

Investigation Five – Physical Land Features

Standard II Students will understand that volcanoes, earthquakes, uplift, weathering, and erosion reshape Earth's surface.
Objective 3 Relate the building up and breaking down of Earth's surface over time to the various physical land features.
Intended Learning Outcomes <ol style="list-style-type: none">1. Use science process and thinking skills2. Manifest scientific attitudes and interests3. Understand science concepts and principles4. Communicate effectively using science and language and reasoning5. Demonstrate awareness of social and historical aspects of science.

Standard II

Objective 3

Background Information

Geologic time is measured in millions of years (MYA). The acronym **MYA** is used because the time span is so large. We know the most about recent history because it has left the most evidence of physical land features and changes.

Pre-Assessment/Invitation to Learn

Prepare a timeline of your own life to show to your students. You will need to show 15-20 things that have happened over the course of your life. Begin with your birth (using as accurate dates as possible) and ending with your current age and date. Show students your timeline and tell them some of the highlights of your life. Explain that many of the items on your timeline have occurred in the recent past, when memory is more clear and vivid.

1. Give students an 8 ½" x 11" sheet of paper and have them list 9-10 events that have occurred in their lives, including their birth as the first item. Ask them to give a date of each occurrence to the best of their knowledge (e.g., born Aug. 12th, 1992; broke arm Feb. 14th, 1999; went to Disneyland June 1st, 2002, etc.)
2. Hand out a 3" x 24" timeline strip to each of your students. Using a ruler have them divide the timeline into 2" segments with each segment representing one of the events they identified on their rough drafts. Then have the students fill in the events along with the corresponding years. Have them bullet each year with a different color. Remind them they will not necessarily have one item per year and that many events may have occurred more recently.

Materials

- Manila strips of paper (3' x 24"); one per student
- Colored pencils, pens or crayons
- Rulers
- 8 ½" x 11" sheet of paper and a pencil

3. Have the timeline begin with their births and end with them being in your 5th grade classroom. It is important they understand there does not need to be one event per year of their lives. Hopefully they will have more events concentrated in the recent past.
4. Have them date each experience to the best of their memories and draw descriptions at the top of their papers.

Instructional Procedure

Activity One – Utah’s Geological Features

Materials

- Computer
- Internet
- Projector
- USU website
www.usu.edu/geoldept/

1. Explain to the students that life of Earth can be illustrated on a timeline also, and is often measured using the term MYA (million years ago)
2. Give a few examples of geologic timeline events in Utah:
 - Utah under warm seas: 1000 MYA.
 - Uplift of Uinta Mountains: 65 MYA
 - Earthquakes, glaciers, Lake Bonneville, water erosion: 15 MYA.
3. Take the students on a Chronology Field Trip by showing them slides of various geological features that have developed throughout Utah over time: www.usu.edu/geoldept/
 - Ice
U-shaped valleys found in Northern Utah
 - Weathering & Erosion
Arches in Arches National Park
Grand Canyon
Stalagtites and Stalagmites in Timpanogos Cave
Terraces formed by Lake Bonneville
Sand Dunes
Thistle mud slide
 - Earthquakes
Uinta Mountains
Mountains in Northern and Central Utah
 - Volcanoes
Southern Utah
Topaz Mountain
 - Uplift
Colorado Plateau (Canyon Country in the southeast portion of the state)
4. Discuss whether the formations were sudden or took place over time.

Materials

For each group

- Adding machine
- Tape
- A metric tape measure
- Marker or crayons to label the tape

Activity Two – Timeline Activity

1. 2000 MYA: “basement” rocks deposited. Measure 200 centimeters (2 meters), draw a line and label 2000 MYA: “basement rocks deposited.
2. 1000 MYA: Utah is under warm seas. Measure 100 centimeters (1 meter), draw a line, and label 1000 MYA: Utah is under warm seas.

3. 350 MYA: Sand and mud deposited in thick layers. Measure 35 centimeters, draw a line and label 350 MYA: Sand and Mud Deposited in Thick Layers.
4. 200 MYA: Desert environments, sand dune deposits. Measure 20 centimeters, draw a line and label 200 MYA: Desert Environments, Sand Dune Deposits.
5. 100 MYA: Mountain building and compression of land. Measure 10 centimeters, draw a line and label 100 MYA: Mountain Building and Compression of Land.
6. 65 MYA: Uplift of Uinta Mountains. Measure 6.5 millimeters, draw a line and label 65 MYA: Uplift of Uinta Mountains.
7. 35 MYA: Volcanic activity occurs, above and below the ground. Measure 3.5 millimeters, draw a line and label 35 MYA: Volcanic Activity Occurs, Above and Below the Ground.
8. 15 MYA: Earthquakes, glaciers, Lake Bonneville, water erosion. Measure 1.5 millimeters, draw a line and label 15 MYA: Earthquakes, Glaciers, Lake Bonneville, Water Erosion.
9. Present Day: Put a small dot to represent the time period we are living in now.

Discussion:

- Have one student from each group hold the tape so that the present day is in their upraised hand and the rest of the tape is on the floor. Emphasize the fact that geologic time is a very long time.
- Make a connection to the Grand Canyon. The Grand Canyon is a mile-deep. It cuts through 20 different layers of rock. It represents nearly 20 million years. The youngest rocks are at the top of the canyon walls. The oldest rocks are at the bottom of the canyon.
- Ask them to predict how much of the tape would represent the time period that has passed in the weathering and erosion of the Grand Canyon.
- If you look at your tape, the top of the canyon is represented with the dot. The bottom of the canyon would be about 2 centimeters or 20 millimeters from the top of the tape.

Curriculum Extensions

Language Arts –

Make a list of famous landforms both in the United States (i.e., Adirondack Mountains, Black Hills, Cape Cod, etc.) and around the world (Alps or the Matterhorn in Europe, Azores in the North Atlantic Ocean, Mount Vesuvius in Italy, etc.). Copy this list onto separate slips of paper. Have each student choose one. Have each student research his/her landform and write a short paragraph about what it is, how it was formed, and why it is unique. (Standard VIII, Objective6).

Visual Arts –

Have each student draw a picture to illustrate the information. The pictures and information could be displayed as a border around a map of the world. Use thumbtacks and string to pinpoint exact locations. (Standard III, Objectives 1, 2)

Assessment Suggestions

- Have students record their observations in their science journal.
- Have students take notes on their findings during the chronology fieldtrip on the Internet.

Reference to Assessment Section:

Unit Test	Multiple Choice	Constructed Response	Performance Test
1	3, 7, 9	2	Modeling Landforms
2		1, 2, 3, 4, 5, 6, 7	Shaping the Land Moving Along

Resources

Web sites:

- <http://www.usu.edu/geoldept/> (4-5 geological fieldtrips)
- www.surweb.org

Posters:

Utah Geologic Posters
Zion's Natural History
Salt Lake City, UT 84114

Books:

- Christian, Spencer. What Makes the Grand Canyon Grand? New York: John Wiley and Sons. ISBN: 0-471-19617-7

Homework & Family Connections

- Students with Internet connections at home can be asked to visit weather Web sites that are given in class to show their parents and family.
- Students can be assigned to watch the evening weather forecast on one of the TV news channels and watch for severe weather around the country.
- Have the students set up a weather station at home to continue their investigation about weather.