APRIL CONTEST 2022

by Riad Khanmagomedov

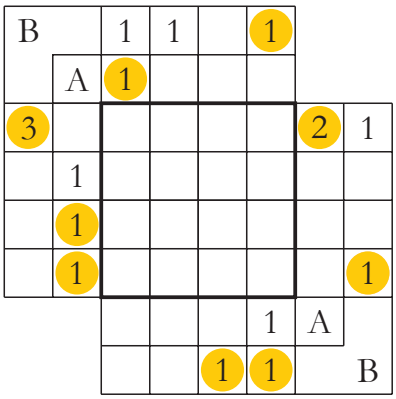
Submissions should be sent on the answer page at LMI not later than 24:00 (of India time) April 22 2022

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

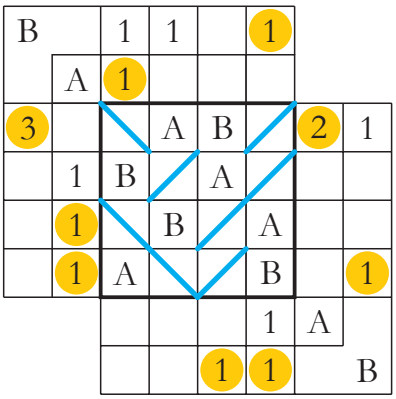
1. BETWEEN THE MIRRORS — 7 pt

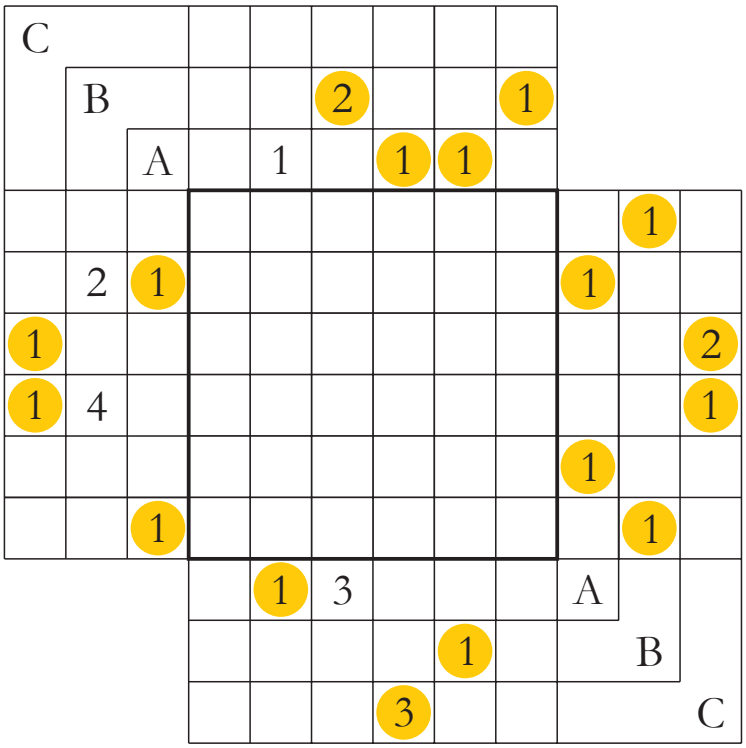
Enter the letters A, B, C (A, B in the example) into the grid so that each row and column contains each letter exactly once. Place a mirror (diagonal segment) in each empty cell. Digits outside the grid denote how many times the corresponding letter is encountered on the way, taking into account the reflections of mirrors. If the digit is in a circle, then the corresponding letter is the first letter found in the corresponding row or column from that direction. If the digit is without a circle, then the corresponding letter is not the first counter.

Example



Solution



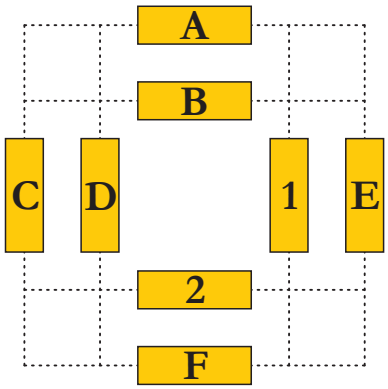


Answer format: Write the contents of the main diagonals from top to bottom: first from the upper left corner to the lower right, then from the upper right to the lower left. Use the letters N and Z for mirrors. For the example: NZZB, ZABA.

