Arachnid Camouflage

Life Science | Engineering Design Process

Engineering Challenge

Visible Elements in Photo

- Tree bark with deep ridges, cracks, and varied texture (white, gray, brown colors)
- Lichen or moss growth on bark surface (pale green/white patches)
- One spider positioned on the bark, body and legs aligned with bark patterns
- Natural camouflage effect: spider blends into textured background
- Multiple vertical and horizontal grooves in bark creating hiding spots

Reasonable Inferences

- From spider's position and coloring: The spider's body color and leg alignment match the bark, suggesting camouflage is a survival strategy that protects the spider from predators or helps it hunt prey without being seen.
- From bark texture and lichen: Rough, uneven surfaces with crevices provide shelter and protection; organisms that live on bark must adapt to or use these features to survive.
- From spider's stillness on vertical surface: The spider can cling to bark using legs/spinnerets, and blending in allows it to remain motionless and undetected while waiting for food or avoiding danger.

Engineering Task

K-2 Challenge:

"Build a Hiding Spot for a Tiny Creature"

Your job is to make a pretend bark that helps a small toy bug or spider hide. Use paper, cloth scraps, and natural materials to create a bumpy, textured surface where the bug can disappear. The bug should be hard to see when it sits on your creation. Test it by having a friend try to spot the bug in 10 seconds—if they can't find it right away, your hiding spot works!

3-5 Challenge:

"Design a Camouflage Surface for Woodland Creatures"

Your challenge is to engineer a 12-inch × 12-inch vertical surface (like tree bark) that allows a small animal figurine to blend in so well that an observer has fewer than 5 seconds to locate it from 2 feet away. Your surface must:
- Include at least 3 different textures (bumpy, ridged, or rough areas)
- Use only natural or recycled materials (bark pieces, lichen, moss, crumpled paper, fabric scraps, paint)
- Support the figurine without it falling or sliding
- Remain stable when tilted 30 degrees

Test your design with at least 2 different observers and record how long it takes them to spot the creature. Refine one element (texture, color, or placement) based on your test results.

EDP Phase Targeted

Ask / Define Problem

This photo of a camouflaged spider on textured bark naturally invites students to identify a real problem: "How do small creatures survive and hide in nature?" The spider's camouflage is the solution already visible, but students haven't yet designed their own answer. Starting with "Ask" lets students explore why camouflage matters before jumping to building, grounding the task in real-world observation rather than an abstract constraint.

Suggested Materials

- Craft paper, newspaper, or cardboard pieces
- Natural items: bark chips, dried leaves, small twigs, moss (real or craft), lichen
- Fabric scraps (burlap, felt, cotton in brown/gray/green tones)
- Tempera or acrylic paint (browns, grays, greens, whites)
- Hot glue gun and glue sticks (or craft glue for K-2)
- Small toy figurines (plastic bugs, spiders, or animal figures)
- Ruler and pencil

Estimated Time

- K-2: 40-60 minutes (one session: 10 min. inspiration, 25-35 min. building, 10 min. testing/sharing)
- 3-5: 90-120 minutes across two sessions (Session 1: 15 min. Ask, 30 min. design & build; Session 2: 20 min. test & observe, 15-20 min. refine & retest)

Why This Works for Teachers

This task directly addresses NGSS 3-5-ETS1-1 ("Define a simple design problem reflecting a need or a want") and K-2-ETS1-1 ("Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through engineering") by grounding the design challenge in observable nature and requiring students to test real-world performance criteria, not just complete a craft.