

3	3	1	3	2	1	1	0	3	0			
	0	0				3		3	0	2	3	3
	2	0	1	3	1	1	1	2		2		
2									1	1		
	3								0			
0									2	1		
2	3	3							3			
	2								2			
1		1							1	3	2	
	3								2	2		
1	3									2		
	1								1			
		3							0			
0									1	1		
2	2								3			
2	1	3							2	2		
		2							3			
	2								1	1	2	
1	0								3			
	2								1			
1		0							3			
	3		2	1	2	2	2	2	2	0		
1		2	1	2	2		1			2		
	1		0	3	1		3	3	3	2	1	2

**Building Proof  
Readiness with  
Language-Independent  
Logic Puzzles**

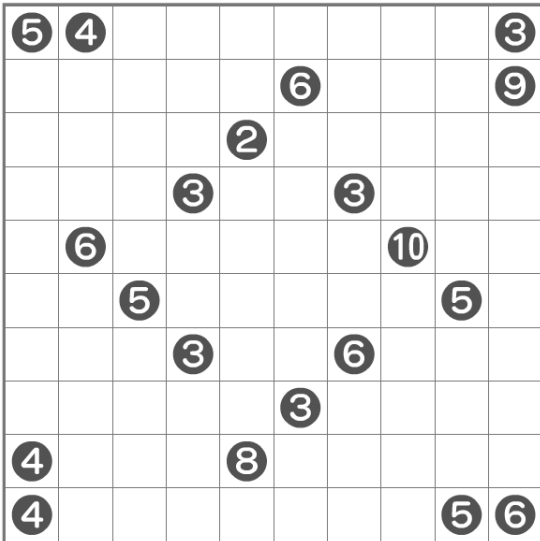
**Jeffrey Wanko**  
**Miami University**  
**Oxford, OH**  
**wankojj@muohio.edu**

**OCTM**  
**October 14, 2010**

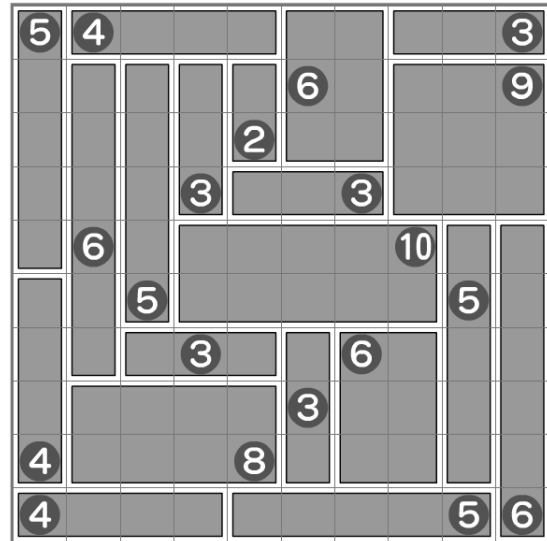
# SHIKAKU

These puzzles originated in Japan and are known as *Shikaku* ("four corners" or "divide by box"). In the United States, they have been published as Partitions puzzles.

Below is a picture of a starting puzzle grid and its solution.



**Example Shikaku Puzzle**



**Example Shikaku Puzzle Solution**

Before you learn about the rules for playing Shikaku, look at the example puzzle and its solution. What do you think is the goal in solving a Shikaku puzzle and what are some of the rules for deciding how to find the solution? Work with a partner and write down your observations and your ideas about the goal and the rules for Shikaku puzzles.

## Shikaku

The goal is to subdivide the grid into rectangles (and squares) so that the number in each rectangle refers to the area of that rectangle. Some additional rules:

- Only one number can appear in each rectangle
- Each square on the grid is used in exactly one rectangle (no rectangles may overlap)

6			6			6		2
9			3					
						12		8
8		12						
						4		4
2		6				6		6

**Shikaku Puzzle 1**

		6		2			4	
6						3		6
		3		8			2	
	4				6			4
	2			4				4
		4			2		2	
4				4				7
		5			4		4	

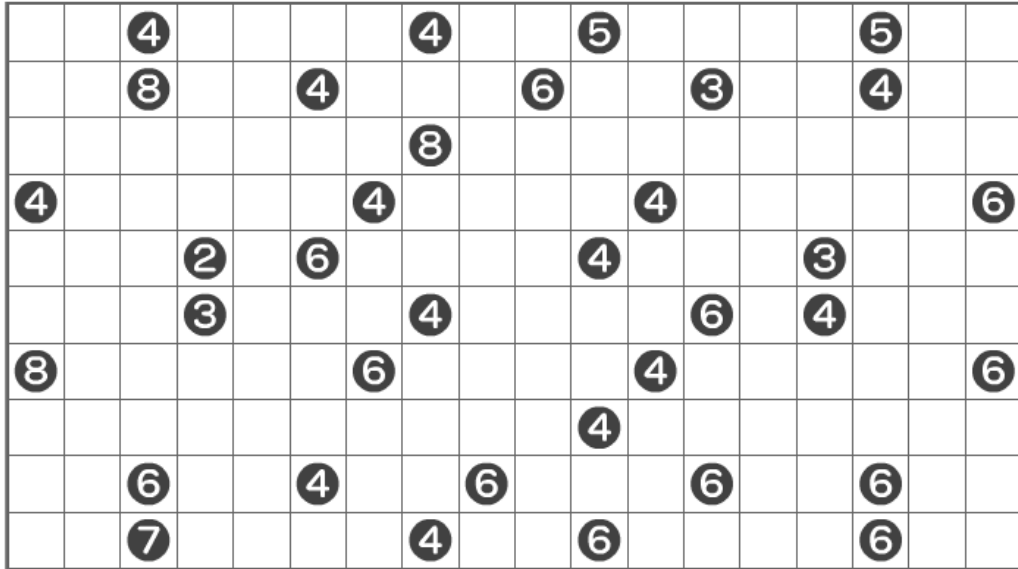
**Shikaku Puzzle 2**

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

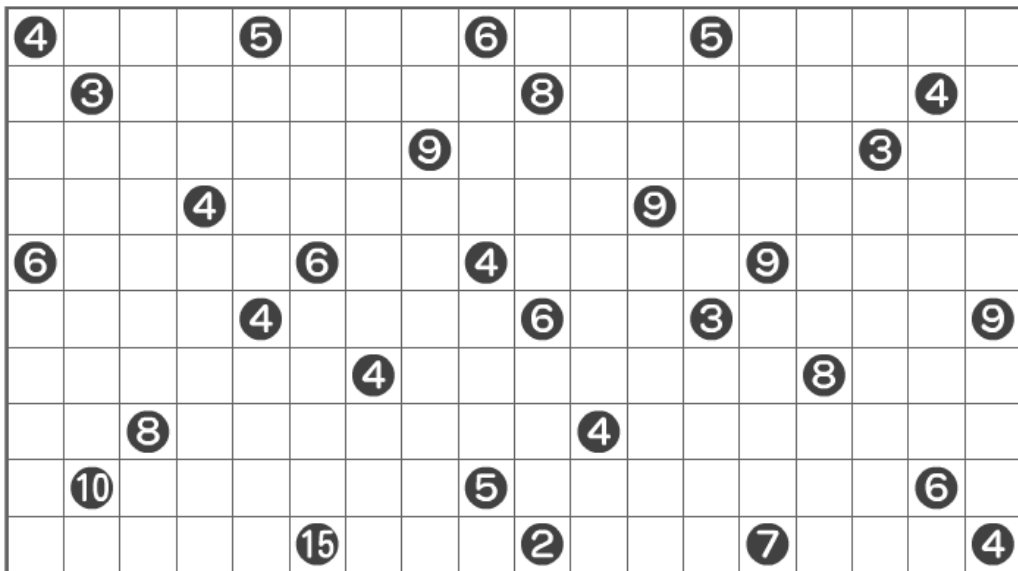
**Shikaku Puzzle 3**

3	7			6				4
								8
				3				
4		5			4		6	
		4		8				
							4	10
				3				
4								
3				6			6	2

