5-2	35-26	22-21	30-36	27-39	33-37	24-32	31-28
18	18	19	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
20-19	39-40	8-16	15-10	2-4	35-30	24-26	18-9	13-12	5-17	7-11	14-1	6-3	36-27	23-22	31-37	28-21	34-38	25-33	32-29
19	19	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

2 TABLE INDIVIDUAL MOVEMENT

8-1-6-2	5-7-3-4
1	1
8-2-7-3	6-1-4-5
2	2
8-3-1-4	7-2-5-6
3	3
8-4-2-5	1-3-6-7
4	4
8-5-3-6	2-4-7-1
5	5
8-6-4-7	3-5-1-2
6	6
8-7-5-1	4-6-2-3
7	7

3 TABLE INDIVIDUAL MOVEMENT

12-1-9-8	5-7-3-11	2-6-4-10
1	2	11
12-2-10-9	6-8-4-1	3-7-5-11
2	3	1
12-3-11-10	7-9-5-2	4-8-6-1
3	4	2
12-4-1-11	8-10-6-3	5-9-7-2
4	5	3
12-5-2-1	9-11-7-4	6-10-8-3
5	6	4
12-6-3-2	10-1-8-5	7-11-9-4
6	7	5
12-7-4-3	11-2-9-6	8-1-10-5
7	8	6
12-8-5-4	1-3-10-7	9-2-11-6
8	9	7
12-9-6-5	2-4-11-8	10-3-1-7
9	10	8
12-10-7-6	3-5-1-9	11-4-2-8
10	11	9
12-11-8-7	4-6-2-10	1-5-3-9
11	1	10

4 TABLE INDIVIDUAL MOVEMENT

16-1-13-6	3-5-15-4	14-11-10-9	2-8-12-7
1	2	3	13
16-2-14-7	4-6-1-5	15-12-11-10	3-9-13-8
2	3	4	14
16-3-15-8	5-7-2-6	1-13-12-11	4-10-14-9
3	4	5	15
16-4-1-9	6-8-3-7	2-14-13-12	5-11-15-10
4	5	6	1
16-5-2-10	7-9-4-8	3-15-14-13	6-12-1-11
5	6	7	2
16-6-3-11	8-10-5-9	4-1-15-14	7-13-2-12
6	7	8	3
16-7-4-12	9-11-6-10	5-2-1-15	8-14-3-13
7	8	9	4
16-8-5-13	10-12-7-11	6-3-2-1	9-15-4-14
8	9	10	5
16-9-6-14	11-13-8-12	7-4-3-2	10-1-5-15
9	10	11	6
16-10-7-15	12-14-9-13	8-5-4-3	11-2-6-1
10	11	12	7
16-11-8-1	13-15-10-14	9-6-5-4	12-3-7-2
11	12	13	8
16-12-9-2	14-1-11-15	10-7-6-5	13-4-8-3
12	13	14	9
16-13-10-3	15-2-12-1	11-8-7-6	14-5-9-4
13	14	15	10
16-14-11-4	1-3-13-2	12-9-8-7	15-6-10-5
14	15	1	11
16-15-12-5	2-4-14-3	13-10-9-8	1-7-11-6
15	1	2	12

