

Mount Saint Mary Academy

AP Biology Summer Assignment



MSMA AP Biology Summer Reading 2010

Readings: Read the following chapters over the summer. All readings can be found in *Biology AP 8th Edition* by Campbell, N., & Reece, J., Pearson (2008) ISBN 13-978-0-8053-6844-4.

These chapters will be reviewed in the fall, so make note of any information that you feel is difficult to comprehend, and we will discuss this during the first few weeks of class. This assignment will be due after the first full week of class in September and will be counted as a grade (100 points). Please be neat, this will become your study guide for these chapters.

Chapter 50 An Introduction to Ecology and the Biosphere

1. List the four levels of ecological study and give examples of the focus of inquiry at each level.
2. Mountains affect local climate. Describe their influence in the following three areas: solar radiation, temperature, and rainfall.
3. Give examples of human actions that could expand a species distribution by changing : a) dispersal b) biotic interactions
4. Are stoneflies, benthic aquatic insects that require relatively high concentrations of oxygen, more likely to live in oligotrophic lakes or eutrophic lakes? Why?
5. Why are phytoplankton, and not benthic algae or rooted aquatic plants, the dominant photosynthetic organisms of the oceanic pelagic biome.
6. What are the 8 major land biomes? Name a plant and an animal species in each biome and its adaptations.
7. What accounts for the similarities in life forms found in the same type of biome in geographically separated areas?
8. Judging from the climograph in Figure 50.3, what mainly differentiates dry tundra and deserts?

9. Identify the natural biome in which you live and summarize its biotic and abiotic characteristics. Do these reflect your actual surroundings? Explain.

Chapter 51 Behavioral Biology

1. What is ethology?
2. Describe the research of Konrad Lorenz and Niko Tinbergen.
3. Many animals breed in the spring or early summer. What is a probable proximate cause of this behavior? What is the probable ultimate cause of this behavior?
4. What is the sign stimulus for attack behavior in male stickleback fish?
5. If an egg rolls out of the nest, a mother graylag goose will retrieve it by nudging with her beak and head. If researchers remove the egg or substitute a ball during this process, the goose will not alter her response. What type of behavior is this? Suggest a proximate and an ultimate explanation.
6. Give an example of a FAP in a human infant and the sign stimulus that elicits it.
7. What similarities and differences would you expect in the optimal foraging strategies of a generalist and a specialist?
8. Indicate the types 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 with 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.
9. 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.
10. Which has greater influence on the development of behaviors, “nature” or “nurture”? Explain.
11. Why are many interactions between members of the same species antagonistic?
12. Which sex usually shows more discrimination in choosing potential mates? Why?
13. 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.

14. How does optimal foraging theory explain why mule deer spend more time foraging in open areas than near or in forests?
15. How is a female bird's fitness associated with her ability to choose a mate by discerning among displays and adornments that "advertise" the health of the male?
16. Give an example of deceptive communication.
17. Why is most communication among mammals olfactory and auditory, whereas communication among birds is visual and auditory?
18. According to kin selection, would an individual be more likely to exhibit altruistic behavior toward a parent, a sibling, or a first (full) cousin? Explain your answer in terms of the coefficient of relatedness.
19. Use a diagram to describe the honeybee's "waggle dance" and the symbolic information it conveys.

Chapter 52: Population Ecology

1. In a mark-recapture study, an ecologist traps, marks, and releases 25 voles in a small wooded area. Three nights later she resets her traps and recaptures 30 voles, 10 of which were marked. What is her estimate of the population of voles in that area?
2. Describe what a survivorship curve represents based on the diagrams in the chapter.
3. Fecundity, mortality, age at first reproduction, number of offspring per reproduction, and parental investment are usually interrelated. Sketch the relationship on a graph that you would predict between the following variables (plot the first variable on the y axis): annual fecundity and annual survival rate; age at first reproduction and annual survival rate; size of eggs or offspring and number of offspring per reproduction; parental care and number of offspring per reproduction.
4. Sketch and describe one situation in which exponential growth could occur.
5. Where is exponential growth by a plant population more likely—on a newly formed volcanic island or in a mature, undisturbed rain forest? Why?
6. Sketch a logistical growth curve and label the carrying capacity. Define carrying capacity.
7. Explain why a population that fits the logistic growth model increases more rapidly at intermediate size than at relatively small or large sizes.
8. List the characteristics of K-selected populations and R-selected populations.
9. Identify three density-dependent factors that may limit population growth and explain how each exerts negative feedback.
10. List some density-independent factors that may limit growth.
11. Describe the limiting factors affecting the growth and density of a population.
12. How does a population's age structure affect its growth rate?

