

OUR ENVIRONMENT

Level - II
(13 to 15 years of age)



Reduce
Reuse
Recycle



Hendricks County

Our Environment

4-H Project Requirements

Level I - 10 to 12 years of age

Level II - 13 to 15 years of age

Level III - 16 to 19 years of age

Level I

- Complete at least two (2) activities each year in the manual
- Read all information sheets in the manual
- Prepare exhibit for 4-H Fair
- Gain knowledge in:
 - Environmental Awareness
 - Natural Resources
 - Basic Recycling Techniques

Level II

- Complete at least two (2) activities each year in the manual
- Read all information sheets and definition pages
- Prepare exhibit for 4-H Fair
- Gain knowledge in:
 - Composting
 - Home and school recycling and purchasing awareness

Level III

- Complete at least two (2) activities each year in the manual
- Prepare exhibit for 4-H Fair
- Gain knowledge in:
 - Community Environmental Awareness
 - Regulations
 - Hazardous Waste

EXHIBIT:

A person may enter an article in one (1) of the following categories:

- a. Clothing items (woven or knitted)
- b. Furniture items
- c. Bottles or cans
- d. Discarded mechanical parts and equipment
- e. Miscellaneous

Ideas for obtaining recycled articles: magazines, books, stores, friends, neighbors, etc.

Examples for each category:

- a. Clothing - hats and purses from blue jeans
- b. Furniture - Coke cases made into end tables, etc.
- c. Bottles or cans - canister set
- d. Discarded mechanical parts and equipment - Model race car from old bolts
- e. Miscellaneous - greeting cards as baskets, etc.

Exhibit will be judged by the following guidelines:

Originality of 4-H exhibit
Choice of materials
Workmanship
Usefulness
Creativity of project

OUR ENVIRONMENT

LEVEL II

13 to 15 years of age

Complete at least two (2) activities each year.

1. Composting - complete questionnaire page (Activity 1)
2. Actual composting from three (3) variations (Activity 2)
3. Tree planting and/or mulching
4. Home survey
5. Home recycling center
6. Paper recycling
7. Plastics
8. Aluminum (Activity 9 and questionnaire)

Read all informational sheets on the following topics:

Recycling definitions:

1. Biodegradable
2. Composting
3. Contaminant
4. Cullet
5. Decompose
6. Drop off centers

COMPOSTING

Yard trimmings and food wastes account for 25 percent of our current waste stream. These same materials can be diverted from landfills and composted into a nutrient rich soil supplement for yards, gardens and farms.

Many home owners currently practice composting, but apartment dwellers and businesses do not have these options available to them.

Yard Wastes

The ideal mixture for composting combines carbon rich materials, such as dry leaves and straw, with nitrogen rich materials, such as green grass clippings, and certain kitchen wastes and manure. Soil must be added to these materials to introduce the necessary microorganisms to the pile.

To facilitate decomposition, the compost pile should be exposed to the air and kept moist during dry weather. Materials should not be compacted; covering piles during heavy rains is recommended. Ideally, green material, dry material and soil should be alternated in layers.

Sides of the pile can be left unsupported or held back by cinder block or chicken wire walls with holes that allow air to pass through. These walls should be arranged to allow materials to be added and to turn the pile.

Chop or shred big items before adding them to the pile. The thicker or denser the piece, the longer it takes to decompose. Meat, bones and cheese should be avoided, as they take a long time to decompose and attract animals to the site. Horse and cow manure will add greater amounts of nitrogen to the compost. Because they harbor disease, dog and cat droppings should not be used in compost intended for use in food gardens.

If the compost generates odors or draws flies, it could be too wet or contain undesirable materials. If an ammonia odor is noticed, compensate for excess nitrogen by adding carbon rich materials such as dry leaves, straw or sawdust. An ammonia smell can also result from too much alkalinity, which can be reduced by adding acids such as coffee grounds or oak leaves.

Depending on the attention the pile receives, compost could be ready within weeks or months. It is ready for use when it has a dark look, crumbly texture and an earthy smell.



Carbon/Nitrogen Ratios of Common Home and Yard Debris

HIGH CARBON

<u>Material</u>	<u>C/N ratio</u>
Oak leaves	50:1
Maple leaves	60:1
Ash leaves	35:1
Fruit tree leaves	35:1
Pine needles	70:1
Corn stalks	60:1
Sawdust	500:1
Newspaper	170:1

HIGH NITROGEN

<u>Material</u>	<u>C/N ratio</u>
Grass	19-25:1
Egg shells	25:1
Fruit wastes	35:1
Humus	10:1
Vegetable Wastes	15:1

The main ingredients for fertilizer are nitrogen, phosphorus and potassium. Composting can provide all three of these key growth ingredients organically, plus most key trace elements.

HIGH POTASSIUM

<u>Material</u>	<u>% Potassium</u>
Granite dust	5
Greensand	5
Seaweed (meal or liquid)	5
Wood ashes	7

HIGH PHOSPHORUS

<u>Material</u>	<u>% Phosphorus</u>
Bone meal	21
Fish meal	4
Phosphate rock (ground)	30

CAUTION: Never compost or mulch with grass or leaves treated with herbicides or pesticides. Never use sawdust from treated wood because it could present a health hazard.

DEFINITIONS:

What is compost?

Compost is natural, organic fertilizer you can easily make with grass clippings, leaves and almost anything that grows in your yard or comes from your table. Compost is safer than synthetic fertilizers, creating and providing natural nutrients and soil conditioners for gardens, lawns and plants and its ingredients are free!

Why Compost? Why Recycle?

Composting eliminates the need for you to haul it away. Composting can eliminate up to 20% of the volume in landfills across America. Composting is one simple, yet important contribution to preserving our environment. It can save you money. Composting the grass and leaves from a typical 1/4 acre yard can provide up to \$100 of humus, fertilizers and soil conditioners. Compost conditioned plants and other vegetation resist disease and insects

better, making them naturally safer for children and pets. Compost provides and promotes a healthier garden, balances the ph in the soil, offers better drought protection, buffers against toxins in the soil, helps to control weeds, and adds valuable nutrients to the soil that synthetic fertilizers and conditioners can't.

