



WHAT'S IN YOUR GARBAGE?

PURPOSE:

The purpose of this unit is to increase the student's awareness of the amount of garbage a person produces and to become knowledgeable about landfills. In accomplishing this, students will examine a case study that arises from waste disposal and examine possible solutions to these problems. This unit primarily focuses on landfills for it is the most frequently used method of disposal. The landfill in Louisa, Virginia is currently presenting several waste disposal issues. My hope is that after the students complete these activities, many will show more interest in local environmental issues and possibly realize that a person can make a difference in preserving our planet.

GETTING STARTED/ TEACHER THOUGHTS:



Garbage, garbage, garbage, what would you do with a pile of garbage? Every day people generate tons of garbage. Why so much garbage? Are we running out of places to put our garbage? These are just a few questions that come to mind in planning this unit. Students will be encouraged to generate more problems in which they can research and draw personal conclusions (values). This unit is prepared for the seventh grade, life science class. It is especially useful if your school is utilizing the block schedule but the lesson plans can be modified to fit different class schedules. The unit is well integrated with the other disciplines and vocabulary and concept development are included. There are opportunities for using a variety of technology. Different learning styles were also considered while preparing this unit. All of the activities presented are not expected to be used but are included in the unit to give the teacher and or the student a group of choices. Those activities that have an asterisk by them are especially, rewarding activities to have your students to do.

LESSON PLAN # 1 Topic: What's garbage?

Objectives: The student will brainstorm ideas using the term "garbage". The student will create a word bank [grade7sciencesols.htm#science1](#), [grade7English.htm#English1](#) - 7.3, 7.8- 7. 10; [grade7civicssols.htm#civics9](#)

Instructional Activities: The teacher utilizes the concept development model using the word "garbage". In using this model, students will brainstorm a list of any term related to garbage. They will categorized the terms into related groups and then generate suitable titles for their groups (explaining their reasons). Have students to start a word bank. This is the anticipation phrase of the unit.

Students Activities: Participation in the concept development activity. Following the organization of the students ideas about garbage, they will start a word bank. New words that they encounter are kept in their folders, and can be used for vocabulary acquisition, and or other activities. Language arts and science skills are enhanced.

LESSON PLAN #2 Topic: What's in your garbage?

Objectives: The student will gather data from their garbage; make predictions; categorize their garbage; and participate in discussions. [grade7sciencesols.htm#science1](#), [grade7mathsols.htm#math5](#) , [grade7English.htm#English1](#) - 7.3, 7.8 -7.10; [grade7civicssols.htm#civics9](#).

Instructional Activity: Teacher facilitated. Allow at least two class periods .

Student Activities: I suggest that the teacher prepares several, large bags of garbage which consists of a variety of paper, plastic, and metals. Each group of four students will be given a prepared bag of garbage. For **safety reasons** it is best not to have your students manipulate food waste. The teacher must be aware of the health issues that can result in having students collect their own garbage. However, an alternative to this activity is to give each student a medium size plastic baggie and have them to collect their own garbage. In this situation, students must be given specific instructions of what items would or would not be suitable or safe to collect for class. Students are to weigh and examine their bag of garbage or the group's bag of garbage. Provide students with information about amounts, volume and mass of garbage produced by the average person each day. Using the results, make predictions on how much land is needed to hold that amount of garbage in one week, in one year, over several years. Have the students consider the environmental consequences of the large volume of waste generated in the U.S. Then proceed to have the students to sort their garbage. What are some items that might have been reused in some way? What are some items in your garbage that may be replaced by something that makes less solid waste? Categorize your waste as paper, plastics, metal, or other. Have them collect all the garbage and smash it together, to get a visual of the amount. Indicate what the smashing symbolizes and discuss where does the garbage generally go (landfills). Have students make a graph illustrating the kinds of garbage found. Math, Language arts, science, and some history will be enhanced.



LESSON PLAN # 3 Topic: How does your garbage glow?

Objectives: The student will examine the root word " methyl" of the word methane and learn about it and other gases. The student will research topics of interests. Share their findings with classmates. [grade7sciencesols.htm#science1](#) , [3](#), [4](#), [7](#), [8](#), [9](#), [10](#), [11](#), [12](#), [14](#) ; [grade7mathsols.htm#math5](#), 7.21; [grade7English.htm#English1](#) - 7.3, 7.8- 7. 10; [grade7civicsols.htm#civics4](#), 7.7, 7.9, 7.10.

