

Unit Design

Unit Title: Digging into the Past

Course/Grade Level: Earth Science/6th Grade

Subject/Topic Areas: Geology/Fossils

Designed by: Marlee Tierce Time Frame:

Brief Summary of the Unit:

Students will

- make simulated fossils and models of fossils,
- read about the principles of geology,
- research major geologic events impacting climate,
- demonstrate layering and resulting changes in layers,
- explain how the process of rock formation impacts fossils,
- explain different kinds of fossils and where they are found
- report on fossil evidence and biographies.

Stage 1: Unpacking the Standards:

Major emphasis:

S6E5. Students will investigate the scientific view of how the earth's surface is formed.

f. Describe how fossils show evidence of the changing surface and climate of the Earth.

Related Content standards:

b. Classify rocks by their process of formation.

c. Describe processes that change rocks and the surface of the earth.

d. Recognize that lithospheric plates constantly move and cause major geological events on the earth's surface.

Characteristics of Science

S6CS1. Students will explore the importance of curiosity, honesty, openness, and skepticism in science and will exhibit these traits in their own efforts to understand how the world works.

S6CS4. Students will use tools and instruments for observing, measuring, and manipulating equipment and materials in scientific activities.

S6CS5. Students will use the ideas of system, model, change, and scale in exploring scientific and technological matters.

S6CS6. Students will communicate scientific ideas and activities clearly.

S6CS7. Students will question scientific claims and arguments effectively.

S6CS8. Students will investigate the characteristics of scientific knowledge and how it is achieved.

S6CS10. Students will enhance reading in all curriculum areas...

Big Ideas: Evidence, Fossils, Climate, Changing Surface of the Earth, History of the Earth

Students will understand that

- Scientists use evidence to explain the history of the earth.
- The Earth's surface is constantly changing.
- Rock formations provide evidence.
- From Earth's rocks we can learn about changes that have occurred in the Earth's surface, we can find evidence of changes in the Earth's climate, and we can find evidence of organisms of long ago.
- Fossils are the most important source of information about life on Earth in the distant past.
- The principle that geological forces seen in operation at present should be used to explain the past history of the Earth is known as uniformitarianism.
- The order in which rocks are layered is an important clue to Earth's history.
- The Law of Superposition is fundamental to the interpretation of Earth's history.
- Layers are usually formed horizontally, with the oldest rock strata on the bottom and the youngest on top.
- Sedimentary rocks are formed particle by particle and bed by bed, and the layers are piled one on top of the other.
- Rock layers reveal data about the locations of earlier oceans, mountains, plains, and plateaus.
- Dating rocks allows scientists to study the most ancient rocks and refer to the history as a geologic timetable.
- The state fossil of Georgia is the shark tooth, and they can be as old as 375 million years old.

To understand, students will need to consider such questions as

- Can we stop the earth from changing?
- Why was Nebraska the first state to require oceanography as a part of its science curriculum?
- Why have fossilized sea life been found in rock at the top of Mt. Everest and the remains of a lush tropical rainforest been found buried under miles of ice and snow at the South Pole?

To understand, students will need to

Know:

How to use the scientific language correctly,

What is a fossil?

How do we obtain fossil evidence?

What is climate?

How do fossils show climate change?

What are the changes in the earth's surface?

How do fossils show changes in the earth's surface?

Major geological events impacting climate change.

Be able to

Make simulated fossils—prints, casts, molds, etc.

Simulate/explain changes in earth's history

Research theories—KT event, Ice Age evidence, Plate Tectonics (lithospheric plates,

Superposition, Uniformitarianism

Simulate geologic dating

Sketch evidence of rock layering and fossil evidence

Stage 2

What evidence will show that students understand?

Performance Task:

Part One:

You are a construction worker in charge of digging the foundation of a building in a downtown area of a large city. You find evidence of fossils. What do you do? What is the evidence? How do you know they are fossils? Write a newspaper article where you were interviewed about your job and the find.

Part Two:

You contact the site manager who must talk to the city council and building owners about the evidence. Write a telephone skit telling about the resulting conference call and what will happen next.

