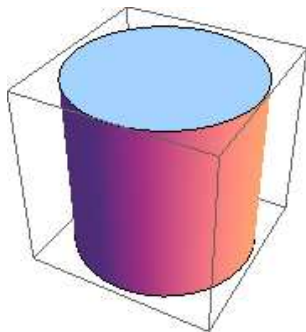


Maths 190 Lecture 20

- ▶ **Topic for today:** The band that wouldn't stop playing
- ▶ **Question of the day:** Is there a shape with one edge and one side?

The cylinder



The cylinder has two sides and two edges. It is formed by taking a piece of paper and sticking two edges together.

August Ferdinand Möbius



A. F. Möbius.

How to make a Möbius band

Take a strip of paper, give it half a twist, and stick the ends together.

Möbius band

- ▶ Colour the edge. What happens?
- ▶ Walk the length of the band. What happens?

Möbius band

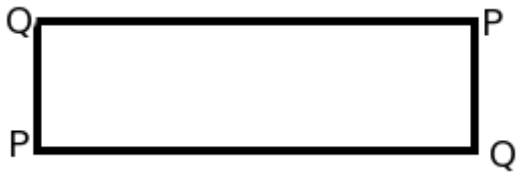
The Möbius band has one edge and one side!



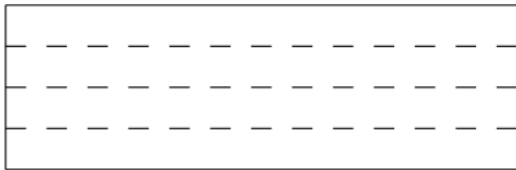
Möbius band

- ▶ Cut along the middle. What happens?
- ▶ How many edges and sides does the new band have?
- ▶ Start with a new Möbius band.
What do you think would happen if you cut along the band, but this time keep really close to the edge?

Möbius band



Möbius band



Two sides and no edges?

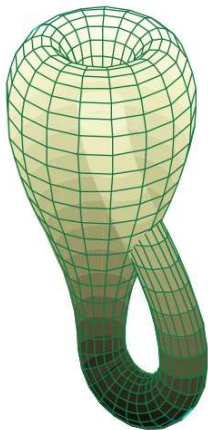
Is there such a shape?

What about a shape with one side and no edges?

One side and no edges?

The Klein bottle has one side and no edges.

It cannot be constructed in 3 dimensions.



Important ideas from today



We explored the Möbius band. This is a shape with one edge and one side. We also considered the sphere and the Klein bottle.

Read 5.2 of the book.