

WPF PUZZLE GP 2023 INSTRUCTION BOOKLET

Host Country: Bulgaria

Deyan Razsadov, Alexander Angelov

Special Notes: None.

Points:			9.	Kropki (Mastermind)	99
1.	Hundred	24	10.	Cave	37
2.	Balance	49	11.	Slitherlink	43
3.	Arrows	46	12.	Cave (Inside+Outside)	53
4.	Star Battle	57	13.	Akari	12
5.	Double Choco	50	14.	Scrabble	20
6.	Pentominous	51	15.	Scrabble (Akari)	103
7.	Mastermind	35			
8.	Kropki	27	TOTAL:		706

1. Hundred [Deyan Razsadov] (24 points)

Place digits into some (or all) cells such that the sum of numbers in each row and column is 100. Some digits are supplied for you; these digits are not necessarily aligned consistently with digits in other cells. Multi-digit numbers may not start with 0.

Answer: For each row, enter all the digits that you placed, from left to right. If you did not place any digits in the row, enter a single letter 'X'.

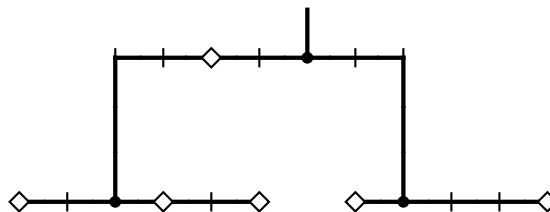
Example Answer: 71, 0, 12

→	6	8	6
→	8	9	2
→	6	2	8

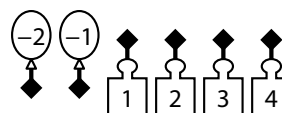
→	76	8	16
→	8	90	2
→	16	2	82

2. Balance [Deyan Razsadov] (49 points)

Attach the given weights (and balloons with negative weight, if given) to the mobile at the diamond-shaped attachment points, one at each point, such that the entire mobile balances — that is, at each fulcrum (round black dot), the total torque (weight multiplied by distance from the fulcrum) on both sides of the balance must be the same. Ignore the weight of the rods. Weights (or balloons) may already be attached for you.

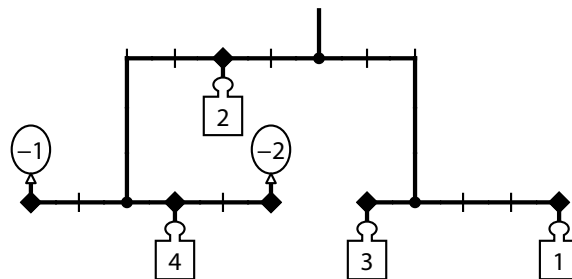


Answer: Enter the weight of each attached item (including any that were attached for you), from left to right. Ignore the vertical position of each item. Use only the last digit for two-digit or negative numbers; e.g., use '0' for a weight of 10 and use '3' for a weight of -3.



Example Answer: 142231

$$((-1) + 4 + (-2)) \times 4 + 2 \times 2 = (3 + 1) \times 2$$



$$(-1) \times 2 = 4 \times 1 + (-2) \times 3$$

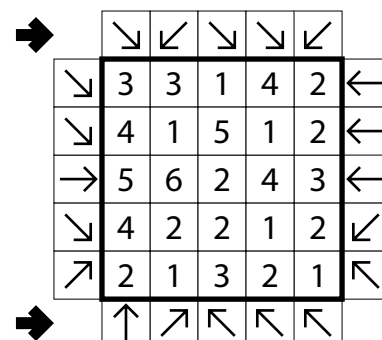
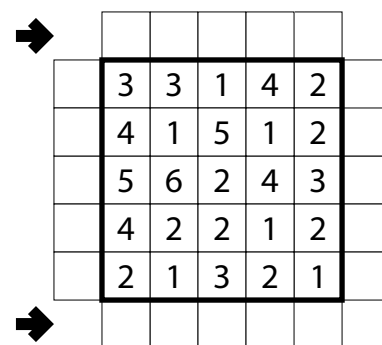
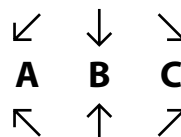
$$3 \times 1 = 1 \times 3$$

3. Arrows [Deyan Razsadov] (46 points)

Draw an arrow in each of the empty cells outside the main grid (shown by a thick outline). Each arrow must point in one of the eight standard directions, and must point to at least one cell in the main grid. Each numbered cell must be pointed at by exactly that number of arrows.

