

## 2011-2012 AP Biology Summer Assignment

Ms. Haswell

[thaswell@gfacademy.org](mailto:thaswell@gfacademy.org)

### *Welcome and Expectations*

AP Biology is the equivalent of a college level Biology course. It will be a challenging and fun year. The laboratory is an important part of this course and you will do extensive laboratory work. In order to get through all 13 required AP Biology Labs there will be approximately 6 Saturday and/or evening 2 ½ hour sessions. The dates and times for these sessions will be decided on by our class in the first week of school. In order to succeed in this course you will need to keep up with the rigorous pace. Completing your homework assignments on time and well, will be essential in your development as a successful AP Biology student and assignments will be graded. You will be required to have a "study buddy"- a person in class that you collaborate with, collect homework and handouts for when they are absent and use as a sounding board. A required part of the course will be to meet with me weekly and we will schedule 15 minute weekly meetings for the first semester to set the rhythm and provide the support you need to succeed. It will become clear in these sessions if additional extra-help is needed. Main goals of this course will be to continually stimulate your interest and understanding of Biology, develop your critical thinking skills, develop your laboratory research methodology, and prepare you for the AP Biology Exam. Our course culminates with the **AP Biology Exam (Monday May 14<sup>th</sup> at 8:00 am)** and throughout the course you will be coached and prepared with questions that have appeared on past exams.

### **Purpose of your summer assignment**

The purpose is to become familiar with the major themes of the field of biology and to complete the Animal Behavior and Ecology portions of the AP biology course syllabus. This Introductory unit will not be covered in-depth in class. Therefore, you are responsible for completing every aspect of the assignment. These assignments will be graded and be part of our two week readiness portion of the course. The first two weeks of school occur before the Add/Drop Period and a high level of achievement during this period will help assure that AP Biology is the right course for you and a course you will be successful in. You will be given a multiple choice and essay test on this unit at the end of the first two weeks.

### **Due Date**

All portions of this assignment (1-3) must be completed and handed in on the first day of school.

### **PART 1**

Read and complete Reading Study Guides for Chapter 1 and Chapters 51-54

## PART 2

- A. For all of the 11 themes discussed in Chapter 1, find an example found in chapters 51 – 54. Type the themes, a description of the themes, and the examples.
- B. Using the following terms/concepts, first define

Abiotic components  
Ecosystem  
Community

Biotic components  
Ecology

Populations  
Biosphere

Then develop a comparative chart that summarizes the biotic and abiotic factors at work in the following biomes: tropical forests, savanna, desert, chaparral, temperate grassland, temperate deciduous forest, coniferous forest, tundra, oligotrophic lakes, eutrophic lakes, rivers and streams, wetlands estuary, intertidal zone, coral reef, ocean pelagic zone, and benthos.

## Part 3

Design An Ecosystem

Adapted from a lab by Karen Westerling

[www.accessexcellence.org](http://www.accessexcellence.org)

### *Introduction*

In this portion of the project you are to create several species in a unique ecosystem. You will describe your species niches as well as their reproductive habits. You will then predict the expected effects of an environmental disturbance (e.g., a flood, paving over the ecosystem to build a new School, clearing of everglades land, hunting, introduction of a foreign species, etc.)

### *Hints*

1. Keep it simple. You will not have a billion years to do this activity.
2. Look ahead. Reading the entire activity first will probably make your work more efficient. Consider the conditions associated with species endangerment while you plan your ecosystem.

### *Method*

1. Your mission is to design an ecosystem. You need to provide either a written and/or visual detail of your ecosystem.
2. Here are some details that you must include.

- a. **Location:** your ecosystem may be anywhere on earth. Name and describe the biome in which your ecosystem is located.
  - b. **Biological community:** imaginary organisms are very welcome.
3. Include at least 7 species. You must have at least one species from each of the following groups:
  - a. Producers
  - b. Primary consumers,
  - c. Secondary and higher level consumers
  - d. Decomposers
4. For each species include its:
  - a. Population size
  - b. Location in your ecosystem
  - c. Reproductive behavior for example, mating rituals, fertilization method, number of offspring, care of offspring, etc.
  - d. Nutritional requirements (if an animal) or soil and water requirements (if a plant)
  - e. ~~Position~~ Position in food web
  - f. Sensitivity to environmental insults
  - g. Any known usefulness/attractiveness to humans
5. Include an example of each of the following symbiotic relationships in your ecosystems: co-evolution, parasitism, commensalism, mutualism, predation, and competition
6. Now that you have created a beautiful ecosystem, add a disturbance. Your disturbance may be spontaneous or human-made, intentional or unintentional, or a combination of these. Here are some ideas, but you are not limited to these.
  - A. **Climate change:** warming, cooling, change in water availability
  - B. **Direct human interference:** hunting, harvesting, land clearing, pesticides, herbicides, introduction of a foreign species, etc.
7. Identify the effect of the disturbance on each species in your ecosystems. Be as specific as possible.

### Analysis Questions

1. Draw and explain an energy pyramid that would represent part of your ecosystem.
2. How could you determine the GPP and NPP for your community?
3. For one of your species, draw and explain a survivorship curve that would represent the pattern of survival found in that species.
4. For one of your species, outline the life history by discussing the importance of:
  - a. number of reproductive episodes per lifetime
  - b. number of offspring per reproductive episode
  - c. age of first reproduction
5. Discuss limiting factors that would be present in your ecosystem. Be sure to define them as density-dependent and density-independent.
6. Specify which organism in your community could be a keystone predator? Why?
7. What are some defenses that can arise/evolve in species as a result of predation?

