

# A P R I L C O N T E S T 2 0 1 9

by Riad Khanmagomedov

Submissions should be sent on the answer page at LMI not later than 24-00 (of Moscow time) April 10 2019

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Andrey Boklagov, Melek Khanmagomedova and Prasanna Seshadri for support

## 1. SIERPINSKI TRIANGLE

Fill a digit from 1 to 8 in the white triangles so that digits do not repeat in the three shown directions. Number in an orange triangle shows the sum of digits in all the white triangles that touch it.



Example

Solution

**Answer format:** Write the content of marked white cells from left to right. For the example: 41.



### 3. ROAD OF MINER

4 pt

Place 18 mines into the grid, no more than 1 mine per cell. Each given digit shows the number of mines in the empty neighbouring (even diagonally) cells. There can be no mines on cells with numbers. Additionally, draw a unique loop going through the centres of all cells and formed by horizontal and vertical segments. The loop cannot touch or cross itself. The loop must turn in each cell with mine. There must be exactly 1 turn between two consecutive mines in the loop.

Example

13 mines

1		3		3	
					2
			3		2
2					
	3		1		

Solution

18 mines

1	2				2	2	
		3				3	2
2	2	3					
		3			2		
			2				
	3			3		2	1
3		3	3			2	
				2	2		

**Answer format:** Write the number of cells with digits, where loop make turn. For the example: 5.

### 4. SUMINO

6 pt

Fill the white cells with digits from 0 to 6. Each number in orange cell indicate the sum of all digits in the white block (continuous white cells) in the indicated direction shown by arrow (horizontal, vertical or diagonal). In the white area find the borders of all 28 dominoes from 0-0 to 6-6. Dominoes cannot overlap each other.

Example

(dominoes from 0-0 to 2-2)

