DIGITAL SCHOOLHOUSE together with NINTENDO SWITCH

Digital Schoolhouse Puzzle Page

"If I had an hour to solve a problem I'd spend 55 minutes thinking about the problem and 5 minutes thinking about solutions"

Albert Einstein

Welcome to the Digital Schoolhouse Puzzle Page

On this paper, we will investigate a series of puzzles that can be used to promote Computational Thinking. This month we will investigate Santa's Glove Selection conundrum.

Mrs Claus and the Three Jugs

Mrs Claus is making a large cake for the elves and requires exactly 4 pints of water. She has an 8-pint jug full of water and two empty jugs of 3-pint and 5-pint capacity. How can she get exactly 4 pints of water in one of the jugs by completely filling up and/or emptying jugs into the other.

Answer:

This puzzle can be solved in six steps as shown below:

Step	8-pint jug	5-pint jug	3-pint jug
	8	0	0
1	3	5	0
2	3	2	3
3	6	2	0
4	6	0	2
5	1	5	2
6	1	4	3

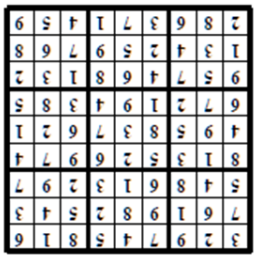
An alternative solution is to use a queue data structure, in which items are removed from the front of the queue and added to the rear of the queue. In this solution, a queue is initialised with the given triple state of 008 representing the state of each jug respectfully. Then for the state at the front of the queue, label all the new states reachable from it, add them to the end of the queue, and then delete the front state from the queue. Repeat this process until the desired state is reached, i.e. a triple containing a 4.

One solution is: 008 ⇨ 053 ⇨ 323 ⇨ 026 ⇨ 206 ⇨251 ⇨ 341

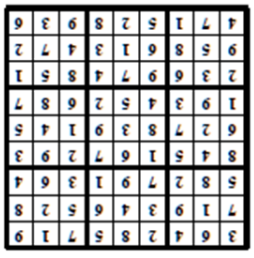
Linkage to Computer Science

Although a solution can be found by trial and error, this puzzle can lead into a discussion abut a queue—one of the basic data structures in computing. Another solution mimics the breadth-first traversal of the puzzle's state-space graph.

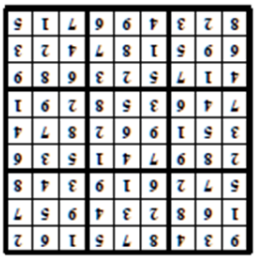
Solutions



Puzzle 24: (Hard, difficulty rating 0.61)



Puzzle 23 (Medium, difficulty rating 0.45)



Puzzle 22: (Easy, difficulty rating 043)

Puzzle 22: Easy

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

Puzzle 23: Medium

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

Puzzle 24: Hard

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