

# Middle School

## Post SWA Classroom Presentation Lesson Plan

### Objective:

1. Students will gain the importance of recycling as a waste reduction method.
2. Students will select the appropriate operations to compute and solve recycling math problems.

### Sunshine State Standard:

#### **Science**

How Living Things Interact With Their Environment

Standard 2, Benchmark 1

Knows that some resources are renewable and others are non-renewable.

#### **Mathematics:**

Number Sense, Concepts and Operations

Standard 3: Benchmark 3:

Adds, subtracts, multiplies, and divides whole numbers, decimals, and fractions, including mixed numbers, to solve real-world problems, using appropriate methods of computing, such as mental mathematics, paper and pencil, and calculator.

### Materials:

"Recycling Activity Sheet" (*master enclosed*) for each student

### Evaluation:

Assess students' knowledge of the presented material through questioning during the presentation.

Check students' answers on the activity sheet.

### Length:

60 minutes

### Background

Recycling is beneficial for the environment because it saves natural resources, conserves landfill space, and conserves energy.

For example, aluminum is made from a non-renewable resource called bauxite ore. It is most prevalent in Australia. Much pollution is created and much energy is used when bauxite ore is mined and extracted from the earth. On the other hand, when aluminum is recycled, much energy is saved and the natural resource, bauxite ore, is saved.

### Interesting recycling facts

- It takes 17 trees to make 1 ton of paper.\*
- The following is saved each time one ton of glass is recycled: 1,330 pounds of sand, 433 pounds of soda ash and 433 pounds of limestone.\*\*
- Every ton of steel that is recycled saves 2,500 pounds of iron ore, 1,000 pounds of coal, and 40 pounds of limestone.\*\*\*
- Recycling one aluminum can will save enough energy to give power to a television set for 3 hours.\*\*

### Procedure:

1. Discuss the environmental benefits of recycling.
2. Elicit responses from students as to the items that are recyclable at home in the blue recycling bin and the yellow recycling bin.
3. Review the Recycling Facts in the "Background" section.
4. Discuss non-renewable and renewable resources.
5. Distribute the "Recycling Activity Sheet" to each student and allow them time to complete it.
6. Check students' answers to the activity sheet.
7. Divide the class into groups of five.
8. Ask the students to work in their group to develop a waste reduction plan that can be implemented in the classroom.
9. Ask the groups to read their waste reduction plan for the classroom. Record the answers on the board.
10. After each group has read their plan, refer to the board and ask the students if they will work to incorporate these ideas into their habits to help reduce waste in the classroom.
11. Ask the students to write a letter to the principal to encourage him/her to incorporate waste reduction practices at the school. Tell the students to list examples of different methods that can be implemented.
12. Collect the letters and correct later.
13. Review the importance of recycling. Encourage the students to recycle at home and at school.

# Middle School

# Pre SWA Classroom Presentation Lesson Plan

### **Objective:**

- (1.) Students will gain an understanding of how garbage is processed in Palm Beach County.
- (2.) Students will develop and present a television commercial which encourages teenagers to recycle.

### **Sunshine State Standard:**

#### **Language Arts:**

#### **Listening, Viewing, Speaking**

##### Standard 3: Benchmark 3:

Speaks for various occasions, audiences, and purposes, including conversations, discussions, projects, and informational persuasive or technical presentations.

### **Materials:**

\*Check ahead of time to see if it is possible for some of the students to perform a television commercial during the school's ITV morning announcements.

### **Length:**

60-90 minutes

### **Evaluation:**

Assess students' knowledge of the presented material through questioning during the presentation.

Assess students' understanding of the importance of recycling by reviewing the television commercial they develop.

**Assess students' speaking skills during the group performance of a recycling television commercial.**

### **Background**

In order to fully understand the impact of recycling on a local level, it is first necessary to understand the issue of garbage.

In Palm Beach County, the garbage from your home, apartment or townhome is collected by garbage trucks and taken to one of five Solid Waste Authority (SWA) transfer stations located throughout Palm Beach County. At the transfer station, garbage is placed onto large semi-trailer trucks. The large trucks can hold four truck loads from the smaller garbage trucks. (*This procedure allows the smaller trucks more time on their route, it reduces traffic on the highway and saves fuel.*) Then the semi-trailer trucks drive the garbage to the Solid Waste Authority's main facility in West Palm Beach where it is unloaded at the Waste-to-Energy Plant.

