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 the classic Sudoku puzzle.

What is Sudoku?

The rules of Sudoku are quite simple: finish filing in the squares (cells) of a 9×9 grid so that the digits 1-9 appear exactly one in each of the nine rows, columns, and 3×3 blocks. Puzzles are designed so there is only one correct way to fill in the 81 one squares, and they tend to be hard enough to be satisfying, but not too easy and certainly not impossible to solve!

There are many Sudoku variants, for examples smaller versions of the game exists: 4×4 and 6×6.

How many solved Sudoku boards are there?

In May 2005, Felgenhaur and Jarvis counted the number of solved Sudoku boards and concluded that there are exactly 6,670,752,021,072,936,960 solved boards. These thousands of billions of billions are so large that it would be difficult to use a supercomputer to enumerate these boards. The only way to count them all is to understand the symmetries (patterns) of the game.

How does a Sudoku puzzle promote Computational Thinking?

Sudoku promotes algorithmic thinking and pattern recognition so that you can think clearly and approach problem solving in a methodical manner. For example, one approach is the **"Forced" Cell** approach. This approach considers a cell to be fixed. By eliminating all possibilities of other numbers in the same column, row and subgrid, you can see whether only one possibility remains.

Further Information

Jean-Paul Delahaye has written a short booklet: *The Science behind Sudoku,* which explains the history and science behind the Sudoku puzzle. It can be downloaded from: https://www.cs.utexas.edu/~kuipers/readings/Sudoku-sciam-06.pdf.

Soren Riis of Queens Mary, University of London (http://www.cs4fn.org/games/sudokusatellite.php) writes about how satellites can use Sudoku puzzles to communicate .

Solutions

Puzzle 1 (Easy, difficulty rating 0.25), Puzzle 2 (Medium, difficulty rating 0.54), Puzzle 3 (Hard, difficulty rating 0.60)

Puzzle 1: Easy

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

Puzzle 2: Medium

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

Puzzle 3: Hard

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