

# Freezing Cracks

## 4<sup>th</sup> 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-9: Identify and describe how freezing, thawing, and plant growth reshape the land surface by causing the weathering of rock.

### Objectives:

Students should be able to describe how weather events such as ice, snow, and freezing water cause weathering of the Earth's surface and rocks. Students should be able to distinguish between erosion and weathering, and understand that freezing water expands to create cracks and broken rocks over time.

### Materials:

- Glass pickle jar w/ lid
- Water
- Small plastic bag
- Clay
- Freezer
- Rulers
- Student lab sheet

### Initial Demonstration:

Fill a glass pickle jar to the very top and cap it off. Place the jar inside a bucket or wrap a towel around it to prevent the glass from breaking into pieces in the freezer. Put it in the freezer over night. Introduce the word "**Ice wedging.**" (Ice is serving as the wedge). Students should find that both plants and ice can cause a rock to break up.

### Target Observations:

- Weathering causes rocks to break up.
- Freezing water expands to cause the jar to break into pieces, just like rocks.

### **Target Model:**

- Freezing water causes weathering of rocks.
- Water expanding and contracting over several years will eventually cause large pieces of mountains to break off and break into smaller pieces, which eventually turns into dirt and sand.

### **Procedure:**

Each pair of students will get a chunk of clay about the size of a grapefruit. Roll it into a ball. Place the ball in a plastic bag and put it in the freezer. Leave it overnight. The next day, remove the clay from the freezer. Have the students observe the surface of the clay. The surface should be slightly cracked and broken. Students will record their observations on their student lab sheet. Wet the clay again, taking care not to close up the cracks that have been formed. Put it back into the freezer for another night.

On the following day, take it out of the freezer and have the students observe what has happened to the cracks. Measure the cracks. Students will record their observations from Day 2 on their lab sheet. You can repeat this process several more times, watching the cracks widen. Discuss how this relates to the breaking down of rocks when rain or water gets into the cracks and then freezes.

### **Target Observations:**

- The clay had small cracks after the first day.
- The cracks got bigger after wetting the clay and putting it back into the freezer.
- If the process was continued, the cracks would get so large that then clay ball would break apart.
- This is how sidewalks and roads get cracks and potholes.

### **Summary:**

Students will use a ball of clay to simulate a rock. They will wet the clay and place it in a freezer. They will leave it overnight and then take it out and observe it. They will do this several times to show how water gets into cracks in the rocks and sidewalks and freezes, then expands and breaks down the rocks.