Logic Masters 2014

Instruction booklet

The Logic Masters 2014 are an offline puzzle contest, which takes place on June 21st in Stuttgart. It serves as the german puzzle championship as well as the german qualification for the upcoming World Puzzle Championship in London.

This year we want to provide additional online puzzle contests. The contests take place on the contest engine of Logic Masters Germany at

http://www.logic-masters.de/Wettbewerbe/?chlang=en

This document serves as the english instruction booklet for the online contests. It's the only translated document and it's the only document which contains the description of the solution codes. Some parts which are only important for the offline contest are left out of this document. The puzzle files are in german and don't contain the description of the solution codes. So please make sure to have this document around if you want to take part.

Each round in Stuttgart is a separate online contest. There are eight rounds and a final round. Each online contest has a time window, which starts 15 minutes after the start of the round in Stuttgart and ends at the times mentioned below. (In case of a bigger delay in the schedule in Stuttgart we might also delay the online contests slightly.)

During each time window, you can choose your starting time freely. After you started a contest, you have exactly the same time limit as the people in Stuttgart. Please note, that you can not enter solution codes after the end of the contest, regardless if you used the full time limit.

Starting time of online contests: (all times are CEST=MESZ/UTC+2)

- *Morning rounds*
- **09:15 (20min time limit) Round 1: Welcome**
- **09:45 (50min time limit) Round 2: Double Slitherlink**
- **10:40 (60min time limit) Round 3: Mixed Puzzles**
- **11:50 (45min time limit) Round 4: Hitori-Variants**
- *Afternoon rounds*
- **14:00 (50min time limit) Round 5: Tinker Puzzle**
- **14:55 (40min time limit) Round 6: Stuttgart Railroads**
- **15:55 (75min time limit) Round 7: Mixed Puzzles**
- **17:20 (75min time limit) Round 8: Four Seasons**

- *Evening round*

- **19:30 (60min time limit) Final round**

Ending time of all contests: Monday 20:00

All informations about scoring in this document refer to the online contests only. We know that the results are not comparable to the offline contestants for various reasons. We hope you have fun regardless of that, and will provide some compiled rankings as well.

To not encourage guessing of solution codes, each wrong solution code scores -5 points. This rule doesn't hold for some special parts for which the scores are adjusted manually. Details on that are provided with the round instructions.

If you have any questions, please ask them in the online contest subforum. Posts in english are welcome.

http://forum.logic-masters.de/forumdisplay.php?fid=27

Round 1 – Welcome

Time Limit: 20 Minutes

Time Bonus: 1 Point for every 20 seconds

1.1 Slalom – 5 Points

Put a diagonal wall into every field, in a way that no completely closed areas occur. The numbers in the circles tell you, how many walls touch this circle.

Solution Code: Number of walls from lower left to upper right in each row. The answer for the example would be 2031.

1.2 Pills – 5 Points

Draw 10 pills with values from 1 to 10 into the grid, so that each value occurs exactly once. Each pill has a size of 3x1 fields, and it's value is the sum of the numbers in it's fields. Hints at the border give the sum of the numbers belonging to a pill in that row or column. If there is no hint, the sum of the numbers belonging to a pill is unknown.

Example with pills from 1 to 3

Solution Code: Number of fields belonging to a pill in each row. The answer for the example would be 1224.

1.3 Yajilin – 10 Points

Blacken some fields in the grid so that blackened fields do not touch each other from the sides. All remaining fields should be traversed by a continuous loop, moving horizontally and vertically. Clues inside the grid indicate the number of blackened fields in the corresponding directions. There may exist some blackened fields that are not pointed by any arrow.
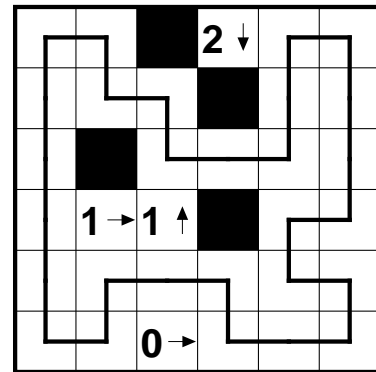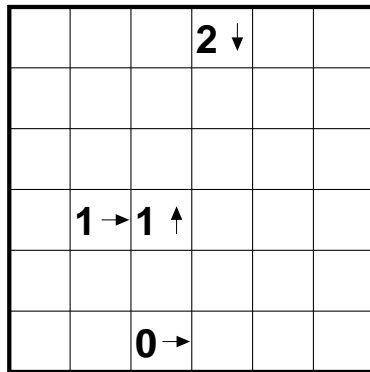
Solution Code: Number of blackened fields in each row. The answer for the example would be 111100.

1.4 Pentomino-Dissection – 10 Points

Divide the grid along the grid lines into pentominos. Each given pentomino has to be used exactly once, but can be mirrored and rotated. The sum of the numbers in each pentomino equals 10. The puzzle file contains an image of the twelve pentominos.

Example with pentominos L, N, V, Z

Solution Code: Number of different pentominos in each row. The answer for the example would be 3342.

1.5 Heyawake – 15 Points

Blacken some fields of the grid, so that black fields don't touch each other. All white fields remain orthogonally connected. A hint inside a region gives the number of black fields in that region. Hints may be blackened, but still hold. No horizontal or vertical sequence of white fields may span more than two regions.
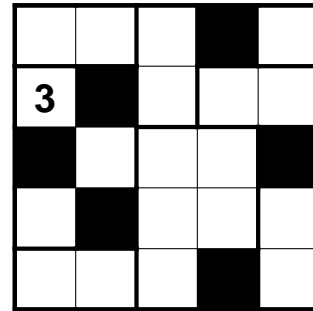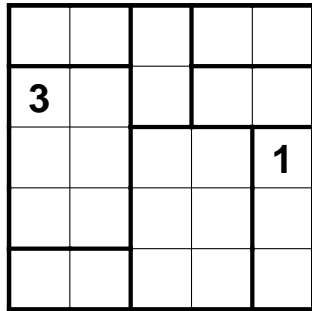
Solution Code: Number of blackened fields in each row. The answer for the example would be 11211.

1.6 ABC'tje – 20 Points

In the following words, replace the letters with numbers from 1 to 9, same letters with the same number, different letters with different numbers. A hint on the right side gives the sum of the numbers of that word.

