

# PACK IT UP

GRADES 6-8  
LINDA GAUTHIER

**TIME ALLOTMENT:** Three 50-minute classes. Five to ten minutes per class once a week for at least one month. The students will need time to examine and record the conditions of **Activity Two**.

**OVERVIEW:**

The packaging of food products serves several purposes. Foods should be packaged to preserve contents safely, economically, retaining the taste and consistency of the food. Using an example such as a can of peaches students should list the possible reasons for this type of packaging. Cans are easy to stack, ship, unbreakable, inexpensive, preserve contents, recyclable. Labels on the can are attractive, informative (weight, nutritional content of food, recipes, etc). This lesson will suggest ways packaging helps to prevent food from decaying. The buried body at the end of the video "Rotten But Not Forgotten" was preserved for five years because of the way it was wrapped shortly after death and before burying. The anaerobic conditions greatly slowed down the decay process. The body had been *packaged to preserve*.

Most foods are packaged with materials made of glass, plastics, paper, or combinations of these. Plastics are often labeled with recycling numbers to indicate the composition of the plastic. Some areas of the country recycle certain plastics as well as glass, aluminum, steel, and paper. Some or all of a package may be recycled, but what happens to the remaining materials that cannot be recycled? Often these non-recyclables are land filled. What is the decay rate of these items in a landfill? Students should research what happens to the items that cannot be recycled locally. This research should include information about general local landfill construction and operation.

**SUBJECT MATTER:** Science



**LEARNING OBJECTIVES:**

Students will be able to:

- Compare the preservative qualities of various packaging of food products. Students will also compare other qualities of packages.
- Design new & improved packaging for a particular product. (Stronger, easier to use, more attractive, easier to recycle, increase shelf life of food)
- Create a presentation comparing the characteristics of original packaging and the new design.
- Design an experiment to determine what happens to the various types of packaging materials in a landfill.

**STANDARDS:**

**National Science Education Standards**

<http://www.nap.edu/books/0309053269/html/index.html>

**ACTIVITY ONE: Science and Technology,**

**Content Standard E:** As a result of activities in grades 5-8, all students should develop:

- Abilities of technological design;
- Understanding about science and technology.

**ACTIVITY TWO: Science as Inquiry,**

**Content Standard A:** As a result of activities in grades 5-8, all students should develop

- Abilities necessary to do scientific inquiry;
- Understandings about scientific inquiry.

**Louisiana Science Frameworks:**

State Standards for Curriculum Development

<http://www.doe.state.la.us/doe/assessment/standards/SCIENCE.pdf>

**SE-M-A4:** understanding that human actions can create risks and consequences in the environment.



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**MEDIA COMPONENT:****Video:**

**Enviro-Tacklebox™, *Rotten But Not Forgotten***

**Web site:**

The following sites can be used by teachers to gain more background information on recycling various materials and additional classroom activities.

**Enviro-Tacklebox™** <http://www.envirotacklebox.org> This is Louisiana Public Broadcasting's Web site providing teaching information, films, articles and student activities involving environmental science.

**A to Z Teacher Stuff-Recycling** [http://www.atozteacherstuff.com/themes/recycling\\_composting.shtml](http://www.atozteacherstuff.com/themes/recycling_composting.shtml)  
This site contains lesson plans on recycling, sites for kids and other resources.

**Thomas Recycling Kids Page** <http://www.thomasrecycling.com/kids> This site contains a variety of facts about recycling plastics, glass, aluminum, paper, steel, etc.

**American Iron and Steel Institute** <http://www.steel.org/markets/containers/ads/packprod3.htm> List of facts about recycling iron and steel cans.

**Australian Canned Food** <http://www.cannedfood.org/index.html> BHP Packaging Products; Amcor Food Cans and VisyPak sponsor the Canned Food Information Service, established in 1984 to support the Australian canned food industry and its suppliers of tin plate and steel cans. This site has information on steel can manufacturing, recycling, how food is canned, etc.

