

Directions: Use your textbook to help you answer the practice questions for each chapter. It is important that you READ the chapter sections and not just search for the answer in order to make sure you understand the material. Similarly, it is important that you really think about your answer and write a complete answer; don't just write the minimum that you think you can get away with or you will not learn the material well enough for the final exam.

Ecology: Chapter 3

WORD BANK

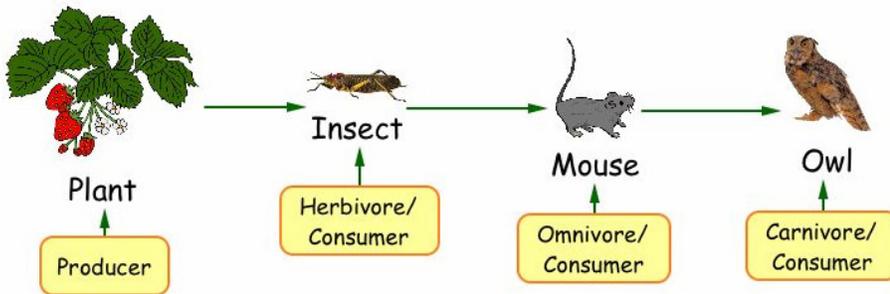
Producers	Respiration	Population	Nitrogen Fixation
Consumers	Ecosystem	Community	Denitrification
Detrivore	Biosphere	Transpiration	Limiting Nutrient
Herbivore	Biome	Precipitation	
Carnivore	Ecology	Condensation	
Photosynthesis	Species	Nutrients	

- All of the chemical substances an organism needs to sustain its life (to build tissues and carry out essential life functions): nutrients _____
- A nutrient that is scarce or cycles very slowly through an ecosystem: limiting nutrient _____
- Group of individuals that are genetically similar enough to breed with one another. species _____
- The portion of the planet (atmosphere, lithosphere, and hydrosphere) that contains all life. biosphere _____
- The study if interactions between organisms, and between them and their environment. ecology _____
- When water returns to the surface of the earth as ice, snow, or rain: precipitation _____
- Group of organisms that all belong to the same species and live in the same area. population _____
- The collection of living organisms (biotic) and nonliving physical environment (abiotic) that makes up a particular area, and their interactions with one another. ecosystem _____
- Refers to the collective group of all populations that live together in the same area. community _____
- Also known as autotrophs, these organisms obtain energy from inorganic sources like sunlight and chemicals from the environment. producers _____
- When water evaporates out of plants: transpiration _____
- The process in which atmospheric nitrogen in the air is converted into ammonia nitrogen fixation _____
- Also known as heterotrophs, these organisms obtain energy by eating other organisms. consumers _____
- The process in which soil bacteria convert nitrates into nitrogen gas. denitrification _____
- Group of ecosystems that all share a similar climate and similar dominant communities. biome _____
- These organisms obtain their energy by eating producers. herbivores _____
- These organisms obtain their energy by eating other *animals*. carnivores _____
- A type of decomposer, these organisms feed on the organic remains of dead organisms. detrivores _____
- When water does this in the atmosphere, clouds form: condensation _____
- Process in which organisms convert the energy from sun into organic energy stored in glucose photosynthesis _____
- Process in which organisms use oxygen to metabolize sugars and release energy stored in them respiration _____

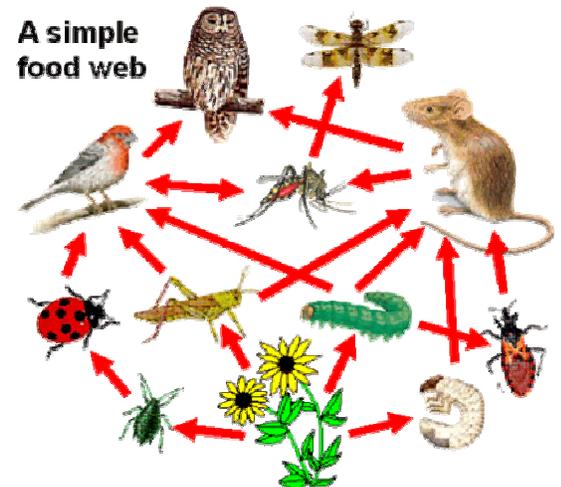
Ecology: Chapter 3

1. What is the primary energy source for all life on earth? **The sun**
2. Label each of the following as a *producer* or a *consumer*. Then next to each consumer, write whether it is an *herbivore*, *carnivore*, *omnivore*, *detrivore*, or a *decomposer*.

