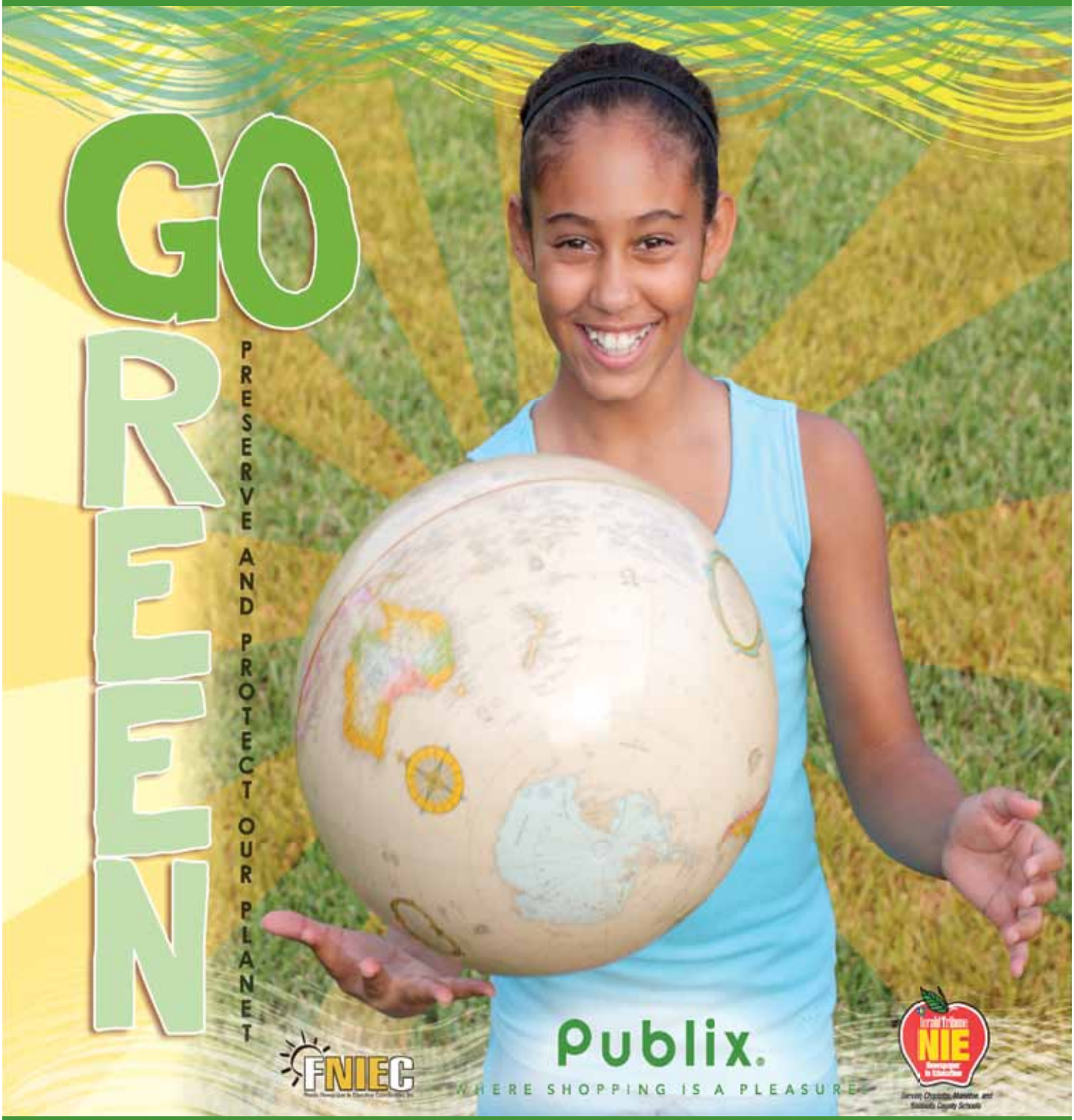
TEACHER'S



GUIDE

Go Green!

Table of Contents

DUMPSTER DIVING

Time Estimate: ~1-1.5 hour

Materials:

- *Several Days Before:*
  - Distribute letter for parents and Recycling in the Home
  - Piece of plastic for sorting recycling materials
  - Hand sanitizer
- *Recycling categories* handout (2-sided)
- *Green's Family Trash* handout x (2-sided)
- Recycling category signs

Teacher Preparation:

- Several days before you do this activity, ask students to bring in trash from home:
  - Give students Parent's Letter which informs the parent about the activity, gives an idea list of what to bring in, and how to "prepare" the items to bring into class.
  - Discuss that they will bring in 1-2 items that they think are recyclable.
  - Discuss that these items should be clean and dry.
- Several days before doing this activity purchase hand sanitizer and plastic (shower curtain liner or plastic paint dropcloth are inexpensive options)
- Copy the *Recycling in the Home* to take home to parents.
- Copy the *Recycling Categories* handout.
- Copy the *Green's Family Trash* graphing handout on page 4-5 to distribute to students.
- Create 8 ½ x 11 signs for each recycling category: plastic, aluminum, glass, paper, cardboard, cartons/drinkboxes & non-recyclables.

Objective:

To utilize and improve students' math, comprehension and writing skills by using recycling as an important environmental theme.

Background:

Recycling preserves our natural resources, conserves energy, prevents pollution and protects our environment. Many of the items that we throw in the trash could be reused or recycled. The US only recycled 6% of our trash in 1960. Today we recycle 31% of our trash. (National Energy Education Development Project, Museum of Solid Waste, 2006). In Palm Beach County, households and businesses recycle more than 130,000 tons of recyclable materials per year. What happens to these items? The Solid Waste Authority sorts, processes and sells them, earning back money for the county. Aluminum cans are sold, reprocessed and can appear back on a store shelf as a new aluminum can in about 60 days. High-grade paper can be recycled into envelopes, writing paper and office paper. Recycled plastic can be used to make a variety of products including t-shirts, carpets, recycled plastic containers, hoses, plastic lumber, street signs, pens, recycling bins, fiberfill for sleeping bags, notebooks and many more products. Newspaper can be reprocessed for newsprint as well as many other products (insulation, tarpaper, roofing shingles, and animal bedding).

Vocabulary:

Conservation – The controlled use and/or maintenance of natural resources; various efforts to preserve or protect natural resources
Environment - The sum of conditions affecting an organism, including all living and nonliving things in an area, such as plants, animals, water, soil, weather, landforms, and air
Pollution - Any alteration of the natural environment producing a condition harmful to living organisms.
Recycling – The collection and often reprocessing of discarded materials for reuse.
Styrofoam - A brand of expanded plastic made from polystyrene.

Procedure:

Day One:

- Distribute the Parent's Letter and the Recycling in the Home handout.
- Have a class discussion about recycling: What does recycling mean? Why is it important? Discuss items that are recycled and what they reprocessed into.
- Go over types of items to bring into class and how to prepare them.

Day Two (several days later):

- Distribute the *Recycling Categories* handout to the class.
- Place the plastic on the floor in a large vacant area of the room. (Clear desks out of the way, if necessary.)
- Have the students bring their trash items and gather around the plastic.
- Using the *Recycling Categories* handout, identify and brainstorm the different categories of recyclables.
- Have a few students place the recycling category signs around on the plastic.
- Ask students one at a time to place the trash that they brought in a category. Confirm how the students sorted each item: "Do you agree with where the item was placed? If not, what category does the item belong in: plastics, aluminum, glass, paper, cardboard, cartons/juice boxes and non-recyclables?"
- Once all items are placed into a category, have the class count the number of recyclables in each category. Write this information on the board as it is determined.
- Distribute the *Green's Family Trash* handout to the class – Students can work alone or in groups.
  - Side One of Handout - Students will answer questions based on the data from the Green family's garbage. If the students haven't worked with graphs recently, review graphs and terms such as mean, mode, range, etc.
  - Side Two of Handout – Students will graph their own data (using the Green family graph as a reference, if necessary). After graphing they will write a paragraph about their data.

References

The American Heritage® Dictionary of the English Language, Fourth Edition. Houghton Mifflin Company, 2004. 20 Jul. 2007.

The Solid Waste Authority of Palm Beach County, Florida. http://www.swa.org/.

Recycling Categories

Paper Products

Newspaper

Magazines

Catalogs

Telephone Books

Paper Grocery Bags

Plastic Containers

Plastic Containers #1-7

Glass

Glass Bottles and Jars

Aluminum

Aluminum Cans, Foil, and Pie plates

Cartons & Drink Boxes

Milk and Juice Cartons

Drink Boxes

Cardboard

Corrugated Cardboard

Go Green!

Can be recycled at Publix or Publix Greenwise Market

Plastic Grocery Bags

Styrofoam

Do Not Recycle these items

In Palm Beach County, the following items can not be recycled in your yellow and blue bins:

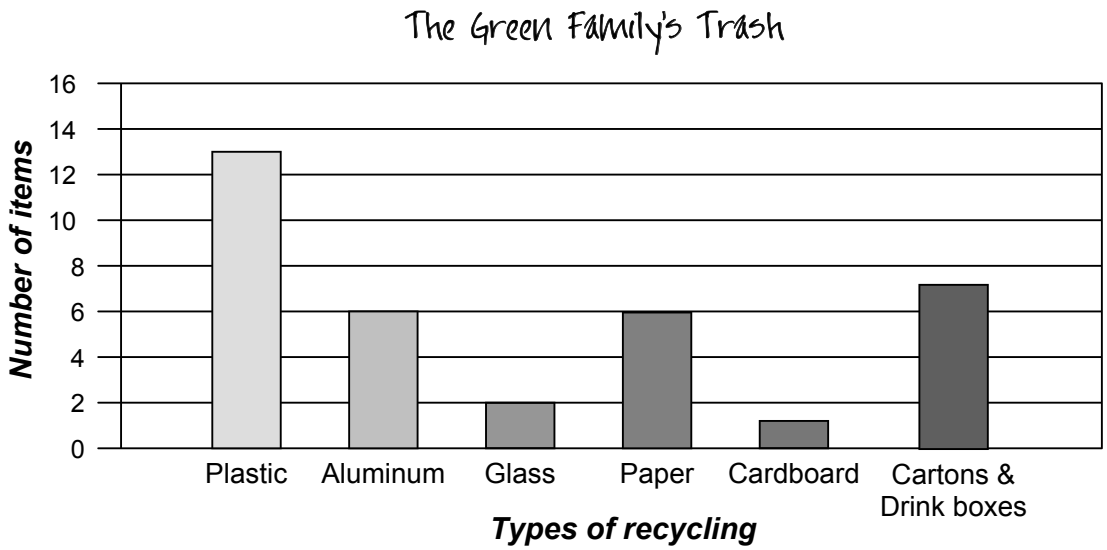
Junk Mail

Cereal Boxes

Tin Cans

Name _____

The Green family examined their trash and found that they were throwing many items in the garbage that could be recycled. The bar graph below shows 6 categories of recyclables that they found in the trash, and the numbers for each category. Using the bar graph below, answer the questions.



