Logic Masters 2011
Qualification round

Solving time: 2:30 hours

1. Masyu   10 points

Draw a single closed loop, traveling horizontally and vertically, connecting the centers of the cells. The loop must pass through every cell containing a circle. At each cell containing a black circle, the loop must make a 90-degree turn, and must travel straight for at least two cells in both directions. At each cell containing a white circle, the loop must pass straight through the circle, and must make a 90-degree turn in at least one of the cells immediately before or after the circle.
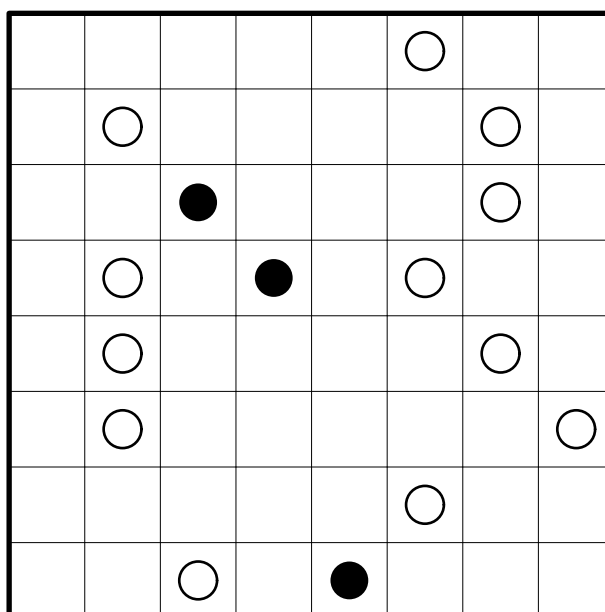
Answer key: For each row from top to bottom, enter the number of cells not used by the loop.

2. Double Block   10 points

Fill the grid with black cells and digits from 1 to 4, so that each row and column contains two black cells and each digit exactly once. The numbers outside the grid indicate the sum of the digits between the two black cells in the respective row or column. In rows or columns without information the black cells may or may not be adjacent to each other.

	5				8	6
3						
→						
7						
9						
2						
→						
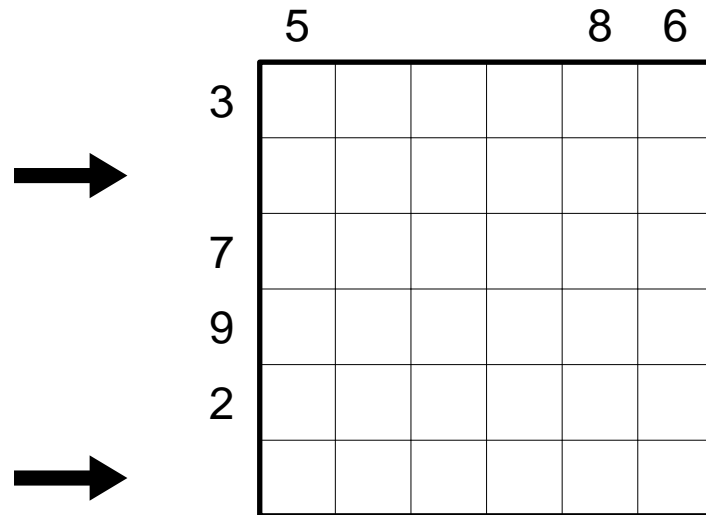
Answer key: Enter the digits in the marked rows from left to right. Use '–' for black cells.

3. Double Easy as ABCD   10 points

Place letters A, B, C, D into the grid, so that in each row and column, each letter appears exactly once; one cell remains empty in each row and column. The letters outside the grid indicate which two letters come first in the respective row or column; in what order is for you to find out.
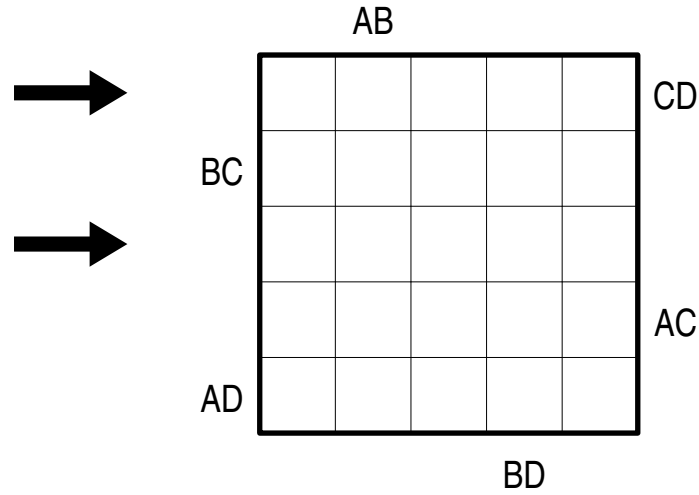
Answer key: Enter the letters in the marked rows from left to right. Use '−' for empty cells.

