**Logic Puzzles that Build**

**Spatial Reasoning**

**Extra Puzzles to Solve**

**Jeffrey Wanko**

wankojj@miamioh.edu

Miami University

Oxford, OH

Presented at Black Swamp Math Teachers' Circle

July 29, 2015

|  |  |
| --- | --- |
| **Sashigane**   * Divide the grid into L-shaped blocks. * Cells with circles form a “bend” in the block * The number in a circle shows the number of cells in its block. Circles without numbers allow the block to contain any number of cells * Cells with arrows form one end of its block. The arrow points towards the “bend” in its block. * The number of markings in a block may be 0, 1, 2 or 3. | **Yosenabe**   * Move all circles, vertically or horizontally, so they enter the gray areas. * Show the movement of a circle by an arrow. * The arrows do not bend, and do not cross other white circles or lines of other arrows. * The number in a gray area must be equal to the total of the numbers of the circles that enter the area. * Empty gray areas may have any sum total. * At least one circle must enter a gray area. |
| **Faibu Seruzu**   * Divide the grid into pentominoes. * Each number in the grid indicates the number of sides of the square around the number that are used. * Each square of the grid must be included in exactly one pentomino piece; in other words, every grid square must be used but no pentominoes may overlap. | **Habi-Loop**   * Every square in the grid must contain either a black square, or a part of the closed loop. * Lines can only be horizontal or vertical and cannot cross another line. * Squares with a letter can be either part of the loop or blacked out. * If a letter is blacked out all of the other squares with the same letter must be blacked out. * Blacked out squares cannot be adjacent and only squares with letters can be blacked out. * The direction of the loop coming in and going out of a square with a letter, must have the same direction for all of the other squares with the same letter. |
| **Herugolf**   * Move all circles vertically or horizontally, so they end at an “H” (Hole). * Show the movement of a circle by an arrow. * The number in the circle represents the maximum number of “strokes” to get to a hole. * The first “stroke” must travel the length of the circled number. * Each successive stroke, if used, must be reduced by 1. (Starting from a 4, the first movement must be 4 units, the second must be 3 and so on). * Lines cannot stop in a grey cell or move off of the grid. * Lines cannot cross. | |

**Puzzle Rules**

**SASHIGANE**

|  |  |
| --- | --- |
| Macintosh HD:Users:trassaal:Desktop:Sashigane:6x6 Sashi 1.png | Macintosh HD:Users:trassaal:Desktop:Sashigane:6x6 Sashi 2.png |
| **Sashigane Puzzle 1** | **Sashigane Puzzle 2** |
| Macintosh HD:Users:trassaal:Desktop:Sashigane:6x6 Sashi 3.png | Macintosh HD:Users:trassaal:Desktop:Sashigane:6x6 Sashi 4.png |
| **Sashigane Puzzle 3** | **Sashigane Puzzle 4** |
| Macintosh HD:Users:trassaal:Desktop:Sashigane:6x6 Sashi 5.png | Macintosh HD:Users:trassaal:Desktop:Sashigane:6x6 Sashi 6.png |
| **Sashigane Puzzle 5** | **Sashigane Puzzle 6** |
| Macintosh HD:Users:trassaal:Desktop:Sashigane:8x8 Sashi 1.png | Macintosh HD:Users:trassaal:Desktop:Sashigane:8x8 Sashi 2.png |
| **Sashigane Puzzle 7** | **Sashigane Puzzle 8** |
| **Macintosh HD:Users:trassaal:Desktop:Sashigane:8x8 Sashi 3.png** | **Macintosh HD:Users:trassaal:Desktop:Sashigane:8x8 Sashi 4.png** |
| **Sashigane Puzzle 9** | **Sashigane Puzzle 10** |
| **Macintosh HD:Users:trassaal:Desktop:Sashigane:8x8 Sashi 5.png** | **Macintosh HD:Users:trassaal:Desktop:Sashigane:8x8 Sashi 6.png** |
| **Sashigane Puzzle 11** | **Sashigane Puzzle 12** |

**YOSENABE**

|  |  |
| --- | --- |
|  |  |
| **Yosenabe Puzzle 1** | **Yosenabe Puzzle 2** |
|  |  |
| **Yosenabe Puzzle 3** | **Yosenabe Puzzle 4** |
|  |  |
| **Yosenabe Puzzle 5** | **Yosenabe Puzzle 6** |
|  |  |
| **Yosenabe Puzzle 7** | **Yosenabe Puzzle 8** |
|  |  |
| **Yosenabe Puzzle 9** | **Yosenabe Puzzle 10** |
|  |  |
| **Yosenabe Puzzle 11** | **Yosenabe Puzzle 12** |

