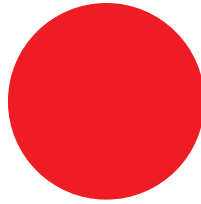


APRIL CONTEST

L 2
M 0
I 2
1



by Riad Khanmagomedov

Submissions should be sent on the answer page at LMI not later than 24-00 (of Moscow time) April 29 2021

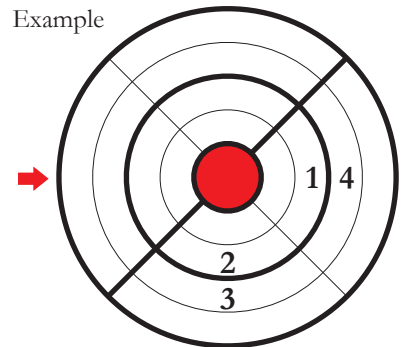
Thanks to Deb Mohanty, Kota Morinishi, Prasanna Seshadri and Rakesh Rai for support

1. SUDOKUSCOPE

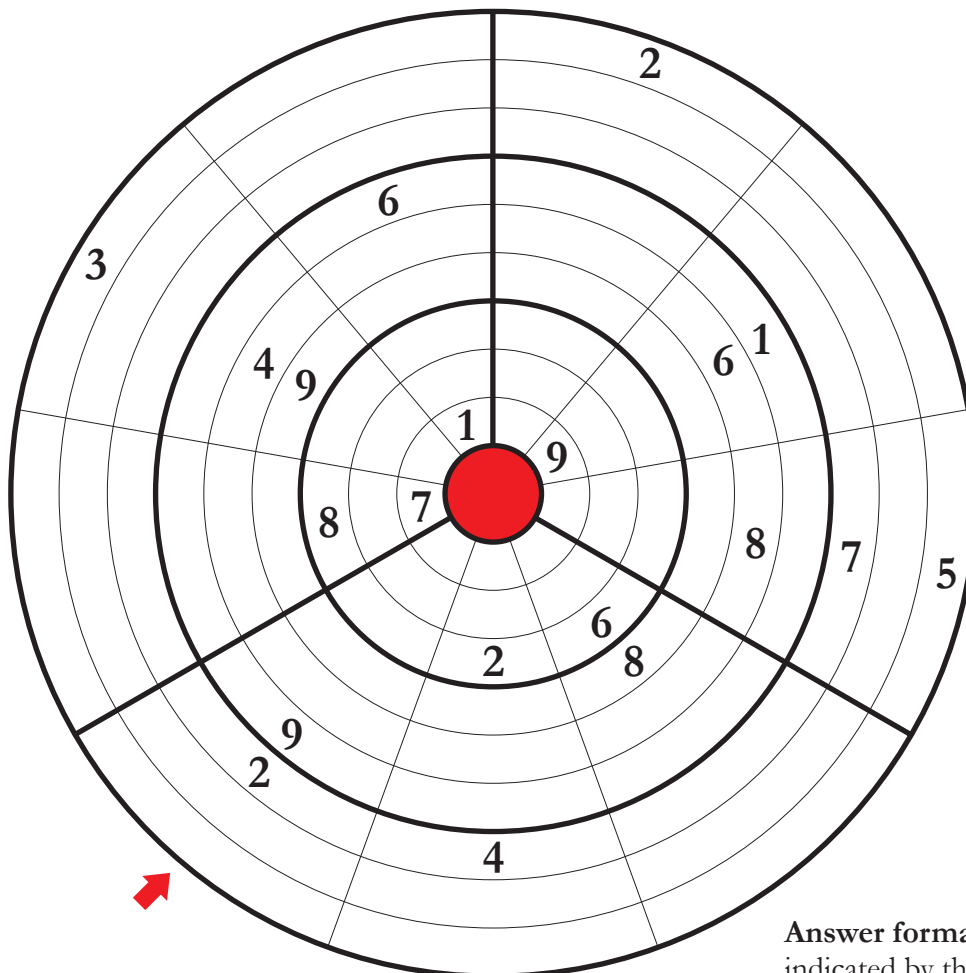
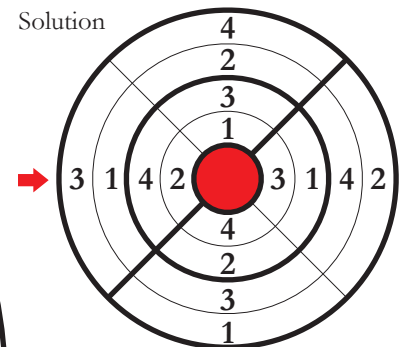
8 pt

