Sunflower

Life Science | Engineering Design Process

Engineering Challenge

Visible Elements in Photo

- A green plant stem with a smooth, cylindrical structure
- Two seed pods or buds attached to the stem (one at top, one at bottom left)—tan/beige colored with visible ridged or textured surfaces
- Water droplets on the green stem, indicating moisture
- Blurred background suggesting an outdoor or natural growing environment
- The overall structure shows a young plant in an early growth stage

Reasonable Inferences

- From seed pods + stem structure: The plant is designed to protect developing seeds inside a tough outer casing until they are ready to be dispersed or grow.
- From water droplets on stem: The plant absorbs and transports water upward through the stem to nourish growing buds—the stem must be strong enough to support the weight of developing pods while remaining flexible.
- From pod texture and form: The ridged, hard exterior of each pod is a protective structure that shields delicate seeds inside from damage, weather, and predators.

Engineering Task

K-2 Challenge:

Make a safe home for a pretend seed! Using clay, paper, and tape, build a pod or shell that protects a small object (like a pea or marble) inside. Your pod must be hard on the outside but have a soft, comfy space for the seed on the inside. Can you make it sturdy enough that it doesn't crack when you gently squeeze it?

3-5 Challenge:

Design and build a seed pod that protects a fragile object (raw egg or water balloon) during a 1-meter drop onto a hard surface. Your pod must:
- Use only natural or recycled materials (paper, leaves, sticks, clay, cotton).
- Weigh no more than 100 grams.
- Protect the contents so no liquid leaks on impact.
- Be able to hold and display the seed inside after opening (design for visibility).

Test your design, record what happens, and redesign to improve protection.

EDP Phase Targeted

Ask / Define Problem

This photo shows a real biological structure solving a protection problem in nature. Students can observe the seed pod and ask: "How does nature keep seeds safe?" This observation-based question naturally leads to identifying the engineering challenge (how to protect something delicate) before imagining solutions. The visible structure makes the problem concrete and motivates curiosity.

Suggested Materials

- Air-dry clay or modeling clay
- Recycled paper, newspaper, or paper towels
- Natural materials: leaves, twigs, grass, straw
- Tape (masking or clear)
- Cotton balls or fabric scraps
- Raw eggs or small balloons (for testing, 3-5 only)
- Ruler or measuring tape

Estimated Time

- K-2: 45–60 minutes (one session: 15 min. observation + discussion, 25 min. building, 15 min. testing and sharing)
- 3-5: Two 40-minute sessions (Session 1: observation, brainstorm, and first build; Session 2: drop test, analysis, and redesign)

Why This Works for Teachers

This task directly addresses NGSS K-ETS1-1 / 2-ETS1-1 / 3-ETS1-1 (Ask questions, make observations, and define engineering problems) by grounding the challenge in a visible natural structure, making the problem statement emerge from student observation rather than teacher instruction alone.