

Trash in Your Class

(Sessions I and II)

BROWARD COUNTY ELEMENTARY SCIENCE BENCHMARK PLAN

Grade 5—Quarter 4

Activities 31 & 32

SC.D.2.2.1

The student knows that reusing, recycling, and reducing the use of natural resources improve and protect the quality of life.

SC.H.1.2.2

The student knows that a successful method to explore the natural world is to observe and record, and then analyze and communicate the results.

SC.H.1.2.3

The student knows that to work collaboratively, all team members should be free to reach, explain, and justify their own individual conclusions.

SC.H.1.2.4

The student knows that to compare and contrast observations and results is an essential skill in science.

SC.H.3.2.2

The student knows that data are collected and interpreted in order to explain an event or concept.

SC.H.3.2.4

The student knows that through the use of science processes and knowledge, people can solve problems, make decisions, and form new ideas.

ACTIVITY ASSESSMENT OPPORTUNITIES

The following suggestions are intended to help identify major concepts covered in the activity that may need extra reinforcement. The goal is to provide opportunities to assess student progress without creating the need for a separate, formal assessment session (or activity) for each of the 39 hands-on activities at your grade.

- 1. Session I—Activity 31:** Ask, *Why did we collect paper over so many days? (We did that to find an average because there may be variation from day to day.)*
- 2. Session II—Activity 32:** Ask, *What location in our classroom is like a landfill? Why? (The waste basket is like a landfill because it is a hole into which we dump our daily trash.)* Have students make a list of the methods they came up with for saving paper in school that can also be used at home. (Answers will vary but could include the ideas discussed at the end of the activity, such as using both sides of a sheet of paper.)

3. Use the Activity Sheet(s) to assess student understanding of the major concepts in the activity.

In addition to the above assessment suggestions, the questions in bold and tasks that students perform throughout the activity provide opportunities to identify areas that may require additional review before proceeding further with the activity.

Trash in Your Class

OBJECTIVES

In this activity students expand their study of litter to the problem of trash disposal and our overflowing landfills.

The students

- ▶ measure the amount of trash produced daily in their classroom
- ▶ calculate how long it would take to fill their entire classroom with trash
- ▶ explore ways to reduce the amount of trash produced in their classroom

SCHEDULE

Session I—Activity 31 15 minutes, followed by 5 minutes at the end of each day for 9 more days

Session II—Activity 32 15 minutes

VOCABULARY

landfill

MATERIALS

For each student

1 pr gloves, disposable*

For the class

1 bag, plastic garbage, 12-gallon
 1 box, cardboard, 2 ft × 1 ft × 1 ft*
 1 chart, Landfill
 1 meterstick*

*provided by the teacher

PREPARATION

- 1 Obtain a cardboard box at least 2 ft × 1 ft × 1 ft (about 60 cm × 30 cm × 30 cm).
- 2 Display the Landfill chart where all students can see it.

BACKGROUND INFORMATION

A **landfill** is more than just a hole in the ground for dumping trash. Landfill sites must be carefully chosen and then constantly monitored.

In most sanitary landfills, trash is compacted, spread over a small area, and covered with a layer of dirt. The bottom of the landfill site is lined with plastic or concrete to prevent liquid waste from leaking into the surrounding soil and into the water table.

Even with careful planning, however, landfills can be a source of pollution. Solid particles as well as gas produced in the fill (such as methane) can escape into the air. Chemicals can leak through holes or cracks in the liner and leach into the soil and water table. Most landfills have probes to detect such leaks, and a system of pipes through which the liquid waste is pumped and then treated.

Because landfill space is at a premium, it is increasingly important for each and every one of us to reduce the amount of trash we produce. This activity puts the problem in perspective by demonstrating to students just how much trash they as a class produce and how quickly it accumulates.

