CHAPTER 10

Teaching Suggestions

Science and Mathematics Lab

(Course 2, Lesson 8-3)

Air Particulate Sampling

OVERVIEW

In this lab, students collect data about air particulate pollution in their neighborhood and use statistics to predict air particulate pollution over a larger area.

RECOMMENDED TIME

2 class periods

MATERIALS

- clear contact paper (14 cm square)
- grid paper (1-cm grid)
- cardboard or $\frac{1}{4}$-inch plywood (40 cm square)
- cellophane tape
- magnifying glass
- number cubes

PREPARATION

Reproduce the centimeter grid paper from the front of the Lab Manual. Cut the cardboard or plywood to size.

You may want to pre-test this activity to find out how long students need to expose their samplers to collect an adequate particulate sample. Twenty-four hours will be sufficient in most areas; six hours may be sufficient in areas with a high number of particles. In areas with low particulate levels, 48 hours or a weekend may be required.

TEACHING THE LAB

1. Have students work individually, in pairs, or in small groups. You may want to set up a sampler at your school to demonstrate the technique.
2. Help students randomly choose the grid to count on their sampler. They can devise a system using number cubes such as: the number cube that lands on the left is the horizontal; the number cube on the right is the vertical. Students should always begin at the same corner.

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Air Particulate Sampling (continued)

Answers and Conclusions

1. Answers will vary depending on the sample area. Check students' math.
2. Answers will vary. Check that students multiplied by 10,000 to obtain the count.
3. Answers will vary. Check that students multiplied by 1,000,000 to obtain the count.
4. Answers will vary. Check that students multiplied by 100 to obtain the count.

CHAPTER 10

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Air Particulate Sampling

INTRODUCTION

The haze that we associate with air pollution is created when particles in the air scatter light coming through the atmosphere from the Sun. The wind lifts dust particles into the air. Other particles in the air are the products of the combustion that takes place in vehicles, fireplaces, factories, volcanic eruptions, and other sources.

The Environmental Protection Agency (EPA) sets standards for the amount of particulates allowed by law in a given area. It is important that these standards are not exceeded. If they are, the health of the living organisms in the area may suffer.

OBJECTIVES

In this lab, you will:

- measure particulate pollution in your neighborhood.
- predict the amount of particulate pollution in the surrounding area.

MATERIALS

- clear contact paper (14 cm square)
- grid paper (1-cm grid)
- cardboard or $\frac{1}{4}$-inch plywood (40 cm square)
- cellophane tape
- magnifying glass
- number cubes

PROCEDURE

1. To make your "pollution sampler," tape the contact paper on top of the cardboard or plywood with the sticky side up. Keep the protective backing on the contact paper.
2. Place the sampler outside your home on a flat surface, preferably at least a meter or two above the ground. Anchor the sampler if it is windy. Make sure the contact paper is taped firmly onto the cardboard, then remove the protective backing.
3. After the sampler has been exposed for an amount of time your teacher will specify, place the grid paper over the collecting surface grid side down. Bring the sampler to class.

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Air Particulate Sampling (continued)

4. Remove the sampler from the cardboard and observe the particles through the clear contact paper. Using a magnifying glass, count the number of particles found in ten randomly selected squares on the grid paper. Select the squares by tossing the number cubes. If the numbers come up two and five, for example, count the square in the fifth column, second row. Record your counts in the Data Table.
5. Divide the total number of particles you counted by 10 to get an average number per square.

DATA AND OBSERVATIONS

Sample Square	Particle Count

Count total:

Average count per square:

Questions and Conclusions

1. Add together the average counts for all the samplers in your class. Divide this number by the number of samplers to obtain a regional average for the 1-centimeter square. What is the regional average?
2. Use your regional 1-centimeter square average to predict the number of particles in 1 square meter. (1 m = 100 cm)
3. Use your regional average for 1 square meter to predict the number of particles in 1 square kilometer. (1 km = 1,000 m)
4. Use your regional average for 1 square kilometer to predict the number of particles in 10 square kilometers.