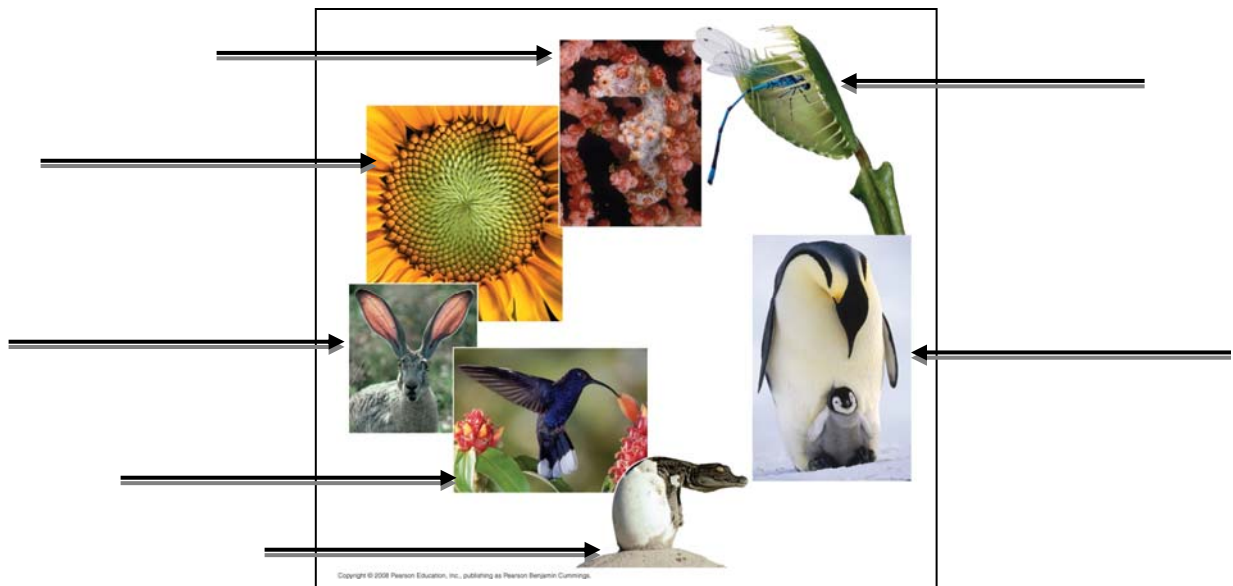
8. Pick one of the cycles (other than water) explained in your text and discuss how it would work in your ecosystem. You may add additional items to your ecosystem if necessary.
9. Explain how biological magnification would occur in your community if a toxin like DDT were introduced.
10. Describe how you would figure out the population growth rate for one of the populations that lives in your ecosystem.
11. Give references that you used other than your textbook.

Name \_\_\_\_\_ Period \_\_\_\_\_

**Chapter 1: Introduction: Themes in the Study of Life**

Begin your study of biology this year by reading Chapter 1. It will serve as a reminder about biological concepts that you may have learned in an earlier course and give you an overview of what you will study this year.

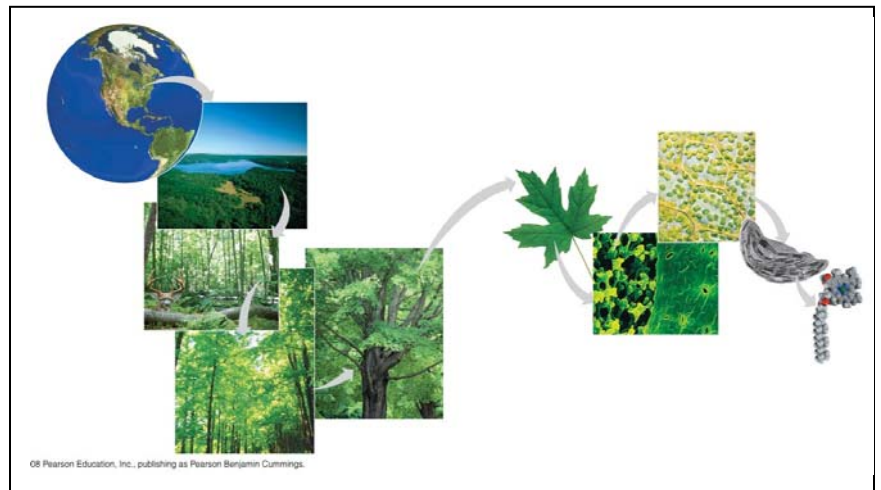
1. In the overview, Figure 1.3 recalls many of the properties of life. Label the seven properties illustrated here, and give a *different* example of each.



**Concept 1.1 Themes connect the concepts of biology**

2. What are **emergent properties**? Give two examples.

3. Life is organized on many scales. Figure 1.4 zooms you in from viewing Earth from space all the way to the level of molecules. As you study this figure, write in a brief definition of each level.



**biosphere**

**ecosystem**

**community**

**population**

**organism**

**organs/organ systems**

**tissues**

**cells**

**organelles**

**molecules**

4. Our study of biology will be organized around recurring themes. Make a list here of the themes that are presented, and give an example that illustrates each theme. Watch for these themes throughout your study this entire year. This will help you see the big picture and organize your thinking. (Go to the *Summary of Key Concepts* at the end of the chapter for a concise look at the themes.)

<i>Theme 1</i>	<i>Example</i>
<i>Theme 2:</i>	
<i>Theme 3:</i>	
<i>Theme 4:</i>	
<i>Theme 5:</i>	
<i>Theme 6:</i>	
<i>Theme 7: (Find it in 1.2.)</i>	

5. As you read this section, you will be reminded of things you may have studied in an earlier course. Since this material will be presented in detail in future chapters, you will come back to these ideas, so don't fret if some of the concepts presented are unfamiliar. However, to guide your study, define each of the terms in bold as you come to them.