1. Which type of recyclable was most common in the Green family's trash?
   - (A) Plastic
   - (B) Aluminum
   - (C) Paper
   - (D) Cardboard

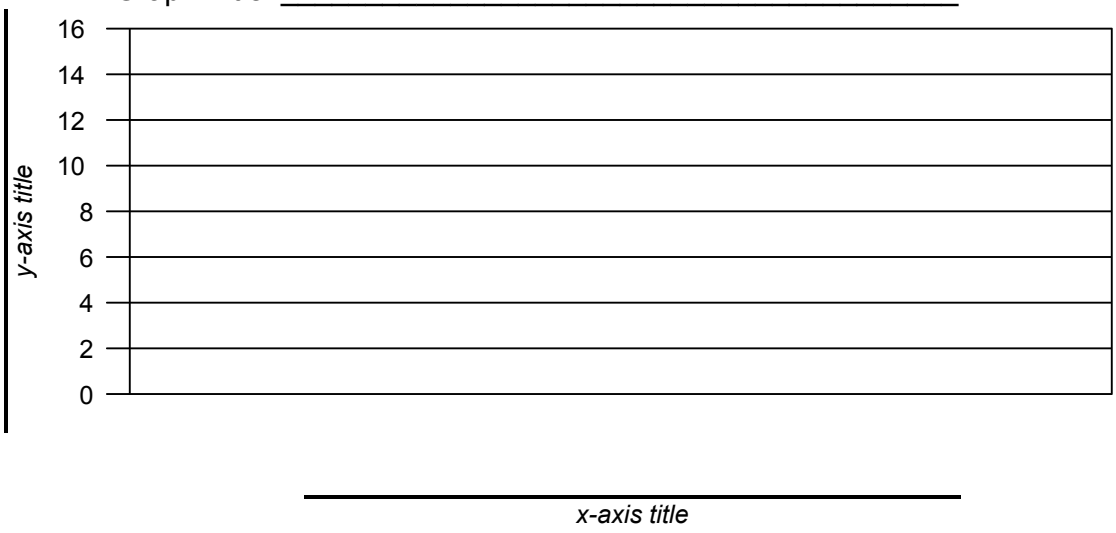
2. What is the range of the items recycled by the Green family?
   - (A) 4
   - (B) 6
   - (C) 12
   - (D) 13

3. What is the mode of the items recycled by the Green family?
   - (A) 2
   - (B) 6
   - (C) 7
   - (D) 8

4. How many more plastic items than cardboard items were there?
   - (A) 10
   - (B) 11
   - (C) 12
   - (D) 13

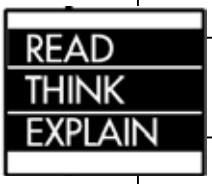
Using the recycling data that you collected in class and create a bar graph below similar to the graph of the Green family's trash. Make sure to give your graph a title and to label the x- and y-axis.

Graph Title: _____



5. In the space below, discuss the data you collected.

- What category did your class have the most of?
- What category did your class have the least of?
- Compare your class data to the Green family's data?



Dear Parent/Guardian,

We are currently studying recycling in class. As part of this unit, we are asking students to bring in 1-2 clean recyclables from home. This assignment is designed to help students learn that recycling preserves our natural resources, conserves energy, prevents pollution and protects our environment.

In class, the students will categorize the items that they bring in and graph their results.

Your child will require some assistance in gathering these items and ensuring that they are washed out and dry. Please assist him/her in finding items that are recyclable. A list of possible items has been attached on the ***Recycling in the Home*** handout. Please do not send in items from the "household hazardous waste" category in the green box or any items with sharp edges. We encourage you to post this handout in a place that you and your family will see it. This will remind you what and where to recycle.

Thank you for your cooperation with this activity. Please contact me should you have questions/concerns regarding this assignment. The recyclables need to be brought in on _____.

Sincerely,

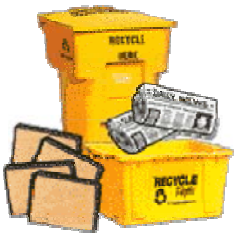
Recycling in the Home

What can you bring to Publix or Publix Greenwise Market to recycle?

- Plastic Bags
- Styrofoam Egg Cartons & Trays

Solid Waste Authority in Palm Beach County recycles:

Paper products go in your yellow bin. These include:



- Newspaper
- Magazines
- Catalogs
- Telephone Books
- Corrugated Cardboard
- Paper Grocery Bags

Recyclable containers go in your blue bin. These include:

- Plastic containers #1-7
- Glass Bottles and Jars
- Aluminum Cans, Foil, and Pie Plates
- Drink Boxes
- Milk and Juice Cartons

DO NOT RECYCLE: Please be careful NOT to place the following in your bin:

- Junk Mail
- Cereal Boxes
- Plastic Grocery Bags
- Tin Cans
- Styrofoam
- Food Waste

DO NOT PLACE THE FOLLOWING ITEMS IN YOUR GARBAGE OR YOUR RECYCLING BINS:

Where to Take Household Hazardous Waste - http://www.swa.org/pdf/hhw_matrix.pdf
These items can be taken to drop-off locations in Lantana, Delray Beach, Jupiter, Royal Palm Beach and West Palm Beach:

- Rechargeable Household batteries
- Automotive Batteries
- Used Oil
- Oil Filters
- Antifreeze
- Fluorescent Lamps
- Propane Cylinders
- Electronics
- Paints, Stains, Thinners
- Pesticides
- Cleaners
- Flares
- Acids
- Caustics
- Corrosives
- Pool Chemicals
- Fuels - gasoline, diesel
- Solvents

EGGCEPTIONAL PACKAGING!

Time Estimate: ~ 1 hr

Materials:

- Three different types of egg cartons
- Eggs, one per group of 4-5 students
- Bucket
- Measuring tape
- Tape
- Glue
- Creative packaging materials, such as:
  - Disposable cups
  - Cotton balls
  - String
  - Rubber bands
  - Resealing plastic baggies
  - Styrofoam
  - Foam rubber
  - Bubble wrap (6" squares)
  - Balloons
  - Corrugated cardboard
  - Plastic grocery bags
  - Coffee cans
  - Newspaper

Teacher Preparation:

- Purchase eggs in three different types of packages: Styrofoam, plastic, and cardboard.
- Gather Materials on the materials list. This may take several days to gather.

Objective:

Students will understand the role that packaging plays as a way to keep our food fresh and as protection. They will also understand that while some packaging can be recycled, too much packaging can be wasteful.

Background:

Nearly all products use some kind of packaging, from the point of manufacture to use by the consumer. When we are choosing a product for purchase, we should consider not only the product itself, but also the type of packaging used. There is a variety of materials available to package the many products we use. Packaging is important for freshness, sanitation, and protection from damage (during transport, handling, etc); on the other hand, a product's packaging inevitably becomes waste. Consumers have the responsibility to make environmentally friendly choices, when possible, opting for products that reduce waste. Such products lack excessive, non-biodegradable, or non-recyclable packaging. As we have seen, when we purchase eggs there are a few packaging options available to us, and there are environmental considerations for each type of egg carton, but most importantly the packaging needs to protect the eggs.

Vocabulary:

Pollution - Any change of the natural environment producing a condition harmful to living things.
Recycling – The collection and often reprocessing of discarded materials for reuse.
Reduce - To use less.

Procedure:

- Hold an egg (in a sealed bag) above your head. Ask the students what will happen if you drop it. Hopefully they will suggest that the egg will break. Drop the egg.
- Ask the class why the egg broke. Guide them towards the fact that it had no protection.
- Ask the class how they buy eggs at the store.
- Show the class the three cartons of eggs. Ask if they know what each is made from.
- Discuss the pros and cons of each: Does each carton provide the same amount of protection? How can each carton be recycled?
- Discuss the issues involved in product packaging: Point out the importance of packaging for freshness, sanitation, and protection from damage (during transport). Have the students give examples of packages that they know and how each provides for freshness, sanitation and protection. What are the pros and cons of each discussed. (Examples – Freshness and Sanitation: sealed in a plastic bag – Pro: the bag keeps the item fresh for a long time, Con: Not recyclable and when thrown in the trash, it takes a long time to break down. Protection: Large amounts of bubble wrap – Pro: can be reused, Con: if thrown in the trash, it takes a long time to break down.
- Some things to consider about packaging when you go to the store:
  - Buy products in the largest size you can use. Examples: Cereal in large boxes rather than single size servings. Juice and other beverages in gallons or half-gallons not small individual bottles. Raisins in a large box rather than single serving box. Kids will be able to give lots of examples of similar products.
  - Whenever possible, shoppers should buy products in recyclable containers, and be sure to recycle them.
- Make sure that students understand that too much packaging inevitably becomes waste.
- Divide the class into groups of 4-5 students. Explain that each group will work together to design packaging for an egg. Each group will test the egg-protecting potential of their design in an experimental egg drop.
- Show the students the supplies that they can choose from to create their packaging.
- Have the students brainstorm about the best type of packaging.
- Once the groups have a strategy, give an egg to each group and have them collect the supplies that they will use for their experiment. Remind students that there should be no intentional egg dropping before the experiment.
- Give the groups about 20 minutes to create their packaging. If needed, they may obtain additional supplies.

Procedure (continued):

- Before the egg-drop, gather the students around and have each group discuss their packaging. What did they use? Why do they think this is the best? You may even have the class rate all of the packaging. Whose will work best? And see if their hyptheses are correct.
- For the egg-drop, place the bucket next to a wall. Measure and mark off a point 1 foot above the bucket.
- With the class observing, drop each egg in its packaging from the point marked into the bucket.
- For the eggs that didn't break, discuss the packaging. Which one does the class feel is the best? Why?

References

Lesson adapted from:
http://www.tnengineering.net/eweek/Demonstrations/Egg%20Drop%20Demonstration.pdf
and
http://www.stanford.edu/group/sciencebus/Lessons/2005%20Winter%20Science%20Olympics/Lesson%20Plan%20for%20Egg%20Drop.doc.

Egg Drop results: http://pbskids.org/zoom/activities/sci/eggdrop.html

Packaging information: http://www.earth911.org/master.asp?s=lib&a=shopsmart/shop.inc

MAKING PAPER

Time Estimate: - 2 days, 1-1 ½ hours each day

Materials:

For every 12-15 students:

- About 50 sheets of white photocopy paper from your recycling bin
- About 12 sheets of colored photocopy paper or uncoated gift-wrap paper
- 2 wooden frames that are flat across their top surfaces (5" x 7" picture frames work well)
- fiberglass or plastic screen (available at hardware stores)
- staple gun or tacks
- dishpan
- blender
- Disposable kitchen cloths (Handiwipes, for example); 1 cloth for 2 sheets of new paper
- Sponge
- Several Buckets
- stack of old newspapers
- Paper enhancements: food coloring, potpourri, dried flowers, dried herbs and spices, seeds, thread, lint from the dryer, etc.
- A packet of plain gelatin (needed if you're making stationery)

Teacher Preparation (1– 2 hours):

- Several days in advance of doing this activity, start saving newspapers, white recycled paper and colored paper scraps.
- Gather materials on the materials list. The plain gelatin will "size" the paper, making it more usable by preventing ink from bleeding.
- Make the mold and deckle in advance. Take your two picture frames and remove the glass and backing from both. (Or make your own frames out of wood.) To make the mold, stretch the screen tightly over the surface of one of the frames, and attach the screen to the back of the frame with a staple gun or tacks. The second frame will be used as the deckle, which makes the sheet of paper the desired size.
- Gather several items to demonstrate reuse. For example, coffee cans, cat litter buckets (you can use these for the paper soaking!), cloth napkins, glass jars, egg cartons, etc.

