Working 9 -5 – Solution Guide

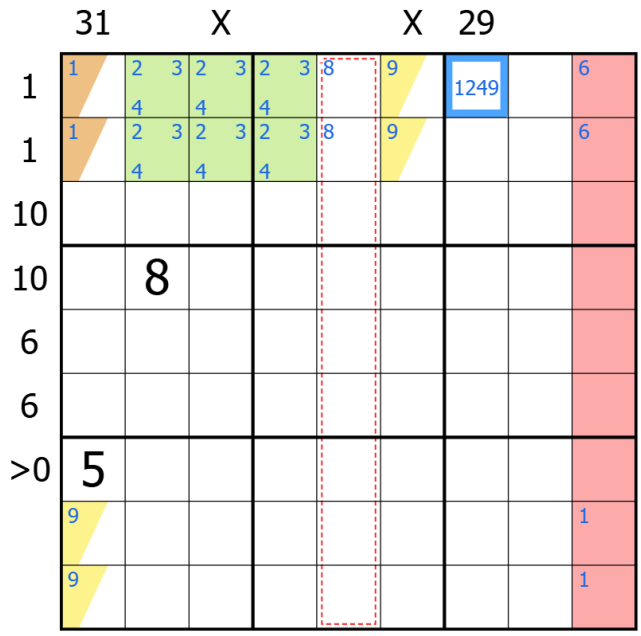
This is a full solution guide to my puzzle *Working 9 -5*, and so spoilers are ahead.

Rules

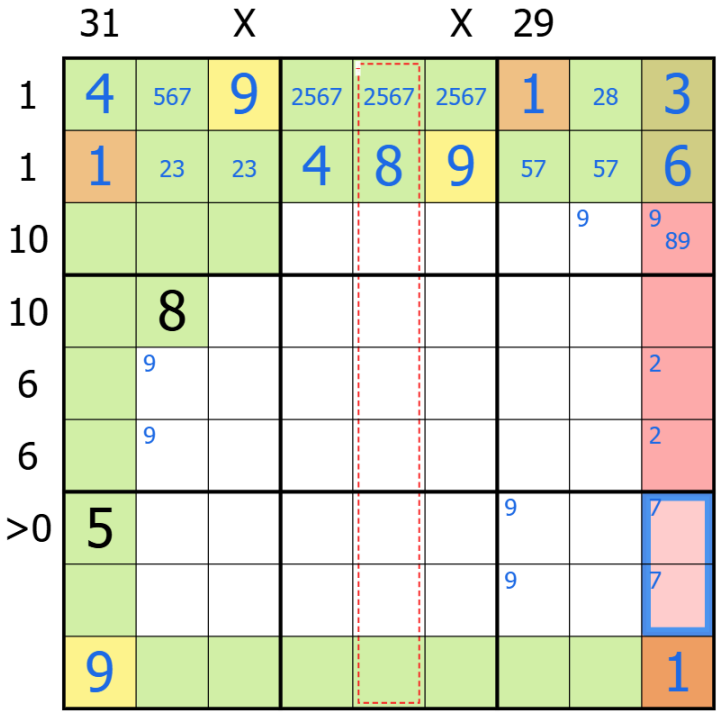
- Normal sudoku rules apply: Place the digits 1 to 9 once each in every row, column and 3x3 box
- **Column Indexer**: The digit in column 9 indicates which position in that row the digit 9 should be placed. For example, if R1C9 were a 4, then a 9 would be placed in R1C4
- **Sandwich**: Clues outside the grid give the sum of the values sandwiched between the 1 and the 9 in that row or column. The X clue is the same in all cases, and its value is to be determined by the solver (it may be 0 or a double-digit number)
- **Column Negator**: Digits in column 5 are negative for the purposes of sandwich sums

