

# Pentominoes embedded in Dezign-8™ tilings

Kate Jones

President, Kadon Enterprises, Inc.; [kate@gamepuzzles.com](mailto:kate@gamepuzzles.com)

## The Dezign-8 Set

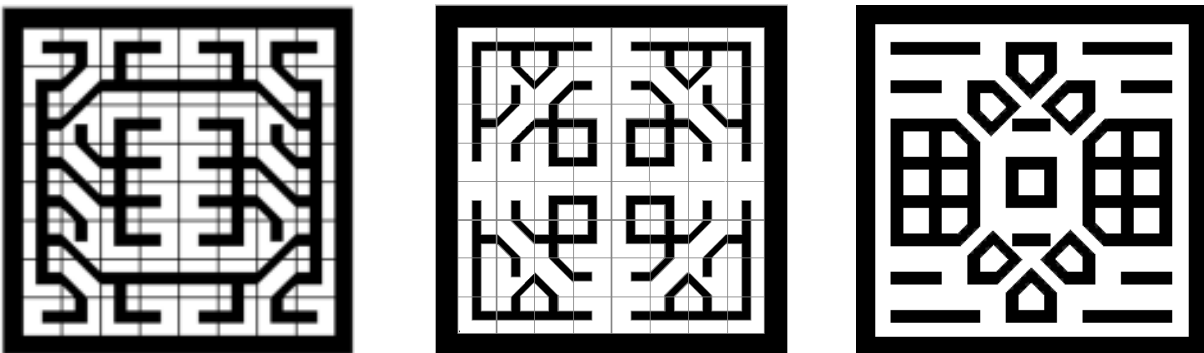
As a mathematical set, the concept for Dezign-8 was created in 1959 by an architect, William A. Briggs, and fully developed by Kate Jones at the request of his widow in 1997. Kadon Enterprises, Inc., produced and released Dezign-8 in 2000 as part of its math-as-art collection. *Games Magazine* chose Dezign-8 as one of the 100 best games of the year 2001. Research and new discoveries are pursued to the present day. This art poster shows solutions found from 2017 to 2020 by Alex Streif and Kate Jones.

The set consists of 64 square tiles forming an 8x8 square. The tiles (Figure 1) represent all the combinations of 1, 2, 3, and 4 path exits on a square.



**Figure 1:** *The 8 distinct tile patterns of Dezign-8. From left: Stop, Corner, Straight, T, Left Split, Right Split, Parallel, Crossroads. Each tile occurs as various multiples in the set.*

The objective is to connect paths and leave no open ends, in effect a labyrinth. Within the tray, the tiles can form a single connected network or up to 19 separate closed groups (Figure 2). A closed group has no open path ends. All path ends connect to other tiles. A closed group is completely surrounded by the background color, like a floating island. No paths touch the border.



**Figure 2:** *The 8x8 grid filled with all matched-end paths. Left to right, these sample solutions show 1, 8, and 19 closed groups. These have pleasing symmetrical patterns, as well.*

## Groups Equal Loops

Closed groups may have any shape, from just two tiles that join two Stops, to a long and circuitous path that runs over the whole set. A closed group may contain closed loops, where paths fully enclose an area. Enclosed areas can be any size and shape, from a small diamond made of four tiles to a single field enclosed by a continuous fence (first case in Figure 2). By a strange circumstance in the composition of the tile set, the number of closed groups within the 8x8 arrangement will always equal the number of enclosed areas. Perhaps a mathematician can give us a simple explanation for why this is the case!

## Embedded Pentominoes

Well after Dezhign-8 was published, further research found interesting new results: each of the 12 pentominoes (Figure 3, shapes made of 5 edge-matched congruent squares each) could be formed within a Dezhign-8 tiling. Figure 4 is a miniature illustration of the poster submitted to the 2021 JMM art exhibition, showing all twelve solutions. The number of groups and loops varies from 6 to 11.