Objective:

Students will understand that many items that we throw away on a daily basis can be reused to make something useful. Students will learn how to make paper out of old newspapers, rather than throwing them in the trash or recycling them.

Background:

According to the Environmental Protection Agency (EPA), during the past 35 years, the amount of waste each person creates has almost doubled from 2.7 to 4.4 pounds per day. The most effective way to stop this trend is by preventing waste in the first place. Reusing products that we would otherwise throw away or recycle is a great alternative because the item does not need to be reprocessed before it can be used again. According to the Energy Information Agency, paper is the number one material that we throw away. For every 100 pounds of trash we throw away, 35 pounds is paper. Newspapers take up about 14 percent of landfill space, and paper in packaging accounts for another 15 to 20 percent.

Vocabulary:

Recycling – The collection and often reprocessing of discarded materials for reuse.
Reuse – To use something again without reprocessing it.

Procedure:

Day One:

- Discuss the 3 R's with the students: Reduce, Reuse, Recycle. In the first lesson, students learned about recycling. In the second lesson, students learned about reducing the amount of packaging by making smart choices. In this lesson, they will learn about ways that they can reuse items.
- Show the class the items that you've brought in to demonstrate reuse. Ask them to share ideas about what each item could be used for.
- Show the students the recycle paper bin in the class. Ask the students what will happen to that paper. What if it wasn't recycled, where would it go?
- Discuss that for every 100 pounds of trash we throw away, 35 pounds is paper.
- Ask the students what paper is used for when it is recycled. (It is turned into other paper products.)
- Discuss with the students that rather than recycling or throwing the paper away, it can be reused. For example, you can make your own paper!

Papermaking instructions

- Have the students tear paper into pieces the size of quarters (do not cut) and put them in a bucket. Used white photocopy paper is the best material to start with for the pulp base; avoid newsprint and glossy paper. Rip the copy paper into small pieces, roughly an inch square. Soak the pieces overnight in a bucket of water. Rip assorted sheets of colored paper into small pieces, and soak them separately. A good ratio to begin with is four times as much white paper as colored paper. Colored photocopy paper and uncoated gift-wrap paper are good choices, but glossy, brightly colored magazines can be used in small amounts for accents.
- Add warm water to cover the paper and soak overnight in buckets.

Day Two:

Making the Pulp

- Put a handful of the soaked white paper into the blender. Add warm water to fill the blender about three-quarters full. Blend for up to a minute until the mixture has a consistency something like that of oatmeal. (If the mixture is not blending well, or if the motor is straining, add more water, or remove some paper.) Repeat this process four times to form the batch of basic pulp.
- Dump the pulp into a large, deep dishpan, and swirl the pulp around with your hands. You'll probably have to add more water at this point; the mixture should be about 90 percent liquid.
- Dissolve a packet of gelatin in hot water, and stir the gelatin into the pulp mixture so that ink won't bleed on your paper.
- Now lightly blend your soaked colored paper for about ten seconds. Don't overblend - you want the colored paper to appear in your paper as confetti-like accents. Alternatively, you may add other materials or food coloring directly to the pulp, or you can add textures on top of the pulp after forming a sheet. For example, you might want to add some wildflower seeds on top of the paper. Cards made with seeds can later be planted by the recipients to create flower gardens.

Making the paper

- Always stir the pulp just before dipping the mold and deckle into it. Hold the mold with the screen facing up. Place the deckle upside down on top of the mold so the smooth sides of the frames face each other.
- Grasp the mold and deckle securely and lower them vertically into the dishpan.
- Immediately bring the mold and deckle to a horizontal position under the pulp and lift them straight up, allowing the pulp to cover the screen.
- Don't let the pulp collect too thickly on the screen - thinner paper turns out better! Let the excess water drip off for about two minutes. You can rest the mold and deckle on a corner of the dishpan while the water is draining. If you want to add seeds or other adornments to the top of the paper, now is the time.
- Set up a drying space where the handmade paper can be left overnight. Place one-half of a disposable kitchen cloth on top of several sheets of newspaper.
- Lift off the deckle. Turn the mold over onto the cloth so that the pulp side is down. With a sponge, soak up the water from the back side of screen. Gently pat the screen to soak up the water; don't wipe it. Make sure to sponge well around the edges. Squeeze the water out of the sponge into a small container or back into the pulp pan. Keep soaking up the water until you see the paper separating from the screen. Starting at one corner, gently remove the mold.
- Repeat the above process to make as many sheets of paper as you like.
- Let your paper dry undisturbed overnight. When it's dry, gently peel off the kitchen cloth from each sheet of paper, starting at one corner. If a sheet isn't dry on the reverse side, turn it over and let it finish drying. When all the sheets are completely dry, stack them and place heavy books on top of the stack for a couple of days to press the sheets flat. (To speed up these last steps, you can iron partially dry paper between two kitchen cloths at a medium temperature.) After the sheets have been pressed, they'll be ready for display or to be made into cards or other objects.

Cleaning up

- Paper fibers can clog your drain, so do not throw any leftover pulp into the sink. Instead, recover it! Use the mold to strain the pulp from the water. Cover the drain in the sink with the mold, and pour the remaining pulp over the screen. Remove the pulp from the screen before it's full. Dry the leftover pulp and place it back in your recycling container.

References

Paper-making instructions adapted from:
http://www.exploratorium.edu/exploring/paper/handmade.html
EPA's Reduce, Reuse, and Recycle - http://www.epa.gov/msw/reduce.htm
Energy Information Agency Recycling Paper & Glass -
http://www.eia.doe.gov/kids/energyfacts/saving/recycling/solidwaste/paperandglass.html

Other Paper Making Resources

Papermaking Facts - http://www.abundantforests.org/gifts.html
Instructions for making paper beads -
http://www.tappi.org/paperu/art_class/paperBeads.htm

EVERY LAST PENNY

Time: Two 30-45 minute classes.

Materials:

- 200 pennies
- piece of coal, or photo of coal/ coal mining
- toy pinwheel
- data sheet
- 4 3-oz plastic cups per pair of students
- permanent markers
- construction paper
- glue
- markers or crayons
- scissors
- shoe boxes (one per group of 4-5 students)

Teacher Preparation (20 minutes):

- Gather materials listed.
- Prior to the class, hide 200 pennies around the room. Make sure that some are hidden in very obscure places.
- This website give great information about renewable vs. nonrenewable. You may want to review prior to teaching the lesson: http://www.eia.doe.gov/kids/energyfacts/index.html

Objective:

This lesson focuses on the difference between renewable and nonrenewable resources, with emphasis on resource availability and depletion. The activity simulates the ever-increasing difficulty of finding nonrenewable energy resources.

Background:

Fossil fuels, such as natural gas, oil and coal, come from the accumulated remains of ancient plants and animals. Because this organic material takes millions of years to replenish, fossil fuels are considered nonrenewable energy resources. Since fossil fuels are limited in supply, it is important that we find clean, renewable alternatives to meet our energy needs.

Vocabulary:

Conservation – The protection of resources and using them carefully.
Energy – A source of usable power.
Nonrenewable resource – An energy resource that takes millions of years to form.
Renewable resource – An energy resources that can be replaced in a person's lifetime.
Resource – Things that people use to meet their needs.

Procedure:

- Start the class by asking: What is energy? How do we get it? What are some different sources (electricity, gasoline, batteries, wind, solar)? How do we use it everyday?
- Show the class a piece of coal (or photo of coal/coal mine) and ask for student volunteers to tell what it is and what it is used for. Lead the students to classify it as a source of energy that must be burned in order to release energy. Point out that many of our electrical power plants generate electricity from burning coal.
- Demonstrate the movement of the pinwheel by blowing toward it. Again, ask students to identify the source of the energy. (If they say "you," be sure to translate that into "wind" or "nature.") Also, ask how the pinwheel uses the wind
  - — how it is captured or harnessed. Students should be able to recognize that the shape of the pinwheel creates the rotation when a current of air strikes it. (For a graphic of a wind machine: http://www.eia.doe.gov/kids/energyfacts/sources/renewable/wind.html).
- Ask students to suggest which one of the energy sources is more likely to run out of its supply. In comparing the two energy sources, students should explain why they think one will likely run out and the other is not likely to run out. Label the two energy sources: nonrenewable (coal) and renewable (wind).
- Explain the definitions of nonrenewable vs. renewable.
- Brainstorm with the students for other sources of energy. As they come up with each, ask them to categorize it as either renewable or nonrenewable. Some examples of Nonrenewable resources would be: Oil (petroleum), Natural Gas, Coal and Uranium (nuclear). Some examples of renewable resources would be: Solar, Wind, Geothermal, Biomass, Hydro and Ocean (tides, waves, currents). If student guess electricity, you can explain that electricity actually is made from another kind of energy and therefore it is a secondary energy source.
- Tell the students that tomorrow they will be doing an activity to learn about nonrenewable vs. renewable resources.
- **Craft Project – Making a Power Plant:** Arrange students in groups of 4-5. Pass out the shoeboxes, markers or crayons, construction paper, scissors, glue and have the student decorate their power plants. Students can brainstorm in their group to come up with a name for their new power company.

Day Two:

- Arrange students into their groups of 4-5 and hand out the data sheet, plastic cups, and markers. Have them label the cups 1 through 4. Tell them that they are going to be searching for a nonrenewable source of energy (such as the coal discussed the day before) symbolized by pennies hidden throughout the classroom.

- Tell the students that they will have at least four 30-second opportunities to find pennies. After each search, they will count, record, and deposit the pennies into a cup (one labeled for each search). The cup of pennies is their energy for the power plant. Have them place the cup inside the shoebox.

- At the end of their four searches, they should make a bar graph and analyze their data.

- When the paired groups have completed the data sheet, ask for volunteers to share their results. Once a few pairs share similar results, lead the class in a discussion. Through the data, students should be able to deduce that due to a limited supply to begin with, the search yielded smaller returns each time.

- You may want to extend the activity beyond the fourth search if you know there are still pennies left. Searching to the exhaustion of the resource will drive home that message that once a nonrenewable resource is gone, it is gone forever (or at least a very long time!).

- Extend the discussion on renewable and nonrenewable energy sources, connecting the search for pennies to the search for nonrenewable energy sources.

References

Vocabulary Definitions: *Measuring Up to the Florida Sunshine State Standards.* Peoples Education, Inc. Saddle Brook, NJ. 2008.

