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# Fossil Fever: Then and Now



## **Group Members:**

Abby Thomas, Chris Thompson, Denise Haglund

## **Description:**

The student will be learning about fossils, their formation, Earth's history, as well as comparing and contrasting fossils and their modern day descendant for gastropods, ferns, mastodon, fish, crinoids, trilobites, and bivalves.

**Grade Level:** 4<sup>th</sup>, can be adapted to other grades.

## **Student Learner Objective – Connecting to the GLEs**

The student will be able to compare and contrast the fossil and their modern day descendant for gastropods, ferns, mastodon, fish, crinoids, trilobites, and bivalves.

## **GLE's:**

4<sup>th</sup> Grade- Science

- Changes in Ecosystems and interactions of Organisms with their Environments 4.3.A.a Compare and contrast common fossils found in Missouri (i.e., trilobites, ferns, crinoids, gastropods, bivalves, fish, mastodons) to organisms present on earth today. (DOK-2)
- Scientific Inquiry 7.1.A.a. Formulate testable questions and explanations (hypotheses) (DOK-3)
- Earth Systems 5.1.A.b. Compare the physical properties (i.e., size, shape, color, texture, layering, presence of fossils) of rocks (mixtures of different Earth materials, each with observable physical properties) (DOK-2)

4<sup>th</sup> Grade- Social Studies

Knowledge standards- SS2, SS5, SS7

Related performance goals-1.2, 1.4, 1.5, 1.6, 1.7

Objective 54- Students will describe the earth forces that shaped the land and analyze the effects of these forces on Missouri's geography.

Objective 67- Students will interpret and construct latitude and longitude on a map to locate places on a map.

Objective 69- Students will organize events on a time line in time order.

5<sup>th</sup> Grade

Earth Science 8.1.C.a. Identify how the effects of inventions or technological advances (e.g., complex machinery, technologies used in space exploration, satellite imagery, weather

observation and prediction, communication, transportation, robotics, tracking devices) may be helpful, harmful, or both (DOK-2)

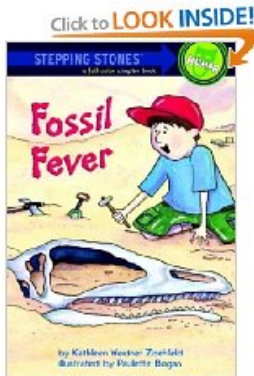
**Featured Textbook:**

**Scott Foresman Science- 4<sup>th</sup> grade**

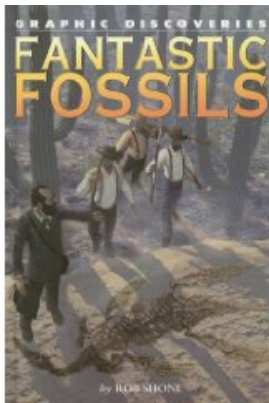
Earth Science Chapter 8 pgs. 233-256.

**Featured Picture Books:**

Fossil Fever by Kathleen Weehee Zoefeld, illustrated by Paulette Hogan



Graphic Discoveries Fantastic Fossils by Rob Shone



**Featured Video Clips: From Learn 360**

Types of Rocks and Fossils- Way Cool Science-Rockfinders

Introduction to Fossils

**Time needed:**

**5 days**

## OVERVIEW-ALL DAYS

### Day 1:

**Engage:** Students explore the various fossils, materials, and books using an OWL chart. **Explain:** *Fossil Fever* is read aloud to students to help explain some of their questions and misconceptions that they have about fossils. **Evaluate:** Teacher evaluates students learning by the participation in discussion.

### Day 2:

**Engage/Explore:** Have students do a discovery time with prepared plates of seashells in Plaster of Paris (casts) and shell imprints (molds) with a magnifying glass, recording on an OWL chart. **Explain:** Build Background- Access website and discuss the pictures that show the cast and the mold in fossils. **Explore:** The students will make a plaster model with shells and molds of shell. **Evaluate:** (From Scott Foresman) Discussion about how well students think their imprints turned out. Think/Pair/Share- show each other cast and mold on their model. Have students journal a Line of Learning in their science journals. **Extend:** (From Scott Foresman -students consider how the wetness of the plaster would affect the imprint left by the dinosaur and materials that would make good “impressions.”

### Day 3:

**Engage:** Read: *The Tale of Fern Fossil* **Explain:** Discuss research questions, note taking and scoring guide, introduce research books and materials. **Evaluate:** Each group will present the poster project on specific topics. Utilize the scoring guide to evaluate student understanding.

### Day 4:

**Elaborate:** Students create an “accordion foldable” to take notes on and use as a study tool. **Evaluate:** Teacher rubric to evaluate foldable **Engage:** Display several mystery fossils from the site below on the projector. Invite the students to guess which fossil it is and justify their answer. Mystery fossil site. Guessing the picture of the mystery fossil. **Explain:** The students will create a foldable that compares fossils of the past to related organisms of present day. **Evaluate:** The students will create their foldable which will be used as a study guide for a later assessment.

### Day 5-

**Engage:** Read selections from: *Fantastic Fossils*- Graphic novel. **Elaborate:** Students will “Buddy Study” with all materials created-gallery posters, OWL charts, foldable x2, journals, notes, and text. **Evaluate:** folder quiz and Line of Learning in journal.

## **Materials-**

- Fossil Fever by Kathleen Weidner Zoefeld
- Fossil samples for students to explore (See local nature center or nearby universities for examples if school doesn't have any available.)
- Slide microscope
- flashlight
- Engaging questions prepared for projector (technology link)
- 11x14 in. construction paper cut in half lengthwise. (1 half piece per student)
- Markers/colored pencils/crayons (whichever you prefer)
- Scott Foresman science book. Pg. 244-245
- Handout of Earth's history
- 1" open fan-type shells- 1 for every 2-3 students- (can be purchased from a craft/hobby store)
- 1/4" or smaller snail type shells- (can be purchased from a craft/hobby store)
- 1 c. prepared Plaster of Paris for each student
- 6" Styrofoam plates- one for each student
- Plastic spoon for each student
- Paper towels
- Cups of water
- Magnifying lens
- Reference books and information on common fossils: trilobites, ferns, crinoids, gastropods, bivalves, sea urchins, horseshoe crabs, spiders, mollusks, snails, clams, oysters, scallops, mussels, sand dollars.
- Poster boards
- index cards
- markers
- Tape
- Fossil / Organism handout for each student (attachment)
- reference books
- 12"x 18" paper for each student
- glue sticks
- scissors
- markers
- pencil
- notes from gallery walk

## **Safety Concerns: (From Scott Foresman)**

Items to be covered with students before labs are started.

