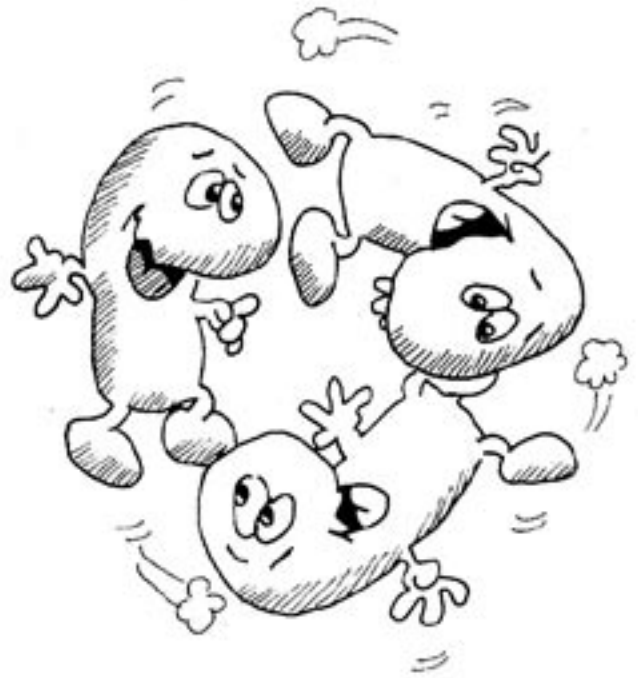


UNIT 6: RECYCLE

VOCABULARY

Baling Station	Landfill
Bin	Non-Recyclable
Charity group	Non-renewable resource
Compaction	Pollution
Conservation	Recover
Depot	Recycling Centre
Drop-off	Refillable containers
Environment	Second-hand
Flea market	Sustainable environment
Fossil fuels	Waste minimisation
Garage sale	Waste
Kerbside collection	Waste stream



BACKGROUND

RECYCLING is the process of recovering materials used in industry or in the home for further uses. Recycling is one of the 3 R's of solid waste management: reduce, reuse and recycle. These methods reduce the quantities of waste that need to be landfilled. Strictly speaking, recycling occurs when a product goes back into the original production process; or is reused in another product.

When we recycle, we reduce our demand for the resources of our fragile environment. Making products from recycled material often lowers the amount of energy required in processing. When we use less energy we reduce our output of harmful greenhouse gases from fossil fuel burning.

Finally, when we recycle goods, they are used productively and do not enter the waste stream. We reduce unsightly pollution and ease the impact on waste disposal and fast-filling landfill sites.

Kerbside collection programmes and convenient drop-off facilities make recycling easier for the majority of the Auckland region. Currently, kerbside collection (for residences) is available to North Shore, Waitakere and Auckland City residents. These programmes accept plastic bottles (1 & 2), glass bottles, aluminium and steel cans and paper. Drop-off facilities are located at most schools throughout the region, providing collection for aluminium cans, plastic bottles (1 & 2), and glass bottles. Recycling services for clothing, used motor oil and telephone books are also available in the Auckland region. Ring Enviroline on (09) 366 2070.

RECYCLE

Materials students may bring from home

samples of glass, paper, aluminium cans, plastics, steel (tinned) cans
old magazines
scissors
glue

one per student:
7 pieces of either A4 size paper, cardboard or gummed coloured paper
piece of aluminium foil
twine
old magazines
marking pens
glue scissors

hole punch
coloured construction paper
paper
pencils
clean plastic products
shoe boxes
earth
several old buckets for water
box to collect used paper
one or two large plastic tubs
electric blender or egg beater
water
one week's collection of classroom used paper
wire mesh (12cm x 17cm)
chalk
starch (optional)
glass jars and bottles - all sorts and sizes
small magnets
samples of clean aluminium and steel cans
pens
paper



RECYCLING...

How and Where

KEY CONCEPT

Recycling reduces the amount of waste requiring landfill disposal. Sorting recyclables at home is the first step in a recycling programme.

LEARNING OBJECTIVES

Students will understand the common types of recyclables, why it is important to wash and clean the containers, how to properly sort them, and where to take them.

MATERIALS

- Samples of glass, plastics, aluminium cans, steel (tin) cans and paper
- Old magazines
- Scissors
- Glue

BACKGROUND INFORMATION

Recycling is an easy and effective way for people to reduce waste. The first step to recycling is sorting the different types of recyclables into categories. Recycling drop-off centres are often located at schools, supermarket carparks and community centres.

Unless the recyclable material is properly sorted it remains rubbish. It is more cost effective for households to pre-sort recyclables than machines and personnel in recycling centres.

LEARNING STEPS

Ask children to bring clean:

- | | |
|--------------------|------------------|
| glass containers | 1 each all sorts |
| plastic containers | 3 each all sorts |



- | | |
|----------------------|------------------|
| cardboard/paper | 3 pieces each |
| aluminium/steel cans | 3 each all sorts |

Categories:

GLASS

1. Clear
2. Brown
3. Green

Recycle: Put in your kerbside recycling bin or phone Enviroline for information on drop-off points

CARDBOARD/PAPER

Recyclable:

- | | |
|-----------|------------------|
| photocopy | Post-it Notes |
| computer | bond |
| notepads | kraft |
| envelopes | cardboard |
| | (no food stains) |

Wax or plastic coated paper/cardboard cannot be recycled. Suggest that students reuse when possible.

Recycle: Paper is collected by Paperchase in a number communities on the same day as your rubbish is collected. Tie or secure papers with string or a paper bag (including newspaper) and leave at the kerb. Ring Paperchase (09) 579 9756 or Enviroline on (09) 366 2070 for information.

ALUMINIUM and STEEL CANS

Separate aluminium and steel cans.

Recycle: Put in your kerbside recycling bin or phone Enviroline for information on drop-off points.

PLASTIC

Most plastic containers and bags have

a number code on the bottom. This code (a triangle surrounding a number) identifies the plastic type. For example plastic milk bottles are a #2.

Currently most recycling programmes in New Zealand accept plastics #1 + 2.

Here are examples of the 7 plastic identification codes:

- 1 PET (Poly-Ethylene Terephthalate)
Clear plastic such as used for soft drink and some fruit juice bottles.
- 2 HDPE (High Density Polyethylene)
Matt finish plastic, such as milk bottles, household cleaning products, shampoo bottles, ice cream containers, supermarket bags.
- 3 PVC (Polyvinyl Chloride)
Not widely used in household packaging - used in spoutings and downpipes.
- 4 LDPE (Low Density Polyethylene)
Mainly plastic bags such as used for bread and drycleaning.
- 5 PP (Polypropylene)
Mainly used in jar and bottle tops.
- 6 Non Expanded Styrene
Yoghurt and cottage cheese tubs

Polystyrene (Expanded Styrene)
Used in meat trays, bean bag filling and protective packaging for electrical appliances.
- 7 Other
This category includes ABS styrene used for butter and margarine containers plus all other resins and layered multi-material.

Recycle: Put in your kerbside recycling bin or phone Enviroline for information on drop-off points.

Students find pictures in old magazines of recyclable items. They can draw their own recycling containers with the cut out items inside. Create mural with cut-outs.



EXTRA ACTIVITIES

1. Write a Letter

Write a letter to your local council representative. Ask what they are doing to help with our waste problems. What kinds of recycling programmes do they have? Do they recycle in their office? Are they trying new ways to reduce waste?

2. Drama

Students write a short play/skit/ interview etc on a recycling situation in the future or on a recycling issue we are currently facing. Could be a journalist or TV reporter interviewing an important person, group or company on a recycling issue. Presentation could be to the class, school, parents or community group.

3. Advertise Recycling

Create a radio or newspaper advertisement to educate people on how to recycle. Ask a local paper and/or radio stations if they will run the ad.

