

### About the Advanced Placement Program<sup>®</sup> (AP<sup>®</sup>)

The Advanced Placement Program<sup>®</sup> enables willing and academically prepared students to pursue college-level studies — with the opportunity to earn college credit, advanced placement, or both — while still in high school. AP Exams are given each year in May. Students who earn a qualifying score on an AP Exam are typically eligible to receive college credit and/or placement into advanced courses in college. Every aspect of AP course and exam development is the result of collaboration between AP teachers and college faculty. They work together to develop AP courses and exams, set scoring standards, and score the exams. College faculty review every AP teacher's course syllabus.

### AP Environmental Science Course Overview

The AP Environmental Science course is designed to be the equivalent of a one-semester, introductory college course in environmental science, through which students engage with the scientific principles, concepts, and methodologies required to understand the interrelationships of the natural world. The course requires that students identify and analyze natural and human-made environmental problems, evaluate the relative risks associated with these problems, and examine alternative solutions for resolving or preventing them. Environmental Science is interdisciplinary, embracing topics from geology, biology, environmental studies, environmental science, chemistry, and geography.

#### LABORATORY REQUIREMENT

Although there are no specific AP Environmental Science labs or field investigations required for the course, it is expected that students perform as many labs/field investigations as possible.

#### PREREQUISITE

Students should have completed two years of high school laboratory science — one year of life science and one year of physical science (for example, a year of biology and a year of chemistry). Due to the quantitative analysis required in the course, students should also have taken at least one year of algebra. Also desirable (but not necessary) is a course in earth science.

### AP Environmental Science Course Content

Environmental science is interdisciplinary; it embraces a wide variety of topics from different areas of study. There are several unifying themes that cut across topics. The following are course themes:

- Science is a process.
- Energy conversions underlie all ecological processes.
- The Earth itself is one interconnected system.
- Humans alter natural systems.
- Environmental problems have a cultural and social context.
- Human survival depends on developing practices that will achieve sustainable systems.

### Topic Outline

- I. Earth Systems and Resources
- II. The Living World
- III. Population
- IV. Land and Water Use
- V. Energy Resources and Consumption
- VI. Pollution
- VII. Global Change

### Inquiry-Based Investigations

Because it is designed to be a course in environmental *science* rather than environmental studies, the AP Environmental Science course includes a strong laboratory and field investigation component.

The AP Environmental Science course requires teachers to provide students with opportunities to perform experiments and analyses involving the study of air, water, and soil qualities as an essential core for the lab/field investigation activities. These investigations challenge students' abilities to

- Critically observe environmental systems;
- Develop and conduct well-designed experiments;
- Utilize appropriate techniques and instrumentation;
- Analyze and interpret data, including appropriate statistical and graphical presentations;
- Think analytically and apply concepts to the solution of environmental problems;
- Make conclusions and evaluate their quality and validity;
- Propose further questions for study; and
- Communicate accurately and meaningfully about observations and conclusions.

## AP Environmental Science Exam Structure

### AP ENVIRONMENTAL SCIENCE EXAM: 3 HOURS

#### Assessment Overview

Exam questions are based on each major topic area. They are designed to cover the breadth of students' knowledge and depth of understanding of environmental science.

#### Format of Assessment

**Section I:** Multiple Choice: 100 Questions | 90 Minutes | 60% of Exam Score

- Discrete Questions
- Questions in sets

**Section II:** Free Response: 4 Questions | 90 Minutes | 40% of Exam Score

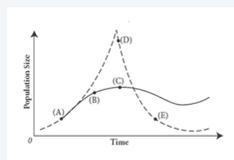
- Data Set (1 question)
- Document-Based Question (1 question)
- Synthesis and Evaluation (2 questions)

## AP ENVIRONMENTAL SCIENCE SAMPLE EXAM QUESTIONS

### Sample Multiple-Choice Question

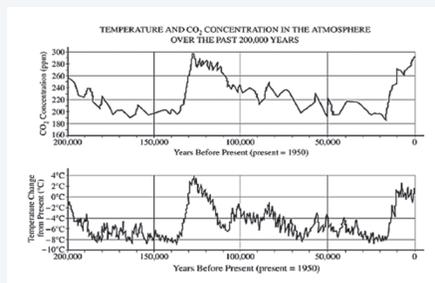
**Directions:** The lettered choices on the graph below refer to the numbered statements immediately following it. Select the one lettered choice that best fits each statement. Each choice may be used once, more than once, or not at all in each set.

**Questions 1–3** refer to the lettered points of the curves plotted on the graph below. The curves show two possible patterns of change in population size over time for a certain species of small mammal in an ecosystem.



1. Population growing exponentially
2. Population decreasing at greatest rate
3. Population growing at a decreasing rate

### Sample Free-Response Question: Data-Set Question



According to atmospheric temperature and CO<sub>2</sub> concentration records derived from Antarctic ice cores, Earth's climate has undergone significant changes over the past 200,000 years. Two graphs are shown to the left. The upper graph shows the variation in atmospheric CO<sub>2</sub> concentration, and the lower graph shows the variation in air temperature. Both graphs cover the same time period from approximately 200,000 years ago up until the year 1950, which is represented as year 0 on the graphs.

- (A) Answer the following questions that relate to the graphs above. Remember that for any calculation you must clearly indicate how you arrived at your answer. Answers must also include appropriate units.
- (i) Determine the net change in atmospheric CO<sub>2</sub> concentration between 140,000 years ago and 125,000 years ago.
  - (ii) Calculate the ratio of the change in the mean global temperature to the change in atmospheric CO<sub>2</sub> concentration between 140,000 years ago and 125,000 years ago.
  - (iii) Scientists predict that between 1950 and 2050, the atmospheric CO<sub>2</sub> concentration will increase by 200 ppm. Predict the change in mean global temperature between 1950 and 2050 using the ratio that you calculated in part (ii).
  - (iv) Describe one major assumption that was necessary to make the prediction in part (iii) above. Discuss the validity of the assumption.
- (B) Identify and describe TWO major causes for the predicted 200 ppm increase in atmospheric CO<sub>2</sub> concentration between 1950 and 2050.
- (C) Identify TWO gases other than CO<sub>2</sub> that contribute to the anthropogenic increase in mean global temperature. For each gas, describe a major human activity that leads to its release.