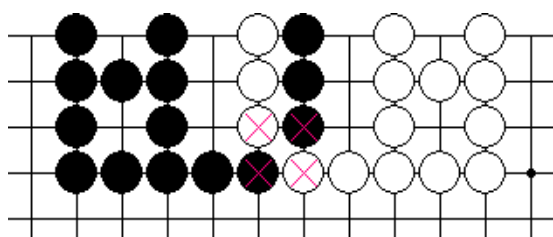


## Chapter Five Capturing Race

### 4000 Capturing Race

Look at the chart below.

As you can see, at the points of four stones marked with X, black is cut into two groups of stones and the white is also cut into two groups.

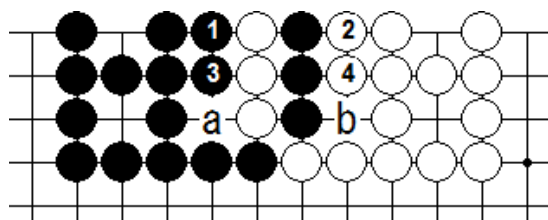


The black group on the extreme left is living with two separate eyes. Similarly, the white group on the extreme right is also living with two separate eyes. But the group of three black stones in the middle right is so small that it is impossible to form two eyes. Similarly, it is impossible for the

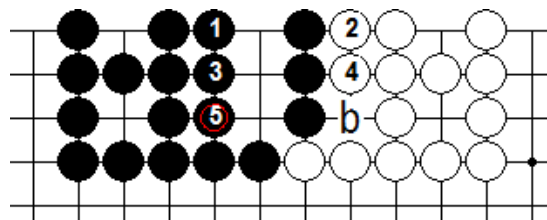
white to form two eyes with group of three white stones in the middle left. These two groups are under an uncertain situation. This means that black will be able to survive if the black player succeeds in killing the unstable white group by capturing. Similarly, white will be able to survive if the white player can kill the unstable black group by capturing. The question is which is faster to capture the opponent's group of stones. This situation is called "a capturing race".

If a situation shown in the above chart occurs, black can capture white if he plays first.

The sequence of possible moves will be shown in the following chart.



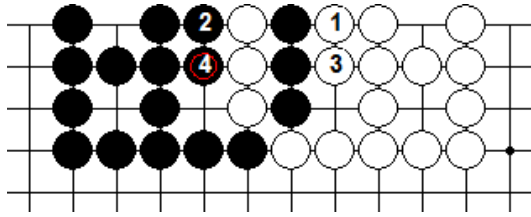
Black can capture white stones by "a".



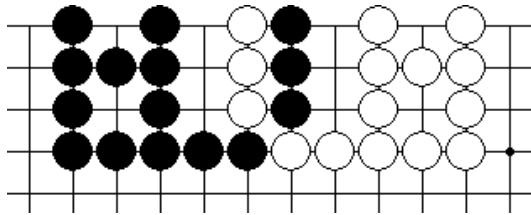
White's move at "b" cannot capture black stones.

The moves started by black's (1) to the white's move (4) are an example of a typical capturing race. And as white plays (4) in the left hand chart, you will see that black can capture three white stones by a move at "a" for (5). It is possible for the white to make a move at "b" after it, but, since three white stones were removed from the board at the time black plays "a", the move of the white at "b" cannot capture black stones as you will see in the chart on the right.

In this case, black started the capturing race first, but what will happen if white starts the capturing race?



The above chart shows the case white started the capturing race. You will see that white will succeed in capturing black stones first by white's move at (5) just below (3).



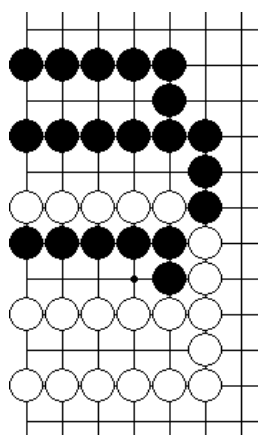
Let us look at this chart showing the original situation. You will be able to count the number of breathing points of the middle groups of uncertain stones of the black and white. Black group has three breathing points and white group also has three breathing points. In this situation, where the number of breathing points is exactly the same, the result of the capturing race will depend on who plays there first.

At this point, it should be mentioned that Capturing Race is not an easy subject understand for beginners, but it is an area where a mathematical study is valid a hundred percent. This means that if you are patient enough, you are sure to master the correct moves if you meet a capturing race in actual games.

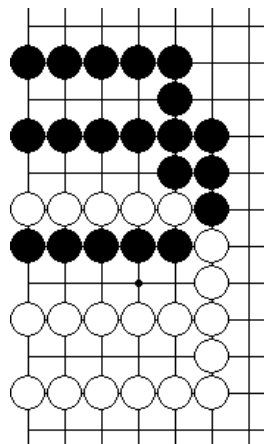
#### 4010 Capturing Race when there are no breathing points inside the uncertain groups.

At this point, we will give you a quiz with three charts below. Please check the groups of stones

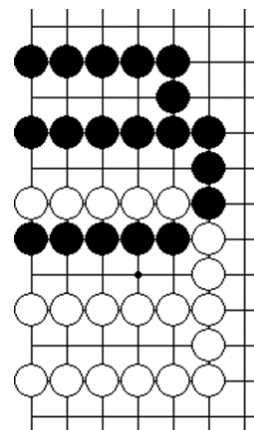
on the board of these charts and confirm the status of each chart.



White will win the race.



The first player will win the race.



Black will win the race.

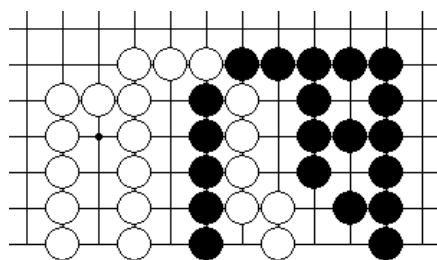
In the left hand chart, the inner black group has four breathing points while the inner white black group has five breathing points. In this case, white will win the capturing race even in case the black plays first.

