

Name: _____

Math Adventures
Week 3: Möbius Strips

Topology is a branch of math that studies the properties of an object that stay the same after the object is deformed.

A **Möbius strip** is created by giving one end of a rectangular strip a 180° twist and then joining the two ends of the strip.

1. Make a Möbius strip.
 - a. Draw a line through the center of one side of the strip until you reach the point you started at. How many sides does a Möbius strip have?

 - b. Draw a line along the edge of the strip until you reach the point you started at. How many edges does a Möbius strip have?

2. Cut along the line you drew in the center of the strip. What do you get?

3. Make a Möbius strip and cut along a line $\frac{1}{3}$ of the way in from the edge.
 - a. What do you get?

 - b. Let's say we were to cut along a line a distance d from the edge, where $0 < d < \frac{1}{2}$. What would happen if d was almost 0?

 - c. What would happen if d was almost $\frac{1}{2}$?

4. Make two regular (non-Möbius) strips attached to each other. Cut in the center of both strips. What do you get?

5. Make one regular strip attached to one Möbius strip. Cut in the center of both strips. What do you get?

6. Make one Möbius strip with a clockwise twist attached to one Möbius strip with a counter-clockwise twist. Cut in the center of both strips. What do you get?

7. Make another strip, but make a full twist instead of a half twist. Cut in the center of the strip. What do you get?

One topological property of a Möbius strip is that it is **unorientable**. This means that there is no orientation that applies to the entire surface of the Möbius strip.

An object similar to the Möbius strip is the Klein bottle. A **Klein bottle** is created by passing one end of a tube through the side of the tube and joining the two ends of the tube. Like the Möbius strip, it only has one side. It has zero edges.

References: Tadashi Tokieda