**Energy Information Administration of the US Dept of Energy** <http://www.eia.doe.gov/kids/recycling/solidwaste/paperandglass.html> Information about recycling paper and glass

Bookmark the following Web site for use in Activity Two:

**Building a Landfill** [http://www.lalc.k12.ca.us/target/units/recycle/activities/bld\\_landfill.html](http://www.lalc.k12.ca.us/target/units/recycle/activities/bld_landfill.html) This part of the site has directions for students to build a mini landfill

**Other References:**

**Science Scope** magazine, "Thanksgiving and Native American Foods", Nov/Dec, vol. 27, no. 3, pages 40-41. This article asks students to design an experiment to investigate the effect of salt on a raw potato. This activity is similar to the process of salt curing meat to preserve the meat. The salt solution around a potato slice causes the water to move due to osmosis from a low concentration in the potato to the higher concentration of the salt solution. The less moisture inside a food the less moisture there is available for decay- causing organisms to grow.

**MATERIALS:***Per Class:*

- Computers with Internet access
- Presentation materials such as computer with PowerPoint type software, or
- Poster boards, or large chart paper, markers, tape, scissors
- Camera (optional)
- Containers for activity 2 such as qt jars (with lids), 400ml beakers, 2 liter plastic bottles cut to about 7' tall, or thick, re-sealable freezer bags, qt size
- Potting soil, 10-20 pounds
- Balances, rulers, paper towels

*Per Group of 3 or 4:*

- Access to computer or poster making materials
- 3 or more jars, plastic bags, etc
- Potting soil
- Students select food package based on guidelines
- Worksheet 1
- Worksheet 3

**PREP FOR TEACHERS:**

Prior to teaching this lessons, bookmark the Web sites used in the lesson on each computer.

Set up package restrictions for safety. Give the following guideline to the students:

- Bring only clean empty packages to school.
- No fresh meat packages or packages from uncooked meats, chicken or fish
- No spray can products
- Teacher must approve the product before packaging is brought to school.

Prepare the following for the hands on activities:

**ACTIVITY ONE:** Clean food package samples including aluminum cans, various types plastic bottles or jars, glass jars, various sizes and shapes of paper boxes (with and without plastic or aluminum lining)

**ACTIVITY TWO:** Potting soil transferred to a large container so students can easily scoop out what they need.

For **Activity Two**, the teacher should try to contact some personnel with the local waste disposal facility and/or recycling plant. Ask if someone is available to talk to the class. If this is not possible, arrange for the students to contact these facilities via phone or email to gather information on local waste management facilities.

When using media, provide students with a **FOCUS FOR MEDIA INTERACTION**, a specific task to complete and/or information to identify during or after viewing of video segments, Web sites, or other multimedia elements.

**INTRODUCTORY ACTIVITY:****(Setting the stage)**

1. Ask students which do they think would be more safe and appetizing to eat: a peach that had been sitting on a shelf at home for 2 months or a can of peaches sitting on a shelf for 2 months? What influenced their choice? Why are foods packaged? Are all foods packaged using the same materials? Can all packaged foods be stored in the same manner? (On a shelf, in the refrigerator, in freezer) If possible, bring to class a fresh piece of fruit, an almost rotten piece of the same fruit, a very rotten piece, and a can of the same fruit and/or a package of dried fruit.
2. Allow students time to list their favorite foods served at home and how these foods are packaged for home use. Divide students into groups of 3 or 4 and have the students compare their lists. Give each group a large sheet of paper or poster board and have the students create a way to group or classify the packaging materials into categories. (Paper, plastic, glass, metal, etc) Allow each group to present their lists to the class.