Composting, Fact verses Myth

Compost is useful for all areas of the yard, not just in vegetable gardens. It is the perfect fertilizer and conditioner for your lawn, shrubbery and house plants. Proper composting does not smell! Using the right materials and occasional turning ensures proper compost without odors.

COMPOST USES:

Once the compost pile has broken down, the new compost material can be used in the following ways:

To Improve Garden Soil

Apply a 3 inch layer of compost, digging it to a depth of six inches with a spading fork or roto tiller. Sidedress around roots of transplants (vegetables, bushes, or trees). Compost also makes a great mulch over bulb gardens. Simply hoe it in lightly.

As a Potting Soil

Use a 1:3 ratio of compost to water and use it to enrich houseplants and seedlings. The results will be healthy, lively plants and flowers.

To Seed a New Lawn

When putting in a new lawn, blend compost into soil prior to seeding or sodding. As a general rule, apply 250 pounds per 1,000 square feet on sandy soil; 400-600 pounds on loamy soil; and 1,200 pounds on clay soil.

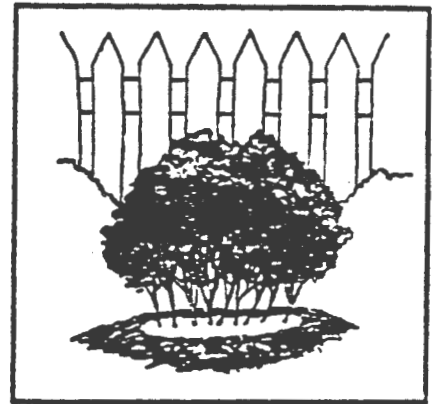
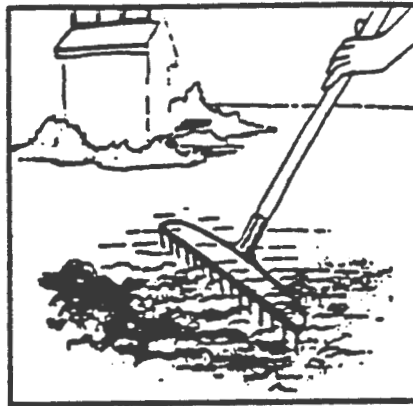
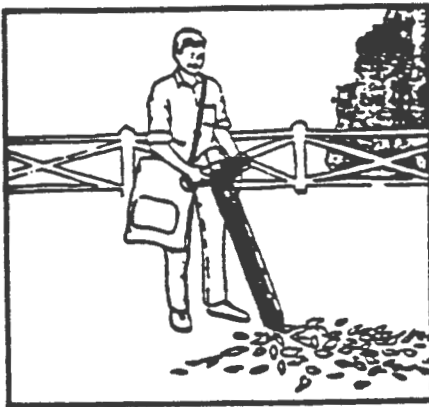
As a Winter Seed Starter

Mix compost with equal parts of sand and loam to start seeds indoors or in a cold frame.

The Six Most Common COMPOSTING MISTAKES:

1. Not covering the pile - sunlight kills bacteria. It's important to keep sunlight out of a compost pile. Use a lid to cover bins and thick, black plastic to cover compost piles and chicken wire bins. Black plastic absorbs heat and keeps sunlight out.
2. Improper ventilation of the bin - a compost bin needs adequate venting through its sides and bottom to allow air to penetrate the pile. Inadequate ventilation slows down the heating process ("cooking") of the compost pile and causes bad odors. Don't over ventilate, or your compost pile won't retain the necessary heat.

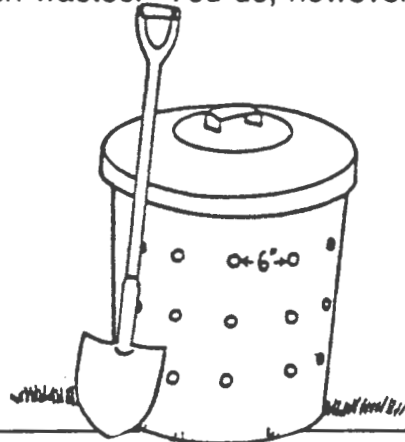
3. Improper mixing - never compost grass clippings that have been treated with pesticides or herbicides. And don't put meats or cooking fats in the compost. This attracts rodents and creates bad odors. Only compost products that are high in carbon (leaves, sawdust) and nitrogen (grass clippings, vegetable peelings).
4. Not shredding leaves - smaller pieces compost better. Shredding speeds up the breakdown of the pile.
5. Improper turning of the pile. Turning your pile every 2 - 7 days accelerates the process and ensures more uniform decomposition. If your compost is clumped and goeey it needs more air, so turn it more often or improve ventilation and add more carbon materials. Turning a pile twice weekly is recommended.
6. Over and under watering. If a compost pile is too dry, it won't heat up and decompose. If it's too wet, the pile will smell from anaerobic decomposition. A good rule is to keep compost as wet as a damp sponge.



ACTIVITY 1

GARBAGE CAN COMPOSTER

A garbage can composter is inexpensive and easy to build. It can be used for food or garden wastes. You do, however, need to turn the wastes.



What You Need	Building a Garbage Can Composter	Maintaining Your Compost Pile
<p><u>Materials:</u></p> <ul style="list-style-type: none"> - garbage can with cover - coarse sawdust, straw, or wood chips 	<p>1. Drill 3 rows of holes 4 to 6 inches apart all around the can. Then drill several holes in the base of the can. The holes allow air movement and the drainage of excess moisture.</p>	<p>Regularly mix or turn the compost with a pitch fork, shovel, or compost turner and keep it covered. This adds air and mixes up the different wastes, preventing the compost from getting smelly. A smelly compost pile may attract animals and cause neighbors to complain.</p>
<p><u>Tools:</u></p> <ul style="list-style-type: none"> - drill - pitch fork, shovel, or compost turner - work gloves 	<p>2. Place 2 to 3 inches of dry sawdust, straw, or wood chips in the bottom of the can to absorb excess moisture and let the compost drain.</p>	
	<p>Adding Wastes Add fruit, vegetable, and garden wastes. Make sure not to add too much of any one waste at a time.</p>	