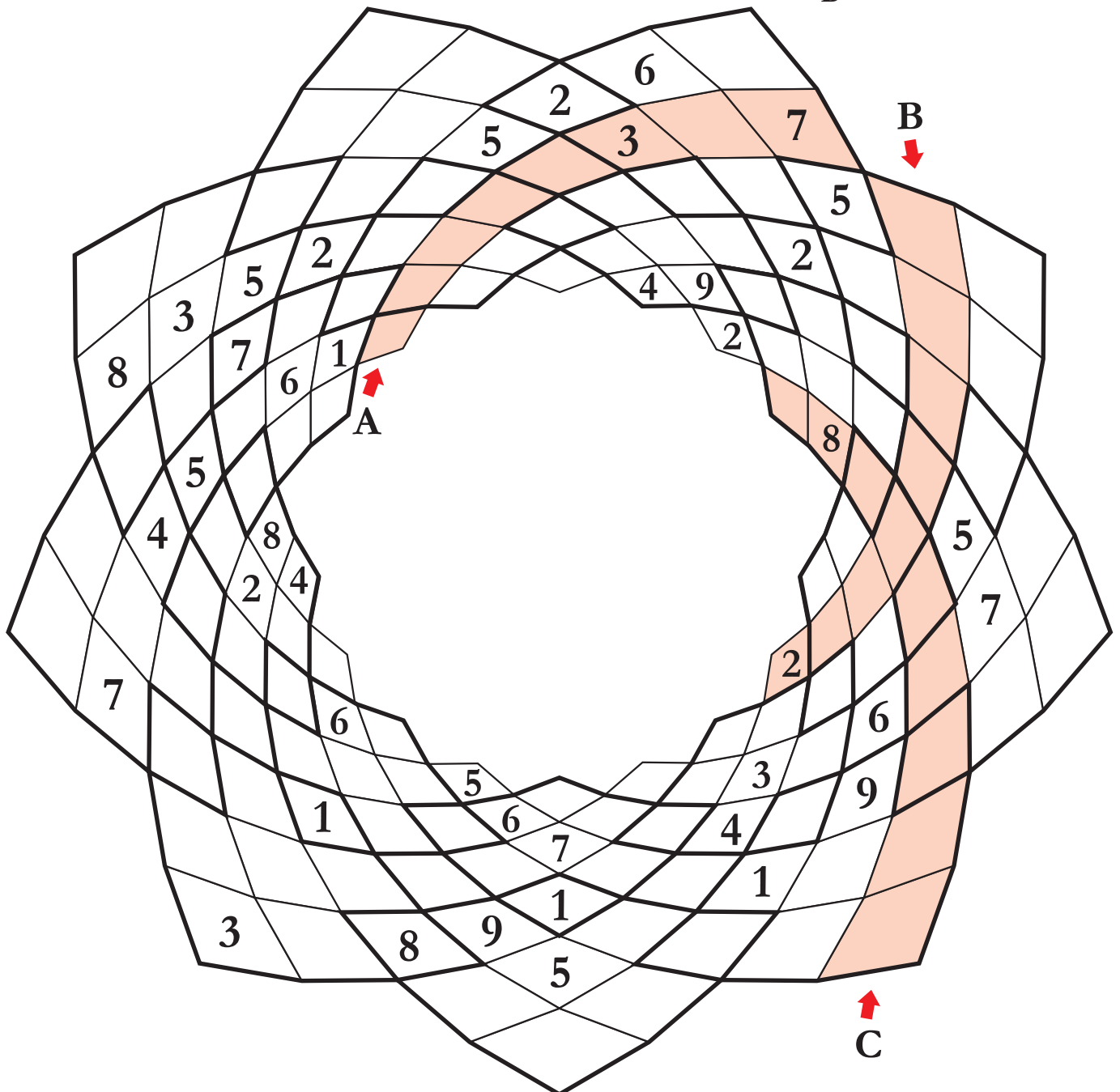
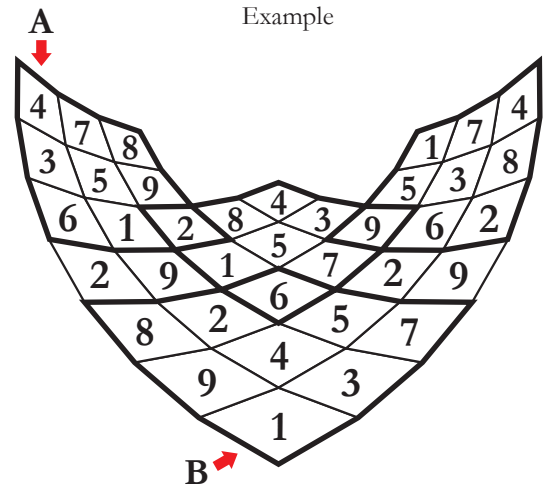
Solution

**Answer format:** Write the number of horizontal dominoes, then the 8 digits of marked column from top to bottom. For the example: 2, 2201.

### 5. PETALLED SUDOKU

5 pt

Fill the grid with digits from 1 to 9. Digits must be different in each 3x3 outlined area and along each arc.



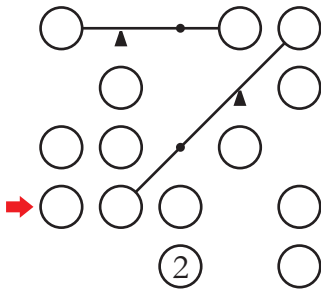
**Answer format:** Write the content of marked arcs from A, B, C, as indicated by arrows. For the example: 4362891, 1379284.

## 6. AT THE LEVERS

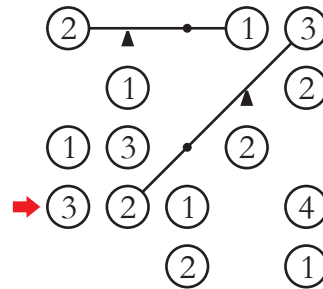
6 pt

Fill the circles with digits. Each row and column must contain all digits from 1 to N (where N = number of circles in the row/column). Some of the digits lie on a balance. For comparing different weights, multiply each digit by the length of the corresponding lever. Weight of the spokes is ignored.