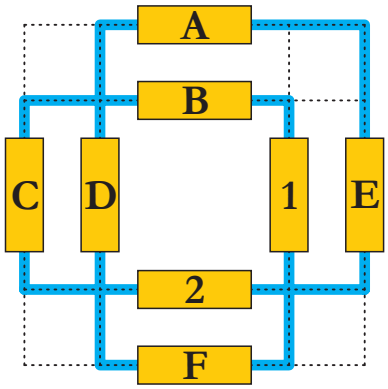
2. CROSSROADS 6 pt

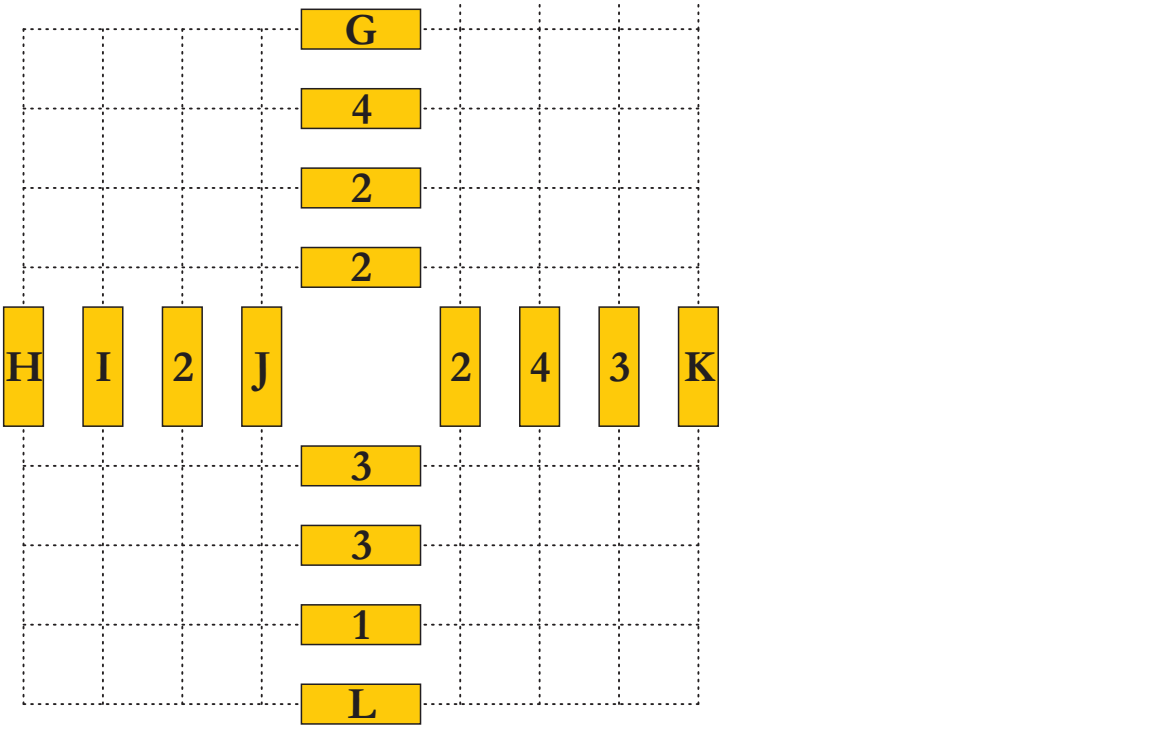
Draw a loop along the dotted lines, passing through all the yellow strips once. Horizontal and vertical strips along the path should alternate. The loop makes one turn between the strips. The digit on a strip shows the number of points of intersection made by the loop crossing the line passing through this strip.
Ignore the letters while solving.

Example



Solution





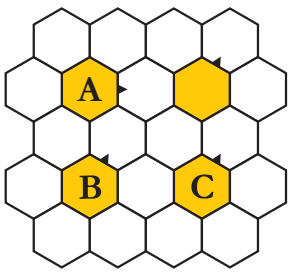
Answer: Enter a sequence of letters along the loop, moving from A to the right. For the example: AECBFD.

3. HEXAPALINDROMES

8 pt

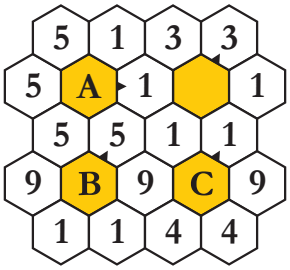
Enter all the given numbers-palindromes around the colored cells clockwise from the pointers.

