

INTRODUCTION TO WASTE MANAGEMENT

Municipal Solid Waste Management

Waste Management in Alabama is as diverse as the state's natural resources. Municipal solid wastes are generated in homes, commercial establishments, institutions, and industries. Municipal solid waste varies from yard waste to food scraps and from construction and demolition debris to office and classroom paper. In the United States, each individual produces 2,555 pounds of garbage each year. In Alabama, each individual produces approximately 4.5 pounds of municipal solid waste a day. Local governments, waste management companies, and consumers have established methods of disposing of waste in an environmentally friendly manner.

Recycling is the process by which used items are reconditioned and are adapted to a new use or function. Recycling is a waste management method that can be a responsible, cost-effective way to help solve some of Alabama's waste disposal problems. Recycling helps preserve natural resources, reduce pollution, and save energy.

Composting is a low-cost disposal method whereby organic material is accumulated in mounds or containers to bring about decomposition by microorganisms such as bacteria or fungi. Composted items can be used as a soil conditioner in landscaping and gardening.

Incineration is a disposal method involving the burning of solid waste to reduce volume, with or without the recovery of energy.

Landfilling is the major disposal method of solid waste in Alabama. A landfill is a system of trash and garbage disposal in which waste is buried between layers of earth in such a manner that minimizes environmental hazards. New EPA regulations called subtitle D make landfilling more environmentally friendly than before, but much more expensive.

Hazardous Waste Management

In addition to municipal waste management, Alabama also must manage hazardous wastes produced in the state. *Hazardous waste* is any solid, liquid, or gaseous material that is no longer of use in its present form and would cause injury or death to living organisms and would pollute land, air, or water if improperly disposed. Some examples of hazardous wastes include oil, batteries, pesticides, and oil paints. Hazardous wastes may be managed through minimization, resource recovery such as recycling or reuse, treatment, or disposal.

The *Resource Conservation and Recovery Act* (RCRA) classifies hazardous waste into two categories: characteristic hazardous waste and listed hazardous waste. *Characteristic hazardous wastes* exhibit one or more of the following traits: ignitability, corrosivity, reactivity, or toxicity. *Listed hazardous wastes* are incorporated into lists from the RCRA rules. They exhibit one of the previously listed characteristics or contain any number of toxic constituents that have been shown to be harmful to health and the environment.

Household hazardous waste, unlike hazardous waste generated by industry, is not regulated in Alabama by the Alabama Department of Environmental Management or the U.S. Environmental Protection Agency. The best way to manage household hazardous waste is to avoid generating hazardous products.

Disposal may be reduced or eliminated by giving leftover products away, recycling materials when possible, using less hazardous alternatives when possible, and buying only the amounts of products needed.

OBJECTIVES:

The student will be able to:

1. Identify three categories of trash: recyclables, biodegradables, and disposables.
2. Classify into these three categories.

BACKGROUND:

Our solid waste problem is very complex. To solve this problem, each community must look at all possible solutions and make a comprehensive solid waste plan. These plans may include reduction, recycling, composting, incineration, and landfilling. No single method will solve the problem; therefore, each community has to decide which alternatives best meet the local needs.

We are all garbage producers and, therefore, are part of the problem. We must also all be part of the solution.

VOCABULARY:

biodegradables - materials that can be broken down naturally

disposables - products designed to be thrown away after use; will be incinerated or sent to a landfill

recyclables - useful materials taken from garbage or waste that are used again or reprocessed

source reduction - to use less to begin with at the place where waste is produced

ADVANCE PREPARATION:

Collect the household trash accumulated in one day.

PROCEDURE:

Setting the Stage

Discuss the amount of trash generated each day at each student's home 365 days a year. Weigh the bag from one day's worth of household trash and multiply it by 365 to impress upon students how much garbage comes from one family.

Activities

1. Divide students into three equal teams. They will represent three categories of trash: Recyclables, Biodegradables, Disposables.
2. One student from each team goes through the household trash and selects an item belonging to his category and places the item in the correct container. Each student on the team repeats this activity. (Be sure students wear plastic gloves.)

Follow-Up

1. Discuss ways in which these items can be reused or recycled.
2. Discuss the biodegradable items and explain how they can rot or decompose over a period of time.
3. Discuss the leftover items that cannot be recycled or cannot decay. How are these items disposed of in the community?
4. Discuss ways in which source reduction may be applied to eliminate these wastes in the first place.

Grades:

K-2

Subjects:

Science, Social Studies

Time Needed:

30 minutes

Materials:

one day's worth of household trash

three boxes or trash cans labeled:

Recyclables

Biodegradables

Disposables

one box of plastic gloves

EXTENSIONS:

1. In a small plot on the campus, bury samples of biodegradable trash. Unearth the trash periodically to see what is happening. Record the observations. Refer to “Mini-Landfill” in Learning Through Legacy (K-2).
2. Contact a local recycling agency to set up a field trip or have a resource person visit the class and discuss the recycling operation.
3. Have students and their parents graph their trash items into the three categories for a period of one week. Identify what types of trash are most common. Have students develop a reduction plan for their family.
4. Refer to “Garbage Pizza” in Learning Through Legacy (K-2).

ORIGINAL DEVELOPMENT RESOURCE:

Goodman, B. (1990). *A kid's guide to how to save the planet*. New York, NY: Byron Preiss Publications, Inc.

OBJECTIVES:

The student will be able to:

1. Describe the composition of landfills.
2. Classify waste into each category.
3. Observe the amount of waste in each category.

BACKGROUND:

The average household in Alabama disposes of about 100 pounds of garbage per week. This trash is made up of an assortment of paper products, food waste, glass, metal, plastic, wood, and yard waste. Unless some of it is reused or recycled, the trash is picked up by garbage trucks and transported to a community landfill.

In many parts of the state, waste collected from homes, transfer stations, and greenboxes is compacted (compressed to make smaller). This helps reduce the amount of space that waste takes up in a landfill. Currently about 80 percent of Alabama's solid waste goes to landfills.

VOCABULARY:

landfill - a large outdoor area designed for waste disposal; sanitary landfills are lined with plastic and covered daily with earth to prevent garbage from polluting surrounding land and water

collection station - a facility where recyclables are collected and processed for the market

transfer station - a facility where garbage is collected before being taken to the landfill

ADVANCE PREPARATION:

Gather materials and supplies.

PROCEDURE:

Setting the Stage

Draw a circle on the board. Explain that we are going to pretend that all waste thrown away in the United States will fit into this circle. Copy the illustration included onto the circle. Point out that some slices are larger than others. Reinforce the fact that the largest slice for paper means there are more paper products sent to the landfill than any other category, followed by yard waste and so on.

Activities

First Period

1. To make a garbage pizza, begin by making crust. This can be done by combining corn starch and school glue until they form a dough consistency.
2. Flatten dough onto waxed paper over a pizza pan or 12" cardboard circle.
3. Cut the pizza into sections as shown on the board.
4. Separate the sections or use a ready-made crust purchased at a local grocery store.