ACTIVITY 2

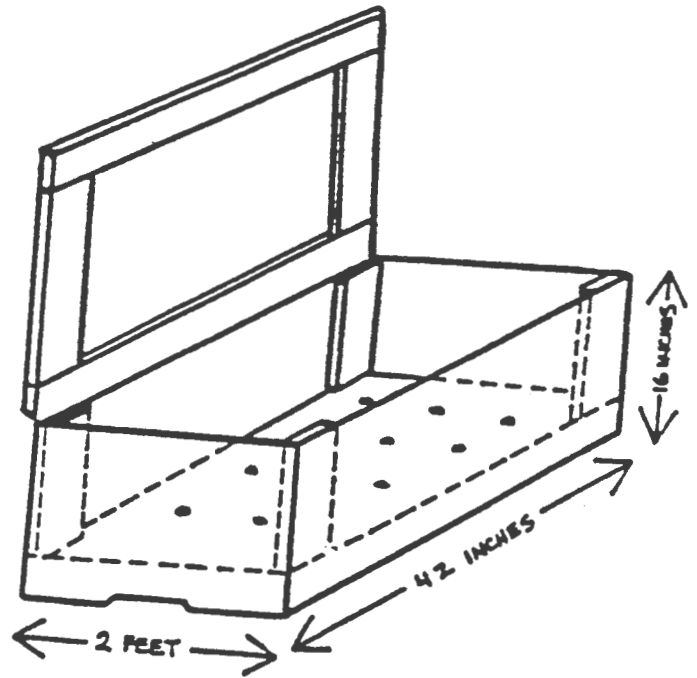
WORM COMPOSTING BIN

Worms in the house? Yuk! But this composting system actually works! The worms stay in the box and eat household scraps, and the box gives off little odor. Worm composting can be done in apartment buildings or other homes with no yard space. You might try it in your school!

What You Need

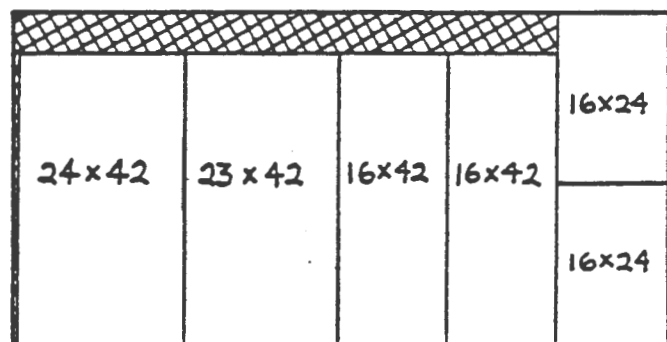
Materials:

- (1) 4-x-8 foot sheet 1/2 inch exterior plywood
- (1) 12-foot length 2-x-4 lumber
- (1) 16-foot length 2-x-4 lumber
- 1/2 pound 16d galvanized nails
- 2 pounds 6d galvanized nails
- 2 galvanized door hinges
- Optional: 1 pint clear varnish or polyurethane
- Optional: plastic sheets for placing under and over bin
- 1 pound of worms for every 1/2 pound of food wastes produced per day. (Worms sold as fishing bait are best. Red worms are available from Flowerfield Enterprises, 10332 Shaver Road, Kalamazoo, MI 49002 Phone: 616 327-0108)
- Bedding for worms: moistened, shredded newspaper or cardboard, peat moss or brown leaves.



Tools:

- Tape measure
- Skill saw or hand saw
- Hammer
- Saw horses
- Long straight-edge or chalk snap line
- Screwdriver
- Drill with 1/2 inch bit
- Eye and ear protection
- Work gloves
- Optional: Paint brush



ACTIVITY 2 (continued)

Building a Worm Composting Bin

1. Measure and cut the plywood as shown on previous page, so you have one 24-x-42 inch top, one 23-x-42 inch base, two 16-x-24 inch ends, and two 16-x-42 inch sides.
2. Cut the 12 foot length of 2-x-4 lumber into five pieces; two 39 inch pieces, two 23 inch pieces, and one 20 inch piece.
3. Lay the five pieces on edge on a flat surface to form a rectangle with the long pieces on the inside and the 20 inch length centered parallel to the ends. Nail the pieces together with two 16d nails at each joint.
4. Nail the 23-x-42 inch piece of plywood onto the frame with 6d nails every 3 inches.
5. Cut four 1 foot lengths from the 16 foot length of 2 x 4 lumber. (Save the remaining 12 foot piece.) Take the two 16-x-42 inch pieces of plywood and place a 1 foot length flat against each short end and flush with the top and side edges. Nail the 2 x 4s in place using 6d nails.
6. Set the plywood sides up against the base frame so the bottom edges of the 2 x 4s rest on top of the base frame and the bottom edges of the plywood sides overlap the base frame. Nail the plywood sides to the base frame using 6d nails.
7. To complete the box, nail the 16-x-24 inch pieces of plywood onto the base and sides at each end.
8. To reinforce the box, make sure a nail is staggered at least every 3 inches wherever plywood and 2 x 4s meet.
9. Drill 12 one half inch holes through the plywood bottom of the box for drainage.
10. To build the frame for the lid, cut the remaining 12 foot piece of the 16 foot length of 2 x 4 lumber into two 45 inch pieces and two 20 inch pieces. Lay the pieces flat to form a rectangle, with the short pieces on the inside.
11. Lay the 24-x-42 inch piece of plywood on top of the lid frame so the plywood is 1 1/2 inches inside all the edges of the frame. Nail the plywood onto the frame with 6d nails.
12. Attach the hinges to the inside of the back of the box at each end (on the 2 x 4) and the corresponding undersides of the back edge of the lid frame, so the lid stands upright when opened.

13. The unfinished box should last for at least five years; finishing the box with varnish or polyurethane, however, will protect the wood and prolong the life of the box. Two coats of varnish with a light sanding between coats should be sufficient.
14. Find a good location for the box. It can be placed anywhere as long as the temperature is more than 50 degrees F (10 degrees C). The most productive temperature is 55 degrees to 77 degrees F (13 degrees to 25 degrees C). Garages, basements, and kitchens are all possibilities as well as the outdoors in warm weather (not in direct sunlight). Make sure to place the box where it is convenient for you to use. It is wise to place a plastic sheet under the box.

Adding the Worms

Moisten the bedding material for the worms by placing it in a 5 gallon bucket and adding enough water to dampen all the material. Don't worry about getting the bedding material too wet because the excess moisture will drain off when it is placed into the composting bin. Be careful if you use peat moss because it will hold too much water. It is a good idea to put wet bedding material into the bin outdoors and wait until all the water has drained out (one to two hours).

