The Right Path: Logic Puzzles that Build Spatial Reasoning

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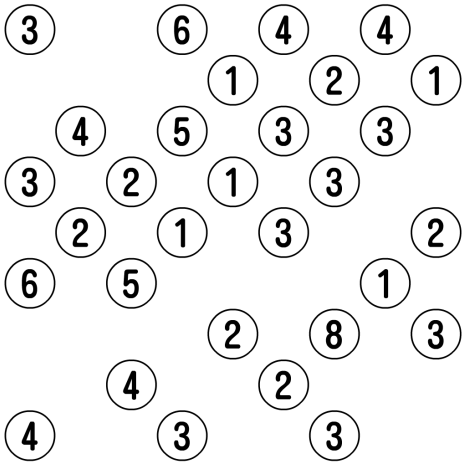
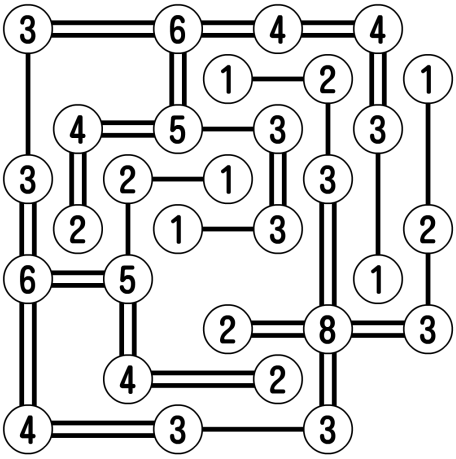
HASHIWOKAKERO

These puzzles originated in Japan and are known as *Hashiwokakero* ("build bridges") or more simply, *Hashi* puzzles. In the United States, they have been published as Bridges puzzles.

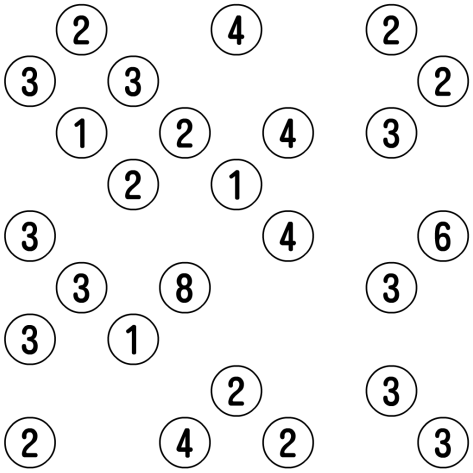
Two examples of Hashiwokakero puzzles and their solutions are shown below. Look at the two examples and their unique solutions to determine both the goal of Hashiwokakero and the rules that govern these puzzles.



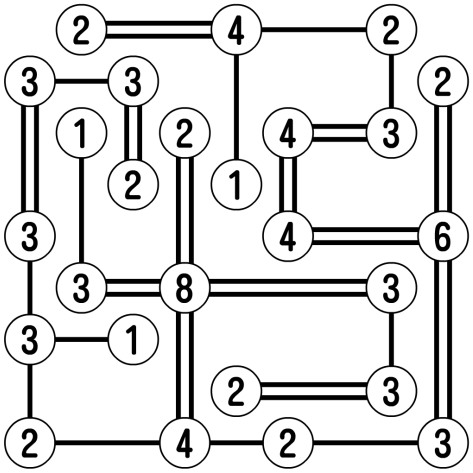
Hashiwokakero Example A



Hashiwokakero Example A - Solution



Hashiwokakero Example B



Hashiwokakero Example B - Solution

As you have probably already determined, the goal of a Hashiwokakero puzzle is to connect all of the islands (the circled numbers 1 through 8) with a series of bridges so that any island can eventually be reached from any of the other islands.

There are some additional rules that must be followed in finding the solution:

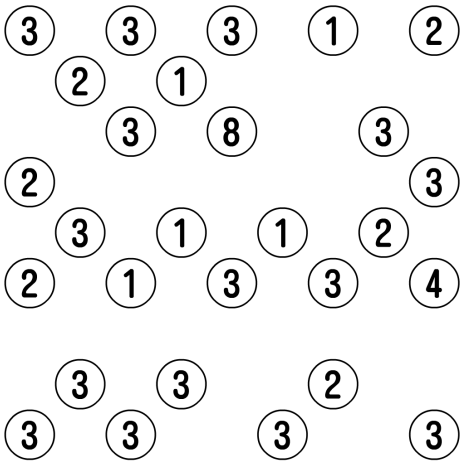
- The bridges must begin and end at islands, traveling in a straight line (horizontally or vertically)
- The bridges must not cross any other bridges or islands
- No more than two bridges can connect a pair of islands
- The total number of bridges connected to each island must match the number on that island

Using deductive and spatial reasoning you should be able to determine each puzzle's unique solution.

<u>Starting points</u>

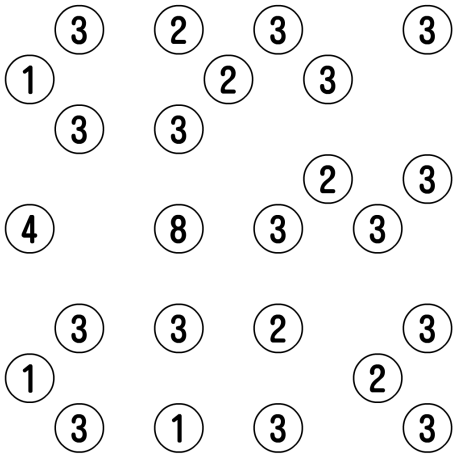
Look at the example puzzle below. There are several starting strategies in finding the solution to this puzzle:

- An island containing a number 8 must have two bridges going in each of the four directions
- Two islands containing each containing a number 1 cannot connect to each other because they would not be connected to all of the other islands
- An island containing a number 3 that is in a corner must have at least one bridge going in each of the two possible directions

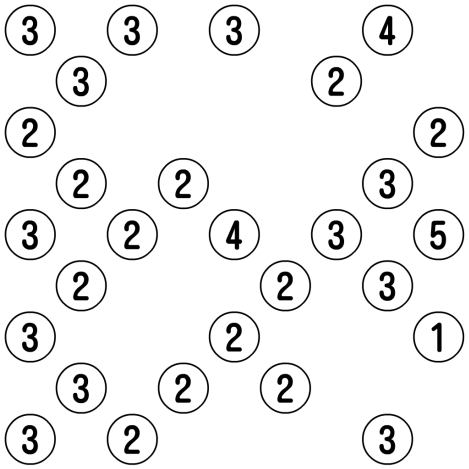


Hashiwokakero Example C

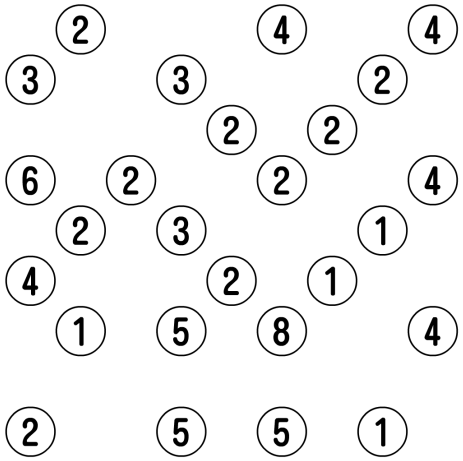
Remember that each puzzle has a unique solution. This fact can often be very useful in completing a puzzle.