In the middle chart, the number of breathing points of inner black and white group are exactly the same. In this case, the first player will win the capturing race.

In the right hand chart, the inner black group has three breathing points while the inner white group has four breathing points. In this case, black will win the capturing race even in case the white plays first.

#### 4020 Capturing Race where there is one common breathing point for black and white groups

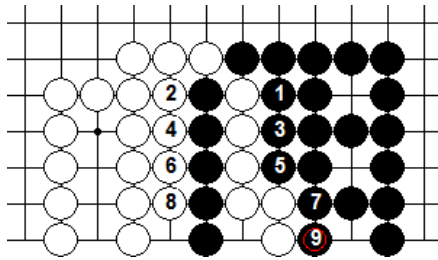
Look at the chart below.



This is a case in which there is one breathing point between the black group and white group which we will be able to call as “common breathing point.”

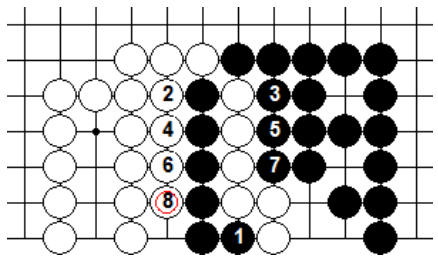
As you can see, black group has 5 outside breathing points and one common breathing point. White also has 5 outside breathing points and one common breathing point. In this case, the calculation of breathing points to determine which player will win the capturing race works exactly the same as the case where there is no common breathing

points. However, it is very important to remember that you must make moves on independent outside breathing points first and then on common breathing points last. This order is very important. Since the number of breathing points left is exactly the same for black and white in this case, the player making the first move will win the capturing race. You will be able to confirm this fact with the following chart.



The black's order of moves is good and after both players play from (1) to (9), you will be able to confirm that black has succeeded in capturing 6 white stones. White could not prevent it.

Next chart shows what will happen if the order of moves is bad.

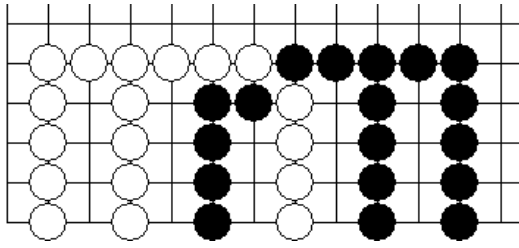


In this case, black started moves from (1). The move (1) is a poor move. If this bad move is made, it will go on as shown from (1) to (8) and you will notice that black failed in the capturing race and white wins the race.

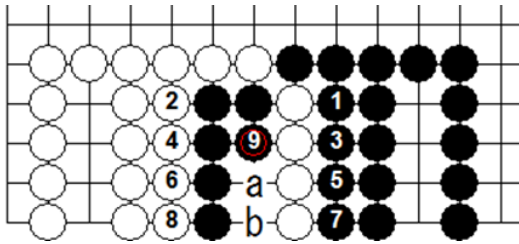
You may wonder why this happens. The explanation is simple. The move at the common breathing point at (1) will reduce the opponent's breathing point for one, yes, but it is reducing your breathing point for one at the same time. Thus the move (1) is inferior to a move which reduces the opponent's breathing point independently.

#### 4030 Moratorium

When there are two or more common breathing points between the black and white uncertain groups, a strange result may be reached. Here is an example.



In this case, each player should first start making moves to reduce the outside breathing points of the opponent's group. When all outside nodes are filled, you may start filling the common breathing points, but.....

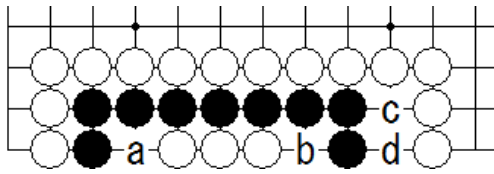


Here is the result of moves from black's (1) to (9). From black's (1) to white's (8), each player is filling outside breathing points of the opponent's group. The black's move (9) is the first move to try to fill the inside breathing points which are common to both players. As you will see, the move (9) is harmless locally. However look at the result carefully. What is the best move of (10) for the white? You will be able to confirm that the white's move at "a" or "b" will be a terrible move. If white should make a move at "a" for example, black will make a move at "b" to win the capturing race. For this reason, white's move at "a" is suicidal.

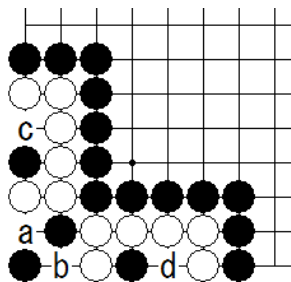
Let us examine what will happen if black plays here. If black should play at "a", for example, white can make the next move at "b" to win the capturing race! This means that black's move at "a" is also a suicidal move. Then, what is the best move for the white after black's (9)? The answer is "pass" locally. Then, when white passes locally and make a move elsewhere, what is the best move for the black? The answer is also "pass" locally. Thus the situation reached in the above chart is regarded as "moratorium" of the race and either black or white has no move of positive value there.

In actual games, this local situation is left touched until the end of the game. And the points "a" and "b" will not be counted as territories of either player.

At this point, let us look at a few other patterns which are regarded "moratorium"



In this pattern, either player may make a move at “c” or “d” which are useless but harmless. However, moves at “a” or “b” will be suicidal for either player. This situation is regarded as moratorium and “a” and “b” left until the end of the game shall not be counted as territories of either player.



