RECYCLING

UNIT 3 and UNIT 4
(This book may be used for 2 years)

How do we do it?

NAME_____

*This book can be used for 2 years.

RECYCLING

INTERMEDIATE - UNIT 3

EXHIBIT REQUIREMENTS: Research paper and poster on one of the topics listed in the project manual.

REQUIREMENTS:

Note: Posters must be on 22 inch by 28 inch posterboard. Be sure to title your poster and include your UNIT number. Use 1/4" plywood or heavy cardboard on the back of the poster to add stiffness for exhibit. All posters are to be displayed horizontally. Poster exhibits must be covered with clear plastic or other transparent covering. Include an exhibit tag and attach to the lower right hand corner.

Note: Research papers must be neatly hand written, or if you know how to type, it may be typed. You may also have someone else type your paper. If your research paper is typed, you must add the words "TYPED BY:" with the name of the person who typed the paper onto the bibliography page. You must add a cover page showing your name, address, county, club, project, and level (Beginner, Intermediate or Advanced) and unit number. Be sure your bibliography lists all your references. Research papers should be placed inside 3-pronged folder. Put your name on each page of your paper and on the outside of the folder along with your level and unit number.

1. Select one of the following to do a research paper AND a poster on. You may want to visit your library to research materials there. Your research paper must be at least 2 pages long not counting your bibliography page or the cover page. Be sure to answer the questions below about your research item. Your poster should include samples of your research item. Remember, you must exhibit a research paper AND a poster.

   A. What is plastic and how is it made? Is it recyclable? Is it a natural or synthetic resource?
   B. What is glass and how is it made? Is it recyclable? Is it a natural or synthetic resource?
   C. What is aluminum and how is it made? Is it recyclable? Is it a natural or synthetic resource?
   D. What is paper and how is it made? Is it recyclable? Is it a natural or synthetic resource?
   E. What is steel and how is it made? Is it recyclable? Is it a natural or synthetic resource?

2. Complete record sheet and turn in at Fair.
3. Spread the word! Encourage others to reuse and recycle!

Requirements for INTERMEDIATE - UNIT 4 are on next page.

*This book can be used
for 2 years.

RECYCLING

INTERMEDIATE - UNIT 4

EXHIBIT REQUIREMENTS: Poster plus plan of Home Recycling Center.

REQUIREMENTS:

Note: Posters must be on 22 inch by 28 inch posterboard. Be sure to title your poster and include your UNIT number. Use 1/4" plywood or heavy cardboard on the back of the poster to add stiffness for exhibit. All posters are to be displayed horizontally. Poster exhibits must be covered with clear plastic or other transparent covering. Include an exhibit tag and attach to the lower right hand corner on top of covering.

1. Complete the worksheet title Plan your own Home Recycling Center. Successful recycling requires a workable set-up for sorting recyclables in the home. You must submit this with your poster for exhibit at the Fair. Place the worksheet in a 3-pronged folder. Put your name on each page of your worksheet and on the outside of the folder along with your level and unit number.
2. Set up and use a Home Recycling Center at your home with your parents permission and cooperation. Do a poster for your Fair exhibit showing how you set up the recycling center and how well it worked. You can draw and/or take pictures to use on your poster. Also show where/how you disposed of the collected wastes.
3. Complete record sheet and turn in at Fair.
4. Spread the word! Encourage others to reuse and recycle!

Some Tips:

The kitchen originates most waste, so it can be a good place; or under the sink, in a closet or pantry, any 3' X 3 ' area, in the garage, or by the back door. A simple system calls for lining up grocery bags, cardboard boxes, waste baskets, etc., for filling. Sort and prepare items first. Remember smashed cans and plastic bottles take up less space. Some things are heavy! One full grocery bag of glass equals 16 pounds and a 55 gallon drum equals 175 pounds. Newspapers - a 12 inch stack equals 35 pounds and a loosely packed grocery stack equals about 18 pounds.

Packaging: The Bulk of What We Recycle

At the turn of the century, relatively few products were packaged in disposable containers. Families kept their milk in heavy glass jars they used over and over. Flour, oats, sugar and rice would be kept in tins, to be refilled by the local merchant when supplies ran low. Home refrigeration relied on regular visits from the iceman; freezing food was out of the question.

Today, virtually everything we buy is packaged. The only open air products found in a supermarket are fresh produce. Certainly, some of this packaging is unnecessary, such as the cardboard containers for roll-on deodorants, and individually wrapped produce and grains.

Relatively few Americans are buying food items in bulk, even though many supermarkets offer them. Buying in bulk offers three major advantages:

- It provides an opportunity to save money.
- Consumers only need to buy the quantities they desire.
- It completely avoids unnecessary packaging; consumers can reuse the containers from their previous purchases.

AVERAGE PRICES PAID FOR RECYCLABLES IN INDIANAPOLIS -- 1989

The main reasons for initiating a recycling program are to avoid disposal costs and extend landfill life. Recycling should not be viewed as something that will generate revenues.

The prices that processors pay can vary with the quality and quantity of materials delivered. They also fluctuate significantly with market conditions. For example, if more old newspapers are available than current processors can recycle, prices can drop.

As new markets for recycled products emerge, the prices paid for certain materials are likely to rise.

Materials commonly recycled in the Indianapolis area and their average 1989 prices are below:

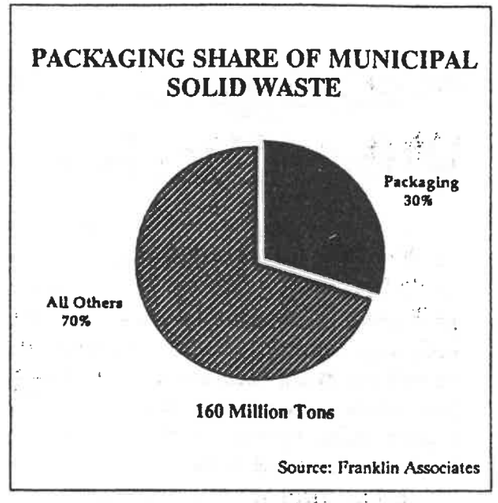
	Cents per pound	*Cents per unit*
Aluminum	30-60	1-2.3
Bi-metal cans	0.3-0.5	0.2-0.3
Glass	1-2	0.5-1
Plastic (2-liter PET bottle)	2-3	0.3-0.5
Steel "tin" cans	0.0-0.5	0.0-0.08

Fortunately, many of the containers we buy are recyclable. They include:

- **Aluminum**--beverage and food containers, "heat-and-eat" trays
- **Glass**--beverages, sauces, condiments
- **Paper**--cereal boxes, egg cartons, milk cartons, laundry detergents
- **Plastics**--beverages, sauces, laundry products, dairy products, microwavable trays
- **Steel**--beverage containers, canned goods

Some of these materials obviously are more readily recyclable than others. A material's true recyclability depends on the viability of collection practices and an available market.

The following pages present an overview of these common packaging materials and their recyclability.



Aluminum: An Overview

Aluminum beverage containers are one of recycling's greatest success stories. The U.S. aluminum industry recycled nearly 61 percent of the cans it produced in 1989.