The lightweight garbage is shredded and burned so that it can be used as a fuel source to generate electricity. This electricity is sold to FPL and it provides enough power to service 30,000 homes in Palm Beach County as well as all the SWA's facilities in West Palm Beach.

The ashes left over from the burning process are placed in a landfill along with any unburned garbage. (*Sometimes people say that garbage goes into a dump; however, dumps are no longer used because they were not environmentally-friendly. State and federal regulations require that landfills have environmental protective systems installed. In addition, the systems are monitored on a regular basis.*)

The landfill is filling up rapidly because so much garbage is thrown away. In fact, approximately 2,500 tons of garbage is thrown away daily. (*To help you visualize that quantity, just imagine a football field full of garbage from one to the other with the pile nine feet high all the way across.*)

One way to stop the landfill from filling up is to recycle as much garbage as possible. Right now in Palm Beach County, we can recycle the following items at home:

#### **Place in the recycling bin for containers:**

*aluminum cans  
aluminum foil  
aluminum foil trays  
glass bottles & jars  
milk cartons  
juice cartons  
drink boxes  
all plastic containers (#1-7, not 6)*

#### **Place the recycling bin for paper:**

*newspapers  
magazines  
catalogs  
phone books  
brown paper bags  
corrugated cardboard*

(If you or your students do not have recycling bins, please call the SWA at 697-2700 to learn how to receive the free recycling bins.)

Many schools have recycling program. In addition, many beaches and parks have recycling containers so that people can recycle in places other than home.

**(Continued on back)**

## Procedure:

1. Explain how garbage is processed in Palm Beach County. (Refer to the "Background" section.) Emphasize that dumps were used years ago for the disposal of garbage and that landfills are currently used.
2. Reiterate that the landfill fills up quicker when recyclables are thrown into the garbage instead of placed in recycling bins for recycling.
3. Discuss the following questions:
  - What would life be like if there was no garbage collection service and each one of us was responsible for his or her garbage. What would you do with your garbage?
  - Do you believe you can make a positive difference for the environment?
  - Do you think there will be changes in the future as to how garbage is collected and managed?
  - What types of things are mainly thrown away in the school garbage?
  - What types of things are mainly thrown away at your house?
4. Emphasize that reusing and recycling garbage are effective ways to reduce the amount of garbage we generate.
5. Ask the students to brainstorm examples of the way some garbage can be reused.
6. Ask the students if they recycle at home.
7. Tell the students that you are going to give them two minutes to write as many things as they can think of that can be recycled in the yellow recycling bin at home. After the two minute time limit, find out which student had the most correct items on their list.
8. Tell the students that you want them to try it again but this time, they are going to list the items that can be placed in the blue recycling bin at home. After they have finished, check to see which student had the most correct items.
9. Divide the class into groups of five.
10. Tell each group that they must develop a television advertisement about the importance of recycling. Advise them that the target audience is teenagers.  
\*If possible, choose the best one and arrange for the students to perform it on the school's In-house television during the morning announcements.
11. Ask each group to perform their television commercial.
12. Review the lesson by encouraging the students to recycle at school and at home.





## Books For Kids: Recycling and Waste Disposal

50 Simple Things Kids Can Do to Recycle by Earthworks Press

Beautiful Junk: Creative Classroom Uses for Recyclable Materials by Karen Brackett and Rosie Manley

Bob's Recycling Day (Bob the Builder Vinyl Sticker) by Annie Auerbach

Compost! Growing Gardens from Your Garbage by Linda Glaser

Crafts from Recyclables: Great Ideas from Throwaways by Colleen Van Blarisom (editor)

Earth Book for Kids by Linda Schwartz

Earth-Friendly Outdoor Fun: How to Make Fabulous Games, Gardens, and Other Projects from Reusable Objects (Earth-Friendly Series) by George Pfiffner

Ecoart! Earth-Friendly Art and Craft Experiences for 3-To 9-Year-Olds (Kids Can Series, No 9) by Laurie Carlson

Ecology Crafts for Kids: 50 Great Ways to Make Friends with Planet Earth by Needham

