

WPF PUZZLE GP 2018 INSTRUCTION BOOKLET

Host Country: India

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Special Notes: The round is presented with similar-style puzzles in three sections: simple rules, well-known types, and complex variations.

Points:				
1.	<i>Numbers: Arithmetic Square</i>	9	16.	<i>Loop: Rows Yajilin</i> 36
2.	<i>Paths: Arukone</i>	6	17.	<i>Regions: Fillomino</i> 18
3.	<i>Paths: Arukone</i>	16	18.	<i>Regions: Fillomino</i> 27
4.	<i>Objects: Gaps</i>	25	19.	<i>Shading: Nurikabe</i> 14
5.	<i>Loop: Simple Loop</i>	3	20.	<i>Shading: Nurikabe</i> 36
6.	<i>Loop: Simple Loop</i>	11	21.	<i>Numbers: TomTom Operations</i> 42
7.	<i>Regions: Shikaku</i>	4	22.	<i>Paths: Snakes</i> 38
8.	<i>Regions: Shikaku</i>	4	23.	<i>Paths: Snakes</i> 28
9.	<i>Shading: Lakes</i>	18	24.	<i>Objects: Half-Region Star Battle</i> 13
10.	<i>Shading: Lakes</i>	14	25.	<i>Loop: No-touch Masyu</i> 10
11.	<i>Numbers: TomTom</i>	73	26.	<i>Loop: No-touch Masyu</i> 37
12.	<i>Paths: Snake</i>	15	27.	<i>Regions: Fillomino Rectangles</i> 14
13.	<i>Paths: Snake</i>	24	28.	<i>Regions: Fillomino Rectangles</i> 17
14.	<i>Objects: Star Battle</i>	22	29.	<i>Shading: Skyscraper Nurikabe</i> 33
15.	<i>Loop: Rows Yajilin</i>	19	30.	<i>Shading: Skyscraper Nurikabe</i> 28
			TOTAL:	654

1. Numbers: Arithmetic Square [Rakesh Rai] (9 points)

Place the numbers from 1 to 9 into the cells (a different single number in each cell) so that the indicated equations/relations are correct. Evaluate from left-to-right and top-to-bottom (ignore the usual precedence of the operators).

It is possible for expressions and partial expressions to be negative or non-integral.

$$\begin{array}{l}
 \rightarrow \begin{array}{c} \square + \square + \square > 23 \\ + \quad - \quad + \\ \square \times \square \div \square = 8 \\ \times \quad \times \quad - \\ \square \times \square + \square = 11 \\ = \quad = \quad = \\ 75 \quad 8 \quad 9 \end{array} \\
 \rightarrow \begin{array}{c} \square + \square + \square > 23 \\ + \quad - \quad + \\ \square \times \square \div \square = 8 \\ \times \quad \times \quad - \\ \square \times \square + \square = 11 \\ = \quad = \quad = \\ 75 \quad 8 \quad 9 \end{array}
 \end{array}$$

Answer: For each designated row, enter the contents of the cells, in order from left to right.

Example Answer: 987, 643, 521

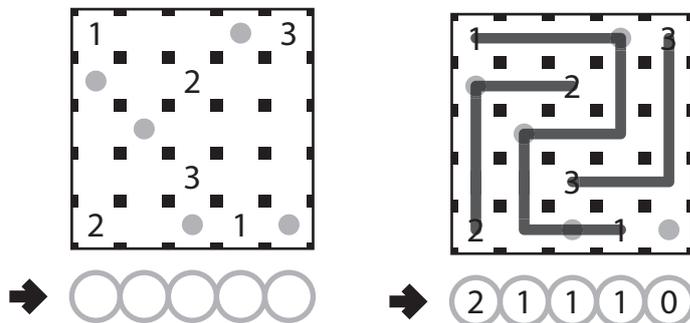
2-3. Paths: Arukone [Rakesh Rai] (6, 16 points)

Some cells in the grid are marked with numbers; each number appears exactly twice and no cell contains more than one number. For each pair of identical numbers, draw a path that connects those two numbers. The paths must go through orthogonally adjacent cells. Each cell may be visited by at most one path, and may not be visited more than once by that path. (It is permissible for a cell to not be visited by any path.)

The dots in cells are only used for entering your answers.