In the past 10 years, more than 10 billion pounds of aluminum cans were collected for recycling. In 1989 alone Americans recycled 48 billion cans, earning over $900 million in the process.

Local entrepreneurs, American can producers and aluminum suppliers like Alcoa and Reynolds Metals are helping establish community buy-back centers that increase recycling awareness. There are now more than 10,000 consumer recycling centers across the United States, employing about 40,000 workers.

These have helped thousands of individuals and charitable institutions raise funds for needed projects. Alcoa estimates

it paid out more than $1 billion for used aluminum cans since its recycling program began in 1970.

Clearly, much scrap aluminum comes from sources other than food and beverage containers and TV Dinner trays. Aluminum components are part of every modern automobile and truck, and once vehicles no longer have useful value, scrap dealers recover as much of this material as possible. Old appliances, siding and gutters are also commonly recycled.

Cutting our reliance on imported bauxite ore has also strengthened the domestic aluminum supply. According to a recent issue of *Resource Recycling*, recycled material currently accounts for about one-third of our annual aluminum supply.

By encouraging reclamation of recycled aluminum during the past two decades, producers saved 95 percent of the energy required to make the metal from bauxite ore. American consumers who recycled scrap aluminum saved about 60 billion kilowatt hours of electricity--enough to power the District of Columbia for 6.5 years.

However, industry officials think more can be done. At present 10 million Americans are regular recyclers. Even though millions more recycle part-time, this number accounts for just a small fraction of the total population. Industry leaders are hoping to reach a recycling goal of 75 percent in five years, and 80 percent by the year 2000.

Aluminum cans are the most commonly manufactured items on earth, yet their design and construction is surprisingly complex. Each can consists of two different aluminum alloys. Bodies use a highly formable 3004 alloy; ends use a stronger 5182 alloy.

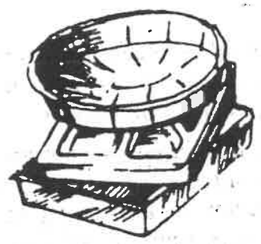
Despite their complexity, the cans are easily recyclable. Cans are flattened and baled at the collection center for shipment to smelters for processing. The smelters shred or grind the aluminum into small chips, which are then melted and poured into ingots. The ingots are sent to manufacturing plants, where they are rolled into sheets to be made back into cans.

The estimated time it takes to recycle a can and return it to the grocer's shelves is only 120 days.

Aluminum food packages

At present relatively little aluminum foil is recycled. About 60 percent of the foil used in rigid or semi-rigid containers can be recycled without difficulty.

However, the remaining 40 percent is used in multi-layered flexible packaging. Usually combining aluminum with paper or plastics, this material is difficult to separate and has limited--if any--recycling potential.



Preparing Aluminum for Recycling

Aluminum is 100 percent recyclable, but different products have different alloy compositions. Some recycling centers allow aluminum cans to be mixed with foil, pie plates and scrap aluminum, such as siding, gutters, storm doors, window frames and lawn-chair tubing. Others want cans separated from all other aluminum, including food containers.

Beverage cans

To prepare aluminum cans for a drop-off or buy-back center, separate the aluminum cans from the steel (bi-metal) ones. This separation can be done by holding a magnet to the side; if it doesn't stick, it's aluminum.

Some drop-off centers and curbside programs allow both types to be intermingled for magnetic separation.

Once the aluminum cans are separated from the bi-metal, flatten them and place them in a box or garbage bag for convenient storage. About 27 cans make up one pound. A large garbage bag with unflattened cans weighs about seven pounds; the same bag with flattened cans weighs about 18 pounds.

Some pet-food, tuna and specialty meat containers are made from the same aluminum alloys as beverage cans. These cans often have the phrase "100% aluminum" on the side. These cans can be rinsed, flattened and mixed with the beverage cans.

Foil, TV Dinner trays and pie plates

Used foil, non-microwave "heat-and-eat" trays and pie plates can also be recycled. Rinse off any food residues and flatten for storage. This material can be stored in garbage bags for convenience.

The multi-layered foil used in some flexible food packaging, such as foil-backed paper, cannot be easily separated into its components. Do not include this material.

Scrap aluminum

Most communities have a scrap metal dealer that welcomes old aluminum lawn-furniture frames, swing sets, gutters, downspouts, storm doors, window frames, automotive parts and other items.

Some curbside services will pick up scrap aluminum; others encourage selling such material directly to the scrap dealer. Check the Yellow Pages of your phone directory for the nearest dealer; ask how they want the aluminum prepared, if they have a pickup service, or if scrap must be delivered.

Steel: An Overview

As a consumer recyclable, steel has not gained the same national attention as paper, aluminum or glass. However, it remains one of the most commonly recycled materials. According to the Steel Can Recycling Institute, the overall recycling rate of all steel products is 66 percent--the highest rate of any material.

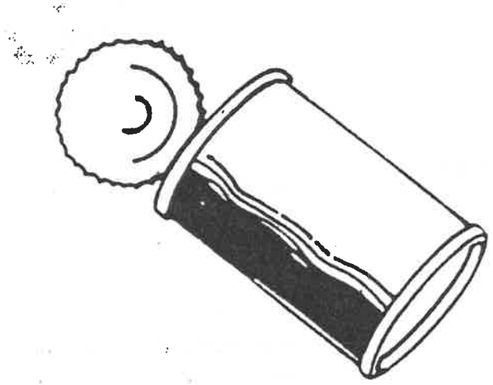
The steel industry currently recycles more than 100 billion pounds of scrap every year, most coming from old cars, farm equipment and major appliances. An additional 2 billion pounds of scrap are exported to foreign steel manufacturers.

Steel is usually prepared for recycling through magnetic separation. Many independent separation facilities, drop-off centers, resource recovery operations, waste-to-energy plants, incinerators and landfills are equipped with magnetic separators. Once this material is prepared, it is crushed and baled for delivery to the detinner or mill.

The vast majority of today's steel products are made from recycled materials; the average recycled content of a product averages 25 percent.

However, the national recycling rate for steel food and beverage containers is only 15 percent. The remaining 85 percent contribute 5 percent of America's total waste stream.

Recycled steel also has considerable environmental benefits as well. Every ton of steel recycled saves 2,500 pounds of iron ore, 1,000 pounds of coal and 40 pounds of limestone. For every pound of steel recycled, 5,450 BTU of energy are conserved--enough to light a 60-watt bulb for more than 26 hours.



Two primary markets exist for used steel food and beverage cans: detinning companies and steel mills.

Bi-metal beverage cans

As a result of more efficient production technologies, the steel industry generates less scrap than in prior years. Recent demand for scrap steel has increased by more than 50 percent. Demand is especially strong for high quality steel, which is used to manufacture bi-metal cans. These cans are an excellent source because they contain small and predictable amounts of trace metals.

This increased demand has created a greatly expanded market for used bi-metal cans. The cans are recyclable, and many Indiana recycling centers currently accept them for processing.

