



Environmental Character Education



Curriculum Resources

Cooperation

Middle School - September, 2006

Welcome back to school! The Broward County Environmental Protection Department is incorporating Character Education into its outreach efforts. Each month the Department will relate core values to environmental science in an effort to educate students about good character and the importance of protecting our natural resources. The curriculum resources and materials provided include the applicable numbering system for the *Sunshine State Standards*.

Cooperation is defined as “working with others to accomplish a common purpose.” We all live on the same planet and share the planet’s natural resources, such as the air, the water and the trees. Maintaining all of those resources can not be done alone; it requires the cooperation of everyone. By working together, we can accomplish the common goal of protection our natural resources for this generation and future generations.

Air Pollution and Acid Rain:

Acid deposition is caused by two pollutants that are released into the atmosphere, or emitted, when fossil fuels are burned: sulfur dioxide (SO₂) and nitrogen oxides (NO_x). The main reason we burn fossil fuels is to generate energy and electricity. There are other cleaner sources of electricity besides fossil fuels. They include: nuclear power, hydropower, wind energy, geothermal energy, and solar energy. There are also alternative energies available to power automobiles, including natural gas powered vehicles, battery-powered cars, fuel cells, and combinations of alternative and gasoline powered vehicles.

Acid deposition penetrates deeply into the fabric of an ecosystem, changing the chemistry of the soil and the streams, and making it harder for certain plants and animals to survive. It takes many years for ecosystems to recover from the effects of acid deposition, even after emissions are reduced and the rain becomes normal again.

Experiment:

Sunshine State Standards: SC.G.1.3

In this experiment you will use cuttings of plants that are easy to grow, such as ivy, philodendron, begonia, or coleus. You will place two cuttings in water with a pH level of 7.0, which is neutral, and two cuttings in water with a pH of 4.0, which is in the range of acid rain. Your goal is to determine how the acidity affects the growth of the plants.

Materials:

- 4 small, clear jars and 2 large water containers
- 4 labels and a marker
- water
- litmus paper and a color scale
- white vinegar
- baking soda
- measuring cups and spoons
- a stirrer
- 2 cuttings each of two easily grown plants, such as ivy, philodendron, begonia, coleus, etc. (Make sure each cutting has the same number of leaves and same amount of stem.)



Pollution Prevention Week - September 18th - 24th, 2006

To order a 2006 Pollution Prevention Week Poster and learn valuable tips for things we all can do at home and school to prevent pollution, visit www.p2.org/p2week.

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Experiment (continued from front page):

Sunshine State Standards: Grades 6-8; SC.G.1.3

Procedure:

1. Label the four small jars: (name of plant 1) neutral; (name of plant 1) acid; (name of plant 2) neutral; (name of plant 2) acid.
2. Pour 2 cups of water into each of the large containers.
3. Use the litmus paper and a litmus color scale to measure the pH level of the neutral or control container. It should be 7.0. If it is higher, add a drop or two of vinegar, stir, and check it again. If it is lower than 7.0, sprinkle in a little baking soda, stir, and check again. Repeat until the color scale shows that the pH level is 7.0.
4. Pour 1 tablespoon (15 ml) of vinegar into the acid or experimental container, stir, and check the pH level. It should be 4.0. If it is higher or lower, add vinegar or baking soda, as in Step 3.
5. Nearly fill the two small jars labeled *Neutral* with the neutral water. Then pour the same amount of acid water into the two small jars labeled *Acid*. Label and save any leftover water so you can keep the small jars full of water with the correct pH level.
6. Place the four plant cuttings in their labeled jars. Make sure the stem and part of the lowest leaf is under water.
7. Place all four jars in a warm, sunny place.
8. Create a chart . Draw each cutting to show how it looked at the beginning.
9. For the next two weeks:
 - a. Every day, make sure all cuttings are still in the water. Add more acid or neutral water to replace any that evaporates. (Be careful to add the right kind to each cup.)
 - b. Every other day, check the pH of the water in each cup, and use vinegar or baking soda to adjust it so it is 7.0 or 4.0.
 - c. Every day, record any changes or growth on the chart. Clearly show any roots that grow longer or branch out, leaves that grow larger, and the emergence of new leaves.
10. Compare results. What happened to the plants in the acidic water? What about the plants in the neutral water? Why do you think these results happened to each?

Source: <http://www.galeschools.com>

Dates to Remember:



International Coastal Clean-Up: September 16th

Visit www.coastalcleanup.org for additional information on how you can work with others to clean up our coast!

Pollution Prevention Week is September 18th - 24th

The Autumn Equinox is September 22nd

Announcing the 2006-2007

EnvironmentTile Contest

Deadline for entries is December 5, 2006

Prizes to be awarded in January, 2007



To obtain contest information and rules, visit www.broward.org/kids and click on the Environmental Kids Club button. You can also contact us at airoutreach@broward.org or 954-519-1220.

If you have any questions regarding these activities or have any comments, call 954-519-1220 or e-mail airoutreach@broward.org. You can also visit our web site at www.broward.org/kids/environment.htm.