**Shikaku Puzzle 4**



**Shikaku Puzzle 5**



**Shikaku Puzzle 6**

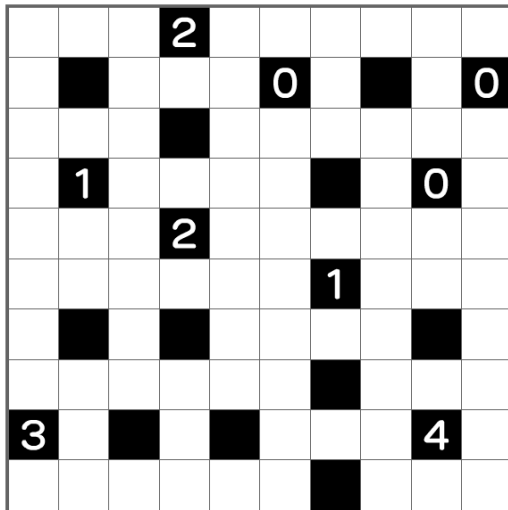
**Resources:**

- [www.nikoli.com](http://www.nikoli.com) – website of Nikoli (the Japanese puzzle magazine that invented Shikaku) which includes ten sample hand-made Shikaku puzzles that can be solved online. The Shikaku examples used in this presentation and in this handout are from Nikoli.
- [www.puzzle-shikaku.com](http://www.puzzle-shikaku.com) – millions of computer-generated Shikaku puzzles that can also be printed out to solve on paper
- [www.shikakuroom.com](http://www.shikakuroom.com) – a puzzle generator that will create Shikaku puzzles from 2x2 to 20x20

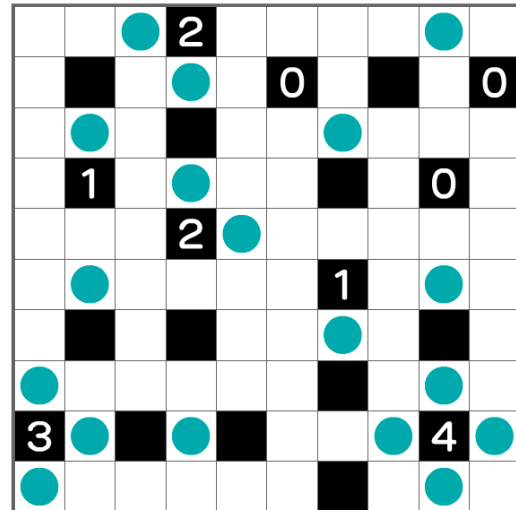
# AKARI

These puzzles originated in Japan and are known as *Akari* ("light up").

Below is a picture of a starting puzzle grid and its solution.



**Example Akari Puzzle**



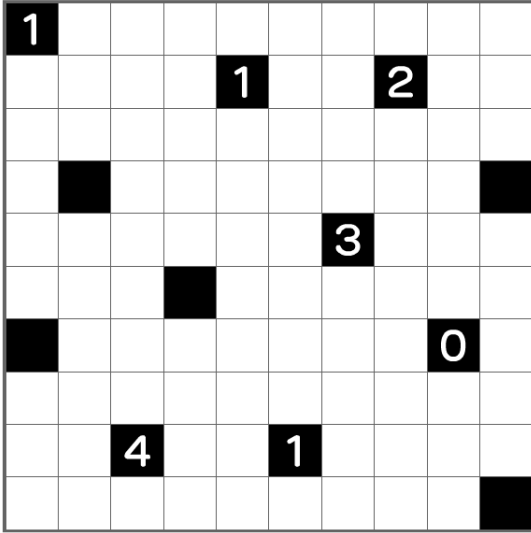
**Example Akari Puzzle Solution**

Before you learn about the rules for playing Akari, look at the example puzzle and its solution. What do you think is the goal in solving an Akari puzzle and what are some of the rules for deciding how to find the solution? Work with a partner and write down your observations and your ideas about the goal and the rules for Akari puzzles.

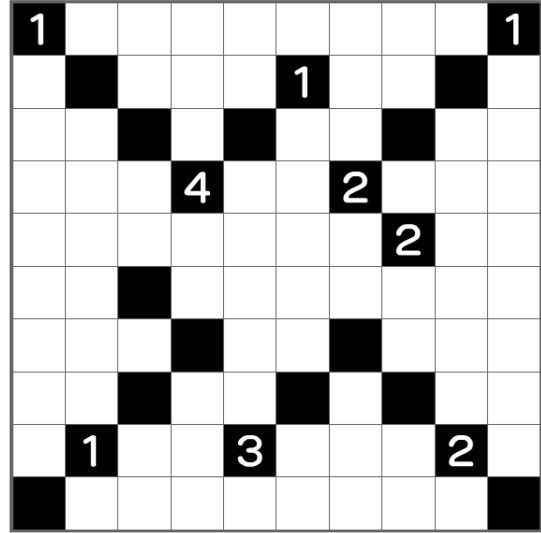
# Akari

The goal is to place light bulbs (circles) so that every white square in the grid contains a light bulb or is lit by a light bulb (their light travels horizontally and/or vertically until it hits a side wall or a black square).  
Some additional rules:

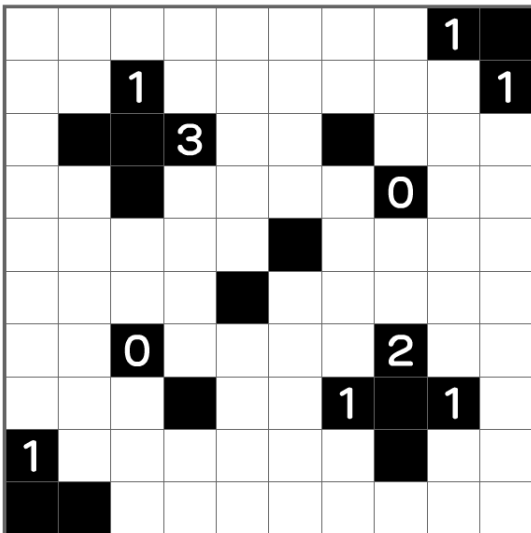
- Each black numbered square indicates the number of light bulbs adjacent to it (horizontally and vertically)
- No light bulb may illuminate any other light bulb