Bi-metal cans may be recycled by adding them directly to the scrap mix for the steel-making furnace. Aluminum is used during this process as a deoxidant and an alloying element. The oxidation of the aluminum end releases heat during the process, helping maintain a thermal balance that saves energy and raw materials. The can also may be shredded so that the aluminum and the steel can be magnetically separated to enable the steel to be detinned. The tin, steel and aluminum can then be recycled.

Preparing Steel for Recycling

"Tin cans"

Although commonly called "tin cans," these containers are virtually all steel. One ton consists of about 1,995 pounds of steel and only five pounds of tin!

The thin coating of tin on these cans is essential to successfully using steel in food processing. It helps solder the side seam, keeps the can from rusting and prevents changes in flavor that could result from food reacting to the steel.

Cans received for recycling are sent to detinning plants, where the tin and steel are chemically and electrically separated for reprocessing.

To facilitate this process, recyclers must take off the labels, remove the tops and bottoms of the cans, rinse and flatten them. Flatten cans with seamless bottoms, such as tuna fish, cat food and soup cans, as best as you are able. Flattening not only saves storage space, it provides better flow and drainage of detinning solutions.

Bi-metal beverage cans

Bi-metal beverage cans, which have steel bodies and aluminum tops and pull-tabs, are becoming more common in Indiana. As their acceptance grows, more recycling centers are collecting them for processing.

These cans should be separated from all-aluminum ones. Steel can be sorted from aluminum with a magnet. Many steel beverage containers in Indiana have a "bp" logo along the side, which stands for Bev-Pac, Inc., a major Midwestern producer of bi-metal cans.

If your drop-off center or curbside program has magnetic sorting facilities and accepts bi-metal cans, they may allow you to mix them with your aluminum ones.

THE CAN MAN

Hi! Let me introduce myself. I am an aluminum can. My name is Canbe Recycled, and I'm here to tell you what happens when I meet the Can Man.

If you want to change the way you look, what do you do? Do you change clothes? Do you change makeup?

When you want to buy new clothes, where do you go? To a store or the mall?

When we beverage cans want to change our appearance, we do it a little differently--and we depend of people like you to help us. Let me explain by telling you about the first time I met the Can Man.

It was a warm day, and I was resting in the grass after someone had finished drinking my soda pop and tossed me there. I was getting hot and afraid someone might kick me or throw me in a trash can never to be seen again.

Suddenly my thoughts were interrupted by the voice of a man saying, "What have we here? A throw-away can? You can't lie in my yard!"

Well, Pete Neat picked me up and took me to his garage where he had a big trash bag sitting in a box.

I was plenty scared, I tell you!

"Don't be afraid, little can," he said, "I'll take you to the Can Man and get you some new clothes. We'll just recycle you. Won't t nice?"

Then he put me into the bag with a lot f.

I didn't know what recycle meant, but I othes.

The next day, Mr. Neat took all of us to ng center where we met the Can Man. All of us were we ome money for taking us there.

Center on page

"Goodbye, cans," he said, "I hope you like your new clothes." Away he went.

After he left, we were placed on a big moving belt and we passed under a magnet. All of us aluminum cans moved right over the top, but a few steel cans that were there by mistake were attracted by the magnet and were dropped away from us.

At the end of the ride, we all went into a shredder where we were cut up into little pieces so we would take up less space. It felt a little funny, but it didn't hurt a bit.

Next we went into something called a smelter where we were melted into pure aluminum. Do you know that this process saves 95% of the energy needed to make new aluminum from bauxite ore? And the reused aluminum is just as good as new metal!

Once we were liquid metal, we got our new clothes, that is, we were formed into new products. I became a can again, but some of my friends became aluminum foil, and some became baking pans and TV dinner trays.

Tomorrow I will go to the beverage company to be filled and taken to the store for you to buy, but today I wanted to explain to you about the Can Man, and how you can help all of us aluminum products get new clothes. That's what recycling means--it means to save natural resources by giving them new clothes and using them again. When we throw away, we waste.

All aluminum is recyclable. It takes only 24 cans to make a pound; if several of you would work together, you could collect lots of cans and other things made of aluminum.

I guess that's all I wanted to tell you today--except that we cans, just like you, really love to get new clothes.

When you see us lying around empty, please recycle us so we can have new clothes to wear. Otherwise, we get buried in landfills or we become ugly litter in yards and streets.

We're counting on you to help clean up the environment, to save landfill space and to save natural resources all at the same time by recycling. So pick me up the next time you see me.

UNDERSTANDING RECYCLING

Directions: For questions 1-5, put the letter of the correct answer in the blank to the left of each question. There is one best answer for each question. Then write out answers to questions 6-9.

_____ 1. The Can Man represents: (a) a recyclable can; (b) the person who saves cans; (c) the person who recycles cans to make them new again; (d) the person who changes clothes.

_____ 2. Canbe Recycled is: (a) the narrator of the story; (b) an aluminum can; (c) a recycling machine; (d) "a" and "b".

_____ 3. As Canbe Recycled was placed with other cans, they moved up a belt to be separated from tinned cans and bimetal cans by a: (a) magnet; (b) shredder; (c) water; (d) "b" and "c".

_____ 4. When Canbe Recycled talks about getting new clothes, this is a metaphor for: (a) shredding cans; (b) the recycling process; (c) saving energy; (d) looking funny.

_____ 5. When you recycle cans, you: (a) save landfill space; (b) are littering; (c) save scarce resouces; (d) "a" and "c".

6. What is a "narrator" as mentioned in question 2 above?

7. The "metaphor" in this story could be stated as follows: Recycling is compared to:

8. List other metaphors you can think of for recycling.

   (a) Recycling can be compared to:

   (b) Recycling can be compared to:

SURE THING CAN IDENTIFICATION

ALUMINUM CAN

1. Is NOT attracted by magnet.
2. Almost all of these cans say "All Aluminum Can" on the side.
3. No seam.
4. If the bottom of the can is round and shiny, then it is aluminum.
5. Shiny, silver, smooth.
6. Lightweight.
7. Aluminums cans, if you look closely, are finely brushed on the bottom.
8. Printing is usually directly on the can as opposed to a paper label.

BIMETAL CAN

1. Is attracted by magnet.
2. Bottom has a rim.
3. If you look closely, the bottom is not finely brushed. It is also usually spray painted.
4. It may or may not have a seam.

