Earth Exploration Post-visit

Classroom Activities

Brief Synopsis

Students will utilize a website as a way t better understand how geologists have interpreted the history of the earth and how they have recorded geologic time through a series of divisions such as Epochs, Eras, and Periods. A second activity helps students further their understanding of what geologists do, either through continued web exploration (following a paleontologists) or through research projects to learn about local geology.

Ages: Designed for 5th—8th grade

Time Considerations: 1hour

Materials:
- Writing paper
- Pens
- Pencils
- Reference sources (books, internet, newspapers, etc.)

Vocabulary:
Epoch, Era, Evolution, Family, Fossil, Geological Period, Gondwanaland, Ice Ages, Laurasia, Paleontology, Pangaea, Supercontinent

Outcomes:
1. Students will be able to list the characteristics of all amphibians.
2. Students will describe the life cycle of a toad using props.
3. Students will use sounds to re-create frog behavior.
4. Students will use careful observations to identify different species of local amphibians.
5. Students will understand how counting amphibians can be a good way to measure the health of our environment.

Minnesota Academic Standards:
Science: 4. IV. B. 1 &4.V.B.1, 7.IV.E, 5.IV.E
Social Studies: 4-8.A.1
Math: 4.V.B.1
Language Arts: 4.I.A.1, 4.I.B.1&2, 4.III.A.1&2, 5.I.A.1, 5.I.B.1, 5.III.A.1&2, 6.I.B.4, 6.III.A.1&3, 7.I.A.1, 7.I.B.1&5, 7.III.A.1

Revised March 2007

Set-up

During the *Earth Exploration* class at Eagle Bluff, we walked through the geologic time scale, adding pictures for major events. This Post-Activity will help your students get a more detailed understanding of what the earth was like during the major periods in geologic history and how scientists have put together the geologic past. To help your students continue their studies of geologic processes and fossil formation, you will need to photocopy the attached **worksheet**, one for each student, **pencils** for each student, and **computer access to the internet**.

Activity 1: Layers of the Earth

Background: Geological processes are changing out landscapes all the time, but often at such a slow pace, we cannot even perceive any change occurring. This means geologists are required to track changes over a much greater span than one human lifetime. This has been done through advancements in technology as well as studying the layers and formations of rocks.

It has been estimated, using evidence such as the fossil and rock records, that life began 1.6 billion years after the earth was formed. Since then life has diversified considerably, resulting in millions of animal and plant species. Most are now extinct, however others survived. Scientists have separated and divided the story of life into geological eras, which are then separated into periods and further into epochs. We can then attempt to fit the fossilized animals and rocks found into these divisions in an effort to better understand the history of the earth.

Procedures:
1. First have your students log on to the following website:

   http://www.ucmp.berkeley.edu/education/explorations/tours/geotime/gtpage1.html

2. Have them navigate the entire website once before handing out the worksheet.
3. Next, hand out worksheets to each student and have them read through it.
4. Ask if there are questions about what the worksheet says and means.
5. Then, have students re-start the website again to go through the website a second time, filling out the worksheet as they go.
6. At the end of their journey through this website, students will be asked some self-correcting multiple choice questions. You might use the quiz questions at the end of the web exploration as part of a unit test to cover geologic time.
   - Are your students able to follow along with the web page and worksheet?

- Do they use the vocabulary words with fluency and accuracy?
- Can your students give examples of major biological changes in geologic time?
- Can your students explain the difference between relative and absolute dating?
- Can your students describe methods used for the dating of fossils?
- Can your students explain why geologic time is broken up into Epochs, Eras, and Periods?

Activity 2: Adventures at Dry Creek

Background: To further their understanding of how fossils are used to create and understand geologic time. *Adventures at Dry Creek* is an interactive field and laboratory experience that could introduces students to the idea of keeping a notebook of field journal while conducting scientific research. There is a teacher's guide to go along with this portion of the website, to help you prepare your student for navigating the Adventures at Dry Creek experience. The teacher's guide can be found at the following web address:

http://www.ucmp.berkeley.edu/education/explorations/reslab/newdc/moddc/guide/catteach.html

Procedure:

1. Have students log on to the *Adventures at Dry Creek* unit on the same website as Activity 1.

http://www.ucmp.berkeley.edu/education/explorations/reslab/newdc/moddc/invite/school_or_indiv.html

2. Students will read the entries from a field notebook and make entries into an electronic notebook of their own.
3. Students will print out their final field notebook to share with a partner, the class or to put on display.

Activity 3: Geologic History of Minnesota

Background: Have students research the geologic history and supporting evidence of that history for Minnesota. This could be in the form of a poster, timeline, oral report/presentation or more formal term paper.