Answer: Enter one digit for each of the dotted cells, from left to right. If the path does not go through the cell, enter a single digit '0'. Otherwise, enter the number associated with the path that goes through the cell. Use only the last digit for two digit numbers; e.g., use '0' if the dot is on the path that connects 10 and 10.

Example Answer: 21110



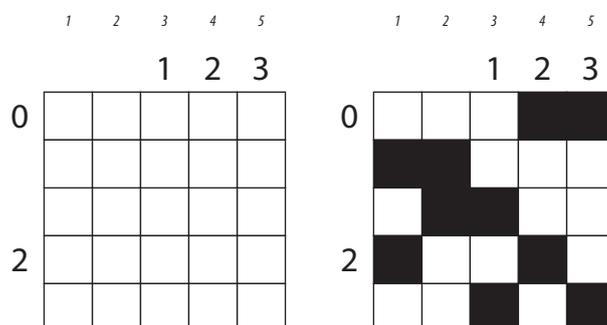
4. Objects: Gaps [Rajesh Kumar] (25 points)

Blacken some cells in the grid such that each row and each column contains exactly two blackened cells. The numbers to the left of (or above) the grid indicate the number of unblackened cells between the blackened cells in that row (or column).

The numbers on the far top of the diagram are for Answer purposes only.

Answer: For each row from top to bottom, enter the number of the first column from the left where a blackened cell appears (the number on top of that column). Use only the last digit for two-digit numbers; e.g., use '0' if the first blackened cell appears in column 10.

Example Answer: 41213



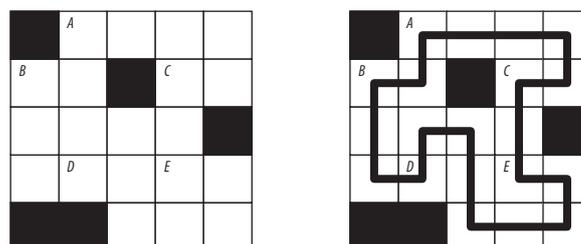
5-6. Loop: Simple Loop [Swaroop Guggilam] (3, 11 points)

Draw a single closed loop (without intersections or crossings) through the centers of all white cells. Loop paths must be orthogonal.

The letters in the grid are for Answer purposes only.

Answer: Starting at the "A" in the upper-left and heading to the right, enter the letters in the grid in the order in which the loop encounters them, ending at the letter "A" (again).

Example Answer: ACEDBA



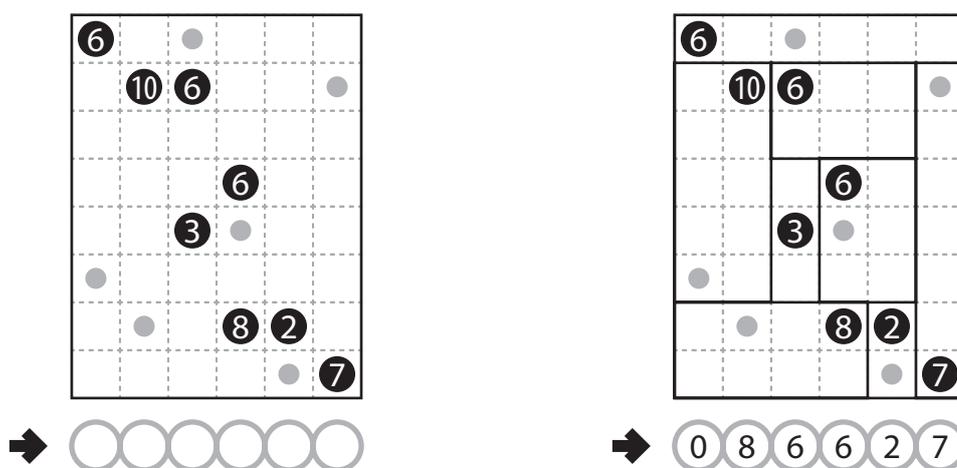
7-8. Regions: Shikaku [Prasanna Seshadri] (4, 4 points)

Divide the grid into rectangles along the grid lines such that each cell is in exactly one rectangle and each rectangle contains exactly one given number. The number must equal the area of the rectangle (in cells).

The dots in cells are only used for entering your answers.

Answer: Enter the number in the rectangle each dot is in, reading the dots from left to right. (Ignore which row the dots are in.) Use only the last digit for two-digit numbers; e.g., use '0' for a rectangle with a 10 inside it.

