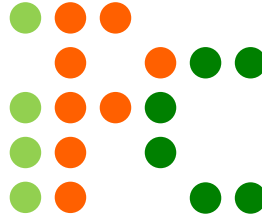


puzzle रामायण

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Episode – 7
27th – 29th February
90 minutes

Loops
by Prasanna Seshadri

Puzzle Ramayan rounds will also serve as qualifiers for Indian Puzzle Championship for year 2016. Please check <http://logicmastersindia.com/PR/2015-16pr.asp> for details.

Important Links

Submission Page : <http://logicmastersindia.com/PR/201602/>

Discussion Thread : <http://logicmastersindia.com/t/?tid=1236>

F. A. Q. : <http://logicmastersindia.com/t/?tid=381>

Registration, if required : <http://logicmastersindia.com/register.asp>

About this Episode

This episode has 22 puzzles, with 5 base puzzle types and 2 Instructionless puzzles based on two of the types.

<ul style="list-style-type: none"> • 4* Simple Loop • 4* Maxi Loop • 4* Linesweeper • 4* Masyu • 4* Railroad Tracks 	<ul style="list-style-type: none"> • 1* Masyu Instructionless • 1* Linesweeper Instructionless
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How to participate?

- Understand the rules of different puzzles that will appear in this episode. This Instruction Booklet has rules for each puzzle.
- Download the password protected Puzzle booklet (will be uploaded before the test starts). The Puzzle booklet contains the actual Puzzles to be solved. It is password protected, so you won't be able to open it.
- Any time between Saturday to Monday, login at the submission page using your LMI userid and password.
- Please check the submission page for exact timing.
- Click on "Start". At this time, password for pdf will be shown and timer will start.
- You will have 90 minutes to solve and submit the puzzles, after your timer starts.
- The puzzle booklet should be downloaded, printed and solved on paper.
- There will not be any interface / applet to solve the puzzles on web browser.
- Most of the puzzles are designed to be solved faster on paper.
- We advise you to have a printer accessible with enough paper.
- Outside solving help of any kind is not permitted. This includes but is not limited to: assistance of any kind from any other person; prepared notes, books, calculators, computers, or tools other than items explicitly permitted.
- You are allowed to use writing implements, eraser, blank paper (including commercial graph paper), ruler, scissors, and tape.

If you are participating at LMI for first time, you must check the F.A.Q. at <http://logicmastersindia.com/t/?tid=381>.

Points Table and Scoring

Points typically indicate difficulty of the Puzzles and time required to solve them. You will get full points if you enter the correct answer key. While the organizers have made best efforts to match them, your personal experience and preference may differ.

Simple Loop	1, 2, 2, 3
Maxi Loop	1, 5, 7, 16
Masyu	2, 1, 3, 4
Railroad Tracks	2, 4, 5, 7
Linesweeper	2, 3, 2, 5
Masyu Instructionless	9
Linesweeper Instructionless	14

Instant Grading

This test uses instant grading where a solver can submit any individual Puzzle and receive confirmation that the solution is correct or not. Each incorrect submission reduces the puzzle's potential score. The first, second, third, and fourth incorrect submissions reduce the potential score to 90%, 70%, 40%, and 0% respectively.

Bonus and Ranking

If you submitted all Puzzles correctly, you can have bonus points 1 point per minute saved, computed upto seconds.

Ranking will be based on following rules in order:

1. Most total points
2. Earliest final submission time, upto seconds (ignoring incorrect submissions)

About the Puzzle Booklet

The password protected Puzzle booklet will have **8** pages. We expect you to print and solve on paper, so you would need to have a printer accessible with enough paper.

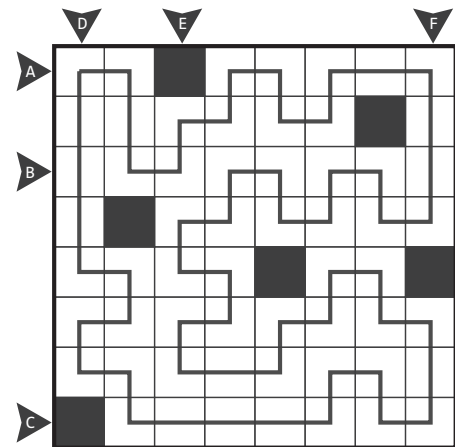
The font sizes, cell sizes, colors, borders, shading, margin in the puzzle booklet and instruction booklet will be identical.

Also, we strongly advise you to save the pdf file on your computer, open the pdf (with the password) using Adobe Acrobat Reader and then print. If you print directly from the browser (for example Google Chrome), unintentional printing problems may arise (see this post for details <http://logicmastersindia.com/t/?tid=1189>).

About answer keys

- All puzzles, including the instructionless ones at the end, use the same answer mechanism in this test.
- Each puzzle will have some lettered arrows around the grid.
- For each marked row from top to bottom, enter the largest horizontal loop segment in the corresponding direction. 0 if no horizontal loop segment.
- For each marked column from left to right, enter the largest vertical loop segment in the corresponding direction. 0 if no vertical loop segment.
- If both rows and columns are marked, first enter for rows and then for columns.
- Remember that the length of the answer key is equal to the number of arrows. The submission system will warn, if a different length answer key is entered.
- The arrows will have letters inside indicating the order in which the answer to be entered.

For the example on the right, the answer key is 214413



General methods of solving Loop puzzles

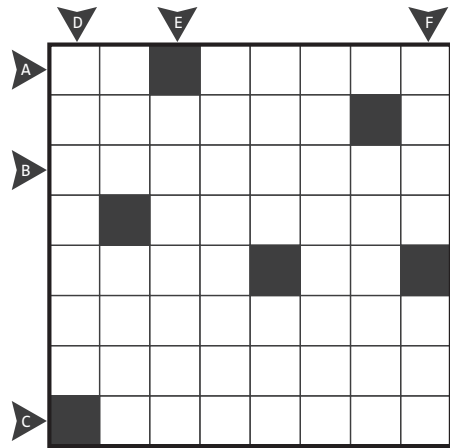
- Avoid “multiple loops” – All the types used here require a single closed loop. There can be no open ends, and there can’t be multiple loops. This isn’t just a rule but a major part of the solving process for a lot of puzzles. If two ends of the loop are about to meet and there are unfilled sections of the grid (or in case of Masyu/Linesweeper, sections with unsatisfied clues) or other loop strands, then avoid having the two ends meet because this will end one loop and the remaining part will have to form another loop.
- If all cells are to be visited, corners are always good places to start. Remember that each cell must be connected to exactly two adjacent cells. After the corners, while solving, when two edges of a cell are blocked and only two are left, the loop can only visit this cell using those two edges.
- Since there cannot be any open ends, all ends must meet. So if there is some isolated space formed by the loop/grid restrictions while solving, make sure there is an even number of open ends within that isolated space, otherwise all open ends cannot be paired up. This also works conversely, where if there is already an even number of open ends and there is one other entry point into that space, it cannot be used by the loop.

Simple Loop

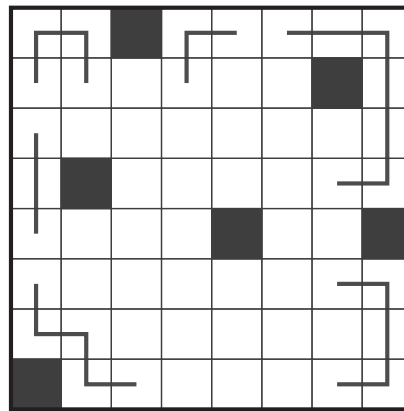
1 + 2 + 2 + 3 points

- Draw a single closed loop passing through every cell in the grid horizontally and vertically, except the given black cells.
- The loop can't cross or touch itself.

Answer key: Enter lengths of largest loop segment in marked row/column. For the example, the answer key is 214413

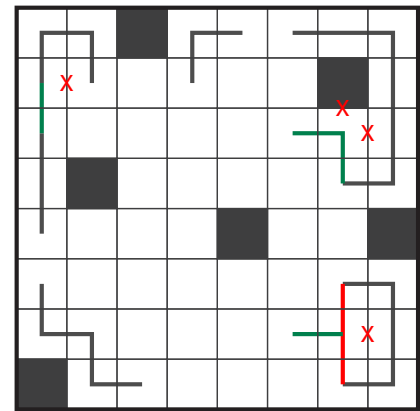


Puzzle



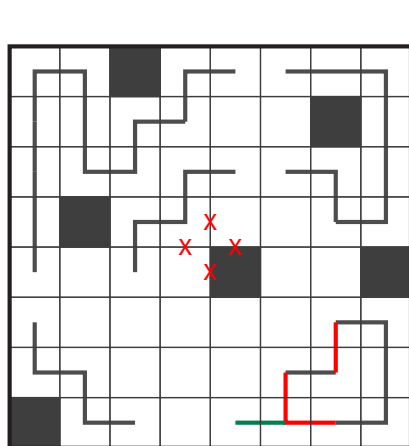
Step - 1

Since the loop visits all cells, it must make a turn at the corners of the grid and also the corners caused by black cells, as shown. Similarly, the loop must go straight where its movement is otherwise restricted, as in R4C1. All such basic markings have been made here.



Step - 2

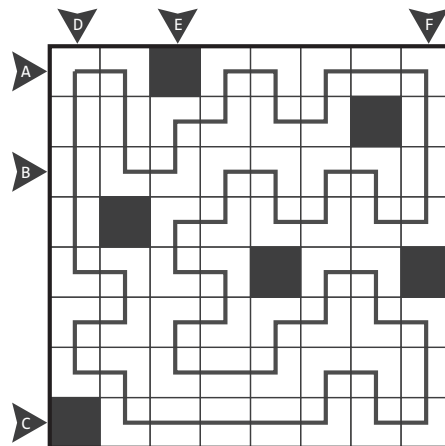
Firstly, avoid multiple loops which are caused by a loop closing prematurely as in R2C1-C2. Then, mark the new 'corners' and similar restricted cells formed while solving, in order to repeat Step - 1 using them. Lastly, in R7C7 there is the technique of using a cell to 'think ahead' and see that one of its edges is blocked, and using two other edges together will close the loop prematurely.



Step - 3

Some more 'new corner' marking is illustrated in R4C5 and R5C4.

Another think-ahead step is illustrated using R8C6. If the loop goes both 'up' and 'right' from this cell it leads to the loop closing prematurely as shown.



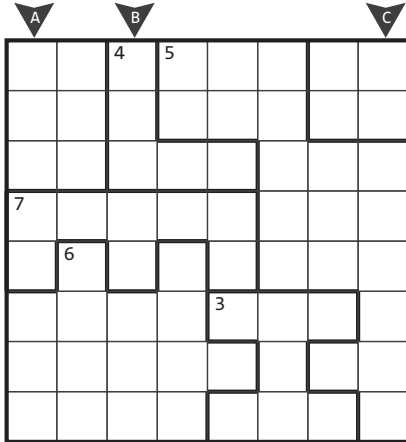
Solution

Maxi Loop

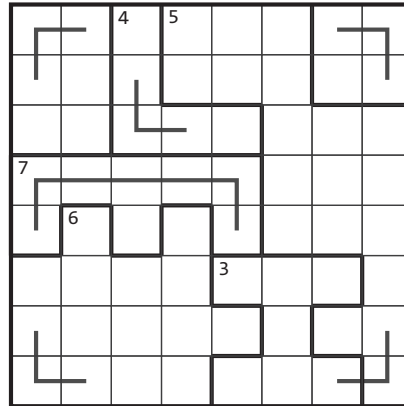
1 + 5 + 7 + 16 points

- Draw a single closed loop passing through every cell in the grid horizontally and vertically.
- The loop can't cross or touch itself.
- The numbers in the **boldly** marked regions indicate the highest amount of cells that the loop goes through consecutively (i.e. without exiting to another region) in that region.

Answer key: Enter lengths of largest loop segment in marked row/column. For the example, the answer key is 414

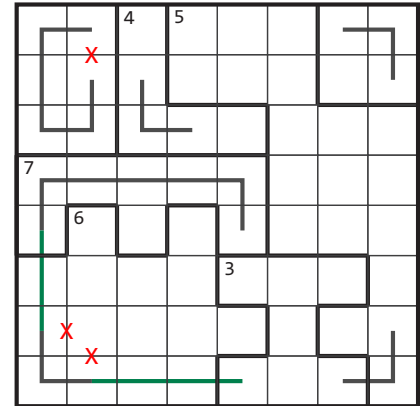


Puzzle



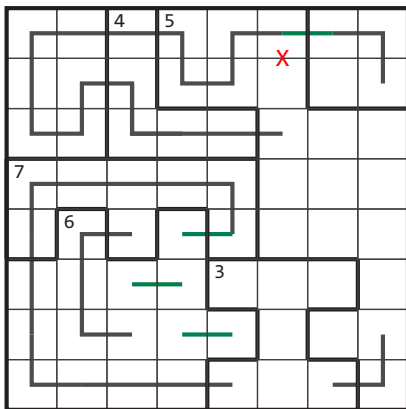
Step – 1

Since the loop visits all cells, it must make a turn at the corners. See high number regions, these usually have either just one way to satisfy a segment visiting that many cells, or at least have some cells commonly used, like the 4-region.



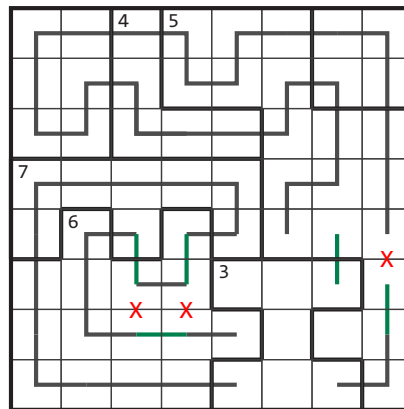
Step – 2

The top left part is basic loop progress. In the bottom left, what is illustrated is a reach technique in a big region, where, if there are excessive turns the loop will visit too many cells (see what happens if there is a segment instead of either X mark for instance)



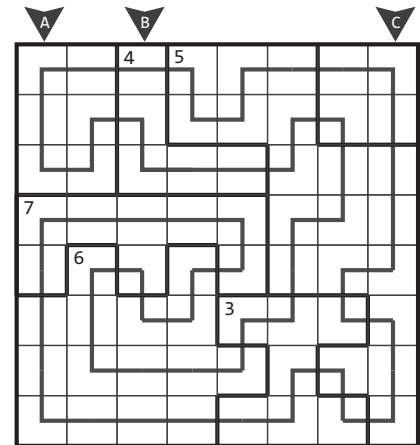
Step – 3

Some more basic progress at the top. Only thing to note is, R1C6 cannot have the continuation to R2C6 because then the loop will have occupied 6 cells in the 5-region. In the bottom part, the green segments are all deductions similar to the 'think-ahead' steps of Simple Loop before this. Refer to that for a better understanding.



Step – 4

The gray portion is again basic progress. The green segments in the bottom right are part of the 'think-ahead' steps from before. Now there must be an X in between R5-R6C8 to prevent the loop visiting 6 cells in the 5-region. Also, the two X marks in the middle-bottom area are to prevent the loop visiting more than 6 cells in the 6-region.



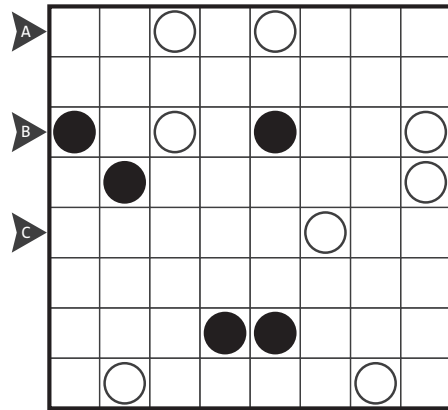
Solution

Masyu

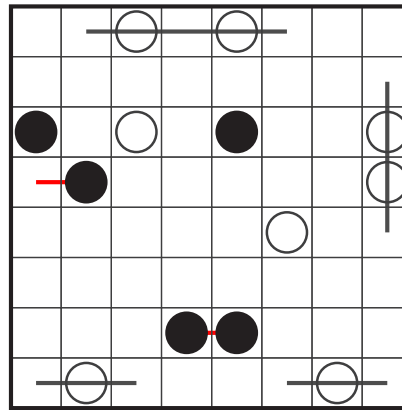
2 + 1 + 3 + 4 points

- Draw a single closed loop, which connects centers of some (not necessarily all) cells horizontally and vertically.
- The loop can't cross or touch itself.
- The loop turns in every black circle and goes straight through both adjacent squares.
- The loop goes straight through every white circle and turns in at least one or both adjacent squares.

Answer key: Enter lengths of largest loop segment in marked row/column. For the example, the answer key is 431

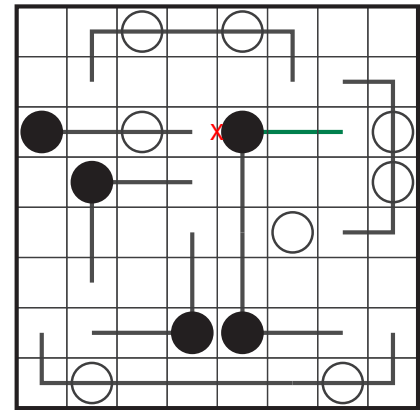


Puzzle



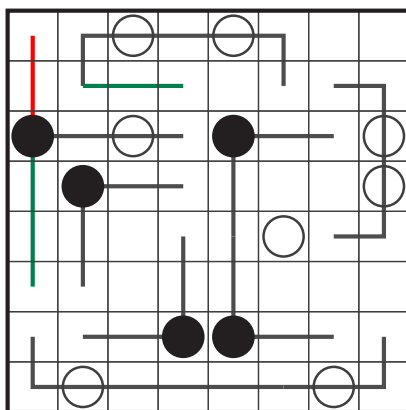
Step - 1

White circles in the first/last rows/columns of the grid must have the loop passing through them parallel to the edge of the grid, or else the segment would need to go out of the grid. Similarly, for black circles, since the segment must go straight for a cell after the turn, black circles one cell away from the edge of the grid, or adjacent to each other are restrictive as shown by the red segments.



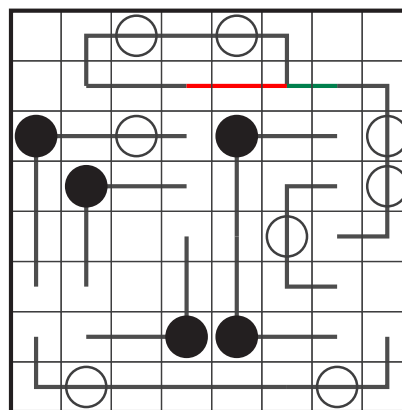
Step - 2

The top left part is basic loop progress. In the bottom left, what is illustrated is a reach technique in a big region, where, if there are excessive turns the loop will visit too many cells (see what happens if there is a segment instead of either X mark for instance)



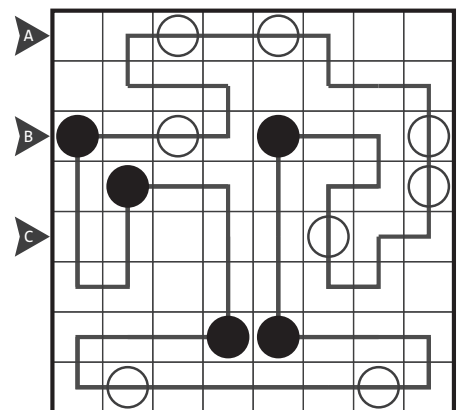
Step - 3

R3C1 cannot turn upwards since it will hit a dead end. So it turns downwards, which means R2C2 has to turn right to avoid hitting a dead end in the top left as well.



Step - 4

R2C6 can't turn left since this will cause a premature closing of the loop. The rest of the connections get solved using similar logic of avoiding multiple loops.



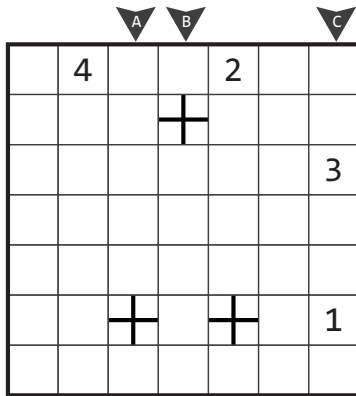
Solution

Railroad Tracks

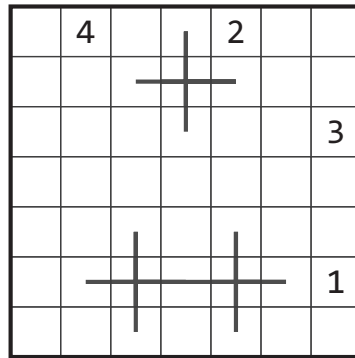
2 + 4 + 5 + 7 points

- Draw a single closed loop passing through every cell in the grid horizontally and vertically.
- The loop can't touch itself and must cross itself only in cells with a given '+'.
- The loop must pass straight through 'stations' (numbered cells), and must travel in order from 1 to 2 and so on till N (where N is the highest number given) and then back to 1.

Answer key: Enter lengths of largest loop segment in marked row/column. For the example, the answer key is 223

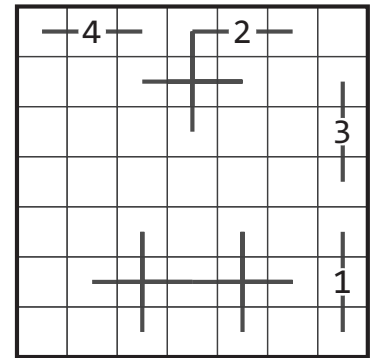


Puzzle



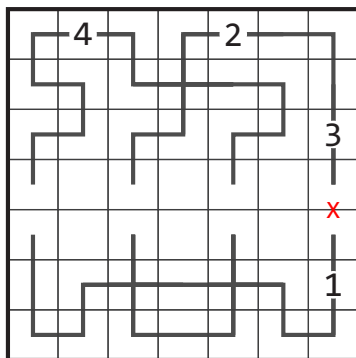
Step - 1

'+' signs indicate crossings, which can immediately be extended as shown above.



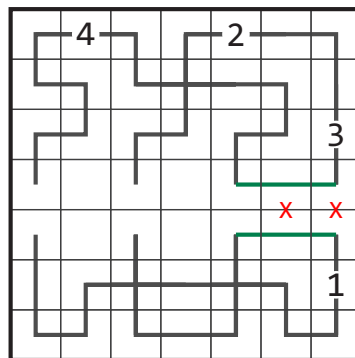
Step - 2

Since the loop goes straight through the numbered cells, the numbers in the first/last rows/columns of the grid must have the loop passing them parallel to the edge of the grid.



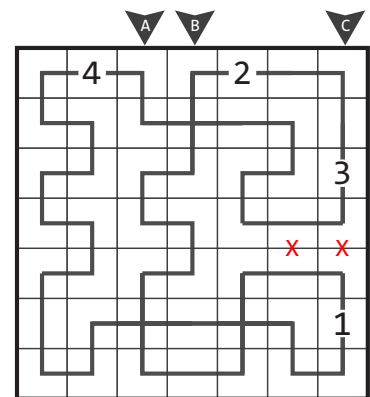
Step - 3

The basic steps shown in Simple Loop walkthrough should be enough to reach this point, and in general are still powerful in this type after the crossings are accounted for. Now the only part left is the ordering. Since the numbers here are 1-4, the loop must go in order from 1-2-3-4. So, it can't go directly from 1 to 3, which means R4C7 and R5C7 cannot be directly connected.



Step - 4

The segments from the 1 and 3 will continue to avoid each other till they reach other strands. Now the ordering looks fine, and the only thing left to do is complete the loop using Simple Loop kind of deductions.



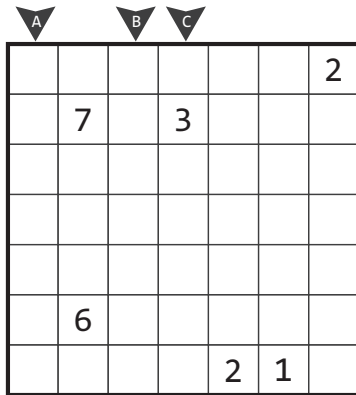
Solution

Linesweeper

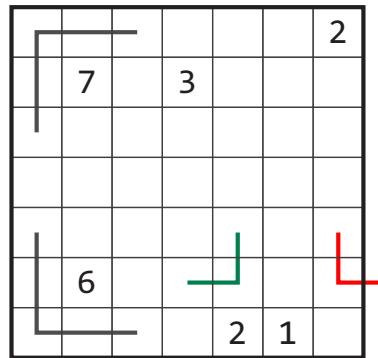
2 + 3 + 2 + 5 points

- Draw a single closed loop, which connects centers of some (not necessarily all) cells horizontally and vertically.
- The loop can't cross or touch itself.
- Numbers in the grid show the number of cells used by the loop in the surrounding 8-cell area.
- The loop cannot pass through cells with numbers.

Answer key: Enter lengths of largest loop segment in marked row/column. For the example, the answer key is 630

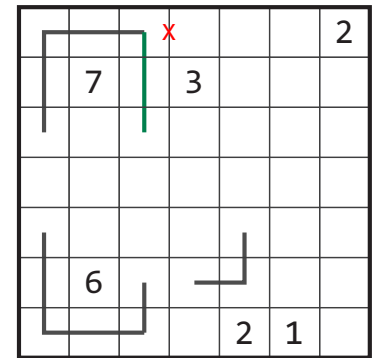


Puzzle



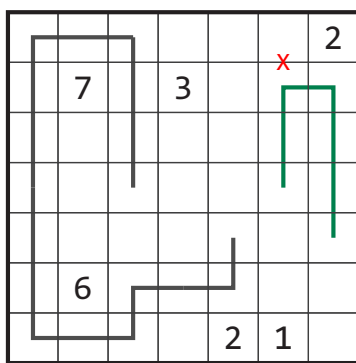
Step – 1

A 1 clue can only have one of its diagonal neighbours used by the loop, and this clearly can't happen on the top right of the 1 given here, so it must be the top left. Also, for higher number clues which are near a corner like the 6 and 7, note that if the corner isn't used, there are only 5 cells remaining for the loop to use. So, the corners must be used.



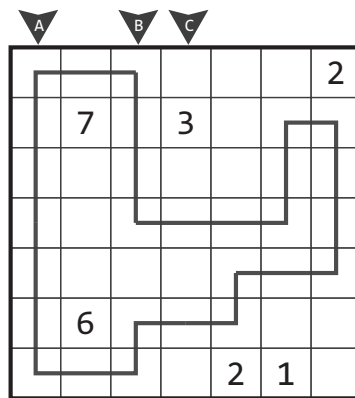
Step – 2

The 2 clue in the bottom has been satisfied, so R7C4 cannot be visited by the loop which forces it to move upwards to R6C3 from R7C3. Note that the 6 clue is now satisfied and the remaining two cells cannot be used. In the top, if the loop goes from R1C3 to R1C5 through R1C4, then it will have used 3 cells for the 3 clue leaving two cells blank for the 7 clue which is not possible.



Step – 3

In the previous step, since R1C3 was forced downwards, the 3 clue and 7 clue are both satisfied, which makes it easy to satisfy the top right 2 clue as shown, in a way to avoid open isolated loop ends. From here it's just helping all ends meet and finishing one single closed loop.



Solution

Another example for Linesweeper

		4			
	8				8
5		4			4
	7				3
		4			

		4			
	8				8
5		4			4
	7				3
		4			

Masyu Instructionless**9 points**

- The rules of this puzzle vary slightly from the Masyu rules.
- One example with solution will be given in the puzzle booklet to demonstrate the change in the rules.
- It is part of solving process to determine the rule changes by exploring/solving the examples.
- There will not be any worded instruction in the puzzle booklet for this puzzle.

Answer key: Enter lengths of largest loop segment in marked row/column.

Linesweeper Instructionless**14 points**

- The rules of this puzzle vary slightly from the Linesweeper rules.
- One example with solution will be given in the puzzle booklet to demonstrate the change in the rules.
- It is part of solving process to determine the rule changes by exploring/solving the example.
- There will not be any worded instruction in the puzzle booklet for this puzzle.

Answer key: Enter lengths of largest loop segment in marked row/column.