

Logic Masters 2010

Qualification round

Solving time: 2:30 hours

Rätselautoren: Silke Berendes (6, 7, 10, 15, 17); Florian Kirch (2, 16); Roland Voigt (13); Ulrich Voigt (1, 3, 4, 5, 8, 12, 20); Philipp Weiß (9, 11, 14, 18, 19)

1. Arithmetics

10 Punkte

Place digits from 1 to 9 into the grid, each digit exactly once, to make six correct equations. All calculations are done from left to right or from top to bottom, ignoring mathematical precedence rules.

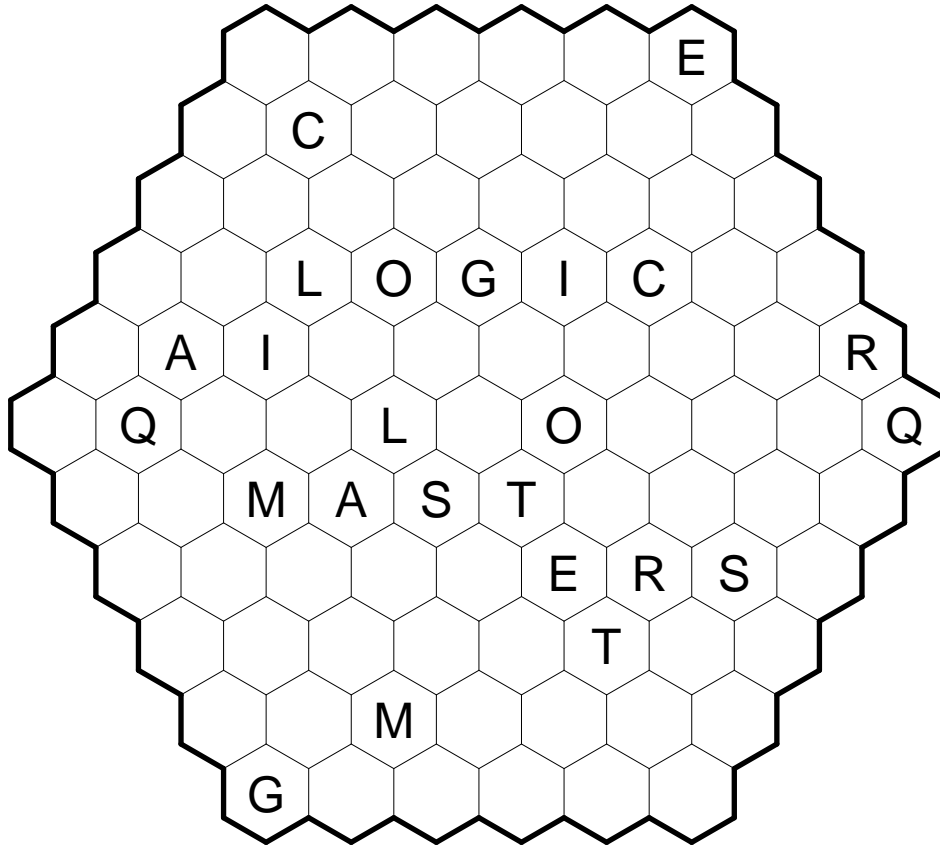
$$\begin{array}{rcccl}
 \square & / & \square & + & \square & = & 9 \\
 \times & & / & & + & & \\
 \square & - & \square & \times & \square & = & 28 \\
 + & & + & & - & & \\
 \square & \times & \square & - & \square & = & 12 \\
 = & & = & & = & & \\
 47 & & 11 & & 9 & &
 \end{array}$$

Antwortschlüssel: Enter the nine digits line-by-line from top to bottom.

2. Hexagonal Arukone

10 Punkte

Connect same letters with continuous lines along the centers of adjacent cells. These connections may make any number of turns. Each cell must be used exactly once.



Antwortschlüssel: For each letter from 'LOGIC MASTER' in that order, enter the number of turns the respective connection makes.

3. Sudoku

15 Punkte

Place digits from 1 to 9 into the grid, so that each digit appears exactly once in each row, column and outlined area.

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

Antwortschlüssel: Enter the digits in the marked row from left to right, followed by the digits in the marked column from top to bottom.

4. Tapa

15 Punkte

Blacken some empty squares, so that all black squares are connected horizontally and vertically. No 2×2 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.

