

A BIRD'S EYE VIEW



AIR & WASTE MANAGEMENT
ASSOCIATION

OBJECTIVES

The student will do the following:

1. Name examples of natural and man-made air pollution.
2. Describe some ways that people pollute the air.
3. Observe and compare air samples.
4. Explain how air pollution may affect us in our daily lives.

BACKGROUND INFORMATION

People pollute the air in various ways. Perhaps the most obvious are the airborne wastes associated with fuel combustion, which are seen often in factory, power plant, and vehicle emissions. Also obvious, by smell rather than sight, are the fumes and vapors from the thousands of chemicals that have become common in today's society, from personal care products to solvents and cleaning fluids to pesticides and fertilizers.

Another, often overlooked, way that people pollute the air is simply by moving around. Vehicles traveling along dry dirt or gravel roads obviously stir up dirt and dust. Less obvious, but just as much of a health concern, are the particles and dusts stirred up into the air when a person walks down the street or moves from room to room indoors. Particulate matter added to the air mixture in the form of dust might be made up of bacteria, microscopic organisms (e.g., dust mites), pollen, animal dander, or other substances. The extremely small size of these particles makes them a particular risk to humans because they are easily inhaled deep into the lungs where they can contribute to a variety of adverse health effects.

The human respiratory tract has built-in, self-cleaning mechanisms designed to keep foreign particles out of the lungs. Some air pollutants can impair or halt these mechanisms, thereby paving the way for other pollutants to travel deeper into the lungs. Conditions ranging from sore, dry throats to asthma and bronchitis have been shown to have some connection with air pollution levels. Particulate matter and certain gaseous pollutants can also cause eye irritation. Apart from adverse health effects, air pollutants can create ugly blankets of smog or mists that spoil the natural beauty of our surroundings and decrease our quality of life.

SUBJECTS:

Science, Health, Language Arts, Art, Social Studies, Weather

TIME:

3 - 4 class periods over two weeks time.

MATERIALS:

Clean, white cloth or tissue
Magnifying lens
Flashlight
Tagboard (laminated)
Two wide-mouthed jars with lids
One piece of paper
Matches
One timer
Coated wire hangers (One per student)
White panty hose or tights (One per 2 students)
Tagboard or construction paper
Scissors
Stapler
Petroleum jelly or butter
Hole punch
Yarn or twine
Butcher paper
Permanent marker
OPTIONAL:
Clear contact paper
Duct tape
Cheese cloth

As you might expect, vegetation is also affected by air pollution. Plants need clean air, sunlight, and water for healthy growth and propagation, and foreign substances in the air can hinder plant uptake of these essentials. Particulate matter that becomes deposited on foliage can block the pores necessary for the exchange of gases in the atmosphere. Also, some studies have shown that certain pollutants can leave a coating on plants that makes them more attractive and susceptible to insect pests.

ADVANCED PREPARATION

1. Assign students to bring in a coated wire hanger and an old pair of white panty hose.
- 2. Photocopy or trace the bird outline from the student sheets onto construction paper.
3. Prepare hangers by stretching them into a diamond shape as stated in Activity A, 2.
4. Cut the legs off of the panty hose stockings as stated in Activity A, 3.

PROCEDURE

I. Setting the Stage

- A. Ask the children what they think of when they hear the phrase "air pollution." Tell the children that air pollution is anything that makes our air dirty or less healthy to breathe. Explain that some pollutants are invisible gases that mix with the air and that some are visible as very tiny particles called particulate matter. Point out that some of the chemicals are needed in the air; but it is a problem when they get out of the balance intended by nature. Solicit examples such as fires, exhaust fumes from trucks, or dust from plowing. NOTE: Additional background information may be shared with the class depending upon their age and attention span. Guide the students to think that natural sources of air pollution are volcanoes and forest fires ignited by lightning. Also dust kicked up by the wind from unpaved roads or unplanted fields is a form of air pollution.
 - B. Wipe the dust from a shelf or piece of furniture with a clean, white cloth or tissue. Examine the dust on the cloth both with and without a hand-held magnifying glass. Hold the cloth in front of a flashlight beam and gently blow the dust into the air away from the students. Discuss the way that wind moves dust from one location to another.
 - C. Discuss other types of "dust" that students may be familiar with. Examples include chalk dust, dust kicked up by a car driving along a dusty road, dust from feed grains as they are being loaded or emptied in a grain bin, a dust storm in a desert or on a beach, saw dust, etc. Have the students think of ways to reduce dust. Older students may write a short story. Younger students may draw a picture.
- D. (TEACHER DEMONSTRATION ONLY) Conduct the following activity.
1. Close any blinds or draperies in your classroom.
 2. Place two empty wide-mouthed glass jars on a table so that all students can see.
 3. Shine a flashlight beam through each jar and ask students what they see in the jars. (*Nothing, other than the flashlight beam.*)

