Post SWA Tour Lesson Plan

HIGH SCHOOL

Objective:

(1) Students will review the items that are recyclable in Palm Beach County's residential recycling program.

(2) Students will create a display of the environmental 3R's (recycle, reuse, reduce).

Sunshine State Standards:

Social Studies

Standard 2: Benchmark 4:

People, Places, and Environments

Understands the global impact of human changes in the physical environment.

Science

Standard 3: Benchmark 6:

How living Things Interact with Their Environment

Knows that those who engage in design and technology to solve practical problems, taking human values use scientific knowledge and limitations into account.

Mathematics

Data Analysis and Probability

Standard 1: Benchmark 3:

Analyzes real-world data and makes predicitons of larger populations by applying formulas to calculate measures of central tendency and dispersion using the sample population data, and using appropriate technology, including calculators and computers.

Materials:

Access to the Internet (Computer)

Length:

2-3 Class Periods

Evaluation:

Check the students' displays and collages.

Procedure:

1. Review with students about how garbage is processed and items, which are recyclable in Palm Beach County's Program.
2. Have students to access the Internet to send out a message asking other schools what initiatives they have undertaken to encourage the use of the environmental 3R's (recycle, reuse, reduce).
3. Collect the replies you receive. Make a display that indicates where the information originated and how it could be used in your school.
4. Locate Internet sites, write to provinces, state departments of environment, and contact environmental organizations and agencies.
5. Investigate issues related to waste management from a global perspective. How does one nation's waste affect other nations? How do rich and poor countries compare in types and amounts of waste generated and methods of waste management.
6. As a final activity students will construct an environmental collage. As part of the study of waste management, use "found" materials to create a collage that express an environmental theme.
7. If time permits, ask some of the students to share their findings.
8. Students will share/display their collages and displays.
9. Encourage students to tell family members and friends about the importance of recycling.

SWA
SOLID WASTE AUTHORITY

HIGH SCHOOL

High School

Pre SWA Tour Lesson Plan #4

Objective:

(1) Students will gain an understanding of the importance of disposing of household hazardous waste properly.

(2) Students will understand the negative environmental effects of the improper disposal of household hazardous waste.

(3) Students will list examples of common household hazardous waste products.

Sunshine State Standards:

Science:

Standard 2: Benchmark 6

Knows he ways in which humans today are placing their environment al support systems at risk.

Language Arts:

Writing

Standard 2: Benchmark 1

Writes text, notes, outlines, comments, and observations that demonstrate comprehension and synthesis of content, processes, and experiences from a variety of media.

Materials:

Pictures of the household hazardous Waste symbols. Experiments/Activities on household hazardous waste.

Length:

2 or 3 Class Periods

Evaluation:

Assess students' understanding of the material presented in the lesson by questioning.

Check students' experiments/activities.

Background

Some products are classified as "household hazardous waste" because they contain ingredients which can be harmful to people or the environment when they are improperly disposed. The following are the main categories of household hazardous waste:

Corrosive means the product inside could eat through clothes and burn skin. Some are so powerful they can eat through metal. Products that are corrosive include some drain cleaners, bleach, pool acids and strong cleansers.

Reactive creates gases. Start a fire or explode when mixed with other chemicals.

Flammable means the product can catch on fire very easily. Some flammable products include gasoline, lighter fluids, paint thinner and furniture polish.

Poison means that if someone eats or drinks it, the product will make them very sick or kill them. Some weed killers, bug killers and rat bait are in this category.

Household hazardous waste products need to be taken to an SWA collection facility or to a licensed facility that accepts the product. If these products are thrown in the garbage, they can harm garbage workers. If the items are poured down a sewer drain, they could poison the earth and contaminate people and animal's water supply.

