Pond Habitat

Life Science | Engineering Design Process

Engineering Challenge

Visible Elements in Photo

- Pond or shallow water body with lily pads (round, flat leaves) covering the surface
- White water lily flowers blooming among the pads
- Submerged and emergent vegetation (tall plants with dark leaves in background)
- Stacked log or wooden edging along the pond perimeter
- Flowering plants (magenta/pink flowers, red flowers) planted in the terrestrial garden area behind the water feature
- Trees providing overhead shade

Reasonable Inferences

- From lily pad density and water coverage: The pond ecosystem supports plants that need stable, floating structures to survive—suggesting that surface area and buoyancy are critical design factors for aquatic life.
- From the log edging and planted garden transition: Human-designed barriers separate water habitats from land habitats, implying that edges and transitions require intentional engineering to prevent erosion and manage water flow.
- From shade-providing trees and blooming flowers: The habitat is managed to balance sunlight and shelter, indicating that organisms in this environment need both light exposure and protection.

Engineering Task

K-2 Challenge:

Build a floating home for pond animals using materials that float and won't sink. Your home must hold a small toy animal (like a plastic bug or frog) and stay on top of the water for at least 1 minute. You can use foam pieces, cork, sticks, and string. How can you make it strong enough so your animal doesn't fall in?

3-5 Challenge:

Design and build a floating plant platform that mimics a lily pad. Your platform must:
- Float on water while supporting a mass of 100 grams (small rocks or washers) placed in the center
- Have a diameter of at least 15 cm
- Remain stable (tilt no more than 15 degrees) when a gentle water current pushes it
- Be constructed using only natural or recycled materials (cork, foam, wood scraps, twine)

Test your design by placing it in a bucket or tub of water and recording how long it floats and how much weight it holds before sinking.

EDP Phase Targeted

Ask / Define Problem

This photo shows a naturally functioning ecosystem where organisms solve real problems (floating, anchoring, accessing light, managing water flow). Students should first observe the pond habitat, identify what plants and animals need, and then define the engineering problem. This grounds the challenge in authentic observation rather than starting with a predetermined solution.

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Suggested Materials

- Cork pieces or foam sheets (recyclable or craft-store)
- Twine or natural fiber rope
- Sticks or thin wooden dowels
- Plastic wrap or old fabric scraps (for testing buoyancy)
- Washers, pebbles, or sand (to test weight-bearing capacity)
- Containers or buckets filled with water (for testing environments)

Estimated Time

K-2: 30–45 minutes (design, build, test once)
3-5: Two 30-minute sessions (Session 1: design and build; Session 2: test, record data, refine design)

Why This Works for Teachers

This task directly aligns with NGSS ETS1.B (Developing Possible Solutions) by requiring students to design a solution to a constraint-based problem observed in nature—floating structures that support life—and test their design against real-world criteria (buoyancy, stability, weight capacity).