4. Heyawake   15 points

Blacken some cells in the grid so that no two black cells are horizontally or vertically adjacent and all white cells are connected (the black cells may not divide the grid into two or more parts). No horizontal or vertical sequence of white cells may span more than two outlined areas. The numbers indicate the number of black cells in the respective area.

Cells with numbers may be blackened; blackened numbers remain valid.
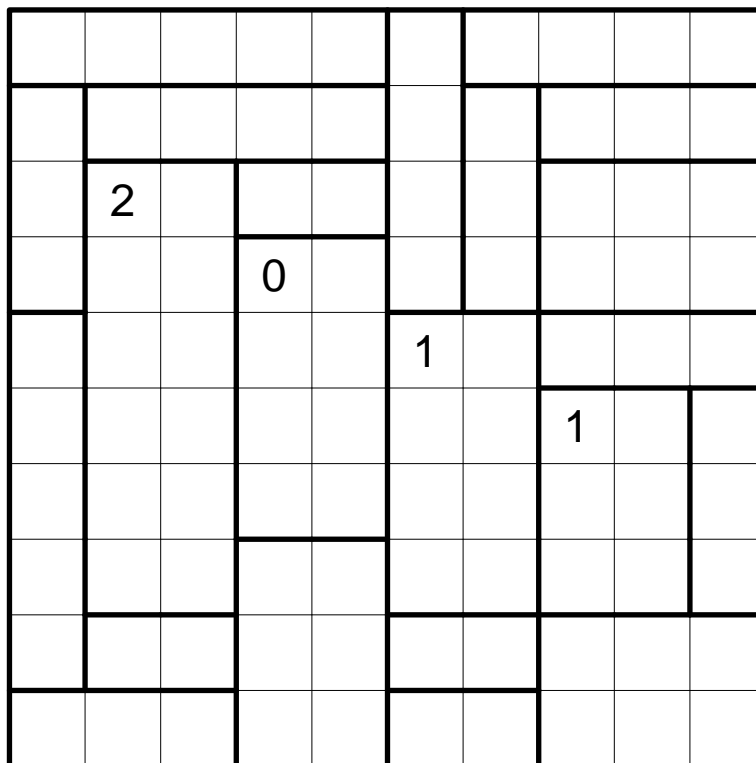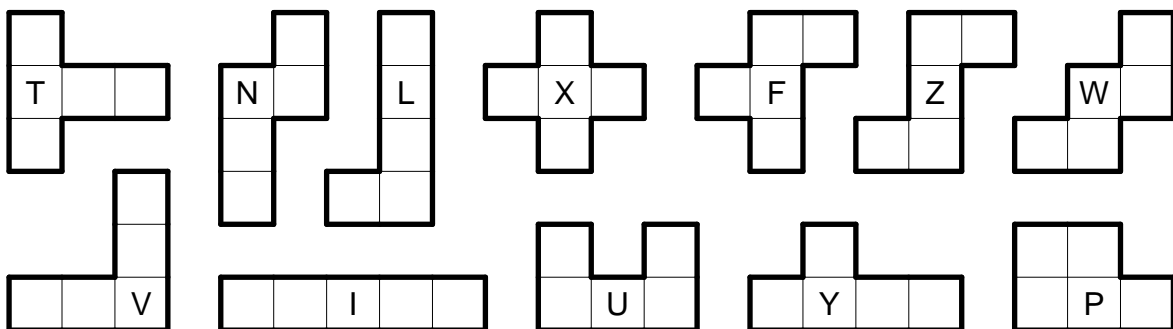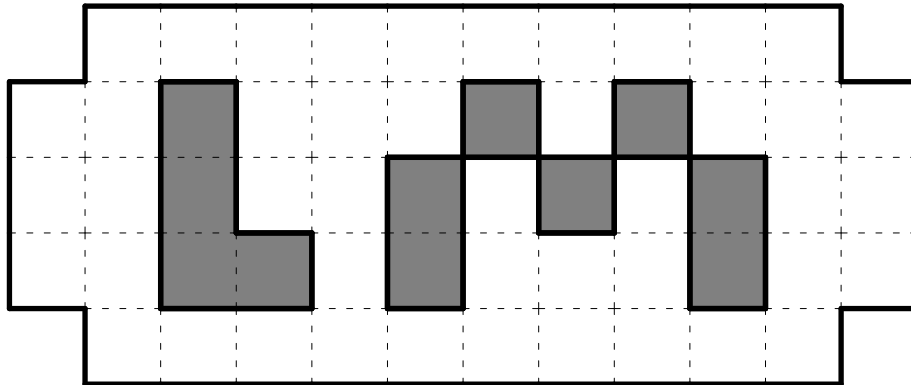
Answer key: For each row from top to bottom, enter the number of black cells in that row.