1. Students should wear goggles to protect eyes, and keep hands from touching eyes until cleaned.
2. Remind students not to put their hands near their eyes after working with prepared Plaster of Paris. Have students wash hands thoroughly when activity is completed.
3. Have students use spoon to smooth out Plaster of Paris, not hands.
4. No food or drinks near project area until all surfaces are cleaned thoroughly.

## **Academic Vocabulary**

Appendages: a body part that comes out of the main part of the body.

Biramous: divided into or forming two branches.

Bivalve: Shellfish with two distinct shells. Bivalves are closely related to clams and oysters.

Casts: a copy of a fossil produced inside a mold.

Crinoid: A sea creature that is often mistaken for a plant. Missouri's state fossil and is closely related to star fish and sea urchins.

Gastropod: A type of mollusk, having a shell that is one piece and usually coiled or spiraled. Gastropods are closely related to the snail family.

Igneous Rock: Formed from melted magma, (within the earth) or lava, (on the surface of the earth).

Luster: The way a mineral's surface reflects light.

Mastodon: Extinct, elephant like mammal

Metamorphic Rock: Rocks that are changed as a result of heat and pressure.

Mineral: Natural non-living solid crystals that make up rocks

Molds: the impression or cavity in rock left behind by a fossil when a fossil dissolves.

Radial Symmetry: symmetry in which something can be divided into two identical halves by a line or plane passing through a central point or axis at any angle

Sediment: The eroded material that settles on land or on the bottoms of lakes, rivers, and oceans.

Sedimentary Rock: Formed when the weight of the layers and sticky clay minerals in the sediment harden.

Thorax: the upper part of an animal's body.

Trilobites: An extinct arthropod that was abundant in Paleozoic times; had an exoskeleton divided into three parts. Most closely related to crabs and lobsters.

## Misconceptions

Children's Misconceptions	Truth
<ul style="list-style-type: none"><li>• There are no fossils found in Missouri.</li><li>• Fossils are only bones.</li> <li>• Dinosaurs and humans have been alive at the same time.</li> <li>• Crinoid is a sea plant</li> <li>• All rocks are the same</li>          <li>• Scientists can't know how long ago different organisms were alive.</li>  <li>• Timelines must go from left to right</li></ul>	<ul style="list-style-type: none"><li>• There are many fossils found here in Missouri, including sea organisms.</li><li>• Fossils can be bones, teeth, shells, leaves, and tree trunks.</li><li>• Dinosaurs lived about 200 million years ago, long before humans existed.</li> <li>• Crinoid is a sea creature that is closely related to star fish and sea urchins.</li><li>• There are 3 kinds of rocks: sedimentary, igneous, and metamorphic. Rocks are different from one another because they are made of different combinations of minerals</li><li>• Scientists can indeed conduct tests that give them a rough estimate of how old a fossil is.</li><li>• Timelines can be used to show geological history by using a vertical illustration.</li></ul>

# **DAY-BY-DAY LESSON PLANS**

## **DAY 1**

### Introducing Fossils Activity (DOK-1)

#### **Objective:**

Students will generate questions and ideas about what they already know about fossils and Earth's history.

#### **Time Needed:**

30-45 minutes

#### **Materials**

Fossil Fever by Kathleen Weidner Zoefeld

Fossil samples for students to explore ( See local nature center for examples if school doesn't have any available.)

Magnifying glasses

Engaging questions prepared for projector (technology link)

#### **Student Pages:**

OWL Chart page

#### **Safety Concerns:**

None

#### **Teacher Tips**

Putting out any materials that are available pertaining fossils and Earth's history for the student inquiry part will help students to explore and develop ideas. Let students speak their ideas and share with each other, even if you are aware they may have misconceptions at this time.

#### **Science Background**

Before beginning the lesson, read "Build Background" on pg. 234 of Scott Foresman teacher manual.

## **OVERVIEW:**

#### **Engage:**

Students explore the various fossils, materials, and books that teacher has laid out. This will grab students' attention while also tapping into their prior knowledge about fossils and Earth's history. After students have inquired about the various materials, teacher asks prompting questions that continue to engage student thinking, and lead to even more questions. Student will record on an OWL form.



### **Explain:**

Fossil Fever is read aloud to students to help explain some of their questions and misconceptions that they have about fossils. Students will not find all the answers they may be wanting, but this explanation part of the lesson will lead to more discovery for the students.

### **Evaluate:**

Teacher evaluates students learning by the participation in discussion.

## **Narrative Day 1:**

*Student centered 10 min. inquiry:* The engagement activity begins with a student directed inquiry. Students will be allowed to look at the materials and books that will be utilized throughout the lesson, and begin to develop their own ideas and activate their prior knowledge. The teacher asks the students what they think we will be learning about in this lesson. This is designed for students to begin to think about what they know already about fossils, and bring their thoughts to the discussion that is prompted by the engaging questions projected for all the students to see. They will record their findings on an OWL chart.

*Discussion lead by teacher:* Teacher will project the engaging questions to help guide students about what they think they might know, and also address some looming misconceptions that exist. This is a time to pose questions and see what the students have for answers, not for the teacher to answer. The misconceptions will be addressed throughout the “Fossil Fever” lesson.

*Engaging Questions:* (These are in a random order and do not all have to be used at this time.) Discussion should last for as long as it is conducive to the students’ engagement.

Suggested time: 15 min.

- What experience do you have with fossils?
- Are there fossils found in Missouri? If so, what kind?
- What are some materials that you think become fossils?
- If a fossil is found of an organism, is that organism extinct? Explain.
- How long does it take to form a fossil?
- How long ago do you think dinosaurs were alive?

The discussion should end leaving students wanting to find out more answers to the questions above, and should have also generated more questions.

*Introduction of picture book, Fossil Fever:*

### **Reading strategies used:**

-Making connections: Teacher models how he/she uses what she knows to help her understand the content in book.

-Questioning: Teacher stops at strategic points to illustrate to students how questioning the text can lead to uncovering more information about fossils and the history they contain.

Teacher will read the book aloud to the students, stopping at certain points to utilize the reading strategies listed above. These pauses will also allow for student sharing and discussion with each other. Throughout the read aloud, the teacher will refer back to the engaging questions to see if the students have anything to add, or even if their thinking has changed a bit. Misconceptions can be addressed during this discussion time as well. When the read aloud comes to an end, students

will be excited about exploring fossils and will have sufficient background knowledge to lead them into their exploration activity!

**Teacher Tips and Background Information:** It is important for teachers to be aware of questions that students may generate about the misconceptions of fossils and other information. Below is a table of misconceptions and accurate information for teachers to look over so they are prepared with answers.