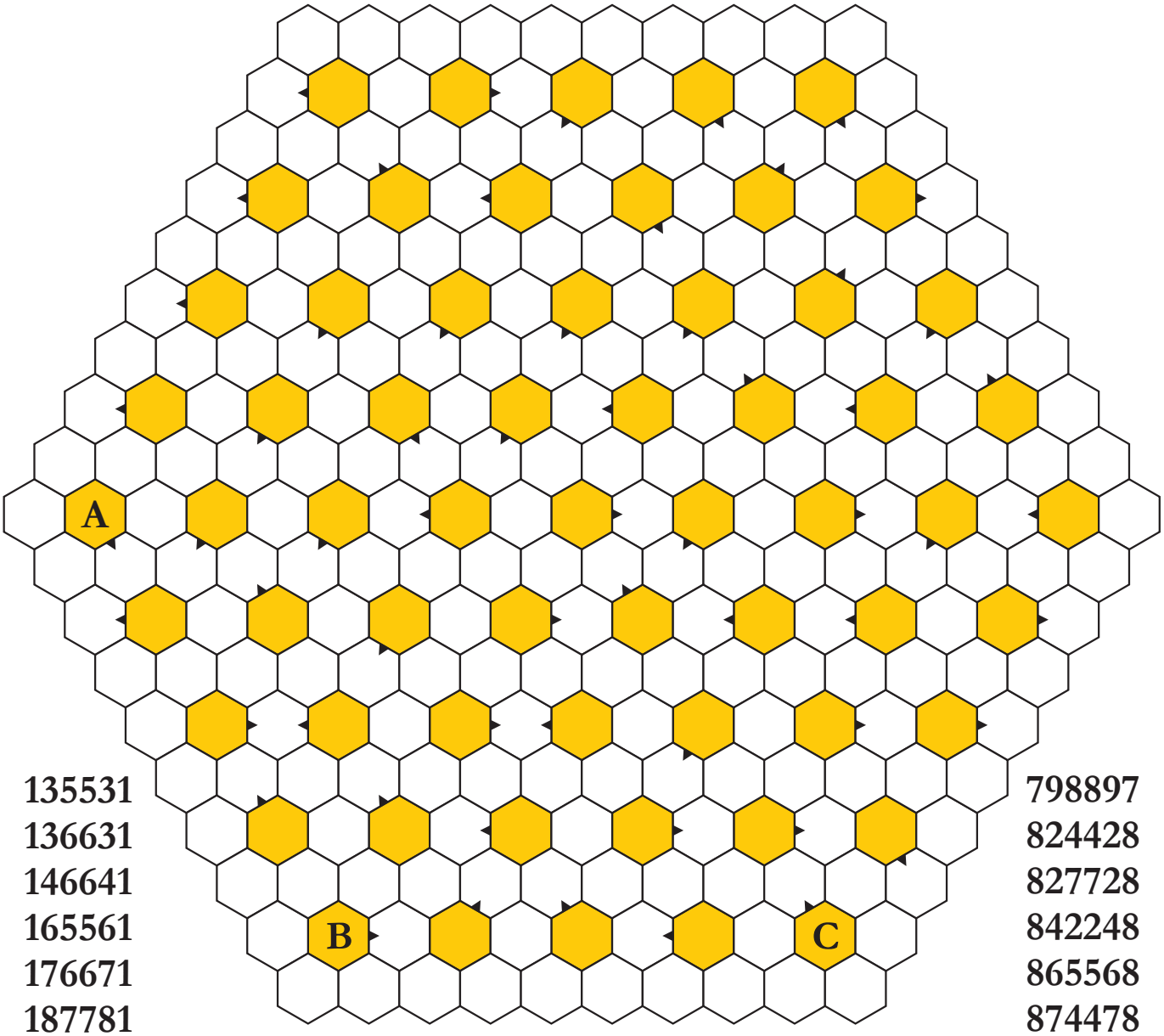
Example



155551
194491
311113
591195

Solution





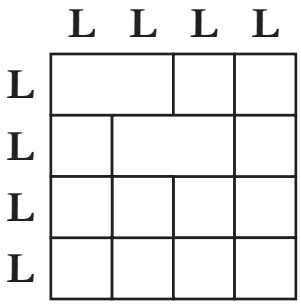
135531						798897
136631						824428
146641						827728
165561						842248
176671						865568
187781						874478
227722	354453	453354	499994	578875	683386	899998
241142	355553	455554	531135	581185	728827	949949
269962	383383	463364	533335	591195	746647	968869
279972	391193	469964	544445	644446	748847	971179
288882	442244	475574	564465	645546	749947	975579
338833	444444	491194	574475	655556	755557	981189
352253	445544	497794	575575	678876	788887	996699

Answer format: Enter the numbers around A, B, C. For the example: 155551, 591195, 194491.

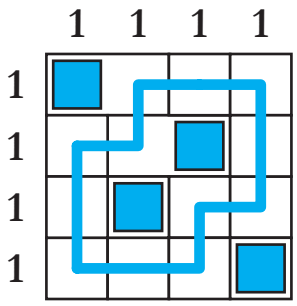
4. LMI-ROAD **5 pt**

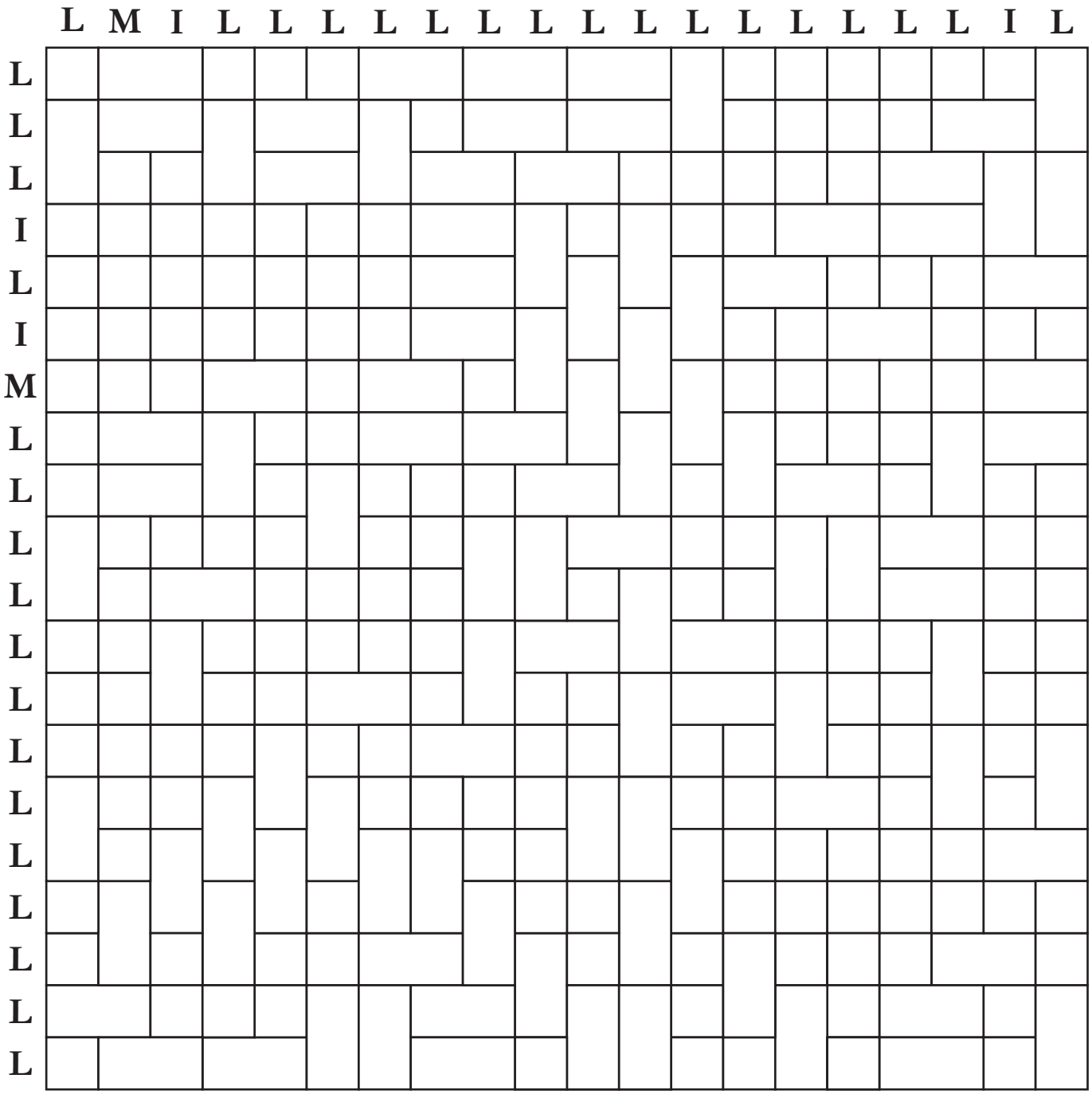
Shade some 1-unit cells and one-half of all double cells (cells with size 2). Numbers outside the grid show the number of shaded cells in rows and columns. You have to determine the values of three numbers denoted by the letters L, M, I. Draw a loop consisting of horizontal and vertical segments through the centers of all the remaining white cells.

