

## AP BIOLOGY

### SUMMER ASSIGNMENT 2009

The AP curriculum is extensive and in order for us to completely cover the content summer work is necessary. This work consists of reading several chapters, answering the questions in this packet as well as the questions at the end of each chapter. It is also highly recommended that you make sure you are familiar with all the vocabulary words for each chapter.

The required reading is the Introduction (Chapter 1) and the Ecology Section (chapters 50-55). You will need to prepare for a test on these chapters. Write out the answers to the questions in attached packet, and from your book: the Science, Technology and Society questions, and the *Self Quiz* multiple choice questions. This work will be collected on the FIRST DAY of class and random subset will be graded. Once we return to school in August we will spend less than two weeks on this material. You will be tested on this material during the first two weeks. Depending on your class schedule this test may occur the **first or second week**.

It is assumed that AP students are self-motivated and disciplined enough to undertake independent studies during the summer. You need to plan ahead and allot enough time to complete the assignment. It is unrealistic to expect that you will be able to complete this work and be prepared to take the test if you wait until the last minute.

All AP students are required to do an independent research project. One of the most difficult aspects of this project is choosing the right topic. You should take some time this summer to think about what you might want to do. Since you will spend several months working on this topic it is important that it is one that will hold your interest. You can get more information by visiting the Massachusetts State Science Fair website (<http://www.SciFair.com>). You can download the required forms from this website.

Below are two suggestions you might find helpful:

- The textbook has a website that you might find helpful. You can follow the instructions below and see if you can log in. If it doesn't work we will help you with it when we return to school.
  1. go to [http://www.phschool.com/access/cmpbell\\_bio.html](http://www.phschool.com/access/cmpbell_bio.html) (there is an underscore between cmpbell and bio)
  2. choose student registration
  3. log in as a new user and insert access code: SSNASt-GRILL-UPEND-KANZU-TAINT-ROVES
  4. fill in school zip: 02421 and country
  5. register personal info and give email –they will need to send you an email
  6. pick id and password and security prompt
- As you study biology you will find that the name of an object or phenomenon often gives you a clue to the use or meaning or function of that object or phenomenon. For example, biology is from *bio* for life and *logos* that means the study of. Biology is the study of life.

You may want to use the website given here [[www.espindle.org/roots.html](http://www.espindle.org/roots.html).] to learn roots of science words. There are other sites as well, but this one is a good place to start. Alternately, in your dictionary you will find roots for most entries.

If you have any questions please contact one of us:

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5. Different marine environments can be classified on the basis of light penetration, distance from shore, and open water or bottom. Label the following zones on the diagram below: abyssal, aphotic, benthic, intertidal, neritic, oceanic, pelagic, and photic

QuickTime™ and a  
decompressor  
are needed to see this picture.

([http://commons.wikimedia.org/wiki/File:Continental\\_shelf\\_\(PSF\).png](http://commons.wikimedia.org/wiki/File:Continental_shelf_(PSF).png))

6. Temperature and precipitation are two of the key factors that influence the vegetation found in a biome. In the space below draw a climograph that shows the following biomes: arctic and alpine tundra, coniferous forest, desert, grassland, temperate forest, and tropical forest. Be sure to label the x and y-axis.

7. a. Define ecology
- b. What methods are used to answer ecological questions?

8. a. What are biomes?
- b. What accounts for the similarities in life forms found in the same type of biome in geographically separated areas.