Grades:

K-2

Subject:

Science

Time Needed:

two 30-minute classes

Materials:

mixing bowl

spoon

pizza pan

paint brushes

corn starch

red food coloring

waste items in these categories:

paper

yard waste

metals

glass

wood

food waste

plastic

misc. waste

Second Period

1. Mix glue with red food coloring until there is a tomato-sauce look.
2. Divide slices and apply sauce with paint brushes.
3. Glue collected toppings onto corresponding slices. Some of the items needed for toppings are shredded paper, wrappers, boxes, grass clippings, sticks, leaves, paper clips, staples, can, lids, marbles, egg shells, pasta, Styrofoam cups, plastic utensils, rubber bands, candles, or pieces of fabric.

Follow-Up

1. Have students use magazine pictures to construct another garbage pizza on poster board.
2. Contact local waste management authorities to locate information concerning the amount and type of garbage disposed of in the area. Construct a circle or bar graph of this. On average, how much money is saved through recycling, reusing, reducing?
3. Have students draw the sequence of trash from stores, to their homes, to the landfill. They may then write or dictate sentences to accompany their illustrations.

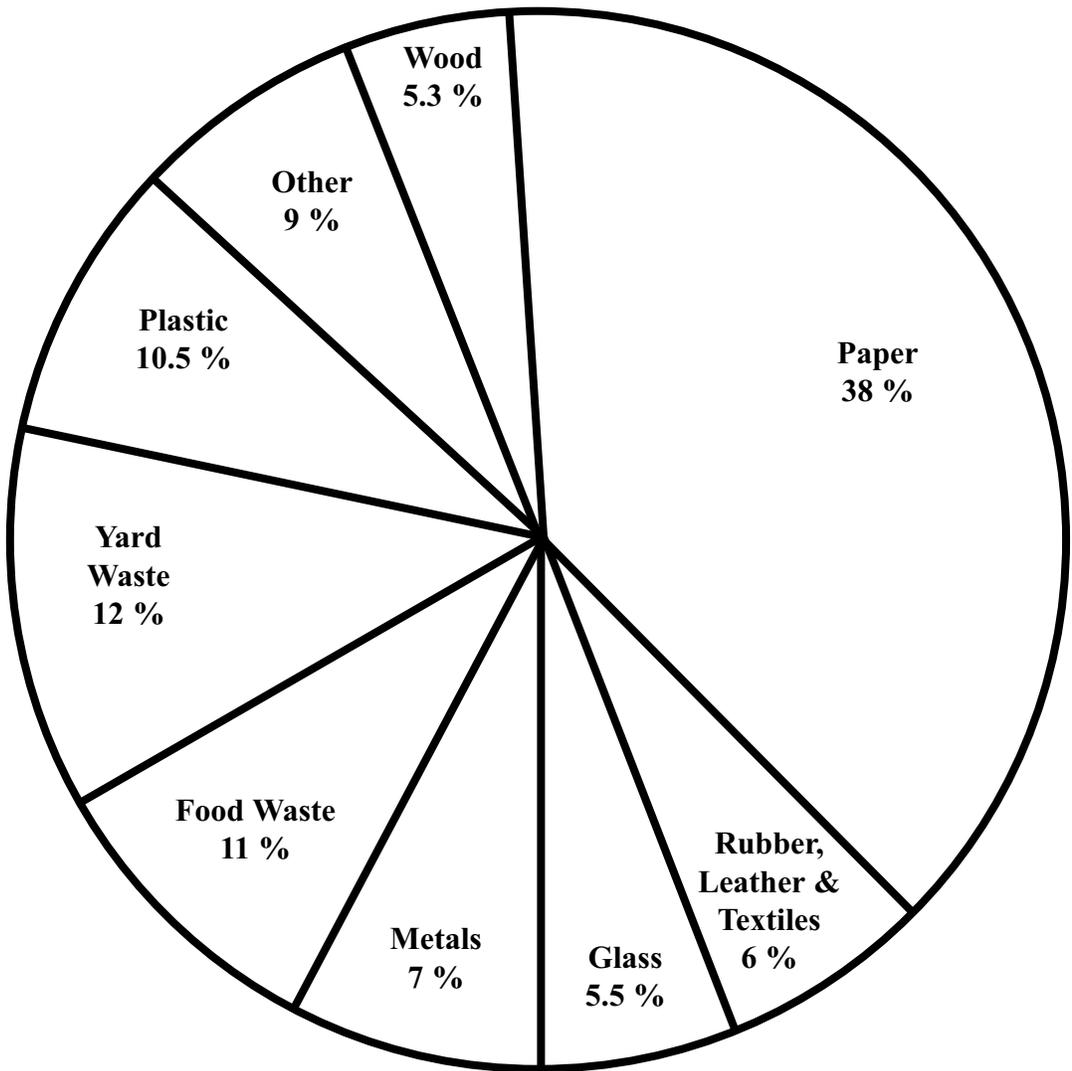
EXTENSIONS:

1. Plan a classroom project to reduce the amount of wasted paper. Students can reduce paper waste by using both sides of paper. Have a reuse paper box in the room and find out if the school purchases products made of recycled paper. Set up a special can for collecting aluminum cans if the school has drink machines on campus.
2. Refer to "What is Trash?" in Learning Through Legacy (K-2).

ORIGINAL DEVELOPMENT RESOURCES:

Auburn Cooperative Extension, *Keep America Beautiful*, (1990), p. 49.

Garbage Pizza



Notes

OBJECTIVES:

The student will be able to:

1. Identify what resources are used to produce the mail.
2. Learn what happens to junk mail in the home.
3. Graph types of junk mail.

BACKGROUND:

Each day Alabama households, along with millions of other American homes, receive an enormous amount of junk mail that must eventually be disposed of. Paper products account for over one-third of the solid waste in our country. It is important that students develop an awareness of how much paper waste is needlessly generated and understand how individual people can be a part of the solution to this problem.

VOCABULARY:

junk mail - mail received that is unwanted by the occupant

solid waste - any discarded material that is not liquid or gas

dispose - to get rid of, or throw away

ADVANCE PREPARATION:

1. Collect a week of junk mail received at home and at school.
2. Prepare a poster board, a graph chart, or a floor graph using a plastic shower curtain and colored tape. Lay it out and label four categories: coupons, advertisements, political, sale merchandise. Divide each category line into equal spaces to form a bar graph. (A floor graph is a recycled teaching aid. It can be relabeled and used again and again.)

PROCEDURE:

Setting the Stage

Begin by telling students that most homes receive large amounts of unsolicited and unwanted mail every year. This mail costs millions of dollars and wastes valuable resources. Much of this junk mail ends up as litter or in landfills. Show the bag of junk mail that has been collected in a week. Have them imagine how much junk mail comes to each family in the room or have them actually collect the junk mail their family receives for one week.

Activities

1. Students will organize junk mail into categories: coupons, advertisements, political, sale merchandise.
2. Next, students will graph the types of junk mail either as a cooperative group or as a whole group. As students categorize mail, place each piece in the correct category.
3. Identify which type of junk mail was received most often. Which type was least often received?

