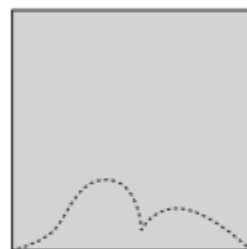


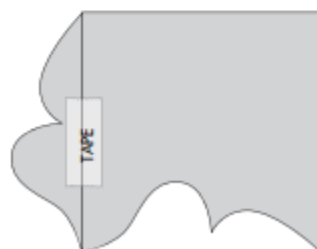
C) ROTATION TESSELATION

Try This:

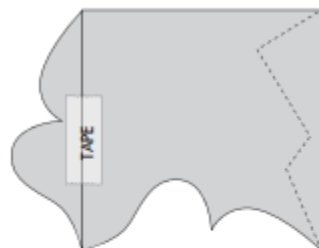
- Step 1 Draw a 2.5" x 2.5" square on your index card.
- Step 2 Cut out the square from the index card.
- Step 3 Draw a line between two adjacent corners on one side of the square. Your line can be squiggly or made up of straight segments. Whatever its shape, your line must connect two corners that share one side of the square.



- Step 4 Cut along the line you drew. Take the piece you cut off (without flipping) and slide it to an adjacent side of the square. Line up the straight edges and tape them together.



- Step 5 Now draw another line that connects the two corners on the side adjacent to the cut side of the square.

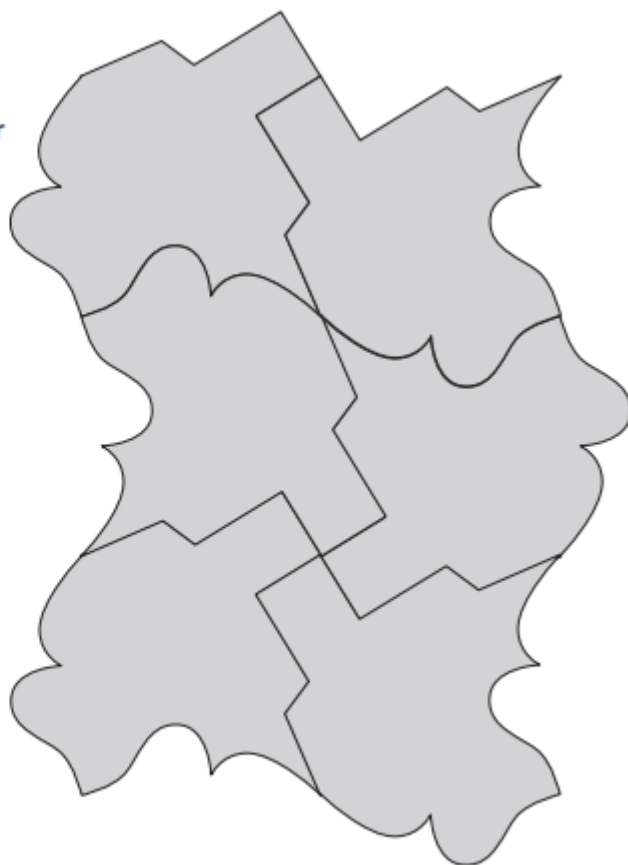


- Step 6 Cut along this new line. Take the piece you cut off (without flipping) and slide it to its adjacent side. Line up the straight edge of the cut piece with the straight edge of the square, and tape them together.



- Step 7 You have now created a shape you can use as a pattern to make a tessellation. Write the letter A on one side of the shape and turn it over and write the letter B on the other side.

- Step 8** On your grid paper, carefully trace around your pattern piece.
- Try to cover your whole sheet of paper by tracing the pattern, then moving it and tracing it again. If you start with the side A facing up, do you ever have to turn it over to side B to make your tessellation? If you have to flip your piece over, you have made a reflection tessellation. If you also had to move the piece to a new position you have also used translation. If you have to turn or rotate the shape to make your tessellation, then you have made a rotation tessellation.



- Step 9** Look for a clever way to color in the resulting design on your sheet of paper.

What's Going On?

If you look around, you'll see many repeating patterns: on wallpaper, on fabric, in a tiled bathroom floor. In this activity, we explored some of the mathematical rules used to make repeating patterns. Tessellations are patterns that cover a surface completely without overlapping or leaving any gaps.

The three mathematical rules of repetition used in this activity are:

- Shifting the position of a shape (something mathematicians call translation.)
- Rotating a shape to a new position (mathematicians don't have a fancy name for this; they just call it rotation.)
- Flipping a shape over so it looks like a mirror reflection of itself (mathematicians call this reflection.)

Many people think of M. C. Escher's work when they think of tessellations. (<http://www.mcescher.com/Gallery/gallery-recogn.htm>) Escher worked for a long time on each of his designs before he was satisfied with the final result. After you try this activity once, you may want to make several more pattern pieces until you come up with an especially interesting or evocative design.

People don't usually think of math when they look at beautiful designs, but math provides tools that help us create and analyze patterns. The three rules used to create these tessellations—translation, rotation, and reflection—are used in making many of the repeating designs we see around us every day.