**eukaryotic cell**

**prokaryotic cell**

**DNA**

**genes**

**genome**

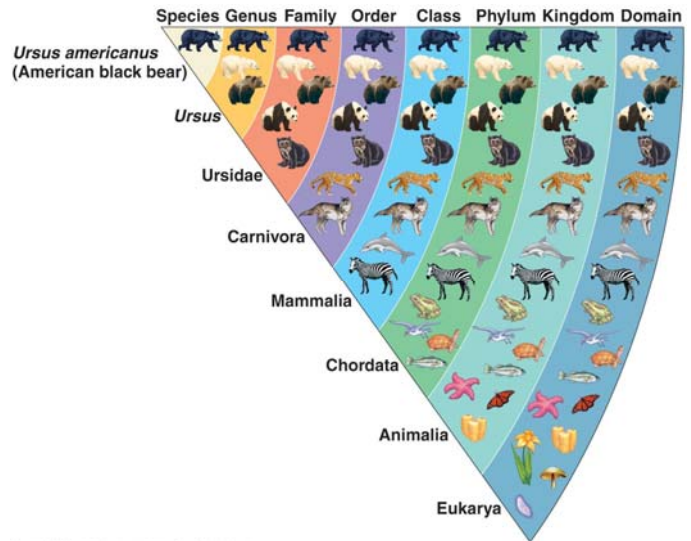
**negative feedback/positive feedback**

**Concept 1.2 The Core Theme: Evolution accounts for the unity and diversity of life**

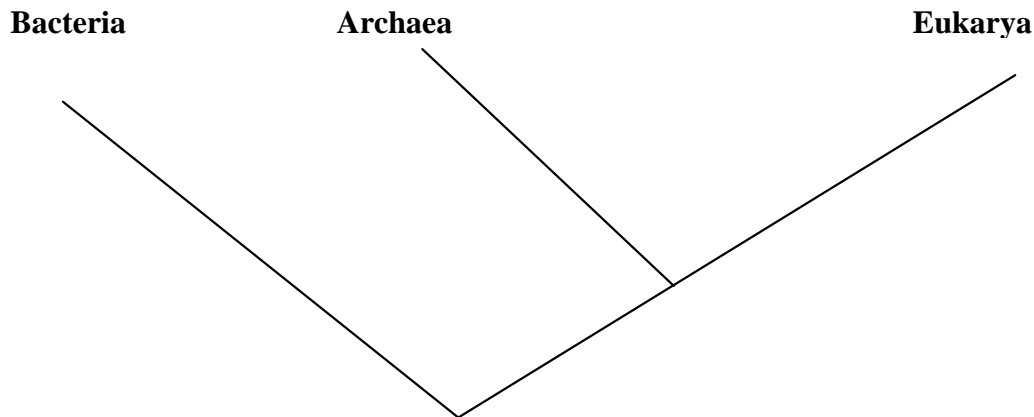
6. Life is organized into groups. Study Figure 1.14.

- Which level contains the greatest diversity of organism?
- The least?
- Write out the levels of organization in order.

- Most people use a mnemonic device to remember these levels. If you have one, write it here.



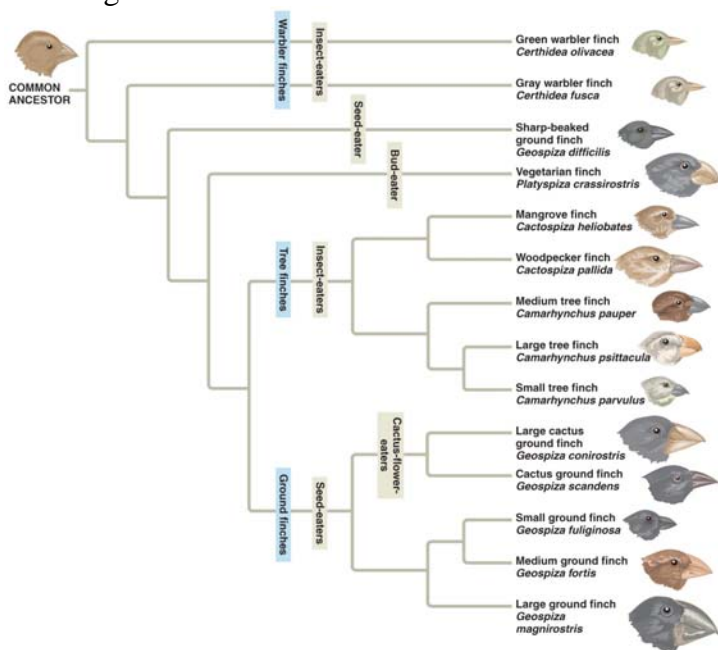
7. Taxonomy is the branch of biology that names and classifies organisms. Because of new molecular information, there have been many changes in placement of certain groups in recent years. Notice that all life is now organized in your text into 3 domains rather than the 5 kingdoms you may have learned earlier. Put the kingdoms mentioned in the text in the space above the proper domain names shown here.



8. What two main points were articulated in Darwin’s *The Origin of Species*?

9. What did Darwin propose as the mechanism of evolution? Summarize this mechanism.

10. Study Figure 1.22, which shows an evolutionary “tree.” What is indicated by each twig? What do the branch points represent? Where did the “common ancestor” of the Galápagos finches originate?



Copyright © 2008 Pearson Education, Inc., publishing as Pearson Benjamin Cummings.

***Concept 1.3 Scientists use two main forms of inquiry in their study of nature***

11. What are the two main types of scientific inquiry? Give an example of each.
  
12. What is *data*?
  
13. Distinguish between quantitative and qualitative data. Which type would be presented in a data chart and could be graphed? Which type is found in the field sketches made by Jane Goodall?
  
14. In science, how do we define *hypothesis*?
  
15. A scientific hypothesis has two important qualities. The first is that it is *testable*. What is the second?
  
16. Are scientific hypotheses proved? Explain your answer!
  
17. Look at Figure 1.24. Use it to write a hypothesis using the “If . . . then . . .” format.
  
18. What is a *controlled experiment*?
  
19. The text points out a common misconception about the term “controlled experiment”. In the snake mimicry experiment, what factors were held *constant*?
  
20. Why are supernatural explanations outside the bounds of science?

21. Explain what is meant by a scientific *theory* by giving the three ways your text separates a theory from a hypothesis or mere speculation.

1.

2.

3.

*Testing Your Knowledge: Self-Quiz Answers*

Now you should be ready to test your knowledge. Place your answers here:

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

5. \_\_\_\_\_

6. \_\_\_\_\_

7. \_\_\_\_\_

8. \_\_\_\_\_

9. \_\_\_\_\_

10. \_\_\_\_\_

Name \_\_\_\_\_ Period \_\_\_\_\_

## Chapter 51: Animal Behavior

### Overview

1. How is *behavior* defined?

### Concept 51.1 Discrete sensory inputs can stimulate both simple and complex behaviors

2. What is *ethology*?
3. What is the difference between *proximate* and *ultimate causation*?
4. Using red-crowned cranes, what is an example of a proximate causation question and an example of an ultimate causation question?
5. Who are the three *ethologists* who shared in a Nobel Prize for their work in 1973? We will look at work by each of them.
6. What is a *fixed action pattern* (FAP)? Give an example.
7. What is a *sign stimulus*? Give at least examples of sign stimuli.
8. *Nicholas Tinbergen's* work with the stickleback fish is a classic study. Explain what he found. Use the terms *fixed action pattern* and *sign stimulus* in your response.