4. Recycling Monster


Design a 'monster' or machine that would 'eat' all our recyclable rubbish. Having designed this on paper, try making such a monster out of junk materials. How would this look at the gate of the school.

5. Match Pictures to Recycling Bins

Draw outlines of recycling bins on large wall charts. Students then paste onto appropriate bin product pictures cut from newspapers, magazines, advertising leaflets (junk mail!). Alternatively students could draw pictures of commonly used products or bring used containers from home to make a 3D wall display. (When finished take it down to the library, supermarket or shopping centre.


DESIGNING A HOME RECYCLING PAMPHLET

KEY CONCEPT




Public education is a necessary tool of a recycling programme for a community. For recycling to be successful, everyone needs to participate.

LEARNING OBJECTIVES




Students will help solve home and community waste problems by constructing a take home recycling kit. Students will be able to explain to their families and community groups the why, what and hows of sorting recyclables. Students will learn how to collect, sort and prepare recyclable materials for recycling.

MATERIALS

- 
- Seven A4 sheets of cardboard or gummed coloured paper sheets or plain white sheets
 - A piece of used foil and used ribbon or twine
 - Magazines for each student
 - Marking pens
 - Glue
 - Scissors
 - Hole punch
 - Variety of coloured construction paper
 - A number of clean cardboard boxes to set up a recycling station at home

BACKGROUND INFORMATION




Recycling is one of the primary ways of diverting waste from landfills. Recycling means to use a material over and over again

Each resident in New Zealand produces the equivalent of 2.5kg of waste each day. More than 50% of what we waste is reusable or recyclable. The loss of natural resources and energy and rubbish tipping

costs, both environmental and economic, make recycling an important waste alternative.

LEARNING STEPS

- 
1. Students discuss sorting and separating recyclables. What materials are recyclable? How do we prepare glass, paper, aluminium, tin, plastic and other items for recycling?

PAMPHLET CONSTRUCTION

- A. Glue different coloured sheets of paper or white A4 sheets onto the cardboard.
- B. Have students label the top of each piece of construction paper with the following headings: Glass, Paper, Aluminium, Steel, Plastic and Other Recyclables.
- C. Using the "How to Recycle" information, transfer the material on to each card for each recyclable item.
- D. Using the magazines, cut out pictures of the different categories of waste. Paste these pictures below the label and above the directions on the corresponding card to form collages. In making the aluminium card, use aluminium foil brought from home.
- E. Have students punch 2 holes on the right hand side of the 'recycle' sheet; 2 holes on both sides of the 'Paper', 'Glass', 'Aluminium', 'Steel Cans' and 'Plastics' sheets; and 2 holes on the left side of 'Other Recyclables' sheet. Connect the sheets with ribbon or wire.
- F. Students discuss setting up a recycling centre in their homes.
- G. Each student draws a floor plan of their house, marking places where the home recycling centre could be set up. Paste this plan on the back of the recycle sheet.

- H. Public information is necessary for recycling to be successful. Students practice presenting the pamphlet to fellow classmates, their own families and the community.
- I. A special certificate can be given to those students who have successfully started recycling at home.
- J. Students make a monthly report of home recycling centres.

whole class activity or as pair/group work.

4. "Waste Week"

We have conservation week and weeks for the less able... why not your own 'waste week'? The whole school concentrates on waste, waste prevention, waste reduction, reusing, and recycling in all areas of the curriculum including language, social studies, mathematics, science, art, music, drama, and physical education. Have a completely integrated and coordinated approach to the topic. Just as in 'Science and Technology Week' school has helicopters, hot air balloons, and fire engines, you could have talks, visits, council and waste contractors equipment, public displays. In fact many of the ideas in this kit! Certainly not a 'wasted week'. Ring Enviroline on (09) 366 2070 for help with this activity.

EXTRA ACTIVITIES

1. Where?

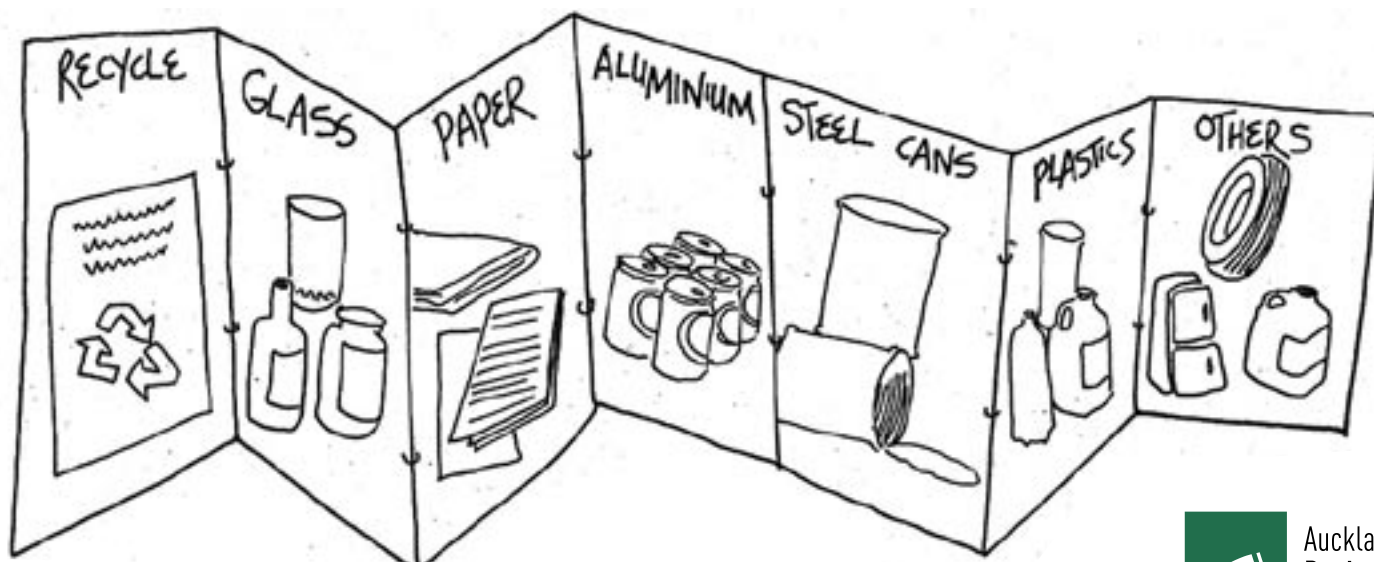
On a large scale map of your town, district or school area, use information from the class to highlight (coloured map pins) the location of kerbside litter bins, glass bottle banks, can collection depots, drop-off sites for clothes, rags, newspapers, plastics, scrap metal, and oil.

2. Posters and More Posters

Encourage students to recycle at school with a poster contest. Obtain some local sponsorship for a class (or school) slogan and poster competition. Arrange for outside judges (ex-students, parents, local shop owners) and then display the best posters in shop windows, public library, supermarket, petrol station, or council office.

3. Recycle Rap

Students can create a catchy rap to encourage recycling within the school and the community. This could be a



HOME RECYCLING CENTRE

Here are some basic steps for establishing a home recycling centre.

1. Find a convenient place in your home or flat for the centre. It does not take much room. The storage of glass, cans and newspaper for a month usually takes a 1 metre area. The garage, laundry closet, kitchen corner, or under the sink are good places.
2. Find sturdy containers to store materials. Three plastic buckets or paper boxes can be used: 1 for paper, 1 for cans, and 1 for glass.

RECYCLING TIPS

Paper

Newspaper/Cardboard

1. Stack newspapers and cardboard in a fire safe area.
2. Tie with string to secure
3. Flatten boxes

Paper

1. Recycle clean paper only. Flatten for easy storage and transportation. Store in a fire safe area.

Glass

Whenever possible, buy returnable or reusable bottles. To prepare glass for recycling, do the following:

1. Wash glass - no need to remove labels
2. Remove any metal caps and rings
3. Separate glass containers by colour, either at home or at the recycling centre

Aluminium Cans

1. Check to make certain the cans are all aluminium
2. Rinse
3. Separate aluminium cans from other aluminium products such as foil.

