

A P R I L C O N T E S T 2016

by Riad Khanmagomedov

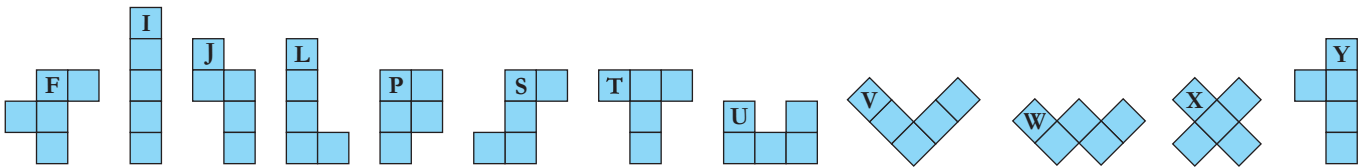
Submissions should be sent on the answer page at LMI not later than 24-00 (of Moscow time) April 28 2016

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

1. PENTOBATTLE

6 points

Place 12 given pentominoes in the two grids. The pentominoes cannot overlap each other. They can be rotated and/or mirrored. Pentominoes must form a single connected area in each grid. Digits outside the grid indicate the size of the blue blocks in the corresponding directions, not necessarily in order. A letter outside the grid indicates that the corresponding column has the pentomino marked with this letter. Put the given fleet in the connected pentomino area: the 10 ships cannot touch each other, even diagonally.



↓ 1

2 1 1 1

3 4 4 5 3 I

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

→

1 ↓

1 1 1

1 5 6 1 5 4 1 2

3								
2	4							
1	4							
2	4							
5								
2								
2								

→

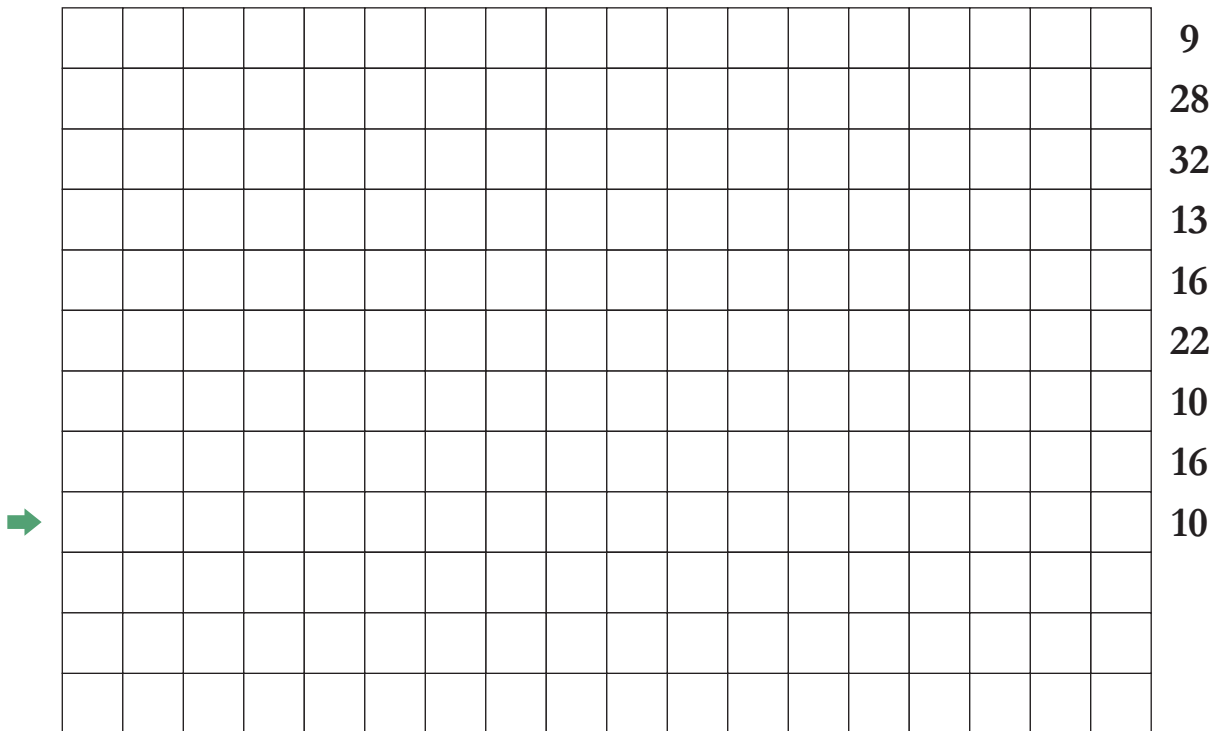
Answer format: Write the content of marked row from left to right and the column from top to bottom for the 1st grid and for the 2nd. Use the corresponding letter for cells occupied by pentominoes, adding to the letter "+" if the cell also is occupied by the ship, and "-" for other cells. The answer could be: J, J+, J, -, I+.

2. IN TERMS OF AREAS

6 points

Blacken some cells to form rectangles having both height and width greater than 1. They cannot touch each other, even diagonally. Numbers outside show the sum of the areas of all rectangles in the corresponding directions.

15 25 19 16 32 16 ↓ 13 9 6 6 10 4 4 8



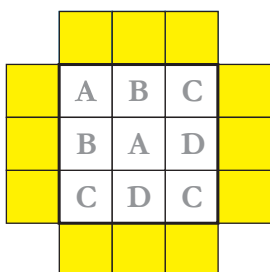
Answer format: Write the sizes of continuous shaded and unshaded areas starting from the border and reading left to right in the marked row, then top to bottom in the marked column.

