



"Ghosts of Trash Past: The Long Life of Waste" October 2024 Lesson Plan - High School

Lesson Overview

In this lesson, high school students will critically analyze the environmental impact of waste decomposition, focusing on organic waste, paper, plastics, and textiles. They will investigate how long different materials take to break down, explore the science behind landfills and methane emissions, and discuss solutions like recycling, composting, and sustainable consumption. A Halloween-themed group project will engage students creatively, as they build a case study on the life cycle of waste materials by creating "Eco Graveyards" to visualize the environmental lifespan of different waste types.

Objectives

By the end of the lesson, students will:

1. Examine the decomposition rates of various materials and understand the scientific processes involved.
2. Analyze the environmental consequences of waste in landfills, with a focus on greenhouse gas emissions and pollution.
3. Evaluate sustainable waste management solutions, including textile recycling and composting.
4. Participate in a Halloween-themed project to creatively illustrate the environmental impact of waste materials..

Time:

Approximately 2 hours + Optional extension activities

Materials Needed:

- Decomposition timelines for multiple materials (can be found through image search)
- Samples: organic waste (small pumpkin), paper, plastic bottle, polyester fabric, cotton fabric
- Whiteboard and markers
- Internet or projector (for landfill video or infographic)
- Craft materials for the project: cardboard, old textiles, markers, string, scissors, glue, paint
- "Eco Graveyard" Project Worksheet (for reflections)
- Decomposition experiment materials (optional for extension)



Vocabulary:

- Decomposition
 - Landfill
 - Greenhouse Gas
 - Methane
 - Composting
 - Sustainable consumption
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Introduction (10-15 minutes)

Hook:

- Ask students: “What happens to the trash we throw away? How long do you think it lingers on Earth?”
- Show images of landfills, plastic waste in oceans, and fast fashion clothing piles.
- Use the Halloween theme to grab attention: “Let’s dig up the *Ghosts of Trash Past*—and see how long they haunt our planet.”

Engage:

- Present today’s objectives: “We’re going to explore how waste decomposes, the environmental impacts of trash in landfills, and how recycling and sustainable choices can make a difference.”
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Part 1: The Science of Decomposition (15-20 minutes)

Activity 1: Decomposition Investigation

1. Pass around real samples (small pumpkin, paper, plastic bottle, cotton fabric, polyester fabric) and ask students to predict how long each takes to decompose.
2. After discussing predictions, reveal the actual decomposition times.
3. Present the decomposition timeline:
 - **Pumpkin:** 2-3 months
 - **Paper:** 2-6 weeks
 - **Plastic Bottle:** 450 years
 - **Clothing (cotton):** 5-6 months
 - **Clothing (polyester):** 20-200 years



Discussion:

- Introduce the science behind decomposition: explain that organic materials like pumpkins and cotton break down due to the action of microbes, moisture, and oxygen. Plastics and synthetic textiles resist decomposition because of their chemical structures, which require much more time to break down.
 - Focus on textiles, noting the environmental impact of polyester (a petroleum-based material) and the rise of fast fashion.
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Part 2: Landfills, Methane, and Environmental Impact (20 minutes)

What Happens in Landfills?

- Explain that most waste ends up in landfills, where anaerobic (oxygen-free) conditions slow down decomposition. This process produces **methane**, a potent greenhouse gas, contributing to climate change.
- Show an infographic or short video on how landfills work, including the layers of waste, gas capture systems, and leachate management.
 - YouTube Video: [Where Does Your Trash End Up?](#) (4:15)
- Emphasize that while organic waste like food scraps and pumpkins contribute to methane emissions, plastics and synthetic textiles don't decompose for centuries, polluting soil and water instead.

