APRIL CONTEST 2023

by Riad Khanmagomedov

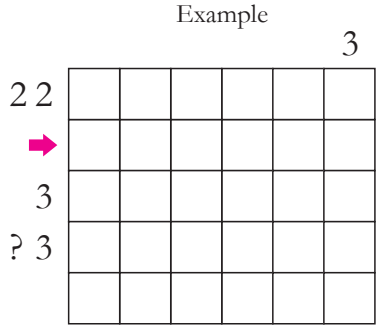
Submissions should be sent on the answer page at LMI not later than 24:00 (of India time) April 23 2023

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

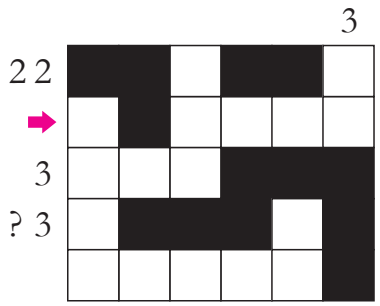
1. PAINT A MAZE — 3 pt

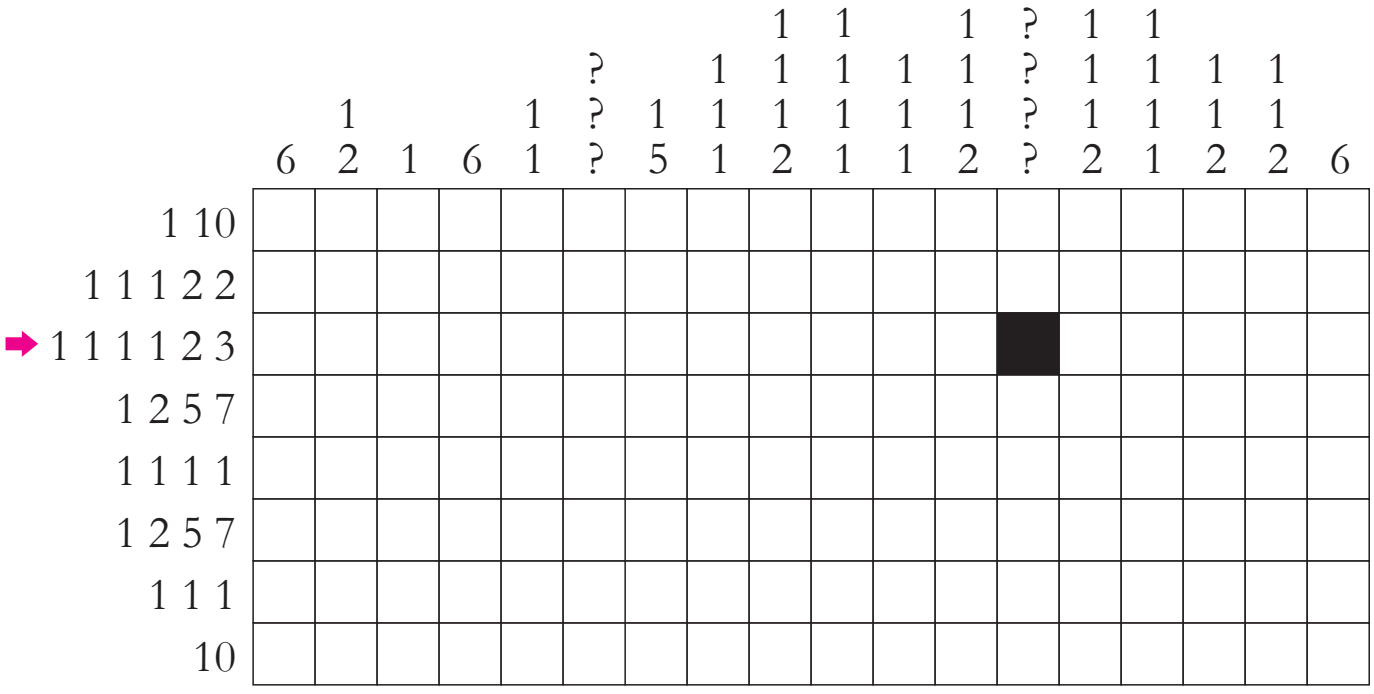
Blacken some cells in the grid. White cells should form a single interconnected area. There cannot exist any 2 x 2 cell area consisting of same colour cells in the grid. Numbers outside the grid show the lengths of all continuous blocks of black cells in corresponding directions, but not necessarily in order. There should be at least one white cell between two black blocks. The sign "?" means any positive number.

Example



Solution



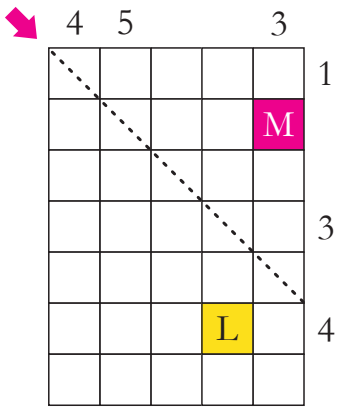


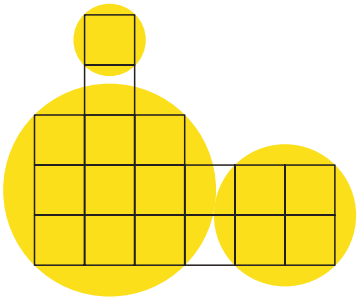
Answer format: Write the content of the marked row from left to right, using the letter B for the black cell and W for the white cell. For the example: WBWWWW.