Instructional Activities: Two - three days. Vocabulary acquisition, KWL, cooperative groups, and the jigsaw models will be utilized. This is the beginning of the realization phrase.

Student Activities: Students participate in vocabulary acquisition using the term , " methane." They take a closer look at the root word and its origin. The properties of methane such as its ability to illuminate and to explode will also be discovered in the definitions using better dictionaries. If available use of the "American Heritage Talking Dictionary " would really enhance this activity. This clearly will motivate the students to want to research for other information. You may read the article,"Gas in Your Gut", Science World Scholastic magazine, vol. 52, No. 6 November, 1995 to further interest students as well as provide knowledge about similar gases that are inside the human body. Students will add new words learned from these activities to their word bank for example, methanol, method, and methodology. They will proceed to generate topics that they feel they need to know about through participation in the KWL model. In this model, students are asked to generate what they already know about garbage and landfills. Then they generate what they want to know and proceed to research what they want to learn. The following are some examples of topics that the teacher may need to suggest for research : (1) In ancient times, what did people do with their trash? (2)What is meant by a throwaway society? Do Americans fit that description (explain)? Compare waste disposal with other industrialized nations. Find out about New York's Gar-Barge (a famous flat-bottomed boat, loaded with 3,168 tons of garbage, litter, waste, and trash). (3) Investigate New Jersey 's garbage. (4) What is a landfill and describe its components? Why is it considered the cheapest method? What kinds of wastes actually go in a landfill? What happens to toxic waste? What is meant by biodegradable? What is done when a landfill becomes full? Where is the world's largest landfill located (describe its history)? Which NFL stadium is built on garbage? (5) Find any garbage success stories (I-95 Sanitary Landfill, Fairfax County, Va., Mountaingate Facility, Los Angeles, CA.)? (6) What are the different ways of waste disposal (incinerators, landfills, hauling it away to someone else's backyard, recycling) ? (7) What are the health hazards (waste risks) dealing with waste disposal? What gases are found in a landfill? Some of the naturally occurring gasses in the atmosphere are carbon dioxide and methane. Find out if landfills contribute to adding more gases into the air and what effect does this have on global warming (green house effect)? (8) What are the waste management practices, procedures, regulations/polices of our local and or state landfills? What are some of the choices in disposing the gases emitted from a landfill (flare the gas , or produce energy (electricity) for sale (profit) , or on-site use)? Are landfills routinely inspected for leaks, (EPA) etc.? What are some problems that could result from leaks (the water supply, your watershed,

animals, plants)? What devices are used to keep landfills safe? (9) It was concluded that a tiny bit of space debris created a hole large enough to damage a window of the STS-7 Challenger. Does this suggest that there is extraterrestrial trash? How might this effect us on earth? (10) What are garbologist? **NOTE:** Remember, only some ideas have been provided. Feel free to add or delete. These questions are knowledge based and written in a thought provoking way.

SOURCES: Students are to use the Reader's Guide and other periodicals, newspapers, editorials, dictionaries (electronic), library books, textbooks, encyclopedias, computers, Internet, interviews, writing letters for information, etc. to find answers to these questions. As the teacher, you may need to provide these resources from other libraries especially if your school's library is limited. During the given research time, the students may work in cooperative groups to answer an assigned set of questions that the group has selected. After the groups are finished researching, they become experts. Each member of the group then form a new group, sharing what they know to their new group. Students move from group to group discussing their answers. This is called the jigsaw method which is an interesting way to learn knowledge. Use your judgment in determining the length of time needed for research. All subjects are enhanced.

LESSON PLAN # 4 Topic: What do others know about waste disposal?



Objectives: The student will have choices to develop a questionnaire, an environmental I.Q. test, or make a time line of waste disposal methods. The student who has more interest will interview people to gather more information on waste disposal.

[grade7sciencesols.htm#science4](#) . 4, 9; [grade7mathsols.htm#math5](#) , 7.21; [grade7English.htm#English1](#) - 7.3, 7.8 - 7.10; [grade7civicsols.htm#civics4](#) , 7.7, 7.9, 7.10.

