



AP Environmental Science 1999 Free-Response Questions

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ENVIRONMENTAL SCIENCE

SECTION II

Time—90 minutes

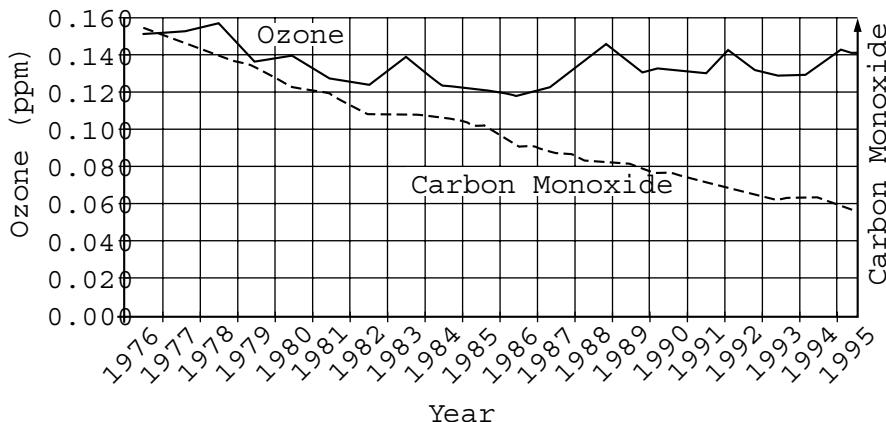
4 Questions

Directions: Answer all four questions, which are weighted equally; the suggested time is about 22 minutes for answering each question. Write all your answers on the pages following the questions in the pink booklet, NOT on the green insert. Where calculations are required, clearly show how you arrived at your answer. Where explanation or discussion is required, support your answers with relevant information and/or specific examples.

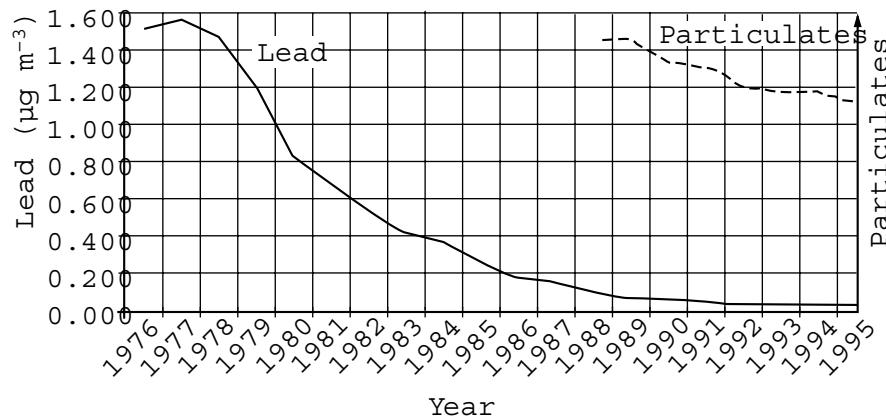
1. On a field trip to two local ponds, a group of students observed a difference between the two ponds in the diversity of worms and insect larvae living in the mud and debris near the edges of the ponds. Numerous factors, both biotic and abiotic, influence the distribution of aquatic organisms.
 - (a) The students decided that they would investigate some of the abiotic factors. List three water-quality tests that could be conducted and explain what information each test provides. Include in your answers a description of the impact of each factor on the distribution of aquatic organisms.
 - (b) Larvae of a certain insect are found in pond *A* but not in pond *B*. Design a controlled experiment that would help explain the observed distribution of these insect larvae. Be sure to include the following in your design.
 1. Formulate a hypothesis.
 2. Identify the variable that will be manipulated.
 3. Outline the field and/or laboratory procedures that will be followed. Describe what data you will collect.
 4. Discuss the possible results and relate them to the distribution of the insect.
 - (c) What are indicator species and how are they used to assess environmental quality? Give a specific example of such a species and its use.
2. The development of plans for long-term resource management depends on understanding the patterns and consequences of resource use.
 - (a) Describe what makes a resource renewable or nonrenewable. Give a specific example of a renewable resource and of a nonrenewable resource.
 - (b) Describe and compare total resource use per capita in developed and developing countries.
 - (c) What is meant by sustainable resource use? Give an example.
 - (d) Economic policies and practices affect society's progress toward achieving sustainable resource use. Discuss one policy or practice that facilitates this progress, and one that impedes it.

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**ATMOSPHERIC CONCENTRATIONS OF OZONE
AND CARBON MONOXIDE**



**ATMOSPHERIC CONCENTRATIONS OF LEAD
AND PARTICULATE MATTER**



3. The six criteria pollutants used by the Environmental Protection Agency to assess air quality in the United States are NO_2 , SO_2 , carbon monoxide, lead, ozone, and particulates. The graphs above show trends in the concentration of four of these in a certain city in the United States.
 - (a) Describe and compare the concentration trends for ozone and lead. Calculate the percentage change in each from 1978 to 1988.
 - (b) For either ozone or lead, identify the major source(s) of that pollutant and describe the main physiological effects in humans.
 - (c) For either particulates or carbon monoxide, identify the major source(s) of that pollutant and describe the most effective method of reducing the concentration of the pollutant in the atmosphere.

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4. The following is an excerpt from a newspaper article describing a controversy.

Pesticide Use in Agriculture—A Controversy

Recently, Jonesville County inhabitants have been embroiled in a controversy regarding the use of pesticides on crops grown in the county. The *Jonesville Express* interviewed county residents for opinions on pesticide use. Below is a sampling of their responses.

Charles Ehler, farmer: "I'm not going to use those pesticides because I don't want to end up with leukemia."

Maurice Gordon, farmer: "The people who oppose the use of pesticides should have to decide which third of the world would starve."

Wendell Mullison, chemical salesman: "The health risks are minimal because these chemicals have been intensively tested by the chemical companies."

Robert Rodriguez, Environmental Protection Agency employee: "I worry about pesticides that find their way into groundwater. My agency has trouble keeping up with the new developments in farm chemistry. We don't even test the water for most of the pesticides that are in use today."

Bessie Smith, 80-year-old resident: "I'm against pesticides. When those planes spray on the farm next to me, most of those chemicals end up in my yard."

Alice Evans, farmer: "I couldn't earn a living without pesticides. My farm would not make a profit."

Judy Johnson, college professor: "We're in a vicious cycle. We develop pesticides, apply them, and the pests evolve resistance. Then we have to do it all over again."

Ben Jackson, librarian: "Pesticides are much safer than they used to be. The newer pesticides only affect specific pests and break down more quickly in the environment."

- (a) Select four of the people interviewed. Provide a concise argument, based on scientific principles, that supports or refutes each individual's viewpoint.
- (b) Identify one specific pest and explain its adverse effects on either agriculture or human health. Describe a viable method, other than the use of pesticides, of controlling this pest.

END OF EXAMINATION

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