The Mobius Strip

Biographical Information

August Ferdinand Mobius was born 1790 in Saxony (now Germany), and died in 1868, in Leipzig. His father died when he was three years old. Mobius was educated at home by his mother until he was thirteen, when he went to college in Saxony. He graduated from the college in 1809, and became a student at the University of Leipzig. His mother wanted him to become a lawyer, but he chose to study math, astronomy and physics instead. Mobius learned from only the best teachers. In 1813 Mobius studied under Gauss, the director of the observatory in Gottingen. He then continued his studies but under Johann Pfaff, who also taught Gauss. The year of 1816 brought an appointment to the Chair of Astronomy and Higher Mechanics at the University of Leipzig. The University granted Mobius a full Professorship in Astronomy in 1844. He stayed at the University for the remainder of his career.

The Mobius Strip

Mobius was a pioneer in the field of topology. Topology is the study of those properties of geometric figures that remain unchanged even when under distortion, so long as no surfaces are torn. It defined a property of simple closed polyhedra pertaining to the vertices (V), edges (E), and faces (F): V - E + F = 2. Mobius speculated that a polyhedron was a collection of joined polygons. This speculation introduced the notion of 2-complexes. It was this study that led Mobius to the surface now known as a Mobius Strip: the simplest geometric shape, a one sided surface. Mobius is best known for this development. It may be replicated by taking a strip of paper or ribbon, turning one side 180 degrees long ways and attaching the two ends. The paradox of the Mobius Strip is that a one-surfaced, one- edged figure is three dimensional. This very paradox, with derivations such as the Klein Bottle, may be used to define such celestial anomalies as black holes and worm holes.

created by http://www.math.wichita.edu/history/topics/geometry.html#mobius

M. C. Escher

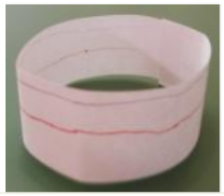
Mobius strip \Mo"bi*us strip`\, Mobius strip \M["o]"bi*us strip`\, Moebius strip \Moe"bi*us strip`\, n. [From August F. M["o]bius, a German mathematician.]

A mathematical object, or a physical representation of it, which is a two-dimensional sheet with only one surface. It is constructed or visualized as a rectangle, one end of which is held fixed while the opposite end is twisted through a 180 degree angle and joined to the fixed end. It is a two-dimensional object that can only exist in a three-dimensional space.

http://illusionsetc.blogspot.com/2005/08/moving-mobius-strip.html

Mobius Strip

http://www.layhands.com/ScienceTricks/Page8.htm

Carefully cut out a strip of paper. Then cut two more strips.	
Make a circle with one of the strips, then tape the ends together.	
On the outside of the circular strip of paper, draw a red line in the middle all the way around the circle (or use some other color). Notice that the circular strip has two sides. It has an "outside" (with a line drawn around it) and an "inside" (with no line drawn on it). Draw a black line all the way around the circle near one edge. Notice that the circular strip has two edges (one with a black line near it, and one with no black line near it).	
Carefully cut all the way around the middle of the circular strip (where the red line is in the pictures). Notice that you end up with two circular strips.	
With another strip of paper, make a circle again but don't tape it yet. Imagine that one end of the paper has an X on the outside. Twist that end over so that the imaginary X is facing downwards, then tape it to the other end.	
Now you have a circular strip with a twist in it. This is called a "Mobius Strip."	

Draw a red line in the middle all the way around the Mobius Strip (or use some other color), just like you did with the circular strip. Notice that the Mobius Strip only has ***one*** side! It doesn't have an "inside" and an "outside" like the circular strip does! How is that possible? If you draw a black line all the way around the Mobius Strip near one edge, you'll see that the Mobius Strip only has ***one*** edge! How is that possible?	
Carefully cut all the way around the middle of the Mobius Strip (along the red line in the picture), just like you did with the circular strip. Notice that it makes one large twisted circular strip instead of two circular strips!	
With the third strip of paper that you cut out in step 1, make another Mobius Strip. This time, cut all the way around the Mobius Strip near the edge (where the black line is in the pictures above). Notice that this time you end up with two linked loops! Weird!