LOGIC MASTERS Deutschland e.V.

Instruction booklet for the qualifying round of Logic Masters 2013

Welcome to the qualification round for the Logic Masters 2013!
We hope you enjoy the competition, regardless of whether you compete seriously or just for fun.

The contest will consist of 20 puzzles, some of them being extremely difficult. We believe most puzzlers will not be able to solve all of them in time. Solve those puzzles you can solve and skip the others; if you have time left, you can always come back to them.

The points for the puzzles have been assigned according to their difficulty. You may use these information to decide which puzzles to try first. However, keep in mind your estimation of a puzzle's difficulty may differ from ours.

The contest will start on Friday, April 26 at 12:00 pm and end on Monday, April 29 at 12:00 pm CEST. During that time, you can choose to start solving whenever you want. When you do, you will obtain the passwort for the encrypted contest file; after that, you have 150 minutes to solve the puzzles and send your answers via the contest page. Note that no results will be accepted on Monday after 12:00 pm anymore.

The 35 best solvers of German citizenship, together with the WPC team of 2012, will be invited to compete at the final round on June 8 in Augsfeld, to determine the German Puzzle Champion 2013 and the team competing at the World Puzzle Championship in Beijing in October.

Rules and rule changes:

- Wrong answers will yield a penalty of 5 points. During your solving time you can correct any mistakes, of course.

- Incorrect answer keys for an otherwise correct solution may be accepted as correct. However, in such a case only 80% of the puzzle's points will be given.

- You may enter your answer keys at any time, to avoid time trouble at the end of the contest.

- You are solely responsible for sending your answers in time.

- You must solve the qualification puzzles without outside help. Computer programs, Sudoku solvers or similar are not allowed.

If there are any last minute changes or clarifications, they will be announced in our forum at
http://forum.logic-masters.de/showthread.php?tid=1147.

Answer keys:

Please keep in mind the following guidelines when entering your answer keys:

- If not specified differently, enter your solution from top to bottom.

- For clarity's sake, you may use commas and spaces in your answer keys; they have no bearing on the correctness of your solutions.

- The solution form does not distinguish between capital and lower case letters.

The puzzles were created by the following authors:

Florian Kirch (2, 15, 16), Sebastian Matschke (20), Roland Voigt (11, 14), Ulrich Voigt (1, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 17, 18, 19)


Instructions

The following instructions come directly from the contest file; only the diagrams have been removed. Instead of them, small examples are shown. These examples can not be found in the test file. You should read and understand the instructions and examples before the test.

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1. Smashed Sums   10 points

Fill the grid with black cells and digits from 1 to 4, so that each row and column contains each digit exactly once as well as two black cells. The numbers outside the grid indicate the sum of the digits between the two black cells in the respective row or column.

Example (using digits from 1 to 3):
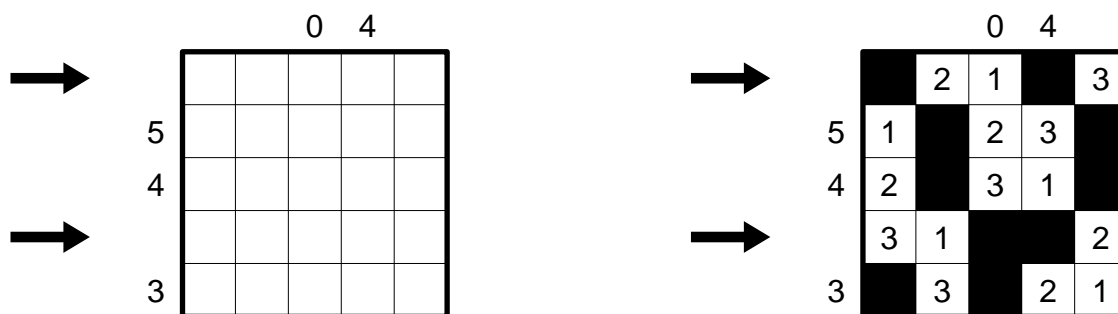
Answer key: Enter the digits in the marked rows from left to right. Use '–' for black cells.
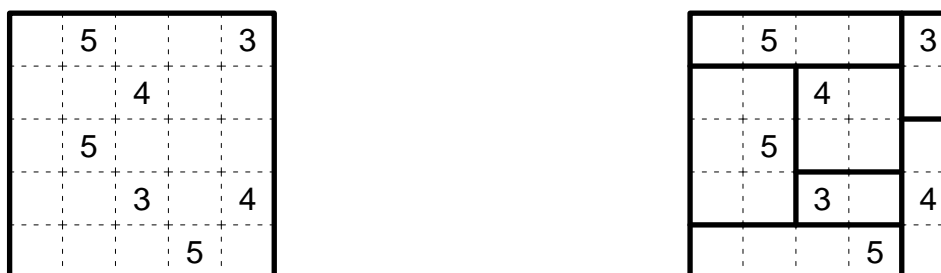
For the example, the answer key would be: –21–3, 31––2

