

MAKE A DIFFERENCE

LESSON 5

OBJECT OR PURPOSE:

To introduce students to the resource economies of recycling aluminum cans. To develop understanding about student's own impact on the amount of solid waste produced and recognize the impact of recycling on energy and natural resources.

MATERIALS REQUIRED:

1. Copies of Challenge Cards
2. Facts About Garbage Handouts
3. Scratch paper, pencils, and calculators

Time requirements

1. Copy and cut up "Facts About Garbage" and Challenge Cards, 10 minutes
2. Class work time Work Problems 30 minutes
3. Wrap up discussion, 5-10 minutes

PROCEDURE OR INSTRUCTIONS:

(Children may have some trouble with the word problems or with the multiplication or division. You may want to work the problems together as a group.)

1. To introduce the activity, begin with some questions:
 - About how many soft drink cans do you or your family use each week?
 - What do you do with the cans when you're finished with them?
2. Explain that some people say environmental problems are so big that one person's actions probably don't matter. Ask students how they feel about that statement? Do they think it's true? Why or why not?
3. Explain that we can find out how our actions do make a difference. Solving our garbage problems is a good example. By using some facts about garbage, we can find out how much difference our actions could make.
4. Have the class form groups of two or three. Explain that they are going to solve some waste problems using a set of facts.
5. Give each group a copy of the challenge cards, paper, pencils and calculators (optional).





6. Do the practice challenge as a class and then let the groups do as many of the activities as time permits.
7. Ask each group to report their answers. Share the following correct answers and review the problem-solving process, if necessary.

PRACTICE: Solutions to challenges

- A. 1 can saves 1 cup of gas; saving 100 cups of gasoline energy would mean you need to recycle 100 aluminum cans
- B. $1 \text{ cup gas}/1 \text{ can} \times (\# \text{ of students in class}) \times 7 \text{ days/week} = \# \text{ cups saved each week}$
 $(\text{previous answer} \times 52 \text{ weeks/year}) = \# \text{ cups saved/year}$
 $(\# \text{ cups saved/year}) \div 16 \text{ cups/gallon} = \# \text{ gallons saved/year}$

Challenge 1:

- A. 1 can saves 1 cup of gas; 50 cans would save the energy in 50 cups of gas/week
- B. $50 \text{ cups} \times 210 \text{ min. light/cup} = 10,500 \text{ Minutes (175 hours)}$

Challenge 2:

- A. $365 \text{ days} \times 1 \text{ aluminum can/day} = 365 \text{ cans}$
 $365 \text{ cans} \times 210 \text{ min. light/can} = 76,650 \text{ minutes (1,277.5 hours)}$
- B. $\# \text{ cans/weeks} \times 52 \text{ weeks} = \# \text{ cans/year}$
 $\text{cans/year} \times 210 \text{ min.} = \# \text{ minutes you can light the bulb}$

Challenge 3:

- A. $3,200 \text{ cans} \div 32 \text{ cans/pound} = 100 \text{ pounds}$
- B. $100 \text{ pounds} \times \$0.25/\text{pound} = \$25$

Challenge 4:

- A. $12 \text{ months/year} \times 8 \text{ cans/month} = 96 \text{ cans}$
 $96 \text{ cans} \times 1 \text{ cup gasoline/can} = 96 \text{ cups of gasoline}$
 $96 \text{ cups gasoline} \times 1 \text{ gallon gas} / 16 \text{ cups liquid} = 6 \text{ gallons gasoline}$
 $6 \text{ gallons} \times 30 \text{ miles/1 gallon gasoline} = 180 \text{ miles}$

- B. Answers will vary.



WRAP UP:

(Discuss the following questions with the group)

1. Would your efforts and your family's efforts to recycle cans make a difference? What did you think when you found out you would make a difference? Give some examples.
2. How many people live in your neighborhood (or apartment building)? If everyone recycled the same amounts of cans as you did, what would your answers to these problems be?
3. A lot of "embedded" energy—the energy it takes to produce, transport, use and dispose of a product –was saved by recycling. Why? (It takes energy to obtain natural resources; recycling replaces natural resources.)
4. What other consequences, besides saving energy, do you get from recycling? (fewer resources used, lower costs, less waste)
5. What other actions could you take that would really make a difference in reducing waste?