Place a digit from 1 to 9 into each of the empty cells so that each digit appears exactly once in each ring (innermost to outermost), each 9-cell sector of the target and each circle part bordered by thick lines. No digit can be the arithmetic average of two adjacent digits above and below, or two adjacent digits left and right.

Example



Solution



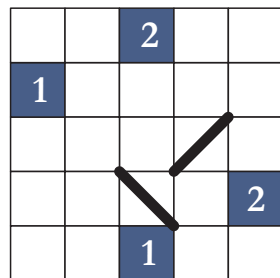
Answer format: Write the 9 digits in the sector indicated by the arrow. For the example: 3142.

2. AKARI WITH MIRRORS

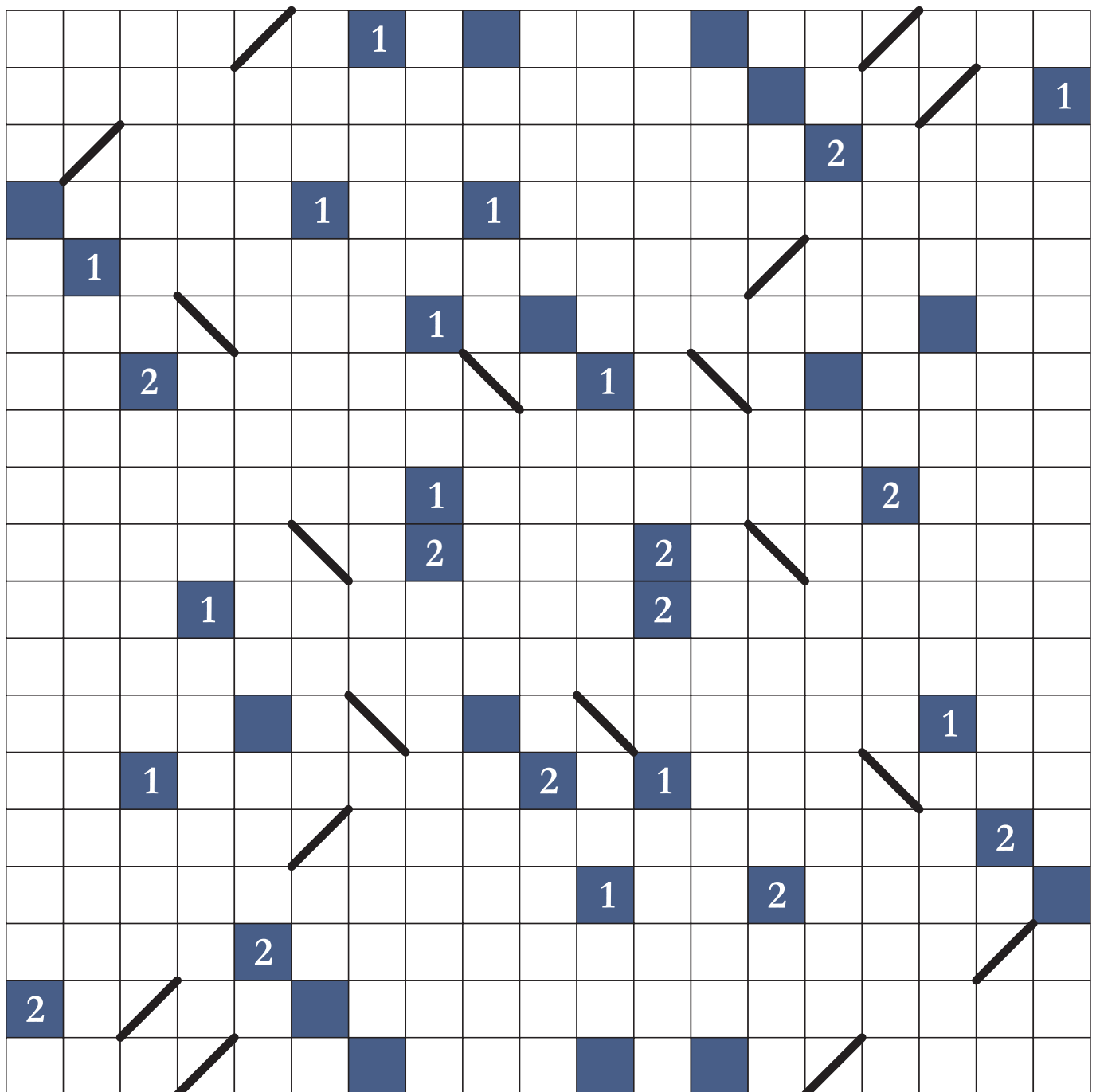
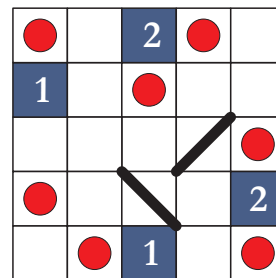
3 pt

