Forbidden Desert – Full Solution Guide

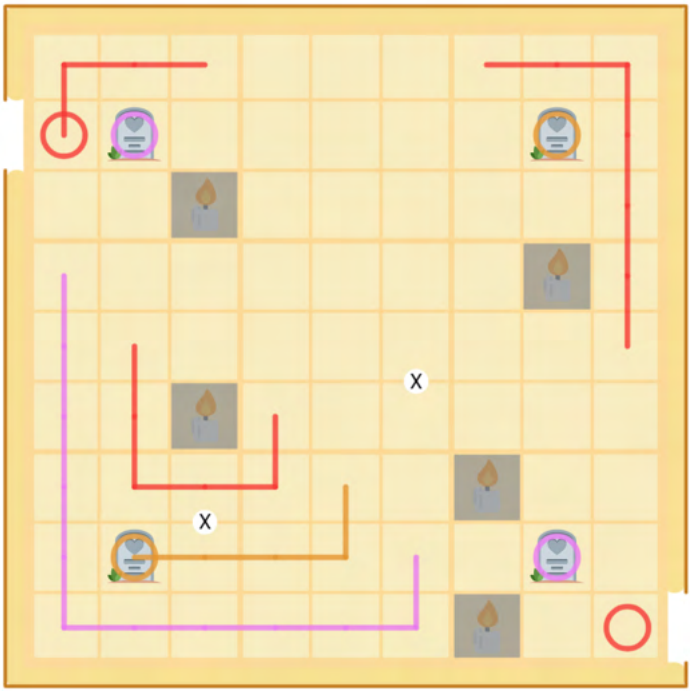
This is a full solution guide to my puzzle *Forbidden Desert*, and so spoilers are ahead.

Rules

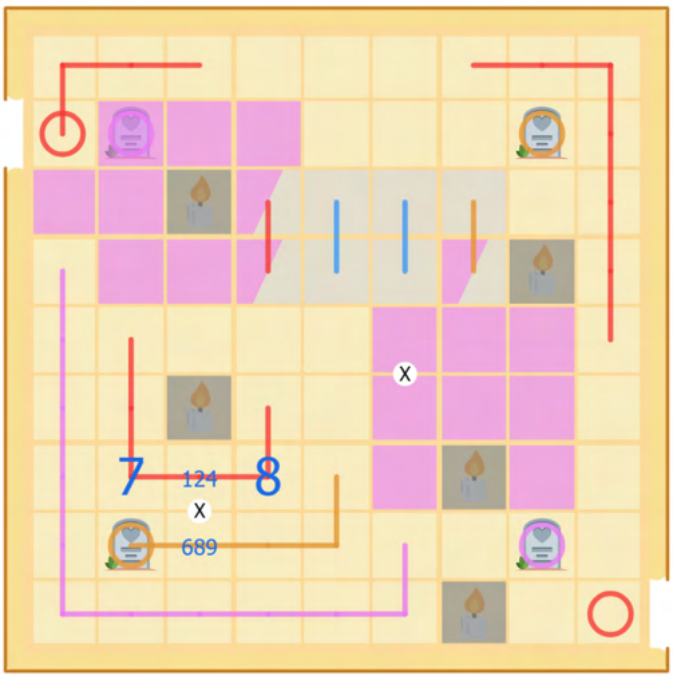
- Normal sudoku rules apply: Place the digits 1 to 9 once each in every row, column, and 3x3 box
- **Snakes:**
  - Two snakes exist in the grid, their ends marked by headstones. Snakes move orthogonally but do not cross themselves or share cells with each other
  - One snake is a German Whisper (adjacent digits differ by at least 5). One is a palindrome (digits read the same backwards and forwards)
- **Path:**
  - Draw your path through the grid from R2C1 to R9C9
  - Your path moves orthogonally and does not visit any cell more than once
  - Your path does not visit any cell containing a snake
  - Your path goes through every cell containing the digit corresponding to its box number (i.e. the 1 in box 1, the 2 in box 2 etc.). Boxes are numbered 1 to 9 in normal reading order
  - Digits along your path differ by at least 2. In addition, path digits differ from any orthogonally adjacent snake cell by at least 2
- **Candles:**
  - Candles contain neither snake nor path
- **X:**
  - Digits on an X sum to 10. No negative constraint