5 TABLE INDIVIDUAL MOVEMENT

20-1-5-13	7-17-16-9	10-12-8-14	2-18-4-3	15-19-11-6
1	2	11	12	17
20-2-6-14	8-18-17-10	11-13-9-15	3-19-5-4	16-1-12-7
2	3	12	13	18
20-3-7-15	9-19-18-11	12-14-10-16	4-1-6-5	17-2-13-8
3	4	13	14	19
20-4-8-16	10-1-19-12	13-15-11-17	5-2-7-6	18-3-14-9
4	5	14	15	1
20-5-9-17	11-2-1-13	14-16-12-18	6-3-8-7	19-4-15-10
5	6	15	16	2
20-6-10-18	12-3-2-14	15-17-13-19	7-4-9-8	1-5-16-11
6	7	16	17	3
20-7-11-19	13-4-3-15	16-18-14-1	8-5-10-9	2-6-17-12
7	8	17	18	4
20-8-12-1	14-5-4-16	17-19-15-2	9-6-11-10	3-7-18-13
8	9	18	19	5
20-9-13-2	15-6-5-17	18-1-16-3	10-7-12-11	4-8-19-14
9	10	19	1	6
20-10-14-3	16-7-6-18	19-2-17-4	11-8-13-12	5-9-1-15
10	11	1	2	7
20-11-15-4	17-8-7-19	1-3-18-5	12-9-14-13	6-10-2-16
11	12	2	3	8
20-12-16-5	18-9-8-1	2-4-19-6	13-10-15-14	7-11-3-17
12	13	3	4	9
20-13-17-6	19-10-9-2	3-5-1-7	14-11-16-15	8-12-4-18
13	14	4	5	10
20-14-18-7	1-11-10-3	4-6-2-8	15-12-17-16	9-13-5-19
14	15	5	6	11
20-15-19-8	2-12-11-4	5-7-3-9	16-13-18-17	10-14-6-1
15	16	6	7	12
20-16-1-9	3-13-12-5	6-8-4-10	17-14-19-18	11-15-7-2
16	17	7	8	13
20-17-2-10	4-14-13-6	7-9-5-11	18-15-1-19	12-16-8-3
17	18	8	9	14
20-18-3-11	5-15-14-7	8-10-6-12	19-16-2-1	13-17-9-4
18	19	9	10	15
20-19-4-12	6-16-15-8	9-11-7-13	1-17-3-2	14-18-10-5
19	1	10	11	16

6 TABLE INDIVIDUAL MOVEMENT

24-1-21-4	19-16-15-14	13-2-3-17	9-11-8-13	10-18-20-7	6-22-5-23
1	4	8	10	14	15
24-2-22-5	20-17-16-15	14-3-4-18	10-12-9-13	11-19-21-8	7-23-6-1
2	5	9	11	15	16
24-3-23-6	21-18-17-16	15-4-5-19	11-13-10-14	12-20-22-9	8-1-7-2
3	6	10	12	16	17
24-4-1-7	22-19-18-17	16-5-6-20	12-14-11-15	13-21-23-10	9-2-8-3
4	7	11	13	17	18
24-5-2-8	23-20-19-18	17-6-7-21	13-15-12-16	14-22-1-11	10-3-9-4
5	8	12	14	18	19
24-6-3-9	1-21-20-19	18-7-8-22	14-16-13-17	15-23-2-12	11-4-10-5
6	9	13	15	19	20
24-7-4-10	2-22-21-20	19-8-9-23	15-17-14-18	16-1-3-13	12-5-11-6
7	10	14	16	20	21
24-8-5-11	3-23-22-21	20-9-10-1	16-18-15-19	17-2-4-14	13-6-12-7
8	11	15	17	21	22
24-9-6-12	4-1-23-22	21-10-11-2	17-19-16-20	18-3-5-15	14-7-13-8
9	12	16	18	22	23
24-10-7-13	5-2-1-23	22-11-12-3	18-20-17-11	19-4-6-16	15-8-14-9
10	13	17	19	23	1
24-11-8-14	6-3-2-1	23-12-13-4	19-21-18-22	20-5-7-17	16-9-15-10
11	14	18	20	1	2
24-12-9-15	7-4-3-2	1-13-14-5	20-22-19-23	21-6-8-18	17-10-16-11
12	15	19	21	2	3
24-13-10-16	8-5-4-3	2-14-15-6	21-23-20-1	22-7-9-19	18-11-17-12
13	16	20	22	3	4
24-14-11-17	9-6-5-4	3-15-16-7	22-1-21-2	23-8-10-20	19-12-18-13
14	17	21	23	4	5
24-15-12-18	10-7-6-5	4-16-17-8	23-2-22-3	1-9-11-21	20-13-19-14
15	18	22	1	5	6
24-16-13-19	11-8-7-6	5-17-18-9	1-3-23-4	2-10-12-22	21-14-20-15
16	19	23	2	6	7
24-17-14-20	12-9-8-7	6-18-19-10	2-4-1-5	3-11-13-23	22-15-21-16
17	20	1	3	7	8
24-18-15-21	13-10-9-8	7-19-20-11	3-5-2-6	4-12-14-1	23-16-22-17
18	21	2	4	8	9
24-19-16-22	14-11-10-9	8-20-21-12	4-6-3-7	5-13-15-2	1-17-23-18
19	22	3	5	9	10
24-20-17-23	15-12-11-10	9-21-22-13	5-7-4-8	6-14-16-3	2-18-1-19
20	23	4	6	10	11
24-21-18-1	16-13-12-11	10-22-23-14	6-8-5-9	7-15-17-4	3-19-2-20
21	1	5	7	11	12
24-22-19-2	17-14-13-12	11-23-1-15	7-9-6-10	8-16-18-5	4-20-3-21
22	2	6	8	12	13
24-23-20-3	18-15-14-13	12-1-2-16	8-10-7-11	9-17-19-6	5-21-4-22
23	3	7	9	13	14

