

Ecosystem in a Jar

Standard:

- **MS-LS2-3:** Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.
 - **MS-LS1-6:** Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.
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A. TEACHER:

B. GRADE LEVEL: 6th Grade

C. SUBJECT: STEM / Science

D. DATE: [Insert Date]

E. DURATION: 60 minutes

F. LESSON FOCUS:

Understanding ecosystems, energy flow, and the water cycle within a closed environment.

G. MATERIALS:

- Clear glass jar with lid (e.g., mason jar)
- Small pebbles
- Activated charcoal
- Potting soil
- Small plants (such as moss, ferns, or succulents)
- Water spray bottle
- Paper and pencils (for observations and notes)

H. LESSON OBJECTIVES:

- Students will build a model ecosystem in a jar to understand the interaction between living and nonliving components.
- Students will observe the water cycle, photosynthesis, and respiration within a closed system.
- Students will describe how matter and energy cycle in a simple ecosystem.

I. PROCEDURES:

1. INTRODUCTION:

- Begin with a short discussion about ecosystems. Ask students what they think makes an ecosystem and how living and nonliving parts interact to create balance.
- Introduce the idea of a “closed system” and explain how an ecosystem in a jar can represent a small-scale version of natural ecosystems.
- Review the objectives of the experiment and the steps involved.

2. EXPERIMENT:

- **Step 1:** Place a layer of small pebbles at the bottom of the jar for drainage.
- **Step 2:** Add a thin layer of activated charcoal to help filter the water and prevent mold.
- **Step 3:** Place a layer of potting soil over the charcoal to create a base for the plants.
- **Step 4:** Plant small mosses or ferns in the soil, pressing them gently to secure them.
- **Step 5:** Mist the plants with water to create humidity.
- **Step 6:** Close the jar to create a sealed environment.

3. OBSERVATION:

- Have students place their jars near indirect sunlight and record observations daily.

- Encourage students to look for signs of condensation, growth, and any changes in the plants. Have them note how the closed environment affects the plants over time.

4. GENERALIZATION:

- Discuss as a class the role of each component in the jar and how it represents a larger ecosystem.
- Explain how the water cycle, photosynthesis, and respiration work together to sustain life within the closed jar.
- Relate these processes to real-world ecosystems and discuss the importance of balance and sustainability in natural systems.

5. ASSESSMENT:

- Students will complete a worksheet describing the water cycle, photosynthesis, and respiration in their jar ecosystem.
- Assess understanding through questions on how each component contributes to the ecosystem's balance and sustainability.
- Encourage students to reflect on what would happen if one component was missing or imbalanced.

Note 1: *Safety Considerations*

Ensure students handle glass jars carefully to avoid breakage and possible injury. Inform students to wash their hands after handling soil or plants to minimize exposure to potential allergens or bacteria. The jar lids should be closed gently to avoid cracking. Remind students not to over-water, as excess water may promote mold growth, which can be harmful if left unchecked.

Note 2: *Accommodations for Diverse Learners (ELL, ESE, etc.)*

Provide visual aids showing each step of the setup to support ELL students and those needing additional guidance. Simplify vocabulary, using terms such as “plant water cycle” and “closed jar environment” for easier comprehension. Allow students to work in pairs or groups to discuss each step of the experiment and make observations together. Provide sentence starters for writing observations and offer one-on-one assistance for students requiring extra help with understanding the processes of photosynthesis, respiration, and the water cycle.