

How To Play Go

Lesson 6: Multiple-Space Eyes

6.1 Two-Space Eyes

In this lesson, we shall investigate the status (i.e. whether a group is living or dead) of groups that has an eye with two or more spaces (and no other eyes) when surrounded. Important: the multiple-space eyes introduced in this lesson are groups with *all its stones solidly connected in a chain* – eyes with cutting points may have results differing from those given in this lesson.

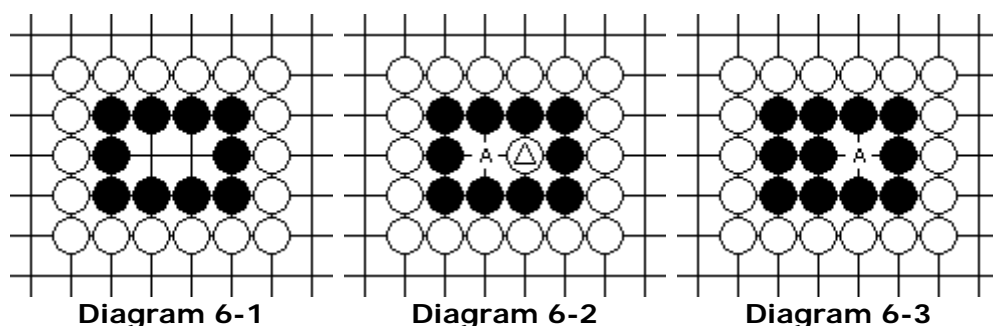
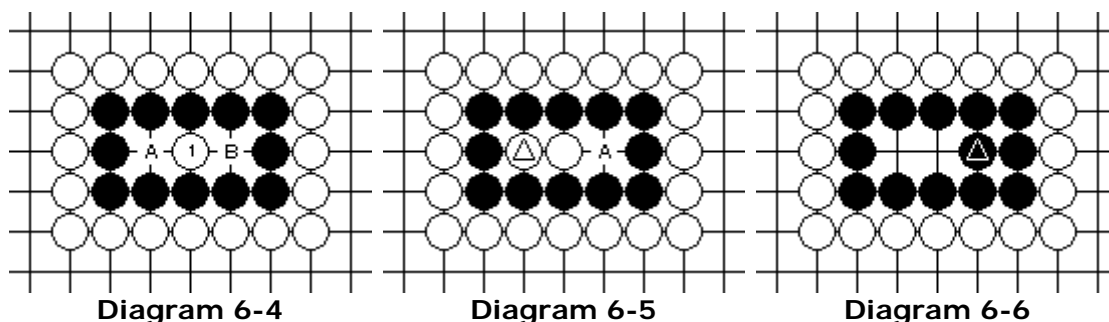


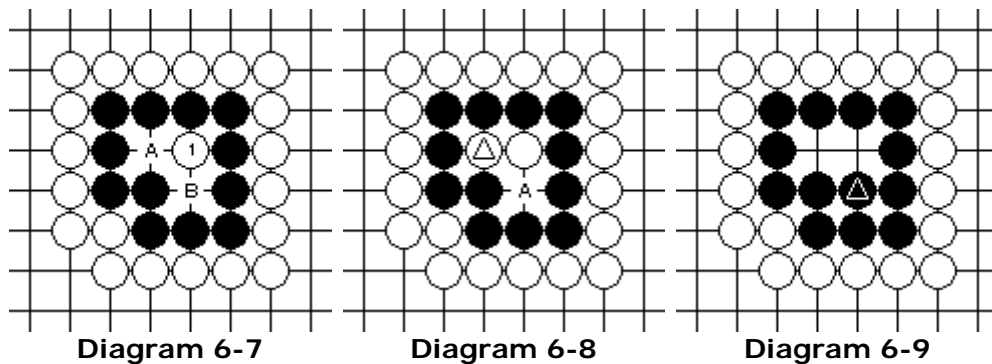
Diagram 6-1 shows a two-space eye. Is it one eye or two eyes? However, unlike a group with two eyes, it is legal for white to play the triangle stone (known as the *placement*) in Diagram 6-2. Assuming that the group is surrounded without outside liberties as shown in Diagram 6-2, white can play at A during the next turn to remove all the black stones from the board. But if black plays at A, the result is Diagram 6-3, which is clearly only one eye, and white can play at A to capture all the black stones. So we go back to the question related to Diagram 6-1: the two-space eye is only one eye. *Verdict: when surrounded, the two-space eye is a dead group.*

