

Logic Masters 2013

Qualification round

Solving time: 2:30 hours

Puzzle authors: Florian Kirch (2, 15, 16), Sebastian Matschke (20), Roland Voigt (11, 14), Ulrich Voigt (1, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 17, 18, 19)

1. Smashed Sums

10 points

Fill the grid with black cells and digits from 1 to 4, so that each row and column contains each digit exactly once as well as two black cells. The numbers outside the grid indicate the sum of the digits between the two black cells in the respective row or column.

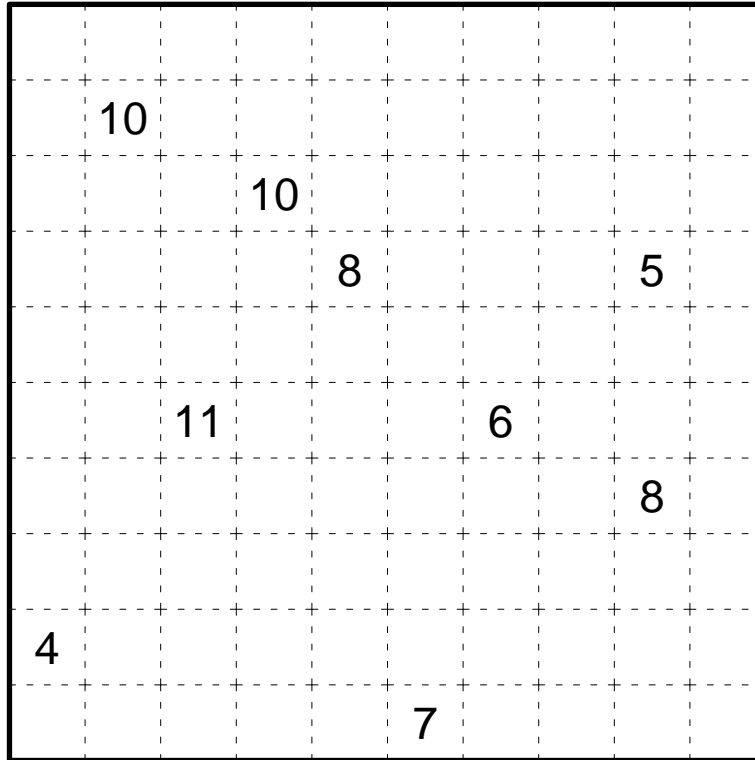
		7	4	10	0	3	8
→	5						
	9						
	2						
	0						
→	6						
	1						

Answer key: Enter the digits in the marked rows from left to right. Use '-' for black cells.

2. Rekuto

10 points

Divide the grid into rectangles, so that each rectangle contains exactly one number that indicates the sum of width and height of the rectangle.

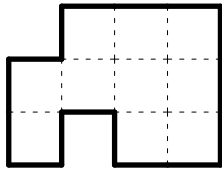


Answer key: For each row from top to bottom, enter the number of rectangles that have at least one cell in that row.

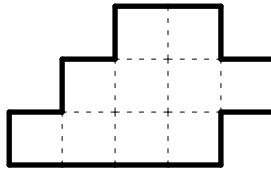
3. Pentomino Pairs

15 points

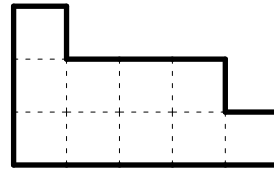
Divide each outlined area into two pentominoes, so that each of the twelve pentominoes is used exactly once.