Follow That Trash! All About Recycling (All Aboard Reading) by Francine Jacobs

Garbage by Eleanor J. Hall

\*Garbage by Karen O'Conner

Garbage by Robert Maass

Garbage and Recycling (Young Discoverers: Environmental Facts and Experiments) by Rosie Harlow and Sally Morgan

The Great Trash Bash by Loreen Leedy

\*How on Earth Do We Recycle Glass? by Joanna Randolph Rott and Seli Groves

\*How on Earth Do We Recycle Metal? By Rudy Kouhoupt

\*How on Earth Do We Recycle Plastic? By Janet Potter D'Amato and Laura Stephenson Carter

I Can Save the Earth by Anita Holmes

The Lorax by Dr. Seuss

Mr. Garbage (Bank Street Ready-To-Read) by William H. Hooks

\*Recycle Metal by Joy Palmer

Recycle That! (Rookie Read-About Science) by Fay Robinson and Allan Fowler

Recycled Paper: From Start to Finish by Samuel G. Woods

The Recycler's Handbook by EarthWorks Press

Recycle: A Handbook for Kids by Gail Gibbons (editor)

Recycling by Gary Chandler and Kevin Graham

Recycling: Meeting the Challenge of the Trash Crisis by Alvin Silverstein, Robert Silverstein, and Virginia B. Silverstein

\*Recycling Paper by Judith Condon

Round and Round Again by Nancy Van Laan

\*Saving Planet Earth by Rosalind Kerven

Sir Johnny's Recycling Adventure by Jackie Hutto (Editor),

Taking Care of the Earth: Kids in Action by Laurence Pringle

Taking Out the Trash: A No-Nonsense Guide to Recycling by Jennifer Carless

Trash! by Charlotte Wilcox

\*Waste and Recycling by Barbara James

\*Waste Disposal and Recycling by Sue Becklake

Waste Not (Spyglass Books) by Rebecca Weber

What Can We Do About Recycling Garbage by Donna Bailey

Where Does the Garbage Go? by Paul Showers

Why Does Litter Cause Problems? by Isaac Asimov)

\*These books are currently out of print. However, they can still be found in libraries, used book stores, and on [www.amazon.com](http://www.amazon.com).

For further information, visit [www.planetpals.com/booklist.html](http://www.planetpals.com/booklist.html)



## ***Steel Can Recycling Information***

Steel cans and other steel items are recycled in Palm Beach County when residents place them in the garbage or the recycling bins. When steel cans are thrown in the garbage, they are removed at the Solid Waste Authority (SWA) of Palm Beach County's Waste-to-Energy facility (*this is the facility where garbage is shredded, burned and used as a fuel source*) by a large magnet. After the steel is separated, it is placed in a machine which cleans and crushes it into nuggets. Afterwards, the nuggets are shipped from the SWA to steel mills where the actual recycling takes place.

When steel cans are placed in a recycling bin, they are separated from the other recyclables by a magnet and then baled. The bales are shipped to mills that melt the steel so that it can be used to make recycled steel products such as steel cans, construction beams, parts of cars and parts of trucks.

### ***Interesting Steel Recycling Facts***

- Every ton of steel recycled saves 2,500 pounds of iron ore, 1,000 pounds of coal, and 40 pounds of limestone.\*
- In 1994, the automobile recycling industry recycled enough steel from old cars to produce almost 13 million new cars.\*
- Americans discard enough iron and steel products to supply all of the automakers in America continually with the necessary amount of steel to build cars.\*\*

Source: \*Steel Recycling Institute, \*\*[Recycler's Handbook](#)

For more information, access the Steel Recycling Institute at <http://www.recycle-steel.org>

## ***Aluminum Can Recycling Information***

The aluminum can was invented in 1968. Aluminum cans are made from bauxite ore which is a non-renewable resource mined from the ground. This mining process creates pollution and consumes energy. Therefore, recycling aluminum cans reduces pollution, conserves energy and saves landfill space.

Aluminum cans placed in recycling bins are collected and brought to the Solid Waste Authority (SWA) of Palm Beach County's Materials Recycling Facility (MRF) where they are separated from other recyclables and then baled. The aluminum bales are loaded onto semi-trailer trucks and transported from the MRF to aluminum manufacturing plants where they are melted into a liquid form. Afterwards, the aluminum is cooled and then poured into a flat mold which gives it a long, rectangular shape. A flat sheet of aluminum is formed after the aluminum solidifies in the mold. The sheets of aluminum are sold to companies that make them into recycled products, such as aluminum cans. It takes approximately 60 days for an aluminum can to be recycled and appear back on store shelves.