Instructional Activities: Using the knowledge learned from research, prepare a handout for students which reviews much of the information presented from class. The handout basically consist of questions from the above lesson and serves as a study guide for the students. Conduct a discussion using the handout while having the students answer the questions. Then have students proceed to the learning activities. Extender activities have also been included that can be extra credit or an requirement.

Student Activities: Student participate in handout activity and either individually or in cooperative groups select one: (1) Develop a questionnaire to determine the attitudes of neighbors, family or friends toward landfills. Students will need to review their research to create a well rounded questionnaire. (2)* Create an environmental I.Q. test using information from their research. Give the quiz to family, etc. or use the Internet to see how environmentally literate those people are. (3)* Using the periodicals, construct a time line of the major events concerning garbage. Be sure to include the following: 400 B.C. - Greeks develop the first town dumps, 1769- Thomas Jefferson builds Monticello

and includes a mechanical garbage disposal system, 1785- the first cardboard box is produced, 1961- Proctor & Gamble begin test-marketing disposable diapers. Add some other dates of your own. **Extenders that interested or advanced students can do basically outside of the classroom** are: (1) Interview an employee of a garden center to find out more on composting. Report to class why people should compost and how it is done. (2) Interview a local community leader to find out what is done locally with waste. Videotape or record the interview and make a presentation to class. (3) Survey the local fast-food restaurants or supermarkets to determine how many of them recycle the packaging they use. Find out the best type of packaging for several items. Report your findings to the class (newspaper). Make a graph of your results. (5) Interview any person who works in various waste management fields. Find out about their careers and report your findings to the class. All of the disciplines are enhanced. These activities are based on action-type questions.

LESSON PLAN #5 Topic: What's the beauty of a landfill?



Objectives: The student will describe an landfill (ecosystem); identify the abiotic and biotic parts of an landfill/ ecosystem; draw and label a diagram of a landfill. The student can create an art form using garbage. grade7sciencesols.htm#science7, 8, 9, 10, 11, 12, 14; grade7civicsols.htm#civics9, 7.10.

Instructional activity: Teacher facilitated.

Student Activities: To reinforce learning, require all students to draw a diagram of a landfill and identify its components with descriptions. The teacher may need to prepare an handout on the components of a landfill. Students are to write several paragraphs explaining how a landfill is an ecosystem, etc. Discuss food chains, webs, plants, and animals living in and around the landfill. Then have students to pick one of the following: (1) Make posters to put around the school encouraging other classmates to become more aware of the solid waste problems and what they can do to recycle. (2) Go on a garbage walk and make a list of what is observed. Using **safe** garbage brought in by the teacher, create something **artistic** such as musical instruments, an animal, etc. (3) Visit a landfill, take photos, create a poster. (4) Draw before and after pictures of landfills. P.E., math, science, and art are enhanced.

LESSON PLAN # 6 Topic: Why recycle?

Objectives: The student will be able to explain how manmade products effect the environment; distinguish between different types of packaging; determine whether packaging can be recycled or not. The student can become involve in the recycling process; create a gas similar to the gases emitted from a landfill; determine which items are biodegradable or not; create a small scaled landfill; detect the odors that come from landfills. Remember to select a few of these activities/ objectives.

[grade7sciencesols.htm#science3](#), 9, 12, 14; [grade7civicsols.htm#civics9](#); [grade7mathsols.htm#math5](#) ; [grade7English.htm#English1](#) - 7.3, 7.8-7.10.

Instructional Activity: Teacher guided labs.

Student Activities: Several, lab activities have been provided for either the students to choose from or the teacher: These labs can be done by the entire class or have students working in cooperative groups, each with a different lab. Each group would present their findings to the class.

**LAB: Pick the best package/ Recycle, Reuse, Reduce.* View the video, "The Rotten Truth," from 3 2 1 Contact series. Student participate in quiz activities on the thirty minute video. Have students bring in packages and rate the package on its ability to be recycled. Which items were best packaged? etc. You may also discuss different forms of pollution.

LAB: See the gas. Put some old vegetable peelings in an old jar until it is three quarters full. Add some water and then pull the open end of a plastic bag over the neck of the bottle and tie it on tightly with sticky tape to make an air-tight seal. To make the process faster, add some yeast. Yeast is a fungus. Watch what happens. Compare this experiment to a landfill. Other ideas that could be discussed are: composting, fungi, molds, bacteria, and chemical reactions.