Example with letters B, E, I, L, P and S and numbers 1 to 6

```
BEISPIEL = 24
LIBELLE = 25
    EIS = 8
```

```
B = 3
E = 1
I = 2
L = 6
P = 4
S = 5
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Solution Code: The letters corresponding to the numbers 1 to 9. The answer for the example would be EIBPSL.

1.7 Star Battle – 25 Points

Draw some stars into the grid so that each row, column and boldly outlined region contains exactly two stars. Stars have the size of one field and don't touch each other, not even diagonally.

Example with one star per column, row and region
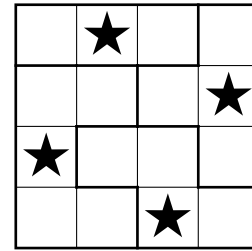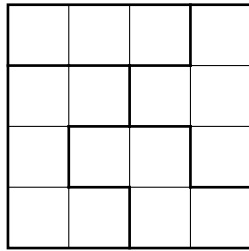
Solution Code: Number of cells between the two stars in each row. (Not possible for example.)

1.8 Kropki – 35 Points

Fill the grid with numbers 1 to 9, so that each number occurs exactly once in each row and column. A black dot means, that one of the adjacent fields has the double value of the other field. A white dot means, that the difference of the adjacent values equals 1. If there is no dot, none of these conditions holds. If both conditions are true only one of the two dots is given.

Example with numbers 1 to 4
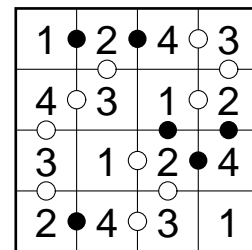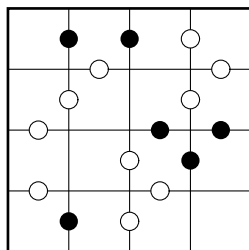
Solution Code: The two main diagonals, first from upper left to lower right, then from upper right to lower left. The answer for the example would be 13213112.

Round 2 – Double Slitherlink

Time Limit: 50 minutes

Time Bonus: 1 point per 20 seconds

Draw a loop inside both of the diagrams which doesn't touch or cross itself and uses the edges of the grid. For this you have to take the hints into account which are either ordinary Slitherlink hints or Touching Loop hints. This depends on the loop in the respectively other diagram. Is the according field of the other diagram on the outside of the loop then it is a Touching Loop hint. Is the according field of the other diagram on the inside of the loop then it is a Slitherlink hint. A Slitherlink hint indicates how many of the four edges of the field are used by the loop. A Touching Loop hint indicates how often the loop touches this field. For this purpose a punctual touch at a corner counts as well as a touch by the usage of one or more adjacent edges.

Example:

Solution:

Scoring and solution code: The scoring for this round is based on correct squares. There are 20 solution codes for this puzzle, one for each row. Use I for a field inside the loop, O for a field outside the loop and - for a square which you haven't determined. You get 1 point for every correct square and -1 for every wrong square. Squares marked by - are ignored for scoring. You can not get a negative score. Scores are counted and adjusted manually, this might take some time depending on the number of contestants.The time limit is extended by 5 minutes to take entering the solution into account.

The six solution codes for the example would be OIO, III, OIO, OII, OOI, III

Round 3 – Mixed Puzzles

Time limit: 60 minutes

Time bonus: 1 point per 20 seconds

3.1 Masyu – 10 Points

Draw a single closed loop into the grid which moves horizontally and vertically from field to field, visits every circle, and visits every field at most once. In fields with a black circle, the loop has to make a 90° turn, but has to move straight through the fields before and after the circle. The loop has to go straight through white circles, but makes a 90° turn in the field before or after the circle.

Solution code: Number of unused cells in each row. The answer for the example would be 23211.

3.2 Eight Winds – 10 Points

Draw horizontal, vertical and diagonal rays into the grid, which start in the fields with numbers. Each empty field is used by exactly one ray. A hint gives the number of fields which are used by rays starting from there. Rays may not cross.

Solution code: Number of different rays that use the fields in each row. The answer for the example would be 42444.

3.3 Islands – 15 Points

Blacken some fields so that all black fields are connected and no 2x2-area contains only blackened fields. Fields with numbers may not be blackened. Each connected white area has to contain exactly one number, and this number gives the size of this area.
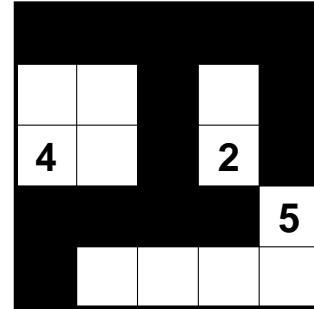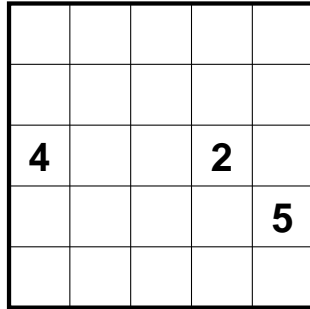
Solution code: Longest sequence of blackened fields in each row. The answer for the example would be 51141.

3.4 Lighthouses – 15 Points

Draw some ships of the size of one field into the grid, so that ships don't touch each other or a lighthouse, not even diagonally. Numbers inside a lighthouse give the number of ships which can be seen horizontally and vertically from there. All ships in the row and column of the lighthouse can be seen, ships don't cover each other. Each ship can be seen from at least one lighthouse.
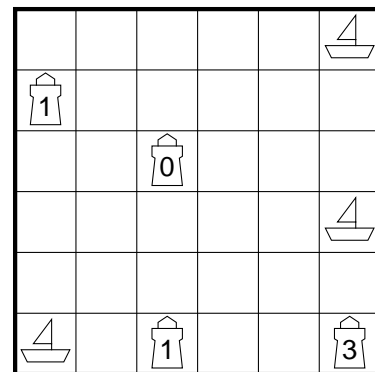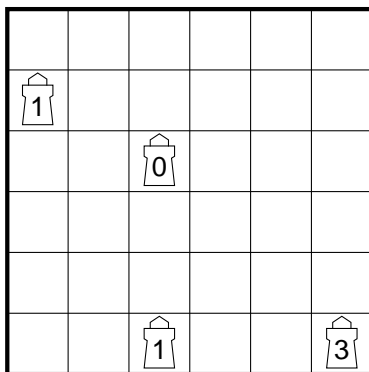
Solution code: Number of ships in each row. The answer for the example would be 100101.

3.5 123-Box – 20 Points

Fill the grid with numbers 1 to 3. Each hint at the border stands for a connected group of equal numbers, and gives either the size of this group or it's value. I.e. a '3' stands for a group of three fields with equal (but unknown) value, or a group of '3's of unknown length. A '?' stands for a group with an unknown value and unknown (positive) length. For a row or column, all groups are given and adjacent groups have different value.

Solution code: The two main diagonals, first from upper left to lower right, then from upper right to lower left. The answer for the example would be 23213322.

3.6 Magic Labyrinth – 20 Points

Write numbers from 1 to 4 into some fields of the grid, so that each number occurs exactly once in each row and column. Starting from the entrance, the sequence 1,2,3,4,... is repeated along the labyrinth.

Example with numbers 1 to 3

Solution code: The two main diagonals, first from upper left to lower right, then from upper right to lower left. - for empty cells. The answer for the example would be 12-2-313.

3.7 Word puzzle – 25 Points

Put the given words into the white fields of the grid, so that they can be read horizontally or vertically. Each white field contains none, one or two letters. Black fields don't contain letters and separate words. Two letters in a field are read in the same order for horizontal and vertical words. White fields without letters may not be adjacent. All words with at least two letters are given. The numbers in the word list give the number of fields which are used by the words. Empty (but not black) fields are included in this count, even at the start or the end of words.
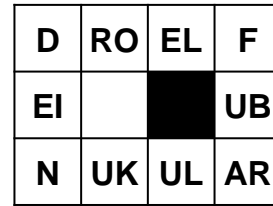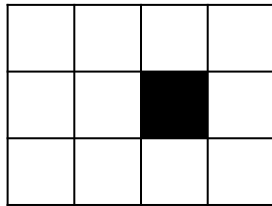
1 field	EL, UB, UL
2 fields	EI
3 fields	DEIN, FUBAR, ROUK
4 fields	DROELF, NUKULAR

Solution code: Number of double-letter cells for each row. The answer for the example would be 223.

3.8 Castle Wall – 35 Points

Draw a single closed loop into the grid, which moves horizontally and vertically from field to field. Fields with a bolded border are hints, and can't be visited by the loop. White hints have to be inside the loop, black hints have to be outside. An arrow with a number gives the length of loop segments in the corresponding direction (alternativly: it gives the number of crossed field borders in the corresponding direction.)
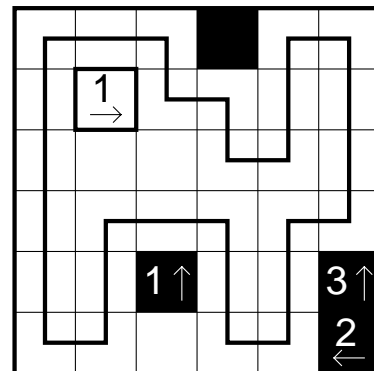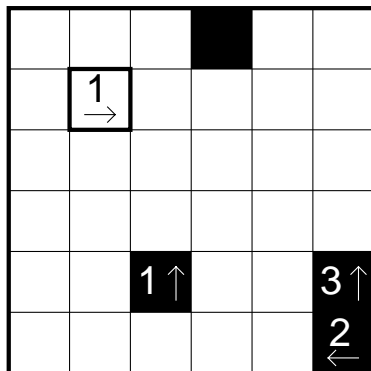
Solution code: Number of unused fields for each row **(including clues)**. The answer for the example would be 112022.

3.9 Thermo-Skyscraper – 40 Points

Fill the grid with numbers 1 to 7, so that each number is used exactly once in each row and column. Numbers inside the grid represent skyscrapers of that height. Hints outside the grid give the number of skyscrapers which can be seen in the corresponding direction. Lower skyscrapers are covered by higher ones. Numbers in a grey thermometer are strictly increasing from the bulb.

Example with numbers 1 to 4
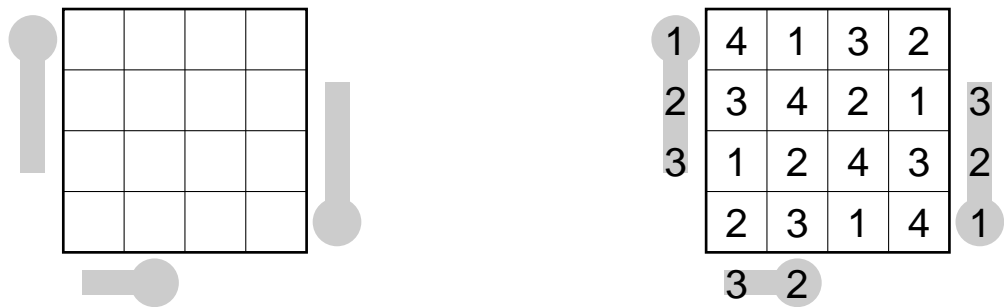
Solution code: The two main diagonals, first from upper left to lower right, then from upper right to lower left. The answer for the example would be 44442222.

3.10 Galaxies – 45 Points

Divide the grid into some regions along the grid lines. Each region contains exactly one circle and has rotational symmetry with respect to the circle.

Solution code: Number of different galaxies in each row. The answer for the example would be 23323.

3.11 Yin and Yang – 50 Points

Draw a black or a white circle into each field of the grid, so that no 2x2-region is completly black or white and all black and all white fields are connected horizontally and vertically.
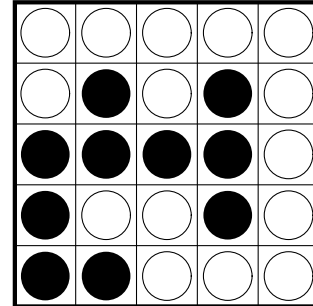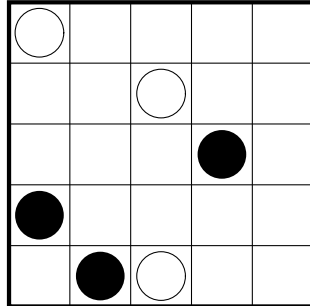
Solution code: Number of black circles in each row. The answer for the example would be 02422.

3.12 Crossword – 55 Points

Put the given words in the grid, so that they form a valid crossword, i.e. all words can be read from left to right or top to bottom and there can't be words (even two-letter-words), which are not on the list. All words have to be connected. There is exactly one letter given from each word, and this letter can be used for this word only.
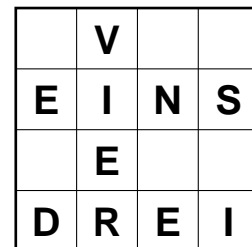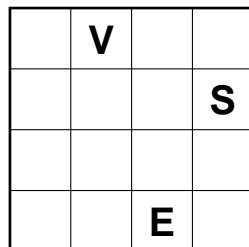
Wörter: *EINS, DREI, VIER*

Solution code: Number of fields with letters for each row. The answer for the example would be 1414.

3.13 Area Sums – 60 Points

Write a number from 1 to 8 into each field of the grid, so that each number occurs exactly once in each row and column. Small hints in a boldly outlined region give the sum of the numbers in that region. Numbers may repeat within a region.

Example with numbers 1 to 4

9		8	
	14		
4		5	

9 3	2	8 1	4
4	14 3	2	1
4 1	4	3	5 2
2	1	4	3

Solution code: The two main diagonals, first from upper left to lower right, then from upper right to lower left. The answer for the example would be 33334242.

Round 4 – Hitori Variants

Time limit: 45 minutes

Time bonus: 1 point per 20 seconds

4.1 Flower-Hitori – 15 Points

Blacken some fields, so that each number occurs in each arc at most once. All white fields must be connected (that is, the black fields don't cut the grid into more than one part). Black fields may not have a common edge.
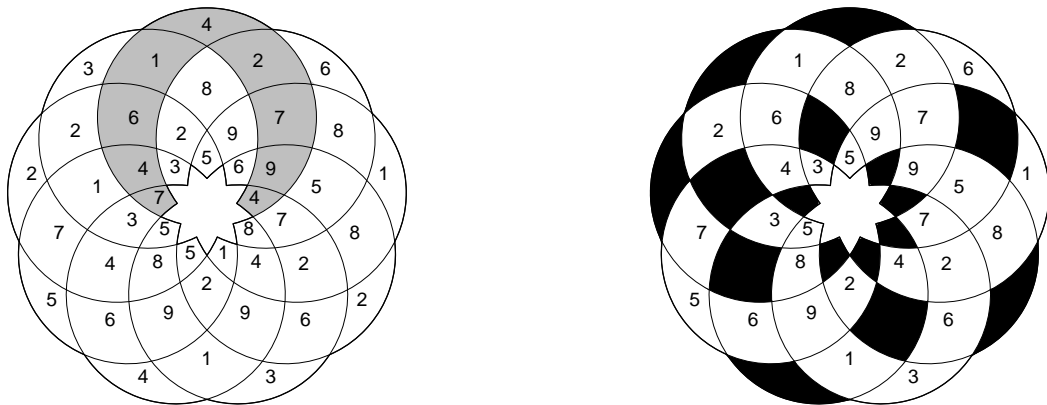
Solution code: Number of blackened cells in each arc, starting with the one directly above the star in the middle then moving clockwise. The answer for the example would be 241524333.

4.2 Penrose-Hitori – 15 Points

Blacken some fields, so that each number occurs in each row at most once. To get a row, start at the border of the grid, move to the the opposite edge of the rectangle, and proceed until you reach another border of the grid. All white fields must be connected (that is, the black fields don't cut the grid into more than one part). Black fields may not have a common edge.

Solution code: Total number of blackened squares. The answer for the example would be 5.

4.3 Triangle-Hitori – 20 Points

Blacken some fields, so that each number occurs in each direction at most once. All white fields must be connected (that is, the black fields don't cut the grid into more than one part). Black fields may not have a common edge.

Solution code: Number of blackened fields in each horizontal row. The answer for the example would be 1111.

4.4 Little-Killer-Hitori – 30 Points

Blacken some fields, so that each number occurs in each direction at most once. All white fields must be connected (that is, the black fields don't cut the grid into more than one part). Black fields may not have a common edge. Clues outside the grid give the sum of the white fields in the corresponding direction.

Solution code: Number of blackened fields in each row. The answer for the example would be 1202.

4.5 Skyscraper-Hitori – 35 Points

Blacken some fields, so that each number occurs in each direction at most once. All white fields must be connected (that is, the black fields don't cut the grid into more than one part). Black fields may not have a common edge. Each white number counts as a skyscraper of that height. Clues outside the grid give the number of skyscrapers which are visible in the corresponding direction. Higher skyscrapers cover lower ones. Black fields can not be seen and don't cover any skyscraper.

Solution code: Number of blackened fields in each row. The answer for the example would be 12121.
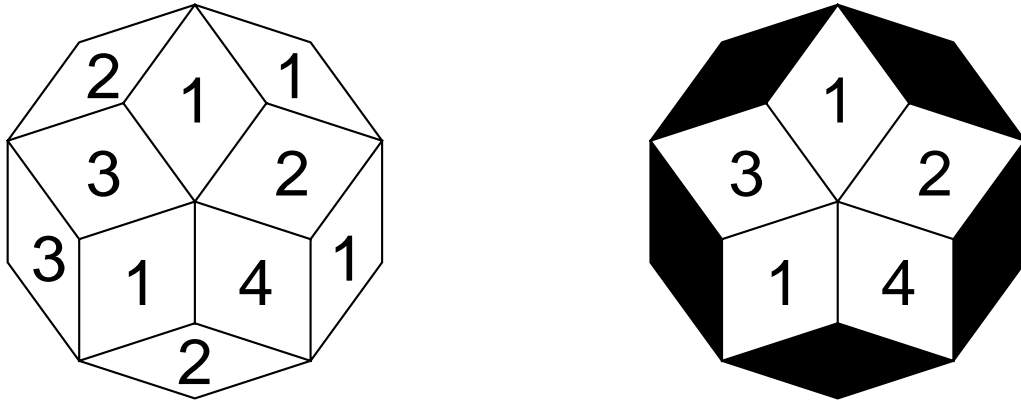
4.6 Kuromasu-Hitori – 40 Points

Blacken some fields, so that each number occurs in each direction at most once. All white fields must be connected (that is, the black fields don't cut the grid into more than one part). Black fields may not have a common edge. Numbers in white fields give the number of white fields which are visible horizontally and vertically from there, including the field. This rule doesn't hold for blackened numbers. Black fields block the view.
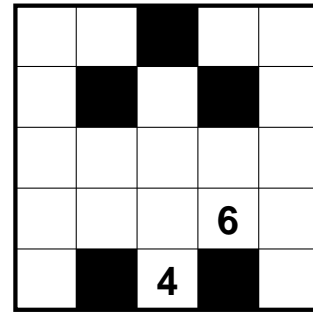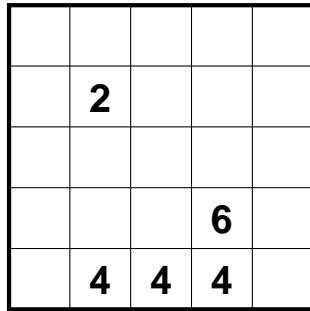
Solution code: Number of blackened cells in each row. The answer for the example would be 12002.

4.7 Cube-Hitori – 40 Points

Blacken some fields, so that each number occurs in each row at most once. To get a row, start at the border of the grid, move to the the opposite edge of the rectangle, and proceed until you reach another border of the grid. All white fields must be connected (that is, the black fields don't cut the grid into more than one part). Black fields may not have a common edge.
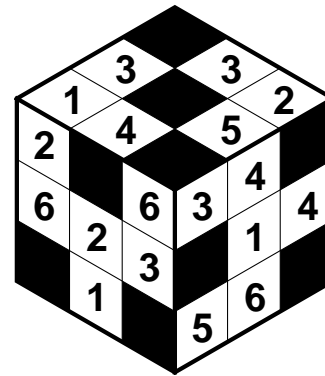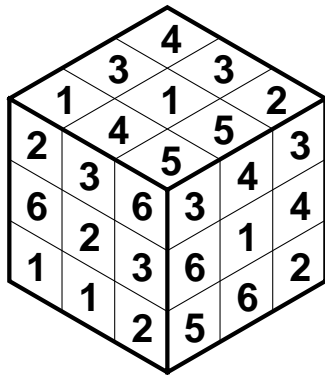
Solution code: Total number of black cells, first for the upper part, then for the left part, then for the right part. The answer for the example would be 333.
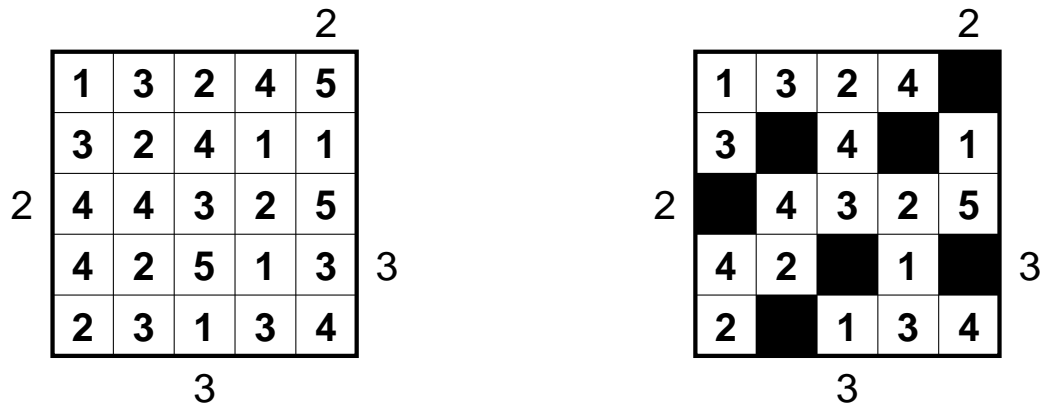
4.8 Loop-Hitori – 45 Points

Blacken some fields, so that each number occurs in each direction at most once. All white fields must be connected (that is, the black fields don't cut the grid into more than one part). Black fields may not have a common edge. In the remaining white fields, draw a single continous loop, which travels orthogonally from field to field and visits each field exactly once.
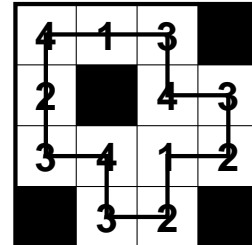
Solution code: Number of blackened fields in each row. The answer for the example would be 1101.

Round 5 – Bastelrunde

Time limit: 50 minutes

Time bonus: 1 point per 20 seconds

This puzzle consists of nine separate smaller puzzles which by themselves have no unique solution. For the unique overall solution, the puzzles have to be positioned in a 3x3-grid, in which they influence each other according to the following rules. There is exactly one positioning for which all puzzles are uniquely solvable. The puzzles may not be rotated or shifted with respect to each other.

Hints that are positioned between two grids have to be correct for both grids. If a hint is invalid according to the rules of either of the two puzzles (for example a 5 for the Easy as 1234), then this positioning isn't allowed. Two hints can not end up on the same position between two grids. This is even true if both hints have the same value. A row or column is allowed to have hints on both sides, as long as both of them are correct. (For some puzzle types this requires both hints to have the same value - this is allowed.) Kurotto has some further limitations, which are explained together with the Kurotto rules.

The puzzle types:

(A) Easy as 1234 – 15 Punkte

Enter the numbers from 1 to 4 into the grid, so that in every row and every column every number occurs exactly once. The numbers at the borders indicate the number that comes first in the corresponding row or column.
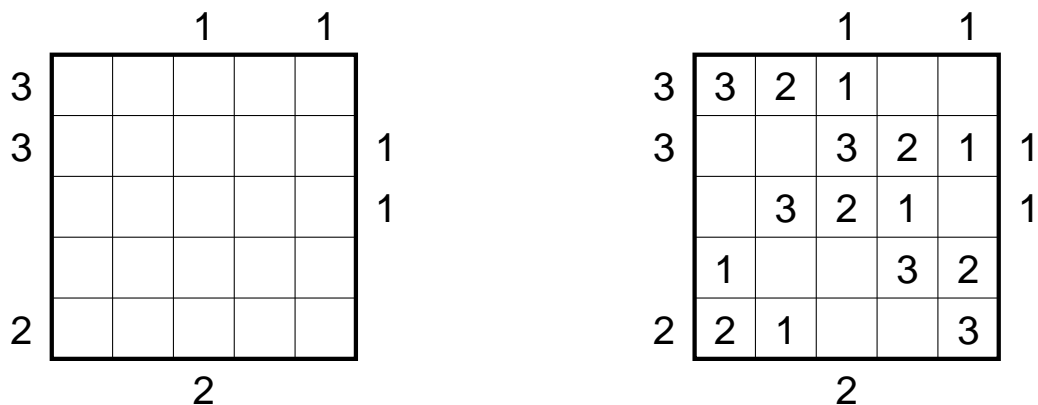
Example with numbers from 1 to 3

(B) Crazy Pavement – 15 Punkte

Blacken some fields in the grid so that for each region either all its fields are blackened or none at all. Numbers outside the grid indicate the number of blackened fields in that row/column.
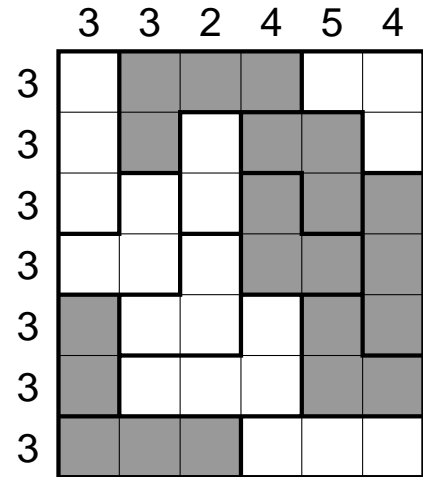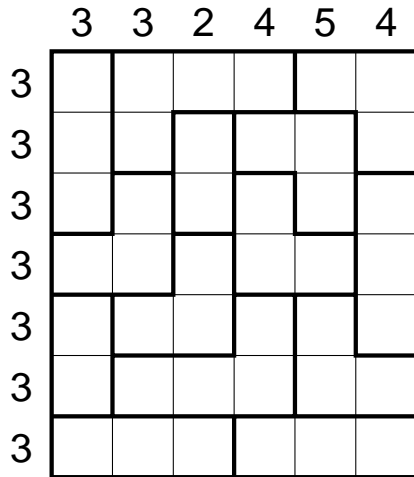
(C) Coral (first seen) – 15 Punkte

Blacken some fields to get a single connected set of fields (the coral) that does not touch itself, not even diagonally (that means there aren't any surrounded white areas) and does not contain any 2x2 blackened area. Numbers outside the grid indicate the size of the first group of consecutive blackened fields in that row or column.
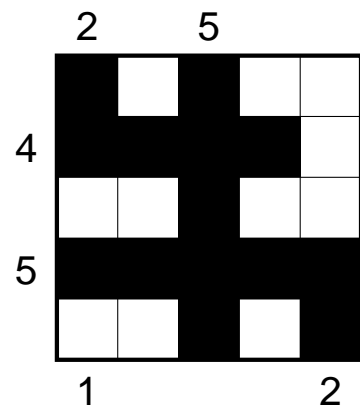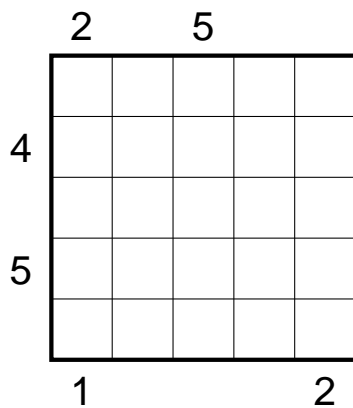
(D) Kurotto – 15 Punkte

Blacken some fields so that each circled number represents the total count of blackened fields in orthogonally connected groups sharing an edge with that number. Fields with circles can not be blackened. Special limitations: The puzzle contains only empty circles in the beginning, the hints are positioned beside the grid. Before solving the Kurotto, the hints have to placed in the nearest circle in their row or column. Two same numbers from different sides can share a circle. There has to be a circle for each hint beside the grid (especially the ones shared with other grids). Some circles may remain empty.
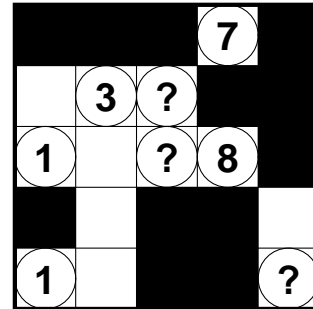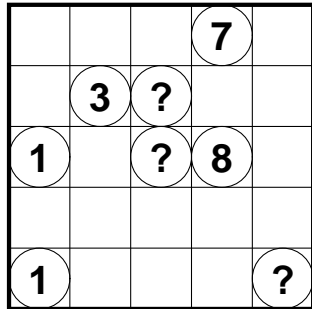
(E) Laser – 15 Punkte

Draw a laser beam, which moves diagonally through the fields of the grid and crosses itself only at the marked points. The entrance and exit are marked by arrows. Also draw some horizontal and vertical mirrors on the intersections of the grid lines. The laser beam hits each mirror exactly once. It moves straight forward unless it hits a border or a mirror, in this case it gets reflected. Numbers beside fields tell you, how often the laser beam passes through a fields in that row or column. Numbers beside lines tell you, how many mirrors have to be put on that line.
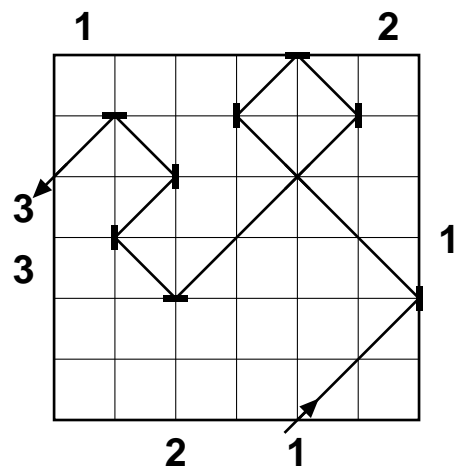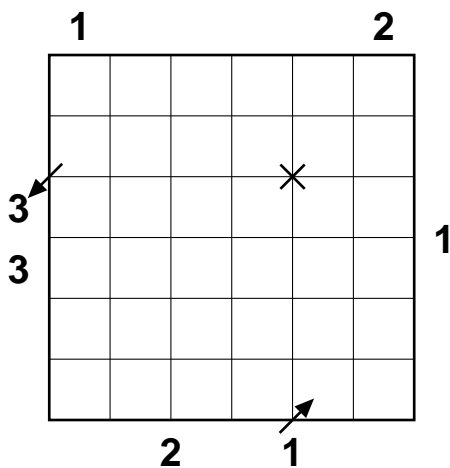
(F) Pentomino Search – 15 Punkte

Put the pentominoes ILTXZ into the fields of the grid. They may not touch, not even diagonally. The pentominoes may be rotated or reflected. The numbers at the borders give the number of fields, that are occupied by the pentominoes in that row or column. Some fields may be marked as empty.
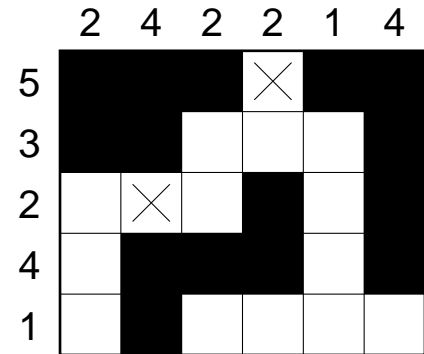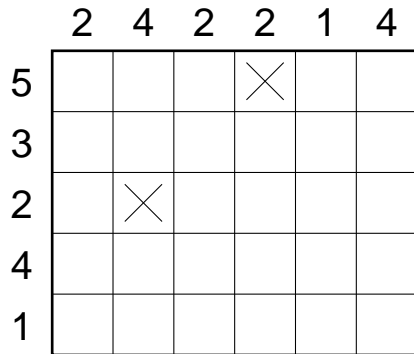
Example with Pentominos L, P, Z

(G) Snake – 15 Punkte

Find a snake beginning and ending in the marked fields. The snake goes from field to field vertically or horizontally, but not diagonally. The snake does not touch itself, not even diagonally. The numbers outside the grid indicate how many fields are used by the snake in that row or column.
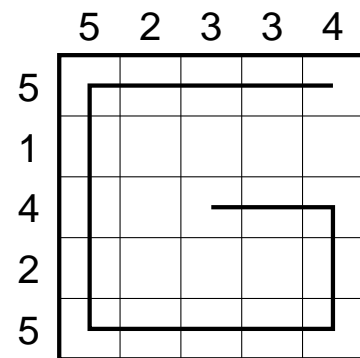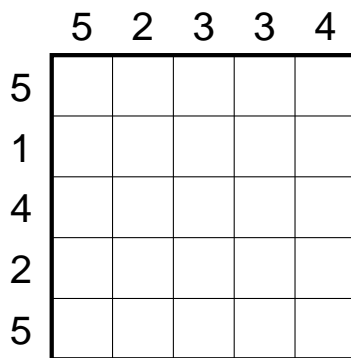
(H) Tapa (first seen) – 15 Punkte

Blacken some fields to create a single continuous wall. Number(s) in a field indicate the length of blackened blocks on its neighbouring fields. If there is more than one number, there must be at least one white field between the blackened blocks. Blackened fields cannot form a 2x2 square or larger. There are no wall segments on fields containing numbers. Additionally, numbers outside the grid indicate the size of the first group of consecutive blackened fields in that row/column.
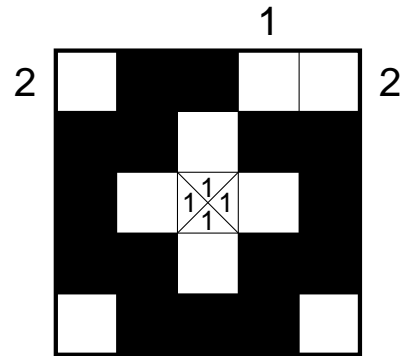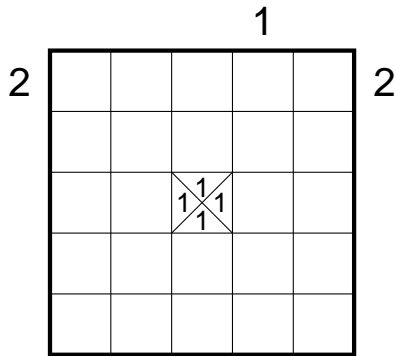
(I) Tents – 15 Punkte

Draw some tents into the grid, so that every tree has exactly one tent, that is located horizontally or vertically adjacent. Tents do not touch each other, not even diagonally. The numbers at the borders give the number of tents in that row or column.
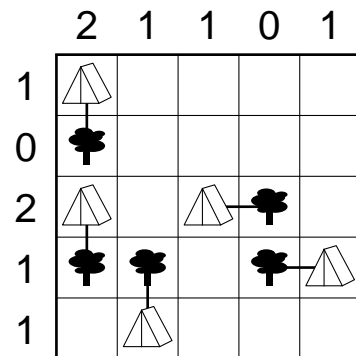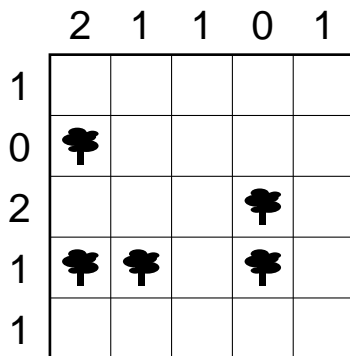
Example with puzzles Kurotto, Tapa, Tents and Easy as 1234

Kurotto (top-left):

```
      2   2
    ┌───┬───┬───┬───┬───┐
    │   │   │   │ ○ │   │
    ├───┼───┼───┼───┼───┤
    │ ○ │   │   │   │ ○ │  3
    ├───┼───┼───┼───┼───┤
    │   │   │ ○ │ ○ │   │  2
    ├───┼───┼───┼───┼───┤
  2 │ ○ │   │   │ ○ │ ○ │
    ├───┼───┼───┼───┼───┤
    │   │ ○ │   │   │   │
    └───┴───┴───┴───┴───┘
              4
```

Tapa (top-right):

```
          5
    ┌───┬───┬───┬───┬───┐
  2 │   │   │   │   │   │
    ├───┼───┼───┼───┼───┤
    │   │   │   │   │   │  1
    ├───┼───┼───┼───┼───┤
    │   │   │   │   │   │
    ├───┼───┼───┼───┼───┤
    │   │   │   │   │   │
    ├───┼───┼───┼───┼───┤
    │   │   │ 3 │   │   │
    │   │   │1  │   │   │
    └───┴───┴───┴───┴───┘
              1
```

Tents (bottom-left):

```
          4
    ┌───┬───┬───┬───┬───┐
    │   │   │   │   │   │
    ├───┼───┼───┼───┼───┤
    │   │   │   │   │   │  2
    ├───┼───┼───┼───┼───┤
  1 │   │   │   │   │   │
    ├───┼───┼───┼───┼───┤
    │   │   │   │   │   │
    ├───┼───┼───┼───┼───┤
  3 │   │   │   │   │   │
    └───┴───┴───┴───┴───┘
              2
```

Easy as 1234 (bottom-right):

```
          1
    ┌───┬───┬───┬───┬───┐
    │   │   │   │ 🌲 │   │
    ├───┼───┼───┼───┼───┤
    │ 🌲│   │   │   │   │
    ├───┼───┼───┼───┼───┤
  0 │   │   │   │   │   │
    ├───┼───┼───┼───┼───┤
    │   │   │   │ 🌲│   │
    ├───┼───┼───┼───┼───┤
    │   │ 🌲│   │   │   │  2
    └───┴───┴───┴───┴───┘
              0
```
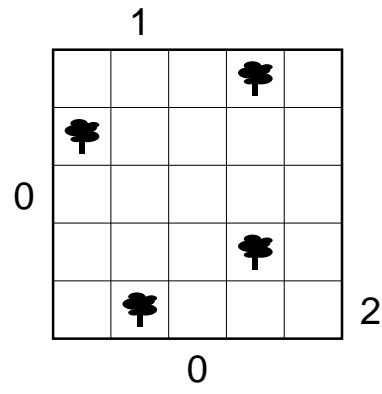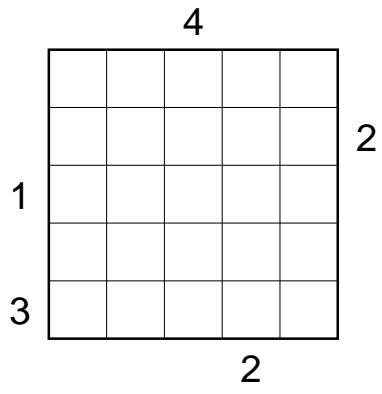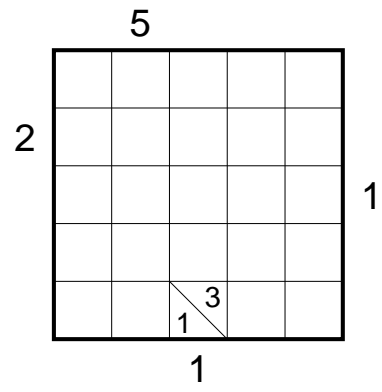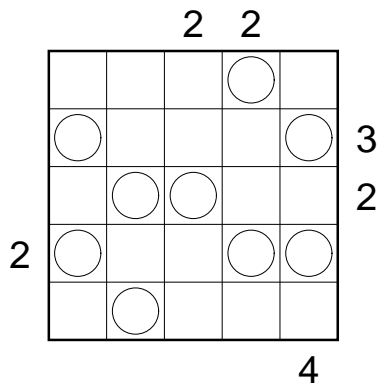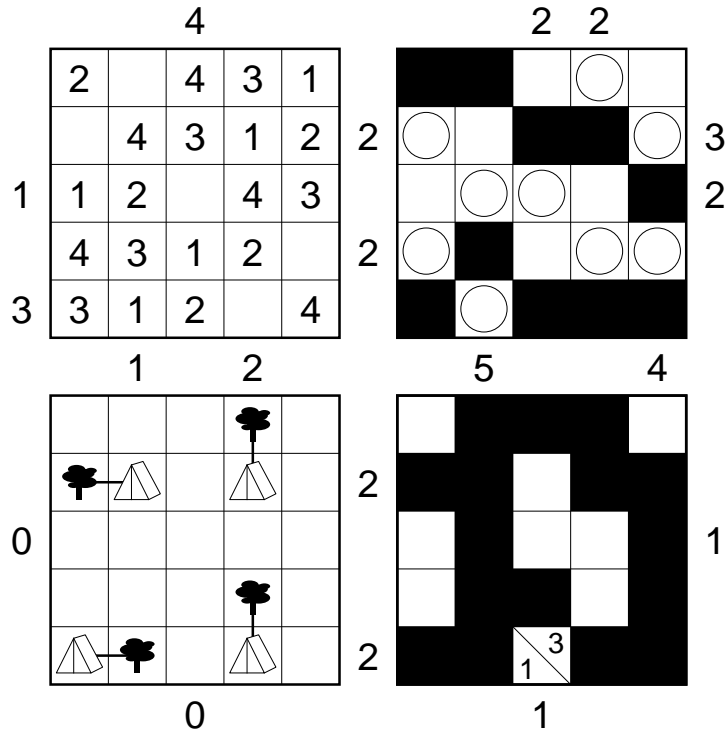
Scoring and solution codes: There are ten solution codes for this puzzle. Time limit has been extended because of them and because the contestants in Stuttgart get the puzzles in cut out form.

The first code asks for the placement of the puzzles. Use the letters from above and write the puzzle types in the 3x3-square in reading order. Use - for places for which you couldn't determine the puzzle type. You get 5 points for each correctly placed puzzle and -5 points for each incorrectly placed puzzle. Places marked with „-" are ignored for scoring. You can not get a negative score for this part of the solution.

The other nine codes are the codes for the single puzzles. Each puzzle is worth 15 points. You can only get points, if your solution is part of the overall solution. The codes are as follows:

- (A) Easy as 1234: The two main diagonals, first from upper left to lower right, then from upper right to lower left. Use „-" for empty squares.

- (B) Crazy Pavement: The two main diagonals, first from upper left to lower right, then from upper right to lower left. Use X for blackened cells and - for empty cells.

- (C) Coral (first seen): The two main diagonals, first from upper left to lower right, then from upper right to lower left. Use X for blackened cells and - for empty cells.

- (D) Kurotto: The two main diagonals, first from upper left to lower right, then from upper right to lower left. Use X for blackened cells and - for empty cells.

- (E) Laser: The number of unused squares for each row.

- (F) Pentomino Search: The two main diagonals, first from upper left to lower right, then from upper right to lower left. Use „-" for empty squares and the letters of the pentominos for filled squares.

- (G) Snake: The longest horizontal snake sequence in each row.

- (H) Tapa (first seen): The two main diagonals, first from upper left to lower right, then from upper right to lower left. Use X for blackened cells and - for empty cells.

- (I) Tents: The column number of the leftmost tent for each row. Then the column number of the rightmost tent for each row.

Round 6 – Stuttgart Railroads

Time limit: 40 Minuten

Time Bonus: 1 point per 20 seconds

6.1 Railroads with letters – 15 Points

Draw a single closed loop into the grid, which moves horizontally and vertically from field to field, and visits every field of the grid exactly once with the exeption of some crossings. All crossings are already marked. Fields with letters are railway stations which have to be visited in an order, that you can read the given password along the path. The path moves straight through fields with letters.

Passwort: Tapa

Solution code: Number of turns in each row. The answer for the example would be 22242.

6.2 Broken Railroads – 25 Points

Blacken some numbers so that exactly one number of each pair of same numbers is blackend. In the remaining fields, draw a single closed loop into the grid, which moves horizontally and vertically from field to field, and visits every field exactly once with the exception of some crossings. All crossings are already marked. Fields with numbers are railway stations which have to be visited in increasing order. The path moves straight through fields with numbers.
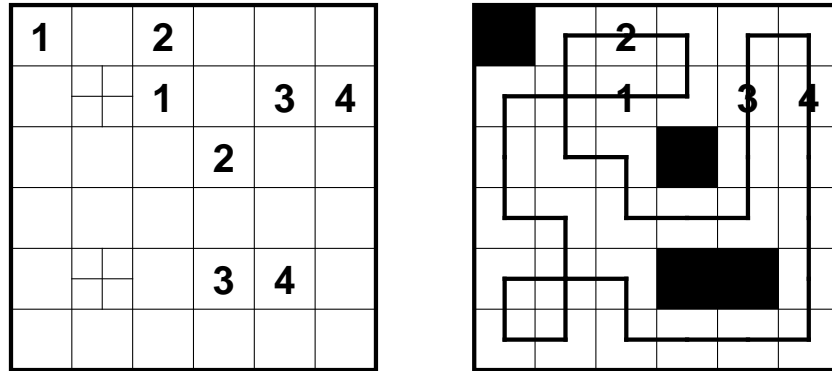
Solution code: Number of turns in each row. The answer for the example would be 422424.

6.3 Sackbahnhöfe – 25 Points

Draw a loop with some branches into the grid, which visits every field of the grid. The loop crosses itself only at the marked crossings. Fields with numbers are railway stations. The loop branches in the field before the railway station. There may be only one branch in a field. The branch then moves straight through the railway station, and ends in the field after it. The branches with the stations have to be in increasing order along the loop.
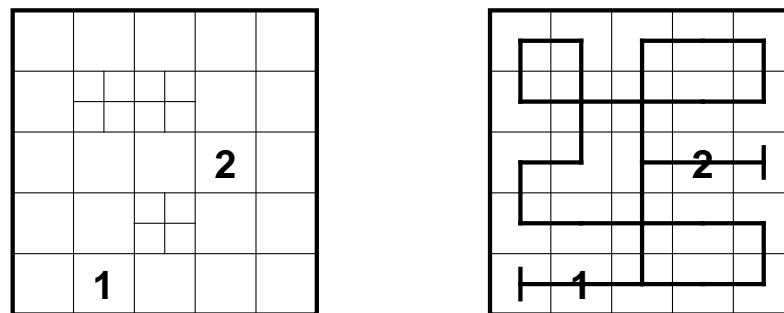
Solution code: Number of turns in each row. The answer for the example would be 42221.

6.4 Masyu-Railroads – 30 Points

Draw a single closed loop into the grid, which moves horizontally and vertically from field to field, and visits every field of the grid exactly once with the exeption of some crossings. All crossings are already marked. Fields with numbers are railway stations which have to be visited in increasing order. The path moves straight through fields with numbers.

In fields with circles, the path follows Masyu rules. White circles may be blackened. The path moves straight through white circles, but has to make a turn immediately before or after the circle. The path makes a turn at black circles, but has to move straight through the field before and after the circle.
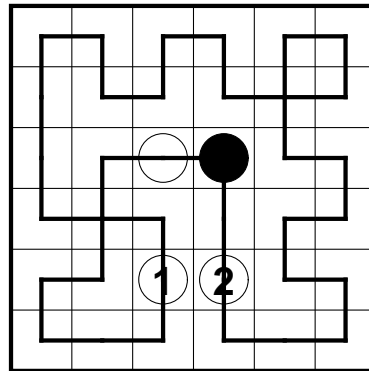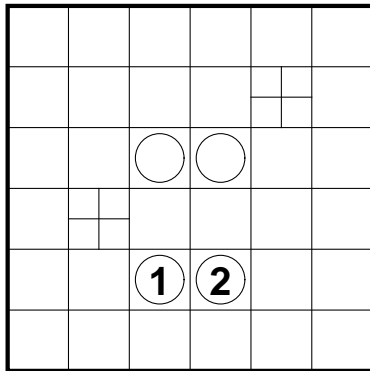
Solution code: Number of turns in each row. The answer for the example would be 644444.

6.5 Railroads – 30 Points

Draw a single closed loop into the grid, which moves horizontally and vertically from field to field, and visits every field of the grid exactly once with the exception of some crossings. All crossings are already marked. Fields with numbers are railway stations which have to be visited in increasing order. The path moves straight through fields with numbers.
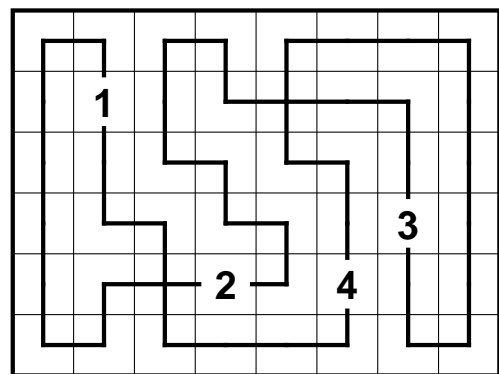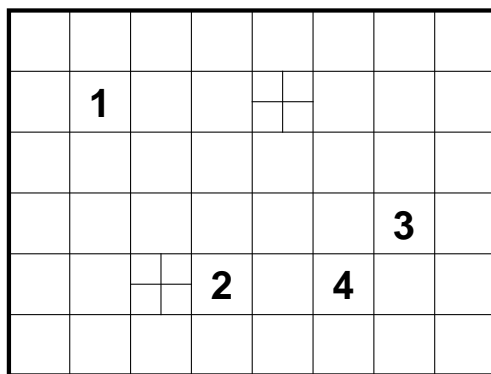
Solution code: Number of turns in each row. The answer for the example would be 624426.

6.6 Subway-Railroads – 35 Points

Draw a single closed loop into the grid, which moves horizontally and vertically from field to field, and visits every field of the grid exactly once with the exception of some crossings. Fields with numbers are railway stations which have to be visited in increasing order. The path moves straight through fields with numbers. Hints at the border give the number of fields in that row or column, where the loop crosses itself, moves straight or makes a turn.
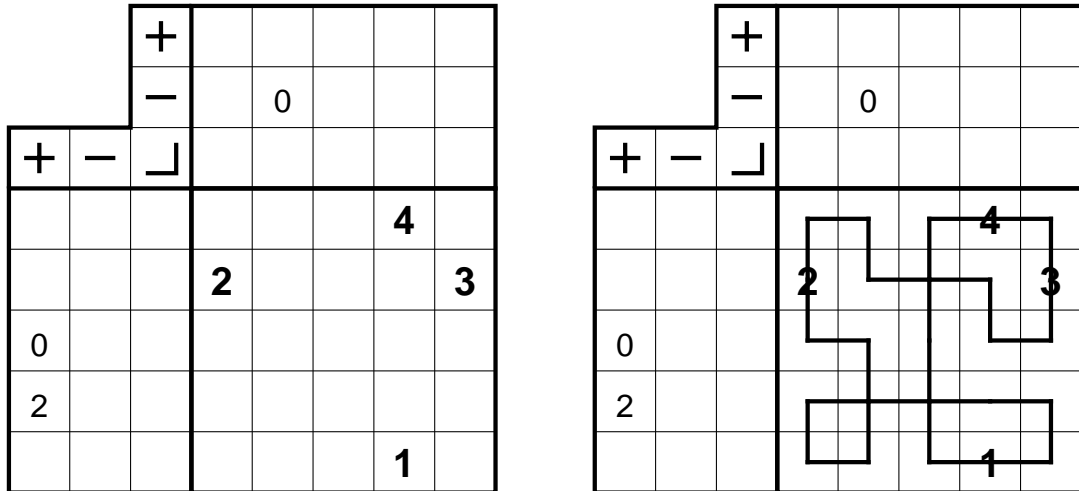
Solution code: Number of turns in each row. The answer for the example would be 42424.

6.7 Cave-Railroads – 80 Points

Find out, which of the clues belong to a cave puzzle and which belong to a railroads puzzle. Blacken some fields without numbers. The remaining white fields form a single connected set of fields, which doesn't touch itself, not even diagonally (that means all black fields have to be connected to the border). Cave clues give the total number of fields, which can be seen horizontally and vertically from there until you reach a black field or the border of the grid. The field with the clue is included.

Draw a path which moves horizontally and vertically from field to field, and visits every remaining white field except the cave clues. It crosses itself only at the marked crossings. The path starts one field before the railway station "1", moves straight through each railway station and visits the stations in increasing order. It ends one field after the last railway station.
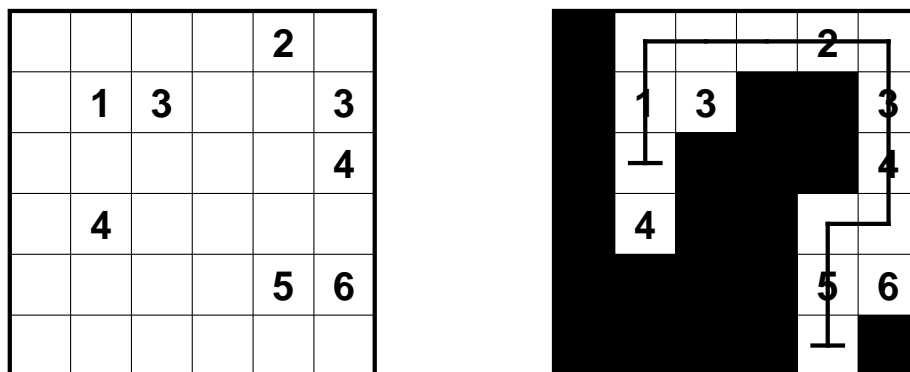
Solution code: First the number of turns in each row. Then the number of fields not used by railroads in each row. The answer for the example would be 200200144455.

Round 7 – Mixed Puzzles

Time limit: 75 minutes

Time Bonus: 1 points per 20 seconds

7.1 Subway – 10 Points

Draw a map of an subway of a city with horizontally and vertically lines from center to center of the fields. The subway can not leave the grid, there are no dead ends and the whole map is connected. At the center of a field, the lines may turn or branch. The numbers at the borders give the corresponding number of the different segments in that row or column. The pieces may be rotated. Fields may remain empty.
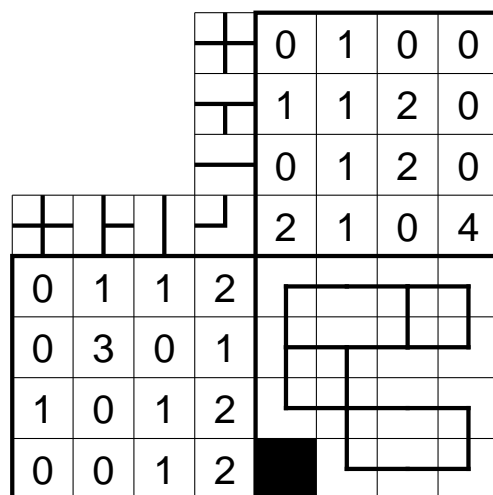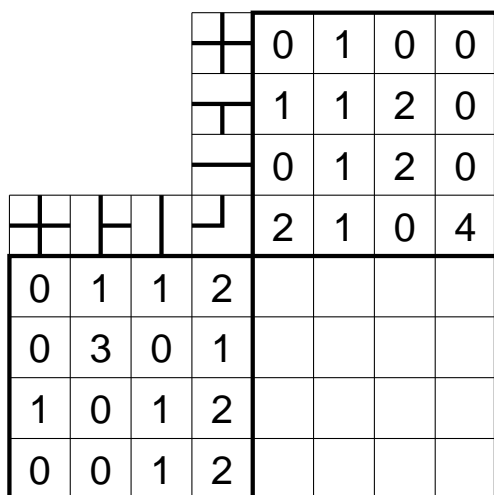
Solution code: Pieces in the second and third row. X for a crossing, T for a branching, I for a straight line, L for a turn and - for an empty square. The answer for the example would be TTTLLXIL.

7.2 Anglers – 10 Points

Draw some lines into the grid going horizontally or vertically from field to field. Every line starts next to an angler given by a number outside the grid and ends at a fish. The number gives the length in fields (including the fish) of that line. Each field may be used by at most one line, some fields may remain empty.

Solution code: Number of turns in each row. The answer for the example would be 1124.

7.3 Snake – 15 Points

Draw a snake into the grid, which moves horizontally and vertically from field to field, and doesn't touch itself, not even diagonally. Hints outside the grid give the number of snake parts in that row or column. The snake parts are numbered from 1 to x. Some parts with numbers may be given, not necesarrily the head and tail of the snake.

Solution code: Longest horizontal segment in each row. The answer for the example would be 6215126.

7.4 Coral – 15 Points

Blacken some fields of the grid so that you get a coral. A coral is connected area of black fields that doesn't contain a 2x2-area of blackened fields and doesn't touch itself (i.e. there is no completly surrounded area of white squares). Hints at the border give the length of blackened blocks in the corresponding row or column, not necessarily in the right order. Between two blocks there has to be at least one white square.
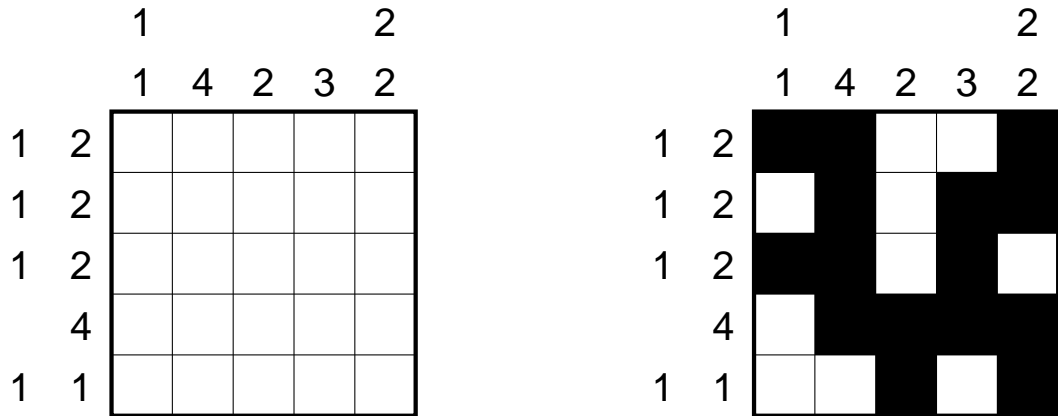
Solution code: The two main diagonals, first from upper left to lower right, then from upper right to lower left. X for a blackened field, - for a white field. The answer for the example would be XX-XXXX-X-.

7.5 LITS – 15 Points

Blacken some fields, so that each marked region contains exactly four orthogonally connected blackenend fields. All blackened fields are orthogonally connected and no 2x2-area is completly black. Blackened fields in a region form a tetromino. Same tetrominos may no touch each other orthogonally.

Solution code: Number of blackened squares in each row. The answer for the example would be 43243.

7.6 Pentomino-Figures – 20 Points

The twelve pentominoes were used to form six figures. Each pentomino was used exactly once, but could be mirrored and rotated. The six figures made of the pentominoes and two additional ones are shown below. Mark the two additional figures.

Examples with three figures and pentominos L, X, Y, Z

Solution code: The position of the unused figures. The figures are numbered in reading order. The answer for the example would be 3.

7.7 Tents – 25 Points

Draw some tents into the grid, so that every tree has exactly one tent, that is located horizontally or vertically adjacent. Tents do not touch each other, not even diagonally. The numbers at the borders give the number of tents in that row or column.

Solution code: Column number of the leftmost tent for each row. Then the column number of the rightmost tent for each row. 0 for no tent. The answer for the example would be 1015210352.

7.8 Magnets – 25 Points

Put neutral and magnetic plates into the grid. Each magnetic plate has two poles (+ and -). There can't be adjacent plate-halfes with the same polarity. Hints outside the grid gives the number of the different poles in the corresponding row or column.

+		1	2	1	1
	−	2	1	1	1
2	1				
0	1				
2	1				
1	2				

+		1	2	1	1
	−	2	1	1	1
2	1	−	+	■	+
0	1	■	■		−
2	1	+	−	+	■
1	2	−	+	−	■

Solution code: The two main diagonals, first from upper left to lower right, then from upper right to lower left. - and + for the poles and N for a neutral plate. The answer for the example would be -N+N+N–.

7.9 Outside Areas – 30 Points

Draw a single closed loop into the grid, which only uses the dashed lines and visits every point exactly once. A hint outside the grid means, that the adjacent field is outside of the loop. The number gives the size of the area outside of the loop in fields.

Solution code: For each row the number of squares outside the loop. The answer for the example would be 020.

7.10 Double block – 40 Points

Blacken some fields and put numbers from 1 to 6 into the remaining fields of the grid, so that each number occurs exactly once in each row and column. Hints outside the grid give the sum of the numbers between the two black fields in that row or column.

Example with numbers 1 to 3

Solution code: The two main diagonals, first from upper left to lower right, then from upper right to lower left. Use - for a blackened field. The answer for the example would be 31-32-2-21.

7.11 Domino – 45 Points

Blacken some fields so that black fields don't share an edge with each other or the border of the grid. Then put the given Domino set into the grid, so that each piece is used exactly once. Adjacent numbers of different Domino-pieces have to be equal.

Example with Dominos 0-0 to 4-4

Solution code: The content of each row with a blackened field. Use - for a blackened field. The answer for the example would be 0-1100-332.

7.12 Masyu-Reconstruction – 50 Points

From a correct, i.e. uniquely solvable Masyu-puzzle, all circles were removed. Hints at the border of the grid give all circles in the corresponding row or column in the right order. Reconstruct the Masyu and solve it.

Masyu rules: Draw a single closed loop into the grid which moves horizontally and vertically from field to field, visits every circle, and visits every field at most once. In fields with a black circle, the loop has to make a 90° turn, but has to move straight through the fields before and after the circle. The loop has to go straight through white circles, but makes a 90° turn in the field before or after the circle.
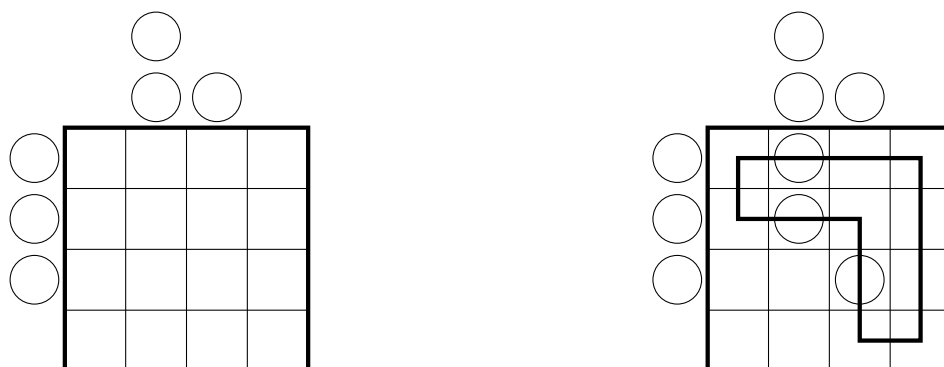
Solution code: The longest horizontal segment for each row. 0 if there are only vertical segments. The answer for the example would be 3201.

7.13 Sudoku with stars – 60 Points

Fill the grid with numbers 1 to 7 and stars, so that each row, column and boldly outlined region contains each number exactly once and two stars. Stars may not touch each other, not even diagonally.

Example with one star per row, column and region and numbers 1 to 4.

Solution code: The two main diagonals, first from upper left to lower right, then from upper right to lower left. S for a star. The answer for the example would be 23S1232S41.

7.14 Non-consecutive Kakuro with circles – 70 Points

Fill the grid with numbers 1 to 9. A hint gives the sum of the numbers in the corresponding „word". In a „word", each number can be used at most once. Adjacent numbers may not have a difference of 1. In the circled fields, each number from 1 to 9 occurs exactly twice.

Example with each number exactly once in the circled fields.

Solution code: From top to bottom in reading order the numbers in the circles. The answer for the example would be 795463281.

7.15 Word puzzle – 70 Points

Put the given words into the white fields of the grid, so that they can be read horizontally and vertically. Fields may remain empty, but empty fields may not be adjacent.

Words: *BLKAU, GRÜN, GELB, LLILA, PINK, ROT*

Solution code: The number of empty fields for each row. The answer for the example would be 202111.

Round 8 – Four Seasons

Time limit: 75 minutes

Time bonus: 1 point per 20 seconds

The puzzles of this round consist of four quarters, which are variations of a main puzzle type. The four rules for the quarters are given, but it is up to you to determine which rule belongs to which quarter. Each rule is used exactly once. Also, the quarters are coupled in some way along the boundaries and can not be solved independently.

In this round, points are assigned for correct quarters, but you will not get points for partial solutions, which are not part of the overall solution, even if all conditions in a quarter hold. Each quarter of a puzzle is worth the same amount of points. This does not mean, that they have all the same difficulty, or that the quarters can be solved one by one.

There are four solution codes for each puzzle. The first code is for the upper left part, the second for the upper right part, the third for the lower left part and the fourth for the lower right part.

8.1 Easy as ABC – 40 Points

Fill the grid with letters A-D so that in each quarter, each row and column contains one blank field and each letter exactly once. Adjacent letters in different quarters are equal. In each quarter, hints at the border follow a different rule from the following list. It is not know, which rule belongs to which quarter.

1. Hints give the first seen letter from that direction.
2. Hints give the second seen letter from that direction.
3. Hints give the third seen letter from that direction.
4. Hints give the fourth seen letter from that direction. an.

The example uses letters A-C. Hints give in two quarters the first seen letter and in two quarters the second seen letter.

Puzzle grid (to solve):

	C					A		
A									C
									B
									A
B									C
	C			B		C		

Example solution:

	C					A			
A	A		C	B	B	C	A		C
		C	B	A	A		B	C	B
	C	B	A			B	C	A	
	B	A		C	C	A		B	
	B	A		C	C	A		B	
B	C	B	A			B	C	A	A
	A		C	B	B	C	A		
B		C	B	A	A		B	C	C
	C			B		C			

Solution codes: The two main diagonals of a quarter, first from upper left to lower right, then from upper right to lower left. Use - for an empty field. The answers for the example would be ACACBBBB, B-CB-BBC, BBCACA–, CBACBCCA.

8.2 Sudoku – 60 Points

Fill the grid with numbers 1 to 6, so that each number occurs exactly once in each row, column and boldly outlined region in each quarter. Adjacent numbers in different quarters are equal. Each quarter is a different sudoku variant from the following list.It is not know, which rule belongs to which quarter.

1. Standard-Sudoku.

2. Consecutive Sudoku. A dot between two fields means that the difference between these fields equals 1. All dots are given.

3. XV-Sudoku. An X between two fields means that their sum equals 10. A V between two fields means that their sums equals 5. All X's and V's are given.

4. „No three in a row"-Sudoku. Three horizontally or vertically adjacent numbers can not be all odd or all even.

The example uses numbers 1 to 4 and the variant „No two in a row" instead of „No three in a row". In this variant, two horizontally or vertically adjacent numbers can not both be odd or both even.

Solution codes: The two main diagonals of a quarter, first from upper left to lower right, then from upper right to lower left. The answers for the example would be 32424131, 41431232, 13132424, 23313213.

8.3 Number Placement – 60 Points

Fill the grid with numbers. Adjacent numbers in different quarters are equal. In each quarter, the numbers follow a different rule from the following list. It is not known, which rule belongs to which quarter.

1. 123-Box. Use numbers 1 to 3. Each hint at the border stands for a connected group of equal numbers, and gives either the size of this group or it's value. I.e. a 3 stands for a group of three fields with equal (but unknown) value, or a group of 3s of unknown length. A ? stands for a group with an unknown value and unknown (positive) length. For each row and column, all groups are given and adjacent groups have different value.

2. Fillomino. Divide the grid into regions and write a number in each field that is equal to the size of the region. Regions of same size may not touch each other orthogonally. There may be regions with no given numbers, even with other numbers than given.

3. Hakyuu. Fill each region with numbers 1 to n, where n is the number of fields in that region. Between two equal numbers, there have to be at least that many other numbers, i.e. between two 3s, there are at least three fields with other numbers. This condition only holds, if both numbers are in the Hakyuu-quarter.

4. Capsules. Fill each region with numbers 1 to n, where n is the number of fields in that region. Same numbers may not touch each other in this quarter, not even diagonally.

? 2	? 2
? 2 3	? 2 3
? 2 3	? 2 3

								?	?
								3	? ?
								3	2
								3	2 1
1							1		

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

Solution codes: The two main diagonals of a quarter, first from upper left to lower right, then from upper right to lower left. The answers for the example would be 21431234, 11132113, 42143341, 33413224.

8.4 Tapa – 80 Points

Blacken some fields to create a single continuous wall. Connection may be violated for a single quarter as long as it holds for the whole grid. Number(s) in a field indicate the length of blackened blocks on its neighbouring fields. If there is more than one number, there must be at least one white field between the blackened blocks. Fields in adjacent quarters counts as neighboring fields as well. Blackened fields cannot form a 2x2 square or larger. The 2x2-rule also holds across quarter-borders. There are no wall segments on fields containing numbers. In each quarter, numbers in fields follow a slight variation of these rules. It is not known, which rule belongs to which quarter. The variations are:

1. Standard-Tapa. Rules as described above.

2. Knapp daneben-Tapa. Each given number is off by one, i.e. a „2" can become a „1" or „3". A given „1" can become a „0" as long as there is at least one positive clue remaining in that field. There can not occur any additional „1"s from invisible „0"s.

3. Tapa Restaurierung. In each clue, exactly one positive number is missing.

4. Twilight Tapa. Clues may be blackened. A blackened clue indicates the length of consecutive white blocks in the neighboring fields. If there is more than one number in that field, then there must be at least one black field between the white groups. Fields in other quarters counts as neighboring fields as well.
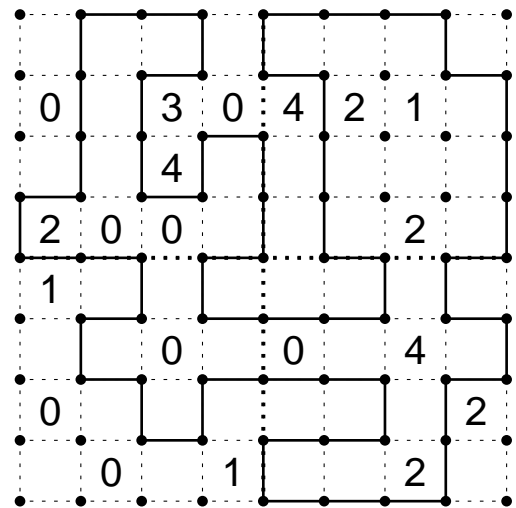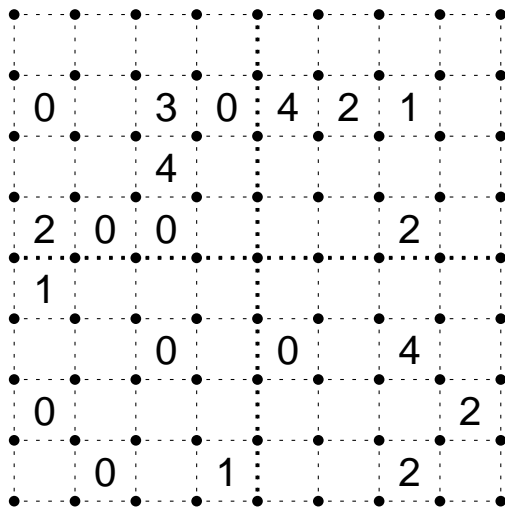

Solution codes: Number of blackened fields in each row. The answers for the example would be 3201, 2423, 4223, 3223.

8.5 Slitherlink – 80 Points

Draw a single closed loop along the grid lines, which doesn't cross or touch itself. Each quarter follows a different rule from the following list. It is not known, which rule belongs to which quarter.

1. Standard Slitherlink with Pentominos. A hint gives the number of edges of this field, that are part of the loop. The inside of the loop in this quarter is formed of different pentominos. Number and type of pentominos are not known, but they are all different.

2. Knapp daneben. A hint gives the number of edges of this field, that are part of the loop. All numbers are off by one, i.e. a „2" can become a „1" or a „3".

3. A hint gives the number of corners of this field, that are part of the loop.

4. Turning Fences. A hint gives the number of corners of this field in which the loop makes a 90° turn.


Solution codes: Number of fields inside the loop in each row. The answers for the example would be 2124,3333,1310,1413.

8.6 Skyscrapers – 80 Points

Write a number from 1 to 6 into each field of the grid, so that in each quarter, each number occurs exactly once in each row and column. Adjacent numbers in different quarters have to be equal. Each number represents a skyscraper of that height. A skyscraper can be seen from a position outside the grid, if it's not covered by a bigger skyscraper in that row or column. In each quarter, the hints outside the grid follow a different one of the following conditions. It is not known, which condition belongs to which quarter.

1. Standard skyscarpers. A hint gives the number of visible skyscrapers in that row or column.

2. Mixed informations skyscraper. A hint gives the number of visible skyscrapers or the height of the first skyscraper in that row or column. Both conditions might hold as well.

3. Sum skyscrapers. A hint gives the sum of the heights of the visible skyscrapers in that row or column.

4. Product skyscrapers. A hint gives the product of the heights of the visible skyscrapers in that row or column.
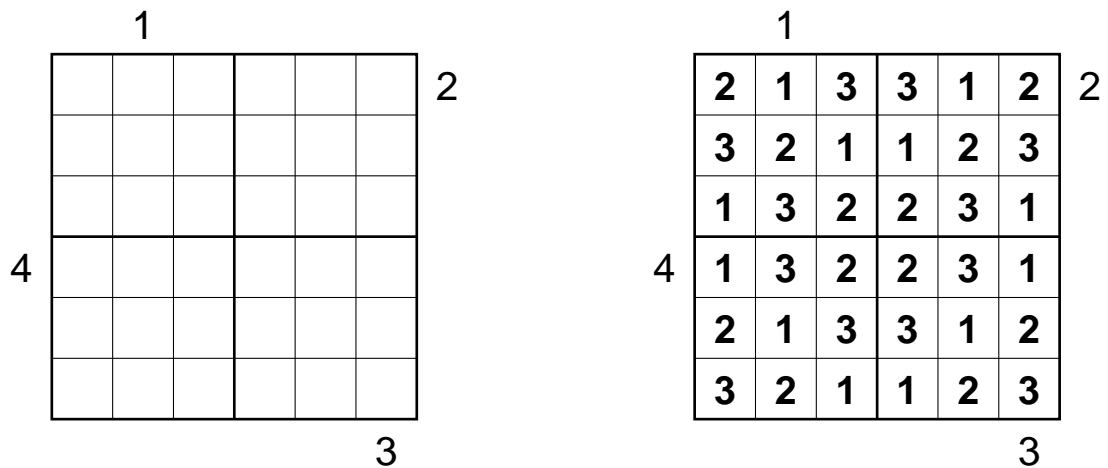
Example with numbers 1 to 3

Solution codes: The two main diagonals of a quarter, first from upper left to lower right, then from upper right to lower left. The answers for the example would be 222321, 321222, 111213, 213111.
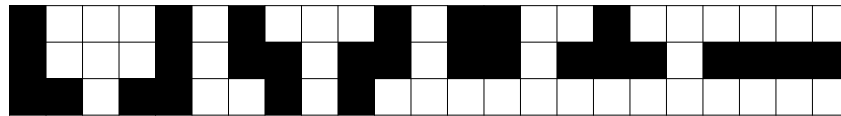
8.7 Object Placement – 100 Points

In each quarter, place the objects from a different point of the following list. It is not known, which objects belong to which quarter.
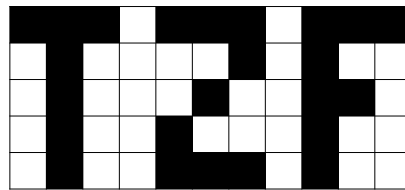
1. The standard battleships fleet: 4x1, 3x2, 2x3, 1x4.


2. Seven tetrominos.

3. The letters T,Z,F.

The letter T in the example is slightly different from the letter T in the puzzle.

4. An unknown number of clouds. A cloud is a rectangular area which both side lengths are at least 2.

Objects may be rotated but not mirrored, and must not touch each other, not even diagonally. A number at the outside of the grid gives the number of different objects in the corresponding row or column in the adjacent quarter. A number between two quarters gives the number of fields occupied by objects in the corresponding row or column (as the sum of the two quarters).

The example uses the following objects. All other rules are equal.

1. *Battleships: a 3x1-ship, a 2x1-ship and a 1x1-ship.*

2. *The two Triominos.*

3. *The letter T.*

4. *An unknown number of clouds. A cloud is a rectangular area which both side lengths are at least 2.*
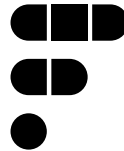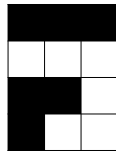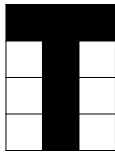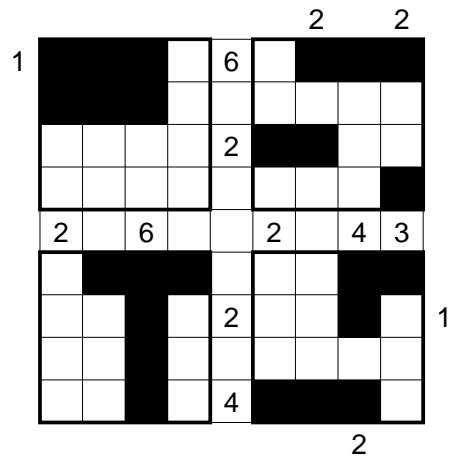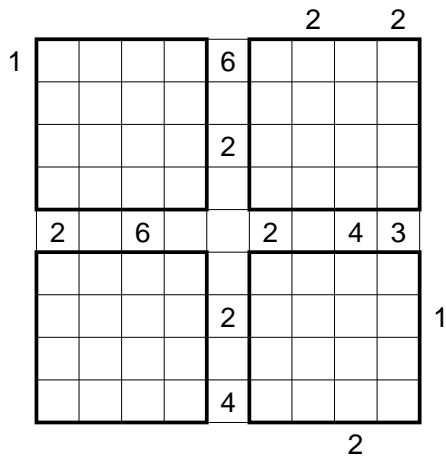
Solution codes: The two main diagonals of a quarter, first from upper left to lower right, then from upper right to lower left. X for a blackened field, - for an empty field. The answers for the example would be XX—X–, —XX-X-, –X-XX–, —-XX-X.

Round 9 – Finals

Time limit: 60 minutes

9.1 Kakuro

Fill the grid with numbers 1 to 9. A hint gives the sum of the numbers in the corresponding „word". In a „word", each number can be used at most once.

Solution code: The first and the last column with numbers. Use - for clue cells. The answer for the example would be 31-73, 81-95

9.2 Word-Hitori

Blacken some fields, so that no letter occurs more than once in a row or column. Blackened fields may not be adjacent and all remaining white fields have to be connected. Then divide the remaining white fields into some of the given words, so that neighboring letters are adjacent (i.e. the words can be read by horizontal and vertical moves in the grid). Each remaining letter in the grid has to be used exactly once, each word can be used at most once. There may be unused words on the list.

Words: *EINS, ZWEI, DREI, VIER, FUENF*

Solution code: Number of blackened fields in each row. The answer for the example would be 20120.

9.3 Castle Wall

Draw a single closed loop into the grid, which moves horizontally and vertically from field to field. Fields with a bolded border are hints, and can't be visited by the loop. White hints have to be inside the loop, black hints have to be outside. An arrow with a number gives the length of loop segments in the corresponding direction (alternativly: it gives the number of crossed field borders in the corresponding direction.)

Solution code: Number of unused fields in each row (including clues). The answer for the example would be 112022.

9.4 123-Box

Fill the grid with numbers 1 to 3. Each hint at the border stands for a connected group of equal numbers, and gives either the size of this group or it's value. I.e. a '3' stands for a group of three fields with equal (but unknown) value, or a group of '3's of unknown length. A '?' stands for a group with an unknown value and unknown (positive) length. For a row or column, all groups are given and adjacent groups have different value.

Solution code: The two main diagonals, first from upper left to lower right, then from upper right to lower left. The answer for the example would be 23213322.

9.5 Sackbahnhöfe

Draw a loop with some branches into the grid, which visits every field of the grid. The loop crosses itself only at the marked crossings. Fields with numbers are railway stations. The loop branches in the field before the railway station. There may be only one branch in a field. The branch then moves straight through the railway station, and ends in the field after it. The branches with the stations have to be in increasing order along the loop.

Solution code: Number of turns in each row. Branching fields don't count as a turn. The answer for the example would be 42221.

9.6 Magnets

Put neutral and magnetic plates into the grid. Each magnetic plate has two poles (+ and -). There can't be adjacent plate-halfes with the same polarity. Hints outside the grid gives the number of the different poles in the corresponding row or column.

+		1	2	1	1
	−	2	1	1	1
2	1				
0	1				
2	1				
1	2				

+		1	2	1	1
	−	2	1	1	1
2	1	−	+	■	+
0	1	■	■	■	−
2	1	+	−	+	■
1	2	−	+	−	■

Solution code: The two main diagonals, first from upper left to lower right, then from upper right to lower left. Use +,- for poles and N for neutral plates. The answer for the example would be -N+N+N−.

Puzzle Authors:

Nils Miehe	Runde 2
	3.5, 3.7
	Runde 5
	6.2, 6.3, 6.4, 6.6, 6.7
	8.3, 8.4, 8.5
	9.4, 9.5
Christoph Seeliger	1.1, 1.5, 1.6
	3.9
	4.1, 4.2, 4.8
	7.1, 7.12
	8.1, 8.2, 8.6, 8.7
Hubert Wagner	1.2, 1.3, 1.4, 1.7
	3.2, 3.3, 3.4, 3.6, 3.8, 3.10, 3.11, 3.13
	4.3, 4.4, 4.5, 4.6, 4.8
	6.5
	7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8, 7.9, 7.10, 7.11, 7.13
	9.3, 9.6
Susanne Zumbrink	1.8
	3.1, 3.12
	6.1
	7.14, 7.15
	9.1, 9.2

Test solvers:

Hans Eendebak, Minyoung Joo, Matthias Klaban, Bram de Laat, Hellmut Lexis, Niels Lohmeyer, Alexandra Massarwa, Palmer Mebane, Michael Mosshamer, Björn Rösel, Eva Schuckert