6.2 Three-Space Eyes

There are two types of three-space eyes: *straight three* and *bent three*.



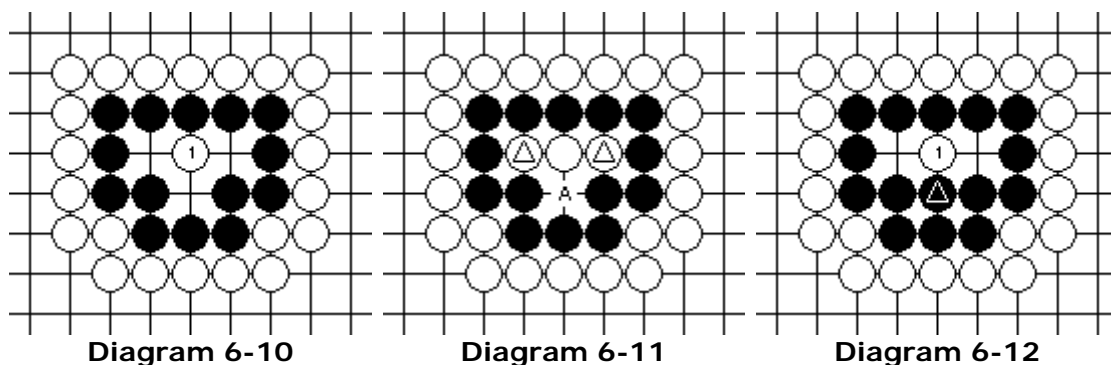
A straight three is shown in Diagram 6-4. If black plays at 1, he definitely has two eyes and lives, so what if white plays the placement at 1? Definitely, black wouldn't want to play at A or B – this will leave black with a dead two-space eye described in section 6.1, so he allow white to prove that the black group is dead. So white plays at the triangle stone in Diagram 6-5, and the entire black group is under atari, which means that black will have to play at A – resulting in Diagram 6-6, which is a dead two-space eye. *Verdict: if black plays first at 1 in Diagram 6-4, black will live; if white plays first at 1 instead, white will kill black.*



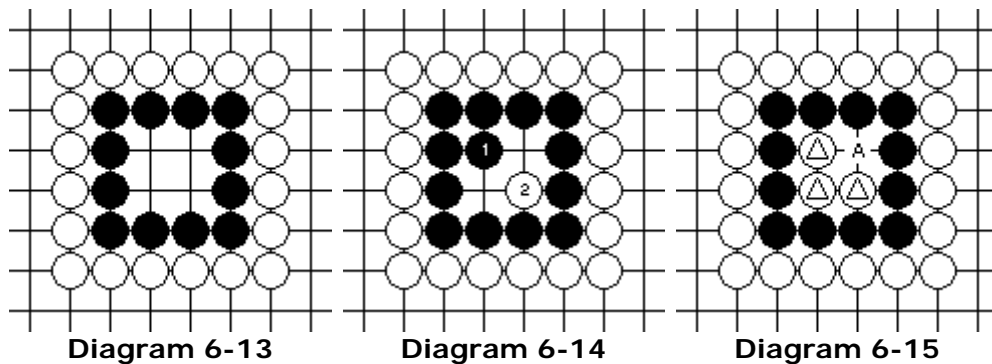
The next type, bent three is shown in Diagram 6-7, where the vital point for both players is at first. Like straight three, *if black plays first black lives; if white plays first black dies*. Suppose black plays at either A or B, black will be dead with a two-space eye. Hence, white can play the triangle stone in Diagram 6-8, putting black in atari, forcing black to play at A, resulting in Diagram 6-9 (a dead two-space eye).