5. Pentomino Dissection   15 points

Divide the grid into nine of the twelve pentominoes without overlapping. All pentominoes may be rotated and reflected, and no pentomino may be used more than once. Grey cells must remain empty.

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

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.
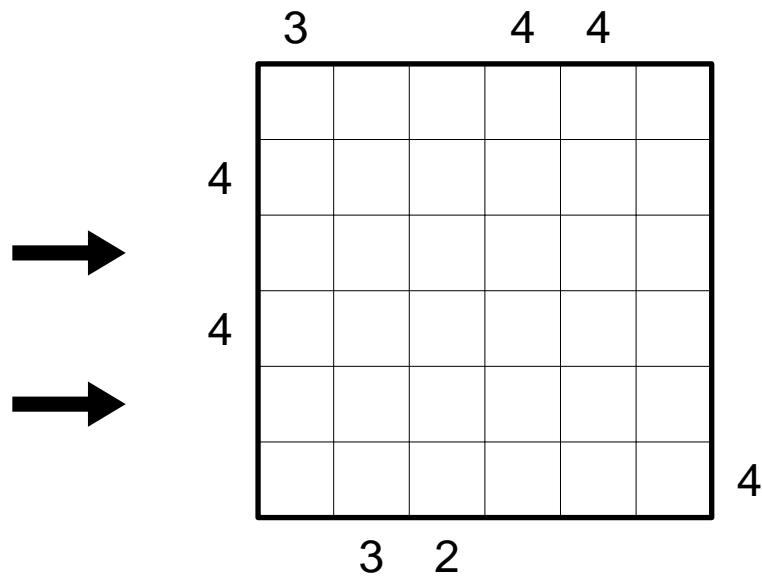
7. Slalom   20 points

Draw a diagonal line in every cell so that no closed loops are formed. The numbers indicate how many line segments meet at the respective vertex.

For solving purposes, ignore the circles with letters.
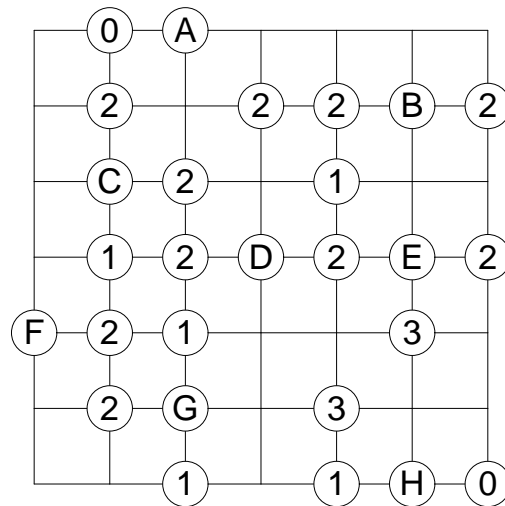
Answer key: For the letters ABCDEFGH, enter the number of line segments meeting at the respective vertex.

8. Star Battle

20 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 may not touch each other, not even diagonally.
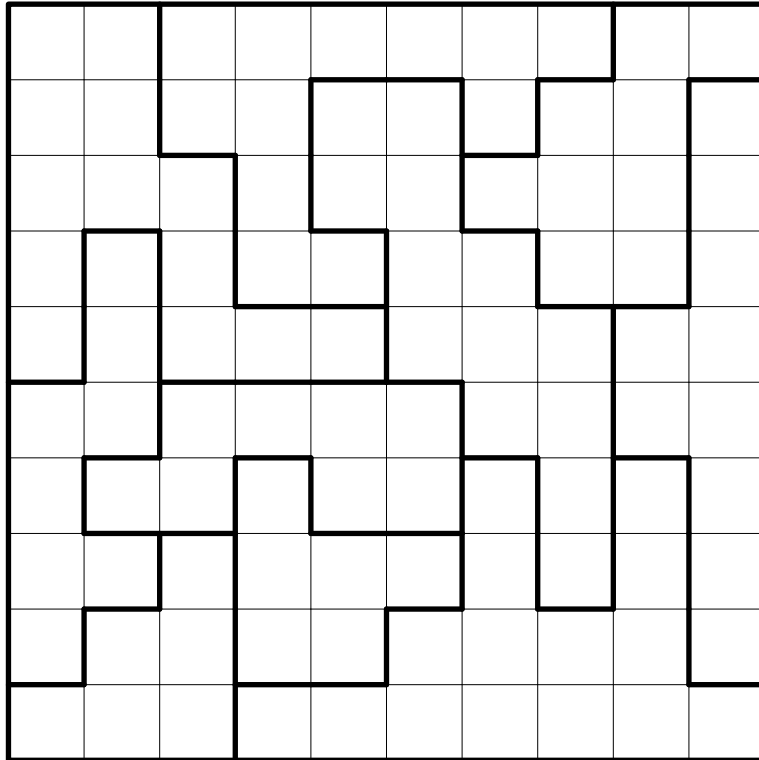
Answer key: From top to bottom, enter for each row the number of empty cells between the two stars (do not count the cells containing stars itself).