Example



Solution





Answer format: Write the number of turns of the path. For the example: 8.

5. PRODUCT TAPA

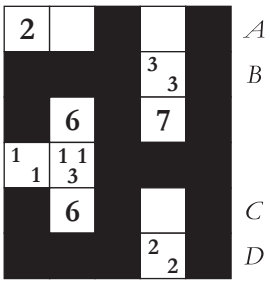
5 pt

Shade some empty cells to create a continuous wall. There should not be any 2x2 shaded areas. Digits in a cell (in some cells, their product is given) can indicate the lengths of black cell blocks on its neighbouring cells. If there is more than one digit in a cell, there must be at least one white cell between the black cell blocks.

Example

2					A
			9		B
	6		7		
1	3				
	6				C
			4		D

Solution

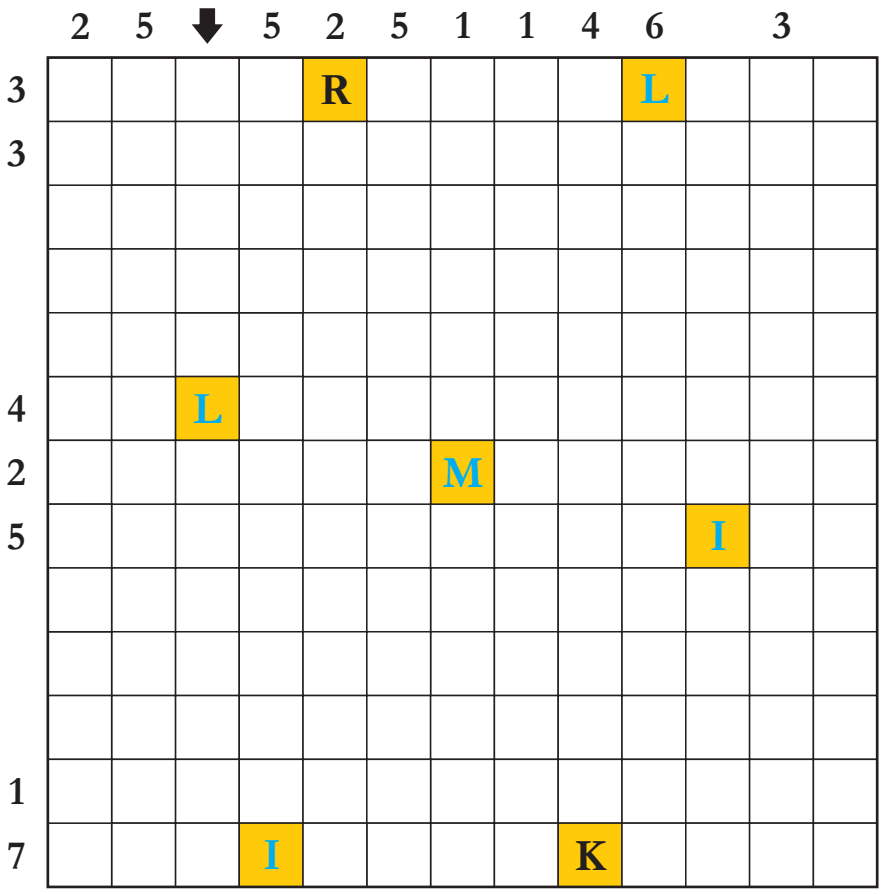


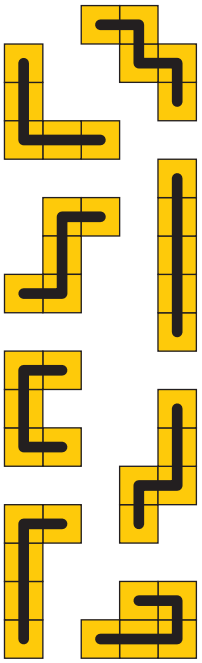
1			4															A
						6			2			1 2						B
										1				1 1			1 4	
		4		9			3			2								
								2								6		
4		5						4				3						C
			6			1				2 3				3			3	
																		D
			2				6					9				5		E
3										5				8				
				8				2									1	
		9				5					1 1 2				3			F
																		G
	4			5				8				9			5			
						2				1						4		4 H
		7								1 2 1								
								2			5			8		1		
	8			8				1										
						3			3			4						I
															3			2 J

Answer format: Enter the length of the maximal black block in the lines marked with letters (from A to J). For the example: 1313.

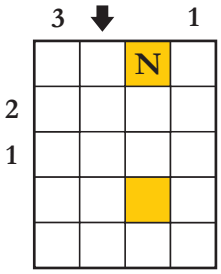
6. LANGUAGE PENTOMINOES 4 pt

Place the 8 given pentominoes in the grid. Pentominoes can be rotated and reflected. They cannot touch each other, not even diagonally. Digits outside the grid show the number of cells occupied by pentominoes in the corresponding rows/columns. Enter all the given names into the pentominoes along the drawn lines. The letters in any row/columns are not repeated. Some cells occupied by pentominoes are already given.