Over 50% of the household hazardous waste products the SWA receives will be prepared for shipment to companies that actually recycle them. (*Please read the enclosed brochure for more information about the proper disposal of household hazardous waste products.)*

(Continued on back)

Procedure:

1. Display placards of “Corrosive”, “Flammable”, “Poison” and “Explosive” one at a time and elicits responses from students as to the meaning of each one.
2. Define household hazardous waste. Explain that it requires special disposal and cannot be thrown away with regular garbage.
3. Ask students to describe the negative effects on the environment when household hazardous waste is thrown in the garbage.
4. Explain how to properly dispose of household hazardous waste.
5. Tell the name of some common household hazardous waste items : moth balls, paint, car batteries, fertilizer, antifreeze, rechargeable batteries, and weed killer, fluorescent lights and motor oil.
6. Distribute the “Household Hazardous Waste” experiments/activities sheet.
7. Review the lesson by having the students complete the following in a narrative paper:
   (1) What is household hazardous waste?
   (2) Name 5 examples of household hazardous waste.
   (3) What is the negative effect if someone improperly disposes of household hazardous waste?
   (4) How do you properly dispose of household hazardous waste?
8. Encourage the students to share with their family and friends about the importance of properly disposing of household hazardous waste.

High School

Objective:

(1) Students will investigate the pros and cons of composting.

(2) Students will understand that biodegradable materials are those that are capable of disintegrating easily in nature.

(3) Students will understand that inventions that use only biodegradable materials are more "friendly" to the environment than others.

Sunshine State Standards:

Science:

Processes That Shape The Earth
Standard 1: Benchmark 4:
Knows the ways in which plants and animals reshape the landscape (e.g. bacteria, fungi, worms, rodents, and other organisms add organic matter to the soil, increasing soil fertility, encouraging plant growth and strengthening resistance to erosion.
The Nature of Science
Standard 3: Benchmark 6
Knows that scientific knowledge is used by those who engage in design technology to solve practical problems, taking human values and l Limitations into account.

Materials:

Computer with Internet access, Research materials about biodegradable materials, rotting log, grass clippings, leaves or food scraps, microscope or hand lens.

Length:

2 –3 Class Periods

Evaluation:

Students will be evaluated on their products and marketing campaigns using a three-point rubric.

Pre SWA Tour Lesson Plan #3

Background:

When we mention "recycling", we often think of recycling glass bottles, aluminum cans, and newspaper. But another 30% of the household garbage we throw out also can be recycled. These recyclable are food scraps, leaves, grass clippings and other biodegradable organic wastes. Organic waste can be recycled by composting. Simply stated, composting creates optimal conditions for decomposition to occur. Decomposition is the biochemical process by which bacteria, fungi and other microscopic organisms break organic "wastes" into nutrients that can be used by plants and animals. Decomposition occurs in nature whenever a leaf falls to the ground or an animal dies. The results of decomposition in a compost pile are nutrient-rich humus that is excellent for improving soil quality and plant growth.

What are some benefits of composting household food and yard wastes? For example:

- Doesn't require the purchase of expensive plastic bags often used for disposing household and yard wastes.
- Saves the cost of transporting wastes to and handling wastes at the landfill or incinerator.
- Reduces pollution form landfill (leachate and methane gas) or incinerator.
- Creates nutrient-rich humus you can use to improve the texture of your yard and garden soil; saves money you might spend on mulch.

What are some possible problems with composting? What suggestions do you have for solving the problems? For example:

- Its too much work. (Mowing the lawn and washing the car are work, too, but we choose to do these activities because they're satisfying – so is composting! And composting has a positive impact on the environment, which can make us feel good.)

Procedure:

1. Review with your students what they know about biodegradable Materials. Be sure they understand that biodegradable materials are those that disintegrate easily in nature.
2. Continue the discussion by asking students why biodegradable Materials are more "environment friendly", and therefore preferable to those that are not.
3. Tell your students that in the early 1990s, a young student Invented a golf tee made entirely out of biodegradable substances. Discuss with the class why this invention was important. (Millions of golf tees are used each year, and many people leave them on the golf course after they have used them. Standard golf tees take a ling time to disintegrate.) Then challenge students to come up with their own biodegradable inventions.