**LEARNING ACTIVITIES:**

1. Ask the students to consider why some foods are packaged in a certain manner. Does the preparation of the food have anything to do with how it is packaged? How and why does the food have to be handled after the package is opened? This information is usually on the package label. (Does the food need to be cooked, or only heated, or can the food be eaten directly from package, food must be refrigerated, etc.) *Possible answers: food has to be cooked and then refrigerated to prevent spoiling; dry foods have to be resealed in package to prevent moisture that could cause spoiling, etc. These answers should help students determine why the particular food is packaged in a particular manner.*
2. Basically all packaging should at least prevent spoilage by keeping out decay causing organisms and/or control the factors (such as moisture, air, temperature) that will allow these organisms to grow. Nature provides many examples of the environmental factors that influence decomposition or spoiling. **CUE** the video ***Rotten But Not Forgotten*** to the segment beginning about 15 min into the show, just after the large coal truck at a mining site. This segment describes the preserving effects of a hot dry desert on a human body and the effects of cold temperatures a body. This segment is about 50 seconds. You will **PAUSE** the video when it shows 4 people walking behind a crime scene tape. Tell the students that you are going to show them a short video segment. Provide your students with a **FOCUS FOR MEDIA INTERACTION**, asking the students which factors caused the 2 bodies described in the video to be preserved. (*Dry desert air for the first body and the cold temperatures for the other body greatly reduced the rate of growth of organisms of decay.*)
3. Before continuing the video provide your students with a **FOCUS FOR MEDIA INTERACTION**, asking the students look for the following information in the video: list and discuss some of the factors that influence rate of decomposition of a body (temperature, climate, humidity, season of the year, clothing). Also ask the students to find information on the significance of an anaerobic environment (no oxygen present) in the case of the human body buried for 5 years but still had fingerprints. (*The body was buried tightly wrapped in plastic soon after death. Very little oxygen was present therefore decay organisms could not grow well.*) Now continue the video through this segment involving the forensic anthropologist, Mary Manhein. This segment is almost 3 min. in length. Stop the video at the end of the segment on forensic anthropology.
4. Tell the students that the body described in this segment was “packaged to be preserved”! Food packaging should preserve food for safe and convenient use. Do **Activity One**.

**ACTIVITY ONE:**

1. Give each group a copy of **Worksheet 1: Pack it Up**.
2. Student groups will choose a packaged food product. If possible the students should take a picture of the packaged as it is opened at home to show the arrangement of the contents. Students should also describe in detail how the package must be opened (use scissors, tear a box top with a closing flap, can opener, pull tab, several inner packages) and any sounds or other observations they encounter when opening (a hiss to indicate vacuum sealing, a fizzing, bubbling, odor).
3. The students will bring the clean, empty packaging to school. As a group the students will determine the purpose of each part of the packaging. The students can elect to compare packaging among different brands for the same food item. Are there any tests that can be conducted to determine the role of each part of the package?
4. The students will display the packaging material on a poster or photograph each component to use in a **Microsoft® PowerPoint®** presentation. An explanation will be given for each part of the package (inner, outer layers, opening process, and label).
5. **OPTIONAL:** Students can compare packaging among different brands of the same food item. For example, some cereals are packaged in boxes and some only in plastic bags.
6. Set up these posters or PowerPoint slides so other students can view them. Give each student a copy of **Worksheet 2**. Ask each student to view the other groups' displays and complete the information on **Worksheet 2**.

