

## Instruction booklet for the qualifying round of Logic Masters 2009

*On Saturday, May 9, the official contest file will be available for download. Make sure you have read and understood the rules of the contest.*

Welcome to the qualification round for the Logic Masters 2009!

We hope you enjoy the competition, regardless of whether you compete seriously or just for fun.

The contest will consist of 20 puzzles, some of them being extremely difficult. We believe nobody will be able to solve all of them in time. Solve those puzzles you can solve and skip the others; if you have time left, you can always come back to them.

The points for the puzzles have been assigned according to their difficulty. You may use these information to decide, which puzzles to try first. However, keep in mind your estimation of a puzzle's difficulty may differ from ours.

We wish you good luck, enjoy the puzzles!

### **Last minute changes:**

If there are any changes or clarifications, they will be announced in our forum at <http://forum.logic-masters.de/showthread.php?tid=382>

### **Remember:**

- Wrong answers will yield a penalty of 5 points (exception: puzzle 20). Be careful when entering your answer keys.
- Enter the answer keys you already have, to avoid time trouble at the end of the test. Remember, late answers will yield a penalty of 1 points per 8 seconds.
- You are solely responsible for sending your answers in time.
- You must solve the qualification puzzles without outside help. Computer programs, Sudoku solvers or similar are not allowed.

### **Answer key:**

Please try to obey the following guidelines when entering your answer keys:

- If not specified differently, enter your solution from top to bottom.
- For clarity's sake, you may use commas and spaces in your answer keys; they have no bearing on the correctness of your solutions.
- The solution form does not distinguish between capital and lower case letters.

## Instructions

The following instructions come directly from the contest file; only the diagrams have been removed. Instead of them, small examples are shown. These examples can not be found in the test file. You should read and understand the instructions and examples before the test.

---

### 1 Easy as ABC

10 points

Place letters A, B, C, D into the grid, so that in each row and column, each letter appears exactly once; two squares remain empty in each row and column. The letters outside the grid indicate, which letter comes first in the respective row or column.

Example (with letters A, B, C):



**Answer key:** Enter the letters in the marked rows from left to right. Use '-' for empty squares.

For the example, the answer key would be: CB-A, ACB-

---

### 2 Masyu

10 points

Draw a closed loop into the grid, which runs only horizontally and vertically and passes through all squares containing a circle. In squares with a black circle, the loop must take a turn, and it must go straight through the next square in both directions. In squares with a white circle, the loop must go straight and it must take a turn in the next square in at least one direction.

Example:



**Answer key:** For each row from top to bottom, enter the number of squares not used by the loop.

For the example, the answer key would be: 23211

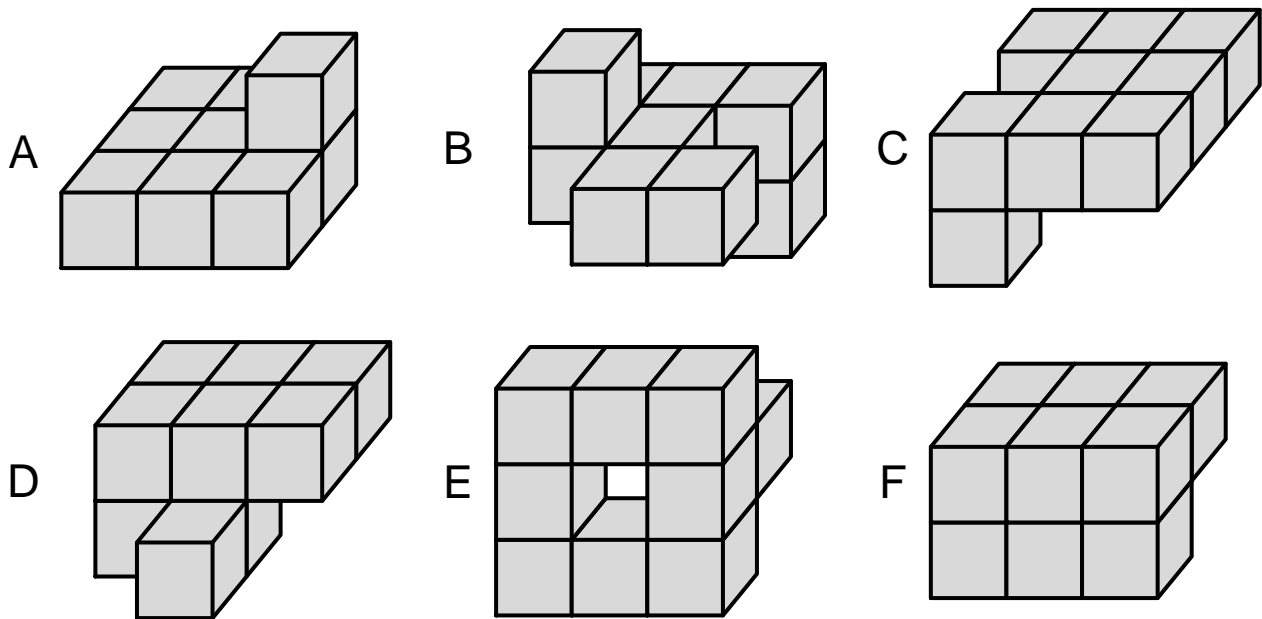
### 3 Cubes

15 points

Build two cubes of size  $3 \times 3 \times 3$  from the given blocks; each block will be used exactly once. The blocks may be rotated in any direction, but not mirrored.

There are no hidden cubes; each block consists of nine cubes, all of them being (at least partially) visible.

**Example:**



**Answer key:** Enter the code letters of the blocks belonging together.

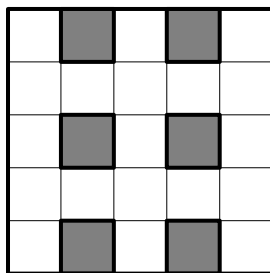
*For the example, the answer key would be: ABC, DEF*

### 4 Crossword

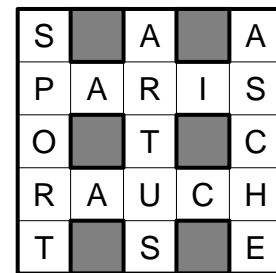
15 points

Place 15 out of 16 given words into the grid, either horizontally from left to right or vertically from top to bottom. One word will remain; which one is for you to find out.

**Beispiel:**



ARTUS  
ASCHE  
ATLAS  
PARIS  
RAUCH  
SPORT



**Answer key:** Enter the unused word.

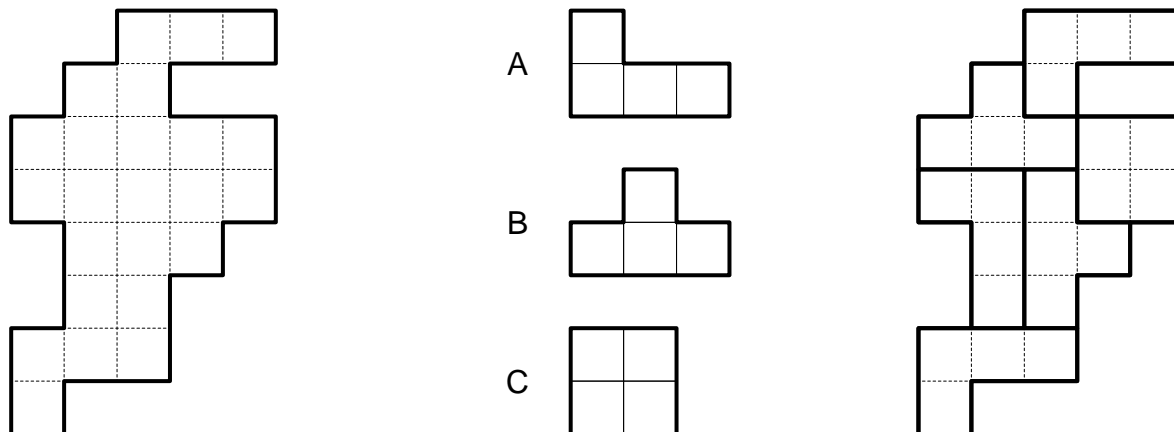
*For the example, the answer key would be: ATLAS*

## 5 Dissection

15 points

Divide the grid into copies of the three given pieces; each copy may be rotated and reflected.