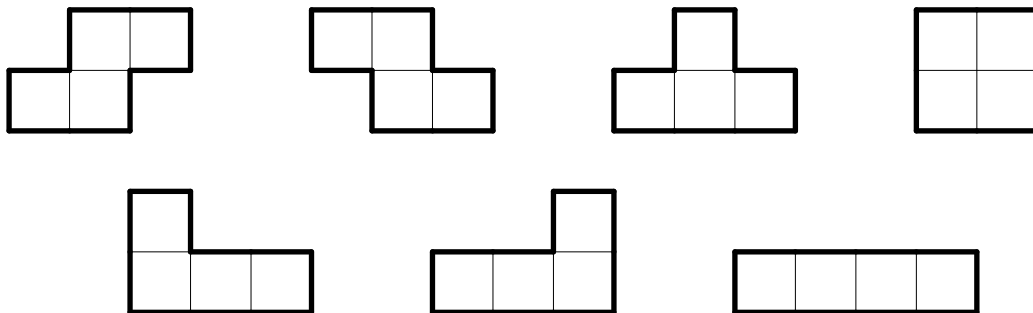
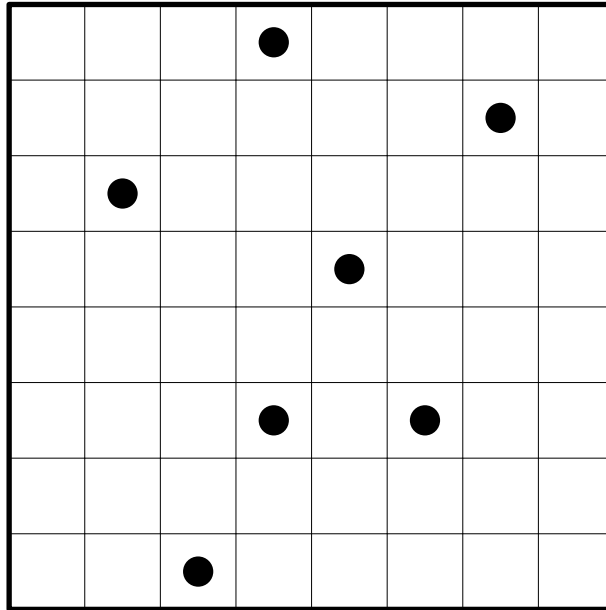
							1 1		2
			1 1 1						
3									
			2 3						
						6			
2									
				3 3			2 2		
	1 1 2							1 4	
			2 2			1 3			

Antwortschlüssel: For each row from top to bottom, enter the number of black squares in that row.

5. Tetrominoes

20 Punkte

Place the seven tetrominoes into the grid, so that they do not touch each other, not even diagonally. Each tetromino must contain exactly one black circle. The tetrominoes may be rotated, but not reflected.

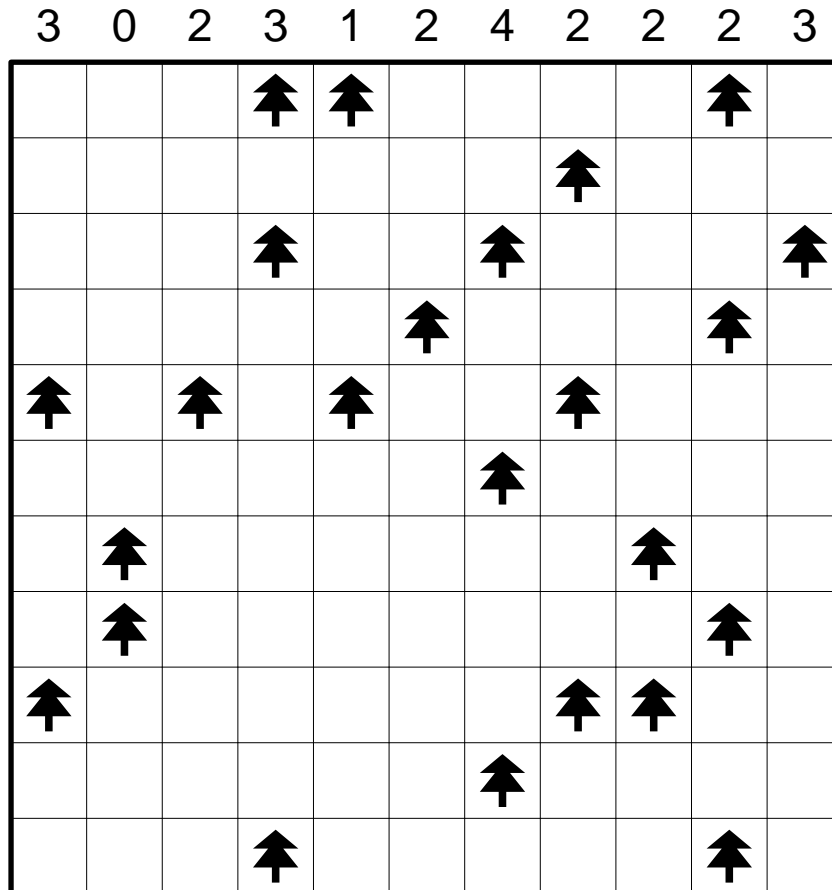


Antwortschlüssel: For each row from top to bottom, enter the number of squares used by tetrominoes in that row.

6. Tents

20 Punkte

Place some tents into the grid, so that they do not touch each other, not even diagonally. Each tent belongs to exactly one tree and vice versa, and each tent must be horizontally or vertically adjacent to the tree it belongs to. The numbers above the grid indicate how many tents are located in the respective column.