Example Answer: 086627

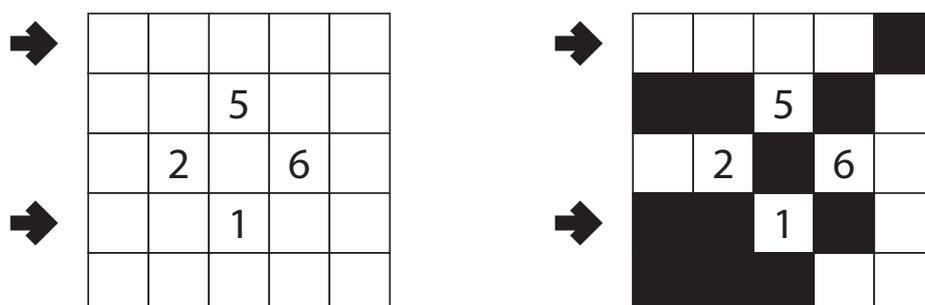


9-10. Shading: Lakes [Ashish Kumar] (18, 14 points)

Shade some cells black (leaving the other cells white) so that the grid is divided into black and white regions. (Cells of the same color are considered in the same region if they are adjacent horizontally or vertically.) Each given number must be in a white region that has the same area in cells as that number. Each white region must have exactly one given number. (There is no constraint on the number, size, or shape of black regions.)

Answer: For each designated row, enter the lengths (number of cells) of the white (not black) segments from left to right. If there are no white cells in the row, enter a single digit '0'. Use only the last digit for two-digit numbers; e.g., use '0' for a white segment of length 10.

Example Answer: 4, 11



11. Numbers: TomTom [Rakesh Rai] (73 points)

Place a number from 1 to X into each cell so that each number appears exactly once in each row and column. (X is the number of cells in each row.) Numbers may repeat within a region. The number in the upper-left corner of each outlined region indicates the value of one of the four basic operations applied to all numbers in the region, starting with the largest number for subtraction and division (e.g., 1, 2, 4 with division has a clue of $2 \div$ as $4 \div 2 \div 1 = 2$). The operation may or may not be given in the region, but at least one of the four operations must apply.

Answer: For each designated row, enter its contents, from left to right. Use only the last digit for two digit numbers; e.g., use '0' for a cell that contains the number 10.

Example Answer: 45213, 54132

{1-5}				
3+	3	33		
	3000x			
	3-		3	
3÷				

{1-5}				
3+	3	33		
2	3	5	4	1
1	2	3	5	4
4	5	2	1	3
5	4	1	3	2
3	1	4	2	5

12-13. Paths: Snake [Ashish Kumar] (15, 24 points)

Locate a "snake" in the grid. The snake is a path that starts in a cell, goes through some number of cells orthogonally, and ends in a cell. The snake cannot go through any cells marked with 'x'. Each cell is used at most once by the snake. The snake may not loop around to touch itself, not even diagonally. (In other words, if two cells in the snake touch orthogonally, then they must be exactly one cell apart along the path of the snake, and if two cells in the snake touch diagonally, then they must be exactly two cells apart along the path of the snake.) Numbers outside the grid, if given, indicate how many cells in that row or column are occupied by the snake.

The two cells containing the ends of the snake are shaded.

Answer: For each designated row, enter its contents. Use \circ for a cell occupied by the snake and \times for a cell not occupied by the snake. You may reverse the two symbols, as long as you are consistent.

Example Answer: $\circ \circ \times \times \times$, $\times \times \times \circ \circ$