9. Define these behavior terms:

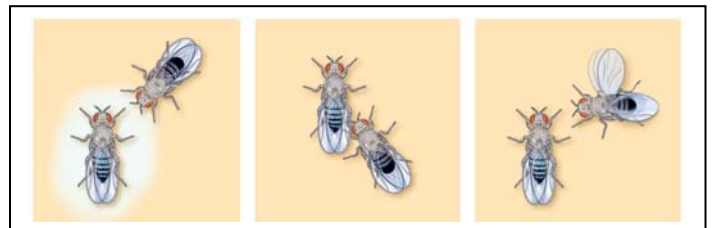
Definition	Example
<i>kinesis</i>	
<i>taxis</i>	

10. Explain what is meant by a *circadian clock* and *circadian rhythms*. Identify two behaviors, either plant or animal, that demonstrate a circadian rhythm. (You may need to refer to Chapter 49 or Chapter 36 for examples.)

11. Discuss two navigational strategies used by birds to migrate.

12. Animals communicate in various ways. Discuss at least three specific examples using different organisms.

13. Notice the pictures that show fruit fly courtship behavior (see AP Biology Lab 11B, “Reproductive Behavior in Fruit Flies”). What different modes of communication are used by the fruit fly?



14. *Karl von Frisch* studied European honeybees. What are the two types of dances that a returning worker bee does, and what information does each dance convey? Use a labeled sketch to describe each dance.

15. What are *pheromones*? Give three specific types of information that can be transmitted through pheromones.

***Concept 51.2 Learning establishes specific links between experience and behavior***

16. What is the difference between *innate* and *learned* behavior? Give an example of each.

17. What is meant by *fitness*? How can *habituation* increase fitness?

18. Describe the process of *imprinting*, and explain what is meant by *sensitive* or *critical period*.

19. Describe the classic study of *parental imprinting* done by *Konrad Lorenz*.



20. What special challenges did researchers face in order to return whooping cranes to the wild? What would you have to wear if you worked with hatchlings? Why?



27. This concept looks at some very interesting ways that genetic changes affect behavior. Several important case studies that show a genetic component to behavior are presented. Take time to read and enjoy them. The study of voles and their mating behaviors is often discussed in other science articles. To return to fruit fly mating, a single gene called *fru* controls male mating behavior. If males lack a functional *fru* gene (short for *fruitless*), what happens?

And what occurs if females are genetically manipulated to express this gene?

***Concept 51.4 Selection for individual survival and reproductive success can explain most behaviors***

28. What is *foraging behavior*?
29. What is proposed by the *optimal foraging theory*? Explain it in terms of cost and benefit, and cite two examples from your text.
30. To demonstrate that you understand the principle of optimal foraging, describe a food source that you would not be likely to exploit.
31. Explain each of these mating systems:
- promiscuity**
  - monogamy**
  - polygamy**
  - polygyny**
  - polyandry**
32. Explain two factors that may be important in determining the evolution of these systems, and apply each factor to a particular species.

33. Let's return to an earlier idea. What is *sexual selection*? (Chapter 23)

34. There are two types of sexual selection. Explain each of them.

**intersexual selection**

**intrasexual selection**

35. What is *agonistic behavior*? Give one example of this behavior that is not in your book.

***Concept 51.5 Inclusive fitness can account for the evolution of altruistic social behavior***

36. What is *altruism*?

37. Explain the evolutionary advantage to a population of having members who exhibit *altruistic behavior*.

38. *Altruism* may reduce the fitness of an individual—for example, by making that individual more obvious to a predator. Explain this behavior using the concept of *inclusive fitness*.

39. Explain the logic behind geneticist *J.B.S. Haldane's* comment that he would lay down his life for two brothers or eight cousins.

40. Contrast *kin selection* and *reciprocal altruism*.

*Testing Your Knowledge: Self-Quiz Answers*

Now you should be ready to test your knowledge. Place your answers here:

1. \_\_\_\_\_ 2. \_\_\_\_\_ 3. \_\_\_\_\_ 4. \_\_\_\_\_ 5. \_\_\_\_\_ 6. \_\_\_\_\_ 7. \_\_\_\_\_

Name \_\_\_\_\_ Period \_\_\_\_\_

## Chapter 52: An Introduction to Ecology and the Biosphere

### *Overview*

1. What is *ecology*?
2. Study Figure 52.2. It shows the different levels of the biological hierarchy studied by ecologists. Notice also the different types of questions that might be studied by an ecologist at each level of study. Use this figure to define or explain the following terms:

**organismal ecology**

**population**

**population ecology**

**community**

**community ecology**

**ecosystem**

**ecosystem ecology**

**landscape ecology**

**biosphere**

**global ecology**

***Concept 52.1 Ecology integrates all areas of biological research and informs environmental decision making***

3. Contrast the terms *ecology* and *environmentalism*. How does ecology relate to environmentalism?

4. What environmental issue was targeted in Rachel Carson's book, *Silent Spring*? What was the outcome of her efforts?

**Concept 52.2 Interactions between organisms and the environment limit the distribution of species**

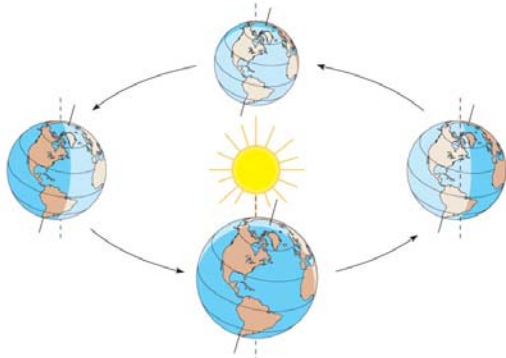
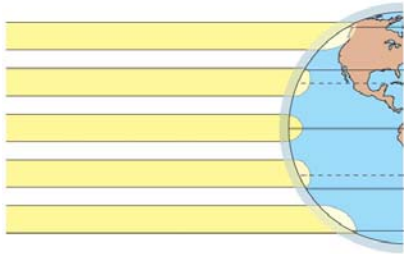
5. What is *biogeography*? What factors determine the distribution of organisms?
6. Read this section carefully to understand different types of experiments and observations that help explain the distribution of species. As you conclude this section, list and describe five examples of *biotic factors*.