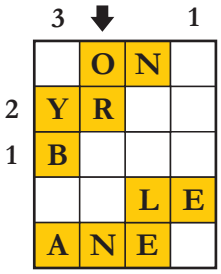


Example



BYRON
ELENA

Solution



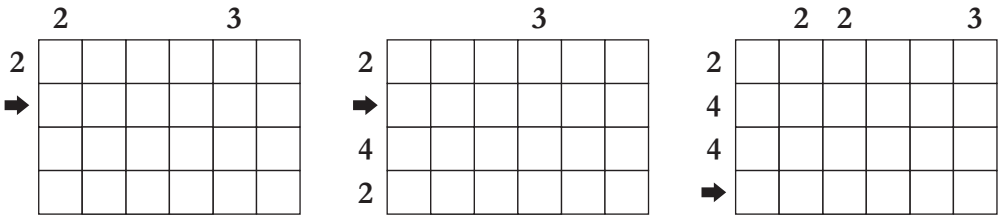
BRIAN MAREK
KEVIN RAMON
KOSEI TAWAN
LAURA VOLXA

Answer format: Write the content of the marked column from top to bottom using "-" for an empty cell. For the example: OR--N.

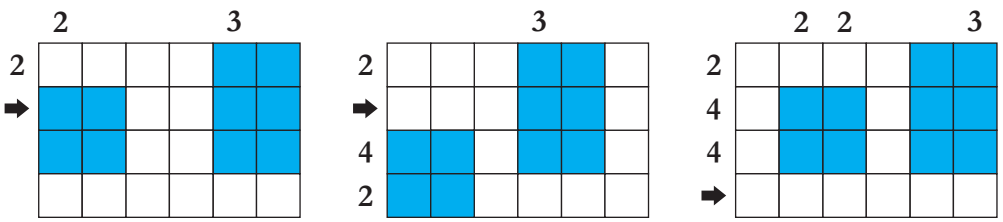
7. FLOATING CLOUDS 9 pt

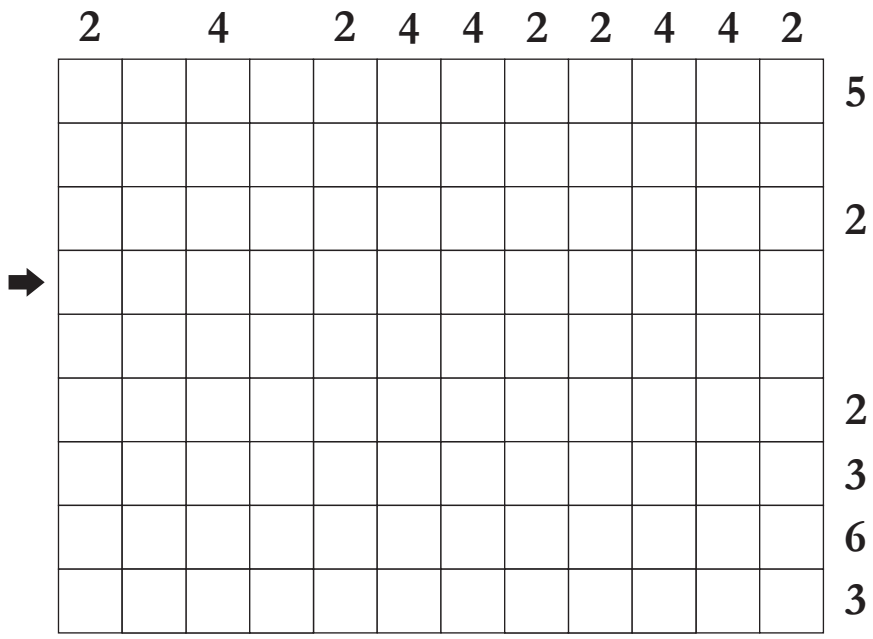
Place some dark rectangles (clouds), that are at least 2 cells wide and 2 cells high. They cannot touch each other, not even diagonally. Digits outside the grid show the number of dark cells in the corresponding row or column. The clouds, without changing, move horizontally and/or vertically to the one cell every minute so that they do not touch each other. On the 1st diagram of the cloud at the initial moment, on the 2nd – after a minute, on the 3rd – after another minute.

