

Garbology Lesson: It's a Wrap!

Grades 3-6; K-8 Standards

Lesson Summary

Students use math and observation skills to analyze packaging of everyday items, and learn how to conserve natural resources and reduce litter and waste.

Overview

In this lesson, students will:

- Discuss the purpose of packaging.
- Compare amount of packaging used for different cookies.
- Identify the waste created by packaging.
- Determine which packaging is easier to recycle.

Time

45-60 minutes to prepare lesson; 60 minutes for lesson

Vocabulary

- Packaging
- Natural Resources

Preparation

- Read the background information on front page.
- Ask students to bring to class a variety of pack-aging materials like cans, boxes, and plastic bags. Have extras on hand.
- Make four copies and one transparency of the *Cookie Packaging* chart or make one large chart for younger students.

Background

Packaging has many uses and benefits. It protects the contents from spoiling or getting damaged, and helps keep the contents clean. Package labels identify contents and provide directions for use. Packaging may also help retailers advertise their goods, keep sales records straight and prevent theft. Packaging also provides consumer convenience. It may reduce waste by dividing food and beverages into individualized portions, which reduces leftovers.

Unfortunately, packaging makes up a large volume of trash since most packaging is meant to be thrown away after one use. Packaging depletes natural resources, adds litter and pollution to the environment, and increases the cost of a product. For every dollar spent on a product, ten cents is for packaging.

Materials

- Choose three brands of one type of cookie (e.g. chocolate chip) with various packaging.

Examples:

Bulk cookies, such as fresh cookies from a bakery or a brand like Mother's cookies, loose in bag or box; Cookies in a tray, such as a brand like Oreo; Individually packaged cookies like Mrs. Fields; or divided into groups by paper cups like Pepperidge Farm.

**Note cost for each brand; you will need the price later.*

- Samples of packaging students are familiar with (e.g. Lunchables)
- Four copies and one transparency of *Cookie Packaging* chart
- Clean cloth towels or reusable plates
- Rubber gloves or sandwich bags



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Some packaging materials don't **biodegrade** and contain contaminating toxic materials. Common packaging that often ends up as litter includes cans, bottles, wrappers, foam containers, and plastic bags.

Generally, packaging is considered excessive when it is purely for the convenience of the retailer or consumer, used only for advertisement, or is not related to protecting contents from being spoiled or damaged. One way to reduce excessive packaging is to encourage manufacturers to voluntarily reduce packaging and do research into new packaging that is less harmful or wasteful. Another way to reduce packaging is for federal and state governments to create regulations that promote the use of reusable, recyclable, and compostable packaging that is not harmful to the environment. These regulations can take the form of container deposits, financial incentives, and bans on specific packages.

When we buy something, we also buy the packaging. We can all be wise consumers and avoid purchasing over-packaged items. We can also make sure that packaging does not become litter, and that packaging is reused or recycled. If it is waste, we need to learn how and where to dispose of it properly.

Pre-Activity Questions

1. Ask students if most of the litter they see at school is packaging material?
(Yes) Why?
2. Ask students to discuss the packaging they brought from home.
3. Have students separate packaging into categories. Allow them to select whatever categories they choose, but note how they decide to do this. Did they classify by type of material or by whether it can be reused or recycled, or by some other method?
4. Ask students why things need to be packaged. You might show students something they are familiar with, such as a "pre-packaged lunch." Have students examine the packaging.
5. Have students discuss the purposes for packaging (*protecting the product, marketing, safety*). List ideas on the chalkboard.
6. Discuss with students the types of materials that are used to make packaging and the natural resources they are made from.
(*paper is made from trees; plastic packaging is made from oil*)
7. Have students help you list disadvantages to overpackaging. (*wastes natural resources; could become litter*)
(*Note: the interpretation of "overpackaging" can vary from person to person.)



Classroom Activity

1. Ask students:
 - Do you ever eat cookies as snacks at home?
 - What type of packaging do the cookies usually come in?
2. Show students the three packages of cookies. Have students guess which cookies they think will produce the least amount of packaging and which ones will produce the most. Write their guesses on the chalkboard and compare this to their findings at the end of their activity.
(*Note: With younger students, consider doing the following activity as a class: analyze one package of cookies each day.)
3. Divide the class into three groups.
4. Provide a copy of *Cookie Packaging* chart to each group.