Lesson adapted from:
http://www.alliantenergykids.com/stellent2/groups/public/documents/pub/phk_001458.pdf

Energy Information Administration– Nonrenewable vs. renewable resources – Kid's Page:
http://www.eia.doe.gov/kids/energyfacts/index.html

Name_____

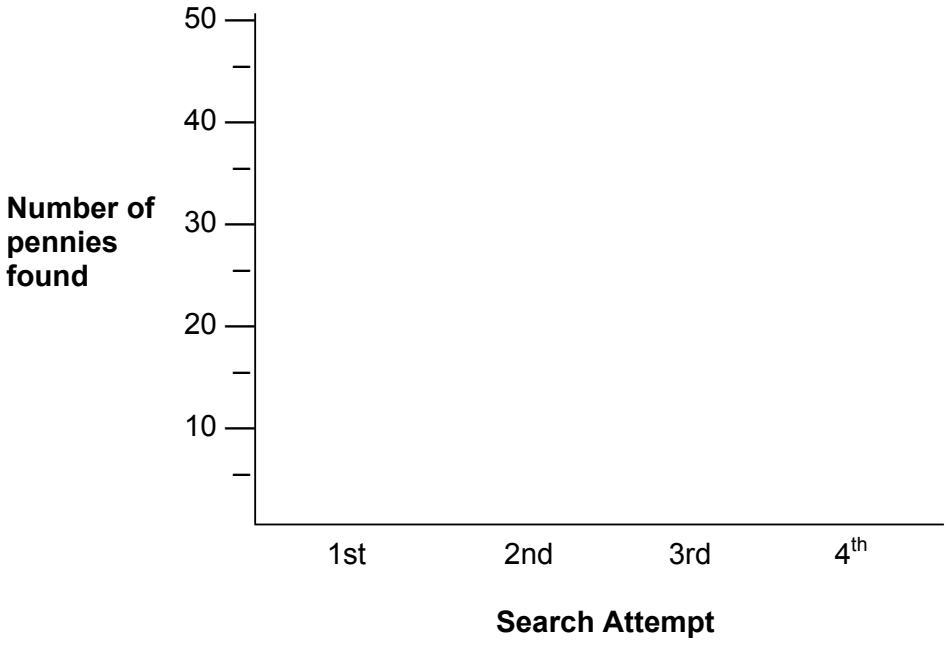
Every Last Penny

Pretend you have been hired to find sources of natural gas, coal or oil. Natural gas is used to heat many homes and operate many appliances such as stoves and dryers. Coal is often used to generate electrical power, which we use throughout the day. Oil is used to make gasoline and other fuels, which we use everyday to fuel cars, trains and airplanes.

Natural gas, coal and oil are called fossil fuels, because they come from the remains of dinosaurs and ancient plants that existed thousands of years ago. When they died and became buried deep in the earth, the heat and pressure of the earth's layers gradually transformed them into coal, natural gas, and other energy sources, such as oil. Fossil fuels are sometimes called "nonrenewable" energy sources because once we find them and use them, they are gone forever!

In this exercise, you will be asked to search for pennies (let's pretend those pennies are coal deposits) in four 30-second sessions. After each search, you will count the pennies, record the total in the area below, and deposit them in the correctly numbered cup. After the fourth search, recount each cup of pennies one at a time, and make a bar graph to show the number of pennies you found in each search.

First search	Second search	Third search	Fourth search



Questions about your penny data:

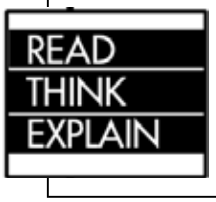
1. Look at your graph. In which search did you find the most pennies?

_____

2. What is the range of your four searches?

_____

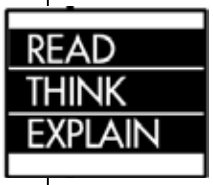
3. Why do you think it became increasingly harder to find pennies?



_____

_____

4. If you were really searching for coal, what does your graph data tell you?

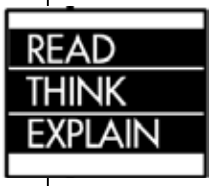


_____

_____

_____

5. What would a real power plant have to do if they ran out of their nonrenewable resource?



_____

_____

Teacher Answer Key

1. Student answers will vary based on the data collected. The expectation is that the largest quantities will be found during early searches
2. Student answers will vary based on the data collected.
3. Student answers should include that students found the easiest-to-find-pennies first. With each search there were fewer pennies.
4. Student answers should include that because coal is a non-renewable resource, as we continue to keep mining for coal, it will become increasingly more difficult to find it.
5. Student answers should include that they would have to look for other forms of energy, preferably from renewable sources.

Mission: Conservation

Time Estimate:

Day 1 – Classtime – ~30 minutes
Day 2 - ~45 minutes -1 hour

Materials:

- Energy and Water Scavenger Hunt Handout (2 – sided)
- Letter to parents
- Family Energy and Water Conservation Plan Handout

Teacher Preparation:

- Make copies of:
  - Energy and Water Scavenger Hunt Handout (pages 3-4)
  - Parent Letter
  - Family Energy and Water Conservation Plan Handout

Objective:

To utilize and improve students' math skills while using water and energy conservation as important environmental themes. By completing the home water and energy scavenger hunt, students will understand and identify ways to conserve water and energy at home.

Background:

Most homes install energy and water efficient fixtures when they are built. However, older homes may still have fixtures that use more energy and water. Local energy and water companies explain ways in which you can conserve home energy and water use on their websites. Also, EnergyStar (http://www.energystar.gov/) is a government program that helps conserve energy. Appliances, home electronics, and other items that have the EnergyStar logo save energy.

Vocabulary:

Conservation – The controlled use and/or maintenance of natural resources; various efforts to preserve or protect natural resources

Procedure:

Day One:

- Review Lessons One and Two from the Energy and Water Conservation Module
- Have a class discussion about water and energy use: Ask student how they use water and energy at home. Make a list on the board.
- Explain to the students that they will do a scavenger hunt at home to see how their family uses water and energy.
- Distribute the Parent's Letter and the Energy and Water Scavenger Hunt handout.
- Explain the scavenger hunt to the students.

Day Two (several days later):

- Go over the results with the students.
- For the water results, make a list on the board of all the student's responses for total number of gallons per person. How different is the data? How similar is the data? If a student has a really low number, see if they can figure out why. (i.e.They live in an apartment and don't have a lawn to irrigate.)
- Break the data into several ranges with the class. For example, if the class data ranges from 100-500 gallons per day, make 4 groups. Make a bar chart on the bar using the class' data: How many student fall within the 100-199 category? 200-299? 300-399? 400-500?
- Now go over each individual question. As you go over the questions, ask the students what they can do to save water or energy relating to that particular question. For example, for shower use, you would encourage shorter showers (and not less showers!). For brushing teeth, don't leave the water running, and so on.
- Write these conservation ideas on the board as they come up with them.
- Pass out the Family Water and Energy Conservation Plan and have them write the ideas that they think will most benefit their family based on the information that they collected on their scavenger hunts. Have the students work in groups or alone.

References

Lesson adapted from Energy Hog Scavenger Hunt:
http://www.energyhog.org/adult/educators.htm

Name _____

Energy Scavenger Hunt

This is a scavenger hunt to explore your home's energy use. Search your home to find the answers to the questions below. Then add up your energy points to discover how energy efficient your household is.

1) How many compact fluorescent light bulbs (CFL's) can you count in you home?
   a) No CFL bulbs (2 points)
   b) 1-4 CFL bulbs (4 points)
   c) 5 or more CFL bulbs (6 points)

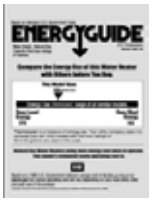
1) How many *Energy Star* labels can you find on your home's appliances and electronics (***Hint:*** Look at appliances in kitchen, washer/dryer, AC, home electronics, etc?
   a) No *Energy Star* labels found (2 points)
   b) 1-2 *Energy Star* labels found (4 points)
   c) 3 or more *Energy Star* labels found (6 points)

2) How often do you turn off the lights when you leave a room?
   a) Never (2 points)
   b) Sometimes (4 points)
   c) Always (6 points)

3) At what temperature do you wash your laundry?
   a) Hot (2 points)
   b) Warm (4 points)
   c) Cold (6 points)

5) At what temperature do you set the thermostat in the summertime when you are at home?
   a) 74 degrees or less (2 points)
   b) 75-77 degrees (4 points)
   c) 78 degrees or more (6 points)

6) How often do you turn the temperature up when no one is home?
   a) Never (2 points)
   b) Sometimes (4 points)
   c) Always (6 points)



7) Find the Energy Guide on your home's water heater and look at the efficiency rating.
   How much energy does it use compared to similar models?
   a) Uses the most energy (2 points)
   b) Uses average amount of energy (4 points)
   c) Uses the least energy (6 points)

Total Points: _____	**14-27 You can make some easy changes in your home to become more energy efficient.** **28-42 Wow! Your family is doing a great job!**

Water Scavenger Hunt

This is a scavenger hunt to explore your home's water use. Ask each person in your household the following questions. Their answers do not have to be exact; just ask them for their best guess. For each question, write their answers in the table. Then use their answers to solve the math problem. For each question, circle and use the first number if you have standard fixtures and the second number if you have water-efficient fixtures.

4) How many minutes a **day** does each person spend in the ***shower***?

Person	#1	#2	#3	#4	#5	Total minutes water used in shower
Minutes		+	+	+	+	=

_____ x 7 / 2.5 gallons per minute = _____ gallons x 7 days = _____ gallons
Total minutes — circle one — Total daily shower water

2) How many times a **day** does each person flush the ***toilet***?

Person	#1	#2	#3	#4	#5	Total flushes
Flushes		+	+	+	+	=

_____ x 6 / 1.6 gallons per flush = _____ gallons x 7 days = _____ gallons
Total flushes — circle one — Total daily toilet water

3) How many minutes a **day** does each person run the ***faucet*** to brush teeth, shave, wash hands and face?

Person	#1	#2	#3	#4	#5	Total minutes water is running
Minutes		+	+	+	+	=

_____ x 3 / 2 gallons per minute = _____ gallons x 7 days = _____ gallons
Total minutes — circle one — Total daily faucet water

4) If your household uses a dishwasher, how many times a **week** do you run the ***dishwasher***?

Household	Total
Loads	=

_____ x 15 gallons per load = _____ gallons
Total weekly Loads in dishwasher

5) How many **loads of laundry** does your family do in a week?

Household	Total
Loads	=

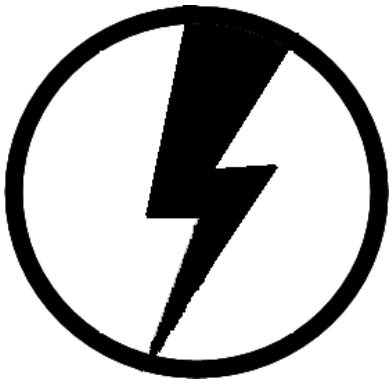
_____ x 40 / 25 gallons per load = _____ gallons
Total weekly laundry loads

6) How many minutes per week does your family irrigate your lawn?