Solve Path

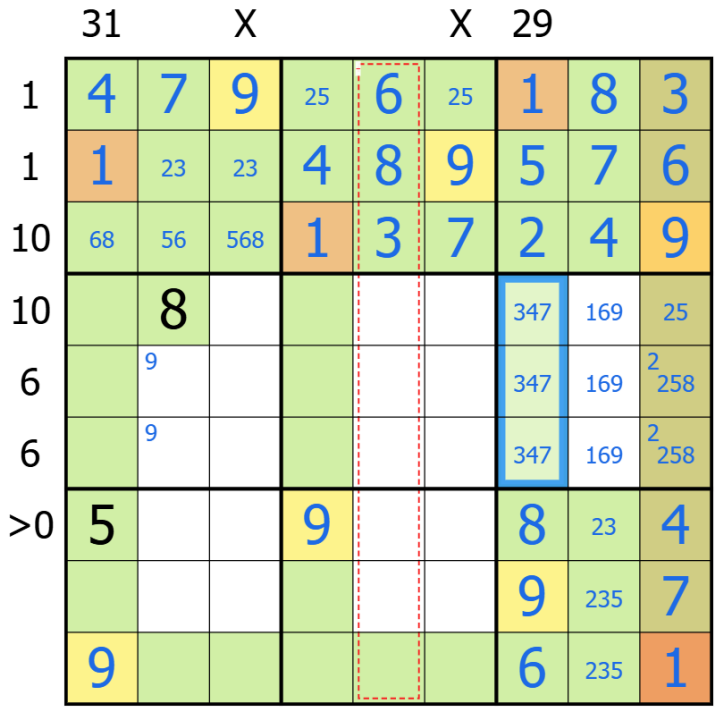
- 1 is not a valid sandwich in a normal sandwich puzzle, so to get the 1 clues to be valid we need some negator action
- The 31 clue in C1 must have a crust in R1C1 or R2C1. If this crust were a 9, this would place a 1 in C9 of the same row and even with negated digits you can't make a sandwich sum of 1 with 7 digits, hence the crust in R1C1 or R2C1 must be a 1
- Whichever 1 clue in R1 or R2 has the digit 1 in C1, can only have the digit 9 in C6, and this will need to be exactly 2 + 3 + 4 + (-8). We can pencilmark 6 in box 3 by indexing
- R1C7 is either a crust, or it is an outie to a 29 sandwich clue. This outie can no longer be a 6 by pencilmarks, so this cell is from 1249
- If the R1C1 was a 1, then the sandwich in that row would break all possibilities for R1C7, hence R2C1 is a 1, R2C6 is a 9



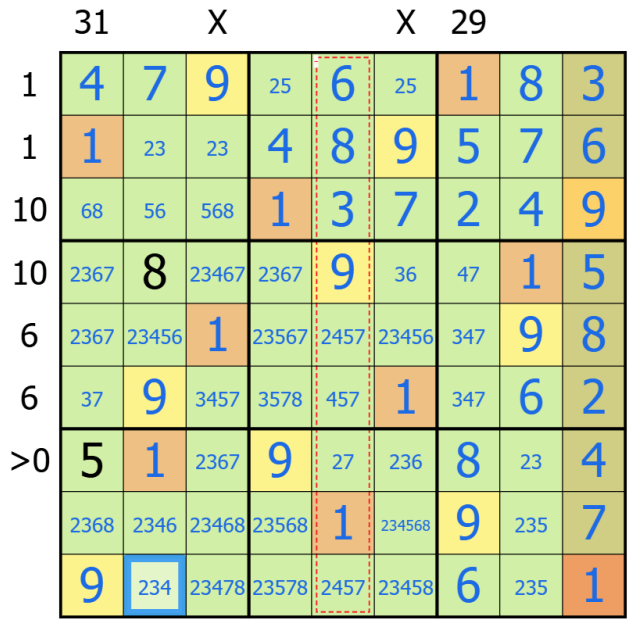
- 31 sandwich needs a 4 outie. The rest of R2 can be completed. R1C7 must be a crust for the 29 clue, and by indexing can only be a 1. The R1 sandwich needs to straddle C5 and can only be 3 cells as the only 4 cell sandwich is taken. Hence, 9 can only be in R1C3



- To make the 1 clue work in row 1, we need either 2+5 with a -6, or 2+6 with a -7, hence there is always a 2 and a 6, and R1C8 is 8, placing 9 and a 24 pair
- The R3 10 clue can't be fulfilled from only positive digits as 424 is not valid, so 1 must be in R3C4 and R3C5 and R3C6 differ by 4, meaning only 7 and a -3 is valid
- 29 clue can't have a 2 cell outie as 24 would break R3C7. This places digits in box 9 and allows sudoku in C789

