

AP Biology Summer Packet, 2017

Mrs. House

Welcome to AP Biology! In order to prepare you for the rigorous year ahead, I have put together a packet of information, assignments, and suggested reading to prepare you. The book you are using this summer is an older edition of the text we will use during the year, so feel free to familiarize yourself with it.

AP Central, run by the College Board, has a vast amount of information regarding all AP classes, not only biology. Go to this website:

<https://apstudent.collegeboard.org/apcourse/ap-biology>

There you can find the BIG IDEAS and topics covered in the course, examples of labs, sample AP questions, exam information, etc. This will give you a "heads up" on what to expect from the course and the exam.

Please understand that this is a COLLEGE LEVEL course, and as such, we will be moving at a rapid pace. You will be required to read and study a lot on your own, and you must possess the qualities of organization and a strong work ethic. You must bring with you the knowledge from your freshman biology class, and within this packet is a list of topics that you SHOULD HAVE LEARNED freshman year, and should review over the summer. These are topics that will NOT be re-taught in detail, but are instead a necessary foundation to the rest of the course.

Good luck, and have a great summer!

Topics you SHOULD HAVE LEARNED freshman year...(and where they can be found in this textbook, just in case!)

I do not expect that you know EVERYTHING about all of these topics, but MUCH of it should be VERY familiar to you!

Topic	Chapter
Basics of Biology	1
Basic Chemistry (atoms, bonding, properties of water, pH)	2
Basics of Organic Chemistry	3
Cell Structure and Function	4
Cell Membranes (structure, diffusion, osmosis, active and passive transport)	5
Metabolism: (ATP function, energy flow, enzyme function)	6
Basics of photosynthesis	7
Basics of cellular respiration	8
Mitosis	9
Meiosis	10
Mendelian genetics	11
Chromosomes and human genetics	12
DNA structure, function and replication	13
DNA transcription and translation	14
Evolution	17 & 20
Ecology	46, 48-50

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Ecology Summer Assignment

You are going to read and take notes on the chapters related to ecology. In the older version of the book, the chapters are 46, 48-50. In the newer book you will receive in September, the chapters are 45-48. Please note how these chapters correspond. The attached questions are marked with the chapter numbers from the new book.

- Population Ecology - Old Book: Ch. 46, New Book: Ch. 45
- Community Ecology - Old Book: Ch. 48, New Book: Ch. 46
- Ecosystems - Old Book: Ch. 49, New Book: Ch. 47
- The Biosphere - Old Book: Ch. 50, New Book: Ch. 48

Sample different note-taking strategies. Go to this website for examples:
<https://www.gvsu.edu/sasc/note-taking-and-concept-mapping-117.htm>

Assignments:

1. Attached are questions to help you with your reading and note-taking. You should complete these, and you may also take your own notes on the topics. Work should be done *neatly* and *thoroughly*. You will have a test on these topics during the first full week of school, and you will be allowed to use your questions and notes.
2. You must also read **TWO** current news articles related to the environment, taken from a reputable news source. Articles must be **dated on or after June 1, 2015**. For EACH article, type a 1-page summary of the article, and a 1-page reaction to the article. When typing your work, the font should be 12-pt., Times New Roman, 1.5 spaced. Margins should be 1 inch. Your heading should be single-spaced. Please attach either the original articles, or copies of them.

THESE ASSIGNMENTS ARE DUE ON THE FIRST DAY OF SCHOOL!!!

Learning Goals:

As you work, make sure you are able to:

- ✓ Define and explain the vocabulary words.

Population Ecology:

- ✓ Explain the limiting factors that affect population density, distribution, and change. List, describe, and give examples of limiting factors.
- ✓ Determine how density-dependent and density-independent factors can control population growth.
- ✓ Explain the meaning and differences between logistic and exponential growth, and analyze a growth curve. Identify graphs showing exponential and logistic growth patterns.
- ✓ Calculate the population density of given areas.
- ✓ Define carrying capacity and population growth rate (PGR).
- ✓ Contrast r-strategists and k-strategists.
- ✓ Explain and graph the trends in human population growth.

Community Ecology:

- ✓ Distinguish between a fundamental niche and a realized niche.
- ✓ Explain the role of competitive exclusion in interspecific competition.
- ✓ Describe and give examples of the different types of symbiotic relationships. Explain their importance.
- ✓ Describe positive and negative impacts of predation on prey populations.
- ✓ Describe the impact of keystone species on community structure.
- ✓ Explain the concept of ecological succession, distinguishing between primary and secondary succession.

Ecosystems:

- ✓ Compare and contrast the movement of energy and chemical nutrients through an ecosystem.
- ✓ Explain how materials enter, pass through, and exit an ecosystem.
- ✓ Explain various trophic roles and levels, and provide examples for different types of ecosystems.
- ✓ Explain biomass and energy pyramids, explaining why there are more producers than consumers, and what happens to energy as it moves through an ecosystem.
- ✓ Describe the movement of materials through the biogeochemical cycles and how these cycles affect life on Earth.
- ✓ Explain the difference between gross primary productivity and net primary productivity.

