



Targeted Age:

Elementary school

Activity Structure:

Individual or group activity

Indiana Standards and Objectives:

K.PS.1, 1.PS.1, 1.LS.2, 1.LS.3, 2.PS.1,
2.LS.2, 2.LS.3, 3.ESS.4, 3.LS.3, 4.LS.1,
4.LS.3

Introduction

In this lesson, students will observe natural objects and evaluate the definition of a fossil. Students will sort different specimens by their physical properties and determine their classification and method of preservation.

Vocabulary

Cast—the process of fossilization in which sediments infill the cavity of a fossil organism

Carbonization—the process of fossilization in which organic material decays and produces a black film of carbon

Fossil—physical evidence of a preexisting organism through preserved remains or an indirect trace

Mold—the process of fossilization in which a fossil organism creates an imprint in sediments

Permineralization—the process of fossilization in which minerals fill the spaces within organic tissue

Replacement—the process of fossilization in which minerals replace organic tissue

Trace fossil—a trace of a once-present organism rather than preserved organic material; includes burrows, tracks and trails, and coprolites

Unaltered hard parts—the process of fossilization in which shells, teeth, and bones retain their original appearance, such as in amber, ice, or tar; can sometimes include soft tissue

MATERIALS NEEDED

- Fossil specimens in a variety of preservation methods (such as trilobite mold/cast, permineralized wood, burrow marks, and carbon film plant)
- Non-fossil specimens (such as igneous rock, modern bone, modern shell, and wood)
- Magnifying lens (optional)
- Fossils of Indiana Discovery Trunk (optional)

Background Information

A fossil is physical evidence of a preexisting organism through preserved remains or an indirect trace. In order to be classified as a fossil, a specimen must be:

- Physical – Fossils are tangible, three-dimensional objects with characteristics that can be measured.
- Preexisting organism – Fossils are a record of a once-living organism that is dead or extinct, and at least 10,000 years old.
- Preserved remains – Shells, bones, and teeth are the most commonly preserved body parts of fossilized organisms. Soft body parts, such as skin and hair, are less likely to be preserved as fossils.

OR

- Indirect trace – Fossilized footprints, burrow marks, or coprolites all provide traces that an organism once existed, but are not preserved remains of the organism itself.

Fossils form when a living organism dies, is rapidly buried by sediment, and minerals replace or form around the original cells and tissues over geologic time. There are five primary methods of fossil preservation. Unaltered hard parts are shells, teeth, and bones that retain their original appearance, such as in amber, ice, or tar. Altered fossils form when minerals (like quartz and calcite) are added to an organism's organic material (permineralization) or replace an organism's organic material (replacement). Organic material can decay and leave a black film of carbon (carbonization). Molds and casts are created by sediment filling in a cavity; the impression is the mold of the organism, while the cavity that is filled is the cast. Trace fossils are a trace of a once-present organism rather than preserved organic material, and include burrows, tracks and trails, and coprolites.

Fossils of any kind are useful in interpreting the rock record. They can help us determine the geologic age and sedimentary environment in which they were deposited, and their study can help scientists better understand patterns in the evolution of life throughout Earth's history.

Procedure

1. Distribute specimens to each student, making sure that they have both fossil and non-fossil examples.

2. Ask the class what they think a fossil is. Common answers include:

- A fossil is something that died a long time ago
- Something that is dead
- Dinosaur bones
- A bone inside a rock
- Something that is extinct



Figure 1: Permineralized mastodon tooth fossil from approximately 12,000 years ago.

3. Ask students to sort the specimens into two categories: fossil (F) or not a fossil (NF). Record predictions on the student data sheet.



Figure 2: Carbon film fossil of a *Sphenophyllum* leaf from approximately 300 million years ago.

4. Review the vocabulary terms and discuss the five methods of fossil preservation. Ask the class to clarify their previous answers with the following guiding questions:

- Can only animals become fossils? What about plants?
- Can non-living things, like rocks and sand, become fossils?
- Besides bones, what else can be a fossil? What about shells, teeth, and footprints?
- Is something that just died considered a fossil?
- How long do you think something must be dead in order to be called a fossil?

5. Ask students to observe the physical properties (density, color, luster, etc.) of each specimen. Record observations on the student data sheet.

What exactly is a fossil? Ask students to carefully evaluate the definition and decide which specimens are true fossils.

6. Using the definition of a fossil, have students re-sort each specimen as a fossil (F) or not a fossil (NF) on the student data sheet. Review answers with class.



Name:

Class Period:

MATERIALS NEEDED

- Fossil specimens in a variety of preservation methods (such as trilobite mold/cast, permineralized wood, burrow marks, and carbon film plant)
- Non-fossil specimens (such as igneous rock, modern bone, modern shell, and wood)
- Magnifying lens (optional)
- Fossils of Indiana Discovery Trunk (optional)

Introduction

In this lesson, students will observe natural objects and evaluate the definition of a fossil. Students will sort different specimens by their physical properties and determine their classification and method of preservation.

Vocabulary

Cast—the process of fossilization in which sediments infill the cavity of a fossil organism

Carbonization—the process of fossilization in which organic material decays and produces a black film of carbon

Fossil—physical evidence of a preexisting organism through preserved remains or an indirect trace

Mold—the process of fossilization in which a fossil organism creates an imprint in sediments

Permineralization—the process of fossilization in which minerals fill the spaces within organic tissue

Replacement—the process of fossilization in which minerals replace organic tissue

Trace fossil—a trace of a once-present organism rather than preserved organic material; includes burrows, tracks and trails, and coprolites

Unaltered hard parts—the process of fossilization in which shells, teeth, and bones retain their original appearance, such as in amber, ice, or tar; can sometimes include soft tissue

Student Data Sheet

Predict if each specimen is a fossil (F) or not a fossil (NF). Observe the physical properties of each specimen and record your observations below.

Number	Prediction	Observation	Answer
1.	F NF		F NF
2.	F NF		F NF
3.	F NF		F NF
4.	F NF		F NF
5.	F NF		F NF
6.	F NF		F NF
7.	F NF		F NF
8.	F NF		F NF