



AP Biology
1999 Free-Response Questions

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1999

The College Board
Advanced Placement Examination

BIOLOGY

SECTION II

Time—1 hour and 30 minutes

Number of questions — 4

Percent of total grade — 40

Answer all questions. Number your answer as the question is numbered below.

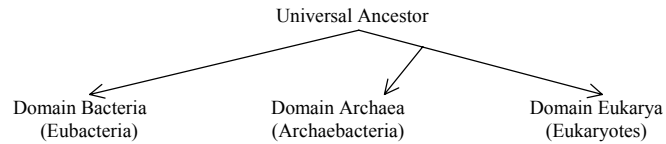
Answers must be in essay form. Outline form is NOT acceptable. Labeled diagrams may be used to supplement discussion, but in no case will a diagram alone suffice. It is important that you read each question completely before you begin to write.

1. The rate of photosynthesis may vary with changes that occur in environmental temperature, wavelength of light, and light intensity. Using a photosynthetic organism of your choice, choose only ONE of the three variables (temperature, wavelength of light, or light intensity) and for this variable
 - **design** a scientific experiment to determine the effect of the variable on the rate of photosynthesis for the organism;
 - **explain** how you would measure the rate of photosynthesis in your experiment;
 - **describe** the results you would expect. **Explain** why you would expect these results.
2. Communication occurs among the cells in a multicellular organism. Choose THREE of the following examples of cell-to-cell communication, and for each example, **describe** the communication that occurs and the types of responses that result from this communication.
 - Communication between two plant cells
 - Communication between two immune-system cells
 - Communication **either** between a neuron and another neuron, **or** between a neuron and a muscle cell
 - Communication between a specific endocrine-gland cell and its target cell

GO ON TO THE NEXT PAGE ➔

1999

3. Scientists recently have proposed a reorganization of the phylogenetic system of classification to include the domain, a new taxonomic category higher (more inclusive) than the Kingdom category, as shown in the following diagram.



- **Describe** how this classification scheme presents different conclusions about the relationships among living organisms than those presented by the previous five-kingdom system of classification.
 - **Describe** three kinds of evidence that were used to develop the taxonomic scheme above, and **explain** how this evidence was used. The evidence may be structural, physiological, molecular, and/or genetic.
 - **Describe** four of the characteristics of the universal ancestor.
4. Scientists seeking to determine which molecule is responsible for the transmission of characteristics from one generation to the next knew that the molecule must (1) copy itself precisely, (2) be stable but able to be changed, and (3) be complex enough to determine the organism's phenotype.
- **Explain** how DNA meets each of the three criteria stated above.
 - Select **one** of the criteria stated above and **describe** experimental evidence used to determine that DNA is the hereditary material.

END OF EXAMINATION