Steel Cans

1. Check if your community has a collection programme in place for these items.
2. Wash them out and remove labels.
3. Remove both ends and flatten



Plastic

1. Rinse out bottles
2. Remove lids and caps
3. Check for the plastic identification code on the bottom of the container. Match this number to those on the plastic recycling bins at the recycling centre. Numbers 1 and 2 can currently be recycled in New Zealand.

Phone the Auckland Regional Council Enviroline (09) 366 2070 to recycle car batteries, appliances, oil and other materials.

RECYCLING CENTRE VISIT



KEY CONCEPT

Rubbish can only be recycled if it is extensively resorted.

LEARNING OBJECTIVES

Students will be able to develop a clear understanding of what is involved in operating a recycling centre.

MATERIALS

- Paper
- Pencils

BACKGROUND INFORMATION

A recycling centre is a place where used materials are sorted and baled for transport to a recycling factory. For example, aluminium cans are baled and sent to Australia to be made into sheets. These sheets are then transported back to New Zealand to be made into cans.

LEARNING STEPS

1. Arrange for your class to visit one of the Auckland area recycling centres or depots. Contact Enviroline (09) 366 2070 to schedule a time. A representative from the Auckland Regional Council will give your class a tour of the centre and be able to answer questions on recycling and rubbish disposal.

Facts to find out:

- How far is the centre from school?
- Is it near a landfill or transfer station?
- What hours is the centre open?

- What does it cost to use the centre?
- What sort of materials does the centre accept?
- What about drop-off facilities for reusable items? (One person's trash is another person's treasure)
- Do many people use the centre? Why? How are they motivated?
- What materials are recycled the most?
- How is the centre promoted?

2. Students can create an advertisement for the centre in the form of a brochure, flyer or poster. The advertisement should mention what recyclables the centre accepts, as well as the location and hours of the centre. Post several copies around the school halls and library - even into the wider community.

EXTRA ACTIVITIES

1. Scrap Book

Each class group will select a different topic and prepare their scrapbook accordingly eg in the form of a dustbin or wheelie bin if the topic is household waste, a globe for world issues, a PET (#1) plastic bottle or milk container for plastic recycling etc. Now prepare for a class display in three months time by pasting in cuttings, advertisements, brochures, leaflets and other material.

2. Draw a Flow Chart

Draw, annotate and illustrate a flow chart to show the processes involved in the manufacture, use, distribution, collection, recycling and consequent stages in the life of a can, glass bottle, plastic container, newspaper etc. Include reference to where each stage takes place in your local community or where materials come from or go to in your district.

3. Debate

Select a controversial topic which will stimulate a discussion of views eg 'We don't need to recycle - who cares about the rest of the world? It's not our problem!' Split the class into 2 groups - for and against. Give the children time to discuss the issue amongst themselves before listing the points they want to make and to select speakers for their group. An extension activity could be a letter to the editor of a local newspaper, a journalists report of the debate or an article for the school magazine or newsletter.

4. Game Show

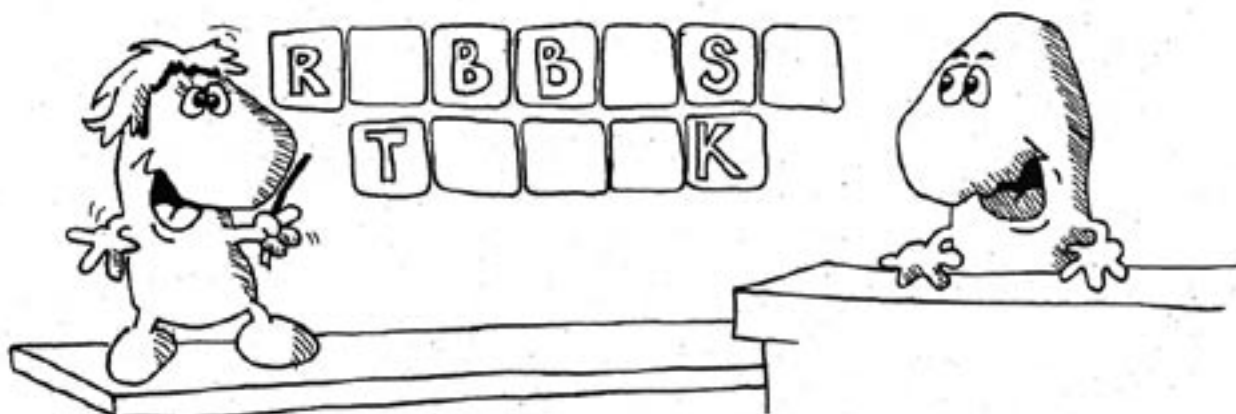
Create a question and answer game show that encourages your class to share their knowledge of recycling. This could be based on television shows eg 'It's in the Bin!' 'Wheel of Recycling' 'Garage Sale of the Century'. Two or three students can record the event on video. Why not take the tape home to show parents? Groups can make up the questions, design the stage set, and seek prizes from local shops.

5. Recycling Club

Start a school recycling club. The club can be responsible for monitoring and promoting recycling at school and can organise school litter cleanups.

6. Recycling Diary

Keep a class or individual diary on all aspects of waste and waste management - observation each day, rubbish tallies, litter counts, items used, reduction in packaging, progress with projects or other class activities etc



PLASTICS

VOCABULARY

Biodegradable	PP
Celluloid	PS
Extrusion molding	Plastic coding system
Foaming	PVC
Fottle	Resin
HDPE	Reusable
LDPE	Synthetic
Packaging	
PET	
Polymers	



BACKGROUND

PLASTIC, first mad from plant cellulose in the 1860s as a substitute for ivory, now comes in more than 60 synthetic versions. Petroleum is the most important raw material for plastic. New uses and compounds are being developed constantly. All can be recycled at the manufacturing stage.

To be recycled, plastics need to be retrieved from the waste stream, collected, sorted and reprocessed into another product. In 1989, the Plastics Institute of New Zealand initiated a voluntary plastics coding system. This is part of an international system to assist in identifying plastic containers for recycling. The coding system assigns a number to each of the primary plastic resins, 1 (PET), 2 (HDPE), 3 (LDPE), 4 (PVC), 5 (PP), 6 (PS) and 7 (Other). The coding system identifies the different types of plastic to the general public and the recycler. But the coding system can be misleading. The general public sometimes perceive the code (the resin number surrounded by a recycling symbol) to mean the product is recyclable in New Zealand. However, most plastic collection programmes only accept plastics 1 and 2.

Each year the average New Zealander throws away nearly 15kg of plastic packaging. Burning of plastic in household incinerators is not recommended, as plastic releases gaseous pollutants when combusted.

Plastics are an inert material that do not breakdown in landfill. Until large scale plastics recycling programmes are available in New Zealand, we can reduce the amount of plastic waste we create by buying groceries in bulk, avoiding single use plastic containers, using less plastic wrap, taking cloth bags to the supermarket and by encouraging manufacturers to produce more reusable plastic packaging. Reusing plastic packaging ie bread bags, supermarket bags and plastic bottles can also reduce the amount of plastic that is discarded.

THE PLASTIC MOUNTAIN



KEY CONCEPT

Plastics are an inert material, and do not decompose in a landfill.

LEARNING OBJECTIVES

Students will be able to understand the basic properties of plastics and how much plastic there is in the world. Students will research biodegradable and non-biodegradable plastic.