**Example:**



**Answer key:** For the pieces A, B, C, enter the number of copies that are needed in the dissection.

*For the example, the answer key would be: 321*

## 6 Railroads

20 points

Draw a closed loop into the diagram, which runs only horizontally and vertically and passes through every square. The loop must cross itself at the marked spots, and only there. The „stations“, indicated by digits, must be passed through in the order 1-2-3-4-5-6-7-8-9-10-11-1-, and the loop may not take a turn in any station.

*For solving purposes, ignore the letters at the crossings.*

**Example (with stations from 1 to 4):**



**Answer key:** Start at station 1 and go towards station 2, until you arrive at station 1 again. Enter the letters assigned to the crossings in the order you pass through them.

*For the example, the answer key would be: BAAB*

## 7 Magic R

20 points

Place the given words into the grid, either horizontally from left to right or vertically from top to bottom, so that they do not touch each other, not even diagonally. The letter 'R' must appear exactly once in each row and column. Some letters are already given.

Beispiel:

		D					
							G
	T						
		M				A	
			T				

ARM  
ART  
GAR  
IRE  
RAD  
ROT  
TOR  
ZAR

(R)	A	D			I		
					(R)		G
	T	O	(R)		E		A
							(R)
				(R)			
A	(R)	M		O		A	
				T		(R)	
Z	A	(R)				T	

**Answer key:** Enter the initial letters of all horizontal words from top to bottom, followed by the initial letters of all vertical words from left to right.

For the example, the answer key would be: RTAZ, RIAG

## 8 Masterword

20 points

A five letter word must be identified.

Using several other words, some clues are given as follows: white digits in a black square indicate how many letters are already in the correct position; black digits in a white square indicate how many letters appear in the solution word, but in a different position.

Example:

A	T	E	M
P	I	L	Z
P	I	S	A
Z	A	H	M

0	2
2	0
0	1
1	2

A	T	E	M
P	I	L	Z
P	I	S	A
Z	A	H	M

0	2
2	0
0	1
1	2

?	?	?	?

4	0
---	---

?	?	?	?
M	A	L	Z

4	0
---	---

**Answer key:** Enter the solution word.

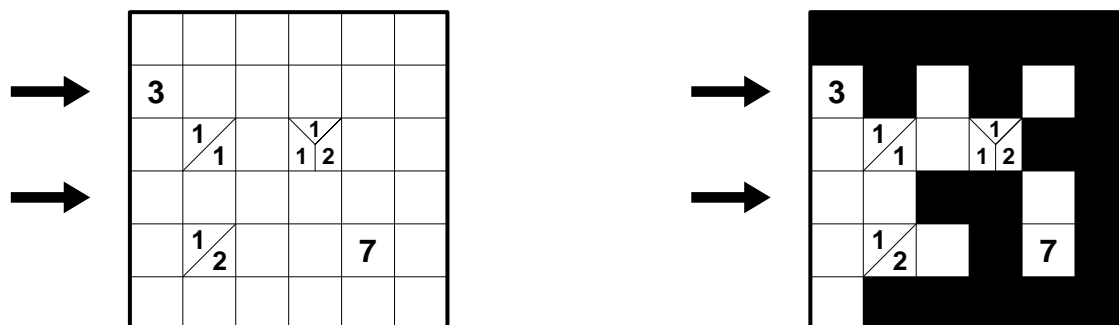
For the example, the answer key would be: MALZ

## 9 Tapa

25 points

Blacken some empty squares, so that all black squares are connected horizontally and vertically. No  $2 \times 2$  area may be completely black, and squares containing numbers may not be blackened at all. The numbers indicate how many of the horizontally, vertically and diagonally adjacent squares are black: each number corresponds to a group of horizontally and vertically continuous black squares, several groups are separated by one or more white squares. Position and order of the numbers within a square are irrelevant.

**Example:**



**Answer key:** Enter the content of the marked rows from left to right. Use 'W' for white and 'B' for black squares. Squares containing numbers are counted as white squares.