Irrigation	Total
Minutes	=

_____ x 45 gallons per minute = _____ gallons
Total weekly Minutes irrigating lawn

Total weekly water use: _____ gallons ÷ _____ = _____
Number of people in family — Total number of gallons per person per family

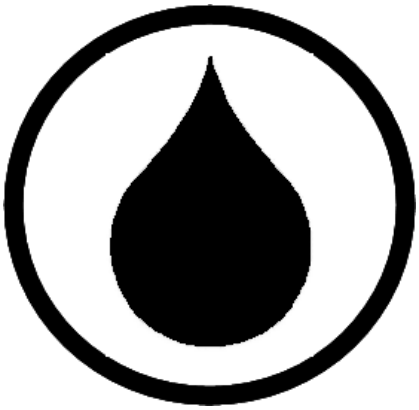


Dear Parent/Guardian,

We are currently studying energy and water conservation in class. As part of this unit, we are asking students to do a scavenger hunt for energy and water use at home. This assignment is designed to help students understand how water and energy are used in the household, and steps their families can take to conserve.

In class, the students will discuss and compare results. The information students obtain through the scavenger hunt will be used to help each of them develop a water and energy conservation plan for their own household.

Your child will require some assistance in gathering this information. Please assist him/her in answering the questions on the Water/Energy Scavenger Hunt handout. When your child brings home his/her Energy and Water Conservation Plan, we encourage you to post this in a location where the entire family can see it.



Thank you for your cooperation with this activity. Please contact me should you have questions/concerns regarding this assignment. This survey needs to be completed by

_____.

Sincerely,

The _____ Family's Energy and Water Conservation Plan

We will try to reduce our home's energy and water use by doing the following:

- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____

COMPOST CRITTERS

Time Estimate: 2 days for ~45 minutes-1 hour each day

Materials:

- Compost Critter Cards
- Yarn for food web
- Compost Pile Food Web Story Handout

Teacher Preparation (30 minutes):

- Copy the Compost Critter Cards and cut out. You may want to paste these onto card stock or just print them on card stock. If you have more than 24 students, you can assign more than one student to the organic material. If you have less than 24 students, give more than one card to a student and have them hold one card in each hand.
- Print the Compost Pile Food Web Game rules and checklist.
- Copy the Compost Pile Food Web handout (2-sided).
- To speed up the game, you may consider pre-cutting your yarn into 4-6 foot lengths. ~ 54 total pieces
- You may want to review the information at: http://www.css.cornell.edu/compost/invertebrates.html. This website gives a detailed overview of what happens in the compost pile.

Objective:

Using composting as the environmental theme, students will improve reading and writing skills as well as learning that all living things are connected in complex relationships within an ecosystem.

Background:

DAY ONE - Food Chain: The Food Chain shows how living things get the energy that they need to survive.

- Plants are called **producers** because they are able to use light energy from the Sun to produce food (sugar) from carbon dioxide and water.
- Animals cannot make their own food so they must eat plants and/or other animals. They are called **consumers**. There are three types of consumers:
  - Some animals eat only plants. They are called **herbivores** or, **primary consumers**.
  - Some animals eat other animals. They are called **carnivores**.
    - Carnivores that eat herbivores are **secondary consumers**.
    - Carnivores that eat other carnivores are **tertiary consumers**.
- **Decomposers** (bacteria and fungi) are also an important part of the Food chain because they feed on decaying matter. Decomposers speed up the decaying process releasing nutrients back into the food chain for absorption by plants.

DAY TWO - Compost Pile Food Web: When discussing the food web of the compost pile, explain that the consumers are also playing a role as decomposers because they are all breaking down the organic material in the pile. In the compost pile, primary consumers eat only organic matter. Primary consumers include: bacteria, molds, fungi, earthworms, and sow bugs. Secondary consumers eat organic matter and primary consumers. These include: springtails, mold mites, roundworms, beetle mites, and protozoa. Tertiary consumers are flesh eating predators that eat other organisms: centipedes, rove beetles, ants, and predatory mites.

Vocabulary:

Consumer – Living things that feed on other living things for food.
Decomposer – Living things that get energy by breaking down decayed plants or animals.
Food chain - Transfer of energy along one path as one animal eats another.
Food web (food cycle) – The interconnected feeding relationships in a food chain
Producer – Living things that make their own food from sunlight, water and air.

Procedure:

DAY ONE -

- Ask the students if they have ever heard of the food chain. Explain that it is the transfer of energy from one organism to another.
- Have students give examples of some food chains that they know about. Help them along by asking leading questions. (Examples: Plant→caterpillar→Bird→Cat; Plant →Deer →Panther; phytoplankton → small fishes → seals → killer whales). Write examples on the board .
- Discuss the Food Chain as detailed in the Background section.
- Have the students help you label the examples on the board as producers (energy source), primary consumers, secondary consumers & tertiary consumers.
- Explain that some creatures can be categorized into multiple levels if they eat many types of organisms.
- Explain that all of these examples are very visual food chains that you can see. Discuss fallen leaves and trees? What causes them to break down?
- But that in nature, there are some examples that you can't see because the organisms are very small. Explain that they will play a game to take a closer look at some of these food chains.
- Pass out the Critter Cards to the class and discuss the rules for the Compost Pile food web game.
- Follow the Compost Pile Food Web Game Rules on page 3.
- Once your food web is complete, have a discussion of the food chain vs. food web. From one critter down to the organic material is a food chain and the entire complex relationship that the class created is the food web.

DAY TWO -

- Pass out the Compost Pile Food Web story worksheet.
- Discuss that the previous day they learn about the complicated food web that takes place in the compost pile. Like the hydrologic cycle which recycles water, decomposition recycles nutrients into soil, so they can be used again.
- Have students work alone or in groups to complete the worksheet.
- Review the answers as a class.

References

Vocabulary Definitions: *Measuring Up to the Florida Sunshine State Standards.* Peoples Education, Inc. Saddle Brook, NJ. 2008.

Composting Information: http://www.css.cornell.edu/compost/invertebrates.html.

Teacher's Answer Key to the Compost Pile Food Web Story:

1. B
2. C
3. Decomposition is important because plants rely on the nutrients that they receive as a result of decomposing material.

Compost Pile Food Web Game

You will need a large area to play this game.
The strings of yarn between students represent the flow of energy.

1. There are 24 cards. If you have more than 24 students, make several students Organic Material. If you have less than 24 students, have one or more students take two cards and make sure they are critters that don't eat more than one or two other organisms.
2. Pass out the cards to the students. Each student will get one (or two, if necessary) card. One card represents Organic Material – the base of the compost pile food web. The remaining cards will each be a different organism that needs to survive in the Compost Pile web of life. The cards indicate what the organism eats and a fun fact about that organism. Each card indicates their consumer level.
3. Review the behavior rules of the game with the students:
   - do not pull on the string,
   - do not let go of the string unless the teacher tells you to,
   - hold onto your own card, and
   - hold it so that everyone can see what organism you are.
4. Start with the organic material. Ask "Who has the card with Organic Material?" That student will come up and read their card.
5. Now the teacher will ask "Who has a card that says they are a primary consumer (this will also include primary-secondary AND primary-secondary-tertiary?" Have these students all gather in one area. There will be 14 students.
6. Following the list in order on the next page, call on each student one at a time. As the student comes up, the organic material will give that student energy (yarn from the skein). Students should walk about 4 feet away from the other student. If you haven't precut the yarn, you will need to cut the yarn. The student will then say what level consumer they are, a fun fact about that consumer and if they eat anything else besides organic material. If yes, have that organism give them energy (yarn) and cut. Check off each organism as they read their card.
7. Now ask for the secondary consumers (3 students) to raise their hands. Call on the secondary consumers in order according to the list on the next page. As each student comes up, ask them to read what level consumer they are, a fun fact and what they eat. Have the organism(s) that they eat pass them energy (yarn) and cut. Check off each organism as they read their cards.
8. Now ask for the secondary-tertiary consumers (6 students) to raise their hands. Call on the secondary-tertiary consumers in order according to the list on the next page. As each student comes up, ask them to read what level consumer they are, a fun fact and what they eat. Have the organism(s) that they eat pass them energy (yarn) and cut. Check off each organism as they read their cards.
9. Now all students should be connected by the "food web," and many will be connected more than once. Discuss what the students see as they look at the web.

Compost Pile Food Web Checklist

Numbers indicate the number of strings that organism will need when they pass their energy onto the organisms that eat them. Check off each item as the student reads the information on their card.

ENERGY SOURCE

___Organic Material (14 – All Primary, Primary-Secondary, Primary-Secondary-Tertiary)

PRIMARY, PRIMARY-SECONDARY, PRIMARY-SECONDARY-TERTIARY CONSUMERS

___Fungi (8 – All Secondary & Springtails, Ants, Roach, Fungus Gnat, Nematodes)

___Bacteria (2 – Roach, Nematodes)

___Earthworms (2- Centipedes, Pseudoscorpians,)

___Slugs and snails (1 – Ground beetle)

___Sowbugs (1 – Wolf Spider)

___Ant (1 – Ground Beetle)

___Millipede

___Soldier Fly (3 – Rove beetle, Ground beetle, Spider)

___Fungus gnat (3 – Rove beetle, Ground beetle, Spider)

___Sap beetle (1 – Spider)

___Scarab beetle (1 – Spider)

___Roaches

___Nematodes (4 - Rove beetle, Pseudoscorpians, Springtails, Predatory mites)

___Springtails (2 - Centipedes, Predatory mite)

SECONDARY CONSUMERS

___ Mold Mite (4 - Rove beetle, Centipede, Pseudoscorpians, Predatory mites)

___ Beetle Mite (4 - Rove beetle, Centipede, Pseudoscorpians, Predatory mites)

___ Feather-winged beetle (1 – Spider)

SECONDARY-TERTIARY CONSUMERS

___ Predatory Mite (1 – Pseudoscorpian)

___ Rove Beetle (1 – Spider)

___ Centipede

___ Pseudoscorpians (1 – Spider)

___ Ground Beetle

___ Wolf Spider

The Compost Pile Food Web Story

Who ate my lunch?

Don't just toss that apple core into the garbage! Recycling food waste by composting reduces garbage going into landfills *and* the nutrients are returned to the soil. So what happens to your apple core in a compost pile? Under the right conditions, composting speeds decomposition, the process of turning your apple core, into a nutrient-rich organic material that plants can use. Just like we need nutrients to grow, plants and animals also need nutrients to grow.

The food web of the compost pile is made up of millions of tiny organisms, and they all take part in the decomposition process. Your apple core has nutrients and energy that can be used by each organism in your compost pile.

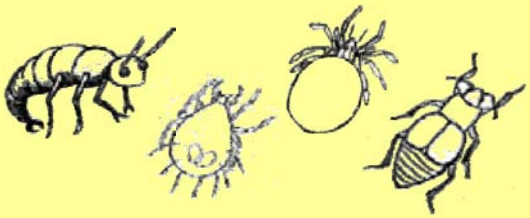
Primary Consumers:

Primary consumers eat only organic matter (living and dead plants and dead animals). Some primary consumers include: Bacteria, fungi, earthworms, and sow bugs.