3. CODED ARROWS

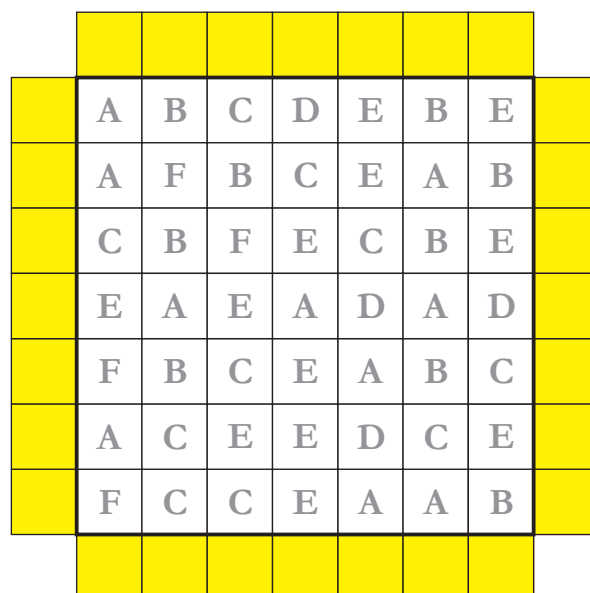
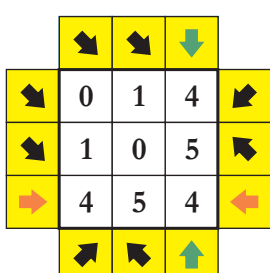
4 points

All letters must be replaced by digits from 0 to 5 so that different letters correspond to different digits, to form a valid Arrows puzzle: In each blank cell surrounding the grid, draw one arrow. All arrows should point inside the main 7 x 7 grid. Each digit inside the grid shows the number of arrows pointing at the digit.

Example
(digits 0, 1, 4 and 5)



Solution



A =
B =
C =
D =
E =
F =

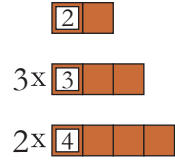
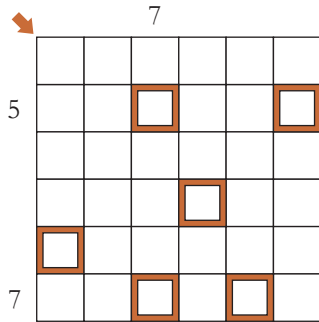
Answer format: Write the total number of horizontal arrows in all surrounding blank cells, then the total number of vertical arrows. For the example: 2, 2.

4. BRICKS

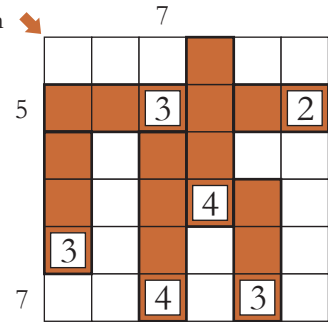
7 points

There is a given list of bricks, which must be placed in white cells. Each brick must contain exactly one given brick fragment which must be filled in with the length of the brick. The bricks must not overlap each other, and must form a single connected area. The numbers outside the grid equal the sum of the digits in the corresponding direction (written into the given brick fragments).