Answer: Enter the contents of the indicated rows, from left to right. Use 'A' for an arrow pointing diagonally left, a 'B' for an arrow pointing orthogonally, and 'C' for an arrow pointing diagonally right. Alternatively, you may use any three characters instead of 'ABC', as long as they are distinct.

Example Answer: CACCA, BCAA



4. Star Battle [Alexander Angelov] (57 points)

Place stars into some cells in the grid, no more than one star per cell. Each row, each column, and each outlined region must contain exactly two stars. Cells with stars may not touch each other along an edge or a corner.

The numbers on top of the diagram are for Answer purposes only.

Answer: For each row from top to bottom, enter the number of the first column from the left where a star appears (the number on top of that column). Use only the last digit for two-digit numbers; e.g., use '0' if the first star appears in column 10.

Example Answer: 261627135

5. Double Choco [Alexander Angelov] (50 points)

Divide the grid into regions along grid lines. Each region must contain one group of orthogonally connected white cells and one group of orthogonally connected gray cells. Both connected groups must form the same shape (rotations and reflections are allowed). Each number indicates the area of the group (not region) that number is in. (Regions may contain no numbers, or multiple given numbers, even in the same color.)

The squares in gray cells are only to make them distinctive in poor printing conditions. The dots in cells are only used for entering your answers.

Answer: Enter the area of the group (not region) each dot is in, reading the dots from left to right. (Ignore which row the dots are in.) Use only the last digit for two-digit numbers; e.g., use '0' for a group of size 10.

Example Answer: 433224

6. Pentominous [Alexander Angelov] (51 points)

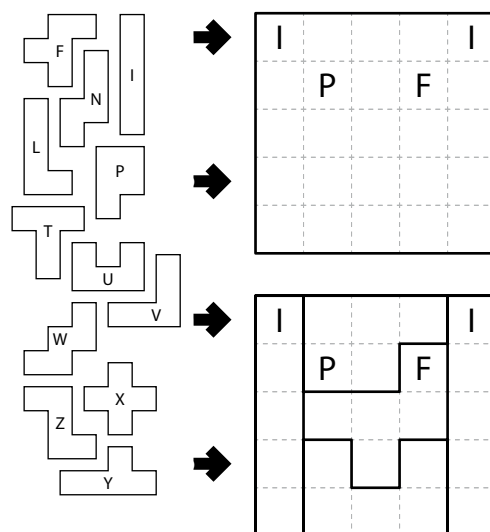
Divide the grid into pentominoes such that every cell in the grid is part of exactly one pentomino. Pentominoes of the same shape (rotations and reflections of a pentomino count as the same shape) cannot touch each other along an edge (but they may touch diagonally). Some letters are given in the grid. Each letter must be part of a pentomino with that letter's shape. It is permissible for a pentomino to contain more than one letter. (It is possible for some pentomino shapes to never appear in the grid, or more than once.)

The letter-to-shape correspondence for pentominoes has been supplied for you.

In the competition puzzle, there may be black areas that are not part of the grid.

Answer: For each designated row, enter the letter for the pentomino that each cell belongs to, from left to right.

Example Answer: IPPPI, IUFUI



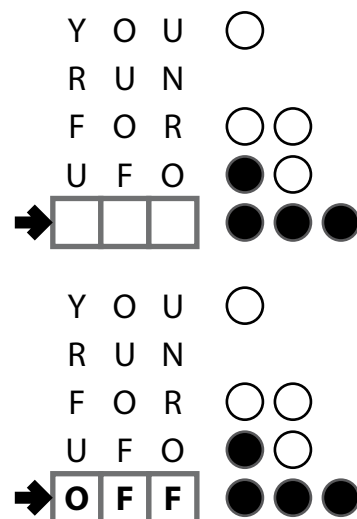
7. Mastermind [Alexander Angelov] (35 points)

