



AP® Biology 2011 Free-Response Questions

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2011 AP® BIOLOGY FREE-RESPONSE QUESTIONS

BIOLOGY SECTION II

Time—1 hour and 30 minutes

Directions: Answer all questions.

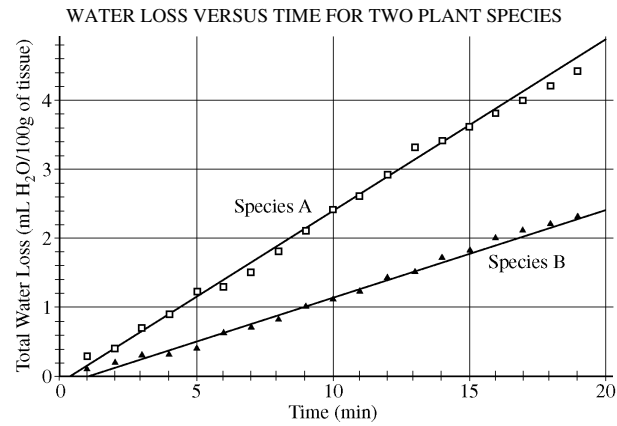
Answers must be in essay form. Outline form is not acceptable. Labeled diagrams may be used to supplement discussion, but in no case will a diagram alone suffice. It is important that you read each question completely before you begin to write. Write all your answers on the pages following the questions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

- During an investigation of a freshwater lake, an AP Biology student discovers a previously unknown microscopic organism. Further study shows that the unicellular organism is eukaryotic.
 - Identify** FOUR organelles that should be present in the eukaryotic organism and **describe** the function of each organelle.
 - Prokaryotic cells lack membrane-bound organelles found in eukaryotes. However, prokaryotes must perform many of the same functions as eukaryotes. For **THREE** of the organelles identified in part (a), **explain** how prokaryotic cells carry out the associated functions.
 - According to the endosymbiotic theory, some organelles are believed to have evolved through a symbiotic relationship between eukaryotic and prokaryotic cells. **Describe** **THREE** observations that support the endosymbiotic theory.
- Organisms utilize a diversity of methods to obtain proper nutrition.
 - Some organisms digest food intracellularly, while others digest food extracellularly.
 - Identify** ONE nonvertebrate organism that digests food intracellularly and **describe** the process.
 - Identify** ONE nonvertebrate organism that digests food extracellularly and **describe** the process.
 - Describe** **TWO** structural features of the human stomach and/or small intestine. For each, **explain** how the structure relates to the function.
 - Plants have a variety of mechanisms for obtaining nutrients. **Describe** **TWO** plant structures and **explain** how each structure is utilized in nutrient uptake.
- Reproduction can be either asexual or sexual.
 - Using a specific example, **describe** how organisms can reproduce asexually. **Discuss** **TWO** evolutionary advantages of asexual reproduction.
 - Identify** **THREE** ways that sexual reproduction increases genetic variability. For each, **explain** how it increases genetic diversity among the offspring.
 - Discuss** **TWO** prezygotic isolating mechanisms that prevent hybridization between two species. Include in your discussion an example of each mechanism.

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4. The regulation of transpiration is an important homeostatic mechanism in plants.

- (a) Under controlled conditions, a transpiration experiment was conducted using two plant species. The data collected are shown in the figure below. Using the data from the experiment, **calculate** the rate of transpiration for species A and species B between the times of 5 and 15 minutes (show your work). **Summarize** the difference between the two transpiration rates.



- (b) **Identify** and **explain** THREE different structural or physiological adaptations that could account for the different transpiration rates of species A and B.
- (c) Water potential (Ψ) is described by the following formulas.

$$\Psi = \Psi_p + \Psi_s$$

$$\Psi = -iCRT$$

Discuss the variables in both formulas and how they affect water potential.

END OF EXAM