Follow-Up

1. Examine the junk mail and look for toll-free numbers or addresses to request that your name be removed from the mailing list. One resource that students can use is a no-charge service that removes names from many national mailing lists. Visit their website at <http://www.dmachoice.org>. You may want to share this information with the students' parents.
2. Have students draft a letter requesting that names of adults in their household are removed from a mailing

Grades:

K-2

Subjects:

Science, Art, Math

Time Needed:

30 minutes

Materials:

junk mail

glue

scissors

poster board, graph chart, or floor

graph

list. (Be sure students don't mail this letter unless the adults have approved it.)

3. Have students brainstorm and list other uses of junk mail around the house.

EXTENSIONS:

1. Students can use the junk mail and construct an airplane. Have a Junk Mail Airplane contest. Some categories might be most original or neatest. You might want to have a distance contest to determine the airplane that can fly the farthest.
2. Students might collect junk mail at their own homes and make Junk Mail Graphs for their household. Students could then bring these to class to share and compare. Discuss why different families receive different junk mail.

ORIGINAL DEVELOPMENT RESOURCES:

Spendlove, D. (1993). *Explorer home*. Lewiston, UT.

OBJECTIVES:

The student will be able to:

1. Identify products that are over-packaged.
2. Compare the amount of packaging for different products.
3. Identify products using the least amount of packaging to protect the item.

BACKGROUND:

As much as 40 percent of household waste (what we throw away at home) is packaging. Packaging of some kind is necessary in many cases to protect food and keep it clean and free from germs. However, many layers of paper and plastic packaging often add unnecessarily to the waste stream and are not recyclable. For instance, paper packaging coated with plastic or aluminum prevents it from being recycled. It is difficult to be aware of how much waste we produce, especially when we throw out one candy wrapper at a time. But many little pieces quickly add up to a surprisingly large amount.

VOCABULARY:

packaging - the wrapper or container covering many items for sale

products - something produced by nature or by people that is used

bulk buying - purchasing a particular item in large quantities

recycling - reprocessing of discarded materials into new, useful products; not the same as reuse of materials for their original purpose, but the terms are often used interchangeably

ADVANCE PREPARATION:

Purchase several items that are over-packaged. For example, deodorant in boxes, frozen dinners in a plastic dish with a plastic cover in a box, vegetables in a plastic tray covered with plastic wrap.

PROCEDURE:

Setting the Stage

Unwrap each product. Have the students identify each of the materials. Ask them how else these products could be packaged to save materials. Identify which materials can be recycled.

Activities

Students will work in cooperative groups.

1. All groups can work with the same product, or each group may choose a different product such as gum, Lifesavers, or snack foods.
2. Ask each group to unwrap the product carefully, saving all the packaging.
3. Weigh the pile of packaging. Next weigh the product. Which weighs more?
4. Ask, "Why are there so many wrappers?" List on board possible purposes for each wrapper. "How would you package this product?"

Grades:

K-2

Subjects:

Science, Math

Time Needed:

30 minutes

Materials:

scale balance

packaged products, gum, snack food

Follow-Up

1. Ask students to identify the raw products or natural resources used in the packaging.
2. Ask students to list products their families purchase that are over-packaged.
3. Discuss “bulk” buying and how this can reduce waste.

EXTENSIONS:

1. Compare how similar products are packaged in other countries. (This will take some research work.)
2. Discuss how materials were “packaged” 100 years ago in a general store. Would this work today? Why or why not?

ORIGINAL DEVELOPMENT RESOURCES:

Foster, J. (1991). *Cartons, cans and orange peels: Where does your garbage go*. New York, NY: Clarion Books.

Garbage Breakdown

OBJECTIVES:

The student will be able to:

1. Classify items into groups.
2. Gain an appreciation of poetry.
3. List major food groups.

BACKGROUND:

When you throw away in Alabama, there are several options for disposal. Composting is a low-cost disposal method whereby organic material is accumulated to bring about decomposition by micro-organisms. Items that contain fat, such as meat scraps or dairy products, should not be composted. Other items may be recycled, thus reducing the amount of garbage. Some items cannot be classified in either category and, therefore, must be disposed of. Students, as well as adults, must realize composting and recycling can reduce landfill waste considerably.

VOCABULARY:

compost - a mixture of plant and food waste used to fertilize the soil

trash - waste that is of no use and should be disposed of in a landfill

biodegradable - waste that can be decomposed by bacterial action

dispose - to get rid of, or throw away

waste - that which is no longer wanted

decompose - to decay or rot from a process of microbial action

micro-organism - plant or vegetable organism too small to be seen without a microscope

landfill - a large outdoor area designed for waste disposal; sanitary landfills are lined with plastic and covered daily with dirt to prevent garbage from polluting surrounding land and water

ADVANCE PREPARATION:

1. Obtain a copy of “Sarah Cynthia Sylvia Stout Would Not Take the Garbage Out” by Shel Silverstein.
2. Make student copies of classifying sheets.
3. Obtain a USDA MyPlate graphic.

PROCEDURE:

Setting the Stage

1. Discuss with class how many different food groups there are at each meal using MyPlate. Find updated guidelines at <http://www.choosemyplate.gov>.
2. Discuss with students the amount of waste left after each meal.

Activities

1. Have students classify items into major food groups: Bread/Cereal, Fruit/Vegetable, Meat, Dairy. This can be a whole group activity or done individually. Provide students with a MyPlate graphic.
2. Read Shel Silverstein’s poem “Sarah Cynthia Sylvia Stout Would Not Take the Garbage Out.” Point out that most items in the poem are biodegradable.

Grades:

K-2

Subjects:

Science, Health, Math, Language Arts

Time Needed:

60 minutes

Materials:

copy of poem, “Sarah Cynthia Sylvia Stout Would Not Take The Garbage Out” from *Where the Sidewalk Ends* by Shel Silverstein
MyPlate graphic

3. Have students classify items into method of disposal. (See: “Help Sarah Take Her Garbage Out” student activity page.)
4. Graph the results and interpret the graph.
5. Compare with MyPlate.