Draw some lamps in empty cells. Lamps cannot be on half-cells. All white cells and half-cells should be lit by one or more lamps, but no lamps can light each other. A white cell or half-cells is lit if it is in the same row or column with a lamp and no dark cell or mirror (diagonal section) is located between them. Light changes direction by 90° after touching the mirror. The given digits in the cells indicate the number of lamps in adjacent cells (horizontal or vertical).

Example



Solution



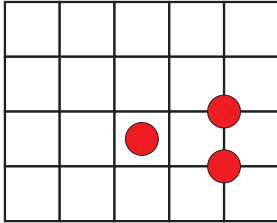
Answer format: Write the total number of lamps. For the example: 7.

3. CIRCUIT

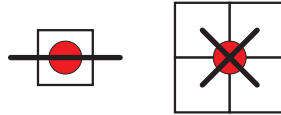
4 pt

There are two types of circles – Central (at the centers of the cells) and Nodal (at the nodes of the grid). Draw a loop that passes once through the centers of all cells, and must pass straight through each circle. The loop must cross itself in nodal circles, and does not cross itself anywhere else. The loop consists of horizontal and vertical segments in all cells not touching the nodal circles. The loop cannot turn in cells with central circles.

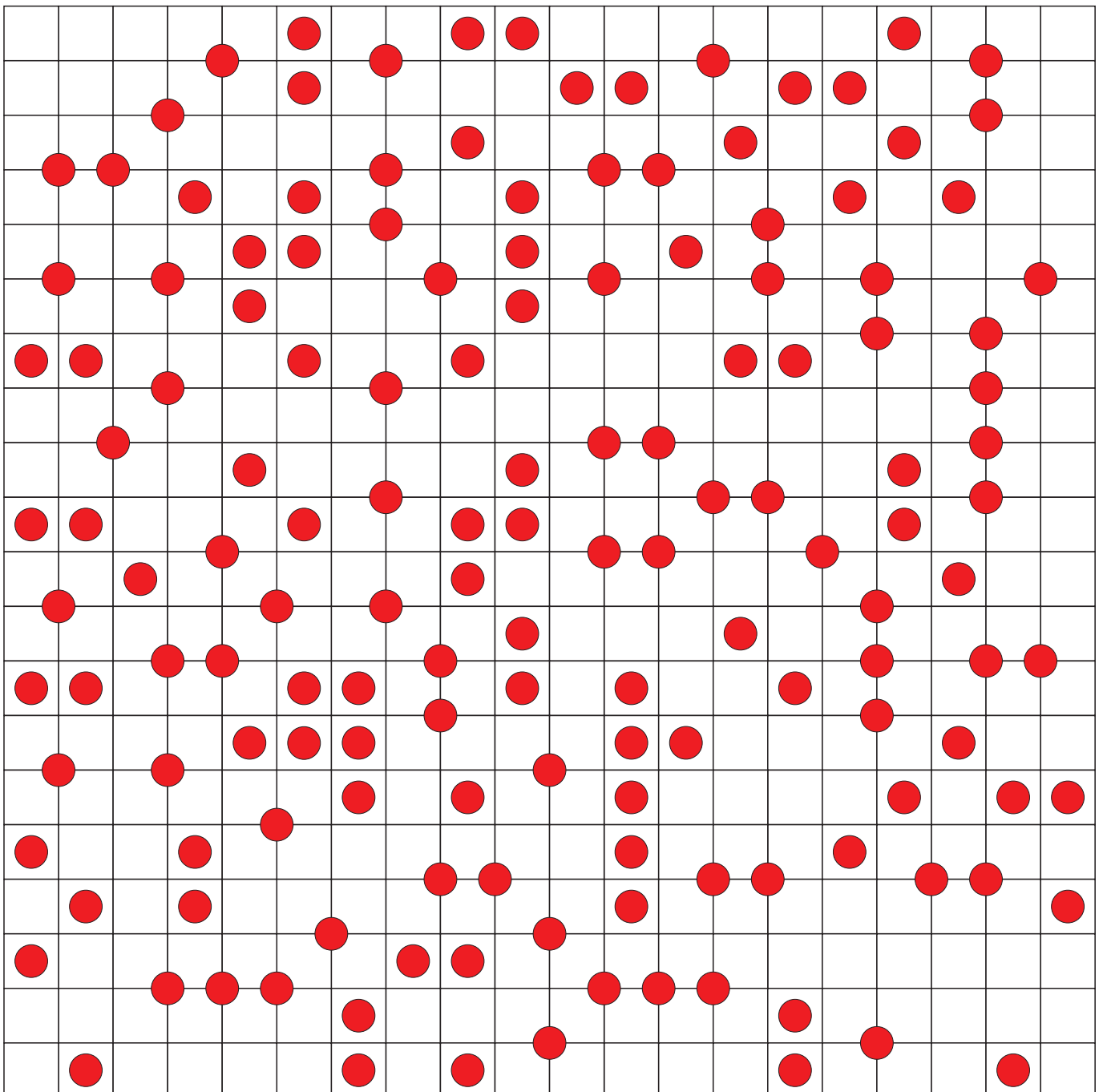
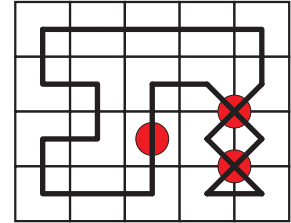
Example



Loop image options:



Solution

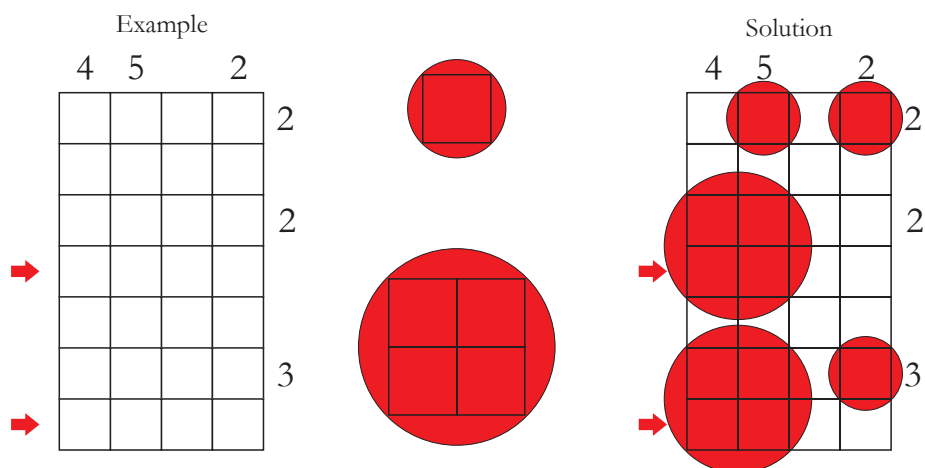


Answer format: Write the total number of right angle turns of the loop. For the example: 11.

4. BUBBLES

5 pt

Draw some red circles of the given sizes so that they do not touch or intersect one another. The numbers outside the grid indicate the number of completely red cells in the corresponding rows and columns.



