

MENDENHALL GLACIER EROSION

Science Concept:

Glacial erosion changes Earth's surface.

Objectives:

The student will:

- define glacial erosion and draw a map on erosion;
- infer and generalize about visitors at a glacial park; and
- create a travel brochure about a glacier.

GLEs Addressed:

Science

- (5)SD2.1 The student demonstrates an understanding of the forces that shape Earth by describing how wind and water tear down and build up the Earth's surface resulting in new land formations (i.e., deltas, moraines, and canyons).
- (5) SA1.1 The student demonstrates an understanding of the processes of science by asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring, and communicating.

Writing

- (5) W2.2.2 The student writes for a variety of purposes and audiences by writing in a variety of nonfiction forms using appropriate information and structure (i.e., step-by-step directions, descriptions, observations, or report writing).

Vocabulary:

erosion – removal of material by water, wind or ice

weathering – includes two-surface or near-surface processes that work in concert to decompose rocks; both processes occur in place; no movement is involved in weathering

mechanical weathering – involves physically breaking rocks into fragments without changing the chemical make-up of the minerals within it; mechanical weathering includes processes such as cracks freezing and expanding, or changes in temperatures that expand and shrink individual minerals enough to break them apart

Materials:

- Blue-colored sports drink
- Vanilla wafers (three boxes, ground to represent sand)
- Saltwater taffy (four bags)
- Skittles® (six bags)
- Shredded/shaved ice (four cups)
- Clear juice of any flavor (four bottles)
- Spray bottles (six)
- Paper towels
- Plastic resealable sandwich bags (one for each group)
- Gallon-size plastic bag (one)
- Pencils (one per student)
- Sticky notes (two per student)
- Large file folder (one)
- Science journals (one per student)
- Pictures of Mendenhall Glacier

Activity Preparation:

1. At least one day ahead, pour blue sports drink into ice cube trays and freeze.
2. Access pictures of Mendenhall Glacier on websites such as the U.S. Forest Service page for the Tongass National Forest - Mendenhall Glacier.
3. Place vanilla wafers in gallon-size bag then crush them until the cookies are like fine sand.
4. Mound about 8-10 pieces of saltwater taffy together and put in plastic sandwich bags, one for each group. (The taffy will be used like modeling clay.)
5. Write the directions for the Explore activity on chart paper with pictures. Label the large file folder with one side labeled as What We Know and the other side What We Learned.
6. Fill spray bottles with clear juice.

Activity Procedure:

Please refer to the assessment task and scoring rubric located at the end of these instructions. Discuss the assessment descriptors with the class before teaching this lesson.

Gear Up

Process Skills: observing, inferring, and communicating

1. Ask students what they already know about glacier erosion. Have everyone write or draw a picture of their definition on a sticky note and post on class file folder on the What We Know section.
2. Show pictures of the Mendenhall Glacier. Tell students they will participate in an activity that will demonstrate how glaciers can cause dramatic changes (erosion).

Explore

Process Skills: observing, investigating, and developing models

3. Have students thoroughly wash their hands then divide them into small groups. Tell students they are going to design edible glaciers using cookies, candy and blue ice. They will record observations of how glaciers change in their science journals as they complete the activity. Review the following directions:
 - a. Flatten taffy then press a piece of ice against it and move it back and forth; record observations in science journal.
 - b. Place ground-up vanilla wafers (sand) on the saltwater taffy then put the ice cube (glacier) on top of the vanilla wafers (sand). Leave the glacier on the sand for a few minutes, then record observations.
 - c. Pick up the ice cube and observe the surface of the cube that was touching the taffy and sand and record observations.
 - d. Replace the ice cube on the sandy part of the salt-water taffy and move it back in forth. Remove the ice, wipe away the sand and record observations.
4. Offer the opportunity for students to explore a variety of weather combinations, because nature has different combinations. Ask students to try adding rain (spray bottles with juice), rocks/boulders (skittles) and shredded/shaved ice to their model in order to explore how a glacier might change. Have students record observations.
5. Allow students to eat exploration, if they choose.

Generalize

Process Skills: describing, generalizing, inferring, and communicating

6. Ask the following questions and record responses on the side of file folder labeled, "What We Learned":
 - a. What happened to the saltwater taffy the first time you rubbed the cube against it?
 - b. What happened to the ice cube after it sat on the vanilla wafers (sand)?
 - c. What did the saltwater taffy look like after you rubbed the ice cube against it a second time?

MENDENHALL GLACIER EROSION

INSTRUCTIONS Grade 5



- d. How does glacier erosion still occur today?
- e. What are some examples of glacier erosion?
- f. How could we change this exploration to add wind erosion?

Apply

Process Skills: describing, making generalizations, and inferring

- 7. Ask students to write or draw a picture in their science notebook to describe how glacier erosion impacts the glaciers in Juneau, Alaska.

Source:

- (2009). *Welcome to the Mendenhall Glacier visitor center*. Retrieved June 30, 2009, from U.S. Forest Service Tongass National Forest website: <http://www.fs.fed.us/r10/tongass/districts/mendenhall/>
- (2009). *Geologic glossary*. Retrieved June 30, 2009, from United States Geological Survey website: <http://www.nature.nps.gov/geology/USGSNPS/misc/glossaryAtoC.html>
- Ansberry, K & Morgan, E. (2005). *Picture-Perfect Science Lessons: Using Children's Books to Guide Inquiry, 3-6*. National Teachers Association: Arlington, Virginia.

THE GREAT RACE

RUBRIC

Assessment Task:

The students will create a travel brochure about the Mendenhall Glacier in the Tongass National Forest, Juneau, Alaska. The brochure will include definitions of glacial weathering and erosion, include examples of glacial erosion, and a map of the Mendenhall Glacier that includes at least two areas of glacial erosion. The student will make at least two inferences and generalizations about what visitors can do while visiting a glacier park. The brochure will include a slogan, a map, captions and labels.

Rubric

Objective	GLE	Below Proficient	Proficient	Above Proficient
The student defines glacial erosion and draws a map that depicts erosion.	(5)SD2.1	The student does not attempt; or defines glacial weathering or erosion, or does not draw a map of a glacier.	The student defines glacier weathering and erosion; draws a map of Mendenhall Glacier, including at least two areas of glacial erosion.	The student defines glacier weathering and erosion and draws a map of Mendenhall Glacier that includes at least three areas of glacial erosion.
The student infers and generalizes about what visitors do at a glacier park.	(5)SA.1.1	The student does not attempt or makes either an inference or generalization about what visitors do while visiting a glacier park.	The student makes one inference and one generalization about what visitors can do while visiting a glacier park.	The student makes multiple inferences and generalizations about what visitors can do while visiting a glacier park.
The student will create a travel brochure about a glacier that includes a slogan, captions and labels.	(5)W2.2.2	The student does not attempt or creates a brochure but is missing one or more of the following parts: slogan, map captions and labels.	The student creates a brochure that has a slogan, map, captions and labels.	The student creates a brochure that has a slogan, map, captions and labels and includes additional drawings. The brochure has three or more reasons why to visit, and a map that shows the correct location of Mendenhall Glacier.