Follow-Up

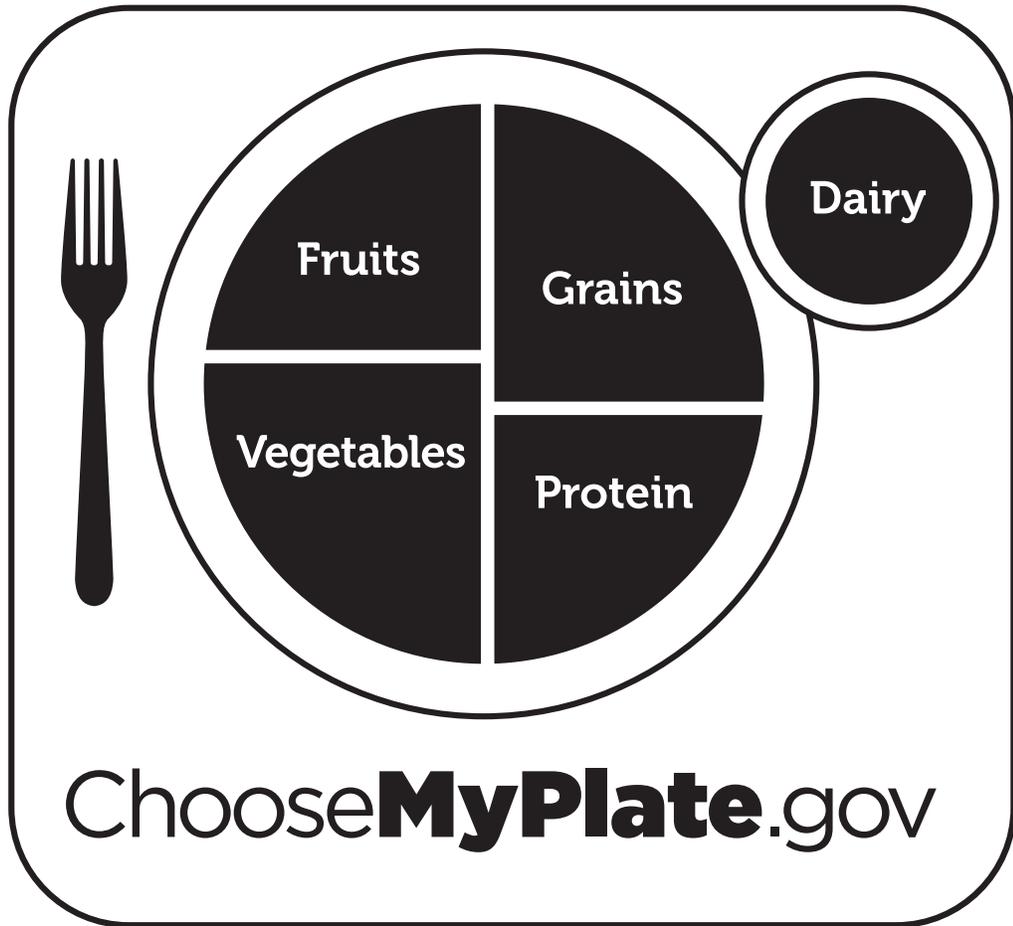
Have students record items disposed of from their evening meal and classify into correct food group. See Meal Time Breakdown and trash disposal categories.

EXTENSION:

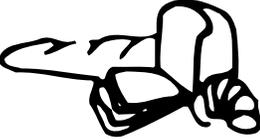
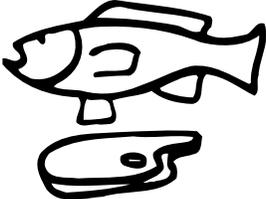
Have class dispose of lunch waste into three buckets or containers using these categories: Compost, Trash, Animal Food. Before lunch have students predict which container will have the most and the least.

ORIGINAL DEVELOPMENT RESOURCES:

Silverstein, S. (1974). Sarah Cynthia Sylvia Stout would not take the garbage out. *Where the sidewalk ends*. New York, NY: Harper & Row, Publishers, Inc. pp. 70-71.



Meal Time Breakdown

 Grain	 Dairy	 Fruits & Vegetables	 Meat (Protein)

Notes

OBJECTIVES:

The student will be able to:

1. Explain that some materials can be made smaller to make less solid waste.
2. Demonstrate the concept of reduction.
3. Compare and contrast between objects.

BACKGROUND:

Trash items do not just go away or disappear. There is no place on Earth called “away.” Things we think we throw “away” have to go somewhere, and these things end up in the soil, air, streams, and oceans. Reusing and recycling goods such as paper, aluminum cans, glass jars and plastics can reduce the amount of solid waste that we throw away. It is up to all of us to be aware of the amount of garbage we produce and take steps to ensure we lower this amount.

VOCABULARY:

reduce - to make smaller in any way such as size and weight.

ADVANCE PREPARATION:

Gather materials and supplies.

PROCEDURE:

Setting the Stage

Blow up a balloon and release the air. Did the balloon become smaller? Was it reduced? What happened to make the balloon smaller? Discuss the concept of reduction as it relates to waste. Remind the students that there is still a balloon even though it is smaller.

Activity

Compare a two-quart package of pre-sweetened powdered drink mix to a two-quart container full of a drink.

1. Mix powdered drink mix with water in a reusable pitcher.
2. Consume both drinks.
3. Compare the waste from the powdered drink mix (packet) and the two-quart container.
4. Also discuss if either of these products is necessary. Ask the students: Do you need the drink mix or is water acceptable sometimes, too?

Follow-Up

1. Have students make a waste reduction shopping list. List common items purchased each week and give waste reduction suggestions for each item.
2. Have students identify specific products with reusable containers that have refills that may be purchased in smaller containers.
3. Discuss what will happen to our earth if we don't begin to reduce.

Grades:

K-2

Subjects:

Science, Math

Time Needed:

30 minutes

Materials:

balloons
two-quart beverage
two-quart powdered drink mix
pitcher
spoon to mix
equal arm balance
two empty 8-ounce cans
one empty 16-ounce can

EXTENSIONS:

1. Demonstrate that purchasing large containers reduces waste. Use an equal arm balance and compare the weight of two empty eight-ounce cans with one empty 16-ounce can, all made from the same material. Remind students that it takes less metal to make the 16-ounce can than two eight-ounce cans. Also it is usually cheaper in the long run to purchase the larger container.
2. Have students check at home to see what types of products the family uses to reduce waste.
3. Pour the same amount of Kool Aid into different sized and shaped containers (both reusable). Have the students guess which container holds the most liquid. Show the students that both containers hold the same amount by measuring the contents. Discuss buying the one with less waste.

ORIGINAL DEVELOPMENT RESOURCES:

Goodman, B. (1990). *A kid's guide to how to save the planet*. New York, NY: Byron Preiss Publications, Inc.

OBJECTIVES:

The student will be able to:

1. Observe and identify the difference between degradable and non-degradable wastes.
2. Understand the importance of recycling and its impact on landfills.
3. Classify garbage items as disposable, recyclable, or compostable.

BACKGROUND:

More than 75 percent of our trash ends up in landfills. In the past, landfills were just big holes dug for burying the trash. Today's modern sanitary landfills must meet strict state and federal requirements. They are now lined with clay or plastic and then filled with garbage so that waste does not pollute nearby land and water.

VOCABULARY:

compostable - organic materials that will break down or decompose naturally and can be used as an organic fertilizer to enrich the soil.

disposables - products designed to be thrown away after use; will be incinerated or sent to a landfill.

landfill - a large outdoor area designed for waste disposal. Sanitary landfills are lined with plastic and covered with earth to prevent garbage from polluting the surrounding land and water.

recyclables - useful materials from garbage and waste that are used again and reprocessed

reduce - to make smaller in any way such as size or weight

reuse - to use again for the same or different purpose

ADVANCE PREPARATION:

1. Collect needed materials for making a mini landfill.
2. Collect some household garbage: kitchen scraps, newspaper, grass clippings, leaves, plastic, aluminum items, paper products, glass items.

PROCEDURE:

Setting the Stage

Lead class in a discussion of what happens to items at a landfill. Have students outline the steps of what happens to garbage from the time they dispose of it until it goes into the landfill. Let students predict what will happen to various types of items once placed in a landfill (paper, food scraps, plastic, glass, aluminum). Record these on a chart.