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2. Rekuto   10 points

Divide the grid into rectangles, so that each rectangle contains exactly one number that indicates the sum of width and height of the rectangle.

Example:

Answer key: For each row rom top to bottom, enter the number of rectangles that have at least one cell in that row.
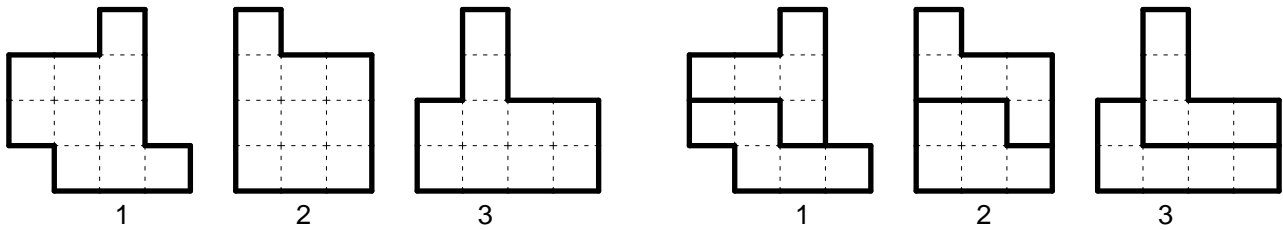
For the example, the answer key would be: 23332

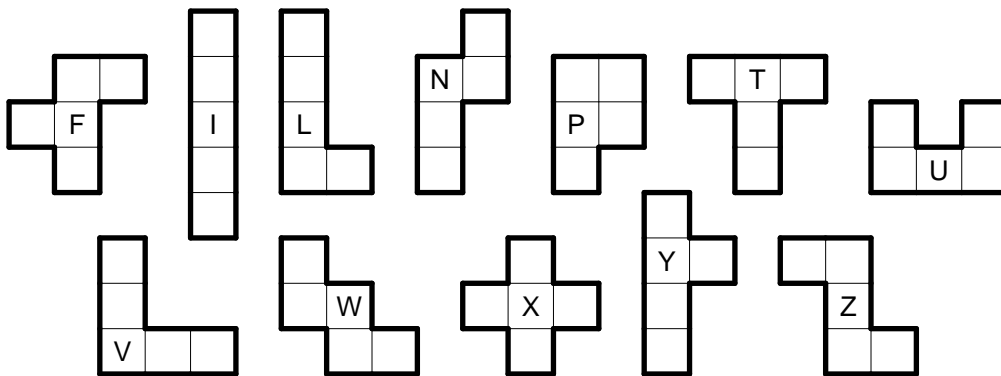# 3. Pentomino Pairs   15 points

Divide each outlined area into two pentominoes, so that each of the twelve pentominoes is used exactly once.

Example (using only the LNPTVZ pentominoes):

The twelve pentominoes:

Answer key: For each area (in the order 1, 2, 3, 4, 5, 6), enter the letters of its pentominoes.
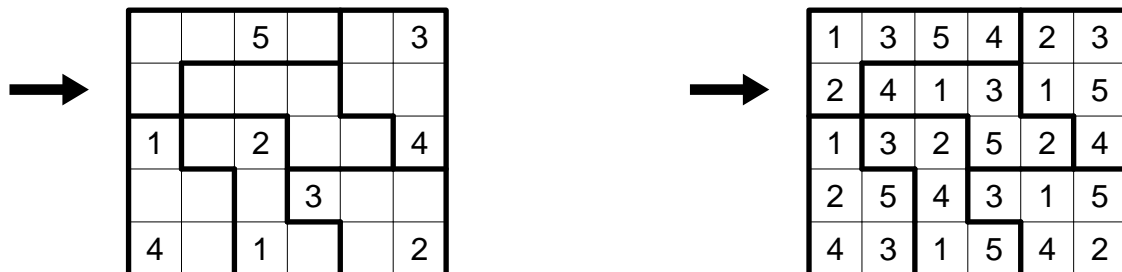
For the example, the answer key would be: NT, PZ, LV

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4. Capsules   15 points

Place digits from 1 to 5 into the grid, so that each outlined area contains each digit exactly once. Same digits must not touch each other, not even diagonally.

Example:

Answer key: Enter the digits in the marked row from left to right.

For the example, the answer key would be: 241315

5. Transporter   20 points

Find the path of the transporter so he can deliver all transport orders.

The path must begin in the cell marked START, run horizontally and vertically only and finish in the starting cell again. The path must not use a cell more than once, and the black cells must not be used at all. Some cells might remain unused.

The cubes represents objects that have to be delivered to their respective destination (the grey circles); the letters indicate where the objects have to be delivered. Whenever the transporter reaches a cell with a cube, he picks up an object; whenever he reaches a destination, he unloads all objects with the matching letter. On his path, the transporter has to pick up and deliver all objects.

The numbers inside the cube indicate the size of each object. The transporter has a limited capacity that must not be exceeded at any time.

Example (with capacity 1, this will be the case in the actual puzzle as well):

Answer key: Enter the destination letters in the order the transporter reaches them.
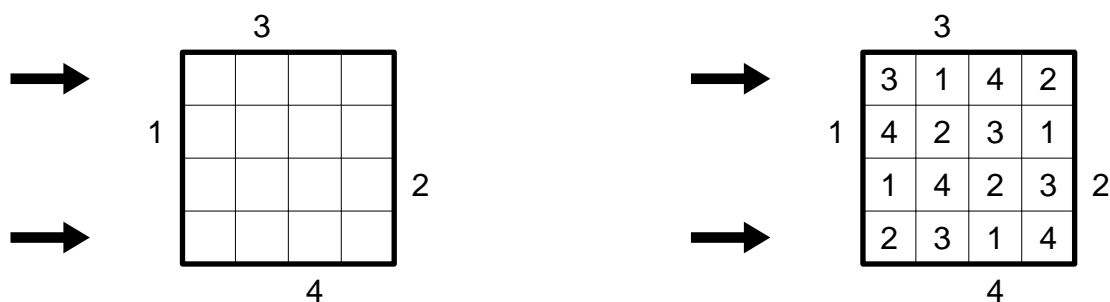
For the example, the answer key would be: CDBA

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6. Skyscrapers   20 points

Place digits from 1 to 6 into the grid, so that each digit appears exactly once in each row and column. The digits represent skyscrapers of different heights; the numbers outside the grid indicate how many skyscrapers can be seen in the respective row or column from the respective direction. Smaller skyscrapers are hidden behind higher ones.

Example (using digits from 1 to 4):

Answer key: Enter the digits in the marked rows from left to right.

For the example, the answer key would be: 3142, 2314

7. Tapa   20 points

Blacken some empty cells, so that all black cells are connected horizontally and vertically. No 2×2 square may be completely black, and cells containing numbers must not be blackened at all.

The numbers indicate how many of the horizontally, vertically and diagonally adjacent cells are black: each number corresponds to a group of horizontally and vertically connected black cells, several groups are separated by one or more white cells. Position and order of the numbers within a cell are irrelevant.

