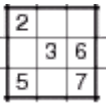
Y-Wing Strategy

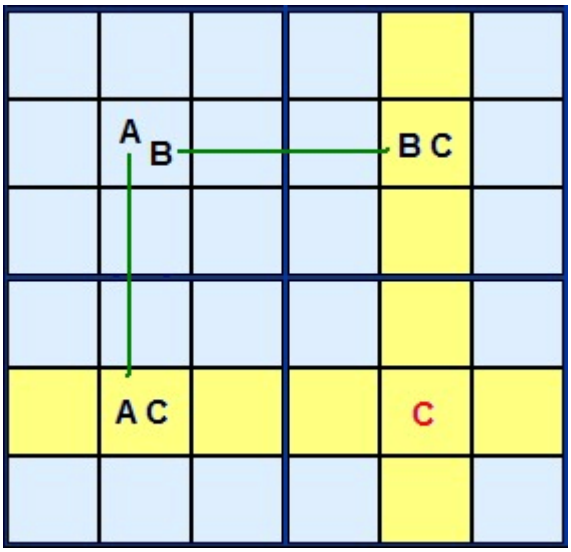
From sudokuwiki.org, the puzzle solver's site



This is an excellent candidate eliminator. The name derives from the fact that it looks like an X-Wing - but with three corners, not four. The forth corner is where the candidate can be removed but it leads us to much more as we'll see in a minute.

Lets look at Figure 1 for the theory.

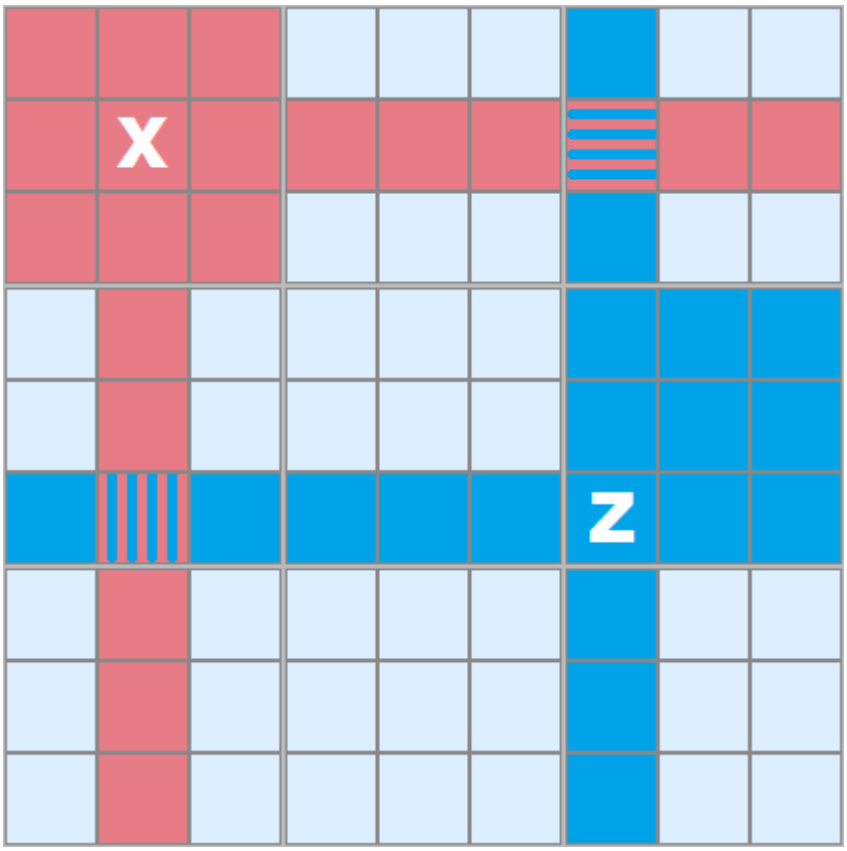
A, B and **C** are three different candidate numbers in a rectangular formation. Three of the corners have two candidates **AC**, **AB** and **BC**. The cell marked **AB** is the key. If the solution to that cell turns out to be **A** then **C** will definitely occur in the lower left corner.If **AB** turns out to be **B** then **C** is certain to occur in the top right corner. **C** is a *complementary* pair.



Y-Wing Figure 1

So whatever happens, **C** is certain in one of those two cells marked **C**. The red C can be 'seen' by both **C**s - the cell is a confluence of both **BC** and **AC**.
It's impossible for a **C** to live there and it can be removed.

In Figure 2 I'm demonstrating the sphere of influence two example cells have, marked red and blue. **X** can 'see' all the red cells, **Z** can 'see' all the blue ones. In this case there are two cells which overlap and these are 'seen' by both.



Y-Wing Figure 2

If our **A**, **B** and **C** are aligned more closely they can 'see' a great deal more cells than just the corner of the rectangle they make. In Figure 3 **BC** can see **AB** because they share the same box. **AC** can see **AB** because they share the same row. **BC** and **AC** can see all the cells marked with a red C where this Y-Wing can eliminate whatever number **C** is.

C	AB	C		AC	
BC			C	C	C

Y-Wing Figure 3

I have found a superb 'tough' Sudoku puzzle with a sequence of five Y-Wings and this illustrates the full range of this strategy. The first three are pictured here but you can load the puzzle into the solver to see the remaining examples.

The first Y-Wing finds the AB cell in **A2** which links 8 with the pair on **B3** and the 3 in **J2**. Common to both the *pincer* cells is 4 which must go in either **B3** or **J2** so 4 in **H3** can be removed.

	1	2	3	4	5	6	7	8	9
A	9	3 8	1 3 6 8	2	4	1 3 7 8	5 7	5 8	5 6 8
B	4 7 8	5	4 8	6	9	7 8	2	3	1
C	1 3 6 7 8	2	1 3 6 8	1 8	5	1 3 7 8	4 7	9	4 6 8
D	1 4 6 8	9	1 4 5 6 8	7	1 6	4 8	3	2	4 5 8
E	1 4 8	4 8	2	9	3	5	6	1 4 8	7
F	1 3 4 6 8	7	1 3 4 5 6 8	4 8	1 6	2	9	1 4 5 8	4 5 8
G	4 8	6	9	1 4 5	2	1 4	1 4 5 8	7	3
H	5	1	3 4 8	3 4	7	9	4 8	6	2
J	2	3 4	7	1 3 4 5	8	6	1 4 5	4 5	9

Y-Wing Example 1 : Load Example or : From the Start

The second Y-Wing gets two candidates because of the alignment in column 1. The 8s in **B1** and **C1** can both see the cells **A2** and **G1** which also contain 8. These *pincer* cells are linked to the pair [4,3] in **J2**.

Y-Wing Example 2 : Load Example or : From the Start

The third step is included because it shows a very neat rectangular alignment which almost mirrors the theory diagram. You couldn't ask for a clearer example. 4 must go in **B1** or **D6** otherwise 7 and 8 would be used up and there'd be nothing to go in **B6**. The 4 in **D1** is the lone candidate that can see the yellow cells and should be removed.

Y-Wing Example 3 : Load Example or : From the Start

Y-Wing Exemplars

These puzzles require the Y-Wing strategy at some point but are otherwise trivial.
They also require one Naked Pair.
They make good practice puzzles.

- Exemplar 1, x1 (score 72)
- Exemplar 2, x2 (score 89)
- Exemplar 3, x4 (score 146)
- Exemplar 4, x3 (score 179)

Go back to Singles Chains Continue to XYZ-Wings