Lesson: Self-sustaining Ecosystem	Name:
Teacher:	Date:

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.

Grade Level: Middle School
Subject: STEM / Science
Duration: 60 minutes

Lesson Focus:

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

Materials:

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

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.

Lesson Procedures

1. Introduction (10 min)

- Begin with a short discussion about ecosystems. Ask: *What makes an ecosystem? How do living and nonliving parts interact to create balance?*
- Introduce the idea of a "closed system" and explain how an ecosystem in a jar represents a small-scale version of natural ecosystems.
- Review the objectives and steps of the experiment.

2. Experiment / Teacher-Led Instruction (20 min)

- **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 water and prevent mold.
- **Step 3:** Place a layer of potting soil over the charcoal.
- **Step 4:** Plant small mosses or ferns in the soil, pressing 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 / Small Group Activity (15 min + ongoing)

- Students place their jars near indirect sunlight and record daily observations.
- Encourage students to look for signs of condensation, plant growth, and changes in the environment.
- Prompt students to consider how the closed environment affects the plants over time.

4. Generalization / Discussion (10 min)

- Discuss 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.
- Relate these processes to real-world ecosystems and the importance of balance and sustainability.

5. Assessment (5 min)

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

Safety Considerations

- Ensure students handle glass jars carefully to avoid breakage and injury.
- Students should wash hands after handling soil or plants.
- Close jar lids gently to avoid cracking.
- Avoid over-watering, as excess water may promote mold growth.

Accommodations for Diverse Learners (ELL, ESE, etc.)

- Provide visual aids showing each step to support ELL students and learners needing guidance.
- Simplify vocabulary (e.g., “plant water cycle” and “closed jar environment”).
- Allow pair or group work for discussion and observations.
- Offer sentence starters for recording observations.
- Provide one-on-one assistance for students needing extra support understanding photosynthesis, respiration, and the water cycle.