9. Masterword   25 points

A five letter word must be identified.

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

The solution word does not contain any letter more than once.

Note: the solution word may or may not be a word of the German (or any other) language.

H	U	M	A	N		**1**	1
L	O	G	I	K		**1**	1
N	E	P	A	L		**1**	2
P	A	R	I	S		**1**	0
R	E	M	I	S		**0**	1

| | | | | | | **5** | 0 |

Answer key: Enter the solution word.

10. Anglers   25 points

Determine which angler caught which fish.

The numbers outside the grid represent anglers. Each of them has a fishing line traveling only horizontally and vertically and ending in a fish. The numbers indicate the number of cells used by the respective fishing line, including the fish itself. No cell may be used by more than one fishing line, but cells may remain empty.
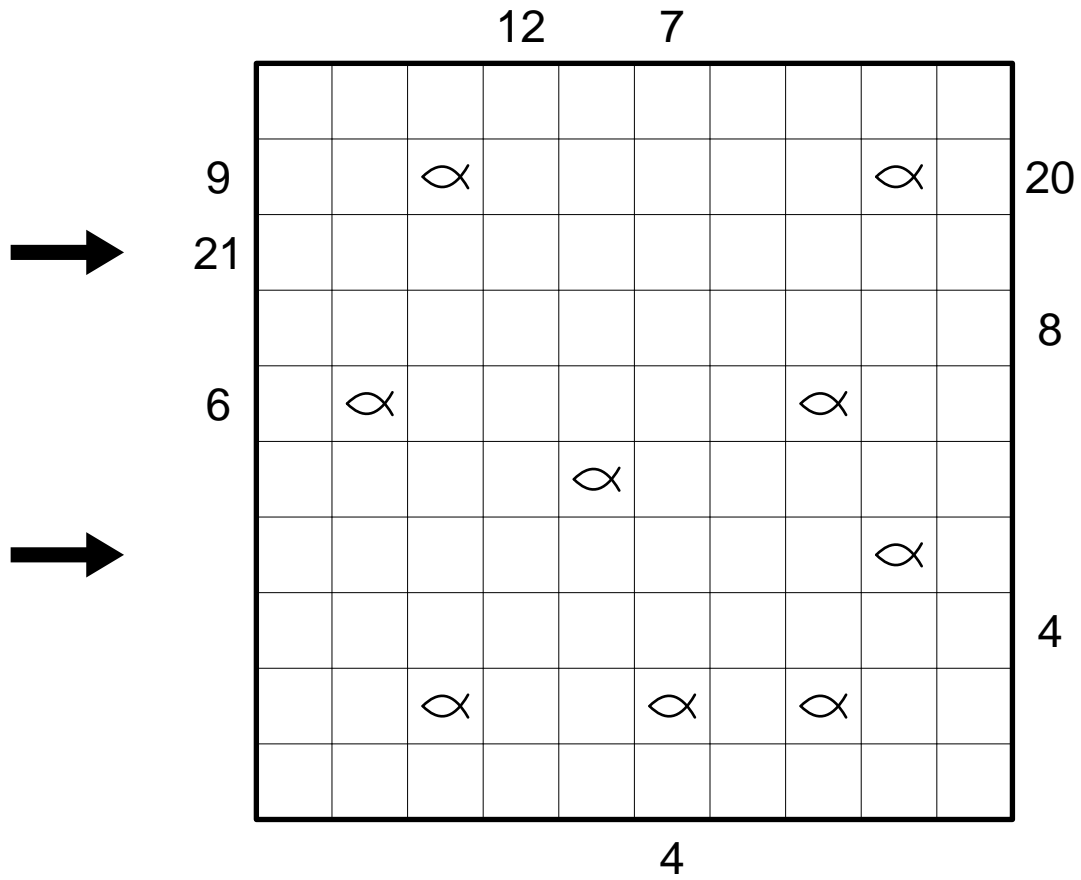
Answer key: For all cells of the marked rows, enter the length of the fishing line using that cell. Use '–' for empty cells.