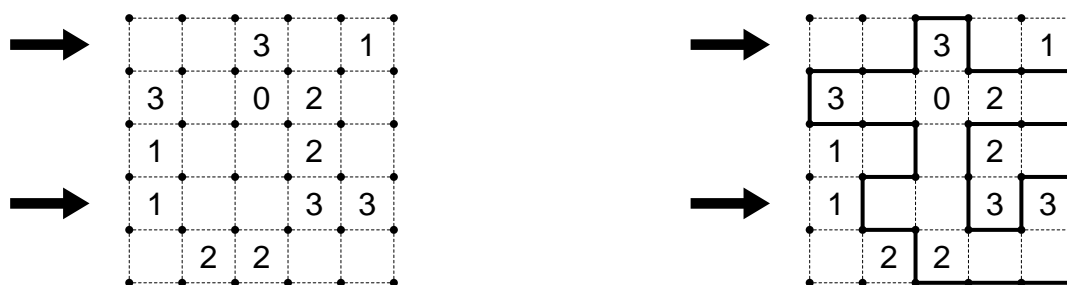
*For the example, the answer key would be: WBWBWB, WWBBWB*

## 10 Slither Link

25 points

Draw a single continuous loop by connecting neighboring dots along the dotted lines. The numbers indicate how many edges of a square are used for the loop. The loop may not touch or cross itself, and it doesn't need to touch all of the dots.

**Example:**



**Answer key:** For the marked rows, enter from left to right whether each square lies inside or outside the loop. Use 'I' for squares inside, 'O' for squares outside the loop.

*For the example, the answer key would be: OOIOO, OIIOI*

# 11 Guards

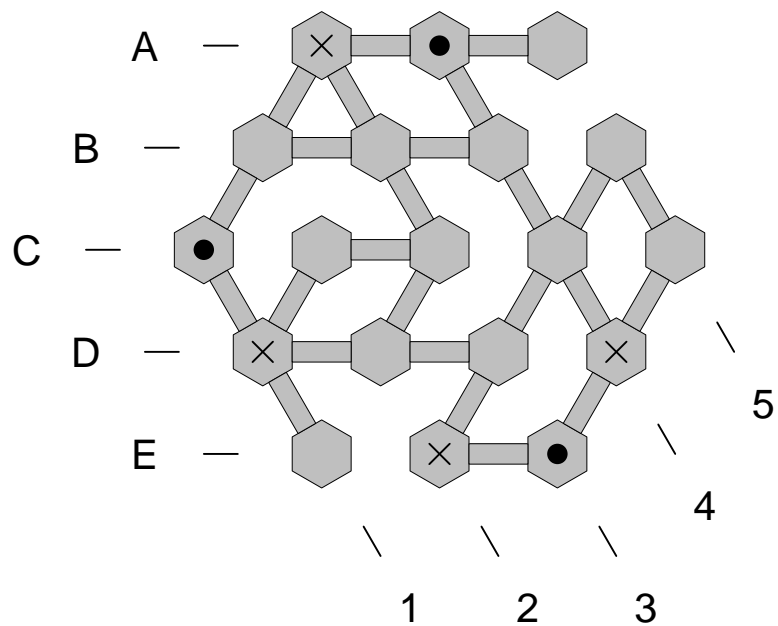
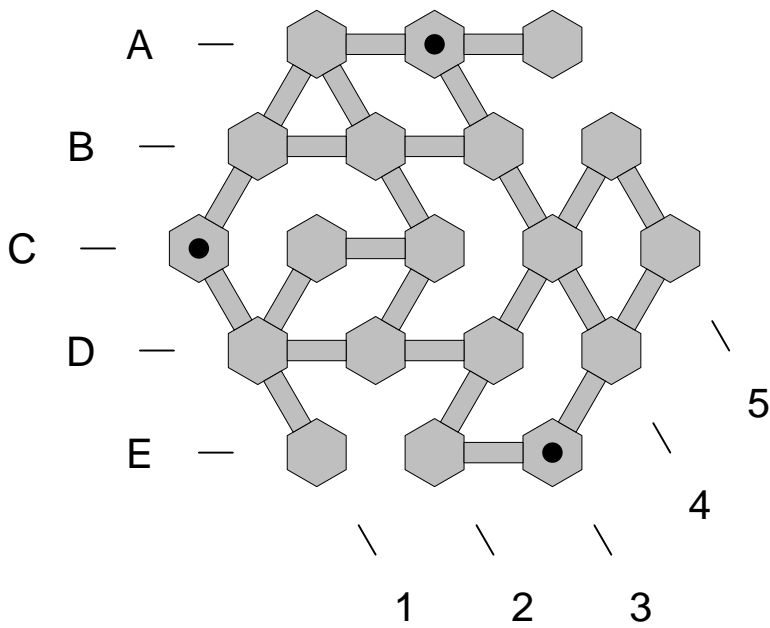
25 points