2. COLORED BUBBLES **4 pt**

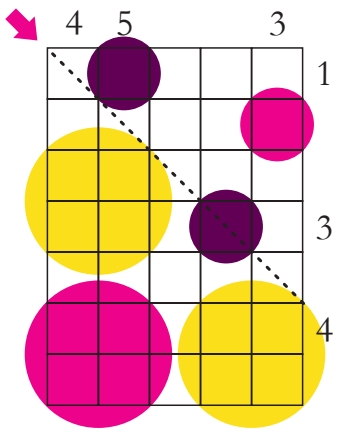
Draw some colored circles of the given sizes so that they do not intersect one another (touch is allowed, as in the picture). The numbers outside the grid indicate the number of completely colored cells in the corresponding rows and columns. Bubbles of the three colors are used – lemon, magenta and indigo. No circles of the same color can be on the same horizontal and vertical imaginary line. Two colored fragments of bubbles are shown.

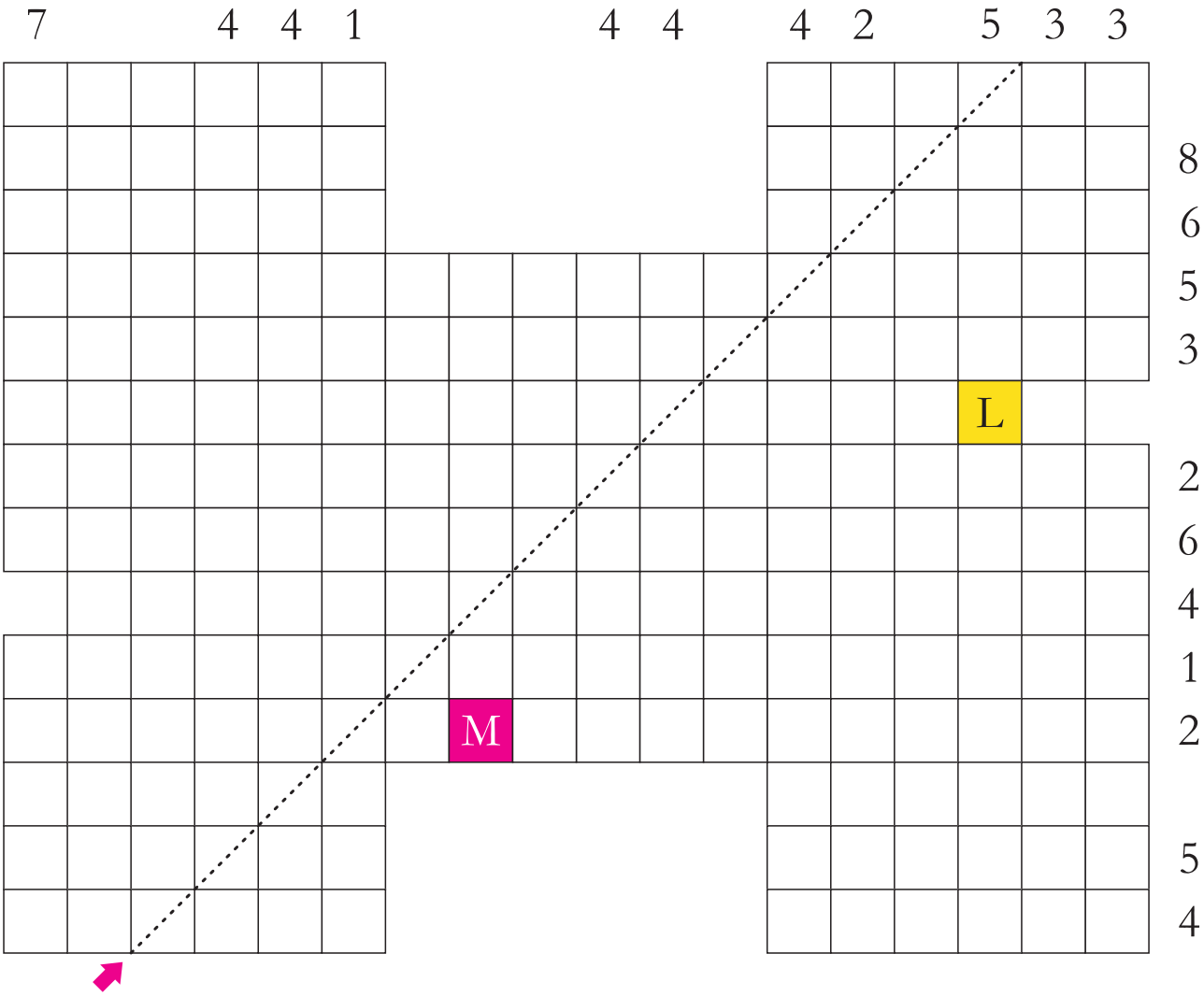
Example





Solution





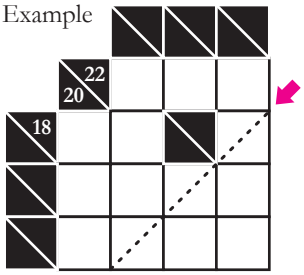
Answer format: Write the color content of marked diagonal from left to right, using L/M/I for completely lemon/magenta/indigo cells and W for other cells. For the example: WWWIW.