Children's Misconceptions	Truth
<ul style="list-style-type: none"> <li>• There are no fossils found in Missouri.</li> <li>• Fossils are only bones.</li> <li>• Dinosaurs and humans have been alive at the same time.</li> <li>• Crinoid is a sea plant</li> <li>• All rocks are the same</li> <li>• Scientists can't know how long ago different organisms were alive.</li> <li>• Timelines must go from left to right</li> </ul>	<ul style="list-style-type: none"> <li>• There are many fossils found here in Missouri, including sea organisms.</li> <li>• Fossils can be bones, teeth, shells, leaves, and tree trunks.</li> <li>• Dinosaurs lived about 200 million years ago, long before humans existed.</li> <li>• Crinoid is a sea creature that is closely related to star fish and sea urchins.</li> <li>• There are 3 kinds of rocks: sedimentary, igneous, and metamorphic. Rocks are different from one another because they are made of different combinations of minerals</li> <li>• Scientists can indeed conduct tests that give them a rough estimate of how old a fossil is.</li> <li>• Timelines can be used to show geological history by using a vertical illustration.</li> </ul>

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## DAY 2

### **Plaster of Paris Mold and Cast Activity (DOK-2)**

Adapted from Scott Foresman 3<sup>rd</sup> grade science textbook activity page 58. “What can you learn from an imprint?”

**Objective:** (From Scott Foresman with adaptation for this activity.)

Students will understand that fossils can be used to learn about plants and animals that lived long ago and they can be classified as either casts or molds.

### **Time Needed:**

40-50 minutes (teacher prepares Plaster of Paris)

### **Materials Needed:**

1” open fan-type shells- 1 for every 2-3 students- (can be purchased from a craft/hobby store)

1/4” or smaller snail type shells- (can be purchased from a craft/hobby store)

1 c. prepared Plaster of Paris for each student

6” Styrofoam plates- one for each student

Plastic spoon for each student

Paper towels

Cups of water

Magnifying lens

### **Student Pages:**

Fossil Fever Student Inquiry Lab Sheet

OWL chart

### **Safety Concerns:** (From Scott Foresman)

1. Students should wear goggles to protect eyes, and keep hands from touching eyes until cleaned.
2. Remind students not to put their hands near their eyes after working with prepared Plaster of Paris. Have students wash hands thoroughly when activity is completed.
3. Have students use spoon to smooth out Plaster of Paris, not hands.
4. No food or drinks near project area until all surfaces are cleaned thoroughly.

### **Teacher Tips:** (From Scott Foresman 3<sup>rd</sup> Grade Textbook)

Preview the activity and the materials with the students. Have students explain what would happen if you pressed a shell into the plaster of Paris. Have each student form an “If...., then... statement, such as: “If I press a shell into the Plaster of Paris, then the imprint should show exactly what the shell looks like.”

(If plaster of Paris is not available- teachers can do alternate activity- Make a Glue Fossil- see additional resources for pdf file.)

### **Science Background:** (From Scott Foresman 3<sup>rd</sup> Grade Textbook)

If an imprint of an animal’s foot, hoof, or claw is made in soft sand or mud

## **OVERVIEW:**

**Engage/Explore:** Students do a discovery time with prepared plates of seashells in Plaster of Paris (casts) and shell imprints (molds) with a magnifying glass.

**Explain:** Build Background- Access website and discuss the pictures that show the cast and the mold in fossils.

**Explore:** The students will make a plaster model with shells and molds of shell. **Evaluate:** (From Scott Foresman) Discussion about how well students think their imprints turned out. Think/Pair/Share- show each other cast and mold on their model. Have students journal a Line of Learning in their science journals. **Extend:** (From Scott Foresman -students consider how the wetness of the plaster would affect the imprint left by the dinosaur and materials that would make good “impressions.”

## **NARRATIVE DAY 2**

### **Engage/Explore:**

*Student centered 10 min. inquiry:* The engagement activity begins with a student directed inquiry. Students will be allowed to look at the materials and books that will be utilized throughout the lesson, and begin to develop their own ideas and activate their prior knowledge. Have students do a discovery time with prepared plates of seashells in Plaster of Paris (casts) and shell imprints (molds) or fossil samples with a magnifying glass or the slide microscope. Have students record their observations in their science journal/notebook.

### **Explain:**

*Discussion lead by teacher:* Build Background- Access website and discuss the pictures that show the cast and the mold in fossils. Casts- the raised fossils- similar to adding a cast to your foot makes it larger and it stick out. Molds- the impressions that go inward into the rock- similar to candy molds, where you pour chocolate into, and remove when it is cooled.

[http://www.paleoportal.org/index.php?globalnav=fossil\\_gallery&sectionnav=search&taxon\\_id=61&state\\_id=&period\\_id=&assemblage\\_id=&last\\_section=search&p=1](http://www.paleoportal.org/index.php?globalnav=fossil_gallery&sectionnav=search&taxon_id=61&state_id=&period_id=&assemblage_id=&last_section=search&p=1)

### **Explain: Need for Lab Safety**

\*class discussion includes the following points:

#### **Safety Concerns:** (From Scott Foresman)

1. Students should wear goggles to protect eyes, and keep hands from touching eyes until cleaned.
2. Remind students not to put their hands near their eyes after working with prepared Plaster of Paris. Have students wash hands thoroughly when activity is completed.
3. Have students use spoon to smooth out Plaster of Paris, not hands.
4. No food or drinks near project area until all surfaces are cleaned thoroughly. Have students use spoon to smooth out Plaster of Paris, not hands.

**Explore:**

Students will do Directed Inquiry Lab using the Fossil Fever Student Lab pages.

1. Students will put plaster of Paris on plate.
2. Spread plaster of Paris around with a spoon.
3. Place small sea shells around perimeter of plate in the plaster of Paris.
4. Wet shell, curved side down, and push into plaster of Paris to make an imprint.
5. Rinse shell and remove all plaster.
6. Let plaster dry.
7. Observe with magnifying glass and record observations.

**Evaluate:** (From Scott Foresman)

1. Facilitate a discussion about how well students think their imprints turned out. Do they think dinosaurs left such good impression? Were some better than others? Why?
2. Have students Think/Pair/Share
  - a. Which the snail shells represent- **cast** or mold
  - b. Which the impression of the shell represents- cast or **mold**
3. Have students journal a Line of Learning in their science journals.

**Extend:** (From Scott Foresman)

1. Suggest that students consider how the wetness of the plaster would affect the imprint left by the dinosaur.
2. Have students suggest other materials that would make good “impressions.”

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**Day 3:**

Fossil Discovery Gallery Walk- DOK-2

**OVERVIEW:**

**Engage:**

Read: *The Tale of Fern Fossil*

**Explain:**

Discuss research questions, note taking and scoring guide, introduce research books and materials.

**Evaluate:**

Each group will present the poster project on specific topics. Utilize the scoring guide to evaluate student understanding.