The picture shows a museum with hexagonal rooms and hallways between them. Place six guards in the museum who can watch all the rooms; each guard is able to watch over any distance along the hallways.

Note: Only the rooms itself must be watched, not necessarily all the hallways.

The rooms marked with a black circle contain especially precious exhibits. Each of these rooms must be watched by two or more guards from different directions. However, no guard may be placed in these rooms itself.

**Example (with four guards only):**



**Answer key:** Enter the coordinates of the six guards in alphabetical order.

For the example, the answer key would be: A3D1D4E2

## 12 Kakuro variation

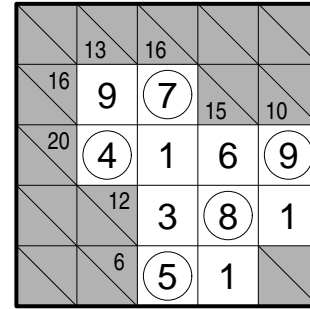
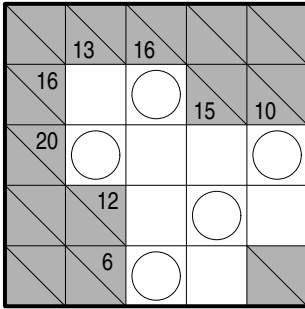
30 points

Enter digits from 1 to 9 into the white squares. The numbers in white squares indicate the sum of digits in the corresponding „word“. In each word, no digit may repeat.

Additionally, the following condition must hold: No „word“ may contain two consecutive digits.

Some squares are marked with circles. These circles label the squares needed for the answer key and have no meaning for the puzzle itself.

**Example:**



**Answer key:** From top to bottom, enter the digits in the squares marked with circles.

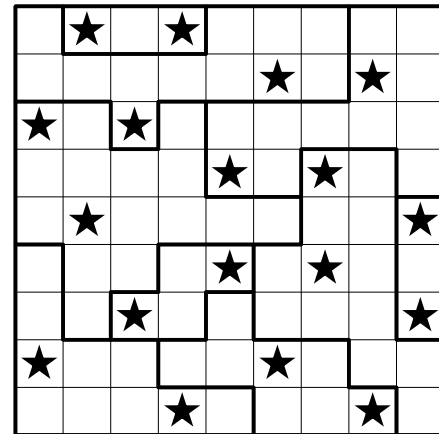
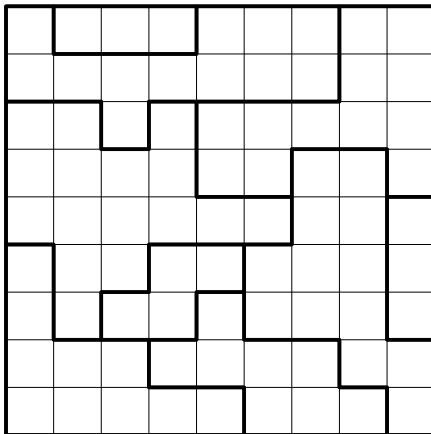
For the example, the answer key would be: 74985

## 13 Star battle

30 points

Place stars into the diagram, such that each row, each column and each outlined area contains exactly two stars. The stars have the size of one square each and may not touch each other, not even diagonally.

**Example:**



**Answer key:** From top to bottom, enter for each row the number of empty squares between the two stars (do not count the squares containing stars itself).