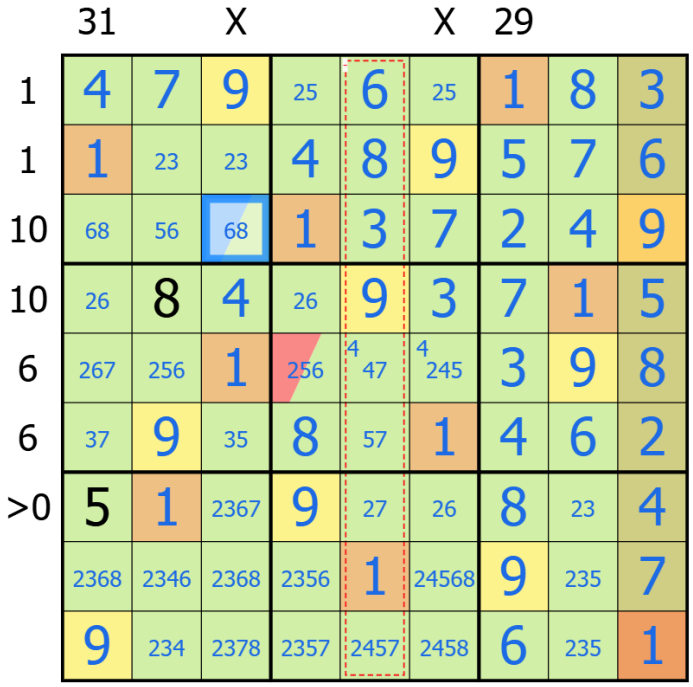


- R4C9 must be 5, placing 9 in R4C5, due to the indexing clue. The R4 10 sandwich is being fulfilled by normal digits, and so 1 must be in R4C8, and the sandwiched digits are 37 or 64
- Where does 1 go in R7? It can't be next to 9 due to the >0 clue, but it also can't only straddle C5 due to the negated column, placing 1 in R7C2. This limits 1 in C3 for the X clue
- Whichever 6 clue in R5 and R6 has the 9 in C2 must be three cells long, as two cells would use a 24 in the sandwich and also a 2 in C9 by indexing. This means that 1 in box 8 is R8C5
- Can R5C6 be 1? It would be a 2 cell sandwich which sums to at most 13, but would also create a 4 cell sandwich in C3 which is at least 14. Hence 1 is in R6C6 and 9 is in R6C2

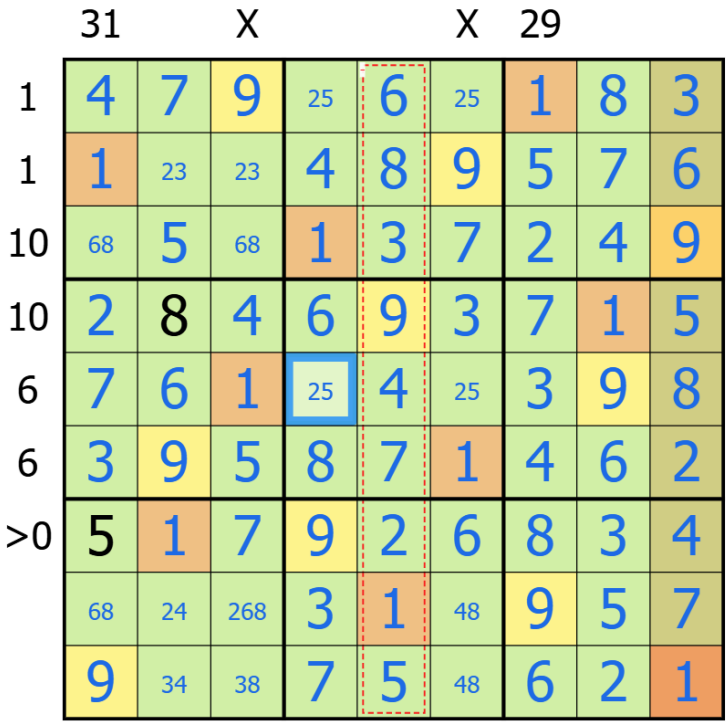


- Can place 8 in R6, and this means that R6C3 and R6C5 must differ by 2, so neither is a 4, placing 4 in R6 and resolving the sandwich in R4

- Considering the possible values for the sandwich in R5, we can have 25 and -4, or 46 and -7. In all cases R5C4 is not a 7, creating a 256 triple in C4
- Alternatively, considering the possible values for X sandwich in C3 there are no valid sandwiches where R3C3 is a 5, creating a 68 pair in R3



- Either way the sudoku progresses in the same way until reaching this end point
- Here we consider the two X clues in tandem. R2C3 and R3C3 must sum to either 8 or 11. On the surface both seem possible, but 38 would break R9C3, so the value of X is 12 and the puzzle resolves



Final grid

	31		X			X	29		
1	4	7	9	2	6	5	1	8	3
1	1	3	2	4	8	9	5	7	6
10	8	5	6	1	3	7	2	4	9
10	2	8	4	6	9	3	7	1	5
6	7	6	1	5	4	2	3	9	8
6	3	9	5	8	7	1	4	6	2
>0	5	1	7	9	2	6	8	3	4
	6	2	8	3	1	4	9	5	7
	9	4	3	7	5	8	6	2	1