	1	2	2	4
2	■			
4				
2			■	

	1	2	2	4
2	■	■	■	
4	■	■	■	■
2			■	■

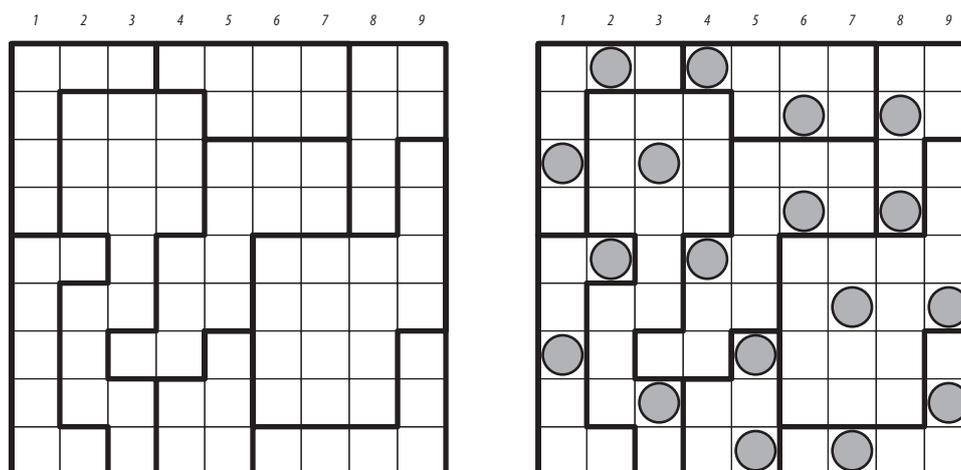
14. Objects: Star Battle [Rajesh Kumar] (22 points)

Place stars into some cells in the grid, no more than one star per cell. Each row, each column, and each outlined region must contain exactly two stars. Cells with stars may not touch each other, not even diagonally.

The numbers on top of the diagram are for Answer purposes only.

Answer: For each row from top to bottom, enter the number of the first column from the left where a star appears (the number on top of that column). Use only the last digit for two-digit numbers; e.g., use '0' if the first star appears in column 10.

Example Answer: 261627135



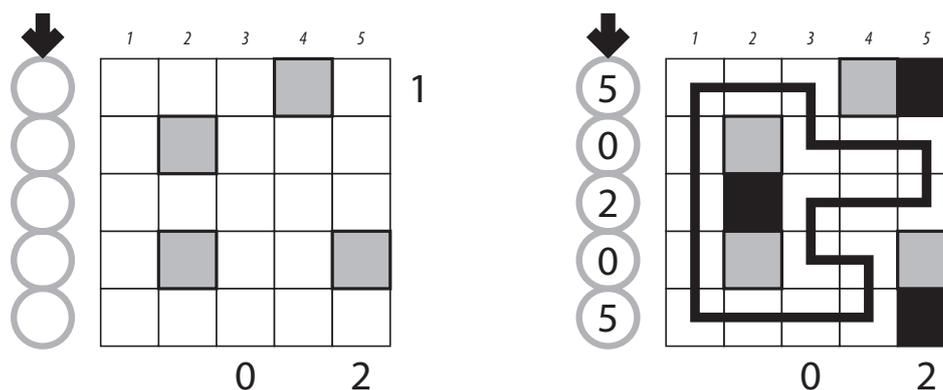
15-16. Loop: Rows Yajilin [Swaroop Guggilam] (19, 36 points)

Blacken some white cells and then draw a single closed loop (without intersections or crossings) through all remaining white cells. Loop paths must be orthogonal. Blackened cells cannot share an edge with each other. Some cells are outlined and in gray and cannot be part of the loop. Each number to the right and bottom of the grid reveals the number of blackened cells that must be located in that row or column.

The numbers on the top of the diagram and the circles on the side are for Answer purposes only.

Answer: For each row from top to bottom, enter the column number of the left-most blackened cell. (Outlined gray cells are not blackened.) Use only the last digit for two digit numbers; e.g., use '0' for column 10. If none of the cells in a row are blackened, enter '0' for that row.

Example Answer: 50205



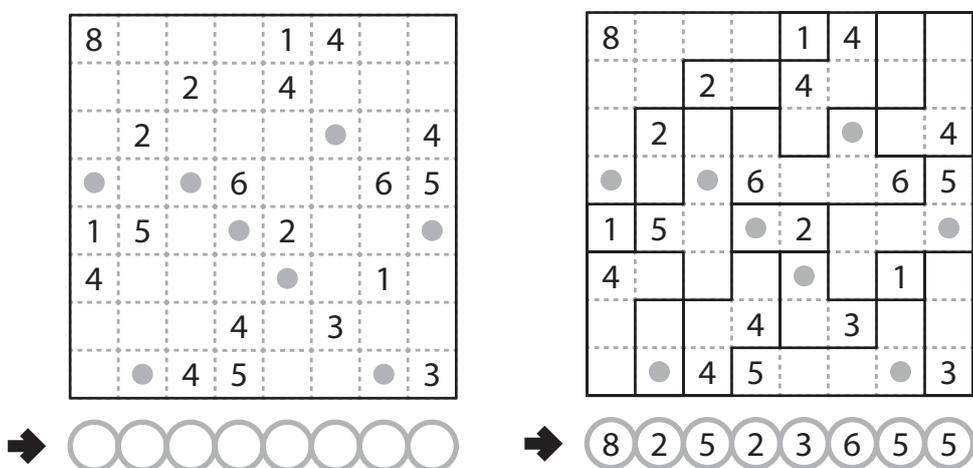
17-18. Regions: Fillomino [Prasanna Seshadri] (18, 27 points)