Identify a secret code comprised of letters. Each row represents a guess at the secret code, whose correctness is described by black and/or white dots to the right. A black dot represents a letter in the guess that is in the same position as a letter in the secret code. A white dot represents a letter in the guess that is in the secret code, but not in the same position. The dots are given in no specific order, and each letter in the secret code contributes at most one dot, with black dots given priority over white dots in case of ambiguity (for example, if the guess was FREED and the secret code was GEESE, the puzzle would display 1 black and 1 white). Each letter in the secret code appears in at least one guess. Blank spaces can appear in the guesses but will never appear in the secret code.

The last line with empty space for the secret code, and any notes on the side, are given for aesthetic reasons only. The secret code may or may not be a meaningful word.

Answer: Enter the secret code.

Example Answer: OFF

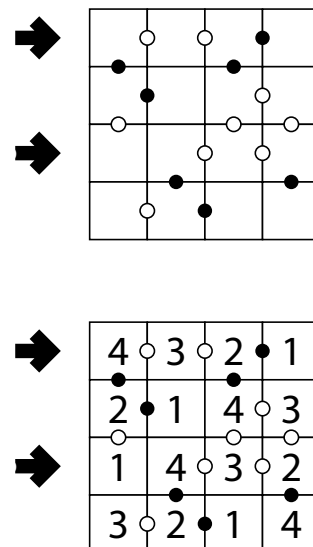


8. Kropki [Alexander Angelov] (27 points)

Place a number from 1 to X into each cell so that each number appears at most once in each row and column. (X is the number of cells in each row.) A white dot on the edge between two cells indicates that those two cells must contain consecutive numbers; a black dot on the edge between two cells indicates that a number in one of those cells is double the value of the number in the other cell. If 1 and 2 are in adjacent cells, then the dot between them could be either color. If there is no dot on the edge between two cells, it means neither a black nor a white dot could go there.

Answer: For each designated row, enter its contents from left to right.

Example Answer: 4321, 1432



9. Kropki (Mastermind) [Alexander Angelov] (99 points)

Place a number from 1 to X (integers only) into each cell so that each number appears at most once in each row. (X is the number of cells in each row.)

There is no restriction on how many times a number may appear in each column.

There are multiple MasterMind grids hidden inside the main grid. All such grids are at least 2 rows tall but may have any width. The last row of a MasterMind grid is the secret code for that grid, and all cells in that row are highlighted with a dotted rectangle; however, there is no indication of where the first row of each grid is. The grids may overlap.

Dots on the bottom edge of a cell may be a Kropki clue or a MasterMind clue; dots on the right or left of a cell are Kropki clues.

Kropki white dots indicate that the two adjacent cells must contain consecutive numbers; Kropki black dots indicate that a number in one adjacent cell is double the value of the number in the other adjacent cell.

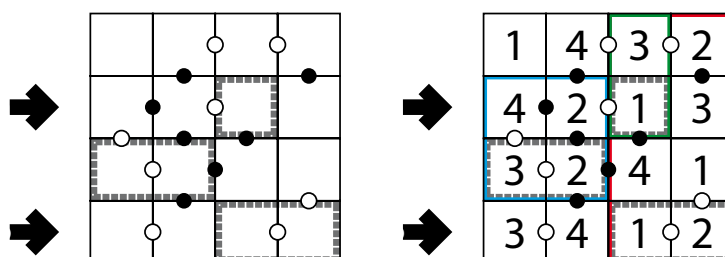
MasterMind black dots indicate that the number in the cell above matches the number in the secret code in the same position; MasterMind white dots indicate that the number in the cell above is in the secret code, but not in the same position.

If multiple dots could be valid in a location, then any valid dot might be shown there (for example, a dot within a MasterMind grid does not guarantee that it is a MasterMind dot). If no dot is shown in a location, then it means no dot can be shown there (however, it is possible that a dot could have been shown there if one of the MasterMind grids were taller).

In the solution, the colored rectangles showing the MasterMind grids are not part of the solution and used to show where the grids are. Note that the precise height of the MasterMind grids need not be uniquely determinable.