For the example, the answer key would be: 111161543

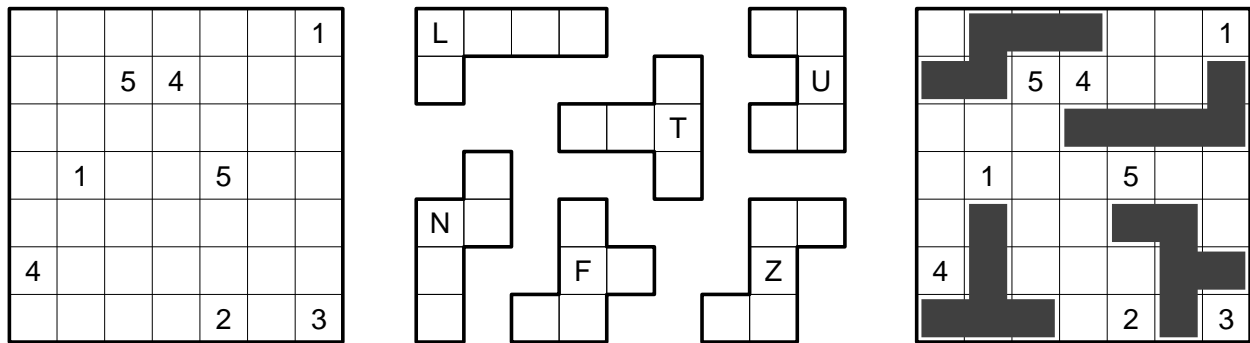


## 14 Pentomino Minesweeper

30 points

Place nine of the twelve pentominoes into the grid, so that they do not touch each other, not even diagonally. The numbers indicate – as in a Minesweeper puzzle – how many of the horizontally, vertically and diagonally adjacent squares are occupied by a pentomino. Pentominoes may not be placed on squares with numbers. All pentominoes may be rotated and reflected.

**Example (six pentominoes given, four of them being used):**



**Answer key:** Enter the letters assigned to the three missing pentominoes.

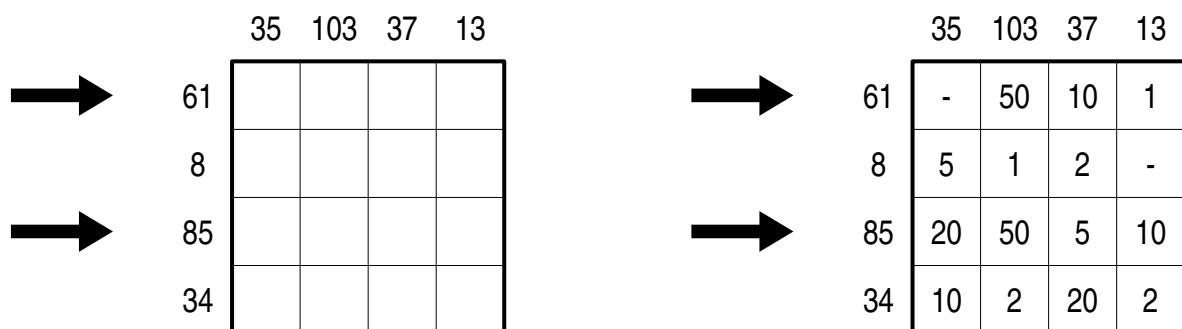
*For the example, the answer key would be: UZ*

## 15 Coin square

35 points

Place coins of values 1, 2, 5, 10, 20, 50 cent into the grid; each kind of coin may be used as often as required. No square contains more than one coin, but some squares may remain empty. Two coins of same value may not touch each other, not even diagonally; however, empty squares may touch each other. The numbers outside the grid indicate the total value of all coins in the respective row or column.

**Example:**



**Answer key:** Enter the content of the marked rows from left to right. Use '-' for empty squares.

*For the example, the answer key would be: -50101, 2050510*

# 16 Route

35 points

Blacken some empty squares, so that each arrow points to the corresponding number of black squares. Black squares may not be horizontally or vertically adjacent, but they may touch diagonally. Squares with numbers may not be blackened, and for each black square there must be at least one arrow pointing to it. The black squares must be placed in such a way, that a closed loop may be drawn, going only horizontally and vertically, that passes through all white squares exactly once, except those containing numbers.