Activities

1. Construct a mini landfill from two two-liter bottles. See diagram.

Grades:

K-2

Subjects:

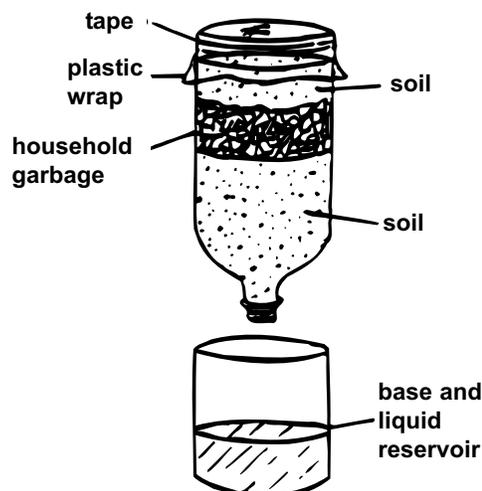
Science, Language Arts

Time Needed:

50 minutes

Materials:

two two-liter plastic soda bottles
scissors
potting soil
household garbage



2. Cut off bottom of one bottle. Next cut top half off of other bottle to form the base and liquid reservoir.
3. Fill upper bottle about half full of soil. Add household garbage. Cover garbage with more soil. Sprinkle soil with water and cover top with plastic wrap.
4. Place the mini landfill in a warm place for ten days to a month. (Students can observe mini landfill during this time.)
5. Then empty the contents of the jar onto a newspaper and examine the garbage. Have students confirm or reject their previous predictions about each type of garbage.

Follow-Up

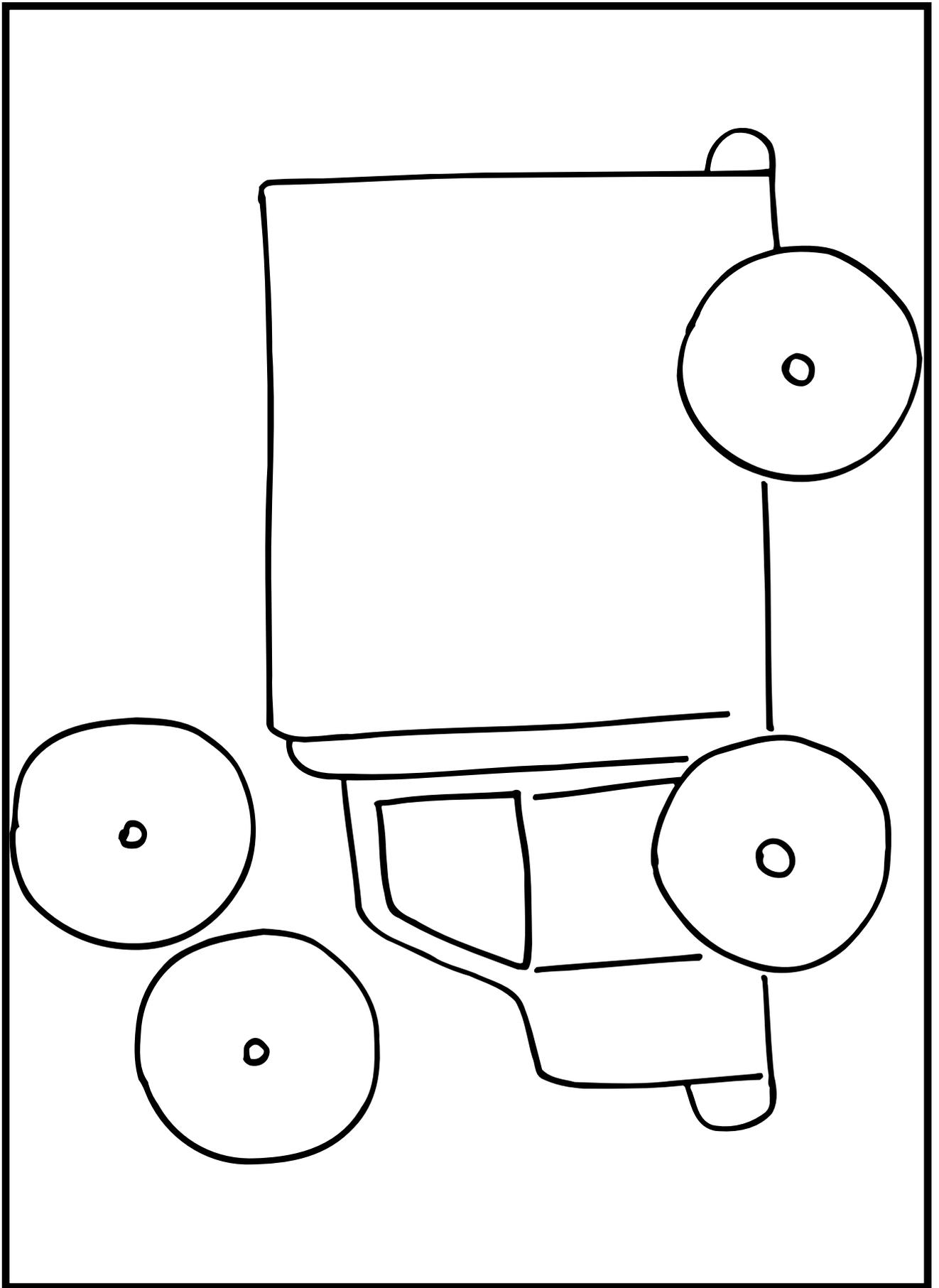
As a whole class activity, have students classify household garbage into categories of disposable, recyclable, or compostable. Identify ways people can reduce materials sent to landfills based on these categories.

EXTENSIONS:

1. Test which environment is best for decomposition to take place. Take four baggies and fill each half full of soil. Then add one banana peel to each and cover the banana peel with soil. Place one baggie at room temperature away from the sun and to the remaining three baggies add water and moisten the soil. Place one baggie in the refrigerator, one baggie in the sun, one baggie at room temperature but away from sun, and one baggie in a closet or cabinet. Re-examine contents of baggies in a week to ten days.
2. Get into three groups.
 - Group 1 makes a list of all recyclable products on the truck pattern provided.
 - Group 2 makes a list of reusable products on another truck pattern.
 - Group 3 makes a list of all reducable products on another truck pattern.
3. Students collect and sort different recyclable products (cans, paper, glass).
4. Students discuss how they can reuse products listed.
5. Purchase a plastic truck.
 - Write reduce, recycle, reuse products or facts on slips of paper.
 - Read the fact. If it is true place it inside the plastic dump truck. If the fact is untrue throw it away.
 - Display in a center for children to review.

ORIGINAL DEVELOPMENT RESOURCES:

Bottle Biology Resources Network, (1990). University of Wisconsin-Madison. Found at:
<http://www.sbwater.org/uploadedFiles/sbwater/education/BottleBiology.pdf>



Notes

OBJECTIVES:

The student will be able to:

1. Observe how plants recycle.

BACKGROUND:

Some items we consider to be waste can be used to grow plants, rather than being sent to the landfill. These plants benefit the environment in other ways as well. They add oxygen to the atmosphere and produce new, useful vegetation. Students should learn to consider plants as recyclable and renewable resources that can also produce usable products such as food.

ADVANCE PREPARATION:

Teacher will gather an assortment of seeds or pits or vegetable parts and containers for plants and potting soil. (Students could be asked to save these, too, and bring them to school.)