Divide the grid along the dotted lines into regions (called polyominoes) so that no two polyominoes with the same area share an edge. Inside some cells are numbers; each number must equal the area of the polyomino it belongs to. A polyomino may contain zero, one, or more of the given numbers. (It is possible to have a "hidden" polyomino: a polyomino without any of the given numbers. "Hidden" polyominoes may have any area, including a value not present in the starting grid, such as a 6 in a puzzle with only clues numbered 1-5.)

The dots in cells are only used for entering your answers.

Answer: Enter the area of the polyomino each dot is in, reading the dots from left to right. (Ignore which row the dots are in.) Use only the last digit for two-digit numbers; e.g., use '0' for a polyomino of size 10.

Example Answer: 82523655

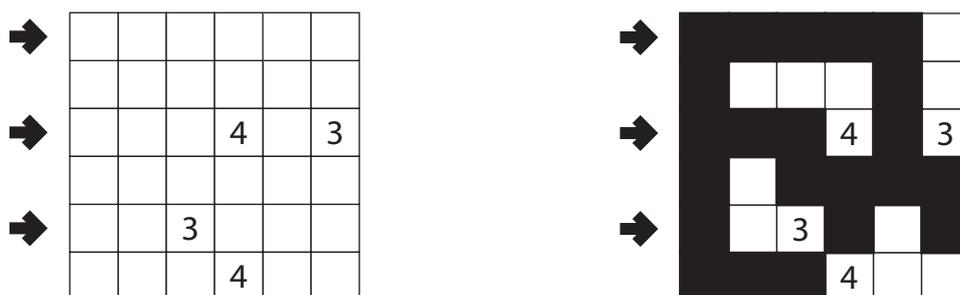


19-20. Shading: Nurikabe [Ashish Kumar] (14, 36 points)

Shade some cells black (leaving the other cells white) so that the grid is divided into non-overlapping regions; cells of the same color are considered in the same region if they are adjacent along edges. Each given number must be in a white region that has the same area in cells as that number. Each white region must have exactly one given number. All black cells must be in the same region. No 2x2 group of cells can be entirely shaded black.

Answer: For each designated row, enter the lengths (number of cells) of the black segments from left to right. If there are no black cells in the row, enter a single digit '0'. Use only the last digit for two-digit numbers; e.g., use '0' for a black segment of length 10.

Example Answer: 5, 31, 111

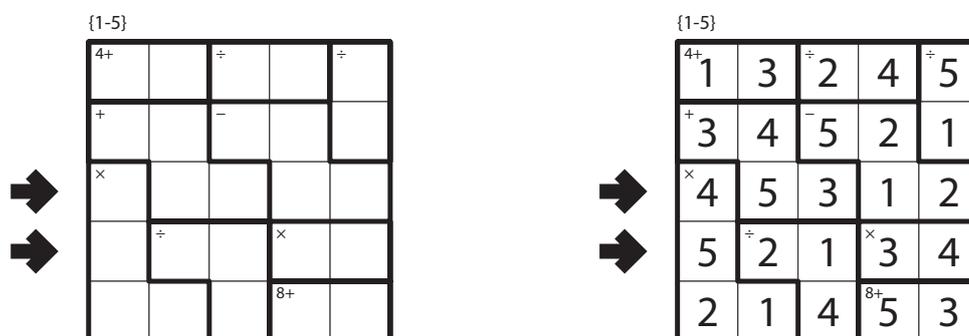


21. Numbers: TomTom Operations [Rakesh Rai] (42 points)

Place a number from 1 to X into each cell so that each number appears exactly once in each row and column. (X is the number of cells in each row.) Numbers may repeat within a region. The number in the upper-left corner of each outlined region indicates the value of the given operation applied to all numbers in the region, starting with the largest number for subtraction and division (e.g., 1, 2, 4 with division has a clue of 2 ÷ as $4 \div 2 \div 1 = 2$). The number may or may not be given in the region; but its value must be a whole number (that is, not negative or fractional — a value of 0 is permitted).

