

LESSON 2: What Do I Do with It Now?

LESSON'S CONCEPT

"Many materials can be recycled and used again, sometimes in different forms." (*Benchmarks for Science Literacy*, page 119)

PURPOSE

Students will determine what beverage containers are made of and which containers can be reused or recycled.

OVERVIEW

In this lesson students will:

- Examine samples of various types of beverage containers.
- Test cans for magnetism, inspect plastic containers for number codes, and identify differences between two plastic-coated cardboard containers.
- Determine which containers can be reused.
- Identify which containers can be recycled in their community.

CORRELATIONS TO CALIFORNIA'S CONTENT STANDARDS AND FRAMEWORKS AND TO BENCHMARKS FOR SCIENCE LITERACY

- Students describe the characteristics of beverage containers by sight, weight, magnetic qualities, and other features. They complete a chart to compare what they have observed.
 - "Properties of materials can be observed, measured, and predicted. As a basis for understanding this concept, students know: objects can be described in terms of the materials they are made of . . . and their physical properties . . ." (*Science Content Standards, Grades K-12; Kindergarten; Physical Science, Standard 1a*)
 - "Many forms of matter are identifiable by their color, texture, or shape; by their hardness or flexibility; by their taste and odor; by the sound or

light that they emit and that we can perceive." (*Science Framework*, page 41)

- "Students organize, represent, and compare data by category on simple graphs and charts." (*Mathematics Content Standards for California Public Schools, Kindergarten Through Grade Twelve*, page 6)
- Students classify which beverage containers can be recycled and which cannot be recycled in their community.
 - "Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept . . . students will . . . compare and sort common objects based on two or more physical attributes (including color, shape, texture, size, weight)." (*Science Content Standards, Grades K-12; Grade 2; Investigation and Experimentation, Standard 4c*)
 - "An awareness of recycling, both in nature and in human societies, may play a helpful role in the development of children's thinking." (*Benchmarks for Science Literacy*, page 119)
- Students sort plastics according to their code numbers.
 - "Students sort and classify objects." (*Mathematics Content Standards for California Public Schools, Kindergarten Through Grade Twelve*, page 2)

SCIENTIFIC THINKING PROCESSES

observing, communicating, comparing, categorizing

TIME

60 minutes to prepare for the lesson; 45–60 minutes per day for two days to implement the lesson

VOCABULARY

aluminum, ferrous metal, magnet, recyclable, resin, reusable

PREPARATION

- 1. Read the “Background Information for the Teacher” at the end of this lesson.
- 2. Make copies of each “Station Investigation Sheet” for each pair of students (pages 70–72). (Consider laminating these sheets and having students use wipeable pens to complete the chart. Then these sheets can be reused by other classes.)
- 3. Copy the “Beverage Containers Station Task Cards,” cut them apart, and place them at the appropriate stations (page 69). Consider laminating the cards for reuse.
- 4. Set up three stations with the following items:
 - Station 1—aluminum soda can and steel soup can
 - Station 2—plastic 2-liter soft drink container (plastic container code #1) and plastic milk jug (plastic container code #2)
 - Station 3—plastic-coated cardboard milk or juice container and plastic-coated cardboard juice boxes
- 5. Find out which materials are recycled in your community. (Contact the city or county recycling coordinator or the local garbage/recycling company.) Note that the materials that are recycled may vary from community to community. Materials that are being recycled may also change as new markets are developed or old markets become unavailable.
- 6. Contact the waste management or recycling office in your area for a directory of recyclers in the community. Ask the recycling coordinators whether they have lists of recyclers and other information on solid waste and, if so, would they send enough sets of information for your class so that each student’s family can be provided with a copy. This allows families without recycling programs in

their communities to find drop-off centers for their recyclables and learn more about how to reduce the amount of solid waste going to the landfill.

- 7. Consider using several students from upper-grade levels to help the younger ones at each station.
- 8. Make a copy of the homework assignment, “Some Are Made of Steel and Some of Aluminum” for each student (page 73).