3. PALINDROMES IN SUMS

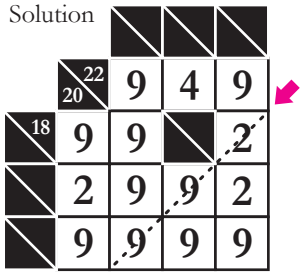
3 pt

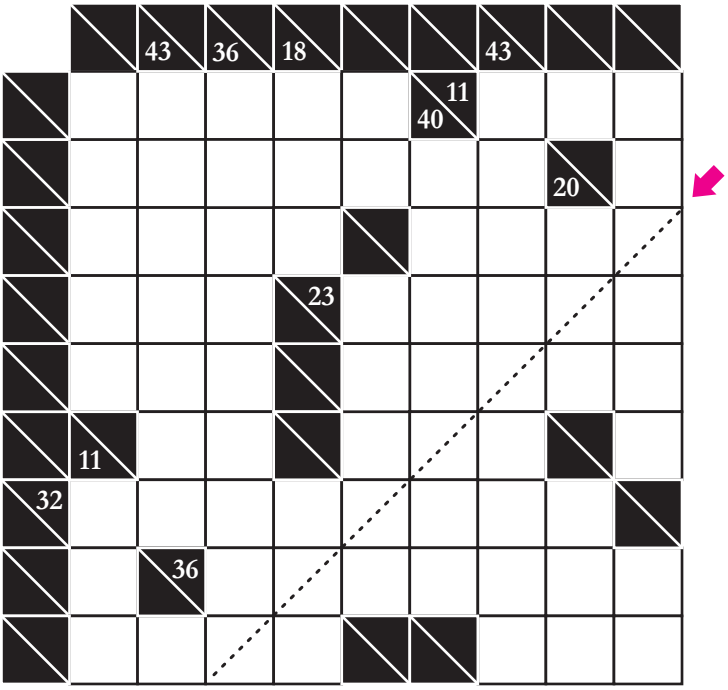
Fill the grid with digits from 1 to 9. The numbers in each continuous row and column are palindromes, that is, they must be read equally from left to right and from right to left. The numbers in the black cells show the sum of the digits in the corresponding rows and columns.

Example



Solution





Answer format: Write the content of marked diagonal from top to bottom. For the example: 299.

4. SUDOKU 4444

5 pt

Solve each grid using Classic Sudoku rules. They are connected in the following way: There exist exactly four rows where there are exactly 4 digits (not less or more) in the same columns-wise positions from left to right. In the example, there exactly 2 rows (Row 1 and Row 4) having two digits in the same column-wise positions from left to right.

Example

4			
		2	
			1
3			

	2		
4			1
			3

Solution

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

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

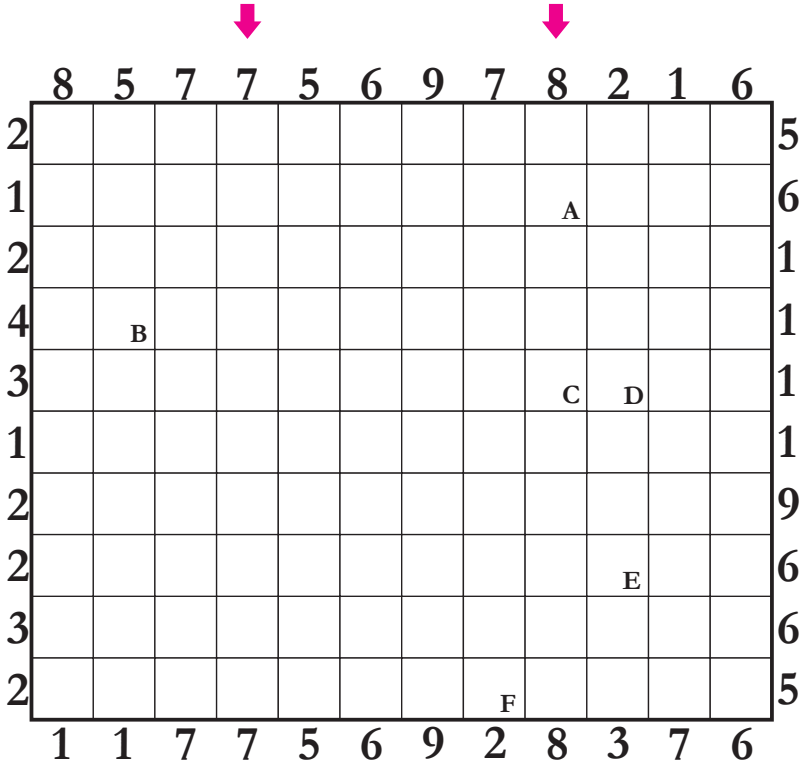
		1				9		
					9			5
	2	4		1	5	8		
		6		3	4			
	3						7	
			7	5		3		
		2	9	7		4	5	
4			2					
		9				6		

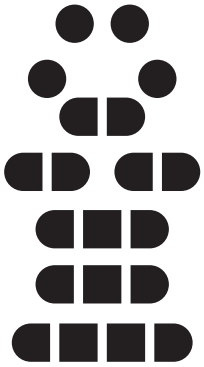
5	9					6	7	
						3		
7				1				2
9		7		5				1
						7		
1				2		5		9
6				8				3
		3						
	5	2					6	8

Answer format: Write the content of marked columns from top to bottom. For the example: 2341, 3412; 3142, 1324.