Guiding the Activity

Session I—Activity 31

- 1 Begin a discussion by asking, **Where does trash go after it is taken away from our homes?**

Ask, **What is a landfill?**

Write the term *landfill* on the board and direct the students' attention to the Landfill chart. Explain that a **landfill** is a waste disposal site especially designed to protect the surrounding land, air, and water from the trash it contains. Point out the synthetic liner and the system of probes, pipes, and pumps that help prevent contamination of the surrounding soil and water table by toxic leakage, as well as the dangerous buildup of methane gas. Point out that methane gas is a by-product of organic decay. This colorless, odorless gas is extremely flammable and must be vented from below the surface of the landfill. It can then be collected and used to generate electricity.

- 2 Ask, **How much trash do you think you make each day?**

Tell students that over one-third of all the trash produced in this country consists of paper. Then ask, **What do you think would happen if no one removed the paper trash we produce each day in this classroom? How long do you think it would take to fill this entire room with paper trash?**

When discussions are completed, invite the teams to write their estimates on the board.

Additional Information

Some students may suggest the local dump, a larger bin, an incinerator, or even the ocean.

Many students may say that a landfill is a big hole filled with trash.

Student estimates will vary widely. Point out that Americans average approximately four pounds of trash per person, per day. You may wish to tell the students that if all the trash that Americans generated in one day were loaded onto trucks, the line of trucks would stretch from Fort Lauderdale to Tallahassee (a distance of about 630 km [390 mi]). If students are interested, tell them that studies have shown that over 80 percent of household waste could be recycled.

Write a few of the students' estimates on the board. Then have the class break into teams of three or four to discuss their estimates.

Guiding the Activity

3 Explain to the students that they are going to measure how much trash they produce in class each day and then calculate how long it would take them to fill their classroom with trash. Draw a chart on the board (or on a sheet of chart paper) like the one in Figure 31-1. Tell them that they will record the volume of trash produced every day for the next 10 days.

4 Place a plastic garbage bag near the class wastebasket. At the beginning of the day, instruct students to place all of their paper trash (writing paper, construction paper, newspaper, and so forth) into the plastic bag, and all other nonpaper trash into the class wastebasket.

At the end of the day, choose two student volunteers to measure the volume of paper trash produced by the class that day. Tell them to set the plastic garbage bag of paper trash into the cardboard box and compact the bag so that it conforms to the shape of the box.

To find the volume of trash, have the students measure the length, width, and height of the trash in the cardboard box and multiply these numbers together (length \times width \times height). Write the answer on the chart.

Additional Information

Trash Produced	
Day	Volume
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
Total	
Average Daily Volume=	

▲ Figure 31-1. The volume of trash produced by the class over the course of 10 days.

Safety Note: You may choose to instruct students to refrain from putting used tissues and other potentially hazardous paper trash into the garbage bag.

Guiding the Activity

When the students have finished measuring, remove the compacted trash from the box and dispose of it properly. Once again, set the now-empty garbage bag next to the class wastebasket for the next day's collection. Repeat this procedure every day for the next nine days.

Additional Information

Safety Note: Students should handle only paper and cardboard trash. Instruct students to wash their hands thoroughly after completing the task.

- 5** At the end of the tenth day, calculate the total volume of trash produced in 10 days. Then divide by 10 to find the average daily volume of trash produced. Fill in these figures on the chart.

Session II—Activity 32

- 6** Invite student volunteers to measure the length, width, and height of the classroom. Write the three figures on the board and have the students multiply them together to find the classroom volume.

Next, have the students divide the classroom volume by the average daily volume of trash produced. The result is the number of days it would take the students to fill their classroom with trash. (See Figure 32-1 for a summary of the calculations.)