Notes

APPENDIX D

IRREGULAR INDIVIDUAL MOVEMENTS

Expansions of many irregular Individual movements.

8 TABLE SHOMATE INDIVIDUAL MOVEMENT

Table Round	1	2	3	4	5	6	7	8
1	1.9.17.25	2.10.18.26	3.11.19.27	4.12.20.28	5.13.21.29	6.14.22.30	7.15.23.31	8.16.24.32
2	4.16.22.27	3.15.21.28	2.14.24.25	1.13.23.26	8.12.18.31	7.11.17.32	6.10.20.29	5.9.19.30
3	5.11.18.28	6.12.17.27	7.9.20.26	8.10.19.25	1.15.22.32	2.16.21.31	3.13.24.30	4.14.23.29
4	2.15.20.30	1.16.19.29	4.13.18.32	3.14.17.31	6.11.24.26	5.12.23.25	8.9.22.28	7.10.21.27
5	7.12.24.29	8.11.23.30	5.10.22.31	6.9.21.32	3.16.20.25	4.15.19.26	1.14.18.27	2.13.17.28
6	2.12.6.14.8	22.25.13.7	23.28.16.6	24.27.15.5	17.30.10.4	18.29.9.3	19.32.12.2	20.31.11.1
7	19.31.13.6	20.32.14.5	17.29.15.8	18.30.16.7	23.27.9.2	24.28.10.1	21.25.11.4	22.26.12.3
8	23.32.10.3	24.31.9.4	21.30.12.1	22.29.11.2	19.28.14.7	20.27.13.8	17.26.16.5	18.25.15.6

9 TABLE SHOMATE INDIVIDUAL MOVEMENT

Table Round	1	2	3	4	5	6	7	8	9
1	1.10.19.28	2.11.20.29	3.12.21.30	4.13.22.31	5.14.23.32	6.15.24.33	7.16.25.34	8.17.26.35	9.18.27.36
2	2.12.23.36	3.10.24.34	1.11.22.35	5.15.26.30	6.13.27.28	4.14.25.29	8.18.20.33	9.16.21.31	7.17.19.32
3	7.13.21.29	8.14.19.30	9.15.20.28	1.15.24.32	2.17.22.33	3.18.23.31	4.10.27.35	5.11.25.36	6.12.26.34
4	4.16.20.30	5.17.21.28	6.18.19.29	7.19.23.33	8.11.24.31	9.12.22.32	1.13.26.36	2.14.27.34	3.15.25.35
5	9.14.26.33	7.15.27.31	8.13.25.32	3.17.20.36	1.18.21.34	2.16.19.35	6.11.23.30	4.12.24.28	5.10.22.29
6	3.11.27.32	1.12.25.33	2.10.26.31	6.14.21.35	4.15.19.36	5.13.20.34	9.17.24.29	7.18.22.30	8.16.23.28
7	22.34.15.8	23.35.13.9	24.36.14.7	25.28.18.2	26.29.16.3	27.30.17.1	19.31.12.5	20.32.10.6	21.33.11.4
8	24.35.18.5	22.36.16.6	23.34.17.4	27.29.12.8	25.30.10.9	26.28.11.7	21.32.15.2	19.33.13.3	20.31.14.1
9	25.31.17.6	26.32.18.4	27.33.16.5	19.34.11.9	20.35.12.7	21.36.10.8	22.28.14.3	23.29.15.1	24.30.13.2