**NARRATIVE DAY 3**

GalleryWalk

### **Explain/Explore:**

Gather in reading area and read the story of *The Tale of Fern Fossil* and discuss how fossils are related to living organisms today. Divide the students into groups and assign topics. **Explain** the informational questions and model with mastodon poster expectations the students need research. Teachers may model by using a crafting session explaining the thought process of their research. Have the students **explore** topics through various research materials provided determining importance of information for the topic assigned. The students through a variety of discussion some inferences will create a poster recording their finds. The students will be **evaluated** as the groups present their posters. Students may have some misconceptions of the relationships of fossils to their present day relatives.

### **Explain:**

#### **Fossil Discovery Gallery Walk**

**Topic:** Fossils discovery and research

**Content:** Science – fossils

### **Time Needed:**

55 Minutes

### **Objectives:**

1. The students will learn to differentiate common fossils.
2. The students will be able to identify the following: trilobites, ferns, crinoids, gastropods, bivalves, and mastodons.
3. The students will gain an understanding of how the fossils of the past is represented on the Earth today.
4. The students will work in cooperative groups to research fossils and compare to counterpart present today.

### **Materials Needed Aids:**

- Reference books and information on common fossils: trilobites, ferns, crinoids, gastropods, bivalves, sea urchins, horseshoe crabs, spiders, mollusks, snails, clams oysters, scallops, mussels, sand dollars.
- Poster boards
- index cards
- markers
- tape

### **Safety Concerns:**

None

**Teacher Tips:**

1. Remind the students of the procedures and rules for a gallery walk.
2. Have materials set up and walk through with students.

**Engage:** Gather in reading area and read the story of *The Tale of Fern Fossil* and discuss how fossils are related to living organisms today. (attachment)

**Procedures/Methods:**

1. Separate the students into groups no less than three. Assign a topic to each group.
2. Tell the students they will be researching a fossil and the organism related to it today.
3. Allow the students time to research, discuss, and create a poster on the topic.
4. Later the students will present their material to the other students, allowing others to take notes on the information being presented.
5. Review scoring guide at this time.

Display the following questions for group research and discussion.

1. How are fossils formed?
2. How can these fossils tell us about the past?
3. How are the fossil and organism related?
4. Identify features of fossils that can be used to compare them to living organisms that are familiar (e.g., shape, size and structure of skeleton, patterns of leaves).

**Explain****Model:**

1. Create a poster displaying information on the mastodon and elephant.
2. Compare and contrast the characteristics of and habitats.
3. Illustrate or download pictures to add to posters.
4. Present to students and allow them to take notes. Discuss findings. Have students review notes.
5. Record any questions for further research.

**Differentiated Instruction:**

Vary reading levels of materials. Make any accommodations necessary.

**Evaluate:**

The scoring guide will be used to evaluate each group during the group's presentation. (attachment) Discuss all information, notes to be used in fossil foldable activity and record questions for future investigations.

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## **DAY 4**

### **Earth History Timeline Foldable (DOK-2)**

#### **Objective:**

Students will gather information from different resources and create a study tool using a timeline. This timeline will show how a fossil is formed and the different periods in Earth's history.

#### **Time Needed:**

45-60 minutes (Includes teacher modeling of foldable)

#### **Materials Needed:**

11x14 in. construction paper cut in half lengthwise. (1 half piece per student)  
Markers/colored pencils/crayons (whichever you prefer)  
Scott Foresman science book. Pg. 244-245  
Handout of Earth's history

#### **Student Pages:**

Earth's History handout

#### **Safety Concerns:**

None

#### **Teacher Tips:**

Cutting the 11x14 construction paper in half and having it ready to pass out to students will save time when beginning the foldable. Students will need to see a detailed modeling of how to fold the paper "accordion" style. Students may have difficulty getting six equal sections to take notes on.

#### **Science Background:**

Students will have already read pages 244-245 in the Scott Foreman textbook. This activity serves as a reinforcement of information in preparation for a later assessment.

## **OVERVIEW:**

#### **Elaborate:**

Students create an "accordion foldable" to take notes on and use as a study tool. This serves to strengthen their knowledge in how a fossil is formed and the different periods in Earth's history.

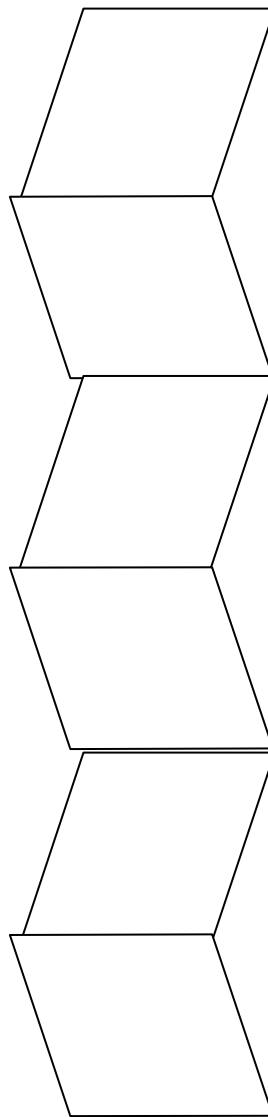
#### **Evaluate:**

See scoring guide- for timeline in Appendix.



## **NARRATIVE DAY 4:**

Students will be challenged to address their misconception of what a traditional timeline should look like. Students will be creating a foldable that will illustrate how a fossil is formed, along with identifying different time periods in Earth's history. This is an individual activity for the students to complete that will result in a study tool for them to use. Students will use their textbook, along with their handout to correctly put in order the process of how a fossil is formed. Foldable: The "accordion book" foldable will be used to show this geological timeline. Students will need to have five folds resulting in six equal sections to write on and illustrate. Teacher will model this for the students and assist those who are having difficulty with their folds/sections.



## **OVERVIEW:**

### **Day 4:**

#### **Engage:**

Display several mystery fossils from the site below on the projector. Invite the students to guess which fossil it is and justify their answer.

Mystery fossil site. Guessing the picture of the mystery fossil

<http://www.ucmp.berkeley.edu/exhibits/mysteryfossil/mysteryfossil.php>

#### **Explain:**

The students will create a foldable that compares fossils of the past to related organisms of present day.

#### **Evaluate:**

The students will create their foldable which will be used as a study guide for a later assessment.

## **NARRATIVE DAY 4**

**Engage/Explore:** the students by using the following website to select different mystery fossils. Invite the students to decide the type fossil that is shown. Have them justify their answer. Then have the students infer what type of living organism it may be related to today. The students create a shutter fold section book exploring their information researched the students will identify, compare, and contrast fossils and present day relatives. The students will cut out the pictures of the fossils on the handout sheet and glue them on the front cover shutter on the left hand side. Then the students will cut out the pictures of the organism and glue the coordinating organism opposite of the fossil it is related to. On the inside shutter cover the student will list the names of both the fossil and organism. On the center the students will compare and contrast each fossil and coordinating organism with a minimum of six characteristics as well as following the guide lines of the scoring guide. When the project is completed and **evaluated**, the students will have a study guide showing specific fossils and their coordinating organism.

