

Composting Lab Lesson Plan

Objective:

To study and record the impact of varying factors on composting by gaining an understanding of the role of temperature, light, water, and location on compost while removing organic matter from garbage.

Standards:

- HS.L2U3.18 Obtain, evaluate, and communicate about the positive and negative ethical, social, economic, and political implications of human activity on the biodiversity of an ecosystem.
- HS.L2U1.19 Develop and use models that show how changes in the transfer of matter and energy within an ecosystem and interactions between species may affect organisms and their environment.
- HS.L2U1.21 Obtain, evaluate, and communicate data showing the relationship of photosynthesis and cellular respiration; flow of energy and cycling of matter.
- HS+E.E1U3.10 Ask questions, define problems, and evaluate a solution to a complex problem, based on prioritized criteria and tradeoffs, that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.
- A2.S-IC.B.4 Use data from a sample survey to estimate a population mean or proportion; recognize that estimates are unlikely to be correct, and the estimates will be more precise with larger sample sizes

Vocabulary:

- **Compost:** The product that is made from the natural decomposition process of anything that was once alive. The process refers to the recycling of organic waste.
- **Decomposition:** A natural process in which organic materials rot to the point where other plants can use their nutrients.
- **Soil pH:** How acidic or basic the soil is. (1-6 it is more acidic, 7 is neutral, and 8-14 it is more basic) Plants like different levels of pH, so knowing the pH can help your plants grow best.
- **Aeration:** Turning over the compost to ensure that there is adequate access to oxygen.
- **Organic Material:** Materials derived from living organisms, such as food, garden, and lawn clippings, which can be recycled.
- **Browns:** Carbon serves as an energy source for bacteria, producing the heat vital for decomposition- includes plant matter that has turned brown (leaves, twigs, etc.), cardboard, newspaper, etc.
- **Greens:** Nitrogen helps bacteria grow and reproduce- includes fruit and vegetable scraps, coffee grounds, lawn clippings, tea leaves, etc.
- **Compost Ratios:** A good starting ratio is 3:1 browns to greens, as this helps achieve the desired rate of decomposition and prevents undesirable odors or attracting pests.

Phenomena:

- Have students ask questions about composting based on a statement or image. What do they see, think, and wonder? This is where they can share what they already know about composting.
 - [Phenomenon Catcher](#)

Question: Choose one question from above to test, make sure there is one independent variable and a measurable dependent variable. *If you need ideas, take a look at the sign on the box or the "Top 3 Items Added box."*

Write your research question:

Hypothesis: If we.... Then Because....

What will be your independent variable?
 What will be your dependent variable?
 What are your controlled variables?

Write your Hypothesis:

Materials:

- Data Collection Form
- Mini Composter
- Tongs
- Food Scale
- Luggage Scale
- Thermometer
- Soil Moisture Meter



Procedure:

What will you test?

Complete your variables on your student page. Use the Data Collection form and the provided equipment to accurately measure and record your information on the data sheet.

WHAT WILL YOU NEED?		
<p>Brown material to produce carbon:</p> <ul style="list-style-type: none"> - Dead Leaves, Branches & Twigs - Cotton & Wool Rags - Sawdust & Wood Chips - Paper Towels - Coffee Filters - Cardboard & Newspaper - Tea Bags - Uncoated Paper Plates & Cups 	+	<p>Green material to produce nitrogen:</p> <ul style="list-style-type: none"> - Grass Clippings & Leaves - Coffee Grounds - Fruit & Vegetable Scraps - Nuts & Nut Shells - Egg Shells - Pasta, Grains & Rice - Hair & Lint - Breads - Sweeping & Vacuum Dust
		+
		<p>WATER</p>

Procedure/ Data Collection:

Track your data on the laminated Countertop Compost Form and the laminated Daily Compost Tracker Form to record and measure specific factors that impact your compost.

Week 1:

- Record the date, starting weight of the empty container, and the container with your browns and food scraps.
- Take a picture of your area and set up.

Week 2:

- Record the date, weight of the container, with your browns and food scraps.
- Use the [3-Way Moisture Meter](#) to record the: Air Temperature, Soil Temperature, Soil Moisture, Light, and pH.
- Check the boxes for Aerated, Pests, and Smell
- Record any notes and observations in the note box

Week 3:

- Record the date, weight of the container, with your browns and food scraps.
- Use the [3-Way Moisture Meter](#) to record the: Air Temperature, Soil Temperature, Soil Moisture, Light, and pH.
- Check the boxes for Aerated, Pests, and Smell
- Record any notes and observations in the note box

Week 4:

- Record the date, weight of the container, with your browns and food scraps.
- Use the [3-Way Moisture Meter](#) to record the: Air Temperature, Soil Temperature, Soil Moisture, Light, and pH.
- Check the boxes for Aerated, Pests, and Smell
- Record any notes and observations in the note box
- Did you use the compost created? Circle yes or no, and explain
- Record the final weight of the container.

Tiered Analysis Questions: Assign these to your students based on their level.

Lexile 500

1. What is compost? How would you explain it in your own words?
2. Why is composting good for the environment? What could happen to plants and animals if people do not compost?
3. Ask people questions about composting. How can you find out if people recycle, compost, or throw things in the trash?

Lexile 750

1. What is compost? Give a definition and describe how it is made.
2. Why might it be harmful to the environment if people do not compost? Explain how this could affect the variety of plants and animals in an area.
3. Plan a short survey to learn how many people in your school or community recycle, compost, or responsibly manage their waste.

Lexile 900

1. Define compost and describe the process by which organic waste becomes compost.
2. Analyze the possible environmental and ethical consequences of not composting, especially regarding the loss of biodiversity in ecosystems.
3. Design and describe a survey method to estimate the percentage of a population that engages in responsible waste management, recycling, and composting.