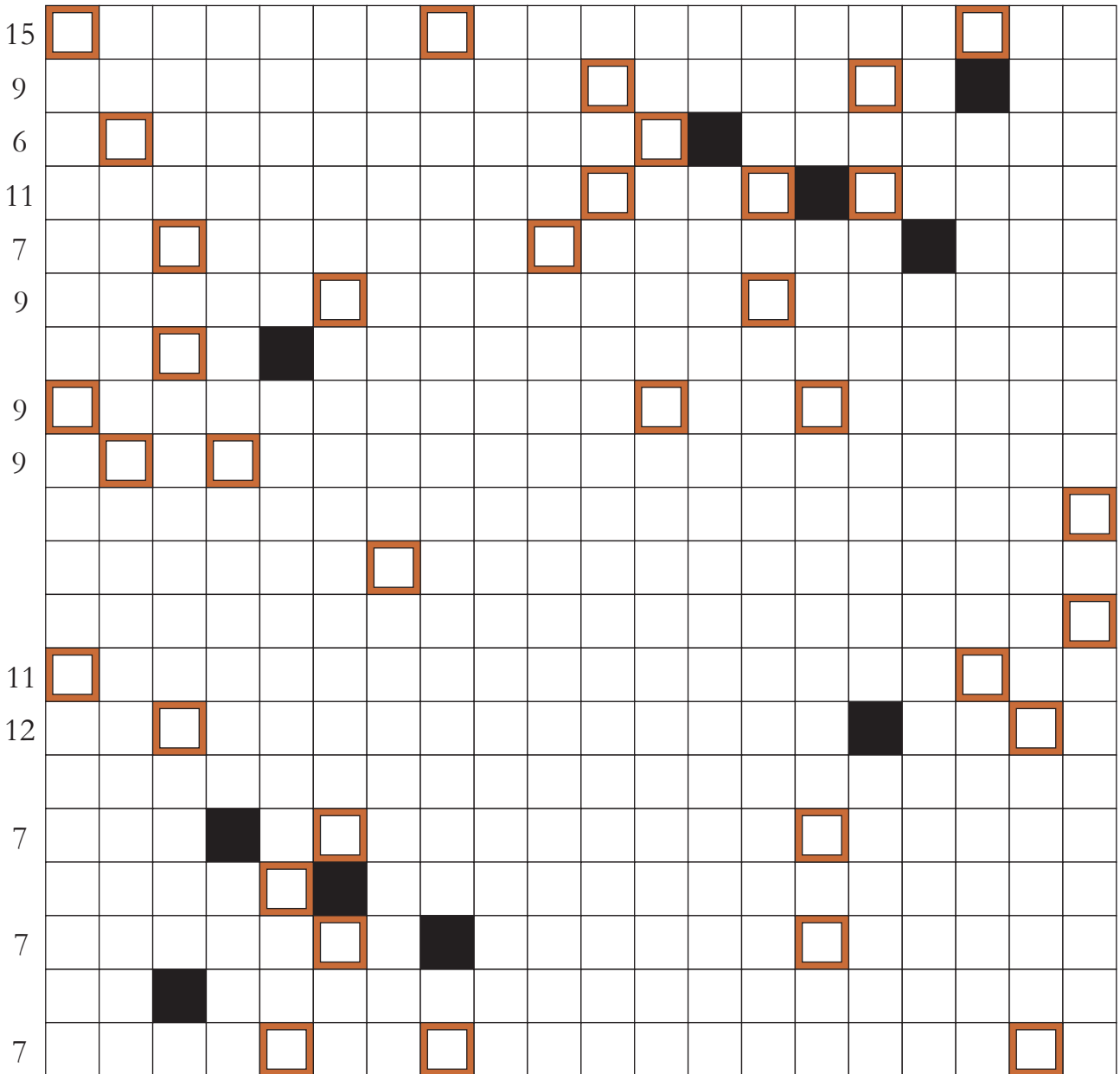
Example ↴



Solution ↴



↴ 16 8 12 5 10 9 10 7 12 8 7 7 8



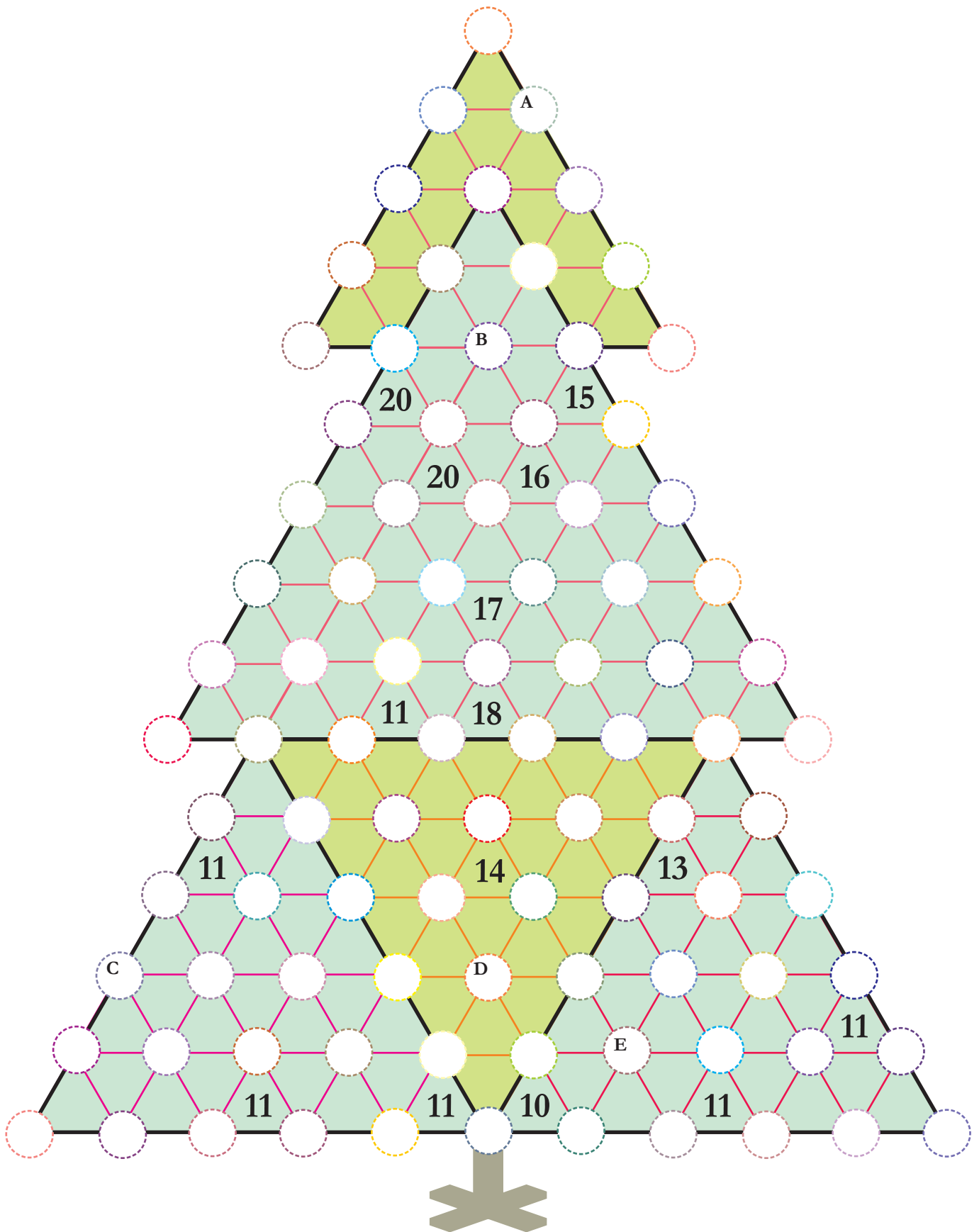
7x 2x 9x 3x 7x 4x 4x 5x 6x 6x 2x 7x

Answer format: Write the content of marked diagonal from top to bottom. Use numbers, "-" for empty cells and "+" for shaded cells. For the example: -++4+-.