Procedure Continued

4. Divide the class into pairs or small groups, asking each group to dream up a product that consists only of biodegradable materials they can find in their homes or outside. Have students explain, in scientific terms, why the materials they have chosen are biodegradable and how they biodegrade.
5. Have students brainstorm ides for products and write down their ideas. For ideas, they can do research on the Internet.
6. Students should then write a list of materials they would need for each product and then determine which idea seems most practical. They should research their materials to make sure they are, in fact, biodegradable.
7. Once groups have chosen their inventions, they should either make models of their products or draw detailed diagrams, showing how and where each material would be used.
8. Have groups create marketing campaigns to convince other people to purchase their environment-friendly products.

EVALUATION

You can evaluate your students on their products and marketing campaigns using the following three-point rubric:

- **Three points: products** use only biodegradable materials; models or diagrams clear and carefully executed; marketing campaigns persuasive and creatively conceived.

- **Two points: products** use only biodegradable materials; models or diagrams adequate; marketing campaigns moderately persuasive.

- **One point: products** use only biodegradable materials; models or diagrams unclear or inadequately executed; marketing campaigns weak.

You can ask your students to contribute to the assessment rubric by determining criteria for a strong marketing campaign.

HIGH SCHOOL

High School

Objective:

(1) Students will gain an understanding of the importance of recycling and waste reduction.
(2) Students will be able to distinguish between non-renewable and renewable resources.
(3) Students will develop an "ecologically sound"city.

Sunshine State Standard:

Science
How Living Things Interact With Their Environment
Standard 2, Benchmark 1
Knows that some resources are renewable and others are non-renewable.
Standard 2, Benchmark 5
Knows the ways in which humans today are placing their environmental support systems at risk (e.g., rapid human population growth, environmental degradation, and resource depletion).

Social Studies
People, Places, and Environments
Standard 2, Benchmark 4
Understands the global impact of human changes in the physical environment.

Materials:

Recyclable materials, computer

Evaluation:

Assess students' knowledge of the presented material through questioning during the presentation.

Length:

2 or 3 Class Periods

Pre SWA Tour Lesson Plan #2

Background

Recycling is beneficial for the environment because it saves natural resources, conserves landfill space, and conserves energy.

For example, aluminum is made from a non-renewable resource called bauxite ore. It is most prevalent in Australia. Much pollution is created and much energy is used when bauxite ore is mined and extracted from the earth. On the other hand, when aluminum is recycled, much energy is saved and the natural resource, bauxite ore, is saved.

Interesting recycling facts

- It takes 17 trees to make 1 ton of paper*
- The following is saved each time one ton of glass is recycled: 1,330 pounds of sand, 433 pounds of soda ash and 433 pounds of limestone.**
- Every ton of steel that is recycled saves 2,500 pounds of iron ore, 1,000 pounds of coal, and 40 pounds of limestone.***
- Recycling one aluminum can will save enough energy to give power to a television set for 3 hours.**

Procedure:

1. To make students aware of the need to respect their Environment, and its natural resources, in order to apply that knowledge, students will develop an "ecologically sound" city.
2. Students will create an outline.
3. Using an outline the students will design an "ecologically sound" city. The city is required to include the following:

❖ Laws for the city to help make all citizens aware of their ecological responsibilities.
❖ Power source for lights and heat. These power sources do not have to be the same.
❖ One river that runs through and around the city.
❖ Some method of waste disposal.
❖ Two productive industries.
❖ Homes for the population.

HIGH SCHOOL

Pre SWA Tour Lesson Plan #1

Objective:

(1) Students will develop a questionnaire or survey to gather raw data.

(2) Students will gain an understanding of how garbage is processed in Palm Beach County.

(3) Students will develop graphs using raw data to present.

Sunshine State Standard:

Language Arts:

Writing

Standard 2: Benchmark 2:

Organizes information using appropriate systems.

Mathematics:

Algebraic Thinking

Standard 2: Benchmark: 1

Represents real-world problem situations using finite graphs, matrices, sequences, series, and recursive relations.

Materials:

Environmental Survey

Length:

60-90 minutes

Evaluation:

Ask questions about the "Environmental Survey" to assess students prior knowledge.