Add about 8 inches of moistened bedding to the bottom of one side of the bin. In go the worms! Leave the lid off for a while and the worms will work down into the bedding away from the light.

Adding Your Wastes

Dig a small hole in the bedding and add your vegetable and fruit scraps. Then cover the hole with bedding. Small amounts of meat scraps can be added in the same way. Do not add any inorganic or potentially hazardous material such as chemicals, glass, metal, or plastic.

Maintaining Your Compost Pile

Keep your compost pile moist, but not wet. If flies are a problem, place more bedding material over the wastes or a sheet of plastic over the bedding, or try placing some flypaper inside the lid. Every three to six months, move the compost to one side of the bin and add new bedding to the empty half. At this time, add food wastes to the new bedding only. Within one month, the worms will crawl over to the new bedding and the finished compost on the "old" side can be harvested. Then add new bedding to the "old" side.

Backyard Composting Recipe

See next page

Backyard Composting Recipe

3 parts brown
2 parts green
a dash of soil

1. Mix ingredients into bin or pile.
2. Keep moist but not wet.
3. Stir ingredients occasionally.

If pile does not warm up within 1 week, add additional green materials; mix thoroughly and remoisten. If undesirable odors occur, add more brown materials and mix thoroughly. Apply finished compost to garden soil.

Greens - Nitrogen Source

Fresh grass clippings
Garden trimmings
Shrubbery trimmings
Young weeds

Browns - Carbon Source

Dry leaves
Chipped brush, twigs
Dry grass
Sawdust

For more information, see publication ID-182 *Managing Yard Wastes: Clippings and Compost*.

ACTIVITY 3

PLANT A TREE/MULCHING

Plant a tree and/or mulching.

Yard Cycling - Mulches

After September 30, 1994, most Indiana landfills won't accept yard waste. Since yard waste currently makes up 20% of the waste stream in Indiana, the ban will keep upwards of 1 million tons annually from our landfills. But it creates another problem: what to do with the roughly 200 pounds of leaves, 1,000 pounds of grass clippings; and 300 pounds of green trimmings and brush a typical Indiana household generates each year.

What You Can Do

Leaving grass clippings on the lawn is a partial solution. So is backyard composting, which can turn yard waste into material you can use to improve your soil. And you can use chipped limbs and brush, shredded leaves, and grass clippings to make mulch, a protective ground covering.

Mulches

Many communities and tree maintenance companies chip brush, limbs, and green trimmings in order to reduce volume for waste collection. But instead of being thrown away, this chipped material can be applied as a ground cover for:

- footpaths or playgrounds
- heavily shaded areas
- erosive areas

ACTIVITY 3 (continued)

And you can use the material as a mulch to conserve soil moisture, maintain even soil temperature, prevent erosion, control weeds, and enrich the soil around trees, shrubs, and flowers in your yard or garden. Applying the mulch to a depth of no more than 3 - 4 inches brings the best results.

Compost, grass clippings, and shredded leaves also make an excellent mulch when applied 2 - 3 inches deep around flowers and vegetables. Do not use lawn clippings as mulch if weed killer has been applied within the previous 8 weeks. Leave these clippings on the lawn.

ACTIVITY 4

HOME SURVEY

1. Make a list of all the disposable products that you and your family buy in two weeks. For additional space, continue your list on the back.
2. How many of these products are made of:

_____ wood?	_____ cellophane?
_____ fabric?	_____ plastic?
_____ metal?	_____ cardboard?
_____ paper?	_____ styrofoam?
_____ glass?	_____ food?
_____ other materials?	
3. What kinds of packages did they come in?
4. What items are biodegradable? Place a "b" beside those that are biodegradable.

5. Can you think of other reusable products you could buy instead of "throw aways"?
6. Which of these products do you and your family recycle? How do you recycle them?
7. Which of these products could you recycle that you and your family don't already recycle?
8. Besides buying reusable products and recycling, what other ways can you work to reduce the amount of materials wasted in our country today?

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:

	<u>Cents Per Pound</u>	<u>Cents Per Unit</u>
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

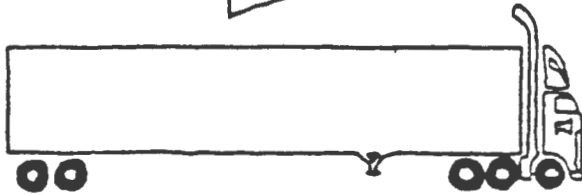
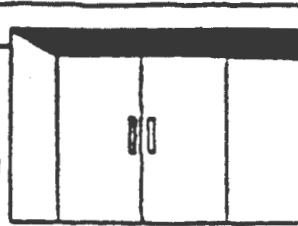
Some of these materials obviously are more readily recyclable than others. A material's true recyclability depends on the viability of collection practices and an available market.



GLASS: 100% RECYCLABLE

GLASS

Recyclers collect bottles and jars. To be furnace ready for recycling, glass should be color sorted and metal free.



The containers are then shipped to a glass plant where they are crushed into small pieces called cullet. This is cleaned, then mixed with sand, soda ash and limestone.



After mixing, the batch is melted in a furnace at temperatures of up to 2800 degrees F.



The melted glass drops into a forming machine where it is blown or pressed into shape.



The newly formed glass containers are slowly cooled in an annealing lehr. After inspection, they are shipped to the customer.

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

ACTIVITY 4 (continued)

Preparing Glass for Recycling

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

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

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 weight 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.

When 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.

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.

