

Make Every Day Green

LESSON ONE

What goes in a garbage can?

Grade Levels: 3-5

Sunshine State Standards

- **Body of Knowledge: The Nature of Science**
 - Big Idea 1: The Practice of Science
- **Body of Knowledge: Life Science**
 - Big Idea 17: Interdependence

Key Concepts

- To investigate different types of solid waste.
- To analyze the source and content of waste as the first step in learning how to reduce, reuse, and recycle.
- To understand how much garbage one family can produce in a day.
- To learn how to identify recyclable and reusable items, and sort them according to the Broward County recycling guidelines.

Vocabulary

- **reduce:** Is the process of reducing the amount of waste produced by a person or a society.
- **reuse:** The use of a product more than once.
- **recycle:** Process, by which materials that would otherwise become solid waste are collected, processed, and returned to the economic mainstream.
- **municipal solid waste:** Garbage generated from residential and commercial sources.
- **waste stream:** All municipal solid waste (MSW) that is recycled, burned, or disposed of in landfills.

Background

A real issue facing the modern world is: What do we do with all of our garbage? To start to understand the problem, first we must identify where it comes from, how it is produced, and how much of it is generated by human needs and wants. With the population of the United States growing each day, each person will be producing waste. According to the Environmental Protection Agency, the average American produces about 4.6 pounds (2 kg) of garbage a day, or over 1,600 pounds (726 kg) a year. Altogether, we produce enough trash to fill a four-lane highway from New York to Los Angeles, six feet deep!

The breakdown of the nation's garbage would look like this approximately:

- Paper products 33%
- Food and yard waste 25%
- Metals 8.2%
- Plastic 12.1%
- Glass 5.3%
- Other wastes 7.6%

Recycling is the process of recovering materials from a used object and using that material over again. By recycling aluminum, paper, glass and plastic we use 90-95 percent less energy than making it from raw materials. For example, when you recycle one aluminum can, you save energy equal to 6 ounces of gasoline, a nonrenewable resource. If 250 people saved one can a day, it would equal 3,000 gallons of gas each year. Recycling can save energy, money, and cut down on the waste generated by people.



Time

10 minutes introduction; return to lesson the following day. About 45-60 minutes to sort, weigh, and do calculations with the class.

Materials

- Spring scales (bathroom scales work best)
- Paper and pencil
- Labels and tape

- Clean garbage bags
- 4 large plastic garbage cans or bins
- Teacher Letter home explaining the activity



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Introduction

- If students are going to help solve the garbage (waste) problem, they first need to understand the size of the problem. Throwing away a single gum wrapper or newspaper doesn't seem very important, until we see the cumulative impact of everyone's combined trash over a period of time.
By performing a waste audit, students will gain the necessary perspective to realize that everyone's individual waste contributes to solid waste management problems. Students will collect, clean, sort, and weigh trash collected from home. A Parent Letter with guidelines will be included. Also this lesson will give students the opportunity to use mathematics in a relevant and challenging way to motivate the learner.

Procedures

- To help students to start thinking "dirty," dissect the classroom's trash can.
 1. Identify and sort trash items. You can "plant" items in the trash to model what the students will do with their own trash audit.
 2. To avoid dealing with food or organic trash, due to health concerns or just it being plain messy, stick to these types of trash to sort:
 - Cardboard • Glass (not broken) • Juice Boxes
 - Newsprint • Magazines • Metal (cans) • Plastic
 3. Remember to explain that this project is focusing on non-organic garbage. This helps students to become aware of items that "accidentally" are placed in the garbage that can be recycled.
 4. Introduce the sorting bins:
 - Bin #1 (paper, metal, plastic bottles and glass products)
 - Bin #2 (Reusable Items: such as clothing)
 - Bin #3 (Does not belong in recycling)
 5. Explain that Broward County uses a "single-stream" recycling system:
 - Bin #1: Recyclable items no longer have to be separated. Place paper, plastic bottles, metal and glass recyclables all together in the same recycling container. Remove all caps and lids.
 - Bin #2: Items that can be reused or donated, for example, clothing, sneakers, books and music CD's.
 - Bin #3: Things that are placed in the trash can: aluminum foil, light bulbs, plastic storage containers, and pizza boxes.
6. Go through your trash can, and have the students identify as a class which items should be placed in the marked bins.
 7. Have students make estimates how much garbage (in pounds) they think their homes can generate in one day.
 - Grade 3: Some children need help in understanding units of measurement. A good non-standard unit of measurement to help students estimate is to use their own body weight. Have students stand on the bathroom scale and record their own weight. Have them think about how much garbage their own families can make compared to how much they weigh.
 - 1 ton = 2,000 pounds.
 8. Inform your class to save their trash tonight (following the guidelines in the Parent Letter) and bring it back to school the next day.
 - Supply each student with a clean trash bag to collect their family's garbage.
 - Remind students to collect non-organic trash.
 9. When your students are ready, have them work in groups to sort their garbage and weigh it.
 - Supply them with fresh bags.
 - Students will use the chart to track individual student's results and the class' total.
 - Have students work with a partner and sort the garbage by bin category, and help each other with one family's trash at a time.
 - Weigh the trash in each category, and have them record the results.
 - Then place the sorted garbage in the large classroom bins, and weigh the total amount of garbage for the whole class.
 10. Now have students compare their data with their original predictions.