MATERIALS

- Worksheet 17 'Plastics'
- Clean plastic products, as many as possible, at least one of each different type (see types listed in Steps) and some unmarked kinds
- Shoe boxes
- Dirt
- Buckets of water

BACKGROUND INFORMATION

Plastics do not change or breakdown in landfills, water or sunlight. They remain relatively inert in a landfill situation. Plastics are dangerous in the marine environment they have the potential to kill marine life.

LEARNING STEPS

1. Photocopy Worksheet 17 for each student. Students follow along with the activity using the worksheet.
2. What sort of plastic is your container? You can identify the plastic type by looking for the number on the bottom.

(The number is surrounded by the recycling arrows).

Plastic Identification Codes

- 1 PET
- 2 HDPE
- 3 LDPE
- 4 PVC
- 5 PP
- 6 PS
- 7 Other

What type of product does it contain? Liquid? Solid? What is the brand name?

3. Gent students to collect all the different types of containers by number. Discuss the different categories and even different types that are marked with the same number.
4. Students place a variety of plastic items in full sunlight. Monitor for 1 week, 2 weeks, 1 month. Record any changes in colour/texture/strength.
5. Fill buckets with water. Students place plastic containers in water. Monitor results for 1 week, 2 weeks and 1 month. Record any changes in colour/texture/strength.
6. Bury the plastic container in a shoe box of dirt to simulate what would happen to it in a landfill. Dig the container up after 1 month, 2 months. Did the container change form? shape? colour?
7. Can the container be recycled? (Only 1's and 2's can now be recycled) reused? Can it be replaced with some other material such as metal or glass?

8. If your school has a drop-off site for plastics, recycle your containers! If not, save them for one of the activities in the 'Reuse' unit.

EXTRA ACTIVITIES

1. Ask an Expert

Phone Enviroline (09) 366 2070 and ask our school recycling expert to come and visit your class.

2. A World Without Plastics

What would our world be like if we didn't have the great variety of plastics we use so widely in our manufactured goods today?

Divide your class into groups to discuss this topic - perhaps under different headings such as cars, sport, clothing, packaging, building materials, furniture, household products ... the list is endless. What was used before plastics? What are the benefits of plastics? Disadvantages?

3. Technology Challenge

Using soft drink bottles or plastic milk containers as floats, design and build a yacht which will sail across the swimming pool faster (and more accurately) than those of other teams within the class. As much as possible use waste materials in the construction of these vessels.

4. Follow That Truck

Many schools take a part in RAP (Recycle All Plastics) schemes - but what happens when the load of plastic leaves the school gate? Ask your school's RAP Coordinator some questions such as: What happens to the plastic? What is produced? How can the process be made more efficient? Could other plastics be recycled? Illustrate class findings in posters, wall charts, displays etc which can be used around the school and in your local shopping centre.

5. Make a Mobile

This may be just a simple mobile constructed from waste plastics as a stimulus or focal point for other displays or can be far more involved showing transition from raw materials to recycled items, or carrying words describing the procedure and processes involved in effective waste management in your community.

6. A Class Display

Collect plastic items to show the diversity of manufactured goods, the range of plastic used, the different processes used, the various qualities of plastic, the use made of recycled plastic etc you will amaze your class (and the school) with the variety you are able to present.

7. Reuse Olympics

Fill 20 fizzy drink bottles or milk containers with sand to use as markers for athletics, ball games, relays etc. Try empty containers as floats in the pool. On a smaller scale, use aluminium cans in skittle games, or in fairground type 'can-shy'.

8. New Toy from Old

Make a toy suitable for a 3-7 year old, using used plastic containers as the main material. In addition, you may use wood, screws, nails, glue, wire, paint etc but the toy must be constructed mainly from one or several plastic containers. NB The toy must be safe and well constructed - no loose parts to fall or be pulled off! Ask your teacher if you may trial your toy at a nearby kindergarten or with a new entrant class.



WORKSHEET 16

PLASTICS WORKSHEET

- 1 Type of plastic
- 2 Texture? Colour? Smell?
- 3 Effects of sunlight?
- 4 Effects of water?
- 5 What happens when it's buried in dirt?
6. Can it be recycled?
Can it be reused?
Can it be replaced with another material?
- 7 Draw your container here



- 8 RECYCLE IT!!!!

PAPER

VOCABULARY

Carbon paper
Cardboard
Consumer
Fibres
Forestry
Junk mail
Kerbside collection
Newspapers
Office paper recycling

Packaging
Paperchase
Photocopier
Pulp
Recycled
Renewable resource
Reusing
Waste reduction



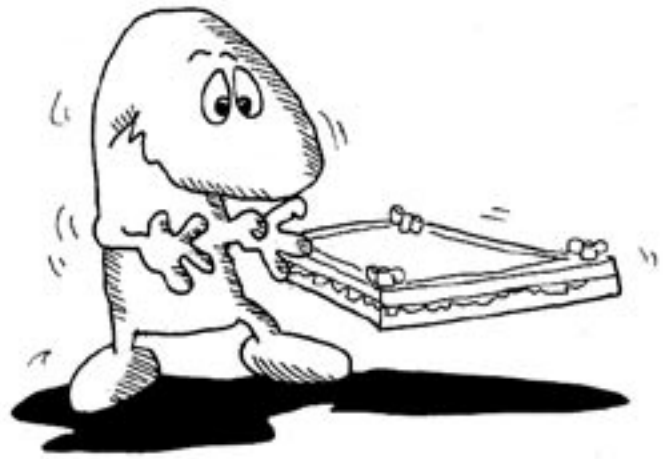
BACKGROUND

PAPER is made from the pulped, pressed and dried out fibres of wood. In New Zealand pulp trees are a renewable resource; from planting to maturity our pulp trees take 20 years to grow. Waste paper suitable for recycling must be easily collected, similar in type, clean, and uncontaminated by wire, plastic and food. Most waste paper recycled in New Zealand is used to make paperboard. Small quantities are used in making printing and writing paper, tissues, toilet paper and other minor applications such as plasterboard backing. Making paper from waste instead of virgin pulp uses up to 64% less energy, reduces air and water pollution by almost 60%, requires only half the water and saves about 17 trees for every tonne of paper recycled.

In New Zealand we can now purchase paper with a recycled content. This recycled content often contains up to 70% scrap from paper mills or misprints, mixed with post consumer waste. Post consumer means that the material has been used by the consumer. Post consumer does not include discards from industrial and manufacturing processes.

MAKING RECYCLED PAPER

A Fun + Easy Method



KEY CONCEPT

We need trees to make paper. Recycled paper is easy and fun to make.

LEARNING OBJECTIVES

Students will understand that recycling conserves resources, protects the environment, reduces solid waste for disposal and conserves energy.

MATERIALS

- Box to collect used paper
- One or two large plastic tubs
- Electric blender or egg beater
- Water
- One week's collection of classroom paper that is normally thrown away
- Electrical outlet
- 12cm x 17cm wire mesh (grid should not be larger than 5mm)
- Chalkboard
- Chalk
- Worksheet 17 '100% Recycled'
- Starch (optional)

OR

Buy a ready made Recycling Kit (available at most London Books, Paper Plus and Whitcoulls book shops for about \$40)

BACKGROUND INFORMATION

We use and throw away enormous amounts of paper every day!

Much of the paper we use can be reused or recycled, saving energy, natural resources and landfill space. For each tonne of paper we recycle, we save 17 adult trees and use 30 to 55% less energy than making paper from raw materials.

NOTES:

1. Set up your recycled paper making table ahead of time, using the instruction sheet as a guide. Collect enough used paper to fill up a small bucket.
2. How much time it takes the class to make a 12cm x 17cm piece of new paper depends on how many blenders and tubs you want to set up and when you want the students to make their paper.
3. Do not begin with a clean tub of water each time. Let the students keep adding their paper pulp to the same water in the tub.
4. Glossy, shiny papers such as magazines do not work well for this activity. Newspaper, notebook paper, paper serviettes and paper towelling work best.