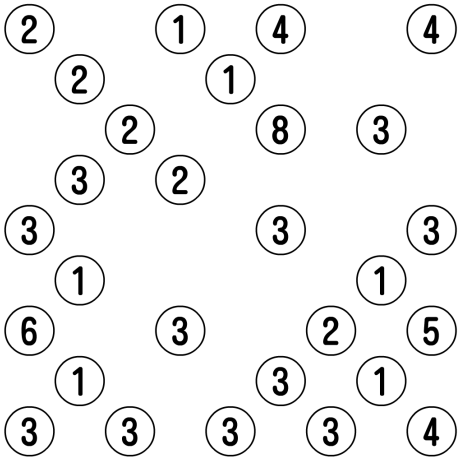
Hashiwokakero Puzzle 1



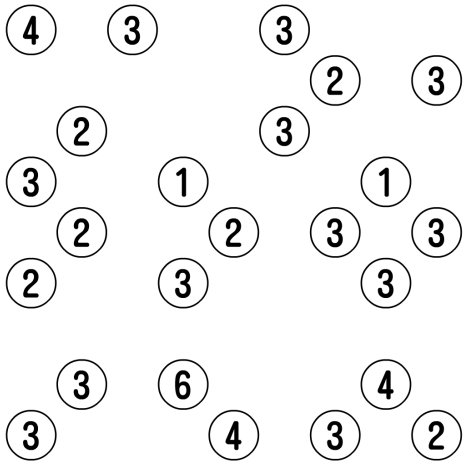
Hashiwokakero Puzzle 2



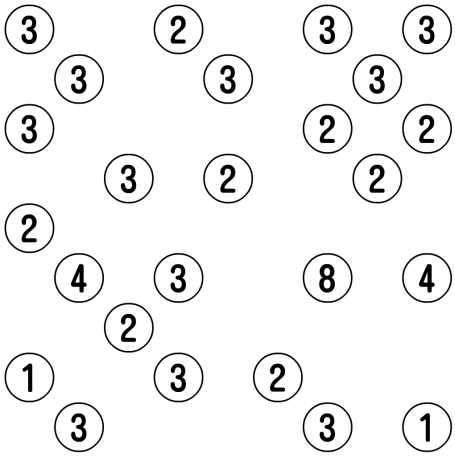
Hashiwokakero Puzzle 3



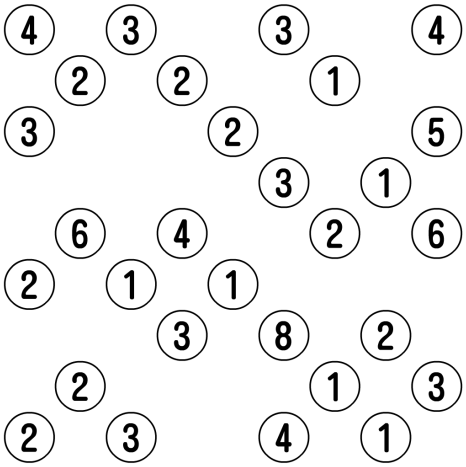
Hashiwokakero Puzzle 4



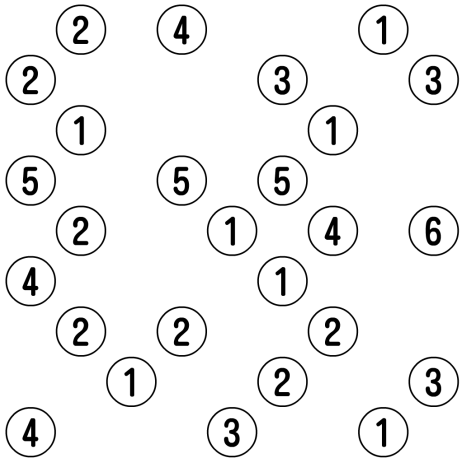
Hashiwokakero Puzzle 5



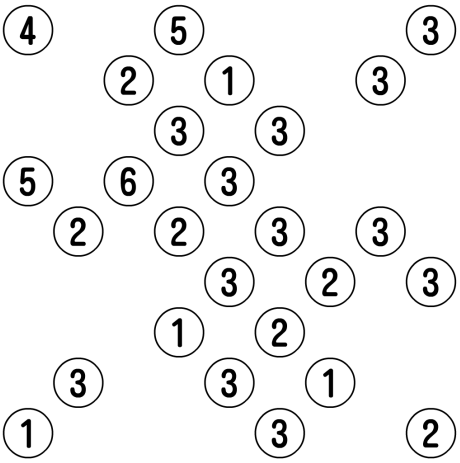
Hashiwokakero Puzzle 6



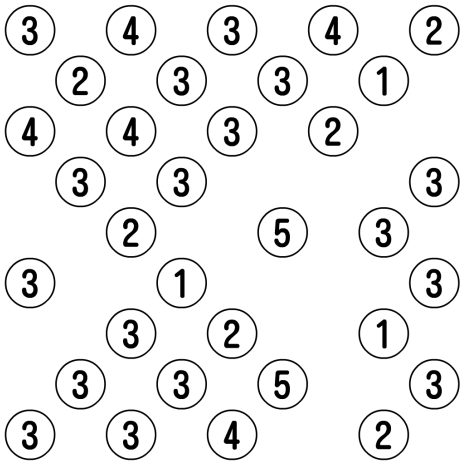
Hashiwokakero Puzzle 7



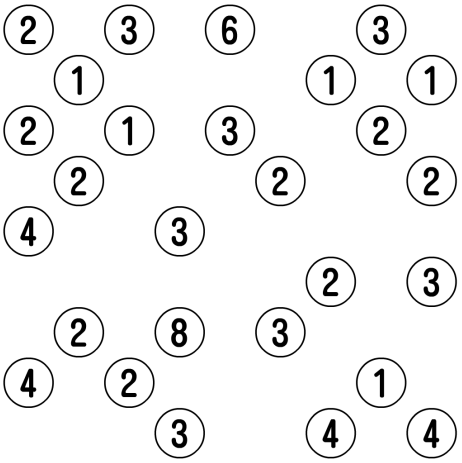
Hashiwokakero Puzzle 8



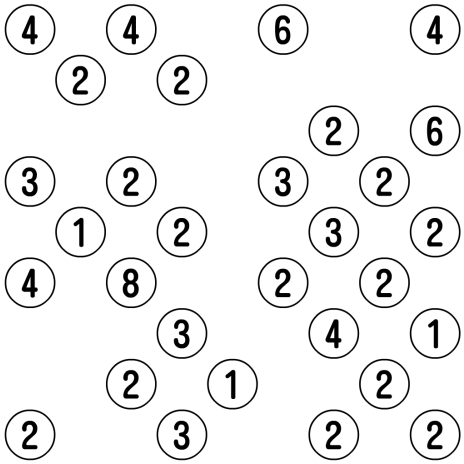
Hashiwokakero Puzzle 9



Hashiwokakero Puzzle 10



Hashiwokakero Puzzle 11

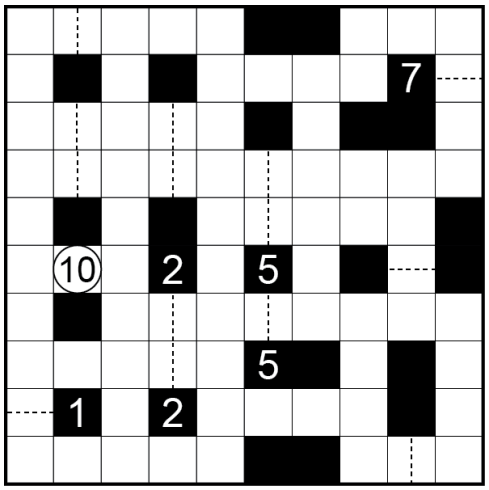


Hashiwokakero Puzzle 12

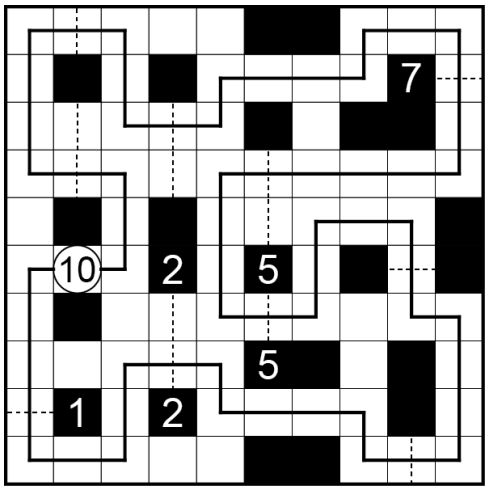
SURAROMU

Suraromu puzzles were created by the Japanese puzzle magazine *Nikoli* and first appeared in 2007. They were originally called Slalom puzzles, but the name was soon changed to Suraromu.

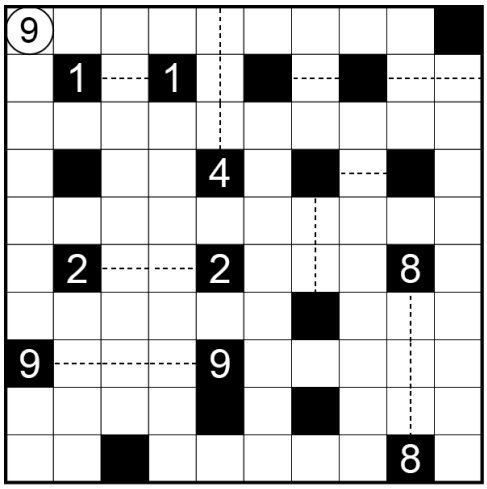
Two examples of Suraromu puzzles and their solutions are shown below. Look at the two examples and their unique solutions to determine both the goal of Suraromu and the rules that govern these puzzles.



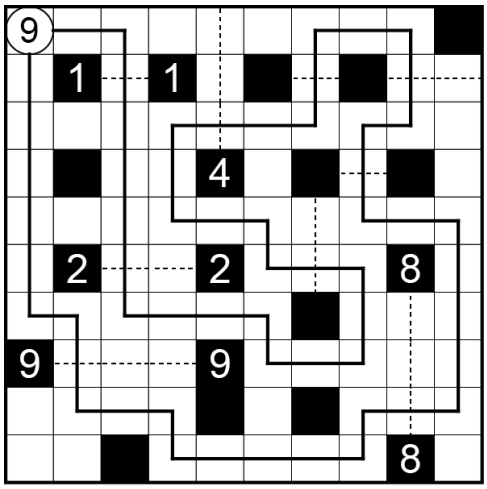
Suraromu Example A



Suraromu Example A - Solution



Suraromu Example B



Suraromu Example B - Solution

As you have probably already determined, the goal of a Suraromu puzzle is to create a path that is a closed loop with horizontal and vertical lines that pass through the centers of the squares in the grid. The rules for determining the solution:

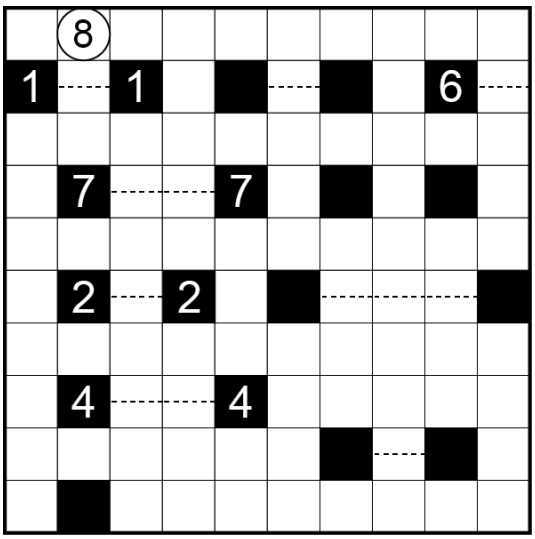
- The continuous dotted lines between black squares or to the outer frame are gates. The path must pass through all gates, but a gate can only be passed through once.
- The path starts and ends at the square with the numbered circle. The number in the circle indicates the total number of gates.
- Numbers at the ends of the gates and contained in black squares show the order in which the path passes through the gate. The path may pass through a gate without a number at any point in the path.

Using deductive and spatial reasoning you should be able to determine each puzzle's unique solution.

<u>Starting points</u>

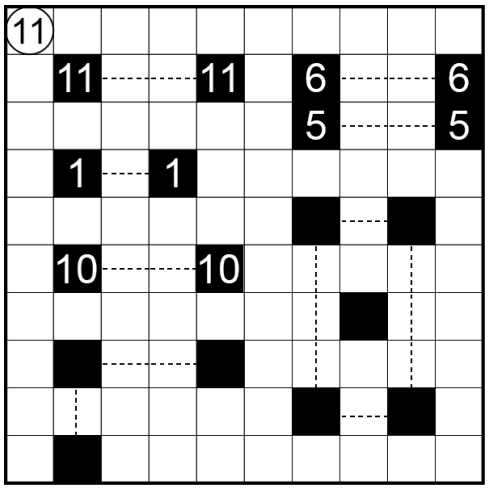
Look at the example puzzle below. There are several starting strategies in finding the solution to this puzzle:

- The circled number may only have two directions from which the path can travel. If so, part of the path can be filled in.
- A gate that is only one square long (whether it is numbered or not) indicates part of the path. That part of the path can be filled in immediately.
- Once part of a path is placed, the path may be able to be continued because of the placement of black squares creating "hallways" in the grid.
- Parts of a gate that is longer than one square may be eliminated as part of the path (for various reasons), leaving only one square that must be part of the gate.