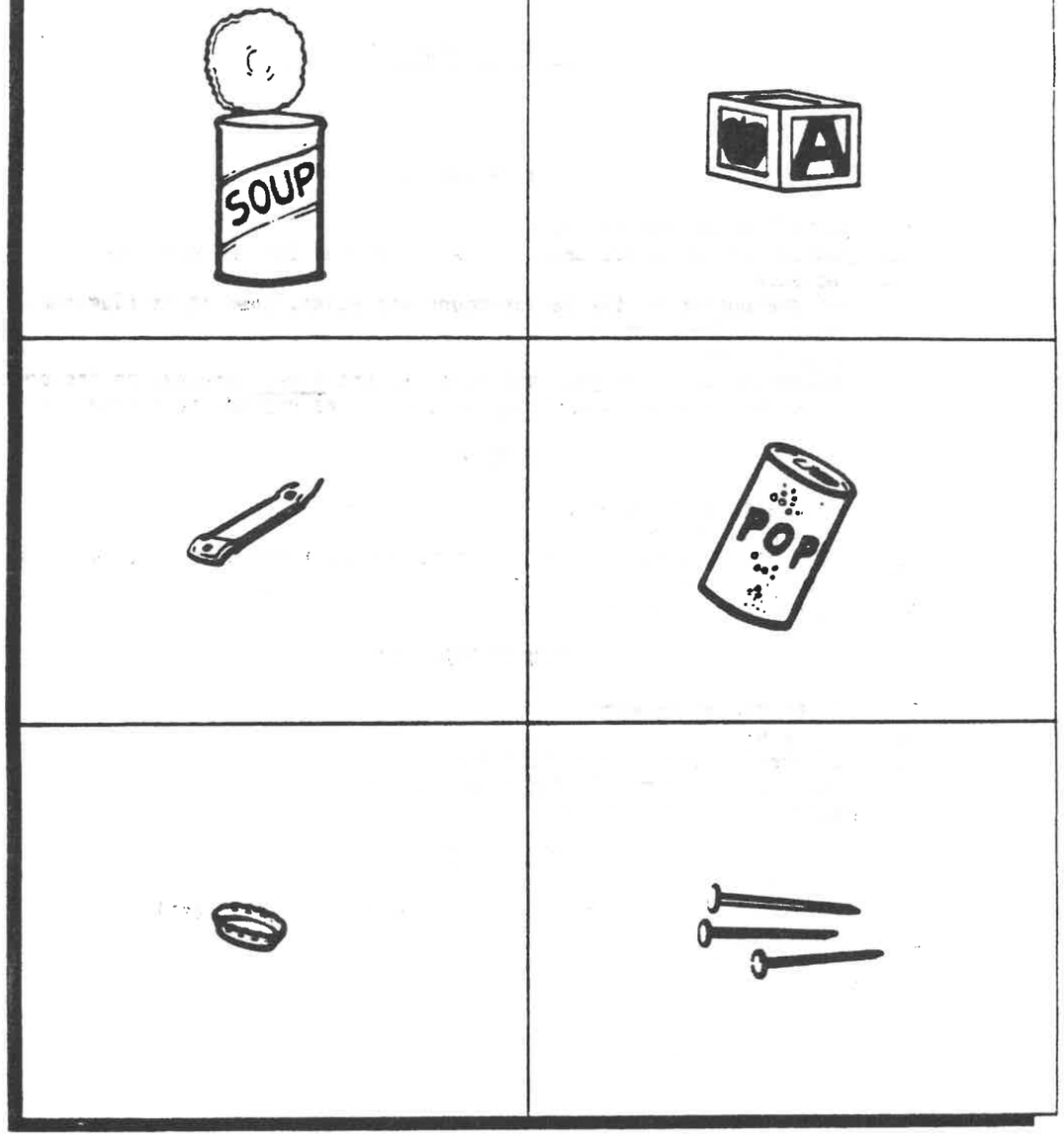
TINNED STEEL CAN

1. Is attracted by magnet.
2. Has a seam.
3. Is heavier weight than aluminum.
4. Usually has rings or ribbing on the can
5. Normally has a paper label.

EXTRUDED STEEL CANS

1. Is attracted by magnet. (This is the only reliable test)
2. Has no seam.
3. Is lightweight.
4. Has no bottom rim.

Directions: Circle the objects that a magnet will attract.



Glass: An Overview

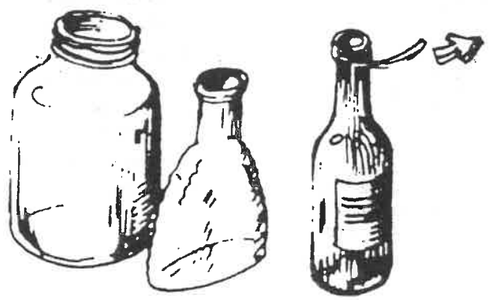
The glass containers used in contemporary food and beverage packaging are 100 percent recyclable. Each American uses about 85 pounds of glass containers each year, and most of them are discarded after use.

Midwestern plants currently use about 30 percent recycled glass to manufacture new bottles and jars. This could increase to 70-75 percent if more recycled material is available. By comparison, 100 percent of the glass in European bottles comes from recycled materials.

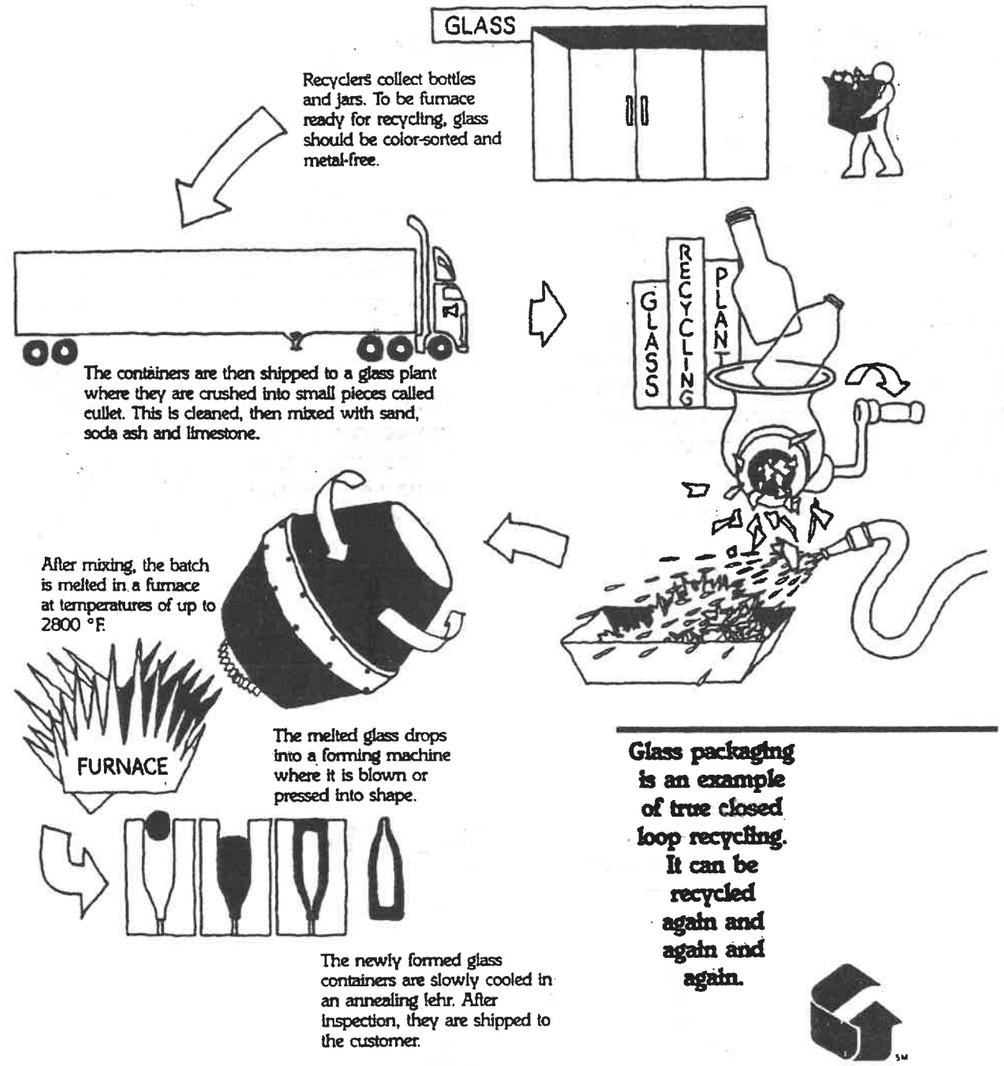
All kinds of glass containers--heavy or light, whole or broken--are acceptable for recycling. The only requirement is that they be cleaned of food residues, neck rings and foreign substances, and color separated into clears, browns and greens.

