Frog

Life Science | Engineering Design Process

Engineering Challenge

Visible Elements in Photo

- A small tree frog (appears to be a green tree frog species) clinging to a large green leaf
- Textured leaf surface with visible veins and slight moisture/dewdrops
- The frog's body is blue-green and flattened against the leaf surface
- Large, prominent eye with a visible pupil
- Blurred green foliage in the background, suggesting a dense forest or canopy environment

Reasonable Inferences

- From the frog's flattened posture on the leaf: The animal needs a surface that provides grip and camouflage to hide from predators and hunt prey safely.
- From the moisture visible on the leaf surface: Tree frogs depend on humid environments and need surfaces that retain moisture to keep their skin healthy.
- From the dense background foliage: Frogs in this habitat require multi-layered structures that provide shelter, shade, and protection from extreme temperature changes.

Engineering Task

K-2 Challenge:

Design and build a cozy hiding place where a tree frog could rest and stay safe. Your hiding spot must:
- Have a smooth, grippy leaf or branch the frog can hold onto
- Be shady and cool (protected from bright light)
- Keep the frog tucked away from view

Use your materials to make layers that create a little "forest" for your frog to hide in. Test it by placing a toy frog on it—does it feel safe and hidden?

3-5 Challenge:

Design and build a small, enclosed habitat (no larger than 12 inches tall) where a tree frog can survive for one week. Your design must include:

- Surface area: At least two textured climbing surfaces (leaves, bark, or foam) that mimic the frog's natural environment
- Humidity retention: A system to keep the air inside moist (e.g., a water source, layers of material that trap moisture)
- Temperature control: Shaded areas and ventilation that prevent overheating
- Accessibility for observation: One transparent side or opening so you can check on the frog without disturbing it

Measure and record humidity levels daily. Refine your design if humidity drops below acceptable levels.

EDP Phase Targeted

Ask / Define Problem

This photo shows a real animal in its natural environment with no human-made structure visible. The starting point is to identify the problem the frog faces (finding shelter, staying moist, staying hidden) and define what a good habitat must do. Students observe the frog's needs first, then design solutions—this is classic problem-finding before problem-solving.

Suggested Materials

- Paper towel tubes or small cardboard boxes (base structure)
- Green construction paper, real leaves, or craft foam (climbing surfaces)
- Spray bottle or shallow water dish (humidity source)
- Mesh or cheesecloth (ventilation and observation window)
- Soil, moss, or shredded paper (moisture-holding substrate)

Estimated Time

K-2: 30–45 minutes (one session: planning, building, and quick testing)

3-5: Two 45-minute sessions (Session 1: design and build; Session 2: test, observe, measure, and refine)

Why This Works for Teachers

This task directly aligns with NGSS 3-5-ETS1-1 ("Define a simple design problem that can be solved by applying scientific ideas about plants, animals, structures, or materials") by asking students to observe a real organism's needs and translate them into measurable design constraints before building a solution.