1. $\text{Length} \times \text{width} \times \text{height of trash in box} = \text{Each day's volume of trash}$
2. $\text{Each day's volume of trash for 10 days} = \text{Total volume of trash}$
3. $\text{Total volume of trash} \div 10 = \text{Average daily volume of trash}$
4. $\text{Length} \times \text{width} \times \text{height of classroom} = \text{Classroom volume}$
5. $\text{Classroom volume} \div \text{average daily volume of trash} = \text{Number of days to fill the classroom with trash}$

▲ *Figure 32-1. Calculating the number of days it would take to fill the classroom with trash.*

Guiding the Activity

Ask, **What comparison can you make between our classroom and a landfill?**

Give students a chance to ponder this idea. Then ask, **What could we do to reduce the amount of trash that we, as a class, produce?**

Additional Information

Try to elicit from students that, like the classroom, landfills fill up with trash quickly, too.

Students may suggest using both sides of a sheet of paper, saving scraps for use in art projects, or even starting their own recycling program if the school does not already have one. Write student suggestions on the board and discuss which of these suggestions they could reasonably follow throughout the year.

REINFORCEMENT

Have the students repeat the activity for another area of the school, such as the lunchroom, library, office, or for the entire grade level.

SCIENCE AT HOME

With parental consent, have the students examine the mail received by their families for one week and divide it into two piles: junk mail, such as advertising fliers, catalogs, and solicitations; and important mail, such as bills and business or personal correspondence. Have the students weigh the pile of junk mail on a kitchen or bathroom scale and multiply this number by 52 to find out how many pounds of junk mail their families receive each year. Students may wish to visit the local post office to find out how they can put a stop to some of the unwanted junk mail that comes to their homes.

Connections

Science Extension

- ▶ Have students investigate which types of materials are naturally biodegradable. As a short-term project, have each student or group fill a clear plastic or glass container with garden soil (not sterilized potting soil) and then bury small pieces of various materials that are commonly found in household trash and garbage, such as newspaper, cardboard, plastic wrap, foam plastic, aluminum foil, and food scraps. Tell students to keep each item separated from the others and to bury the items against the side of the container so they can be seen. Have students pack the soil firmly, dampen it with water, and cover the container with plastic wrap. Let students examine their containers every few days for a month to see which items begin to degrade, or break down. Explain that the breakdown occurs naturally as the result of action by fungi and bacteria in the soil.
- ▶ As a long-term project, have each group cut the top off a gallon plastic jug, fill the jug with soil, and again bury common trash and garbage materials. Explain that this time they will dig up the items later, so they do not need to bury them against the side of the container. Make sure each group makes a list of the items they have buried. Tell students to dampen the soil, cover the jugs with plastic wrap, and then set them aside in a warm, dark place in the classroom. Remind students to redampen the soil as needed. After one month, have one group open its jug and carefully uncover and remove the buried items. What signs of decomposition can students observe? Which materials have changed very little or not at all? Record student observations in a master chart. Repeat every month until all jugs have been opened and their contents examined. Which types of materials are biodegradable and which are not? Organic

materials (such as food scraps) and items made from organic materials (such as paper and cardboard) are biodegradable, but plastics, glass, and other items made from inorganic minerals are not.

Science and Math

Tell students that if all the disposable diapers thrown out in the United States each day were fastened tape to tape, they would stretch halfway around the Earth at the equator. Have students measure the tape-to-tape width of a typical disposable diaper, find out the length of the equator, and then calculate the approximate number of disposable diapers thrown out each day. (about 48 million) Let interested students debate the pros and cons of using disposable or cloth diapers.

Science and Language Arts

Students could develop a “Life Before Plastics” questionnaire to give to older people who remember what life was like before plastics were widely used. Encourage students to find out what materials were used to package foods and to make common household items and how discarded materials were disposed of or reused. Encourage each student to give the questionnaire to at least one older person.

Science, Technology, and Society

Encourage students to find out how trash is disposed of in their community—whether it is buried in a town landfill, burned in a town incinerator, or taken to a landfill or incinerator in another area. Ask students to identify common problems with landfills and incinerators. Develop a class master list of the advantages and disadvantages of each method of trash disposal. If possible, arrange a class visit to a landfill or incinerator.