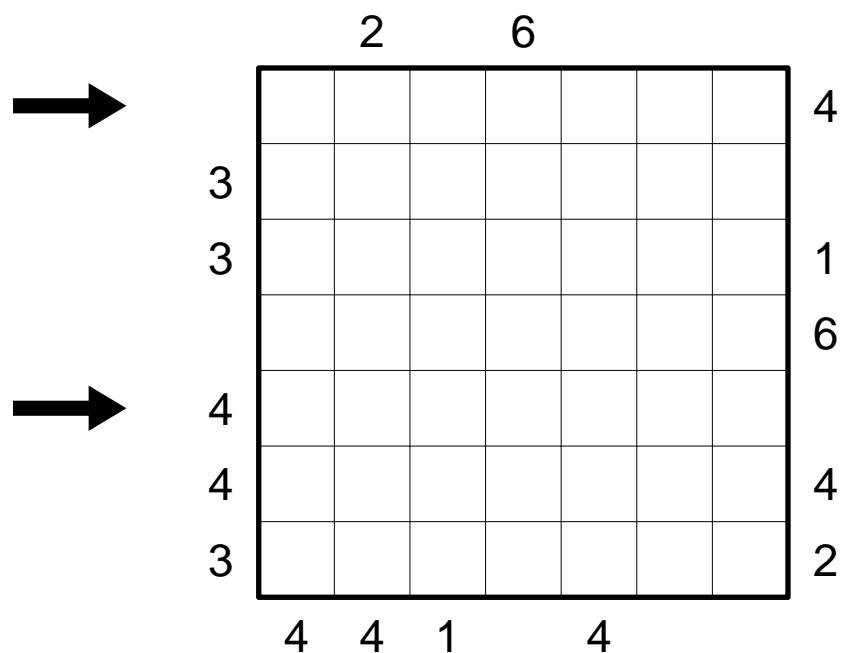


Antwortschlüssel: For each row from top to bottom, enter the number of tents in that row.

7. Skyscrapers

25 Punkte

Place digits from 1 to 7 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.



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

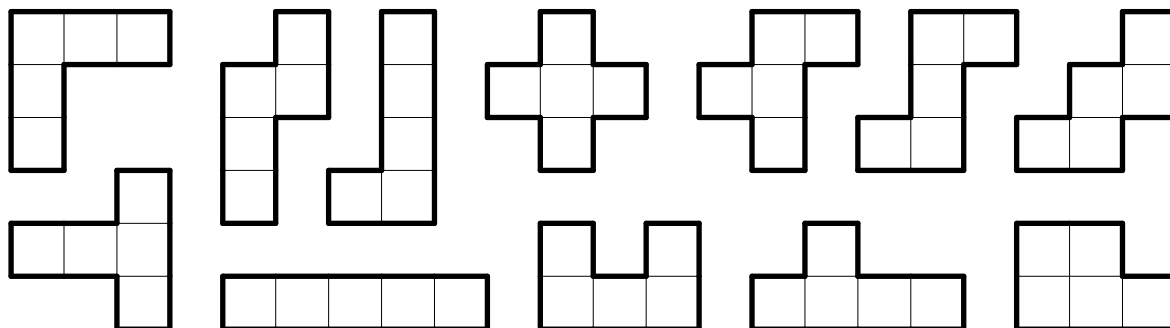
8. Pentomino Words

25 Punkte

Divide the grid into the twelve pentominoes, so that they do not overlap. Each pentomino must contain the letters of one of the twelve given words, and each word is used exactly once. Conversely, each pentomino is used exactly once; pentominoes may be rotated and reflected.

H	I	C	L	E	I	C	H	I	A
N	H	G	A	A	P	U	N	A	T
A	A	P	A	N	A	B	A	I	H
G	L	O	J	E	L	M	U	G	B
T	O	E	J	E	A	A	T	N	I
A	N	P	N	N	M	L	E	N	N

- | | |
|-------|-------|
| BENIN | JAPAN |
| CHILE | JEMEN |
| CHINA | MALTA |
| GABUN | PALAU |
| GHANA | POLEN |
| HAITI | TONGA |



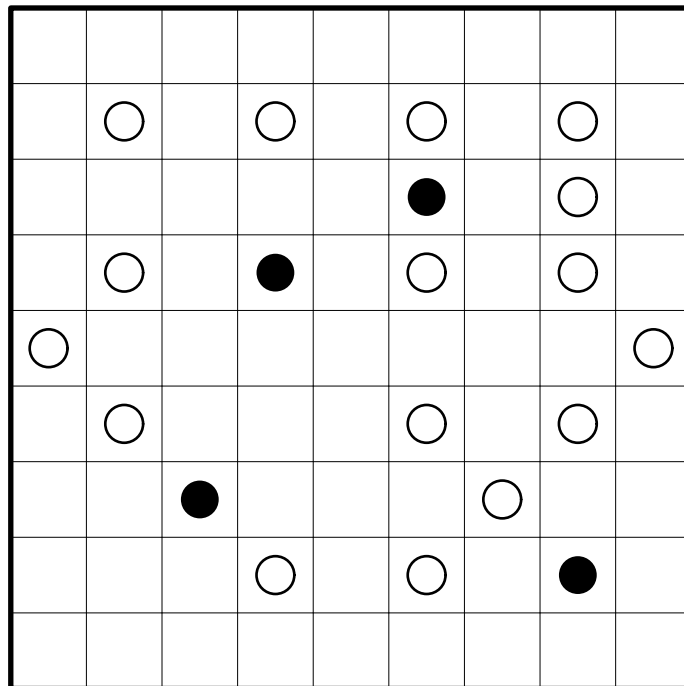
Antwortschlüssel: For each row from top to bottom, enter the number of pentominoes appearing in that row.

9. Deformable Masyu

25 Punkte

Paint some white circles black, and 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 make 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 make a turn in the next square in at least one direction.

How many circles must be painted black and which ones, is for you to find out.