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

Answer format: Write the content of marked rows from left to right, using R for completely red cells and W for other cells. For the example: RRWW, RRWW.

5. MINING

5 pt

Place some mines into the empty cells, no more than 1 mine per cell. Each digit shows the number of mines in the neighbouring (even diagonally) cells. Some digits have been replaced with a ? sign – these digits must be determined as part of solving. Black out all the empty cells. The remaining white area, consisting of digits and mines, must be orthogonally connected. Black cells can touch each other only diagonally.

Example

↓

→	?	3			?	
	?			?	2	1
		5		5		
	3	?	4			3
	?			1	1	

Solution

↓

→	?	3	●	●	?	■
	?	●	●	?	2	1
	■	5	■	5	●	■
	●	●	●	●	●	●
	3	?	4	■	●	3
	?	●	■	1	1	■

↓

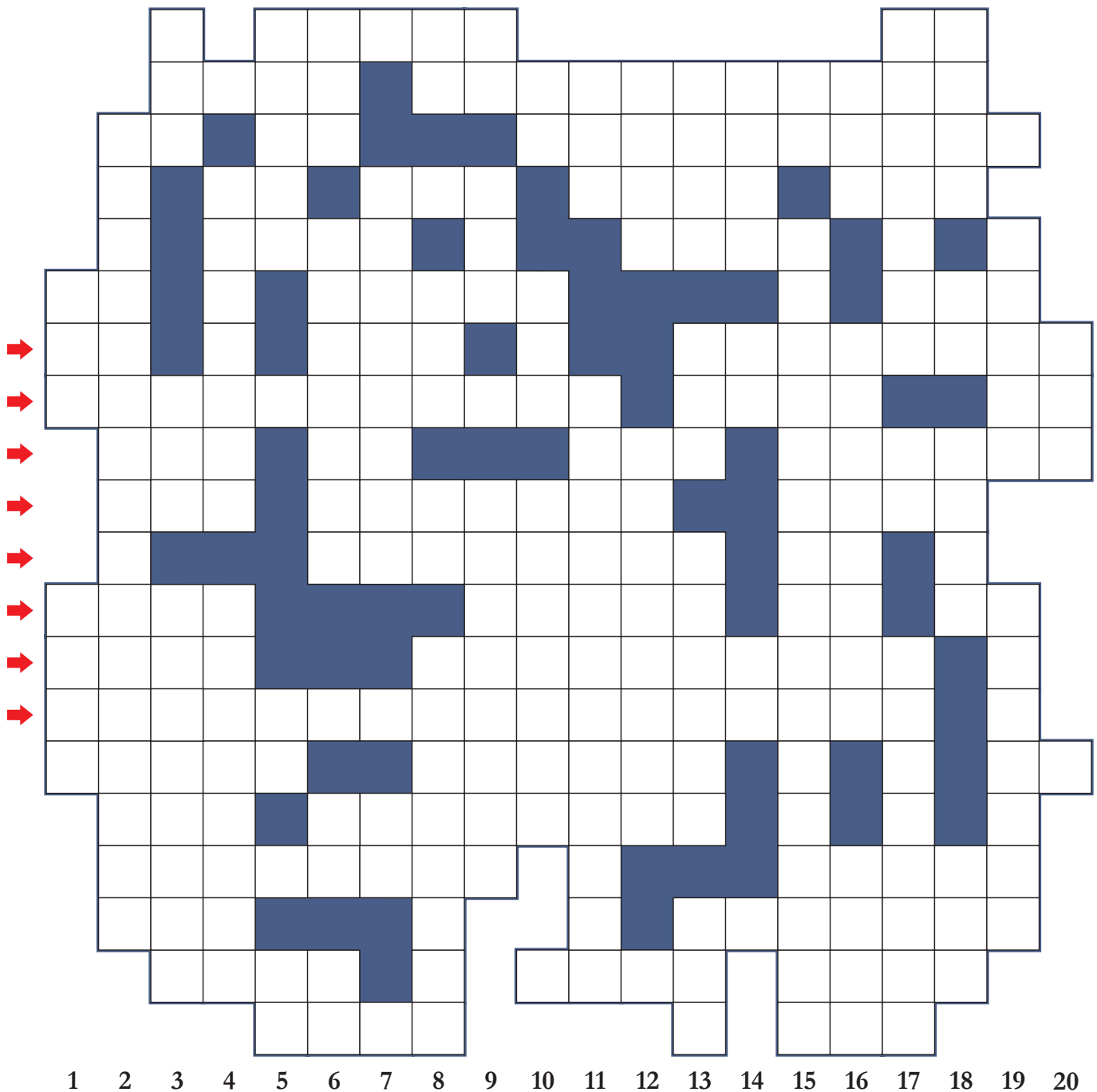
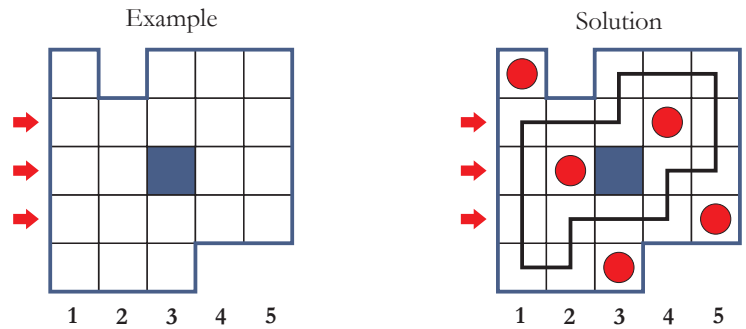
		2		?					?				2	
?			4		3		3		3			3	2	
	4					?	?		4			3	3	
		4		4	3		?		?				2	
	3		3			3		3	?			4	?	
	?		5		4			?		3				
1										?		?	3	
	3		4			?	?		4	4		3		
2			?		3		2						?	
		3		?				?	4			3	3	
	?				3					?		3	?	
2					4		4	3		?		3		
			3	?				3					4	
?	4	?			4				3	?			?	
	?		4							1	?		?	
→			2		3		?		3	2		?	3	2