PROCEDURE:

Setting the Stage

Lead a class discussion on what might happen to some of our kitchen waste when it is discarded. The teacher might want to bring some different types of fruit as a snack so students can consume the fruit and see the waste leftovers.

Activities

Plant seeds or plant parts as a whole group activity or in cooperative groups. Some suggestions are as follows

1. Carrot top in water: Cut about 1" - 1 1/2" off the top of the carrot. Fill shallow bowl 2/3 full of washed pebbles (could use salad containers from fast-food restaurants). Place carrot top on pebbles. Add water to the level of the pebbles and maintain this level at all times. Soon the tops will sprout.
2. Pineapple in water: To separate the top from the fruit, hold the fruit firmly in one hand and twist the leafy head with the other. The top should come right off. (This only works if the fruit is very ripe. You may have to cut off if fruit is green.) Remove the lower leaves until the stump is about 1 1/2" long. Place top in a glass of water and change water weekly. When roots are 3"-4" long, transplant to a pot.
3. Beans/Peas: Soak dried beans overnight in water. Plant seeds about 1/2" in moist potting soil using a salad container from a fast-food restaurant. Now place the lid on the container and set in a sunny window. When the seeds begin to grow, remove the plastic lid.
4. Oranges, Lemons, Grapefruit: Soak seeds overnight in water. Plant seeds about 1/2" in moist potting soil using a salad container from a fast-food restaurant. Now place the lid on the container and set in a sunny window. When the seeds begin to grow, remove the plastic lid.
5. Sweet Potato: Cut off three inches of the end of a sweet potato. Place toothpicks around the other end. Fill a quart jar with water, and place the potato in the jar using the toothpicks to support the potato around the jar opening.
6. Other seeds, such as avocado or mango seeds, can also be grown. Avocados can be grown in water like the sweet potato. Mango seeds need to be planted.

Follow-Up

1. Divide students in cooperative groups according to the food items used in the project.
2. Have them predict what they think will happen to their item over the next ten days. (Some may take more

Grades:

K-2

Subject:

Science

Time Needed:

45 minutes and a few minutes daily for observing and recording for ten days

Materials:

seeds, pits, vegetable or fruit parts
potting soil
containers for plants
water

than ten days.) They may write or draw their prediction.

3. Allow students to observe and record changes in their plant over the next ten days.
4. Let each group report its observations to the class to confirm or reject its predictions.

EXTENSIONS:

1. If possible, schedule a tour of a local grocery store's produce department. The teacher may wish to purchase more unusual or exotic types of fruit to introduce students to different foods.
2. Have students diagram and label the parts of their plant.
3. Have students in groups come up with original tongue twisters describing natural recyclables.
Ex. 1) Pollution Pete picked up a peck of paper particles.
Ex. 2) Reliable Ron replanted a row of recycled radishes.
The group that receives the best response from classmates get to take home all recycled plant projects

ORIGINAL DEVELOPMENT RESOURCES:

Goodman, B. (1990). *A kid's guide to how to save the planet*. New York, NY: Byron Preiss Visual Publications, Inc.

OBJECTIVES:

The student will be able to:

1. Identify common household items that are recyclable.
2. Explain the process of making recycled paper.

BACKGROUND:

By recycling paper, we can greatly reduce the amount of solid waste that has to be dumped or incinerated. It has been estimated that paper forms about a quarter of the weight of garbage in household garbage cans. It also is a significant part of office and school waste. Over a third of the total weight of solid waste in the United States is made up of paper in one form or another. Recycling paper not only reduces the amount of paper disposed of in landfills, but it also helps save a valuable natural resource - trees.

ADVANCE PREPARATION:

Gather all supplies for making paper.

PROCEDURE:

Setting the Stage

Discuss with class where paper comes from - trees. Explain why we should recycle paper. Show different examples of paper, colored paper, textured paper.

Activities

To make paper from paper :

1. Tear (do not cut) newspaper into 2 cups of very small pieces. Add 1 cup of hot water and stir for three to five minutes. Use a blender for best results.
2. Add liquid starch and stir three more minutes. Slowly pour paper pulp on screen and move pulp around until screen is covered.
3. Lift screen and let drain for a few seconds. Then place it on a piece of cloth and on a section of newspaper. Place another piece of cloth on top, and then put a second section of newspaper over it.
4. Press the excess water out by rolling the jar over the newspaper. Take off the top newspaper, turn the cloth sandwich over, and take off the top piece of cloth and the screen.
5. Let recycled paper dry for two hours then gently pull off cloth. Let recycled paper dry overnight before writing on it.

Follow-Up

1. Write a class letter on the recycled paper to an elected government official asking for support on environmental issues.
2. Write a letter to nursing home patients on recycled paper.
3. Have students write or dictate the sequence of steps involved in making recycled paper.
4. Check your final paper product to find out if it is symmetrical. Fold the paper to see if the ends meet neatly.

Grades:

K-2

Subjects:

Science, Language Arts

Time Needed:

60 minutes

Materials:

piece of window screen attached to an old picture frame
pan larger than screen
spoon
3 Tablespoons liquid starch
jar
two pieces of cloth 8"X10"
two sections of newspaper
two cups of hot water
blender

EXTENSIONS:

1. Visit a local newspaper office to see how newspapers are printed.
2. If there is a paper plant in the area, tour the facility to see how paper is made.
3. Have students survey local businesses to see how many participate in paper recycling.
4. Start or help with paper recycling in the school.
5. Have a small clean garbage can. Children break into groups. Find recycling facts in the books. After writing important facts on small sheets of paper, wad up the paper and throw them in the trash can.
Discuss: don't throw away that piece of paper - recycle it. Whenever you have a few minutes, before lunch etc, pull out a wadded sheet of paper and read the fact. Use them for games etc.

ORIGINAL DEVELOPMENT RESOURCE:

Dees, L., & Force, B.A. (1987). *Alabama pals litter education activity guide*. The Center for Environmental Research and Science, Troy State University.

OBJECTIVES:

The student will be able to:

1. Discuss how trash items can be used for other purposes.
2. Perform basic math operations using “trash” manipulatives.

BACKGROUND:

Learning basic math operations is a vital skill for young children. Math concepts should be presented to young children using real manipulative materials. There is an abundance of trash items available to teachers and students. Use them to teach creativity. This activity will actively involve students in the learning process by engaging them in collecting the teaching materials as well as using them as part of the learning experience.

VOCABULARY:

recyclables - useful materials from garbage or waste that are used again and reprocessed

ADVANCE PREPARATION:

1. Have students and their parents collect and send plastic six-pack rings. Also needed are small trash items that can be used as counters: buttons, bottle tops, seeds, beans, packing “peanuts.”
2. Cut rings into sections of two or three for teaching addition. If teaching multiplication, leave the six-pack rings together.

PROCEDURE:

Setting the Stage

Tell students that they will be using the six-pack rings and other small trash items to do some math problems. Discuss what can happen to aquatic animals if six-pack rings are thrown in the water. Animals can swallow them or catch body parts in them. Always dispose of properly and cut the rings.

Activities

These manipulatives can be used to teach three basic math concepts depending on the learning level of the students.