Discussion:

- Ask: "What happens if we do nothing? How do landfills affect climate, ecosystems, and even human health?"
 - Discuss how recycling, composting, and choosing sustainable materials reduce the need for landfills.
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Part 3: Sustainable Solutions (15 minutes)

Waste Management and Recycling

- Introduce waste reduction strategies:
 1. **Recycling:** Focus on paper, plastic, and textile recycling. Explain how textile recycling reduces waste and how brands are exploring compostable clothing.
 2. **Composting:** Discuss how organic waste like food scraps and pumpkins can be composted to avoid methane emissions and enrich soil instead.



3. **Sustainable Consumption:** Encourage students to think critically about their consumption choices, especially regarding fast fashion, plastic use, and food waste.

Discussion:

- Ask: “What small actions can we take in our own lives to reduce waste? How can we push for systemic change, like better recycling programs or more sustainable fashion choices?”
 - Encourage students to think globally: “How do waste management challenges differ between countries? What can we learn from other nations' policies?”
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Part 4: Halloween-Themed Project – “Eco Graveyard” (25-30 minutes)

Introduction:

- Introduce the creative project: “In the spirit of Halloween, we’re going to create an *Eco Graveyard*—a visual representation of the lifespans of different waste materials. We’ll explore the environmental ‘afterlife’ of these materials in landfills.”

Instructions:

1. Divide students into small groups and provide each group with a range of recyclable materials (textiles, paper, plastic, etc.).
2. Using the materials provided, each group will create a cardboard “graveyard” with gravestones representing different types of waste.
3. Each gravestone should display the item, its decomposition time, and an epitaph summarizing its environmental impact. For example:
 - “Here lies Plastic Bottle, 450 years of pollution and counting.”
 - “Rest in pieces, Polyester Shirt: 50 years and still not breaking down.”
4. Groups can get creative by adding Halloween designs, such as ghosts, pumpkins, or skeletons, to their graveyards.

Presentation:

- Once complete, each group will present their graveyard, explaining their material choices, decomposition times, and why they are harmful to the environment.
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Reflection Activity: Graveyard of Waste Worksheet (10 minutes)

Worksheet:

- Hand out the *Graveyard of Waste* reflection worksheet, where students reflect on:
 1. The materials they used in their graveyard and their decomposition times.
 2. The impact of these materials on the environment.
 3. How they can personally reduce waste and promote sustainability.
 4. What steps society could take to reduce waste and landfill reliance.
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Optional Extension: Decomposition Experiment (Optional – Multi-week activity)

Objective:

- Students will observe the decomposition of organic materials, paper, cotton fabric, and polyester fabric over time.

Materials:

- Samples of organic waste (pumpkin), paper, cotton fabric, polyester fabric, and plastic
- Soil and 4 small containers
- Labels for each container
- Access to sunlight and water

Instructions:

1. Bury a sample of each material in separate containers filled with soil.
 2. Label each container and track the decomposition process weekly.
 3. After a few weeks, analyze the results and discuss how the different materials decomposed.
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Closing Discussion & Homework (10 minutes)

Wrap-Up:

- Ask students to reflect on the environmental afterlife of the waste we produce. Discuss how every action we take—from what we buy to how we dispose of things—can help reduce the impact of waste on the planet.



Homework Assignment:

- Have students research one waste management initiative (e.g., composting, zero-waste movements, textile recycling) and write a one-page reflection on how it could be implemented in their community.

Optional Research Extension:

- Students can research how various companies are tackling textile waste, such as through sustainable fashion or clothing donation programs.
 - Students can also look into the work of Erika Leigh, who is doing work in clothing composting. You can learn more about her work here: [Sewn Apart](#)
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Suggested Books and Resources

- *The Human Footprint: Everything You Will Eat, Use, Wear, Buy, and Throw Out in Your Lifetime* by Ellen Kirk
 - *Plastic: A Toxic Love Story* by Susan Freinkel
 - *Fashionopolis: The Price of Fast Fashion and the Future of Clothes* by Dana Thomas
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Closing Activity (10 minutes)

- Ask students to imagine a future where landfills are minimized. What will that world look like? How can they contribute to making that a reality?
- End with a reflective conversation: “What’s one change you could make today to help reduce the environmental lifespan of your trash?”