<b>Biotic Factor</b>	<b>Example and Description</b>

7. List five abiotic factors. Include an example and description of each factor's influence on living organisms.

<b>Abiotic Factor</b>	<b>Example and Description</b>


8. What is *climate*? What abiotic factors are its components?
9. Study Figure 52.10, which summarizes Earth's climate patterns and how they are formed. Explain how Earth's curvature and axis of rotation influence the amount of sunlight reaching a given area, and how these factors influence the temperature and precipitation in that area.



Copyright © 2008 Pearson Education, Inc., publishing as Pearson Benjamin Cummings.

10. Let's look at factors that affect climate on a smaller scale. Begin by studying Figure 52.11. Why is the Pacific Northwest so rainy? What causes the Mediterranean climate?

11. Explain the “rain shadow” effect.
12. What effect does elevation have on climate? Why do we say that hiking from Gatlinburg, Tennessee, at 393 meters of elevation in the Smoky Mountains region, to the top of Mount LeConte, at 2010 meters, is like traveling to Canada?

***Concept 52.3 Aquatic biomes are diverse and dynamic systems that cover most of Earth***

13. What is a *biome*?
14. What is the largest marine biome, and how much of Earth’s surface does it cover?
15. As you read this section and study Figure 52.18, you will encounter a number of new terms. Distinguish between each of the following pairs of terms:

**photic/aphotic**

**benthic/pelagic**

**oligotrophic/eutrophic**

**littoral zone/limnetic zone**

**zooplankton/phytoplankton**

**neritic/abyssal**

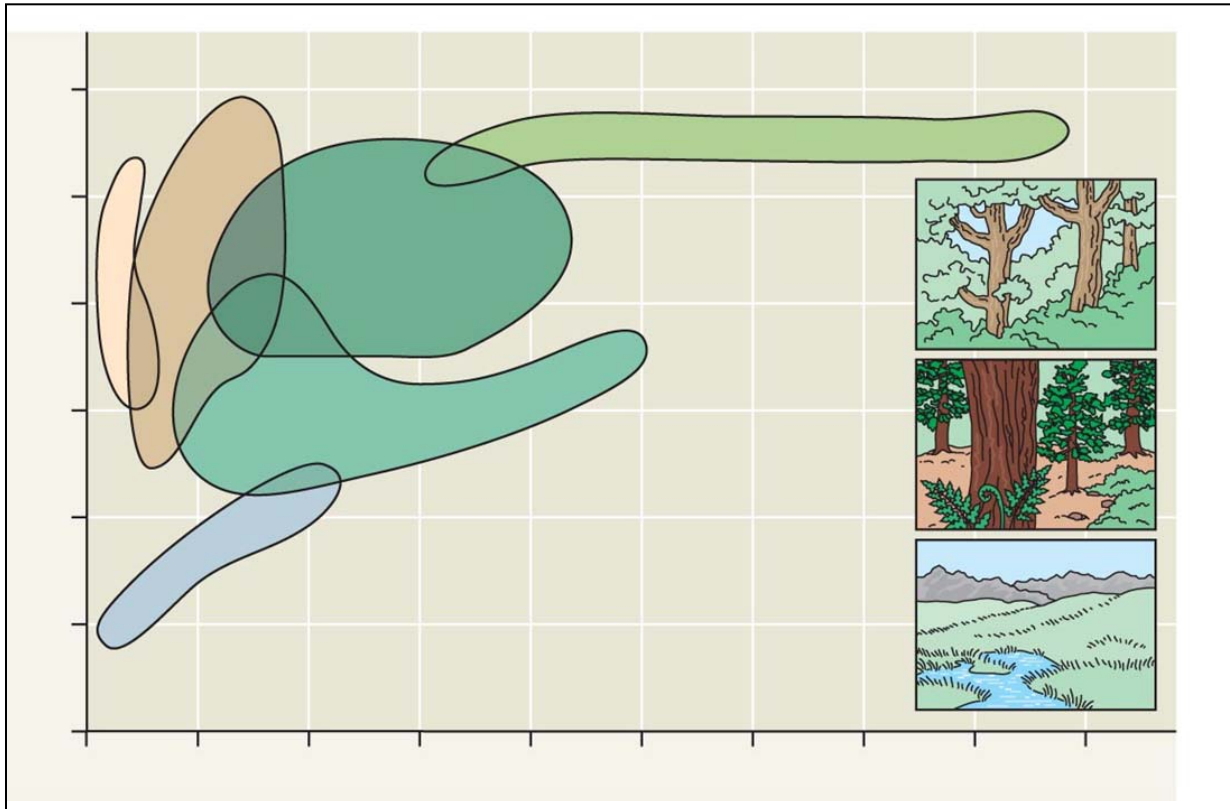
16. The aquatic biomes are listed in the chart. Give a description of the biome below its name, and then complete the other parts of the chart.

<b>Aquatic Biome</b>	<b>Typical Autotrophs</b>	<b>Typical Heterotrophs</b>	<b>Human Impact</b>
<i>Lakes</i>			
<i>Wetlands</i>			
<i>Streams and rivers</i>			
<i>Estuaries</i>			
<i>Intertidal</i>			
<i>Oceanic pelagic</i>			

**Concept 52.4** *The structure and distribution of terrestrial biomes are controlled by climate and disturbance*

17. Figure 52.20 shows a *climograph* for some major biomes in North America. What two abiotic factors shown here are most important in determining the distribution of the biome?

18. Label the axes of this figure, and identify each biome shown here. Try to do this based on your understanding of the figure, and then use the text to check your answers. You will use these biomes: *temperate grassland*, *temperate broadleaf forest*, *tropical forest*, *northern coniferous forest*, *desert*, *tundra*.