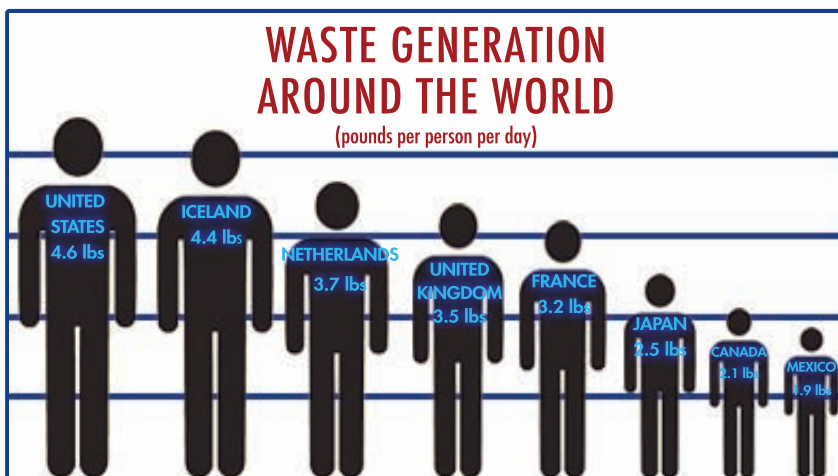
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Reflection/Response

- What could you do to make less waste?
 - Examples include never taking more than you need, finding creative uses for items that are no longer wanted by others; giving away clothes that no longer fit to someone else, etc.
- What can you do to help prevent recyclable material from ending up in the garbage or landfill?
- On average, one person produces about 4.6 (EPA 2007) pounds (2 kg) of garbage a day. Use this information to have students compare their own garbage totals, and reflect on ways they can reduce their garbage output.
- Students can generate real world math problems using the data collected.



Courtesy of <http://faculty.mercer.edu/mccreanor%5Fpt/eve420/Lesson03-Generation/Lesson03-Generation.html>

Extension

- Electronics, old cell phones, and paint can't be collected in curbside bins. If not properly disposed of, they can release hazardous materials into our environment. Broward County has free electronics recycling drop-off locations in Pompano Beach, West Park, and Davie. Another free drop-off base is located at the Achievement and Rehabilitation Center (ARC) in Sunrise. Students can create maps, and help inform their community on where they can recycle these "other" household items.
- Make a list of items from the reusable bin, and have children work together to come up with ideas for reusing the item before it reaches the garbage can.
- Using the "Waste Generation Around The World" graph, ask students why they think the U.S. is the largest generator of waste?



Teacher Letter Home

Dear Parent,

In our classroom we are learning about the importance of recycling. In order for this lesson to be successful, we need your help. Please save non-food items from your family's trash and send these items to school with your child. Students are going to practice sorting items that can be recycled. Please use the following steps to prepare the items saved for this activity.

How to prepare recyclables:

- Rinse containers.
- Remove newspapers from plastic delivery bags.
- Please, no plastic grocery bags. They can be recycled at the local supermarket or can be saved to be reused- don't place with recyclables.
- Remove all caps, lids, and straws.
- Some examples of items that can be sent to school with your child:
 - empty soda cans
 - empty milk cartons
 - junk mail
 - cereal boxes
 - old newspapers
 - old magazines
 - plastic bottles

Thank you for helping us to learn about recycling. Please send recyclable items in by _____, 20__.

Thank You,



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My Family's Garbage for One Day			
Garbage Type	How many of each?	Bin #	Garbage Weight*

* Note: Weight of full bag minus weight of empty bag equals actual garbage weight.

Total Classroom Garbage	How many items?	Weight of bin
Bin # 1 (all-in-one)		
Bin # 2 (reusable items)		
Bin # 3 (does not belong in recycling)		
Classroom Totals		

1 cubic yard of:	(average)
uncompacted but flattened cardboard	100 lbs.
office paper	600 lbs.
aluminum cans	65 lbs.
mixed plastic bottles	32 lbs.
glass bottles and jars	600 lbs.
food waste	850 lbs.
1 Kilogram	2.2 pounds
1 cubic yard	27 cubic feet