#### **Explain:**

**Foldable Activity for Fossil Fever**

**Compare and Contrast fossils to present day organisms.**

**(Trilobites, Crinoids, Gastropods, Bivalves)**

#### **Objectives:**

The students will learn to identify specific fossils, how they are related to present day organisms. The students will compare and contrast characteristics of the fossils and organisms.

**Time Needed:**

45 minutes

**Materials:**

Fossil / Organism handout for each student (attachment)  
reference books  
12" x 18" paper for each student  
glue sticks  
scissors  
markers  
pencil  
notes from gallery walk

**Safety Concerns:**

None

**Engage:**

Use the following website to select different mystery fossils. Invite the students to decide the type fossil that is shown. Have them justify their answer. Then have the students infer what type of living organism it may be related to today.

<http://www.ucmp.berkeley.edu/exhibits/mysteryfossil/mysteryfossil.php>

**Explain:****Procedure:**

1. As a class discuss fossils list several characteristics for each one. Then do the same for the organisms. Ask students to identify which fossil they think is related to the organism that exists today.
2. Create a shutter fold section book. This can be used as a study guide for assessment. Instructions: Make a shutter fold using 12" x 18". Begin as if you were going to make a hamburger crease but instead of creasing the paper pinch at edges to show the mid-point. Fold the outer edges of the paper to meet at the pinch or mid-point forming a shutter fold. Have student fold hamburger style and pinch twice creating cut points. The students will create 4 windows on each shutter. Cut the sections.
3. The students will cut out the pictures of the fossils on the handout sheet and glue them on the front cover shutter on the left hand side. Then the students will cut out the pictures of the organism and glue the coordinating organism opposite of the fossil it is related to. On the inside shutter cover the student will list the names of both the organism and fossil. On the center the students will compare and contrast each fossil and coordinating organism with a minimum of six characteristics. When the project is completed, the students will have a study guide showing specific fossils and their coordinating organism.

**Evaluation:**

The students will be evaluated according to the attached scoring guide.

\*\*\*\*\*

**DAY 5**

**Review and Assessment Day (DOK 1-3)**

**Objective:**

Students will be able to match up fossils to their present day decedents while addressing prior misconceptions about fossils, their formation, and their timeline in history.

**Time Needed:**

45 minutes

**Materials**

All prior instructional materials for unit, texts, and student notes/foldables.

**Safety Concerns:**

None

**Teacher Tips**

Having all material available for students to revisit will help to activate their memory about what they have learned throughout this unit. Allow students to move around the room and encouraging the academic conversations will help them learn and review with each other. Organize pairing of students for “Buddy Study” that will be conducive to student learning.

***\*\*\*See Folder Assessment instruction in Appendix to create reusable folder.***

**Science Background**

All previous lessons taught.

**OVERVIEW:**

**Engage:** Read selections from: *Fantastic Fossils*- Graphic novel. This is a non-fiction text that will reinforce the information that have learned throughout the unit.

**Elaborate:** Students will “Buddy Study” with all materials created-gallery posters, OWL charts, foldable x2, journals, notes, and text..

**Evaluate:** folder quiz and Line of Learning in journal.

## **NARRATIVE DAY 5:**

### **Engage:**

Teacher gathers class together to read aloud selections from the non-fiction text, Graphic Discoveries: Fantastic Fossils by Rob Shone. Teacher utilizes the Determining Importance reading strategy to help reinforce the information that the students have learned throughout this unit. After stopping in strategic places to allow for student discussion, teacher will break students into their “study buddy” groups (these should already be chosen by teacher).

### **Elaborate/Evaluate:**

Working in pairs, students will be allowed to move around the room to revisit the various texts and activities they have completed throughout the “Fossil Fever” unit. During this time, students work to meet the objective of being able to match fossils to their present day descendants which is assessed with the folder quiz. As certain students are completing this folder quiz (passed around by the teacher), other students will be recognizing what they feel their individual Line of Learning will be. This Line of Learning will have guidelines set by the teacher, of distinguishing what misconceptions the students had about fossils at the beginning of the unit, and how they have changed as the unit has come to an end. The Line of Learning will be written in their science journal for an assessment piece for the teacher. Teacher will be traveling around the room recognizing that students will be working at different paces and completing different tasks and any given time. When the time period of 45 minutes has passed, each student should have completed the folder quiz and have a Line of Learning written in their science journal.

***\*\*GPS unit could be also be used as a review.***

## Bibliography and Additional Resources

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21. Sloan, C. (2009). *How Dinosaur's Took Flight*. London: Penguin Group.
22. Squire, A. O. (2002). *True Books: Fossils*. United States: Children's Press.
23. Stewart, M. (2002). *A True Book Elephants*. New York: Children's Press.
24. Taylor, P. (2004). *DK Eyewitness Books-Fossils*. New York: D K Publishing.
25. Thompson, I. (1982). *National Audubon Society: Field Guide to Fossils*. New York: Alfred A. Knopf, Inc.
26. Unkelesbah, A.G. (1973). *The Common Fossils of Missouri*. Missouri: University of Missouri Press.
27. Wad, N. , (Ed.) (1998). *The Science Times Book of Fossils and Evolution*. New York: Lion's Press.
28. Walker, C. & Ward, D. (2002). *Smithsonian Handbooks: Fossils*. New York: Dorling Kindersley, Inc.
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## Website Resources

1. <http://www.zoomschool.com/subjects/dinosaurs/dinofossils/Fossilhow.html>

How fossils were formed.

2. <http://www.sdnhm.org/kids/fossils/index.html>

Where to find fossils

3. <http://www.ucmp.berkeley.edu/education/explorations/tours/fossil/index.html>

Animated- Getting into the fossil record

4. <http://www.fossilmuseum.net/FossilGalleries.htm>

Fossils image gallery

5. <http://www.museum.state.il.us/exhibits/larson/>

How the Midwest looked 16,000 years ago

6. <http://pubs.usgs.gov/gip/fossils/succession.html>

Timelines of fossils

7. <http://www.usgennet.org/usa/mo/county/stlouis/normandy.htm>

Plant fossils of Missouri

8. <http://www.usgennet.org/usa/mo/county/stlouis/prehistory.htm>

Other fossils of MO

9. <http://www.dnr.mo.gov/pubs/pub665.pdf>

Collecting fossils in MO

10. [http://owensville.k12.mo.us/~SMART\\_Lessons/4/Judy%20Andrews/science/GLE%20fossils/Fossils.pdf](http://owensville.k12.mo.us/~SMART_Lessons/4/Judy%20Andrews/science/GLE%20fossils/Fossils.pdf)

Great lesson plans

11. <http://www.learn360.com/ShowVideo.aspx?SearchText=Fossils&ID=150330>

Learn 360 video- lots of videos to choose from on this site.