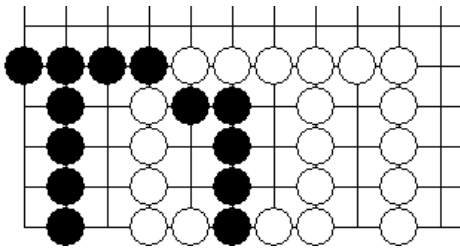
What is this pattern? A little complicated, yes, but if this situation is reached, black has no valid move to play here locally. For the black, “c” and “d” are suicide moves which are not allowed by rule. And for him, the move at “a” or “b” will be suicidal in the sense that black stones inside this area will be captured if you should make that move. It is a suicidal move although it is not a suicide move like “c” or “d” in the strict sense of the word.

For the white, “a” and “b” are also suicidal. Interestingly, white can play at “c” to capture one black stone and he can also play at “d” to capture another black stone. In either Japanese rules or Chinese rules, white should make moves at “c” and “d” before the end of the game. In Japanese rules, the two captured stones shall be counted as dead stones. In Chinese rules, the stones remaining after such moves will add value to your score.

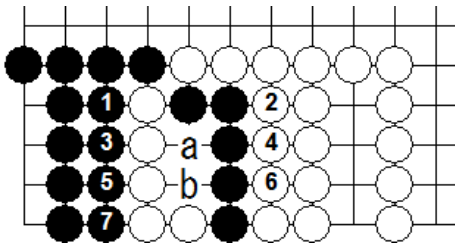
Thus white’s moves at “c” and “d” are valuable. Moreover, after the capture of two stones, the respective vacant points which look like true eyes shall be counted as white’s territory in Chinese rules, although Japanese rules state that these single eyes shall not be counted as territories of the white.

#### 4040 Capturing Race in case there are two or more common breathing points

In the last section, you saw a pattern in which the result was moratorium. However, it is not the only result possible of a capturing race in case there are two or more common breathing points. Let us examine it with the following chart.

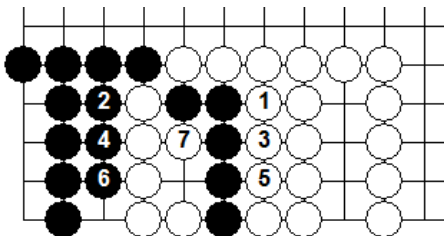


In this case, if black starts moves here, the result will be the pattern shown in the next chart.



From black's (1) to white's (6), the moves are to fill outside nodes. Black's move to fill the outside node at (7) is important. If the black neglects to make the move of (7), white can make a move at either "a" or "b" to win this capturing race. However, if black can make a move of (7), the result is moratorium and neither player can win the capturing race, since a move at "a" or "b" is suicidal for either player.

Let us check what happens if white plays first.



In this case, the moves from white's (1) to black's (6) are the moves to fill outside breathing points. But in this case, white can make a move of (7) to fill the inside common breathing point. And this move is leading the white to win this capturing race.

As a conclusion, we will see that in case there are two or more common breathing points, there can be these different cases shown below.

1. Black will win the capturing race no matter which plays first.
2. Black will win the race if black plays first, but the result would be moratorium if white plays first.
3. The result will be moratorium no matter which plays first.
4. White will win the race if white plays first, but the result would be moratorium if black plays first.

5. White will win the race no matter which plays first.

There is a mathematical formula to determine which of the five applies by observing a pattern on the board. The only numbers that count are those of black's outside breathing points (Bo) and white's outside breathing points (Wo) and inside common breathing points. (C)

To determine which of the five categories applies to a given pattern, let us define the difference of Bo and Wo as  $\Delta_o$ . It is apparent that if  $\Delta_o$  is great enough, the player with larger outside breathing points will win the capturing race. However, if  $\Delta_o$  is zero or small enough, the result of the race will be moratorium.

Here is the formula to check the distinction.

$$\text{If } \Delta_o + 1 > C$$

The player with greater number of outside breathing points will win the capturing race.

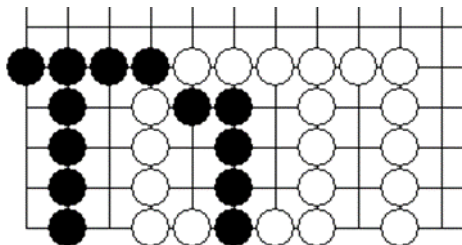
$$\text{If } \Delta_o + 1 = C$$

The player with greater number of outside breathing points will win the race if he plays first

But the result of the capturing race would be moratorium if the other player plays first.

$$\text{If } \Delta_o + 1 < C$$

The result of the capturing race will end as moratorium.



You will be interested in applying the formula to the chart shown above. The number of the black's outside breathing points is 3 and the number of the white's outside breathing points is 4. Therefore  $\Delta_o = 1$  and  $\Delta_o + 1 = 2$ .  $C = 2$ , and thus  $\Delta_o + 1 = C$ .

The formula says if white plays, first he will win the capturing race, but, if black plays first, the result would be moratorium. This fact was already confirmed in the charts shown above.

#### 4050 Capturing Race in case one uncertain group has an eye.

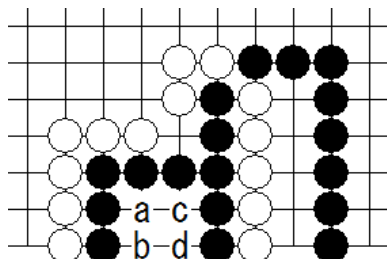
So far, we have discussed the capturing races between two uncertain groups of stones of the black and the white which have no eyes.

We have studied the distinction of outside breathing points and inside common



breathing points. In this section, we shall learn that there are breathing points of the third category.

