

Visible Elements in Photo



- One earthworm on soil surface with visible segmented body structure
- Mix of green grass blades and dried/tan plant material covering the ground
- Moist soil visible between plant material
- Worm positioned horizontally across the surface (not burrowed)
- Varied textures of decomposing organic matter (leaves, grass fragments)

Reasonable Inferences

- From worm on exposed surface: Earthworms typically burrow underground to escape predators and find moisture; this worm may need shelter or be returning to soil after rain.
- From mixed fresh and decomposed plant material: The soil contains organic layers that worms consume and move through; a good habitat requires layered soil with food sources.
- From moist appearance of worm and soil: Earthworms depend on soil moisture and would struggle in dry conditions; a habitat design must manage water retention.

Engineering Task

K-2 Challenge:

- > "Build a Home for a Worm"
- >
- > Your job is to design a cozy underground home for an earthworm. The worm needs:
 - > - A safe, dark tunnel to live in
 - > - Soft soil it can move through
 - > - Bits of dead leaves and grass to eat
 - > - Just the right amount of wetness (not too dry, not soaked)
- >
- > Using a jar, soil, sand, and plant scraps, layer a worm home. Then predict: will your worm tunnel down, stay at the top, or move around? Build it and watch!

3-5 Challenge:

> "Design and Test an Optimal Earthworm Habitat"

>

> Earthworms improve soil by tunneling and breaking down organic matter. Your challenge: design a two-layer soil habitat in a clear container that meets these criteria:

> - Layer 1 (top): Mix soil with decomposed plant material; must be 5–7 cm deep

> - Layer 2 (bottom): Sandy loam or pure sand; must be 5–7 cm deep

> - Moisture requirement: Soil should feel like a wrung-out sponge (not dusty, not dripping)

> - Success measure: Observe and sketch where the worm burrows within 24 hours. Did it stay in one layer, move between layers, or create new tunnels?

>

> Modify one variable (organic matter amount, moisture level, or sand ratio) and test again. Which design change made the worm more active?

EDP Phase Targeted

Ask / Define Problem

This photo shows a real organism in its natural environment with an implicit challenge: "What does this creature need to thrive?" The worm on the surface (unusual behavior) prompts students to define what a healthy habitat looks like. Rather than handing them a solution direction, the task asks them to observe, infer needs, and design a testable habitat—making the Ask phase the natural entry point.

Suggested Materials

1. Clear plastic containers or jars (recycled takeout containers, mason jars, or plastic cups work well)
2. Potting soil or garden soil (or a mix with sand)
3. Dry leaves, shredded newspaper, or grass clippings (decomposed plant matter)
4. Water in a spray bottle (for moisture control)
5. Live earthworms (order from a bait shop or collect from your yard after rain; use 1–3 per habitat)

Optional add-ons: black construction paper or cloth to cover containers (worms prefer darkness), thermometer, measuring tape or ruler.

Estimated Time

K-2: 20–30 minutes for setup + 5–10 minutes daily observation over 3–5 days

3-5: 30–40 minutes for design and build + 10 minutes per day for observation and data recording over 5–7 days (or two 30-minute sessions if testing a modified design)

Why This Works for Teachers

This task directly addresses NGSS K-ESS2-1 (K-2) and 3-LS4-3 (3-5) by having students design solutions based on observable organism needs and test how habitat conditions affect behavior—authentic engineering applied to a living system they can interact with safely and inexpensively.