EXTENSION:

1. Ask a parent or an older brother or sister to help you with this challenge. On a county or city map, trace the route your family takes to run errands or go to a favorite place such as your soccer games, your relatives' homes or your school. Calculate the mileage involved by reading the mileage scale on the map. Use information about how many miles your family car could go on the number of aluminum cans you recycled each year, and figure out how many trips you could take to that place on the amount of gasoline saved.

This is the information you need to get started:

1. # of aluminum cans your family could recycle each year
2. # of cups of gasoline saved
3. # of gallons of gasoline saved
4. # of miles to the gallon saved (a parent can tell you how many miles the family car gets in one gallon of gas)
5. # of miles traveled on your favorite route (check the mileage scale on the map; ask a parent to help you if you get stuck)
6. To figure out how many trips you could take based on energy saved, divide the answer to #4 by the answer to #5.



Here's an example: The Jones family travels 10 miles to their favorite amusement park. They use and recycle 320 cans per year. The Jones family car goes 30 miles on every gallon of gas.

320 cans = 320 cups of gasoline saved, $320 \div 16 \text{ cups/gallon} = 20 \text{ gallons saved}$
 $20 \text{ gallons} \times 30 \text{ miles/gallon} = 600 \text{ miles/gallon saved}$. It's 10 miles to the amusement park. $600 \text{ miles saved} \times 10 \text{ miles each trip} = 60 \text{ trips}$

4

REFERENCE

"What a Difference I Make!" Working on Waste, publication 4-H-BU-6064, Minnesota Extension Service, 1992, page 26.

TEACHER TIPS:

You may want to laminate the "Facts About Garbage" handout and Challenge Cards (or glue them to sturdy cardboard) so they can be used again. You may need to adapt the math exercises "up" or "down" depending on your students' skill levels, or work the activities as a group.

According to the Can Manufacturers Institute, 101.3 billion aluminum cans were shipped for purchase in 1995. Using recycled aluminum beverage cans to produce new cans allows the aluminum can industry to make up to 20 times more cans for the same amount of energy.

New aluminum cans are made up of an average of 54 percent recycled aluminum. In 1995, the amount of energy saved was equivalent to 20.6 million barrels of oil or 12.3 billion kilowatt-hours of electricity. The recycling industry operates a coast-to-coast recycling network of more than 10,000 buy-back locations and works with more than 8,000 cities and counties with municipal or curbside recycling programs.

Environmentally literate citizens act on their own conclusions about actions they can take to ensure environmental quality. This lesson invites students to apply their math skills as they inquire whether or not what they do as individuals and in groups can make a difference.





Lesson 5 Challenge Cards

Challenge 1

A. Suppose your class decides to recycle cans for a recycling contest. You set a class goal of 50 cans each week. How much “gasoline energy “will your class save each week?



Challenge 2

A. If you recycle one aluminum can Each day for one year, you would Save enough energy to light a Room with a 100-watt light bulb for how many minutes?

B. Give the number of soda cans You and your family use each week, How many minutes could you light the light bulbs in one year if they Were recycled?

Challenge 3

A. At the end of 6 weeks, the fourth grade class collected 3,200 cans for recycling. How many pounds of aluminum did they Collect?

B. If recyclers pay \$.25 per pound of aluminum, how much money can the class earn for 3,200 cans?



Lesson 5

Facts About Garbage

- There are 365 days in one year.
- There are 7 days in one week and 24 hours in one day.
- There are 52 weeks in one year.
- There are 12 months in one year.
- There are 16 cups in one gallon.
- Recycling one aluminum can saves the energy equivalent of one cup of gasoline.
- Recycling one aluminum can saves enough energy to light a 100-watt light bulb for 3.5 hours (210 minutes).
- Each person generates about 5 pounds of garbage per day.
- Each pound of aluminum makes 32 cans.

Practice Challenge

- A. A fourth-grade class decided to collect cans for The Great Aluminum Can Round Up. How many cans will they need to collect if they want to save the “equivalent” energy in 100 cups of gasoline?
- B. If each student in your class recycles one aluminum can each day, how much “gasoline energy” would the class save in one week? In one year? How many gallons of gasoline would they have saved?