12. [http://images.google.com/imgres?imgurl=http://www.csama.org/safaris/safaris/Fern\\_Key.jpg&imgrefurl=http://www.csama.org/safaris/shfgkc.htm&usq=Ds-mrUIOBktTr9GnBpOmXGgM3ac=&h=703&w=821&sz=18&hl=en&start=7&sig2=z0Mmc6owNWs9ti3aAGJHVQ&um=1&tbnid=p9HVp\\_NWr3kvWM:&tbnh=123&tbnw=144&prev=/images%3Fq%3Dfern%2Bfossils%26hl%3Den%26safe%3Dactive%26rlz%3D1T4DKUS\\_enUS327US329%26sa%3DN%26um%3D1&ei=Q99pSoS\\_L5C4M-O0lasL](http://images.google.com/imgres?imgurl=http://www.csama.org/safaris/safaris/Fern_Key.jpg&imgrefurl=http://www.csama.org/safaris/shfgkc.htm&usq=Ds-mrUIOBktTr9GnBpOmXGgM3ac=&h=703&w=821&sz=18&hl=en&start=7&sig2=z0Mmc6owNWs9ti3aAGJHVQ&um=1&tbnid=p9HVp_NWr3kvWM:&tbnh=123&tbnw=144&prev=/images%3Fq%3Dfern%2Bfossils%26hl%3Den%26safe%3Dactive%26rlz%3D1T4DKUS_enUS327US329%26sa%3DN%26um%3D1&ei=Q99pSoS_L5C4M-O0lasL)

Missouri fossils information

13. <http://www.trilobites.info/trilobite.htm>

Trilobite information



14. [http://www.paleoportal.org/index.php?globalnav=time\\_space&sectionnav=state&name=Missouri](http://www.paleoportal.org/index.php?globalnav=time_space&sectionnav=state&name=Missouri)  
[uri](#)

Missouri Map of paleontology and geology-links to other sites, too.

15. <http://www.ucmp.berkeley.edu/education/explotime.html>

Interactive modules on the history of life on the earth.

16. <http://www.ecarter.k12.mo.us/dept/elementary/fourthgrade/ccrites/gles.html>

Social Studies GLE's on 4<sup>th</sup> grade- Missouri fossils

17. <http://www.sos.mo.gov/symbols/symbols.asp?symbol=fossil>

Missouri State fossil page

18. <http://www.ecarter.k12.mo.us/dept/elementary/fourthgrade/ccrites/missourinewspapers.html>

Lesson plans from East Carter Elementary

19. <http://www.lakeneosho.org/images/1GeoMap.html>

Generalized Geologic Map of Missouri

20. <http://paleobiology.si.edu/dinosaurs/interactives/dig/main.html>

Virtual Interactive Dinosaur Dig- Sponsored by the Smithsonian National Museum of Natural History.

21. <http://www.ucmp.berkeley.edu/exhibits/mysteryfossil/mysteryfossil.php>

Mystery fossil site. Guessing the picture of the mystery fossil.

22. [http://www.paleoportal.org/index.php?globalnav=fossil\\_gallery&sectionnav=search&taxonomy\\_id=61&state\\_id=&period\\_id=&assemblage\\_id=&last\\_section=search&p=1](http://www.paleoportal.org/index.php?globalnav=fossil_gallery&sectionnav=search&taxonomy_id=61&state_id=&period_id=&assemblage_id=&last_section=search&p=1)

Good example of difference between molds and casts of fossils.

23. <http://idahoptv.org/dialogue4kids/season6/fossils/facts.cfm>

Common questions/answers about dinosaurs for kids.

## APPENDIX

### Scoring Guide for Timeline Foldable



	0	5	10
5 folds with 6 equal sections			
Sequence of fossil formation included			
Time periods and years labeled.			
Land and sea attributes added			
Illustrations: Included and beneficial for student			
Neatness			

Points possible: 60

Total Correct\_ /60

\*Can also be used as a tool to figure out percentages if teacher does not use points in their grading system.

# Earth's History Handout



Our Earth has been around for a very long time. Almost 20 billion years! Scientists have been able to identify different eras in which various life forms lived, and also became extinct. Here are some important ones that you will need to know.

-670 million years ago: **Precambrian Era**

Land: No life on land

Sea: Hard-shelled invertebrate trilobites appear.

-225 million years ago: **Mesozoic Era**

Land: Relatives of later dinosaurs; then first dinosaurs and mammals appear.

Sea: Plesiosaurs and ichthyosaurs

- *Jurassic Period: 193-136 million years ago*

Land: Dinosaurs rule; first birds

Sea: Fish and shellfish begin to resemble modern forms

-65 million years ago: **Cenozoic Era**

Land: Mammals take over

Sea: Beginning of modern shell life

-10,000 years to present: **Holocene Period**

Our Earth is always changing, and there are still many things to be discovered! Organizing the different stages that the Earth has gone through has helped scientist uncover the mysteries of the path, and begin to understand why plants and animals and all living things are the way they are today!

# OWL Chart

Know	Want to know	Learned



# OWL Chart



Observe	Wonder	Learned

Names \_\_\_\_\_

### Scoring Guide for Gallery Walk

Description	Points Possible	Points Earned
Title Listed	1 pts.	
Illustration of fossil along with the organism that is related	6 pts.	
Questions have been addressed in the poster.	10 pts.	
Additional information/illustration	3 pts.	
Presentation (all group members present)	10 pts.	

**Total points possible 30**

**Total points earned \_\_\_\_\_**

Name \_\_\_\_\_

**Scoring Guide for Fossil Fever Foldable**

<b>Description</b>	<b>Possible Points</b>	<b>Points Earned</b>
<b>Pictures of fossil/organisms glued coordinated</b>	<b>Self check</b> _____ <b>4 pts.</b>	
<b>Names of fossils/organisms listed correctly.</b>	<b>Self check</b> _____ <b>4 pts.</b>	
<b>Compare and contrast citing 6 characteristics on each fossil/organism category.</b>	<b>Self check</b> _____ <b>12 pts.</b>	
<b>Neatness/correct spelling.</b>	<b>Self check</b> _____ <b>5 pts.</b>	

**Total points 25      Points Earned \_\_\_\_\_**



Student Name: \_\_\_\_\_

## Fossil Fever Student Inquiry Lab Sheet

### Investigate:

Can fossils be used to learn about plants and animals that lived long ago? What are casts and molds?