Check students' graphs for accuracy of data.

Assess students' knowledge of the presented material through questioning during the presentation.

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Background

The Solid Waste Authority of Palm Beach County (SWA) is a dependent special taxing district (not a department of the County) created by the Florida State Legislature under the Palm Beach County Solid Waste Act, Chapter 75-473, in 1974. Under this act, the SWA is responsible for developing and implementing plans for an **integrated countywide solid waste management system** comprised of source reduction, recycling, composting and landfilling to serve palm Beach County and reduce the amount of waste going into the landfill.

The main function of the SWA is to process all of the solid waste collected in palm Beach County's unincorporated areas and 38 municipalities. SWA also contracts with private collection services for the unincorporated areas of PBC.

Municipal solid waste (MSW) is more commonly known as trash or garbage – consists of everyday items such as product packaging, grass clippings, furniture, clothing, bottles, food scraps, newspapers, appliances, paint, and batteries. MSW management practices, such as source reduction, recycling, and composting prevent or divert materials from the wastestream. **Source reduction** involves altering the design, manufacture, or use of products and materials to reduce the amount and toxicity of what gets thrown away. Practices such as grasscycling, backyard composting, two-sided copying of paper and transport-packaging reduction by industry have yielded substantial benefits through source reduction. **Recycling** diverts items, such as paper, glass, plastic, and metals, from the wastestream. These materials are sorted, collected, and processed and then manufactured, sold, and bought as new products. Recycling prevents the emission of many greenhouse gases and water pollutants, save energy, supplies valuable raw materials to industry, creates jobs, stimulates the development of greener technologies, conserves resources for our children's future, and reduces the need for new landfills and combustors. **Composting** decomposes organic waste, such as food scraps and yard trimmings, with microorganisms (mainly bacteria and fungi), producing a humus- like substance.

Other practices address those materials that require disposal. **Landfills** are engineered areas where waste is placed into the land. Landfills have liner systems and other safeguards to prevent groundwater contamination. **Combustion** is another MSW practice that has helped reduce the amount of landfill space needed. Combustion facilities, like SWA burn MSW at a high temperature, reducing waste volume and generating electricity. Burning MSW can generate energy while reducing the amount of waste by up to 90 percent in volume and 75 percent in weight.

Procedure:

1. Administer the Environmental Survey. Discuss the survey and what it entails.
2. Explain how garbage is processed in Palm Beach County. *(Refer to the "Background" section.)*
3. Students will develop and/or create their own 'Environmental Survey" similar to the one in the packet.
4. Students will administer the Environmental Survey to five different family households.
5. Students will take data and create graphs to show whether the families or single families, multi-families, apartments/condos, or townhomes families. Graphs should include the breakdown of each question on the survey with the percentages of families.
6. Students will present their data orally in class.
7. Students will work in teams to graph their garbage at school over a week period. They will monitor the types and quantities of garbage produced in their school. Graph this information and use this baseline data to identify possible areas for improvement in waste reduction efforts. After a specified period of time (week), measure the garbage production again and graph the results. Compare the "before" and "after" data to determine if your waste reduction campaign was successful. Collect and grade later.
8. Elicit responses from students on how to reduce the amount of garbage entering the landfill.
9. Emphasize that reusing and recycling garbage is an effective way to reduce the amount of garbage we generate.
10. Encourage the students to recycle at school and at home.

Pre/Post Tour Test
About the Solid Waste Authority (SWA) of Palm Beach County
High School

1. How is garbage processed in Palm Beach County?

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2. What happens at the SWA's Materials Recycling Facility?

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3. When a landfill is full and it is no longer used, do you think it can serve any useful purpose, i.e. do you think building can be constructed on it?

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4. Give an example of the detrimental effects that the improper disposal of household hazardous waste has on the environment?

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5. Write three examples of household hazardous waste.

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6. What is compost?

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7. Name everything you can recycle in your yellow recycling bin.

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8. Name everything you can recycle in your blue recycling bin.

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9. What is the difference between a landfill and a dump?

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10. What is leachate?

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