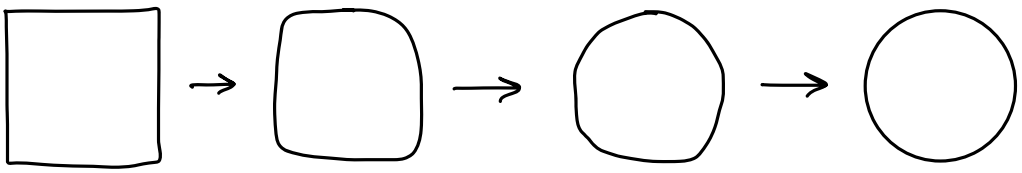
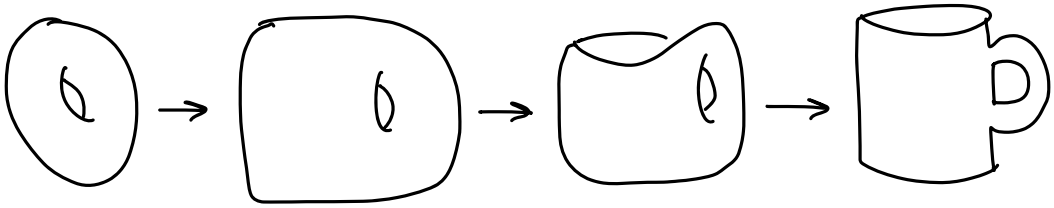
"Twist & Shout" & "Thinking Globally" (Joy, Ch 27-28)

Topology & Modern Geometry

• Topology

- geometry's "loosey goosey" cousin
- concerned with deepest properties of shapes, features that do not change under _____
  - stretching, bending, smoothing, squishing : all ____
  - ripping, puncturing, gluing : _____



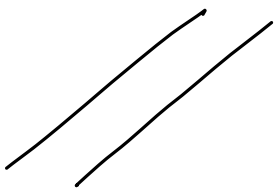


"A topologist is a person who cannot tell the difference between a coffee mug & a donut."

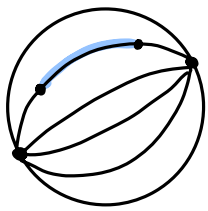
- practical applications : sensor networks & robotics, patterns in big data, political science & economics, chemistry, ...

• Modern Geometry

- vs ancient, plane geometry
  - "straight" paths are ____
  - parallel lines ____ meet



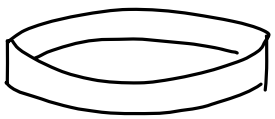
- geometry on curvy spaces
  - ex: surface of sphere (globe)
    - "straight" paths are ____ of _____
    - parallel ones ___ meet



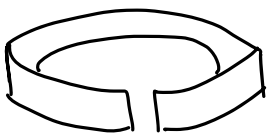
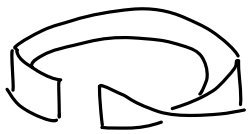
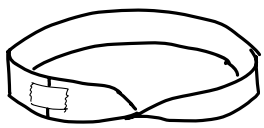
  - general relativity : _____ is curvature of "spacetime" (GPS)

Demo : Mobius Band

- Each group needs :
  - 5 thin (½ inch) strips of paper
  - enough thicker (1½ in.) strips for each person to have one
  - 1 tape dispenser
  - enough scissors for each person to have a pair
- As a group, make several bands (from thin strips)

(1) no twist :  # sides : ____

(2) half twist

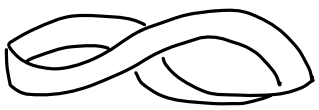




Mobius band

sides : ____

flip end & tape

(3) 2 half twists (full twist)



sides : ____

For each band, draw line down center.
One-sided?
Or two sided?

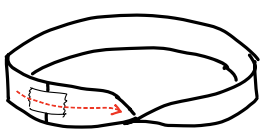
(4) 3 half twists # sides : ____

(5) 4 half twists (double twist) # sides : ____

- Each person : use a thick strip to make Mobius band

Then, either

cut down center line

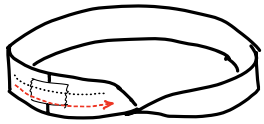


:

cut down center line again?

or

cut down one-third line



What do you get?