Bacteria

fungi

earthworms *sow bugs*



Springtails *mold mites* *beetle mites* *feather-winged beetles*

Secondary Consumers:

Secondary consumers eat organic matter and first level consumers. Some secondary consumers include: springtails, mold mites, beetle mites, and feather-winged beetles.

Tertiary Consumers:

Tertiary consumers are predators that eat other organisms. Some tertiary consumers include: centipedes, rove beetles, ants, and predatory mites.

centipedes

rove beetles

ants

predatory mites

Life in the Compost Pile

In a compost pile, small living things feed on your apple core as well as other food scraps and plant debris. Some of these organisms grind, chew and shred the organic material. However, they leave behind a large amount of unused nutrients and energy. Bacteria, fungi and several other types of organisms finish the decomposition process by changing the shredded organic matter into smaller bits of nutrients. These organisms break down the material on the smallest level. When they have finished, the compost is ready to be used by plants.

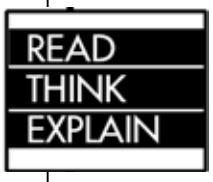
Back to Nature

Just like in the compost pile, decomposition in nature puts nutrients back into the soil that plants need to survive. For example, leaves that fall on the forest floor or into a lake are eaten by small organisms, bacteria, and fungi. The nutrients go back into the environment so more plants can grow. Decomposition plays an important role in nature.

1. Secondary consumers are consumers that :
   - Ⓐ Eat only organic material
   - Ⓑ Eat organic matter and primary consumers
   - Ⓒ Are predators that eat other organisms
   - Ⓓ None of the above

2. Which if the following is NOT an example of a compost pile food chain?
   - Ⓐ Rove beetle > Mold Mites > Fungi > Organic Material
   - Ⓑ Predatory Mites > Springtails > Fungi > Organic Material
   - Ⓒ Beetle Mites > Earthworms > Ants > Organic Material
   - Ⓓ Centipedes > Springtails > Fungi > Organic Material

3. Explain why decomposition is important in nature.



WHO'S EATING MY LUNCH?

Time Estimate:
2 days with ~45minutes-1 hour each day

Materials:
- Compost, By Gosh! by Michelle Eva Portman
- 10- gallon bin (~24" X 18" X 8")
- Tray for under the bin
- Newspaper
- 1 pound of Red Wigglers (about 100) *(Eisenia fetida)*
- About a gallon of topsoil or good black dirt from a garden (do not use potting soil)

Teacher Preparation:
- Purchase 10- gallon bin (~24" X 18" X 8"). The box should be shallow rather than deep and can be made of plastic (like a storage bin).
- Drill holes in the lid and two rows of holes on the side of the bin. Holes in the side should be 2 inches from the top and 1 inch from the bottom. Cover these holes with screening material and attach with hot glue, liquid nails or duct tape For very detailed instructions you can see: http://www.urbanext.uiuc.edu/worms/neighborhood/01-intro.html
- Obtain red wigglers - Red wigglers can be purchased at local bait shops (or via the Internet. **Make sure that you are ready to go with this project before ordering your worms.**

Objective:
By creating a worm bin, students will see how the composting process takes place, thereby learning about decomposition.

Background:
Students learned in Lesson One that decomposition is an important part in nature. Plants obtain the nutrients that they need to grow as a result of decomposition. Vermicomposting is an easy way to compost indoors. Just like regular composting, food scraps are turned into nutrient-rich material that can be used by plants.

Vocabulary::
Compost - A mixture of various decaying organic substances.
Vermicompost – Composting with worms.

Procedure:

DAY ONE -

- Tell your students that they will be helping to set up a worm bin in the classroom.
- Read the short story Compost, By Gosh! to your class.
- As a class, determine how many pounds of newspaper strips you will need. Multiply the number of gallons in the bin by 0.4. If using a 10 gallon bin, that would be 4 lbs. of newspaper.
- Have the students tear the newspaper (no glossy or colored) into one inch wide strips and put into a garbage bag.
- Add 3 pints of water for every 1 pound of paper and toss in a big plastic garbage bag until they are as damp as a wrung-out sponge. If you have 4 lbs. of paper, that would be 4 x 3 = 12 pints of water. Let strips stay in bag overnight to insure that all paper is evenly damp. Be sure to squeeze out the excess water before adding to the bin.

DAY TWO:

Setting up your bin:

- Add newspaper strips and fluff them up. Fill your bin 3/4 full with this moist "bedding."
- Sprinkle bedding with the topsoil.
- Place 1 pound of worms on top of the bedding.
- Leave the bin exposed to light as the worms work their way down in to the bedding.
- Once all the worms have left the surface, bury their first meal, cover with the lid and leave them alone for a week or so to allow them to get used to their new home.
- Place the bin on a “tray” to collect the moisture, or compost tea, that will drip out.
- After about a week, begin their regular daily feeding schedule.

Feeding your worms:

- Feed worms 3-7 days a week (averaging about a cup of good scraps per day). Feed worms fruits, vegetables, breads, cereal, eggshells, coffee and napkins. Cut up fruits and vegetables into smaller pieces. Eggshells should be crushed.
- **DO NOT feed them meat or oil products.**
- Always bury food under the bedding and put fresh paper over the food. You can also wrap food scraps in moistened newspaper. **Do not leave food scraps exposed on top of the bin.**

Harvesting the vermicompost (usually done every 1-4 months and can be done several ways):

- Start feeding on one side of the bin and the worms will migrate to that side. OR
- Move the contents of your bin to one side. Fill the empty side with fresh damp bedding and a small handful of soil. Feed only on the new side and the worms will eventually migrate to the fresh side. OR
- Dump out the contents onto a plastic-covered table in daylight or under a bright lamp and form many small piles of material. The worms will dive down, and in a few minutes you can remove a small amount of vermicompost free of worms. Ten minutes later, the worms in each pile will have gone down again and you can continue to remove the vermicompost. When you’re finished, rebed the worms.

Procedure (continued):

Rules for a successful bin:

- Keep the bin at temperatures of 65-85°F.
- Don't use citrus fruits as they are acidic and attract fruit flies.
- Use more vegetable material than fruits.
- Wash off food scraps to prevent the infestations of fruit flies.
- Avoid broccoli and onions as they can smell.
- Collect the compost tea (the liquid that will accumulate in the tray beneath your bin) and add this liquid to the water that you use to water your plants!
- If the bin starts to smell or food isn't breaking down quickly, give your worms a break and feed them less food.
- Feed in a pattern, choosing a spot and rotate around the bin.
- Add fresh bedding every 2-3 weeks, keeping a 4" to 6" layer of fresh bedding over the worms and food in your bin
- Keep bedding moist, like a wrung-out sponge. Add dry bedding to absorb excess moisture. The bin should never be too wet.

References

Worm Composting Basics, by Jen Fong and Paula Hewitt:
http://compost.css.cornell.edu/worms/basics.html
The Adventures of Herman: Com live with Me:
http://www.resourcefulschools.org/2004/learnwithworm.html

Extensions:

More About Worms... And Related Classroom Activities:
http://compost.css.cornell.edu/worms/moreworms.html
Potential Cross-Curricular Applications of a Worm Bin For the Elementary School Classroom: http://compost.css.cornell.edu/worms/curriculum.html

Great Worm Bin Resources on Web:

Worm Composting Basics, by Jen Fong and Paula Hewitt:
http://compost.css.cornell.edu/worms/basics.html
The Adventures of Herman: http://www.urbanext.uiuc.edu/worms/index.html
The Adventures of Herman: Com live with Me:
http://www.resourcefulschools.org/2004/learnwithworm.html
The Worm Woman: http://www. wormwoman.com/
The New York City Compost Project: http://www.n yccompost.org/how/wormbin.html

Great Worm Bin Books

Compost, By Gosh! by Michelle Eva Portman
Worms Eat My Garbage: How to Set Up & Maintain a Worm Composting System, 1982, Mary Appelhof, Flower Press, Kalamazoo, MI

Going Green While in the Red

Overview: In this lesson, students suggest and evaluate environmentally-friendly policies in tough economic times and write letters to President Obama offering policy advice on energy and climate change.

FIRST ACTIVITY:

Prior to class, make a six-column chart on the board with the following headings: Energy Resources, Transportation, Education, Population Growth, Food Production, and Scientific Research.

Students can work in pairs or small groups. Ask them the following questions, they can write their answers in journals or on a piece of paper.

1) "If you could give President Barack Obama advice on how to promote earth-friendly policies, especially in these troubling economic times, what would it be?
2) What ideas do you have for how he can solve the nation's environmental problems while working toward economic recovery?

Select any three categories from the chart on the board, and propose at least one idea for each of your chosen categories.

After a few minutes, invite students to write their ideas on the board under the appropriate category until the class has generated a large list of possible suggestions. As a class, discuss and evaluate the list:

- Which ideas do you like the best and why?
- Which ideas seem to be the most achievable?
- Which ideas seem the most outlandish or extreme?
- What obstacles would have to be overcome to put an idea into action?

Then have student pairs or groups select one idea from the list. Record students' initials or group numbers next to the respective idea selected so that every group has a different topic. Encourage the class to select a wide range of ideas so that all six categories are represented.

SECOND ACTIVITY:

Groups will use the handout "Dear President Obama,…" to create a classroom "station" where they will promote their idea or proposal for President Obama. Depending on the time available, "stations" may be as simple or complex as students or the teacher choose to make them. For example, groups may choose to make a simple, enlarged copy of the handout stating their idea and supporting reasons in clear, persuasive language. Or students may make a more elaborate poster-board that includes clips of text from the article and other resources, persuasive images on the topic, quotes from leading researchers or graphs and data supporting their respective points of view. It may be useful to provide a time limit in which students must complete their station.

When all groups are ready, students rotate through every station with pens in hand. At each spot they are asked to write a comment, reaction, or question about the advice or proposed idea they find there. Because each group rotates through each station adding their own comments, this quickly becomes a "conversation on paper" in which students react to the text as well as to previous students' comments.

At the end of class, you may wish to wrap up by having students privately vote for the best three ideas generated by the class.

Handout "Dear President Obama, …" on next page.

FOR HOMEWORK OR FUTURE CLASSES:

For homework, students compose a formal letter offering earth-friendly advice to President Obama. Students should use the comments and questions posed by their classmates to further refine their ideas.

In future classes, provide time for students to find news articles from their local newspapers or websites related to policy advancements on their proposed idea. In their journals, have students record the headline or title, date published and a brief summary. Students may present updates to the class on what, if anything, President Obama is doing in relation to their topic.

Lesson Plan Source:
Going Green While in the Red
NY Times Learning Network
(www.nytimes.com/learning)

NAME _____ DATE _____

Dear President Obama...

Directions: Clearly state your idea for President Obama and 3 statements supporting your idea. The bottom sec
will be used by your classmates during a class "conversation on paper" exercise.