10 TABLE SHOMATE INDIVIDUAL MOVEMENT

Table Round	1	2	3	4	5	6	7	8	9	10
1	1.11.21.31	2.12.22.32	3.13.23.33	4.14.24.34	5.15.25.35	6.16.26.36	7.17.27.37	8.18.28.38	9.19.29.39	10.20.30.40
2	6.12.23.34	5.11.24.33	8.19.21.32	7.20.22.31	2.17.26.30	1.18.25.29	4.15.28.39	3.16.27.40	13.10.37.36	14.9.38.35
3	9.3.36.24	10.4.35.23	15.1.30.22	16.2.29.21	13.7.32.28	14.8.31.27	19.5.40.26	20.6.39.25	11.17.34.38	12.18.33.37
4	26.7.33.39	25.8.34.40	16.5.31.37	15.6.32.38	14.3.29.12	13.4.30.11	20.1.23.9	19.2.24.10	27.18.35.21	28.17.36.22
5	22.29.10.8	21.30.9.7	24.35.17.6	23.36.18.5	27.33.19.4	28.34.20.3	25.38.13.2	26.37.14.1	10.31.12.15	39.32.11.16
6	38.30.27.5	37.29.28.6	40.36.14.7	39.35.13.8	10.34.16.1	9.33.15.2	11.22.18.3	12.21.17.4	24.32.26.20	23.31.25.19
7	35.40.1.28	36.39.1.27	29.38.4.20	30.37.3.19	31.9.6.18	32.10.5.17	24.12.8.16	23.11.7.15	33.22.14.25	34.21.13.26
8	32.37.4.25	31.38.3.26	34.39.2.18	33.40.1.17	36.11.8.20	35.12.7.19	21.10.6.14	22.9.5.13	30.23.16.28	29.24.15.27
9	13.14.19.20	17.18.15.16	25.26.11.12	9.10.27.28	37.38.23.24	21.22.39.40	29.30.35.36	33.34.31.32	1.2.7.8	5.6.3.4
10	17.18.15.16	13.14.19.20	9.10.27.28	25.26.11.12	21.22.39.40	37.38.23.24	33.34.31.32	29.30.35.36	5.6.3.4	1.2.7.8

8 TABLE 24 BOARD INDIVIDUAL MOVEMENT

Table Round	1	2	3	4	5	6	7	8
1	1.17.25.9	2.18.26.10	3.19.27.11	4.20.28.12	5.21.29.13	6.22.30.14	7.23.31.15	8.24.32.16
2	1.19.29.16	4.18.32.13	3.17.31.14	6.24.26.11	5.23.25.12	8.22.28.9	7.21.27.10	2.20.30.15
3	1.21.30.12	2.22.29.11	7.19.28.14	8.20.27.13	5.17.26.16	6.18.25.15	3.23.32.10	4.24.31.9
4	1.23.26.13	8.18.31.12	7.17.32.11	6.20.29.10	5.19.30.9	4.22.27.16	3.21.28.15	2.24.25.14
5	32.15.22.1	31.16.21.2	30.13.24.3	29.14.23.4	28.11.18.5	27.12.17.6	26.9.20.7	25.10.19.8
6	28.10.24.1	25.11.21.4	26.12.22.3	31.13.19.6	32.14.20.5	29.15.17.8	30.16.18.7	27.9.23.2
7	27.14.18.1	28.13.17.2	29.12.24.7	30.11.23.8	31.10.22.5	32.9.21.6	25.16.20.3	26.15.19.4
8	31.11.20.1	26.14.21.8	25.13.22.7	28.16.23.6	27.15.24.5	30.10.17.4	29.9.18.3	32.12.19.2

The single number under the four is the Board-Set number and is also the table number when stationary boards are used.