19. Describe each major terrestrial biome as to rainfall, temperature, location, and representative flora and fauna.

**tropical forest**

**desert**

**savanna**

**chaparral**

**temperate grassland**

**northern coniferous forest/taiga**

**temperate broadleaf forest**

**tundra**

*Testing Your Knowledge: Self-Quiz Answers*

Now you should be ready to test your knowledge. Place your answers here:

1. \_\_\_\_\_ 2. \_\_\_\_\_ 3. \_\_\_\_\_ 4. \_\_\_\_\_ 5. \_\_\_\_\_ 6. \_\_\_\_\_ 7. \_\_\_\_\_ 8. \_\_\_\_\_ 9. \_\_\_\_\_

Name \_\_\_\_\_ Period \_\_\_\_\_

## Chapter 53: Population Ecology

The next three chapters on population, community, and ecosystem ecology provide the academic backbone for this unit on ecology. Each chapter is a different organizational level in ecology, starting with population ecology. Before beginning your study of each chapter, be sure you have a clear understanding of the terms in the chapter title.

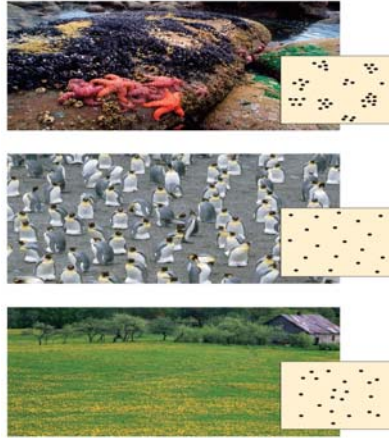
### *Concept 53.1 Dynamic biological processes influence population density, dispersion, and demographics*

1. What two pieces of data are needed to mathematically determine *density*?
2. What is the difference between density and *dispersion*?
3. Work through Figure 53.2, doing the math to make sure you get the same answer as the text. Note and understand what the letters of the formula mean. Next, try the following problem.

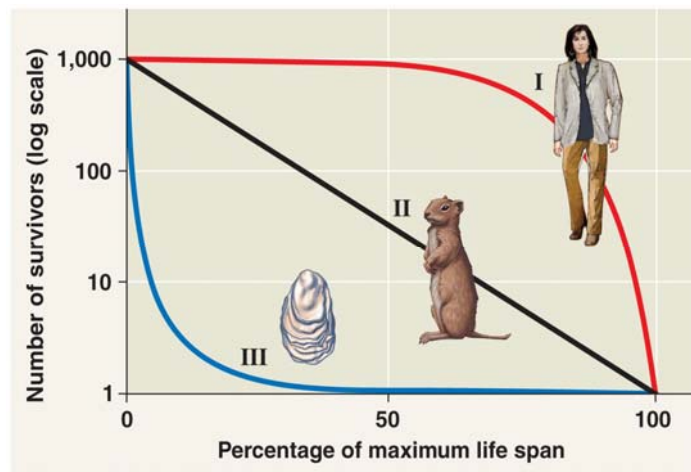
A population ecologist wished to determine the size of a population of white-footed deer mice, *Peromyscus leucopus*, in a 1-hectare field. Her first trapping yielded 80 mice, all of which were marked with a dab of purple hair dye on the back of the neck. Two weeks later, the trapping was repeated. This time 75 mice were trapped, out of which 48 of the mice were marked. Using the formula  $N = mn/x$ , what is the population of mice in the field? (Answer is at the end of this reading guide.)

4. Explain the impact of *immigration* and *emigration* on population density. (To avoid confusion between these two terms, it might help to use this memory trick: **i**mmigration is the movement **i**nto a population, while **e**migration is the **e**xiting of individuals from a population.)

5. Label the dispersion pattern shown by each population in the figure below. Second, and most important, what do the dispersion patterns tell us about the population and its interactions?



6. In what population statistic do *demographers* have a particular interest? How is this data often presented?
7. Is your biology class a *cohort*? Explain.
8. *Survivorship curves* show patterns of survival. In general terms, survivorship curves can be classified into three types. Using the figure below, label and explain the three idealized survivorship patterns.



9. In the natural world, many species show survivorship curves that are combinations of the standard curves. How would an open nesting songbird's survivorship curve appear if it was Type III for the first year and then Type II for the rest of its life span? Sketch this curve on the survivorship curve graph in question 8.
10. What does a *reproductive table* show?

***Concept 53.2 Life history traits are products of natural selection***

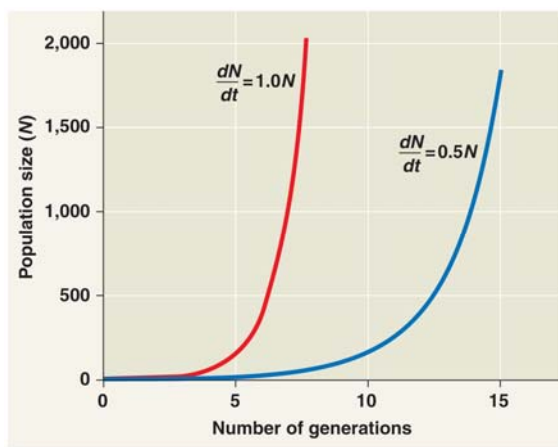
11. On what is the *life history* of an organism based?
12. What three variables form the life history of a species?
13. Explain the difference between *semelparity (big-bang reproduction)* and *iteroparity (repeated reproduction)* as life history strategies.
14. Explain how two critical factors influence whether a species will evolve toward semelparity or iteroparity.
15. Explain the effect of offspring care on parental survival in kestrels.

***Concept 53.3 The exponential model describes population growth in an idealized, unlimited environment***

Do not let the math in this section be a problem. Instead of trying to understand the calculus involved, concentrate on the idea of exponential growth, how it is graphed, and what this type of growth indicates about a population.

16. What is the advantage to using per capita birth and death rates rather than just the raw numbers of births and deaths?

17. What will the per capita birth and death rates be if a population is demonstrating *zero population growth*?
18. What does it mean for a population to be in *exponential population growth*?
19. In the graph below, explain why the line with the value of 1.0 shows a steeper slope that reaches exponential growth more quickly than does the line with the value of 0.5. On this graph, add a third line that approximates a population with an exponential value of 1.25.