Example

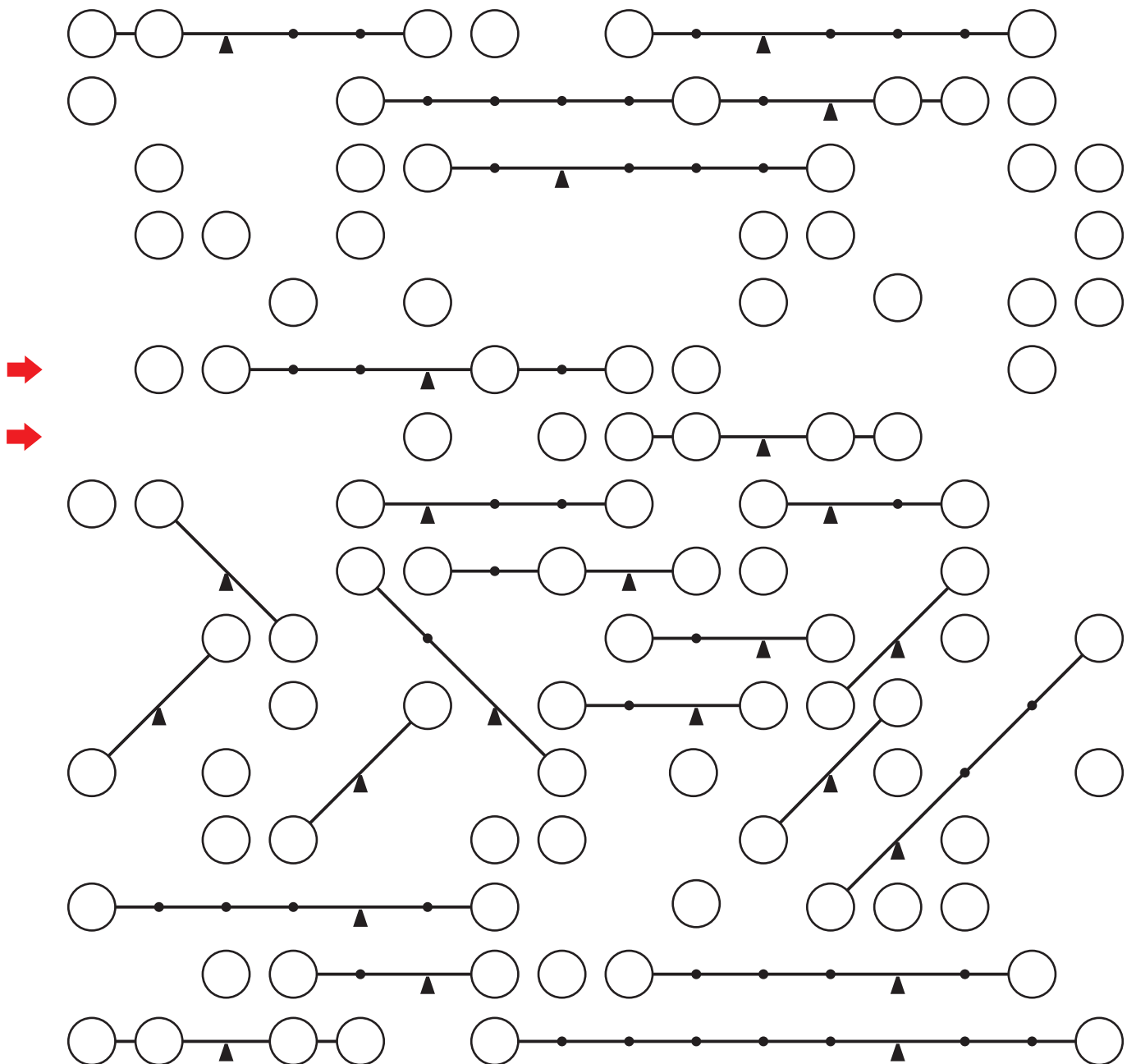


Solution



$$2 = 1 \times 2$$

$$2 \times 2 > 3$$

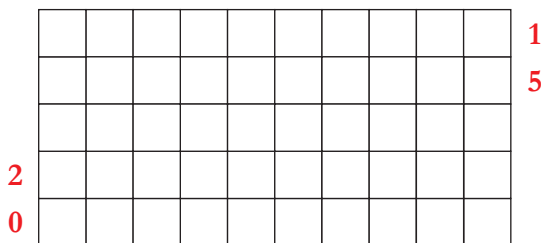