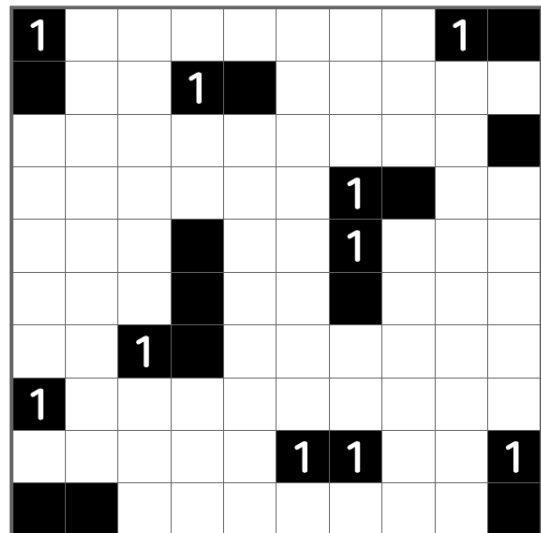
**Akari Puzzle 1**



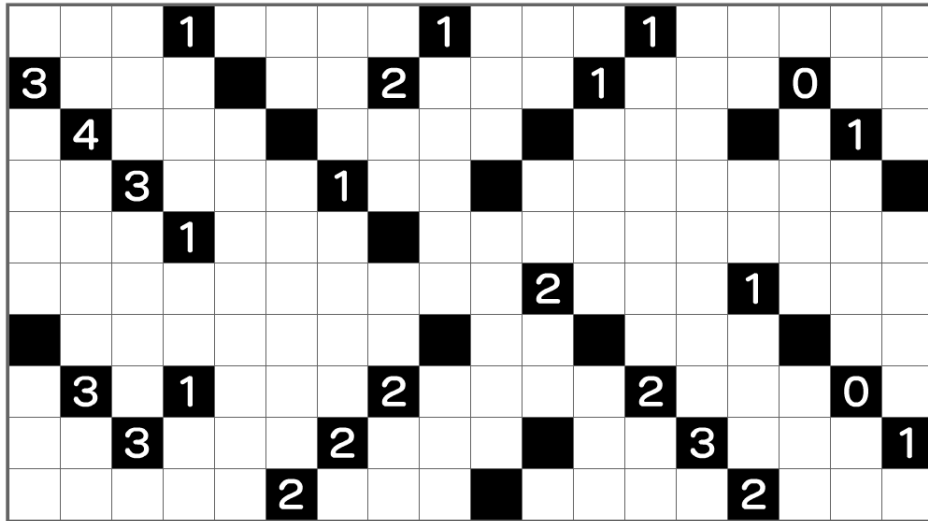
**Akari Puzzle 2**



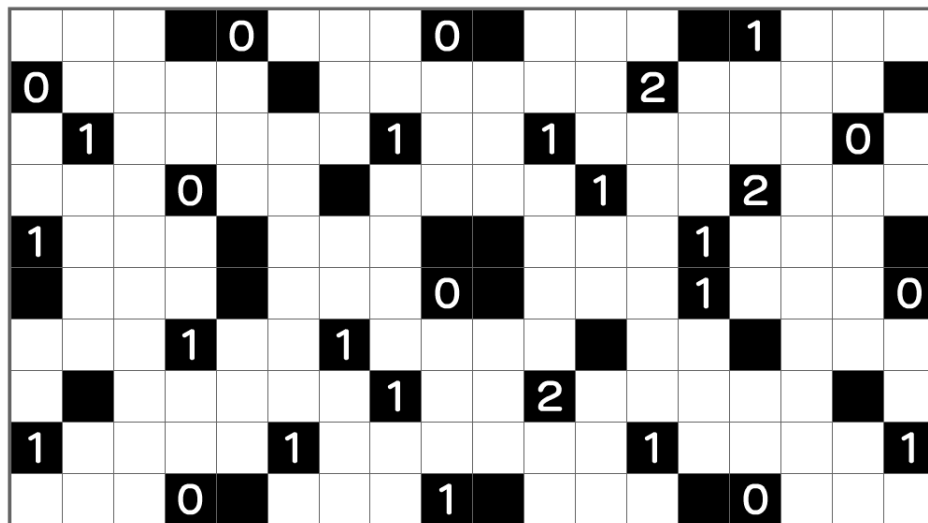
**Akari Puzzle 3**



**Akari Puzzle 4**



**Akari Puzzle 5**



**Akari Puzzle 6**

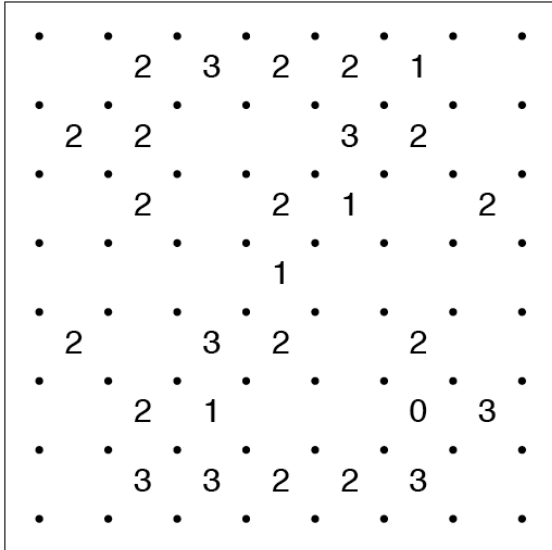
**Resources:**

- [www.nikoli.com](http://www.nikoli.com) – website of Nikoli (the Japanese puzzle magazine that invented Akari) which includes ten sample hand-made Akari puzzles that can be solved online. The Akari examples used in this presentation and in this handout are from Nikoli.
- [www.puzzle-light-up.com](http://www.puzzle-light-up.com) – millions of computer-generated Akari puzzles that can also be printed out to solve on paper

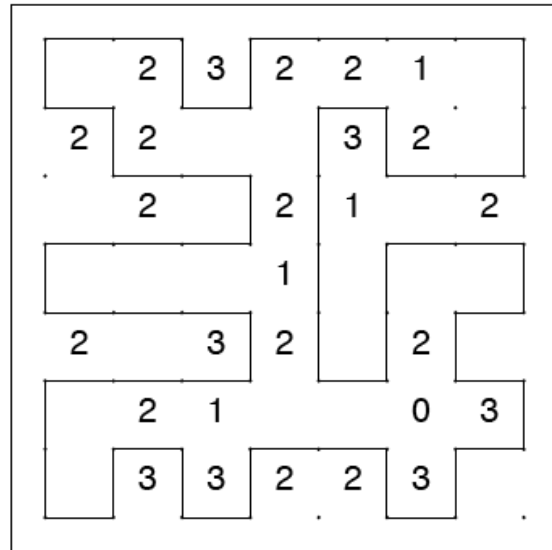
# SLITHERLINK

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

Below is a picture of a starting puzzle grid and its solution.