Example:
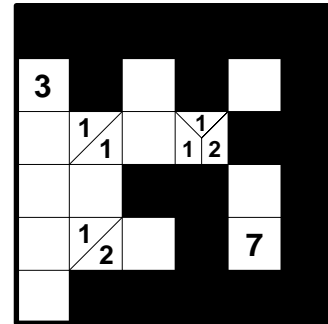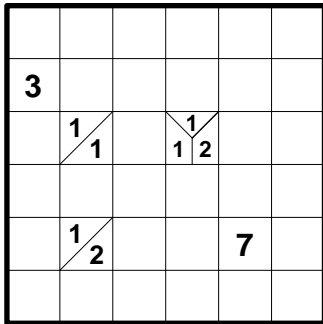
Answer key: For each row rom top to bottom, enter the number of black cells in that row.
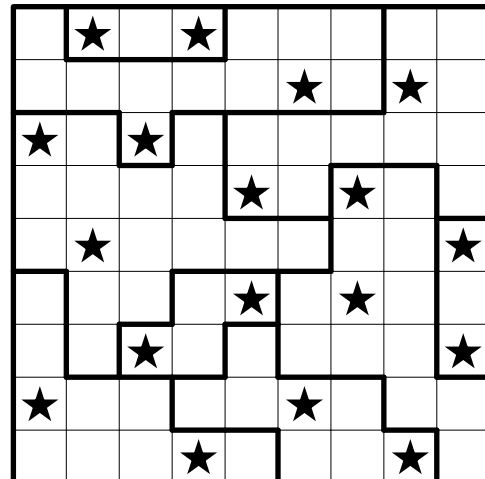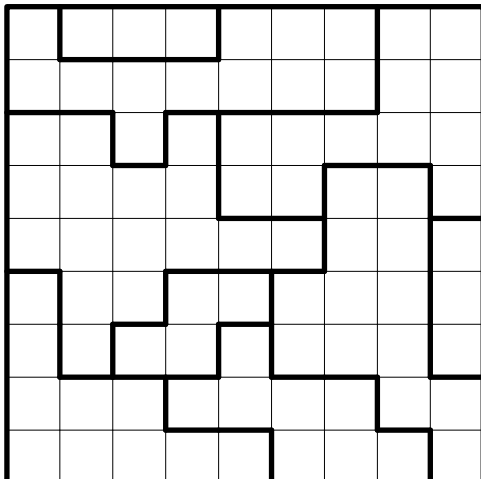
For the example, the answer key would be: 632325

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8. Star Battle   25 points

Place stars into the grid, so that each row, each column and each outlined area contains exactly two stars. The stars have the size of one cell and must not touch each other, not even diagonally.

Example:

Answer key: From top to bottom, enter for each row the number of empty cells between the two stars (do not count the cells containing stars themselves).
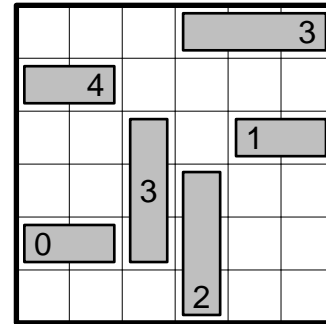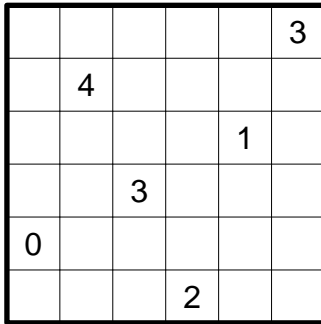
For the example, the answer key would be: 111161543

9. Tren   25 points

Place some blocks of sizes 2×1 und 3×1 into the grid that don't overlap each other. Each block must contain exactly one number that indicates the number of possible movements of that block. Only movements in the long direction are considered, and only those that don't cross the boundary of the puzzle grid and don't cause an overlap with another block. (In other words, the number indicates the number of empty cells in both directions.)

Example:

Answer key: For each row rom top to bottom, enter the number of unused cells in that row.