Solve Path

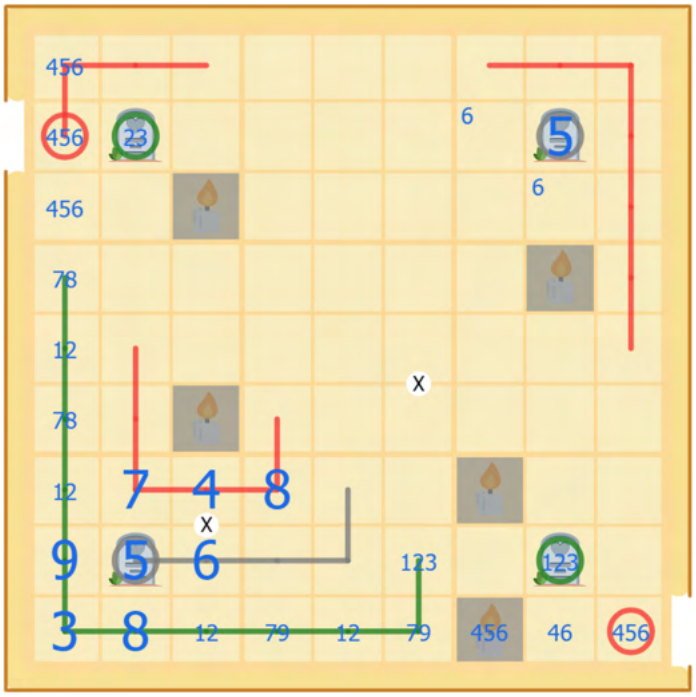
- Meta: One of the snakes is a palindrome, which means it must connect two headstones which are diagonally opposite. Therefore, we are drawing three non-overlapping paths, one of the snakes has to wrap around the other, so takes one of the corners, and our path has to take the other corner
- Meta: Our path has to enter every box since it picks up the digit corresponding to the box number
- If the pink snake connects across the middle, then the orange snake will take a corner and block the entry and exit for our path, hence orange snake connects across the middle
- If pink snake takes R1C9, our path has to take R9C1 and then is blocked from the exit by candles
- Hence we can draw in some small segments of snake and path like so:



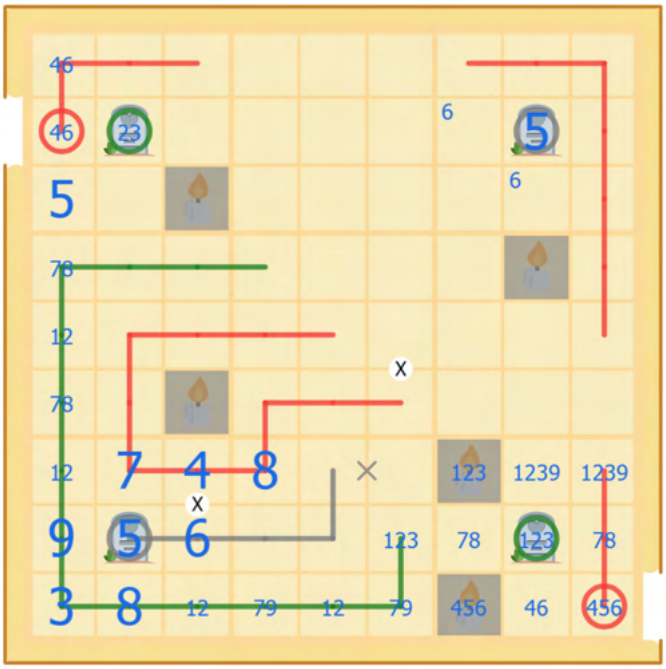
- Only one cell is taken in box 8, which must contain an 8 by path rules
- By non-consecutive we can place 7 in box 7, and mark the X
- Consider whether pink snake can be a palindrome. A palindrome snake that moves orthogonally can only have its centre on the edge of a 3x3 box and take a 90 degree turn in that cell. Looking at where the centre could be (marked in purple) there is no way to make the pink snake take an equal number of cells on either side of the centre without shutting in the other paths