7 TABLE 4 STANZA INDIVIDUAL MOVEMENT

STANZA 1

Table & Set: Round	1	2	3	4	5	6	7
1	22.1.15.8	23.2.16.9	24.3.17.10	25.4.18.11	26.5.19.12	27.6.20.13	28.7.21.14
2	28.2.20.11	22.3.21.12	23.4.15.13	24.5.16.14	25.6.17.8	26.7.18.9	27.1.19.10
3	14.18.27.3	8.19.28.4	9.20.22.5	10.21.23.6	11.15.24.7	12.16.25.1	13.17.26.2
4	10.16.26.4	11.17.27.5	12.18.28.6	13.19.22.7	14.20.23.1	8.21.24.2	9.15.25.3
5	13.21.25.5	14.15.26.6	8.16.27.7	9.17.28.1	10.18.22.2	11.19.23.3	12.20.24.4
6	24.6.19.9	25.7.20.10	26.1.21.11	27.2.15.12	28.3.16.13	22.4.17.14	23.5.18.8
7	23.7.17.12	24.1.18.13	25.2.19.14	26.3.20.8	27.4.21.9	28.5.15.10	22.6.16.11

STANZA 2

Table: Set: Round	1 8	2 9	3 10	4 11	5 12	6 13	7 14
8	22.8.1.15	23.9.2.16	24.10.3.17	25.11.4.18	26.12.5.19	27.13.6.20	28.14.7.21
9	6.18.9.28	7.19.10.22	1.20.11.23	2.21.12.24	3.15.13.25	4.16.14.26	5.17.8.27
10	4.21.10.27	5.15.11.28	6.16.12.22	7.17.13.23	1.18.14.24	2.19.8.25	3.20.9.26
11	2.17.11.26	3.18.12.27	4.19.13.28	5.20.14.23	6.21.8.23	7.15.9.24	1.16.10.25
12	25.12.7.20	26.13.1.21	27.14.2.15	28.8.3.16	22.9.4.17	23.10.5.18	24.11.6.19
13	24.13.5.16	25.14.6.17	26.8.7.18	27.9.1.19	28.10.2.20	22.11.3.21	23.12.4.15
14	3.19.14.23	4.20.8.24	5.21.9.25	6.15.10.26	7.16.11.27	1.17.12.28	2.18.13.22

STANZA 3

Table: Set: Round	1 15	2 16	3 17	4 18	5 19	6 20	7 21
15	28.16.13.4	22.17.14.5	23.18.8.6	24.19.9.7	25.20.10.1	26.21.11.2	27.15.12.3
16	27.17.11.7	28.18.12.1	22.19.13.2	23.20.14.3	24.21.8.4	25.15.9.5	26.16.10.6
17	26.18.9.3	27.19.10.4	28.20.11.5	22.21.12.6	23.15.13.7	24.16.14.1	25.17.8.2
18	6.14.25.19	7.8.26.20	1.9.27.21	2.10.28.15	3.11.22.16	4.12.23.17	5.13.24.18
19	2.12.20.24	3.13.21.25	4.14.15.26	5.8.16.27	6.9.17.28	7.10.18.22	1.11.19.23
20	23.21.10.5	24.15.11.6	25.16.12.7	26.17.13.1	27.18.14.2	28.19.8.3	22.20.9.4