**Example Slitherlink Puzzle**



**Example Slitherlink Puzzle Solution**

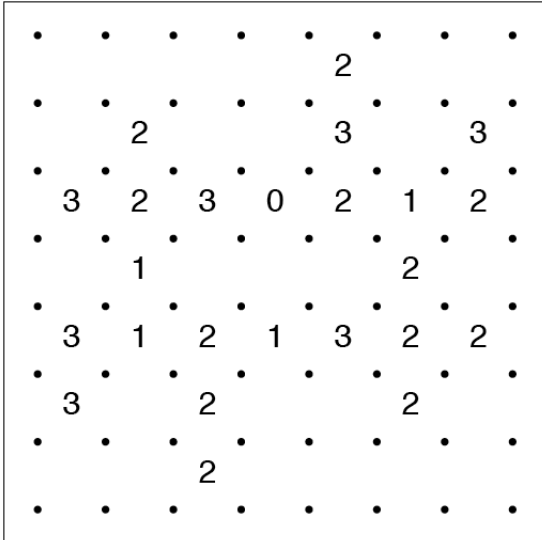
Before you learn about the rules for playing Slitherlink, look at the example puzzle and its solution. What do you think is the goal in solving a Slitherlink puzzle and what are some of the rules for deciding how to find the solution? Work with a partner and write down your observations and your ideas about the goal and the rules for Slitherlink puzzles.



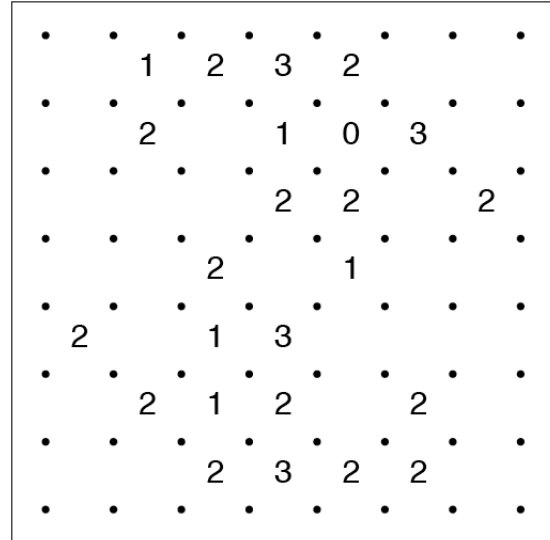
## Slitherlink

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

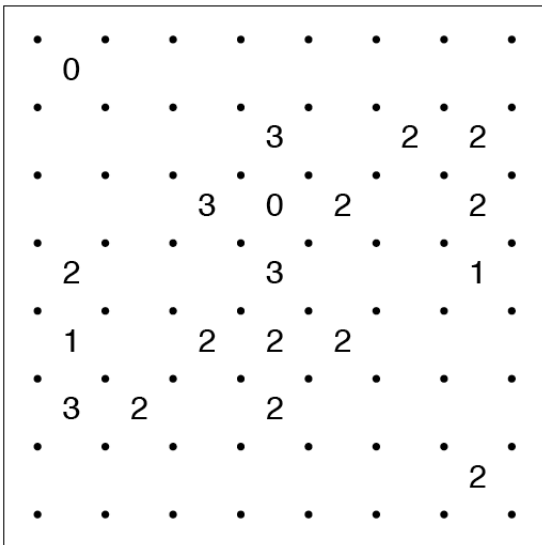
- The loop may not cross itself
- Each number in the grid indicates the number of sides of the square around the number that are used in the loop
- Empty cells in the grid can be surrounded by any number of lines



