Iteration – Full Solution Guide

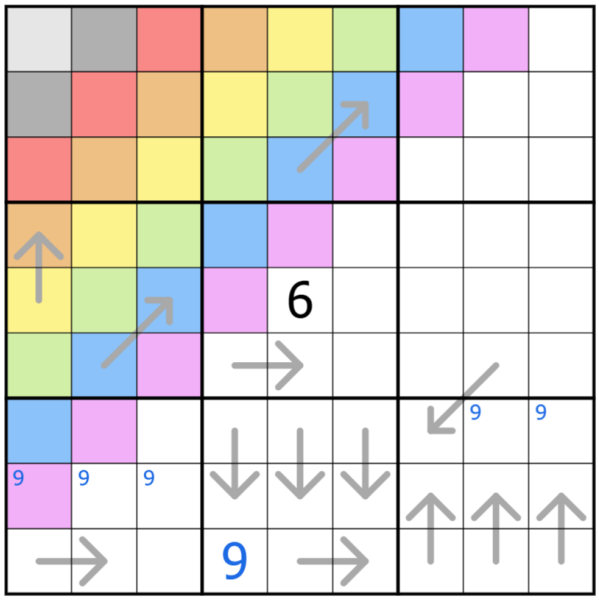
This is a full solution guide to my puzzle *Iteration*, and so spoilers are ahead.

Rules

- Normal sudoku rules apply: Place the digits 1 to 9 once each in every row, column, and 3x3 box
- **Coordinate Arrows**: Digits on an arrow spell out the coordinates for the digit that is their sum. The row number is written on the start of the arrow, the column number is written on the arrow tip. For example, read from shaft to tip, if an arrow contained the digits 14 then there must be a 5 in r1c4. All the arrows must correspond to different coordinates. Digits may repeat on an arrow if allowed by other rules

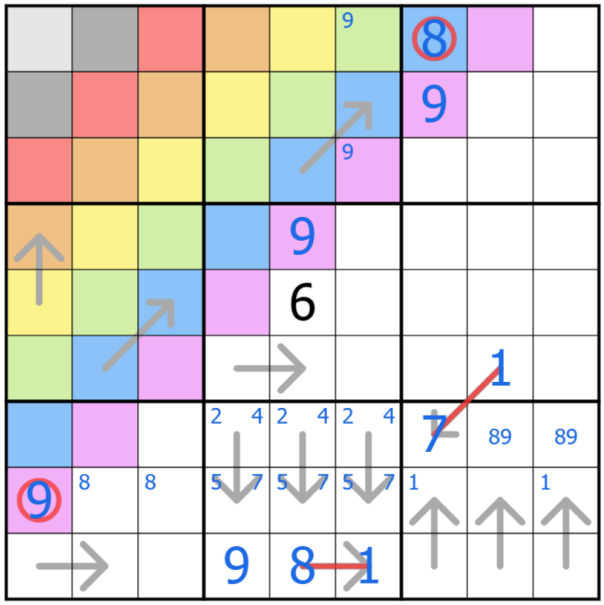
Solve Path

- Meta: 9 can never be placed on an arrow as it would need to be added to another digit and then that digit placed in the grid somewhere
- Meta: A digit can only me indexed into positions on a diagonal, for example 9s will get indexed onto the purple diagonal going from R8C1 to R1C8
- We can place 9 in box 8 and mark this in boxes 9 and 7