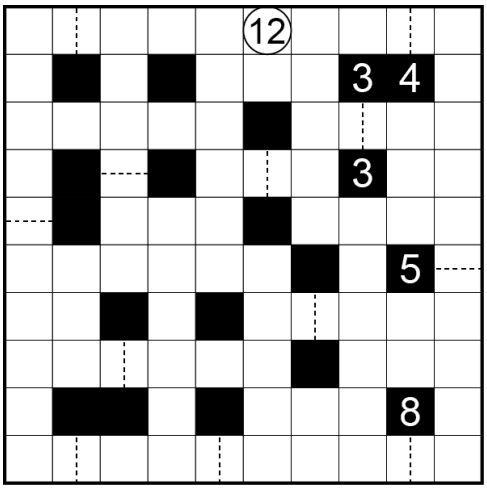


Suraromu Example C

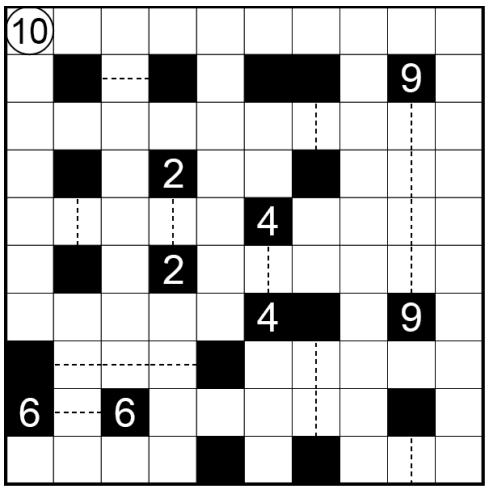
Remember that each puzzle has a unique solution. This fact can often be very useful in completing a puzzle.



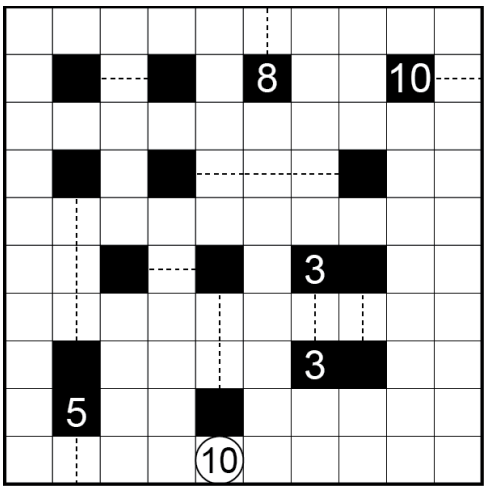
Suraromu Puzzle 1



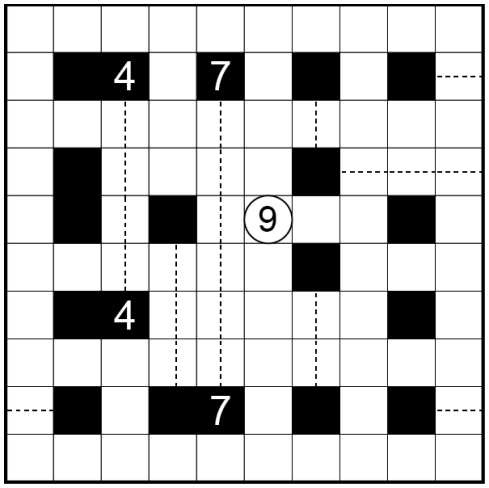
Suraromu Puzzle 2



Suraromu Puzzle 3



Suraromu Puzzle 4



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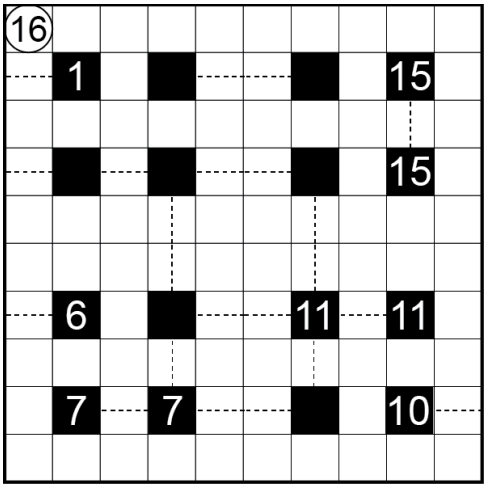
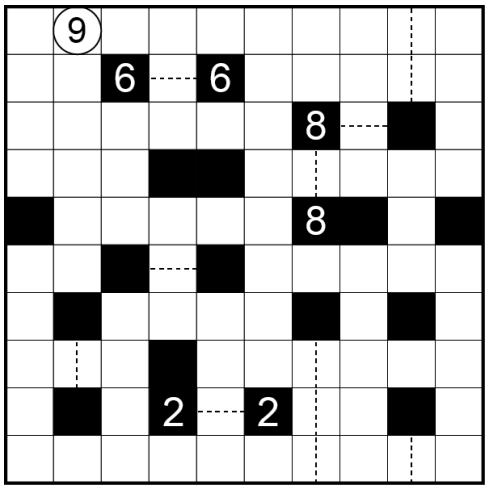
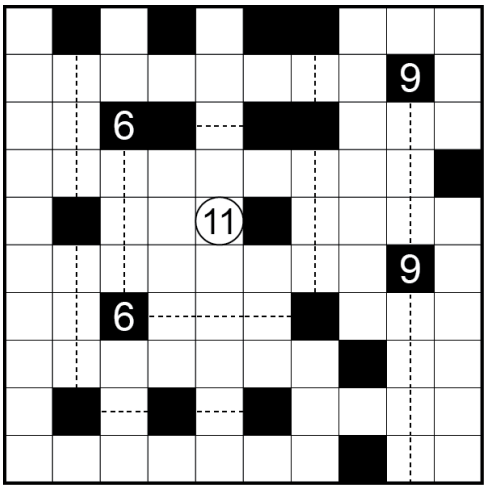