Answer: For each designated row, enter its contents, from left to right. Use only the last digit for two digit numbers; e.g., use '0' for a cell that contains the number 10.

Example Answer: 45312, 52134



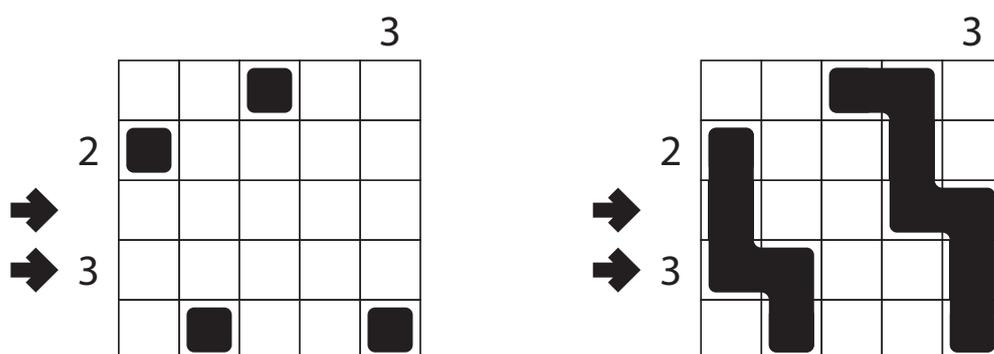
22-23. Paths: Snakes [Prasanna Seshadri] (38, 28 points)

Locate many "snakes" in the grid. A snake is a path that starts in a cell, goes through some number of cells orthogonally, and ends in a cell. A snake cannot go through any cells marked with 'x'. Each cell is used at most once by any snake. A snake may not loop around to touch itself or touch other snakes, not even diagonally. (In other words, if two cells in any snakes touch orthogonally, then they must be exactly one cell apart along the path of the same snake, and if two cells in any snakes touch diagonally, then they must be exactly two cells apart along the path of the same snake.) Numbers outside the grid, if given, indicate how many cells in that row or column are occupied by snakes.

The cells containing the ends of all snakes are shaded.

Answer: For each designated row, enter its contents. Use O for a cell occupied by the snake and X for a cell not occupied by the snake. You may reverse the two symbols, as long as you are consistent.

Example Answer: OXXOO, OXXO



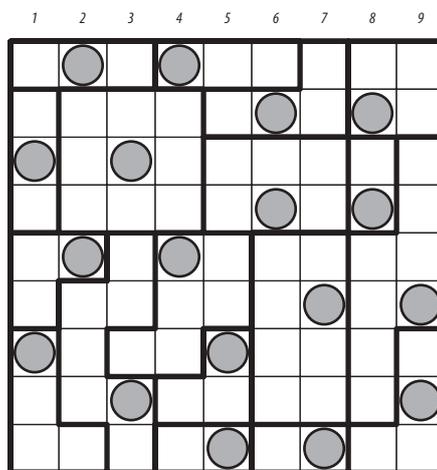
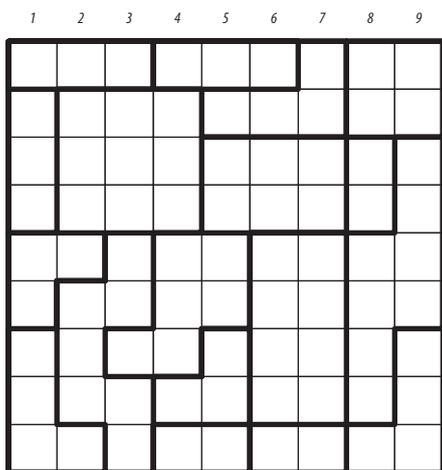
24. Objects: Half-Region Star Battle [Rajesh Kumar] (13 points)

Place stars into some cells in the grid, no more than one star per cell. Each row and each column must contain exactly two stars. Each outlined region must contain exactly one star. Cells with stars may not touch each other, not even diagonally.

The numbers on top of the diagram are for Answer purposes only.

