APRIL CONTEST 2015

by Riad Khanmagomedov

Submissions should be sent with answer page at LMI not later than 24-00 (of Moscow time) April 11 2015

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

1. COOL-L-L **7 points**

Write a letter C, O or L in each empty cell so that there never occur two consecutive C, three O or four L in any row, column or diagonal.

							L				L		L			L		C	
		O	L	C				C		C		C			O	L		O	
		L			L	C				L	L		O	L	L		O		
O	L	L			L			L		C	L		O		C				L
			L				C										L		C
L	C			O		L						C					L		
	L		L				O		C			L			C		L		O
				C							O					L		C	
	C	O	O			O		L		L	L		C						
	L				C				C	L	L							L	
O	C		C			L	C				O		O			C			O
	O				L		L									L		L	
	C					C	L	O	C				O	L			L	O	
	L			C		L					C						C		
O		L		L			C		L		O	L		C				O	
O		C			L											L		C	
								L		C			C			C		O	O
C	L						L		L			L							O
			L	L			L		L		O	L		O		L	O		
O		C			C	L		C			L				C		L		
	O		O	O			L	L		C	L	C			O				

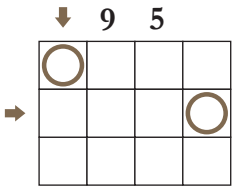
Answer format: Write the total number of cells with C in the grid.

2. SUMMED SNAKE

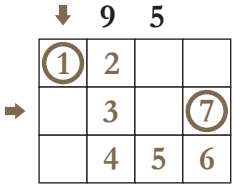
3 points

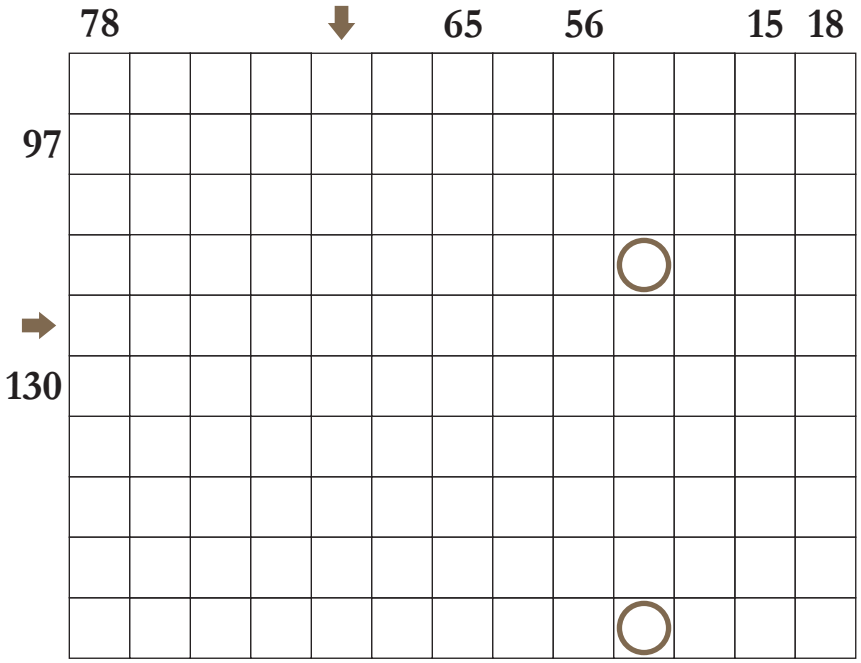
Draw a 45-cell number snake which forms a single continuous path from the head to the tail. The head and tail of the snake are marked with circles. Adjacent cells of the snake are connected horizontally or vertically. The snake has one unit width and cannot touch itself, not even diagonally. The numbers on the left and the top indicate the sums of all numbers in corresponding row and column.

Example
(7-cell number snake)