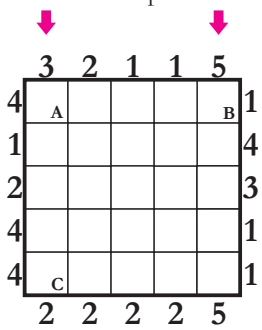
5. NAVIGATION 6 pt

Divide the grid along the grid lines into 8 connected areas. Each area should have an outlet to the border of the grid. The letters A–F denote the cells of six different areas. The digit shows how many cells in the corresponding row/column belong to the area adjacent to the border with this digit. In exactly two of the eight areas, place a flotilla consisting of 10 given ships. The cells occupied by different ships cannot touch, not even diagonally.

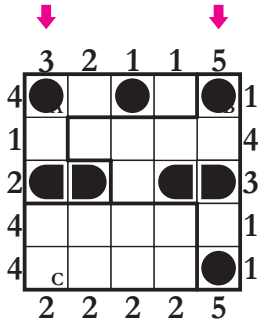




Example



Solution



Answer format: Write the content of marked columns from top to bottom. Use N for any ship segment where N is the size of that ship. For an empty cell, use the letter corresponding to the area. For the example: 1A2CC, 1B2B1.

6. ON THE SLY 11 pt

Solve a Minesweeper puzzle in the white part of the 20 x 20 grid. Each digit shows the numbers of mines in the neighbouring (even diagonally) cells. Locate 106 mines in the grid, one mine per cell. Its cannot occupy cells with digits. In the 20 x 20 grid, there should be a loop going through the centers of some white cells (including numbered ones). The loop consists of horizontal and vertical segments and cannot touch or cross itself in any way. Three of its fragments are marked. The grid is divided into 4 equal squares, each of which has 4 different rules. These rules of Masyu, My line, Path and Turns puzzles. Matching the ruleset to the sub-grid is up to the solver.

MASYU

Black out some mines. At every cell with a white circle the line 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. The circle rules must be met even if lines pass from a circle in this grid into another grid.

MY LINE

The line makes a 90° turn in each cell with a circle, and the lengths of the line segments wich form this turn are equal. The line passes through all the white cells of the 10 x 10 square. The length rule must be met even if lines pass from a circle in this grid into another grid.

PATH

The line goes through only all the cells without mines.

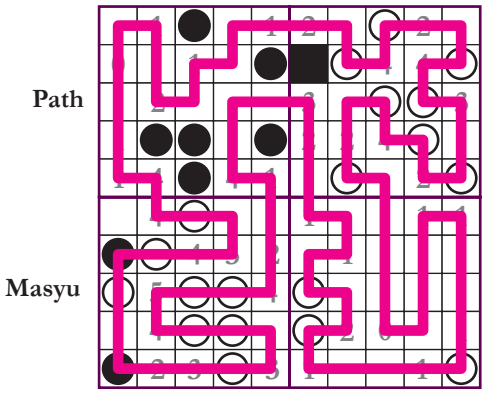
TURNS

The line goes through all the white cells. In a cell with a circle, the line turns. If the line makes a turn in a cell without a circle, then the next turn is necessarily in a cell with a circle, and vice versa. It is also possible for the line to make a turn and leave the grid, in this case it can turn in the next grid before meeting a circle.

Example with 27 mines

	1			1	2			2	
0		1			■		4	4	
	2				3				3
1					2	2	4		
1	4		4	1				2	
	4				1			1	1
		4	3	2		1			
	5			4					
	4					2	0		1
	2	3		3	1			1	

Solution



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

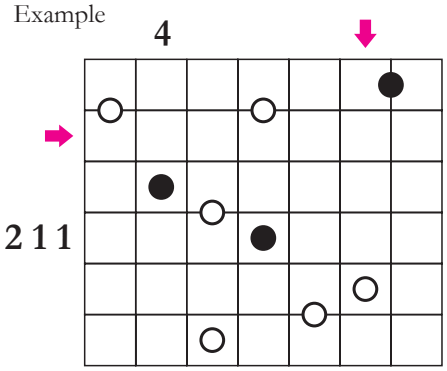
			2		3				1
2		3	3			3	3		
		2		4					2
			2				2		
	4		3	2	1			3	
				1				4	
	2					1			2
			2			2	2		2
2			2				1		
		2		3	3				
	2				3				2
	3		3		2		3	4	
	3								3
		3	3				3	3	
3		4		3	3	3			
		5		4			5		2
4					3			4	
3					3				3
		3		3		3		4	
		2		3		3			

Answer format: Write the number of turns of the path. For the example: 54.

