

BLOWIN' EROSION

Science Concept:

Wind changes the surface of Earth through erosion.

Objectives:

The student will:

- describe how wind shapes Earth's surface through erosion;
- infer and make generalizations about wind erosion; and
- create a computer-generated presentation on wind erosion.

GLEs Addressed:

Science

- [4] SD2.1 The student demonstrates an understanding of the forces that shape Earth by observing models of how waves, wind, water, and ice shape and reshape Earth's surface by eroding rock and soil.
- [4] 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

- [4] 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., personal letters, recounts, descriptions, or observations).

Vocabulary:

deposit – solid material left or laid down by a natural process; includes layers of mud left by a stream, piles of stones left by a melting glacier, or layers of coal formed over many years

erosion – the gradual wearing away of the surface of land by water, wind, or a glacier; erosion usually moves the loosened material, such as rocks and soil, from one place to another and can be very damaging to the habitats of wildlife and to land used for farming

sediment – material such as silt, sand, or rock that has been moved from one place to another by water, wind, or a glacier; over time, sediment can harden into sedimentary rock

suspension – a mixture in which small particles of a substance are spread out in a gas or liquid; if a suspension is left alone, sooner or later the particles will settle down to the bottom

wind – a flow of air, especially a natural flow that moves along the surface of Earth

Materials:

- Science notebook (one per student)
- Safety goggles (one pair per student)
- Large trays or shallow boxes (one per group)
- Sand (one gallon per group, plus enough for teacher demonstration)
- Gravel (one quart per group)
- Water (one quart per group, save for last)
- Leaf litter or hole-punch dots (one pint per group)
- Tube (paper towel roll or other cardboard tube will do, one per student plus one for teacher)
- Butcher paper (one yard per group plus one for teacher demonstration)
- Colander (one for straining sand after activity)

References:

Wind Tunnel <http://www.oznet.ksu.edu/fieldday/kids/wind/wind-tunnel.htm> (6-17-09)

Dig This! Erosion Investigation <http://www.cas.muohio.edu/scienceforohio/Erosion/L.html> (6-17-09)

Activity Preparation:

Write the directions for the Explore activity (see 3. a.) on chart paper or the board and gather materials for Gear Up and Explore.

Teacher Note: Wind erosion is the removal of soil from the land by wind. It includes the breaking away of soil particles from the soil surface, movement downwind, and the soil particles settling out when the wind slows. One of the tools used by scientists is the wind tunnel, a tube-like structure or passage in which wind is generated by a large fan and flows over the soil surface to simulate wind in natural conditions. The paper towel tube used in this activity simulates a wind tunnel. Using these wind tunnels, students will create small wind storms then explore how the wind shapes Earth's surface and what features effect wind erosion.

Because this activity involves blowing sand, students are required to wear safety goggles.

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: *predicting and communicating*

1. Divide students into pairs prior to demonstration. Dump a large bucket of sand on a paper-covered table or countertop so that the resulting pile is strategically placed between you and the students. Pick up a tube, take a deep breath, and place the tube to your lips as if you're about to blow through the wind tunnel. Ask the following questions:
 - a. What do you predict will happen if I blow through this tube or "wind tunnel"?
 - b. Are there any processes in nature or weather events that produce similar results?
2. Have students record their answers in their science notebooks. Once they are done, allow partners to share their ideas with each other, allotting one minute each. Ask students to share their ideas and predictions with the class.

Explore

Process Skills: *predicting, observing, describing, inferring, and developing models*

3. Divide students into cooperative groups of four. Ask students to design and build a wind erosion model using the following directions:
 - a. Draw the following chart in your science notebook:

Material(s)	Prediction	Observation	Explanation
Sand			

- b. Place about 10 handfuls of sand into a large tray or shallow box. Position the tray on a hard surface, on top of a piece of butcher paper.
 - c. Predict what you think will happen if you use the wind tunnel to create wind along the surface of the sand. Record your predictions.

- d. Using the wind tunnel, blow air along the surface of the sand and record your observations. Why do you think that happened? Record your explanation.
- e. Repeat the activity using any of the resources available to you.
4. After students have had the opportunity to explore with sand, gravel, and the hole-punch dots, ask them to add water to the available materials; this should be the final material used in the exploration. Ask students to record all observations in science notebook.

Generalize

Process skills: describing, making generalizations, inferring, and communicating

5. In a whole-group discussion format, pose the following questions:
 - a. What happened to the sand?
 - b. Why do you think this happened?
 - c. How do your predictions compare with your observed results?
 - d. How did adding other materials to the sand affect the results?
 - e. What do you think the other materials represent?
 - f. Where might something similar happen in the environment? (mud flats, glaciers, river beds, deserts)
 - g. How would having a bare-sand or bare-soil environment be different from one with other materials mixed in or on top?
 - h. How did the intensity of the wind affect the results?
 - i. How did the angle of the wind affect the results?
 - j. What happened to the sand as it reached the edge of the pan?
 - k. What happens downwind? (butcher paper)
 - l. How can particles be re-suspended after they were blown away initially?
 - m. What is wind erosion?
 - n. What are ways that people can prevent wind erosion?
 - o. What other events besides wind put particles into the air?
 - p. What are other materials besides sediments that are carried by wind?
 - q. How does wind change the surface of Earth?

Apply

Process Skills: describing, predicting, inferring, and making generalizations

6. Students should return to their science notebooks and record the following:
 - a. Describe and illustrate at least one way in which your local area is affected by wind erosion.
 - b. What conditions do you predict might change the amount of erosion by wind?
 - c. What could you do to test your prediction?

Extension Idea:

Further Explore or Generalize session might include testing predictions.

Source:

Editors of the American heritage dictionaries, (2009). *The American heritage student science dictionary*.
Wilmington, MA: Houghton Mifflin Co.

BLOWIN' EROSION

RUBRIC

Assessment:

In cooperative groups of four, students will create a computer-generated presentation that describes how wind shapes Earth's surface through erosion by transporting sediments. In a written script of a voice-over or dialog, include at least three details of the process of wind erosion, and include at least one inference and one generalization about how wind changes Earth's surface through erosion.

Rubric

Objective	GLE	Below Proficient	Proficient	Above Proficient
The student describes how wind shapes Earth's surface through erosion.	[4] SD2.1	The student does not describe how wind shapes Earth's surface through erosion by transporting sediments or includes less than three details.	The student describes how wind shapes Earth's surface through erosion by transporting sediments and includes three details.	The student describes how wind shapes Earth's surface through erosion by transporting sediments and includes more than three details.
The student infers and makes generalizations about wind erosion.	[4] SA1.1	The student makes either an inference or a generalization about how wind changes Earth's surface through erosion.	The student makes both an inference and a generalization about how wind changes Earth's surface through erosion.	The student makes more than one inference and generalization about how wind changes Earth's surface through erosion.
The student creates a computer-generated presentation on wind erosion.	[4] W2.2.2	The student does not create a computer-generated presentation on wind erosion or does not write an accompanying script of voice-over or dialog.	The student creates a computer-generated presentation on wind erosion with an accompanying written script of voice-over or dialog.	The student creates a computer-generated presentation on wind erosion with an accompanying written script of voice-over or dialog that has correct capitalization, punctuation, and spelling.