Solution



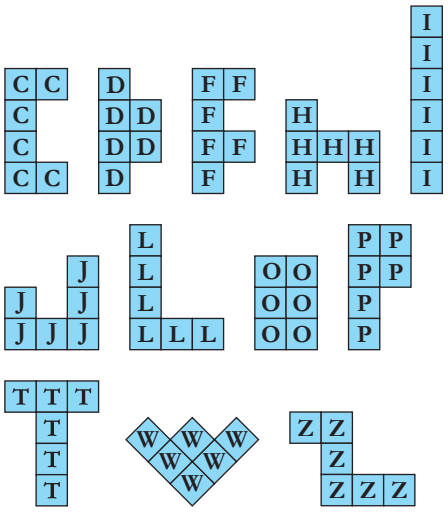


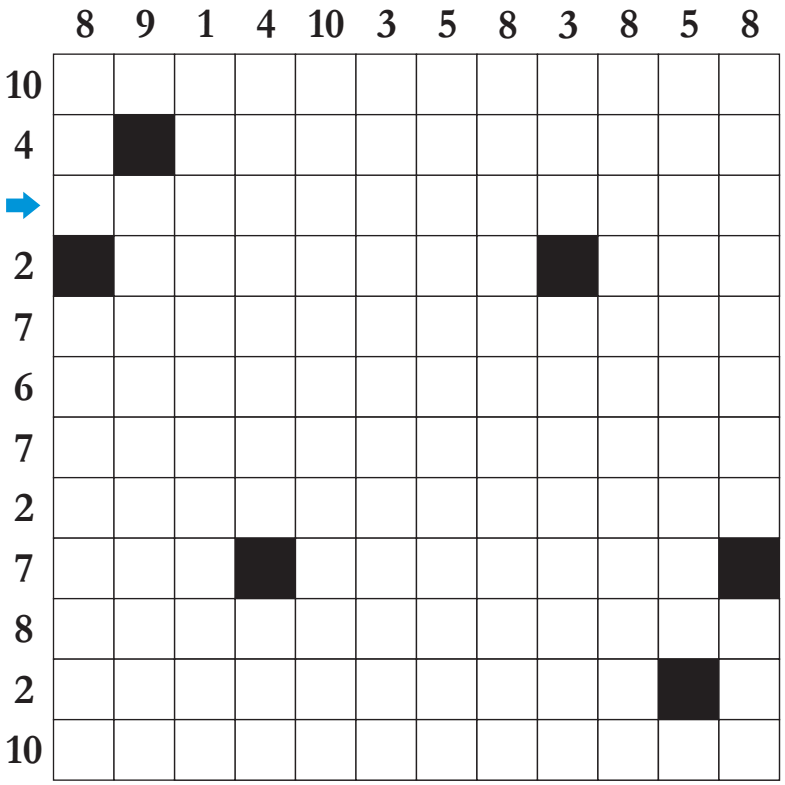
Answer format: Write the sum of all numbers in the marked row and column. For the example: 10, 1.

3. HEXAMINO

4 points

Put the 12 given hexaminoes in white cells. Hexaminoes can be rotated and/or mirrored. They cannot touch each other, even diagonally. Numbers outside the grid indicate how many cells are occupied by hexaminoes in the corresponding directions.





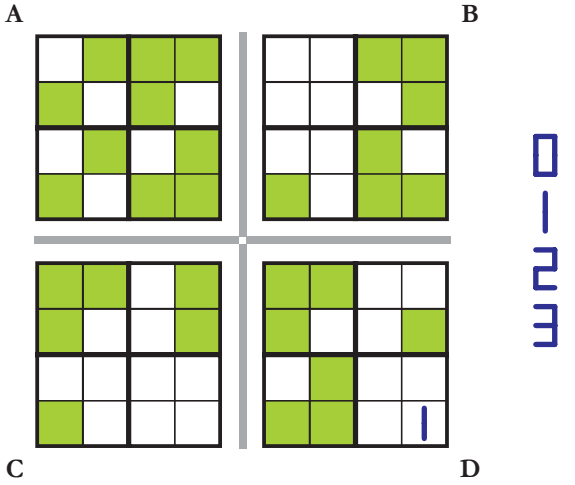
Answer format: Write the content of the marked row from left to right. Use the corresponding letter for cells occupied by hexaminoes and "-" for other cells.

