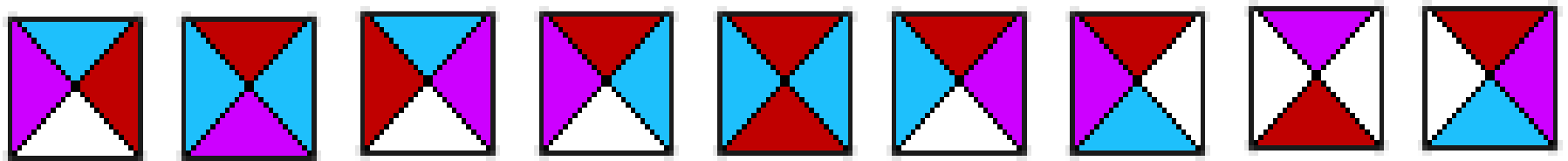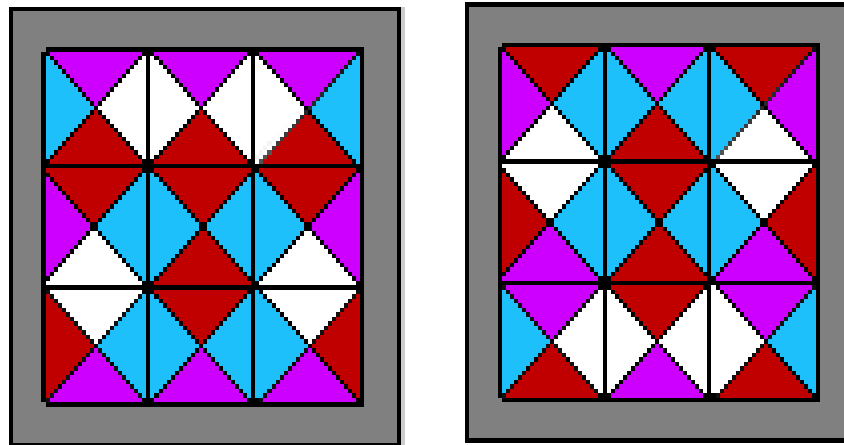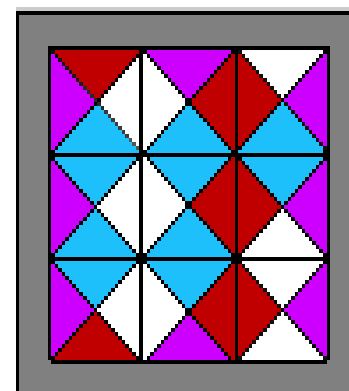# The Surprising Versatility of Edge-Matching Tiles
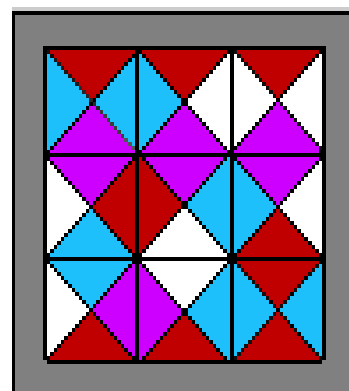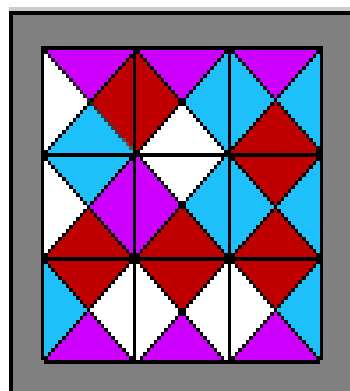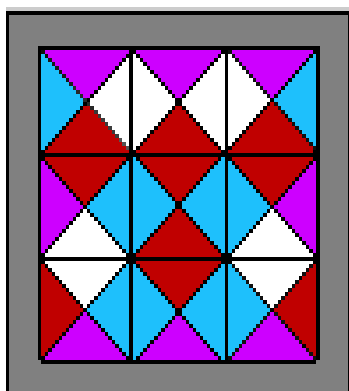
MiniMatch-I
9 edge-colored squares
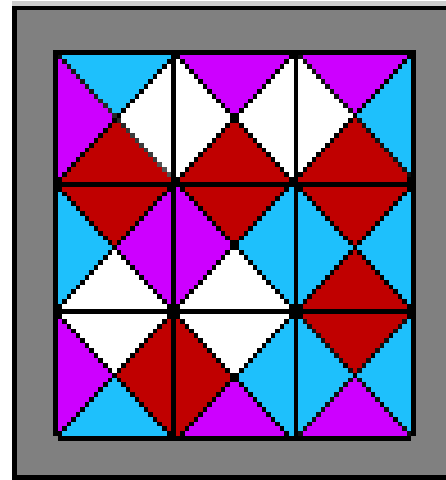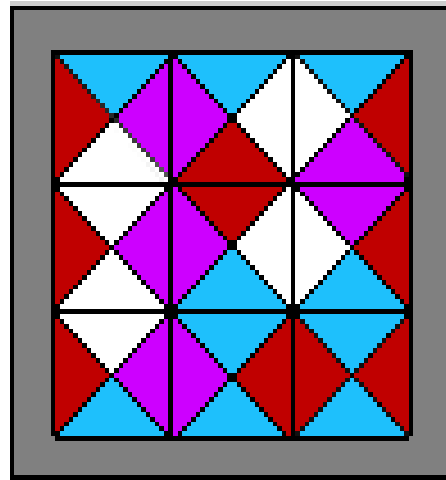

