AP® Biology
2006 Free-Response Questions
Form B

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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. Sexual reproduction requires that half of the chromosomes in a zygote come from one parent and the other half from the second parent.
   (a) Describe the process by which a germ cell's complement of chromosomes is halved in the formation of gametes.
   (b) Choose **one** organism or group of organisms that reproduce **asexually**. Describe the mode of asexual reproduction in that organism and explain the advantages to the organism of asexual reproduction.
   (c) Choose **one** organism or group of organisms that reproduce **sexually**. Describe the mode of sexual reproduction in that organism and explain the advantages to the organism of sexual reproduction.

2. The relationship of structure to function is one of the major themes in biology. For **three** of the following structure/function pairs, describe the structure and then explain how the function is related to the structure.
   (a) Enzyme structure/catalysis
   (b) mRNA structure/protein synthesis
   (c) Cell membrane structure/signal transduction
   (d) Membrane protein structure/active transport or facilitated diffusion

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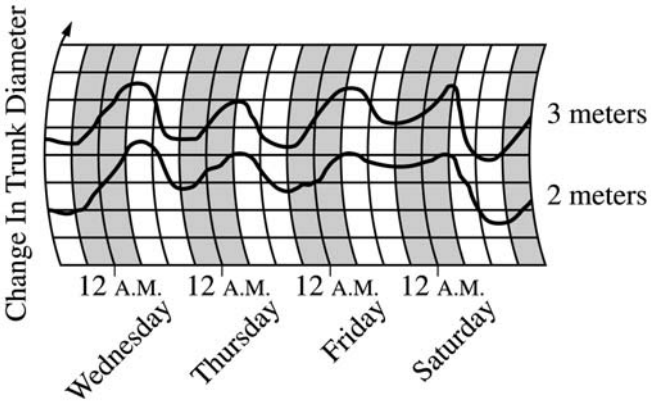

3. While studying transpiration, a scientist used a dendrometer to record the small daily changes in the diameter of a tree trunk at two different heights (2 meters and 3 meters) above the ground at the same time. The diameter decreased in the daytime. This decrease happened first at the higher location. Discuss the following in relation to water movement in plants.

   (a) Identify how **two** different environmental factors could be involved in the daily fluctuations shown above.

   (b) Discuss the mechanisms involved in the uptake and transport of water by vascular plants.

   (c) Discuss the role of water in the normal functioning of plants.

4. In many ways, all organisms in a food web can be said to be solar-powered. The producer level of the food web is responsible for the transformation of the solar energy into a form that can be used by other living organisms.

   (a) Discuss the role of green plants in transforming the Sun's energy into a form that can ultimately be used by heterotrophs.

   (b) Discuss the flow of energy from producers through top carnivores in a food web in terms of the laws of thermodynamics.

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END OF EXAM