

Visible Elements in Photo



- A large, stratified rock formation with visible horizontal layers (tan, brown, and white bands) sitting on a blue wooden pallet
- Surrounding gravel and small stones covering the ground
- A vehicle (partial view) and paved surface in the background
- Shadows cast by structures, indicating strong sunlight and outdoor location
- Clear evidence of weathering and erosion on the rock's upper surface

Reasonable Inferences

- From layered rock structure: The rock was formed over time by compressed sediment; different layers indicate different environmental conditions when each layer was deposited.
- From weathering patterns: Exposure to weather, temperature changes, and moisture causes the rock's surface to break down and separate along weak points (the white mineral bands appear to be natural fracture zones).
- From placement on pallet: This rock may have been transported or is being stored, suggesting it has value or purpose (educational specimen, landscaping material, or construction material).

Engineering Task

K-2 Challenge:

You found a big rock that is breaking apart into layers. Design a rock holder using craft materials that will keep the rock from falling apart. Your holder must:

- Wrap around or support at least two sides of the rock
- Use only paper, tape, string, or cloth
- Keep the rock safe when you gently lift it

3-5 Challenge:

Stratified rocks like this one break apart along weak layer boundaries due to freezing, water infiltration, and weathering. Design a protective sleeve or casing that will slow down layer separation when the rock is exposed to repeated wetting and drying cycles (simulated in the classroom). Your design must:

- Cover at least 50% of the rock's surface
- Use only biodegradable or recyclable materials (burlap, kraft paper, twine, or cardboard)
- Allow you to remove it without damaging the rock
- Withstand at least 5 wet-dry cycles (each cycle: soak for 2 minutes, air dry for 10 minutes)
- Test and measure how many layers separate after your protection is applied versus an unprotected control sample

EDP Phase Targeted

Ask / Define Problem

This phase fits because the photo shows a real-world problem: natural rock deterioration due to weathering and layer separation. Students aren't looking at a finished solution; they're identifying why the rock is vulnerable and what protection it needs. The visible erosion and stratification invite students to ask, "How can we prevent this from getting worse?" before jumping to solutions.

Suggested Materials

1. Kraft paper or brown kraft tape – wraps easily around irregular shapes and is biodegradable
2. Twine or natural jute string – binds layers together without adhesive
3. Burlap fabric scraps – breathable, allows drying, mimics historical preservation methods
4. Cardboard or foam sheets – provides rigid support for fragile edges
5. Spray bottle with water – simulates repeated wetting for durability testing

Estimated Time

- K-2: 20–30 minutes (design and wrap) + 5–10 minutes (lift test)
- 3-5: Two 40-minute sessions (Session 1: design and build sleeve; Session 2: conduct wet-dry cycles, measure results, document layer separation)

Why This Works for Teachers

This task directly addresses NGSS 3-5-ETS1-2 (Generate and compare multiple possible solutions based on how well they meet the criteria and constraints of a design problem) by requiring students to test whether their protective design actually slows weathering and then iterate based on real data.