Antwortschlüssel: For each row from top to bottom, enter the number of squares not used by the loop in that row.

10. LCM-Kakuro

30 Punkte

Enter digits from 2 to 9 into the white squares (*Note: the digit 1 may not be used*). The numbers in grey squares indicate the *lowest common multiple* of all digits in the corresponding „word“. In each word, no digit may repeat.

The *lowest common multiple* is the smallest positive integer that is divisible without remainder by all digits in question.

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

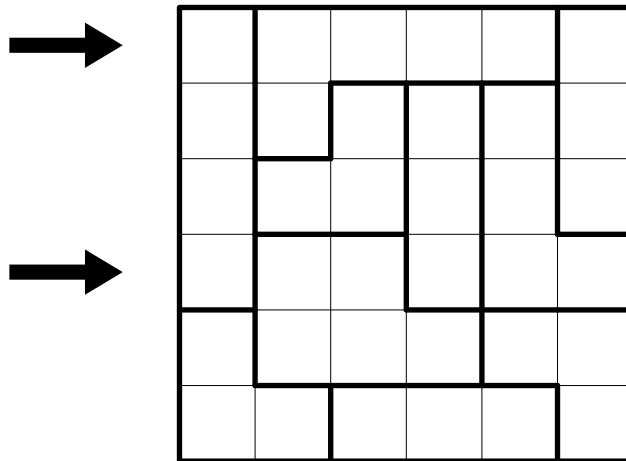
			6	280					
		21					36	280	45
	28			○		63			○
30			○		140	120		○	
35		○	280				○		
8	○			18		○		56	315
		40			○		24		
	360			○			20		○
	210		○		315			○	
	60	○				28	○		

Antwortschlüssel: Enter the digits in the marked diagonals; the diagonals successively from top left to bottom right, and for each diagonal from bottom left to top right.

11. Hakyuu

30 Punkte

Place digits into the grid, so that each outlined area contains digits from 1 to the size of that area, each digit exactly once. If a row or column contains the same digit more than once, those digits must have a minimum distance given by that digit: Between two digits '1', there must be at least one other square; between two digits '2', there must be at least two other squares, etc.



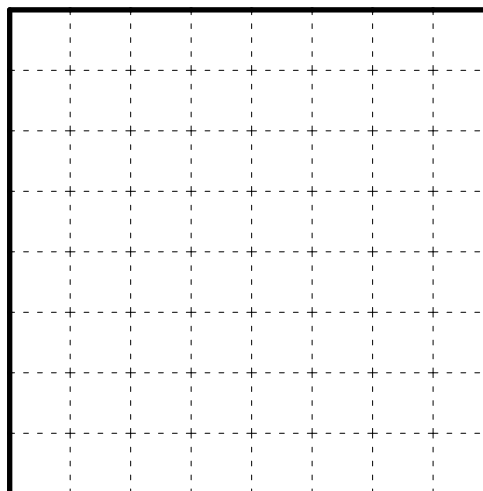
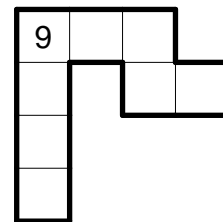
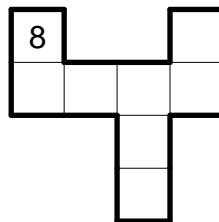
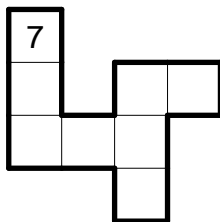
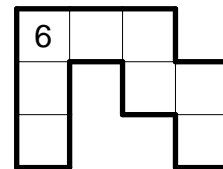
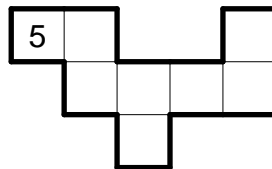
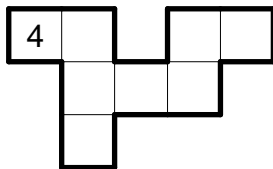
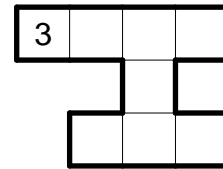
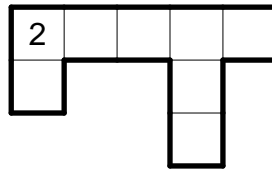
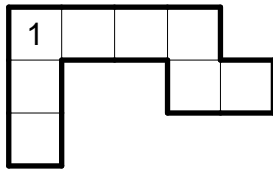
Antwortschlüssel: Enter the digits in the marked rows from left to right.

12. Jigsaw Puzzle

35 Punkte

Put together an 8×8 square from the given pieces. Pieces may be rotated and reflected, but no piece may be used more than once. One of the pieces remains unused; which one is for you to find out.

For solving purposes, ignore the digits, they are used for the answer key only.