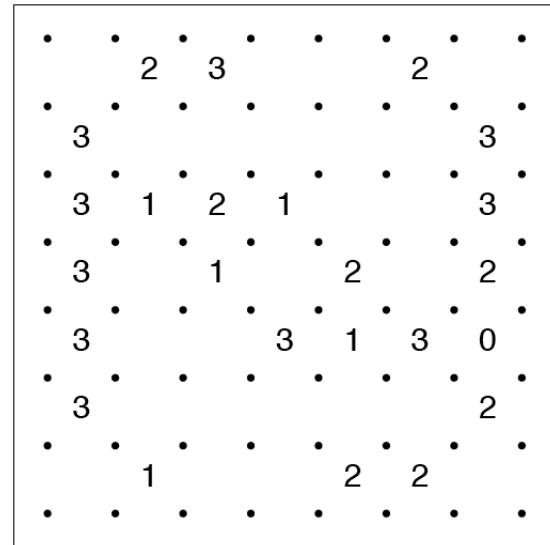
**Slitherlink Puzzle 1**



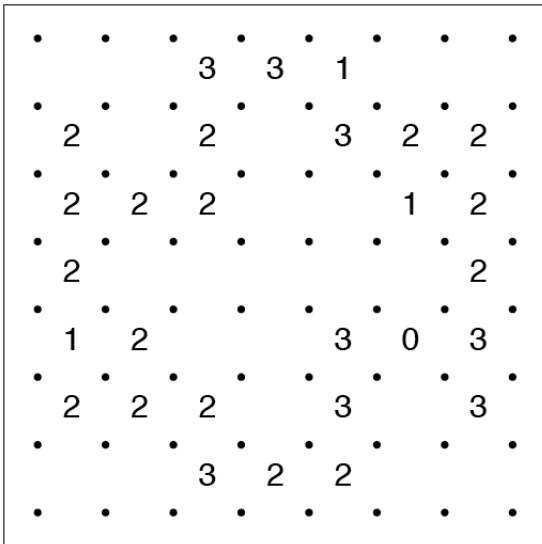
**Slitherlink Puzzle 2**



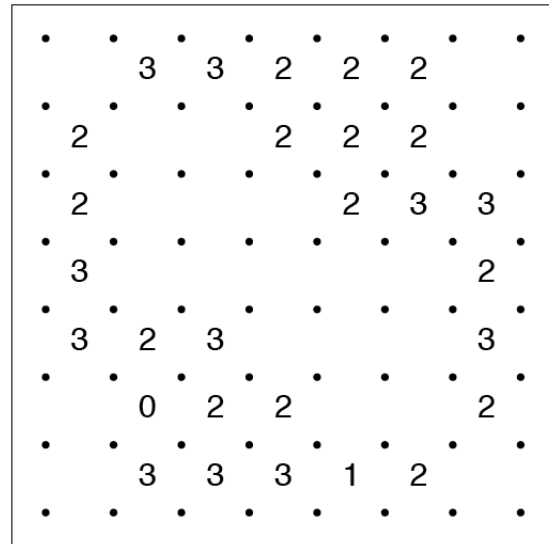
**Slitherlink Puzzle 3**



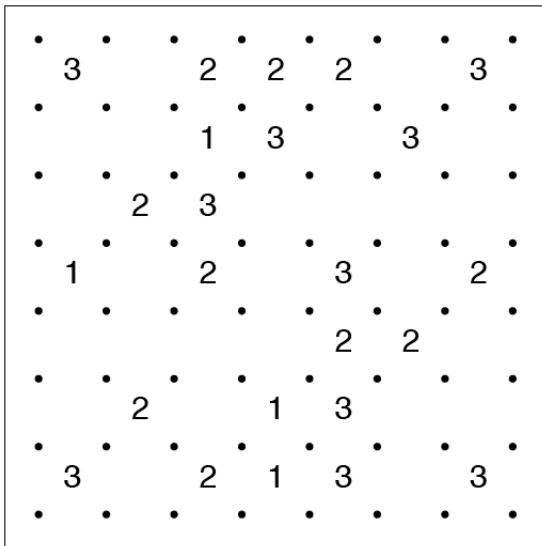
**Slitherlink Puzzle 4**



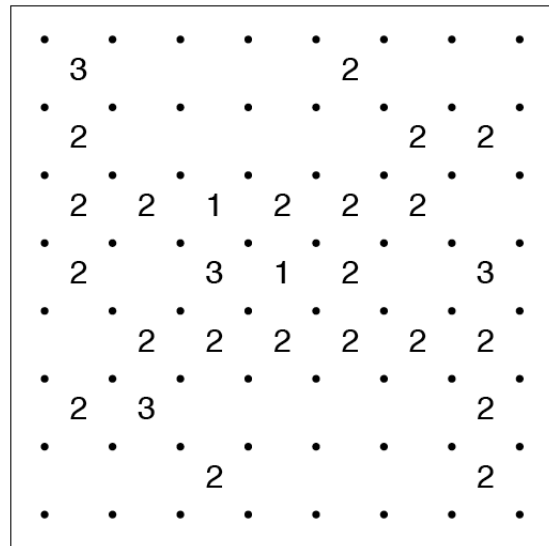
**Slitherlink Puzzle 5**



**Slitherlink Puzzle 6**



**Slitherlink Puzzle 7**



**Slitherlink Puzzle 8**

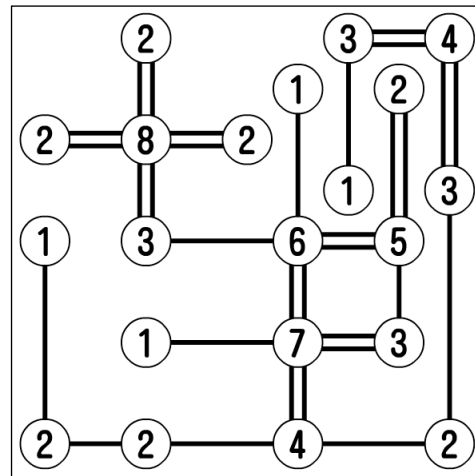
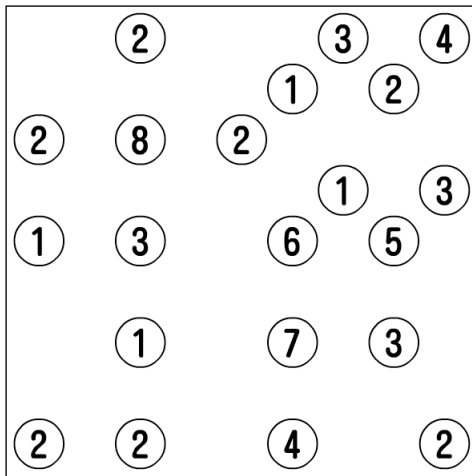
**Resources:**

- [www.krazydad.com/slitherlink](http://www.krazydad.com/slitherlink) – hundreds of standard Slitherlink puzzles that must be printed out ranked easy to tough, from 7x7 to 20x20, and hundreds of variations with different kinds of grids. The Slitherlink examples used in this presentation and in this handout are from KrazyDad.
- [www.nikoli.com](http://www.nikoli.com) – website of Nikoli (the Japanese puzzle magazine that invented Slitherlink) which includes ten sample hand-made Akari puzzles that can be solved online. The smallest puzzles are 10x10 and may not be the best place to begin exploring Slitherlink.

# 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.

Below is a picture of a starting puzzle grid and its solution.



**Example Hashiwokakero Puzzle**

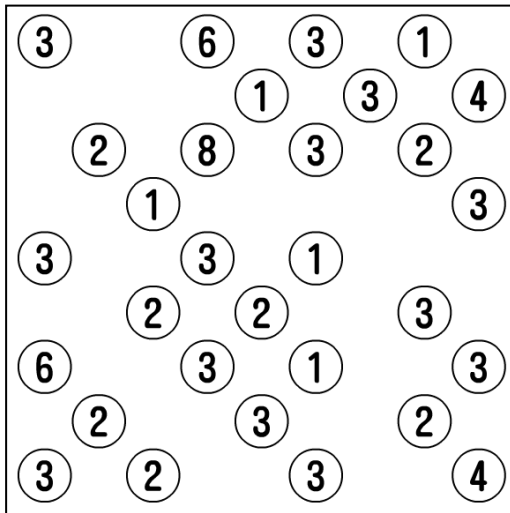
**Example Hashiwokakero Puzzle Solution**

Before you learn about the rules for playing Hashiwokakero, look at the example puzzle and its solution. What do you think is the goal in solving a Hashiwokakero puzzle and what are some of the rules for deciding how to find the solution? Work with a partner and write down your observations and your ideas about the goal and the rules for Hashiwokakero puzzles.

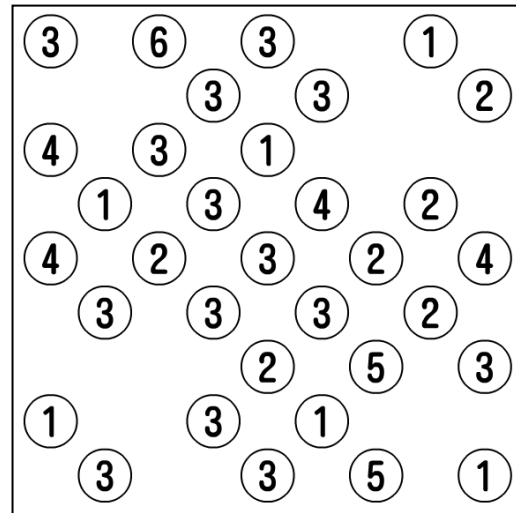
## Hashiwokakero

The goal 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. The bridges must follow these criteria:

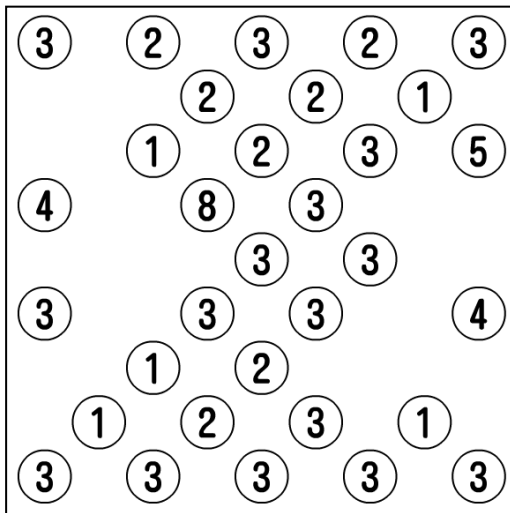
- The bridges must begin and end at islands, traveling in a straight line (horizontally or vertically)
- The bridges must not cross any other bridges or islands
- No more than two bridges can connect a pair of islands
- The total number of bridges connected to each island must match the number on that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