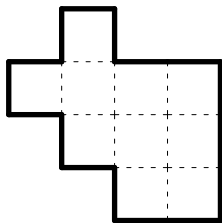
1



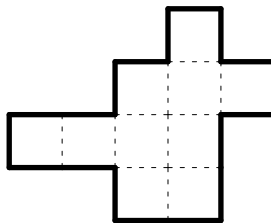
2



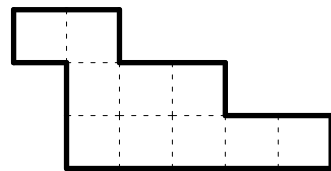
3



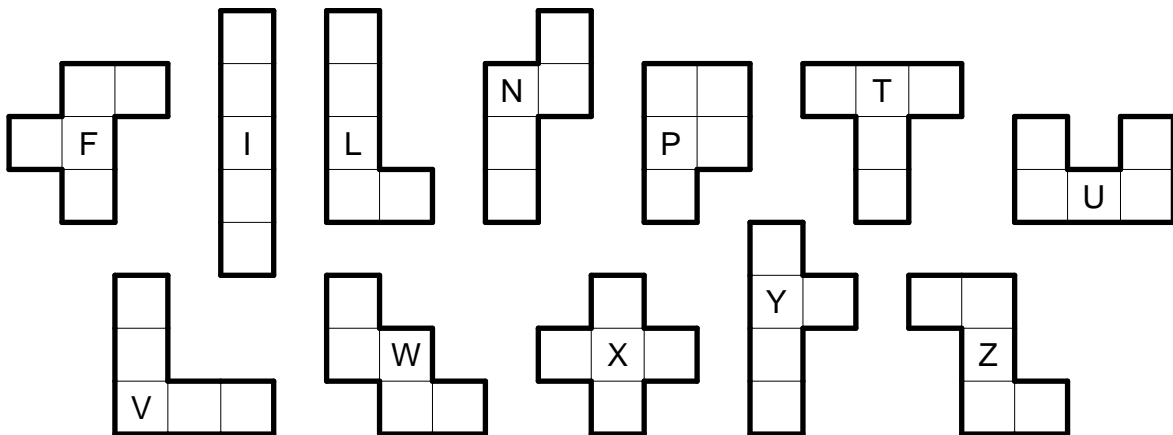
4



5



6

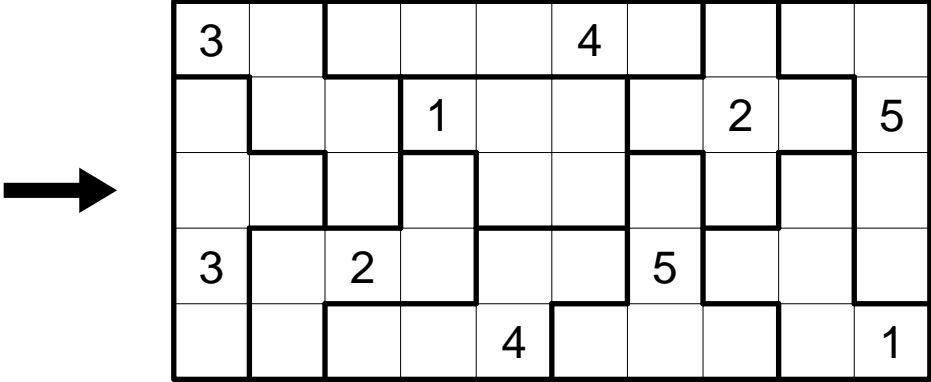


Answer key: For each area (in the order 1, 2, 3, 4, 5, 6), enter the letters of its pentominoes.

4. Capsules

15 points

Place digits from 1 to 5 into the grid, so that each outlined area contains each digit exactly once. Same digits must not touch each other, not even diagonally.



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

5. Transporter

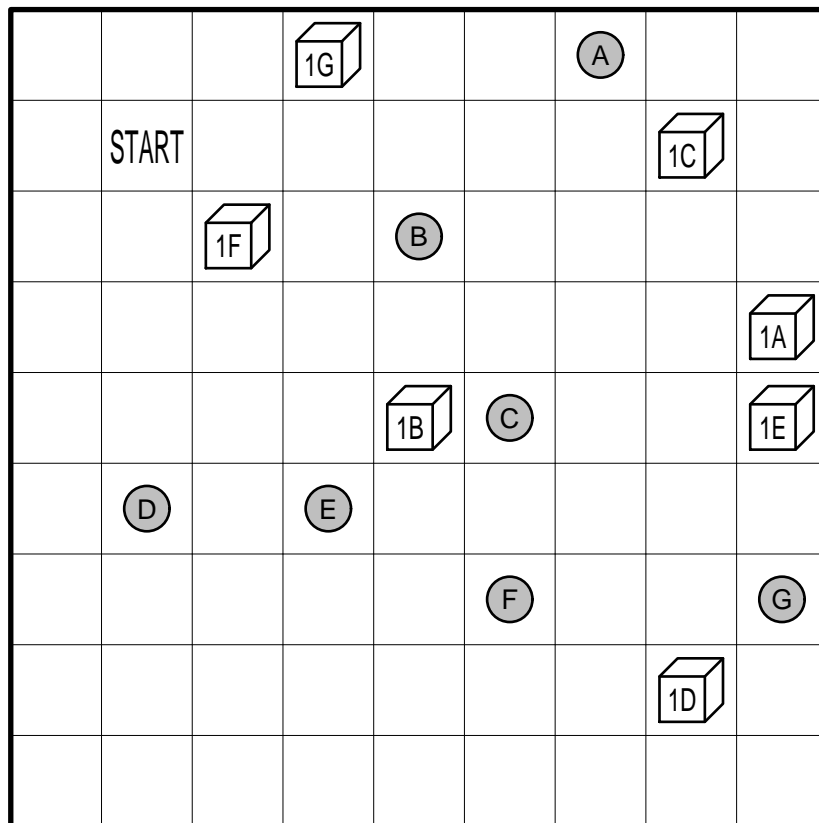
20 points

Find the path of the transporter so he can deliver all transport orders.

The path must begin in the cell marked START, run horizontally and vertically only and finish in the starting cell again. The path must not use a cell more than once, and the black cells must not be used at all. Some cells might remain unused.

The cubes represents objects that have to be delivered to their respective destination (the grey circles); the letters indicate where the objects have to be delivered. Whenever the transporter reaches a cell with a cube, he picks up an object; whenever he reaches a destination, he unloads all objects with the matching letter. On his path, the transporter has to pick up and deliver all objects.

The numbers inside the cube indicate the size of each object. The transporter has a limited capacity that must not be exceeded at any time.