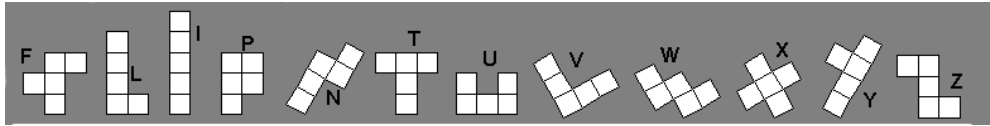


Figure 3: The 12 pentominoes

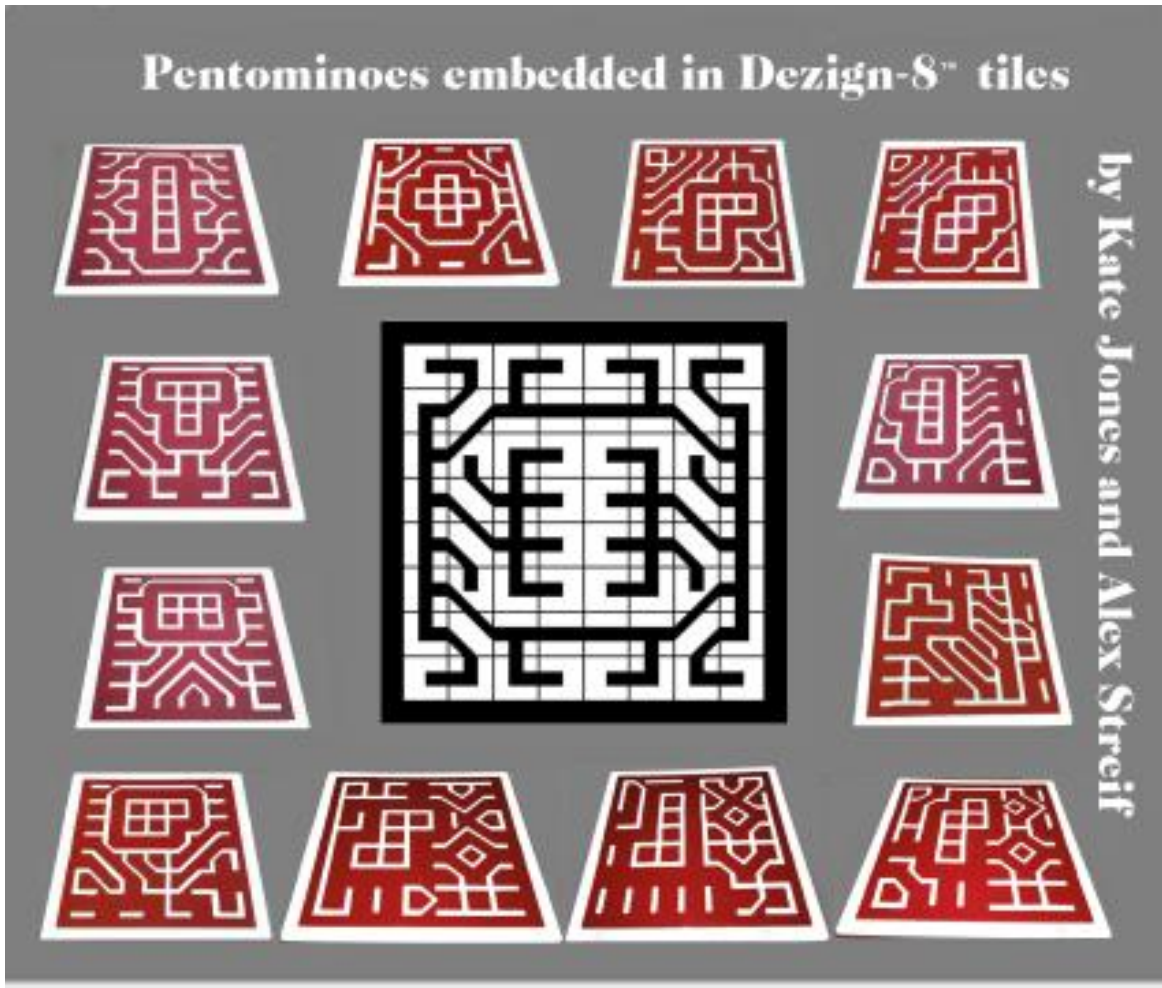


Figure 4: Center--a single network, one enclosed area. Outside figures--embedding the 12 pentominoes, each solution's number of groups equals its loops, from 6 to 11.

## References

- [www.gamepuzzles.com](http://www.gamepuzzles.com)
- [www.gamepuzzles.com/tiling2.htm#D8](http://www.gamepuzzles.com/tiling2.htm#D8)
- [www.gamepuzzles.com/revu-d8.htm](http://www.gamepuzzles.com/revu-d8.htm)

To custom-order a copy of this framed poster, 25x33" -- \$49

<mailto:kadon@gamepuzzles.com>