Amazing Math

A surprising twist on the result you expect.

WHAT TO DO

Attach a piece of tape to one end of a long strip of paper so that half of the tape extends over the edge of the paper. Holding both ends of the paper, carefully twist the strip along its length 1/2 turn (i.e. flip the back side of one end to become the front side) and attach the two ends together with the tape. You should now have a loop of paper with half a twist along its length.

Now take a pencil or crayon and carefully draw a line along the center of the strip (like the center line in a roadway). Keep drawing until your line meets the starting point. Did you notice anything odd as you drew the line?

Next draw another line all the way around the loop halfway between the first line you drew and the edge of the strip. Keep drawing again until your line meets the starting point. Did something really odd happen as you drew this line?

With scissors carefully cut your paper loop along the first center line that you drew (you will need to poke the tip of the scissors through the paper to start cutting). What happened when you finished cutting? Is this what you expected?

For an even stranger result, make another paper loop exactly like the first one and draw the two lines again. This time carefully cut the loop along the second line you drew. What happened this time?

Amazing Math

A surprising twist on the result you expect.

WHAT'S HAPPENING?

A normal loop of paper has an inside surface (the front side of the paper) and an outside surface (the back side), as well as a top edge and a bottom edge. You've probably made simple loops like this before, and maybe even cut them in half to make two thinner loops. But the loop you made in this activity had a very simple twist- literally- that turned it into something entirely different called a Möbius Loop.

By attaching the the front side of one end of the paper to the back side of the other end the paper no longer has a front and back side (or if you prefer, there is no "inside" or "outside" of your loop). This loop has only one surface! If you don't believe this try to color only one "side" of the paper. You should also be able to prove that this Möbius loop has only one edge - there is no "top" or "bottom" edge.

This simple activity introduces a fascinating field of mathematics called topology, which is all about stretching and bending multi-dimensional objects and spaces. The Möbius Loop is about as simple as it gets in topology, but as you see, it's behavior is already very strange indeed!