4. MIRRORED SUDOKUS

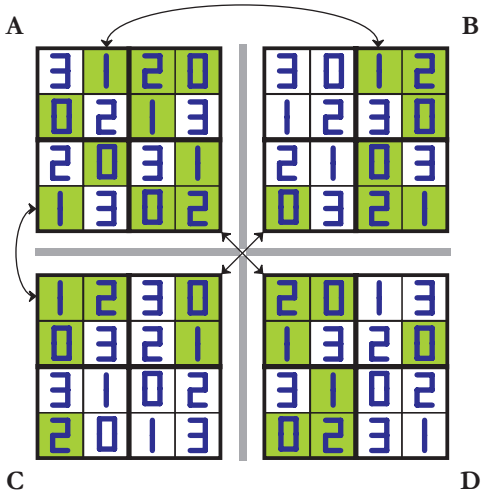
7 points

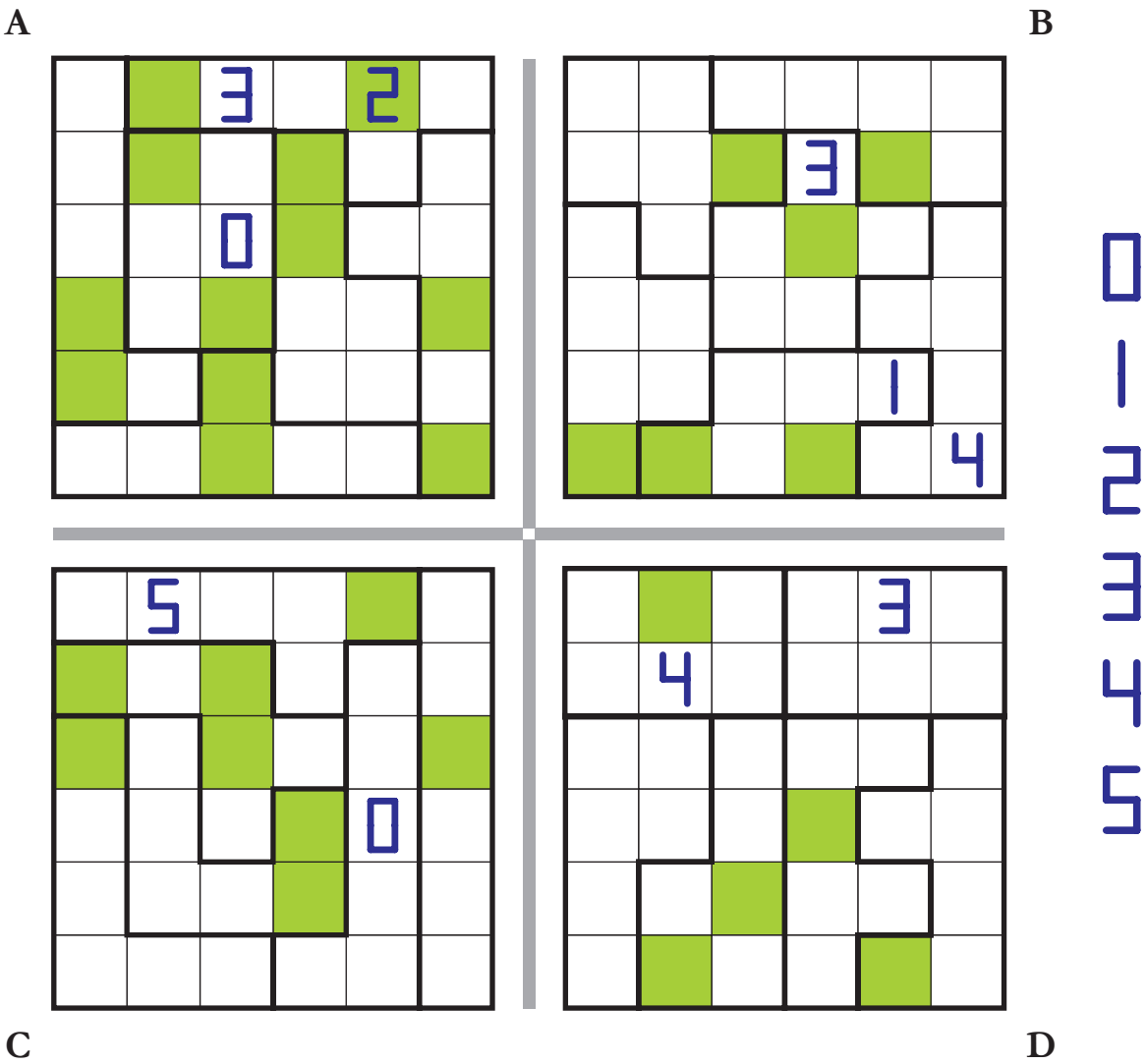
Fill each grid with digits from 0 to 5 (using the given shapes for the numbers). Within a grid, the numbers cannot repeat in rows, columns and outlined areas. Grey lines are mirrors. For every cell, there are three mirrored cells (one in each of the other three grids). All cells with digits which, after mirroring, become the same or other digits (in any of the other grids) are marked by green. In the example, some of the mirrored cells are indicated by arrows.