STANZA 4

Table: Set: Round	1 22	2 23	3 24	4 25	5 26	6 27	7 28
21	1.6.22.26	3.4.8.12	16.19.25.27	23.24.11.13	15.20.9.10	5.2.17.18	**14**21**28 (**21)
22	1*8*15*22	2.7.23.27	4.5.9.13	17.20.26.28	24.25.12.14	16.21.10.11	6.3.18.19 (**15)
23	7.4.19.20	2*9*16*23	3. 1. 24.28	5.6.10.14	18.21.27.22	25.26.13.8	17.15.11.12 (**16)
24	18.16.12.13	1.5.20.21	3*10*17*24	4.2.25.22	6.7.11.8	19.15.28.23	26.27.14.9 (**17)
25	27.28.8.10	19.17.13.14	2.6.21.15	4*11*18*25	5.3.26.23	7.1.12.9	20.16.22.24 (**18)
26	21.17.23.25	28.22.9.11	20.18.14.8	3.7.15.16	5*12*19*26	6.4.27.24	1.2.13.10 (**19)
27	2.3.14.11	15.18.24.26	22.23.10.12	21.19.8.9	4.1.16.17	6*13**2*27	7.5.28.25 (**20)

Those tables marked with an "*" play the board-sets shown down the right hand side of the schedule (these sets coming from the previous stanza). If there is to be a break between the last two stanzas, then the set of tables shown by "*" represents the last round of the third stanza (round 21 then) and a bye occurs in each of the 7 rounds in the last stanza (then rounds 22 to 28).

25 PLAYER 5 STANZA INDIVIDUAL MOVEMENT

STANZA 1

Table:	1	2	3	4	5	6	Sit out
Set:	1	2	3	4	5	1to5	
Round							
1	25.1.16.6	24.5.17.7	8.18.23.4	3.22.9.19	20.10.2.21	13.12.14.11	15
2	18.7.3.21	25.2.19.8	24.1.20.9	10.16.23.5	4.22.6.17	14.13.15.2	11
3	5.22.8.20	16.9.4.21	35.3.17.10	24.2.18.6	7.19.23.1	15.14.11.13	12
4	9.17.23.2	1.22.10.18	19.6.5.21	25.4.20.7	24.3.16.8	11.15.12.14	13
5	24.4.19.10	6.20.23.3	2.22.7.16	17.8.1.21	25.5.18.9	12.11.13.15	14

STANZA 2

Table:	1	2	3	4	5	6	Sit out
Set:	6	7	8	9	10	6to10	
Round							
6	25.6.11.16	21.10.12.17	18.13.24.9	8.23.19.14	15.20.17.22	3.2.4.1	5
7	13.17.8.22	25.7.14.18	21.6.15.19	20.11.24.10	9.23.16.12	4.3.5.2	1
8	19.23.18.15	11.19.9.22	25.8.12.20	21.7.13.16	17.14.24.6	5.4.1.3	2
9	19.12.24.7	6.23.20.13	14.16.10.22	25.9.15.17	21.8.11.18	1.5.2.4	3
10	21.9.14.20	16.15.24.8	7.23.17.11	12.18.6.22	25.10.13.19	2.1.3.5	4

STANZA 3

Table:	1	2	3	4	5	6	Sit out
Set:	11	12	13	14	15	11to15	
Round							
11	25.11.6.1	22.15.7.2	3.8.21.14	13.23.4.9	10.5.12.24	18.17.19.16	20
12	8.2.13.24	25.12.9.3	22.11.10.4	5.6.21.15	14.23.1.7	19.18.20.17	16
13	15.23.3.10	6.4.14.24	25.13.7.5	22.12.8.1	2.9.21.11	20.19.16.18	17
14	4.7.21.12	11.23.5.8	9.1.15.24	25.14.10.2	22.13.6.3	16.20.17.19	18
15	22.14.9.5	1.10.21.13	12.23.2.6	7.3.11.24	25.15.8.4	17.16.18.20	19

STANZA 4

Table:	1	2	3	4	5	6	Sit out
Set:	16	17	18	19	20	16to20	
Round							
16	25.16.1.11	23.20.2.12	13.3.20.19	18.24.14.4	5.15.17.22	8.7.9.6	10
17	3.12.18.22	25.17.4.13	23.16.5.14	15.1.21.20	19.24.11.2	9.8.10.7	6
18	20.24.13.5	1.14.19.22	25.18.2.15	23.17.3.11	12.4.21.16	10.9.6.8	7
19	21.17.2.14	3.15.16.24	20.22.11.4	25.19.5.12	13.1.23.18	6.10.7.9	8
20	4.15.19.23	18.21.11.5	1.12.17.24	16.22.13.2	25.20.3.14	7.6.8.10	9