Presentation by Kate Jones
at Bridges 2017
Waterloo, Canada
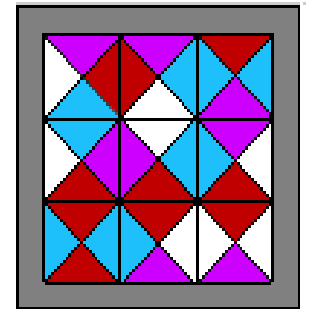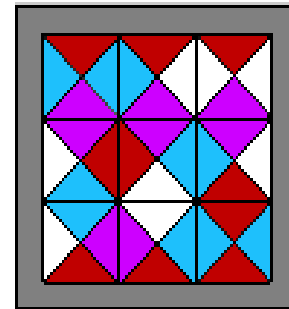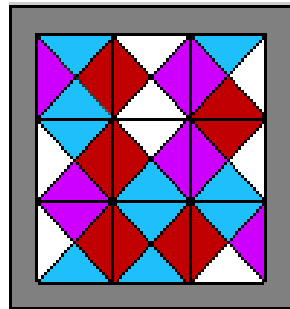
Research Results:

1. Enclose any one color
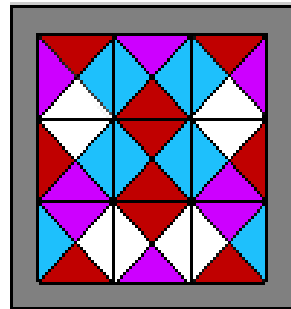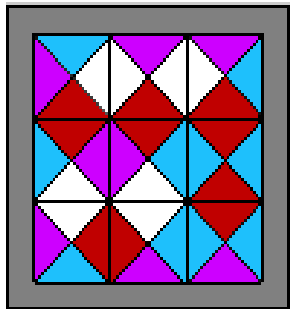
2. Enclose two colors.

Only purple/white and red/white are solvable.

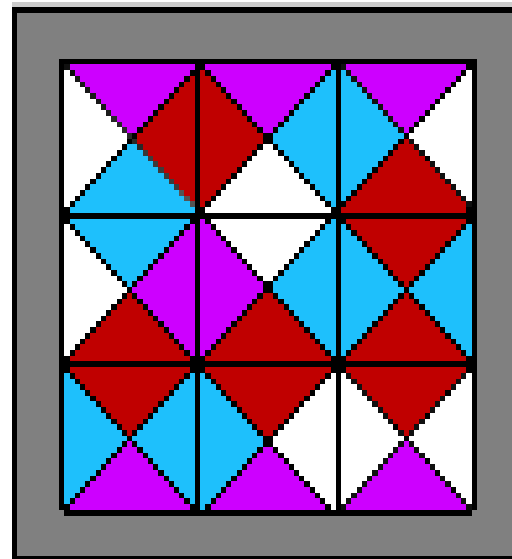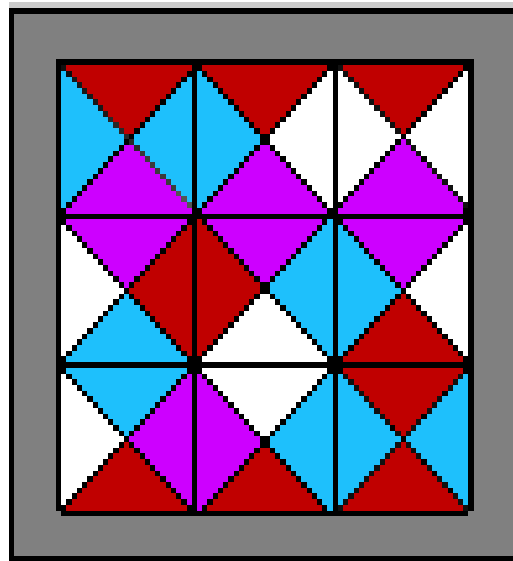# 3. Wrap-arounds.