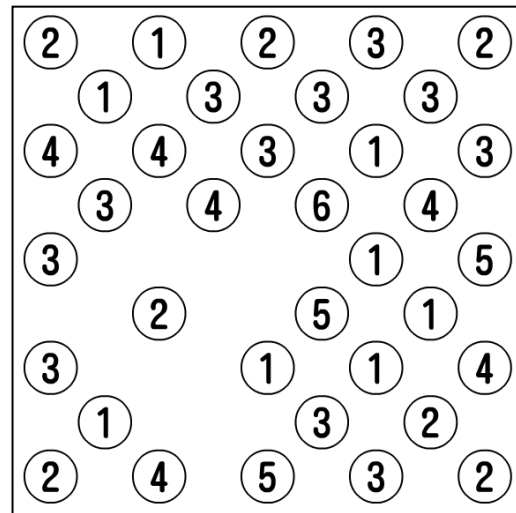
Hashiwokakero Puzzle 1



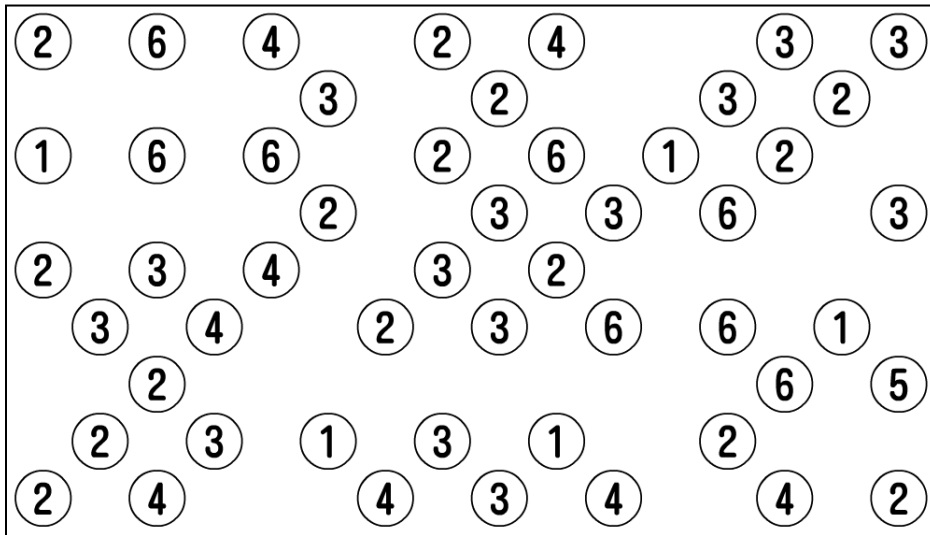
Hashiwokakero Puzzle 2



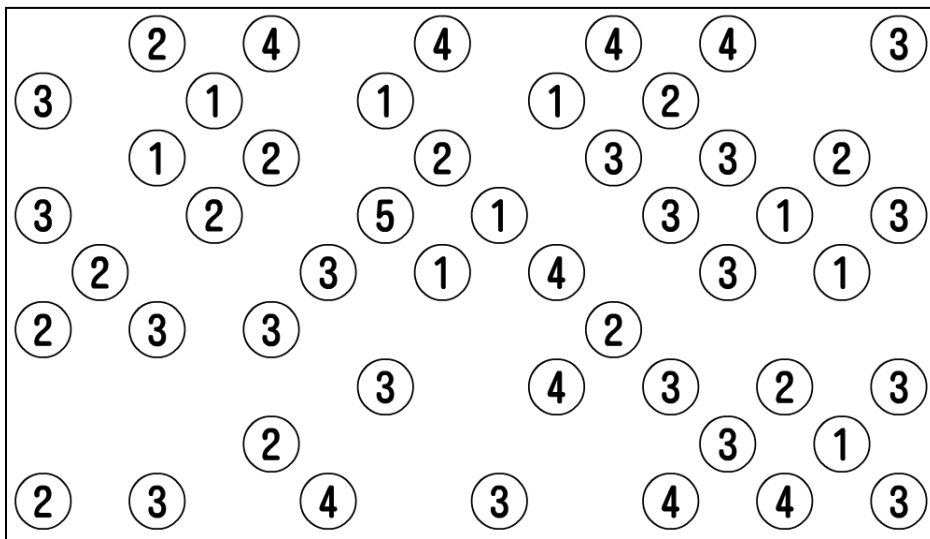
Hashiwokakero Puzzle 3



Hashiwokakero Puzzle 4



**Hashiwokakero Puzzle 5**



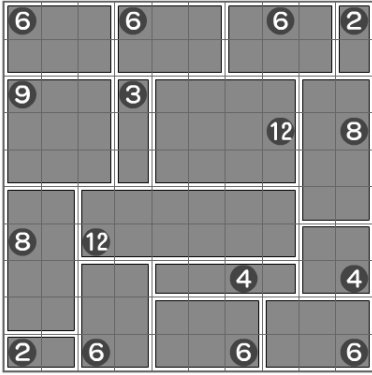
**Hashiwokakero Puzzle 6**

**Resources:**

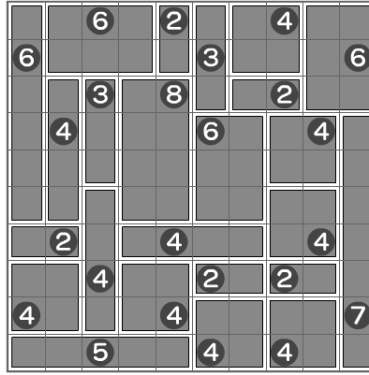
- [www.nikoli.com](http://www.nikoli.com) – website of Nikoli (the Japanese puzzle magazine that invented Hashiwokakero) which includes ten sample hand-made Hashiwokakero puzzles that can be solved online. The Hashiwokakero examples used in this presentation and in this handout are from Nikoli.
- [www.puzzle-bridges.com](http://www.puzzle-bridges.com) – millions of computer-generated Hashiwokakero puzzles that can also be printed out to solve on paper