For the example, the answer key would be: 343425

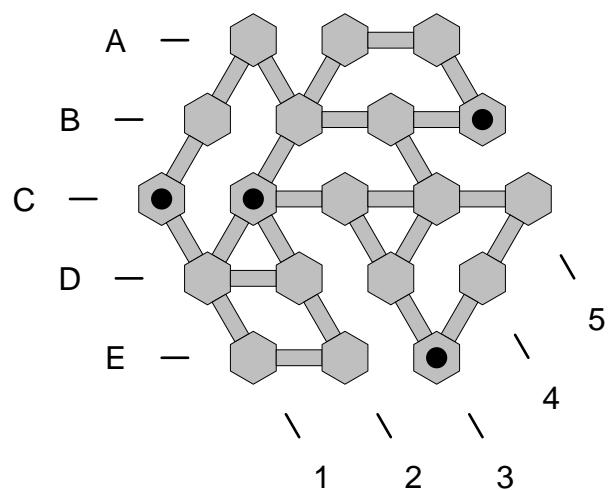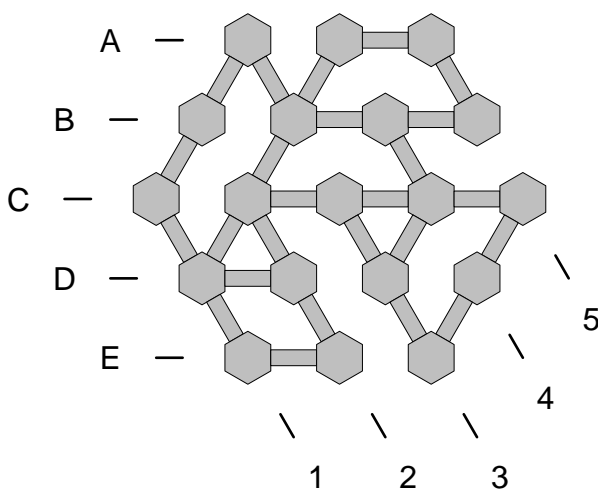## 10. Guards   30 points

The picture shows a museum with hexagonal rooms and hallways between them. Place six guards in the museum so that they can observe all the rooms; each guard is able to see over any distance along the hallways. Only the rooms themselves must be watched, not necessarily all the hallways.

For solving purposes, ignore the numbers and letters outside the grid. They define the coordinate system used in the answer key.

Example (with four guards):

Answer key: Enter the coordinates of the six guards, in alphabetical order.

For the example, the answer key would be: B5, C1, C2, E3

11. Cave   30 points

Blacken some empty cells, so that all the remaining cells form a group of horizontally or vertically connected cells (the cave). All black cells (the walls) must be horizontally or vertically connected to the border of the puzzle, either directly or via other black cells; in other words, there is no group of black cells that is completely surrounded by white cells.

Cells with numbers must not be blackened; they indicate how many cave cells are visible in all four directions, including the numbered cell itself.

Example:

	4			
		5		
6	2		4	
				3

	4		⬛	⬛
		5		⬛
	⬛			
6	2	⬛	4	
	⬛	⬛		3
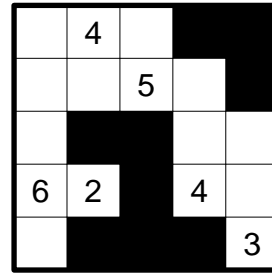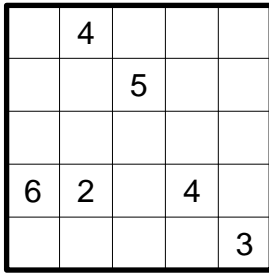
Answer key: Enter the size (number of cells) of all areas outside the cave. Start in the top left corner of the grid and proceed clockwise.

For the example, the answer key would be: 3, 6

# 12. Battleships   35 points

Place the given fleet into the grid, so that ships do not touch each other, not even diagonally. The numbers outside the grid indicate the number of ship segments in the respective row or column. Marked cells must not contain ship segments.

For solving purposes, ignore the letters outside the grid. They define the coordinate system used in the answer key.

Example (using a smaller fleet):
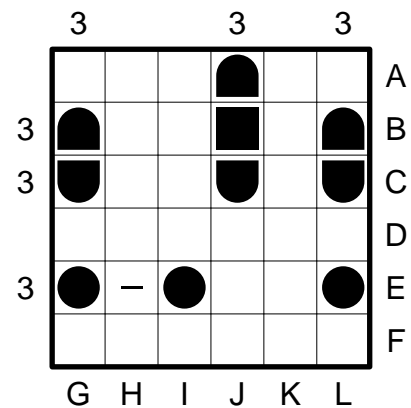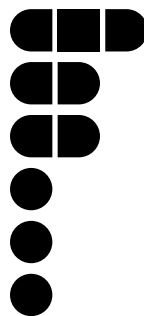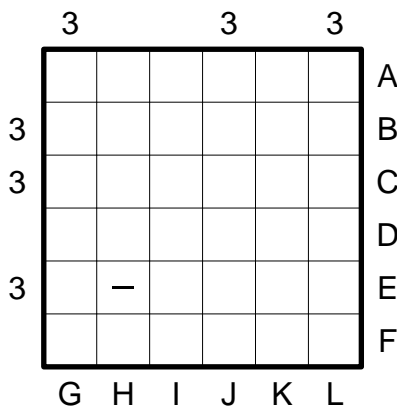
Answer key: Enter the coordinates of the four smallest ships, in alphabetical order.

For the example, the answer key would be: EG, EI, EL

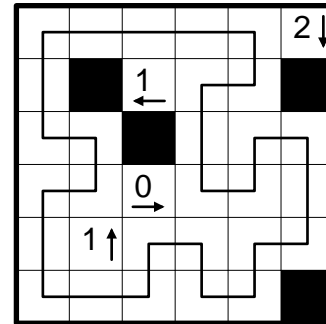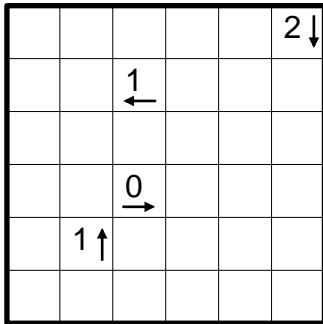# 13. Yajilin   35 points

Blacken some empty cells, so that each arrow points to the corresponding number of black cells. Black cells must not be horizontally or vertically adjacent, but they may touch diagonally. It is possible to have black cells with no arrows pointing to them; cells with numbers must not be blackened.

Furthermore, draw a closed loop, going only horizontally and vertically, that passes through all white cells exactly once, except those containing numbers.

Example:

Answer key: For each row rom top to bottom, enter the number of black cells in that row.

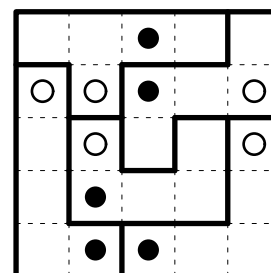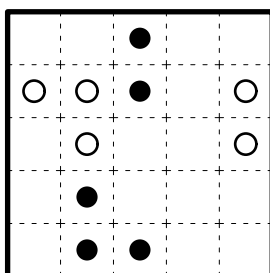*For the example, the answer key would be: 021001*

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14. Corridors   40 points

Divide the grid into nine regions of size 9, so that each region contains exactly one black and one white circle. No region may contain a 2×2 square. Adjacent cells separated by a bold line must not belong to the same region.

Example (with five regions of size 5):

Answer key: For each row from top to bottom, enter the largest number of adjacent cells that belong to the same region; then do the same for each column from left to right.
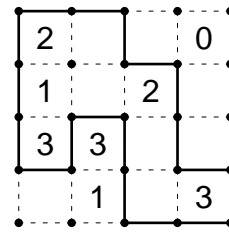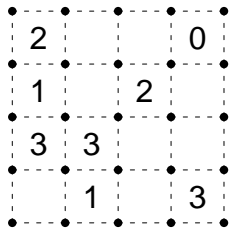
For the example, the answer key would be: 43133, 42223

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15. Slitherlink   45 points

Draw a single continuous loop by connecting adjacent dots along the dotted lines. The numbers indicate how many edges of the respective cells are used by the loop. The loop must not touch or cross itself, and it doesn't need to touch all of the dots.

Example:

Answer key: Enter the size (number of cells) of all areas outside the loop. Start in the top left corner of the grid and proceed clockwise.

For the example, the answer key would be: 4, 3

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16. Kropki-Kakuro   45 points

Place digits from 1 to 9 into the white cells. The numbers in grey cells indicate the sum of digits in the corresponding „word". In each word, no digit may repeat.

Additionally, Kropki rules apply. A black circle between two horizontally or vertically adjacent numbers indicates that one of these numbers is exactly twice the other; a white circle indicates that the difference between these numbers is exactly 1. If there is no circle between two adjacent numbers, none of these two properties may hold.

Example:
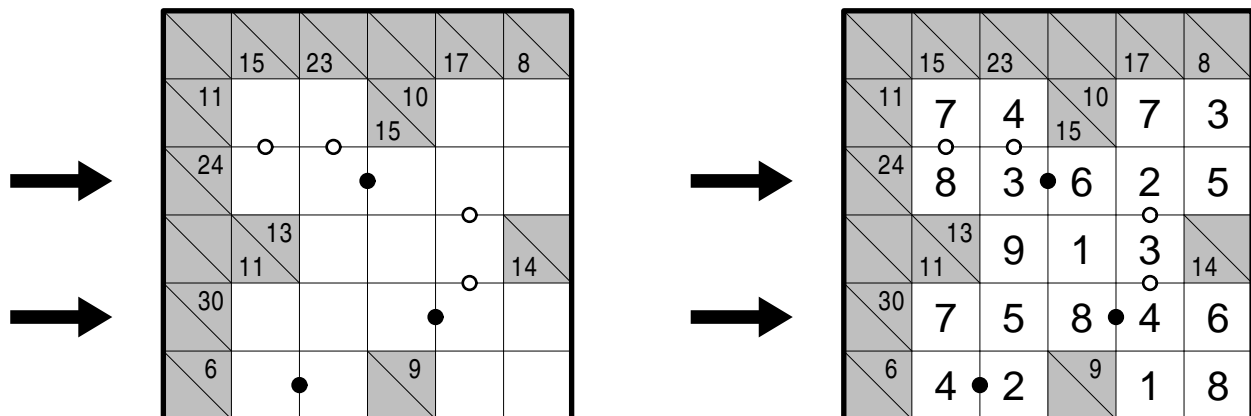
Answer key: Enter the digits in the marked rows from left to right. Ignore the grey cells.
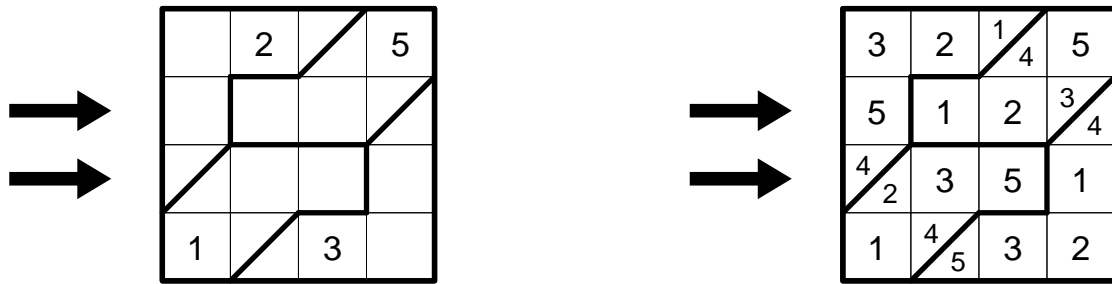
For the example, the answer key would be: 83625, 75846

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17. Tight Fit Chaos Sudoku   50 points

Place digits from 1 to 9 into the grid, so that each digit appears exactly once in each row, column and outlined area. Diagonally halved cells contain two digits, one on each side. There is no rule which of two digits in one cell should be higher than the other.

Example (using digits from 1 to 5):

Answer key: Enter the digits in the marked rows from left to right. In cells with two digits, enter the left one first.

For the example, the answer key would be: 51234, 42351

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18. Word Snakes 50 points

Place the given words into the grid, according to the following rules:

Each word must start in one of the grey cells; different words must start in different cells. The second letter of each word must be placed in the marked adjacent cell. Every further letter must be horizontally or vertically adjacent to the previous letter. Words may cross or overlap in any way, and they may also use the starting letter of other words.

Words may turn any number of times, however a word must not use the same cell more than once.

Example:

ARAGORN
BOROMIR
FRODO
GANDALF
GIMLI
LEGOLAS
MERRY
PIPPIN
SAM

Answer key: Enter the letters in the marked rows from left to right, including the givens.