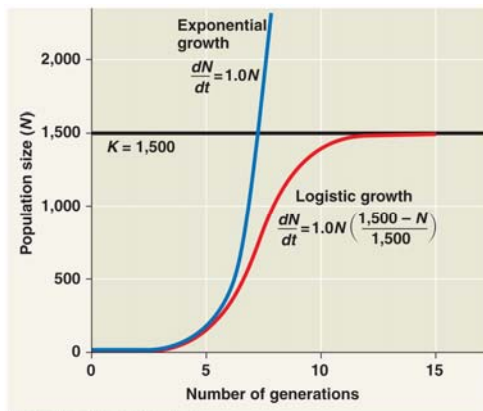


20. What are two examples of conditions that might lead to *exponential population growth* in natural populations?

**Concept 53.4** *The logistic model describes how a population grows more slowly as it nears its carrying capacity*

21. What is *carrying capacity*?
22. What are six examples of limiting resources that can influence carrying capacity?
23. In the *logistic population growth* model, the per capita rate of increase approaches zero as the \_\_\_\_\_ is reached.

24. If the carrying capacity (or  $K$ ) is 1,000 and  $N$  is 10, the term  $(K - N)/K$  is large. Explain why a large value for  $(K - N)/K$  predicts growth close to the maximum rate of increase for this population.
25. In the graph below, explain why the logistic model predicts a sigmoid (S-shaped) growth curve when the population density is plotted over time. Hint: The critical part of this answer concerns why growth slows as  $N$  approaches  $K$ .



26. The end of this concept attempts to bring together the ideas of life histories and growth models. This is done with the introduction of two new terms:  $K$ -selection and  $r$ -selection. Explain the ideas behind the creation of these two terms.
27. Compare and contrast these two terms:

**density-independent regulation**

**density-dependent regulation**

28. Explain how negative feedback plays an essential role in the unifying theme of regulation of populations. Does negative feedback play a role in both density-independent and density-dependent regulation?

29. Complete the following chart.

**Density-Dependent Population Regulation**

<b>Negative Feedback Mechanism</b>	<b>Explanation</b>	<b>Example</b>
<i>Competition for resources</i>		
<i>Territoriality</i>		
<i>Disease</i>		
<i>Predation</i>		
<i>Toxic wastes</i>		
<i>Intrinsic factors</i>		

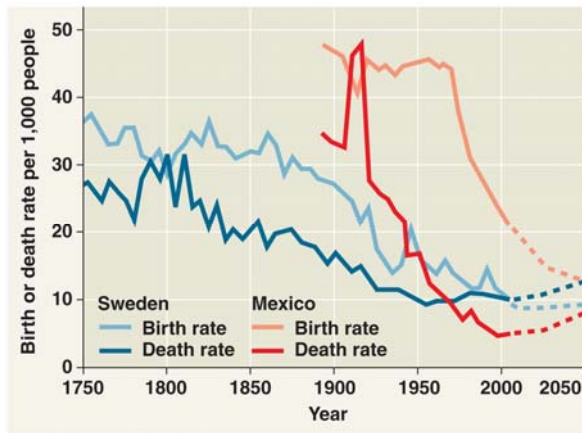
30. Give both biotic and abiotic reasons for population fluctuations over the last 50 years in the moose population on Isle Royale, based on *population dynamics*.

31. Explain the importance of immigration and emigration in *metapopulations*.

**Concept 53.5 The human population is no longer growing exponentially but is still increasing rapidly**

32. Summarize human population growth since 1650. (Of all the reported statistics, which one surprises you the most?)

33. What is *demographic transition*? Use the figure below to explain the process in Sweden and Mexico.



34. You should be able to look at *age-structure graphs* and make predictions about the future growth of the population. Using Figure 53.25, describe the key features for the three age-structure graphs and predict how the population of each country will grow.

Country	Key Features	Predicted Future Growth
Afghanistan		
United States		
Italy		

35. Why do *infant mortality* and *life expectancy* vary so greatly between certain countries?
36. Can the world's population sustain an *ecological footprint* that is currently the average American footprint? Explain.

*Testing Your Knowledge: Self-Quiz Answers*

Now you should be ready to test your knowledge. Place your answers here:

1. \_\_\_\_\_ 2. \_\_\_\_\_ 3. \_\_\_\_\_ 4. \_\_\_\_\_ 5. \_\_\_\_\_ 6. \_\_\_\_\_ 7. \_\_\_\_\_ 8. \_\_\_\_\_ 9. \_\_\_\_\_ 10. \_\_\_\_\_

*Answer to Question 3: 125 P. leucopus*

Name \_\_\_\_\_ Period \_\_\_\_\_

**Chapter 54: Community Ecology**

**Concept 54.1** *Community interactions are classified by whether they help, harm, or have no effect on the species involved.*

1. What is a *community*? List six organisms that would be found in your schoolyard community.
2. This section will look at *interspecific* interactions. Be clear on the meaning of the prefix! To begin, distinguish between *intraspecific competition* and *interspecific competition*. Give an example of each.

Type of Competition	Explanation	Example
Intraspecific competition		
Interspecific competition		

3. What is G. F. Gause's *competitive exclusion principle*? Give one example.
4. Define *ecological niche*.
5. Several species of *Anolis* lizards live in the same types of trees and have a similar diet. Discuss *resource partitioning* to explain how interspecific competition is reduced. (Study Figure 54.2.)
6. What is the difference between the *fundamental niche* and the *realized niche*?

7. Study Figure 54.5, and then explain what is meant by *character displacement*. (To do this, you will have to learn or review the difference between *sympatric* populations and *allopatric* populations. You will find this information in Chapter 24.)
8. *Predation* is a term that you probably already know. Can you give examples of some predator-prey combinations as listed below?

Predator	Prey	Example
Animal	Animal	
Animal	Plant	
Fungus	Animal	
Bacteria	Animal	
Fungus	Plant	

9. List three special adaptations that predator species possess for obtaining food.
10. List three ways prey species elude predators.
11. Compare the two types of mimicry.

