Möbius Strip and tetra-tetra flexagon

Monday, October 26th 2015

The name of your team_____

Members :   1. _____   2. _____

`   3. _____   4. _____

   5. _____   6. _____

Introduction:

This is your first approach to Topology, a branch of Mathematics that views geometric objects as being flexible. This means that they may change their shape but as long as they keep their holes and knots they remain the same.

So, each team will…
- create a Möbius strip and experiment with it
- present and discuss its findings with other teams
- follow instructions to create a "magic card" (tetra-tetra flexagon) with two "magic pictures" on it.
- exchange cards with friends
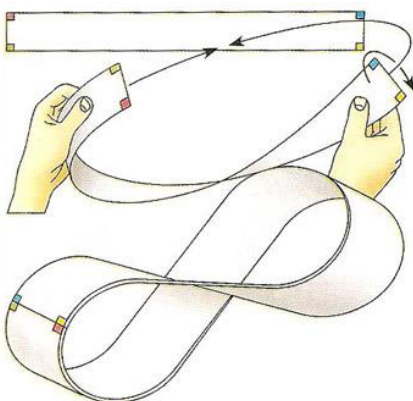
Möbius Strip

Have a look at these fine paintings by M.C. Escher. Do they have something in common?
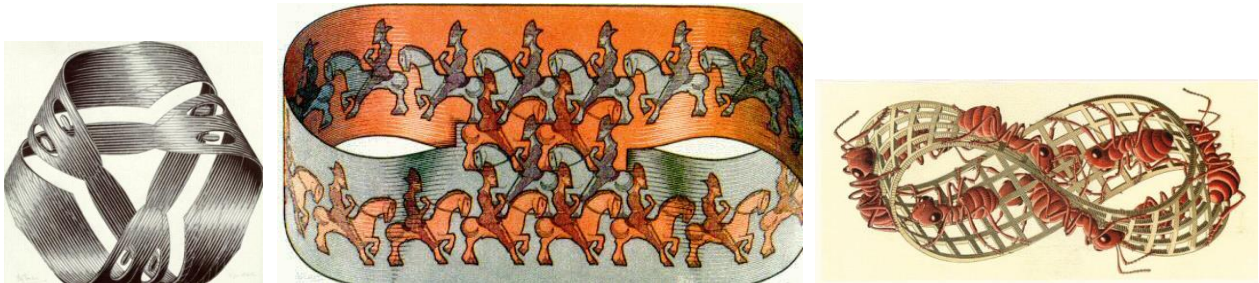
How you make a Möbius Strip:
Take a long paper strip, twist it once about the long axis and join the narrow ends.

Experiment with it:

1. Draw a line along the strip, half way from its edges. Keep the move continuous, stop when you are back where you started. Does it tell you anything about how many sides does Möbius Strip have?

2. Cut the strip along the line you drew before. What happened? Did you expect that?

3. *Investigation*: What would happen if we started to cut at a distance of 1/3 of the Möbius strip width?
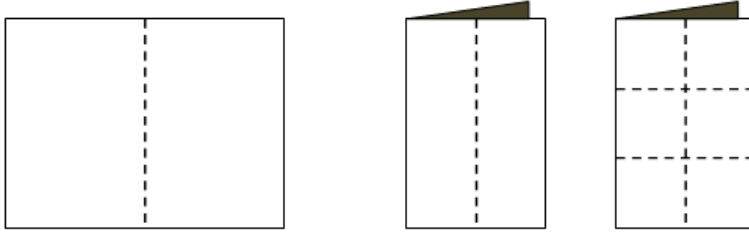
4. Can you suggest any more experiments?
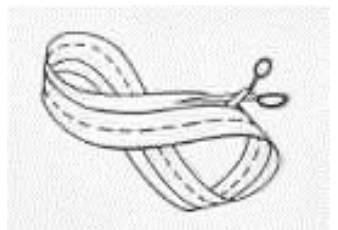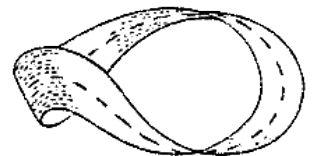
A magic card (tetra-tetra-flexagon)

Instructions to make one:

1. Begin with an A4 paper sheet in landscape orientation. Fold it in half vertically twice and then horizontally in thirds as shown below. Your sheet is then divided into 4×3 cells.
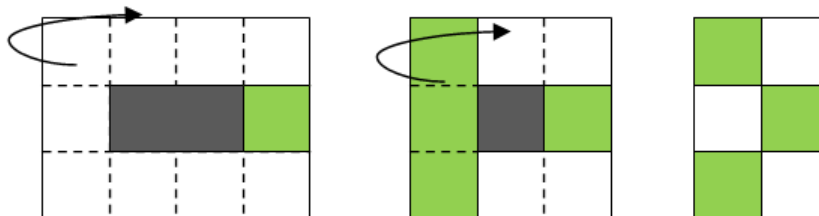
2. As your sheet is folded in half, cut halfway the two horizontal folds as shown below (1st picture). Open the sheet and cut once more to create a "window" (2nd picture).
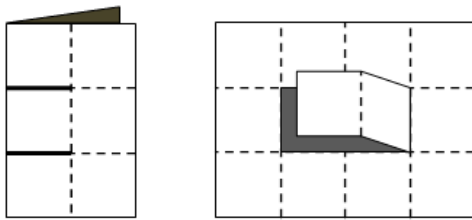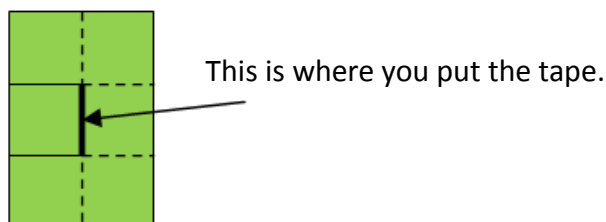
3. "Open" the window, and fold it to the right. Then, fold the square that extends to the back of the sheet.
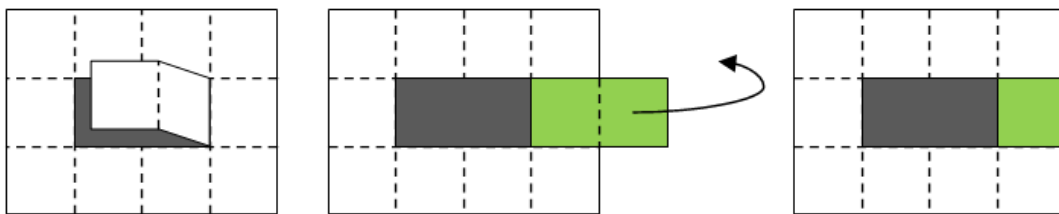
4. Fold the left column to the right twice as shown (first and second picture below).

5. Turn over your card carefully. One of the squares jumps out of the card. Put some tape on this square and the one next to it to join them (just these two middle ones).

   This is where you put the tape.

6. Mark the face with the tape as "4". Turn the card over and mark that face as "3". Fold your card in half with face 3 outside and face 4 inside. Open along that fold to reveal a new face. Name it "2". Repeat to reveal the last face, face "1".

7. "Magic pictures" that reverse, can be drawn in faces "2" and "3".