### ***Interesting Aluminum Can Recycling Facts***

- Since 1972, approximately 13 million tons of aluminum have been recycled. That's enough aluminum cans to place side by side and stretch from the earth to the moon 190 times.\*
- It takes approximately 32 aluminum cans to make 1 pound of aluminum.\*
- The first aluminum can was made in 1968.\*\*
- Aluminum was worth more than gold when it was discovered.\*\*
- Americans throw away enough aluminum every 3 months to rebuild the entire commercial air fleet in America.\*\*

Source: \*Aluminum Can Manufacturers Institute, \*\* Recyclers Handbook  
For Reynolds Aluminum Corp - <http://www.rmc.com>

### ***Paper Recycling Information***

Newspapers and other paper products collected from residents are brought to the Solid Waste Authority (SWA) of Palm Beach County's Materials Recycling Facility where they are separated according to grade (*quality of paper*). All the newspaper is placed in a separate pile, all the cardboard is placed in a separate pile, all the magazines are placed in a separate pile and all the mixed paper is placed together in a pile. Once the paper is sorted, it is baled or loaded loosely onto trucks that transport it to paper manufacturing mills. At the mills, the paper is loaded onto conveyor lines which move it to a pulper which is a machine filled with water that has steel blades on the bottom. When the pulper is turned on, it tears the soaked paper apart and the ink is dissolved with chemicals. (*Sometimes chemicals are also added to whiten the fiber.*) At this point, the paper is referred to as "slurry" because it is mainly water mixed with paper fiber. The slurry is sprayed through two fabric belts which squeeze out some of the water. Then the slurry is carried by a conveyor to steel rollers which squeeze more water out of the fiber. Afterwards, a conveyor carries the slurry to numerous heated rollers which dry it. Following this, the slurry is pressed between steel rollers which smoothes it into dry, flat paper. Finally, the paper goes to a machine which cuts it into the specified size and then winds it onto cardboard tubes. The paper is then loaded onto trucks and transported to companies that purchase the recycled paper.

Low-grade paper can be recycled into egg cartons or fiberboard. High-grade paper can be recycled into envelopes, writing paper and office paper. Other grades are recycled into toilet tissue and paper towels. Regardless of the quality of paper, there is a limit to the number of times paper can be recycled because each time it is recycled the fiber gets thinner and thinner.

### ***Interesting Paper Recycling Facts***

- It takes 17 trees to make 1 ton of paper.\*\*
- A stack of newspaper 3 1/2 feet high will save one Southern Pine tree.\*
- Americans purchase 62 million newspapers everyday and discard 44 million of them.\*\*\*
- Phone books are made with the lowest possible quality paper; however, they can still be recycled and made into ceiling tiles, textbook covers and insulation.\*\*\*

Source: \*World Wildlife Federation, \*\*American Forest and Paper Association, \*\*\*Recyclers Handbook  
For more information access the Mead Corporation at <http://www.mead.com> or the American Forest and Paper Association at <http://afandpa.org>

## ***Glass Recycling Information***

Glass bottles and jars placed in recycling bins are collected from Palm Beach County residents and brought to the Solid Waste Authority (SWA) of Palm Beach County's Materials Recycling Facility where workers sort them according to their color: green, clear or brown. After the glass is sorted, it is placed in trucks which transport it to glass manufacturing companies. These companies mechanically remove the product labels, metal lids and then crush the glass. The crushed glass, also called cullet, is mixed with sand, soda ash and limestone and heated at a temperature of 2,800 degrees Fahrenheit. After the cullet is heated sufficiently, it will liquify into molten glass. The molten glass is poured into glass container molds to form recycled glass bottles, jars and other products.

Recycling glass saves natural gas and electricity because the cullet melts easier than sand; therefore, the furnace does not have to be set at as high a temperature.