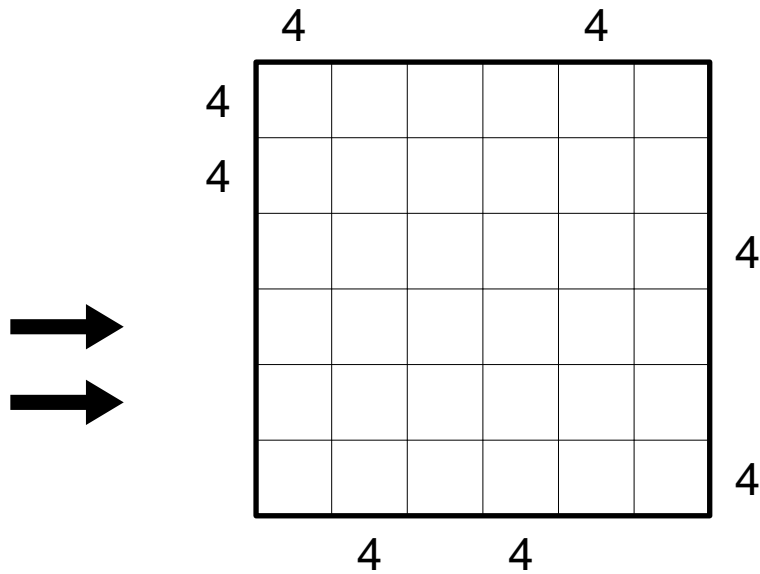
Capacity 1

Answer key: Enter the destination letters in the order the transporter reaches them.

6. Skyscrapers

20 points

Place digits from 1 to 6 into the grid, so that each digit appears exactly once in each row and column. 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.



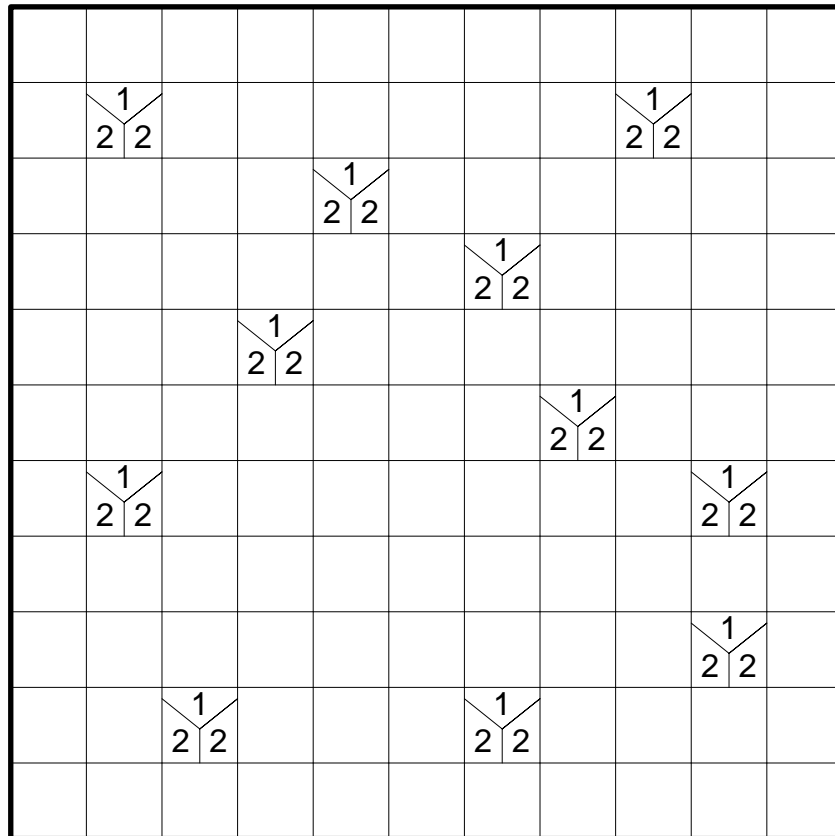
Answer key: Enter the digits in the marked rows from left to right.

7. Tapa

20 points

Blacken some empty cells, so that all black cells are connected horizontally and vertically. No 2×2 square may be completely black, and cells containing numbers must not be blackened at all.

The numbers indicate how many of the horizontally, vertically and diagonally adjacent cells are black: each number corresponds to a group of horizontally and vertically connected black cells, several groups are separated by one or more white cells. Position and order of the numbers within a cell are irrelevant.

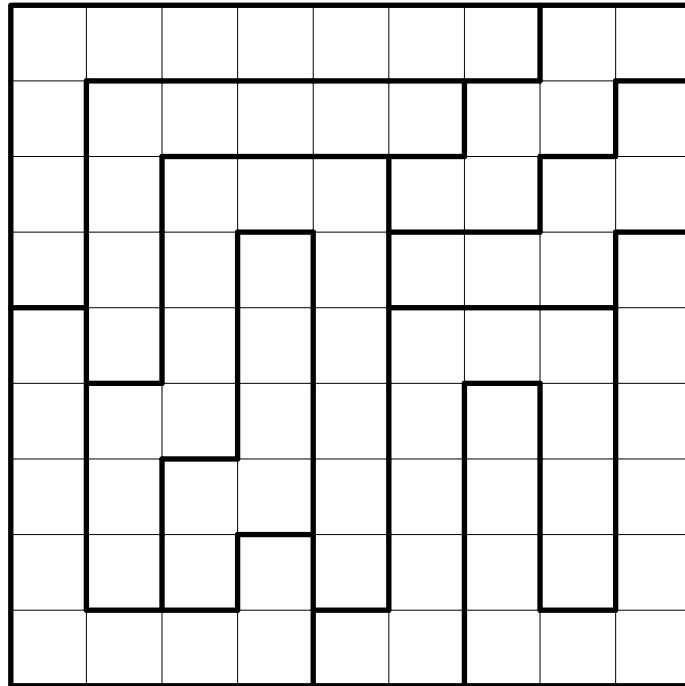


Answer key: For each row from top to bottom, enter the number of black cells in that row.