Answer: For each designated row, enter its contents from left to right.

Example Answer: 4213, 3412

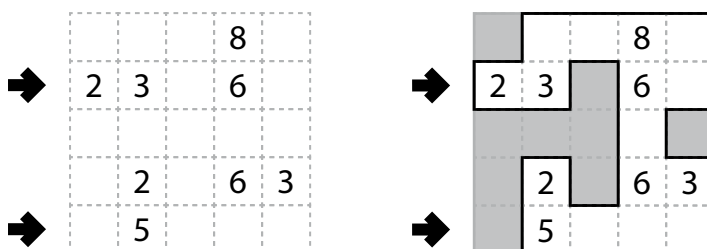


10. Cave [Deyan Razsadov] (37 points)

Shade some cells to leave behind a single orthogonally-connected group—the cave—with no shaded cells enclosed within the cave. In other words, all shaded cells must be connected edge-wise by other shaded cells to an edge of the grid. All numbered cells must be a part of the cave (and therefore not shaded). Each number indicates the total count of unshaded cells connected in line vertically and horizontally to the numbered cell including the cell itself.

Answer: For each designated row, enter its contents from left to right. Use 'O' for an (unshaded) cell occupied by the cave and 'X' for a (shaded) cell not occupied by the cave. You may use two other letters or numbers, as long as they are distinct.

Example Answer: OOXOO, XOOOO



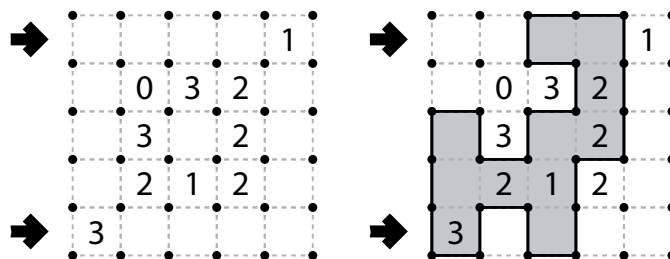


11. Slitherlink [Deyan Razsadov] (43 points)

Draw a single, non-intersecting loop that only consists of line segments between the dots along the dotted lines. A number inside a cell indicates how many of the edges of that cell are part of the loop.

Answer: For each designated row, enter its contents from left to right. Use 'o' for a cell inside the loop and 'x' for a cell outside the loop. You may use two other characters, as long as they are distinct.

Example Answer: xxoox, oxoox



12. Cave (Inside+Outside) [Deyan Razsadov] (53 points)

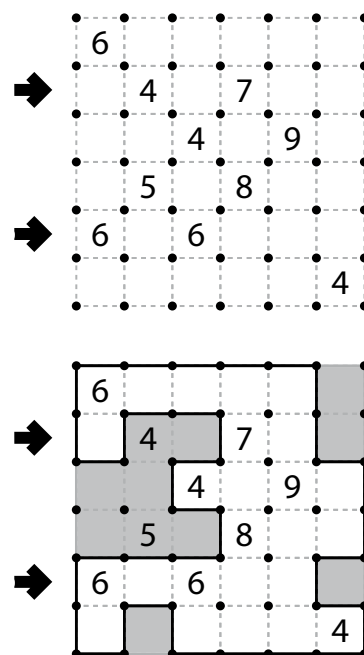
Shade some cells to leave behind a single orthogonally-connected group—the cave—with no shaded cells enclosed within the cave. In other words, all shaded cells must be connected edge-wise by other shaded cells to an edge of the grid.

Each number inside the cave indicates the total count of unshaded cells connected in line vertically and horizontally to the numbered cell including the cell itself.

Each number outside the cave indicates the total count of shaded cells connected in line vertically and horizontally to the numbered cell including the cell itself.

Answer: For each designated row, enter its contents from left to right. Use 'o' for an (unshaded) cell occupied by the cave and 'x' for a (shaded) cell not occupied by the cave. You may use two other characters, as long as they are distinct.