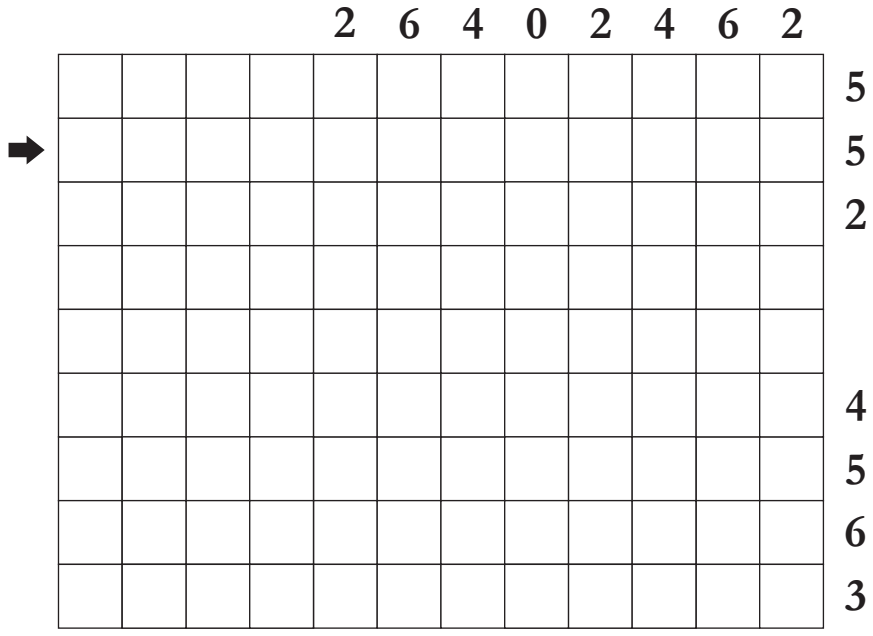
Example

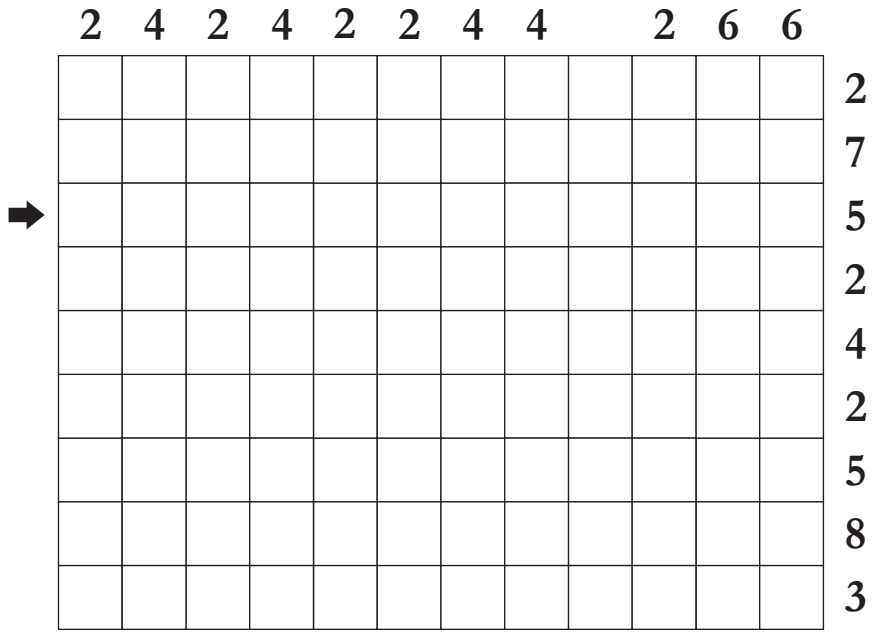


Solution









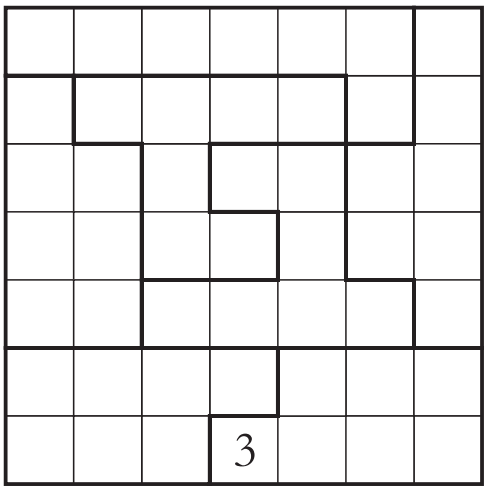
Answer format: Write the content of the marked rows from left to right, using the letter C for the cell occupied by the cloud, and "-" for an empty cell. For the example: CC--CC, ---CC-, ------.

8. MECHANICAL SUDOKUS

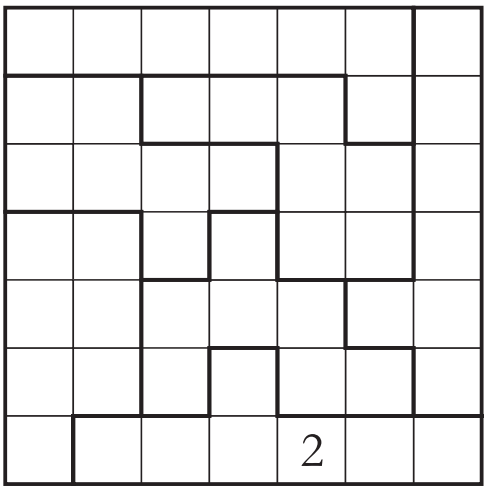
8 pt (2 for each row)

Fill each grid with digits from 1 to 7. Within a grid, digits must be different in rows, columns and outlined areas. All given fragments should be placed without rotation or reflection in the four grids. The fragments do not share any cells.