The Biosphere:

- ✓ Explain the role of abiotic factors in the formation of biomes.
- ✓ Characterize each of the world's major terrestrial, freshwater, and marine biomes based on climate, plant life, animal life, and any other defining characteristics.
- ✓ Explain human impact on the environment, both positive and negative.

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CHAPTER 45: POPULATION ECOLOGY

1. What is a population? _____

2. Describe the four characteristics that can describe populations:

a. population size _____

b. population density _____

c. distribution _____

d. age structure _____

3. What is crude density? _____

4. Describe the 3 types of population distribution. Give an example for each.

a. _____

b. _____

c. _____

5. Application: One species of birds is highly territorial, while a second lives in flocks. What is each species' likely pattern of dispersion? Explain.

6. Describe 2 methods used by ecologists to estimate population sizes.

a. _____

b. _____

7. Populations are dynamic. What does this mean?

8. List the 4 factors that may change population size, and whether each factor increases or decreases the population size.

a. _____

b. _____

c. _____

d. _____

9. Define zero population growth: _____

10. Define per capita: _____

11. Explain how each of the following is calculated. Use this example: 100 wolves live in a forest. Each year, 30 are born, and 10 die.

a. Birth rate: _____

b. Death rate: _____

c. net reproduction per individual per unit time (r): _____

12. Define what each variable means in the following equation: $G=rN$

a. G _____

b. r _____

c. N _____

13. Using the example in #11, and the equation in #12, calculate the size of the wolf population after 1 year.

14. Define exponential growth: _____

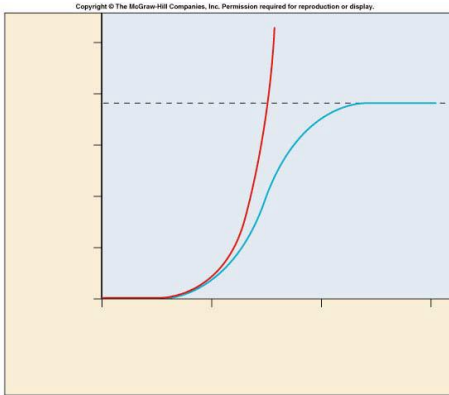
15. Explain why the exponential growth curve produces a “J-shaped” curve instead of a straight line.

16. Explain why an exponential growth curve is rarely seen in nature. Give examples of when it is likely to occur.

17. What is biotic potential? _____

18. Define logistic growth: _____

19. Label the graph illustrating the two models of population growth.



20. Define carrying capacity. Label it on the graph.

21. Define limiting factors. Give examples.

22. Write the formula for population growth without limits. (HINT: See #12!)

23. The formula for population growth with limits is
What must (K-N)/K represent? (See pg. 806)

$$G = rN \frac{(K - N)}{K}$$

24. Contrast density-dependent and density-independent limiting factors. Give examples of each.

25. Compare K-selected to r-selected species. Give examples of each.
a. K-selected

b. r-selected

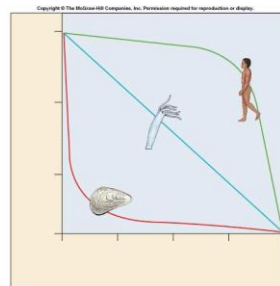
26. What are life tables used for in population studies? _____

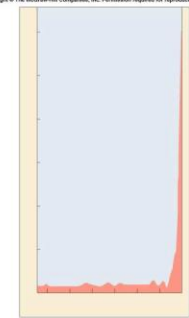
27. Compare the survival strategies of species and give an example of each type.
Type I