11. Tapa word chains   30 points

Place some letters into the grid, so that the given words can be read as „word chains": Starting with the initial letter, every letter must be horizontally or vertically adjacent to the previous letter. Word chains may take any number of turns. However, two letters may be adjacent in the grid only if they are part of such a word chain. Each word must appear in the grid exactly once.

Further, Tapa rules must be observed with regard to the cells filled with letters. The numbers indicate how many of the horizontally, vertically and diagonally adjacent cells contain letters: each number corresponds to a group of horizontally and vertically continuous letters, several groups are separated by one or more empty cells. Position and order of the numbers within a cell are irrelevant.

All letters are connected horizontally and vertically, and no 2×2 square may be completely filled with letters.

		7	7		
4					
			2		

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MASTERS

ZWANZIG

ELF

Answer key: Enter all letters from top to bottom; ignore numbers and empty cells.

12. Gapped Kakuro   30 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.

Some white cells may remain empty. Empty cells may not be horizontally or vertically adjacent, but they may touch diagonally.
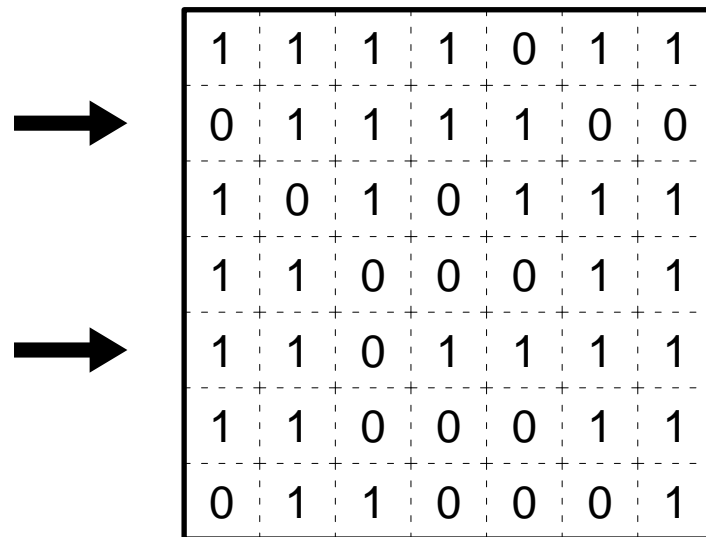
Answer key: Enter the digits in the marked rows from left to right. Use '–' for empty cells. Ignore the grey cells.

13. Binary dissection   35 points

Divide the grid into rectangles of sizes 1×1, 1×2, 1×3 and 1×4, so that every binary number from 1 to 1111 can be found in one of these rectangles. Numbers must be read from left to right or from top to bottom.

1	1	1	1	0	1	1
0	1	1	1	1	0	0
1	0	1	0	1	1	1
1	1	0	0	0	1	1
1	1	0	1	1	1	1
1	1	0	0	0	1	1
0	1	1	0	0	0	1

```
1 = 1          5 = 101      9 = 1001     13 = 1101
2 = 10         6 = 110     10 = 1010     14 = 1110
3 = 11         7 = 111     11 = 1011     15 = 1111
4 = 100        8 = 1000    12 = 1100
```

Answer key: For all cells of the marked rows, enter the number (converted to decimal) of the respective rectangle.

