1. Arithmetic Square (Encrypted) [Markus Roth] (33 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).

Some digits (including those in the cells) have been replaced with letters. Each letter represents a different digit. It is up to you to figure out which letter corresponds to which digit. As a reminder, multi-digit numbers cannot start with the digit 0 (zero).

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

Answer: For each designated row, enter the digits (not letters) of the cells, in order from left to right.

Example Answer: 179, 658, 243

\[ \begin{align*}
\text{\#1:} & \quad - & \quad + & \quad = & \quad A \\
\times & \quad + & \quad - & \quad = & \quad 3 \\
\text{\#15:} & \quad 1 & \quad - & \quad 7 & \quad + & \quad 9 & \quad = & \quad 3 \\
\text{\#6:} & \quad + & \quad - & \quad = & \quad A \\
\times & \quad + & \quad - & \quad = & \quad 3 \\
\text{\#2:} & \quad 6 & \quad + & \quad 5 & \quad - & \quad 8 & \quad = & \quad 3 \\
\text{\#13:} & \quad + & \quad - & \quad A & \quad = & \quad A \\
\times & \quad + & \quad - & \quad = & \quad 3 \\
\text{\#8:} & \quad 2 & \quad + & \quad 4 & \quad - & \quad 3 & \quad = & \quad 3 \\
\end{align*} \]
2-3. Coins [Markus Roth] (8, 12 points)

Place one coin into each cell such that the sum of the coins in each row (and column) matches the number to the left (and the top). The valid denominations of coins are supplied with the puzzle; the same denomination may be used multiple times in each row (or column).

The size of the coins are only for cosmetic purposes. It is possible for any denomination to remain unused in the correct solution.

Answer: For each designated row, enter its contents from left to right. The content of each cell is the denomination of the coin in that cell.

Example Answer: 2052, 221

4-5. Column Dance [Markus Roth] (4, 10 points)

Remove some columns so that there is exactly one symbol in each row.

Any difference between the symbols or cell lines are purely for decorative purposes.

Answer: Enter the letters above the non-removed columns, from left to right.

Example Answer: BDF

6-7. Arrow Maze [Markus Roth] (15, 11 points)

Put a different number in each arrow so that every arrow points in the direction of a number that is exactly one more than its own number.

Answer: For each designated row, enter its contents (just the numbers). Use only the last digit for two-digit numbers; e.g., use ‘0’ for the number 10.

Example Answer: 870, 612

8-9. Tiger in the Woods [Markus Roth] (19, 19 points)

Find a path that starts at a white cell in the grid and visits every white cell in the grid. The path may only travel in the orthogonal directions, and must continue straight if the next cell ahead of it is white (this means that the ending cell of the path must be immediately before a black cell or the edge of the grid). The path may visit a cell more than once, but the visits must be at right-angles to each other and that cell may not be the starting cell nor the ending cell of the path.

The letters to the left of the grid and the numbers above the grid are for Answer purposes only.

Answer: Enter the row letter and column number (in that order) for the starting cell of the path, then do the same for the ending cell of the path.

Example Answer: D8, A6
10-11. Infection [Markus Roth] (21, 15 points)

Fill some cells with a number from 1 to 4. All numbered cells must be orthogonally connected. Orthogonally adjacent cells cannot contain the same number. Each number must indicate the number of orthogonally adjacent numbered cells. Some numbers are given to you.

**Answer:** For each designated row, enter its contents, from left to right. Use ‘X’ for an empty cell.

**Example Answer:** 1XXXX, X2X23

12-13. Domino Search [Markus Roth] (24, 22 points)

Divide the grid into a full set of dominoes. Each domino should be used exactly once. The orientation of the digits does not matter. Empty cells are not part of a domino. A checklist of the full set is provided for your convenience.

**Answer:** For each designated row, enter all the digits in dominoes that are only in that row (that is, the horizontal dominoes), from left to right. If there are no horizontal dominoes in the row, enter a single digit ‘0’.

**Example Answer:** 0,1213

14-15. Pentomino Division [Markus Roth] (31, 62 points)

Each cell in the grid contains one of five different symbols. Divide the grid into pentominoes such that every cell in the grid is part of exactly one pentomino. You may not have more than one pentomino of the same shape (rotations and reflections of a pentomino count as the same shape). Each pentomino must contain five different symbols.

The letters for the shapes of the pentominoes are only used for entering your answer.

**Answer:** For each designated row, enter the letter for the pentomino that each cell belongs to, from left to right.

**Example Answer:** VLUUY, PPPTTT
16-17. Hitori [Markus Roth] (29, 20 points)
Remove some numbers from the grid so that all remaining numbers are connected orthogonally and no two removed numbers are adjacent orthogonally. Additionally, for each row and each column, the remaining numbers must be all different.

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

Answer: For each row from top to bottom, enter the number (on top) of the second column from the left that has a removed number. Use only the last digit for two-digit numbers; e.g., use ‘0’ if the second removed number appears in column 10. If fewer than two of the numbers in the row are removed, enter ‘0’.

Example Answer: 40050

18-19. Wordsearch [Roger Kohler] (19, 45 points)
Locate the list of words in the grid. Words always appear in a line in one of the eight standard directions. Some letters in the middle of the grid (inside the dotted lines) are missing and you must discover what they are while solving.

Answer: Enter the missing letters from top row to bottom row, entering each row in order from left to right.

Example Answer: RALA

Label some cells with numbers such that each bold region contains at least one labeled cell. Each number (including any given numbers) must equal the total count of labeled cells in that region. When two labeled cells from different regions are connected orthogonally, they must contain different numbers. All labeled cells are connected orthogonally. No 2×2 group of cells can be entirely labeled.

While not required, it may be helpful to shade in the unlabeled cells (as in the displayed solution).

Answer: For each designated row, enter its contents, from left to right. Use ‘X’ for an unlabeled cell. Use only the last digit for two-digit numbers; e.g., use ‘0’ for a cell labeled with 10.

Example Answer: 616X1XX3, 12X1XX34

22-23. Nurikabe [Roger Kohler] (47, 54 points)

Shade some empty (non-numbered) 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 2×2 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
24-25. Tower Defense [Roger Kohler] (14, 72 points)

Place a number from 1 to X (integers only) into each cell so that each number appears exactly once in each row and column. (X is the number of cells in each row.) A cell with an uncircled number “attacks” (up to) four other cells that are at an orthogonal distance equal to that uncircled number. A cell with a circled number does not attack, but must be attacked by at least as many cells as its number. Some numbers may be given to you.

**Answer:** For each designated row, enter its contents (including any given numbers).

**Example Answer:** 21453, 15342

26-27. Statue Park (no reflection) [Esther Naef] (21, 41 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. The black regions must form the set of given shapes; each shape may be rotated in the final answer. Shapes cannot touch along an edge, but can touch at corners. All white cells must be in the same region.

A cell with a black square must be shaded and a cell with a white circle must not be shaded.

Unlike a regular Statue Park puzzle, shapes should not be reflected.

The letters on the given shapes are only for entering your answer.

**Answer:** For each designated row, enter the contents of each cell, from left to right. For each cell, its contents are the letter of the shape occupying that cell, or the letter ‘A’ if the cell is not shaded.

**Example Answer:** AAATASSA, AALAJAAA