1. Addition with Two Addends - Facts to 18
Cut rings into sections of two. Write an equation such as $7 + 3$ on the board. Students will then fill each ring with the correct number of counters (7 and 3). Then tell students to count them together to get the answer ($7 + 3 = 10$). Students may work in pairs. One student can make up and write the equations while the other uses the manipulatives to solve them.
2. Addition with Three Addends - Facts to 18
Cut the rings into sections of three. Follow the above procedure using three addends instead of two. The teacher can direct the students to turn their rings horizontally or vertically depending on how the equations are written.
3. Multiplication Facts
Leave the six-pack ring together to do multiplication facts through the sixes. Write a multiplication fact,

Grades:

K-2

Subjects:

Math, Science

Time Needed:

45 minutes

Materials:

10-20 plastic six-pack drink rings
trash items to be used as counters:

old buttons

seeds

dried beans

packing “peanuts”

bottle tops

paper

pencil

such as 3×4 , on the board. Tell students to place sets of three counters into four rings. Then have them count the total number of items: $3 \times 4 = 12$. Do this several times as a group. Students may then work in pairs. One student can make up and write the multiplication equations while the other uses the manipulatives to solve them.

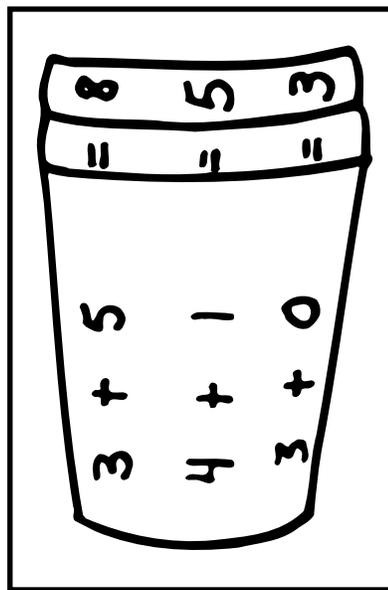
4. Use six-pack rings for sorting various items: shells, rocks, etc.

Follow-Up

1. Place rings and counters in a math center. Have students formulate their own addition or multiplication equations and record them using these manipulatives.
2. Have students make up and write word or story problems. Share them with the class. Students can then solve the problems using their “trash manipulatives.”

EXTENSIONS:

1. Use six-pack rings for other classroom activities such as art. Create circles and patterns to make designs or pictures. For example, draw six rings in a line to make a caterpillar. Make a flower from circles. Draw one in the middle and surround it with five or six other circles to form the petals. Use markers or paint to add features, color, or on background. Cut the rings before disposing.
2. Stack two styrofoam cups. Label the outside cup with a series of math facts. Label the rim of the inside cup with the corresponding answers. A student restacks the cups so that the facts and answers correspond.



ORIGINAL DEVELOPMENT RESOURCES:

Original idea by Lynn Libell, Tuscumbia City Schools, Tuscumbia, AL.

OBJECTIVES:

The student will be able to:

1. Explain the importance of recycling materials into usable items.
2. Demonstrate different rhythms and beats and create his/her own music.

BACKGROUND:

Each day we discard and dispose of many items that with a little creativity could be used to teach sounds and rhythm. It's easy to "recycle" household items into great teaching tools that allow children to engage in many fun music and art activities.

VOCABULARY:

rhythm - a beat that accompanies music

ADVANCE PREPARATION:

Gather many assorted materials that students can use to make their own instruments.

PROCEDURE:

Setting the Stage

Lead a class discussion on musical sounds and rhythm. Consult music books about native American drums and African instruments.

Activity

Construct several instruments from materials considered to be trash.

1. **Yogurt Cup Shakers:** For each shaker, you will need a clean empty yogurt cup, hot glue gun, popcorn kernels, dried beans, gravel, sand, small shells, or other small items. Use a yardstick, ruler, wooden spoon, or a paint stirrer for a handle. If the handle isn't wide enough to seal the cup's opening, cut from strong cardboard, a cover to fit. Pour various amounts of different materials into the yogurt cup and shake it until you find a sound you like. Hot glue the cup to the handle. If you are using a cardboard cover, glue that to the cup first. Then glue the cardboard to the handle.
2. **Bottle-Cap Tambourines:** For each tambourine, you will need a strong Y-shaped branch, about a dozen metal bottle caps, and strong wire. If desired, remove the rubber liners from the caps by heating them for 5 minutes on an outdoor grill. Flatten the caps with a hammer. Then use a nail to punch a small hole in the center of each cap. Thread the caps onto the wire and string tautly between the arms of the Y.
3. **Box Harp:** For each box harp, you will need a small box with lid (decorate if you wish). Use a craft knife to cut an oval hole in the lid. For a bridge, fold a strip of cardboard into a triangular prism and cut four notches along the top. Glue the bridge in place below the hole. Slide four rubber bands of different widths over the box and into the bridge notches.
4. **Coffee Can Bongo:** Use a can opener to remove both metal ends from the can. Replace with the plastic lid or a balloon. Cover the outside of the can with colorful paper and decorate with paint, crayons, sequins, or other items.

Grades:

K-2

Subjects:

Music, Science, Art

Time Needed:

60 minutes

Materials:

yogurt container
glue, hot glue gun
dried beans, popcorn, sand, shells,
aquarium gravel
rulers, paint sticks
bottle caps
strong wire
Y-shaped branch
hammer, nail
small box with lid
craft knife
rubber bands with different widths
coffee can with plastic lid
can opener

Follow-Up

1. Have a trash tune parade in the school halls or on the playground
2. Use the instruments to accompany a variety of types of music: jazz, blues, folk, popular, Native American and African rhythms.

EXTENSIONS:

1. Have students write a Trash Tunes Rap that features each instrument.
2. Correlating sound waves to water levels. Use identical drinking glasses each filled with increasing levels of water. Have students tap each glass with a metal spoon, then ask students to write or tell of the observations of sound and water levels.
3. Make decorative items from recycled materials for a nursing home.

ORIGINAL DEVELOPMENT RESOURCES:

Whitemore, K. (1996, March). Music makers. *Family fun magazine*. pp.70-76

OBJECTIVES:

The student will be able to:

1. Turn disposable items into creative entertainment for themselves.
2. Identify disposable items and suggest ways to use them for fun and enjoyment.

BACKGROUND:

Outer space holds many wonders for children of all ages. We can get there quickly by using our imaginations and recycling some disposable household items. Often the items we consider disposable may be valuable tools for teaching and learning, or self expression through creativity.

ADVANCE PREPARATION:

Gather supplies. Cut space helmets from milk jugs. Hot glue two two-liter bottles together. Make constellation templates from poster board.

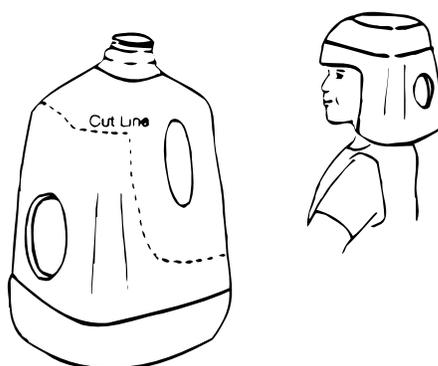
PROCEDURE:

Setting the Stage

This activity may be used with a space unit or perhaps as a follow-up to a reading story about stars, planets, astronauts, or space shuttles.