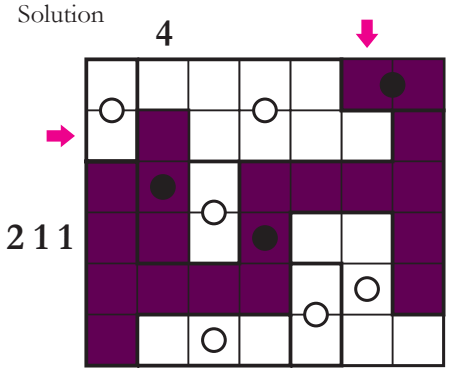
7. UNDISCOVERED GALAXIES 5 pt

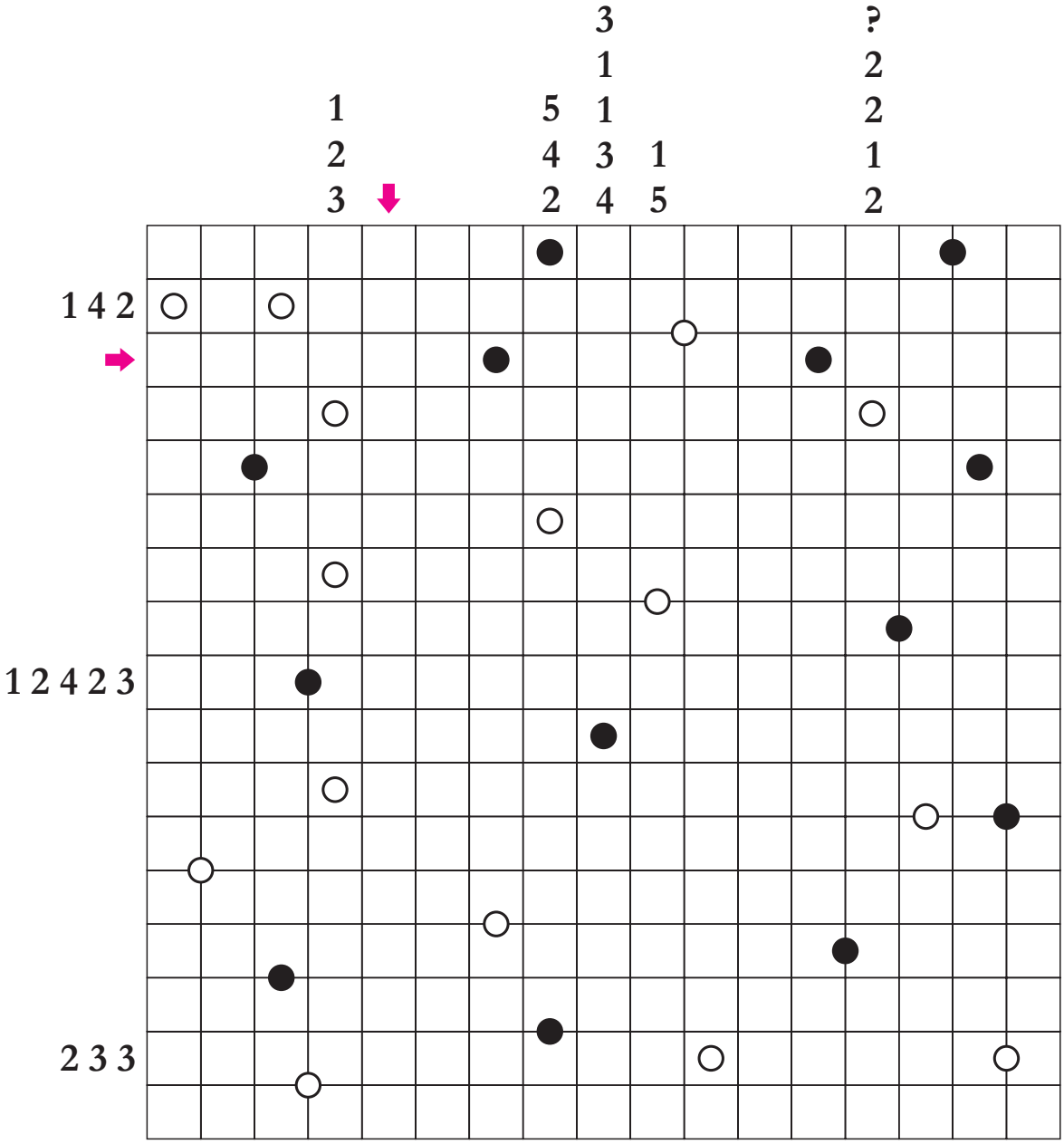
Draw connected areas (galaxies) along the grid lines. Each cell belongs to only one area. Any galaxy must contain a circle that is the center of its symmetry. When rotating 180° around the center, the galaxy turns into itself. Darken all areas with black circles. Each digit outside the grid shows the length of the black block in the corresponding row/column. The given digits follow in order. Groups of black cells are separated by at least 1 white cell. The sign "?" means any positive number.

