



**AP<sup>®</sup> Biology**  
**2004 Free-Response Questions**  
**Form B**

**The materials included in these files are intended for noncommercial use by AP teachers for course and exam preparation; permission for any other use must be sought from the Advanced Placement Program<sup>®</sup>. Teachers may reproduce them, in whole or in part, in limited quantities, for face-to-face teaching purposes but may not mass distribute the materials, electronically or otherwise. This permission does not apply to any third-party copyrights contained herein. These materials and any copies made of them may not be resold, and the copyright notices must be retained as they appear here.**

The College Board is a not-for-profit membership association whose mission is to connect students to college success and opportunity. Founded in 1900, the association is composed of more than 4,500 schools, colleges, universities, and other educational organizations. Each year, the College Board serves over three million students and their parents, 23,000 high schools, and 3,500 colleges through major programs and services in college admissions, guidance, assessment, financial aid, enrollment, and teaching and learning. Among its best-known programs are the SAT<sup>®</sup>, the PSAT/NMSQT<sup>®</sup>, and the Advanced Placement Program<sup>®</sup> (AP<sup>®</sup>). The College Board is committed to the principles of excellence and equity, and that commitment is embodied in all of its programs, services, activities, and concerns.

For further information, visit [www.collegeboard.com](http://www.collegeboard.com)

Copyright © 2004 College Entrance Examination Board. All rights reserved. College Board, Advanced Placement Program, AP, AP Central, AP Vertical Teams, APCD, Pacesetter, Pre-AP, SAT, Student Search Service, and the acorn logo are registered trademarks of the College Entrance Examination Board. PSAT/NMSQT is a registered trademark jointly owned by the College Entrance Examination Board and the National Merit Scholarship Corporation. Educational Testing Service and ETS are registered trademarks of Educational Testing Service. Other products and services may be trademarks of their respective owners.

For the College Board's online home for AP professionals, visit AP Central at [apcentral.collegeboard.com](http://apcentral.collegeboard.com).

# 2004 AP<sup>®</sup> BIOLOGY FREE-RESPONSE QUESTIONS (Form B)

BIOLOGY

SECTION II

Time—1 hour and 30 minutes

**Directions:** Answer all questions.

Answers must be in essay form. Outline form is not acceptable. Labeled diagrams may be used to supplement discussion, but in no case will a diagram alone suffice. It is important that you read each question completely before you begin to write. Write all your answers on the pages following the questions in the goldenrod booklet.

1. Prokaryotes are found throughout the biosphere. Answer two of the following.
  - a) Provide three examples of adaptations found in various prokaryotes. Explain how these three adaptations have ensured the success of prokaryotes.
  - b) Discuss how prokaryotes early in Earth's history altered environments on Earth.
  - c) Discuss three ways in which prokaryotes continue to have ecological impact today.
  
2. In most aquatic environments, primary production is affected by the light available to the community of organisms. Using measurements of dissolved oxygen concentration to determine primary productivity, design a controlled experiment to test the hypothesis that primary productivity is affected by either the intensity **or** the wavelength of light. In your answer, be sure to include the following.
  - A statement of the specific hypothesis that you are testing
  - A description of your experimental design (Be sure to include a description of what data you would collect and how you would present and analyze the data using a graph.)
  - A description of results that would support your hypothesis

## 2004 AP<sup>®</sup> BIOLOGY FREE-RESPONSE QUESTIONS (Form B)

3. Homeostasis, maintaining a steady-state internal environment, is a characteristic of all living organisms. Choose three of the following physiological parameters and for each, describe how homeostasis is maintained in an organism of your choice. Be sure to indicate what animal you have chosen for each parameter. You may use the same animal or different animals for your three descriptions.
- Blood-glucose levels
  - Body temperature
  - pH of the blood
  - Osmotic concentration of the blood
  - Neuron resting-membrane potential
4. Organisms differ from one another and yet share common characteristics.
- a) Select two kingdoms and briefly describe three characteristics used to distinguish between members of one kingdom and members of the other.
  - b) Describe three characteristics (at least one molecular and one cellular) that members of these two kingdoms share.
  - c) Propose an explanation for the existence of similarities and differences between the two kingdoms.

END OF EXAMINATION