8. Star Battle

25 points

Place stars into the grid, so that each row, each column and each outlined area contains exactly two stars. The stars have the size of one cell and must not touch each other, not even diagonally.



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

9. Tren

25 points

Place some blocks of sizes 2×1 and 3×1 into the grid that don't overlap each other. Each block must contain exactly one number that indicates the number of possible movements of that block. Only movements in the long direction are considered, and only those that don't cross the boundary of the puzzle grid and don't cause an overlap with another block. (In other words, the number indicates the number of empty cells in both directions.)

	3					0		
					0			3
	0			3				
				0			3	
0			3					
						3	0	
		3	0					
3								0
		0			3			

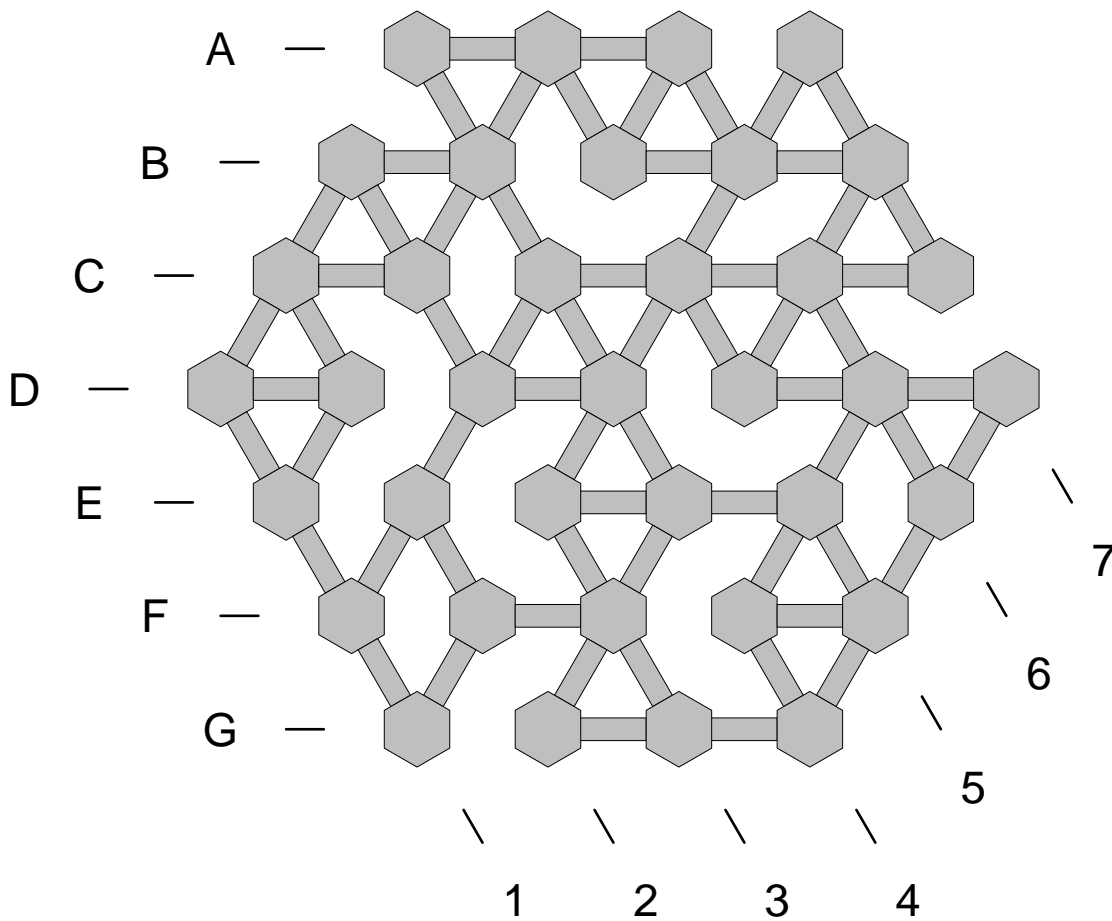
Answer key: For each row from top to bottom, enter the number of unused cells in that row.

10. Guards

30 points

The picture shows a museum with hexagonal rooms and hallways between them. Place six guards in the museum so that they can observe all the rooms; each guard is able to see over any distance along the hallways. Only the rooms themselves must be watched, not necessarily all the hallways.

For solving purposes, ignore the numbers and letters outside the grid. They define the coordinate system used in the answer key.



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

11. Cave

30 points

Blacken some empty cells, so that all the remaining cells form a group of horizontally or vertically connected cells (the cave). All black cells (the walls) must be horizontally or vertically connected to the border of the puzzle, either directly or via other black cells; in other words, there is no group of black cells that is completely surrounded by white cells.

Cells with numbers must not be blackened; they indicate how many cave cells are visible in all four directions, including the numbered cell itself.