Example



Solution





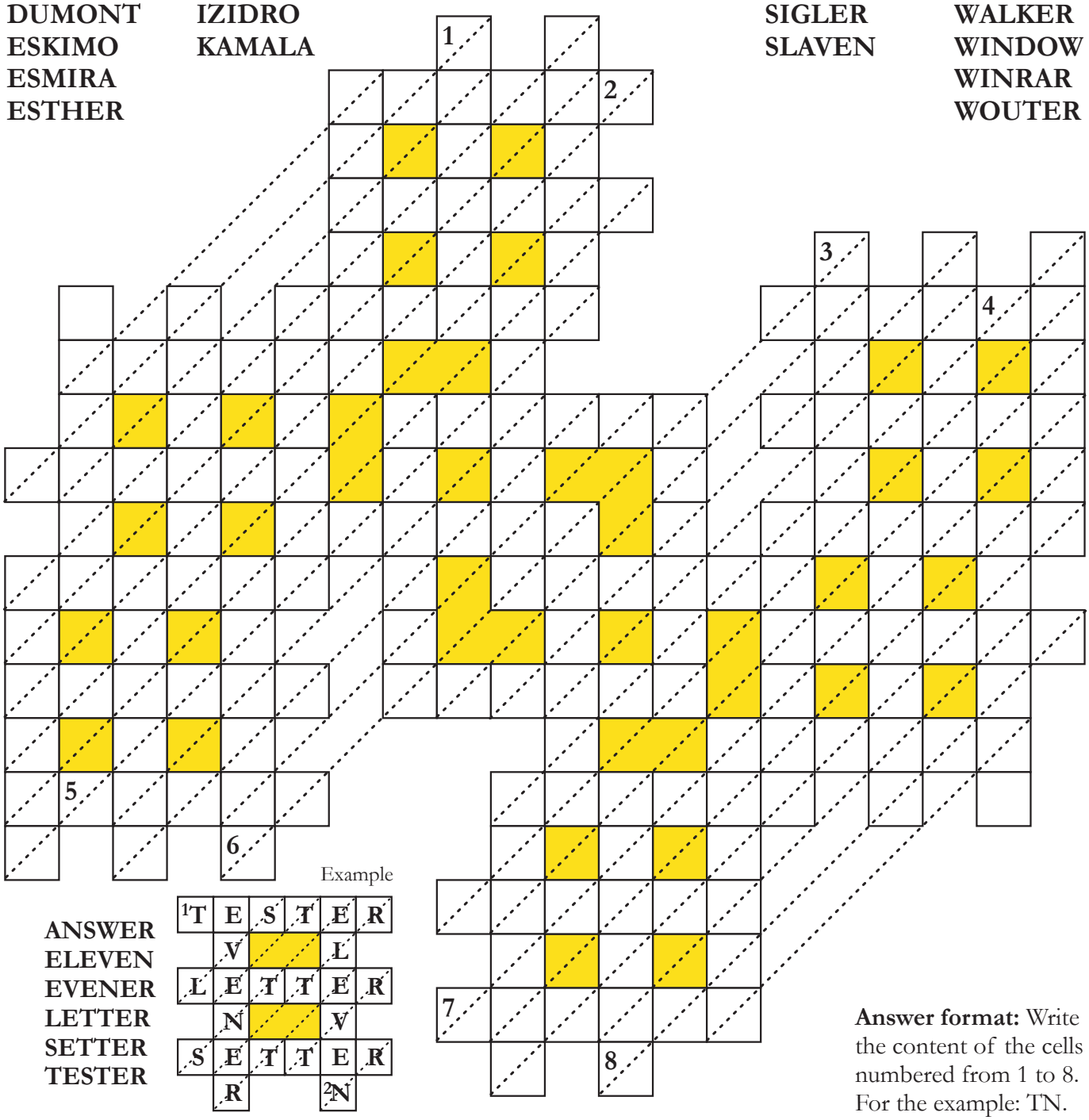
Answer format: Write the content of marked row from left to right and column from top to bottom. Use D for each dark cell and W for each white cell. For the example: WDWWWWD, DWDWWW.

8. CROSSWORD WITH DOTS

16 pt

Place some words from the list into the crossword grid. Words should read from left to right, or top to bottom. The letters on any dotted line cannot be repeated. No word can be used more than once.

AMSTER
ANDREY
ANGELA
ANUBIS
ANURAG
ASEGBO
ASKEZA
AUROUX
BELUGA
CANADA
CARLOS
DROGBA
DUMONT
ESKIMO
ESMIRA
ESTHER
ETIHAD
FABIEN
FERHAT
FREGAT
GASPAR
GEORGE
GETAFE
GIULIA
HEDERA
HELENA
HIDATO
ISTVAN
IZIDRO
KAMALA
KOHLER
LAIDNA
MANGUP
MARTIN
MASTER
MEBANE
MOHLER
MOSCUP
NAPOLI
NARGIS
NATALI
NEILIA
ONDREJ
ONEGAI
ONLINE
OPARIN
PALMER
PERALA
PINDOS
PLAYER
POLAND
POPPIT
PRESNO
PUSSIO
PUZZLE
RABBIT
RAJESH
RAKESH
ROBBEN
ROBERT
RUSLAN
RUSSIA
SANDRA
SARKAR
SASKIA
SERKAN
SIGLER
SLAVEN
SUBARU
SUDOKU
THOMAS
TOMASZ
TOMOYA
TOPKIN
TRAVEL
TYLOVA
UNIQUE
UNIVER
VERENA
VIRGIP
WALKER
WINDOW
WINRAR
WOUTER



Example

ANSWER
ELEVEN
EVENER
LETTER
SETTER
TESTER

1T	E	S	T	E	R
	V			L	
L	E	T	T	E	R
	N			V	
S	E	T	T	E	R
	R			2N	

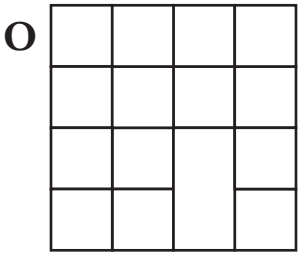
Answer format: Write the content of the cells numbered from 1 to 8. For the example: TN.