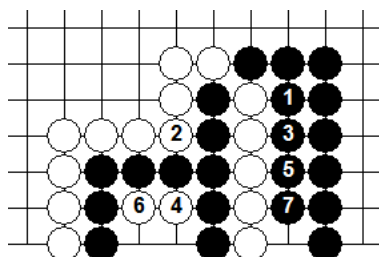
Let us check the pattern shown here.



In this case, there is no inside common breathing points. White's uncertain group has five outside breathing points. Black's uncertain group has one outside breathing point. Now, you will see that the black group has one eye. If the black can form the second eye, black can survive and the white shall automatically die. But in this pattern the black cannot form two separate eyes so easily. For the white, if he tries to fill the breathing points inside the black's eye, there are four points "a", "b", "c" and "d", which must be filled to capture the black. We must distinguish the breathing points inside such an eye shape from outside breathing points and inside common breathing points.

For the pattern shown above, as there is no inside common breathing points, the result of the capturing race can be determined by counting the number of breathing points of each player. As you can see, it is easy to count white's outside breathing points as 5. To count the number of breathing points of the black group, the calculation is not that simple. You may count the black's outside breathing point as 1 which is correct. If the number of breathing points inside the eye is 4, the total number of breathing points of the black group is  $1 + 4 = 5$  and you may conclude that either player will win the capturing race if he can play first as the number of total breathing points matches as 5 vrs. 5.

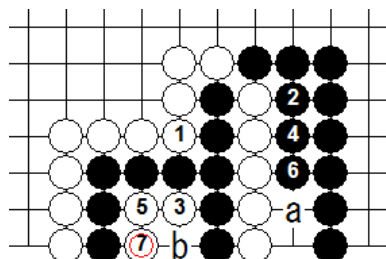
. However, the number of breathing points inside the eye counted as 4 is not correct! Let us confirm this fact with the following chart.



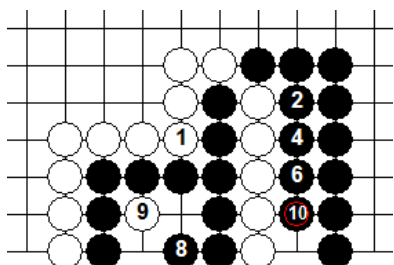
If the black starts the capturing race, this is what will happen. The moves from black's

(1) to (7) are to fill the outside breathing points of the white. White can start filling the black's outside breathing points by (2) followed by moves to fill the breathing points inside the eye from (4) to (6). But, as black's (7) is played, you will see that white has no means to prevent the black's next move to capture the white group. So far the calculation of breathing points is OK.

However, if white starts the capturing race, the result is not exactly the same.



From white's (1) to (7), the order of moves filling black's breathing points is correct. Black's moves from (2) to (6) are also fine. Now at the point white's (7) is played, if black fill the white's outside breathing point at "a", that is too late. White can capture the black group by the move at "b" before black can capture the white. However, black's move at "a" is not correct. When white plays (7), black must play at "b" rather than at "a". The result will be the pattern shown below.



The black's correct move is (8) to capture three white stones. Then, you will see that white needs a move at (9) to prevent black's survival. Then the black can make a move at (10). Now white needs another two moves to capture the black while the black can capture the white with one move. This means that this capturing race results in black's winning! Why was it so?

The following is the answer to that question. The number of moves you need to fill inside the eye is not always the same as the number of vacant points in the eye. Here is an interesting mathematical formula.

The number of vacant points inside the eye	The number of moves needed
x	y
1	1

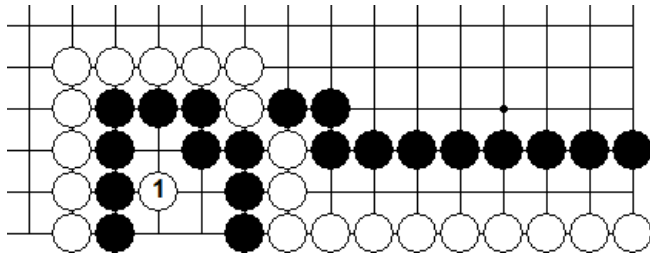
2	2
3	3
4	5
5	8
6	12
7	17

It is an interesting formula. It is best to remember this chart at least upto  $x=6$ . If you forget that chart, you can reproduce it in your mind if you recall the following mathematical formula.

- Deduct 2 from  $x$  to get  $z$
- Add from 1 to  $z$  to get  $v$
- Add 2 to  $v$  to get  $y$

This may sound too complicated but it is not. For example, if you wish to get the number for 6, you deduct 2 from 6 to get 4, you add from 1 to 4 just like  $1+2+3+4=10$ , and finally add 2 to 10 to get 12. 12 is the right answer.

Please confirm the correctness of the calculation by trying the following chart



In this case, white can capture the black. White group has 8 breathing points. Black's vacant points inside the eye was 5 which needs 8 moves to fill in, but as white (1) was played white only needs seven moves to win the race. This means that black cannot win the race even if black starts with (2) filling the outside breathing points.

#### 4060 Capturing Race between a group with one eye and a group without an eye

When a group without an eye and a group recognized to have an eye has a capturing race, the group with an eye has some advantage. This recognition is correct but let us clarify it in detail.

First of all, please remember that if there is no inside common eye, the group without an eye has no disadvantage at all. In this situation, only the number of moves needed to capture the opponent's group counts. The example we studied in the last section was a typical case.

Now, if there is one or more common eyes between two uncertain groups and one group

has an eye and the other has no eye, the advantage of the group with an eye is clear.

In such a situation, the number of the inside common nodes is only valid for the group with an eye. Thus you only need to compare the following numbers.