# SOLUTIONS

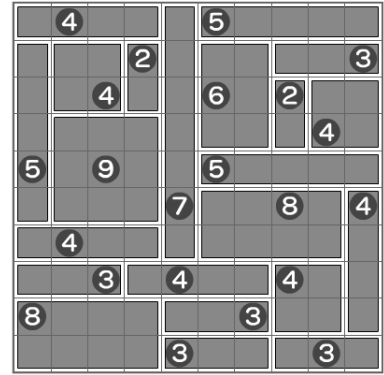
## Shikaku



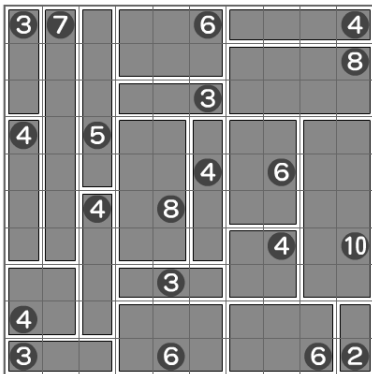
**Shikaku Puzzle 1**



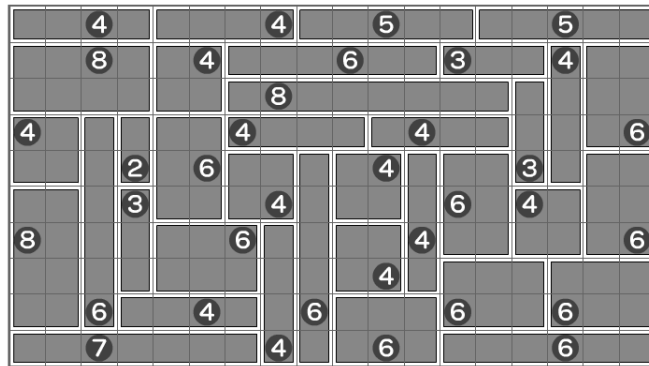
**Shikaku Puzzle 2**



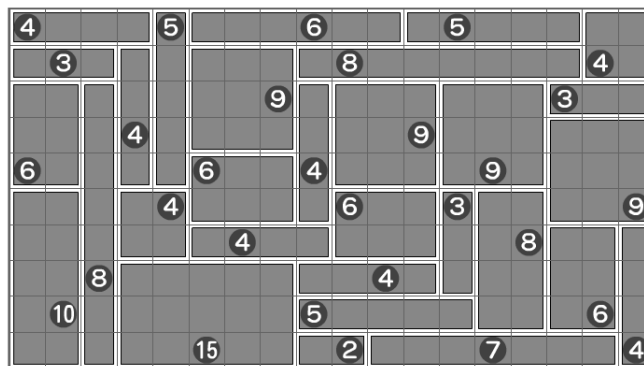
**Shikaku Puzzle 3**



**Shikaku Puzzle 4**



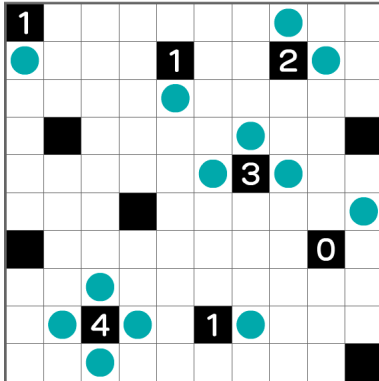
**Shikaku Puzzle 5**



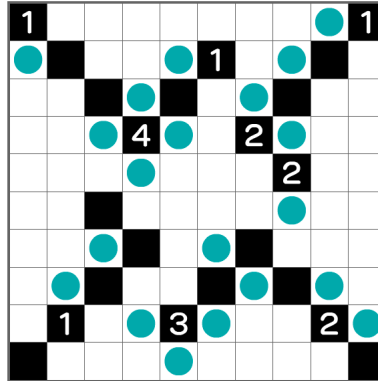
**Shikaku Puzzle 6**

# SOLUTIONS

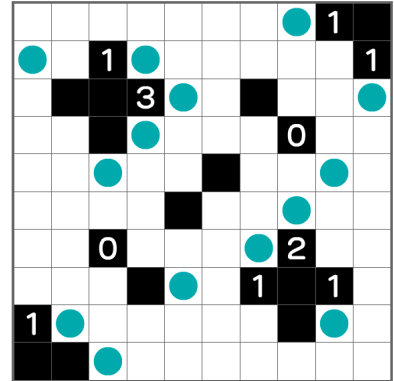
## Akari



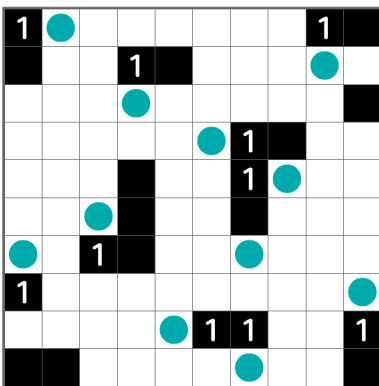
Akari Puzzle 1



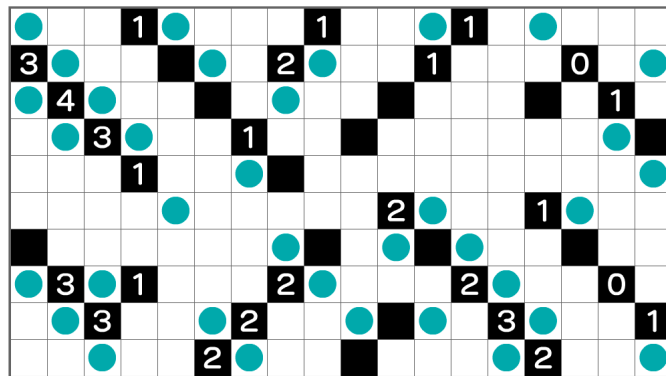
Akari Puzzle 2



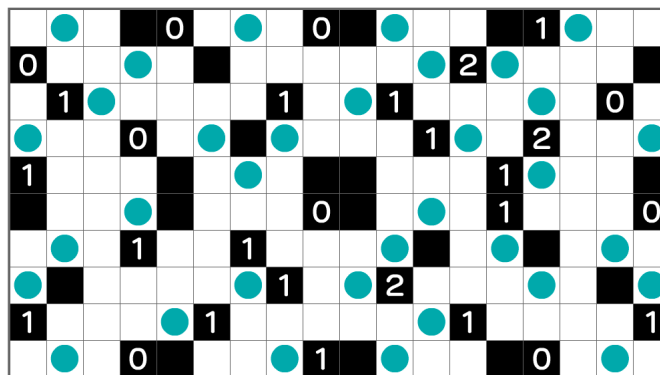
Akari Puzzle 3



Akari Puzzle 4



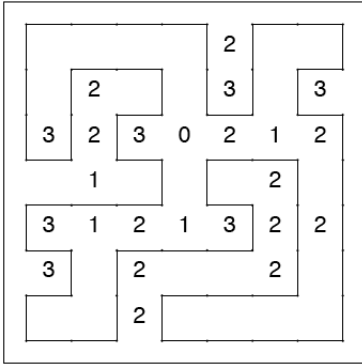
Akari Puzzle 5



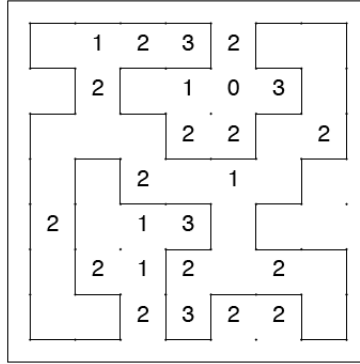
Akari Puzzle 6

# SOLUTIONS

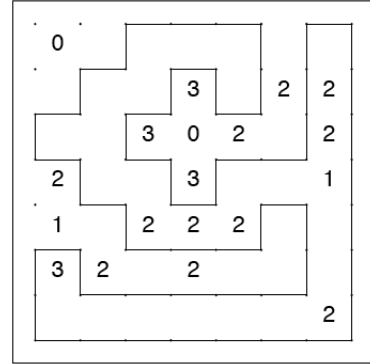