14. Number path   35 points

Choose a starting cell, then draw a path into the grid that travels only horizontally and vertically and visits every cell exactly once. If you number the cells along the path consecutively, beginning with 1, each of the given numbers borders the respective cell of the path.
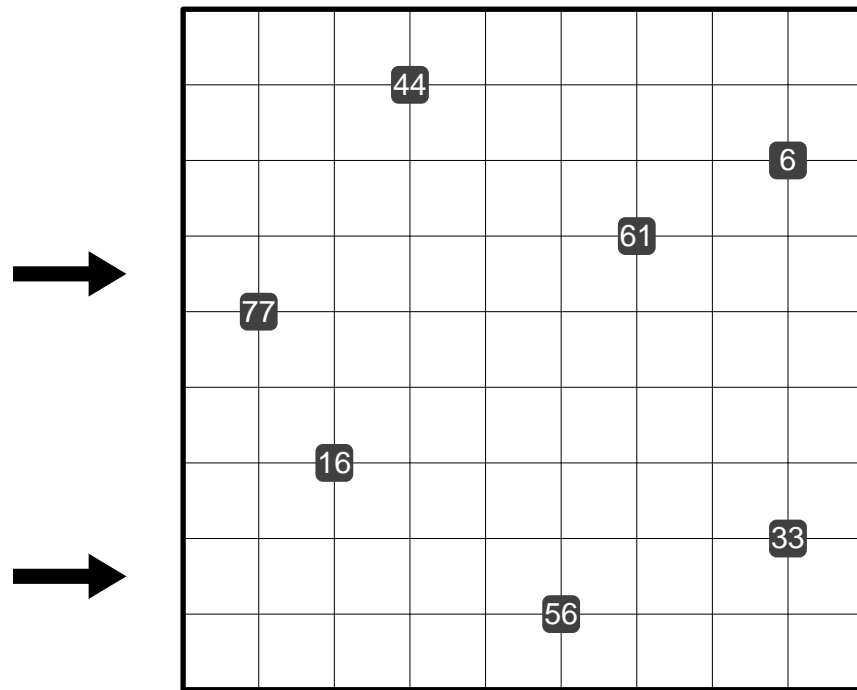

Answer key: Enter the numbers in the marked rows from left to right.

15. Paint by encrypted numbers   40 points

Replace the letters from A to J by digits from 0 to 9, so that all numbers from 1 to 29 appear in the grid (each number appears exactly once). Draw a path into the grid according to the following rules: Connect the points 1 and 2 by a straight line, similarly 2 and 3, 3 and 4, and so on up to 29. The path formed by this procedure may not touch or intersect itself.

The grid lines serve as orientation only.
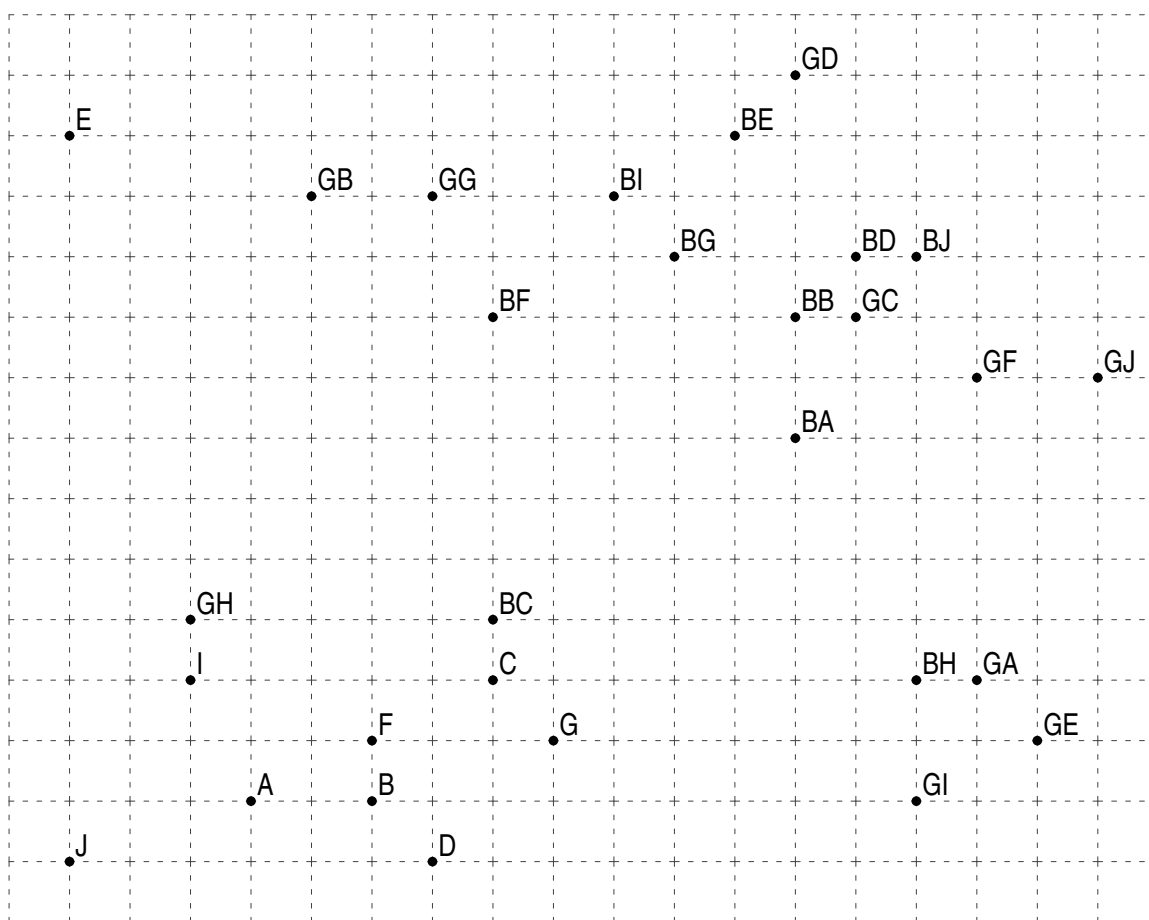
A	B	C	D	E	F	G	H	I	J