- **Cylinder**
- **Torus**
- **Moebius Strip**
- **Klein Bottle**
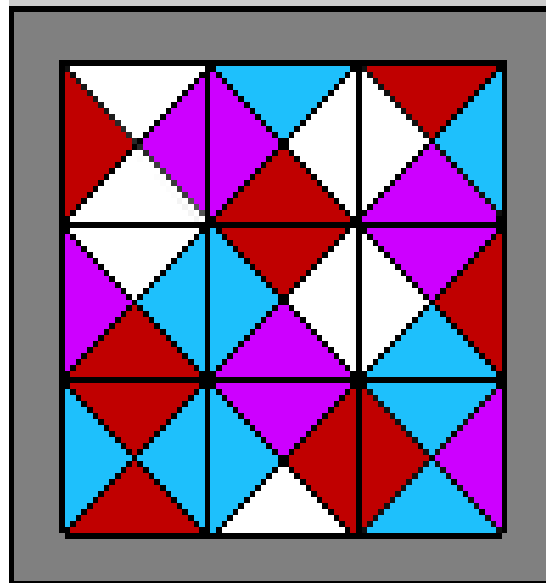- **Projective Plane**

4. Wrap-around transformations.

After shifting one row from top to bottom:

5. Unmatched row ends.
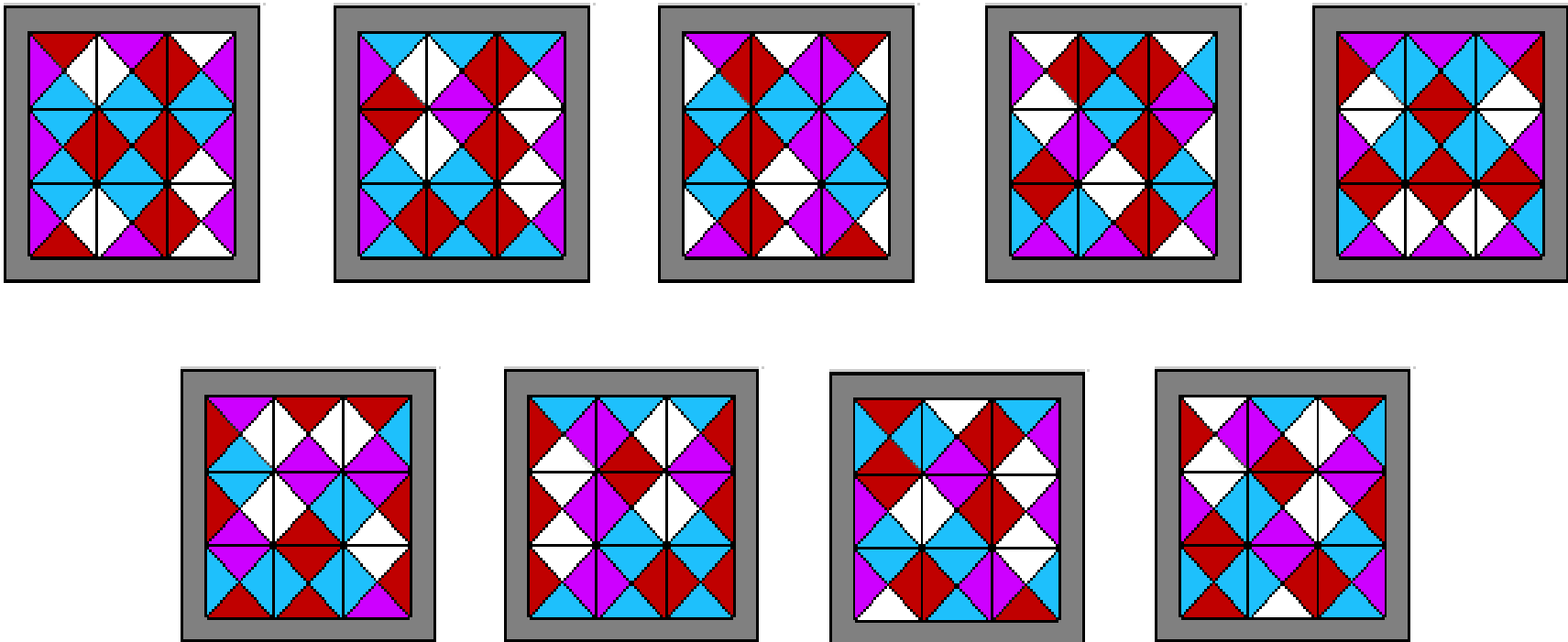
Very difficult.

6. Interior color divisions.

12 interior color squares can contain 3 or 4 colors in all these different sums:

     5 4 3 0   5 4 2 1   5 3 3 1   5 3 2 2   4 4 4 0

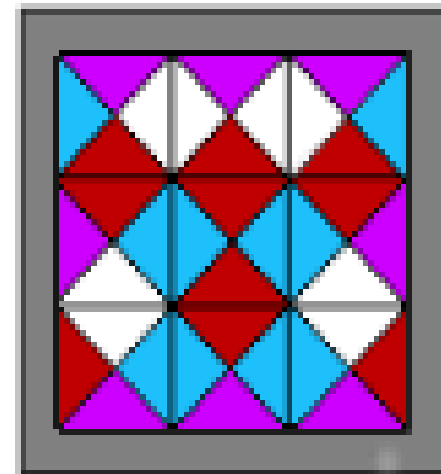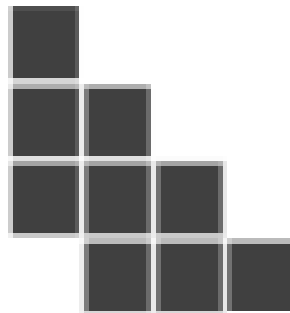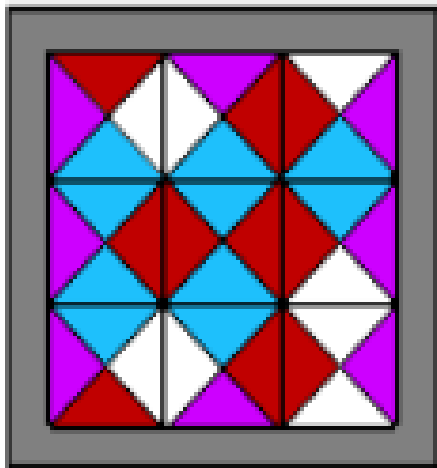   4 4 3 1   4 4 2 2   4 3 3 2   3 3 3 3

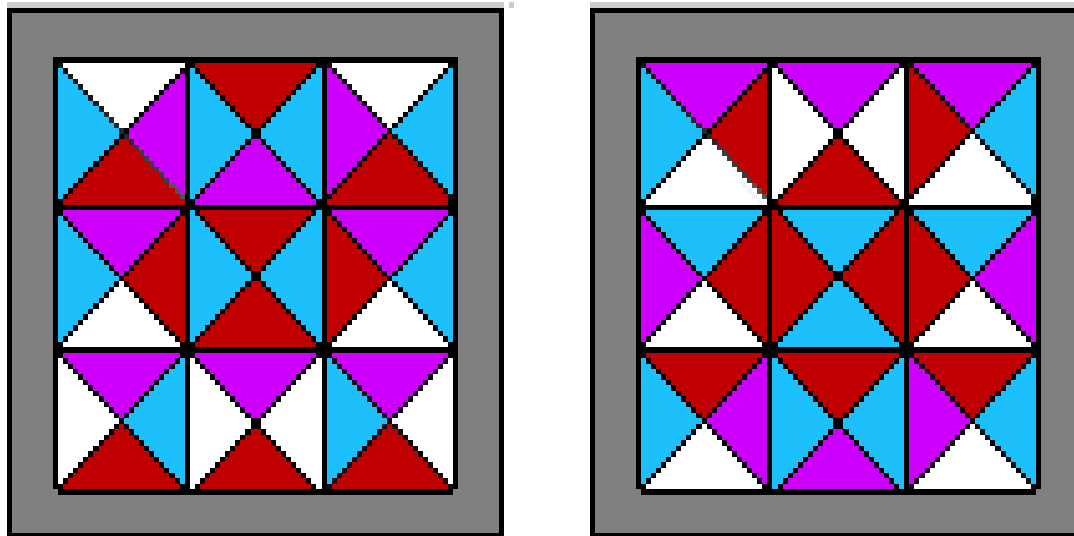The only combinations with no solutions are 5 5 2 and 5 5 1 1

7. Other observations.

- Only one of the four colors can be entirely on the border.