ACTIVITY 5

HOME RECYCLING CENTER

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

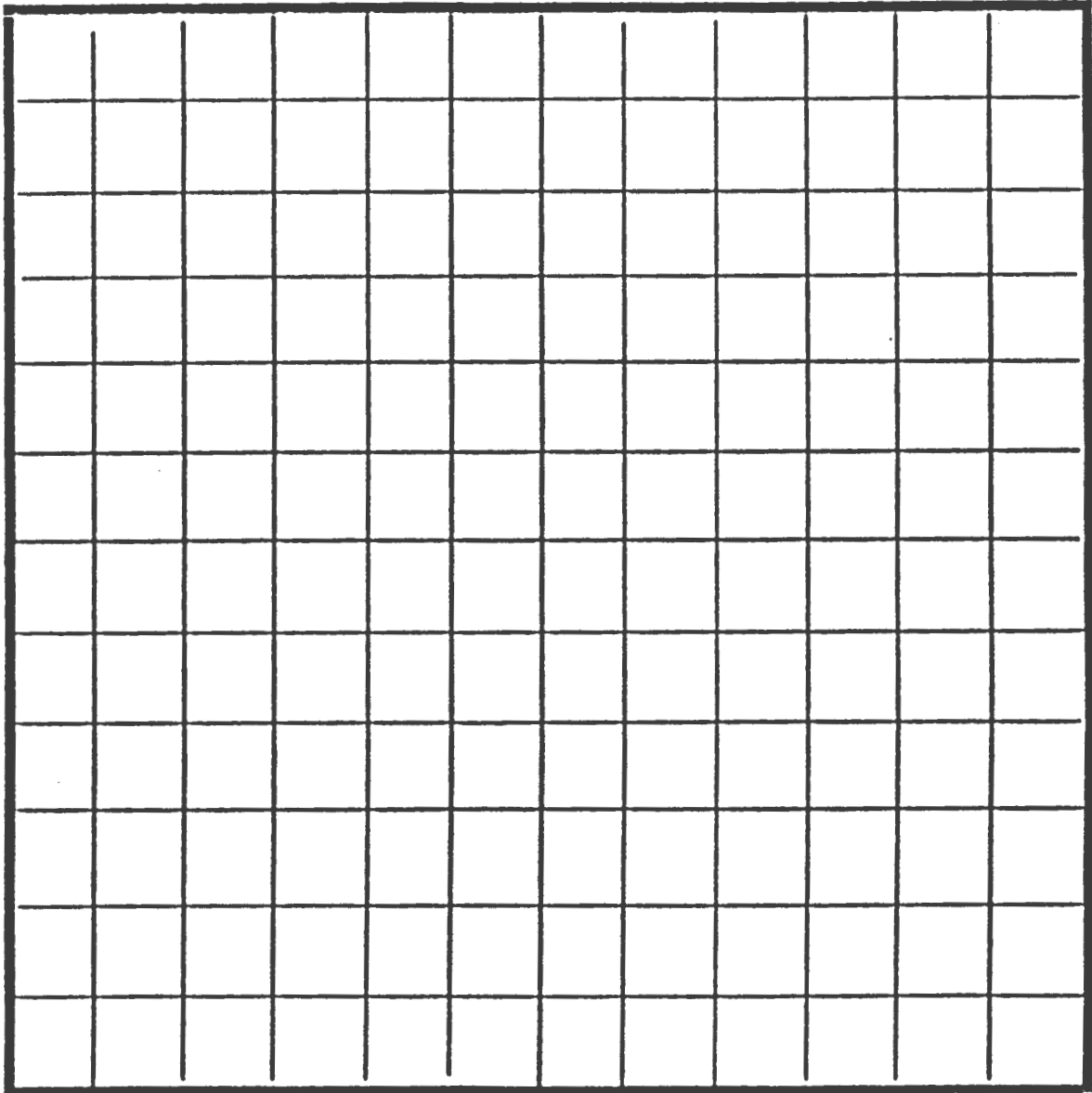
STEP 2 - Think of a room at home where you could get permission to set up a recycling center (garage, basement, mudroom utility room, etc.). Remember, it should be close to the place where cans, bottles and newspapers are used in the first place.

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"

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.)

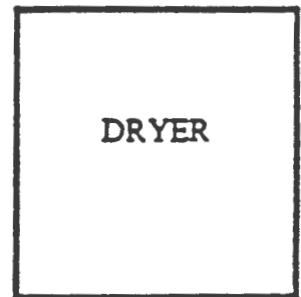
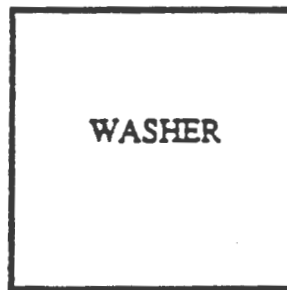
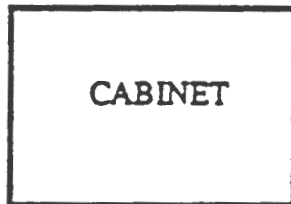
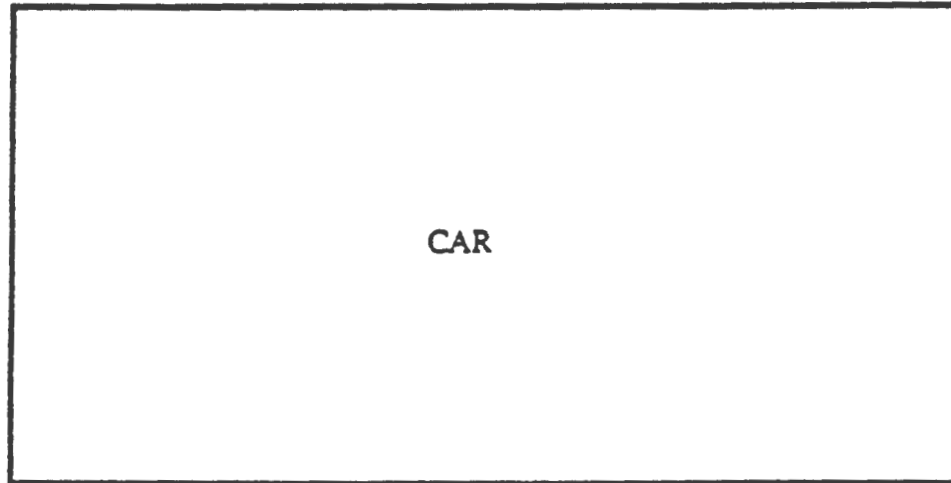
STEP 3 - Show your plans at home. Do your parents or brothers and sisters have any ideas to improve your plans? Can you make your plans work for real? What changes in your original plans did you have to make to get your "recycling center" started?

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.