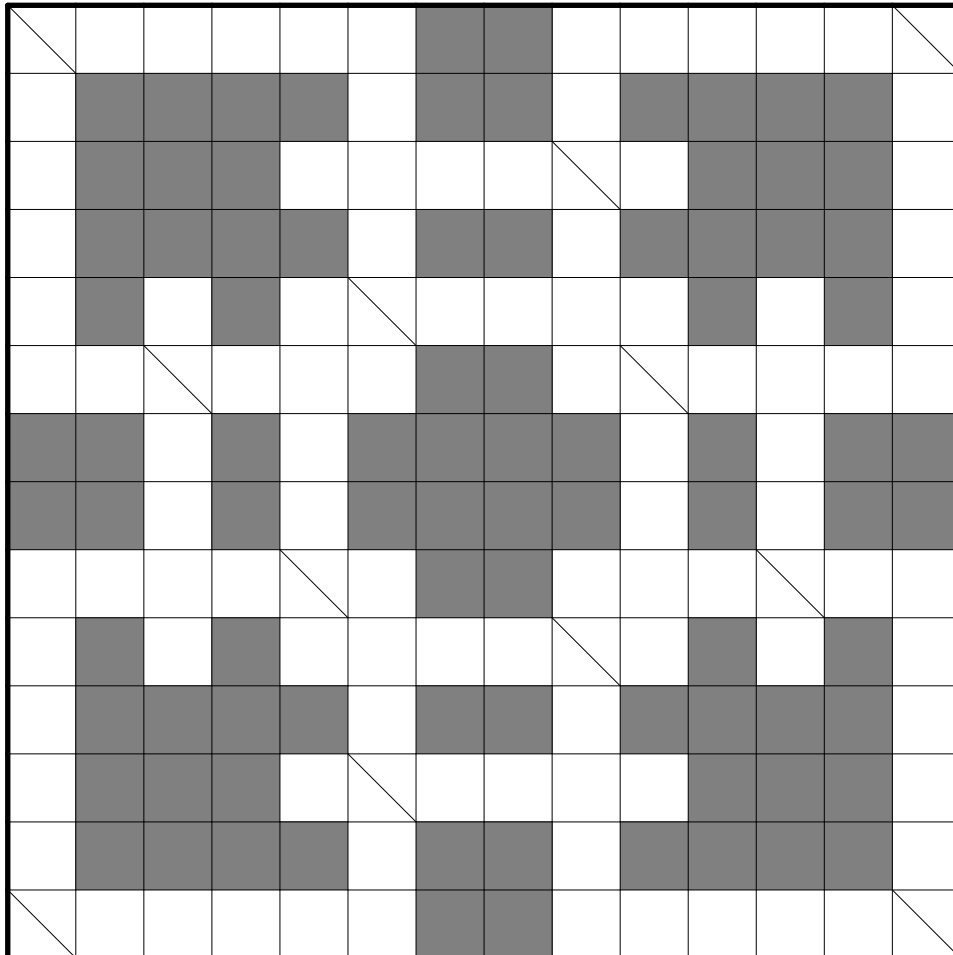


Antwortschlüssel: For the marked rows, enter the digits corresponding to the pieces covering each square from left to right.

13. Crossword

35 Punkte

Place the given words into the grid, reading from left to right and from top to bottom. The diagonally split squares must contain two letters each. Note that those letters are in different order for horizontal and vertical words. One word remains unused; which one is for you to find out.



- | | | | | |
|---------|---------|---------|---------|---------|
| AMPHORE | ENERGIE | KADAVER | MEISTER | RADIANT |
| EDELGAS | GAUDIUM | LEITUNG | MONOKEL | RESPEKT |
| EINSATZ | GEBIRGE | LIBELLE | NIKOTIN | RETTUNG |
| EKSTASE | GUANAKO | LORBEER | OPOSSUM | SAUEREI |
| ELYSIUM | INSIDER | MARTINI | POLEMIK | TORPEDO |

Antwortschlüssel: Enter the unused word.

