

# AP<sup>®</sup> Biology

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

The Advanced Placement Program<sup>®</sup> 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 Biology Course Overview

The AP Biology course is an introductory college-level biology course. Students cultivate their understanding of biology through inquiry-based investigations as they explore the following topics: evolution, cellular processes, energy and communication, genetics, information transfer, ecology, and interactions.

### RECOMMENDED PREREQUISITES

Students should have successfully completed high school courses in biology and chemistry.

### LABORATORY REQUIREMENT

This course requires that 25 percent of the instructional time will be spent in hands-on laboratory work, with an emphasis on inquiry-based investigations that provide students with opportunities to apply the science practices.

Students should be able to describe how to collect data, use data to form conclusions, and apply their conclusions to larger biological concepts. Students should report recorded data and quantitative conclusions drawn from the data with appropriate precision (i.e., significant figures). Students should also develop an understanding of how changes in the design of the experiments would impact the validity and accuracy of their results. Many questions on the AP exam are written in an experimental context, so these skills will prove invaluable for both concept comprehension and exam performance.

## AP Biology Course Content

The AP Biology course is organized into commonly taught units of study that provide a suggested sequence for the course. These units comprise the content and skills 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 crosscutting concepts that build conceptual understanding and spiral throughout the course. Following are the big ideas of the course and a brief description of each:

### ■ Evolution

- ◆ The process of evolution drives the diversity and unity of life.

### ■ Energetics

- ◆ Biological systems use energy and molecular building blocks to grow, reproduce, and maintain dynamic homeostasis.

### ■ Information Storage and Transmission

- ◆ Living systems store, retrieve, transmit, and respond to information essential to life processes.

### ■ Systems Interactions

- ◆ Biological systems interact, and these systems and their interactions exhibit complex properties.

## AP Biology Science Practices

### ■ Concept Explanation

- ◆ Explain biological concepts, processes, and models presented in written format.

### ■ Visual Representations

- ◆ Analyze visual representations of biological concepts and processes.

### ■ Questions and Methods

- ◆ Determine scientific questions and methods.

### ■ Representing and Describing Data

- ◆ Represent and Describe Data

### ■ Statistical Tests and Data Analysis

- ◆ Perform statistical tests and mathematical calculations to analyze and interpret data.

### ■ Argumentation

- ◆ Develop and justify scientific arguments using evidence.

## AP Biology Exam Structure

AP BIOLOGY EXAM: 3 Hours

### Assessment Overview

The AP Biology Exam assesses student understanding of the science practices and learning objectives outlined in the course framework. The exam is 3 hours long and includes 60 multiple-choice questions and 6 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 | 60 Questions | 90 Minutes | 50% of Exam Score

- Questions appear either individually or in sets of typically four to five questions per set.
- All six AP Biology science practices are assessed in the multiple-choice section.
- modify an argument that addresses the question.

**Section II:** Free Response | 6 Questions | 90 Minutes | 50% of Exam Score

- Question 1: Interpreting and Evaluating Experimental Results
- Question 2: Interpreting and Evaluating Experimental Results with Graphing
- Question 3: Scientific Investigation
- Question 4: Conceptual Analysis
- Question 5: Analyze Model or Visual Representation
- Question 6: Analyze Data

### Exam Components

#### Sample Multiple-Choice Questions

In the early 1970s, researchers hypothesized that carbon was the limiting nutrient in many aquatic ecosystems. To test this hypothesis, the researchers divided a small lake in two roughly equal halves with an impermeable curtain that was fastened and sealed to the bedrock of the lake. Beginning in 1971 the researchers treated one side of the lake with sucrose and the other side with both sucrose and phosphate. From 1971 to 1983 the researchers monitored the phytoplankton biomass in both parts of the lake. The results are shown below in Figure 1.

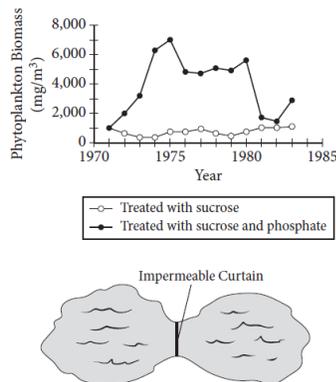


Figure 1. Phytoplankton biomass in two sides of a small lake that is divided by an impermeable curtain

Which of the following claims is best supported by the data?

- (A) Carbon was a limiting factor for phytoplankton in the lake.
- (B) Phosphate was a limiting factor for phytoplankton in the lake.
- (C) Both carbon and phosphate were limiting factors for phytoplankton in the lake.
- (D) Neither carbon nor phosphate was a limiting factor for phytoplankton in the lake.

The average growth rate of the phytoplankton population from 1971 to 1975 in the side of the lake treated with sucrose and phosphate is closest to which of the following?

- (A) 125 (mg/m<sup>3</sup>)/year
- (B) 1,000 (mg/m<sup>3</sup>)/year
- (C) 1,500 (mg/m<sup>3</sup>)/year
- (D) 6,000 (mg/m<sup>3</sup>)/year

#### Sample Short Free-Response Question

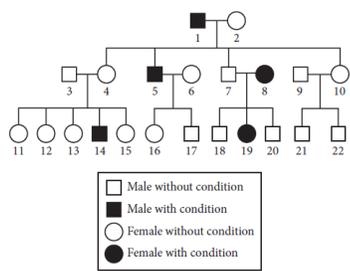


Figure 1. Inheritance of a particular condition over three generations of a family

#### Analyze Model or Visual Representation (Question 5 on AP Exam)

In humans, the gene that determines a particular condition has only two alleles, one of which (B) is completely dominant to the other (b). The phenotypes of three generations of a family with respect to the condition are shown in the pedigree in Figure 1. Individuals are numbered.

- (a) Describe the process in eukaryotes that ensures that the number of chromosomes will not double from parent to offspring when gametes fuse during fertilization.
- (b) Explain how any one chromosome in individual 16 contains DNA that came from both individuals 1 and 2.