Total number of moves to capture group A with an eye expressed as  $A_t$  shall be equal to

$A_o$  (outside breathing points of of A) plus

$A_c$  (common breathing points) plus

$A_e$  (moves needed to fill in the breathing points inside the eye)

Thus  $A_t = A_o + A_c + A_e$

Total number of moves to capture group B without an eye expressed as  $B_t$

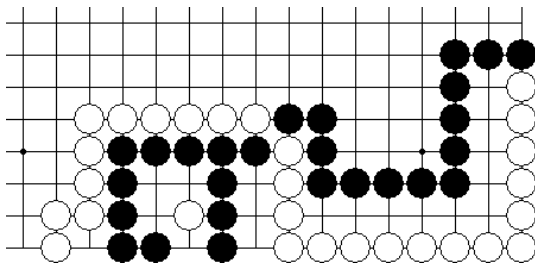
Shall be equal to

$B_o$  (outside breathing points of B)

Thus  $B_t = B_o$

You have only to compare  $A_t$  and  $B_t$ . If one is greater, that player will win the capturing race. If they are equal, the first player will win the race. Remember that there will be no possibility of resulting in moratorium under this situation.

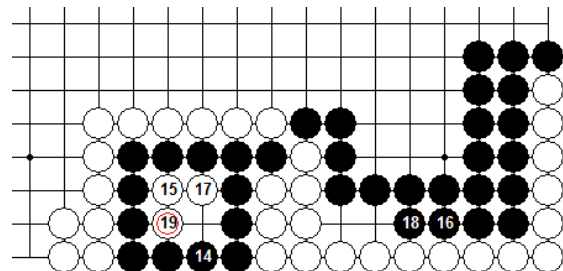
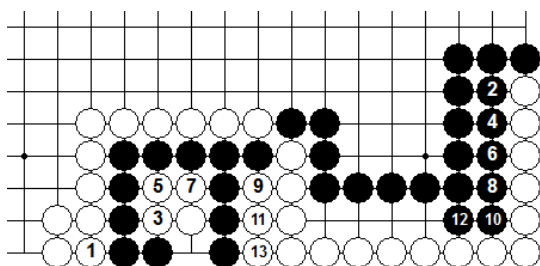
Here we shall show you one example.

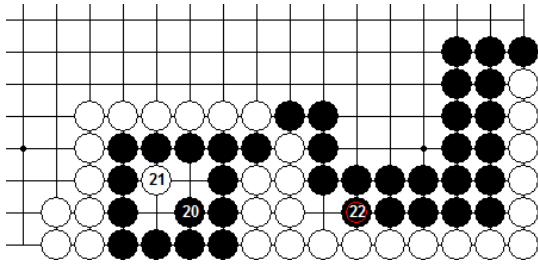


This pattern is pretty complicated but you can calculate the result very easily.

$$A_t = A_o + A_c + A_e = 1 + 3 + (8 - 1) = 11 \quad B_t = B_o = 10$$

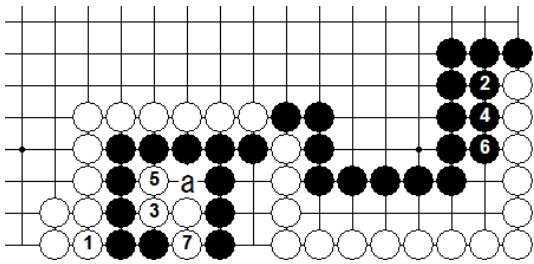
The conclusion is that the A (Black) need not play here since the result of the winning of this capturing race is assured by this calculation. Even if white can start the capturing race, the black would win the race. The result of the race will be confirmed by the following charts.





The moves from the white's (1) to the black's (21) are all correct and the result shows that white cannot make a move at (23) to win the race. The white can make a move a point to the right of (21) but black can capture white group before the white can capture the black.

At this point, it is important to realize that the player must be careful in the order of moves to fill the breathing points within the eye. If the white makes a mistake in the order of moves within the eye, a different result may be reached.



The white's move at (7) in this pattern is an example of a mistake in the order of filling nodes inside the eye. The correct move for (7) is at "a". If the white makes a mistake and play (7), black can instantly respond at "a" to capture the four stones. The result of the capture is a typical bent four survival pattern. When a survival pattern is obtained, the capturing race is over and in this case, the white cannot do anything about the capturing race.

#### 4070 What happens if two groups have one eye each ?

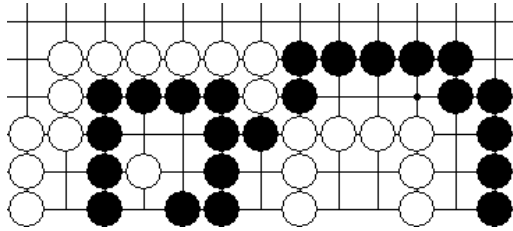
When both groups have one eye each, there are two distinct patterns you should remember. To clarify the distinction, we need to know the ranking of an eye.

Ranking	The number of points inside the eye.
A	1,2 and 3,
B	4,
C	5,
D	6
Etc.	

If the rankings of eyes of two groups are different, the formula to be used is exactly the same as “a capturing race between a group with an eye and a group without an eye” discussed at section 4050.

The group with an eye with a higher rank is in advantage. This situation is called by the term “Big eye and small eye”.

Here is a typical example to see if the formula is correct.



Let us apply the formula.