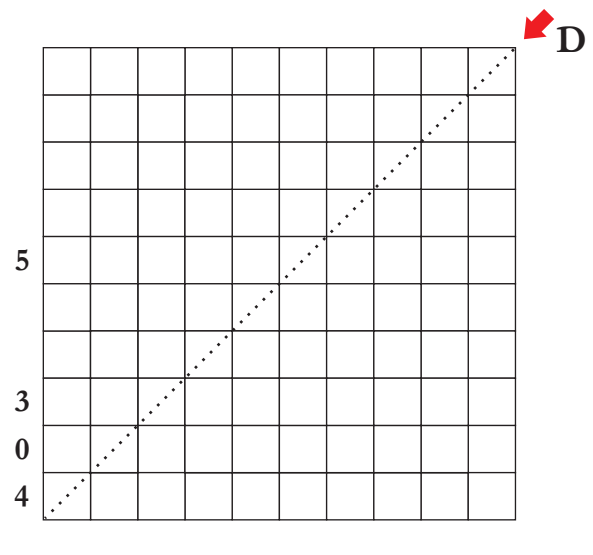
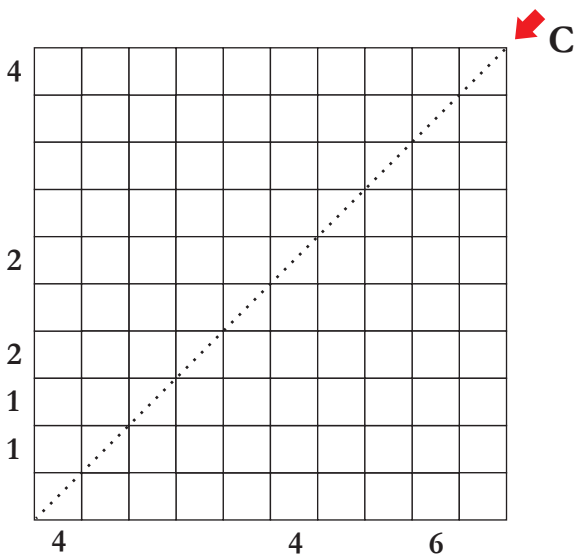
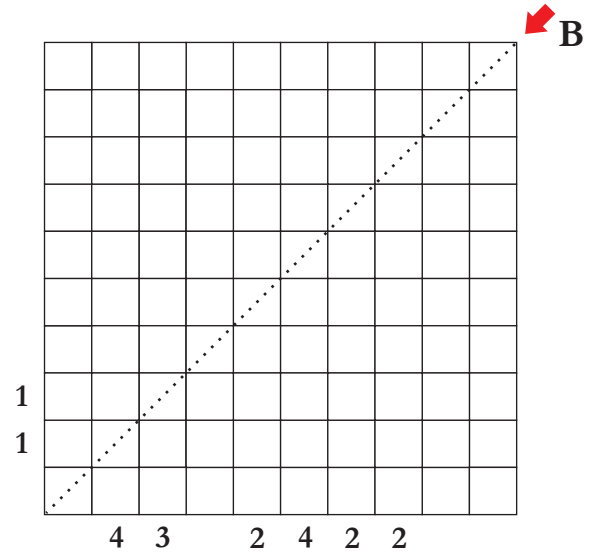
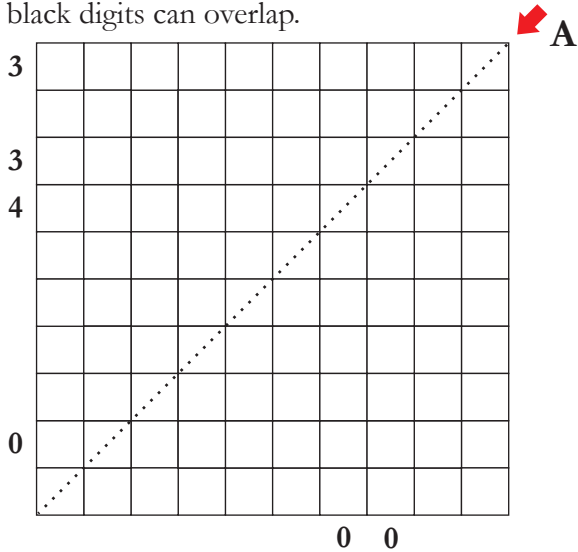


