



Title: What Lands up in the Landfill?

Grade: Middle School

Subjects: Social Studies, Math, Science, Language Arts

Time: 50 minutes

Objectives:

- Explain the need to reduce the amount of trash disposed of in landfills.
- Identify ways in which humans can make changes in their actions to support waste reduction.
- Organize, interpret and analyze data using graphic representations and draw logical conclusions.
- Communicate ideas and inform the public about concerns regarding solid waste management.

Standards:

Geography Standard 16: Understand the changes that occur in the meaning, use, distribution and importance of resources.

- Benchmark # 2: Know strategies for wise management and use of renewable and non-renewable resources (e.g., programs for recycling and reusing materials).

Mathematics Standard 1: Use a variety of strategies in the problem solving process.

- Benchmark # 5: Represent problem situations in, and translate among oral, written, concrete, pictorial and graphical forms.

Mathematics Standard 3: Use basic and advanced procedures while performing the process of computation.

- Benchmark # 6: Use proportional reasoning to solve mathematical and real-world problems (e.g., involving fractions, proportions and percents).

Mathematics Standard 6: Understand and apply the basic and advanced concepts of statistics and data analysis.

- Benchmark # 4: Read and interpret data in charts, tables and plots.
- Benchmark # 5: Organize and display data using tables, graphs (e.g., bar graphs, pie charts and line graphs), frequency distributions and plots.
- Benchmark # 8: Understand that the same set of data can be represented using a variety of tables, graphs, and symbols and that different modes of representation often convey different messages.

Technology Standard 3: Understand the relationship among science, technology, society and the individual.

- Benchmark # 5: Know ways in which technology and society influence one another (e.g., New processes for solid waste management encourage humans to change habits).

Language Arts Standard 8: Use listening and speaking strategies for different purposes.

- Benchmark # 5: Use grade level appropriate vocabulary in speech (e.g., specialized language).

Materials:

- Chart paper
- Poster marker
- Art materials: paper, markers, colored pencils
- Rulers, protractors and compasses

Overview: The average US citizen generates approximately one ton of trash annually, but seldom gives it any thought once they throw it away. This trash ends up in the waste stream where it is collected and



hopefully, disposed of in a manner that least impacts the environment. This process is known as solid waste management.

The Environmental Protection Agency has designed a plan for this process, which they refer to as “integrated solid waste management”, and has identified five ways to properly handle waste materials: a) source reduction and reusing, b) recycling, c) composting, d) converting to energy, and e) burying it in a sanitary, engineered site. The EPA emphasizes that there is no definitive approach to waste management and encourages communities to combine these five methods to effectively address the issue.

In most communities across the country waste materials end up in at least one of three locations: a) a materials recovery facility, b) a waste-to-energy facility, or c) a landfill. A landfill is a long-term disposal solution that buries trash in as safe and sanitary manner as possible. In a landfill trash is deposited and compacted overtime, burying layer upon layer of waste material and leaving it to decompose. The EPA has identified eight categories of waste that Americans typically toss into the trash and which inevitably end up in the landfills. These categories include: paper, yard trimmings, food scraps, plastics, metals, textiles (including rubber and leather), glass and wood. The EPA recommends land filling as a last resort, after all other methods have been exhausted; however many communities find the other options too costly or impractical, and use a landfill solution as one of their primary methods of disposal.

Kid’s Speak: People throw away all sorts of materials every day, and seldom think about where they go or what happens to them. Fifty–five percent of the waste Americans throw away end up in a landfill. The most common types of waste items include: paper, yard trimmings, food scraps, plastics, metals, textiles – rubber-leather, glass and wood.

Eco-Fact: As of 2008 there are a total of 1,812 municipal landfill facilities in the continental US, 10 on the islands of Hawaii, and 300 in the state of Alaska.

Procedures:

Before Conducting the Lesson:

- Review with students the purpose of a landfill. Ask students why we need landfills. (Recycling, composting, reducing waste and reusing items minimizes the amount of waste produced, but the waste items that are not recycled, etc. still need to be disposed of safely.) Explain to students that before waste was regulated, people dumped trash into lakes, streams and by roadsides. This caused pollution, contaminating water supplies, and resulted in people becoming ill. Disposing of waste properly protects our health and the environment.
- Ask students what municipal solid waste is. What types of waste material do they think can go into a landfill? What types of waste do they think cannot go into a landfill? Record their responses. Explain to students that municipal solid waste includes: paper, yard trimmings, food scraps, plastics, metals, textiles – rubber-leather, glass and wood. Landfills are not allowed to take hazardous, toxic, liquid waste or large appliances, including: tires, motor oil, anti-freeze, bleach, cleaning products, pesticides, insecticides, herbicides, moth balls, pool chemicals, products containing mercury or coolants, paint solvents, materials that are flammable, corrosive, or reactive, and televisions, monitors or refrigerators.

Conducting the Lesson:

- Explain to students that according to the EPA approximately 31 percent of the trash in the US is recycled or composted, 14 percent is burned and 55 percent is buried in landfills. This information can be organized in a pie chart to visually represent the data. Show students how to construct a pie chart using this data.
- The chart provided below shows the types of trash and the amounts that are disposed of in landfills and incinerators as of 2008. Display a class size chart of this information.



- Students will add the percentages to verify that the total amount of trash equals 100%.
- Provide students with the appropriate art materials to create a graphic organizer. Instruct students to use the data provided on the chart to construct a pie chart.

After Conducting the Lesson:

- Students will use the pie chart to answer questions similar to the following:
- Which type of material is most frequently disposed of in landfills?
- If people were to recycle all the materials that can be recycled, what percentage of trash would still go to the landfill or be incinerated?
- What percentage of waste that goes to the landfill could potentially be composted?
- What conclusions can be drawn from this data?
- Discuss the answers to the questions in a whole group setting. Draw up a list of concerns that need to be addressed in regards to the amount of solid waste that continues to be disposed of in landfills and incinerators. Brainstorm ways to address these concerns.

Adaptations: Students can use other types of graphic representations (e.g., bar graphs) to organize the data.

Extensions: Students can develop a public awareness campaign to educate people about the need to continue to reduce the amount of trash that is deposited in to the waste stream.