**Example:**



**Answer key:** From top to bottom, enter for each row the number of squares the loop passes through straight, without taking a turn.

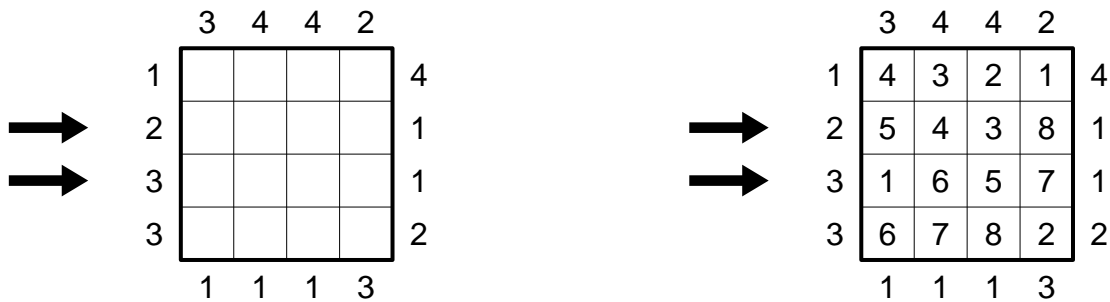
*For the example, the answer key would be: 032021*

# 17 Skyscrapers 9×4

40 points

Place digits from 1 to 9 into the grid, so that each digit is used exactly four times and each row and column contains six different digits. The digits represent skyscrapers of different heights; the numbers outside the grid indicate how many skyscrapers can be seen in the respective row or column from the respective direction. Smaller skyscrapers are hidden behind higher ones.

**Example (with digits from 1 to 8 being used twice):**



**Answer key:** Enter the digits in the marked rows from left to right.

*For the example, the answer key would be: 5438, 1657*

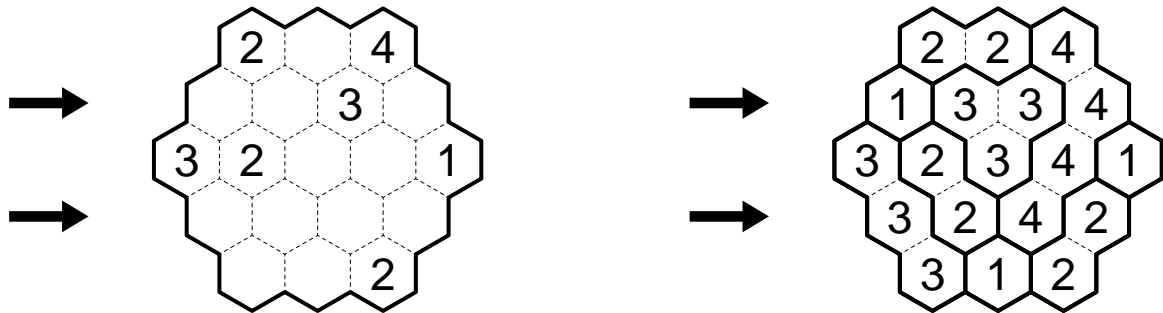
## 18 Hexagonal Fillomino

40 points

Divide the grid into several areas and fill in a number into each cell. Within each area, all numbers must be the same and be equal to the number of cells of that area. Areas of same size may not touch each other.

Given numbers may belong to the same area, and there may be areas from which no number is given at all, even with higher numbers than all the given ones.