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

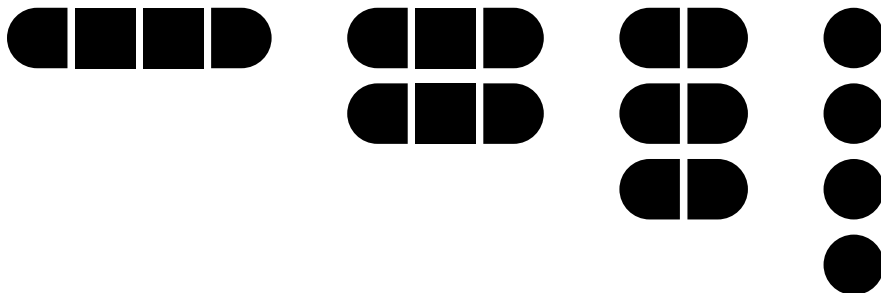
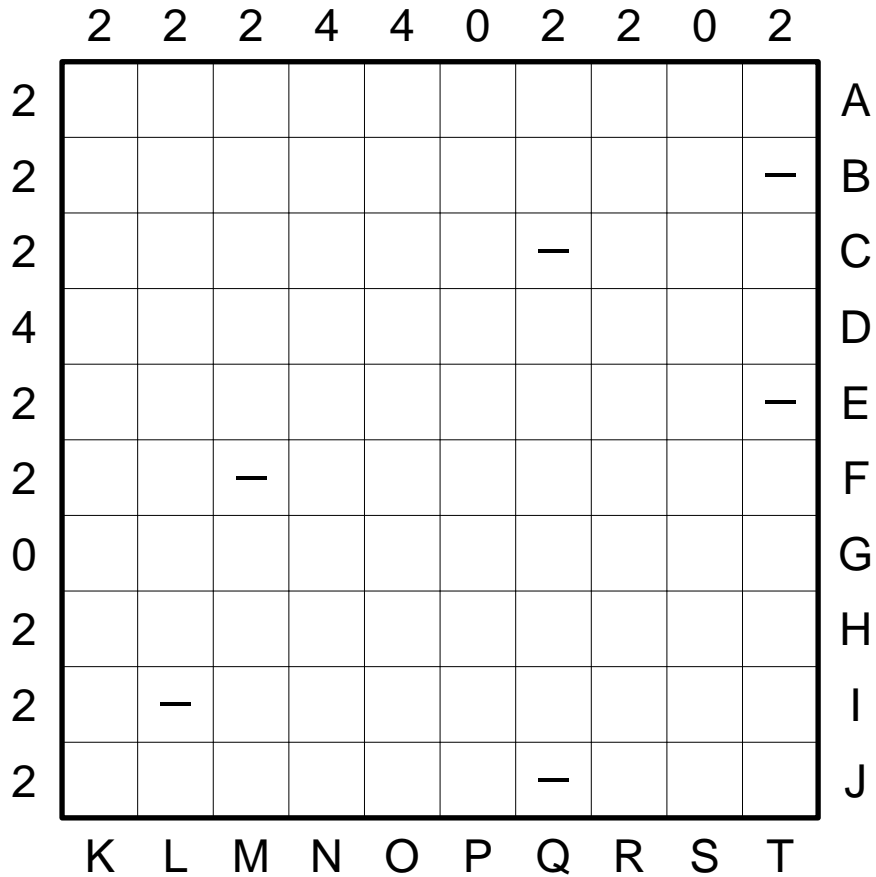
Answer key: Enter the size (number of cells) of all areas outside the cave. Start in the top left corner of the grid and proceed clockwise.

12. Battleships

35 points

Place the given fleet into the grid, so that ships do not touch each other, not even diagonally. The numbers outside the grid indicate the number of ship segments in the respective row or column. Marked cells must not contain ship segments.

For solving purposes, ignore the letters outside the grid. They define the coordinate system used in the answer key.



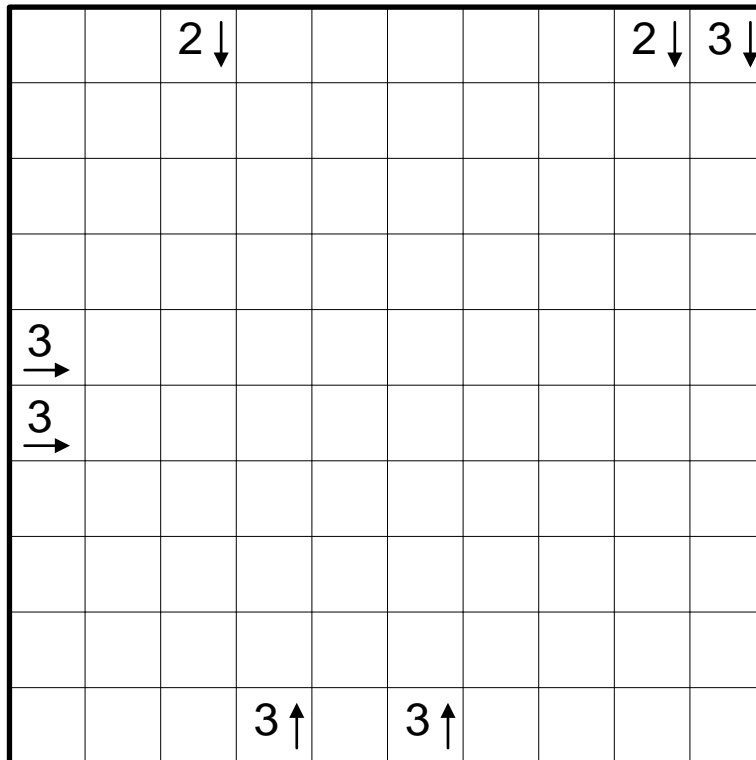
Answer key: Enter the coordinates of the four smallest ships, in alphabetical order.