5. TRID-FIR

7 points

On each of 5 large triangles solve Trid puzzle. Some circles are common to different triangles. The Trid rules: Write digits from 1 to N into the circles (N is the number of circles on the side of large triangle). Digits in one line should be different. Each number in the grid indicate the sum of digits in three adjoining circles.



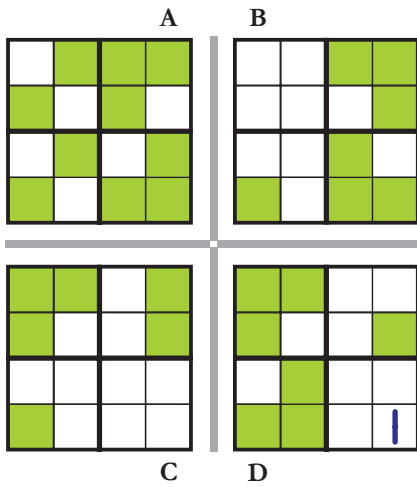
Answer format: Write the content of circles with A, B, C, D, E.

6. MIRRORED SUDOKUS

9 points (1.5 for each diagonal)

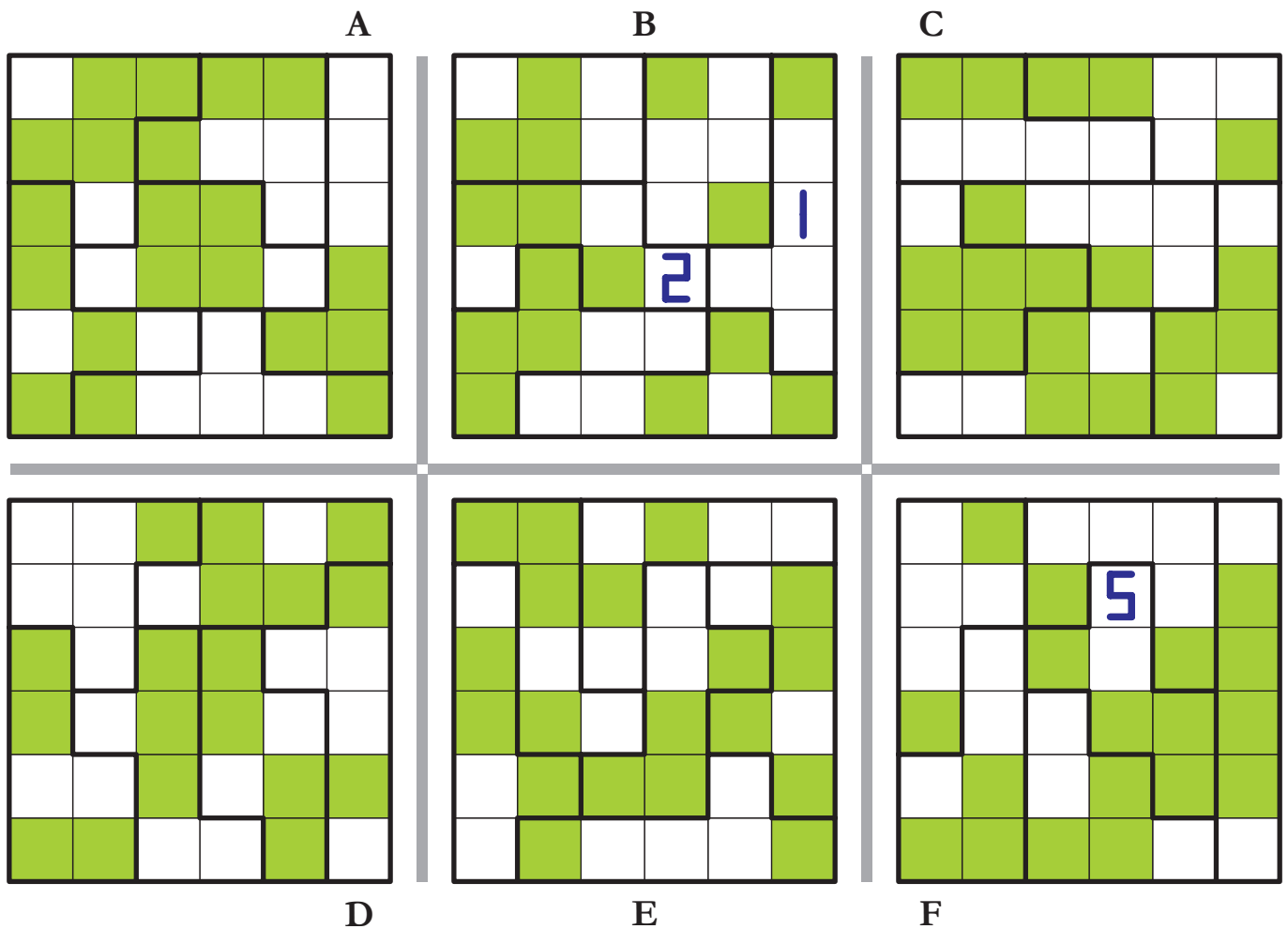
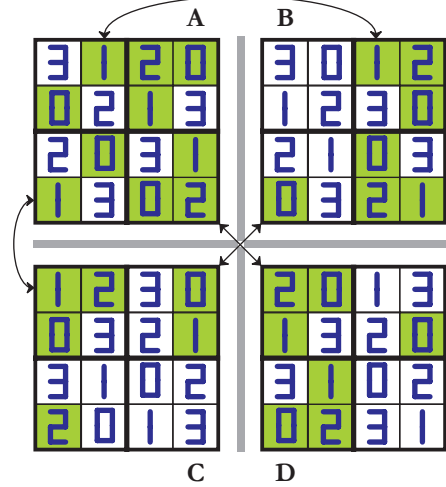
Fill each grid with digits from 0 to 5 (using the given shapes for the numbers). Within a grid, the numbers cannot repeat in rows, columns and outlined areas. Grey lines are mirrors. For every cell, there are 5 mirrored cells (one in each of the other 5 grids). All cells with digits which, after mirroring, 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