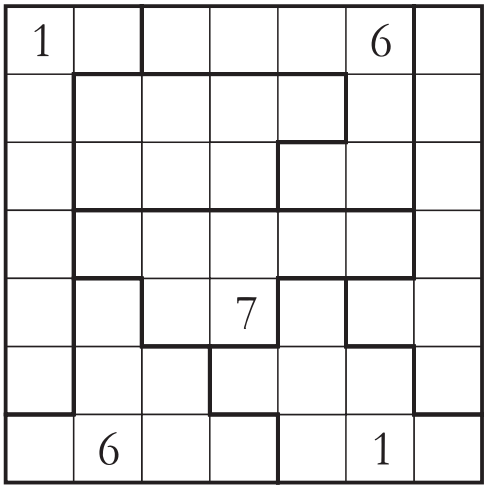
A ➡



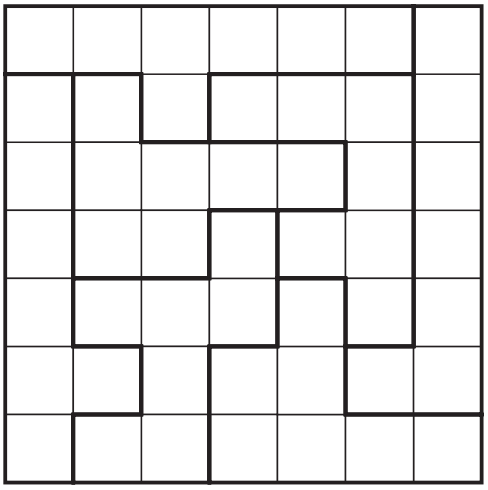
B ➡

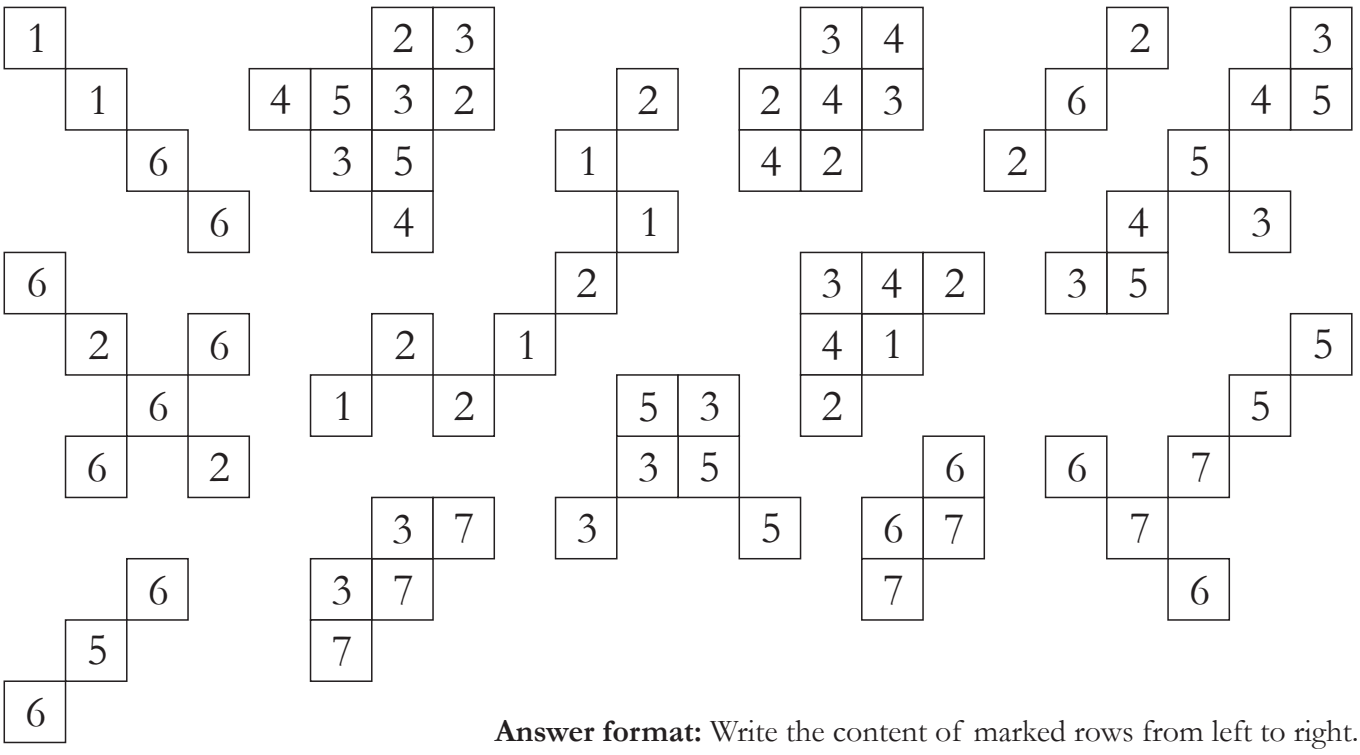


C ➡



D ➡





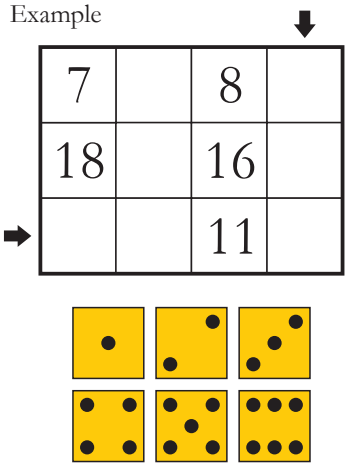
Answer format: Write the content of marked rows from left to right.

9. DOMINER

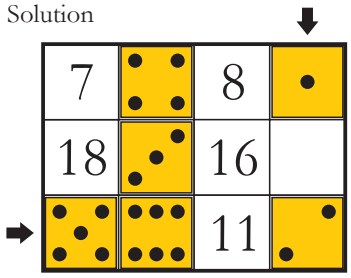
4 pt

Place all the given half-dominoes in the empty cells of the grid. The number in the cell indicates the number of circles in all adjacent cells.

Example



Solution



		9	6					13		
5					2				14	
	4	5	4	9		14			8	4
	4					10		9		
	16			10	8	13			7	
		13		11					9	
13	16			15		14	7	7	16	
	4				13					17
		2					7	10		

5x 5x 5 x 5x 5x 5x

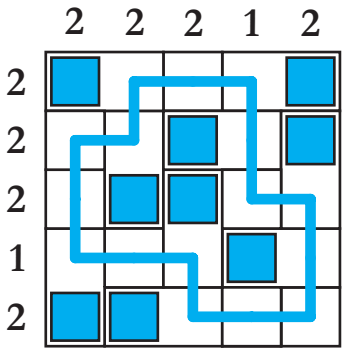
Answer format: Write the content of the marked row from left to right and the column from top to bottom. Use the numeric values of the half-domino and "X" for the other cells. For the example: 56X2, 1X2.

10. OPTI-ROAD

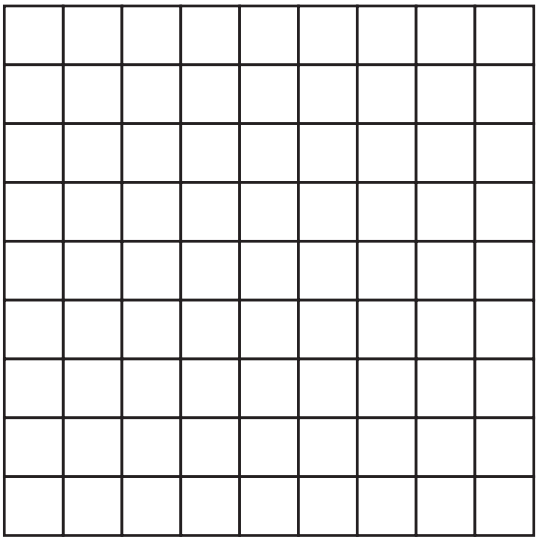
14, 11, 8, 5, 2 pt for best solutions

Create a puzzle LMI-ROAD with a unique solution in the 9x9 grid, where all digits are given instead of letters, and the number of different given digits can be more than three. Its rules: Shade some 1-unit cells and one-half of all double cells. Digits outside the grid show the number of shaded cells in rows and columns. Draw a loop consisting of horizontal and vertical segments through the centers of all the white cells. Maximize the value of the expression D - (G - g)(V - v), where D is a number of double cells, G and V are the maximum given numbers for the horizontals and verticals, g and v are the minimum, accordingly.