LEARNING STEPS

1. One week before the activity, hold up an empty cardboard box and tell the students that they are to save any paper (besides magazines) that is normally thrown away. Collect the papers in the box.
2. The day of the lesson, separate the collected paper into 2 piles:
 - a. reusable paper: paper that can be used again on the reverse. Put this paper in a 'reuse it' box.
 - b. recyclable paper: paper that has been completely used. This paper can be used

3. Discuss where paper comes from. Using the attached worksheet, illustrate the process of papermaking on the blackboard.
4. Ask students if they recycle paper at home. Do they know how recycled paper is made?
5. Tell students to watch carefully as you demonstrate how they can make their own recycled paper. Following the instruction sheet carefully.
6. You may want to add food colouring, flowers, bits of purple cabbage. The water from boiled onion skins makes a wonderful dye.

EXTRA ACTIVITIES

1. Paper Mathematics

Investigate paper sizes. What are the dimensions of A1, A2, A3, A4, A5, B3, B4? What about quarto and foolscap? How many sheets in a ream? If we were buying paper in bulk, what savings would we make buying by the ream, box, pallet load? (You may need to get a student to ring an office supply company or paper merchants for some of the answer). And what is a quire? How many trees do you save from recycling a tonne of paper?

2. A Work of Art!

Create papier mache sculptures with used paper. Display in library or in classrooms. Design and/or decorate boxes for paper recycling at your school.

3. Copy Copy: Take the Waste out of Paper

How much copying does your school do? Find out how many reams of paper are used per day/week/term/year for notices, newsletters, teaching notes, worksheets, etc How many photocopiers does your school have? What happens to the extra copies, the misruns, the trial sheets? Perhaps someone could demonstrate how copying was done in the 60s with a Gestetner or sprint duplicator?

4. Recycled Paper

Many newsletters, brochures, envelopes, packets, cardboard boxes etc are being printed on or made with recycled materials. Encourage your class to look for examples of these and bring and make up a display as part of their recycling unit. Phone or fax a printing company for samples of coloured recycled papers. See if you can find a way to tell if the paper is made from recycled materials.

5. Office History

Ink wells, quills, ledger books and handwritten records - how does the office of one hundred or even fifty years ago compare with a modern office with computers, facsimile machines, photocopiers, or voice mail? What does this mean in terms of paper usage? Find out how much paper is now used in a small office or business.

6. Start Recycling in Class

Recycling paper at school can be fun and easy! Paper is collected in classrooms and administration offices. It is then taken to a central paper collection site. Auckland Regional Council Environment can provide boxes for collecting paper in the classrooms. Check the 'School Recycling' list in the Appendix for a list of paper recyclers.



WORKSHEET 17



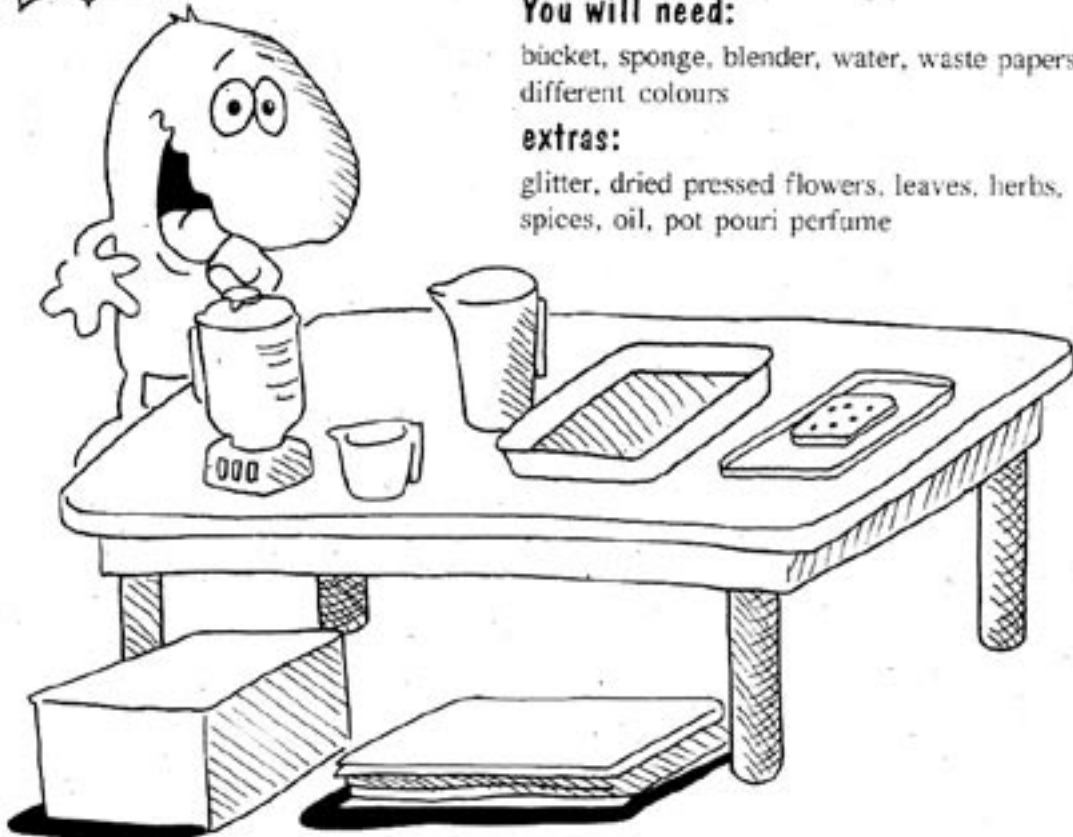
PAPER MAKING: 100% Recycled (Instruction Sheet to make paper)

You will need:

bucket, sponge, blender, water, waste papers of different colours

extras:

glitter, dried pressed flowers, leaves, herbs, spices, oil, pot pouri perfume



① FILL BLENDER



② SHRED PAPER INTO 4 CUP CONTAINER



③ ADD SHREDDED PAPER TO BLENDER BY SMALL HANDFULS



⑤ POUR PAPER PULP INTO SCREEN TUB



⑥ SWIRL WATER TO SUSPEND PAPER PULP THEN LIFT SCREEN STRAIGHT UP AND OUT OF WATER

⑦ GENTLY SPONGE THE PAPER PULP ON SCREEN TO REMOVE EXCESS WATER

⑧ CAREFULLY LIFT AT CORNER: LIFT PAPER OFF SCREEN AND PLACE ON NEWSPRINT TO DRY

⑨ EXTRAS CAN BE ADDED AT STEP 2 OR STEP 5

NB:— A BUCKET AND AN EGGBEATER OR WHISK CAN BE USED INSTEAD OF A BLENDER.

GLASS

VOCABULARY

Bottle bank
Blown glass
Containers
Cullet
Flint
Furnace
Glass
Limestone

Multi-fill bottle
Pyrex
Raw material
Returnable
Reusable
Silica
Soda ash



BACKGROUND

Each year we throw away thousands of tonnes of GLASS. Ironically, glass is in demand with manufacturers as it is both reusable and 100% recyclable. New Zealand's recovery rate of used glass is one of the highest among developed countries.

Household bottles and jars are made from a melted mixture of silica (sand), soda ash and limestone. Old glass or 'cullet' is a very valuable raw material in the production of new glass. It helps the batch melt quickly and reduces the required energy output of the furnaces by 20 to 25%. In recycling glass, we reduce the pressure of extracting ash required for glass production. As well as saving space at tips, glass recycling benefits the environment by reducing sand and limestone mining and reduces litter and pollution from soda ash production.

Window glass, mirror glass, crystal glass and lightbulbs are not recyclable due to their high lead content. There are four types of manufacturing glass: containers, flat glass, pressed glass and blown glass. Glass colours are clear or flint, green and brown.