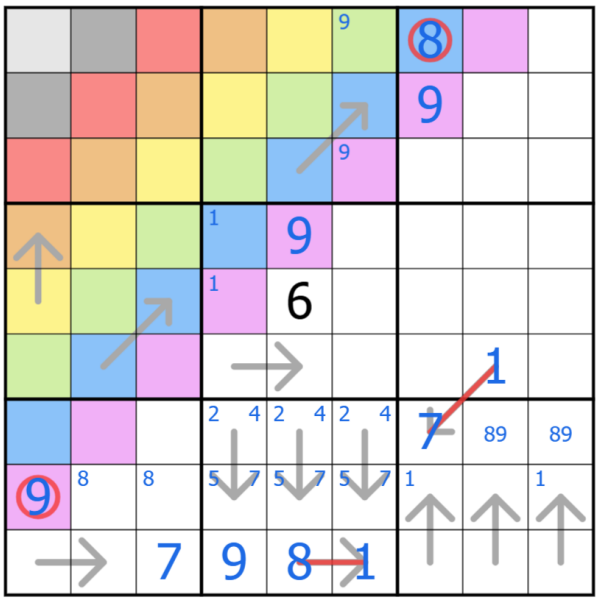


- The arrows in box 8 will all sum to 9 and index a 9. These will index one of R8C1/R1C8, R7C2, R2C7, R3C6/R6C3 and R4C5/R5C4
- By the placed 9, we will index a 9 into R4C5
- By pencil marks we will index a 9 into R8C1
- By leftover options we will index a 9 into R2C7, and one of R3C6 and R6C3
- In box 9, we can't place 8 on an arrow, because this has to be paired with a 1 and R8C1 and R1C8 can't take another 9
- This means that we have an 89 pair in box 9
- We need a 81 arrow in box 8, and this can only be in row 9

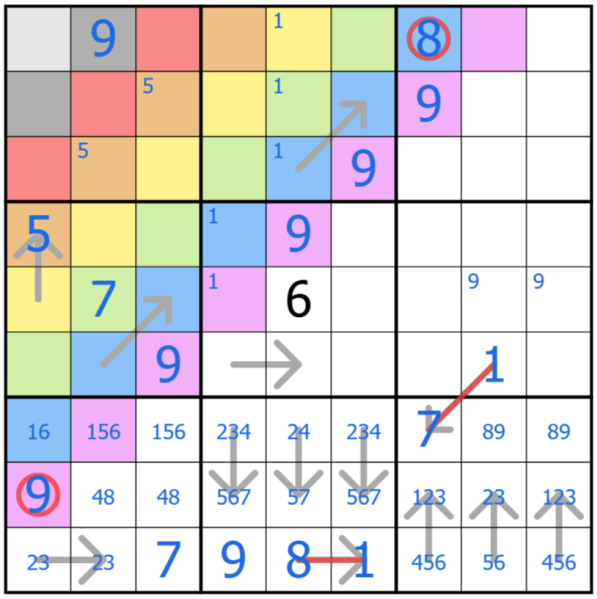
- Where is 7 in box 8? It can't be paired with a 2 as we have no more available spots for a 9 in R2C7 or R7C2, so it must be paired with a 1. Only R1C7 can take an 8, so we need a 17 arrow and by pencilmarks the 7 can only go in R7C7 with a 1 in R6C8



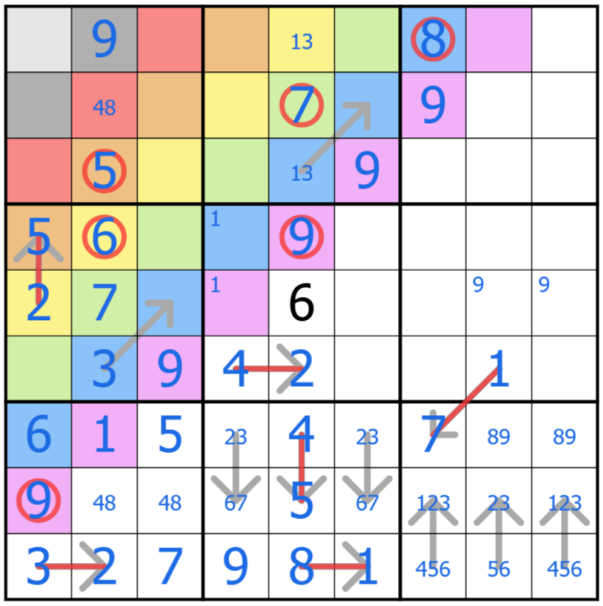
- The arrows in box 9 sum to 21. These can't be a trio of 7s because there are only two available spaces that a 7 can be indexed to. None of the arrows can be 8s because we can't index 8 into R2C6, R3C5, R5C3 or R6C2 because these cells all contain arrows, and this would create a duplicate 81 or invalid 18 arrow
- Hence one of the arrows in box 9 is indexing the last remaining 9 in R6C3 or R3C6
- The two remaining arrows sum to 6. They can't be a pair of 6s as one of R1C5 or R5C1 would need to be an indexed 6, but the given 6 prevents both of these
- Hence the remaining arrows sum to 5 and 7
- Where is 7 in row 9. We can't have another 17 or 27 arrow, so 7 is in R9C3