**FAIBU SERUZU**

|  |  |
| --- | --- |
|  |  |
| **Faibu Seruzu Puzzle 1** | **Faibu Seruzu Puzzle 2** |
|  | Macintosh HD:Users:wankojj:Dropbox:Puzzles:New Puzzles:5 Cells:7x7 Puzzle 4.png |
| **Faibu Seruzu Puzzle 3** | **Faibu Seruzu Puzzle 4** |
|  |  |
| **Faibu Seruzu Puzzle 5** | **Faibu Seruzu Puzzle 6** |
|  |  |
| **Faibu Seruzu Puzzle 7** | **Faibu Seruzu Puzzle 8** |
|  |  |
| **Faibu Seruzu Puzzle 9** | **Faibu Seruzu Puzzle 10** |
|  |  |
| **Faibu Seruzu Puzzle 11** | **Faibu Seruzu Puzzle 12** |

**HABI-LOOP**

|  |  |
| --- | --- |
| C:\Users\trassaal\Desktop\6x6 HL 1.png | C:\Users\trassaal\Desktop\6x6 HL 2.png |
| **Habi-Loop Puzzle 1** | **Habi-Loop Puzzle 2** |
| C:\Users\trassaal\Desktop\6x6 HL 3.png | C:\Users\trassaal\Desktop\6x6 HL 4.png |
| **Habi-Loop Puzzle 3** | **Habi-Loop Puzzle 4** |
| C:\Users\trassaal\Desktop\6x6 HL 5.png | C:\Users\trassaal\Desktop\6x6 HL 6.png |
| **Habi-Loop Puzzle 5** | **Habi-Loop Puzzle 6** |
| `C:\Users\trassaal\Desktop\8x8 HL 1.png | C:\Users\trassaal\Desktop\8x8 HL 2.png |
| **Habi-Loop Puzzle 7** | **Habi-Loop Puzzle 8** |
| C:\Users\trassaal\Desktop\8x8 HL 3.png | C:\Users\trassaal\Desktop\8x8 HL 4.png |
| **Habi-Loop Puzzle 9** | **Habi-Loop Puzzle 10** |
| C:\Users\trassaal\Desktop\8x8 HL 5.png | C:\Users\trassaal\Desktop\8x8 HL 6.png |
| **Habi-Loop Puzzle 11** | **Habi-Loop Puzzle 12** |

**HERUGOLF**

|  |  |
| --- | --- |
|  |  |
| **Herugolf Puzzle 1** | **Herugolf Puzzle 2** |
|  |  |
| **Herugolf Puzzle 3** | **Herugolf Puzzle 4** |
|  |  |
| **Herugolf Puzzle 5** | **Herugolf Puzzle 6** |
|  |  |
| **Herugolf Puzzle 7** | **Herugolf Puzzle 8** |
|  |  |
| **Herugolf Puzzle 9** | **Herugolf Puzzle 10** |
|  |  |
| **Herugolf Puzzle 11** | **Herugolf Puzzle 12** |

|  |
| --- |
| **SOLUTIONS** |

Sashigane

|  |  |  |
| --- | --- | --- |
| **Macintosh HD:Users:trassaal:Desktop:Sashigane:6x6 Sashi 1 Solution.png** | **Macintosh HD:Users:trassaal:Desktop:Sashigane:6x6 Sashi 2 Solution.png** | **Macintosh HD:Users:trassaal:Desktop:Sashigane:6x6 Sashi 3 Solution.png** |
| **Puzzle 1** | **Puzzle 2** | **Puzzle 3** |

|  |  |  |
| --- | --- | --- |
| **Macintosh HD:Users:trassaal:Desktop:Sashigane:6x6 Sashi 4 Solution.png** | **Macintosh HD:Users:trassaal:Desktop:Sashigane:6x6 Sashi 5 Solution.png** | **Macintosh HD:Users:trassaal:Desktop:Sashigane:6x6 Sashi 6 Solution.png** |
| **Puzzle 4** | **Puzzle 5** | **Puzzle 6** |