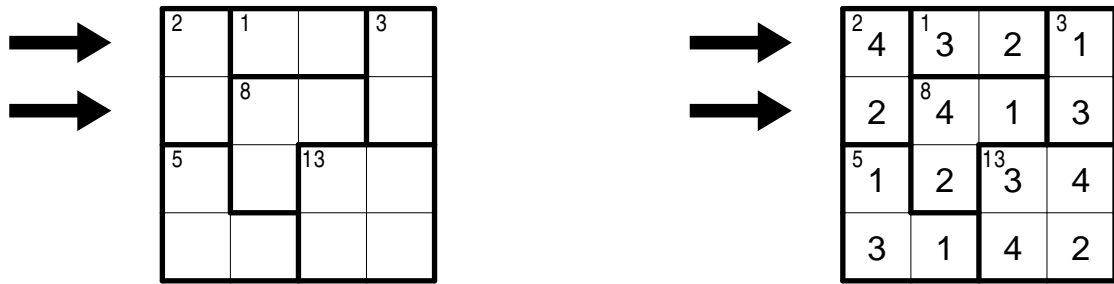*For the example, the answer key would be: IILREM, BODALF*

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19. TomTom 60 points

Place digits from 1 to 8 into the grid, so that each digit appears exactly once in each row and column. The number in the upper left of each outlined region indicates the value of a mathematical operation (addition, subtraction, multiplication, division) applied successively to all digits in the cage, starting with the largest digit for subtraction and division.

Digits can repeat within a cage.

Example (using digits from 1 to 4):

Answer key: Enter the digits in the marked rows from left to right.

For the example, the answer key would be: 4321, 2413

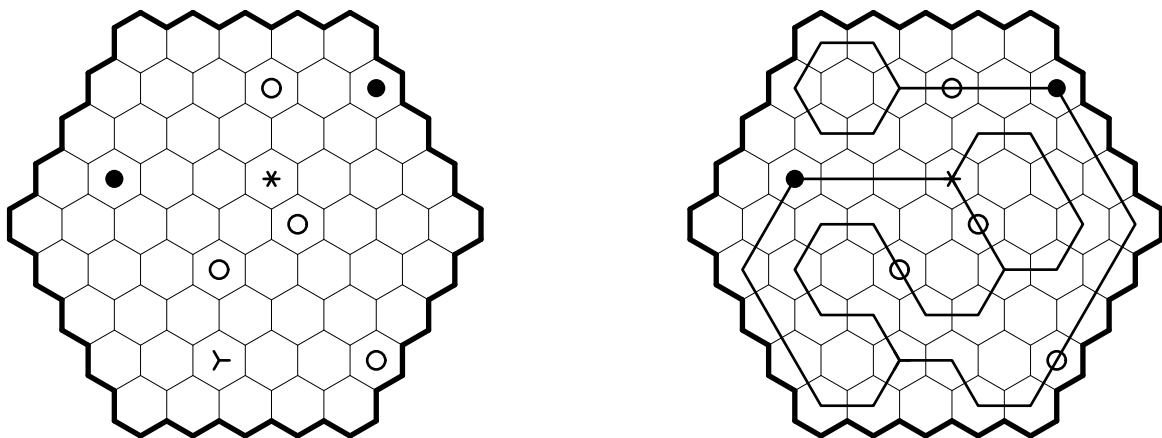# 20. Hexagonal Masyu with branches   70 points

Draw a path system, connecting the centers of adjacent cells, passing through all cells with symbols. The path may pass straight through a cell or make a 120° angle, however 60° angles are not allowed. The path may branch out (any number of times); that means, from one cell lines are drawn to three adjacent cells, making three 120° angles (again, 60° angles are not allowed). All parts of the path must be connected, and there must not be any open ends.

The symbols have the following meaning:

- white circle: The path must pass straight through, and in the next cell in at least one direction it must make a turn or branch out.
- black circle: The path must make a 120° angle (not a branch), and it must go straight through the next cell in both directions.
- branching symbol (Y): The path must branch out, in the directions indicated by the symbol.
- asterisk: The path must branch out, in either of the two possibilities according to the rules mentioned above.

Note that not all branching points are given.

Example:

Answer key: For each row rom top to bottom, enter the number of unused cells in that row.

For the example, the answer key would be: 312232121