9. OPEN ROAD

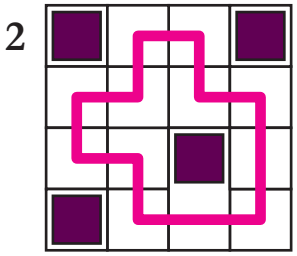
11 pt

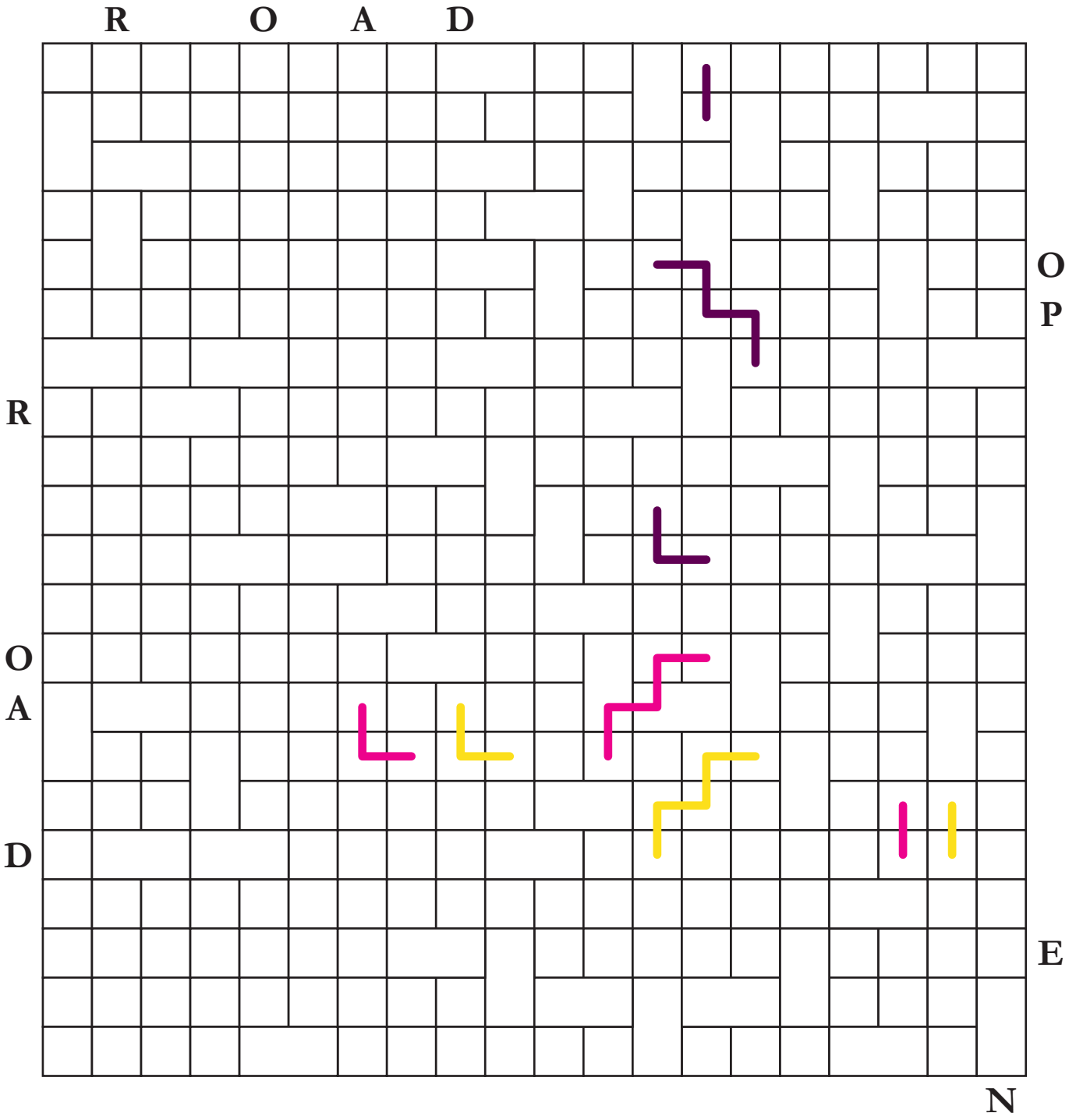
Shade some 1-unit cells and one-half of all double cells (cells with size 2). The shaded cells cannot share a side but can touch diagonally. Numbers outside the grid show the number of shaded cells in rows and columns. You have to determine the values of seven different digits from 2 to 9 denoted by the letters O, P, E, R, A, N, D. Draw a loop consisting of horizontal and vertical segments through the centers of all the remaining white cells. 9 fragments of the loop depicting the letters L, M, I are marked.

Example



Solution





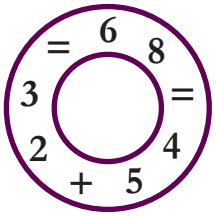
Answer format: Write the number of turns of the path. For the example: 10.

10. CIRCULAR EQUALITIES

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

Create a circular equality without parentheses that is true when reading both clockwise and counterclockwise. Use the digits from 0 to 9 no more than once and any number of arithmetic signs +, -, x, / and equal signs = (the number of equal signs must be at least two). Note that the number LMI is converted to IML when read back. The priority of operations is standard (for example, 9-6/3=7, not 1). The number can start from zero. Maximize the expression RxNxS, where R is the larger of the two results of arithmetic operations (clockwise or counterclockwise), N is the number of digits used from 0 to 9, S is the number of different arithmetic signs (from 1 to 4).