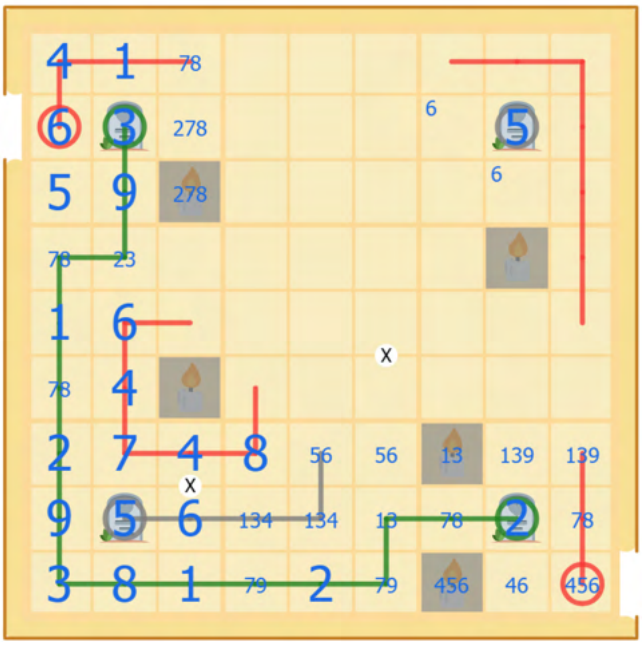
- We now know the palindrome and german whisper snakes, and can place some digits on the whisper snake



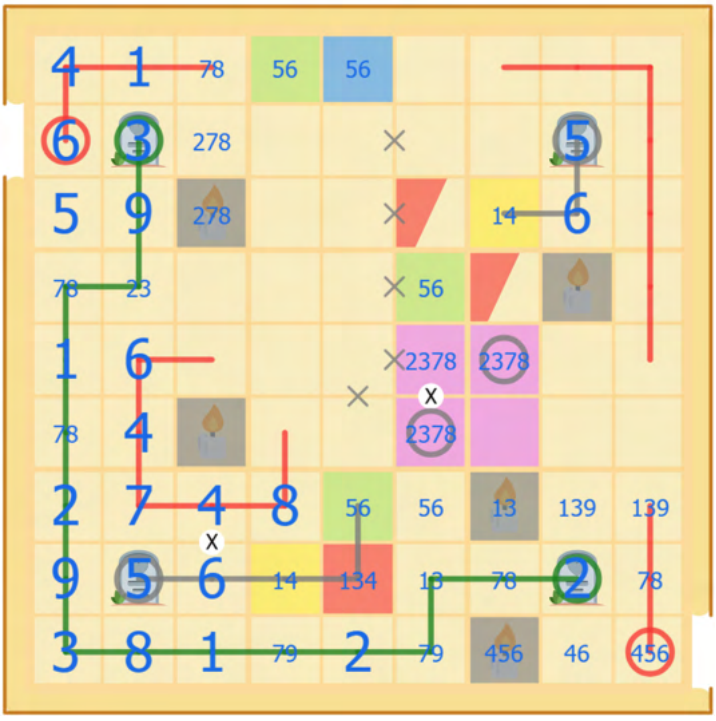
- Consider whether german whisper snake can take R4C4. If so, it ultimately shuts in the palindrome snake, like so:



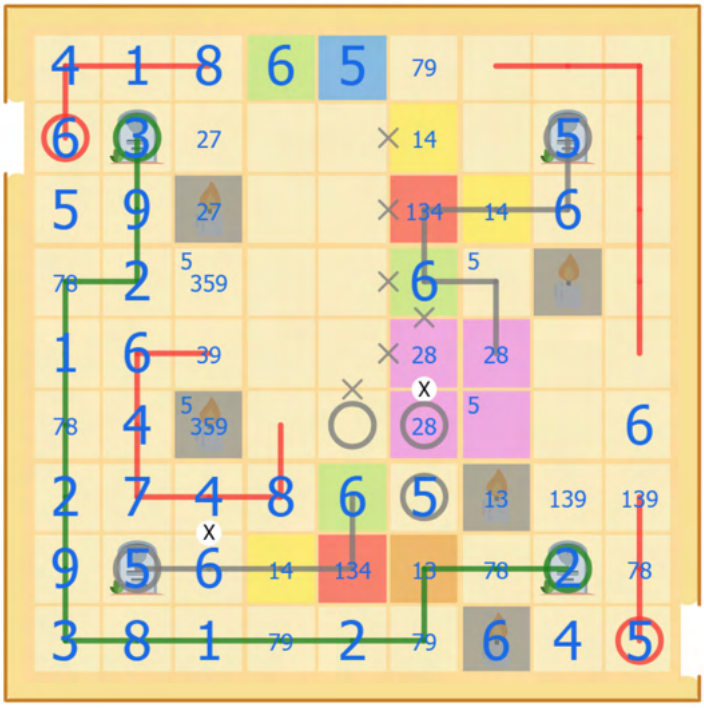
- German whisper snake must connect through R2C3, and places further digits in box 1
- 1 must be on the path in box 1, which places 3 and 6 by non-consecutive
- By sudoku, 78 pair in box 9, 56 pair in box 8



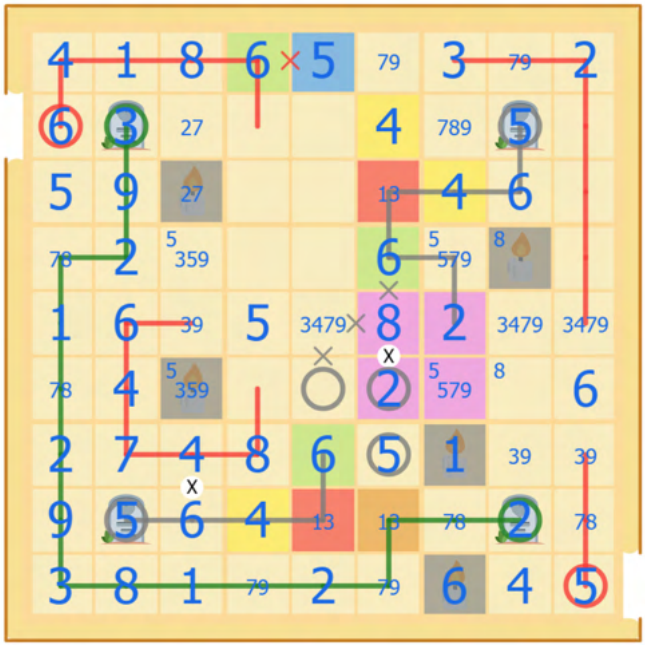
- 6 is the next cell on the palindrome in box 3, which is placed, as well as the next cell on the palindrome which can't be 3 by the rules of the path in box 3
- As our path needs two sections in box 2, so the palindrome snake is limited and can't enter column 5
- This means R7C6 is definitely on the palindrome snake
- The only way R7C6 is the snake centre is if the snake goes straight up C7, which puts a 56 pair on the snake in box 6 and breaks R9C7 and breaks the rule that 6 is on our path in box 6
- Hence R6C6 = R5C7 and the snake centre is R5C6 or R7C6
- Hence the palindrome snake has to place R7C5 in R4C6 creating a 56 pair in C6, and by sudoku 56 pair in R1



- Green 56 must be a 6 as 5 is on our path in box 5
- Places 8 in box 1 by non-consecutive
- 6 in box 6 can't be R6C7 as there is no way to get our path there, so this is R6C9
- X in column 6 sees both cells containing 3 in R8, hence this X is a 28

