Fungi03

Life Science | Engineering Design Process

Engineering Challenge

Visible Elements in Photo

- Pale tan and white fungi (mushrooms or toadstools) with rippled, funnel-shaped caps growing on dark wood and soil
- Dark tree branches and bark (living or recently dead wood) serving as the growing surface
- Green conifer needles in the upper left, suggesting a forest or woodland floor environment
- Decaying wood debris and dark soil surrounding the fungi
- Multiple fungi clustered together on the same substrate

Reasonable Inferences

- From fungi structure and location: These organisms break down dead wood and return nutrients to soil—they are nature's recyclers and need a moist, shaded environment to survive.
- From clustered growth pattern: Fungi thrive in groups because they share nutrients through underground networks (mycelium), suggesting interdependence and efficient resource use.
- From dark, damp surroundings: The fungi's habitat is cool, humid, and protected from direct sunlight—key conditions for decomposition and fungal growth.

Engineering Task

K-2 Challenge:

Build a cozy home for mushrooms! Using twigs, leaves, and damp soil, create a small shelter that keeps a sponge (pretend mushroom) safe and wet. Your shelter should keep water in and let air move through. Can you make it without using tape?

3-5 Challenge:

Design and build a moisture-retaining growing chamber for fungi using recycled materials. Your chamber must:
- Maintain visible moisture on interior surfaces for at least 3 days
- Allow air circulation (include at least 2 small openings)
- Support decomposing wood or cardboard substrate without collapse
- Use only materials that would not harm fungal growth (no plastic wrap or glues)

Test your design by placing a damp wood sample inside and observing condensation and substrate condition daily over one week. Redesign any section that fails to hold moisture or allow air flow.

EDP Phase Targeted

Ask / Define Problem

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This photo shows a natural system already solving a problem—fungi decomposing dead wood in a specific environment. Students should start by asking: "What does a fungus need to survive and do its job?" This grounds the engineering challenge in observation of nature before they build a solution. The visible success of fungi in their real habitat makes the problem clear and concrete.

Suggested Materials

- Damp wood pieces or corrugated cardboard (substrate)
- Small containers (yogurt cups, plastic bottles with tops cut off)
- Sphagnum moss or leaf litter (moisture and air pores)
- Twigs and bark pieces (structure)
- Paper towels or cotton balls (moisture regulators)

Estimated Time

K–2: One 30-minute session (building only; optional 5-minute check-in the next day)
3–5: Two to three 30-minute sessions over one week (Day 1: design & build; Days 2–7: daily observation and notes; Day 8: redesign discussion)

Why This Works for Teachers

This task directly addresses NGSS ETS1.B: Developing Possible Solutions by having students engineer a system that mimics natural conditions (moisture, airflow, decay substrate), applying observable evidence from the photo to solve a real-world decomposition challenge.

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