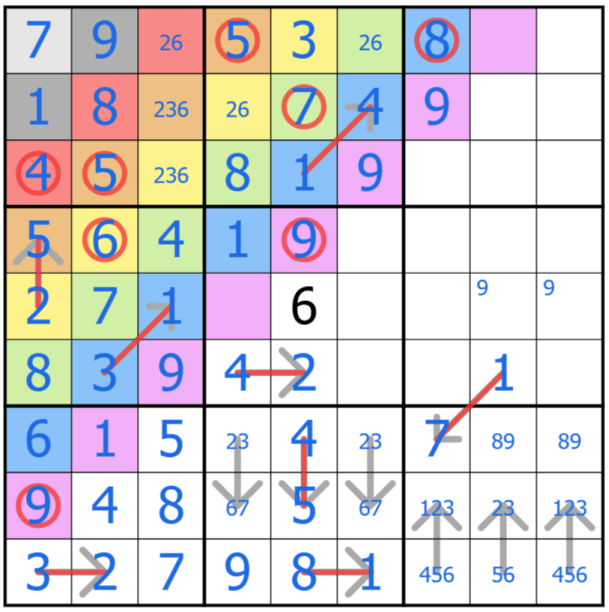
- Where is 6 in row 9? We can't make another 62 or 63 arrow in box 7, so it must be in box 9, indexing a 9 into R6C3, and in turn the arrow in box 8 is indexing a 9 in R3C6
- 5 in row 9 is in box 9, and this must be paired with a 2 to index a 7 into R5C2
- The remaining digits in box 9 are indexing a 5 into R4C1



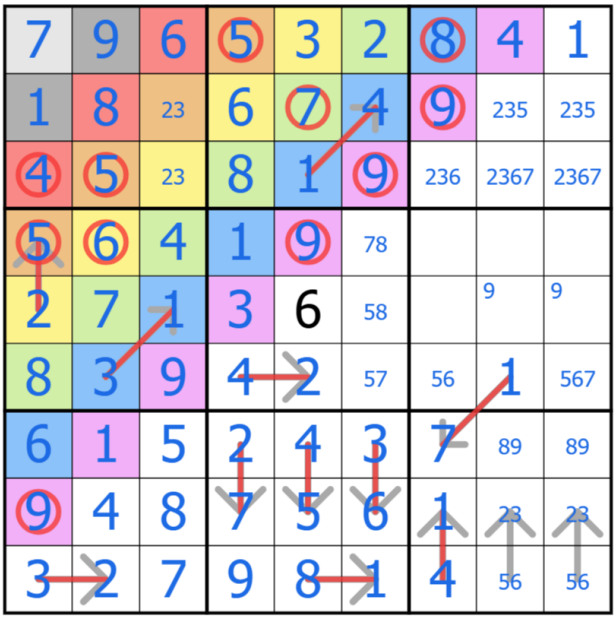
- R5C1 must be a 2 indexing a 7 into R2C5
- This fixes the arrow in box 7 indexing 5 into R3C2
- The arrow in box 5 doesn't contain a 1, and it is not possible to make this either 32 or 23, so R6C4 must be 4, and will index a 6 into R4C2



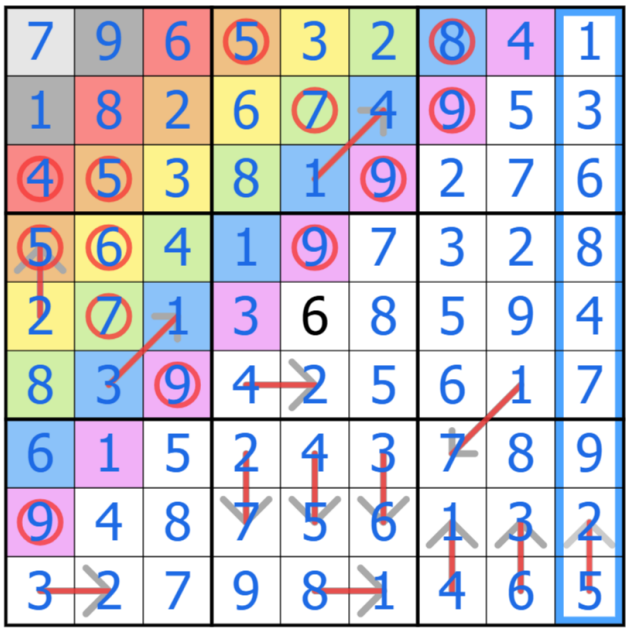
- Only option for R5C3 is a 1, indexing 4 into R3C1
- Only option for box 2 arrow is 14 indexing a 5 into R1C4



- R5C4 is a naked 3, which resolves the arrows in box 8
- This resolves the 41 arrow in box 9



- R5C7 is a naked 5, and then sudoku to finish, including resolving a final 23 deadly pattern via the arrows in box 9


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