Type of Mimicry	Description	Example
<i>Batesian</i>		
<i>Müllerian</i>		

12. What is *herbivory*?

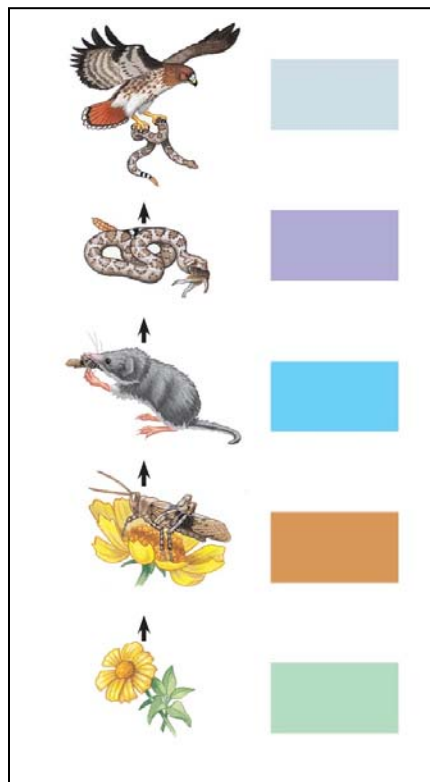
13. Did you list any special herbivore adaptations for predation in your response to question 9? Or plant adaptations to avoid herbivory? List two adaptations for each category here.
14. Describe and give an example of each of the following interactions:

Type of Interaction	Description	Example
<i>symbiosis</i>		
<i>parasitism</i>		
<i>commensalism</i>		
<i>mutualism</i>		

15. Which category above includes the other three? Note that other texts may define this term more narrowly.
16. Your text uses +/- symbols to indicate how interspecific interactions affect survival and reproduction of the two species. Use this notation for each of these interactions.

Type of Interaction	+/, +/-, -/-, +/-0
<i>predation</i>	
<i>commensalism</i>	
<i>mutualism</i>	
<i>parasitism</i>	
<i>interspecific competition</i>	
<i>herbivory</i>	

17. What is *species diversity*? What are its two components? Why is it important?
18. What does an ecologist summarize in a *food web*?
19. Know the levels of trophic structure in food chains. Give a food chain here, including four links that might be found in a prairie community, and tell the level for each organism.
20. Name every organism in the pictured food chain, and give the trophic level in the box.



21. According to the *energetic hypothesis*, why are food chains limited in length? How much energy is typically transferred to each higher level?
22. What is a *dominant species*? For the area where you live, what would be considered a dominant tree species?

23. How is a *keystone species* different from a dominant species?
24. Name one keystone species, and explain the effect its removal has on the ecosystem.
25. Explain *facilitator* or *foundation species* and give an example.

You may omit bottom-up and top-down controls.

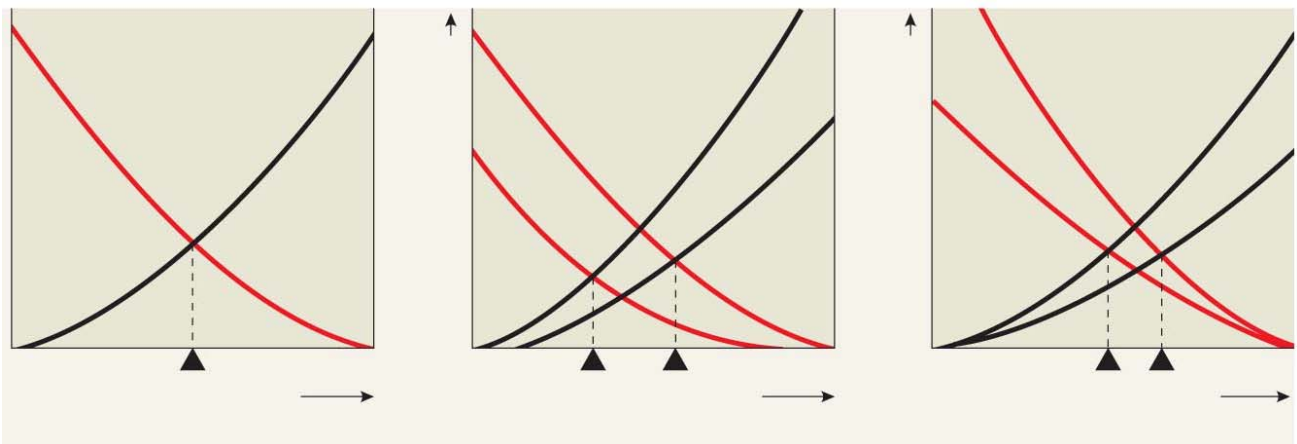
***Concept 54.2 Disturbance influences species diversity and composition***

26. What is the *intermediate disturbance hypothesis*? Give an example of a disturbance event, and explain the effect it has on the community.
27. *Ecological succession* is the changes in species that occupy an area after a disturbance. What is the difference between *primary succession* and *secondary succession*?

***Concept 54.3 Biogeographic factors affect community biodiversity***

28. Explain *latitudinal gradients* in terms of species richness. Where is species richness greatest?
29. There are probably two key factors in latitudinal gradients. List and explain both here, and put a star next to the one that is probably the primary cause of the latitudinal difference in biodiversity.
30. Explain what is demonstrated by a *species-area* curve.

31. Renowned American ecologists Robert MacArthur and E. O. Wilson developed a model of *island biogeography*. While the model can be demonstrated with islands, any isolated habitat represents an island. What are the two factors that determine the number of species on the island?
32. What two physical features of the island affect immigration and extinction rates?
33. Why do small islands have lower immigration rates? Higher extinction rates?
34. Closer islands have \_\_\_\_\_ extinction rates and \_\_\_\_\_ immigration rates.
35. What is the *island equilibrium model*?
36. Use this model to describe how an island's size and distance from the mainland affect the island's species richness.
37. Label this figure to show immigration, extinction, island size, and equilibrium. Then explain what each figure shows.



***Concept 54.4 Community ecology is useful for understanding pathogen life cycles and controlling human disease***

38. Let's pull a couple of ideas from this section: What is a *pathogen*?

39. What is a *zoonotic pathogen*? List three examples.

40. What is a *vector*? List three examples.

*Testing Your Knowledge: Self-Quiz Answers*

Now you should be ready to test your knowledge. Place your answers here:

1. \_\_\_\_\_ 2. \_\_\_\_\_ 3. \_\_\_\_\_ 4. \_\_\_\_\_ 5. \_\_\_\_\_ 6. \_\_\_\_\_ 7. \_\_\_\_\_ 8. \_\_\_\_\_ 9. \_\_\_\_\_