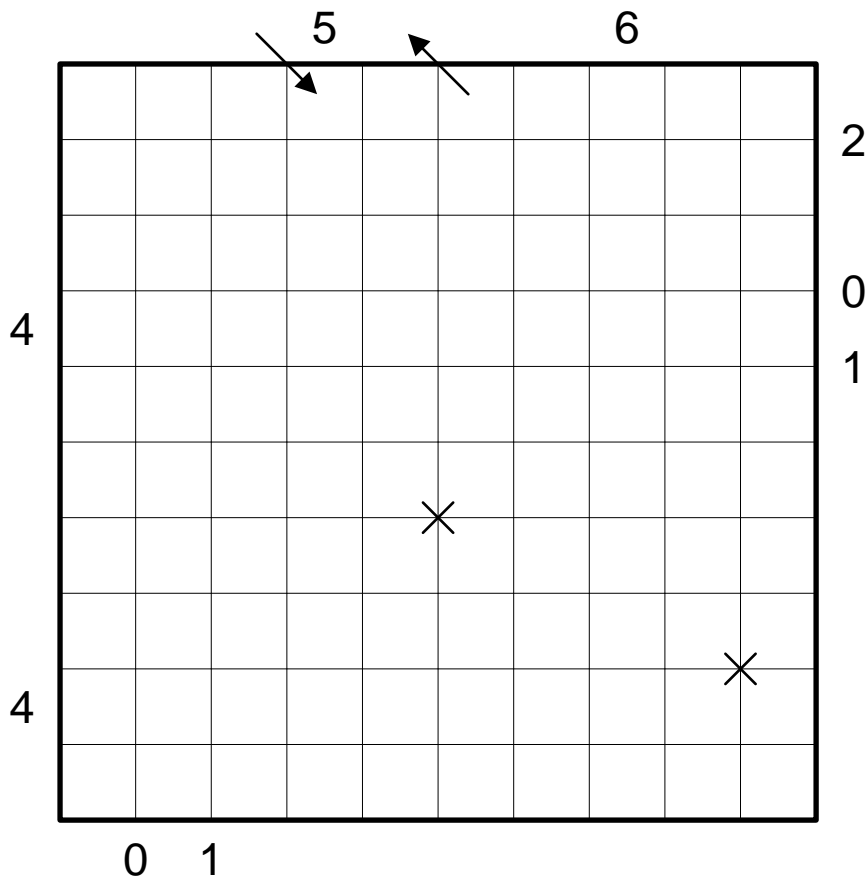
14. Laser

40 Punkte

Draw a laser beam into the grid that runs only diagonally. It enters and leaves the grid in the places marked by arrows. Place some mirrors at the grid points, so that the following conditions are fulfilled:

The laser beam must cross itself at the marked spots, but nowhere else. Each mirror must be hit by the laser beam on exactly one side.

The numbers to the left and above the grid indicate how many squares in the corresponding row or column the beam passes through. The numbers to the right and below the grid indicate the number of mirrors along the corresponding grid line.



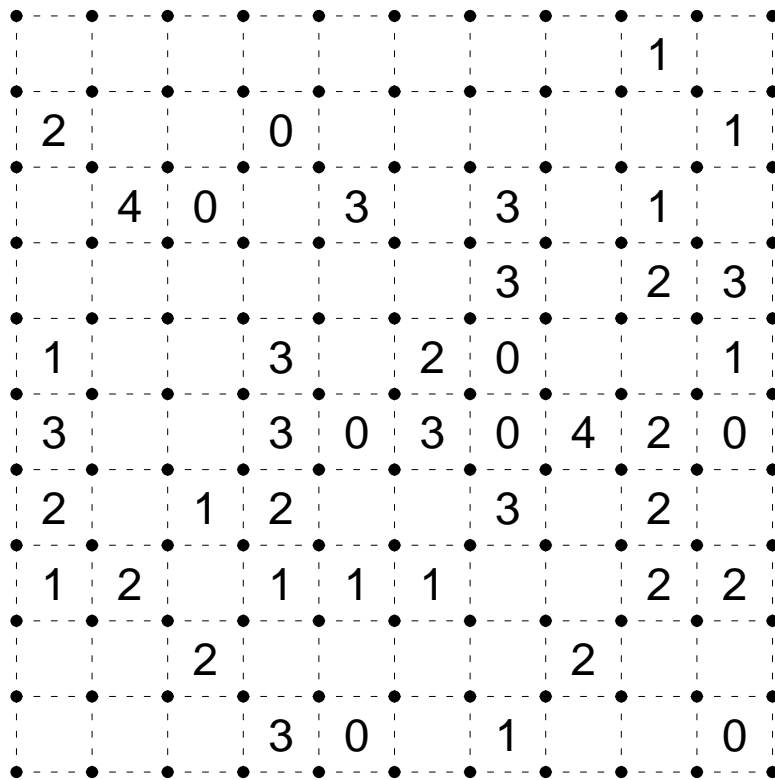
Antwortschlüssel: Follow the laser beam in the direction indicated by the arrows. Enter the length (number of squares the beam passes through) for each section of the beam till the next mirror or leaving the grid. Ignore the crossings.

15. Outside False Fences

40 Punkte

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

However: Only the digits *inside the loop* are correct. Digits *outside the loop* are one more or one less than the respective correct number.



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

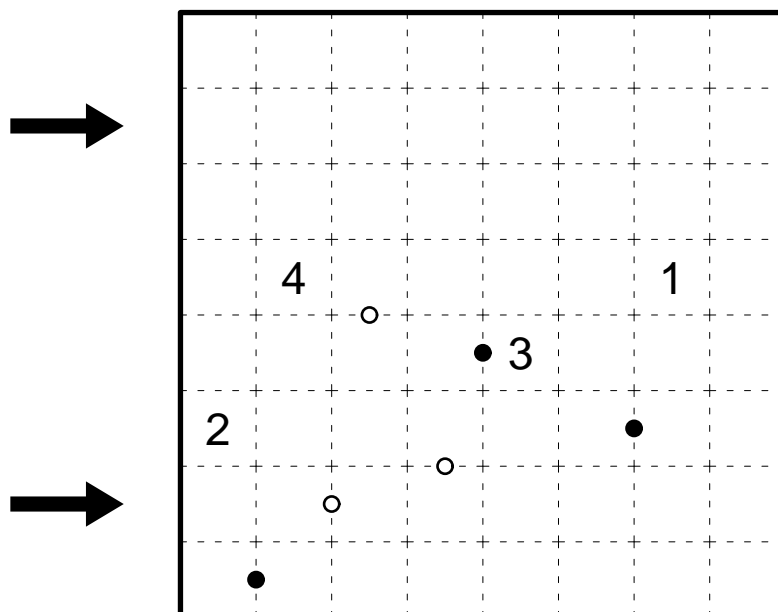
16. Kropki-Fillomino

45 Punkte

Divide the grid into several areas and fill in a number into each square. Within each area, all numbers must be the same and be equal to the number of squares of that area. Areas of same size may touch each other only diagonally.