13. Yajilin

35 points

Blacken some empty cells, so that each arrow points to the corresponding number of black cells. Black cells must not be horizontally or vertically adjacent, but they may touch diagonally. It is possible to have black cells with no arrows pointing to them; cells with numbers must not be blackened.

Furthermore, draw a closed loop, going only horizontally and vertically, that passes through all white cells exactly once, except those containing numbers.

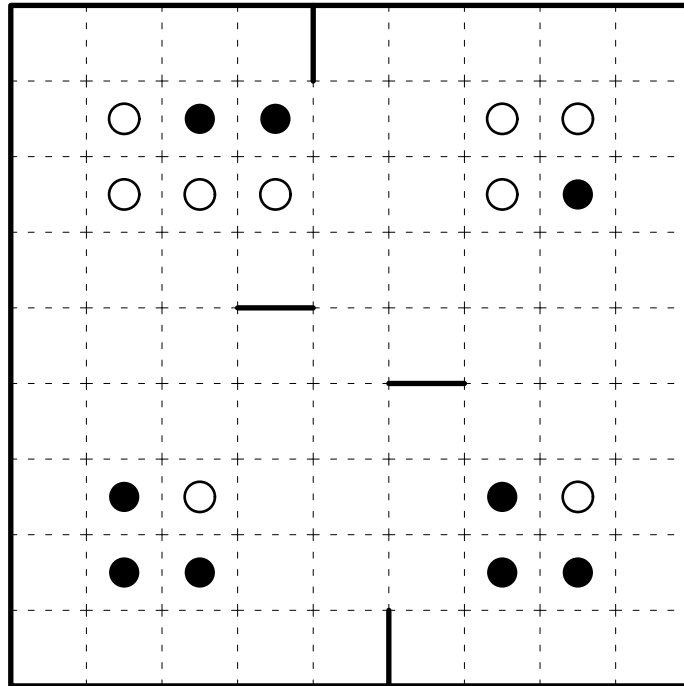


Answer key: For each row from top to bottom, enter the number of black cells in that row.

14. Corridors

40 points

Divide the grid into nine regions of size 9, so that each region contains exactly one black and one white circle. No region may contain a 2×2 square. Adjacent cells separated by a bold line must not belong to the same region.

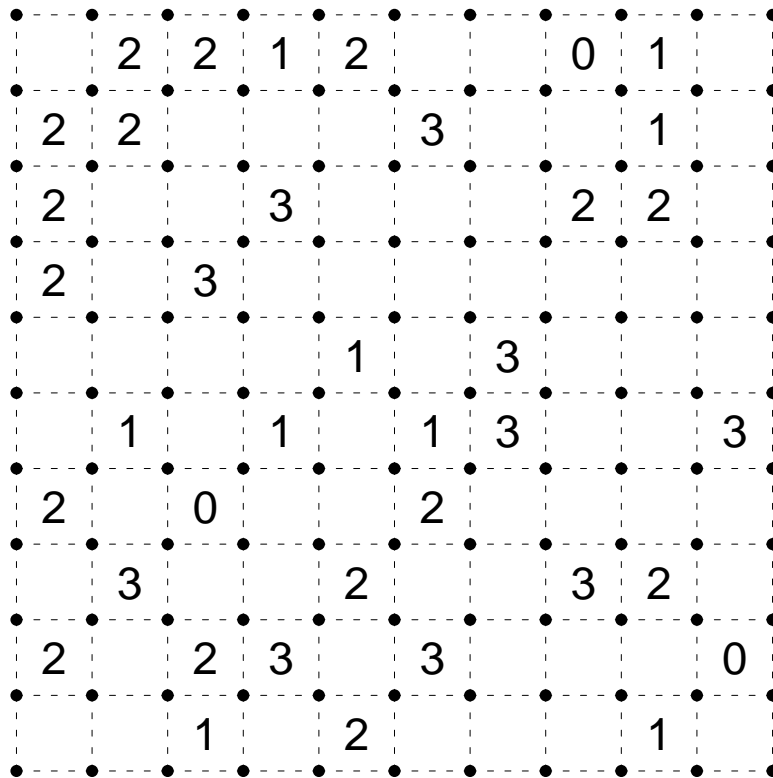


Answer key: For each row from top to bottom, enter the largest number of adjacent cells that belong to the same region; then do the same for each column from left to right.

