

Idea of Twins

Terms:

1. Strong cells:

When there are two candidates in a house, they make a strong link. Their cells are called strong cells.

2. Hidden strong link:

When there are more than two candidates in a box, two of them would make a strong link if the others are eliminated. They are called hidden strong link. Their cells are called hidden strong cells.

Twins:

Twins are a combination of two cycles of strong cells and hidden strong cells in four boxes or more.

Structure:

There is only one strong link or hidden strong link in a house (box, row, column) throughout the Twins.

Each cell of the cycle 1 is a peer of three other cells of the cycle 2 in box, row and column, except when they are in the same line in box.

Candidates that are not in any cycles of Twins are Not-Twins Cells and can be eliminated.

X-Wing and **Uniqueness** are parts of Twins.

True and False Twins:

True Twins can be almost completed by starting from many or any of their cells of one cycle and the structure does not change.

False Twins can be completed by starting at only one cell of their cycle and the result is that this starting cell does not contain candidate. Starting from other cell of the cycle, you can not complete the Twins.

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Types of Twins:

Complete Twins: when two cycles of Twins can be made paired in boxes that contain candidates. All candidates of Not-Twin cells can be eliminated.

X-Twins: when a cycle leaves four cells undetermined and at least one of these four cells belongs to two cycles. Cycle that causes X-Twins contains solved digit.

U-Twins: or (**Uniqueness-Twins**) when a cycle leaves four cells undetermined and all of them belong to one cycle. U-Twins contain solved digit, so its cycle does too. ¹

Locked Twins: when the same Twins can be started from two cells in a box. These two cells work like a pointing pair and only *Not-Twins Cell* candidates on the same line outside the box can be eliminated. It may come to a solved digit. ²

How to find out a Hidden Strong Cell:

1. In a house, there are not two cells of the same cycle.
2. One cell of a strong link belongs to cycle 1 and the other cycle 2.
3. On a line (row, column) of three candidates, one cell belongs to the cycle 1, another belongs to the cycle 2 if this cell is the only cell outside the box that contain two others; **or** this cell has a strong link with another cell in its box when each candidate of the three belongs to one box different.
On a line of four or more candidates, a hidden strong cell can not be determined even when they have a strong link, because there are always two cells can have hidden strong link. This is when X-Twins or U-Twins happen.
4. In a house, a cell can be a hidden strong cell when no other cells can do.
5. When two cells of the same cycle are found in the same house, this cycle become invalid and the starting cell of the cycle does not contain the candidate.

¹ corrected

² corrected

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This example from Sudocue-10000 collection number 10

Copy Values after some moves:

76.9....3.2.3.7..6.3462.7..1..752.34.4319657..7.834..9..74813..4
 ..5.3.8.3..2.9.4.

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

false Twins 8 from cell r4c2

Cycle 1 blue Cycle 2 red

Twins cover boxes 1,2,3,4,6 and 7.

The only cell to start these Twins is r4c2; Twins can not be completed if the starting cell is r5r9, r3c6 r2c1 ... of the cycle 1.

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From the same example , Twins 8, starting from r1c7, cover boxes 1, 2, 3, 4 and 6 and leave X-Wing in boxes 4 ,7.

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

true Twins 8 from r1c7 or X-Twins 8

These Twins can be started from any blue cell: r1c7, r2c1, r3c6 or r5c9.

Cycle 1 (blue) leaves four cells undetermined r4c23 and r9c23, these cells belong to cycle 1, except r9c2 belongs to both cycle. And so, they make a X-Twins. The result is that all blue cells contain solved digit 8