STANZA 5

Table:	1	2	3	4	5	6	Sit out
Set:	21	22	23	24	25	21to25	
Round							
21	10.12.3.19	6.11.2.18	1.17.15.7	16.5.8.14	13.9.20.4	25.21.24.22	23
22	18.1.9.14	17.5.10.13	6.12.4.16	7.11.3.20	8.15.2.19	25.22.23.24	21
23	4.17.11.8	9.15.3.16	14.10.30.2	1.19.13.6	7.12.5.18	25.23.22.21	24
24	16.2.7.13	12.8.20.1	11.9.19.5	4.18.15.10	17.3.6.14	25.24.21.23	22
25	20.5.6.15	14.7.19.4	18.3.8.13	2.17.12.9	10.11.1.16	24.21.22.23	25

Table 6 shares boards with tables 1 and 5 alternatively. If only one board sets are used, then table 6 plays boards 26 to 30 (one for each stanza) and each player only plays 25 out of the 30 boards. If there are only 24 players then the sit-out player occupies the position of player 25.

5 TABLE 4 STANZA INDIVIDUAL MOVEMENT

STANZA 1

Table: Set: Round	1	2	3	4	5
	1	2	3	4	5
1	1.11.20.10	2.12.19.9	3.13.18.8	4.14.17.7	5.15.16.6
2	14.2.6.18	15.3.10.17	11.4.9.16	12.5.8.20	13.1.7.19
3	7.16.12.3	6.20.13.4	10.19.14.5	9.18.15.1	8.17.11.2
4	19.8.4.15	18.7.5.11	17.6.1.12	16.10.2.13	20.9.3.14
5	9.17.5.13	8.16.1.14	7.20.2.15	6.19.3.11	10.18.4.12

STANZA 2

Table: Set: Round	1	2	3	4	5
	6	7	8	9	10
6	1.20.10.11	2.19.9.12	3.18.8.13	4.17.7.14	5.16.6.15
7	18.2.14.6	17.3.15.10	16.4.11.9	20.5.12.8	19.1.13.7
8	7.12.3.16	6.13.4.20	10.14.5.19	9.15.1.18	8.11.2.17
9	15.8.19.4	11.7.18.5	12.6.17.1	13.10.16.2	14.9.20.3
10	9.13.17.5	8.14.16.1	7.15.20.2	6.11.19.3	10.12.18.4

STANZA 3

Table: Set: Round	1	2	3	4	5
	11	12	13	14	15
11	5.9.12.18	1.10.13.19	2.6.14.20	3.7.15.16	4.8.11.17
12	13.20.4.7	14.16.5.8	15.17.1.9	11.18.2.10	12.19.3.6
13	17.14.10.3	18.15.6.4	19.11.7.5	20.12.8.1	16.13.9.2
14	8.2.19.15	9.3.20.11	10.4.16.12	6.5.17.13	7.1.18.14

STANZA 4

Table: Set: Round	1	2	3	4	5	
	16	17	18	19	20	
15	1.4.3.2	6.9.8.7	11.14.13.12	16.19.18.17	5*10*15*20	(*15)
16	1*6*11*16	2.5.4.3	7.10.9.8	12.15.14.13	17.20.19.18	(*11)
17	18.16.20.19	2*7*12*17	3.1.5.4	8.6.10.9	13.11.15.14	(*12)
18	14.12.11.15	19.17.16.20	3*8*13*18	4.2.1.5	9.7.6.10	(*13)
19	10.8.7.6	15.13.12.11	20.18.17.16	4*9*14*19	5.3.2.1	(*14)

Those tables marked with an "*" play the board-sets shown down the right hand side of the schedule (these sets coming from the previous stanza). If there is to be a break between the last two stanzas, then the set of tables shown by "*" represents the last round of the third stanza (round 15 then) and a bye occurs in each of the 5 rounds in the last stanza (then rounds 16 to 20).

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