Example



Solution



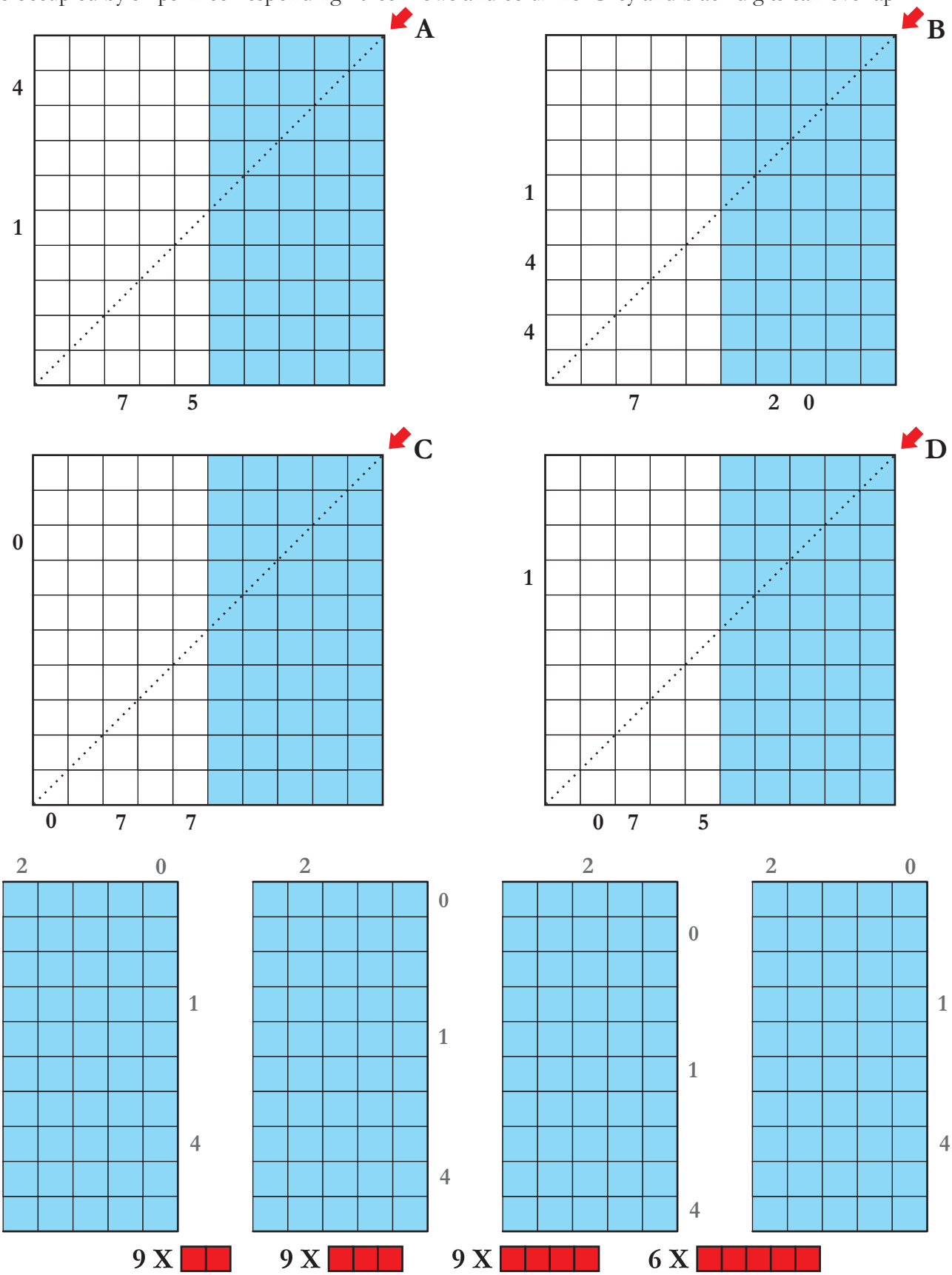


Answer format: For each grid, write the content of the diagonal from the top right corner to the bottom left corner. For the example: 0101, 2310, 0212, 3210.

5. HALVES OF SEAS

6 points (1.5 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 flotillas (right halves of seas) shown below. You need to determine which flotilla belongs to which grid. 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. Grey digits (top and right) and black digits (left and bottom) outside seas indicate the number of cells occupied by ships in corresponding 10-cell rows and columns. Grey and black digits can overlap.



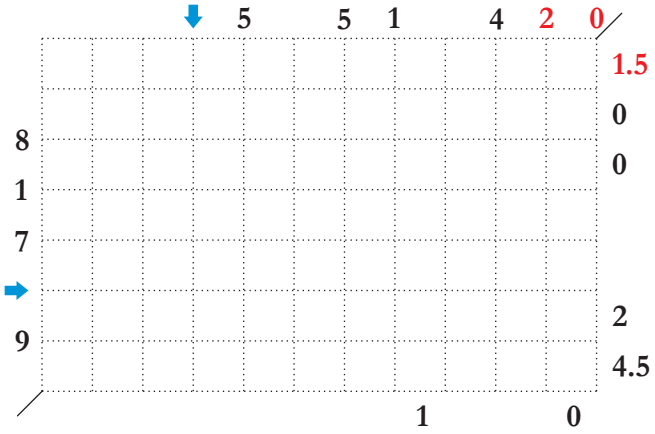
Answer format: Write the content of each diagonal from the top right corner to the bottom left corner. Use "S" for cells occupied by ship and "-" for other cells.

6. TOOLS

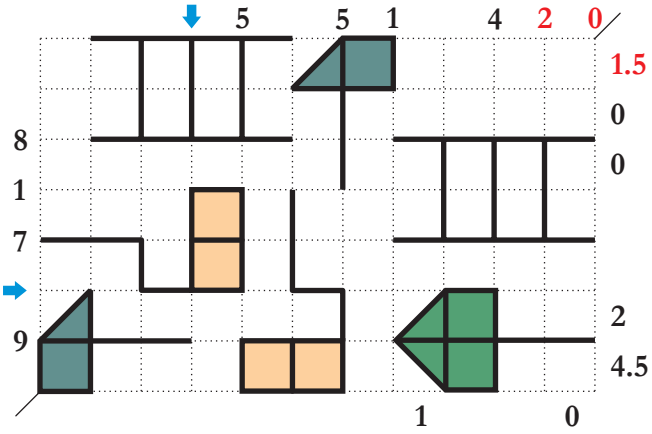
9 points

Place tools of given shapes along grid lines. They cannot touch each other, not even diagonally. Tools can be rotated and mirrored. Numbers at the right and bottom show number of cells occupied by tools in the corresponding rows and columns. Numbers at the left and top show how many edges are occupied by tools in corresponding rows and columns.