MATERIALS

- Butcher paper on which to record students’ responses
- The book, *Where Does the Garbage Go?* by Paul Showers
- Magnets (one for each pair of students plus one for “Station #2”) (These can be bar magnets or even refrigerator magnets.)
- Examples of metals, including a washer (steel), aluminum foil, penny (copper), nail (iron)
- A plastic milk jug (The plastic code found on the bottom of the container should indicate #2.)
- A 2-liter soft drink container (The plastic code found on the bottom of the container should indicate #1.)
- An aluminum soft drink can
- A metal soup can (steel)
- A plastic-coated cardboard milk or juice carton
- A juice box
- Three copies of the “Station Investigation Sheet” (for stations 1, 2, and 3) for each pair of students
- A copy of the homework assignment, “Some Are Made of Steel and Some of Aluminum,” for each student

PRE-ACTIVITY QUESTIONS

Ask students:

- How many of you help your families shop for groceries?
- How do we choose what we buy?
- If you were going to help your family decide

the kinds of drinks they were going to buy, what would you consider? (Students might not be able to answer this question at this time. Ask them to remember this question so they can answer it at the end of the lesson.)

- What are some of the different kinds of drink containers that you can think of? *Aluminum can, glass bottle, plastic bottle, cardboard and plastic box.* List these on butcher paper so the list can be referred to in other lessons. Which of those containers do you think can be recycled? Circle those listed.
- What do you recycle at home? Make a list on the butcher paper.

PROCEDURE

A. Explain to students that today they will become drink container experts. At different learning stations, they are going to learn about different kinds of drink containers. Because they will be using magnets at one of the stations, they will first learn to use magnets.

1. Ask them whether they know what a magnet is. *Something that sticks to metal; a decoration on the refrigerator; a black piece of metal.*
2. Once students have established that magnets attract some metals, show them the various metals you have collected for this lesson. See whether students can identify what kinds of metal each item contains. *Steel (washer), iron (nail), aluminum (foil), copper (penny).*
3. Have students determine whether a magnet will attract all the metals you have shown them.
 - Provide magnets and the various metals and have students test each metal. Allow students an opportunity to do some free exploration with magnets and items in the classroom.

Note: Make certain to keep magnets away from computer disks, as the disk's contents could be erased.

- After students have had sufficient time to draw conclusions on their own, bring them together as a group to discuss their findings. Students should conclude that a magnet attracts only steel and iron. Introduce the words *ferrous metals*. (These are

metals which contain iron and are therefore attracted to magnets.)

- B. Tell the students that they will go in groups, but will stay with their partners, and visit three different stations to examine containers that hold things they drink and determine what these containers are made of. They will record their answers on their investigation sheets.

Note: For younger students consider doing one station per day. Then on the last day, the charts can be reviewed. Also, younger students can test the materials, and the chart can be completed as a class.

- C. As you explain each station, walk to the station and hold up the beverage containers.
1. Explain to students that at "Station #1, Metal Cans," they will test two kinds of cans to see whether they are "magnetic." Tell them that some cans are made from ferrous metal and are attracted to magnets. Other cans are made from metal that is not attracted to magnets. Students will test the sides and the top and bottom of each can for magnetism and will record their answers on their investigation sheets.
 2. Explain to students that at "Station #2, Plastic Containers," they will examine a 2-liter plastic soft drink container and a plastic milk jug. They will be looking at the color of these plastic containers and the plastic container number found on the bottom of each container. They will be recording the information on their investigation sheets.

Note: Students may have already had experiences in sorting plastics if they completed Lesson 1 in this unit.

3. Tell students that they will also be looking at two plastic-coated cardboard containers, one for milk and one for juice at "Station #3, Plastic Coated Containers." They will record on their investigation sheets their answers to the questions on the card for this station.
- D. Provide an investigation sheet for each pair of students. Separate the class into three groups. Ask the groups to rotate

through the stations and to complete their investigation sheets with a partner.

Note: If you can get the help of students from upper-grade levels, have them help the younger ones at each station.

DISCUSSION/QUESTIONS

Place the various beverage containers in front of the class.

- A. Ask students what they discovered at “Station #1, Metal Cans.”
- Do they think that both of these cans can be recycled? *Yes.*
 - Tell them that some recyclers want aluminum cans separated from metal cans at the curbside. Other recyclers collect all cans together and separate them with large magnets at the recycling site. Also, some cans are separated on a conveyor belt by people working in a materials recovery facility (MRF). By separating the metals, recyclers can ensure that aluminum cans will be recycled into new aluminum products and steel cans will be recycled into new steel products.
 - Discuss ways that students can reuse cans. Generate a list and post it in the classroom. Students can illustrate each use and add new uses. (See “Resources” for books containing additional ideas on reusing cans.)

Note: If you have completed Lesson 1 in this unit, the following section will be a review for your students.

