AP® Environmental Science
2005 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 this booklet. 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. Read the following article from the *Fremont Examiner*.

FREMONT EXAMINER

Diseases on the Rise!

Despite the fact that many old diseases have been effectively controlled by the use of antibiotics and vaccines, it appears that the world today is becoming more vulnerable to the outbreak of relatively new diseases such as severe acute respiratory syndrome (SARS) and West Nile Fever, and the reemergence and spread of old diseases such as malaria, cholera, and tuberculosis.

According to epidemiologist Dr. Amodie, "It is not possible to protect the health of Americans without addressing the problems of infectious diseases on a global scale."

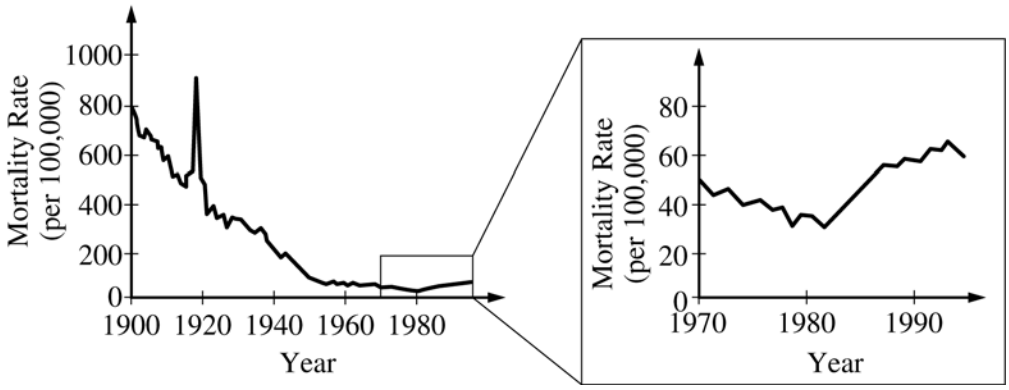
The threat of the emergence and spread of newly arising infectious diseases has become a dangerous reality. These new diseases could become the endemic diseases of tomorrow.

(a) For one new disease and one old disease named in the article above, explain how the disease is transmitted through the human population and describe an effective method for controlling the spread of the disease.

(b) For one of the two diseases you chose in part (a), identify one environmental factor that contributed to the emergence or reemergence of the disease and explain how that factor influenced the increased incidence of the disease.

(c) Provide a rationale to support Dr. Amodie's statement as quoted in the article.

INFECTIOUS DISEASE MORTALITY IN THE UNITED STATES, 1900–1996



(d) The graphs above show the mortality from infectious diseases in the United States since 1900. Identify an infectious disease that made an important contribution to the trend of increasing mortality rates that began in about 1980 and explain one major cause of the increased rate of mortality from that disease.

2. Between 1950 and 2000, global meat production increased from 52 billion kilograms to 240 billion kilograms. During this period, the global human population increased from 2.6 billion to 6.0 billion.

(a) Calculate the per capita meat production in 1950 and in 2000.

(b) Use the values from part (a) to calculate the change in global per capita meat production during this 50-year period as a percentage of the 1950 value.

(c) Discuss why it is more efficient to produce grain for human consumption than to produce meat for human consumption. In your answer, consider both land use and energy use.

(d) Describe TWO environmental consequences of the increase in the production of meat for human consumption.

(e) Identify and explain one potential advantage and one potential disadvantage for human health of a diet that contains very little meat.

GO ON TO THE NEXT PAGE.

3. Most of the coal mined in the United States today comes from surface (strip) mines. In surface mining, the vegetation, soil, and rock covering the coal (referred to as overburden) are removed and set aside. After the coal has been hauled away, good conservation practices require that the overburden be replaced and the surface be restored to its original condition. Land restoration may be difficult in some regions, due to factors such as the local climate, the thickness of the coal seam, the extent of the overburden, and the sulfur content of the coal.

   (a) Describe the steps that should be taken to restore the land after the overburden has been replaced.

   (b) Explain why the restoration of the land would likely be more difficult in an arid climate (less than ten inches of precipitation per year).

   (c) Describe one environmental impact that the sulfur content of the remaining coal and the tailings would have on the reclamation process and suggest a possible remedy.

   (d) Other than mining and reclamation, describe TWO environmental impacts of using coal for energy.

   (e) Explain why per capita coal consumption in the United States is likely to increase.

4. The Alaskan National Wildlife Refuge (ANWR) on Alaska's North Slope is frequently in the news because petroleum geologists estimate that there are billions of barrels of economically recoverable oil beneath the surface of its frozen tundra. According to a 1998 United States Geological Survey (USGS) estimate, ANWR could contain up to 10 billion barrels of technically recoverable oil. Oil company officials advocate opening the refuge to oil exploration and the subsequent development of its petroleum resources. Environmentalists argue that oil exploration and development will damage this fragile ecosystem and urge Congress to protect ANWR by designating it as a wilderness area.

   (a) The United States consumes approximately 20 million barrels of oil per day. According to the USGS estimate, for how many days would the technically recoverable oil resource in ANWR supply the total United States demand for oil?

   (b) Describe TWO characteristics of arctic tundra that make it fragile and explain how these two characteristics make the tundra particularly susceptible to damage from human impacts.

   (c) Identify TWO activities that would be associated with the development of ANWR petroleum resources and describe a substantial environmental impact of <u>each</u> in ANWR.

   (d) Identify and describe TWO major end uses of the 20 million barrels of oil that the United States consumes each day and for <u>each</u> use describe a conservation measure that would substantially reduce United States consumption.

END OF EXAM