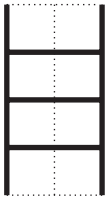
Example



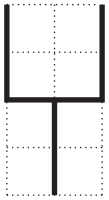
Solution



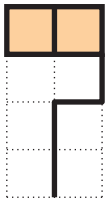
H (Hammer)



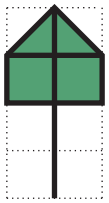
L (Ladder)



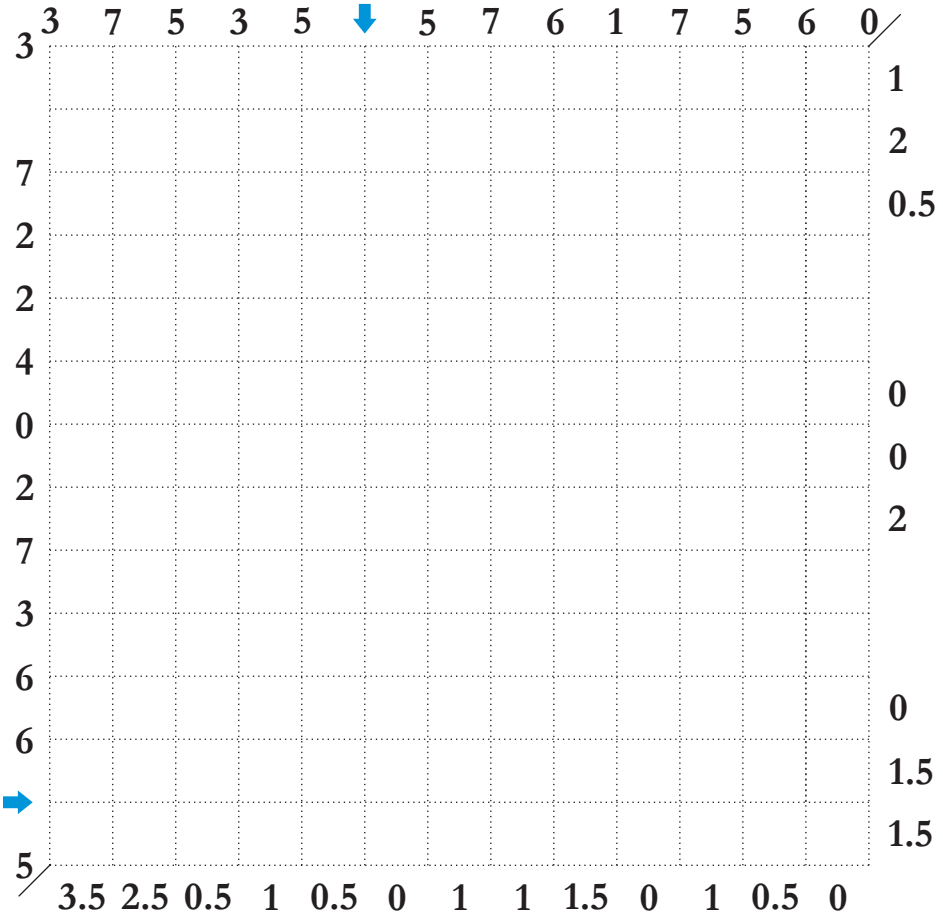
P (Pitchfork)



R (Roller)



S (Spade)



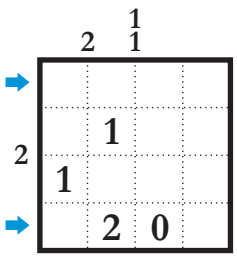
Answer format: Write the content of the marked row from left to right and the marked column from top to bottom. Use H, L, P, R, S for Hammers, Ladders, Pitchforks, Rollers and Spades respectively, and "-" for other cells. For the example: --RR-R--S--, LL-RR--.

7. SUDOKU WITHOUT WALLS

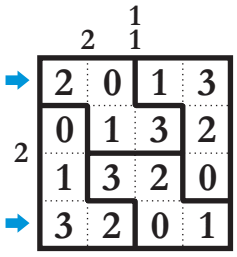
9 points

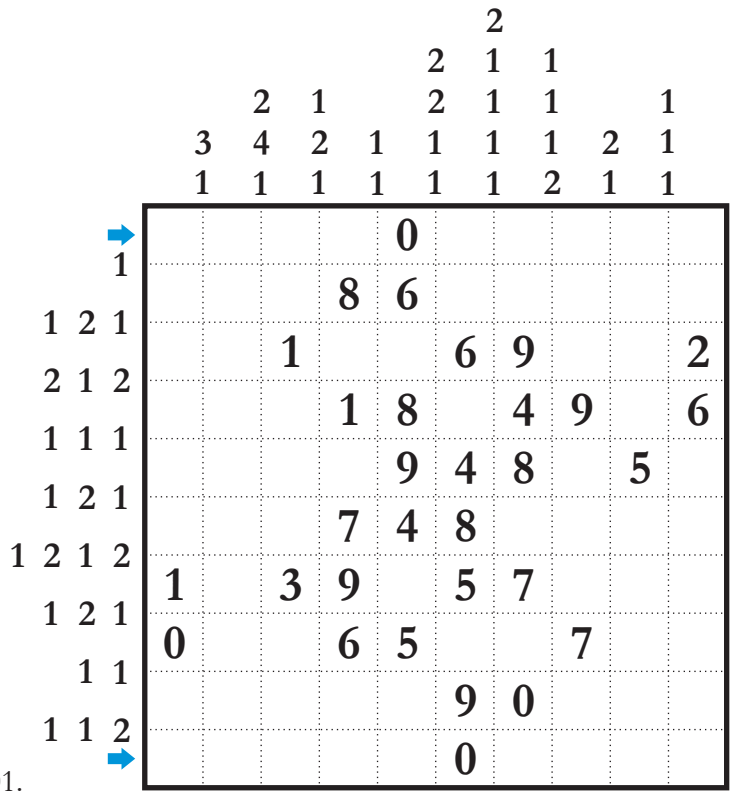
Place wall segments in the grid creating ten 10-cell areas and solve the irregular Sudoku. Fill the 10 x 10 grid with digits from 0 to 9. Digits cannot repeat in rows, columns and 10-cell areas. Wall segments must lie along gridlines. Digits outside the grid show lengths (from top to bottom, or left to right) of all wall segments in the corresponding direction. There should be at least one empty space between two wall segments.