Activities

1. Using a utility knife or sharp scissors, cut a space helmet from the milk jug in the shape shown in the illustration. Decorate the helmet with discarded items, bread ties, seeds, shapes cut from old notebook covers, Styrofoam packing, peanuts, film canisters, pipe cleaners.



2. Construct an oxygen back pack using two two-liter bottles, yarn, and plastic beverage rings. Begin by hot gluing the two-liter bottles together, side-by-side, to form the life support back pack. Cut the beverage rings down the center to make two sets of three rings. Connect these with yarn until you achieve the proper length to form shoulder straps for back pack.

Grades:

K-2

Subjects:

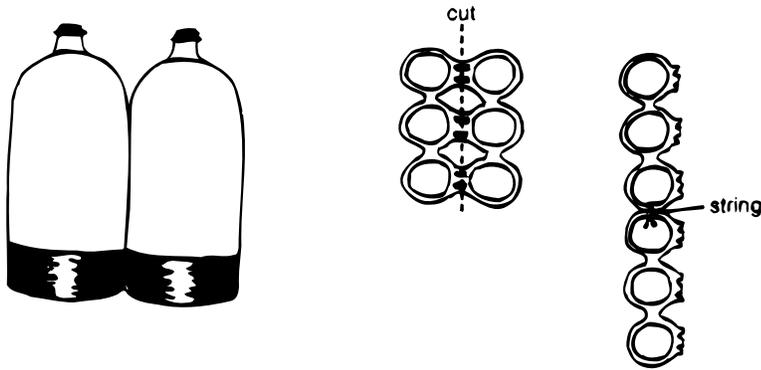
Science, Art

Time Needed:

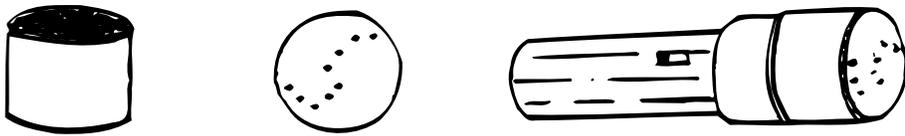
60 minutes

Materials:

utility knife
glue
hot glue
scissors
one-gallon milk jug
two two-liter bottles
several beverage rings
yarn
vienna sausage can
nail
hammer
poster board template of constellations
standard flashlight
miscellaneous decorative materials



3. To construct a constellation can, you will need: a vienna sausage can, nail, hammer, and teacher-made template of constellations. Place clean can open end down and then place constellation template on the bottom of the can. Gently hammer nail through can at the points where stars are in the constellation. Most standard flashlights will fit the can opening. Turn off lights and view your constellation. Discuss the shapes of the constellations. Add the number of stars in the constellations. Name the constellation with the most stars. Find the constellations that have an even number of stars, and odd number of stars.



4. Do in groups. You are going to travel in space. You don't have much room in your space shuttle, therefore you can only pack things you need in order to live. What will you take with you?

Follow-Up

1. Discuss transportation today and a long time ago. Explain how travel today has connected us to the world geographically and economically.
2. As a whole class or as a cooperative group, write an activity and act out a space adventure. You may wish to select planets in our solar system to visit, or others may choose a space fantasy.

EXTENSIONS:

1. Create a space travelling machine from an appliance box to add to the excitement of space travel.
2. Display the importance of recycling air for space travel. Use a stopwatch to time and chart the length of time students can hold their breath. Discuss the importance and methods for recycling air on a space ship. Teacher may need a little research of their own to adequately handle student questions.

ORIGINAL DEVELOPMENT RESOURCES:

Williams, R., Rockwell, R., & Sherwood, E. (1987). *Mudpipes to magnets: A preschool science curriculum*. Mt. Ranier, MD: Gryphon House.

OBJECTIVES:

The student will be able to:

1. Define composting.
2. Create soil from composting
3. Construct compost in a container.
4. Observe changes that will happen to the compost pile during the school year.

BACKGROUND:

Landfills in Alabama are filling up fast. Residents are encouraged to recycle newspapers, cans, glass, and plastics. Landscape recycling is an important way to save landfill space. Lawn clippings and tree trimmings comprise 30% of the material being dumped into our landfills. Through the process of composting we can help Mother Nature recycle in our own backyard. This economical way of recycling produces rich soil for our backyard gardens, which contain important nutrients and help the Earth in many ways. Bacteria in the compost piles break down organic matter. The organic matter consists of grass clippings, leaves, flowers, weeds, twigs, fruits, vegetables, etc.

VOCABULARY:

compost - a mixture of plant and food waste used to fertilize the soil

decomposition - to decay or rot from a process of microbial action

bacteria - microscopic, one-celled organisms. Most act as decomposers.

organic - formed from living matter

ADVANCE PREPARATION:

1. Obtain a scrap bucket or medium-sized garbage can.
2. Drill holes in the bottom for drainage.
3. If composting is done inside the classroom provide a container to catch drainage.
4. Collect scraps for composting

PROCEDURE:

Setting the Stage

1. Brainstorm definition of composting.
2. Ask students what they think can be composted and what can't.
3. Question students on benefits of composting to the environment.

Activity

1. Fill a scrap bucket with 1/3 dirt.
2. Add a few vegetable and fruit scraps (no meat or dairy products). Chop scraps into small pieces for faster decomposition.
3. Add leaves, grass clippings, and flowers.
4. Add more dirt to the bucket.
5. Turn the mixture with a spoon every few days and keep it damp by spraying it with water. Make sure the top of the mixture is always covered with dirt each time the mixture is turned over.

Grades:

K-2

Subjects:

Science, Math

Time Needed:

One Hour

Additional time will be needed for maintenance and observations.

Materials:

seeds

bucket

scraps (grass clippings, leaves, vegetable and fruit).

6. Eventually the food mixture will disappear. This will be compost and now is ready to use for planting. It will look like soil.
7. Plant seeds.

Follow-Up

Discuss the following questions;

1. Why is composting important? The more we compost the less garbage we will have. Fact: More than one-fourth of the discards headed for the landfill can be composted.
2. How can you tell when the compost is finished? When it looks like rich dark soil.
3. How does composting help the Earth? Composting puts important nutrients in the soil. It extends the life of a landfill. It's nice to know you are helping Mother Nature.

EXTENSIONS:

1. Expand into larger composting areas at your school.
2. Refer to "Wiggling Willy" in Learning Through Legacy (K-2).
3. Try adding other materials such as shredded newspaper, coffee grounds, and egg shells. Experiment to see which decomposes first.
4. Locate the landfills nearest your school. Refer to "We're Down in the Dumps" in Learning Through Legacy (3-5) which contains a landfill map. Refer to "Backyard Composting" in Learning Through Legacy (3-5).
5. Measure height of the materials in the bucket. Measure weekly and compare as matter begins to decompose.
6. Check the prices of potting soil. Analyze the amount of money that can be saved yearly by composting.

ORIGINAL DEVELOPMENT RESOURCES:

"Composting : Feed Your Landscape". Cooperative Extension Service. The University of Georgia.