|  |  |  |
| --- | --- | --- |
| **Macintosh HD:Users:trassaal:Desktop:Sashigane:8x8 Sashi 1 Solution.png** | **Macintosh HD:Users:trassaal:Desktop:Sashigane:8x8 Sashi 2 Solution.png** | **Macintosh HD:Users:trassaal:Desktop:Sashigane:8x8 Sashi 3 Solution.png** |
| **Puzzle 7** | **Puzzle 8** | **Puzzle 9** |

|  |  |  |
| --- | --- | --- |
| **Macintosh HD:Users:trassaal:Desktop:Sashigane:8x8 Sashi 4 Solution.png** | **Macintosh HD:Users:trassaal:Desktop:Sashigane:8x8 Sashi 5 Solution.png** | **Macintosh HD:Users:trassaal:Desktop:Sashigane:8x8 Sashi 6 Solution.png** |
| **Puzzle 10** | **Puzzle 11** | **Puzzle 12** |

|  |
| --- |
| **SOLUTIONS** |

Yosenabe

|  |  |  |
| --- | --- | --- |
|  |  |  |
| **Puzzle 1** | **Puzzle 2** | **Puzzle 3** |

|  |  |  |
| --- | --- | --- |
|  |  |  |
| **Puzzle 4** | **Puzzle 5** | **Puzzle 6** |

|  |  |  |
| --- | --- | --- |
|  |  |  |
| **Puzzle 7** | **Puzzle 8** | **Puzzle 9** |

|  |  |  |
| --- | --- | --- |
|  |  |  |
| **Puzzle 10** | **Puzzle 11** | **Puzzle 12** |
| **SOLUTIONS** | | |

Faibu Seruzu

|  |  |  |
| --- | --- | --- |
|  |  |  |
| **Puzzle 1** | **Puzzle 2** | **Puzzle 3** |

|  |  |  |
| --- | --- | --- |
|  |  |  |
| **Puzzle 4** | **Puzzle 5** | **Puzzle 6** |

|  |  |  |
| --- | --- | --- |
|  |  |  |
| **Puzzle 7** | **Puzzle 8** | **Puzzle 9** |

|  |  |  |
| --- | --- | --- |
|  |  |  |
| **Puzzle 10** | **Puzzle 11** | **Puzzle 12** |

|  |
| --- |
| **SOLUTIONS** |

Habi-Loop

|  |  |  |
| --- | --- | --- |
| **C:\Users\trassaal\Desktop\6x6 HL 1 Solution.png** | **C:\Users\trassaal\Desktop\6x6 HL 2 Solution.png** | **C:\Users\trassaal\Desktop\6x6 HL 3 Solution.png** |
| **Puzzle 1** | **Puzzle 2** | **Puzzle 3** |

|  |  |  |
| --- | --- | --- |
| **C:\Users\trassaal\Desktop\6x6 HL 4 Solution.png** | **C:\Users\trassaal\Desktop\6x6 HL 5 Solution.png** | C:\Users\trassaal\Desktop\6x6 HL 6 Solution.png |
| **Puzzle 4** | **Puzzle 5** | **Puzzle 6** |

|  |  |  |
| --- | --- | --- |
| **C:\Users\trassaal\Desktop\8x8 HL 1 Solution.png** | **C:\Users\trassaal\Desktop\8x8 HL 2 Solution.png** | **C:\Users\trassaal\Desktop\8x8 HL 3 Solution.png** |
| **Puzzle 7** | **Puzzle 8** | **Puzzle 9** |

|  |  |  |
| --- | --- | --- |
| **C:\Users\trassaal\Desktop\8x8 HL 4 Solution.png** | **C:\Users\trassaal\Desktop\8x8 HL 5 Solution.png** | **C:\Users\trassaal\Desktop\8x8 HL 6 Solution.png** |
| **Puzzle 10** | **Puzzle 11** | **Puzzle 12** |

|  |
| --- |
| **SOLUTIONS** |

Herugolf

|  |  |  |
| --- | --- | --- |
|  |  |  |
| **Puzzle 1** | **Puzzle 2** | **Puzzle 3** |

|  |  |  |
| --- | --- | --- |
|  |  |  |
| **Puzzle 4** | **Puzzle 5** | **Puzzle 6** |

|  |  |  |
| --- | --- | --- |
|  |  |  |
| **Puzzle 7** | **Puzzle 8** | **Puzzle 9** |

|  |  |  |
| --- | --- | --- |
|  |  |  |
| **Puzzle 10** | **Puzzle 11** | **Puzzle 12** |