Chapter 53 Community Ecology

1. Community A has 6 different species; 90% of the population members belong to one of those species. Community B has 5 different species; 20% of the population belongs to each of those species.
 - a. Which community has the greatest species richness?
 - b. Which community has the greatest species diversity?
2. According to the competitive exclusion principle, what outcome is expected when two species compete for a resource? Why?
3. Most plant communities appear to be individualistic. What may explain the occasional occurrence of sharp delineations in species composition between communities?
4. Name the following two types of mimicry;
 - a. A harmless species resembling a poisonous or distasteful species.
 - b. Mutual imitation by two or more distasteful species
5. Is the evolution of Batesian mimicry an example of co-evolution? Explain your answer.
6. Define ecological niche.
7. What is the difference between fundamental and realized niche?
8. Name and give examples of the four interspecific interactions.
9. A keystone species makes a large impact on community structure. Give an example of a keystone species that may alter the character of a whole community.
10. How does a dominant species effect on community structure differ from keystone species effect?
11. In a structurally complex laboratory culture, two species of protozoan coexist with a species that is predatory on both protozoan species. Removal of species A from the culture led to the extinction of species B. Placement of all three species in a simple culture dish led to the extinction of B and C, followed by A.
 - a. Which species was most likely the predator?
 - b. Develop an explanation for the first experimental result.
 - c. Develop an explanation for the second experimental result.
12. How might a community exposed to severe and frequent disturbances differ in composition from one that experience mild and infrequent disturbances?
13. Describe primary and secondary succession and the factors that contribute to this process.

Chapter 54 Ecosystems

1. Why is the transfer in an ecosystem referred to as energy flow, not energy cycling?

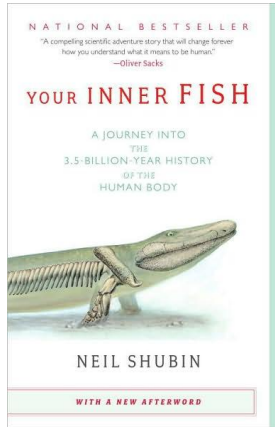
2. What are trophic levels?
3. How are detritivores essential to sustaining ecosystems?
4. What is the main difference between a food chain and a food web?
5. Why is only a small portion of the solar energy that strikes Earth's atmosphere stored by primary producers?
6. What is primary productivity?
7. The open ocean has low net primary productivity yet contributes the greatest percentage of Earth's net primary productivity. Explain.
8. Antarctic seas are often more productive than most tropical seas, even though they are colder and receive lower light intensity. Explain.
9. What is biomass? Which area would tend to have a greater biomass/unit area, a prairie or a forest? Explain.
10. Why is an ecosystem's net primary production lower than its gross primary production?
11. What are the ultimate energy source and sink for most ecosystems?
12. Assuming a 10% ecological 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?
13. What is the effect of loss of vegetation on nutrient cycling?
14. How can the addition of excess nutrients to a lake threaten its fish population?
15. How can clear-cutting a forest (removing all the trees) damage the water quality of nearby lakes?
16. In the face of biological magnification of toxins, is it healthier to feed at a lower or higher trophic level? Explain.
17. Define the problem of global warming. List one human action that may have caused the problem. List some of the potential consequences of global warming. Give one positive action that could be taken to reduce the problem.
18. There are vast stores of organic matter in the frozen soils of the Arctic. Why might this be a cause for concern by scientists studying global warming?

Chapter 55 Conservation Biology

1. What is conservation science? List the many areas of human endeavors that intersect with this field.
2. Give an example of how each of the following causes of the biodiversity crisis has reduced population numbers or caused extinctions: habitat destruction, exotic species, and overexploitation.
3. How does benthic marine diversity vary with depth and what hypothesis may explain this cline?
4. Where are most biodiversity hot spots located?
5. Is the effective population size usually larger or smaller than the actual number of individuals in the population? Explain.

6. What is meant by the term sustainable development?
7. In what ways would humans benefit by preserving biodiversity?

Summer Reading Novel



In addition to the above assignment, you are required to read [Your Inner Fish, A Journey into the 3.5 Billion-Year History of the Human Body](#) by Neil Shubin. This book can be found on the Classbooks.com website for the school under summer reading assignments, or you can purchase it at several bookstores such as Borders, Amazon, Barnes & Noble, etc.

Some Questions that you should consider while reading (for the purpose of discussion and assessment):

1. Why did I assign this reading? What do I expect you to learn from this book?
2. What is the author's message about evolution of humans and the anatomy of the fish?
3. What is the big deal behind teeth?
4. How are our hands similar to other animal limbs? How are they different? How is this connected to the fish?
5. What do genes have to do with all this? How do they relate to the inner fish?
6. How are we connected to others via embryology?
7. How are humans connected to the sea anemone?
8. How long has the earth been around?
9. How are the senses important in the evolution of a species?
10. What does our "family tree" look like?
11. Why does history make us sick?
12. What does this have to do with understanding AP biology, and will I ever look at a fish in the same way again?



I HOPE YOU HAVE A GREAT VACATION, see you in September!

Mrs. Maxwell