GLASS GALORE!



KEY CONCEPT

Glass is 100% recyclable.

Recycling glass saves energy and natural resources.



LEARNING OBJECTIVES

Students will learn that glass is reusable and recyclable.



MATERIALS

- Glass jars, bottles (all sorts and sizes)



BACKGROUND INFORMATION

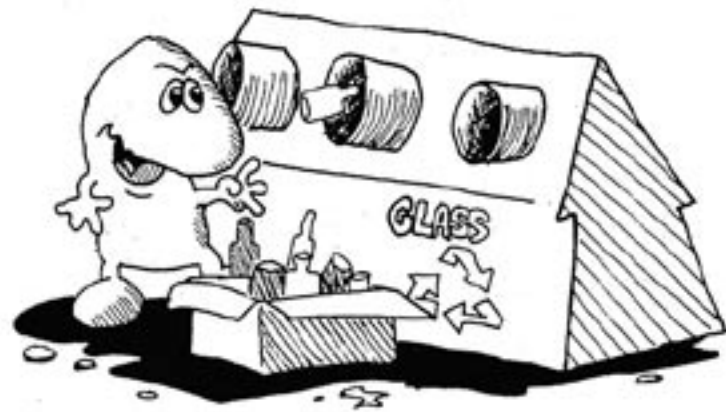
Glass recycling programmes have been in operation throughout New Zealand for a number of years with the yellow bottle bank programme. Although there are a large number of facilities to recycle glass available, many people throw glass into their rubbish. Glass is excellent to wash and reuse. Milk used to come in reusable glass bottles.

Glass can be recycled and made into many things. In some countries, recycled glass is mixed with road base to make glassphalt roads. Recycling glass saves energy because less fuel is needed to make new glass from old bottles than from raw materials.



LEARNING STEPS

1. Class discussion: What is glass made from? How is glass reused or recycled?



2. Invite a local glass recycler (see list in Appendix) to talk to the class about how glass is recycled and how to go about organising a glass recycling programme. Or have the students write a letter to the glass recycler or ring Enviroline (09) 366 2070 for information.
3. Find out:
How much glass is recycled in Auckland? New Zealand? What can be made from recycled glass?
4. Start a glass recycling drop-off centre: Ask the glass recycler or an Auckland Regional Council waste officer to help your class start a bottle bank at school. What is involved? Who is responsible? Who maintains it? Ask your headmaster for approval of the bottle bank site.

Ask your school newspaper or bulletin to promote the programme throughout the school. Make signs for the glass recycling bins to encourage students and parents to participate in the programme.
5. Ask students to think of ways to reuse glass jars. Suggest that each student find a used jar from home and decorate it for storing pencils, lollies etc or as a container for a Christmas gift. Old jars make excellent storage containers.



EXTRA ACTIVITIES

1. Survey Glass Recycling

Develop a questionnaire survey for family members or neighbours - what glass containers do they have coming into the house? When there is a choice

do they prefer to buy in glass? What do they do with these glass containers? Are they aware of recycling and do they use recycling drop-off sites or kerbside collection? What does the local council do to promote glass collection and recycling? How can we find out? And what about glass recycling in the future?

Share findings within the class and prepare a statement for those who took part in the survey. If the class are happy with the scope of their survey, why not send the results to your local newspaper?

2. All Kinds of Bottles

Start a class collection of bottles - different shapes, colours, sizes and kinds... and encourage the class to bring their additions to collection displayed along a top shelf. If you have a bottle collector in the area, a local history museum display, or an antique shop, add to the interest generated by the class bottle collection with a visit to a historical collection and a talk with a dedicated and knowledgeable collector.

3. The Life of a Bottle

Trace the life of a bottle from manufacturer to factory to wholesaler to retailer to home to bottle bank to glass recycler, or in domestic rubbish to recycling station or discarded, placed in landfill, thrown in the river, all the basis of a story, newspaper article, chart, poster, mural, etc.

4. Musical Bottles

Have students make a collection of similar sized glass bottles or jars. These should then be filled with varying amounts of water - none, 1/4 full, 1/2 full, etc. By tapping the side of each bottle or jar, or by blowing across the top of each, children can arrange the bottles in order of pitch. Simple drums can be made by stretching lunch paper across the mouth of a jar and securing with a rubber band. With different groups of discarded bottles - what an orchestral delight!

5. Reusable versus Single Trip

Promote a study leading to a class debate on the question of reusable bottles (the old milk bottle, beer bottles, soft drink etc) versus the single trip/disposable/recyclable bottle. Should there be a levy/refund? What are the real costs, benefits, disadvantages? Should we go back to having glass milk bottles?

6. Promote Recycling

Through posters, slogans, logos etc, promote glass recycling within the school and throughout your local community. Talk with local council officers to see if you can start a 'Glass Collection Week'.

7. Mathematics of Bottles

Using a bottle bank or bottle collection - how many bottles are collected? What kinds? Can we estimate totals using samples? How long to fill the bottle bank? What is the average donation to the bottle collection? What volume of wines/beer/soft drinks are represented? Does this proportion change during summer? winter? What mass of clear, green, brown glass is collected? Observe, count, measure, weigh, estimate, sample, discuss. Express results in tables, charts, graphs etc.

8. Glass in the Library

Make a library study of glass - different groups working on different aspects such as who discovered glass? When? Has glass making changed through history? What kinds of glass are there? How is glass important to a modern community? Why do we use glass? What are the chemical and physical properties of glass?

9. Community Visits

Take the class out into the community to study glass containers in the supermarket, special bottles in chemists, stained glass in the church, glass in a craft shop, to a glazier to discuss different kinds of window glass, to a panel beater or autoglass agent to see car windscreens, to a university or even a glass blower!

10. Glass Recycling Unit

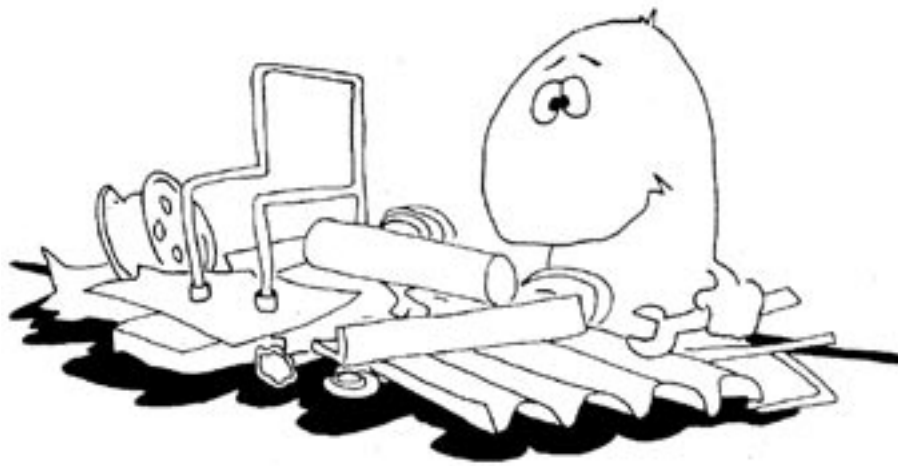
Prepare a Glass Recycling Kit which can be placed in the library or resource room for use by others within the school or by next year's class. Your kit should contain details of community recycling schemes, location of bottle banks, the do's and don't's of glass recycling, how glass is recycled, fact sheets on glass, brochures and posters from councils, glass companies etc. Add fun glass crosswords, poems, stories, competitions and more!

METAL

VOCABULARY

Alloy
Aluminium
Bauxite
Brass
'Cash for Cans'
Chromium
Copper
Corrosion
Ferrous
Furnace
Ingot
Iron

Landfill
Magnetic
Metal
Non-ferrous
Raw material
Renewable resource
Salvage
Scrap dealer
Smelting
Steel cans
Tin



BACKGROUND

Nine percent of everything we throw away is METAL. Metal recycling makes economic and environmental sense as pure metals and many alloys need far less energy to recycle than to mine, extract and smelt. The two most common metals found in household waste are aluminium and steel.

