

Totally Topological Tricks

Big Concepts:

- Topology
This lesson looks into knot theory, as well as other topological concepts

Materials:

- Button Up Shirts
- Sweatpants
- String
- Paper and scissors All of these items should be set up as seen at this website:

Prep Before Lesson:

- Watch these videos to learn the topological tricks
 - <https://www.youtube.com/watch?v=MrN1hNzXoec>
 - <https://www.youtube.com/watch?v=34OsWAmffjY>
 - <https://www.youtube.com/watch?v=aiNl-EL6vfk>
- Place stacks of paper and scissors on tables
- Prepare strings for loose handcuffs, and shirts as shown in youtube videos

Lesson Plan:

:00–:30 *Introduction - What is topology*

- Have students share what they think of when they hear the word “topology”
- Mobius Strip Activity
 - * Have students make mobius strips with construction paper; ask them what they notice; have them observe properties of the shape
 - * Have students cut the mobius strip in half (the long way) or in thirds. Ask how cutting the surface changed its properties. Is it still the same? What do we mean by sameness? You can have them repeat the process. Give time for open exploration
- Transition
 - * Using the information from the activity, ask if students have any new ideas of what topology is? (Highlight things about classification, twists, holes, etc.)
 - * How can we use properties of objects to solve puzzles?

:30–1:15 *The Puzzles*

- Have students get in small groups (no more than 4) and have them work on one of the puzzles from the videos above. As they explore, they should be asking whether the puzzle is easy, difficult, or impossible.
- As students get frustrated, give minor hints (what shapes are we working with? What would make it impossible? What have you tried so far? Etc.), have them switch activities, or have them take a break. Be encouraging

1:15–1:30 *Conclusion*

- Have students present solutions if they have them
- Ask them what they think math research is like and how this activity could be related
- Ask what made each puzzle difficult
- Ask if they have any new ideas of what topology is and tie everything together

1:30–1:45 *Clean Up*