**1. Sudoku Variants:**

* **Diagonal Sudoku**: In addition to the regular Sudoku rules, the diagonals (both from top-left to bottom-right and top-right to bottom-left) must also contain digits 1 through 9 without repetition.
* **Samurai Sudoku**: This is a combination of 5 overlapping 9x9 Sudoku grids. The central grid overlaps partially with four other grids.
* **Killer Sudoku**: It combines elements of Sudoku and Kakuro. In addition to filling numbers in a Sudoku grid, certain "cages" are outlined, and the numbers within each cage must sum to a certain total. Numbers within a cage must not repeat.

**2. Latin Square Puzzle:**

* A **Latin square** is an n x n grid where every row and column contains n different symbols, and no symbol is repeated in any row or column.
* Example question: Construct a 5x5 Latin square where each number from 1 to 5 appears exactly once in each row and column.

**3. N-Queens Problem:**

* The **N-Queens puzzle** is a classic chess problem where you must place n queens on an n x n chessboard such that no two queens threaten each other (no two queens can be in the same row, column, or diagonal).
* Example question: Solve the 8-queens problem on an 8x8 chessboard.

**4. KenKen Puzzle:**

* Similar to Sudoku, but the grid contains smaller cages where the numbers inside must meet certain arithmetic conditions (sum, product, etc.). Each row and column must still have unique numbers.
* Example question: Solve a 4x4 KenKen puzzle where the cages are defined with sums and products.

**5. Magic Star Puzzle:**

* A **magic star** puzzle is similar to a magic square, but the numbers are arranged on the points of a star. The sum of numbers on each straight line through the center of the star must be the same.
* Example question: Fill a 5-pointed star with the numbers 1 through 10, so that the sum of the numbers on each line is the same.

**6. Pandigital Puzzle:**

* A **pandigital puzzle** requires you to use every digit from 1 to 9 exactly once in a mathematical equation.
* Example question: Arrange the digits 1 through 9 to make a valid equation (e.g., 123 - 45 - 67 - 8 = 9).

**7. Latin Square Magic Square:**

* Create a **Latin square** where each row and column contains numbers from 1 to 4 without repeating any number, and also satisfies the properties of a **magic square** where the sum of the rows, columns, and diagonals is constant.

**8. Futoshiki:**

* A **Futoshiki puzzle** involves filling in numbers in a grid where inequality signs between adjacent cells must be satisfied. The numbers in rows and columns cannot repeat.
* Example question: Solve a 5x5 Futoshiki puzzle where some inequality signs (>, <) are provided between adjacent cells.

**9. Cross Sums (Kakuro):**

* A **Kakuro puzzle** is similar to a crossword but with numbers. The grid contains clues representing the sums of numbers placed in horizontal and vertical blocks. The numbers in each block must be unique.
* Example question: Fill a 7x7 Kakuro puzzle where the sums are given for each block of cells.

**10. Magic Hexagon:**

* Similar to a magic square but arranged in the shape of a hexagon. Fill the hexagonal grid with numbers such that each row, column, and diagonal sums to the same constant.
* Example question: Fill a 3x3 magic hexagon where the sum of numbers on each diagonal equals 38.