



## PUZZLE: CREATE A WORM FARM

**STANDARDS & CONNECTIONS:** NGSS.3-5-ETSI, NGSS.MS-ETSI, NGSS.MS-LS2-5, NGSS.5-LS2-1, NGSS.HS-ESS2-7

**SUGGESTED MATERIALS:** Soil, cardboard box with lid, water, food scraps

**BACKGROUND:** An earthworm has no arms, legs or eyes, but is responsible for helping make our soil healthy so we can grow food. As worms move through soil, they create space for water, roots, and air. This helps make the soil less compact, making it easier for plants to grow. Worms also break down organic matter, like leaves and grass, which are important for soil health. As they break down organic matter, they create waste, or castings, which are a natural fertilizer for plants.<sup>i</sup> In one acre of land, there could be one million earthworms that can create 100 tons of castings.<sup>ii</sup> Earthworms are an invaluable helper to the agriculture industry.

**1. IDENTIFY:** Share the background information with the students, then share the puzzle to be solved. Determine constraints (e.g., time allotted, space, materials provided, etc.) and divide students into small groups.

**2. IMAGINE:** Ask a series of questions to help students brainstorm solutions to the puzzle. Encourage students to list all ideas – don't hold back! Before moving on, make sure each group selects a solution that fits within the constraints.

- Ask: *How can you solve this puzzle? Which of your ideas can you build a prototype for given the constraints?*

**3. DESIGN:** Students diagram the prototype, identify the materials needed to build the prototype, and write out the steps to take. Students describe the expected outcomes.

- Ask: *What steps will you take to create your solution? What do you expect your solution to look like and be able to do?*

**4. CREATE:** Students follow their design plan and build their prototypes. Monitor their progress and remind them about how much time they have.

**5. TEST & IMPROVE:** Students evaluate their creation and compare it with the expected outcomes. Students seek areas of improvement and make changes where needed.

**6. SHARE:** Students share their solution to the puzzle and communicate lessons learned.

- Ask: *What was your biggest takeaway? What would you do differently?*

**ADDITIONAL RESOURCES:** For more background information on this topic, please visit [www.purpleplow.org](http://www.purpleplow.org).



Punch holes in the lid and keep the box in a shaded place to keep the soil moist. Occasionally put scraps in the box for the worms to eat. Do not put in meat, onions or peppers and limit citrus and starchy food.

<sup>i</sup> University of Illinois Extension. (n.d.). *Can't live without me*. Retrieved from <http://extension.illinois.edu/worms/live/>

<sup>ii</sup> University of Illinois Extension. (n.d.). *Worm facts*. Retrieved from <http://extension.illinois.edu/worms/facts/>