- Can form 78 other color-matched symmetrical shapes. Here's one.

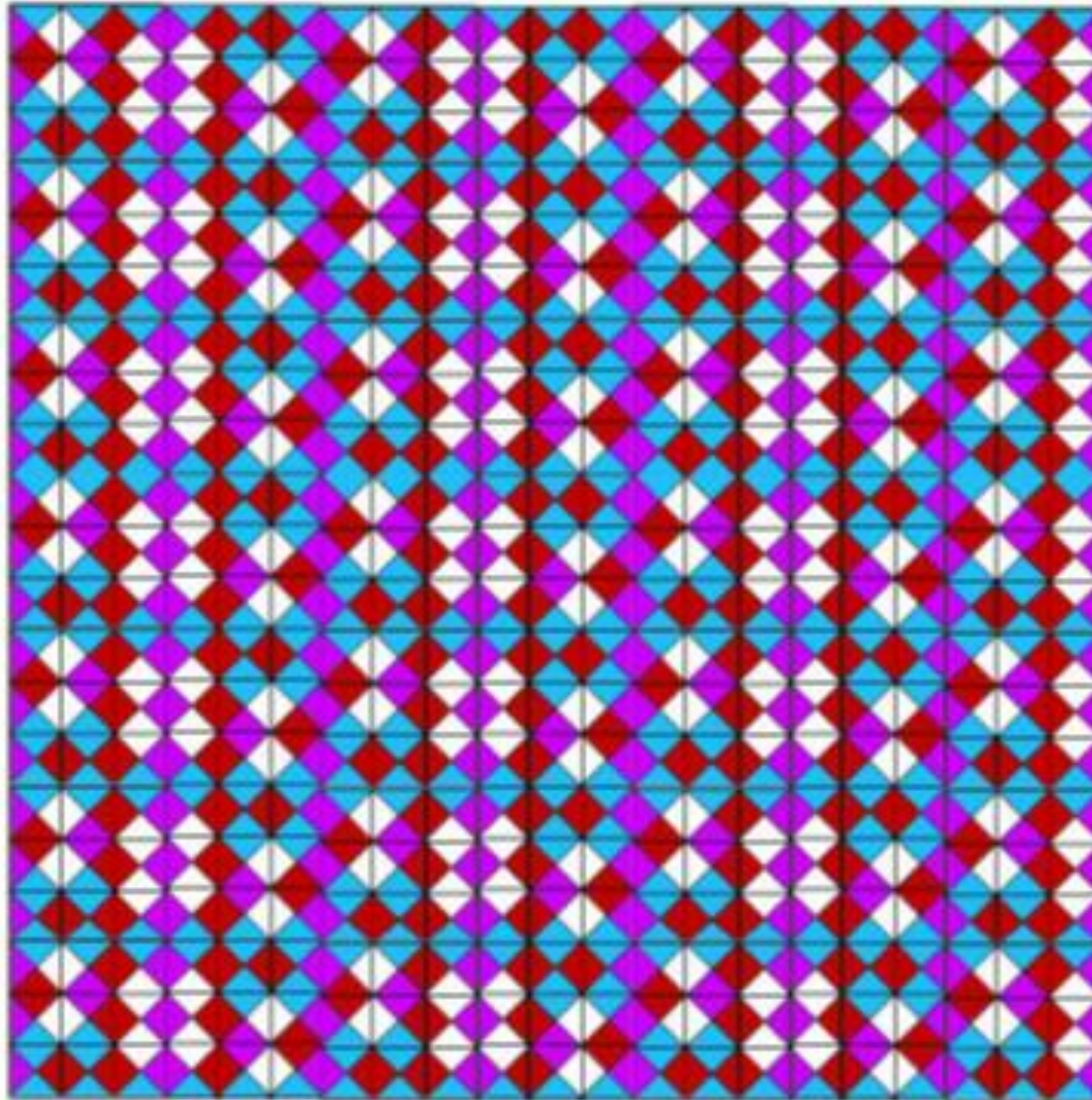- Can form perfect mirror symmetry of all colors, producing double wrap-arounds as well.

-

8. Non-matching arrangements.

A liberating, artistic exercise…

9. Mega-constructions

Any single 3x3 solution can tile infinitely—on floors, walls, as art.

There is no end!

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