Answer: For each row from top to bottom, enter the number of the first column from the left where a star appears (the number on top of that column). Use only the last digit for two-digit numbers; e.g., use '0' if the first star appears in column 10.

Example Answer: 261627135



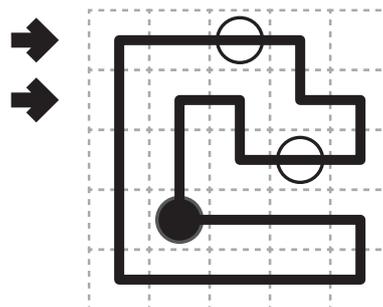
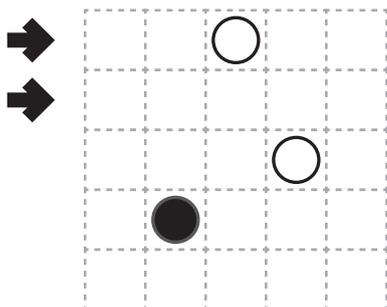
25-26. Loop: No-touch Masyu [Swaroop Guggilam] (10, 37 points)

Draw a single loop that passes orthogonally through centers of cells. The loop must go through all circled cells. The loop may not intersect itself or enter the same cell more than once. The loop must go straight through the cells with white circles, with a turn in at least one of the cells immediately before or after each white circle. The loop must make a turn in all the black circles, but must go straight in both cells immediately before and after each black circle.

Unused cells (cells that the loop does not go through) cannot share an edge with each other.

Answer: For each designated row, enter the letter for each cell, from left to right. The letter for a cell is 'I' if the path goes straight through the cell, 'L' if the path turns in the cell, and 'X' if the path does not go through the cell.

Example Answer: LIILX, ILLLL





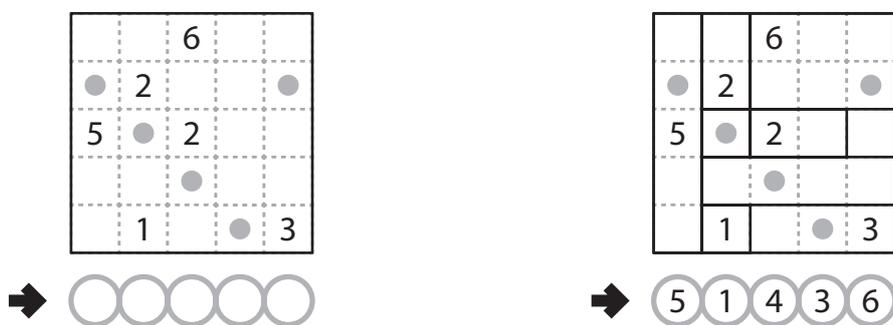
27-28. Regions: Fillomino Rectangles [Prasanna Seshadri] (14, 17 points)

Divide the grid along the dotted lines into rectangles so that no two rectangles with the same area share an edge. Inside some cells are numbers; each number must equal the area of the rectangle it belongs to. A rectangle may contain zero, one, or more of the given numbers. (It is possible to have a "hidden" rectangle: a rectangle without any of the given numbers. "Hidden" rectangles may have any area, including a value not present in the starting grid, such as a 6 in a puzzle with only clues numbered 1-5.)

The dots in cells are only used for entering your answers.

Answer: Enter the area of the rectangle each dot is in, reading the dots from left to right. (Ignore which row the dots are in.) Use only the last digit for two-digit numbers; e.g., use '0' for a polyomino of size 10.

Example Answer: 51436



29-30. Shading: Skyscraper Nurikabe [Ashish Kumar] (33, 28 points)

Shade some cells black (leaving the other cells white) so that the grid is divided into non-overlapping regions; cells of the same color are considered in the same region if they are adjacent along edges. Each given number inside the grid must be in a white region that has the same area in cells as that number. Each white region must have exactly one given number. All black cells must be in the same region. No 2x2 group of cells can be entirely shaded black.

The numbers outside the grid indicate how many black segments (groups of adjacent black cells) can be "seen" in the respective row or column from the respective direction; shorter and equal-length segments are "hidden" behind longer ones.

Answer: For each designated row, enter the lengths (number of cells) of the black segments from left to right. If there are no black cells in the row, enter a single digit '0'. Use only the last digit for two-digit numbers; e.g., use '0' for a black segment of length 10.

Example Answer: 14, 7