Example Answer: oxxoox, ooooox

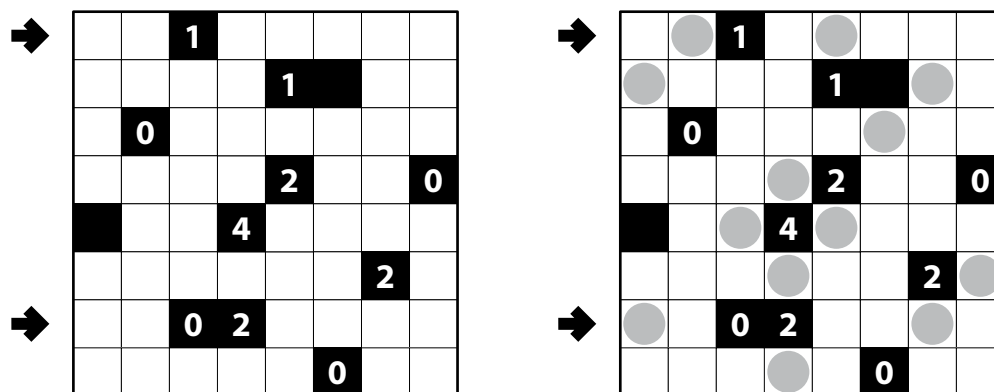


13. Akari [Deyan Razsadov] (12 points)

Locate some "light bulbs" in the grid such that every white cell is "lit up". Each bulb occupies a single white cell, and lights up its own cell, as well as white cells in the four orthogonal directions until the light beam encounters a black square or the edge of the grid. A bulb may not illuminate another light bulb. All white cells must be lit up by at least one bulb. A given number in a black cell indicates how many cells orthogonally adjacent to it are occupied by bulbs.

Answer: For each indicated row, enter its contents from left to right. Use 'o' for a cell with a bulb and 'x' for a cell without a bulb. Ignore cell colors and numbers when entering your answer. You may use two other letters or numbers, as long as they are distinct.

Example Answer: xoxxoxxx, oxxxxxox





14. Scrabble [Alexander Angelov] (20 points)

Put at most one letter into each cell so that the given words can be read either across (left-to-right) or down (top-to-bottom) in consecutive cells in the grid. Every word must appear in the grid exactly once, and no other words may appear in the grid (that is, if two cells are filled and are adjacent orthogonally, then there must be a word that uses both of them). Every word must have either a blank cell or the edge of the grid before and after it. All letters must be orthogonally connected in a single group.

Some letters may be already supplied in the grid. For any such letter, all instances of that letter are given.

Answer: For each designated row, enter its contents from left to right, ignoring any blank cells. If all cells in the row are blank, enter a single letter 'X'.

Example Answer: CYPRUSO, ONMUO, AUR, GA

A									
	A								
						A			
						A			A
A									
								A	
						A			

AUSTRIA
CROATIA
CYPRUS
GEORGIA
ICELAND
LUXEMBOURG
MACEDONIA
MOLDOVA
SPAIN

M									
A	S	L							M
C	Y	P	R	U	S				O
E	A	X							L
D	I	C	E	L	A	N	D		
O	N		M		U				O
N				B	S				V
I		C	R	O	A	T	I	A	
A				U		R			
		G	E	O	R	G	I	A	
				G	A				

15. Scrabble (Akari) [Alexander Angelov] (103 points)

Put at most one letter into each cell so that the given words can be read either across (left-to-right) or down (top-to-bottom) in consecutive cells in the grid. Every word must appear in the grid exactly once, and no other words may appear in the grid (that is, if two cells are filled and are adjacent orthogonally, then there must be a word that uses both of them). Every word must have either a blank cell or the edge of the grid before and after it. All letters must be (orthogonally) connected in a single group.

Some letters may be already supplied in the grid. For any such letter, all instances of that letter are given.

Each cell with a letter O "lights up" itself and all cells in the four orthogonal directions until the light beam encounters another letter or the edge of the grid. It is not permitted to have two Os light up each other. All empty cells must be lit up by at least one O.

Answer: For each designated row, enter its contents from left to right, ignoring any blank cells. If all cells in the row are blank, enter a single letter 'X'.

Example Answer: O, TO

A				

ALSO
OLTS
ON
OSTIN
TO

	O			
A	L	S	O	
	T			O
O	S	T	I	N
		O		