**ACTIVITY TWO:**

1. Ask the students to consider what part of their package cannot be recycled in their town. Where will this material end up?
2. Give students the local contact information about waste management companies. Students should write 3 or 4 questions per group that they could ask personnel at these companies. The students should be given several days to gather the information.
3. Allow the students class time to go to this Web site to get information about constructing a simple landfill: [http://www.lalc.k12.ca.us/target/units/recycle/activities/blc\\_landfill.html](http://www.lalc.k12.ca.us/target/units/recycle/activities/blc_landfill.html)
4. **FOCUS FOR MEDIA INTERACTION:** After the students have viewed this site, tell the students to write their own set of directions to construct and monitor a landfill to test the decay rate of the packaging materials they used in Activity one. Give each group a copy of **Worksheet 3**. The students should also turn in a diagram of their landfill. Challenge the students to consider measuring/observing as many factors in the landfill as they can think of in order to get a complete picture of the process of decay. (Students should observe/measure temperature changes, availability of light, moisture, changes in packaging materials, odors.) The students should have some method of recording changes, if any, in the packaging material. The students should have the teacher check their plan.
5. Set a date for the students to bring materials to class to set up the landfill. Provide additional materials in class for students unable to obtain any supplies. Remind the students to measure and describe each layer as the landfill is constructed.
6. Discuss with the students where the landfills should be placed in the classroom. Remind students to record as many conditions about this area as possible.
7. For the next several weeks allow the students some class time to make observations/measurements on their landfill. The packaging material can be carefully uncovered to observe any changes and then reburied. Take pictures if possible.
8. At the end of the designated time, allow the students to make a presentation concerning the effect of the "landfill" on their packaging material.

**CULMINATING ACTIVITIES:**

1. Ask the students to consider the results of activities 1 and 2. What were some of the advantages and disadvantages of the food packaging materials they investigated? Each group should list these on a large sheet to share with the class.
2. Have each group design an improvement for the packaging or design an entire new package. Students can also design a new label that includes information about why the new packaging is better. Each group should make a poster size, detailed drawing of the new package and list the improvements. For bonus points, the group can construct the new package.
3. Students can display the new packaging in the school cafeteria or at local grocery stores. Students can also email the food company a description and a picture of the new package.

**CROSS-CURRICULAR EXTENSIONS:****MATHEMATICS:**

- Students compare mass or volume of packaging to contents using various sizes of packaging of the same product. How could it be determined which size or type of packaging is most cost efficient?

**SOCIAL STUDIES:**

- How did Native Americans and Pilgrims preserve food? Use salting of potato activity from **SCIENCE SCOPE MAGAZINE**, "Thanksgiving and the science of Native American foods", Nov/Dec 2003, p.40-41.

**COMMUNITY CONNECTIONS:**

- Speaker from solid waste disposal company
- Ask a local grocery store to allow student projects to be displayed
- Ask a parent to demonstrate home canning procedures for fruits or vegetables

**STUDENT MATERIALS:**

- Worksheet 1: **Package Dissection and Evaluation**
- Worksheet 2: **Food Packaging: The Good, the Better and the Best**
- Worksheet 3: **Mini Landfill Activity**



**Worksheet 1: Package Dissection and Evaluation**

Team members: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

1. Name/brand of food item \_\_\_\_\_

2. Description of food contents \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

3. How is the package opened? \_\_\_\_\_  
 \_\_\_\_\_

4. Description of the packaging \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

5. Purpose of each material in packing

Material	Purpose

**Worksheet 2 : Food Packaging: The Good, the Better, and the Best**

Name: \_\_\_\_\_

**Directions:** Look at several displays and answer the following questions. Stay at each display for about 8 to 10 minutes. You may not have time to see all the displays. Use the back of this sheet if you have time to go to more than 3 displays.

**Display 1**

Type of Food Packaged \_\_\_\_\_

Types of materials used in the package. \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Explain one reason why this type of packaging was used for this food product. \_\_\_\_\_

\_\_\_\_\_

**Display 2**

Type of Food Packaged \_\_\_\_\_

Types of materials used in the package. \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Explain one reason why this type of packaging was used for this food product. \_\_\_\_\_

\_\_\_\_\_

**Display 3**

Type of Food Packaged \_\_\_\_\_

Types of materials used in the package. \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Explain one reason why this type of packaging was used for this food product. \_\_\_\_\_

\_\_\_\_\_



**Worksheet 3: Mini Landfill Activity**

**Team members:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Goal:** Design an experiment to observe what happens to packaging material in a landfill.

**Materials needed:**

_____	_____
_____	_____
_____	_____
_____	_____

**Procedure:** *List on another sheet if more room is needed*

**Predictions:**

**Observations and measurements:** make a chart or graph

**Summary of results**

**Conclusions**

