

Particulate Matter

Purpose

Students will explain that the environment may contain dangerous levels of substances that are harmful to human beings and that the good health of individuals requires monitoring the soil, air, and water as well as taking steps to keep them safe.

Materials

For the teacher: chalk, chalkboard

For each group of students: 2 microscope slides, petroleum jelly, hand lens, graph paper

Activity

A. Pre-Activity Discussion

1. Ask students: “What is pollution? What are some types of pollutants? Where are they found? Where do they come from?”
2. Tell students that some air pollutants are referred to as *particulate matter*. Explain that tiny pieces of debris and soot, in large quantities, affect the health of individuals and ecosystems.
3. Discuss where particulate matter may originate, such as from industrial processes.
4. Ask students: “If you were to study the amount of particulate matter found in and around the school and community, which locations would you be most interested in investigating?”

B. Activity

1. Divide students into small groups and distribute slides and petroleum jelly to each group.
2. Direct each group to thinly coat one side of the microscope slide with petroleum jelly and to place the slide in a location on the school property where it will not be disturbed. (Have the groups choose various locations inside and outside of the school.)
3. Instruct each group to choose a second location, such as a residential, commercial, industrial, or rural setting, to place another coated slide. Direct students to describe the chosen locations and write them on the chalkboard.

C. Discussion

1. Ask the class questions, such as: “Where would you expect to find the most particulate matter? Why? What kinds of particulate matter might be collected, based on locations?”

(continued)

EXTENDING
THE



ACTIVITY

Find out how your class can join the Hoosier Riverwatch or GLOBE program, where students become an integral part of testing and maintaining records of the water quality of a local body of water.

MEETING
INDIVIDUAL



NEEDS

Have students who need a challenge identify pollutants, such as PCBs, asbestos, mercury, radiation, lead, molds, and carbon monoxide. Have them identify what makes each a pollutant, how each affects humans and ecosystems, and what is being done to minimize or prevent each from contaminating the environment.

Standards Links
7.1.1, 7.2.7, 7.5.4

Activity (continued)





2. Discuss how high concentrations of particulate matter could be found in rural, commercial, and industrial areas (e.g., dust and pesticide residues in rural areas, dust from construction sites in commercial areas, and soot from factories in industrial areas).
3. Explain to students that breathing in large quantities of particulate matter, whether in one instance or in small quantities over a long period of time, can affect the health of individuals.
4. Discuss how exposure to particulate matter, such as traces of pesticides and carbon-soot from industry, have been linked to serious illnesses, such as lung disease and cancer.
5. Explain how particulate matter also moves into the water cycle, causing water pollution, which introduces problems in food webs.

D. Studying Slides

1. At the end of five days, have students collect their slides and distribute hand lenses and graph paper to each group.
2. Instruct students to place one slide on graph paper and to use the hand lens to count the number of particles in at least four sections of the slide (four grids on graph paper).
3. Tell students to find the average of the four areas and to use that number to calculate an estimate of particles on the entire slide (by multiplying the average number of particles in one area by the total surface area of the slide).
4. Explain that this will provide an estimate of the amount of particulate matter at each location the slides were placed.
5. Discuss each group's results and have them make comparisons.
6. Ask students: "How can people make sure that individuals and the environment are affected minimally by the use of pesticides, industrial processes, and other causes of pollution?"
7. Discuss how government and private agencies have implemented several programs and are currently monitoring and regulating the release of pollutants into the air, water, and soil.

Classroom Assessment**Basic Concepts and Processes**

At the conclusion of the activity, ask questions, such as the following:

-  Why might dangerous levels of harmful substances be found in the environment?
-  What could your community do to minimize and/or prevent the release of pollutants?
-  Which area contained the most particulate matter?
-  How do you know?