The number of moves to capture the black group will be calculated as

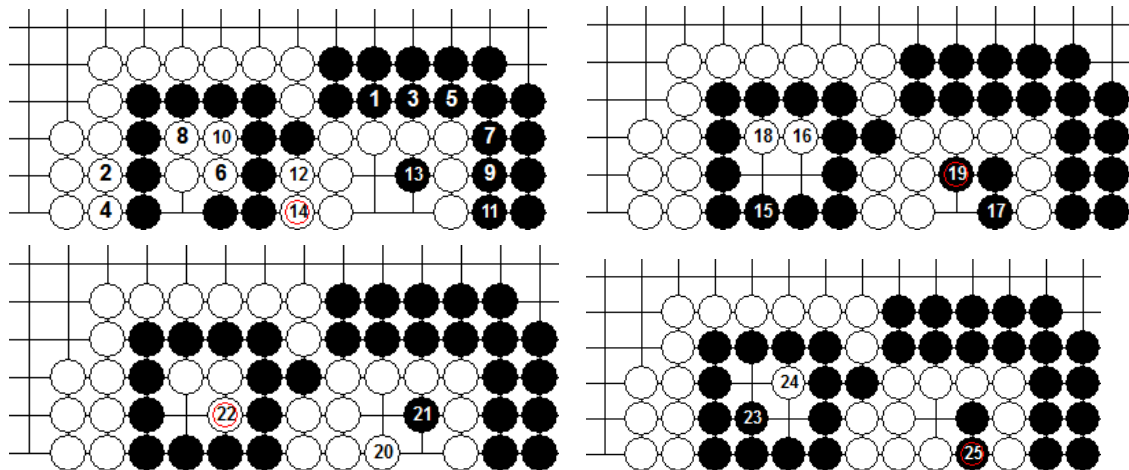
$$A_t = A_o + A_c + A_e = 2 + 2 + (8 - 1) = 11$$

And the number of moves to capture the white group will be calculated as

$$B_t = B_o + B_e = 6 + 5 = 11$$

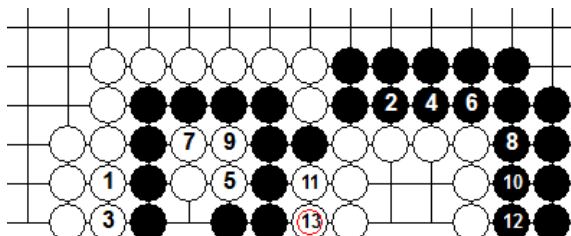
Since the numbers are exactly the same, the first player will win the capturing race.

There is no possibility of reaching a situation of moratorium. Let us confirm this with the followin charts.

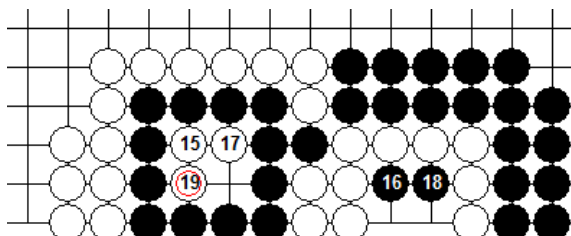


From the black’s (1) to white’s (4) and black’s (5), both players are filling in the outer breathing points. The black continues the same from (7) to (11) while the white will start filling in the points inside the eye from (6) to (10). Then the white must start filling in the common breathing points from (12). When the white plays (14), the black needs a move of (15) to capture four stones. From (16) to (19), both try to fill in the breathing points inside the eye. At (20), white must capture three stones inside the eye. The black’s (21) is important to avoid survival of the white. At the black’s

(23), black must capture three stones and the while must play (24) to avoid the survial of the black. And finally, the black's move (25) shows that the black has won this long capturing race.



This chart shows the case the white played first from the original pattern. As white reaches (13), the black needs a move to capture four white stones. At that point the patterns of the black and the white are exactly the same.



Therefore, from (15), white runs the capturing race with one move ahead of the black. The final result will be the white winning the long capturing race.

#### 4080 The Capturing Race between two groups with eyes of the same ranking

When the black and white has an uncertain group with an eye of the same ranking as the opponent's uncertain group with an eye, there is no advantage to either the black or the white. This situation resembles the capturing race between two groups with no eye but there are two or more common breathing points discussed at section 4040

In such a situation, the result of moratorium may occur depending on the situation of the number of breathing points. There can be five patterns shown below.

1. Black will win the capturing race no matter which plays first.
2. Black will win the race if black plays first, but the result would be moratorium if white plays first.
3. The result will be moratorium no matter which plays first.
4. White will win the race if white plays first, but the result would be moratorium if black plays first.
5. White will win the race no matter which plays first.

There is a mathematical formula to determine the result by counting the outside breathing points, common breathing points and number of moves needed to fill in

the breathing points inside the eye.

To analyse and confirm the result, you first check the difference to the total of outside breathing points and breathing points inside the eye. Let us define the difference of the total between the two players as  $\Delta$ . Now you compare this  $\Delta$  with the number of common breathing points  $C$ .

Here is the formula to check the distinction.

$$\text{If } \Delta_o > C$$

The player with greater number of outside breathing points will win the capturing race.

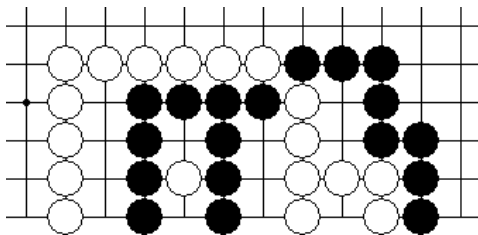
$$\text{If } \Delta_o = C$$

The player with greater number of outside breathing points will win the race if he plays first. But the result of the capturing race would be moratorium if the other player plays first.

$$\text{If } \Delta_o < C$$

The result of the capturing race will end as moratorium.

You may notice that the formula resembles the formula you saw in section 4040.



Here is a good example of a capturing race where we can apply the formula. First we confirm that each group has one eye but the rankings of the eye are the same.

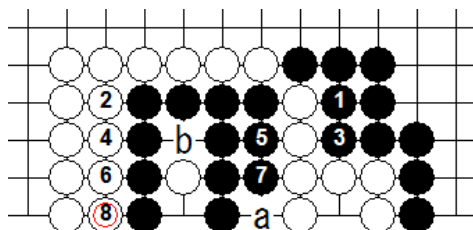
Then we count the number of moves to fill in the breathing points. For the black group,  $A_o=4$ ,

$A_e=3-1=2$ , The total  $A_t=A_o+A_e=6$ . For the white group  $B_o=2$ ,  $B_e=1$ , the total  $B_t=3$ .

