# Cold As Ice
# 4th Grade

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**References:**

- Lesson plan from CPS 4th grade Earth Science curriculum guide

**Benchmarks**:

(Benchmark B): Summarize the processes that shape the Earth's surface and describe evidence of those processes. ES-8: Describe how wind, water, and ice shape and reshape Earth's land surface by eroding rock and soil in some areas and depositing them in other areas producing characteristic landforms.

**Objectives**:

Students should be able to describe how glaciers cause weathering of landforms, as well as the movement of sediment to new locations through slow movement of ice. Students should be aware that glaciers have existed for millions of years and have been shaping the Earth's surface ever since. Even the land here in Ohio was once covered and shaped by a glacier.

**Materials:**

- Modeling clay
- Ice
- Sand
- Clock or timer
- Tray or paper towels
- Square cake pan
- Brick or any object of similar size and weight
- Access to a freezer with a wire rack
- Student lab sheet

**Initial Demonstration**:

This demonstration provides and introduction into glaciers and how they move. Before the lesson begins, make sure to fill the cake pan with water and allow it to freeze into a block. Remove the block of ice from the pan and set the ice block on the wire rack in the freezer. Lay the brick on top of the ice block and allow it to sit for 24 hours. The students must know what you have done to prepare for the lesson, so take a minute to explain to them what has been done. Make sure they know that the ice was a solid block before hand with no marks or grooves in it. Have the students observe the bottom of the ice block. Explain to them that the shape of the block is a result of many things, and this is how glaciers move. Glaciers are large masses of ice in motion, so when enough ice builds up, the pressure on the bottom layer of ice is so great that it becomes soft and

pliable. The softer ice moves outward like thick honey. As long as snow continues to fall on the surface, the height of the glacier remains constant and fingers of ice move out from the bottom of the mountain of ice. Some glaciers move only a few centimeters each day, while others move many meters in a single day.

**Target Observations**:

- The brick smashes the ice block down onto the wire rack.
- The ice moves through the spaces between the wire rack, called fingers.

**Target Model**:

- Glaciers are one of the largest contributors to the formation of landforms we see today, as a result of weathering and erosion.
- Even though glaciers are slow moving, their large sizes and weight are capable to moving large amounts of dirt and rock.

**Procedure**:

Students will work in groups of 4 and each student will need a small block of modeling clay, an ice cube, sand, a tray or paper towel, a clock or a timer, and their student lab sheet. Students will press an ice cube against the flat surface of the modeling clay and move it back and forth several times. Observe and record on their lab sheet. Students should then place a small pile of sand on the clay and place the ice cube on top of the sand. The ice cube should be left on top of the sandy clay for one minute. Students should then pick up the ice cube and observe the surface of the cube that was touching the sand. Again, record the observation in the Student lab sheet. The same side of the ice cube should then be placed on the sandy part of the clay again and moved back and forth several times. The students will then remove the ice cube and wipe away the sand from the surface of the clay. Observe the surface texture of the clay and record on the lab sheet.

**Target Observations**:

- The sand caused small indentions in the ice.
- The clay smoothed out after the ice was rubbed on it the first time.
- The surface of the clay changed after the ice was rubbed on it a second time.

**Summary:**

The Earth's surface is constantly changing. Students participate in a guided inquiry, hands on lesson using ice, clay and sand to simulate a glacier moving over land with sediment.