Record your observations about your shell impression and the shells in the plaster.

Appearance	
Shell Impression	Whole Shells

### Explain your results

1. How is your imprint like the shell that made the imprint?

---

---

---

2. How is your imprint different from the shell that made the imprint?



3. **INFER:** How might an imprint fossil of an animal be like the animal that made it?

---

---

---

4. How might they be different?

---

---

---

THINK/PAIR/SHARE-

1. Which the snail shells represent- cast or mold
2. Which the impression of the shell represents- cast or mold

Using your science journal-

Write a Line of Learning about what you can learn from fossils, and how you can tell the difference between a cast and a mold.



Student Name: KEY

## Fossil Fever Student Inquiry Lab Sheet-Teacher Key

### Investigate:

Can fossils be used to learn about plants and animals that lived long ago? What are casts and molds?

Record your observations about your shell impression and the shells in the plaster.

Appearance	
Shell Impression	Whole Shells
Possible description: lines about 1" long spikes coming off the lines no colors	Swirls, colors, ridges, lines, spirals

### Explain your results:

5. How is your imprint like the shell that made the imprint?

They both have the same lines, the same size, the same shape

6. How is your imprint different from the shell that made the imprint?

The shell has colors, but the imprint doesn't, they are made of different materials, one is older than the other one, the lines are not as clear on the imprint as they are on the shell.

7. **INFER:** How might an imprint fossil of an animal be like the animal that made it?

A fossil imprint and the animal that make it will probably have the same size and shape.

8. How might they be different?

The imprint will probably have fewer details than the animal that made it, and you wouldn't be able to tell what color it was.

THINK/PAIR/SHARE-

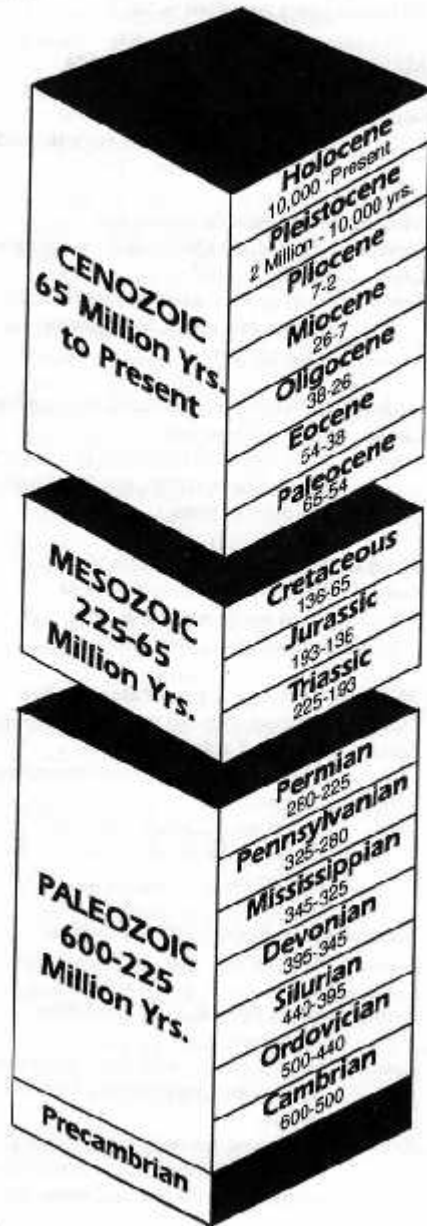
1. Which the snail shells represent- cast or mold
2. Which the impression of the shell represents- cast or mold

Using your science journal-

Write a Line of Learning about what you can learn from fossils, and how you can tell the difference between a cast and a mold.

## THE AGES OF THE EARTH

This geological chart tells the fascinating story of the earth's history. The numbers show how many millions of years ago each era or period occurred. The Holocene and the Pleistocene periods are shown in *thousands* of years.



# Assessment Matchup for Fossil Fever- Key

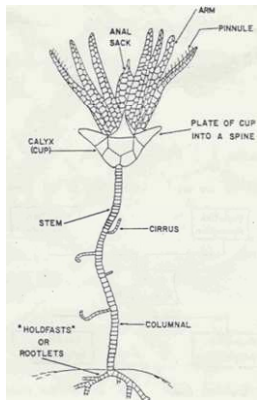
**Trilobites-fossil**



**Crabs, Lobsters**



**Crinoids fossil**



**Starfish, Sea Urchins**



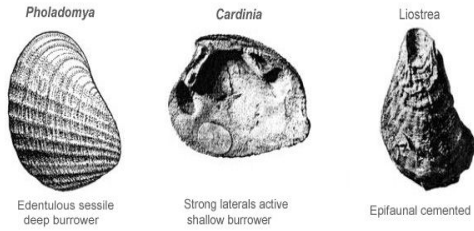
**Gastropods-fossil**



**Snail family**



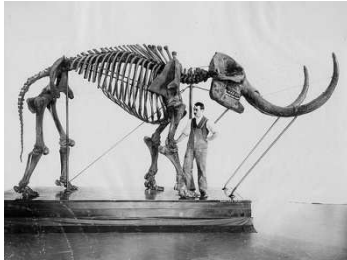
## Bivalves-fossil



## Clams, Oysters



## Mastodons-fossil



## Elephants



## Fern Fossils



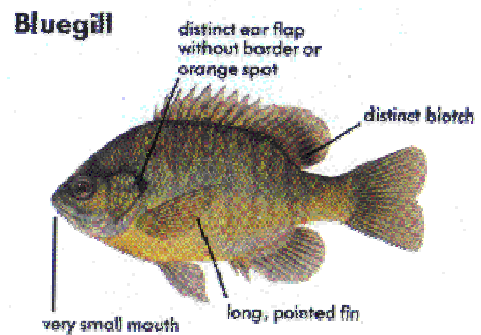
## Ferns



## Fish Fossils



## Fish of Missouri



# FOSSIL FIND FINALE



Sample of cover for Folder Assessment

# Folder Assessment Instructions

These instructions are to make a folder that you can use for any subject that uses matching terms, pictures, or topics. It is a paper saver by being reusable- that is why my example is **GREEN!**

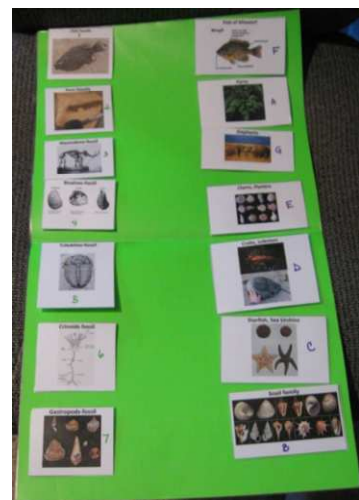
## Materials needed:

- ❖ Colored poster board
- ❖ White card stock
- ❖ Contact paper
- ❖ Small circles of Velcro-type material, with a sticky back. 4 for the title page and 1 for each card needed. I fit 7 sets on the inside of my example.
- ❖ Scissors

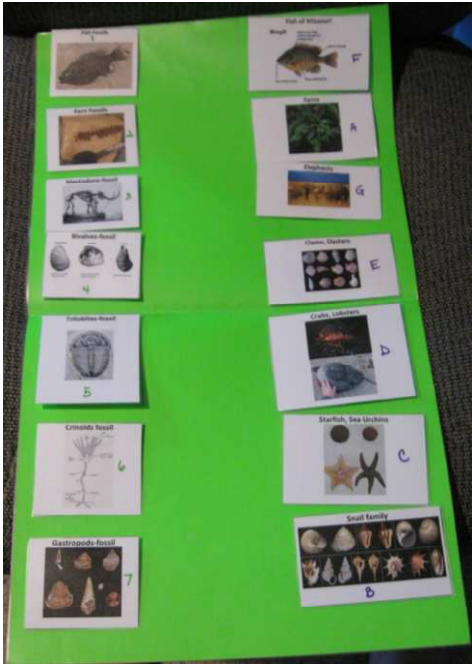
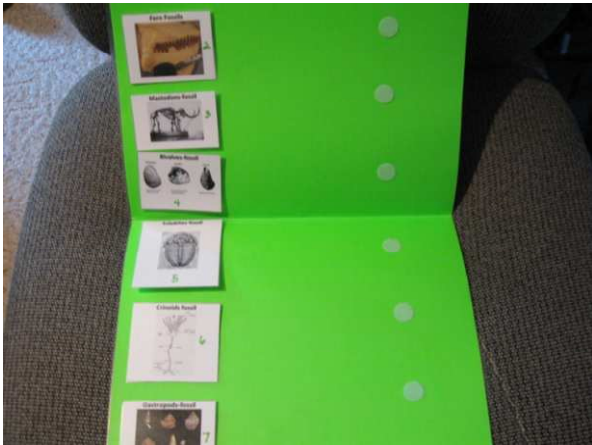
## Procedure:

Take poster board of approximate size 12" x 20" (exact size is not required for this project.)

1. Cover it with Contact paper- lamination could also be used. Contact paper is a little tougher. Trim edges. Fold in half. Crease well.
2. Make a Title paper by choosing pictures and word art on a word document, print out on color printer on white card stock.
3. Cut white card stock approximately 6 ½" x 8 ½". Cover with contact paper.
4. Place sticky circles on the back of the title card, with both halves connected. Press on front side of folder, being careful to center the card on the front. (This will connect the dots to the front of the folder and secure the title to the folder.)
5. Copy words, pictures, whatever needs a match, to a word document and print out on card stock. Print. Cut out as needed. Cover with contact paper and trim.
6. Open folder so that the greatest length is going top to bottom. Repeat step 5 so that the cards are evenly spaced.







Examples of Folder Assessment

[Back to activities list](#)

[Next](#)

[Activity](#)

## Make a Fossil From Glue!

[print](#) [add to favorites](#) [Share This](#)

by Mike Calhoun

Topics: **Fifth Grade, Science**

**We did this activity**

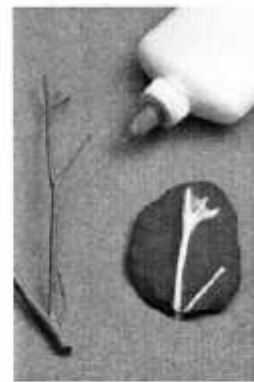
Your fifth grader will be learning all about fossils this year. Fossils are ancient plant, animal and microbe life that lived in the distance past preserved in stone. You can make your own fossils at home with a little modeling clay and glue.

### What You Need:

White glue

Modeling clay

Seashell or other hard natural objects like bones, or small tree branches.



### What You Do:

1. Have your child collect 2-3 objects like seashells, bones, tree limbs, etc.
2. Place one of the selected objects on a flat surface like a table top. Press the clay into the object. The impression should not be too deep (the deeper the impression, the longer it will take for the glue to dry).
3. Slowly and carefully pull the object out of the clay. Try not to have the clay stretch or smear when you remove the object. The impression of the object in the clay forms a "mold" of the object even if the object is gone.
4. Next, take white glue and fill in the mold. In a real fossil when animals rot beneath the soil, the space they filled can be filled with minerals from groundwater. The glue is like those minerals.
5. Let the glue dry. The time it takes to dry depends on the depth of the impression.
6. When the glue has dried, peel back the glue shape from the clay. The glue shape is a "cast" of the object. Many fossils are preserved as casts and molds. Sometimes there is excess glue around the "fossil." Cut away the excess glue with your fingers or scissors. Many natural fossils have excess material around them and have to be cleaned to see the original fossil.

Follow up this activity with a trip to your local science museum so that they can see a real fossil!

## PRIMARY ENERGY STORY: The Tale of Fern Fossil



Once upon a time, a beautiful fern tree grew in a swamp. All day, she soaked up sunlight and stored it in her fronds. The sun's energy helped her grow tall.

The biggest frond was Fern Fossil. Every day she stretched closer to the sun. She was proud to be the tallest frond on the tree.

One day, the sky grew dark and a strong wind blew. The other fronds huddled together. They gave each other strength. But Fern was too high. She was all alone. There were no fronds tall enough to help her.

The wind blew harder and Fern's stem snapped. She fell from the tree into the dark water. Fern sank to the bottom of the swamp. She thought her journey was over.

Nature had a different plan for Fern. For a long time, she lay in the swamp. More plants fell into the water. They covered Fern like a blanket.

After many years, the water dried up and the swamp turned into land. Dinosaurs roamed over the earth. Fern lay under the ground, buried deeper and deeper.

The weight of the dirt and the heat of the earth changed Fern. She was no longer green. She lost her leafy shape. But she still had the sun's energy stored in her.

Fern Fossil had turned into a shiny black rock full of energy. She was a piece of coal. Fern and many other plants were now a big seam of coal buried under the ground.



One day, a big machine dug into the earth. It took away the dirt on top of the coal. It lifted Fern from the earth and put her into a huge truck. She was taken to a building where she was washed, then put on a train.

The train chugged through the night to a power plant. Fern was put into a boiler and burned. Her energy produced a lot of heat.

The power plant used Fern's energy to make electricity. It traveled through a power line to a house. A little boy turned on a light so that he could read.

The energy that Fern had gotten from the sun millions of years ago was lighting the night. Fern had traveled a long way.

Examples for teachers- shell plate, foldable, poster