Example



Solution





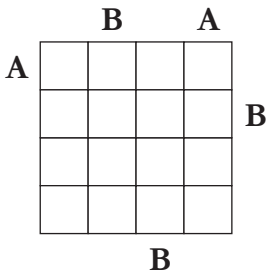
Answer format: Write the content of the marked rows from left to right. For the example: 2013, 3201.

8. BORDERLESS EASY AS ABCDEFG

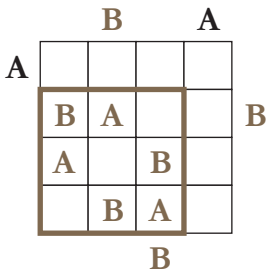
9 points

Outline an 8 x 8 area inside the given 11 x 11 grid and write letters A, B, C, D, E, F and G into the 8 x 8 grid. Every row and column should contain each letter exactly once, and one cell remains empty. Letters outside show the second visible letter from corresponding directions.

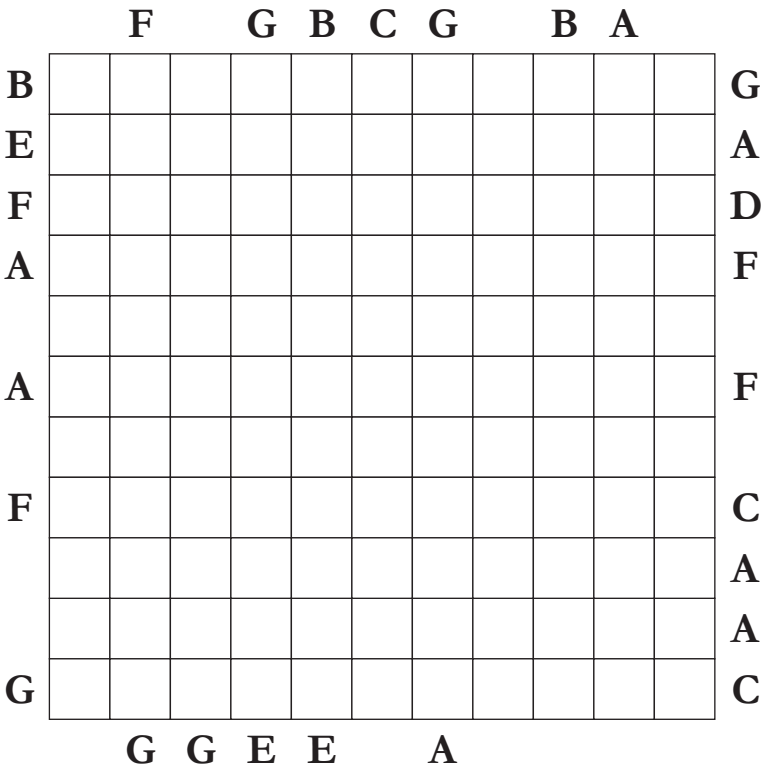
Example
(the 3 x 3 area)



