Making Good Impressions

Standard IV:
Students will understand how fossils are formed, where they may be found in Utah, and how they can be used to make inferences.

Objective 1:
Describe Utah fossils and explain how they were formed.

Intended Learning Outcomes:
1. Use Science Process and Thinking Skills
2. Manifest Scientific Attitudes and Interests
3. Understand Science Concepts and Principles
4. Communicate Effectively Using Science Language and Reasoning

Content Connections:
Math III-3, Visual Arts I-1 & 2, Language Arts VIII-6

Science Standard IV

Objective 1

Connections

Background Information

There are three types of impression fossils:

- *Imprints*—impressions of parts of organisms left in soil or sediment before it hardens, such as plants, leaves, fish, and feathers.
- *Traces*—impressions that show the activities of ancient life such as footprints, teeth marks, tracks, trails, burrows, body outlines, or a dragging tail.
- *Molds* and *casts* (oysters, clams, shelled fish, trilobites):

  molds—Spaces in rock that have the shapes and impressions of the remains of living things that once occupied those spaces.

  casts—Form when minerals or rock particles fill the spaces in molds having the same shapes and impressions of the living things or its remains.

Research Basis

Shapiro, E.S. (1996). *Academic skills problems: direct assessment and intervention.* ISBN 1-57230-093-0

This textbook has excellent information about Direct Instruction, which is one of the methods used in this activity. It explains what Direct Instruction is and provides research that shows how it is a very effective way of teaching.

National Academy Press. (200). *Inquiry and the National Science Education Standards, A Guide for Teaching and Learning*. 2101 Constitution Avenue, NW, Washington, DC 20418. ISBN 0-309-06476-7.

This guide is devoted to the use of the Inquiry method of teaching, which is also used in this activity.

Assessment Suggestions

- Students may be evaluated by the model they create, the diagram they draw, and the explanation they write in their journals.

Invitation to Learn

Materials

- ❑ Fossils, replicas, or pictures of five or six the following: Imprints (leaves, fish, feathers, etc.); Traces (footprints, tracks, teeth marks, dragging tail mark, skin prints, etc.); Casts and molds (oysters, clams, trilobites, etc.).

Tell the students that they are going to be learning about impression fossils today. (You may want to define impression for them at this time.) Have a few of the different impression fossils mixed up in five or six piles (imprints—leaves, fish, feathers; traces—footprints, tracks, teeth marks; casts—clams, oysters, trilobites). Have groups of students around each pile so they can look at them. Tell them that there are three types of impression fossils in the pile. They are to look at the fossils and group them by how they look. When they are done, discuss the three types of impression fossils—imprints, traces, and molds and casts. Have students group them accordingly if they haven't already. Describe each type of impression fossil and tell students that they are going to make each one today.

Instructional Procedures

Materials

For each student:

- ❑ Plaster of paris
- ❑ School milk carton or bottle
- ❑ Modeling clay
- ❑ Paper cup
- ❑ Craft stick
- ❑ Water
- ❑ Shell with a lot of detail

Part I

1. Put about a half a stick of modeling clay in the bottom of a school milk carton (or similar type of container). Push the clay down so it is flat on the bottom of the carton. (The carton needs to have the top part cut off.)
2. Make a dinosaur footprint (or any print they would like) in the modeling clay. Make sure it is deep.
3. Pour 1/4 cup of water into a paper cup.
4. Slowly pour 1/2 cup of plaster of paris into the water, stirring with a craft stick as you pour. The mix should have the consistency of a milk shake.
5. Pour the plaster of paris on top of the footprint. Level the plaster out by lightly tapping the bottom of the carton on the desk.

6. While the plaster is still wet, place the shell, ribbed side up (bowl-side down), in the plaster.
7. While the students are waiting for the plaster to harden, have them predict what their footprint impressions will look like. Have them tell why the impression of the footprints will look the way they predict. Have students explain why the footprint in the plaster is like a trace fossil.

Note: **Never pour plaster down the sink drain.** Always discard extra plaster in the garbage.

Part II

1. After the plaster has hardened, put a thin layer of baby powder over the shell and on the plaster that is exposed.
2. Make more plaster the same way as described in Part I.
3. Pour the plaster on top of the shell. Tap the carton lightly on the desk to level off the plaster.
4. While the plaster is still wet, put the green leaf on it, vein side down. Make sure no edges of the leaf are curled up. All parts of the leaf should be stuck to the plaster.
5. While the students are waiting for the plaster to harden, have them predict what their shell impressions will look like. Have them tell why the impression of the shell will look the way they predict. Have students explain why the shell in the plaster is like a cast and mold fossil.
6. When the plaster is hard, cover the leaf and plaster with baby powder.
7. Make more plaster and cover the leaf.
8. Put aside until the next day.

Part III (the next day)

1. The next day, with the milk carton in front of the students, ask the students these questions:
   - Which types of impression fossils did we make? (trace, mold and cast, and imprint)
   - Which is the trace? (footprint)
   - Which is the mold and cast? (shell)
   - Which is the imprint? (leaf)

Materials

For each student:

- ❑ Baby powder
- ❑ Plaster of paris
- ❑ Paper cup
- ❑ Craft stick
- ❑ Green leaf
- ❑ Water

Materials

For each student:

- ❑ Milk carton with the fossils and plaster for each student
- ❑ Paper towel

For the teacher:

- ❑ Hammer
- ❑ Screwdriver
- ❑ Fossils from the Invitation to Learn.

- What is the definition of each?
  - Trace impressions are the activities of the organisms as they lived.
  - Mold and cast impressions are when organisms are buried and decayed and the hole is filled with sediments showing the size and outside impressions of the organisms.
  - Imprints are thin organisms that are left in sediment before it hardens, showing the outside impressions of the organism.
- Why must these fossils be covered or filled with sediments after the impressions have hardened? (If they weren't covered, then weathering and erosion would have destroyed them. When they are buried in sediments, they are preserved for millions of years.)

2. Put a paper towel down on the desk of each student. Place the milk carton on the paper towel.
3. Have the students tear the milk carton paper off, exposing the plaster and clay.
4. Peel the clay off, exposing the footprint.
5. Lay the plaster on its side.
6. Find the lines where you can see the different pourings of plaster. Place the screwdriver point on one of the lines. Tap the screwdriver lightly with the hammer. The plaster should break open. Do the same thing at the other line.
7. The three fossils are now exposed—the footprint, the shell and shell impression, and the leaf. (The top part won't show anything. It was only a covering.) Peal off the leaf to see the leaf impression.
8. Talk to the students about each impression fossil.
9. Have the students compare each type of fossil they made with the real fossils they looked at during the Invitation to Learn.
10. Have the students come up with conclusions as to what they have learned.

Curriculum Extensions/Adaptations/Integration

- Show how the mold and cast of the shell is similar to flipping an object in math and that it is a three-dimensional shape.
- Provide peer tutoring or work in cooperative groups to mix and pour the plaster. This helps special needs learners and minimizes clean-up efforts.
- Students make a diagram and write an explanation of what they did and learned in a science notebook.

Resources

Web sites

Bryce Canyon National Park website:
http://www.nps.gov/brca/geodet/geodet_paleontology.html

Fossil kits may be purchased from Nasco Science:
www.enasco.com

Family Connections

- There are many places in Utah where parents can take their children to learn more about dinosaurs and fossils. A family fieldtrip to a dinosaur museum or a fossil quarry is a great learning opportunity.
- There are many dinosaur kits, models, books, videos, and games that can be enjoyed together as a family.
- Students share the projects they have completed at school with their family members.