



Title: The Adventures of Plastic Bottles and Aluminum Cans

Grade: 3

Subject: Science, Social Studies, Language Arts

Time: 60-90 minutes, could be divided into two sessions

Objective

- Explain the need to reduce the amount of trash they generate, and describe ways in which they can make changes in their actions to support waste reduction.
- Identify and describe the life cycle of consumer products.
- Communicate their ideas in writing and by creating graphic representations to classmates about the life cycle of a plastic bottle or aluminum can.
- Understand and summarize informational text.

Standards

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

- Benchmark # 5: Know advantages and disadvantages of recycling and reusing different types of materials.

Geography Standard 18: Understand global development and environmental issues.

- Benchmark # 2: Know ways in which resources can be managed and why it is important to do so (e.g., conservation practices, recycling non-renewable resources).

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

- Benchmark # 3: Respond to questions and comments (e.g., gives reasons in support of opinions).

Language Arts Standard 7: Uses reading skills and strategies to understand and interpret a variety of informational texts.

- Benchmark # 1: Uses reading skills and strategies to understand a variety of informational texts (e.g., textbooks, biographical sketches, letters, diaries, directions, procedures, magazines) .
- Benchmark # 5: Summarizes and paraphrases information in texts (e.g., includes the main idea and significant supporting details of a reading selection).

Materials

- Multiple copies of “The Adventures of a Plastic Bottle” by Allison Inches
- Multiple copies of “The Adventures of an Aluminum Can” by Allison Inches
- Writing paper
- Pencils
- Provided conclusion and reflection worksheet
- Large white construction paper
- Crayons or markers

Recycling Overview:

The average US citizen generates approximately one ton of trash annually, but seldom gives it any thought once they throw it away. So what happens to it all? Well, it goes into 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.

Most recyclable materials are sent to a single stream materials recovery facility. (The term “single stream” refers to the fact that the recyclables are not pre-sorted by the consumer.) Trucks transport the recyclables to the facility, where they are unloaded onto the “tipping floor”. From there they are placed on a conveyor belt and sorted by hand and by machine into the four main recycling categories: a) plastics, b) paper, c) metals, and d) glass.

Once sorted plastics are further sorted by color and type. Some facilities use air to separate lighter plastics from heavier ones, while others use optical scanners, or both methods, to separate by type (e.g., PET, HSPE, etc). After sorting, the plastics are baled and sent off to manufacturing plants where they are ground up, washed, melted, and reformed into plastic pellets. These plastic pellets are what is used to make other consumer goods.

Paper recyclables are sorted into four categories: a) corrugated boxes, b) newspaper, c) mixed paper, and d) office mix. These are each baled and sent off to paper mills. Used newsprint, for example, is washed and rinsed and simultaneously has the long and short fibers separated from it. The long fibers are then mixed with wood scraps from lumber mills and together combine to make up pulp. The pulp is then poured onto large rollers, drained, and run through heated rollers. The paper that results is trimmed, rolled onto tubes and sent to printing plants.

Glass recyclables are sorted by color. This may take place before or after crushing the glass, depending on the facility, and sometimes it is shipped without sorting. Once glass is crushed it is cleaned of any debris and contaminants. Then the crushed glass, or “cullet”, is loaded onto trucks and transported to manufacturers. Crushed glass is used for a variety of purposes, including the production of new containers, kitchen countertops, and in the construction of roadways. To make new glass containers the recycled, crushed glass is mixed with sand, soda ash, limestone and feldspar. This mixture is then melted down in large furnaces and reformed into new containers. Recycling one ton of glass saves 1330 pounds of sand, 433 pounds of both soda ash and limestone, and 151 pounds of feldspar that would otherwise be used to produce new glass.

Magnets are used to separate steel from other recyclables, and aluminum is separated mechanically using an eddy current. Once separated the steel and aluminum are crushed, baled and sent to processing mills. Aluminum is melted down, and either poured into molds or rolled into sheets, to await use by manufacturers to make new products. Tin and steel require the process of electrolysis to be recovered. Following the recovery they are purified, melted and poured into molds. When it is time to make them into new products, the steel is melted down, poured onto sheets and then coated by the tin before forming. Once these and the other recyclables mentioned above have been processed and transformed into useful items, they are placed back on the shelves for consumers to purchase, and the cycle starts once again.

Kid's Speak: Recycled plastics and aluminum cans go through many steps to become a new product. Plastics are sorted, baled, ground up, washed, melted, and reformed into something new. Aluminum cans separated from other steel, crushed, baled, sent to a processing mill, melted, poured into molds or rolled into sheets, and then used to make something new. When you recycle plastic bottles and aluminum cans they are made into useful new products rather than being buried in our rapidly overcrowding landfills.

Eco-Fact: Tossing away an aluminum can wastes as much energy as pouring out half of that can in gasoline.

Procedure:

Before Conducting Adventure Lesson:



- Teacher poses a question to students, “Please show by a raise of hands if you usually recycle plastic bottles. Please show by a raise of hands if you usually recycle aluminum cans.”
- Teacher continues, “Where do you put the items that you recycle? Do you think after you dispose of these recyclables that you will ever see them again?” Allow time for brief discussion.
- Tell students that today we are going on great adventures with plastic bottles and aluminum cans. We are going to discover what happens to the plastic bottles and aluminum cans that we recycle. We are going to learn where these items came from before we used them and what happens to them after they leave us. You may see that bottle or can again but would you recognize it!!

Conducting Adventure Lesson:

- Divide the class into groups of 3 or 4 students. Explain to the students that they will become experts on the life and adventures of either a plastic bottle or aluminum can. They will share their expertise with their classmates who learned about the other material and vice versa.
- Distribute copies of “The Adventures of a Plastic Bottle” by Allison Inches to half of the groups and copies of “The Adventures of an Aluminum Can” by Allison Inches to the other half of the groups.
- Introduce the two books to the class by comparing the covers and browsing the text. The books are similar in style and genre but the recycled product is different.
- The groups will partner read their assigned books. Instruct students to stop after every other page and quickly review the adventure of the bottle or can so far.
- After reading is complete instruct students that they are going to make a lifeline of the bottle or can. The first step is to make a list of the major events or adventures in the life of the bottle or can. Group will work together to generate a list on lined paper. Teacher will check list to ensure that major events were included.
- Distribute large sheets of white construction paper. Tell students that they are going to draw the important steps in the life of their can or bottle and write a caption under each step. They are to draw an arrow pointing to the next step in the sequence. They will continue this process until they have reached the final product. Students should put the title of the appropriate book at the top of their project. (Note: To facilitate working together, students divide up tasks and work on separate papers, cut out their portion and glue onto main project.)

Communicating and Presenting Knowledge of Recycling Adventures:

- Pair up one bottle group and one can group.
- Each group will teach the other what they have learned.
- Each group will present their project to teacher, explaining the process and importance of recycling.

Adaptations:

- This project could be done on the computer using drawing and word processing software.

Extension:

- The lifeline of the bottle or can project could easily be extended into the construction of a board game. Students could transform their lifeline into a “Candyland style” board game. They could use recycled materials (bottle caps from soda bottles or milk jugs, buttons, etc.) as game pieces.