Solution



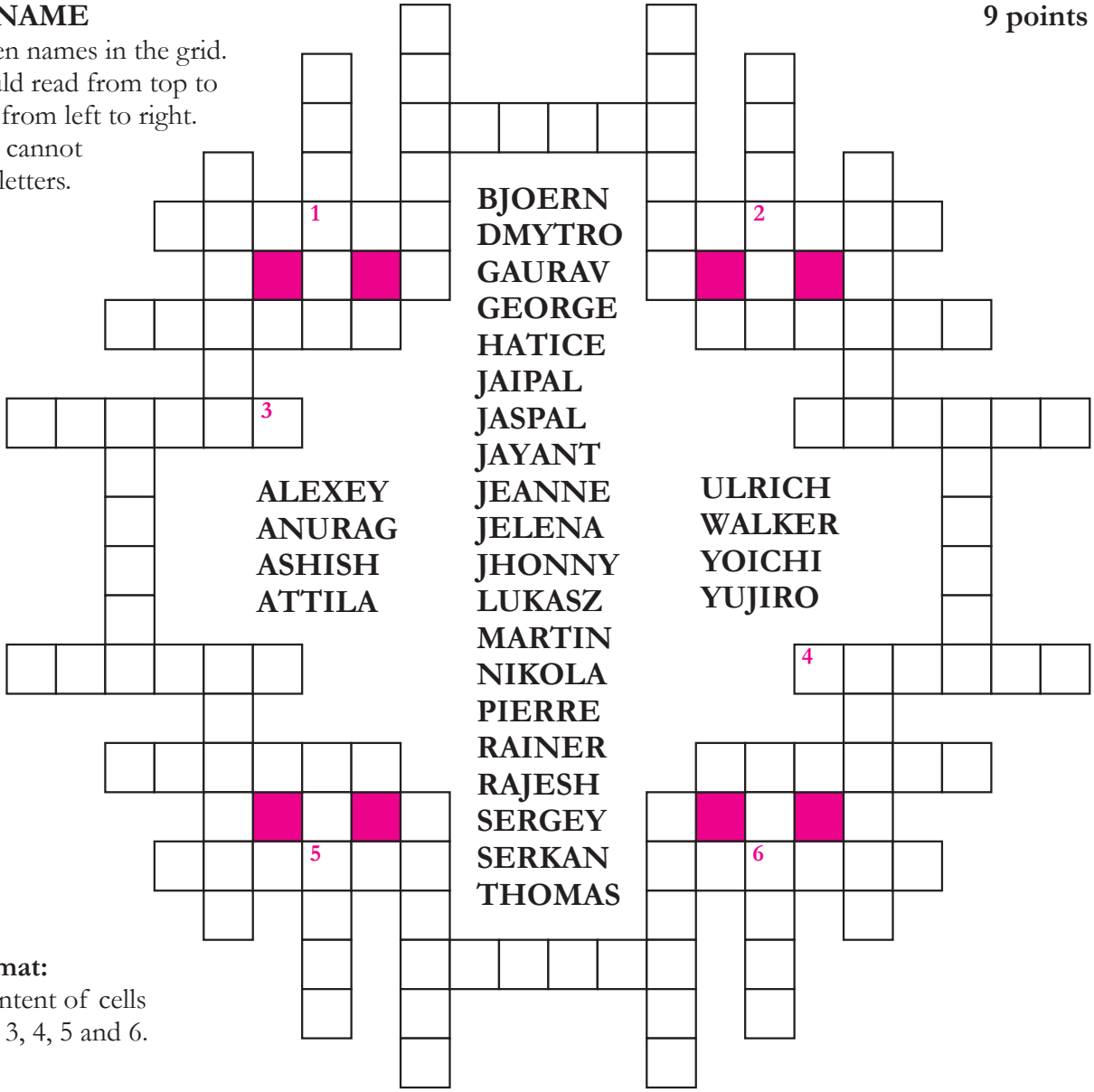
Answer format: Write the content of the diagonal of the 8 x 8 grid going from top left corner to the bottom right corner. Use "-" for empty cells. For the example: B-A.



9. CROSSNAME

9 points

Place all given names in the grid. Names should read from top to bottom and from left to right. Shaded cells cannot contain any letters.

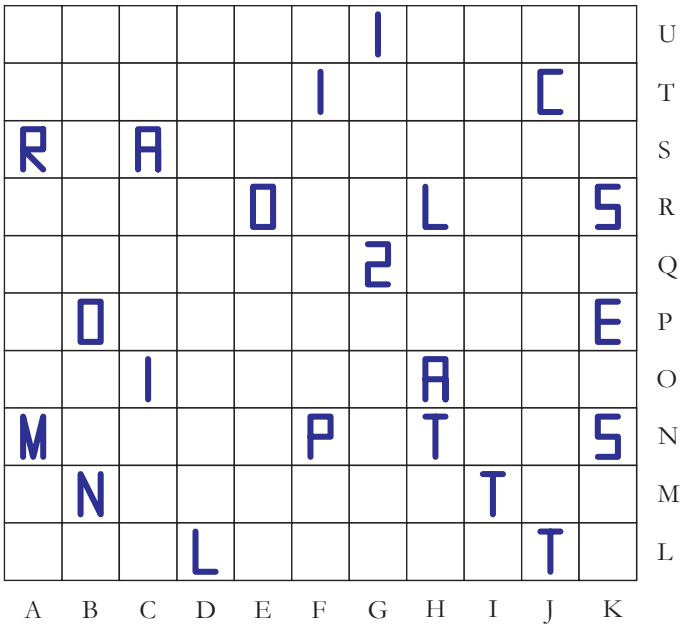


Answer format:
Write the content of cells marked 1, 2, 3, 4, 5 and 6.

10. APRIL CONTEST 2015 AT LMI

10, 7, 4, 1 points for best solutions

Draw a line (not necessarily loop) going through the centers of some cells and formed by horizontal and vertical segments. Along the line should read "**APRIL CONTEST 2015 AT LMI**". The line cannot overlap itself but can cross itself in centers of cells. Minimize the value of the expression "P + 2E", where P is the number of points of intersection, and E is the number of empty cells.