**Answer format:** Write the content of marked rows from left to right. For the example: 3214.

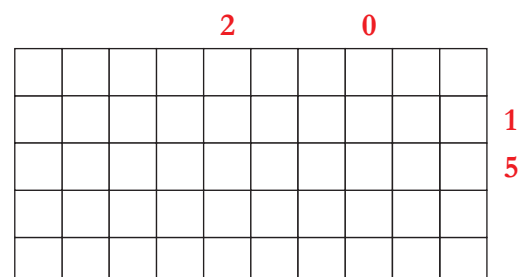
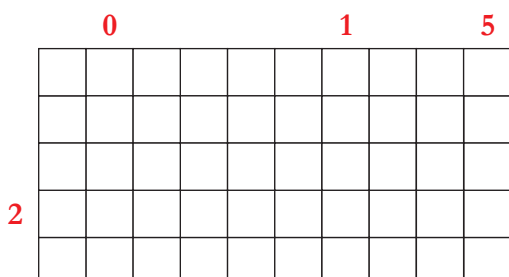
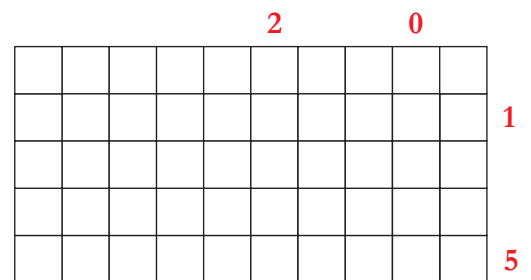
## 7. FRAGMENTS OF SEAS

10 pt (2.5 for each diagonal)

There are four 10 x 10 sea grids A, B, C and D. You need to solve the puzzle Battleships in these grids. There are also four 5 x 10 fragments of seas shown below. You need to determine which fragment belongs to which grid. The fragments are not necessarily located at the top or bottom borders of the grids. You need to place either 9 two-decked ships, or 9 three-decked ships, or 9 four-decked ships, or 6 five-decked ships in the four sea grids – one type in each grid. Ships cannot touch each other, not even diagonally. Red and black digits outside seas indicate the number of cells occupied by ships in corresponding 10-cell rows and columns. Red and black digits can overlap.



- 9 X
- 9 X
- 9 X
- 6 X



**Answer format:** Write the content of each diagonal from the top right corner to the bottom left corner. Use "S" for cells occupied by ship and "-" for other cells.

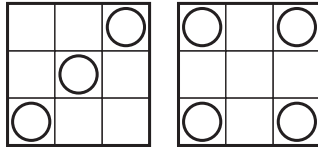
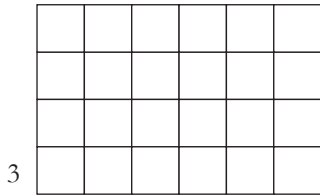
### 8. DICE MASYU

12 pt

Place all given half-dominoes into the grid. They cannot overlap each other. Half-dominoes can be rotated. Blacken some circles. Clues outside the grid indicate the total number of circles in the corresponding directions. Clues of the form M/N indicate that, in the corresponding row, there are M circles are of one colour and N circles of the other colour. There should be a single loop going through the centres of some cells and formed by horizontal and vertical segments. The loop does not visit any cell more than once. At every cell containing a white circle, the loop must pass straight through that circle and make a 90° turn in at least one of the cells adjacent to the circle. At every cell with a black circle, the loop must make a 90° turn and travel straight through both cells adjacent to the circle.