My Idea for President Obama:

Why you should support my idea:

Class comments and questions:

Mathematics and Environmental Concerns

Includes three worksheets & instructions: Aluminum cans, Plastic Packaging & Classroom Paper

Aluminum Cans:

LEARNING OBJECTIVES:

- Gather data about aluminum can use
- Graph the data and interpret graphs
- Develop a recycling plan

Materials: Aluminum Cans Activity Sheet and Aluminum Cans

Show aluminum can. Discuss what students know about such cans.

- Of what are they made? [Aluminum.]
- What products are sold in similar cans? [Soda, other soft drinks, juice, motor oil.]
- What other products are made of aluminum? [Siding for houses, rain gutters, silver paint, mirrors, packaging (i.e., aluminum foil) and CDs.]

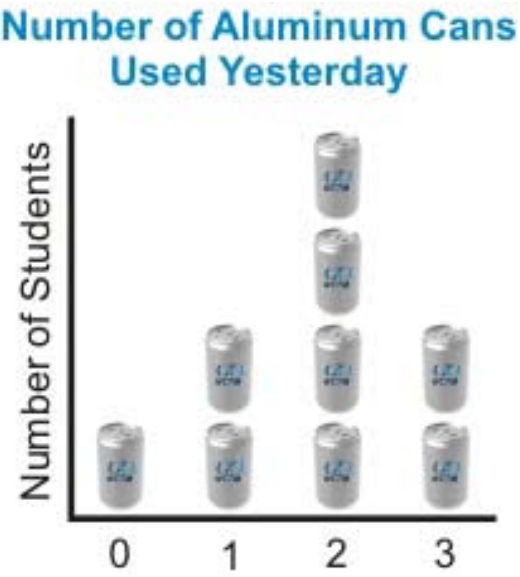
Why is aluminum an important metal? [It's relatively inexpensive, malleable, and lightweight.]

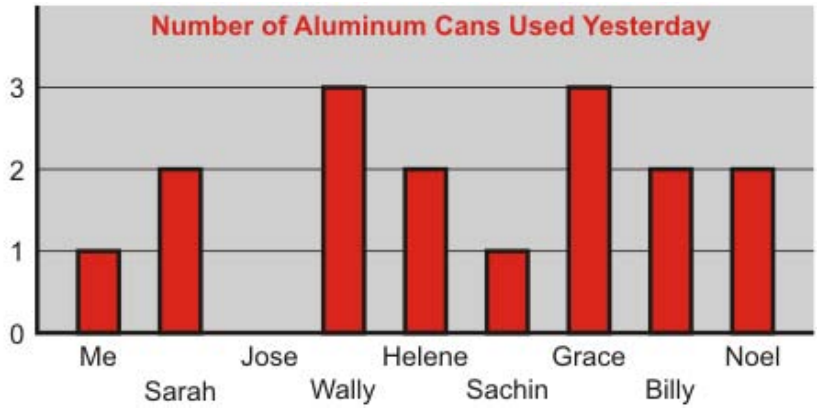
Distribute the Aluminum Cans activity sheet to each student. (On pages 11 and 12) Allow time for students to record their own numbers, and poll eight classmates. The data should be recorded in the chart on the activity sheet.
A sample chart is shown below.

Name	Number of Aluminum Cans Used Yesterday
Me	1
Sarah	2
Jose	0
Wally	3
Helene	2
Sachin	1
Grace	3
Billy	2
Noel	2

Next, each student should create a line plot or bar graph of his or her data. (Or, you may ask half the class to create each type of graph. Then, a rich discussion can occur about the differences between the graphs and the types of information that each shows.) A sample of each type is shown below; the line plot is on the right, and the bar graph is below:

Have each student look at the line plot and write several things that the graph shows. Students should note the range of numbers on their graphs. Review, as needed, how to figure the mean (average). Have students compute the mean of their sets of data. They may check their calculations by using the calculator.





Discuss ways to compare an individual's can use in a day with the typical American's use of 1500 cans per year (Javna, 1990). Have students compute per-year use and compare it with 1500. They should also work with the group mean, figure the number of can used per year on the basis of this number, and compare the number per year with 1500. Students should use calculators and may check each other's work.

Discussion questions could include:

- Were they surprised at their own or the mean for the people they polled?

NAME _____

It s common to see people drinking from aluminum cans. How many cans do you and your classmates ordinarily use in a day? Let s find out. Think back to the number of cans you used yesterday. Record that number in the chart below. Ask eight classmates about the number of aluminum cans they used yesterday, and record their responses in the chart below.

NAME	NUMBER OF ALUMINUM CANS USED YESTERDAY
Me	

1. Make a line plot of the data from the chart.

2. Write about the line plot you made. What are some things it shows?

3. What was the largest number of cans that was used? ____ The fewest number? ____

What was the mean number of cans used? Show how you determined the mean.

4. Discuss some things you noticed about the mean and the other data collected.

5. *Fifty Simple Things Kids Can Do to Save the Earth* (Javna, 1990) states that a typical American uses 1,500 aluminum cans each year. On the basis of the number of cans you used yesterday, figure the number of cans you might use in a year.

How does your number compare with 1,500?

6. Aluminum cans may be recycled many times, which allows more of the metal to be used for airplanes, bicycles, and building materials. Less energy is used. Write some things you might do to recycle or conserve aluminum.

Go Green!

Publix Design-A-Bag Contest Official Rules

1. YOU DO NOT HAVE TO BUY ANYTHING TO ENTER OR WIN.

2. The Publix Design-a-Bag Contest ("the Contest") is sponsored by Publix Super Markets, Inc. ("Publix"), Florida Newspaper In Education Coordinators, Inc. ("FNIEC"), and The Herald-Tribune Media Group ("HTMG"), (collectively "Sponsors"). The geographical scope of this Contest is the state of Florida and portions of Georgia, Alabama, Tennessee and South Carolina. Contest is subject to all federal, state and local laws and is void where prohibited. Publix may interpret these rules as needed — including but not limited to rules regarding entries, selection of winners, deadlines, restrictions on prizes, and eligibility — and all of Publix's decisions are final. You may only enter once and you may only win one (1) prize. By entering, you agree to these rules. There are other restrictions so please read these rules carefully.

3. Contest begins on October 12, 2009 and ends on January 4, 2010. The last day to mail your entry is November 6, 2009. Grand Prize Winner will be announced on or about January 4, 2010.

ELIGIBILITY

4. To be eligible to enter this Contest, you must be in the 6th grade, you must have your parent or legal guardian's signed permission, and you must live in one of the following areas:
(a) Florida; or
(b) one of the following Alabama counties: Limestone, Madison, Morgan, Tuscaloosa, Jefferson, Shelby, Montgomery, Russell, Baldwin or Autauga; or
(c) one of the following Tennessee counties: Sumner, Davidson, Wilson, Rutherford, Williamson, Maury, or Hamilton; or
(d) one of the following Georgia counties: Barrow, Bartow, Cherokee, Forsyth, Hall, Paulding, Cobb, Fulton, DeKalb, Gwinnett, Jackson, Clarke, Oconee, Greene, Carroll, Coweta, Fayette, Clayton, Henry, Newton, Rockdale, Spalding, Troup, Bibb, Houston, Muscogee, Bryan, Chatham, Glynn, Camden, Dougherty, Thomas, Lowndes, Douglas, Richmond, Seminole or Columbia; or
(e) one of the following South Carolina counties: Pickens, Anderson, Greenville, Spartanburg, Richland, Lexington, Aiken, Berkeley, Dorchester, Charleston, Beaufort or Columbia.

5. You are not eligible to enter the Contest if anyone in your immediate family (which means mother, father, sisters and brothers) is an employee of Publix Super Markets, Inc., Florida Newspaper In Education Coordinators, Inc., or The Herald-Tribune Media Group.

PRIZES

6. One (1) Grand Prize will be awarded, consisting of a $100.00 Publix gift card, and up to one hundred dollars ($100.00) worth of food and/or beverages from Publix for a party at school for the Grand Prize Winner's classroom, and two admission tickets (1 adult ticket & 1 child's ticket) to a theme park of the Grand Prize Winner's choice, located in Florida, Georgia, Alabama, Tennessee or South Carolina. Approximate Retail Value ("ARV"): Up to $340.00, depending on the theme park tickets selected by the Grand Prize Winner.

7. Four (4) Finalist Prizes will be awarded, each consisting of a $25.00 Publix gift card and up to one hundred dollars ($100.00) worth of food and/or beverages from Publix for a party at school for each Finalist's classroom. ARV: $125.00 each Finalist Prize.

PRIZE RESTRICTIONS

8. All details of all prizes are at Publix's sole discretion. Gift cards cannot be replaced if they are lost or stolen, cannot be exchanged for cash and are subject to other restrictions by Publix. Visit http://www.publix.com/services/gift/GiftCertificates.do for more information. Theme Park admission tickets are subject to additional restrictions imposed by theme park operators/owners. No transportation or accommodations will be provided. Classroom party prize is subject to the following additional limitations: The Newspapers in Education representative for the particular will be provided a Publix gift card in the amount of $100 in order to purchase the food and beverages for the classroom party. A representative from the winning classroom will be responsible for picking up the food & beverages from their local Publix store of choice.

9. You are responsible for any items or expenses that are not specifically listed above in the prize description, including, but not limited to, transportation, hotel accommodations, food, drinks, souvenirs, etc. You are also responsible for paying any taxes that may be associated with your prize.

10. You may not transfer or change your prize or exchange it for cash except that Publix may substitute a prize with a prize of equal or greater value if it believes that it is necessary. Any portion of your prize that you do not claim or use will be forfeit and you will not be entitled to any alternative prize or cash substitute. All prizes are being awarded and provided "as is" with no warranty or guarantee of any kind by Sponsors. Merchandise prizes do not have any warranty except for manufacturers' warranties (if any). Sponsors have not made any promises to you about your Prize or any part of it.

TO ENTER

11. You can mail your entries into the Contest starting on October 12, 2009 and ending November 6, 2009 ("Entry Period"). To enter, create an original, hand-drawn design for a limited edition reusable bag (referred to as your "Bag Design"). Hand-print your name and telephone number on the back of your Bag Design. Your Bag Design entry must meet all of the requirements in this paragraph and elsewhere in these Official Rules to be accepted into the Contest and to be eligible for consideration. Your Bag Design must be original to you and it must not have been published or entered in any contests before. Do not add any watermarks, signatures, or copyright notices to your Bag Design. Your Bag Design should demonstrate a sustainable and earth-friendly art design for the reusable Publix bag. Your Bag Design should be designed to be printed on the front of the bag only and it must be no bigger than 17 inches width x 12 inches height (43.18 cm x 30.48 cm). The design must include the word "Publix" or the Publix logo in one of the three colors: Black, White or Green. You agree that, if your submitted Bag Design does not include the word "Publix" or the Publix logo, you will allow Publix to insert the word or logo into the Bag Design for you.

