AP® Biology
2008 Free-Response Questions

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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 pink booklet.

1. The physical structure of a protein often reflects and affects its function.

   (a) **Describe** THREE types of chemical bonds/interactions found in proteins. For each type, **describe** its role in determining protein structure.

   (b) **Discuss** how the structure of a protein affects the function of TWO of the following.

   - Muscle contraction
   - Regulation of enzyme activity
   - Cell signaling

   (c) Abnormal hemoglobin is the identifying characteristic of sickle cell anemia. **Explain** the genetic basis of the abnormal hemoglobin. **Explain** why the sickle cell allele is selected for in certain areas of the world.

GO ON TO THE NEXT PAGE.

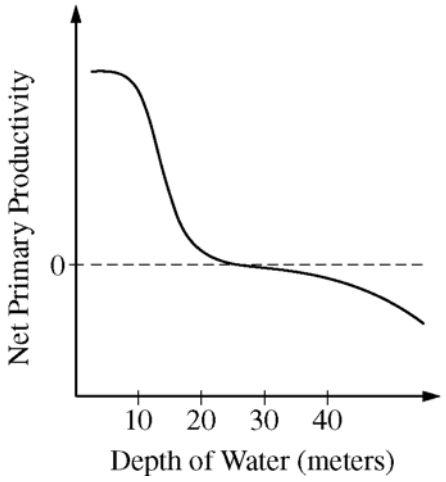
2. Consumers in aquatic ecosystems depend on producers for nutrition.

   (a) **Explain** the difference between gross and net primary productivity.

   (b) **Describe** a method to determine net and gross primary productivity in a freshwater pond over a 24-hour period.

   In an experiment, net primary productivity was measured, in the early spring, for water samples taken from different depths of a freshwater pond in a temperate deciduous forest.

NET PRIMARY PRODUCTIVITY IN A FRESHWATER POND ECOSYSTEM DURING SPRING



   (c) **Explain** the data presented by the graph, including a description of the relative rates of metabolic processes occurring at different depths of the pond.

   (d) **Describe** how the relationship between net primary productivity and depth would be expected to differ if new data were collected in mid-summer from the same pond. **Explain** your prediction.

3. Regulation is an important aspect of all biological processes.

   For FOUR of the following processes, **describe** the specific role of the regulator and **discuss** how the process will be altered if the regulation is disrupted.

Process	**Regulator**
Cell cycle	Cyclin
Metabolic rate	Thyroxine
Ovarian cycle	Follicle-stimulating hormone (FSH)
Prey population dynamics	Predators
Ecological succession	Fire

4. Flowering plants have evolved various strategies for fertilization.

   (a) **Describe** the process of fertilization in flowering plants.

   (b) **Discuss** TWO mechanisms of pollen transfer and the adaptations that facilitate each mechanism.

   Some species of flowering plants have evolved mechanisms to prevent self-fertilization.

   (c) **Discuss** an evolutionary advantage of preventing self-fertilization.

   (d) **Describe** TWO mechanisms that prevent self-fertilization.

STOP

END OF EXAM