- B. Ask how the containers in “Station #2, Plastic Containers” differ from each other. *The plastic with the plastic container code number 1 is clear, and the plastic with the plastic container code number 2 is milky in color.* Note that there are plastic containers with the code number 2 which are unpigmented (e.g., milk and water jugs) and those that are pigmented (e.g., orange juice containers). You might bring (or ask a student to bring) to class a pigmented plastic container with code number 2 for students to see.
- Tell students that most plastic containers have a number inside a triangle embossed on the bottom of the containers. This is called the plastic con-

tainer code or plastic resin code. What did they find? *The 2-liter soft drink bottle was number 1, and the plastic milk jug was number 2.*

- After reviewing the list of plastics recycled in your community, determine which plastics can be recycled in your area.
 - Explain that each number on a plastic container indicates the resin type, and for recycling purposes these cannot be mixed. Usually, plastic containers marked with plastic container number 1 and number 2, which are unpigmented (have no color), are commonly recycled. Other plastics (usually not used for beverage containers) are sometimes recycled. All plastics are not being recycled, because markets for certain recycled plastics have not yet been developed.
 - Explain that when plastic is recycled, the following happens:
 - a. The containers are sorted by their resin types.
 - b. The plastic is cut into tiny pieces (called pellets).
 - c. The pellets are melted.
 - d. The melted plastic is reshaped into new plastic objects.
 - Ask students what natural resource is conserved when plastic is recycled. *Petroleum is conserved, because it is not used to make new plastic.* However, students should be aware that natural resources are still being used to transport the plastics and to cut and melt them.
 - Ask students how reusing plastic containers can conserve natural resources even more than recycling them. Lead students to say that when plastics are reused, they do not need to be transported and reprocessed. Discuss ways that students can reuse the plastic containers. Generate a list and post it in the classroom. Students can illustrate each use and add new uses.
- C. Take apart the juice box and/or milk carton to show the layers.

- Ask students whether they think that plastic-coated cardboard containers can be recycled. Ask them why they believe that these containers can be recycled or cannot be recycled.
- After collecting their answers, explain that at this time we have the technology to recycle these containers, but it is not always feasible. The plastic coating on the cardboard prevents it from being mixed with plain cardboard and, therefore, requires a special process to retrieve the high quality paper that is used in juice boxes and milk cartons. Only certain reprocessing facilities have the technology to recycle plastic-coated cardboard. There are only a few of these facilities in California, which means that these materials have to be transported long distances to reach the reprocessing facilities. If the transportation expense exceeds the benefit of recycling, these containers are thrown in the waste container. Then they go to an incinerator (where they are burned) or to a landfill (where they are buried).

Homework Assignment: Have students select a container made from one of the following materials: plastic, aluminum, steel, plastic coated (e.g., juice box). Ask students to list and/or draw three ways that the container they selected could be reused.

- D. Discuss with students:
- Of the containers that we investigated, which are reusable? *All of them could be reused.*
 - Which containers are recyclable? *Aluminum, metals, some plastic, and possibly juice boxes and milk cartons.* (This will depend on what is recyclable in your community.)
 - Which drinks seem to have better packaging, and what is considered “better” and why? *Packaging that has less to throw away or is reusable or recyclable could be considered better because natural resources are conserved.*
- E. Ask students to share their homework assignments.

APPLICATION

- A. Ask students to look at the list of drink containers listed at the beginning of this lesson on butcher paper. Have different students select one container and tell the class what it is made of and whether it can be recycled in their community. Make sure everyone has a turn. Another way to do this is to write the following on the chalkboard:

- A—steel
- B—plastic
- C—plastic and cardboard
- D—aluminum

Then say a letter; e.g., “B.” A student reads the word “plastic” and selects a container that is made from plastic. Then the student tells the class whether this container can be recycled in their community.

Play the same game, except have students describe one way each item can be reused.

- B. Show students the illustrations on pages 24–27 in the book, *Where Does the Garbage Go?* by Paul Showers, which shows how different materials are recycled. Students can make their own large illustrations on ways materials get recycled.
- C. Ask students to complete the following sentence in their journals: I used to throw away _____ but now I _____ (don’t buy it; don’t use it; reuse it; recycle it). Students can also illustrate what their sentences represent.
- D. Ask students to share their journal entries.
- Homework Assignment:** Distribute the homework assignment, “Some Are Made of Steel and Some of Aluminum.” Ask students to look in a newspaper advertisement section or Sunday’s edition coupon section and cut out ads that show steel and aluminum cans. They should then glue pictures in the appropriate section of the homework assignment sheet.
- E. Ask students to share their responses to the homework assignments.
- F. Ask students:
- If you were going to help your family decide what kinds of drinks to buy, what might you consider? *Whether the containers can be recycled in our community.*

- What could you tell your parents or relatives that might make them buy reusable and recyclable containers?