The difference  $\Delta=A_t-B_t=3$ . Now,  $C$  the number of common breathing points is 3.

Thus we find that  $\Delta=C$ . The formula says that black will win the capturing race if he plays first, but the result would be moratorium if white plays first.

Let us check if this analysis is correct using the following charts.

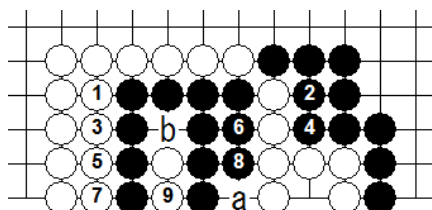


From the black's (1) to white's (4), outside breathing points are filled in. From black's



(5) to (7) black is filling in the common breathing points while white plays at (6) and (8) filling the outside breathing points. However, at this point, white is finding that (8) was too late. For the move of (9), black can make a move at “a” to capture the white group and white has no means to avoid it.

If white had chance to make another additional move to place another stone at “b”, black would not have been able to make a move at “a”. That is a moratorium.

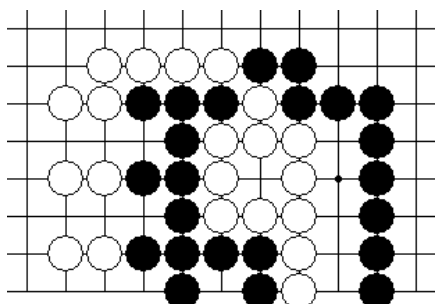


This chart shows the case, the white played first. From (1) to (7), the white is filling in the outside breathing points. Black filled two outside breathing points by (2) and (4) but started fillin in the common breathing points as (6) and (8). At white’s move (9), the black will find that he is not able to try to capture the white group by a move of a since that move at “a” is suicidal. Black can capture two white stones by a move at “b”, but white can make a move at (9) inside the eye and then the black cannot play “a” after all. However, at the same time, the white cannot make a move at “a”, either. Thus the result is moratorium.

#### 4090 Exceptions of counting of number of breathing points

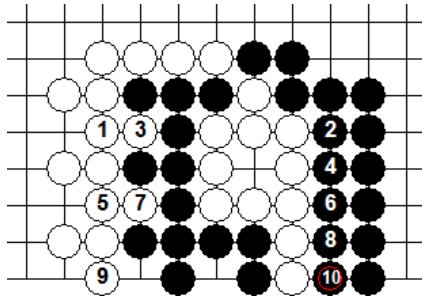
As we have discussed so far, the result of the capturing race has a lot to do with the situation of breathing points of groups of stones. However, in actual game patterns, there are cases the number of moves needed to capture the opponent’s stones is not exactly the same as the number of breathing points.

Here is one example easy to understand what we mean by it.



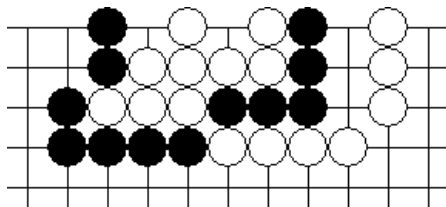
Looking at this pattern you may be able to count that black group has 3 outside breathing points and 1 inside the eye. The total is 4. The white group has 5 outside breathing points and 1 inside the eye. The total is 6. Just counting them

that way, you may judge that white will win the capturing race. But that is not correct. Why? Because white can not make a move at any of the three outside breathing points. For that reason the result will be just as shown in the chart below even when the capturing race starts with the white's move.

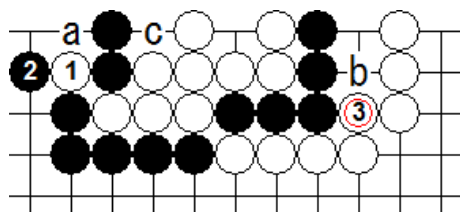


As you will notice, the white needs to make a move at (1) before (3). Similarly, he needs (5) before (7). Likewise, white's (9) is needed to make a move to the right of (9). Thus as the black makes a move at (10), you will find that it was too late for the white to capture the black.

There are many other cases where the number of breathing points counted is not indicating the number of moves needed to capture a group of stones. We will show you one important example.



In the pattern shown above, if you count the number of breathing points, you will find that the inside black group has 3 breathing points, while the white has one eye plus one outside breathing point the total of which is 2. This sounds like implying that white cannot win this capturing race. However that is not the case. Actually if black plays here to fill in the white's outside node, the white cannot avoid black's capture by the last move inside the eye. But, if it is white's turn, there is a good move!



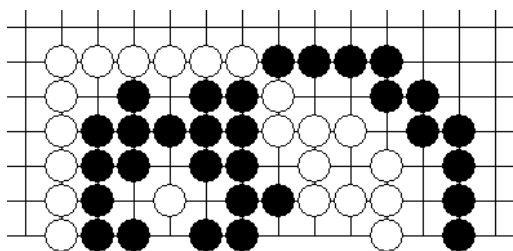
Here is a chart showing the white's best moves. First, white makes a move at (1).

This move cannot capture two black stones near the upper edge. In fact, black will make a move at (2) in response and the white's stone at (1) is captured. However, you will realize that black cannot make a move at "c" as it is suicidal as long as (1) is there. This means that white can play (3) and black cannot make a move at "c" since (1) is still there. Thus the black needs to make another move at "a" to capture (1) completely to remove it from the board. But alas, it is too late. As black plays (4) at "a", white can make a move at "b" proving that he won this capturing race even though the comparison of the original number of breathing points were unfavorable.