6.3 Four-Space Eyes

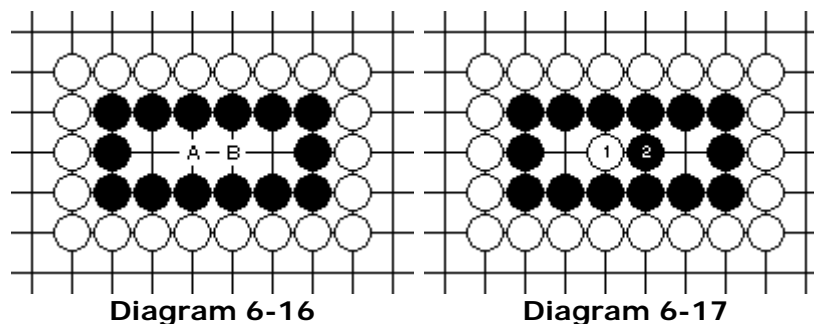
There are the following kinds of four-space eyes: *pyramid four*, *squared four*, *straight four* and *bent four*.



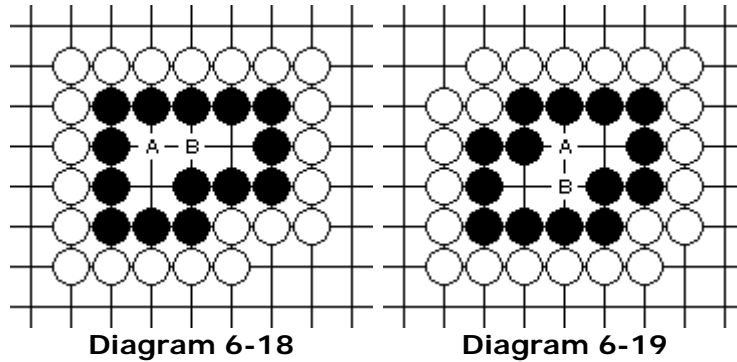
First, we introduce the pyramid four, which is a T-shaped four-space eye, with the vital point in the middle of the eye at 1 in Diagram 6-10. If black plays anywhere inside the eye after white plays 1, he would only be reducing his eye to straight three or bent three. However, white is able to play at the marked stones as shown in Diagram 6-11 and put black in atari, so black must play at A to capture the three white stones. But it is white's turn again with the black group reduced to straight three, and so white plays the placement at 1 in Diagram 6-12 and black is dead. The status of the pyramid four hinges on whoever plays first: *black first will live, white first will kill*. (Note: white can also elect to reduce the black eye into a bent three rather than a straight three and the effect is exactly the same.)



The squared four eye (Diagram 6-13) is *dead when completely surrounded*. No matter what move black plays inside this eye, it becomes a bent three. Diagram 6-14 illustrates this: when black plays at 1, white will play at 2 in the middle of the bent three and black is still dead. However, white can play the triangle stones in Diagram 6-15, forcing an atari, and when black takes the three triangle stones, the group becomes a bent three and it is still dead.