0
1
2
3

Solution



0 1 2 3 4 5

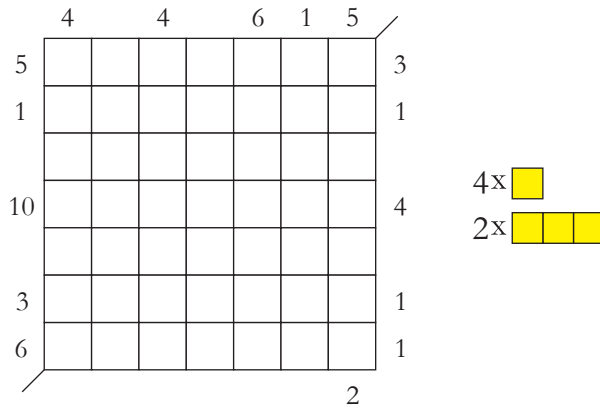
Answer format: For each grid, write the content of the diagonal from the top right corner to the bottom left corner. For the example: 0101, 2310, 0212, 3210.

7. VOYAGE

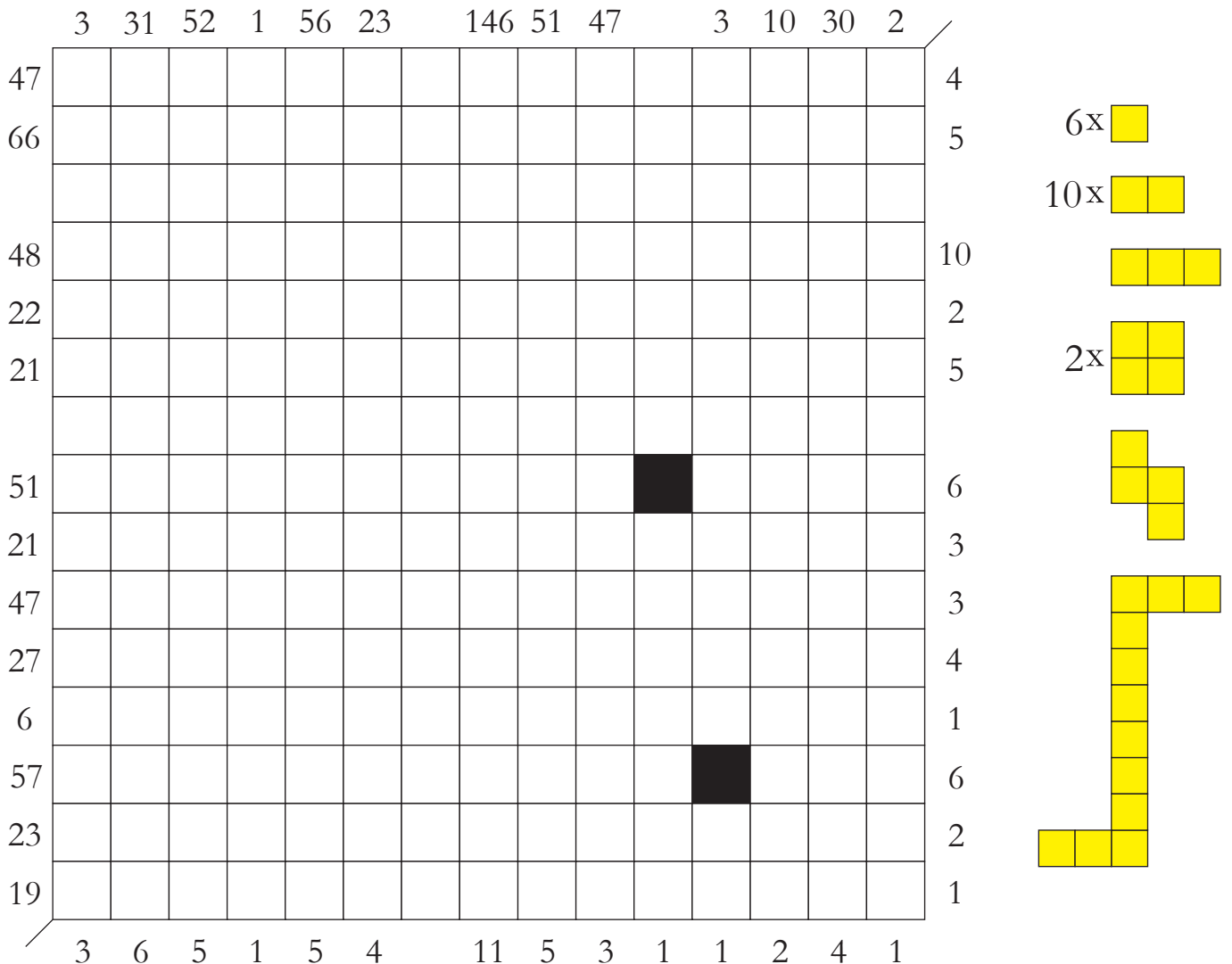
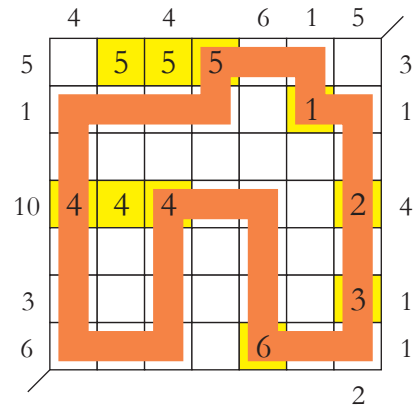
11 points

Place all given figures in white cells. They can be rotated, but not mirrored. Figures cannot touch each other, even diagonally. Numbers at the right and bottom show the number of figure-parts in the corresponding directions. Each figure must represent a different number from 1 to 21. If a figure represents a number, the number must be written into all cells of the figure. Draw a loop of 1-cell width and a length of 96, connecting centers of cells. The loop consists of horizontal and vertical segments, and cannot touch or cross itself. It must pass through at least one cell of all figures. Numbers at the top and left show the sum of numbers in the cells crossed by the loop in the corresponding direction.