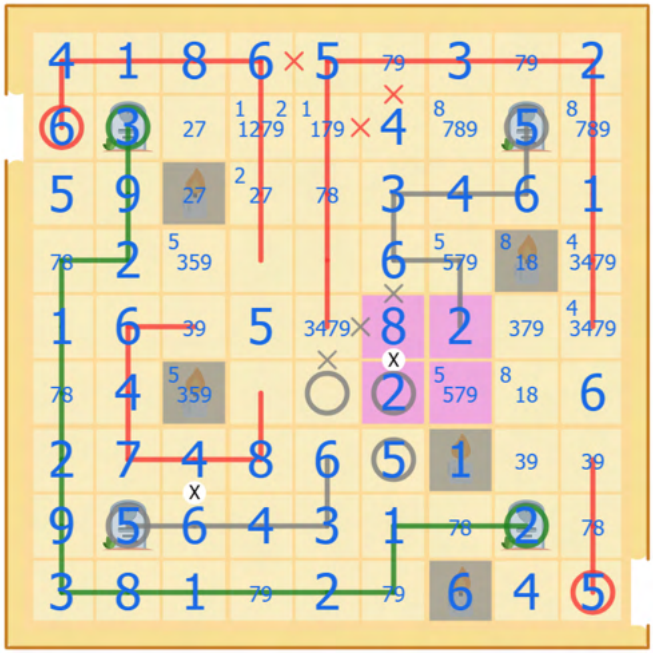


- 8 in C8 is in box 6, resolving the 28 pair on the X
- 2 is placed in box 3, which places 3 by non-consecutive
- This resolves the 134 triple in C6
- 5 is placed in R5

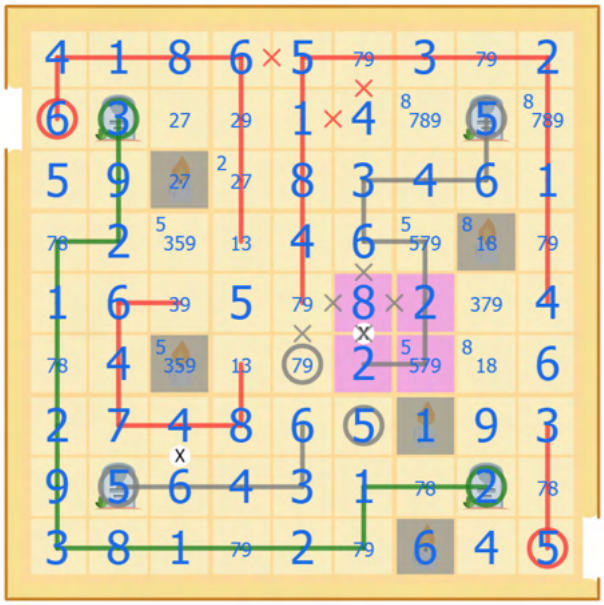


- 1 is placed in box 3

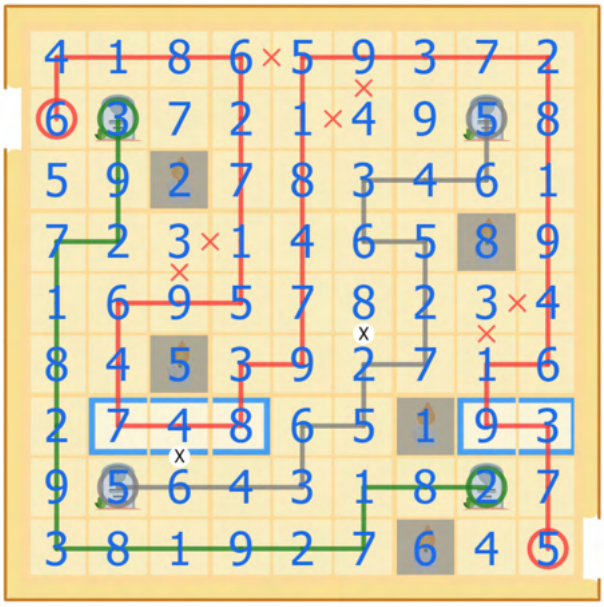
- We can draw more path sections by considering non-consecutive



- Marking the remaining cells, we have a pair in R3 which places 8 in R3C5
- By non-consecutive this places 1 and 4 in C5, then 4 and 3 in box 6
- R5C5 will be consecutive with R5C6 so the palindrome snake can't take this cell



- Our path must take the 9 in box 9, thus also R6C8, which must be a 1
- This resolves the sudoku, and by the path rules we can uniquely draw our path and that of the palindrome snake


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