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.

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.



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

17. Anti-Magnets

50 Punkte

Fill the grid with neutral (black) and magnetic plates.

Each magnetic plate has a positive (+) and a negative (-) halve. Unlike standard magnets, only same symbols may touch each other horizontally or vertically; + and - from two different plates may never be horizontally or vertically adjacent.

Numbers outside the grid indicate the number of + or - symbols in the respective row or column.

The grid is a 10x10 square. The numbers around the grid are as follows:

- Top row: +, 4, 3, 2, 3
- Second row: -, 6, 1, 3, 3, 3
- Left side (rows 1-10): 4, 3, 5, 1, 4, 3, 1, 2
- Bottom side (columns 1-10): 0, 4

Two arrows point to the 5th and 9th rows from the left.

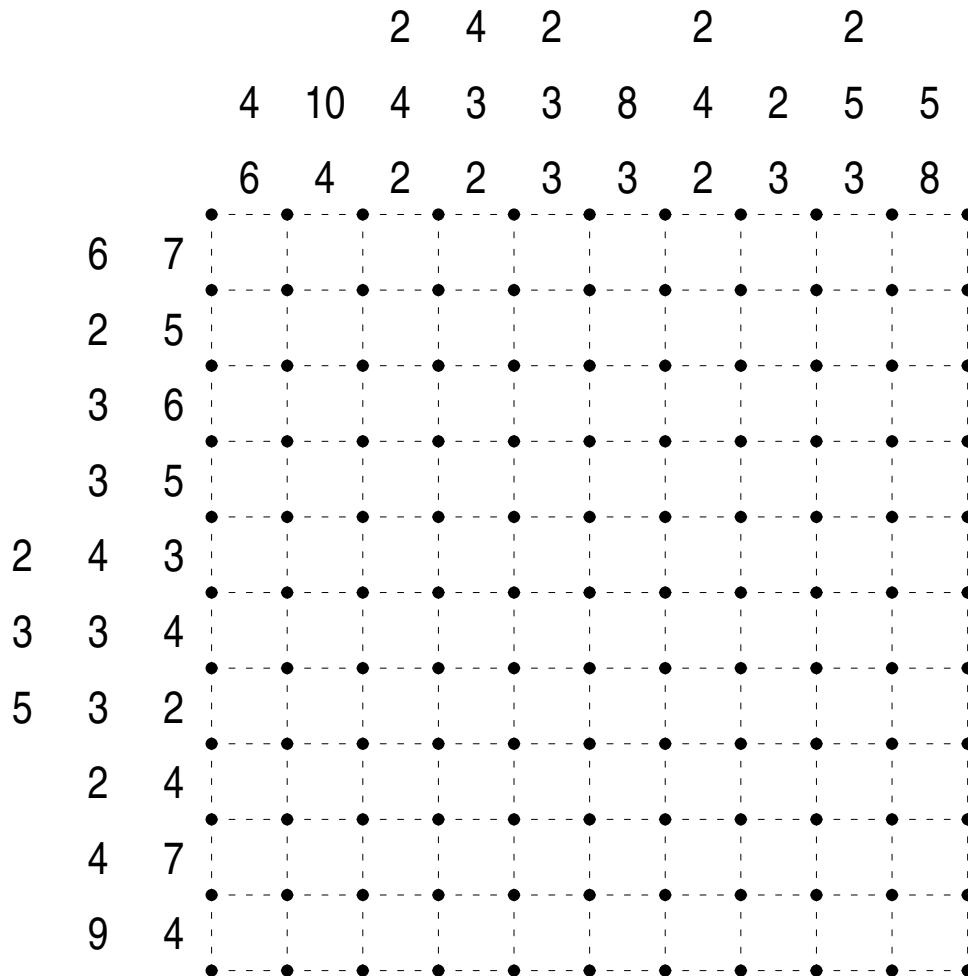
Antwortschlüssel: Enter the content of the marked rows from left to right. Use + and - along with 'N' for neutral plates.

18. Summenbild-Rundweg

55 Punkte

Draw a single continuous loop by connecting neighboring dots along the dotted lines. The loop may not touch or cross itself, and it doesn't need to touch all of the dots.

Each number outside the grid corresponds to a continuous group of squares inside the loop in the respective row or column. The number indicates how many edges adjacent to that group are used by the loop. Between two such groups there must be one or more squares outside the loop; the numbers of each row are in the same order as their corresponding groups.