Glass can be used and reused an indefinite number of times without a loss in quality. Bottles are crushed into cullet, which melts at lower temperatures than the basic raw ingredients of glass: silica sand, soda ash and limestone.

This "batch mix" melts at 2,600 degrees Fahrenheit; the red-hot molten mass is then moved into a forming machine, where it is pressed into a new container. These containers are cooled, inspected, and shipped to the customer. The process is extremely efficient, producing virtually no waste or unwanted byproducts.



GLASS: 100% RECYCLABLE



Glass packaging is an example of true closed loop recycling. It can be recycled again and again and again.

Source: Central States Glass Recycling Program

Preparing Glass for Recycling

The type of glass most commonly recycled is that used for containers. This includes:

- Non-returnable beverage bottles
- Juice containers
- Ketchup bottles
- Wine and liquor bottles
- Food containers

Containers must be separated and stored by color:

- Clear (flint)
- Green
- Amber (brown)

Color sorting is necessary to maintain color consistency of new containers made from recycled glass. No equipment exists for color sorting at recycling or processing sites.

Glass should be delivered unbroken. However, broken containers are acceptable for recycling, providing the fragments are placed in the proper color category.

Any bottle, jar or container should be thoroughly rinsed before being placed in a bag or stored in a cardboard box. Food residues often attract ants and vermin.

Labels can remain on containers, but other contaminants should be removed. Not only will these contaminants affect the recycled glass, they can severely damage the refractory lining of glass furnaces.

- Remove any metal neck rings, lids or caps.
- Clean off any dirt and remove any stones.

Do not mix non-container glass or ceramics with container glass! Such products include:

- Plate glass, window glass and mirrors
- Pyrex or other heat-resistant glass
- Light bulbs
- Lead-based glass, such as crystal and TV tubes
- Ceramic cups, dishes and ovenware
- Automotive glass
- Milk-white glass
- Household drinking glasses

The chemical compositions of these items are different from that used in bottles and jars. Although technically recyclable, these materials contaminate the cullet, or broken glass, needed to produce new containers.

Commercial container-glass users

Commercial container-glass users, such as restaurants and taverns, may want to invest in a "bar crusher." These can save considerable space by automatically crushing and storing the glass. Keep in mind that filled containers of crushed glass are quite heavy; a 55-gallon drum filled with *whole* bottles can weigh up to 175 pounds. Make sure the container can be lifted by a hand truck and is able to pass through outside doorways.

Glass

The glass jars and bottles that food comes in were once plain old sand. At a glass factory, the sand is heated in large vats until it melts. Then the melted sand is mixed with baking soda and chalk. This makes glass.

While the glass is hot, it can be made into different shapes. It can be rolled flat for windowpanes or poured into molds to make cups, vases, bowls, and other useful things.

Old glass jars and bottles can be melted again to make new glass.

Write yes in front of the sentences that are correct.
Write no in front of the sentences that are not correct.

1. _____ Glass is made from sand.
2. _____ The sun melts the sand at the beach.
3. _____ Glass is rolled flat to make light bulbs.
4. _____ Glass is made into cups and bowls while it is hot.
5. _____ Old glass can be melted again to make new glass.

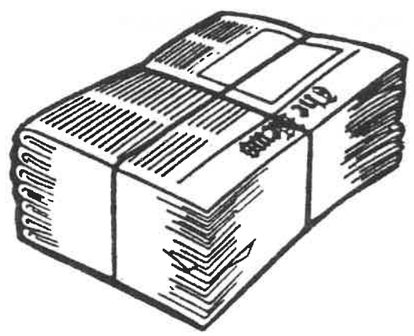
Paper: An Overview

About 85 percent of all the post-consumer waste recovered for recycling in America is paper and paperboard. But those figures are misleading, because Americans still need to recycle more paper products. The domestic demand for timber is expected to rise 50 percent by 2040, and the bulk of that increase is expected to be for paper production.

Four grades of waste paper are generally collected for recycling. One, newsprint, is primarily collected from residences and newspaper publishers. The other three, corrugated containers, office paper and mixed paper, are usually generated by business. Each of these general grades can be broken down into numerous, more distinct grades.

Newsprint

Old newspapers account for about 8 percent of America's total waste stream. An average household produces about 360 pounds of newsprint per year--almost one pound per day!



Recycling newsprint saves both energy and natural resources. One ton of newspapers takes up a space of about 60 cubic feet--a cube that is four feet on a side. Recycling that ton saves 17 Georgia white pines and between 70-100 gallons of gasoline.

About 4.5 million tons of newsprint are recycled every year, or one-third of America's consumption. Clearly, much more can be recycled.

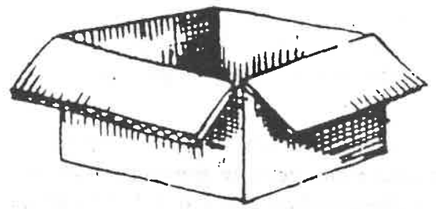
Old newspapers can be converted into new newsprint through deinking processes. Using chemicals and detergents, the ink is separated from newspaper fibers. A slusher turns the old paper into pulp, and the detergents dissolve the ink and carry it away. Next, screens remove contaminants like bits of tape and dirt. The remaining pulp is bleached and mixed with additional pulp from wood chips to strengthen it.

The watery mixture is poured onto a continuously moving belt-screen that allows excess moisture to drain through. By the time the mixture reaches the end of the belt, it's solid enough to be lifted off and fed through steam-heated rollers. This removes the water and flattens the paper into a continuous sheet. The paper machine produces finished newsprint at the rate of 3,000 feet per hour.

Other materials can also be made from old newspapers, including cellulose insulation, boxboard, cat litter, roofing felts, toweling, packing material, egg cartons, animal bedding and mulch.

Old corrugated containers

Old corrugated containers (OCC) include paperboard or cardboard, and are primarily generated by commercial and retail establishments. Many grocers, department stores, appliance outlets, wholesalers and manufacturers recycle OCC due to its high volume, ease of separation and substantial waste reduction benefits.



OCC accounts for more than half the paper recycled in North America. Approximately 12 million tons were recycled in 1988--about 50 percent of the total produced in the United States. However, the potential recovery rate is 75-80 percent.

Paperboard, often referred to as cardboard, is made from all waste paper grades, but primarily from OCC and old newspapers. Familiar paperboard products are corrugated boxes, tubes, cereal boxes, writing tablet backings and construction products.