Products: The class is divided into characters and groups for a debate over what will happen to the project. Suggested characters and groups include

- Construction worker,
- Site Manager,
- City Council members,
- Building owners and their lawyers,
- Professor of geology from a local university,
- Curator of a natural history museum,
- Members of the public,
- News reporter from local media

After the debate, write a position paper or make a display about this scenario.

1. Choose a location in Georgia and explain what kind of fossil evidence would be found there.
2. What may have caused the fossil evidence?
3. What are some reasons for preserving or not preserving fossil evidence?
4. Could you find history of fossil evidence in that location? Site sources.
5. Use the following terms correctly: rock formation, superposition, uniformitarianism, fossil formation

Other Evidence (quizzes, tests, prompts, observations, dialogues, work samples, etc.)

Quizzes: Vocabulary—selected response

Constructed response about major theories

Tests: Selected response test about evidence (Examples included in samples)

Observation: Sketches of rock layers and fossil evidence

Demonstrate how a fossil can be formed using sand, water, and an object such as seashell.

Simulations of fossil production

Simulations depicting rocks as they change: layering, folding, faulting, etc.

Simulations of fossil digs

Constructed Response Tell or write what a fossil is and what information it can provide.

Reports: Research on geological events, principles of geology, and biographies
Cartoon or PowerPoint presentation of major geological events impacting climate changes

Group reports (jigsaw reporting) of biographies

Diagram: Label and sequence pictures depicting fossil formation

Self Assessment: Journal of questions and contemplations (See list of sample questions.)
Rubric on simulations

Language Marlee's students will use in this unit are not necessarily the same terms that would be found on a standardized assessment:

evidence, archeology, paleontology, sedimentary rock, extinction, fossil, mold, print, cast, index fossil, layers, superposition, uniformitarianism, relative dating, plate tectonics, ice age evidence, KT event

Sample Self Assessment Questions

- What did you accomplish today?
What strengths do you think you showed in your work?
- How did you feel about the topic we investigated today?
- How well do you think you understood the activity we did today?
- What questions do you have about what we did today?
- Are there some things you don't understand?
- What do you think is the most important thing you learned in science this week?

Sample Tasks and Activities

➤ Index Fossils

“Fossil Fill,” AIMS Newsletter, Volume XIII, Number 9, April, 1999

Key Question: How can we use fossils to date the relative age of a set of rocks?

Focus: Through three experiences students will learn how paleontologists use the Principle of Superposition to determine the relative ages of fossils.

1. Layering and index fossils
 2. Nonsense words to determine position
 3. Cards of fossil sketches to determine position
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- Making fossils— Recipe for modeling clay that hardens for fossil simulations:
Materials: 1 ½ cups cold water, 1 cup cornstarch, 2 cups baking soda, food coloring optional
Directions: Add food coloring, if desired, to water and mix additional ingredients in sauce pan. Cook over medium heat for 4 to 5 minutes, stirring constantly until consistency of mashed potatoes. Cover with damp cloth to cool. Knead until smooth. It can be kept in an airtight container. It will harden overnight and can be painted when dry.
 - Activities and Resources on the web: <http://www.glc.k12.ga.us>
 - Released Tests from other states
<http://edinformatics.com/testing/testing.htm>
 - “Is There a Site Here?” A program for Learning About Archaeology Within the Science Curriculum by the Georgia Department of Transportation.
Archaeology and the Prehistory of Georgia Department of Education
Contact: Eric Duff, (404) 699-4406, eric.duff@dot.state.ga.us
 - Georgia State Fossil—In 1976, the shark tooth was designated the official state fossil. Probably one of the most sought-after fossils by amateur collectors, the shark tooth is a relatively common fossil in the Georgia coastal plain. In fossil form, the shark tooth can be traced back 375,000,000 years. Fossilized shark teeth are found in a range of colors—from the more common blacks and grays to whites, browns, blues and reddish browns.

➤ Stage 3—Plan Learning Experiences and Instruction

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20