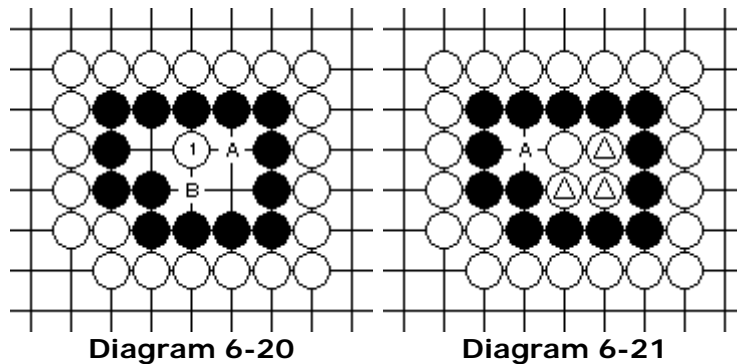
The black group in Diagram 6-16 is a straight four, which is *always a living group*. Even when surrounded, it is impossible for white to play both A and B on a turn. Look at Diagram 6-17. When white plays at 1, black plays at 2, and we see black has two eyes. If white 1 is played at 2, then black plays at 1, and the result is still the same. However, if white is allowed to play at both 1 and 2, then black dies from a straight three.



Both Diagram 6-18 and Diagram 6-19 are diagrams of bent four, with the same result of straight four – *can never be killed*. In both diagrams, black will get to play at either A or B no matter which placement move white plays.

6.4 Five-Space Eyes

This section discusses *bulky five* and *flower five*. Since straight four and bent four are already alive, we can infer that straight five, bent five, straight six, bent six and so on are all alive, so they will not be discussed here.



We start off this section with the bulky five, shown in Diagram 6-20. Like most of the other types of multiple-space eyes, *if white first then black dies, if black first then black lives*. The vital point is at 1. After white plays at 1, if black plays at A, then white plays at B; and vice versa, if black plays at B, then white plays at A. For the case if black chooses not to play anything, white can play the triangle stones in Diagram 6-21 to force an atari, forcing black to remove the four white stones from the board, and reducing the black eye into the dead squared four eye. (Alternatively, white can also reduce black into the dead pyramid four eye.)

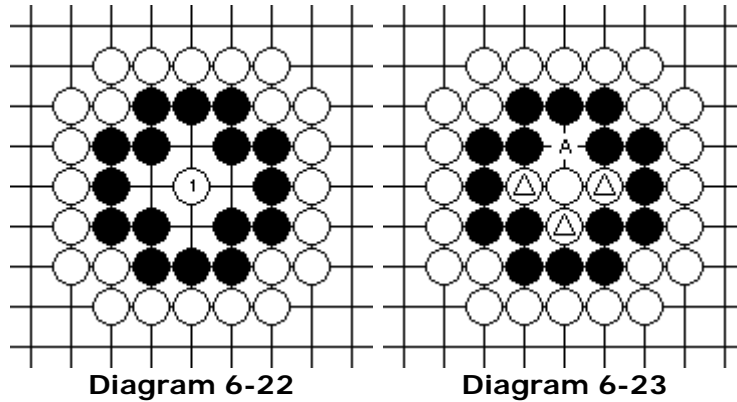
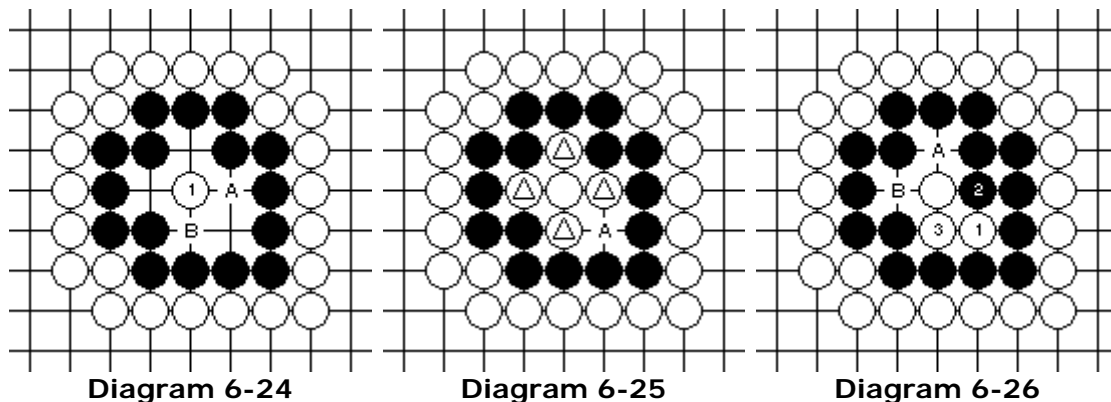