15. Slitherlink

45 points

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



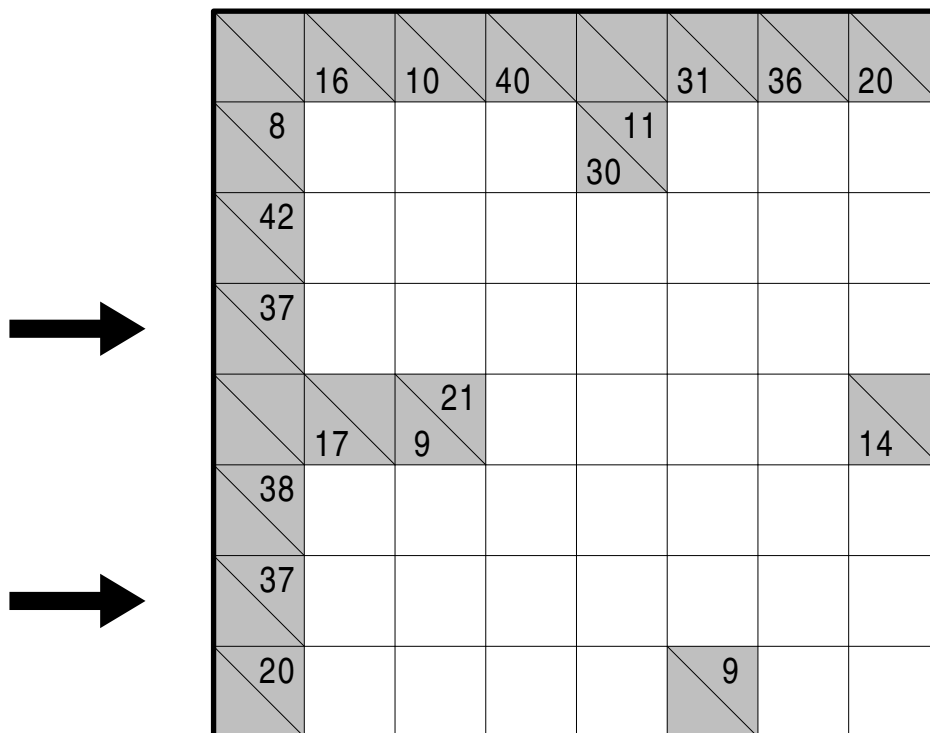
Answer key: Enter the size (number of cells) of all areas outside the loop. Start in the top left corner of the grid and proceed clockwise.

16. Kropki-Kakuro

45 points

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

Additionally, Kropki rules apply. A black circle between two horizontally or vertically adjacent numbers indicates that one of these numbers is exactly twice the other; a white circle indicates that the difference between these numbers is exactly 1. If there is no circle between two adjacent numbers, none of these two properties may hold.

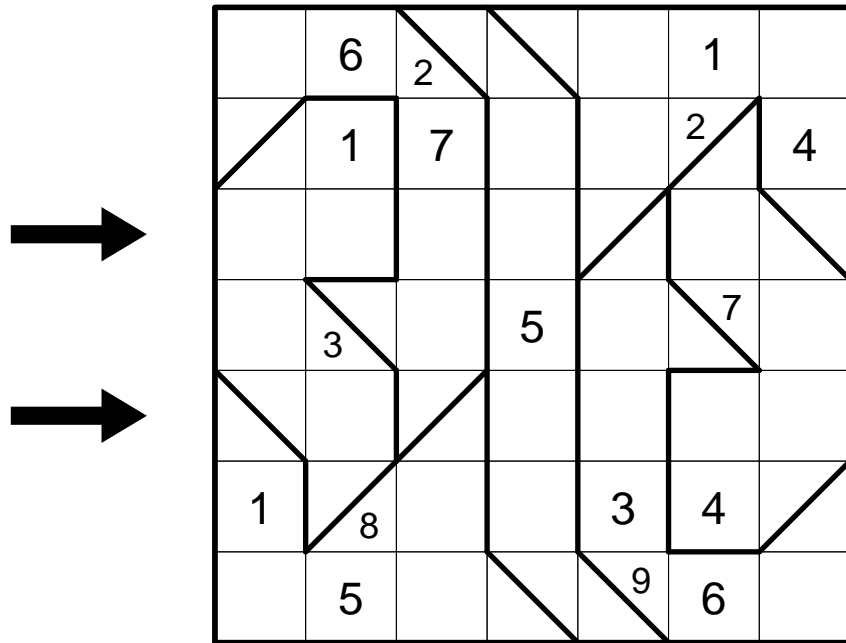


Answer key: Enter the digits in the marked rows from left to right. Ignore the grey cells.

17. Tight Fit Chaos 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. Diagonally halved cells contain two digits, one on each side. There is no rule which of two digits in one cell should be higher than the other.



Answer key: Enter the digits in the marked rows from left to right. In cells with two digits, enter the left one first.

18. Word Snakes

50 points

Place the given words into the grid, according to the following rules:

Each word must start in one of the grey cells; different words must start in different cells. The second letter of each word must be placed in the marked adjacent cell. Every further letter must be horizontally or vertically adjacent to the previous letter. Words may cross or overlap in any way, and they may also use the starting letter of other words.

Words may turn any number of times, however a word must not use the same cell more than once.

C		◀ C					◀ W	
			E ▶					◀ R
			◀ K	P				
T ▶			T					▲ A
						▲ C	▲ A	
▲ M							◀ R	
			▼ G			▲ G		
L ▶					◀ H		T ▶	

→

→

ADAMS
 ARTHUR
 CLEVELAND
 CLINTON
 COOLIDGE
 EISENHOWER
 GARFIELD
 GRANT
 HARDING
 KENNEDY
 LINCOLN
 MONROE
 PIERCE
 REAGAN
 ROOSEVELT
 TAFT
 TAYLOR
 TRUMAN
 WILSON

Answer key: Enter the letters in the marked rows from left to right, including the givens.