Project Idea: Have students decorate cardboard boxes for gathering items that can be reused in the classroom and those that can be recycled. They should clearly mark these. Students can also decorate cardboard boxes to give to other classes.

EXTENSIONS

- Have students put their nonfood snack or lunch trash in garbage bags for several days. Then have the class identify which trash is recyclable or reusable and which needs to be taken to the landfill.
- Have students write or draw containers they currently use and describe or draw options for reusing and recycling these containers. Have students discuss their drawings with a partner and then share them with the class. These recommendations can be shared with their families.
- Have students determine whether they can cut down on the waste created if they buy things in larger containers. Compare six 6-ounce juice bottles to a 36-ounce juice bottle. Drink the juice and compare the number and weight of the containers.
- Have your community's recycling coordinator come in to speak to your students about how to recycle. Other materials besides plastic, glass, and metal can be discussed (e.g., newspaper, cardboard, paperboard cereal/cracker boxes, glass).

RESOURCES

Videos

Garbage Tale—An Environmental Adventure. Los Angeles, Calif.: Churchill Media, 1990 (18½ minutes).

In a dream, Ernie is taken to discover where his garbage goes. He travels to landfills, incinerators, compost bins, and recycling centers. He learns about reducing, reusing, and recycling.

Recycle That Trash. Santa Monica, Calif.: Pyramid Film and Video, 1990 (18 minutes).

A class visits a landfill, a transfer station, and a recycling center and begins recycling programs at home.

Recycling Is Fun. Oley, Penn.: Bullfrog Films, 1991 (12 minutes).

Three children visit a landfill, a recycling center, and a supermarket to determine what they can do to reduce, reuse, and recycle.

Recycling: It's Everybody's Job. Washington, D.C.: National Geographic, 1992 (20 minutes).

For a class project, students sort through and separate family garbage to learn why recycling can be part of a solution to the solid waste problem.

Books

Albert, Toni. *Hands-on Recycling* (Grades 1–2). Greensboro, N.C.: Carson-Dellosa Publishing Co., Inc., 1991.

Contains activities about recycling.

Gibbons, Gail. *Recycle! A Handbook for Kids.* New York: Little, Brown and Company, 1992.

Explains the problem of too much garbage and what can be done to reduce the amount of garbage going into our landfills. For young readers.

Kalbacken, Joan, and Emilie U. Lepthien. *Recycling.* New True Book series. Chicago, Ill.: Children's Press, Inc., 1991.

Describes, in simple text, how and what to recycle.

Showers, Paul. *Where Does the Garbage Go?* Let's-Read-and-Find-Out Science series. New York: HarperCollins Children's Books, 1994.

Describes landfills and how materials can be recycled into new products.

BEVERAGE CONTAINERS STATION TASK CARDS

Station #1: Metal Cans

Test the magnetic attraction for each can.

- Place the magnet on the top, bottom, and sides of each can.
- Record on your investigation sheet what you found out.
- Do you think each container can be recycled?

Station #2: Plastic Containers

Look at the plastic containers.

- How are they different?
- Can you find a number on the bottom of the container?
- Record on your investigation sheet what you found out.
- Do you think each container can be recycled?

Station #3: Plastic-Coated Containers

Look at the plastic-coated containers.

- How are they different and how are they alike?
- Do you think each container can be recycled?

STATION INVESTIGATION SHEET STATION #1 – METAL CANS

Names: _____

Date: _____

Metal Cans*	Can #1	Can #2
A. Does a magnet stick to the: Top?	Yes No	Yes No
Bottom?	Yes No	Yes No
Sides?	Yes No	Yes No
B. Can it be recycled?	Yes No	Yes No
C. What is it?		

*Circle your answer to each question.

STATION INVESTIGATION SHEET

STATION #2 – PLASTIC CONTAINERS

Names: _____

Date: _____

Plastic Containers*	Plastic 1 bottle	Plastic 2 jug
A. Is it clear or milky?	Clear Milky	Clear Milky
B. What number is on the container?	1 2	1 2
C. Can it be recycled?	Yes No	Yes No

*Circle your answer to each question.