Example



68=45+23, 32+54=86
R=86, N=6, S=1

Answer format: Write the value of the expression RxNxS and equalitys in both directions. For the example: 516, 68=45+23, 32+54=86.

11. SAPPER WAY

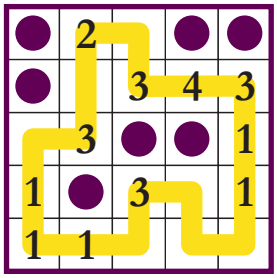
12, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1 pt for best solutions

Create a Minesweeper puzzle with a unique solution in the 9 x 9 grid. Each digit shows the numbers of mines in the neighbouring (even diagonally) cells. There cannot be more than 1 circle in a cell. Mines cannot occupy cells with digits. You have only digits from 1 to 6, you cannot use 0. Use all digits from 1 to 6 at least once. In the solved grid there should be a unique loop that goes through all the cells that are not occupied by mines. The loop cannot touch and intersect itself. Minimize the expression K+|L-M|, where K is the total number of given digits, L is the number of cells with loop fragments and M is the number of cells with mines.

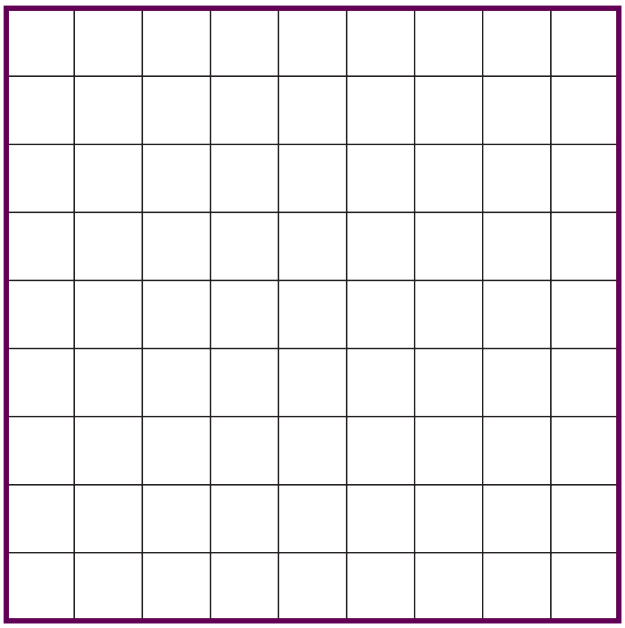
Mini-example
with necessary digits 1, 2, 3, 4

	2			
		3	4	3
	3			1
1		3		1
1	1			

Solution



K=11, L=18, M=7



Answer format: Write the value of the expression K+|L-M|, then describe the grid line by line from top to bottom using the digits and sign "-" for each empty cell. For the example: 22, -2---, --343, -3--1, 1-3-1, 11---.

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

In the names of the puzzlers, all letters O were replaced by the digit 0, I by 1, Z by 2, M by 3, Y by 4, S by 5, G by 6, F by 7, B by 8, J by 9. Create a crossword – put some of the given words into the 13 x 13 grid. Words should read from left to right, or top to bottom. Each name should intersect with at least one other. Words cannot be repeated and no other words should be formed in a crossword. In some rows and columns, digits are formed numbers when reading from left to right and from top to bottom. The number can start from 0. Maximize the sum of all the numbers.

0L6A
0NDRE9
160R
180N
31R05LAV
3A5TRCLA4
3ART1N
40N6
4UN6U0W00
51NCHA1
5AN6
5E0K
5ERH11
5H1N1CH1
5TE7AN0
5WA6ATA3
610R61A
6ARANCE
7ERNAND0
7R1EDHEL3
84R0N
8EATR1CE
8ENEDEK
905EPH
91R1
9A3E5
9ACK
9AN
9ELENA
ANDRE4
ANDREA
ANDREW
ANNE
ANTH0N4
ANTHEA
ARNAUD
ART
AU81N
C0NN0R
C4X
CHR15T1AN
D31TR4
DE8
DEN15
DUC
EWEL1NA
H15A5H1
H1DEAK1
HAR3EET
HAR5H
HARR150N
HENNA
HU60
K0N5TANT1N
KA2U4A
KA51A
KAR3EL1C
KARTAL
KEN
K0TA
L1N
LAURENT
LUKA52
N15
N15H1NANNT0KA
N1K0LA
N6U4EN
NA0K1
PAUL
PH1L1PPE
PRA5ANNA
PRA406A
R06ER
RAKE5H
REND1
R1AD
RU8EN
T130TH4
T1331LLER
T1RAL30
TA160
TAKU4A
TANA
TH03A5
V1R61
VALENT1N
VER0N1KA
VERENA
W09C1ECH
W0UTER
W1EKE

Mini-example

1	6	0	R
8			1
0	L	6	A
N			D

Horizontally:
160
81
0 and 6

Vertically:
180
6
06
1

Sum:
440

Answer format: Write the sum, then describe the grid line by line from top to bottom using the letters, digits and sign "-" for each empty cell. For the example: 440, 160R, 8--1, 0L6A, N--D.