

Tiling the Plane

This is a “paper and pencil” activity where you use different colored pens or markers to fill in the squares of 32×32 grid. The general algorithm we will be doing is called *tiling* and you see examples of this every day. Figure 1 shows a tiled floor.



Figure 1: A tiled floor.

In general, tiling consisting of placing one or more shapes having one or more colors on a surface, such as a floor. There are lots of different shapes that we can use when tiling. In this challenge, we will be doing tiling using the following shape shown below which belongs to the category of tiles called *pentominoes*. A pentomino is a tile constructed from five unit squares (*penta*, whose origin is the Greek word *pente*, means five). Using 5 unit squares it is possible to construct 12 distinct pentomino tile shapes.

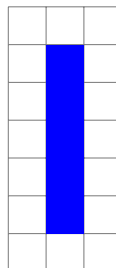


Figure 2: A pentomino shape.

Herringbone

A herringbone pattern is constructed from rectangles positioned at right angles to one another. The resulting pattern resembles the skeleton of a herring fish. Herringbone patterns can be found in floor tilings, road pavement, wallpaper, mosaics, and textiles. Figure 3 shows a brick road having a herringbone pattern.

An important observation regarding herringbone patterns is that they involve 2 distinct rotational positions (e.g., vertical and horizontal) of a single rectangular shape.

Imagine you have a bunch of *tiles* having the shape shown in Figure 2. Also imagine the tiles you have come in different colors. Can you tile a plane (e.g., a floor) using just this pentomino so that adjacent pentominos have different colors?

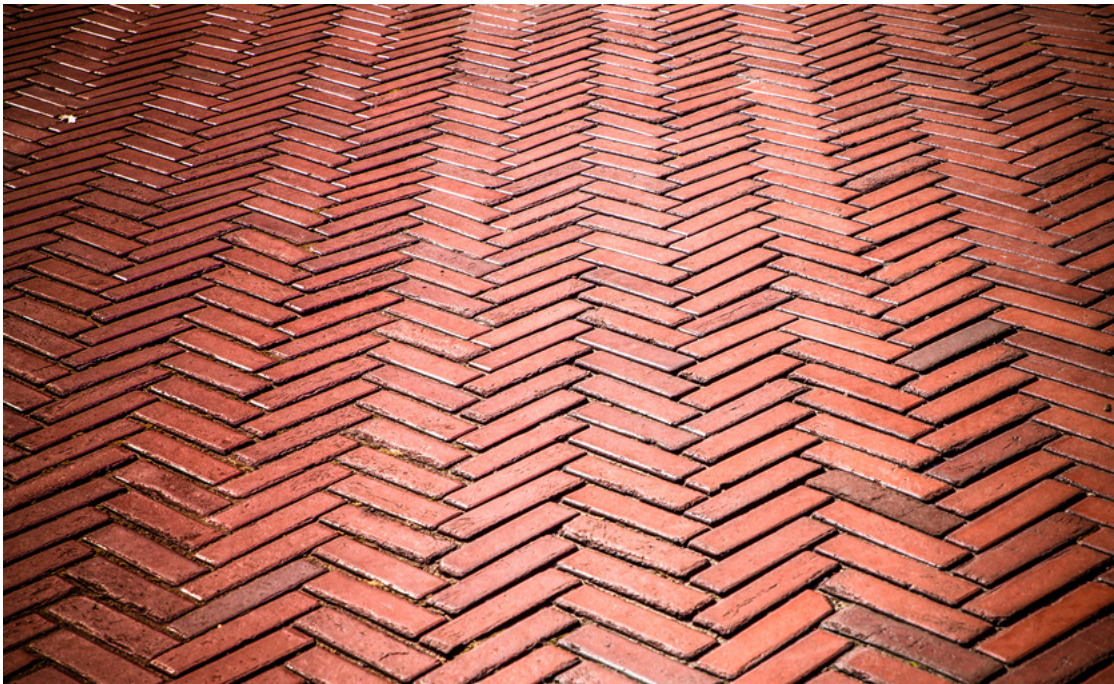


Figure 3: A floor tiled using a herringbone pattern.