Fossil in Sedimentary Rock

Earth & Space Science | Engineering Design Process

Engineering Challenge

Visible Elements in Photo

- A tan/brown rock with a detailed fossil imprint of what appears to be a fan-shaped marine creature (likely a trilobite or brachiopod)
- Multiple rounded stones and pebbles surrounding the fossil, varying in color (gray, tan, brown)
- Fine sediment and soil between the stones
- Clear surface texture and relief details in the fossil impression

Reasonable Inferences

- From fossil imprint detail: Ancient organisms left impressions in soft sediment that hardened over time, meaning soft materials can preserve shape when compressed and solidified.
- From surrounding rocks and sediment: Fossils form in layered environments with a mix of materials (fine sediment + larger debris), suggesting stratification is important to preservation.
- From the fan-like structure of the fossil: The organism had a protective or feeding structure that was rigid enough to leave a detailed mold, implying hard body parts existed.

Engineering Task

K-2 Challenge:

Make a Fossil Imprint Mold

You're a paleontologist discovering how fossils form! Press objects into soft clay to make imprints, then cover them with more clay. Remove the objects carefully. Can you make a clear print? Which objects make the best imprints—bumpy things or smooth things?

3-5 Challenge:

Design a Fossil Preservation System

Your challenge: Create a two-layer model that shows how a creature's shell can be preserved as a fossil. Your system must:
- Use a soft bottom layer (clay or playdough) to capture an imprint of a shell, bone, or textured object
- Cover it with a hardening top layer (plaster, salt dough, or air-dry clay)
- Preserve at least 3 distinct surface details that are recognizable after the original object is removed
- Be completed and tested within one class session

Success looks like: Your fossil mold shows clear, detailed impressions without crumbling or collapsing when handled.

EDP Phase Targeted

Ask / Define Problem

This phase fits because the photo shows a real fossil result without showing the process that created it. Students must first understand why fossils form and what conditions allow preservation before they can design a system to recreate those conditions. The task starts with curiosity about the problem ("How did this imprint get trapped in rock?") rather than jumping straight to building.

Suggested Materials

1. Air-dry clay or modeling clay (soft layer for imprints)
2. Plaster of Paris or salt dough (hardening top layer)
3. Natural objects to press into clay (small shells, leaves, bones, twigs, textured bark)
4. Water (for mixing plaster or activating salt dough)
5. Sculpting tools or popsicle sticks (for careful removal and detail work)

Estimated Time

45–60 minutes (one extended class period)
- 10 min: Observe fossil photo and discuss how fossils form
- 15 min: Layer and impress objects into soft material
- 20 min: Apply hardening layer and let it begin to set
- 10–15 min: Remove original objects and examine details

Optional extension: Repeat with different materials or layering techniques (two sessions total).

Why This Works for Teachers

This task directly addresses NGSS ETS1.A (defining problems and identifying constraints) by asking students to reverse-engineer how nature preserves shape and detail, connecting Earth science observation to hands-on design thinking in a single, low-prep activity.