**Example:**



**Answer key:** Enter the digits in the marked rows from left to right, including those digits already given.

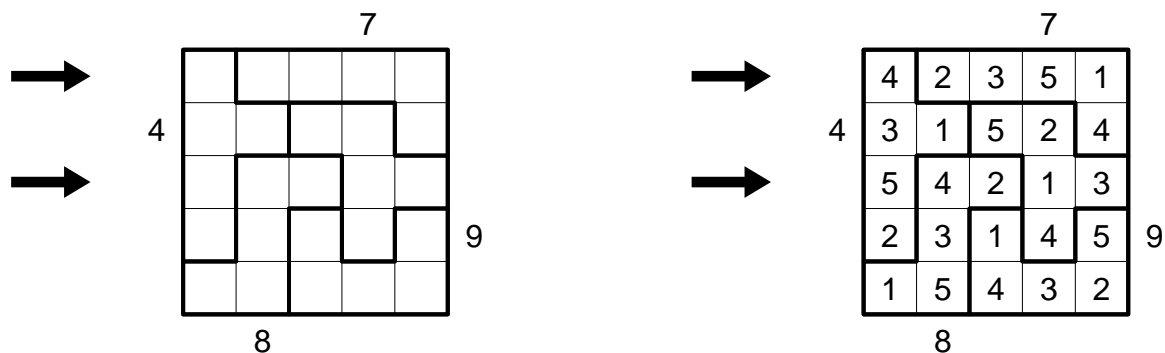
*For the example, the answer key would be: 1334, 3242*

## 19 Outside sums Sudoku

50 points

Place digits from 1 to 9 into the grid, so that each digit appears exactly once in each row, column and outlined area. The numbers outside the grid indicate the sum of the first two digits of the respective row or column.

**Example (with digits from 1 to 5):**



**Answer key:** Enter the digits in the marked rows from left to right.

*For the example, the answer key would be: 42351, 54213*

---

## 20 Twin maze

? / 60 points

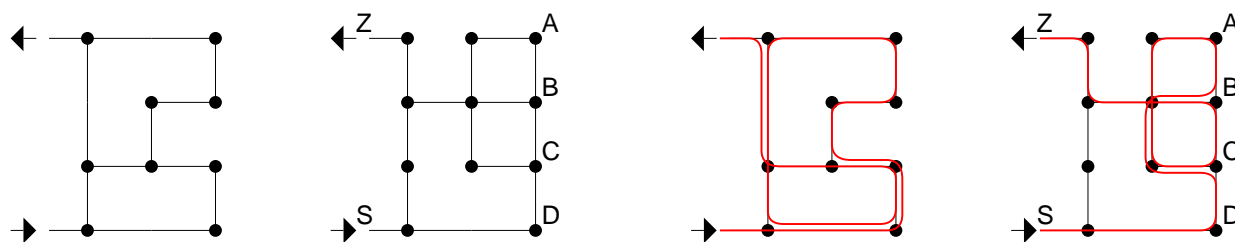
The picture shows two separated mazes, entry and exit indicated by arrows. There is no way to go from one maze to the other.

Your task is to find a way through both mazes simultaneously, according to the following rules:

In each step, go in one of the four directions (right, left, up, down) till the next point. Each step must be performed in both mazes simultaneously; if it is not possible to go in one direction in one maze, it is not allowed to do so in the other. It is not allowed – and of course not necessary – to make a U-turn. All points and lines may be used as often as required.

Both mazes are entered at the same time; find a way to leave both mazes simultaneously. Aside from forbidden U-turns, that way is unique.

**Example:**



3

**Answer key:** Some nodes in the right maze are labeled with letters. Enter the sequence of letters on your path, beginning with S ('Start') and ending with Z ('Ziel' = finish). If you pass through some labeled nodes more than once, the corresponding letter must be entered accordingly.

*For the example, the answer key would be: SDCBACBZ*

**Note:** This puzzle differs from all others in this respect, that it is possible to earn points for an incomplete solution: Each correct letter from start till the first missing or incorrect letter yields 2 points, likewise each correct letter before finish; S and Z itself are not counted here. It is allowed to deliberately enter incomplete solutions; for instance, 'SD-CBZ' as solution of the example puzzle is worth  $3 \times 2 = 6$  points.

Of course, for this puzzle there is no penalty for an incorrect solution.

---

The puzzles were created by the following authors:

- Immanuel Halupczok: Nr. 20
- Florian Kirch: Nr. 9, 10, 13, 18
- Hartmut Seeber: Nr. 8
- Richard Stolk: Nr. 14, 16, 19
- Roland Voigt: Nr. 2, 3, 4, 6, 11, 17
- Ulrich Voigt: Nr. 1, 5, 7, 12, 15