Mini-example



D=9, G=2, g=1, V=2, v=1



Answer format: Write the value of the expression D - (G - g)(V - v), then sequentially all the horizontal given digits from top to bottom and vertical from left to right. Finally, describe the grid line by line from top to bottom using the letter L for 1-unit cells, MM for double horizontal cells and II for double vertical cells. For the example: 8, 22212, 22212, MMLMM, LIMMI, LIILI, ILIMM, IMMLL.

11. FROM 0 TO 9

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

Create an equality without parentheses, using no more than once the digits from 0 to 9 and any number of arithmetic signs +, -, x, /. Maximize the expression RxNxS, where R is the result of arithmetic operations, N is the number of digits used from 0 to 9, S is the number of different arithmetic signs (from 1 to 4).

Example

6x2=9+5+0/8-34/17
R=12, N=10, S=4

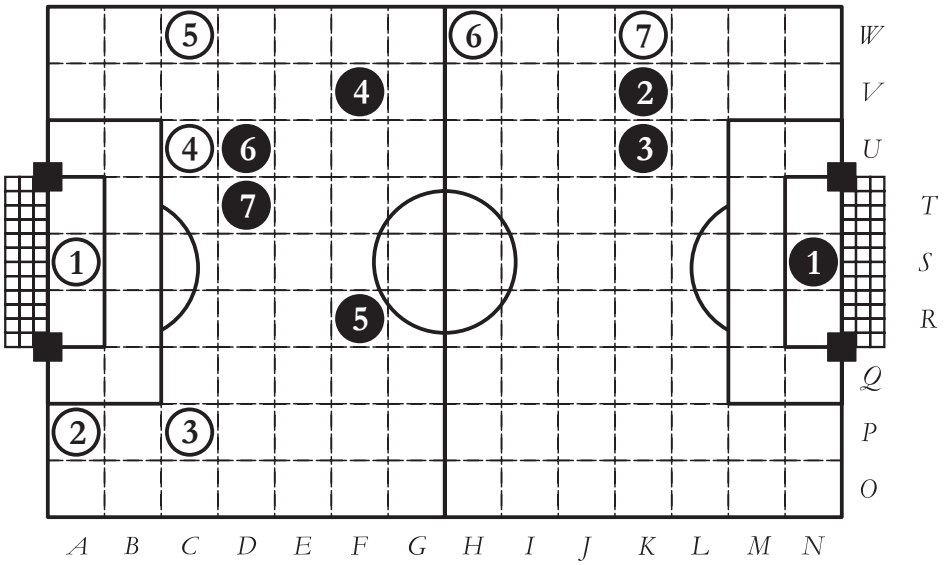
Answer format: Write the value of the expression RxNxS and equality. For the example: 480, 6x2=9+5+0/8-34/17.

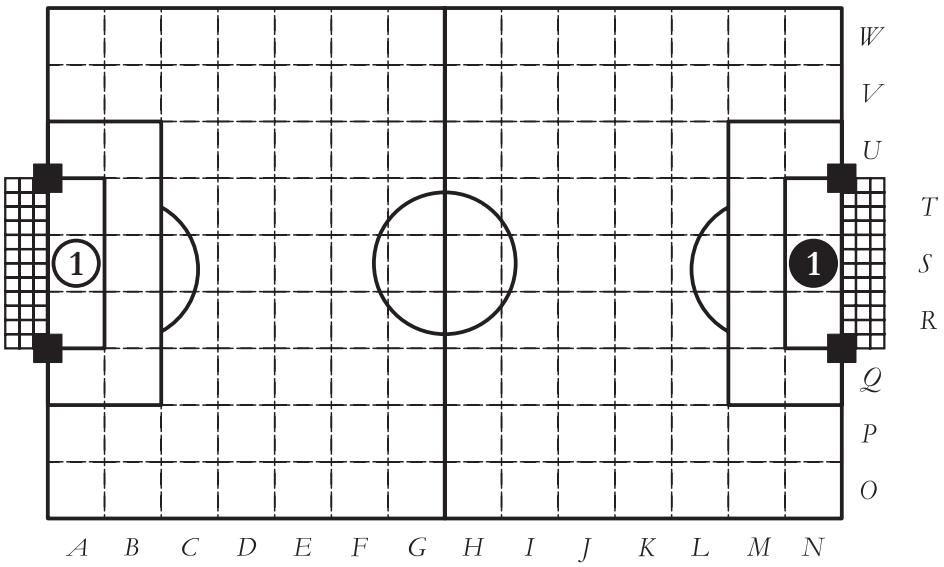
12. RECORD SCORE

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

Place 6 white and 6 black circles (players) in the 14x9 grid and number them from 2 to 7. Goalkeepers are already marked with the digit 1. Goal path must start at the circle labeled with 1, encounter all circles of the same color exactly once each, and exit the grid between the "goalposts" (the black squares on the side opposite the starting circle). Each path may only travel in the eight standard directions, may only change direction at circles, and may not encounter a circle of the other color (although it may pass through the corner of a cell containing a circle of the other color). It is cannot score an own goal. Maximize the total number of possible goal paths for both teams. The paths may intersect themselves and/or each other, but must not touch any goalposts. Reflection of the path from the walls of the grid is prohibited.

Example





Answer format: Write the total number of goal pathes, then the numbering and coordinates of the white and black circles. Finally, list all the goal parhes of each team.
For the example: 2, 2AP3CP4CU5CW6HW7KW, 2KV3KU4FV5FR6DU7DT, white 1234567, black 1236745.