Type II

Type III

28. Label the survivorship curves diagram.

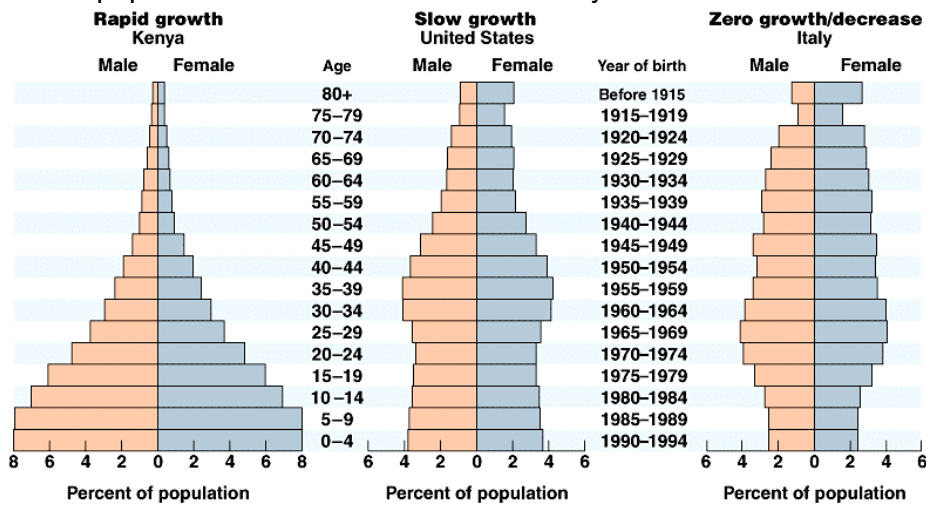




29. Look at the growth curve of the human population. How does it compare to the growth curves earlier in the chapter?

30. Have humans reached K? What factors are significant when explaining our growth curve? Label the graph.

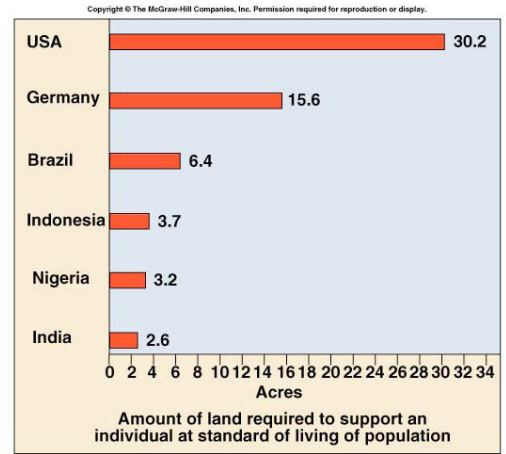
31. Look at the age structure diagrams (population pyramids) of different countries. What will the population distributions look like in 20 years?



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32. Explain ecological footprint.

33. Explain the significance of this diagram. Application: What is the more significant cause of resource depletion— overpopulation or overconsumption?



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CHAPTER 46: COMMUNITY ECOLOGY

1. What is species richness, and what factors influence the structure in a community?

2. Fill in the chart of interspecific interactions.

Interaction	Definition	Effects on Population Density	Example
Predation			
Competition			
Parasitism			
Mutualism			
Commensalism			

3. What is the difference between facultative and obligatory mutualism? Give an example for each.

4. What is the difference between interference competition and exploitative competition? Give an example for each.

5. What is the competitive exclusion principle?

6. Describe Gause's experiment with Paramecia.

7. Define ecological niche.

8. Define and give an example of resource partitioning.

9. How is co-evolution significant in community ecology?

10. Draw graphs showing the 3 different models for predator-prey interactions, and describe each type.

Type I

Type II

Type III

11. Describe several defense mechanisms to predation in plants.

12. Define and give an example of the different animal defenses:

13. Describe and give examples of parasite-host interactions, and describe parasitoids.

14. Define ecological succession.

15. What is the difference between primary and secondary succession?

16. What is the intermediate disturbance hypothesis?

17. Define a keystone species and why are they so important to a community?

18. What is geographic dispersal, and how can it occur?

19. Describe the uses of studying mainland, marine, and island patterns of species distribution and richness.

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CHAPTER 47: ECOSYSTEMS

1. How does the definition of ecosystems expand on the concept of the community?

2. What is needed to maintain a self-sustaining ecosystem?

3. Define the following:

a. primary producers/photoautotrophs: _____

b. consumers/heterotrophs: _____

c. detritivores: _____

d. decomposers: _____

4. Differentiate between food chains and food webs. _____

5. Why are food chains, even in rich ecosystems, relatively short? _____

6. What environmental conditions favor shorter food chains? Longer food chains?

7. Differentiate between detrital food webs and grazing food webs. _____

8. What happens in biological magnification? _____

9. What would be some of the properties of molecules that could be candidates for biological magnification?

10. Give an example of biological magnification. _____

11. Define the following energy budget terms:

a. Primary productivity

b. Gross primary productivity _____

c. Net primary productivity _____

12. Which ecosystems have the highest productivity per unit area?

13. What factors do you think contribute to differences in productivity?

14. Why is the open ocean so low in productivity?

15. What happens to the size each level in the idealized pyramid as energy is transferred through the trophic levels?

16. Explain what happens to the energy and biomass as it is passed through the trophic levels?

17. Why is it essential that elements move through biogeochemical cycles in the ecosystem?

18. What is the source of acid rain? _____

19. Why is acid rain a problem? _____

20. What are the major processes that move carbon through the ecosystem?

21. What is the impact of combustion on the carbon cycle?

22. What are possible reasons for global warming called the greenhouse effect?

23. Identify the role of each of the following in the nitrogen cycle:

a. Nitrogen fixation _____

b. Ammonification _____

c. Nitrification _____

d. Denitrification _____

24. Describe the major processes of the phosphorus cycle.

25. Why is human population growth at the root of environmental issues?

26. Define eutrophication. Why is it a problem?

27. List several additional disruptive impacts humans have had on the environment.

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CHAPTER 48: THE BIOSPHERE

1. List and describe examples of factors that limit geographic distribution of biomes.

2. Define the terms:

a. Biosphere _____

b. Ecosystem _____

c. Community _____

d. Population _____

3. What are the most important factors influencing terrestrial distribution?

4. Define the term biome.

5. Describe desertification.

6. What is the largest biome on earth?

7. Identify factors that are significant to organism distribution and abundance in a lake.

8. What is the difference between a lake that is oligotrophic and one that is eutrophic?

9. Describe eutrophication.

10. List and describe Earth's major biomes: