

**PRACTICE PUZZLES AND TIPS FOR
INDIAN PUZZLE CHAMPIONSHIP 2013**

TO BE HELD ON 7TH JULY 2013

Notes:

1. All Puzzle rules have been copied from the IPC 2013 Instruction booklet. Participants are advised to have a look at the booklet before trying out these puzzles, as they contain easier examples with solutions that are meant to give the solver a basic idea of what is expected.

2. The name of the author of each puzzle is provided next to that puzzle's name. Participants may contact either of us for help using the links below, for even more detailed tips than the ones provided below, but to prevent it from becoming one-sided, and to help serve its purpose of general improvement in solving abilities, it is advised that the participant makes a good attempt at solving the puzzle first with the existent tips.

3. We have decided not to address the well-known puzzle types, the categorization of "well-known" is quite simply puzzles that appear regularly in newspapers and magazines in India. These include Sudoku, Kakuro, Fence, Missing Words, Multiple Choice Questions. If practice puzzles are desired for these, comment on the LMI forum requesting them.

4. You may not redistribute these puzzles as your own. They can only be used for solving purposes as practice for the Indian Puzzle Championship 2013. The authors must be contacted if the puzzles are intended to be used in any other way.

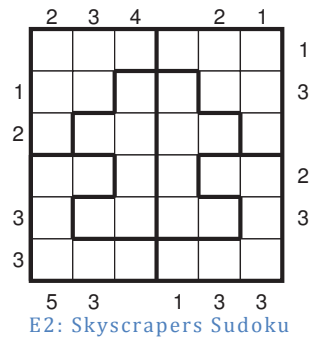
5. Below is a basic Puzzle grid image to demonstrate notations that will be used in the Tips. 1-10 from left to right is the numbering of Rows, and 1-10 from top to bottom is the numbering of Columns. For example, the cell in between the letters A-H is denoted as R4C5. The 8 letters around R4C5 will be used in a puzzle like Tapa, where the clue describes the 8 cells around it. So if a cell is described as "D from R4C5", it should be understood as R4C6. In other words, the tips will always be easy to follow if the puzzle is seen while reading them.

1	2	3	4	5	6	7	8	9	10
2									
3			A	B	C				
4			H		D				
5			G	F	E				
6									
7								A	B
8								H	
9								G	F
10									

6. We would like to thank Zoltán Horváth, Murat Can Tonta and Zalak Ghetia for testing the puzzles. Also, Thanks to Serkan Yürekli for helping with the puzzle image and testing of Pentomino Kakuro.

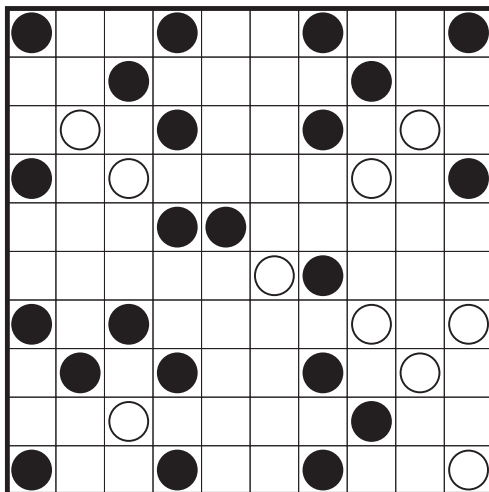
We hope you enjoy the set. Good luck for the Indian Puzzle Championship!

E2: Skyscrapers Sudoku (By Prasanna Seshadri) Rules: Place a digit from 1 to N in each cell of the N by N grid. Digits do not repeat in rows or columns or outlined regions. Digits inside the grid represent height of skyscraper in that cell. Digits outside the grid represent total number of skyscrapers seen (not blocked by a taller skyscraper) from the corresponding direction.

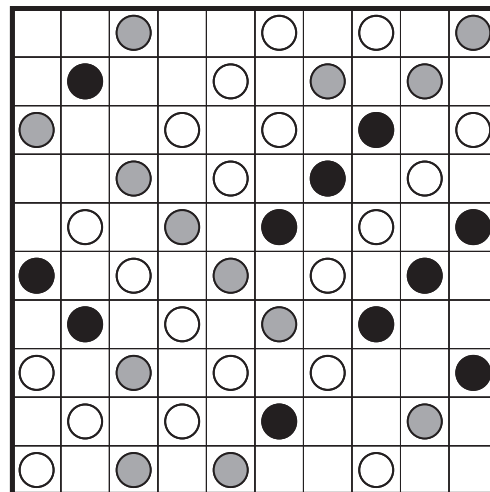


F1: Black and White Loop (By Prasanna Seshadri) Rules: Draw a loop which passes all cells exactly once. Between two circles with same colour the loop cannot turn. Between 2 circles with different colours, the loop must turn exactly once.

F2: Black, White and Grey Loop (By Prasanna Seshadri) Rules: Apply rules of "F1 – Black & White Loop", except that some circles are grey. Each grey circle can act as either a white circle or a black circle or both.



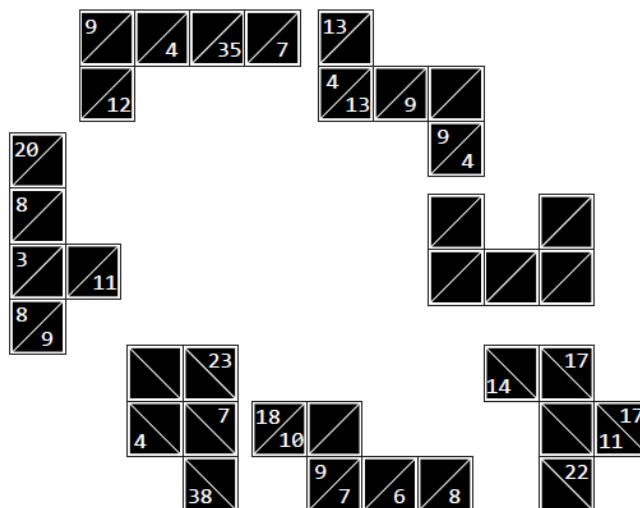
F1: Black and White Loop



F2: Black, White and Grey Loop

G2: **Pentomino Kakuro (By Prasanna Seshadri)** Rules: Place the given pieces into the white cells to form a Kakuro puzzle. The pieces may be rotated, but not mirrored. The pieces cannot touch each other, not even diagonally.

	11	11			21			14	7	42
14										
3										
3										
12										
	13									
	36									



G2: Pentomino Kakuro

(Solution for this puzzle is at the end of the Solutions)

I1: Tapa (By Swaroop Guggilam) Rules: Paint some empty cells black to create a continuous wall. Number/s in a cell indicates the length of black blocks on its neighbouring cells. If a cell has more than one number, there is at least one white cell between the black blocks. No 2X2 square contains only painted cells. Question marks (?) are replaced by non-zero digits.

I2: Tapa Difference (By Prasanna Seshadri) Rules: Replace each clue with two non-zero digits whose difference is equal to the clue. Apply "I1 –Tapa" rules.

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

I1: Tapa

		2		2			0	
		4						
							0	
	0			0		3		
			2		1			
							0	
						2		0
0								
		1						

I2: Tapa Difference

J1: Corridors (By Swaroop Guggilam) Rules: Divide the grid along the grid lines into regions consisting of five adjacent cells. Each region contains exactly one white and one black circle. No 2X2 area belongs to a single region.

J2: Happy Dots (By Prasanna Seshadri) Rules: Place one white circle diagonally next to each black circle. Divide the grid along the grid lines into regions consisting of five adjacent cells. Each region contains exactly one white and one black circle.

		○			○			●
			○		●		●	
	○	●		○	○		○	●
●	●		●		●	●		○
			●				○	
●			●	●				●
				○		○	●	
○	○		○		●			
		○			○	●		
●		●	○	○			○	○

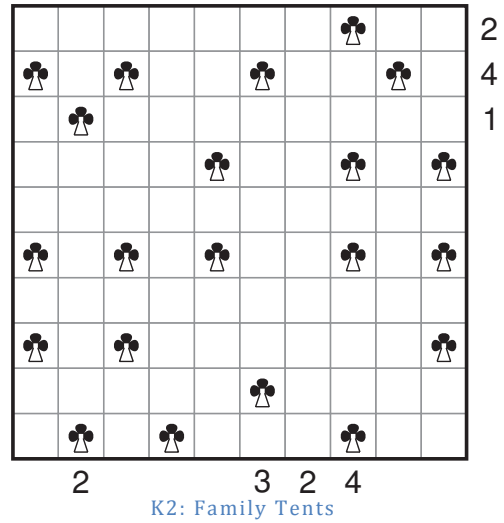
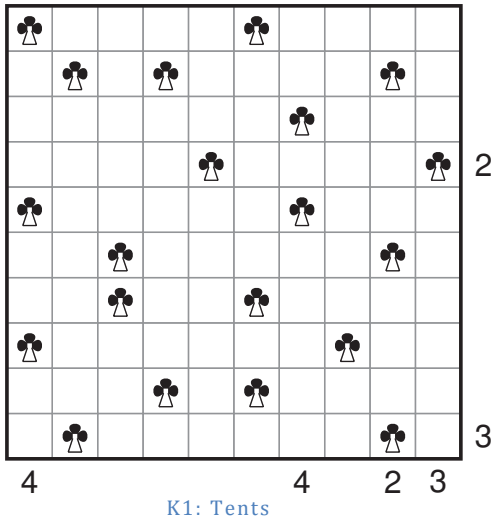
J1: Corridors

		●			●	●		
●					●		●	
					●			
●								●
								●
	●	●						
					●			
●		●						
●		●	●		●		●	●

J2: Happy Dots

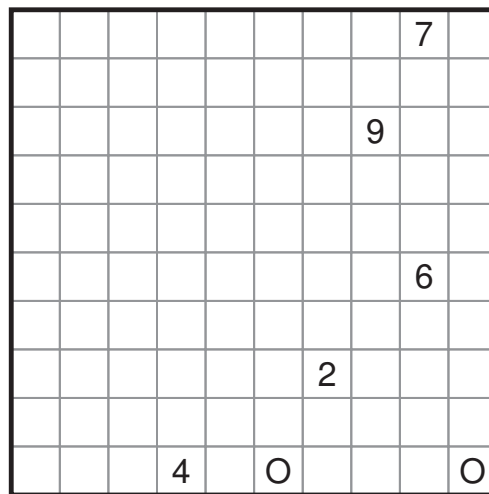
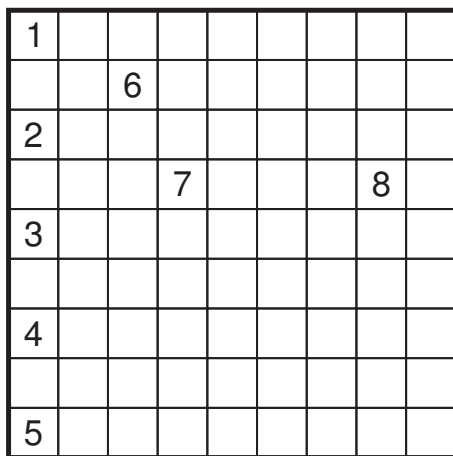
K1: Tents (By Swaroop Guggilam) Rules: Place a tent horizontally or vertically next to each tree. Tents connected to different trees do not touch each other, not even diagonally. Numbers outside the grid indicate the number of tents in that row or column.

K2: Family Tents (By Prasanna Seshadri) Rules: Same rules as "K1 – Tents" except that a tree can have more than one tent connected to it. Tents connected to same tree can touch each other diagonally.

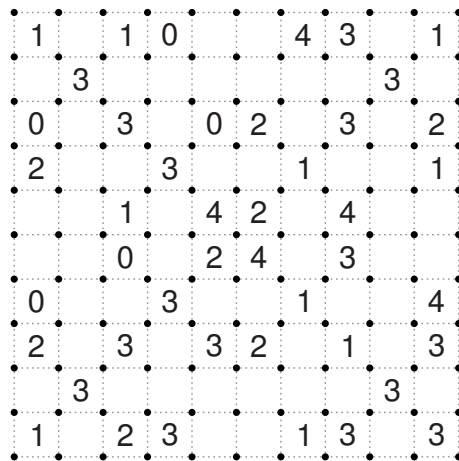


L1: Nurikabe (By Prasanna Seshadri) Rules: Shade some blank cells so that the grid is divided into white regions. Each white region contains exactly one numbered cell and has same area as the number. Two white regions may only touch each other diagonally. All shaded cells are connected to each other horizontally or vertically. Shaded cells do not form 2X2 squares.

L2: Snake Egg (By Prasanna Seshadri) Rules: Locate a snake, passing through non-numbered cells, whose head and tail are given. The snake cannot touch itself orthogonally, but can touch itself diagonally. The remaining cells should form 9 separate regions with sizes 1-9 each (Examples uses 1~5). Numbers in the grid indicate size of the region.



M1: **Crosslink (By Prasanna Seshadri)** Rules: Draw a single continuous loop along the dotted line segments. The loop cannot collide with itself but may intersect itself at a point. At every intersection, the segments travel straight through the dot. Clues given inside the cell indicate the count of line segments surrounding the cell those are part of the loop.



M2: Crosslink

Tips

1) B1: Easy As ABC

- If a cell is first seen by two different clues, then that cell has to be blank, as it cannot satisfy both clues. The clue above C1 is C and the clue to the left of R1 is A, R1C1 can't be both C and A at the same time, and so, is blank.
- The letters that have just one instance in a bunch of clues covering a whole side of the grid, can only appear in the first cell from that letter. A and D each appear just once in the clues above the grid and so R1C3 is A and R1C5 is B. Note that this can only be applied when all clues on that side are given.
- C is first seen from the right in R6, which means the other 3 letters all need to be fit to the left of C. Hence, R6C3 is blank.

2) B2: Strangely As ABC

- This puzzle is very easy, but it shows the basic deductions that can be made from observing the grid, such as the fact that, since every row and column has a "strange" cell stretching across 2 units, every row and column will have just one blank cell.

3) C: Battleships

- The basic part is, to use the given ship segments to proceed. In the puzzle given above, it is obvious the ship segments already present in the grid are ones to be "extended", the one in R9C6 will be extended to the left, and the one in R9C8 will be extended to the right, by at least one cell.
- So mark this one cell for now for each segment, and also mark water cells where ships can't be now, using the "no ships can touch even diagonally" rule. So, A, B, C, D, E, F, G of R9C6 and A, G of R9C5 will be water cells because of this, and do something similar for R9C8.
- Remember to look at the fleet, the standard fleet used here uses 20 ship segments in total and so, the clues below C1 and C10 should sum up to $20 - (\text{rest of the clues}) = 20 - 17 = 3$. So only 3 ship segments can be in first and last columns. Do the same for rows too.
- Finding where the 4-cell ship can be cramped in, usually helps.
- Last year, in IPC 2012, there was a Battleships with a different fleet. This is within the rules so can happen this year too. You can find a link to that puzzle in links.

4) D: Regional Star Battle

- Most important to note is that 2 stars cannot touch even diagonally and so, in a 2x2 group of cells, only one star can exist.
- In the second Star Battle therefore, it is obvious that only 1 star can be placed into certain regions, and so there will be 1 star in each region throughout.
- In the first Star Battle, it's not so obvious. Here you can use a simple counting rule to determine number of stars. There's a 9x9 grid, so 2 stars in each column means 18 stars, and there's 6 regions. So, 3 stars per region.
- In the second Star Battle, check the region covering R3C9-C10. A star has to be in one of these cells, and so, using tip a), R2C9-C10 and R4C9-C10 cannot be stars.

- e) Ins and Outs rule – See the second Star Battle again, the bottom 3 rows have 6 complete regions. So, fitting 1 star in each, the 6 for those 3 rows is satisfied. So, R8C3-C4 cannot contain a star, which leads to a lot happening above. Using the fact that R7C3-C4 must have one star, and R7C7-C8 must have one star, a lot of cells in row 7 can be eliminated.
- 5) **E2: Skyscrapers Sudoku**
- Look for 1 clues outside the grid. As this means just one height can be seen from that direction, it'll have to be the biggest height, which is in this case 6. A variation of this is to see if a side has all clues except one, and all those clues are greater than 1, meaning 6 has to be in the cell without a clue outside.
 - Look for high number clues, that mean many skyscrapers can be seen, and so need to start with lower numbers and end with higher ones. So, for C3, 6 can only be in R4/5/6, because of the 4 clue, and also, R1C3 cannot be more than 3, because it has to have 3 skyscrapers larger than it.
- 6) **F1: Black and White Loop**
- The basic tip is to mark the loop at the corners (E.g. – R2C1-R1C1-R1C2). If other corners are formed while solving, mark the loops there too. Another basic tip is to just see if the loop is directly disobeying the rules if it goes one way, and then go the other.
 - The most used trick is usually to see that, if a segment turns, then will it go on to hit the right circle? The segment at R10C9 cannot turn upwards because it'll then be turning from a white to another white. A variation of this tip is to see that if R10C9 turns, a corner is formed at R10C8 which will then connect the 2 blacks at R10C7 and R9C8 wrongly.
 - Common looping characteristics, make sure two ends of the loop don't collide before crossing all cells, and avoid forming 2 separate loops.
- 7) **F2: Black, White and Grey Loop**
- The reason the Greys are there is usually to give an alternative path where you reach a contradiction with the whites and blacks using the above tips.
- 8) **G2: Pentomino Kakuro**
- Remember that in a Kakuro, sums aren't blocked. So, where the clues are given outside the grid, you can mark cells where Pentominos can't be. For example, for the 21 clue above C5, since 21 sum has to be at least 3 cells long, R1-R2-R3C5 can be marked as "non-Pentomino" cells, where numbers will have to be placed later.
 - Doing this in many places, there is a spot in the top left where, if the 3 outside R3 is also 2 cells long, you get a chain reaction going that sets up a "P" Pentomino in the first 3 rows around C3 and C4, but the Pentomino given is a mirrored P, so that's a contradiction. So the 3 outside R3 is only one cell long, and R3C2 is a Pentomino piece.
 - Basic Pentomino rules with the no diagonal touching means that, since now you have a piece in R3C2 and earlier should've had a piece in R2C3, R3C3 has to be a piece.
 - Remember a) for Pentomino placements too. This helps in the orientation of the Z Pentomino.
- 9) **I1: Tapa**
- See basic Tapa patterns in the links below, to have a better understanding.
 - The clue in R1C8 can only be 1-1-1, as you cannot fit in different blocks of shaded cells any other way. So, H, D, F are all shaded, and E and G are crossed out, which means the Shaded cells now need to "come out" to stay connected.
 - The 4-? Clue has to have a block of 4 continuous shaded cells out of 6, leaving space for just one more shaded cell, providing for a cross-out in between. So, the shaded cells around that clue are either A, B, C, D, G or A, B, D, G, H. A, B, D, G are common so these can be shaded in.
 - Use the no 2x2 rule and the connectivity rule after that. It takes a bit of staring in this one, but the Tapa cannot stay connected around the top left 3-3 because of the 1-1 clue.
- 10) **I2: Tapa Difference**
- For an edge clue, the maximum difference can be 2, as you can't have more than 3-1 because the 2 blocks need to sum to 4 to provide for a cross-out in between. So all 2s at the edge become 3-1. Similarly, for 8 cells, providing for 2 cross-outs in between the blocks, the maximum total can be 6, so if difference is 4, it can only be 5-1.
 - 0 clues have same size blocks, and this can help sometimes if you can't fit say a 3 in, or a 2 in and so both blocks have to be 1.
- 11) **J1: Corridors**
- Reachability – If a white circle is 5 cells (or less) away from a black circle, and all other black circles are more than 5 cells away, then those two form a pair.
 - Corners – Check the black in R4C1 and white in R1C2 and use a), they have to be connected, and if they don't pass R1C1, another 5-cell pairing cannot be fit in the top left corner. So, these two are paired with a line from R4C1 to R1C2, turning at R1C1.
 - Similarly, the black in R1C10 can reach only the white in R3C9 which means the black in R3C10 needs to go downwards and pair with the white in R4C10.
 - This leads to the cramping logic. This pairing has only 3 remaining white cells it can go into, so it has to go into those 3.

- e) In this particular puzzle, a key deduction is to determine that, the blacks in R9C8 and R8C7 have to be paired with either of the whites in R9C7 and R10C5, freeing up other whites to go pair elsewhere.
- f) Remember the no 2x2 rule while finishing up.

12) J2: Happy Dots

- a) The basic start is to see the corners, although variations of this usage can appear. The black in R10C1 can only have one diagonally adjacent white, in R9C2. This leads to a chain reaction, like R10C3's white needing to be in R9C4 and so on.
- b) At a point, it is necessary to stop placing whites and see where the blacks and whites meet, and then the cells their pairing goes through. This can eliminate a few more places where other whites can be placed so that a) can be used again.
- c) Remember that the no 2x2 rule is lifted and doesn't exist for this puzzle.

13) K1: Tents

- a) Cross-out all places that can't be "reached" by trees, as they can't have tents.
- b) See the higher number clues and start there, assuming there's no "0" clue which is an easier start. Here, there's a 4 in C1. Now use logic similar to Star Battle to cross-out places where tents can't be in C2.

14) K2: Family Tents

- a) Very similar, but just keep in mind that tents connected to the same trees can touch each other diagonally. Due to this rule, this is one of those variations where it's key to avoid confusion.

15) L1: Nurikabe

- a) The basic rules that Islands can't touch, and extending the stream to be connected gets a lot, and then there's a standstill.
- b) The first uncommon deduction comes that the 6 island, that has been extended till R2C7, cannot extend its last cell into R3C7, because that leads to either violating the no 2x2 rule in the top right corner, or closing up the stream coming from the top, from the rest. So, 6 island extends to R2C8.
- c) Now, look at R8C6. The 7 cannot reach this spot, as it will close the stream parts on the left. The 8 can reach it, but if the 8 reaches, there won't be enough cells to cramp the 7 into. So, R8C6 is a steam cell, and by no 2x2 rule, R7C6 has to be an island now.
- d) Again, because 7 gets cramped if that island cell is connected to the 8, that island cell belongs to the 7. After a bit more staring, and using the 2x2 rule, and the connectivity rule, the 8 also is determined.
- e) Keep in mind that this is a really hard puzzle as practice.

16) L2: Snake Egg

- a) The 2 cannot extend to R9C7 because then, that end of the snake at R10C6 will have two extensions, which isn't allowed. So, R9C7 is a snake cell and it is connected to that end of the snake by either R10C7 or R9C6.
- b) So, there is now 2 separate snake segments that need to extend via C8 and C10 in the right bottom corner.
- c) 6 cells that are part of the 6 island can be determined by now, so close the snake around it, avoid the snake touching itself, and extend further. This also determines the extension of the 2, causing more snake segments.
- d) Then it is just a case of using the rules to keep extending the snake and make sure no islands of the same size get formed.

17) M2: Crosslink

- a) Firstly, basic Slitherlink patterns are provided in the links, but one needs more than basic patterns for a Crosslink.
- b) Obviously, the easiest part is to draw segments around the 4s. In the center of the grid, the 2 2s next to the 4s mean that many segments can be crossed out (2 segments around the 2 will get crossed out, and then, following the rule that states that any intersection needs to extend both ways, a few more segments get crossed out).
- c) Basically, just remember that a full + sign needs to be formed on a dot if an intersection needs to be made. This eliminates possibility of intersections at edges.
- d) Remember that none of the dots around a 1 clue or a 0 clue can be intersected, so when the segments around these clues are "closed", the intersection possibilities can be crossed out.

Solutions

	C	B	A	C	D	B	
A			A	C	D	B	
C	C	B		A		D	D
B	B	C	D			A	
		A	B	D	C		C
A	A	D	C		B		B
	D			B	A	C	C
	D	D	C	B	A	C	

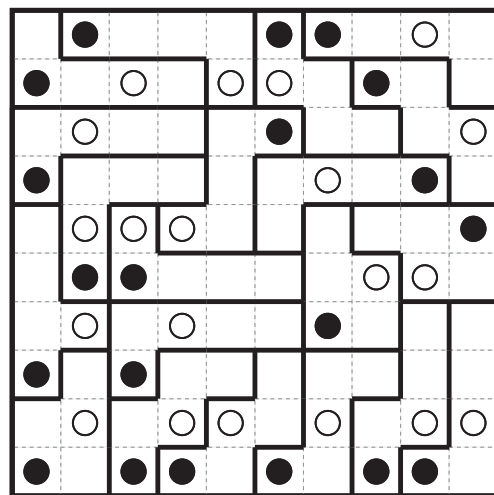
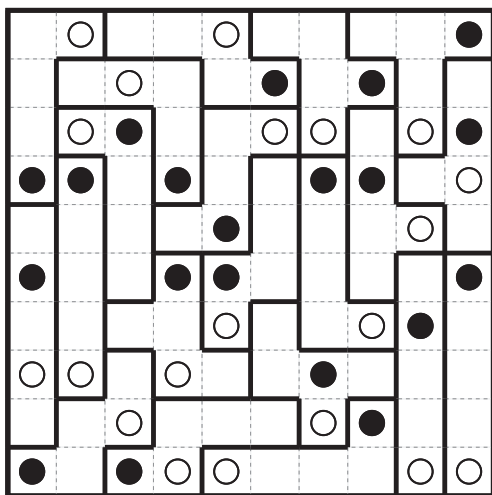
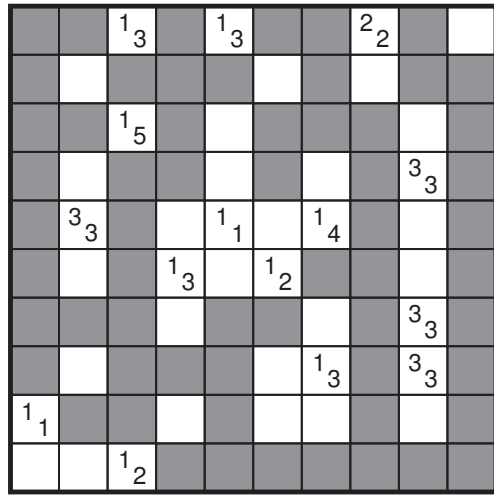
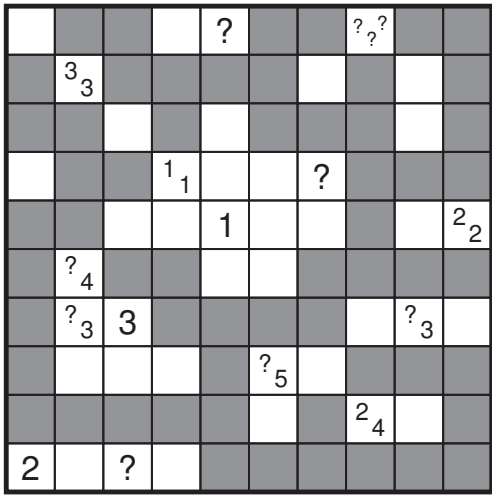
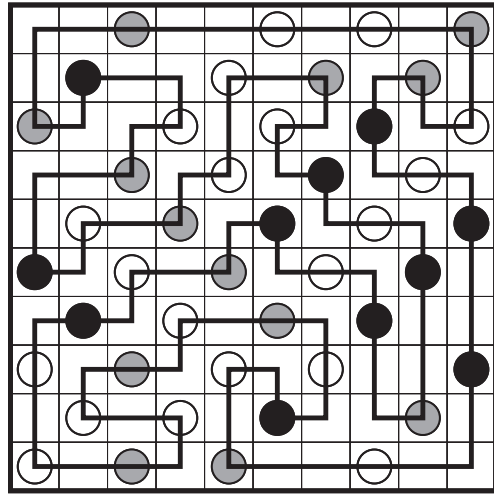
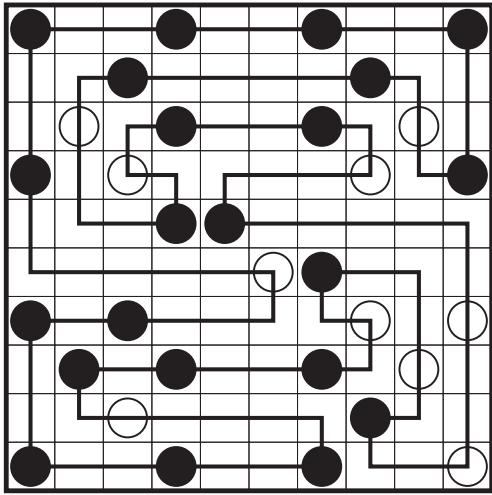
A		B	C		D
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C	B		D		A
		A		C	
D		C	A		B

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	1	1	4	3	1	2	3	2		

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



Links

LMI forum – <http://logicmastersindia.com/forum/forums/thread-view.asp?start=1&tid=694>

IPC Submission Page with Instruction Booklet for download – <http://logicmastersindia.com/2013/IPC/>

Tapa Patterns guide – <http://rohanrao.blogspot.in/2011/03/solving-tapa-elementary-beginnings.html>

Slitherlink Patterns guide – http://puzzleparasite.blogspot.in/2011/11/slitherlink-pattern-guide_23.html

IPC 2012's Twisted Battleships – <http://motris.livejournal.com/167808.html>

Other techniques - <http://swaroopg92.blogspot.in/search/label/Solving%20techniques>

Prasanna Seshadri's E-mail ID – prasanna16391@gmail.com

Swaroop Guggilam's E-mail ID – swaroop.guggilam@gmail.com

B1 – AS EASY AS ABC

<http://prasannaseshadri.files.wordpress.com/2013/02/easyasabc.png>

<http://prasannaseshadri.files.wordpress.com/2012/05/abc.png>

<http://swaroopg92.blogspot.in/search/label/Easy%20As%20ABC>

I1 – Tapa

<http://swaroopg92.blogspot.in/search/label/TAPA>

<http://prasannaseshadri.files.wordpress.com/2013/04/tapa.png>

<http://prasannaseshadri.wordpress.com/2013/04/22/puzzle-no-369-tapa/>

<http://prasannaseshadri.wordpress.com/2013/05/24/puzzle-no-379-tapa/>

K1 – TENTS

<http://swaroopg92.blogspot.in/search/label/Tents>

<http://prasannaseshadri.files.wordpress.com/2013/04/tents.png>

L1 – Nurikabe

<http://swaroopg92.blogspot.in/search/label/NURIKABE>

<http://prasannaseshadri.files.wordpress.com/2012/06/p1683.png>

<http://prasannaseshadri.wordpress.com/2012/08/05/puzzle-no-186-nurikabe/>

<http://prasannaseshadri.files.wordpress.com/2013/02/nurikabe.png>

<http://prasannaseshadri.files.wordpress.com/2013/02/nurikabe-185.png>

M1 – Slitherlink

<http://swaroopg92.blogspot.in/search/label/Slitherlink>

<http://prasannaseshadri.wordpress.com/2012/03/19/puzzle-no-99-slitherlink/>

<http://prasannaseshadri.wordpress.com/2012/01/10/puzzle-no-10/>