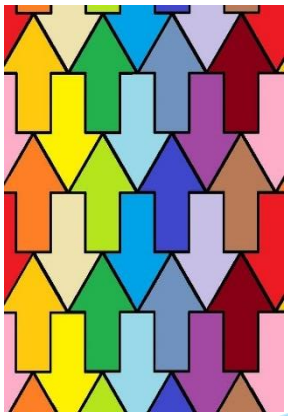
Tessellations

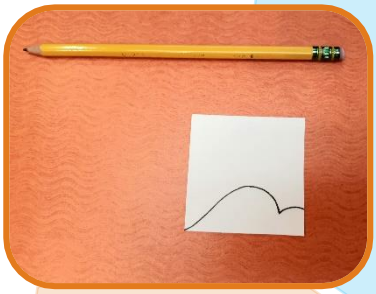
Recommended Ages: 4-12



Look at the image to the right. Do you see how the arrows fit together and leave no space between them? This is called a **tessellation**. There are three basic shapes that work for tessellations: triangles, hexagons, and squares. You can see below how these shapes fit together with each other very easily. The next step is to change them a little bit to create a new pattern. In this activity, we will experiment to see what kinds of tessellations we can make!

Materials:

- Paper
- Pencil
- Tape
- Index Card
- Scissors
- Coloring Supplies (optional)



Procedure:

1. Using the index card, choose your starting shape (triangle, hexagon, or rectangle) and cut it out. *We chose a square since all squares are rectangles.*

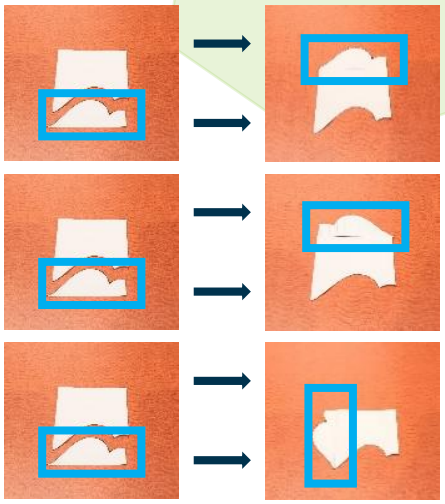
2. Draw a simple design on one of the edges of your shape. When you are happy with your design, cut it off. Keep the piece you just cut off!

3. Choose your transformation and tape the piece you cut off onto your original shape.

Science Tip: Transformations

*There are three geometric transformation options when making a tessellation: **translation**, **reflection**, and **rotation**.*

- *Translation: take the piece you cut off and place it on the opposite side with no changes.*
- *Reflection: take the piece you cut off and place it on the opposite side. Flip from left to right while keeping the flat side against the flat side.*
- *Rotation: take the piece you cut off and place it on one of the adjacent sides, making no changes.*



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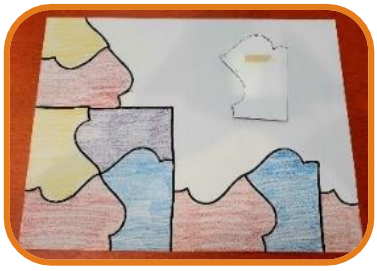
4. Try tracing your new shape on the paper. Line up the edges and trace it again. Repeat these steps to fill your page. There should be no gaps between your shapes.



Were you able to fill all the spaces on your paper? You may have seen tessellations in your home or neighborhood without really thinking about them. A tessellation covers a flat surface using one or more geometric shapes with no overlaps and no gaps. In history, tessellations were used by the Ancient Romans and in Islamic art, architecture, and decorative tiling. Tessellating patterns are still used today for both practical reasons and for beauty. Could we use tessellations to create less waste in some way?

DID YOU KNOW?

An **engineer** is someone who plans, designs, and develops different machines and products. They even come up with ways to cut down on waste on cut products. If you liked designing your new shape, maybe engineering is for you!