



AP[®] Environmental Science

About the Advanced Placement Program[®] (AP[®])

The Advanced Placement Program[®] has enabled millions of students to take college-level courses and 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, in college, to receive credit, placement into advanced courses, or both. 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 within 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.

RECOMMENDED PREREQUISITES

Students should have completed two years of high school laboratory science—one year of life science and one year of physical science (e.g., 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.

LABORATORY REQUIREMENT

Although there are no specific AP Environmental Science labs or field investigations required for the course, it is required that students have the opportunity to spend a minimum of 25% of instructional time engaged in hands-on, inquiry-based laboratory and/or fieldwork investigations.

AP Environmental Science Course Content

The course content is organized into commonly taught units of study that provide a suggested sequence for the course. These units comprise the content and conceptual understandings that colleges and universities typically expect students to master to qualify for college credit and/or placement.

This content is grounded in big ideas, which are cross-cutting concepts that build conceptual understanding and spiral throughout the course. The big ideas, along with brief descriptions of each, are as follows:

- **Energy Transfer:** Energy conversions underlie all ecological processes.

- **Interactions Between Earth Systems:** The Earth is one interconnected system.
- **Interactions Between Different Species and the Environment:** Humans alter natural systems and have had an impact on the environment for millions of years.
- **Sustainability:** Human survival depends on developing practices that will achieve sustainable systems.

Unit Outline

- **Unit 1:** The Living World: Ecosystems
- **Unit 2:** The Living World: Biodiversity
- **Unit 3:** Populations
- **Unit 4:** Earth Systems and Resources
- **Unit 5:** Land and Water Use
- **Unit 6:** Energy Resources and Consumption
- **Unit 7:** Atmospheric Pollution
- **Unit 8:** Aquatic and Terrestrial Pollution
- **Unit 9:** Global Change

AP Environmental Science Practices

- **Concept Explanation:** Explain biological concepts, processes, and models presented in written format.
- **Visual Representations:** Analyze visual representations of environmental concepts and processes.
- **Text Analysis:** Analyze sources of information about environmental issues.
- **Scientific Experiments:** Analyze research studies that test environmental principles.
- **Data Analysis:** Analyze and interpret quantitative data represented in tables, charts, and graphs.
- **Mathematical Routines:** Apply quantitative methods to address environmental concepts.
- **Environmental Solutions:** Propose and justify solutions to environmental problems.

AP Environmental Science Exam Structure

AP ENVIRONMENTAL SCIENCE EXAM: 2 HOURS, 40 MINUTES

Assessment Overview

The AP Environmental Science Exam assesses student understanding of the science practices and learning objectives outlined in the course framework. The exam is 2 hours and 40 minutes long and includes 80 multiple-choice questions and 3 free-response questions. A four-function, scientific, or graphing calculator is allowed on both sections of the exam.

Format of Assessment

Section I: Multiple Choice | 80 Questions | 90 Minutes | 60% of Exam Score

- The multiple-choice section includes both individual and set-based questions, with all set-based questions including stimulus material.
- All nine AP Environmental Science units are assessed in the multiple-choice section.

Section II: Free Response | 3 Questions | 70 Minutes | 40% of Exam Score

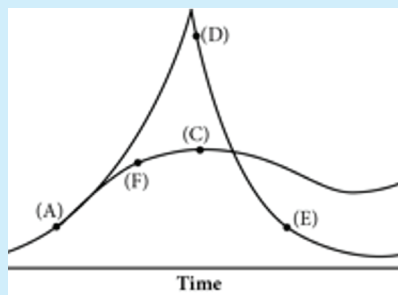
- Question 1: Design an investigation.
- Question 2: Analyze and interpret quantitative data
- Question 3: Analyze an environmental problem doing calculations

Exam Components

Sample Multiple-Choice Question

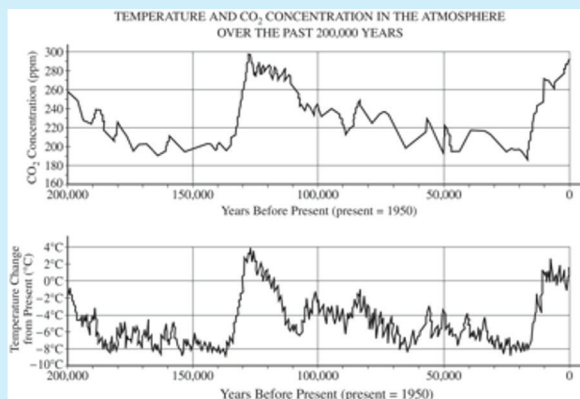
Directions: The lettered choices on the graph below refer to the numbered statements immediately following it. Select the one lettered choice that best fits each statement. Each choice may be used once, more than once, or not at all in each set.

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



According to atmospheric temperature and CO₂ 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 CO₂ 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.
- Determine the net change in atmospheric CO₂ concentration between 140,000 years ago and 125,000 years ago.
 - Calculate the ratio of the change in the mean global temperature to the change in atmospheric CO₂ concentration between 140,000 years ago and 125,000 years ago.
 - Scientists predict that between 1950 and 2050, the atmospheric CO₂ 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).
 - 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 CO₂ concentration between 1950 and 2050.
- (C) Identify TWO gases other than CO₂ that contribute to the anthropogenic increase in mean global temperature. For each gas, describe a major human activity that leads to its release.