Deceased Deer

Life Science | Engineering Design Process

Engineering Challenge

Visible Elements in Photo

- One deceased ungulate (deer) in prone position on ground
- Tan/brown fur coat with white markings on underside and tail area
- Four long, thin legs extended outward
- Decomposed state with visible skeletal structure
- Ground surface covered with wood chips, leaf litter, and scattered green vegetation
- Natural outdoor setting (likely forest floor or wildlife area)

Reasonable Inferences

1. From decomposed state & outdoor setting !’ This organism has been exposed to natural decomposition processes (bacteria, fungi, scavengers, weather) over time, suggesting a need to understand nutrient cycling and habitat restoration.
2. From fur and skeletal structure !’ This animal once moved through its environment; the rigid position suggests the body is no longer flexible, indicating significant time has passed since death.
3. From vegetation patches near body !’ Plants continue to grow despite the presence of decomposing organic matter, suggesting soil is still viable for new growth.

Engineering Task

K-2 Challenge:

"Build a Home for Nature's Helpers"

Imagine small creatures (bugs, worms, mushrooms) help break down things in nature and put nutrients back into the soil. Design a cozy space where these nature helpers can live and do their important work. Use wood chips, soil, leaves, and sticks to build a special "decomposition home." Make sure your design:
- Has places for bugs and worms to hide
- Keeps things damp (like real forest floors)
- Lets air get in

Test your design by checking if worms or pill bugs want to live in it!

3-5 Challenge:

"Design a Controlled Decomposition Habitat"

In nature, dead organisms are broken down by decomposers (bacteria, fungi, insects, worms). Your challenge: design and build a small-scale decomposition system that speeds up the breakdown of organic waste while measuring nutrient release back into soil.

Constraints:
- Use only classroom materials (see list below)
- System must fit in a container no larger than a shoebox
- Must maintain moisture (wet as a wrung-out sponge) for 2+ weeks
- Must allow air flow to bottom and sides

Success Criteria (measurable):
- Organic material visibly breaks down by 50% after 3 weeks
- pH of soil layer changes (test with pH strips before/after)
- Decomposer organisms present (observe with magnifying glass)
- System produces no bad smells (subjective, but important!)

EDP Phase Targeted

Ask / Define Problem !• This phase fits best.

Why: The photo shows a real-world phenomenon (natural decomposition) but presents a problem to solve—how can we harness decomposition safely and efficiently in a controlled way? Students start by observing what happens in nature and asking: "How can we speed this up?" or "How can we use this to improve soil?" This grounds the task in authentic need-finding before moving to design.

Suggested Materials

1. Soil (potting soil or garden soil from outdoors)
2. Organic waste (shredded leaves, grass clippings, vegetable scraps—NO meat/dairy)
3. Wood chips or cardboard pieces (for structure and carbon source)
4. Containers (clear plastic storage boxes, 5-gallon buckets with drainage holes, or terrariums)
5. Decomposer starters (compost from existing pile, or collected worms/pill bugs from outdoors with permission)
6. Optional: pH test strips, magnifying glass, thermometer

Estimated Time

K-2: 45–60 minutes (initial build) + 10 minutes per week for 3–4 weeks (observation)

3-5: Two 45-minute sessions (design/build + setup) + 15 minutes weekly for 3–4 weeks (measurement & observation)

Why This Works for Teachers

This task directly addresses NGSS ETS1.A (defining engineering problems) and ETS1.B (designing solutions) while grounding learning in life science (K-LS1.C: organization for matter and energy flow, 3-LS1.B: information processing, 5-LS1.C: matter and energy in organisms)—students observe a natural system, identify a problem it solves, and engineer a controlled version.