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- Assign each group a number from one through three (to correspond to the numbers on the chart).
 - Give each group a different package of cookies to analyze.
 - Provide rubber gloves or sandwich bags with which students should handle the cookies.
5. Ask students to complete columns “A” through “C” on the chart for the number they were assigned.
 - They should estimate the number of pieces of packaging and the number of cookies in the package.
 - They should then look at the outer packaging and open the package to see whether there is additional packaging inside.
 - They should count the pieces of packaging and then count the cookies and record their findings on their charts.
(*Note: When counting the number of cookies, students may have to spread the cookies out on a towel or plate.)
 6. For their brand of cookie, have groups identify the different types of packaging used (paper bag, plastic coated bag, paper tray, plastic tray, paper cups, paper box.); count how many pieces there are of each packaging type; and decide if the packaging can be reused, recycled or composted. Help them to complete column “C” on the chart.
 7. Ask groups to present their findings to the class. Record these.
 8. Discuss with students why they think the manufacturer chose each type of packaging. (*To keep the product safe, to advertise, to keep contents from breaking.*)
 9. Ask students:
 - Were you surprised at the actual number of pieces of packaging and cookies? Why or why not?
 - Do you think that all the packaging is necessary? Why?
 10. Ask students to determine whether there is unnecessary packaging in the package of cookies that they were assigned. Ask groups to show the class which pieces of packaging are not necessary and to explain why.
 11. Ask students whether any of the packaging can be reused, recycled or composted. Does any of the packaging contain recycled material? (This information would be printed on the outside package.)
 12. Tell the class the total cost for each brand of cookie and ask them to note the cost for each in column “D” of the chart. Using the information already recorded on their chart, ask students to determine the cost per cookie for each cookie brand.
*For simple math for younger students, round the total cost for each brand of cookie to the nearest dollar.
 13. Ask students to share their cost per cookie results. Which brand of cookie had the highest cost per cookie? Which brand had the lowest cost per cookie? For older students, ask them if they think there is any connection between the cost of the cookies and the amount of packaging used.
 14. Discuss the pros and cons of packaging for cookies and ask students to draw or write two sentences or a paragraph on what they learned about packaging.

Extension Math Problems

Depending on your students’ math skills, pose one or more of the following math problems for each group to solve for their brand of cookie:

1. What is the difference between the number of cookies estimated and the actual number of cookies they counted?

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2. What is the difference between the number of pieces of packaging estimated and the actual number of pieces of packaging?
3. What fraction of their pieces of packaging can be reused? Recycled? Composted? What fraction of their pieces of packaging is garbage?
4. What percent of their cookies packaging is garbage?
5. If they bought three boxes/bags of their brand of cookie, how many total pieces of packaging would they have? How many total recyclable pieces of packaging would they have? What would be the total cost?

Discussion Questions

1. What did you learn about packaging today?
2. What surprised you about the ways cookies are packaged?
3. Which cookie packaging produced the most waste? How do your results compare with your earlier predictions?
4. (For older students) Did any of the groups have cookie packaging that was made from trees? Are trees a renewable or nonrenewable natural resource? What do living trees provide for humans and the planet? Did any of the groups have cookie packaging that was made from oil? Is oil a renewable or nonrenewable natural resource?
5. What can you do to conserve natural resources and lower your production of waste in regard to cookie buying and packaging? *Buy cookies with the least amount of packaging; buy cookies in reusable or recyclable packaging.*

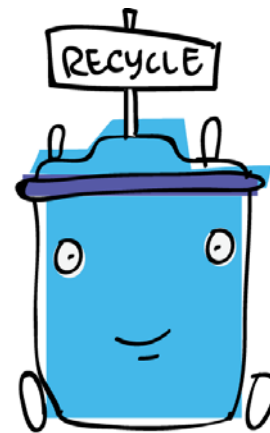
Extensions

- Have students weigh the package with cookies, then just the package. How much of the weight is packaging material?
- As a homework assignment, have students track how much packaging they use at home and how much of it is reused, recycled, composted, and thrown in the garbage. Have them graph their findings.
- Have students design a package for cookies that will protect the cookies but will not have “excessive” packaging. Students could send their ideas to a cookie manufacturer.
- Ask students to make a connection between the natural resources used for a piece of packaging and the animals that might live in the area where the resource was extracted. (e.g. aluminum comes from bauxite, which is mined in part from the rainforest.)

Have students create art projects using packaging materials.

National Science Standards Addressed

- Grades 5-8: Abilities necessary to do scientific inquiry (8ASI1)
Understandings about scientific inquiry (8ASI2)
- Grades K-4: Abilities necessary to do scientific inquiry (4ASI1)
Understandings about scientific inquiry (4ASI2)



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Cookie Packaging Chart



Brand of Cookie	A Number of pieces of packaging	B Number of cookies in package	C			D Total cost of cookies	E Cost per cookie
			What type of packaging was used? How many of each? Can the packaging be reused, recycled or composted? RU = Reuse REC = Recycle C = Compost				
1.	Estimate	Estimate	Type	How Many?	RU, REC, or C?		
			• Plastic bag				
			• Paper bag				
	Actual	Actual	• Paper tray				
			• Plastic tray				
			• Paper cups				
			• Paper box				
2.	Estimate	Estimate	Type	How Many?	RU, REC, or C?		
			• Plastic bag				
			• Paper bag				
	Actual	Actual	• Paper tray				
			• Plastic tray				
			• Paper cups				
			• Paper box				
3.	Estimate	Estimate	Type	How Many?	RU, REC, or C?		
			• Plastic bag				
			• Paper bag				
	Actual	Actual	• Paper tray				
			• Plastic tray				
			• Paper cups				
			• Paper box				

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