**LAB: Biodegradability/ a Landfill?* Provide students with 4 cups of garden or other soil from an outdoor area. Have them bring items from home that they consider to be biodegradable or non-biodegradable. Substances may be small pieces of fruit, bread, meat, plastic, paper or cardboard, charcoal, etc., The soil is then placed in a metal tray or bread pan. Soda bottles that have been cut off may also be used. The soil should be at least 7 cm deep (2 1/2 inches). Divide the pan into 6 areas, and bury a small piece (about 1 cubic centimeter) of material in each area. Label each area to identify what item is buried there. Every other day for two weeks or so, dig up the substance and describe its appearance, smell, etc. How is this similar to small-scaled landfill? How have the items changed? Why? What materials show little or no change? Why or why not? It is an excellent lab in which to review parts of an experiment. A student may be interested in adapting this lab into a science fair project.

LAB: What's involved in the recycling process? Make recycled paper out of newspaper. Tear up a half sheet of newspaper into 1/2 inch pieces and put into a bowl with one part paper and two parts water. Let the paper soak overnight. It will be pulped the next morning. Add a little cornstarch and using a hand beater, beat the mixture until it looks like pulp. Take a handful of the pulp and place it on a piece of screen or felt. Mold the pulp to the size of the paper you want to make. Cover the "paper" with wax paper and press the pulp with your hands or a rolling pin to squeeze out the excess water. Let the paper dry for about two days.



LESSON PLAN # 7 The CASE STUDY: Would you want to live near a landfill?

Objectives: The student will participate in debates using various environmental issues. The student will distinguish between facts and opinions. The student will examine editorial cartoons. This is the consolidation phrase. [grade7sciencesols.htm#science14](#) ; [grade7mathsols.htm#math5](#), 7.21; [grade7English.htm#English1](#), 7.8- 7.10; [grade7civicsols.htm#civics4](#), 7.7, 7.8, 7.9, 7.10.

Instructional Activities: Guide the debate. Provide the students with newspapers and library books that have information on the topics. Help them examine any editorial cartoon in their research. All subjects are enhanced.

Student Activities: Have your students participate in a debate on: Does the U.S. have a garbage crisis? One side argues that the U.S. is running out of space and methods of disposing of its garbage. People should recycle, reuse, and reduce their garbage. Questions to ask are: Do you agree with this? Explain your answer by providing some facts to support the issue. How might you verify these facts. Is your answer to the case a fact or an opinion? The other side argues that the U.S. has the capability to safely bury or burn its garbage. Many states are creating large recycling programs that are unnecessary. Students can create their own editorial cartoon to help express their points of view. This activity is designed for the students to first take a look at a general issue .

Local Case PART ONE: What are some of the reasons why recycling centers were built in Louisa County? What did the County use for waste disposal before the centers? What environmental conditions surround the recycling centers. Would you want to live near one? Explain why or why not. What are some solutions for waste disposal? How can you help? Write several paragraphs answering the above questions and explaining your position.

****MAIN CASE:** Currently, the Louisa landfill is being expanded vertically. In 1994 the height was 40 feet and will grow until a new facility is completed. Research estimates that the landfill will be full in about 15-20 years. Generate some possible consequences that can result from vertical expansion? What can be done with a full landfill site? What are some undesirable or desirable affects of living near a landfill? Describe the environmental surroundings (plant and animal life) of the landfill. In preparing for the future, the Louisa County has purchased additional land for expansion but the land has an historic, farm house located on it. What are some possible solutions to this problem. How can you help?

Background About the Home: The 19th century house on the property was originally a log home that was renovated in the '60s and '70s. The nine bedroom, three bathroom, home has been vacant since the County purchased it for \$251,000 in 1992. The home sits on a 107 acre tract on Route 700 and abuts the County landfill. It is considered one of the

oldest homes in the Pendleton area. Due to concerns voiced by citizens, the board of supervisors has requested a study of the longevity property regarding the disposition and future of the farm house on the property. Students should generate their own options. Some suggested options are: using portions of the land for a fire/rescue training center, repair and lease the dwelling, possibly conversion of the dwelling to an 'at risk youth' group home and tear it down for landfill expansion. Some citizens would like to see how to stabilize and recondition the house or the possibility of moving the home, either as one unit, or have it taken apart and put back together in another location.