4. Turn off all lights to further darken the room. Fold, crumple or twist a half sheet of paper tightly and hold it close to the mouth of one jar, then light it with a match. Drop the paper into the jar and cover the mouth tightly with the metal lid. **CAUTION: STRESS THE IMPORTANCE OF BEING CAREFUL WHEN HANDLING MATCHES AND FIRE. KEEP STUDENTS AT A SAFE DISTANCE.**
 5. Ask the students the following questions:
 - a. Shine the flashlight beam through both jars and ask the children what differences they see. (*One is empty, one has smoke in it.*)
 - b. What color does the light look in the smoke? (*Yellow*)
 - c. Why? (*Particles in the smoke make the light look dingy.*)
 - d. How long do you think the smoke will stay in the jar? (*Answers will vary.*)
 6. Turn the lights on and set a bell timer for five minutes. Check the smoke filled jar with the flashlight at 5 to 10 minute intervals until the smoke settles (about 30 to 45 minutes.)
- E. Tell the students that wood and fossil fuels such as coal, gasoline and kerosene do not burn completely, so some solid particles are released into the air as dust that we call soot. Soot makes smoke visible. Once the smoke in the jar appears to have disappeared, ask the students if all the pollution is gone since the air looks clean in the jar. (*Most students will say "yes."*) Open the jar, and when the students react to the odor, ask them if they still believe all the pollution is gone. (*No.*) Discuss with students the importance of being responsible by not burning firewood, leaves, trash or other materials because of the dust (soot) that will pollute the air.
- F. NOTE: If you prefer not to use matches, you can produce a similar effect by shaking talcum powder in a closed jar, and then shining a flashlight beam through the jar.

II. Activity

- A. Have the students construct the "flying bird." An illustration is provided as a Teacher Sheet. Kindergarten teachers may want to get a parent or aide to help the students make their birds. Teachers should prepare ahead of time the coat hangers for younger students. If you prefer, you can have the students do this activity in cooperative groups of four or five.
1. Pass out one set of bird parts to each student. Have the students cut out the bird parts.
 2. Grasp a wire hanger by the handle and in the center bottom. Pull and stretch the hanger into a diamond shape. A coated wire hanger works best.
 3. Cut one leg from a white panty hose stocking.
 4. Pull the stocking leg onto the point formed in the bottom of the coat hanger diamond.
 5. Pull the stocking toward the handle until the toe fits snugly across the bottom point.
 6. Knot the stocking at the handle and cut off excess fabric.
 7. Attach the head, wings and tail to the bird using a long-arm stapler. Be sure to attach the head near the hook of the hanger. Apply petroleum jelly or butter on the birds eyes.

8. Tie a sufficient length of yarn or twine to the hook of the hanger and hang the birds in desired locations.
- B. If weather conditions such as high winds make "flying birds" impractical, try one of the variations below. Kindergarten teachers may want to have the patterns done ahead of time.
1. Laminate tagboard patterns of trees, animals, hearts, or lungs.
 2. Use an exacto knife to carefully trim the inner pattern away leaving a template shape intact.
 3. Place tagboard on a matching piece of clear contact paper.
 4. Use duct tape to mount the shapes so the "sticky" side (adhesive) of the contact paper is exposed to the air in suitable locations.
 5. Another variation is to follow steps 1 and 2 as above, but substitute a double layer of cheese cloth for contact paper and staple it to your template. You may find it simpler to double the template and sandwich the cheese cloth between the two layers before stapling.
- C. Hanging the birds.
1. Help the children hang the birds at different locations inside and outside the classroom. Examples: playground, trees, breezeway, parking lot, cafeteria, ball field, etc. Label each bird's location with a permanent marker. You may want to make a chart listing the locations.
 2. Have the students check their birds for signs of particulate matter pollution every 2-3 days for 2 weeks.
- D. Collection and comparison of birds.
1. Have the children guess and chart their predictions as to which birds will be the dirtiest.
 2. Collect all of the birds and place them on a table or floor covered with a length of butcher paper.
 3. Students may visually select the bird showing the most and least signs of pollution. Assist students in identifying the locations of greatest and least pollution. Ask if they can think of reasons for the variations in pollution.
 4. Give children large hand-held magnifying glasses to examine the birds' eyes. Stress to students that the smallest particles can be the most dangerous and that there are particles present they cannot see, even with the magnifying glass.
 5. Discuss with children the implications that if the birds are "dirty" or polluted due to the air, then our lungs must be dirty too. Ask how they think this may affect their health, especially their breathing. Help them think of things we can do to protect our lungs. Examples are avoid burning trash or leaves; wear masks when working around saw dust; walk instead of driving, etc.