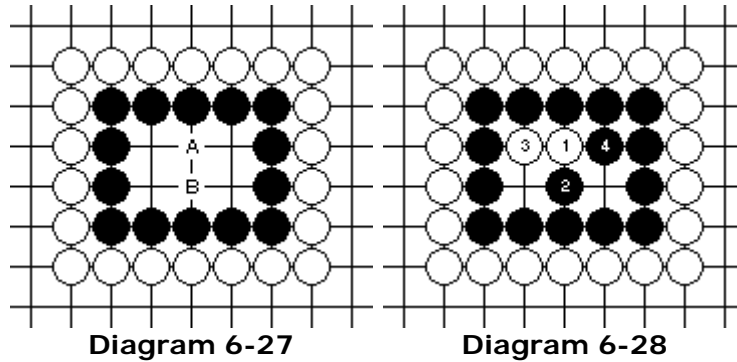
Diagram 6-22 shows a flower five, and if white plays at 1, the black group is killed. Conversely, if black plays first at 1, black is alive with four eyes. Diagram 6-23 shows how white can play the triangle stones to reduce the black eye into a pyramid four by forcing an atari.

6.5 Six-Space Eyes

Here we will discuss the *flower six* and the *rectangular six*.



Suppose black plays first at 1 in Diagram 6-24, then black gets three eyes and lives. So white has to play at 1 in order to kill black. Now if black plays at A, then white will play at B, and vice versa. Diagram 6-25 shows that white can reduce the black group into flower five by playing at the triangle stones. *Verdict: white first will kill black, black first will live.* However, one must exercise caution in reducing this black eye: if white carelessly plays at 1 in Diagram 6-26, then black ataris at 2, forcing white to connect at 3, and the result is a seki. Definitely black won't reduce his eye to bent three by playing at either A or B, but white can't play at A or B to black live by having a bent four living group. Hence both the black and white groups are alive, and it is a seki. (Note: white can also reduce a flower six into a bulky five instead.)



A rectangular six is *alive even when totally surrounded*. Black will live because he will get one of the points A and B in Diagram 6-27, but if white occupies both, black dies from a bulky five. Diagram 6-28 shows how black will live. In the sequence up to 4, black clearly has two distinct eyes. If white 1 is played at 2, then black will play at 1. If white 3 is played at 4, then black will play at 3. (Even if black does not play at 4 and allow white to play at 4, the result is a seki – but black will not have any territory.)

6.6 Special Cases In The Corner

The bent four and the rectangular six are usually living groups. However, if such eyes occur in the corner, the *status* (whether the group is living or dead) may change.

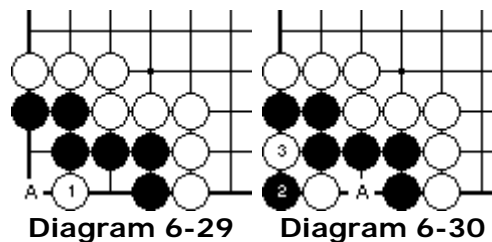
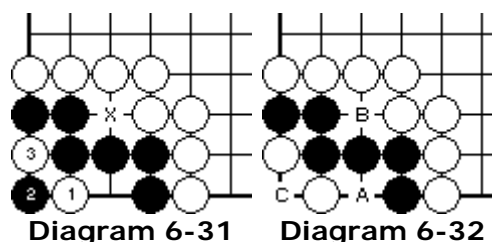
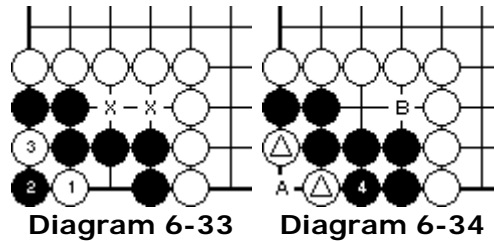


