

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 nine commonly taught units, which have been arranged in the following suggested, logical sequence:

- **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

In addition, the following big ideas serve as the foundation of the course, enabling students to create meaningful connections among concepts and develop deeper conceptual understanding:

- **Energy Transfer:** Energy conversions underlie all ecological processes. Energy cannot be created; it must come from somewhere. As energy flows through systems, at each step, more of it becomes unusable.
- **Interactions Between Earth Systems:** The Earth is one interconnected system. Natural systems change over time and space. Biogeochemical systems vary in ability to recover from disturbances.
- **Interactions Between Different Species and the Environment:** Humans alter natural systems and have had an impact on the environment for millions of years. Technology and population growth have enabled humans to increase both the rate and scale of their impact on the environment.
- **Sustainability:** Human survival depends on developing practices that will achieve sustainable systems. A suitable combination of conservation and development is required. The management of resources is essential. Understanding the role of cultural, social, and economic factors is vital to the development of solutions.

AP Environmental Science Practices

- **Concept Explanation:** Explain environmental 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 an environmental problem and propose a solution.
- Question 3: Analyze an environmental problem and propose a solution doing calculations.

Exam Components

Sample Multiple-Choice Questions

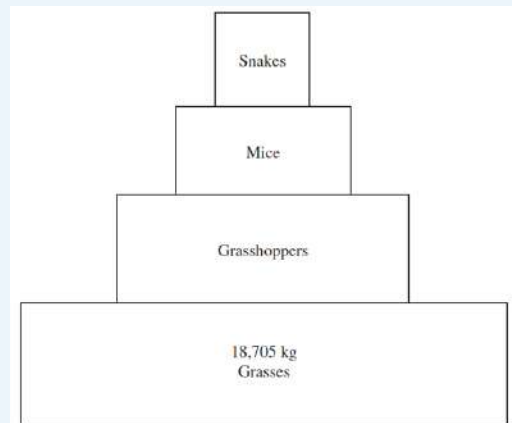
Each of the questions or incomplete statements below is followed by four suggested answers or completions. Select the one that is best in each case.

Based on the diagram, which group of organisms would be considered herbivores?

- (A) Snakes
- (B) Mice
- (C) Grasshoppers
- (D) Grasses

Based on the laws of thermodynamics, which of the following is the applied mathematical routine used to estimate the biomass of the mice in the pyramid?

- (A) $18,705 \text{ kg} \times 10$
- (B) $18,705 \text{ kg}/10 \times 100$
- (C) $18,705 \text{ kg} \times 0.10 \times 0.10$
- (D) $18,705 \text{ kg}/0.10$



Sample Free-Response Question

Analyze an environmental problem and propose a solution.

The graph shows temperature anomalies from 1900 to 2016 globally and in the Arctic.

(a) Refer to the graph to answer the following questions.

- i. Based on the data in the graph, **identify** the change in the difference from average temperature in the Arctic between 1980 and 2016.
- ii. **Describe** the difference in the change in temperatures in the Arctic with the change in global temperatures from 2000 to 2016.

(b) The cause of the temperature trend seen in the map is a result of increasing concentrations of greenhouse gases in the atmosphere.

- i. **Identify** a greenhouse gas that has a global warming potential (GWP) that is greater than 1.
- ii. **Identify** an anthropogenic source that contributes to greenhouse gas emissions.
- iii. **Explain** how increasing amounts of greenhouse gases in the atmosphere are linked to a change in pH of the ocean.

(c) Greenhouse gases can pose threats to both human health and the environment.

- i. **Describe** TWO impacts that global climate change can have on human health.
- ii. **Describe** one effect global climate change can have on marine organisms.

(d) In order to reduce the effect of greenhouse gases on ecosystems, greenhouse gas emissions must be reduced.

- i. **Propose** one realistic solution to reduce greenhouse gas emissions.
- ii. **Justify** how the solution posed in (d)(i) would lead to a decrease in greenhouse gas emissions.