III. Follow-up

- A. Help the class develop a mural, experience chart, big book, or small book detailing the activity and its results.
- B. Small books may be duplicated for children to take home and share with their families. Older students can draw illustrations and make their own books to share with their families and friends.

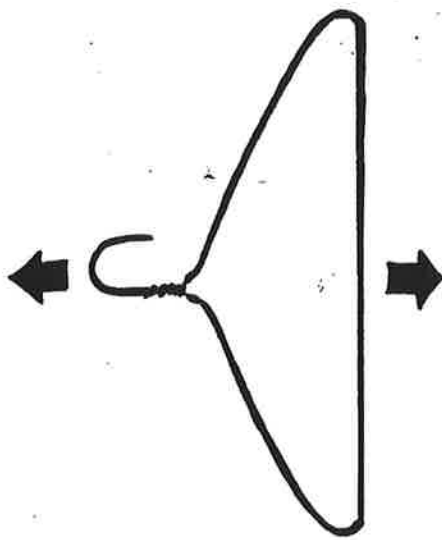
IV. Extensions

- A. Wrap a strip of clear contact paper over the mouth of a small jar. Use a compass to identify north; as you place the jar outside, mark an "N" for north on the appropriate side of the jar. Try to determine the direction from which the particles are coming by observing the jar over several days or weeks. Particles will be heavier and darker due to a stronger source or wind prevalence.
- B. Develop an interactive poster or a bulletin board showing the outline of a human body and the respiratory and circulatory systems. The students can attach picture cards of the nose, mouth, lungs, and heart to the appropriate places on the poster or bulletin board.
- C. Arrange for a representative of a local industry or a power plant to come and talk with the class about things their organization does to minimize air pollution.
- D. Representatives from the local Air & Waste Management Association chapter, Environmental Protection Agency, Public Health Department, environmental ministries, conservation groups such as the Audubon Society, the Sierra Club, the Wilderness Society, or specific health organizations such as the American Heart or Lung Association or the National Tuberculosis and Respiratory Disease Association may be contacted for additional demonstrations, hand-outs, or films.

RESOURCES

Goodman, Billy. A Kid's Guide to How to Save the Planet. New York: Avon Books, 1990.

Herbert, Don and Ruchlis, Hy. Mr. Wizard's 400 Experiments in Science. North Bergen, N.J.: 1983.

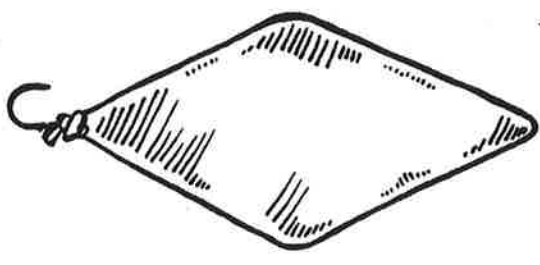


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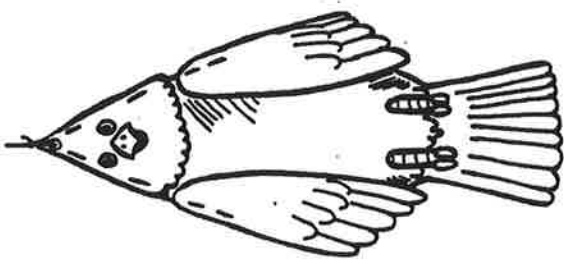
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