Diagram 6-29 shows a bent four in the corner, and black has no exterior liberties. When white plays at 1, black must play at A in order to survive. However, as black does so in Diagram 6-30, white can play at 3 to take black 2 off the board. The survival of the whole group will now depend on the outcome of this ko: if white wins this ko, white will play at A to capture the black group; if black wins this ko, black will play at A and makes two eyes.

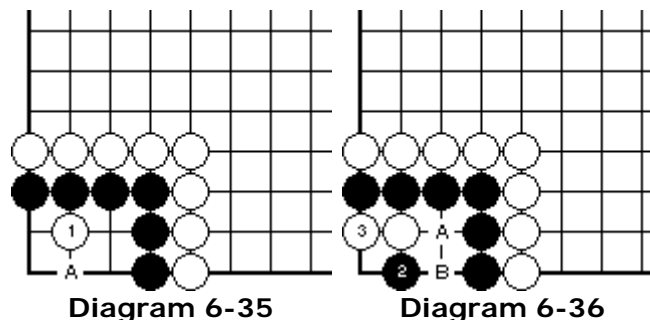


This time we give the white group an exterior liberty in Diagram 6-31, shown as X. White will play as usual in the sequence from 1 to 3, resulting in Diagram 6-32. We see that black can't play at A, as white can take all the black stones off the board by playing at B. So black will still need to fight the ko at C. If white wins the ko he connects at C and black dies from a bent three. If black wins then he will occupy both C and A and makes two eyes.



Assuming now we have a bent four in the corner with two exterior liberties, indicated as X in Diagram 6-33. And we suppose that white still plays at 1 and 3 as before. Now we look at Diagram 6-34: black can now play at 4 and capture the two triangle stones. This time round white can't connect at A: this is suicide. So when white ataris the black group at B, black will play at A to form two eyes.

Conclusion: If the bent four in the corner has less than two exterior liberties and the opponent plays first, the result is a ko. Otherwise, the group has at least two exterior liberties and lives unconditionally (i.e. without a ko).



A rectangular six is by right a living group, but things get different when it appears in a corner. Diagram 6-35 shows such a group without exterior liberties. White 1 will kill black. Naturally, black has to play at A, which is 2 in Diagram 6-36, but white answers with 3. Now black is short of liberties: if he plays at A, then white can take the black stones off the board with B. However, black cannot play at B either, as he will be dead with a bent four with both vital points occupied by white.

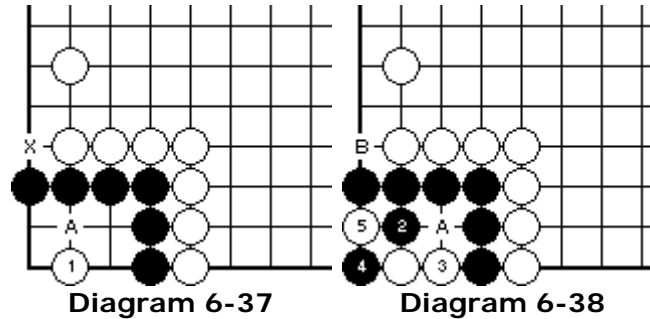
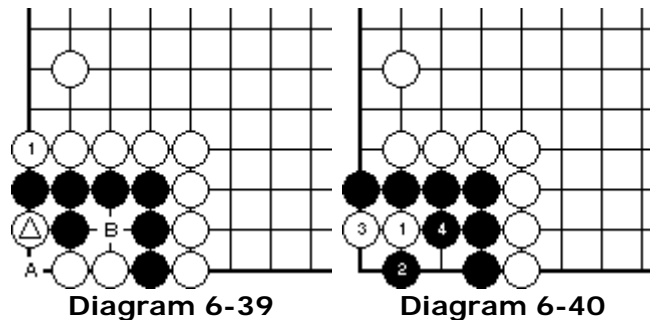


Diagram 6-37 shows the case where black has one liberty at X. This time round white should play at 1 instead of A. Black should answer white 1 with A, but what happens? See Diagram 6-38. White will play at 3, forcing black to play at 4, and then white 5 takes a ko. Notice that like the bent four in the corner, black is short on liberties and therefore cannot play at A. If black wins this ko, he will live by taking the white stones at A.



