

# 2.8

# GLACIER DYNAMICS

## What makes a glacier slip?

Activity Time: 45 minutes

### Background

Under the pressure of its own weight and forces of gravity, a glacier moves outwards and downhill. Valley glaciers flow down valleys and very large glaciers (ice sheets) flow outward in all directions from a central point. Glaciers can also move when the glacier slips on a thin layer of water at the bottom of the glacier. This water may come from glacial melting at the base (due to the pressure of the weight of the ice) or from water that has worked its way through the cracks when ice melted at the surface. The layer of water reduces friction and causes the glacier to move faster downhill.

### Directions

1. Show pictures of glaciers at:  
<https://www.cresis.ku.edu/gallery/photo/greenland-field-work>
2. Give students time to explore the goo if they have not used it. What happens if you pull on it slowly? Quickly?
3. Ask students to place the entire amount of goo at the top of the goo chute and mark the chute at the goo's highest point.
4. Set the timer for 5 minutes.
5. Mark where the goo stopped.
6. Measure the distance the goo traveled from start to finish.
7. Determine the rate of flow by:

$$\frac{\text{Distance goo traveled (in centimeters)}}{\text{Time}}$$

8. Set up the experiment again, marking the beginning of the goo.
9. Set timer for 5 minutes
10. Poke a straw through the goo as close to the top of the goo as possible.
11. Add 10ml (2 t) of water through the straw.
12. Measure the distance the goo traveled from start to finish.
13. Determine the rate of flow now that you added water.

### Discussion

- Which goo traveled fastest? Slowest?
- Why? (*faster due to less friction*)
- What does this tell you about glaciers? (*They move faster with water at their base*)
- Why is it important for scientists to find out how fast glaciers move?

### Assessment

Complete **Assessment 2.8**: *What makes a glacier slip?*

### Extension

Have students design their own glacier investigations using goo and water.

### Materials

*Per Team:*

- One recipe of goo (**see attached recipe**)
- One goo chute (PVC pipe or cookie sheet)
- Books to prop up chute
- Dry erase marker
- Medicine dropper with marked measurements
- Pencil
- Ruler
- Straw
- Water

### Vocabulary

**Friction:** the resistance of two objects against each other when one or both are moving.

### ALIGNMENT TO NGSS:

*Scientific and Engineering Practices*

- Asking questions
- Using models
- Planning and carrying out investigations
- Using mathematics and computational thinking
- Analyzing and interpreting data
- Constructing explanations
- Engaging in argument from evidence
- Obtaining, evaluating, and communicating information

*Crosscutting Concepts*

- Cause and effect
- Systems and models
- Stability and change

*Disciplinary Core Ideas*

- K-5: ESS1.C; ESS2A; ESS2.C
- 6-8: ESS1.C; ESS2A; ESS2.C