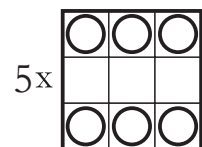
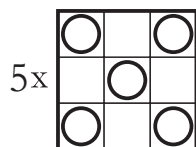
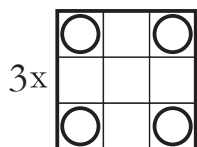
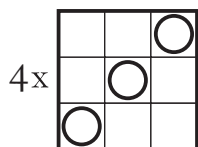
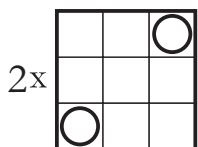
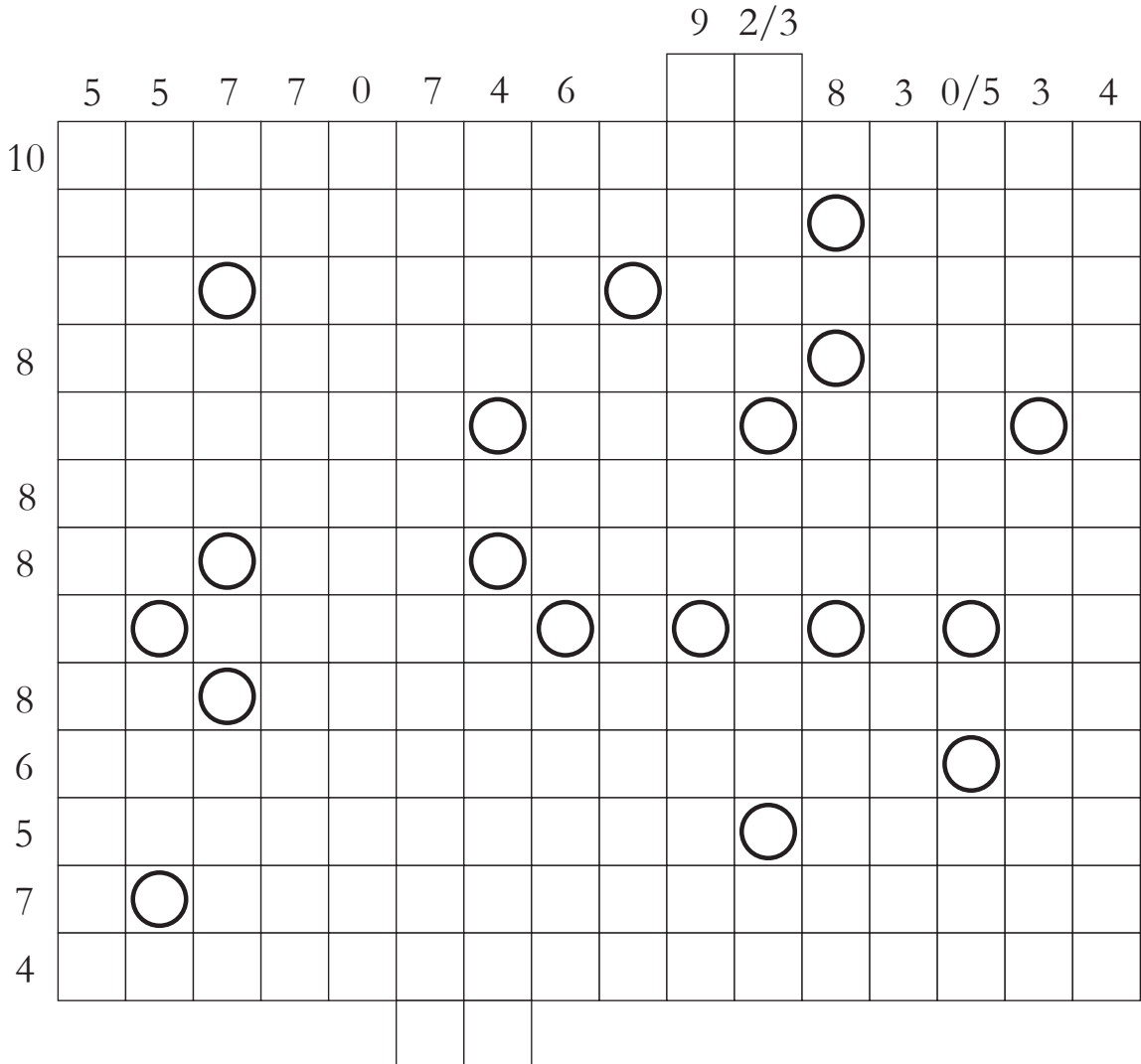
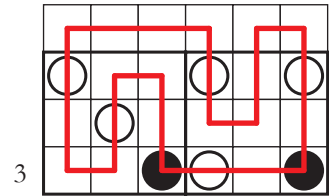
Example

2



Solution

2



**Answer format:** Write the number of all turns of the loop. For the example: 12.

### 9. CROSSWORD WITH TIPS

12 pt

Place 41 different names from the list in the crossword grid. Words should read from left to right or top to bottom. Wherever a letter is given with an arrow, the letter must be used in the word marked by the arrow.