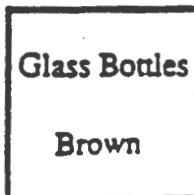
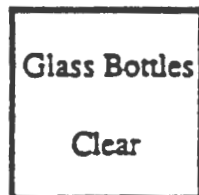
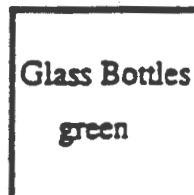


Drafting Objects (scale: 1/2 inch = 1 foot)

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: $10 \times 1/2 \text{ inch} = 5 \text{ inches}$, $5 \times 1/2 \text{ inch} = 2 \frac{1}{2} \text{ inches}$. After playing with the floor plan, paste the objects onto the graph. Now, put it into reality!



Recycling Containers:



ACTIVITY 5 (continued)

RECYCLE/WHAT/WHERE

WHERE TO RECYCLE WHAT IN HAMILTON COUNTY

<u>WHAT</u>	<u>WHERE</u>	<u>PREPARATION</u>
Newspaper	A, D, E	Remove glossy sheets, bundle or bag
Corrugated cardboard	A	Fold and stock
Aluminum cans	A	Rinse well and flatten
Aluminum/steel beverage cans only	B, C	Wash and remove labels
Steel & tin food cans	C	Wash and remove labels
Glass (containers only)	A, C	Wash, remove lid & neck ring. Leave label. Sort clear, brown, green.
PET plastic pop bottles	B	Remove metal lids & neck rings, flatten

A.
Senior Citizens Organization Center
18336 North Cumberland Road
Noblesville, Indiana 46060
(317) 773-6904

C.
Carmel Street Department
(dropsite)
211 Second Street, S.W.
Carmel, Indiana 46032

E.
Boy Scouts of America
(pick up site, third Saturday of
each month, 9 a.m. - 5 p.m.)
Orchard Park Presbyterian Church
1605 East 106th Street
Carmel, Indiana 46032

B.
Bev-Pak Recycling Mobile Unit
Kroger Grocery (dropsite)
South Range Line Road
Carmel, Indiana 46032

D.
Boy Scouts of America
(pick up site, first Saturday of
each month, 9 a.m. to 4 p.m.)
Forest Dale Elementary
10721 Lakeshore Drive, West
Carmel, Indiana 46032

**DON'T LET IT ALL
GO TO WASTE!**



ACTIVITY 6

PAPER

Paper: An Overview

About 85 percent of all the post consumer waste recovered for recycling in America is paper and cardboard. 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.

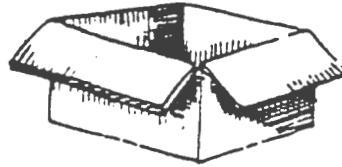
About 4.5 million tons of newsprint are recycled every year, or one third of America's consumption. Clearly, much more can be recycled.

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.

ACTIVITY 6 (continued)



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.

ACTIVITY 6 (continued)

PAPER 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 (stapes are acceptable)
- Newspapers, cardboard, magazines and books

- Any colored paper stock
- File folders
- Lunch bags, wax paper, smoking materials, 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.

ACTIVITY 7

NEWSPAPER CYCLE

Old newspapers can be recycled. That means they can be used again instead of being thrown away or burned. You can save your old newspapers and take them to a recycling center. The recycling center will take them to the paper mill.

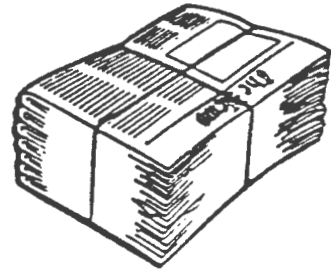
The paper mills make the old newspapers into new paper. First, they soak the newspapers with water and beat the pulp with paddles. Then the wet pulp is put through heated drying rollers. These rollers squeeze the water out of the pulp and dry it into new paper and cardboard.

When we use paper which has been recycled, we are saving trees.

Recycle: Recycled Paper

To make crude, recycled paper you will need:

- Newspaper
- Warm water in a pot or bowl
- Beater, mixer, or blender (with parents' consent!)
- Window screen
- Powdered or liquid laundry starch (optional)
- Food coloring (optional)
- Aluminum or tin can (optional)
- Apple, potato or orange peel, carrot tops, flowers, glitter (optional)