### **Chapter 51 BEHAVIORAL BIOLOGY**

1. Many animals breed in the spring or early summer.
  - a. What is a probable proximate cause of this behavior?
  - b. What is the probable ultimate cause of this behavior?
2. What is the sign stimulus for attack behavior in male stickleback fish?
3. Give an example of a FAP in a human infant and the sign stimulus that illicits it.
4. Indicate the type of learning illustrated by the following examples:
  - a. Ewes will adopt and nurse a lamb shortly after they give birth to their own lamb but will butt and reject a lamb introduced a day or two later.
  - b. A dog, whose early “accidents” were cleaned up with paper towels accompanied by harsh discipline, hides under the bed any time a paper towel is used in the household.
  - c. Ducklings eventually ignore a cardboard silhouette of a hawk that is repeatedly flown over them.
  - d. Kittens stalk and pounce on each other, biting and kicking as they roll around together.
  - e. In Pavlov’s experiments, the ringing of a bell caused a dog to salivate.
5. Sow bugs are placed in experimental chambers that are either humid or dry and have both light and dark areas. In the humid chamber, the sow bugs move into the dark area and stop moving. In the dry chamber, they move into the dark area and continue to move about in that area. Explain these experimental results.

6. Why are many interactions between members of the same species agonistic?
7. What mechanisms reduce violent encounters between conspecifics?
8. Explain the basis for the distinction between male competition and female choice in courtship behavior.
9. Natural selection has resulted in exclusive male parental care being much more frequent in species with external fertilization, where the male's genetic contribution to the offspring is more certain. Explain how such behavior could evolve.
10. Why is most communication among mammals olfactory and auditory, whereas communication among birds is visual and auditory?
11.
  - a. According to kin selection, would an individual be more likely to exhibit altruistic behavior toward a parent, sibling, or a first (full) cousin?
  - b. Explain your answer in terms of the coefficient of relatedness and Hamilton's rule.
12. How does the nature-versus-nurture controversy apply to behavior?
13. How does the concept of Darwinian fitness apply to behavior?

## Chapter 52 POPULATION ECOLOGY

1. In a mark-recapture study, an ecologist traps, marks, and releases 25 voles in a small wooded area. A week later she resets her traps and captures 30 voles, 10 of which were marked. What is her estimate of the population of voles in that area?
2. Identify the types of survivorship curves shown below and give examples of groups that exhibit each curve

QuickTime™ and a  
decompressor  
are needed to see this picture.

3. Mortality, number of offspring per reproduction, and prenatal investment are usually interrelated. On the following graphs, sketch the relationship you would predict between the variables.

QuickTime™ and a  
decompressor  
are needed to see this picture.

4. Label the exponential and logistic growth curves, and show the equation associated with each curve. What is  $K$  for the population shown with curve  $b$ ?

QuickTime™ and a decompressor are needed to see this picture.

5. List some density-dependent factors that may limit population growth.
6. What is the best collection of life history traits that would maximize reproductive success?

### Chapter 53 COMMUNITY ECOLOGY

1. List some abiotic factors that may cause population fluctuations.
2. Species composition and distribution in most plant communities appear to be individualistic. What may explain the occasional occurrence of sharp delineations in species composition between communities?
3. Name the following 2 types of mimicry:
  - a. Harmless species resembling a poisonous or distasteful species:

b. Mutual imitation by two or more distasteful species:

4. Name and give examples of the interspecific interactions symbolized in the table.

	Interaction	Examples
+/+		
+/0		
+/-		
-/-		

5. Experimental data from tree hole communities showed that food chains were longest when food supply at the producer level was greatest. Which hypothesis about what limits food chain length do these results support?

6. Many freshwater lake communities appear to be organized along the top-down model. What actions might ecologists take if they wanted to use *biomanipulation* to control excessive algae blooms in a lake with four trophic levels (algae, zooplankton, primary predator fish, and top predator fish)?

7. Describe the effects of the alder stage of succession on soil pH and fertility.

[Questions and graphs are from Student Study Guide for Biology, Campbell and Reece 6<sup>th</sup> ed.]

### Chapter 54 ECOSYSTEMS

1. List some ecosystems with high rates of production.

2. List some ecosystems with low rates of production.

3. The open ocean has low net primary production yet contributes the greatest percentage of earth's net primary production. Explain.