Answer key: Enter the digits corresponding to the letters ABCDEFGHIJ, in that order.

16. Area Tapa   45 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 may 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 continuous black cells, several groups are separated by one or more white cells. Position and order of the numbers within a cell are irrelevant.

Each outlined area must contain exactly five black cells.
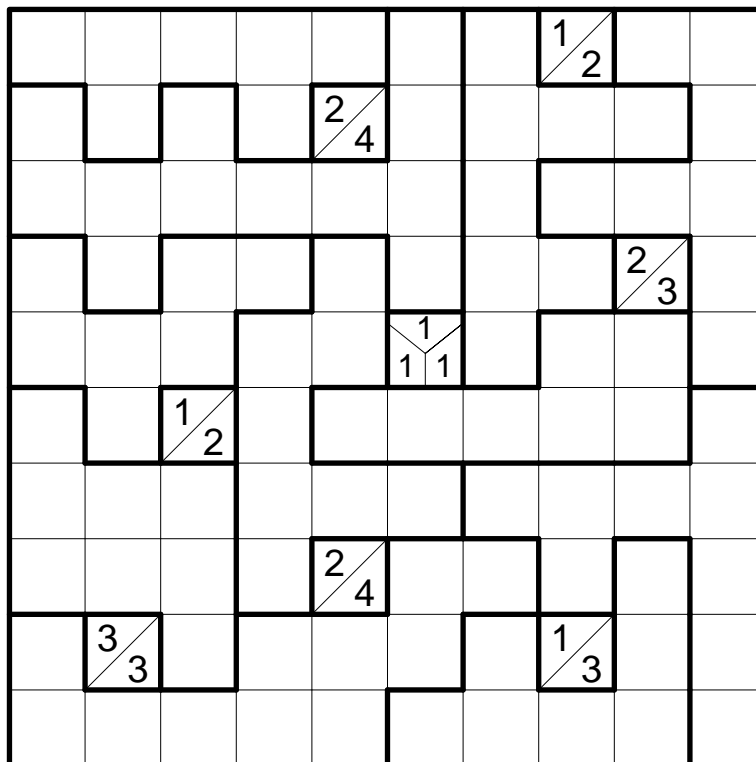
Answer key: For each row from top to bottom, enter the number of black cells in that row.

17. ABC Box with number clues   50 points

Fill the grid with letters A, B and C; no cells may remain empty.

The letters, numbers and question marks describe the letters in the respective row or column. Each symbol corresponds to a group of adjacent cells filled with the same letter; two adjacent groups must consist of different letters. The order of the symbols is the same as the order of the groups.

A letter outside the grid corresponds to a group of cells filled with that letter; a number outside the grid is equal to the length of the corresponding group. A question mark corresponds to a group with no further information.

Column clues (top to bottom):

```
                ?
                ?
        ?       A  A
        ?  C  ?  C  ?       3
        3  2  B  2  ?  ?  ?
        ?  B  ?  ?  ?  ?  1
```

Row clues (left of grid):

```
        ?  ?  2
        ?  3  ?  ?
→    ?  ?  ?  ?  ?
   A  ?  B  ?  C  ?
        ?  B  A  ?
→    ?  ?  3  ?
     ?  B  2  ?  A
```