Aluminium is one of the most abundant metals in nature. Made from bauxite, aluminium accounts for 8% of the earth's crust. From one tonne of bauxite 500kgs of aluminium and 500kgs of waste are produced. Large amounts of energy are needed to produce primary aluminium from bauxite. Once aluminium is in metal form, it can be re-melted over and over again with very little metal loss in the process. Recycling aluminium cans uses a mere 5% of the energy needed to produce new aluminium. Aluminium is used extensively in beverage containers, roofing, window and door frames, aeroplanes, and kitchen equipment. Of all packages, aluminium cans are probably the simplest and most efficient to recycle.

Steel cans, commonly known as tin cans, are made of steel and coated with a thin layer of tin. The tin layer stops the steel can from corroding. The steel can has been used for many years in New Zealand both as a food and beverage container. Once washed thoroughly steel cans can be recycled at some recycling centres and scrap metal dealers.

Scrap metal recycling is another economically viable activity. Steel and iron are reclaimed from cars, railway lines, appliances and building materials. Brass is recovered from household fittings and ammunition cases. Copper can be take from electrical wiring, radiators and car batteries are recycled for lead.

METAL CANS...

Can you tell the difference?

KEY CONCEPT

Steel and aluminium are both used to package food items. Magnets can effectively sort steel and aluminium.

LEARNING OBJECTIVES

Students will learn how to tell the differences between aluminium and steel cans by using magnetism and by observing differences in appearance.

MATERIALS

- Small magnets
- Samples of clean aluminium and steel cans

BACKGROUND INFORMATION

There are two general categories of metal cans: aluminium and steel.

The composition of what we call 'tinned' cans has changed. These cans are made mostly from steel with a thin coating of tin to prevent rust and corrosion, thus we now refer to them as 'steel' cans.

Characteristics of Metal Cans

ALUMINIUM

Is not attracted by a magnet.

Has no seam.

If the bottom of the can is round and more shiny, then it is aluminium.

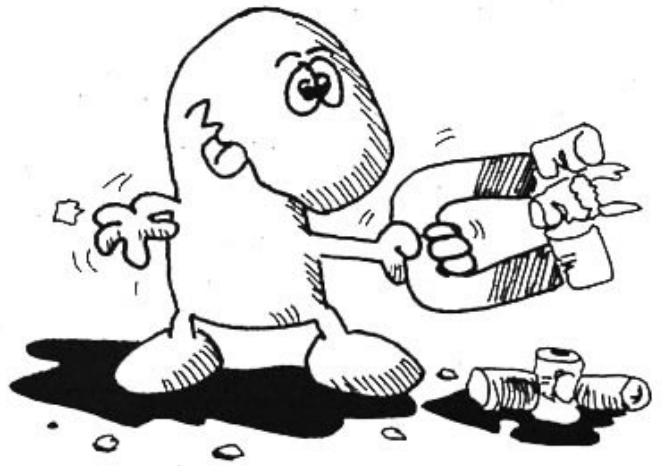
Aluminium cans are used mainly in NZ to package drinks.

STEEL

Is attracted by a magnet.

Bottom has a rim.

If you look closely, the bottom is not finely brushed.



LEARNING STEPS

1. Review what recycling means. Class lists some common recyclables. Cans are recyclable, but some are much easier to recycle than others.
2. Explain and demonstrate to students the following ways to tell the difference between metals:

MAGNETS

Explain that magnets are pieces of iron or steel that can attract iron or steel. Experiment with some object to show some of the metals the magnet will attract and others that are not attracted.

Demonstrate that magnet attracts steel cans, but not aluminium cans.

APPEARANCE

Pass out can samples. Class compares differences in cans, ie weight, seams, colour, shininess, texture.

Demonstrate how to prepare cans for recycling, ie remove labels, wash and flatten the cans.

EXTRA ACTIVITIES

1. Follow our Cans

Is there a can bank at your school? If so, what happens to the cans? Where do they go from your school? Who collects the cans? Are they sorted or processed in any way? What does smelting involve? What is produced? How is this used? Where and by whom? Write a letter, use the telephone or fax machine,

invite a representative of the recycling or aluminium processing firm to visit the school. With the information and sample obtained make a display, flow chart, storyline etc to encourage next year's class to collect cans.

2. Can Castles

Stack up cans in the shape of a castle, take 10 steps back and draw a base line: students then take turns in trying to 'down' the castle by throwing a can at it. This could be done as a team relay event.

3. Bin Mathematics

Counting, measuring, estimating, sampling, predicting... How can we estimate the number of cans in the bin? What percentage of the cans are soft drink? juice? beer? What is the surface area/volume/mass of a single can/100 cans/a bin full of cans? What is the average number of cans brought by each person to the depot? How long does it take to fill the bin in the summer? winter? Let's display our findings as a table, chart bar graph, pie graph etc.

4. Can Beat It!

Team games with a pile of cans - each team must collect and bring to school the fifty or one hundred cans required. In addition to can monsters, can castles and other activities, try these events:

Stand Clear: How far can you throw an empty can?

Roll Em: How far will one can roll? Or make it a relay event for a team of five - what is the total distance rolled?

Stack Em: How many cans (uncrushed) can you stack onto a rubbish tin lid without any falling off?

Smash Em! Bang Em!: With a hammer and a block of wood and a couple of empties for each team member, who can get their cans into the smallest space? How many soft drink cans can you get into a large fruit tin?

Can Stilts: Students make their own pair of stilts from used steel cans with

string handles. Races or can-ballet on can stilts is an excellent physical event involving balance and coordination. Decorate the stilts with team colours.

5. Can-cophany

Make 'music' from cans of all kinds. Collect a variety of aluminium and steel cans, drums and metal containers of all sizes and kind. Now, get busy making stringed, percussion and wind instruments of every kind. Encourage innovation and invention - be sure that your class entertains the school with their own orchestra (The Recyclers??) with a difference. Playing, of course, a recycling rap!

6. Food Preservation

What is the history of using cans as a means of preserving food? Would you believe the date of 1795? What were the materials and methods used? What were some of the dangers? How were these overcome? Do we still have problems with can food? (ptomaine or other poisoning, deficiency diseases etc) What safeguards (use-by date stamp) do we have? What foods are preserved in cans today? What about home canning?

7. Every One Different

How many different cans can your class collect? With just aluminium cans alone could we get one hundred different kinds? What about steel? Use this as a basis of a 'collect cans' promotion. Go further into the world of cans by collecting newspaper and magazine advertisements, and labels from steel cans. Visit antique and second hand shops or the local historical museum to see how many old cans you can spot. Do you have someone in your school district who collects old or new cans?