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

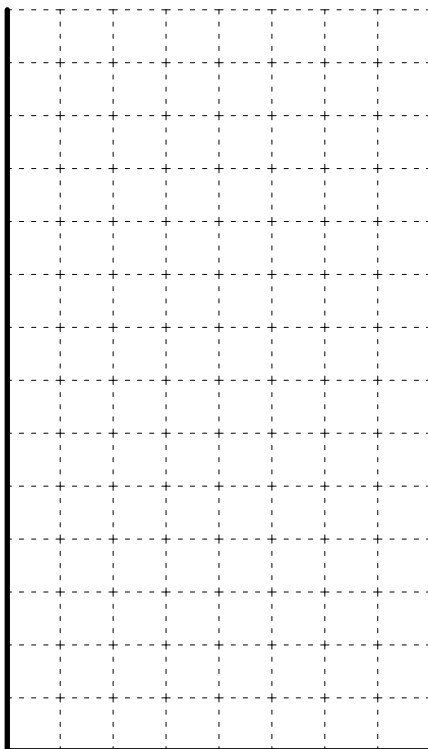
19. Tetris Reconstruction

60 Punkte

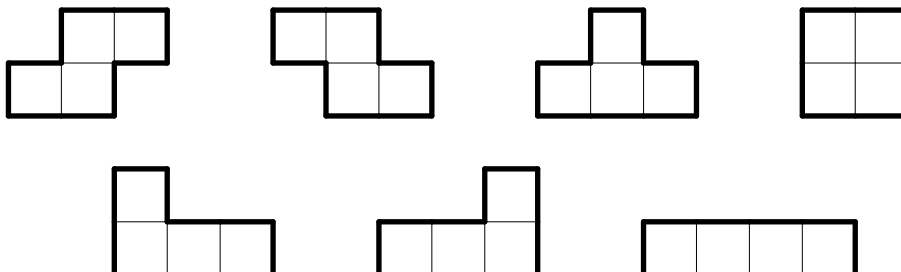
Assign letters from A to G to the seven tetris pieces (pieces may be rotated, but not reflected). Place some tetris pieces into the left grid and fill those pieces with their corresponding letters. Remove all completely filled rows, and the grid on the right must remain.

There is no restriction on how many pieces of each kind may be used; however, after removing completely filled rows, at least one letter from each used piece must remain. There are nowhere three or more consecutive rows completely filled.

Note: There is no „gravity“, stones are simply placed in the grid and do not fall down. Completely filled rows are simply cut out of the grid.



	A	A	B	C	C	D	
C		B	B	B	C	D	D
	E	E	F	E		C	
G	G	G	B	B		G	

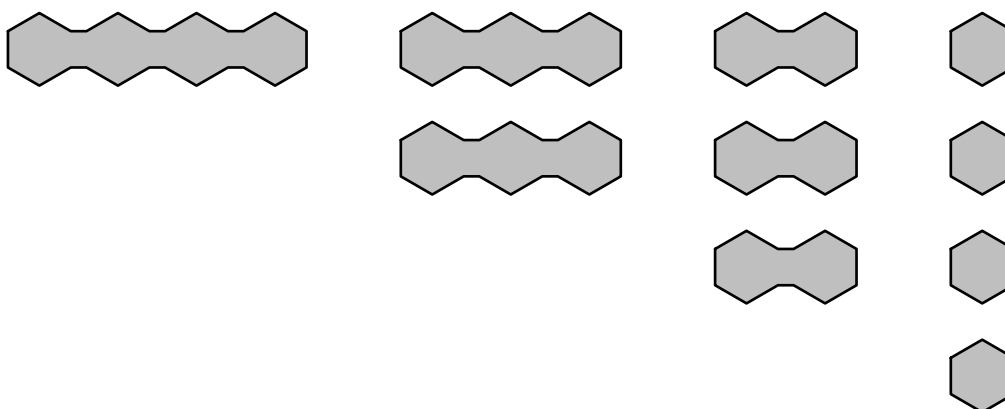
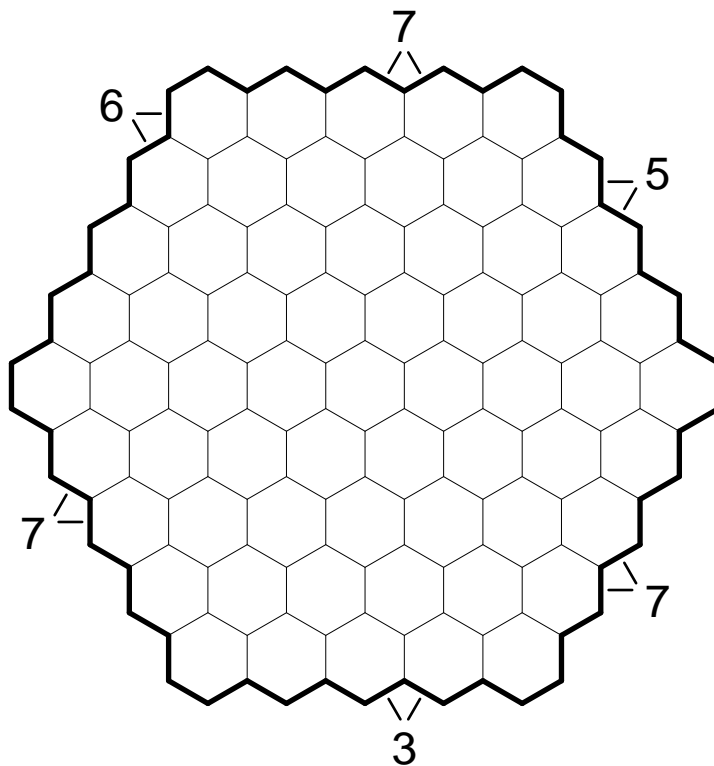


Antwortschlüssel: Enter the letters of all completely filled rows from top to bottom.

20. Hexagonal Battleships

65 Punkte

Place the given fleet into the grid, so that ships do not touch each other. All ships may be rotated. Numbers outside the grid indicate the number of ship segments in both adjacent rows.



Antwortschlüssel: For each row from top to bottom, enter the number of ship segments in that row.