Example (numbers from 1 to 6, the loop length is 30)



Solution



Answer format: Write the number exactly once for each instance (defined as passing the shape till the next white cell) where the loop passes its shape. For the example: 5, 1, 2, 3, 6, 4, 4.

8. BORDERLESS SEXTET

11 points

Draw six connected regions, not overlapping each other, inside which it is possible to solve the six puzzles: Battleships, Loop, Packing, Scrabble, Snake, Tetrominoes.

Battleships: Put the standard fleet in a connected region consisting only of blue cells. 10 ships cannot touch each other, even diagonally.

Loop: In a certain connected region draw a loop passing through centers of all its 16 white and/or blue cells and consists of horizontal and vertical segments. The loop cannot touch itself.

Packing: 7 given yellow numeric figures put without overlapping so that each yellow cell was occupied by a white cell of the grid. Should appear the connected yellow region (possibly only with black cells inside). Figures can be rotated, but not mirrored. Numbers outside the grid show the sum of all numbers in the yellow region on corresponding diagonals.

Scrabble: All words from the list fill in the grid according to usual crossword rules: from left to right and top to bottom. Cells with letters should form one connected white-blue region. In the crossword should not form other words.

Snake: Draw a numeric 19-cells snake – the line width of 1 cell, consisting of horizontal and vertical fragments. The snake cannot touch or cross itself. Its head, mid and tail tip are marked by circles with numbers 1, 10 and 19.

Tetrominoes: 7 given purple tetrominoes put without overlapping so that they formed a connected purple region (possibly only with black cells inside). Figures can be rotated, but not mirrored. In the grid marked by crosses 7 cells belonging to 7 different tetrominoes. Figures with the same letters must not touch each other, even by corners.

45

FLEET

32

PACKING FIGURES

BJOND
DVD
EMMY
FNUFF
FUNCUUB
FX
GOGOVOV
GX
HNJ
HV

HWK
JIJW
LQQ
PKP
QQ
THRASHER
TIPLLL
VID
XXX
ZY

1

10

19

Answer format: Write the content of marked columns from top to bottom. Use "-" for empty and black cells, "B" for cells occupied by ships, "L" for cells occupied by the loop, numbers in yellow cells and circles, letters (including letters, corresponding to tetrominoes).

9. ACCORDANCES

3 or 2 points

Define the logic and find the natural number corresponding to 1500.

1 ~ 53

5 ~ 23

51 ~ 3

100 ~ 6

150 ~ 17

400 ~ 48

1500 ~ ?

Answer format: Write the number and your logic in parentheses.

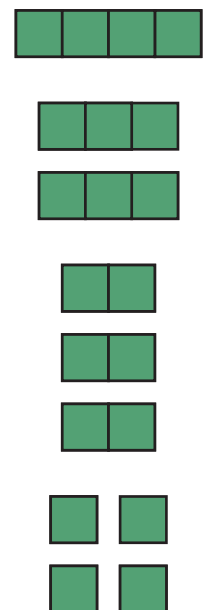
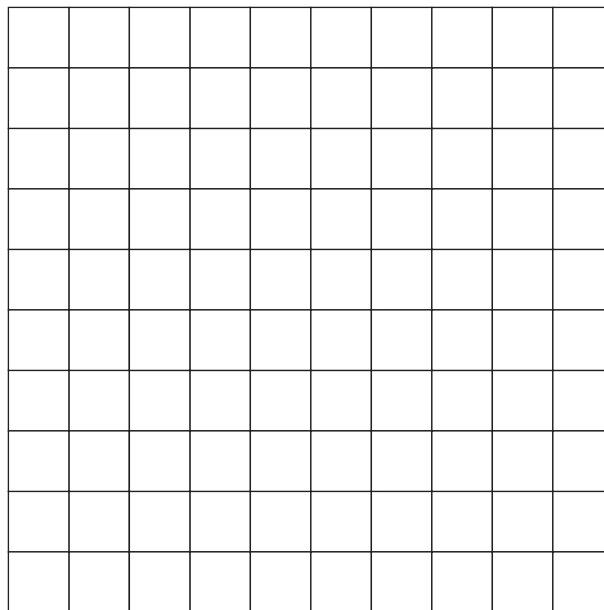
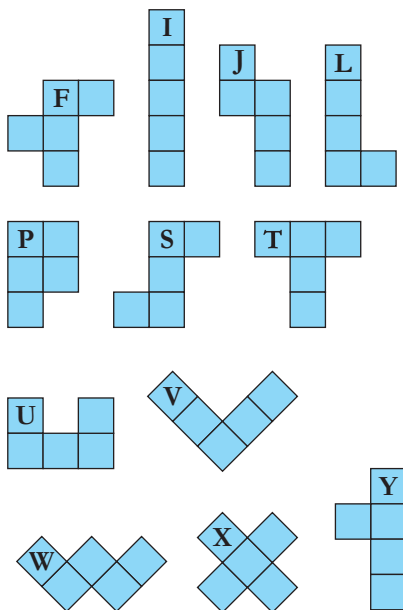
Score: 3 points for logic, coinciding with the author's, 2 points for different logic.