*(Windows, drinking glasses, dishes, light bulbs, pyrex and mirrors are made from glass that has different ingredients than what is used in glass bottles and jars. Therefore, these items are not accepted for recycling in Palm Beach County.)*

### ***Interesting Facts About Glass Recycling***

- Approximately 41 billion glass containers are produced in the United States (U.S.) each year.\*
- Glass-making has been recorded as early as 5,000 B.C.\*
- Every glass container made today has a percentage of recycled glass in its contents.\*
- We save the following each time we recycle a ton of glass: 1,330 pounds of sand, 433 pounds of soda ash and 433 pounds of limestone.\*\*

Source: \*Glass Packaging Institute, \*\* Recyclers Handboo

## ***Plastic Recycling Information***

Plastic containers that are placed in recycling bins are collected and brought to the Solid Waste Authority (SWA) of Palm Beach County's Materials Recycling Facility. The containers are sorted according to the number on the container (*the number on plastic containers indicates the particular type of plastic that was used to construct the container*). Afterwards, the plastic is baled and loaded onto semi-trailer trucks. The plastic is transported from the MRF to a plastic manufacturing mill where it is cleaned, washed and either cut into flakes by a grinder or pelletized. Then the flakes or pellets are melted and stretched to form plastic fiber.

Recycled plastic can be used to make a variety of products including t-shirts, carpets, recycled plastic containers, hoses, plastic lumber, street signs, pens, recycling bins, fiberfill for sleeping bags, notebooks and many more products.

## ***Interesting Facts About Plastic Recycling***

- The first PET (plastic # 1) bottle was recycled in 1977.\*
- Five PET bottles will provide enough fiber to make an extra-large t-shirt
- It takes five two-liter PET bottles to make one square foot of carpet.\*
- It takes 35 two-liter PET bottles to make enough fiberfill for a ski jacket.\*
- It takes 1,050 milk jugs to make a 6 foot plastic park bench.\*\*
- Every hour Americans consume 2 ½ million plastic bottles. \*\*
- SWA's recycling bins are made from post-consumer recycled plastic.

Source: \* NAPCOR

\*\*[Recyclers' Handbook](#)

For more information, please visit the American Plastics Council website at [www.plasticsresource.com](http://www.plasticsresource.com)

## **Plastic Recycling**

<b>Code</b>	<b>Original Plastic</b>	<b>New Products</b>
1 (PET) Polyethylene Terephthalate	<b>Soft-drink bottles, peanut butter jars, salad dressing bottles, frozen-food trays</b>	Surfboards, film, paint brushes, skis, carpets, soft-drink bottles
2 (HDPE) High Density Polyethylene	<b>Detergent bottles, milk and water jugs, toys, grocery bags*</b>	Flowerpots, trash cans, trash bags, stadium seats, toys, detergent bottles, plastic lumber
3 (V) Polyvinyl Chloride	<b>Shampoo bottles, clear food wrap</b>	Floor mats, pipes, hoses, mud flaps on trucks
4 (LDPE) Low Density Polyethylene	Bread bags, frozen-food bags	Grocery and other types of bags, lawn furniture
5 (PP) Polypropylene	<b>Ketchup bottles, yogurt cups, other food containers</b>	Food trays, car battery parts, brooms, video cassette storage cases
6 (PS) (styrofoam) Polystyrene	Plastic spoons, foam cups and trays*	Trash cans, egg cartons, hangers, flower pots, building insulation, rulers
7 Other Plastics	Packages with many layers of materials	Plastic lumber, limited number of recycled products such as pens and street signs

*Bolded items ARE acceptable in Palm Beach County's residential recycling program.*

*\* These items should be dropped off at grocery stores to be recycled.*

## **Organization**



## **Web Address**

100 Top Recycling Sites

[www.100toprecyclingsites.com](http://www.100toprecyclingsites.com)

The Aluminum Association

[www.aluminum.org](http://www.aluminum.org)

Aluminum Can Manufacturer's Institute

[www.cancentral.com](http://www.cancentral.com)

American Forest & Paper Association

[www.afandpa.org](http://www.afandpa.org)

American Plastics Council

[www.plasticresource.com](http://www.plasticresource.com)

American Rubber Technologies, Inc.