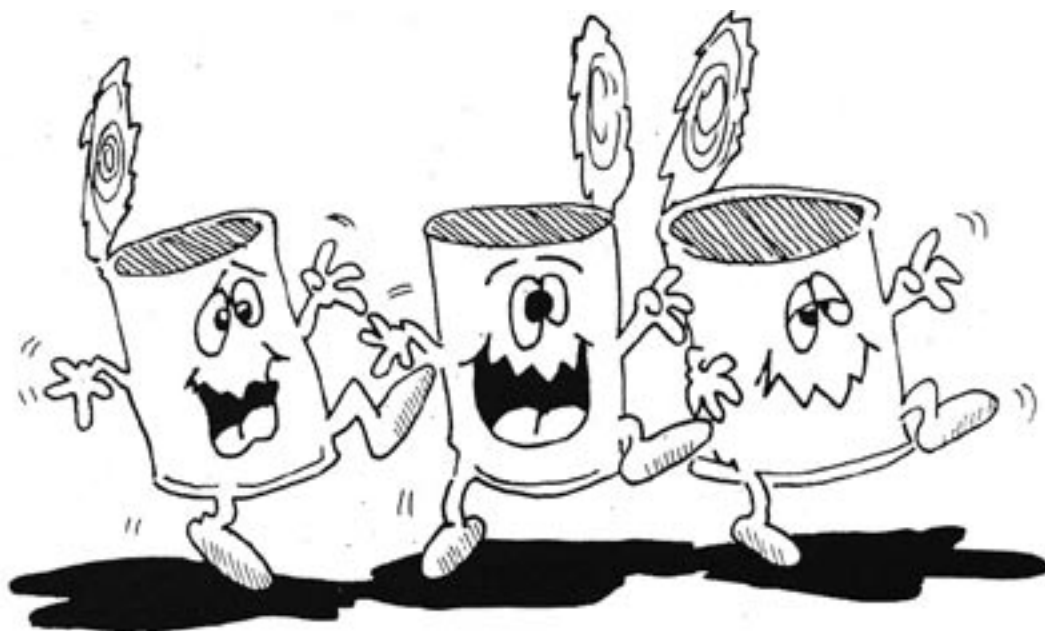
8. Tin Can Rally

Review safety issues on bike riding and rider protection (contact Traffic Safety Officers or Dirt Riding Club and invite a speaker to the school). Students plan an obstacle course, calculating the number of aluminium and steel cans required for each obstacle. How should these be spaced? How many? What

is the length of the course? Set up the course, have a trial run (or two), make any modifications required... and the race is on! It may be against each other or as a timed event! A can of juice for the winner?

9. A Study of Cans

Compare 'lifetime' versus 'throw away' metal products. Discuss different products and different containers - the steel can and the aluminium can for example. Make this the subject of a group seminar, pictorial or sample display. Try different writing styles, poetry, essay etc.



METAL RECYCLING

Don't Scrap It!

KEY CONCEPT

Metal objects are made from many different types of metal. Scrap metal has been recycled for a number of years.

LEARNING OBJECTIVES

Students will understand what metal is, how it is used, and how it is recycled.

MATERIALS

- Pens
- Paper

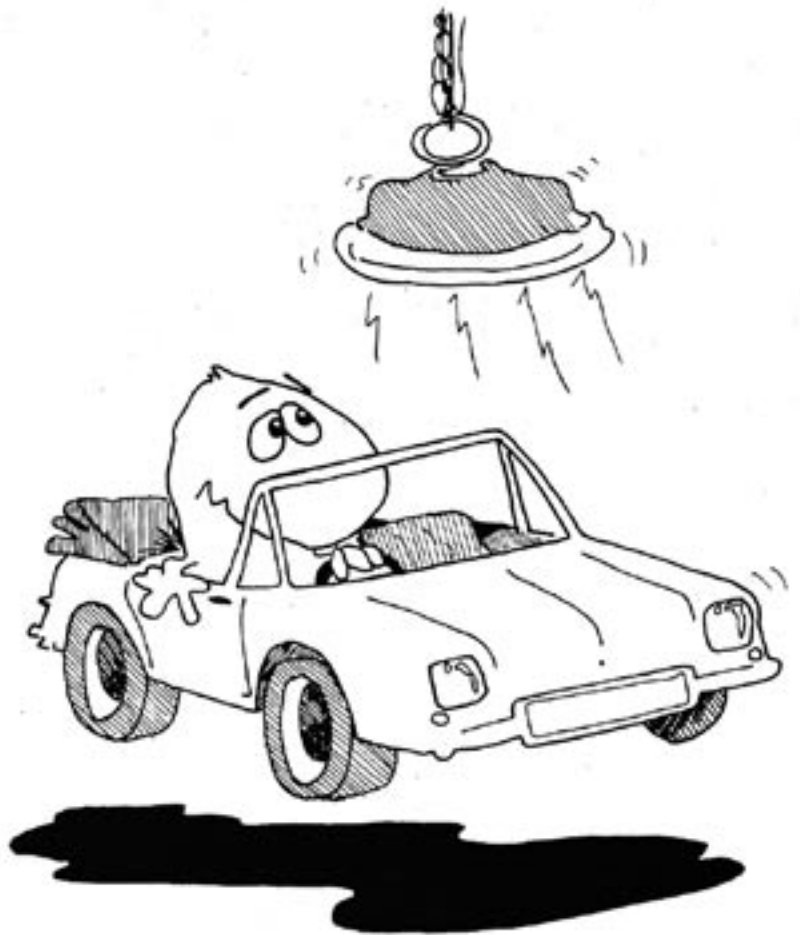
BACKGROUND INFORMATION

Almost 9% of everything we throw away is made from metal. Metals are elements or mixtures of elements which occur naturally in the earth.

The most common metals used today are aluminium, iron, steel and tin. Aluminium is the third most common element, making up 8% of the earth's crust. The greatest concentration of aluminium is found in bauxite ore.

Iron is also a naturally occurring element. Steel is produced by adding carbon to iron. Tin is another metallic element. The mining and processing of iron is quite costly, energy intensive and has serious environmental impacts.

Steel and iron are reclaimed from cars, cans, railway lines, appliances and building materials. Brass is recovered from household fittings and ammunition cases. Copper can be taken from electrical wiring, radiators, hot water systems and car batteries are recycled for lead.



LEARNING STEPS

1. Class is divided into 5 groups: aluminium, steel, iron, brass and copper.
2. Have groups research their assigned metal. Have them prepare a short paragraph all about that metal. What does it look like? Is it rough? smooth? Where does it come from? How is it used? What are examples of that metal? (eg steel bars, iron gates, aluminium panel etc) Find examples in the classroom.
3. Arrange a visit to a scrap recycling centre or scrap metal dealer. Refer to the Yellow Pages for a list of scrap metal companies or ring Enviroline (09) 366 2070 for assistance.
4. Suggested questions:
How many kinds of metal are recycled?
What metal is recycled the most?
What is recycle dmetal used to make?
Who recycles metal more often?

Where does the metal go for recycling?

5. Use what you learned from your tour and create a metal recycling brochure for the students and teachers.



EXTRA ACTIVITIES

1. Can Dooooooooo!

Invite students to write a poem, limerick or song on metal recycling. Haiku poetry means everyone will succeed! As an extension, sing this creative writing to well known tunes, eg advertising jingles such as 'slip, slop, slap'...

2. Journey to Metallica

Get out into your community and explore the world of metal - plumbers, plumbing suppliers, building hardware, aluminium joinery, car wreckers, panel beaters, jewellers, home hardware, supermarket, scrap metal merchant, recycling dept, farm machinery, railway station, building site.... every community is a world of opportunities for your 'Journey to Metallica'.

3. Library Resources

Look for fiction or non-fiction music, videos, posters etc about the world of metal. Have the class read 'The Tin Soldier'. 'The Iron Man' or the 'The Wizard of Oz', or look for articles in school journals, newspapers, magazines? Why not compile and illustrate your own story books which must involve metal and some aspect of recycling?

4. Scrap Metal Drive

Many small bits of lead, brass, copper, zinc, aluminium, etc make for a big cash producing pile! Why not get your class (perhaps with the help of the school PTA?) to organise a scrap metal drive? They will need to prepare posters, newsletters, phone lists, displays in other classrooms and the school foyer, talks from a metal recycler, collection details... 'This is bring a bit of lead week' Who knows? you may work up to old stoves, refrigerators, file cabinets and more!

5. Tin Ti's Tower

Test dexterity, balance, planning, teamwork and other skills by challenging each group within the class to use empty aluminium or steel cans to build a tower. Try suggesting a base of four cans, then six or eight. Try a 'cans only' tower and then see how much higher the tower can be with a set length of sellotape or string.