Answer format: Write the content of the marked row from left to right and the marked column from top to bottom. Use B for black cell and M for mine. Replace the ? signs with the corresponding digits. For the example: 13MM1B, B1BM3B.

6. INTERSTELLAR ROUTE

6 pt

Draw circles in some white cells, so that each row and column contains exactly 2 circles (1 in the example). Cells with circles do not touch each other, not even diagonally. There should be single loop going between the centres of all empty white cells. The loop consists of horizontal and vertical segments and cannot touch or cross itself.



Answer format: Write the coordinates of all cells with circles in the marked rows from left to right row by row. For the example: 4, 2, 5.

9. CHAIN

8 pt

Starting from the black square, draw a loop along the circles passing through all horizontals (they are shown by lines outside the grid) and the verticals and consisting of fragments with ends at black dots. When moving clockwise, the lengths of these fragments must alternate in the sequence 1-2-3-1-2-3...1-2-3 (a quarter circle is taken as one unit of length). The loop cannot pass through the black crosses. The loop does not cross and does not touch itself. Some loop fragments are already given.

Example

Solution

Answer format: Write the content of the dotted horizontal line from left to right. Use fragments lengths (1, 2 or 3) and 0 for quarter circles that the loop does not pass through. For the example: 030012230010.

10. OPTI-CIRCUIT

14, 11, 8, 5, 2 pt for the best solutions

Create a puzzle Circuit with a unique solution in the 10 x 8 grid (see the rules on page 5). Minimize the number of circles in the grid.

Example

A								
B								
C								
D								
E								
F								
G								
H	I	J	K	L	1	2	3	4

Answer format: Write the total number of circles, and their coordinates row by row from left to right. For the example: 3, D3, EL, F3.

