

# 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 Dining Table.

### Dining Table

How many ways are there to seat four people around a circular table, where two seatings are considered the same when each person has the same left and right neighbours?

#### Answer:

Number the seats around the table from 1 to 4 proceeding clockwise.

There are four ways to select the person for seat 1, 3 for seat 2, 2 for seat 3 and one way for seat 4. Thus there are  $4! (4 \times 3 \times 2 \times 1) = 24$  ways to order the four people. However, since two seatings are the same when each person has the same left and right neighbours, for each choice for seat 1, we have the same seating.

Therefore, using the Division Rule, there are  $24/4 = 6$  different seating arrangements.

### Linkage to Computer Science

This puzzle is an example of combinatorics, which is the study of the arrangement of objects. This field has an important part to play in computer science for example, it is used to determine the complexity of algorithms and determine whether there are enough Internet Protocol (IP) addresses to meet demand.

### Solutions

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

Puzzle 45: (Hard, difficulty rating 0.61)

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

Puzzle 44: (Medium, difficulty rating 0.54)

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

Puzzle 43: (Easy, difficulty rating 0.43)

### Puzzle 43: Easy

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

### Puzzle 44: Medium

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

### Puzzle 45: Hard

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