Answer format: Write the value (P + 2E), coordinate where line starts (2 letters), then coordinates of all turn points successively. The answer could be: 28, FQ, FP-HP-HO...

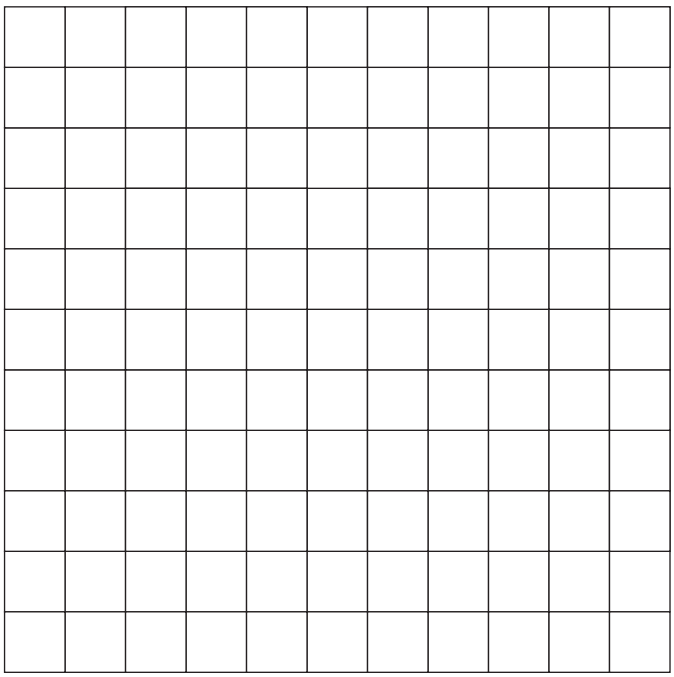
11. NUMBERED SNAKE 13, 12, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1 points for best solutions

Draw into the 11 x 11 grid a 45-cell number snake which forms a single continuous path from the head to the tail. Adjacent cells of the snake are connected horizontally or vertically. The snake has one unit width and cannot touch itself, not even diagonally. Count the sum of numbers in all rows. Let "R" be the maximum sum and "r" be the minimum sum. Similarly, let "C" be the maximum sum among columns and "c" be the minimum sum. Minimize the value of the expression " (R - r)^2 + (C - c)^2 ".

Examle
(11-cell snake into the 5 x 5 grid)

	1	9	5	30	21
11					11
19				9	10
11	1	2		8	
10		3		7	
15		4	5	6	

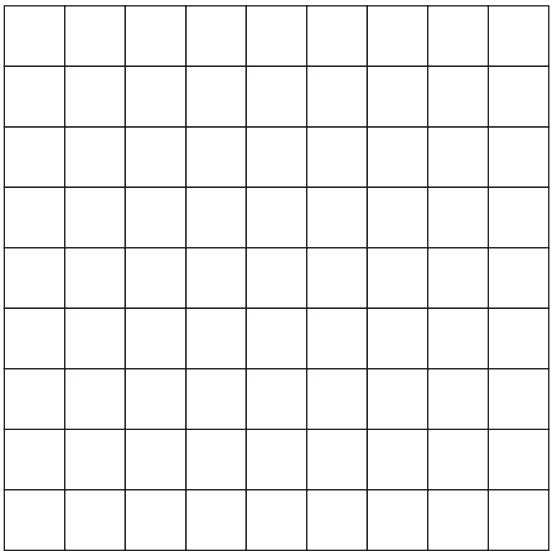
R = 19,
r = 10,
C = 30,
c = 1



Answer format:
Write the value [(R-r)^2 + (C-c)^2], then the content of the grid row by row from left to right and from top to bottom. Use "-" for empty cells and brackets for two-digit numbers. For the example: 922, ----(11), ---9(10), 12-8-, -3-7-, -456-.

12. ROMAN COOL-L-L 13, 11, 9, 7, 5, 3, 1 points for best solutions

For the 9 x 9 grid, use numbers outside (top and right) and letters C, O, L inside, to make a ROMAN COOL-L-L puzzle with a unique solution. The rules of this puzzle: Write in each empty cell a letter C, O or L so that there never occur two consecutive C, three O or four L in any row, column or diagonal. According to the Roman system of numbers C=100, L=50. The given numbers outside represent the sum of all Cs and Ls in the corresponding row or column.
Minimize the value of the expression "S+150 K", where S is the sum of all given numbers and K is the number of given letters inside the grid.



Example (for the 5 x 4 grid)

100	100			100	
					50
					50
			C		

K=1
S=400

Solution

100	100			100	
L	L	C	L	L	
O	O	L	O	O	50
O	O	L	O	O	50
L	L	L	C	L	

Answer format: Write the value (S+150K), then the given numbers from left to right and then from top to bottom. Use "-" if there is no given number. Finally describe the content of the grid row by row from left to right and from top to bottom. For empty rows, one "-" sign should be used.
For the example: 550, 100, 100, -, -, 100, -, 50, 50, -; -, -, -, ---C-.