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

18. Renban 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.

Horizontally, vertically and diagonally connected grey cells form Renban groups. Each Renban group must contain consecutive digits in any order, and within such a group no digit may repeat.
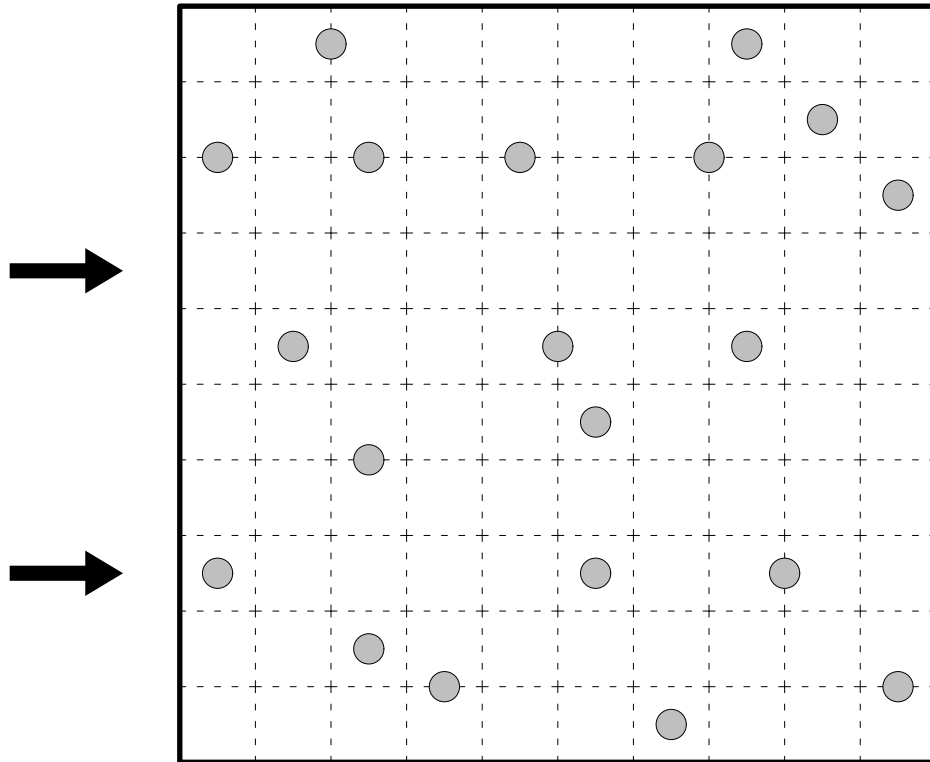

Answer key: Enter the digits in the marked rows from left to right.

19. Galaxies   55 points

Divide the grid along the grid lines into several areas. Each area must contain exactly one circle and have point symmetry with regard to that circle.

Answer key: For all cells of the marked rows, enter the size of the respective area.

20. Fences variation: letter pairs   60 points

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

For each pair of identical letters, one of them must be inside the loop and the other one outside.

Please take care not to confuse the letters O and I with the digits 0 and 1!

O				2	R	1		
3			3			E	3	3
					2		U	
	L	O	G	I	C		Q	
Q	M	A	S	T	E	R	S	M
	U	3		2	0	1	1	
		A	3					C
	1		L		2	T	3	
2	2		3	I				G
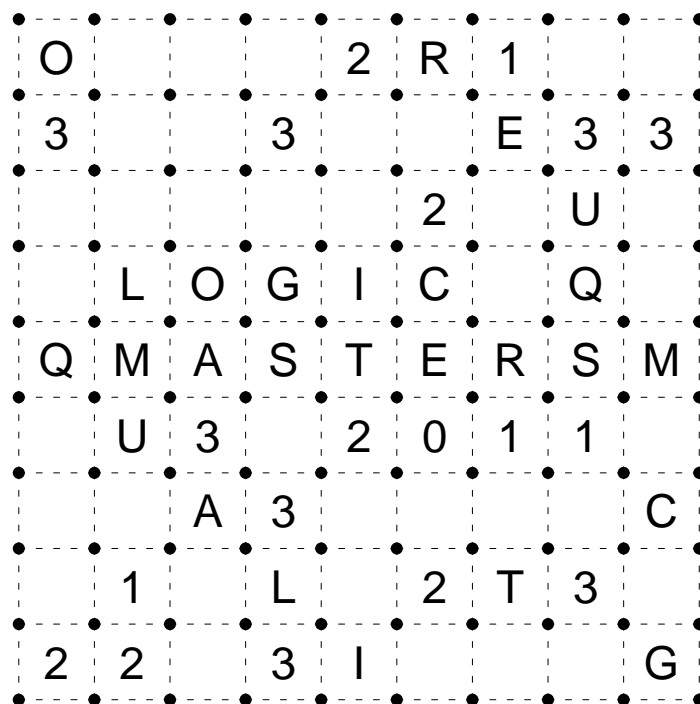
Answer key: Enter the size (number of cells) of all areas outside the loop. Start in the top left corner of the grid and proceed clockwise.