Office papers

A third grade of paper encompasses the fine grades of paper used in offices including white ledger and computer paper. These papers have vast potential for reuse, including newsprint, toweling, writing paper and tissue.

The EPA estimates that 90 percent of all office waste by weight is waste paper. However, most of the high grade paper that

is recycled does not come from offices. It comes from cuttings and trimmings collected by converting/printing plants.

Mixed paper

Mixed paper is the lowest grade of waste paper, consisting of unsorted household and commercial paper, magazines and various packaging wastes. They can include paper of different color stocks.

Magazines are not always accepted by some recycling centers. They contain contaminants such as glues that must be trimmed and discarded before processing. Relatively few recycling centers have the capabilities to effectively trim magazines.

Some types of paper cannot be bundled with mixed paper. These include such non-recyclables as carbon paper, stickers and other glued paper, such as Post-It notes. Brown paper bags and kraft paper should be bundled with OCC.

Waxed containers such as produce boxes and milk cartons cannot be recycled, and should not be included with other mixed paper.

Preparing Paper for Recycling

Newsprint

Old newspapers are easy to package for recycling. Separate any glossy, shiny paper, such as ad inserts and magazine sections.

Keep the newspapers clean and dry, bundled in stacks between 8" and 12" thick. Tie them *securely* with twine or place them in brown-paper grocery bags. A tied 12" bundle weighs about 25 pounds; a loosely packed grocery bag weighs about 18 pounds. Do not set newspapers outside if rain is expected!

Paperboard

Old corrugated cardboard, chipboard, writing tablet backs and cereal boxes of any color can be bundled together for recycling. Brown-paper grocery bags and kraft paper can be mixed with this material.

Break down and flatten all boxes, then tie into secure bundles for pickup or delivery.

Do not include any corrugated materials that have a wax coating. These materials cannot be recycled.

Office paper

The value of office paper depends on its freedom from contaminants. When bundled together, the following paper grades bring premium prices:

- White typing paper
- White writing paper
- White photocopy (xerographic) paper

The following grades of office paper are also recyclable:

- Computer printout paper
- White index cards (ruled cards are acceptable)
- Tabulating cards

All six types *can* be mixed together, but generally, the better the separation, the better the price.

The following items are considered contaminants in this category, and should *not* be mixed with other office paper:

- Envelopes (standard and plastic-window)
- Carbon paper and other sensitized paper
- Blueprint paper
- Film, photographs, cellophane tape or glue
- Metal stickers, spiral binders and fasteners (staples are acceptable)
- Newspapers, cardboard, magazines and books
- Any colored paper stock
- File folders
- Lunch bags, wax paper, smoking materials and paper cups

Office desks should reserve a file tray for space in a napkin-type holder for recyclable high-grade paper. Custodial personnel should identify and collect this material and transfer it to a centrally located, covered and protected container, either outdoors or in the loading dock area.

Plastics: An Overview

Plastics are coming under careful scrutiny by environmentally conscious individuals. Scientists are developing new compounds that break plastics apart when subjected to light and microorganisms. But controversy remains as to what these products will degrade into, as well as the practice of producing anything designed to be discarded.

Only two percent of all plastics made are now recycled. Because of multi-layered packaging and the infinite number of plastic compounds, separating this material seems an impossible task. However, most commonly used plastics, such as beverage bottles and milk jugs, are each made from a single type of plastic which can be easily sorted for recycling. Recently the industry adopted a seven-category recycling code to help make the sorting process more efficient.

New technologies hold considerable promise for the future of plastics recycling. Imaginative, cost-effective uses for recycled plastics, especially polystyrenes, are opening new markets for once-discarded materials.

One of today's most commonly used plastic containers is the two-liter beverage bottle. Because few recycling centers in Indiana currently accept them, countless millions are needlessly landfilled within the state. Their value as a recyclable is apparent to the plastics industry; more than 100 million pounds of these bottles are recycled annually.

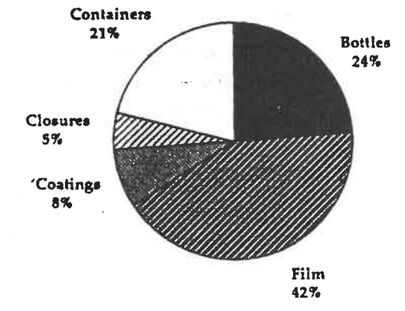
The bottle itself is made of polyethylene teraphthalate (PET), with a bottom base cap of high-density polyethylene (HDPE). At present, PET can be recycled into:

- Fibers--carpets, twine, rope, apparel, filters
- Textiles--belts, webbing, sails, tire cord
- Strapping
- Scouring pads
- Fence posts

PET also can be reprocessed into polyol for automobile bumpers and freezer insulation, and unsaturated polyester used in bathtubs, sinks, boat hulls, and awnings.

One popular product from recycled PET is fiberfill for cushions, pillows and insulated outerwear. Five two-liter bottles produce enough fiberfill to line an adult's ski jacket; 36 bottles can fill a sleeping bag.

USES OF PLASTICS IN PACKAGING 1987



7 Million Tons

Source: Modern Plastics

The total market for fiberfill is about 250 million pounds per year, and manufacturers are eager for recycled material. Traditionally, recycled fiberfill costs half as much as material from virgin polyester.

HDPE, which is also used for milk jugs, can be recycled into new bottom base caps or products like:

- Waterproof "plastic lumber"
- Flowerpots
- Drainage pipe
- Trash cans
- Traffic barrier cones
- Signs

Some markets exist for recycling low-density polyethylene (LDPE), the thin plastic film used for sandwich, produce and garment bags.

Polyvinyl chloride, commonly known as vinyl, is another easily recyclable plastic. Uses for recycled vinyl includes:

- Drainage, sewer and irrigation pipe
- Pipe fittings
- Handrails
- Downspouts

Polystyrene foam offers considerable recycling potential. Such items as cups, plates and fast-food carry-out containers

PLASTIC RECYCLING CODES

CODE	MATERIAL
1 PETE	Poly-Ethylene Terephthalate (PET)
2 HDPE	High Density Polyethylene
3 V	Vinyl / Polyvinyl Chloride (PVC)
4 LDPE	Low Density Polyethylene
5 PP	Polypropylene
6 PS	Polystyrene
7 OTHER	All Other Resins and Layered Multi-Material

Preparing Plastics for Recycling

Plastics can be tricky to recycle because there are so many kinds available. Similarly, many containers may include different types of plastics, such as two-liter beverage bottles and multi-layered plastic packaging.

However, interest in recycled plastics is growing; the industry recently adopted a standardized recycling code to help identify these materials.

Despite demand for recycled plastics in many parts of the country, the market in Indiana is relatively soft. Some recycling centers only accept polyethylene terephthalate (PET) beverage bottles and their high-density polyethylene (HDPE) base caps. Others will accept HDPE milk jugs.

To prepare plastics for recycling, remove call metal caps and neck rings. If possible, remove the labels. Rinse and drain milk jugs several times to eliminate any residues that can sour.

It is not necessary to separate the base caps from PET beverage bottles.