12. Complete an Official Entry Form with the following required information:
(a) name, (b) address, (c) telephone number, (d) alternate telephone number; (e) date of birth; and (f) your parent or guardian's signed permission. Put both your original and unfolded Bag Design and your completed Official Entry Form in a large envelope with sufficient postage and mail them to the following address: "Publix Design-a-Bag Contest", c/o Karen Tower, FNIEC, 336 E. College, Suite 203 Tallahassee, FL 32301 for receipt by FNIEC during the Entry Period.

13. To be eligible for the Contest, your entry must be received by FNIEC no later than November 12, 2009. If you do not provide all of the information above, you will not be eligible to win and you will not be notified. All entries become the property of Publix and they will not be returned to you or acknowledged. Sponsors are not responsible for lost, late, illegible, misdirected, postage-due, mutilated or incomplete entries or for any entries that for any reason are not received by Publix by the deadline stated above.

Go Green!

Publix Design-A-Bag Contest Official Rules

WARRANTY BY ENTRANT

14. By entering your Bag Design, you promise that your Bag Design is original to you, that you created it by yourself, and that it does not plagiarize, libel, disparage, or otherwise violate anyone's rights.

LICENSE

15. Publix will print the winning Bag Design on a limited edition reusable grocery bag. By entering your Bag Design in the Contest, you agree that if you are declared the Grand Prize Winner, you are granting to Publix a non-exclusive, perpetual, worldwide, royalty-free, irrevocable license to copy, distribute, display, modify, publish and make derivative works from your Bag Design or portions of your Bag Design on the reusable bag and in Publix's marketing materials in any media of any kind, including Publix's web site, and you agree that you will not be entitled to any compensation or money for any of these uses of your Bag Design.

FIRST ROUND OF JUDGING (SEMI-FINALIST SELECTION)

16. On approximately November 16, 2009, FNIEC will create an independent panel of judges consisting of education professionals. This first panel will judge all of the entries and select twenty (20) Semi-Finalists based on the following judging criteria: originality, relevance to theme, effectiveness in communicating message, creativity, completeness of design, and design ability as demonstrated by uniformity, contrast, repetition, variation and alignment/flow. The twenty (20) entrants whose submissions are selected during this First Round of Judging will be declared the Semi-Finalists and will proceed to the Second Round of Judging.

SECOND ROUND OF JUDGING (FINALIST SELECTION)

17. On approximately November 30, 2009, Publix will create a second panel of independent judges consisting of Corporate Publix Marketing professionals. This second panel will judge the entries of the twenty (20) Semi-Finalists based on the judging criteria listed above, and will select one (1) Finalist for each of the participating states (Florida, Georgia, Alabama, Tennessee and South Carolina) for a total of five (5) Finalists. Once their eligibility is confirmed, the five (5) Semi-Finalists whose submissions are selected during this Second Round of Judging will be declared the Finalists and will proceed to the Final Round of Judging. The Finalist who is later chosen as the Grand Prize Winner will not receive a Finalist Prize in addition to the Grand Prize.

FINAL ROUND OF JUDGING (GRAND PRIZE WINNER SELECTION)

18. On approximately December 3, 2009, Publix will create a third (and final) panel of independent judges consisting of Corporate Publix professionals. This third panel will judge the entries of the five (5) Finalists based on the judging criteria listed above, and will select one (1) Grand Prize Winner. The Finalist whose submission is selected during this Final Round of Judging will be declared the Grand Prize Winner.

19. In the event that there is a tie during any of the three (3) rounds of judging, the entry that receives the highest score in the "effectiveness in communicating message" category will be declared the winning entry of the tied entries.

20. Publix will post the winning Bag Design and project summary on the Publix Corporate Sustainability Web site at http://www.publix.com/sustainability. Subject to obtaining parental consent, Publix may choose to display pictures and/or profiles of the Grand Prize Winner and/or the Finalists on the Corporate Sustainability Web Site, without compensation to the Grand Prize Winner and/or the Finalists.

FINALIST/GRAND PRIZE WINNER NOTIFICATION

22. After the Second Round of Judging, Publix will contact all Finalists using the information provided by the Finalists on their Entry Forms. Finalists may be verified over the telephone at the time and may be asked to provide Publix with valid identification. A parent or guardian of each Finalist will be required to sign an affidavit of eligibility and a publicity release (except for Tennessee residents). A parent or guardian of each Finalist also may be asked to provide Publix with a copy of proof that the Finalist is currently enrolled in the sixth (6th) grade and may be required to sign other legal documents, including tax forms and a release supplied by Publix which, among other things, releases Sponsors and a range of related companies or persons from liability related to this Contest and the receipt or use of any prize. Faxes will not be accepted. Grand Prize Winner will be contacted as soon as possible following his or her selection as the Grand Prize Winner, again using the information provided on his or her Entry Form. Confirmed Grand Prize Winner and Finalists' names may be displayed indefinitely on the Publix's Corporate Sustainability Website Page at http://www.publix.com/sustainability on or after January 4, 2010.

23. A potential Finalist or Grand Prize Winner may be disqualified and forfeit his or her prize if any of the following occur: (a) Publix cannot reach him or her or a parent or guardian directly after trying for seven (7) days, (b) the potential Finalist or Grand Prize Winner or his or her legal guardian fails to satisfy any eligibility or verification requirement in these Official Rules, (c) the potential Finalist or Grand Prize Winner refuses to accept the prize, (d) Publix determines that the potential Finalist or Grand Prize Winner has violated any of these Rules; or (e) the potential Finalist or Grand Prize Winner is determined to be ineligible for any reason. If a potential Finalist or Grand Prize Winner is disqualified, he or she will forfeit his or her right to any prize or to continue to participate in this Contest and Publix will select an alternate Finalist or Grand Prize Winner from the remaining entries using the same judging method and criteria described above. Alternates must satisfy all requirements and restrictions in these Official Rules.

PUBLICITY RELEASE

24. By accepting a prize, Finalists and Grand Prize Winner agree to award Publix the right to publicize their names, photographs (including the use and appearance of their photographs on Publix's web site), likenesses, voices and details of winning for purposes of this and future promotions without further compensation, except where prohibited.

LIMITATION OF LIABILITY/DISCLAIMER OF LIABILITY

25. All entrants and their parents and/or legal guardians agree that Publix Super Markets, Inc., Florida Newspaper In Education Coordinators, Inc., and The Herald-Tribune Media Group, and their subsidiaries, directors, agents, agencies, affiliates, franchisees, promoters, officers, directors, employees and related persons (a) are not responsible for lost, interrupted, or unavailable network, server, or other connections, or for any failed telephone or computer hardware or software, or for any failed, delayed, misdirected, corrupted, or garbled transmissions or errors of any kind, whether human, mechanical, or electronic, or for entries that for any reason are not received by Publix by the deadlines stated above; (b) are not responsible for any injury or damage to any computer, modem or other electrical device as a result of participation in this Contest or downloading of any software or materials; (c) are released from any and all liability related to this Contest and the receipt and use of any prize; and (d) will not be responsible for the inability to select Finalists or Grand Prize Winner because of postal failure, equipment failure, or data storage failure.

Go Green!

Publix® Design-A-Bag Contest Official Rules

MISCELLANEOUS

26. Publix has the right to cancel, terminate or suspend this Contest or any part of this Contest if the security, administration, fairness or operation of this Contest is corrupted or impaired by any non-authorized intervention, human or mechanical error or failure, network failure, information storage failure, telecommunications failure, malfunction, or other causes beyond Publix's control, as determined by Publix in its sole discretion. In that event, Publix will select the winners from among all entries received at the time of the Contest termination that are not believed to have been affected by the event causing suspension or termination, using the same judging method and criteria set forth above.

27. Publix has the right to prohibit you from participating in this Contest if Publix determines (in its discretion) that (a) you have attempted to tamper with any part of the Contest in any way; (b) you have tried to cheat or circumvent the Rules; (c) you have acted in any unfair way while partici pating in the Contest; (d) you have tried to annoy, threaten or harass any other entrant or any of the Sponsors; or (c) you have acted in any disruptive manner. If Publix fails to enforce any of these Rules in any situation, that does not mean that Publix has waived the Rules with respect to you.

28. Publix reserves the right to correct typographical or clerical errors in any Contest-related materials. No more than the number of prizes stated above will be awarded. If more than that stated number of prizes is claimed for any reason, Publix will award only the stated number of prizes by selecting the Winners from all legitimate, un-awarded, eligible prize claims by applying the same judging method and criteria described above.

NOTE: DESIGN PARAMETERS:
The submitted designs can contain no more than four colors and will be placed on a one color bag. The design imprint will be placed on one front panel of the bag (roughly a 17" wide x 12" high image area), excluding the handles. Publix reserves the right to alter the color and design to fit production capabilities.
All entries must have a Sustainable/ Earth-Friendly focus.

Please add the Publix logo to the design, in either of the following 3 colors: Black, white and green.

Publix®

DISPUTES

29. By entering the Contest, entrants and their parents and/or legal guardians, agree that (a) any and all disputes, claims, and causes of action that relate to the Contest or any prizes will be resolved individually, without any class actions of any kind; (b) any and all claims, judgments and awards will be limited to actual out-of-pocket costs, but will not include attorneys' fees; and (c) no entrant will be permitted, under any circumstance, to claim or receive any award of punitive, incidental or consequential damages or damages that are multiplied or increased in any way and entrants and their parents and/or legal guardians waive any claims for such damages.

30. All issues and questions relating to this Contest or the Official Rules in any way are governed by Florida law, regardless of any choice of law or conflict of law principles. Any legal proceedings relating to the Contest or the Official Rules can be brought only in the federal or state courts located in Hillsborough County, Florida and entrants and their parents or legal guardians consent to mandatory jurisdiction in Hillsborough County, Florida. If any of these Rules is held to be invalid or unenforceable or illegal, these Official Rules will otherwise remain in effect and be interpreted as if the invalid or illegal rule were not included.

WINNERS' LIST/OFFICIAL RULES COPY

31. For a copy of the Official Rules, refer to the school curriculum or mail a self-addressed, stamped envelope to: "Publix Design-a-Bag Contest" c/o Publix Super Markets, Inc., 3300 Publix Corporate Parkway, Lakeland, FL 33811, attn: Marketing Dept., and also specify: "Official Rules Request". For a Winners' List, visit http://www.publix.com/sustainability, or mail a request to the above address and specify "Winners' List Request". Winners' List will be available after May1, 2010.

Go Green!

Publix® Design-A-Bag Contest

Official Entry Form

PLEASE PRINT

NAME:

ADDRESS:

CITY: STATE: ZIP:

TELEPHONE NUMBER: ALTERNATE TELEPHONE NUMBER:

DATE OF BIRTH: E-MAIL ADDRESS

SCHOOL NAME:

TEACHER NAME:

PARENT/GUARDIAN'S SIGNED PERMISSION **(REQUIRED)**

Mail your completed form and bag design to:
"Publix Design-a-Bag Contest", c/o Karen Tower, FNIEC, 336 E. College Ave. Suite 203, Tallahassee FL 32301