- |        |        |         |        |        |        |
|--------|--------|---------|--------|--------|--------|
| AASHAY |        |         |        |        |        |
| ALEXEY |        |         |        |        |        |
| ALYONA |        |         |        |        |        |
| ANITEI |        |         |        |        |        |
| ANNICK |        |         |        |        |        |
| ANURAG |        |         |        |        |        |
| ASHISH |        |         |        |        |        |
| ATTILA |        |         |        |        |        |
| BJOERN |        |         |        |        |        |
| BOJANA |        |         |        |        |        |
| BRANKO |        |         |        |        |        |
| CHENYU | HATICE |         |        |        |        |
| DANIEL | HELENA | KAZUYA  |        |        |        |
| DEEPTI | HOWARD | LASZLO  |        |        |        |
| DILLIP | ICHIRO | LEONID  | PIERRE | SAMUEL | THOMAS |
| DINESH | ISTVAN | LEVENT' | PIHUNG | SAUMYE | TOMOYA |
| DMITRY | JAAKKO | LUKASZ  | PLUCKY | SERGEY | ULRICH |
| DMYTRO | JAANUS | MAKSIM  | PRANAV | SERHAT | VICTOR |
| DRAGAN | JAIPAL | MARCEL  | PRATIK | SERHIY | VIKTOR |
| ESTHER | JASPAL | MARKKU  | PUNEET | SERKAN | VISHAL |
| EVGENY | JAVIER | MARKUS  | RAINER | SHANTA | WALKER |
| GAURAV | JEANNE | MARTIN  | RAJESH | STEVEN | WEIFAN |
| GEORGE | JELENA | MEHMET  | RAKESH | SUNDER | YOICHI |
| GEORGI | JEROME | NEERAJ  | RASHMI | TAKEYA | YUJIRO |
| GIULIA | JHONNY | NIKOLA  | ROBERT | TAKUMA | ZOLTAN |
| GIULIO | JUDYTA | ONDREJ  | SABINE | TAKUYA | ZRINKA |
| GULCIN | KARTIK | PALMER  | SACHIN | TANTAN | ZUZANA |

**Answer format:** Write the 11 letters of marked diagonal from top to bottom. For the example: AANA.





## 12. MAXIDOMINO

12, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1 pt for best solutions

You are given seven sets of digits from 1 to 6. Place all these digits in the 7 x 6 grid so that the Domino Search Puzzle has N solutions (1 or more). Find the borders of all dominoes from 1-1 to 6-6. Dominoes cannot overlap each other. Cells with some digits together form the connected regions. For each digit, choose an orthogonally connected region (containing only that digit) with maximum area. Add the digits in all six regions. This sum will be denoted by S.

Maximize the value of the expression (S/N).

Example

6	6	2	6	5	2	3
3	6	1	5	5	1	5
3	4	1	4	4	5	4
2	1	4	3	2	1	4
2	3	6	5	6	5	2
6	4	1	1	3	3	2

Solution

6	6	2	6	5	2	3
3	6	1	5	5	1	5
3	4	1	4	4	5	4
2	1	4	3	2	1	4
2	3	6	5	6	5	2
6	4	1	1	3	3	2

$$S=6*3+5*3+4*2+3*2+2*2+1*2$$

$$N=1$$


1	1										
1	2	2	2								
1	3	2	3	3	3						
1	4	2	4	3	4	4	4				
1	5	2	5	3	5	4	5	5	5		
1	6	2	6	3	6	4	6	5	6	6	6

**Answer format:** Write the value S/N (round to two decimal places), then describe the content of the grid row by row from left to right and from top to bottom. For the example: 53, 6626523, 3615515, 3414454, 2143214, 2365652, 6411332.