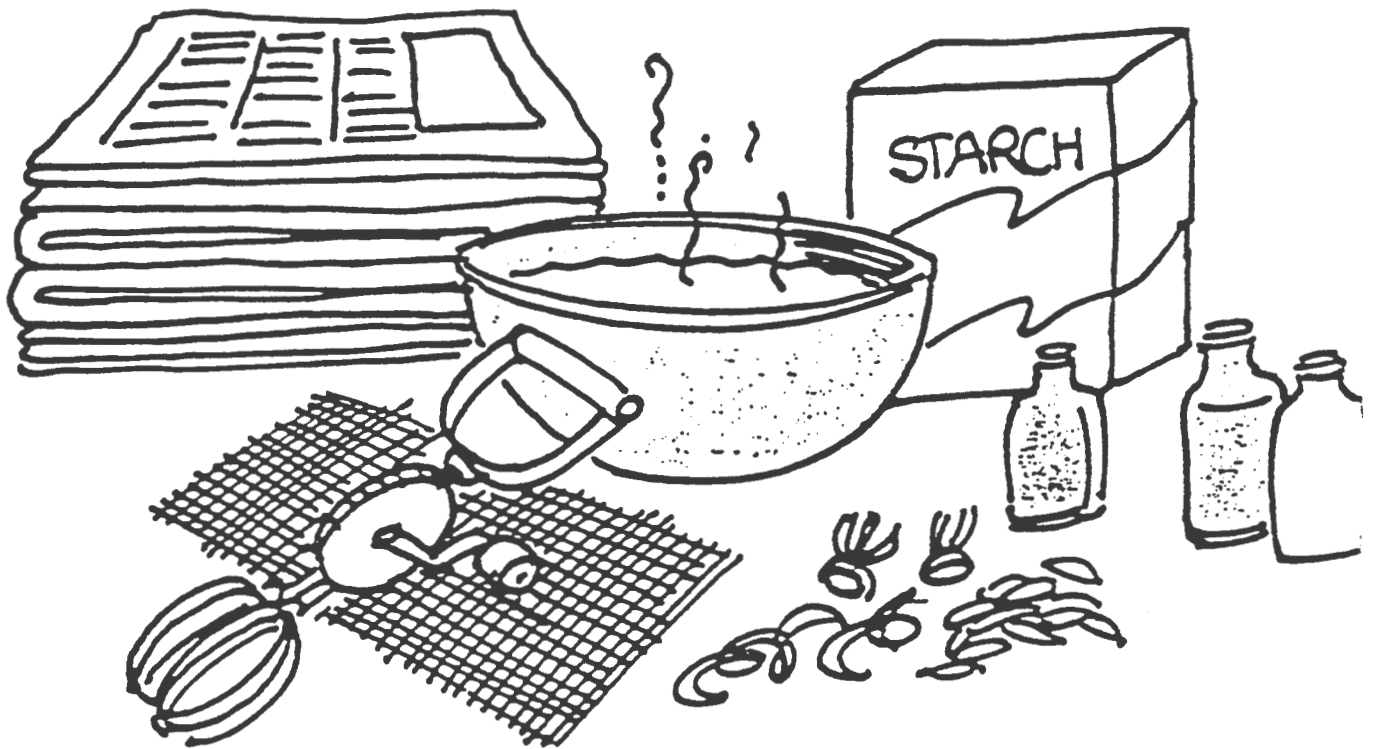


1. Tear the newspaper into small pieces and place it in the warm water. Let these soak for 10 minutes to half an hour.
2. If you are using starch (which makes the paper strong), add 2 tablespoons of it to the bowl or pot.
3. Scoop the paper into a blender half full of warm water. If you are using a mixer or blender, use 2 cups of water to 2 cups of paper. The paper at this state is called *slurry*. It is more water than paper!
4. Blend or mix at moderate speed until you no longer see individual pieces of paper.

5. Set screen over a bucket or basin (do not do this over a sink because it could clog the drain). Pour the slurry over the screen.
6. If you so desire, you can help squeeze out the water by rolling over the paper with an aluminum or tin can.
7. Turn the screen face down onto newspaper. Gently peel off the screen. There's your own recycled paper! Don't try to lift it until it's dry (several hours).

You can experiment by using different types of paper; adding food coloring (at step four); or by adding little bits of vegetable matter, glitter, or ribbon in step 3.

After your paper dries, you can write on it, cut it up or do whatever you want with it. Try to make some very thin paper (facial tissue torn up) or some very thick and heavy paper (cardboard).



ACTIVITY 7 (continued)

Cut out samples of paper you made and paste them here. Tell what you did to make them each different.

1. _____

2. _____

3. _____

4. _____

ACTIVITY 8

PLASTICS

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 terephthalate (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.

ACTIVITY 8 (continued)

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, irrigation pipe
- Pipe fittings
- Handrails
- Downspouts

Continued on next page.

PLASTIC RECYCLING CODES

<u>CODE</u>	<u>MATERIAL</u>
 PETE	----- Poly-Ethylene Terephthalate (PET)
 HDPE	----- High Density Polyethylene
 V	----- Vinyl / Polyvinyl Chloride (PVC)
 LDPE	----- Low Density Polyethylene
 PP	----- Polypropylene
 PS	----- Polystyrene
 OTHER	----- All Other Resins and Layered Multi-Material

ACTIVITY 8 (continued)

Polystyrene foam offers considerable recycling potential. Such items as cups, plates and fast food carry out containers 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 caps and any neck rings from the bottle. The base caps 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.

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 all 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.

ACTIVITY 8 (continued)

Recycle: Plastic

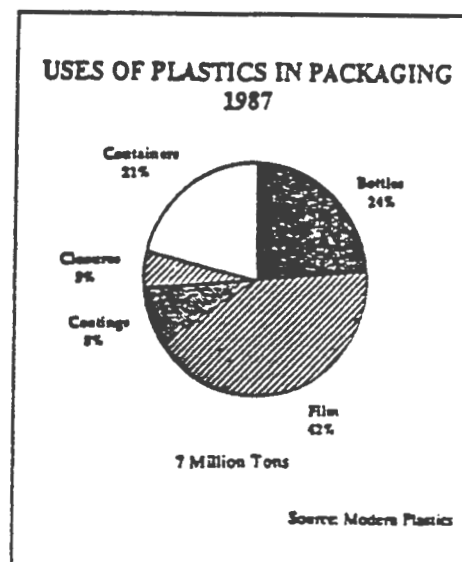
Here's how to make your own lucky plastic pieces! You will need:

- A non stick muffin pan (**with** parents' permission)
- Bottoms from 2 liter pop bottles
- Scissors
- A coin (optional)
- A shell (optional)
- Any textured, non-burnable object (optional)
- Hot pads or mitts
- Newspaper
- Oven or toaster oven (**with** parents' permission)



You'll need an adult to help you with this.

1. Separate the bottoms (colored) of 2 liter pop bottles from the clear plastic bottle. Cut the colored bottoms into small squares or strips or shapes.
2. Sprinkle the squares into a heaped pile in the cups of the muffin tin - the pile should be less than 1/4 of the way up the cup. You may want to place them in a pattern.
3. Place in a 375 degree (F) oven or toaster oven. Allow to melt (about 10 minutes). Keep an eye on them!
4. Remove from oven - use hot pads or mitts! While plastic is still hot, press a coin or shell or any textured non-burnable design into the plastic. Allow to cool and turn onto newspaper. There's your lucky plastic piece! You could drill or punch holes in them (ask dad or mom to help) and string them for a necklace or put them on shoelaces as holiday ornaments. You could also glue pins and earring clips or posts onto the back and use them for jewelry. The plastic bases come in red, orange, green, and black. Mix colors for fun.



