

Visible Elements in Photo



- A metallic, weathered metal beam or rail with rust and corrosion visible
- A green chrysalis (butterfly pupa) hanging from the beam by a thin silk thread
- Blurred green background (foliage or outdoor setting)
- Natural attachment point where the chrysalis connects to the structure
- Evidence of structural support: the beam bears the weight of the hanging chrysalis

Reasonable Inferences

1. From the chrysalis: The organism needs a safe, stable place to hang during metamorphosis—it is vulnerable and depends entirely on its anchor point for survival.
2. From the metal beam: Exposed structures in nature must withstand environmental forces (wind, rain, temperature changes) while remaining strong enough to support living things.
3. From the attachment method: Small, delicate living things often use minimal materials but require strong, reliable connections—suggesting that strength and efficiency can coexist.

Engineering Task

K-2 Challenge:

Build a Safe Home for a Butterfly Baby

A chrysalis (a butterfly baby) needs a safe place to hang while it grows. Design and build a hanging pod using string and natural materials (leaves, twigs, clay). Your pod must:

- Hold a small object (like a walnut or marble) safely
- Hang from a stick or rod without falling
- Keep the object dry and protected

How will you make sure your pod doesn't break or drop?

3-5 Challenge:

Design a Protective Chrysalis Shelter

Butterfly chrysalises must hang safely from branches and withstand wind, rain, and temperature swings while remaining lightweight. Design and build a hanging shelter using only natural or recycled materials that:

- Hangs stably from a wooden dowel or branch using a single attachment point
- Protects a water-filled balloon (representing the chrysalis) from direct water spray for at least 30 seconds
- Does not weigh more than 50 grams
- Can support itself without additional support from below

Test your design by suspending it, applying a light wind simulation (fan on low), and spritzing it lightly with water. Measure success by whether the "chrysalis" remains protected and the structure stays attached.

EDP Phase Targeted

Ask / Define Problem

This photo shows a real organism in a real survival situation, making it ideal for starting with problem identification. Students observe that the chrysalis faces a genuine challenge (finding stable shelter during a vulnerable stage), and the engineering task emerges naturally from that authentic need. Rather than telling students "here's how to build a hanging structure," they discover the why first.

Suggested Materials

- Yarn, string, or twine
- Small branches, twigs, or wooden dowels
- Leaves, bark, or moss (fresh or dried)
- Air-dry clay or modeling clay
- Recycled paper, newspaper, or tissue paper
- Small objects to simulate weight (walnuts, marbles, water balloons)
- Tape or natural plant fiber (optional reinforcement)

Estimated Time

- K-2: 45-60 minutes (one session: design, build, test)
- 3-5: 60-90 minutes (may span two 45-minute sessions: design/plan, build, test, refine)

Why This Works for Teachers

This task directly addresses NGSS ETS1.A (defining and delimiting engineering problems) and ETS1.B (developing possible solutions) by anchoring the design challenge in a real organism's survival need, making the engineering constraints meaningful rather than arbitrary.