THE PROBLEM: The citizens in the Louisa community want to preserved the farm house. What do you think Louisa should do about the house on its future site? Your decisions should be based on preserving the farm home or on expanding the landfill. If you were the landfill owner, consider the profit or cost in operating and monitoring a landfill? If you were a homeowner, consider how the value of your land is affected? How might you feel? How can you help? Research your options and be prepared to participate in the debate (could also be an excellent role play activity).

Related Issues: Many years ago there were few rules and regulations for landfills. Many of these landfills today leak lead, cadmium and other metals into the water and soil. Cleaning these landfills will cost millions of dollars in every state. Discuss whether people should or should not be taxed to pay for the cost of these clean-ups. Should everyone pay taxes even if they are not directly using the services (for example, trash collection fees if you live in the heart of a town, others who burn their own garbage)? Suppose the state decides to start dumping garbage in the oceans, rivers instead of landfills (Chesapeake Bay Bridge - possible discussion). Where should we to put toxic wastes (one student response: "there is a lot of flat -looking land out west where nobody lives")? What can we do about waste disposal? **How can you help?**

NOTE: Each student may take turns role playing the role of the homeowner, landfill owner, waste management personnel, mayor, Board of Supervisors, taxpayer, the EPA, etc. Students can write to these people to gather additional information and find newspaper articles to support their views. Contact your local public works manager and find out current cases that may be occurring in your area. If possible, contact your local newspaper for past news articles that they may still have in their files. The teacher could then make copies of editorials and or actual news clippings for the students. Invite the waste management officials to speak to your class. These activities are designed to investigate consequences/values. Students will learn that waste disposal is a real-life issues that may be in their backyard.

MORE ACTIVITIES: Worksheet activities can be designed by the teacher to assist students during labs. Some other worksheet ideas can be used to **culminate the unit or as mini lessons**. They are: (1) Make a word search from the words gather from the word bank. (2) Invent your own board game about garbage. Provide students with a guideline for this activity. (3) Create a garbage acrostic activity using the letters of words. (4)* Design math problems for students to solve (If 180 million tons of garbage fit into 100,00 trucks, how many tons of garbage fit into one truck? How many pounds is that? In

the U.S. over one and a half billion ballpoint pens are thrown away every year. How many different ways can you write one and a half billion using numerals? According to the U.S. Census Bureau, the population of the United States was approximately 250,000,000 in 1990. Approximately how many ballpoint pens were thrown away per person?). Make copies of graphs for students to read, etc. (5) Design a worksheet on clues, garbage can give about the person (career focus). (6) Make a garbage puzzle using the word bank. (7) Develop an activity that will allow the student to practice distinguishing between fact and opinion through using some of the environmental issues generated in the unit. (8)* Create an illuminating monster of garbage or an interstitial monster and write a creative story about it and its habitat. (9) Make a garbage fact book that is made of recyclable materials. (10)* Have students write a recycle, national creed in which they pledge to do their part in preserving the earth. (11) Create a garbage song or rap. All subjects are enhanced.



VOCABULARY/CONCEPTS: Some of the vocabulary/concepts that research will present in completing this unit are: *garbage, trash, landfill, *methane, pulp, garbologist, compactor, biodegradable, *composting, debris, dump, hazardous waste, incinerator, rubbish, salvage, *sanitation, toxic, cellulose, cocktail, disposal, waste management, solid waste, ferment, fungi, *germinate, insulate, bacteria, perennial, annual, *leachate, *manufactured goods, nutrients, vermin, quarry, *ecosystem, niche, habitat, water, air, soil pollution, environmentalist, earth day, resource, *consumer, marketing, and *biomass. Words that have an asterisk by them are good for vocabulary acquisition.

ASSESSMENT: Suggestions are as follows: tests, quizzes, art final products or productions, lab reports, participation in groups, debates, role play, worksheet activities, oral presentations, graphs, math calculations, and written paragraphs.



CLOSING REMARKS: In closing, I think that this unit provides a wealth of exciting learning avenues and activities for students to become little environmentalist, conscience of preserving our planet. I do hope this proves to be true for your students. The activities in this unit came from activities I have personally adapted for my own style of teaching. This unit is prepared by Avis M. Anderson, a middle school science teacher from Louisa County, Virginia.