10. OPTI-PENTOBATTLE

13, 11, 9, 7, 5, 3, 1 points for best solutions

Choose different pentominoes from the 12 given and place them into the 10 x 10 grid without overlapping each other. They can be rotated and/or mirrored. Pentominoes must form a connected area. The area formed should have at least one valid solution for Battleships puzzle: Put the given fleet in the Pentomino area, different ships cannot touch each other, even diagonally.

Minimize the value of the expression $K + 1.5N$, where K is a number of chosen pentominoes, N is a number of Battleships puzzle solutions. If two solutions have same value of $K + 1.5N$, the solution which has smallest rectangular Pentomino area will be considered as better solution.



Answer format: Write the value $K + 1.5N$, then the content of the grid row by row from left to right and from top to bottom. Use the corresponding letter for cells occupied by pentominoes and "-" for other cells. For empty rows, one "-" sign should be used.

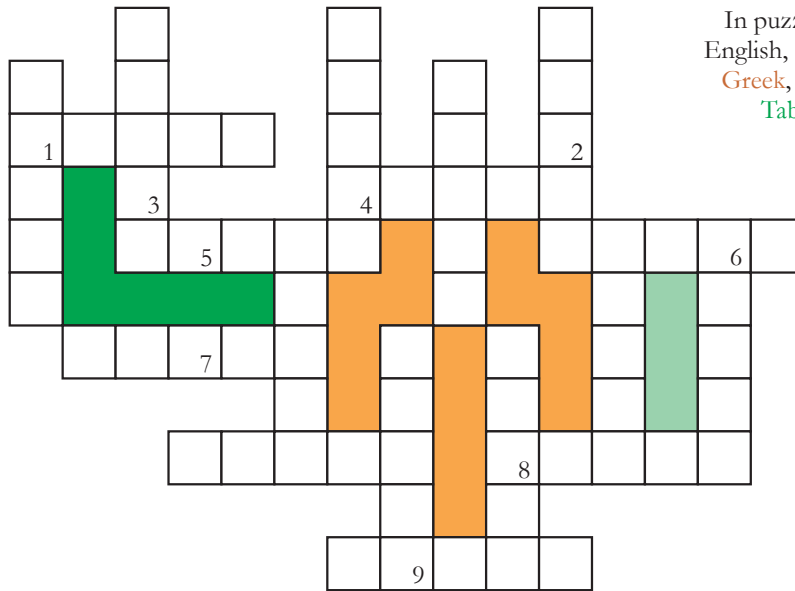
11. CROSSMIND

12 points

Solve 18 Mastermind puzzles and place all 5-letter answers in the crossword grid from left to right and top to bottom. In some cases, the puzzle has several solutions: set of correct answers which will help the crossword crossing.

The Mastermind rules: Identify the hidden word by comparing it with the given words above. Each black circle indicates that the given word contains a correct letter in a correct position compared to the hidden word. Each white circle indicates that the given word contains a correct letter in a wrong position compared to the hidden word.

In puzzle used words of Azerbaijani, English, Estonian, Georgian, German, Greek, Italian, Latin, Polish, Russian, Tabasaran and Turkish languages written in Latin.



ADASH ○
 BATJA ○○○
 OJCZE ●
 OTETS ○●
 PADRE ○○
 PATER ○○○
 PEDER ○
 VATER ○○○

~~~~~ ●●●●●

BAZAR ○  
 CARSI ○●●  
 FORUM ○○  
 MARKT ○●  
 RYNOK ○○○

~~~~~ ●●●●●

BEANS ○●
 BOHNE ○○○
 FASOL ○○○
 LOBIO ○○○
 LOBYA ○○○●
 PAHLA ○○●

~~~~~ ●●●●●

BORBA ○○  
 FIGHT ●●  
 KAMPF ○○  
 LUCTA ○○  
 ZHENG ●

~~~~~ ●●●●●

BURSA ●●●
 SUMKA ●●●
 TORBA ●●●

~~~~~ ●●●●●

CAUSA ○  
 CAUSE ○  
 DALIL ○○  
 MOTIV ○○  
 NEDEN ●  
 NOMEN ○  
 RATIO ○○○  
 REZON ○●  
 SEBEP ●

~~~~~ ●●●●●

CORNU ○
 KANAT ○●●●
 KRYLO ○●
 PAPAL ○●●

~~~~~ ●●●●●

DEGER ○●  
 FIYAT ○  
 NIZAM ○○  
 PREIS ○○●

PRICE ○●  
 TSENA ○○○○  
 UCRET ○●  
 VALUE ○○

~~~~~ ●●●●●

DOGAN ○
 FALCO ○●
 FALKE ○●
 LACIN ○○
 PPAZI ○
 SAHIN ○●
 SOKOL ○○●●

~~~~~ ●●●●●

FIMUM ○●●  
 GUBRE ○  
 MAYIS ○●●  
 NAVOZ ○  
 PEYIN ○○  
 URSAL ○○

~~~~~ ●●●●●

FLOCK ○○
 KATAR ●●
 RUDEL ○○●●
 SUREK ○○○●

~~~~~ ●●●●●

GROCH ○  
 HARAR ●  
 NOHUT ○○○  
 PISOS ●●  
 PISUM ○○

~~~~~ ●●●●●

HABAR ○●
 MOLVA ○
 RUMOR ●●
 SERMO ○○●
 TOLKI ●
 VESTI ○●

~~~~~ ●●●●●

IMAGE ○  
 OBRAZ ●●  
 SEKIL ○●●  
 SURAT ○●  
 WEISE ○