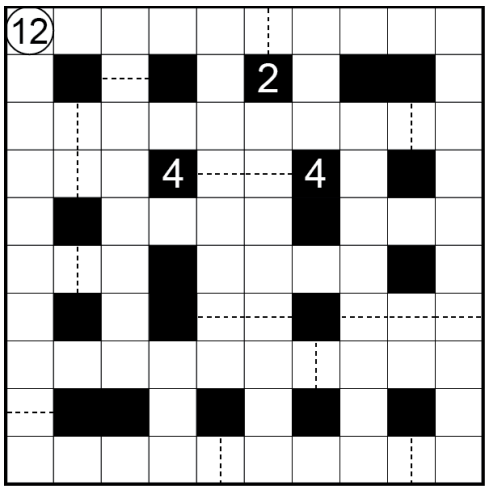
Suraromu Puzzle 6



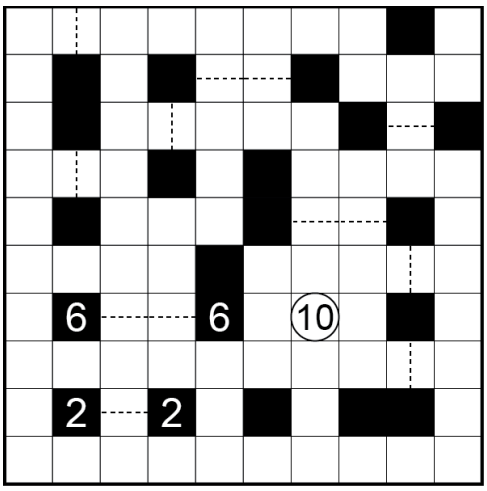
Suraromu Puzzle 7



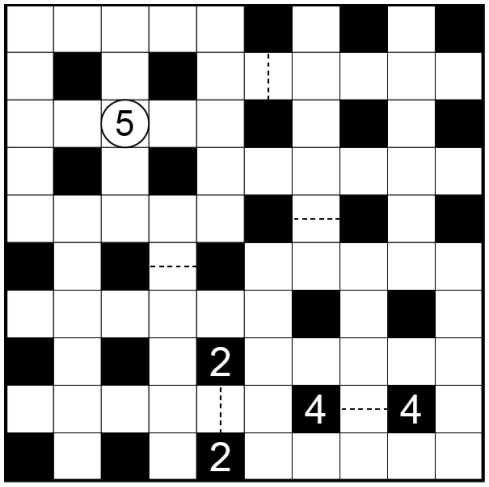
Suraromu Puzzle 8



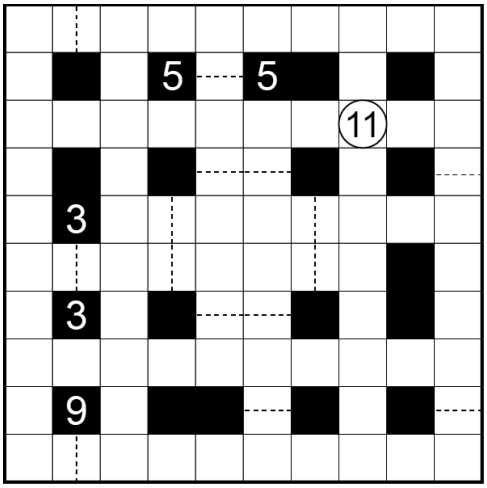
Suraromu Puzzle 9



Suraromu Puzzle 10



Suraromu Puzzle 11

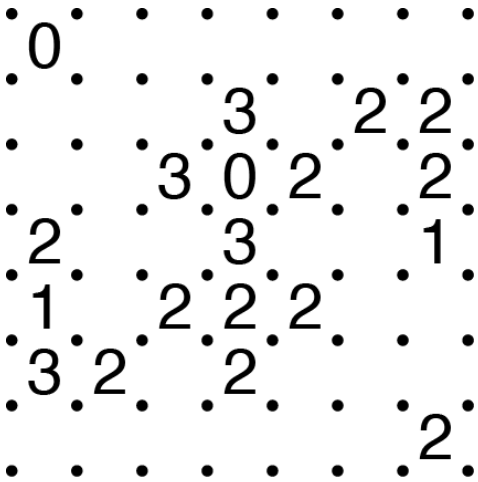


Suraromu Puzzle 12

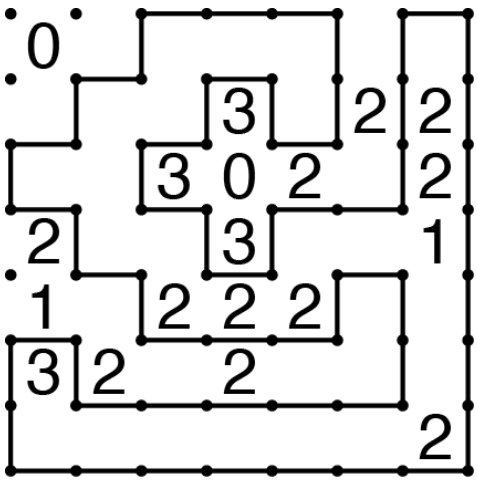
SLITHERLINK

Slitherlink puzzles originated in Japan. In the United States, they have also been published as Fences, Loop the Loop, and many other names.

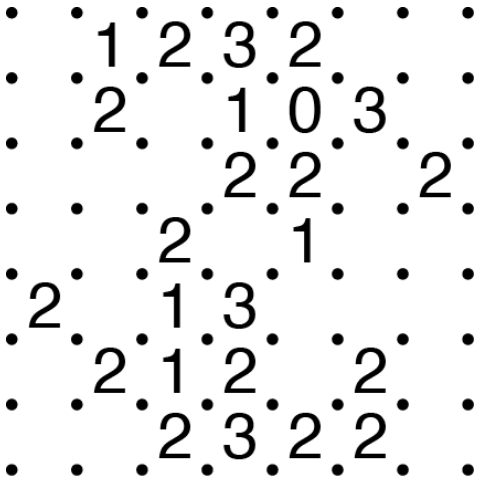
Two examples of Slitherlink puzzles and their solutions are shown below. Look at the two examples and their unique solutions to determine both the goal of Slitherlink and the rules that govern these puzzles.



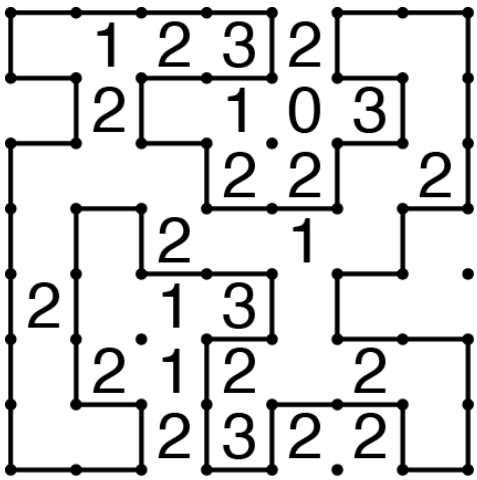
Slitherlink Example A



Slitherlink Example A - Solution



Slitherlink Example B



Slitherlink Example B - Solution

The goal is to draw a single closed loop by connecting dots in the grid with horizontal and vertical lines. Some additional rules:

- The loop may not cross itself
- Each number in the grid indicates the number of sides of the square around the number that are used in the loop
- Empty cells in the grid can be surrounded by any number of lines

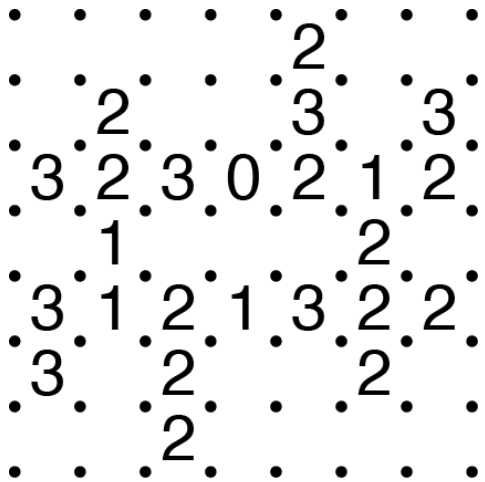
<u>Starting points</u>

Look at the example puzzle below. There are several starting strategies in finding the solution to this puzzle:

- The 0-3 adjacent combination – When a zero and a three are adjacent to each other, what parts of the loop can be determined?

