

# MINI LANDFILLS

## **BENCHMARK and TASK**

**SC.G.1.2.4** The student knows that some organisms decompose dead plants and animals into simple minerals and nutrients for use by living things and thereby recycle matter.

- The student categorizes populations of organisms by the function they serve in an ecosystem; plants and some microorganisms as *producers* that make their own food; animals, including humans, as *consumers*, which obtain food by eating other organisms; and *decomposers*, primarily bacteria and fungi, recyclers that break down dead plant and animal materials into elements that return to the soil, water, and air for use again.

## **KEY QUESTIONS**

What kinds of materials are biodegradable?

What conditions are necessary in order for decomposition to take place?

## **BACKGROUND INFORMATION**

Living things in an **ecosystem** do one of three different jobs; they are **producers, consumers, or decomposers**. Producers are green plants that make their own food through a process called **photosynthesis**. Consumers are living things that eat other living things. Decomposers break down dead plant and animal materials into abiotic (nonliving) elements. Decomposers are recyclers that return the nonliving elements to the soil, water, and air to be used again. Decomposers include bacteria, fungi, earthworms, and snails.

Decomposition is the process by which materials break down. For example, air, water, sunlight, and other agents break down nonliving materials such as rocks and metals. Living organisms break down organic materials such as food waste, wood, and dead animals—materials that come directly or indirectly from other living things. Because they're broken down by living organisms, these materials are said to be biodegradable and will eventually decompose, given the proper conditions and enough time. About twenty percent of the garbage that ends up in landfills is organic.

## **MATERIALS**

### **Per group**

2 small, plastic cups and one lid (Use plastic wrap and a rubber band, if lids are not available.)

soil from outdoors, preferably near established bushes or trees

1 plastic spoon

newspaper

“trash” materials such as: crackers, wax paper, Styrofoam, foil, leaves, notebook paper, candy, paper towels, pieces of bark

water (a spray bottle is ideal, but not necessary)

1 ruler

1 balance and mass set

masking tape

1 permanent marker

### **Per teacher**

trash can filled with the trash items listed above

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### **Per student**

*Mini Landfills* observation chart

1 hand lens

plastic gloves

### **TEACHING TIP**

This activity will take place over a four-week period.

### **ENGAGE**

Place a filled trash can on a table in front of the class and ask students where all the garbage in it will likely be by next week. (in a landfill) *What will this garbage look like in a week? . . . in a month?*

Ask: *What items do you and your family throw away on a regular basis?* On the chalkboard, make a list of common items students and their families throw in the garbage.

### **EXPLORE (DAY ONE)**

1. Divide the class into groups. Give each group two cups and have them use the masking tape and permanent markers to label them as “Cup A” and “Cup B.”
2. Have each group go outside and fill their cups  $\frac{3}{4}$  full with soil and then return to the class.
3. Assign each group a trash item (see Materials) and give them two samples of the item.
4. Have students write the names of the items the various groups will bury along the top of the *Mini Landfill* observation chart. In the row labeled Day 1, students should observe and describe the physical characteristics of each of the trash items. Students should be careful to list only features that are observable (e.g., size, weight, shape, color) and not subjective descriptions (e.g., pretty, smelly). Make sure hand lenses, rulers, balances, and other tools are available for making observations.
5. Have the groups share their observations with the class, each student recording results from other groups on their charts in the Day 1 column.
6. Students should bury the trash in their landfills by placing one item in each cup and covering the trash with about an inch of soil.
7. Put a lid on container A and set it aside.
8. Thoroughly moisten (don't soak) the soil in Cup B. At the end of each day, students should lightly wet Cup B and gently shake it to allow some air to get between the particles. Depending upon the humidity, they may want to put a cover on Cup B at night, just to prevent it from totally drying out, but it may not be necessary, and it should be removed each day to allow air flow.
9. Have students predict what they think will happen to the trash over the next few weeks.

### **AFTER ONE WEEK**

1. Have each group cover the work area with newspaper.
2. Students should wear gloves if they will be handling the trash items.
3. Students should carefully remove the trash item from Cup A and observe any changes in the item. Then have them record their observations on their *Mini Landfills* chart in the “End of Week 1” column. Encourage students to look at the observations they made on Day 1 and identify any changes.

4. Ask each group to share their observations with the class so that each student may record the changes for all the trash items on their chart in the same “End of Week 1” column. If no changes occurred, that should also be noted.
5. Students should return the trash to Cup A, cover it with soil, and replace the lid.
6. Repeat the process for Cup B but do not add a lid. If Cup B is dry, add a little water to moisten the soil.

### **AFTER WEEKS TWO AND THREE**

Repeat the same process that was done After One Week.

### **END OF WEEK FOUR**

1. Empty the contents of each cup and examine the trash items for the last time. Record observations on the chart.
2. Have students share observations with the class so they can record the information on their charts.
3. Once all the data has been recorded, analyze the data with the entire class, discussing their earlier predictions and the accuracy of their data.

### **EXPLAIN**

*What is decomposition?* (Decomposition is the process in which fungi and bacteria break down dead plant and animal materials and animal wastes and release nutrients back into the environment.)

*Which items showed signs of decomposition?*

*Which items did not show signs of decomposition?*

*What do you think could account for these differences?* (Some items were biodegradable while others were not biodegradable.)

*Were there different degrees of decomposition in different cups? Suggest reasons for these differences.*

*What might have caused the results you observed?*

### **EXTEND/APPLY**

Discuss:

*How could what you observed and learned about the mini landfills be applied to county landfills?*

*What recommendations could you make to a county trash landfill operator who wanted to decompose trash more effectively?* (Aerate the landfill, turn soil frequently, be sure to add moisture)

### **EXTENSION**

Create a class compost outside. Students can add biodegradable materials from their lunch leftovers (minus meat products) daily. Start the compost by digging a hole in the ground and adding several layers. Perhaps start with grass clippings and then add wastes such as coffee grounds, apple cores, orange peels, etc. Finally, add a layer of decaying leaves and spread some soil on top. Add worms to the compost to help decompose matter. Water regularly to keep the compost damp but not wet. Students should also turn the soil regularly to stir the compost. Watch for the decomposition of materials and study the soil as it changes. (Note: As an alternative, the compost could be created in a plastic garbage can with many holes punched to allow circulation and a lid.) Stop adding materials when the can or hole is about  $\frac{3}{4}$  full. The compost will be ready when it is dark and crumbly. It can be added to a school plant or vegetable garden.

Name \_\_\_\_\_

## MINI LANDFILLS

Item buried								
	A	B	A	B	A	B	A	B
Day 1								
End of Week 1								
End of Week 2								
End of Week 3								
End of Week 4								