4. Antarctic seas are often more productive than most tropical seas, even though they are colder and receive lower light intensity. Explain.
5. Why is production efficiency higher for fishes than for birds and mammals?
6. Assuming a 10% trophic efficiency (transfer of energy to the next trophic level), approximately what proportion of the chemical energy produced in photosynthesis makes it to a tertiary consumer?
7. Draw and label the nitrogen cycle. Include all organisms and compounds.
8. In which natural ecosystem do nutrients cycle the fastest? Why?
9. In which natural ecosystem do nutrients cycle the slowest? Why?
10. What is the effect of loss of vegetation on nutrient cycling?
11. List some of the potential consequences of global warming.



5. What are some potential benefits of corridors? How may they be harmful?
  
6. What factors would favor the creation of larger, extensive preserves? What factors favor smaller, unconnected preserves?
  
7. What are the major threats to biodiversity, listed in order of importance?
  
8. How does the loss of biodiversity threaten human welfare?
  
9. How does the loss of biodiversity threaten human welfare?

Answer the following questions on another piece of paper

### **Chapter 50**

1. Wondrous deep-sea communities have been found in the oceans. Why are we unlikely to find similar wonders at the bottom of temperate lakes?

### **Chapter 51**

1. What is the effect that territoriality and dominance hierarchies will have on competition for resources?
2. Explain how J.B.S. Haldane might come out ahead of the game when he jokingly said that he would lay down his life for two brothers and eight cousins. Also, explain how he could come out behind if he followed through with this strategy.
3. Explain how a subordinate animal within a dominance hierarchy remaining part of that social group could be an evolutionarily successful strategy for some individuals, even if they never get a chance to breed.

### **Chapter 52**

1. Assume that water lilies once introduced to a shallow pond will first completely cover the pond in 30 days. Also assume that the water lilies double the area of their coverage every day. When would water lilies cover only  $1/100^{\text{th}}$  of the pond?
2. You are in charge of managing a fish farm. You can harvest fish but not add replacement fish to your farm. Given logistic population growth, explain where on the growth curve you should harvest fish and at what point on the growth curve must the harvest cease.
3. In history, what have been the two most important turning points in worldwide human population growth?
4. Consider the age structures of Sweden and Mexico. Why is it important that countries like Mexico progress towards an age structure similar to Sweden's?
5. r-selection and K-selection are relative. Pick an organism that may take a diverse approach to life. Suggest how one approach may be more r-selected, while another approach may be more K-selected.
6. In some ways patterns of dispersion are relative and depend on the lens through which one views a population. In what ways do humans demonstrate clumped, uniform and random dispersion?

### Chapter 53

1. Symbiotic associations are not always clear examples of mutualism, commensalism or parasitism. They may be viewed as a spectrum ranging from mutualism to parasitism. Choose two organisms existing symbiotically and discuss how aspects of their association may encompass the various types of symbiosis.
2. How might the rules of island biogeography apply to the Town of Lexington's use of conservation land? For what types of organisms are the islands appropriate and for what types are the islands inappropriate?
3. Specify three local examples of animal defenses against predators and three local examples of plant defenses against herbivores.

### Chapter 54

1. The chapter discusses the carbon dioxide cycle, the water cycle, the nitrogen cycle and the phosphorus cycle. It does not describe the oxygen cycle, so you should.
2. Explain biomagnification and its relevance to you. What makes some chemicals more prone to biomagnification than other chemicals are?
3. You are a United Nations administrator who is responsible for sending personnel to areas of the world experiencing famine. The small island of Caspiar is experiencing a famine. In addition to sending food for relief until their agricultural output increases, you have the option to send one of two agricultural specialists to teach Caspiar citizens how to feed themselves. One specialist can teach them how to raise goats and cows and the other can show them how to grow corn and wheat. Given no other information, who should you send and why?
4. Why is energy said to "flow" through ecosystems while elements (matter) are said to "cycle"?

### Chapter 55

1. Evolutionarily it is most advantageous for a species to have a large number of individuals and a diverse gene pool. Select one species discussed in this chapter and explain what has happened to its population size, what has happened to the diversity of its gene pool, and what might be done to ensure the survival of this species. Be as specific as possible.
2. Lions and tigers have no natural predators, and human hunting is not a significant source of mortality. Explain why they are now considered threatened or endangered species.