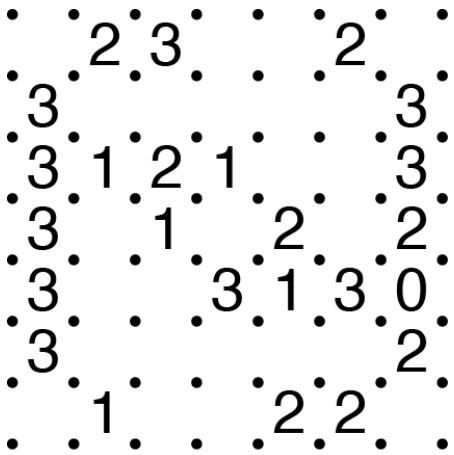
- The 0-3 diagonal combination – When a zero are next to each other on a diagonal, what two sides of the square are the three must be part of the loop?

- The 3-3 adjacent combination – When threes are adjacent to each other, how can the loop be drawn around the threes? Are there any parts of the loop that must be included?

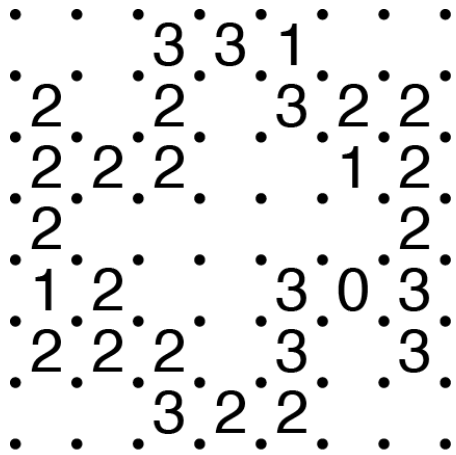


Slitherlink Example C

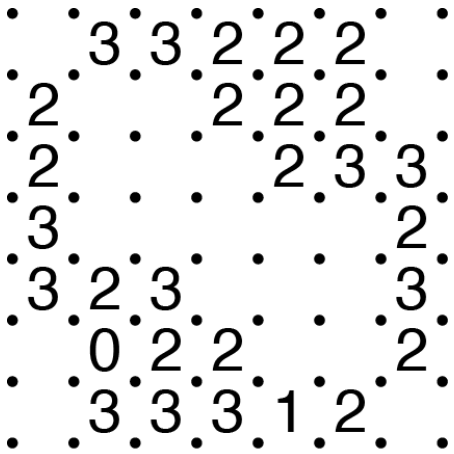
Remember that each puzzle has a unique solution. This fact can often be very useful in completing a puzzle.