Teacher Tips

- Take time to navigate the website yourself before you give this assignment, that way you may be better able to predict where your students may struggle and can offer better guidance.
- If the worksheet is too time consuming, simply have your students explore the website without it and conduct a classroom discussion based on the ideas presented in the website.
- If you choose to complete the second or third activity, you may want to display the final "notebooks" or projects/reports to help teach the rest of your school about Minnesota's geologic history.

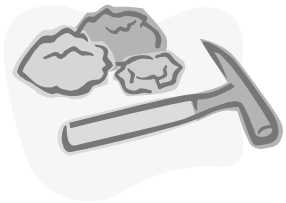
Additional Resources

http://near.jhuapl.edu/Education/lessonHazards/act2hazards.html
An additional activity written by two teachers for building a geologic timeline with adding machine paper and a meter stick.

http://www.ucmp.berkeley.edu/education/explotime.html
This is the title page for several well-done online explorations about geology developed by UC Berkeley.

http://www2.nature.nps.gov/geology/esw/k_g_fws.htm
Earth Exploration fossil word search.

Worksheet: Geologic Time



http://www.ucmp.berkeley.edu/education/explorations/tours/geotime/gtpage1.html

1. How old do geologists thing the earth is?

2. What is the difference between relative order of events and absolute date of when events happened?

   Relative order means…

   Absolute dating means…

3. When looking at a cross-section of a hillside, how can you tell which rock is the oldest layer?

4. What it the Law of Superposition?

5. Number the following fossils in order of oldest (1) to youngest (4):

   Eurypterids **Trilobites** **Brachiopods** **Amnonites**

6. Which method is used to give relative age of fossils and which method is used to give absolute dates?

   Radiometric dating gives…

   Law of Superposition gives…

7. Circle the Epoch which contains the most abundant and complex life on Earth?

   Phanerozoic **Proterozoic** **Archaen** **Pre-Archean**

8. Write down major distinctions for each geologic period below.

Cambrian:

Ordivician:

Silurian:

Devonion:

Carboniferious:

Permian:

Triassic:

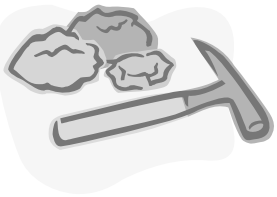
Jurassic:

Cretaceous:

Tertiary:

Quarternary:

Answer Sheet: Geologic Time



http://www.ucmp.berkeley.edu/education/explorations/tours/geotime/gtpage1.html

1. How old do geologists thing the earth is? About 4.6 billion years old.

2. What is the difference between relative order of events and absolute date of when events happened?

   Relative order means… Putting things in order of when they happened (1st, 2nd, 3rd, etc.).

   Absolute dating means… Giving actual times or dates to when things happened, like 2,000 years ago or in 1972.

3. When looking at a cross-section of a hillside, how can you tell which rock is the oldest layer?
   The oldest rock layer is the one at the bottom of the hillside.

4. What it the Law of Superposition? Rock layers are deposited on top of layers that were already there, which means older rocks are found under younger rocks.

5. Number the following fossils in order of oldest (1) to youngest (4):

   (3) **Eurypterids** (1) **Trilobites** (2) **Brachiopods** (4) **Amnonites**

6. Which method is used to give relative age of fossils and which method is used to give absolute dates?

   Radiometric dating gives… Absolute dates for events.

   Law of Superposition gives… Relative age of events.

7. Circle the Epoch which contains the most abundant and complex life on Earth?

   (**Phanerozoic**) **Proterozoic** **Archaen** **Pre-Archean**

8. Write down major distinctions for each geologic period below.

   Cambrian: Most major groups of animals first appeared.

   Ordivician: Diverse marine invertebrates and early vertebrates (conodonts).

   Silurian: Coral reefs and fishes, some life on land and earliest vascular plants appear.

   Devonion: Ferns and seed plants (the first trees) appear and more land animals appear.

   Carboniferious: Amniote eggs (can be laid on land) and large insects and tree ferns abound.

   Permian: Ferns and seed plants (the first trees) appear and more land animals appear.

   Triassic: Marine reptiles and modern conifers are the major life forms.

   Jurassic: Plant-eating dinosaurs exixt and there is a high level of diversity in the oceans.

   Cretaceous: Flowering plants dominate, modern mammals and birds appear.

   Tertiary: Flowering plants, grasses, insects, birds, and mammals flourish.

   Quarternary: Giant mammals exist to survive the cold glacial periods.