Beverage bottles and milk jugs can be kept in separate plastic bags for curbside collection.

are beginning to be recycled in many regions in the United States.

Polystyrene foam items are being collected in special receptacles at schools, fast-food restaurants and other institutions. This material is cleaned and converted into pellets that can be used to manufacture plastic lumber, building insulation and packing materials.

Plastics are recycled in different ways

Plastics are shredded or baled by the local collection center before being shipped to a reclamation center.

A two-liter bottle can be reclaimed through dry or wet processes.

The dry system separates the HDPE base cups and any neck rings from the bottle. The base cups are ground and placed in one bin; neck rings in others. PET bottles are then separated by color, fed to individual grinders, then moved to air separators to remove the labels. The ground PET is then washed. The clean flakes are then sold or processed into pellets.

Wet reclamation systems feed the entire bottle into grinders. This material is washed and separated automatically into aluminum, HDPE and PET.

RECYCLING DEFINITIONS

Adverse Impact	Unfavorable effect
Baling	Compressing material into a large, tightly packed bundle. Newspapers are the most commonly baled material.
Biodegradable	Capable of being broken down especially into harmless products by the action of living beings (as microorganisms)
Buy-back	Programs where material is purchased from the public.
Composting	An oxygen-dependent degradation process by which plant and other organic wastes decompose or rot under controlled conditions to produce a product with fertilizing and soil condition value.
Consumer	One who purchases goods and/or services; a customer.
Contaminant	A substance which causes other substances to be unfit for use by the introduction of unwholesome or undesired elements. For example, metal is a contaminant in newsprint.
Cullet	Broken or refuse glass, usually added to new material to facilitate melting when making glass.
Decompose	The breakdown of matter by bacteria and fungi. To break down into component parts or basic elements or to rot. Decomposition is needed for the continuation of life since it makes essential nutrients available for use by plants and animals.
Drop-Off Center	Centers where material can be brought in for recycling.
Energy	Usable power such as heat or electricity and the resources for producing such power.
Environment	The physical, chemical surrounding that create and effect on the quality of life.
EPA	The U.S. Environmental Protections Agency, the primary federal agency concerned with natural resources.
Ferrous metal	Metal containing iron. Ferrous metal will stick to a magnet.
Garbage	Food waste.

General Fund	Local tax revenues, generally obtained through property taxes.
Generate Trash	Solid waste that is disposed of by an individual or a company.
Groundwater	The supply of fresh water found beneath the Earth's surface often used for supplying wells and springs. It is the major source of drinking water. It is susceptible to contamination from agricultural or industrial substances draining through leachate into the groundwater supply.
Hazardous	Harmful to health and/or dangerous.
IDEM	The Indiana Department of Environmental Management.
Incineration	Destruction of certain types of solid or liquid waste by controlled burning at high temperatures.
Landfill	Disposal sites for non-hazardous solid waste which is spread in layers, compacted to the smallest practical volume and covered with material at the end of each operating day.
Leachate	A liquid that results from water collecting contaminants as it trickles through wastes, agricultural pesticides or fertilizers.
Methane	A colorless, nonpoisonous, flammable gas created by rotting of certain organic compounds when oxygen is not present.
Natural	What occurs in nature, such as trees, water, air, soil.
Non-ferrous metal	Metal without iron, such as aluminum.
Nonrenewable Resource	A natural resource that because of its scarcity and the great length of time it takes to form or its rapid depletion, is considered limited in amount. For example: coal, copper and petroleum.
Packaging	The sealed wrapping of a product, covering wrapper or container. 1. Essential Packaging - The product wrapping and sealing necessary for consumer protection. 2. Older Packaging - Minimum packaging or buying in bulk. 3. Modern Packaging - The excessive use of plastic and/or shrink wrap to improve the appearance in order to promote the sale to the consumer.

4. Natural Packaging - That which occurs in nature. For example: bananas, apples, eggs.

Palletize	To place on a portable platform for handling, storing or moving materials and packages.
Pollution	The impure condition caused by contamination. A man-made or man-induced alteration of the physical, biological state.
Prohibited Materials	Materials that absolutely cannot be contained in a load of recycled material. As an example, ceramics are a prohibited material for glass collection. A processor could reject a load if it contains any prohibited material.
Recycling	A closed-loop system which includes the separation, collection, processing, remanufacture and the eventual resale or reuse of materials which would otherwise be disposed of as municipal waste. The reuse of materials that we have thrown away.
Resource Recovery	The generation of energy from solid waste through combustion with the extraction of some recyclable materials as a by-product.
Roll-Off	A bulk container for holding waste materials. Small roll-offs are picked up and emptied into a waste disposal truck; large ones are mechanically pulled onto a roll-off bin truck, trailer or transfer trailer.
Salability	How the manufacturer or store wraps or displays a product so that it will appeal to the customer.
Separation	Sorting material by its physical properties including color, luster, size, shape, brittleness, texture, structure or surface characteristics.
Shredding	To break up into long narrow strips. Cans and paper are usually shredded.
Solid Waste	Residential, commercial and industrial wastes. It does not include hazardous wastes which are covered under the Resource Conservation and Recovery Act (RCRA) and certain Indiana statutes.
Source Separation	Sorting specific discarded materials at the point of generation into separate containers for collection.
Synthetic	Manmade from other sources. For example, petroleum is taken from the ground in its natural crude oil state. By using manufacturing processes, synthetics such as gasoline or plastics are made.

Toxic Materials	A chemical or mixture that may present an unreasonable risk to health or to the environment.
Wasteful	Excessive, unnecessary. To use foolishly or needlessly.
Zoning	The legal designation of the purposes that can be conducted in an area. Recycling centers are usually in areas zoned for industry, business or commerce.

SOME MATERIALS RECYCLE BETTER THAN OTHERS

MARCH 1993

RECYCLING FOR FLOYD COUNTY

Sam Peden Community Park - Grant Line Park - 9:00 AM - 5:00 PM on Saturday and noon to 5:00 PM on Sunday. The center, sponsored by the Trash Force, a volunteer group organized by the Floyd County Community Education Council, accepts aluminum, cardboard, newspapers, clean glass containers and plastic-milk jugs and 2-liter containers. Volunteers are needed to help staff the center. To volunteer, call 944-9661 or 948-9248

Sertoma Park, on Mill Lane off Old Ford Road, accepts recycling items at different times through the year. Times and dates are published in the Indiana Weekly. They accept newspapers, aluminum cans, plastic milk jugs and 2-liter bottles.

Riverside Recycling - 1001 Floyd - New Albany, In. - Hours 7:00 AM - 6:00 PM Monday - Friday, 7:00 AM - 3:00 PM Sat. and 9:00 AM - 12 Noon on Sunday. They buy aluminum cans, newspapers, corrugated boxes, glass containers, assorted metals, 2-liter plastic contaiers and plastic milk jugs.

McDonalds - Charlestown Road - Drop off container behind restaurant for corrugated cardboard.

