

Visible Elements in Photo



- Tree trunk with rough, textured bark (left side, in sharp focus)
- Thorny/spiky plant stem or branch extending from or near the trunk, with multiple sharp protrusions radiating outward
- Forest floor with leaf litter and soil visible in soft focus
- Multiple tree trunks receding into background, suggesting a wooded environment
- Dappled sunlight filtering through canopy

Reasonable Inferences

1. From thorny structure: The spikes protect the plant from herbivores or climbers—a defensive adaptation that prevents animals from eating or damaging the plant.
2. From proximity to bark: The thorny plant may depend on the tree for structural support while offering the tree some protection in return (mutualism).
3. From forest setting: Plants with thorns are successful in competitive woodland environments where many creatures compete for food and space.

Engineering Task

K-2 Challenge:

"Build a Prickly Plant Protector"

Imagine you have a young plant that needs protection from hungry bugs and animals. Design a "thorn suit" using sticks, toothpicks, or straws to make it pokey. Can you arrange your spikes so that nothing can easily touch the plant? Test it by gently poking with your finger—your spikes should stop you before you reach the center!

3-5 Challenge:

"Engineer a Thorn Defense System"

Design a protective covering for a plant stem using only natural or recycled materials (sticks, twigs, toothpicks, dried grasses, clay, or cardboard tubes). Your thorn system must:

- Cover at least 15 cm of a test stem
- Have spikes spaced no more than 2 cm apart
- Withstand being "nibbled" by a toy animal or gentle finger pokes without losing more than 2 spikes
- Stay attached to the stem for at least 5 test pokes

Sketch your design first, build it, test it, and redesign if needed. What spacing and spike angle works best?

EDP Phase Targeted

Ask / Define Problem

This phase fits because the photo shows a solution already present in nature (the thorn), but students must first identify the problem it solves (predation, competition for space, physical damage). By asking "Why do plants have thorns?" students discover the need, then move into imagining their own defensive designs. This mirrors real engineering: nature shows us problems worth solving.

Suggested Materials

- Toothpicks or bamboo skewers
- Drinking straws (cut into segments)
- Twigs and small branches
- Clay or modeling putty (to anchor spikes)
- Pipe cleaners or wire (to wrap around stem)
- Cardboard tubes from paper towels (for larger test structures)

Estimated Time

- 45–60 minutes (one extended session or two 30-minute sessions)
- Design sketch: 5–10 min
 - Build prototype: 20–25 min
 - Testing and redesign: 15–20 min
 - Reflection / discussion: 5–10 min

Why This Works for Teachers

This task directly addresses NGSS 3-5-ETS1-1 (Ask and define a simple design problem that can be solved by applying scientific ideas about plants, animals, structures, and/or behavior) by grounding students' engineering work in observable biological adaptation and motivating them to solve a real ecological problem.