19. TomTom

60 points

Place digits from 1 to 8 into the grid, so that each digit appears exactly once in each row and column. The number in the upper left of each outlined region indicates the value of a mathematical operation (addition, subtraction, multiplication, division) applied successively to all digits in the cage, starting with the largest digit for subtraction and division.

Digits can repeat within a cage.

1	14		13		12		11
	6	5		4		3	
2		4	1		8		10
	7		5	7		2	
3		2			6		9
	8		3			1	
4		9		10			8
	5		6		7		

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

20. Hexagonal Masyu with branches

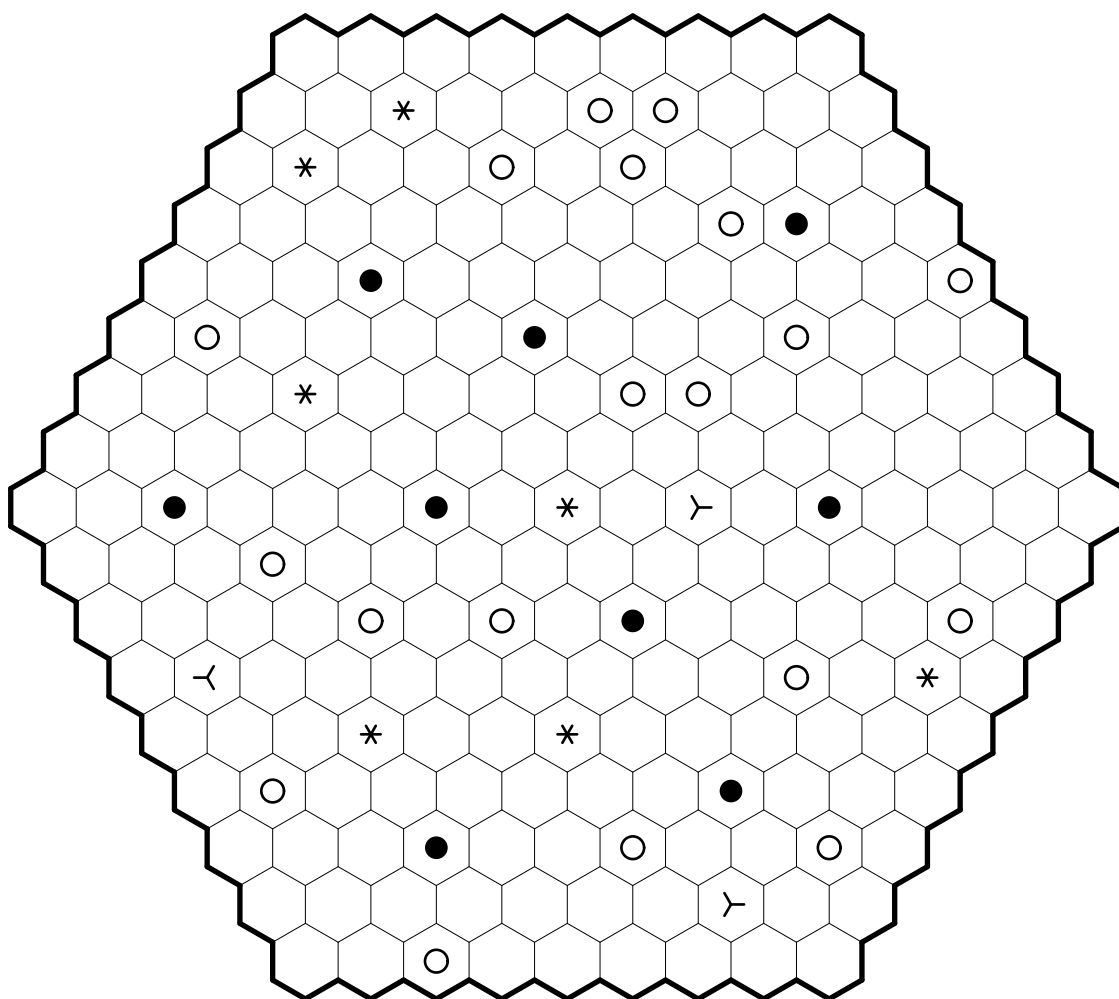
70 points

Draw a path system, connecting the centers of adjacent cells, passing through all cells with symbols. The path may pass straight through a cell or make a 120° angle, however 60° angles are not allowed. The path may branch out (any number of times); that means, from one cell lines are drawn to three adjacent cells, making three 120° angles (again, 60° angles are not allowed). All parts of the path must be connected, and there must not be any open ends.

The symbols have the following meaning:

- white circle: The path must pass straight through, and in the next cell in at least one direction it must make a turn or branch out.
- black circle: The path must make a 120° angle (not a branch), and it must go straight through the next cell in both directions.
- branching symbol (Y): The path must branch out, in the directions indicated by the symbol.
- asterisk: The path must branch out, in either of the two possibilities according to the rules mentioned above.

Note that not all branching points are given.



Answer key: For each row from top to bottom, enter the number of unused cells in that row.