## Slitherlink



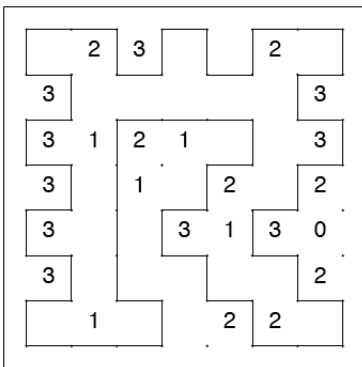
**Slitherlink Puzzle 1**



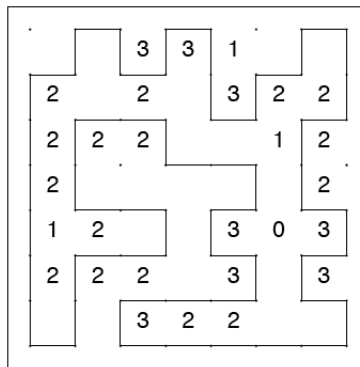
**Slitherlink Puzzle 2**



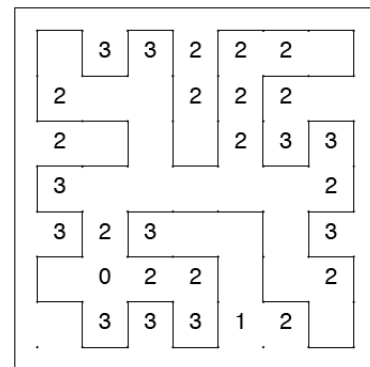
**Slitherlink Puzzle 3**



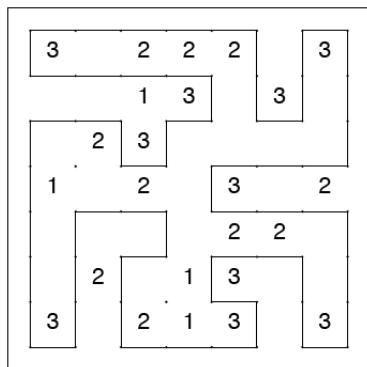
**Slitherlink Puzzle 4**



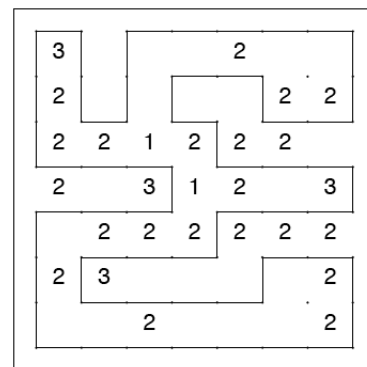
**Slitherlink Puzzle 5**



**Slitherlink Puzzle 6**



**Slitherlink Puzzle 7**

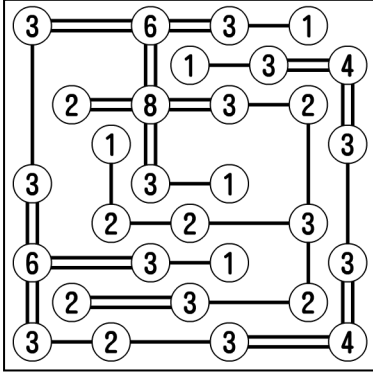


**Slitherlink Puzzle 8**

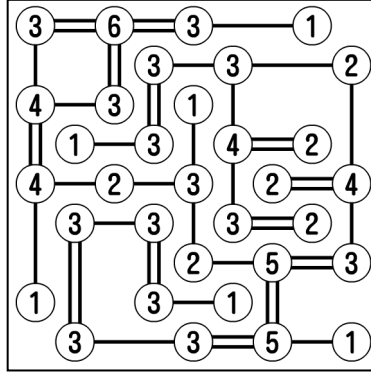


# SOLUTIONS

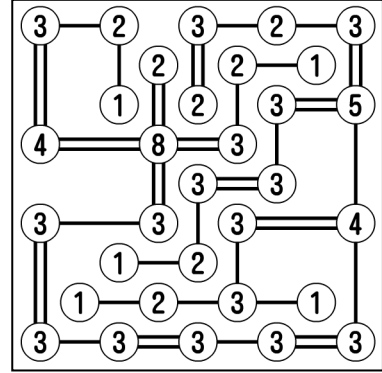
## Hashiwokakero



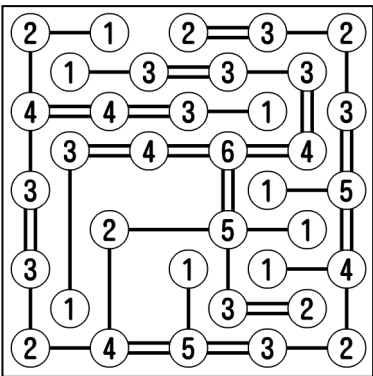
Hashiwokakero Puzzle 1



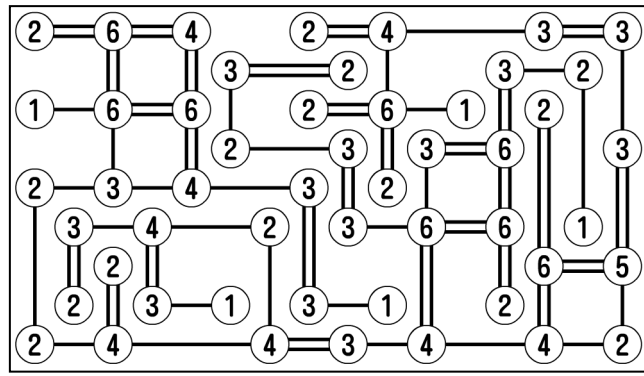
Hashiwokakero Puzzle 2



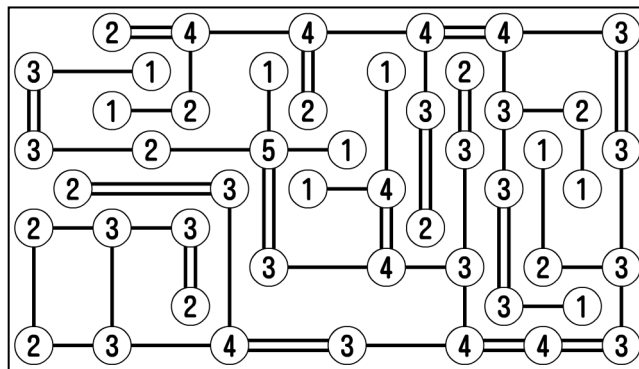
Hashiwokakero Puzzle 3



Hashiwokakero Puzzle 4



Hashiwokakero Puzzle 5



Hashiwokakero Puzzle 6