

Luscious Layered Landfill



science



social studies



Objective

To teach students how a modern landfill functions (that is, how its many layers contain garbage and prevent leakage into soil or ground water).



Activity Description

Students will construct edible models of a landfill to learn about its different layers and their functions.



Materials Needed

- One 8-ounce pliable clear plastic cup per student
- Five chocolate sandwich cookies per student
- One 8-ounce box of raisins
- One fruit rollup per student
- Two graham crackers per student
- Two red licorice sticks per student
- One package of birthday candles
- One set of matches
- One scoop of chocolate ice cream (or pudding) per student
- Two tablespoons of whipped cream per student
- One plastic knife per student
- One plastic fork per student
- One handful (per student) of a variety of small chewable candies (e.g, chocolate, peanut butter, fruit)
- One copy of *Anatomy of a Landfill* handout per student



Key Vocabulary Words

Landfill
Clay liner
Plastic liner
Leachate
Leachate collection pipes
Methane
Decompose
Rodent



Duration

1 hour



Skills Used

Observation/classification
Motor skills



Activity

Step 1: Refer to the Teacher Fact Sheet titled *Landfills* on page 165 for background information. Explain the purpose of a landfill to students and explain that they will construct their own model landfills in class. Copy and distribute the *Anatomy of a Landfill* handout. Using the handout, go over each layer's name and function with students.

Step 2: Distribute a cup and five chocolate sandwich cookies to each student. Explain that the cup represents an excavated hole in the ground.

Step 3: Have students carefully “unscrew” two of their cookies so that one half has white cream and the other is bare. Students should have two cookie halves with white cream and two cookie halves without cream. Crush the bare cookie halves into small pieces and put



Journal Activity

Ask students to list some common items that they throw away. What do they think people threw away 100 years ago? Ask them to predict what we will throw away in the future. What would they expect to find in a landfill in another country (pick a country)? Ask students to compare these answers with the United States.

them into the cup. Explain that the crushed cookies represent a layer of soil that is placed in the bottom of real landfills.

Step 4: Next, have the students take the cookie halves with white cream and break them up into two or three pieces. Direct students to place the pieces in the cup with the white cream face up. These pieces represent a layer of clay that is put on top of the soil in real landfills.

Step 5: Have students use the plastic knife to cut their fruit rollups to roughly fit the size of the top of cup and slide them into place (will push up on sides) on top of the cookies to represent a plastic liner. Plastic liners prevent leachate from escaping from a landfill into the ground. Leachate is liquid created when trash decomposes.

Step 6: Have students crush and add their graham crackers to represent a sand layer. This layer is used to prevent liquids in landfills from seeping out.

Step 7: Have students place raisins on top to represent a layer of pebbles. Like the sand layer, pebbles provide further protection against leachate leaks.

Step 8: Have students rip the licorice sticks in half and bite off both ends to represent leachate pipes. Stick pipes into pebble layer. These pipes collect any leachate that collects on top of the liners.

Step 9: Ask students to sprinkle the candies on top of the raisins. The candies represent pieces of garbage. Ask students to think about what happens when a landfill or “cup” is filled up with trash or “candies”? How can they reduce the amount of trash that they send to the landfill? (Refer to the Teacher Fact Sheet titled *Recycling* on page 101 for background information.)

Step 10: Give each student a scoop of ice cream on top of the candies. Then, have the students add one more layer of candies on top of the ice cream. The ice cream layer represents the seepage created from rain seeping through the garbage. Explain that in a real landfill, more layers of garbage or “candies” are placed on the landfill each day, so that liquid from the decomposition of the trash is continually created.

Step 11: Direct students to “unscrew” their two remaining cookies and crush another layer of the bare cookie halves, without the cream, on top of the candies and ice cream to represent soil again. (Students can eat the other cream-covered cookie halves.) This layer reduces the amount of rain water that reaches the garbage.

Step 12: Each student should use a layer of whipped cream to “cap” the landfill or cover it (as would a plastic cap) in order to prevent odor, insect, and rodent problems.

Step 13: In front of the class, stick a candle deep into your own edible “landfill” and light it. Explain that the candle represents the methane gas recovery system, which draws methane gas from the decomposing garbage. The flame represents energy that can be generated by burning the captured methane gas.

Step 14: Have students eat their landfills as a snack. When they get to the bottom of their cup, ask students to notice whether their cookie or “soil” layer is dry, or whether the ice cream or “leachate” leaked past the many layers and the fruit roll-up liner to soak the cookies. Remind students that if they built their landfill correctly, their cookies will be dry, just as in a real landfill the soil remains protected from leachate.