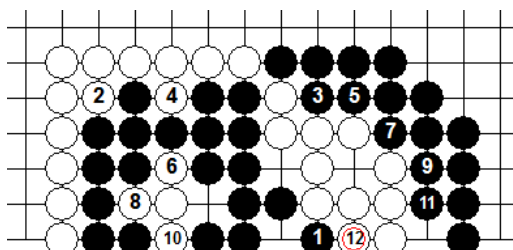
In actual games, a situation similar to this pattern will occur very frequently. Players needs to pay attention to these exceptional cases carefully.

#### 4100 What if one group survives ?

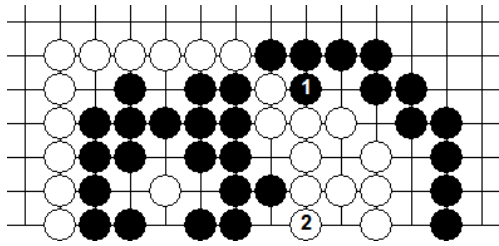
Before closing this chapter discussing capturing race, there are a few more important observations.



As you try to analyse this pattern you will be able to count the black's outside breathing points as 2. Black's number of moves in the eye is calculated as  $8 - 1 = 7$ . As you can see, there are at least 2 common breathing points. The total will be  $2 + 7 + 2 = 11$ . Let us count the number of moves needed to capture the white group. The number of outside breathing points is 6. There is an eye with 1 point. There seems to be 3 common breathing points. The total is  $6 + 1 + 3 = 10$ . Thus it looks like a pattern of the black's winning the capturing race. The white may give up the capturing race and pass. The result would be just like this.



At white's (12) it is getting clear that white cannot win this capturing race.

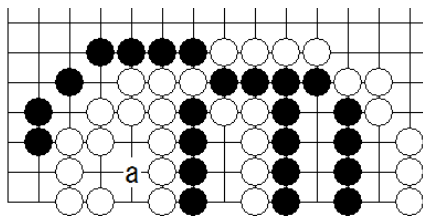


But the above analysis is not correct. If the black made the first move at (1) in this chart, white should play at (2). What is the result?

By white's (2), white has got two eyes which means the white group is perfectly living now. This is not a capturing race at all. The white is living and the black is dead! Let us look at the original pattern. It was wrong for the white to give up this local situation. He would have been able to make that living move at the starting point. This shows that if there are two uncertain groups of each player, it is the starting point of a capturing race, but if one group succeeds surviving to form a living pattern, that is the end of the capturing race.

#### 4110 If the outside wall of moratorium fails to survive....

In this chaptr studying patterns of capturing races, we found out that we often end up with a moratorium pattern. As for a moratorium pattern, there would be uncertain groups left unsettled where further attack is not possible. However, it is important to see that the outside stones must be living at the end of the game. If the outside wall is destroyed, the moratorium situation will not last to the end of the game.



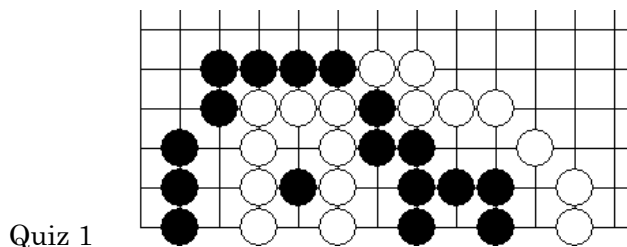
Here is one example where the situation is uncertain. Please pay attention to the status of each group of stones carefully. You will recognize that the inside black group of four stones and the inside white group of five stones are in the situation of moratorium. Either player can fill in the common breathing points in between these two group of stones. However, it is a different question if the outside groups of stones are living. In this example, the black outside group on the right has four point territory and living completely. On the other hand, the left hand white group outside the moratorium status is uncertain. If the black makes a move at "a", the uncertain pattern changes into a distinct death pattern and the white has no means

to bring that group into a survival pattern. In this case, the moratorium situation is still there but at the end of the game the dead white stones shall leave the board, and then, the moratorium situation will also be dissolved.

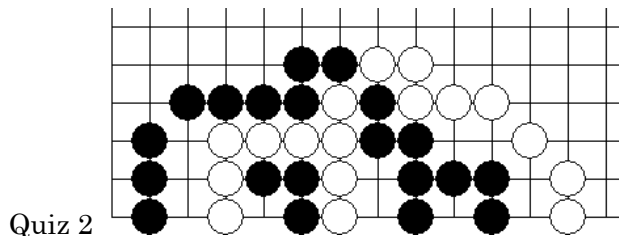
We have so far discussed various patterns of capturing races. Sometimes, it was going into a rather mathematical analysis and became pretty complicated. But please note that capturing race is an area the truth is very clear and anybody can understand fully if one is interested in it.

#### 4120 Final Test of a Capturing Race

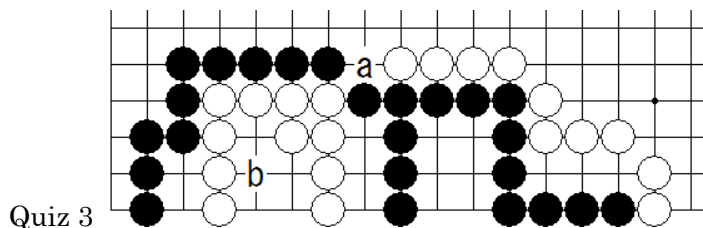
Just to check if you understand Capturing Races in full, here are the final tests.



Please confirm what will happen if black plays first.  
Then confirm what will happen if white plays first.



Try confirming what will happen if black plays first.  
Then confirm what will happen if white plays first.



The big question is “Should black play at “b” to try to capture white’s group of 11 stones or play at “a” to protect the black group at the lower side.