My World and Me™

RESOURCES AND THE ENVIRONMENT

Detecting Air Pollution

Written by Barbara Tharp, M.S., Nancy Moreno, Ph.D., and Paula Cutler, B.A.

from *Resources and the Environment Teacher's Guide* and for *Tillena Lou's Big Adventure*.

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This activity is part of the Resources and the Environment teaching unit. The *teacher's guide* may be used alone or with integrated unit components. The Resources unit is comprised of the guide, *Tillena Lou's Big Adventure* (storybook), and two supplements: *The Reading Link* and *The Math Link*. For more information on this and other educational programs, contact the Center for Educational Outreach at 713-798-8200, 800-798-8244, or visit http://www.bioedonline.org./

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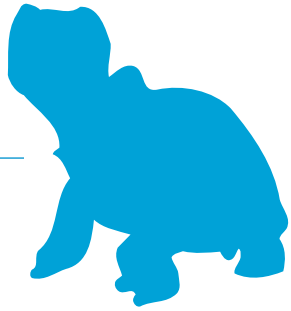
Detecting Air Pollution



Students create model air pollution detectors to sample particles in indoor and outdoor air.

A thin layer of air, a mixture of gases consisting mainly of nitrogen and oxygen, surrounds our planet. This layer is known as the atmosphere. It protects the Earth's surface from extremes of temperature and harmful radiation from the sun. All living things on Earth need air. Living organisms require oxygen to release energy from food and stored reserves. Plants and other producers also need carbon dioxide for photosynthesis.

When we breathe in air, we take in nitrogen, oxygen and tiny particles. Particles in air are pollutants and can be harmful. Air can become polluted or dirty in many ways. Indoor air contains tiny bits of dust made from animal dander, mold spores, dust mites and other materials concentrated inside living areas. Outdoor air can become polluted by car exhaust, other kinds of burning, manufacturing waste, soil and dust.

SETUP

Part 1: Obtain six 2-meter-sheets of butcher paper. Have students work in groups of four.

Part 2: Cut a 4½-in. x 6½-in. (12 cm x 16 cm) rectangle out of the center of two sheets of 9-in. x 12-in. heavy paper (making a picture frame set). Make 25 frame sets for students (one set per student, one set for demonstration).

Make 25 8-in.-strips (20-cm strips) lengths of wax paper to put inside and between each set of frame sheets.

Have students work in groups of four.

PROCEDURE

Part 1

1. Begin the class by darkening the room. Either let a shaft of light enter through a small opening in the blinds or shine a flashlight through the air. Ask students what they see. They should be able to observe small particles, "dust." Ask students, *What is air?* Help them understand that air is comprised of all the gases around us and it makes up our atmosphere. Ask, *Do we need air? What for?* (It is one of the things we need to live.) *How do we get air?* (We breathe it in and out of our lungs through our nose and mouth.) Ask, *Can we see air?* Expect varied responses (like wind, clouds, rain, snow, tornadoes, dust, smoke, bubbles, airplanes, etc.) that we observe when we look around outside. Project the page, "What's In the Air?" Discuss the different kinds of particles in air and match them to their sources (see "Answer Key to "What's In the Air?" sidebar, p. 2).
2. Have student work in groups to create a mural of things in the

CONCEPTS

- Air is all around us.
- Air in our atmosphere includes weather phenomena and flyers.
- Air is a necessity for life.
- Air can be polluted.
- Air can be cleaned or filtered.

SKILLS

- Observing
- Predicting
- Comparing and contrasting
- Communicating
- Counting
- Modeling

TIME

Setup: 20 minutes
Class: 2 sessions of 30 minutes

MATERIALS (see Setup)

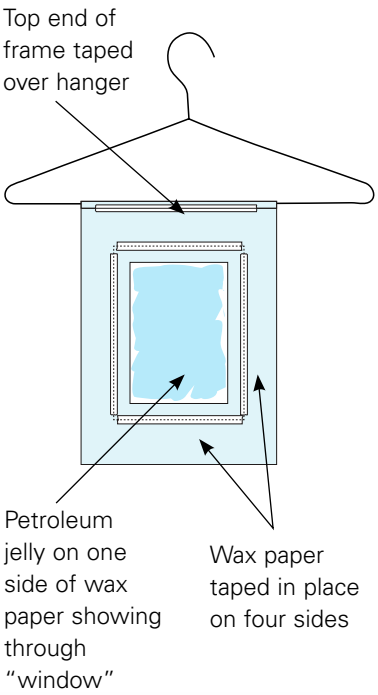
Teacher Materials

- 50 sheets of heavy, white or light colored paper, 9 in. x 12. in (to make "picture frames")
- Roll of wax paper
- Pair of scissors (or an X-acto knife, ruler and cutting board)

Materials per Student Group

- 4 coat hangers
- 4 hand lenses
- 4 pairs of scissors
- 4 plastic knives
- 4 sets of prepared "picture frames"
- 4 sheets of wax paper, 8-in. in length
- Construction paper in assorted colors and drawing paper
- Cotton balls
- Crayons and/or markers
- Glue
- Petroleum jelly, medium-sized jar
- Sheet of butcher paper, 2 meters in length
- Tape
- Copy of "What's In the Air?" and "My Science Journal" pages

AIR POLLUTION DETECTOR



ANSWER KEY TO "WHAT'S IN AIR?"

1. Spores are made by molds in damp places, like bathtubs.
2. Dust mites live in pillows and mattresses.
3. Pollen grains are made by flowering or cone-bearing plants. Pollen can be found indoors.
4. Tiny pieces of dead insects are in dust.
5. Flakes of dead skin are in the air.

EXTENSION

Have students make air pollution detectors to take home.

atmosphere (or air). Give each group a sheet of butcher paper. Encourage students to draw on the sheet, or make pictures using construction paper, scissors and glue to attach created items. When students have completed their murals, hang them on the classroom wall for class observation and discussion.

Part 2

1. Ask, *How can we discover what is in the air in our environment?* As students think about and discuss this subject, remind them about air filters on the cooling/heating systems at home and at school. (You may want to show them a filter.) Now explain that they will be making pollution detectors to check for dirt, dust or other particles that might be in the air in their homes or outside.
2. Distribute one set of two cut-out picture frames to each student pair and instruct students to draw pictures of things that might be in the air around the edges of the frames.
3. After students have finished decorating the frames, demonstrate how to place the wax paper between the frames and tape it into place on both sides. Tape the sides of the frame together.
4. Have students work as teams to put the frame and wax paper together.
5. Demonstrate how to attach the "Pollution Detector" (instrument) to a hanger by folding a small strip of the frame over the hanger and taping the frame in place.
6. Have students attach their pollution detectors to the hangers, then coat one side of the wax paper windows with petroleum jelly.
7. Instruct students to decide on a place to hang their detectors, inside or outside, considering factors such as weather, vents, doors and windows, etc. Then, in their science journals, have students draw pictures of their detectors in the environment in which they will be placed. Also have students draw what they think might become trapped on the sticky sides of the detectors.
8. Help students place their detectors inside the classroom or outside.
9. After a designated period, help students collect their detectors and examine the sticky surfaces using hand lenses.
10. Have students draw pictures of the different particles that have become trapped.
11. Ask students to bring their pictures to a sharing circle. Arrange students so that those with indoor samples will be on one side of the circle and those with outside samples will be on the other side. Have each student present one thing he or she has drawn and place the drawing on the floor. Consider creating a class graph on the floor using students' individual pictures.
12. Discuss students' findings as a class.

What's In the Air?