[www.americanrubber.com](http://www.americanrubber.com)

Can Manufacturers Institute

[www.cansforcash.com](http://www.cansforcash.com)

Earth Force

[www.earthforce.org](http://www.earthforce.org)

Earth 911

[www.earth911.org](http://www.earth911.org)

Environmental Protection Agency

[www.epa.gov](http://www.epa.gov)

Florida Department of Environmental Protection

[www.dep.state.fl.us](http://www.dep.state.fl.us)

Future Solutions, Inc.

[www.futuresolutionsinc.com](http://www.futuresolutionsinc.com)

Glass Plastics Institute

[www.gpi.org](http://www.gpi.org)

Imagination Factory

[www.kid-at-art.com](http://www.kid-at-art.com)

Mead Corporation

[www.mead.com](http://www.mead.com)

PlanetPals

[www.planetpals.com](http://www.planetpals.com)

Recycling on the Net  
Broward County, FL

[www.co.broward.fl.us/iwi06000.htm](http://www.co.broward.fl.us/iwi06000.htm)

Roscoe's Recycle Room

[www.recycleroom.org](http://www.recycleroom.org)

Steel Recycling Institute

[www.recycle-steel.org](http://www.recycle-steel.org)

Solid Waste Authority of PBC

[www.swa.org](http://www.swa.org)

University of Missouri Outreach and Extension  
Office of Waste Management

<http://outreach.missouri.edu/owm/hhw.htm>

Name: \_\_\_\_\_ Date: \_\_\_\_\_



## Recycling Activity Sheet

**Directions: Choose from the words on the right to complete the sentences in the paragraph.**

Recycling is good for the environment. It saves \_\_\_\_\_  
\_\_\_\_\_, reduces pollution and prevents the \_\_\_\_\_ from  
filling up quickly. Therefore, it is important to recycle as much as you can at  
home and at school.

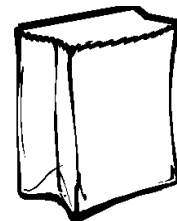
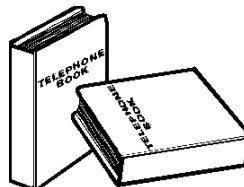
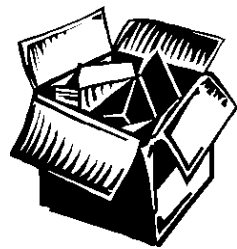
In your blue recycling bin at home, you can recycle \_\_\_\_\_  
\_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_,  
\_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, and  
\_\_\_\_\_.

In your yellow recycling bin at home, you can recycle \_\_\_\_\_  
\_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_,  
\_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.

Recycling bins are located at many places. For example, you can recycle  
aluminum cans and plastic containers at many parks and \_\_\_\_\_.  
You can recycle paper and cardboard at school. And, you can even recycle  
newspapers at the \_\_\_\_\_. So, look for recycling containers wherever  
you go. By recycling, you will be helping the \_\_\_\_\_.

### Words

- Environment
- Catalogs
- Airport
- Landfill
- Cardboard boxes
- Plastic containers
- Phone books
- Glass bottles
- Natural resources
- Magazines
- Beaches
- Aluminum cans
- Juice cartons
- Paper bags
- Newspapers
- Drink boxes



Name: \_\_\_\_\_ Date: \_\_\_\_\_



## Recycling Activity Sheet

### Answer Sheet

**Directions:** Choose from the words on the right to complete the sentences in the paragraph.

Recycling is good for the environment. It saves natural  
resources, reduces pollution and prevents the landfill from  
filling up quickly. Therefore, it is important to recycle as much as you can at  
home and at school.

In your blue recycling bin at home, you can recycle plastic  
containers, glass bottles, aluminum  
cans, juice cartons, and  
drink boxes.

In your yellow recycling bin at home, you can recycle cardboard  
boxes, magazines, catalogs, newspapers,  
phone books, and paper bags.

Recycling bins are located at many places. For example, you can recycle  
aluminum cans and plastic containers at many parks and beaches.  
You can recycle paper and cardboard at school. And, you can even recycle  
newspapers at the airport. So, look for recycling containers wherever  
you go. By recycling, you will be helping the environment.

#### Words

Environment  
Catalogs  
Airport  
Landfill  
Cardboard boxes  
Plastic containers  
Phone books  
Glass bottles  
Natural resources  
Magazines  
Beaches  
Aluminum cans  
Juice cartons  
Paper bags  
Newspapers  
Drink boxes