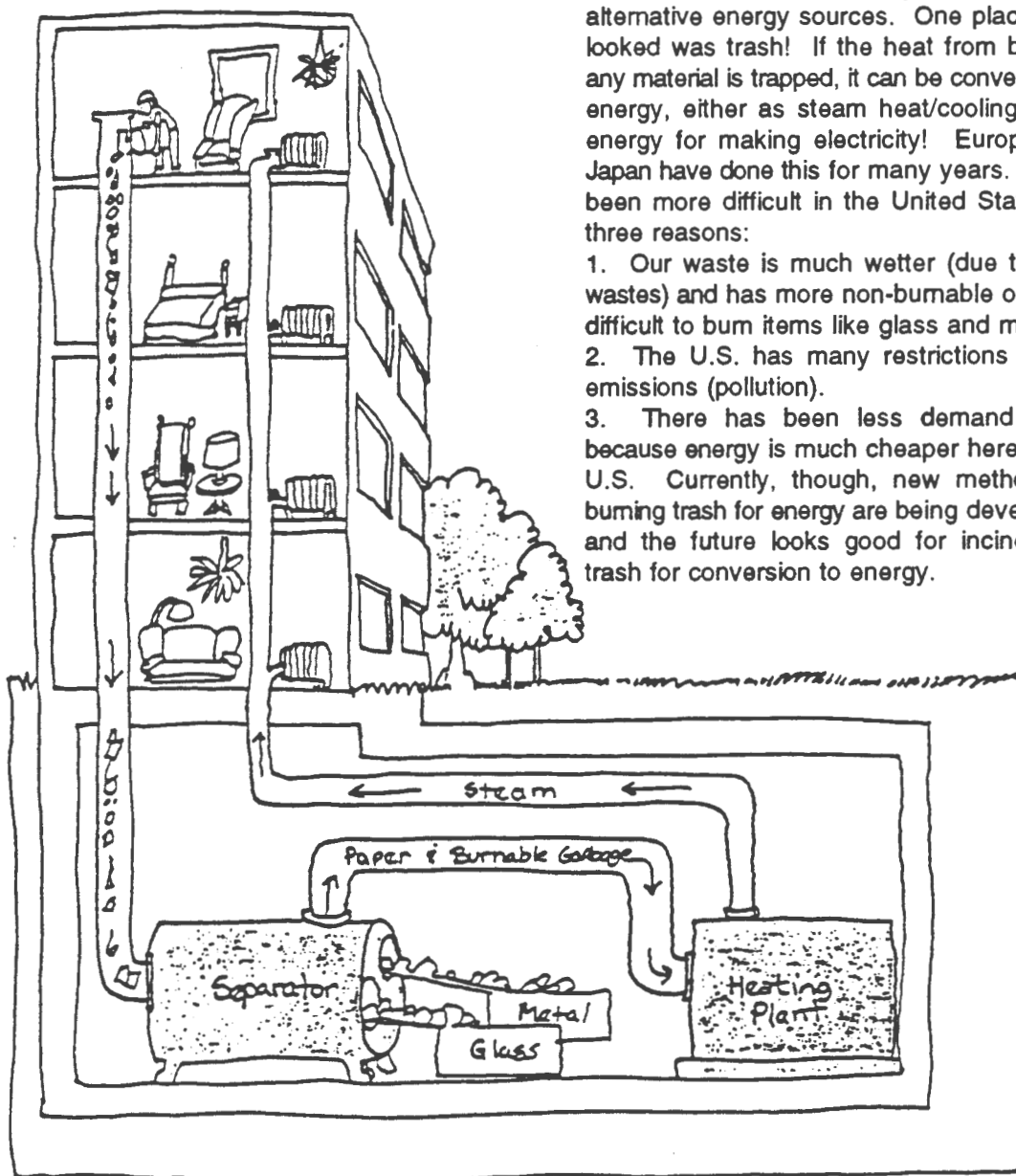
ACTIVITY 8 (continued)

Incineration

Incineration is high temperature burning in which whatever is burned is left as very fine ash. In the United States, we once burned much of our trash. As our communities became more populated and as amounts of trash increased, burning became more difficult. More recently, the pollution caused by open burning made burning trash less desirable and acceptable. One alternative to open burning was the use of incineration plants, but scrubbing equipment to clean the smoke was, and still is, very expensive.

However, when energy prices went very high in the 1970s, people began looking for alternative energy sources. One place they looked was trash! If the heat from burning any material is trapped, it can be converted to energy, either as steam heat/cooling or as energy for making electricity! Europe and Japan have done this for many years. It has been more difficult in the United States for three reasons:

1. Our waste is much wetter (due to food wastes) and has more non-burnable or more difficult to burn items like glass and metals.
2. The U.S. has many restrictions on air emissions (pollution).
3. There has been less demand for it because energy is much cheaper here in the U.S. Currently, though, new methods of burning trash for energy are being developed, and the future looks good for incinerating trash for conversion to energy.



ACTIVITY 8

Aluminum: An Overview

Aluminum beverage containers are one of recyclings 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 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 strong 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.

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.

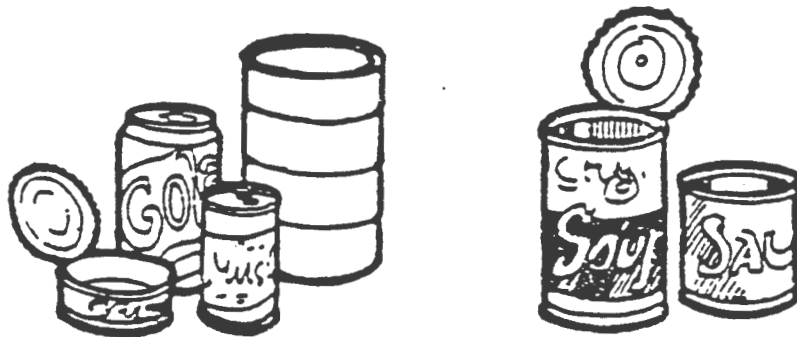
Two primary markets exist for used steel food and beverage cans: detinning companies and steel mills.

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 bimetal 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.



ACTIVITY 10

CAN IDENTIFICATION

Sure Thing Can Identification

Please answer True or False to the following questions.

Aluminum Cans

- 1. Aluminum cans are NOT attracted by a magnet.
- 2. Almost all of these cans say "All Aluminum Can" on the side.
- 3. Have no seam.
- 4. If the bottom of the can is round and shiny, then it is aluminum.
- 5. Shiny, silver, smooth.
- 6. Are lightweight.
- 7. Aluminum 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.

Bi-Metal Cans

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

Tinned Steel Cans

- 1.. Are attracted by magnet.
- 2. Have a seam.
- 3. Are heavier weight than aluminum.
- 4. Usually have rings or ribbing on the can.
- 5. Normally have a paper label.



Extruded Steel Cans

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

How do you recycle cans at the home, school or community level? Be specific; list drop off centers.