For white, this is a two move approach ko. Even if white wins the ko in Diagram 6-38, white must still play at 1 in Diagram 6-39 to fight another round of ko. Thus if white wins this round of ko he will play at B and remove all black stones from the board. The placement at 1 in Diagram 6-40 is a mistake for white. Black responds as usual, but because he has an extra exterior liberty, the black group is alive. This is a failure for white.

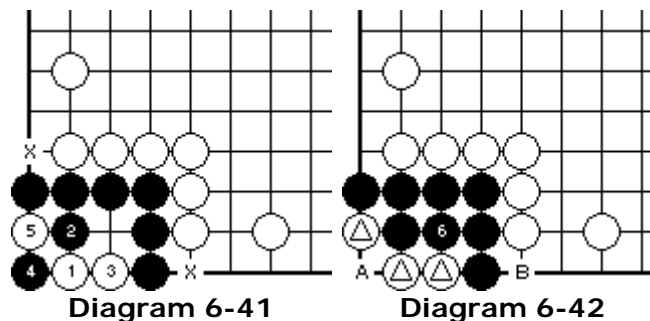


Diagram 6-41 shows the black group with two exterior liberties shown as X. If white plays 1 at 2, then the result would be the same as Diagram 6-40. So if white plays from 1 onwards and takes the ko at 5, black can play at 6 in

Diagram 6-42. This is similar to Diagram 6-34: for white to play at A is suicide; but if white ataris at B, black will play at A and remove the triangle stones from the board. In short, the black group cannot be killed.

Conclusion: For a rectangular six in the corner, if it has no exterior liberties, then it can be killed. If it has one exterior liberty, then it may be turned into a two-stage ko. If it has two or more liberties, then it is alive.

[More Stuff] – Multiple-Space Eyes With Defects

At the beginning of this lesson it is stressed that for the results in this lesson to be valid, the multiple-space eye must be made up of stones that are *solidly connected in a chain*. If not, there are chances that the result might not hold. Two examples are given below.

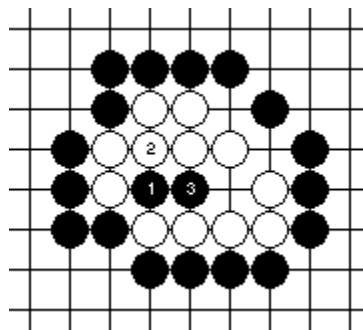


Diagram 6-43

Diagram 6-43 shows a bent four, but unfortunately not all white stones are solidly connected. Here black can atari at 1, forcing white to connect at 2, and black extends at 3 into the middle of the straight three. White is dead.

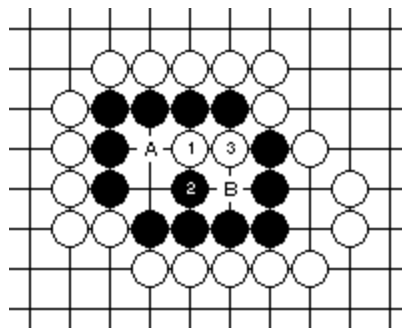


Diagram 6-44

Now Diagram 6-44 shows a supposedly living six-space eye, but it contains cutting points. With white's placement at 1, even if black responds at 2, white can cut at 3, so that black is unable to play at A. Now, if black plays at B, white will kill him with a straight three by playing at A.