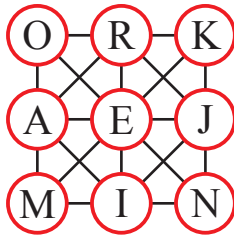
A																		
B																		
C																		
D																		
E																		
F																		
G																		
H																		
I																		
J																		
K																		
L																		
M																		
N																		
O																		
P	Q	R	S	T	U	V	W	X	Y	Z	1	2	3	4	5	6	7	8

11. OPTI-NAMES

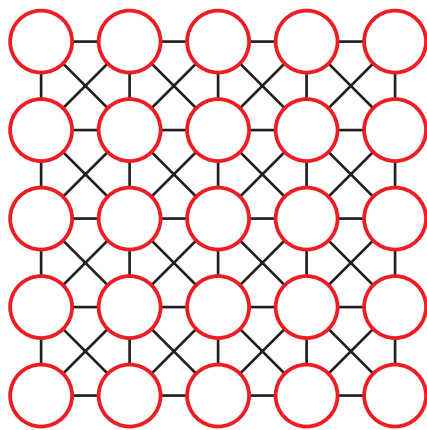
14, 12, 10, 8, 6, 4, 2 pt for best solutions

Write 25 different letters in the circles so that along the chains you can read N puzzlers from the list. You can use the appropriate letter more than once for each word. Names can be read in any direction, including diagonal ones, and can intersect with each other. Maximize N.

Example



Names used:
ARJEN, JEREMI, KEN



- | | | | |
|-----------|----------|-----------|----------|
| ALEXANDER | GANGHYUN | KAZUYA | ROBERT |
| ALEXIS | GARCHA | KEN | SERGEY |
| ANDREW | GAVRIEL | KRYSTIAN | SLADJANA |
| ANTONY | GIORGIA | KURO | SONU |
| ANURAG | GIULIA | LABHAM | SRAVANI |
| ARJEN | GIULIANO | LAURENT | STEFANO |
| ASHISH | HARMEET | LUCA | SWAGATAM |
| BJOERN | HARUKA | LUKASZ | TAKEMASA |
| BOGDAN | HIDEAKI | MANUELA | TAKUMA |
| BRANKO | HISASHI | MARCO | TANER |
| BRET | HUGO | MATHIS | TIM |
| BYRON | HYUNMO | MICHAEL | TOMASZ |
| CHARLES | ILARIA | MICHELE | TOMOYA |
| CHOI | IVAN | NICK | USEVALAD |
| CHRISTIAN | JAIPAL | NICOLAS | VERONIKA |
| CONNOR | JAKUB | NIKOLA | VIVEK |
| DANIELE | JAMES | OLGA | VIVIDH |
| DENIS | JAN | PAUL | VLADIMIR |
| DEYAN | JANKA | PAVEL | WALKER |
| EVA | JAVIER | PEAR | WEIFAN |
| FABIEN | JELENA | PHILIPPE | XIAO |
| FERNANDO | JEREMY | PIERDANTE | ZOLTAN |
| FRIEDHELM | JONATHAN | PRANAV | |
| GABRIELE | JOSEPH | RICARDO | |

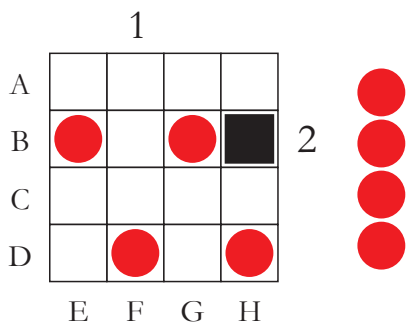
Answer format: Write N and enter the letters of the grid row by row. Add to each letter the number of names in the solution that begin with this letter. For the example: 3, ORK1, A1EJ1, MIN .

12. SUBMARINES

14, 11, 8, 5, 2 pt for best solutions

Create a puzzle Submarines with a unique solution in the 8 x 8 grid. Place 9 circles in some of the white cells. Circles cannot touch each other, not even diagonally. Digits outside the grid indicate the number of circles in the corresponding row or column. Use only 1 and 2 as the given digits, and these numbers can be used any number of times. You can also blacken N cells in the grid. Minimize (S + N) where S is the sum of all given digits.

Example



Answer format: Write the value of (S + N). Then write the digits above the grid from left to right, and then the digits to the right from top to bottom. Use "-" for columns and rows without a digit. Finally write the coordinates of the black cells row by row from left to right. For the example: 4, -1--, -2--, BH .

