

# THE MAGICAL LOOPS

BY YANRAN LI

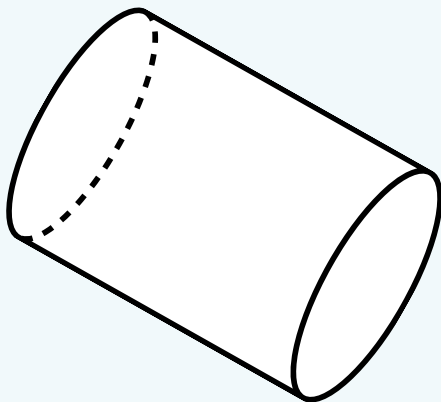
## EXPERIENCES & OUTCOMES

Having explored a range of 3D objects and 2D shapes, I can use mathematical language to describe their properties, and through investigation can discuss where and why particular shapes are used in the environment.  
MTH 2-16a

## LEARNING INTENTIONS

1. Be aware of the difference between a loop (cylinder) and a Möbius strip
2. Understand a Möbius strip is not a 3D object but a 2D shape with only one face
3. Be able to make a Möbius strip

## PAPER CRAFTS WE'RE GOING TO MAKE...

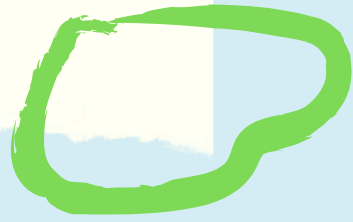


CYLINDER  
(LOOP)



MÖBIUS STRIP

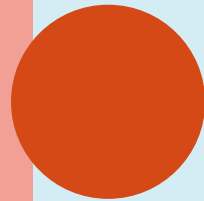
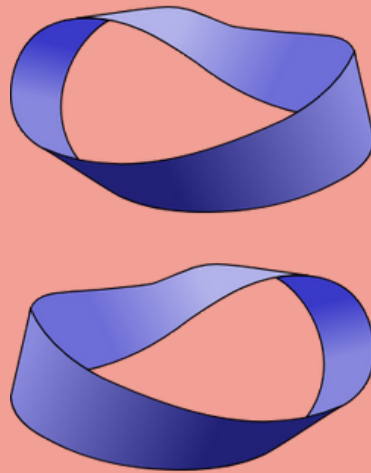
# BACKGROUND



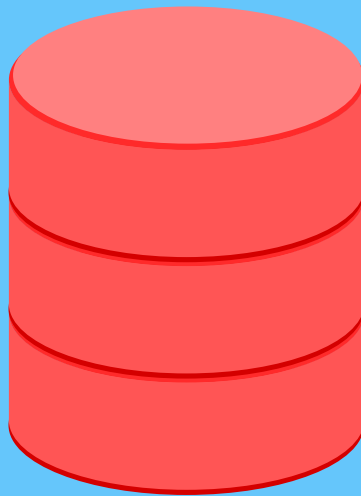
The **Möbius strip** or **Möbius band** is a looped surface with **only one side** and **only one edge**.

It can be made using a strip of paper by gluing the two ends together with a half-twist. The twisting is possible in two directions (clockwise and counterclockwise) ; so there are two different (mirror-image) möbius strips.

## MÖBIUS STRIP



## CYLINDER (LOOP)



A **cylinder** is a three-dimensional shape in geometry.

A cylinder is round and has a top and bottom in the shape of a circle. The top and bottom are flat and always the same size.

When we make a **paper loop**, we make it as a cylinder without the top and bottom.



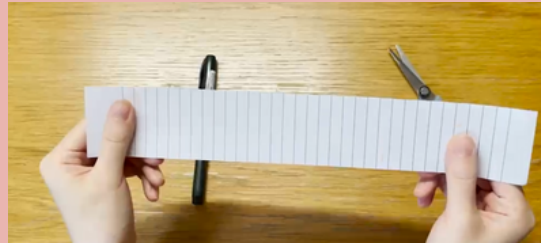
# MAKE A MÖBIUS STRIP

## Resources needed:

- A paper strip
- A pen
- Tapes
- Scissors



## Step 1: Hold the strip



## Step 2: Twist the right end 180 degrees and tape the two ends



## Step 3: Draw a line all the way along one surface



## Step 4: You will end up right back where you started, because a Möbius strip only has one surface



# CYLINDERS AND SQUARE

**Resources needed:**

- Two paper strips
- Tapes
- Scissors

**Step 1:**

**Place the strips one on top of the other to form a cross shape and tape them together**



**Step 2:**

**Make the strips into two paper loops**



**Step 3:**

**Cut the loops along the centre lines**



**Step 4:**

**You will end up with a big square**



# MÖBIUS STRIPS AND LINKED HEARTS

**Resources needed:**

- Two paper strips
- Tapes
- Scissors

**Step 1:**  
**Tape the strips**



**Step 2:**  
**Make the strips into two möbius strips  
(one counterclockwise  
twist, one clockwise  
twist)**



**Step 3:**  
**Cut the strips along the  
centre lines**



**Step 4:**  
**You will end up with a  
pair of linked hearts**





# FUTURE RESEARCH LINKS



## Handcraft tutorial

- <https://drive.google.com/file/d/11fSSoLxajOUrj8LC64RBOVhPqTIX8xIh/view?usp=sharing>

## Other useful links

### Websites:

- The Mathematical Madness of Möbius Strips and Other One-Sided Objects: [shorturl.at/ghF34](http://shorturl.at/ghF34)
- The Timeless Journey of the Möbius Strip: [shorturl.at/boEXY](http://shorturl.at/boEXY)
- Möbius Strips: [shorturl.at/bvJ56](http://shorturl.at/bvJ56)
- Mobius Strips: So Simple to Create, So Hard to Fathom: [shorturl.at/nKMYZ](http://shorturl.at/nKMYZ)



### Videos:

- Unexpected Shapes (Part 1) - Numberphile: [shorturl.at/zCHNT](http://shorturl.at/zCHNT)
  - Music on a Clear Möbius Strip - Numberphile: [shorturl.at/mnMRW](http://shorturl.at/mnMRW)
  - Klein Bottles - Numberphile: [shorturl.at/iGMX9](http://shorturl.at/iGMX9)
  - Cutting a Möbius strip in half (and more) | Animated Topology |: [shorturl.at/fnprG](http://shorturl.at/fnprG)
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