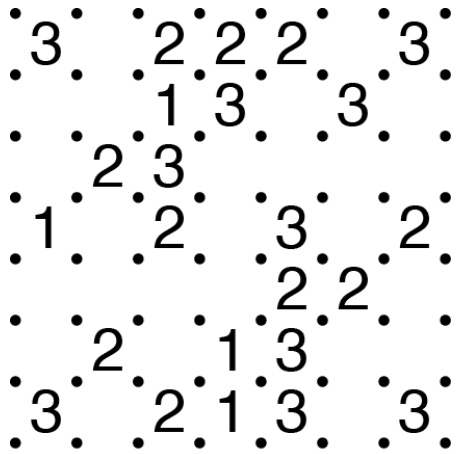
Slitherlink Puzzle 1



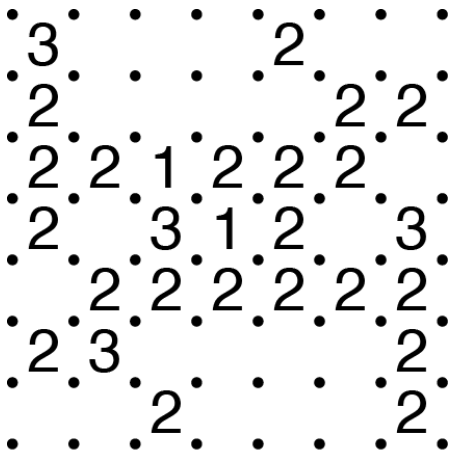
Slitherlink Puzzle 2



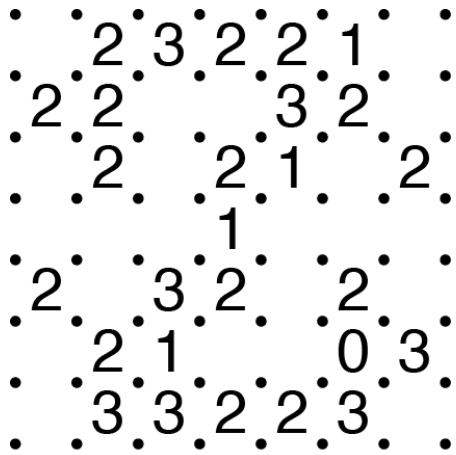
Slitherlink Puzzle 3



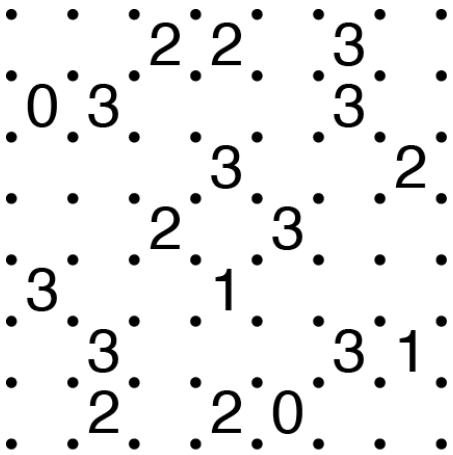
Slitherlink Puzzle 4



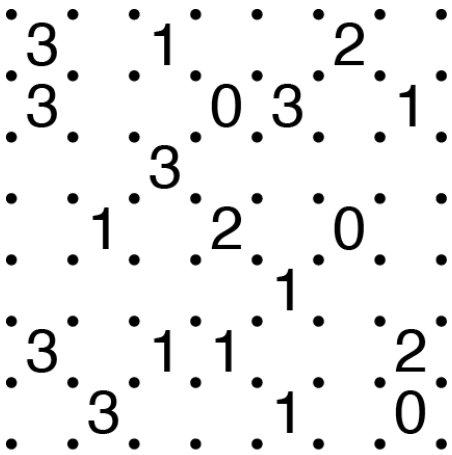
Slitherlink Puzzle 5



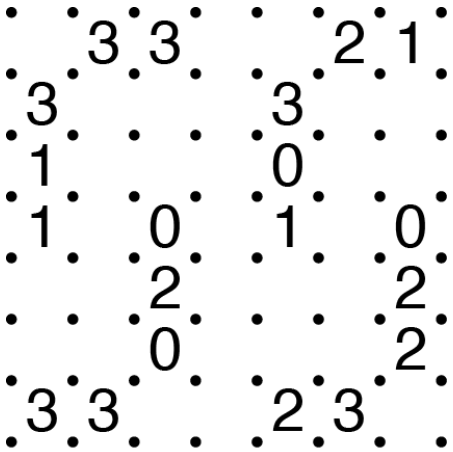
Slitherlink Puzzle 6



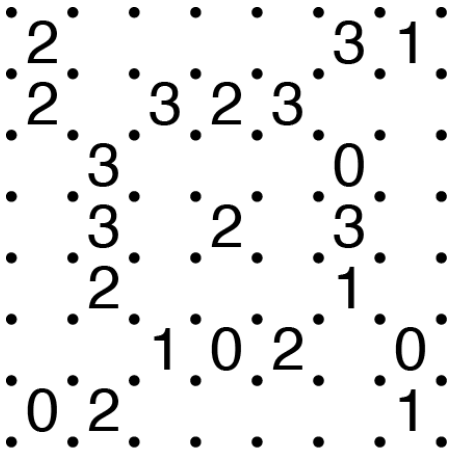
Slitherlink Puzzle 7



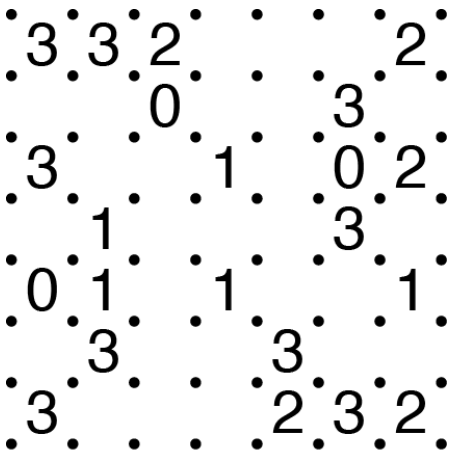
Slitherlink Puzzle 8



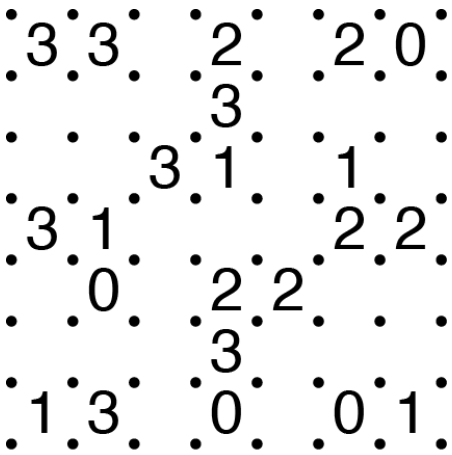
Slitherlink Puzzle 9



Slitherlink Puzzle 10



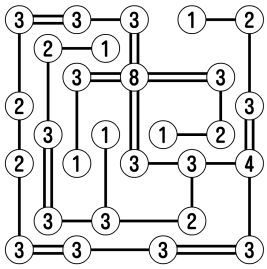
Slitherlink Puzzle 11



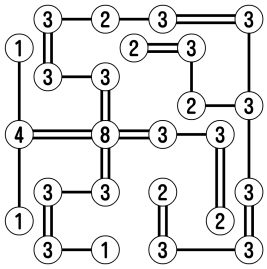
Slitherlink Puzzle 12

SOLUTIONS

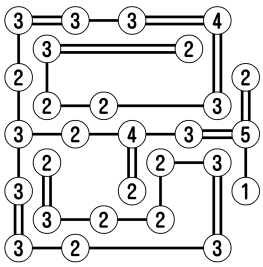
Hashiwokakero



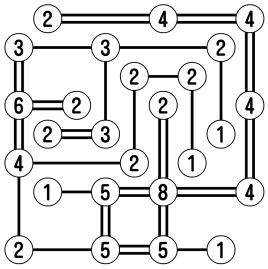
Puzzle C



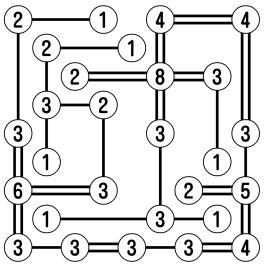
Puzzle 1



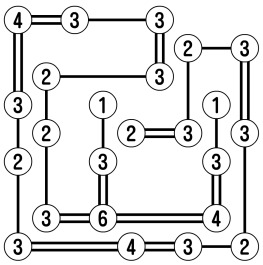
Puzzle 2



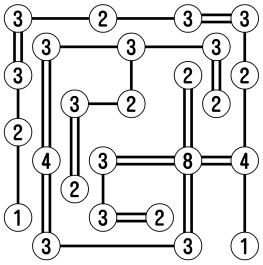
Puzzle 3



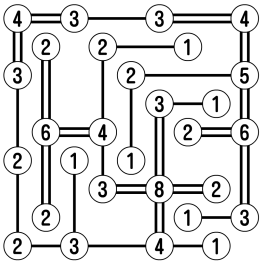
Puzzle 4



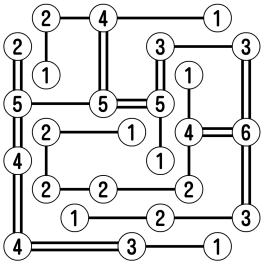
Puzzle 5



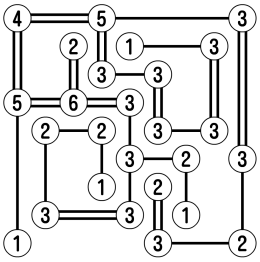
Puzzle 6



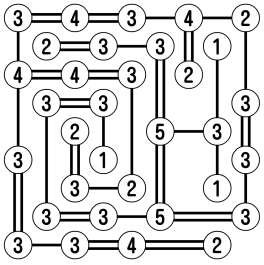
Puzzle 7



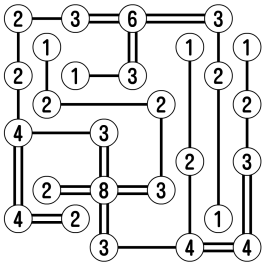
Puzzle 8



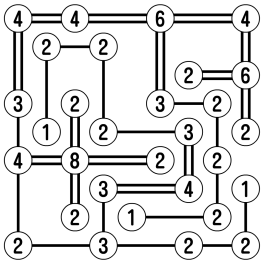
Puzzle 9



Puzzle 10



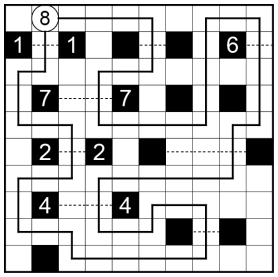
Puzzle 11