~~~~~ ●●●●●

Example

AETAS ○●
 DEVIR ●●●
 EPOKA ○
 VANUS ○●●
 ZAMAN ●

~~~~~ ●●●●●

Solution

DAVIS

ISSUE ●  
 NOMER ○○○●  
 NUMRA ○○○○  
 NUSHA ○○

~~~~~ ●●●●●

JISHV ○●
 LOCUS ●
 NOKTA ○●●
 POINT ○○○●
 PUNKT ○○

~~~~~ ●●●●●

KELEF ○  
 MOTEK ○●●  
 MOTOK ●●●  
 NITKI ○○●  
 SKEIN ○○○  
 ZWIRN ○

~~~~~ ●●●●●

NUBAT ○○●
 SMENA ○○○○
 SPELL ○
 TAKIM ○○○
 WACHE ○○
 WATCH ○●

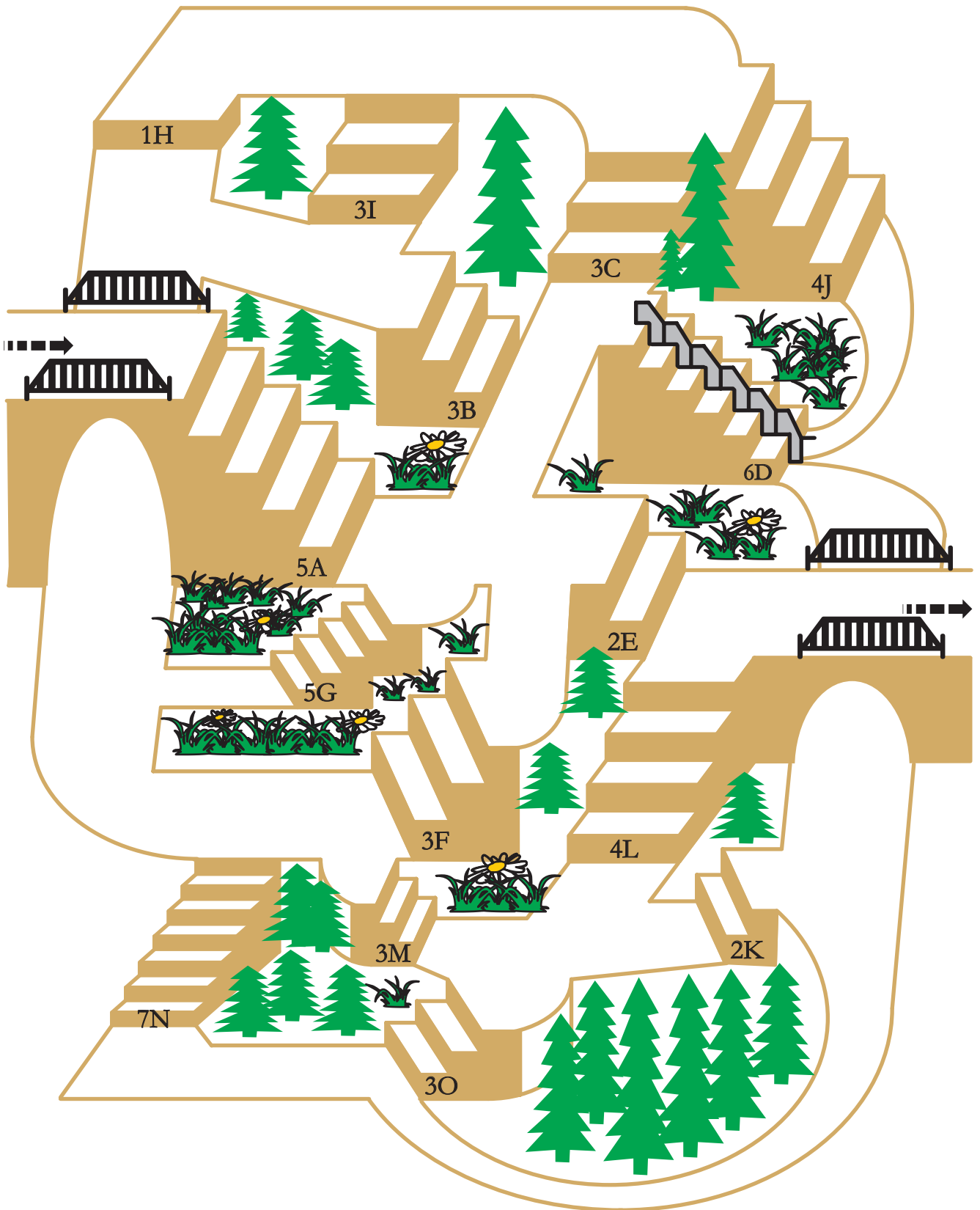
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Answer format: Write the content of cells with digits from 1 to 9.

## 12. IN THE CITADEL

13, 10, 7, 4, 1 points for best solutions

Go from the left arrow to right, avoiding green areas, so as to minimize the absolute difference between the total number of steps on all climbs and the number of steps on all descents. Each staircase (they are designated with letters from A to O and the number of steps) can be used not more than once. Among solutions with the same difference best will be the result involving a greater number of steps.



**Answer format:** Write the difference, the total number of completed steps, then consecutively alphanumeric codes of stairs, using "+" and "-" in front of them on climbs and descents, respectively. The answer could be: 1, 21, -5A+3B+1H-4J+6D-2E.