LOGIC MASTERS Deutschland e.V.

www.logic-masters.de

World Puzzle Federation

Logic Masters 2019

Instructions

Round 1 – Welcome

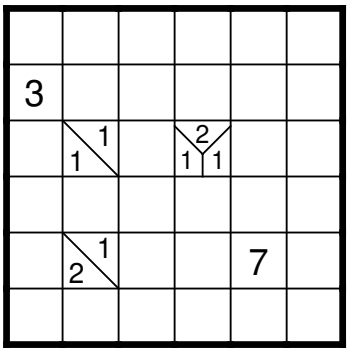
Time: 30 minutes

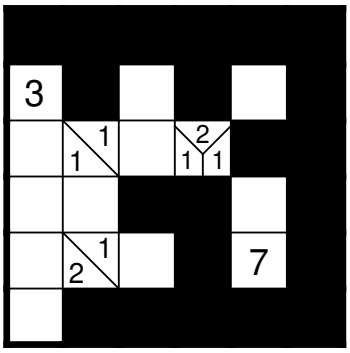
Total points: 140 points

Bonus: 2 points for every 30 seconds remaining

1.1 Tapa — 10 Punkte

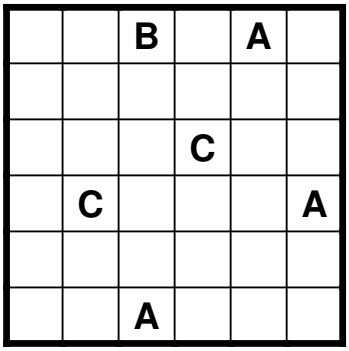
Blacken some empty cells such that all black cells are connected but no 2x2 area is blackened completely. Numbers determine the size of all groups in the eight adjacent cells. A group is a sequence of connected black cells. Different groups are separated by at least one white cell. The order of numbers in a clue cell is irrelevant.

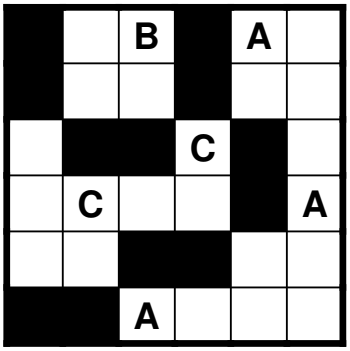




1.2 Dominion — 10 Punkte

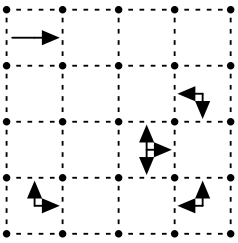
Place dominoes consisting of two adjacent cells in the diagram, such that they divide the remaining cells into regions. The dominoes are not allowed to overlap or touch orthogonally. All equal letters have to be in the same region and different letters have to be in different regions. Regions without letters are not allowed.

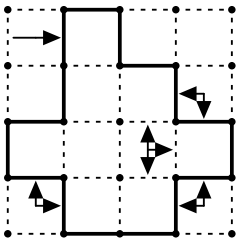




1.3 Myopia — 15 Punkte

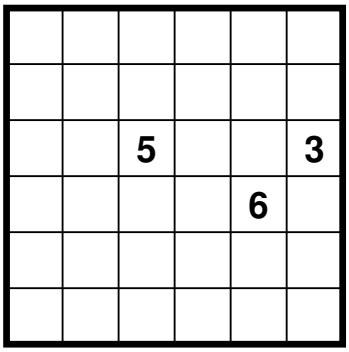
Draw a loop along the dotted lines. The arrows indicate in which direction (horizontally and vertically) the closest loop segment appears. If multiple segments have equal distance, all arrows in those directions are indicated.

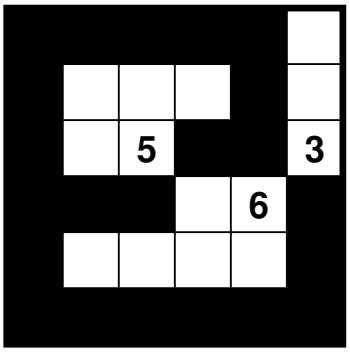




1.4 Nurikabe — 15 Punkte

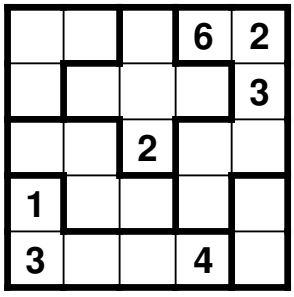
Blacken some empty cells such that all black cells are connected but no 2x2 area is blackened completely. Every white region contains exactly one of the given numbers. The number represents the size of the region.





1.5 Variable Capsules — 25 Punkte

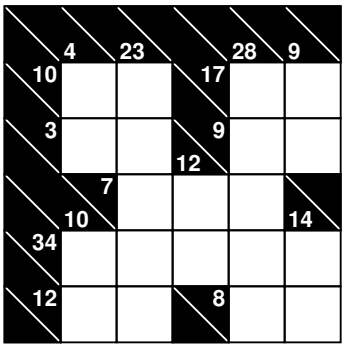
Write the numbers from 1 to the respective region's size into the diagram, such that every region contains every number exactly once and equal numbers do not touch, not even diagonally.

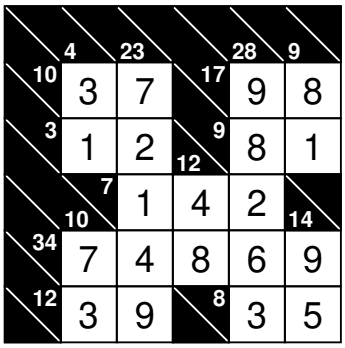


3	2	3	6	2
1	4	1	5	3
2	3	2	4	1
1	4	1	5	2
3	5	2	4	1

1.6 Kakuro — 35 Punkte

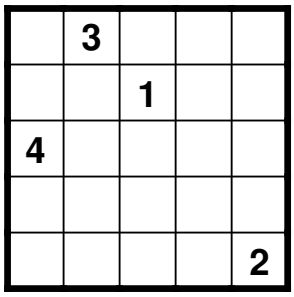
Fill the grid with numbers from 1 to 9. Given numbers are the sum of all numbers in the respective row or column up to the next black cell. Within a sum, no number is repeated.

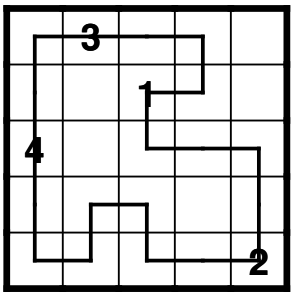




1.7 Geradeweg — 20 Punkte

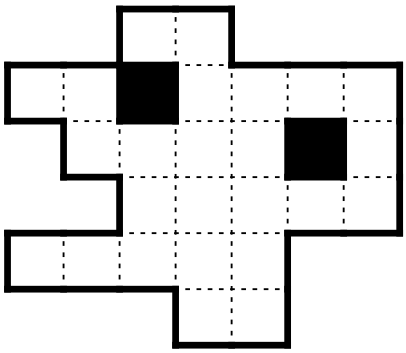
Draw a single loop that travels horizontally and vertically between cell centers and that passes through each clue. The length of every straight segment that meets a clue is given by that clue.

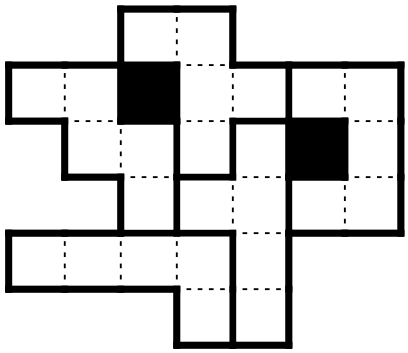


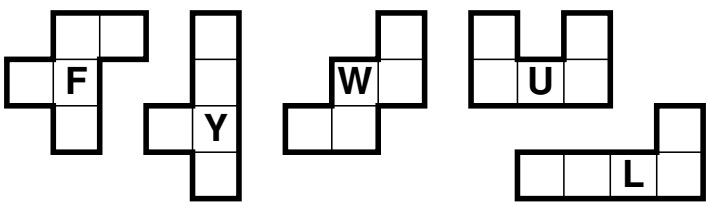


1.8 Pentomino Dissection — 10 Punkte

Divide the grid along the dotted lines into the given pentominoes. Pentominoes may be mirrored and rotated.







Round 2 – Metamorphosis

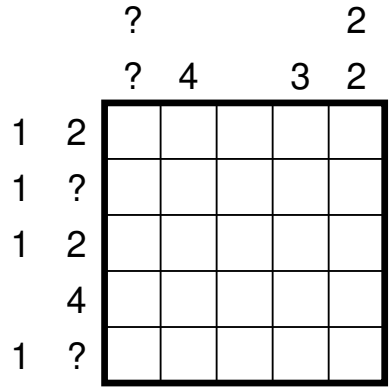
Time: 35 minutes

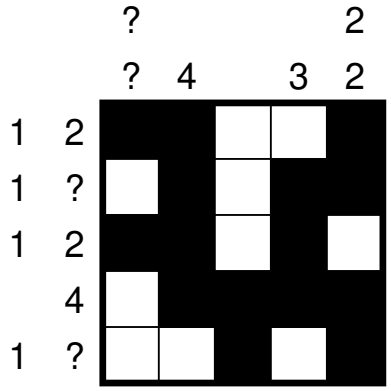
Total points: 190 points

Bonus: 2 points for every 30 seconds remaining

2.1 Coral — 35 Punkte

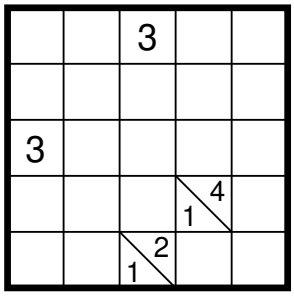
Blacken some cells of the grid to form a coral. A coral consists of connected cells, does not touch itself, not even diagonally, and does not contain 2x2 regions. The outside numbers indicate the lengths of sequences of coral cells within the respective row or column. The numbers are not necessarily in the correct order. Different sequences are separated by at least one empty cell. Numbers can be replaced by question mark. A question mark represents a one-digit or a multi-digit number.

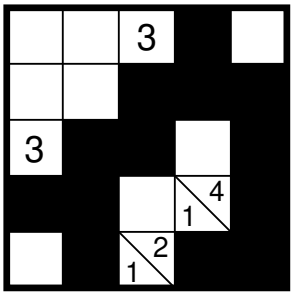




2.2 No Islands Tapa — 45 Punkte

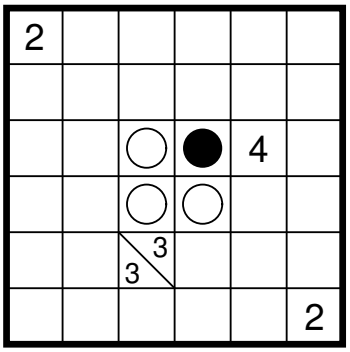
Blacken some cells of the grid to form a coral. A coral consists of connected cells, does not touch itself, not even diagonally, and does not contain 2x2 regions. Numbers determine the size of all groups of connected black cells in the eight adjacent cells. Different groups are separated by at least one white cell. The order of numbers in a cell does not matter.

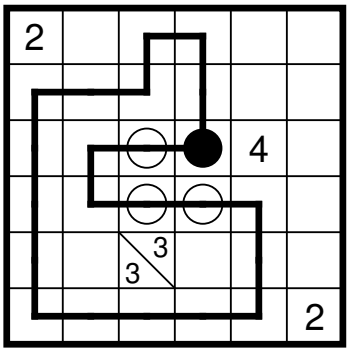




2.3 Tapasyu — 15 Punkte

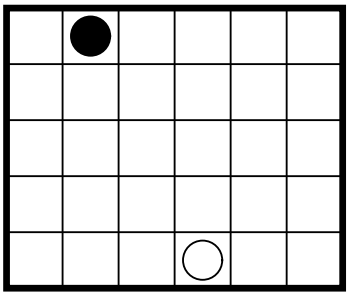
Draw a loop into the grid that connects the centers of horizontally or vertically adjacent cells, passing every cell at most once, but no cells containing numbers. The loop visits every cell with a circle. In cells with white circles the loop keeps straight on but turns in at least one of the adjacent cells (following the loop). In cells with black circles the loop turns but keeps straight on in both adjacent cells. Numbers determine how many of the eight adjacent cells are used by the loop. Each number represents one group of connected cells used by the loop. Such a group cannot be interrupted by empty cells, but does not need to form a contiguous part of the loop. Distinct groups around the same cell must be separated by at least one empty cell. The order of numbers in a cell does not matter.

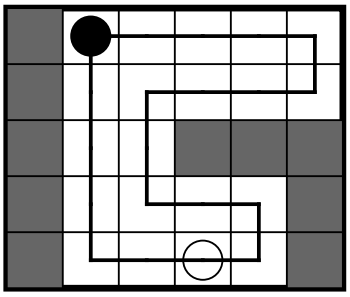




2.4 Pentomino Masyu — 25 Punkte

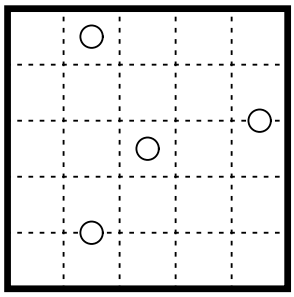
Place some pentominoes in the grid, such that they do not touch, not even diagonally. No pentomino may apprear twice. Rotated ore mirrored pentominoes are considered equal. Not all pentominoes need to be used and it is not given which pentominoes are used. Draw a loop through all remaining cells that connects the centers of horizontally or vertically adjacent cells. In cells with white circles the loop keeps straight on but bends in at least one of the adjacent cells (following the loop). In cells with black circles the loop bends but keeps straight on in both adjacent cells. The loop passes every cell not covered by a pentomino exactly once.

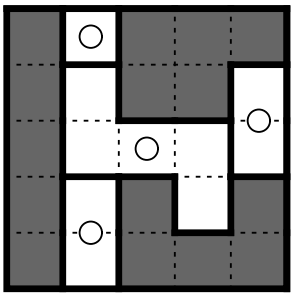




2.5 Pentomino Galaxies — 35 Punkte

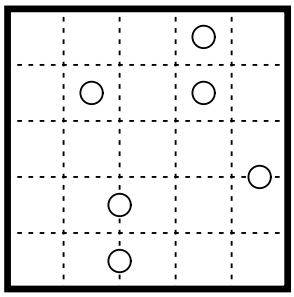
Place some pentominoes in the grid, such that they do not touch each other, not even diagonally. No pentomino may apprear twice. Rotated ore mirrored pentominoes are considered equal. Not all pentominoes need to be used and it is not given which pentominoes are used. Dissect the remaining cells into regions such that every region containes exactly one white circle. Every region is point symmetrical with respect to its circle.

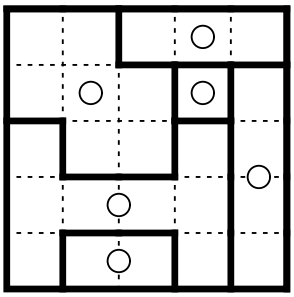




2.6 Galaxies — 35 Punkte

Dissect the grid into regions such that every region contains exactly one white circle. Every region is point symmetrical with respect to its circle.





Round 3 – Ghost Train 2.0

Time: 90 minutes

Total points: 530 points

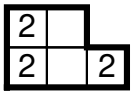
Bonus: 2 points for every 30 seconds remaining

This round consists of ten puzzles. These instructions contain 15 rules. For each puzzle, only some of these rules apply. Which rules these are concretely will only be revealed during the competition.

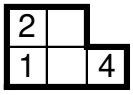
Subject to these rules, some of the cells of each grid have to be filled with numbers. For each puzzle, a number range of valid numbers will be given (e. g. 2-5). All numbers have to be whole numbers and greater or equal to zero. Each cell contains at most one number (not counting possible small given numbers for the regional sum rule).

It is possible that some numbers or empty cells are already given. Given empty cells are indicated by this symbol: ×. For a valid solution, it suffices to fill in all numbers correctly, empty cells do not need to be marked.

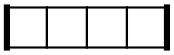
In each puzzle, at most one kind of outside number clue may appear. The possible rules are as follows:



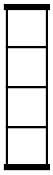
In every region, all numbers must be equal. Empty regions are allowed.



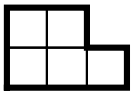
In every region, all numbers must be distinct. Empty regions are allowed.



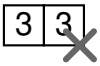
Every row must contain exactly the given numbers, i. e. every number must be used exactly as often as it is indicated, and numbers that are not indicated do not appear in the puzzle.



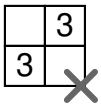
Every column must contain exactly the given numbers, i. e. every number must be used exactly as often as it is indicated, and numbers that are not indicated do not appear in the puzzle.



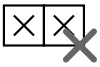
Every region must contain exactly the given numbers, i. e. every number must be used exactly as often as it is indicated, and numbers that are not indicated do not appear in the puzzle.



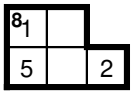
Equal numbers are not allowed to touch horizontally or vertically.



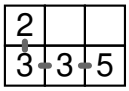
Equal numbers are not allowed to touch diagonally.



Empty cells are not allowed to touch horizontally or vertically.

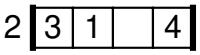


The small given numbers in regions indicate the sum of all numbers in that region.

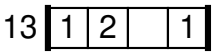


All numbers must be orthogonally connected. Diagonally neighboring numbers do not count as connected.

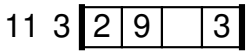
Kropki clue: A white circle between two cells indicates that both cells contain numbers, and their difference is 1. A black circle between two cells indicates that both cells contain numbers, and one number is exactly twice the other. If no circle appears between two cells, neither condition applies.



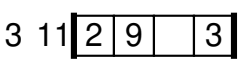
Skyscraper clue: An outside number clue indicates the amount of "visible" numbers in the corresponding row or column. Numbers hide equal or lower numbers behind them, as seen from the clue's direction.



Summon clue: An outside number clue indicates the sum of the numbers that are made up from the sequences of adjacent digits within the row or column. Different sequences are separated by at least one empty cell. Clues appear left of and above the grid. All numbers are read from left to right and from top to bottom, respectively. Puzzles with this rule will contain at most the numbers from 0-9. Leading zeros are allowed.

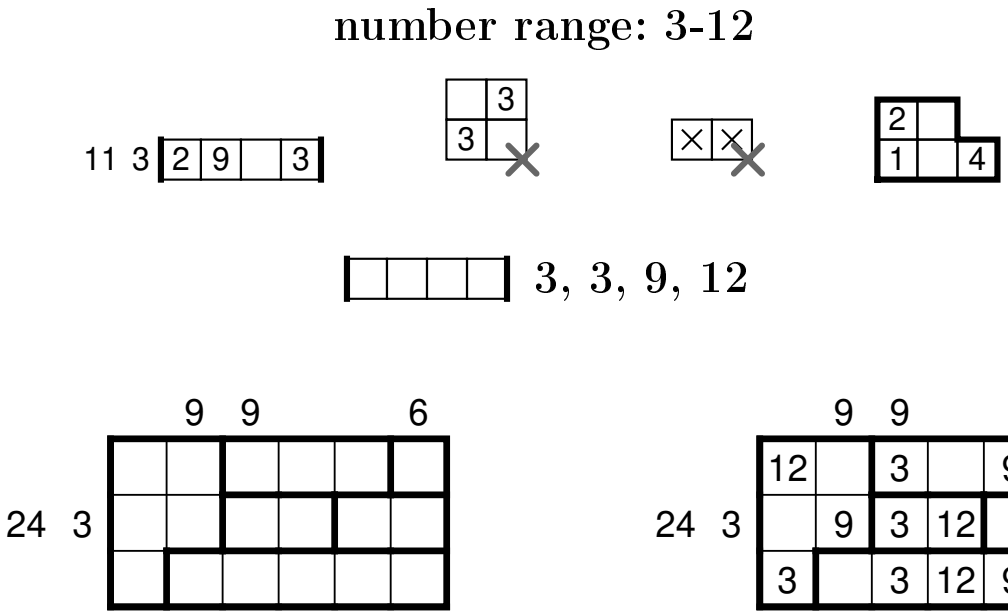


Japanese Sums clue: The outside numbers indicate the sum of numbers in sequences of adjacent numbers within the respective row or column. The numbers are in the correct order. Different sequences are separated by at least one empty cell.

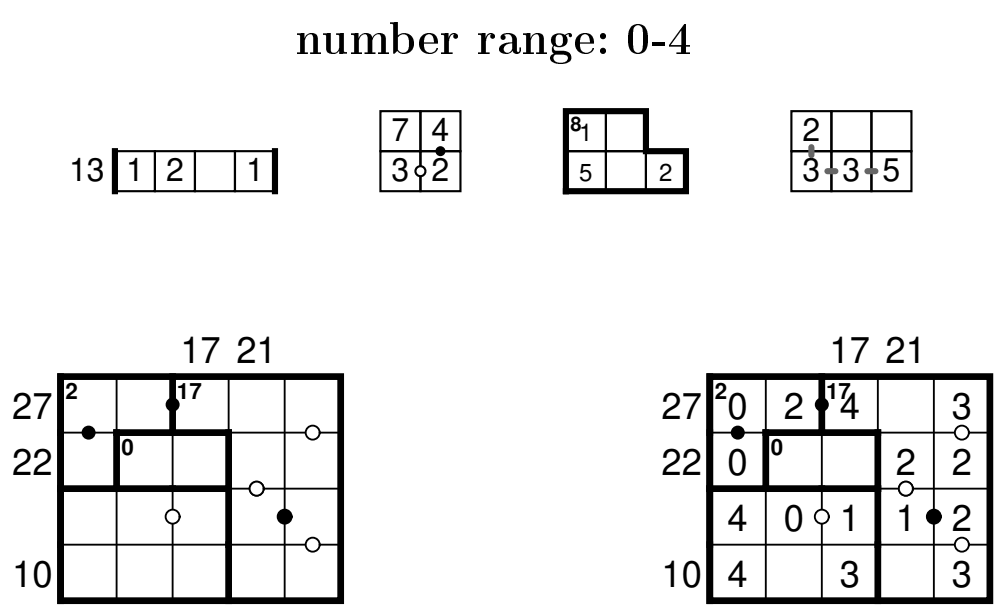


The outside numbers indicate the sum of numbers in sequences of adjacent numbers within the respective row or column. The numbers are not necessarily in the correct order. Different sequences are separated by at least one empty cell.

Example A



Example B



3.1	**Puzzle 11**	**35 Punkte**
3.2	**Puzzle 12**	**40 Punkte**
3.3	**Puzzle 9**	**40 Punkte**
3.4	**Puzzle 6**	**45 Punkte**
3.5	**Puzzle 7**	**45 Punkte**
3.6	**Puzzle 8**	**50 Punkte**
3.7	**Puzzle 3**	**50 Punkte**
3.8	**Puzzle 10**	**65 Punkte**
3.9	**Puzzle 1**	**70 Punkte**
3.10	**Puzzle 2**	**90 Punkte**

Round 4 – Mixed

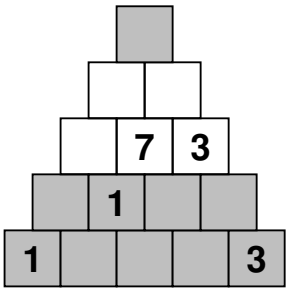
Time: 100 minutes

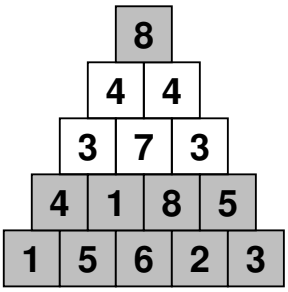
Total points: 680 points

Bonus: 2 points for every 30 seconds remaining

4.1 Pyramid — 5 Punkte

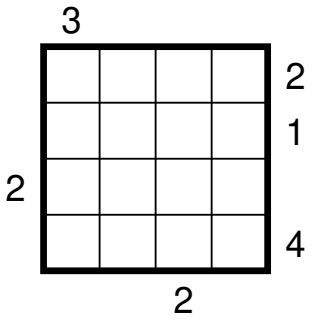
Fill the diagram with numbers from 1 to 9, such that every number is either the sum of difference of the two numbers below. In gray rows, no number may occur twice. In white rows at least one number does occur a least twice.

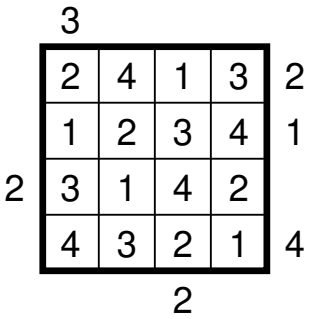




4.2 Skyscrapers — 10 Punkte

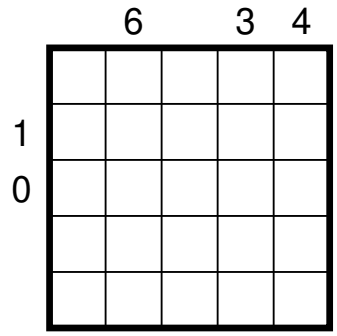
Fill the grid with scycrapers of heights 1 to n (n the number of rows) such that every height occurs exactly once in every row and column. Numbers at the edge of the grid determine how many skyscrapers are visible in this direction. Higher skyscrapers hide lower skyscrapers.

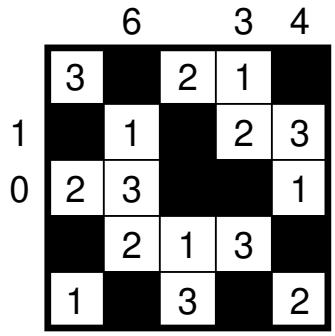




4.3 Double block — 15 Punkte

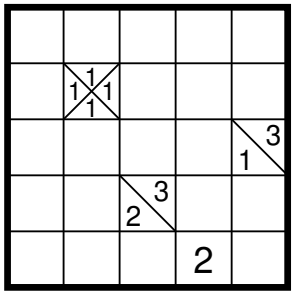
Blacken some cells and fill the remaining cells with numbers from 1 to n (n the number of row minus two) such that in every row and column two cells are blackend and every number occurs exactly once. Numbers at the edge indicate the sum of all numbers between the two blackened cells in the respective row or column.

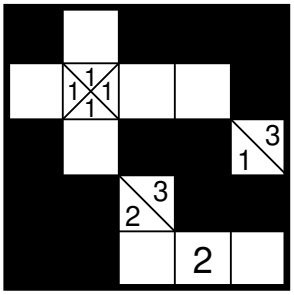




4.4 Geisterbahn-Tapa — 15 Punkte

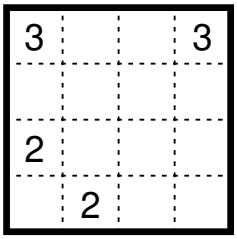
Blacken some cells of the grid such that all connected components of black cells are different. Components that match each other when they are rotated or reflected are considered identical. Different groups are separated by at least one white cell. The order of numbers in a cell does not matter.

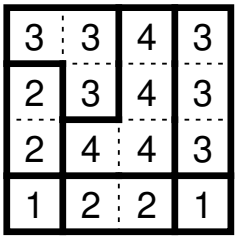




4.5 Fillomino — 25 Punkte

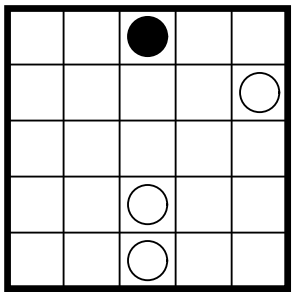
Divide the grid into regions and write a number into each cell, indicating the region's area. Regions of the same area do not share an edge. Given numbers may belong to the same region. There may be regions not containing any given number, even with numbers bigger than any given number.

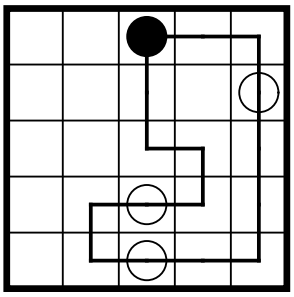




4.6 Masyu — 15 Punkte

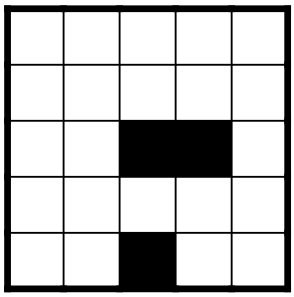
Draw a loop into the grid that connects the centers of horizontally or vertically adjacent cells, passing every cell at most once. The loop visits every cell with a circle. In cells with white circles the loop keeps straight on but turns in at least one of the adjacent cells (following the loop). In cells with black circles the loop turns but keeps straight on in both adjacent cells.

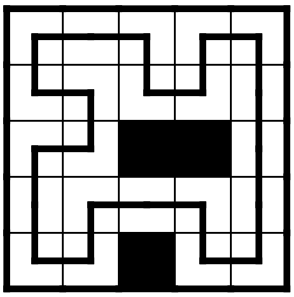




4.7 Simple Loop — 35 Punkte

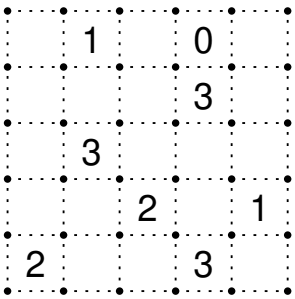
Draw a loop into the grid connecting the centers of horizontally or vertically adjacent cells using every white cell exactly once.

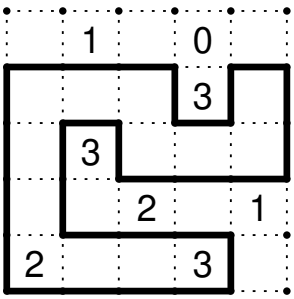




4.8 Slither Link — 40 Punkte

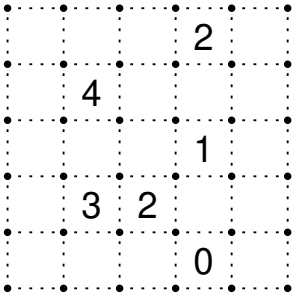
Draw a loop along the dotted lines using every point of the grid at most once. Numbers indicate how many edges of the cell are used by the loop.

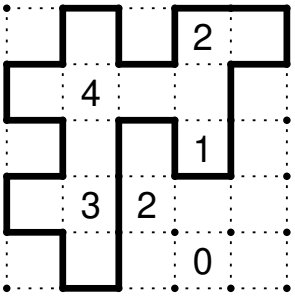




4.9 Touching Fences — 60 Punkte

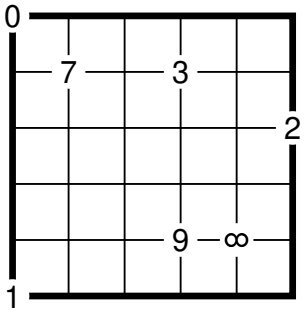
Draw a loop along the dotted lines using every point of the grid at most once. Numbers indicate how often the loop touches the respective cell.

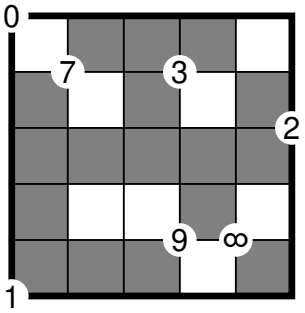




4.10 + 4.11 Land measurement — 25 + 40 Punkte

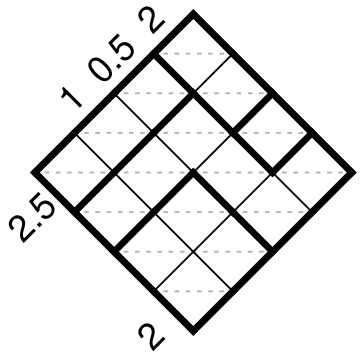
Blacken some cells of the grid such that for any two black cells there is at most one path along black cells connecting them. The path connects horizontally and vertically neighboring black cells. That means, there cannot be a closed loop on the black cells. Numbers indicate the length of the shortest path that visits all black cells among the four touched cells. An infinity symbol ∞ means that there is no such path.

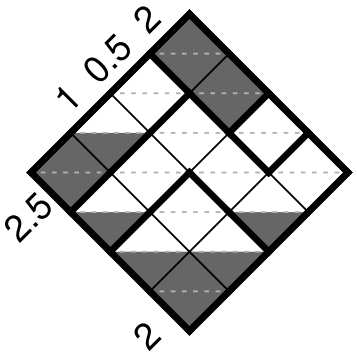




4.12 Tilted Aquarium — 35 Punkte

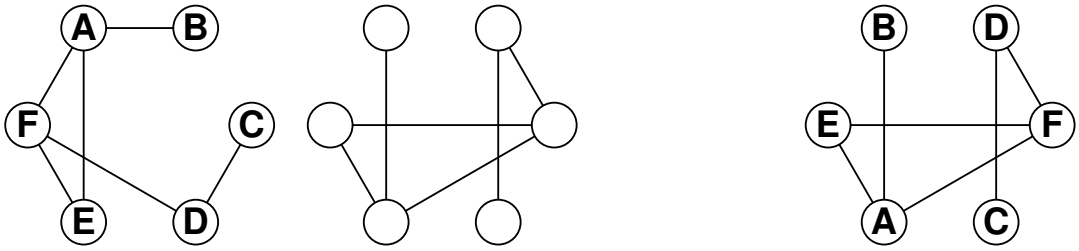
Fill some cells or half cells with water. Regions are filled with water from bottom to top. Within one row of a region, the water-level of all cells is identical. Numbers at the edge of the grid indicate how much water there is in the respective (diagonal) line.





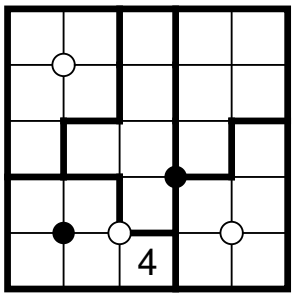
4.13 Elastic Bands — 45 Punkte

The first diagrams shows labelled balls that are connected by elastic bands. In the second diagram, the balls have changed their position, but the connections stayed the same. Find the labels of the balls in the second diagram.



4.14 Clockfaces Sudoku — 25 Punkte

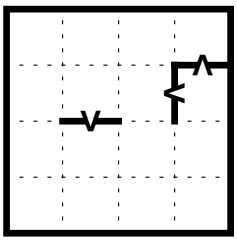
Fill the diagram with numbers from 1 to n (n the number of rows), such that every number occurs exactly once in every row, column and region. Numbers around a white circle are sorted increasingly clockwise, beginning in any cell. Numbers around a black circle are sorted increasingly counter-clockwise, beginning in any cell. If there is no circle, the numbers are not sorted.

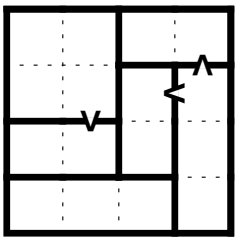


1	2	5	3	4
4	3	1	5	2
5	4	2	1	3
2	1	3	4	5
3	5	4	2	1

4.15 Daisho — 50 Punkte

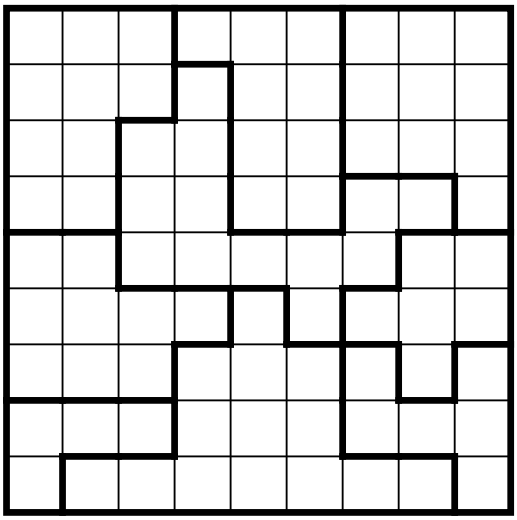
Divide the diagram into rectangles along the dotted lines. Each rectangle occupies at least 2 cells. The relation symbols indicate which of the two adjacent rectangles has the larger area.

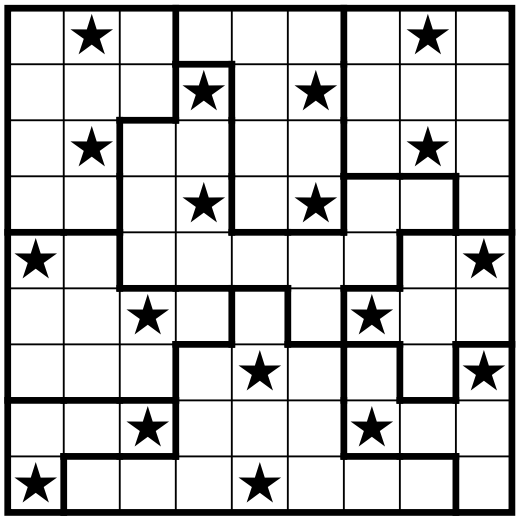




4.16 Starbattle — 50 Punkte

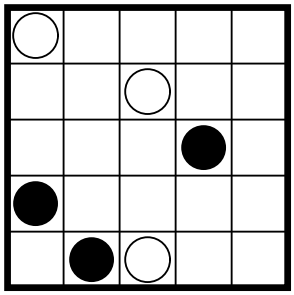
Place some stars into the grid such that there are exactly two stars in every row, column and region. Each star occupies exactly one cell. Stars do not touch each other, not even diagonally.

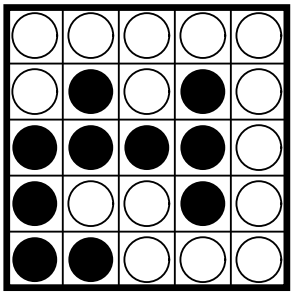




4.17 Yin Yang — 55 Punkte

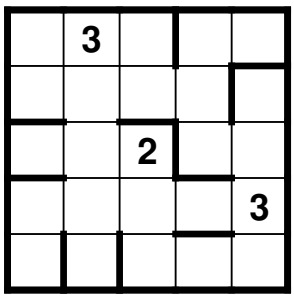
Fill each cell with either a black or a white circle, such that all circles of the same color are horizontally and vertically connected and no 2x2 area is completely filled with circles of the same color.





4.18 Infection — 65 Punkte

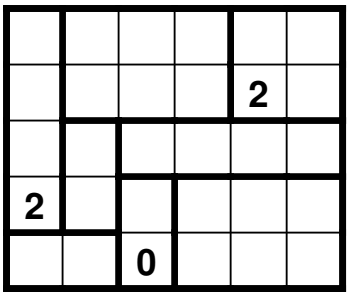
Fill the grid with numbers from 1 to 4. Every number indicates the number of different numbers in the vertically and horizontally adjacent cells. Numbres separated by a think line are not considered adjacent.

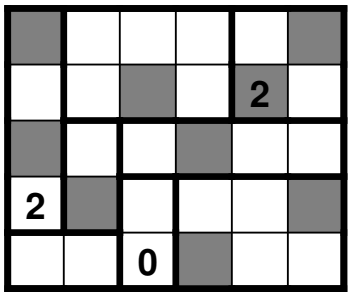


2	3	1	2	1
2	3	3	2	1
1	4	2	2	3
2	4	3	1	3
1	1	2	1	2

4.19 Heyawake — 20 Punkte

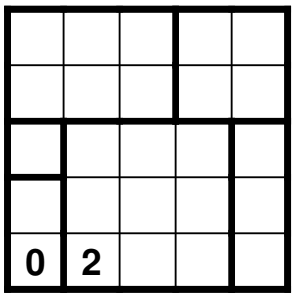
Blacken some cells, such that no two black cells share an edge and all white cells are connected. It is allowed to blacken cells containing numbers. There is no connected sequence of white cells in any row or column which extends to more that two regions. Numbers determine the number of black cells in the respective regions.

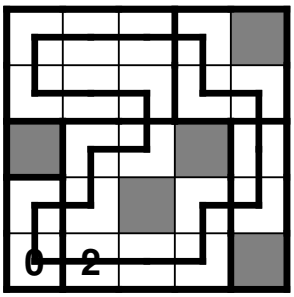




4.20 Yajiwake — 50 Punkte

Blacken some cells, such that no two black cells share an edge and all white cells are connected. It is allowed to blacken cells containing numbers. There is no connected sequence of white cells in any row or column which extends to more that two regions. Numbers determine the number of black cells in the respective regions. Draw a loop through all remaining cells (including white cells with numbers) that connects the centers of horizontally or vertically adjacent cells.





Round 5 – Cryptic Shapes

Time: 45 minutes

Total points: 255 points

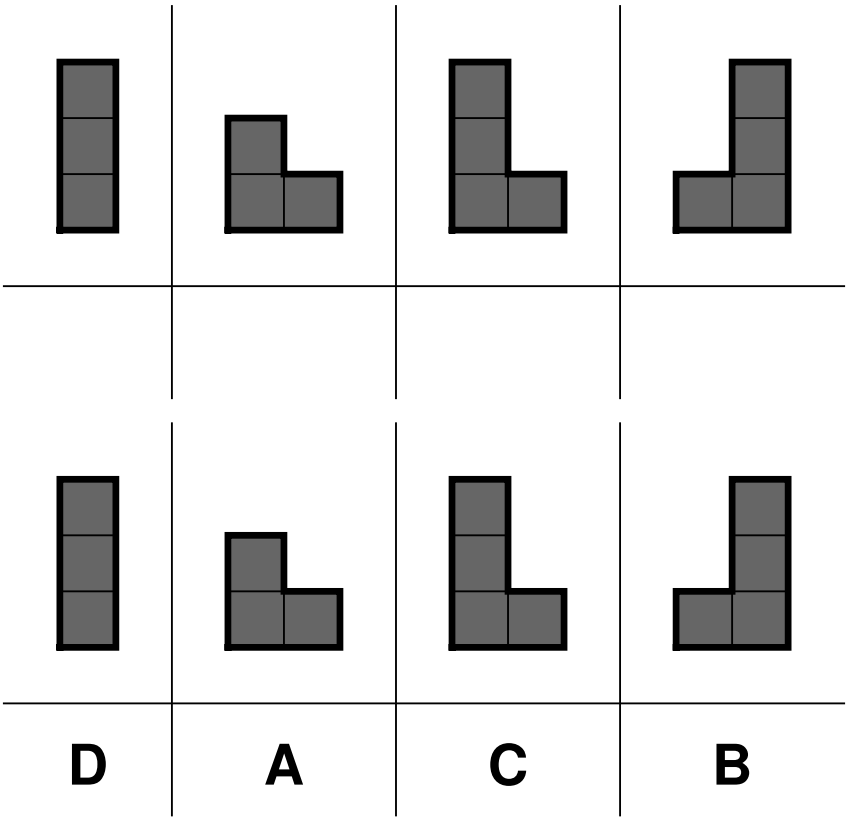
Bonus: 2 points for every 30 seconds remaining

This round consists of six connected puzzles. 9 shapes are given (4 shapes in the example), and have to be assigned to the letters A-I (A-D). Same letters correspond to the same shapes and different letters correspond to different shapes.

The shapes have to be placed into the 6 puzzles such that every shape covers exactly one given letter and every given letter is covered by the shape that it represents.

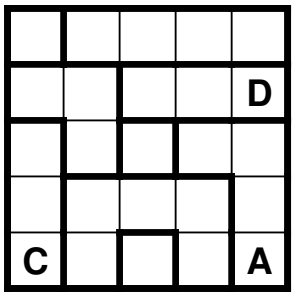
The shapes may be rotated but not mirrored. They may not touch each other, not even diagonally.

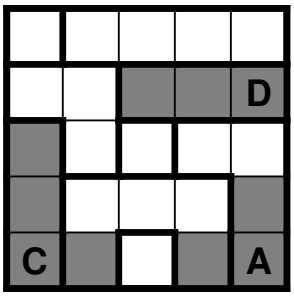
Points are awarded for every correctly solved puzzle that matches the single global solution. Additionally, 5 points are awared for every correctly assigned letter, as indicated in the provided table of shapes.



5.1 Aquarium — 35 Punkte

Blacken some cells such that the shapes are created. Within a region, the cells have to be blackened from bottom to top. With a row in a region, either all cells have to be blackened or none. Except for the shapes, no other black cells can exist.



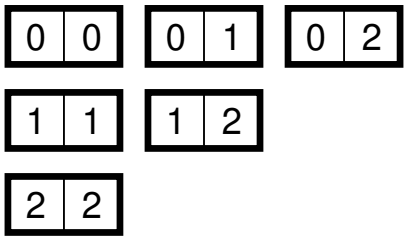


5.2 Domino — 35 Punkte

Blacken some of the given numbers to create the shapes, and divide the remaining diagram into dominos mad up from two cells each. Every domino from 0-0 to 6-6 (0-0 to 2-2 in the example) has to be used exactly once. Dominos can be rotated.

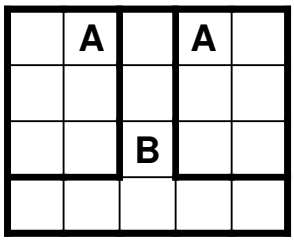
B	2	1	1	2
0	0	2	1	2
2	1	0	1	0
2	0	1	0	**C**

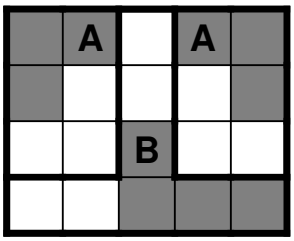
B	2	1	1	2
0	0	2	1	2
2	1	0	1	0
2	0	1	0	**C**



5.3 Shape placement — 35 Punkte

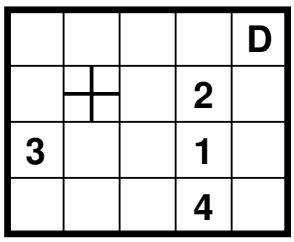
Exactly one letter is given in every region. Place the shapes in such a way that every shape lies completely within a region.

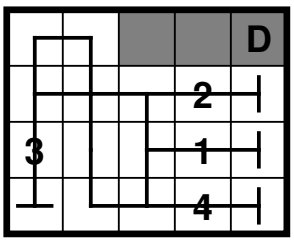




5.4 Railroad with dead ends — 35 Punkte

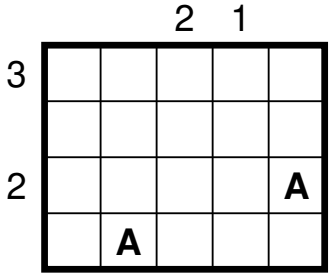
Draw a loop into the diagram with train stations branching off from it. All cells that are not covered by shapes have to be used. On the marked cells, the loop intersects itself, but nowhere else. Through numbers (indicating the terminal train stations), the path has to go straight. In one of the two adjacent cells, the path has to end. In the other adjacent cell, the train station connects to the loop, forming a T-secion. Two train stations cannot connect to the loop in the same spot. The stations have to be traversed in increasing order along the loop.

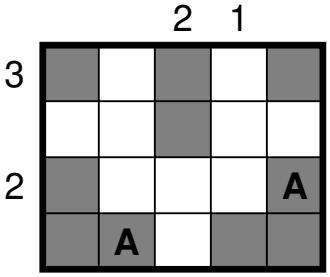




5.5 Battleships — 35 Punkte

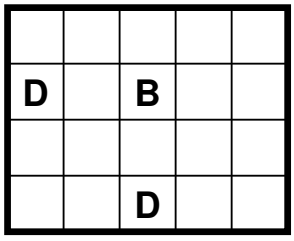
Place the given fleet into the diagram such that the ships and the shapes do no touch each other, not even diagonally. The ships may be rotated. The numbers on the boundary indicate, how many cells in the row or column are covered with ships or shapes.

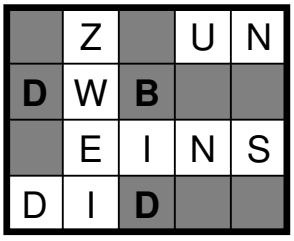




5.6 Word placement — 35 Punkte

Place a letter into every non-blackened cell such that the given words are created. Every word made from at least two letters is given, and every letters has to belong to at least one such word. The given letters are clues for the shapes, and therefore have to be blackened.





UN EINS

DI ZWEI

Round 6 – Tetrominoes

Time: 45 minutes

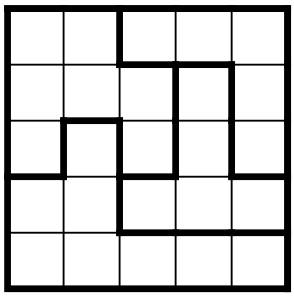
Total points: 255 points

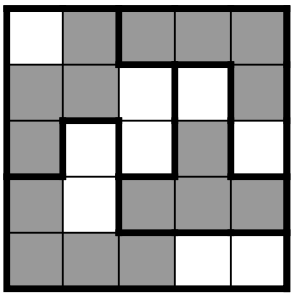
Bonus: 2 points for every 30 seconds remaining

This round contains seven tetromino puzzles

6.1 LITS — 10 Punkte

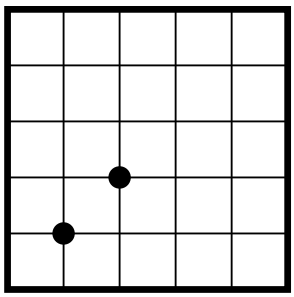
Blacken some cells such that in every region there are four connected black cells, forming a tetromino. All black cells are connected but no 2x2 area is completely black. Equal tetrominoes do not share an edge. Mirrored or rotated tetrominoes are considered equal.

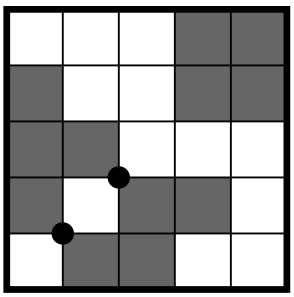


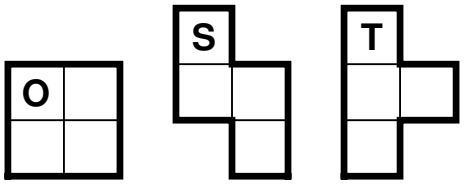


6.2 Touching Tetrominoes — 10 Punkte

Place the given tetrominoes into the grid. The tetrominoes may be rotated but not mirrored. No two tetrominoes may share an edge. All vertices where two tetrominoes meet each other diagonally are marked with a black circle.

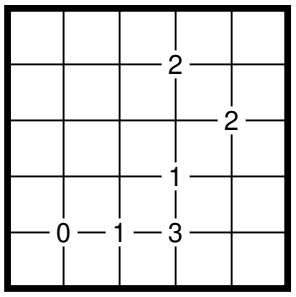


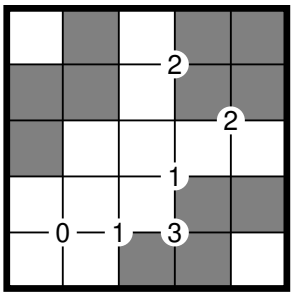


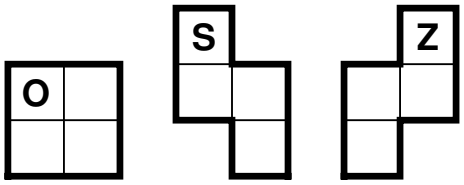


6.3 Tetroscope — 15 Punkte

Place the given tetrominoes into the diagram. Tetrominoes do not touch each other, not even diagonally. They may be rotated, but not reflected. Numbers indicate how many of the adjacent cells are occupied by tetrominoes.

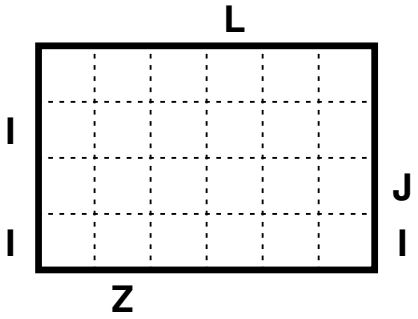


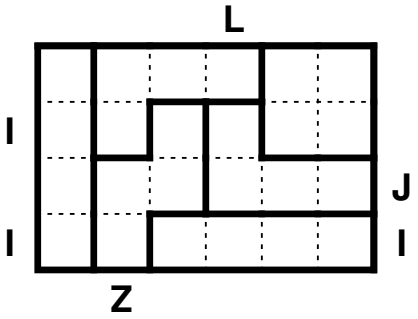


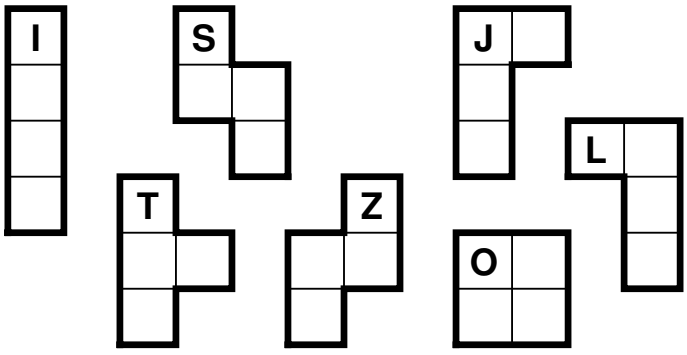


6.4 Easy as Tetromino — 40 Punkte

Dissect the grid into tetrominoes such that equal tetrominoes do not share an edge. Rotated tetrominoes are treated as equal. However mirrored tetrominoes are not considered equal. The outside clues indicate the first tetromino in the respective row or column as seen from the respective direction.

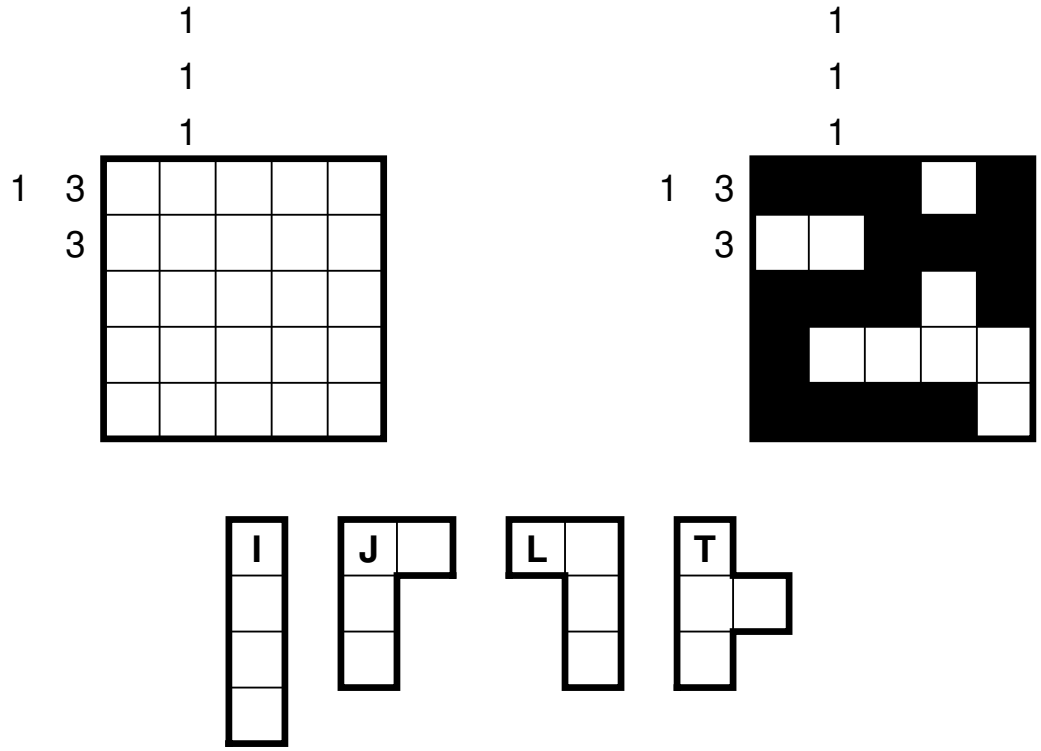






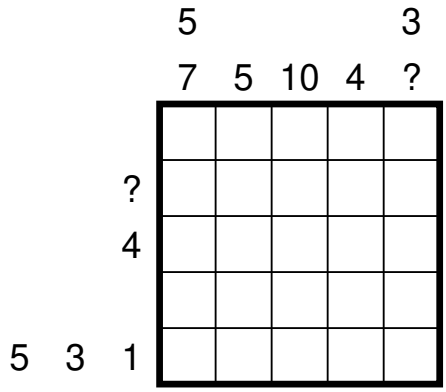
6.5 Tetromino Coral — 55 Punkte

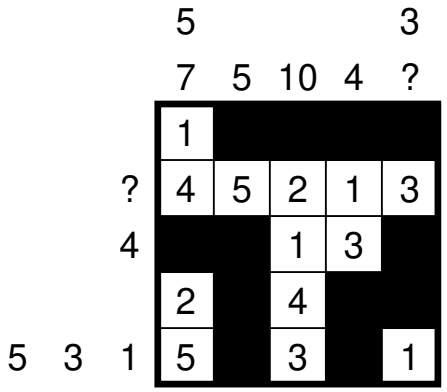
Place the given tetrominoes into the grid to form a coral. The tetrominoes may be rotated but not mirrored. A coral consists of connected cells, does not touch itself, not even diagonally, and does not contain 2x2 regions. The outside numbers indicate the lengths of all sequences of coral cells within the respective row or column. The numbers are not necessarily in the correct order. Different sequences are separated by at least one empty cell.

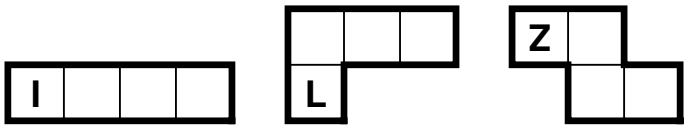


6.6 Tetromino Japanese Sums — 60 Punkte

Place the given tetrominoes into the grid. The tetrominoes may be rotated but not mirrored. They cannot touch each other, not even diagonally. Fill the remaining cells with numbers from 1 to 9 (1 to 5 in the example) such that no number repeats in any row or column. The outside numbers indicate the sum of numbers in sequences of adjacent numbers within the respective row or column in the correct order. Single digits are also mentioned here. Different sequences are separated by at least one empty cell. Numbers may be replaced with question marks (?). Each question mark can represent a one- or multi-digit number.

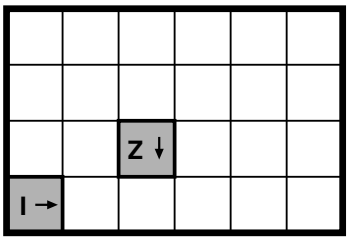


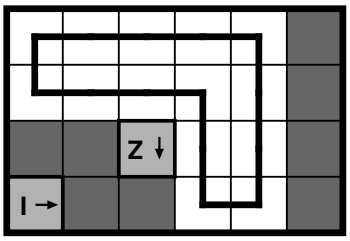


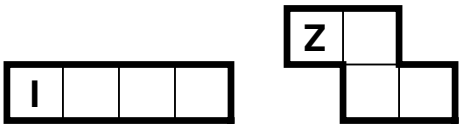


6.7 Tetromino Yajilin — 65 Punkte

Place all the given tetrominoes into the grid such that every arrow points at the indicated tetromino. This tetromino is not necessarily the first or the only one the arrow points at. The tetrominoes may be rotated but not mirrored. No two tetrominoes may share an edge. There may be tetrominoes no arrow points at. Draw a loop through all remaining empty cells connecting the centers of horizontally or vertically adjacent cells. The loop uses each of the cells exactly once and does not intersect itself.







Round 7 – Land measurement

Time: 30 minutes

Total points: 160 points

Bonus: 2 points for every 30 seconds remaining

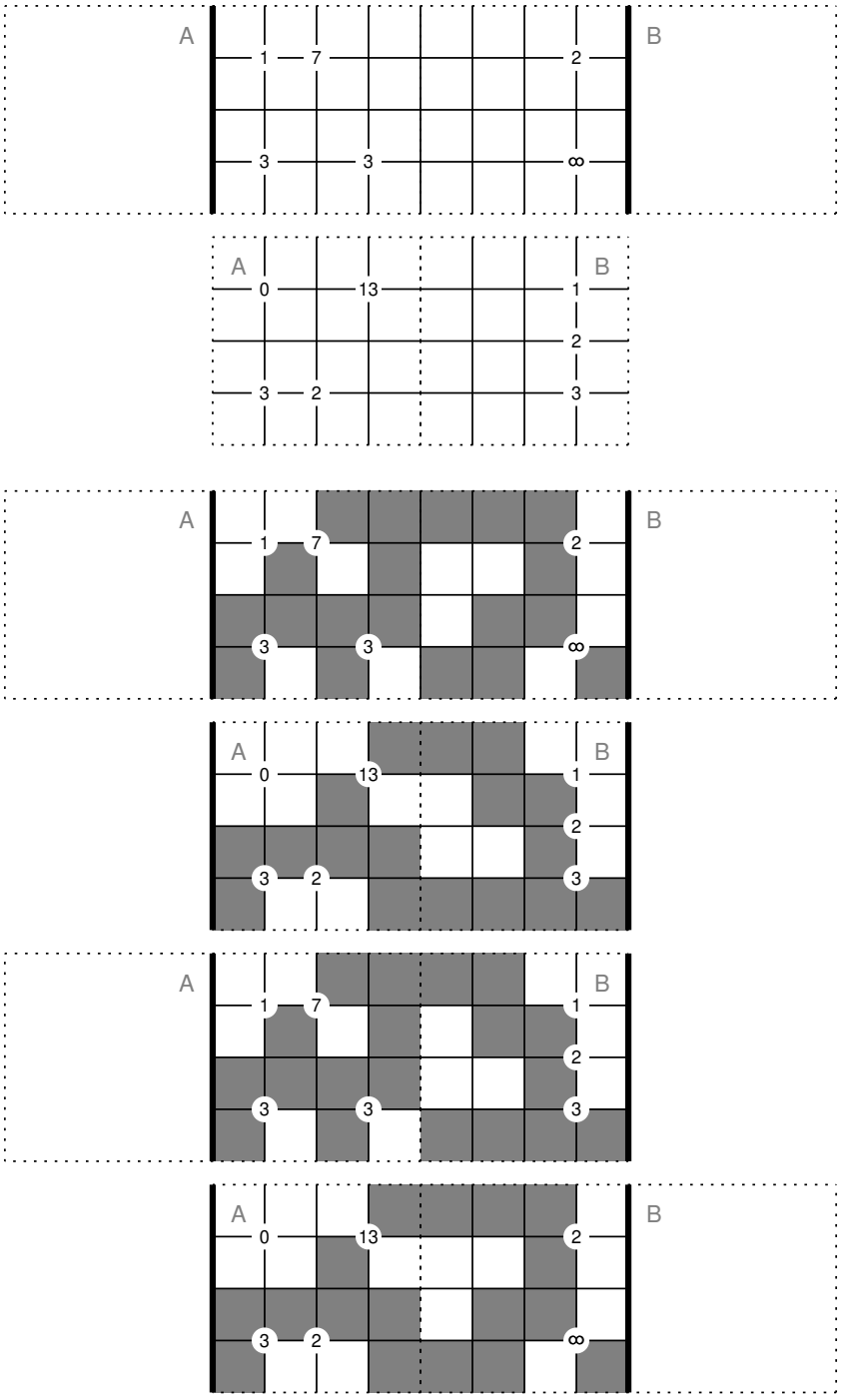
Assembly instructions: Cut along the dotted lines. This results in 3 pieces: Two squares and one more long diagram. Glue the square diagrams on the flip side of the other diagram, such that equal letters land on the same spot, but opposite sides of the paper.

Land measurement

8 × 20 Punkte

Blacken some cells of the grid such that for any two black cells there is at most one path along black cells connecting them. The path connects horizontally and vertically neighboring black cells. That means, there cannot be a closed loop on the black cells. Numbers indicate the length of the shortest path that visits all black cells among the four touched cells. An infinity symbol ∞ means that there is no such path.

Every quater (in the example every half) of the diagram can be covered by a different diagram via folding along the thick line. Color all eight quaters (four halfs in the example) such that the above rules are satisfied for each of the 16 (4 in the example) possible folding combinations.



Tie-break Puzzle

Time: 10 minutes

Skyscrapers

Fill the grid with scycrapers of heights 1 to n (n the number of rows) such that every height occurs exactly once in every row and column. Numbers at the edge of the grid determine how many skyscrapers are visible in this direction. Higher skyscrapers hide lower skyscrapers.

Finals

Time: 60 minutes

8.1 Land measurement

8.2 LITS

8.3 Fillomino

8.4 Ghost Train

8.5 Coral

8.6 Myopia

Authors

Ute Weiß:

2.1, 2.2, 2.3, 2.4, 2.6,

3.1, 3.6,

4.2, 4.6, 4.8, 4.9, 4.15, 4.16, 4.18, 4.19, 4.20,

6.2, 6.4, 6.5, 6.6, 6.7,

Tie-break puzzle,

8.2, 8.5, 8.6

Philipp Weiß:

1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8,

2.5,

3.2, 3.3, 3.4, 3.5, 3.7, 3.8, 3.9, 3.10,

4.1, 4.3, 4.4, 4.5, 4.7, 4.10, 4.11, 4.12, 4.13, 4.14, 4.17,

5,

6.1, 6.3,

7,

8.1, 8.3, 8.4

Testsolvers

Arvid Baars, Anderson Wang, Andreas Ettner, Andrey Bogdanov, Anne-Kathrin Meyer, Annick Weyzig, Bernhard Seckinger, Eva Schuckert, Henna Perälä, Isabelle Gall, Ken Endo, Markus Roth, Matthias Klaban, Michael Moßhammer, Prasanna Seshadri, Sebastian Matschke, Torsten David, Wei-Hwa Huang, Qiu Yanzhe, Huang Xiao Wei – thank you very much!