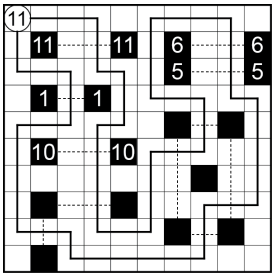
Puzzle 12

SOLUTIONS

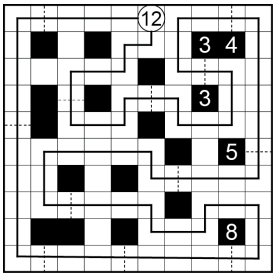
Suraromu



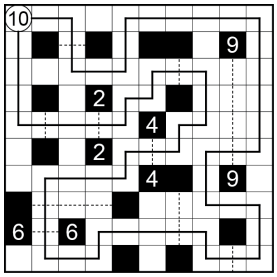
Example C



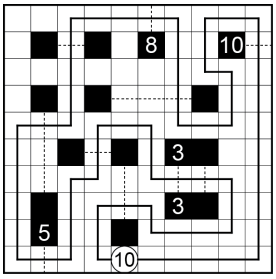
Puzzle 1



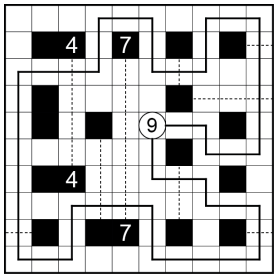
Puzzle 2



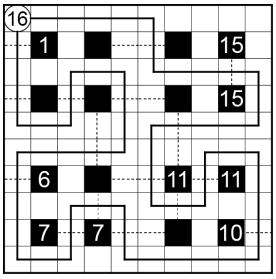
Puzzle 3



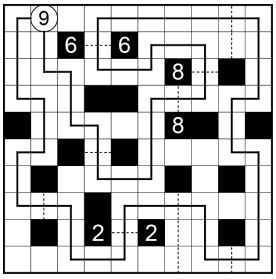
Puzzle 4



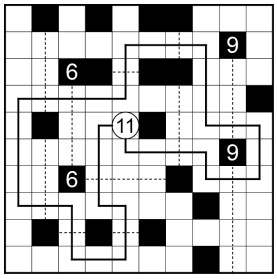
Puzzle 5



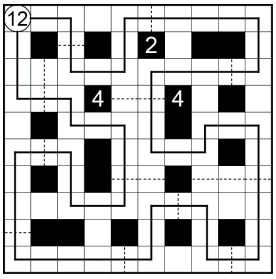
Puzzle 6



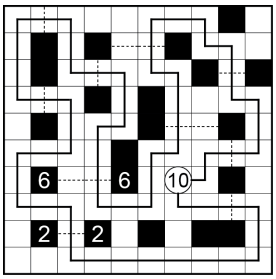
Puzzle 7



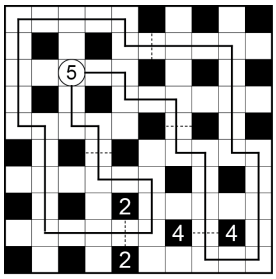
Puzzle 8



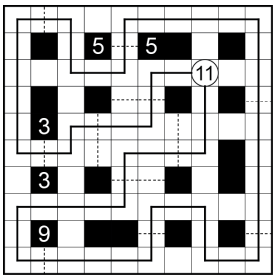
Puzzle 9



Puzzle 10



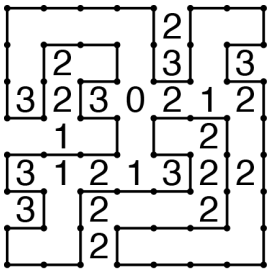
Puzzle 11



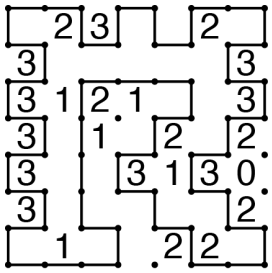
Puzzle 12

SOLUTIONS

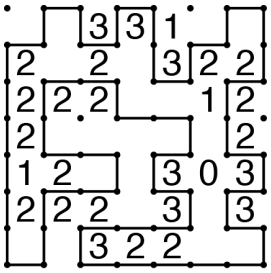
Slitherlink



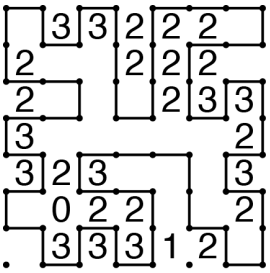
Puzzle C



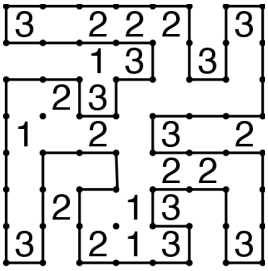
Puzzle 1



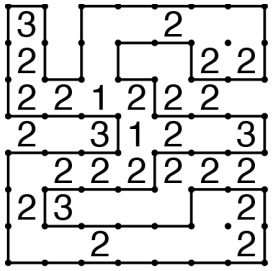
Puzzle 2



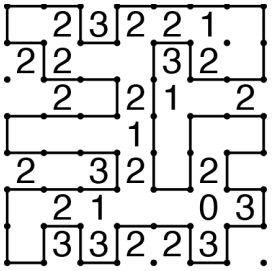
Puzzle 3



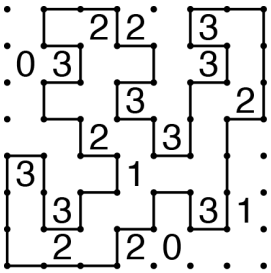
Puzzle 4



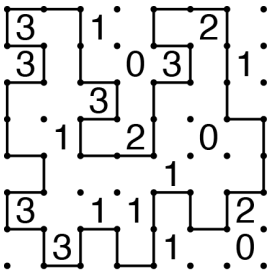
Puzzle 5



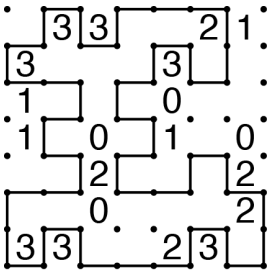
Puzzle 6



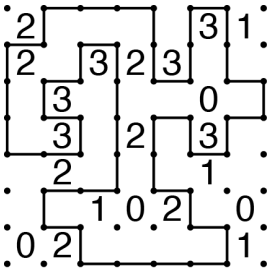
Puzzle 7



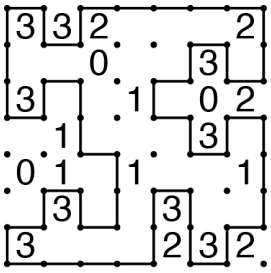
Puzzle 8



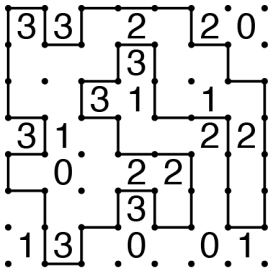
Puzzle 9



Puzzle 10



Puzzle 11



Puzzle 12