STATION INVESTIGATION SHEET

STATION #3 – PLASTIC-COATED CONTAINERS

Names: _____

Date: _____

1. How are the two containers different?

2. How are they the same?

3. Do you think they can be recycled? Why or why not?

Homework Assignment

SOME ARE MADE OF STEEL AND SOME OF ALUMINUM

Look in a newspaper advertisement section or in the coupon section of Sunday's edition and cut out ads that show steel and aluminum cans. Glue pictures

Steel Cans	Aluminum Cans

BACKGROUND INFORMATION FOR THE TEACHER

in the proper section below.

Students may be recycling at home if their community has a curbside recycling program. Other students may have parents who are committed enough to recycling that even though there is no curbside program in place, they take recyclables to a “drop-off” center. Some rural communities have no recycling opportunities. Students from those communities can be encouraged to select containers that can be reused. Beverage containers for milk, juice, and soft drinks are familiar to children and are, therefore, a simple and effective means for introducing reusing and recycling.

In this lesson students will be testing some beverage containers to see whether they attract a magnet. Note that steel is magnetic, but aluminum is not. However, some bimetal aluminum beverage cans may have a steel body and aluminum tops and bottoms. For more information on aluminum and ferrous metals, see “Appendix C-I, Aluminum,” and “Appendix C-III, Ferrous Metals.”

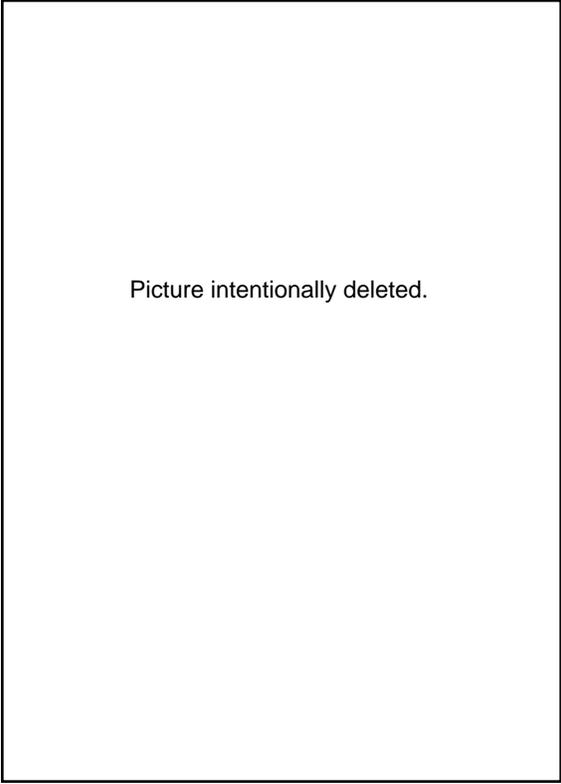
The coding system for marking plastics is described in Lesson 1 of this unit. The resin number identification code is stamped on the bottom of plastic containers in a small triangle or printed on plastic bags. Usually, only the plastic with the code number 1 (PETE bottles) and the unpigmented plastic with the code number 2 (HDPE) are recycled into new products, because manufacturing companies have not yet come up with products (at least on a large scale) made from other types of plastics.

Once reusables and recyclables are identified, the teacher can also introduce the question of what to do about containers that are not reusable or recyclable in their community. Currently, they must be disposed with waste that is either incinerated or placed in landfills. Since both of these choices waste resources, teachers can discuss with students what else could be done to eliminate these containers from the waste stream, or to prevent waste from being generated in the first place.

This discussion will lead to the idea of “choice” when buying products. In order to make a wise choice, students should be aware of the materials which can be reused or recycled in their community. From the standpoint of waste reduction, purchasing milk in returnable glass bottles is ideal, but these bottles are usually not available at

all grocery stores. The next preferable container in which to purchase milk would be whatever container is recycled in your community, which could be the plastic container code number 2 jug (HDPE) or the plastic-coated cardboard milk carton. In most communities, the plastic jugs are more likely to be recycled, and the milk cartons are least likely to be recycled. Students can encourage the collection and recycling of containers by contacting their local haulers and city or county recycling coordinators.

As a result of this lesson, students could become wiser consumers, and they can help educate their parents and relatives about the best choices to make at the store to help reduce solid waste and conserve natural resources.



Picture intentionally deleted.

Children at the Solar Community Housing Association Homestead CO-OP check a steel can to see whether it is attracted to a magnet.