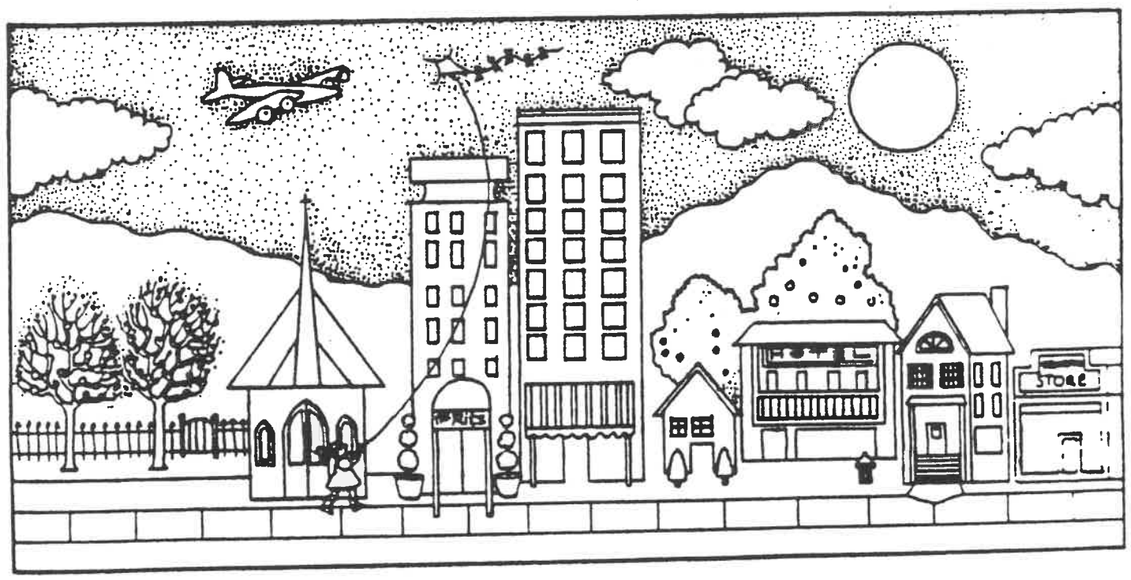
Kroger Stores - Accept plastic bags and brown paper bags.

Winn Dixie - Grant Line Road - Accept aluminum cans, plastic and brown paper bags.

K-Mart - Accept car batteries if purchasing a new battery.

Georgetown, Indiana - Drop off basket for aluminum drink cans.

Other Recycling Centers in the Kentuckiana Area are listed in the yellow pages of your phone book.



RECYCLING UNIT 3
RECORD SHEET

Name_____

Address_____

Year in Club Work_____ Present Age_____

Name of 4-H Club_____

Leader's Signature_____

Date_____

1. What did you learn from this project?_____

_____

_____

2. Did your family get involved with you on this project?_____

3. What did you enjoy most about this project?_____

_____

_____

4. What did you dislike about this project?_____

_____

5. Demonstration or Illustrated Talk:_____

_____

_____

_____

_____

6. List the names of people you have shared your recycling knowledge with:

_____ _____

_____ _____

_____ _____

_____ _____

Signature of 4-H'er_____

Date_____

RECYCLING UNIT 4
RECORD SHEET

Name_____

Address_____

Year in Club Work_____ Present Age_____

Name of 4-H Club_____

Leader's Signature_____

Date_____

1. What did you learn from this project?_____

_____

_____

2. Did your family get involved with you on this project?_____

3. What did you enjoy most about this project?_____

_____

_____

4. What did you dislike about this project?_____

_____

5. Demonstration or Illustrated Talk:_____

_____

_____

_____

_____

6. List the names of people you have shared your recycling knowledge with:

_____ _____

_____ _____

_____ _____

_____ _____

Signature of 4-H'er_____

Date_____

Plan your own Home Recycling Center

Use the 1/2"=1 foot grid and symbols to plan a recycling center in your home.

Activity:

Items needed - pencil, glue, scissors, measuring stick and tape.

To get a recycling program going at home, you need to ask yourself several questions. What kinds of things are recyclable in your community? Who takes newspapers? aluminum cans? bimetal cans? Plastic containers? glass containers? "tin" cans?

STEP 1 - Make a list of the things you are going to recycle and write them here.

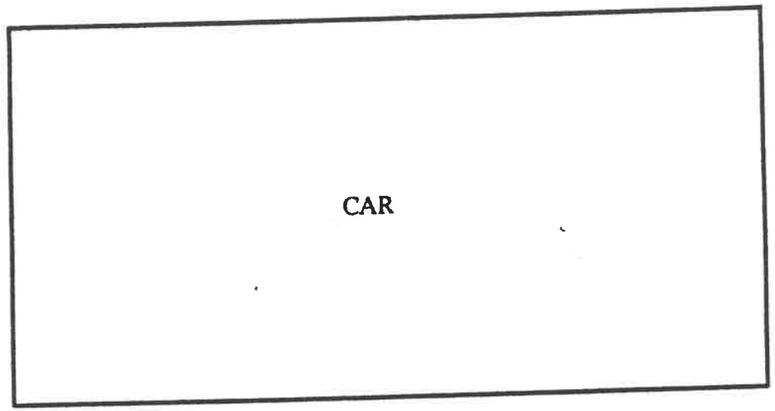
STEP 2 - Think of a room at home where you could get permission to set up a recycling center (garage, basement, mudroom, utility room, etc.). Remember, it should be close to the place where cans, bottles and newspapers are used in the first place.

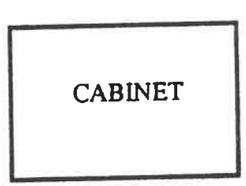
Use the grid on the following page to make a floor plan for the "recycling room". you may need help from an adult to measure the room. Your "recycling room" may be smaller or larger than a 12 foot by 12 foot room. Each 1/2 inch on the paper is equal to one foot on the real floor. The family car or washing machine may be located in your "recycling room". You can cut out the "Drafting Objects" and arrange them on the floor plan until everything fits. Remember to include a container for each of the things you listed in Step 1. Then you can tape or paste the objects onto the graph. (You could make an even nicer model of the room by pasting the grid to the bottom of a shoebox and using blocks and toys to show the room where your "recycling center" will be set up.)

STEP 3 - Show your plans at home. Do your parents or brothers and sisters have any ideas to improve your plans? Can you make your plans work for real? What changes in your original plans did you have to make to get your "recycling center" started?

DRAFTING OBJECTS (Scale: 1/2 inch = 1 Foot)

Here are a few objects to cut out and use in your floor plan. Create other objects to fit the particular room that you are using. Remember to keep to scale. For example, if your family car measures 10 feet by 5 feet, it would measure 5 inches by 2 1/2 inches on this floor plan: 10 x 1/2 inch = 5 inches. 5 x 1/2 inch = 2 1/2 inches. After playing with the floor plan, paste the objects onto the graph. Now, put it into reality!





Recycling Containers:

Set up a recycling center in your garage, basement, mudroom, utility room, etc. Use the graph below and the drafting objects on the following page to make a floor plan. Arrange things in the room to make your recycling center easy to work in. The graph may be adjusted to fit the size of room you are using, or the scale may be changed. This graph is for a 12 foot by 12 foot room. Scale is 1/2 inch = 1 Foot.