Assessment

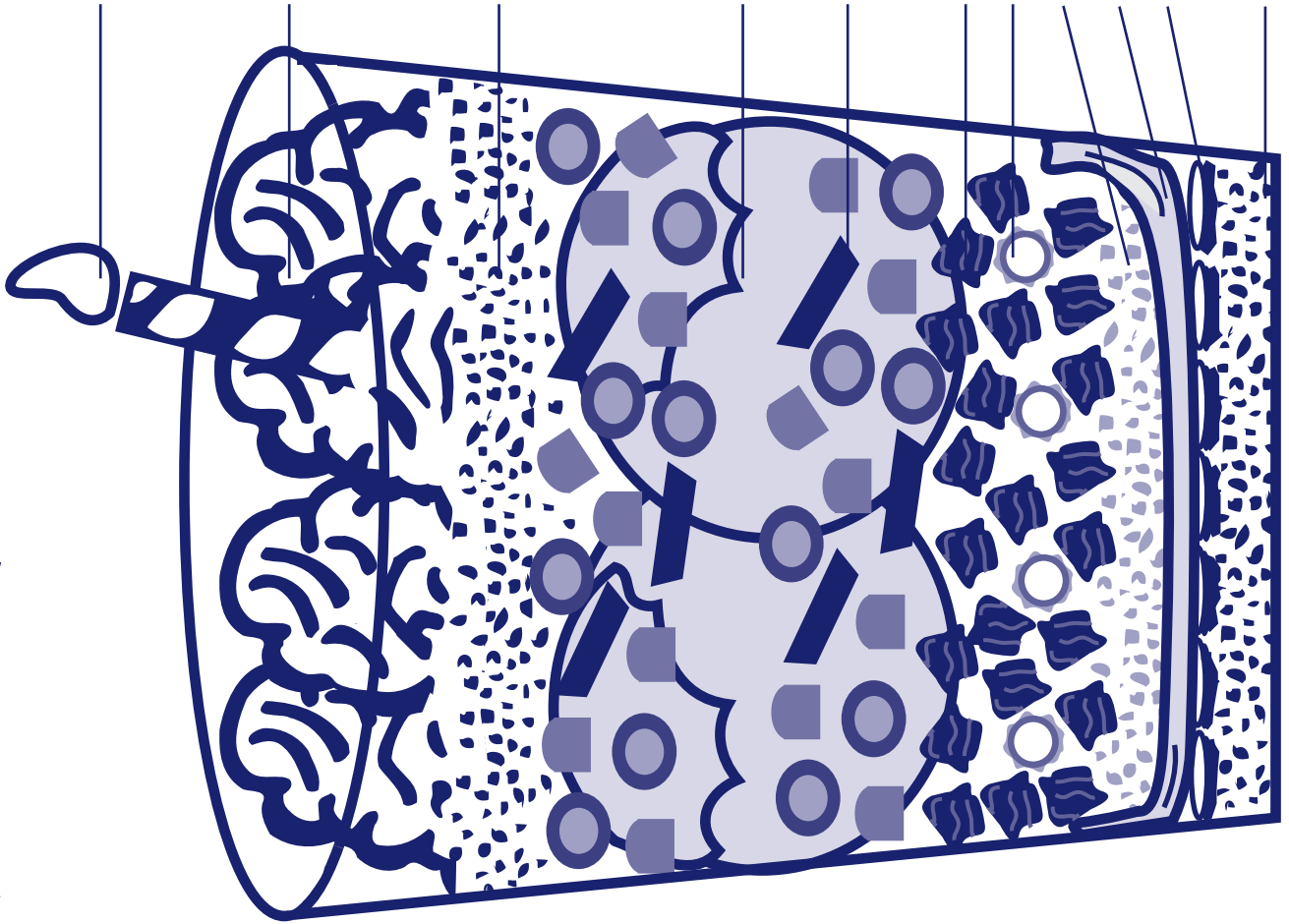
1. After enjoying the luscious layered landfill as a snack, ask the students if they remember the purpose of all the different parts, such as the fruit roll-up, the licorice, the cookies, and your candle.



Enrichment

1. Contact a landfill in your community and take a tour. Ask to hear about all the different parts of the landfill. If your landfill recovers methane for energy, ask for a tour of the plant.
2. Have students conduct a survey of friends and family asking them where their garbage goes. Have them record peoples' responses and determine whether they are well informed. In class, discuss the survey results.

Anatomy of a Landfill



Methane gas recovery system (candle): recovers gas for energy from decomposing garbage

Landfill cap (whipped cream): prevents odor, insect, and rodent problems

Soil layer (cookie pieces): used to cover daily garbage

Leachate (ice cream): natural byproduct of decomposing garbage

Garbage (candies): added daily from communities

Pebble layer (raisins): prevents liquid from seeping out

Leachate pipe (licorice stick): collects leachate

Sand layer (graham crackers): prevents liquid from seeping out

Plastic liner (fruit rollup): prevents leachate from escaping into the ground

Clay layer (cookie pieces): absorbs any leachate (or liquid) that escapes the plastic liner

Soil layer (crushed cookies): lines the bottom of the landfill