a. Kelp: producer _____	f. Shark: consumer: carnivore _____
b. Crabs: consumer: carnivore or detrivore _____	g. Most Fungi: consumer: decomposer _____
c. Algae: producer _____	h. Apple Trees: producer _____
d. Earth Worms: consumer: detrivore/decomposer _____	i. Mosquitoes: consumer: herbivore/carnivore (females) _____
e. Squid: consumer: carnivore _____	j. Humans: consumer: omnivore _____
3. Which type of organism makes up the first trophic level of any food chain or food web? **producers**
4. In the food chain below, which organism is the first level (primary) consumer? **The insect**
5. In the food chain below, which organism is the top level consumer (tertiary consumer in this example)? **The owl**
6. According to the food chain below, how do mice obtain their energy and nutrients? **By eating insects**



7. The arrows in the food chain above show the flow of energy and nutrients from one organism to the next. What percentage of energy is passed from each trophic level to the next? **10%**
8. So then, how much energy is used up and lost to the environment at each trophic level by living processes like respiration, movement, reproduction, and body heat? **90%**
9. So then, referencing the food chain above, how much of the original energy absorbed by the plant is actually passed on to the owl? **0.1%**
10. According to the food web, which organisms obtain energy and nutrients from the mouse? **The owl and the mosquito (females)**



11. Which organisms are primary (first level) consumers in the the food web at right? **All of the insects that feed on the plant**
12. How does the owl obtain energy and nutrients to stay alive according to the food web at right? **It eats mice and small birds**
13. Why are biogeochemical cycles critical to survival of life on the planet? **These cycles are critical for making resources available again and again so that new organisms (next generations) can occur**
14. Put the following in order of when they occur during the water cycle starting with what happens to water that is part of the ocean and lakes: condensation, evaporation, precipitation

1) evaporation	2) condensation	3) precipitation
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15. Why do organisms need carbon to survive? **Carbon is the atom that is the foundation of all life. It forms the backbone of all four organic macromolecules that make up living organisms: proteins, carbohydrates (sugars), fats/lipids, and nucleic acids (DNA and RNA)**
16. Describe seven processes that give off carbon to the atmosphere:
 1) **burning fossil fuels** 2) **respiration** 3) **erosion** 4) **fires/burning forests**
 5) **volcanic activity** 6) **decomposition** 7) **mining**
17. Describe two processes that move carbon out of the atmosphere:
 1) **photosynthesis** 2) **absorption into the ocean, deposition (storage under ground in the form of fossil fuels, carbonate rocks, and other means)**
18. Why do organisms need nitrogen to survive?
nitrogen is a primary ingredient in amino acids, which make up proteins, which are necessary for all life
19. Where is nitrogen most abundant on planet earth? **In the atmosphere (air)**
20. Why are nitrogen fixing bacteria critical to the survival of all life on the planet?
nitrogen fixing bacteria remove nitrogen from the air and turn it into ammonia in the soil where it is a necessary nutrients for plants to grow
21. What are the three sources that deposit ammonia into the soil?
 1) **decomposition** 2) **excretion** 3) **nitrogen fixation**
22. Why do organisms need phosphorus to survive?
phosphorous is a primary ingredient in nucleotides which make up nucleic acids (DNA and RNA)
23. Why do farmers apply fertilizer to the soil of their crops?
fertilizers provide nitrogen to nutrient-depleted soil

Be sure to study the Reviewing Content questions on page 83. Some of these will be on your final exam.

Ecology: Chapter 4

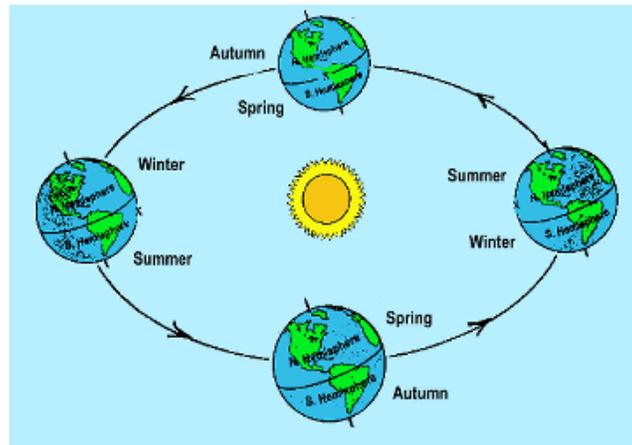
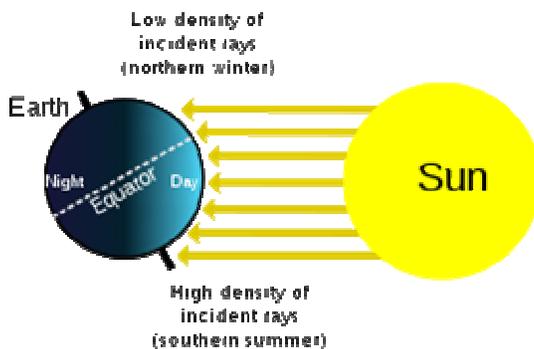
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Greenhouse Effect	Niche	Habitat	Commensalism
Competition	Biotic Factors	Mutualism	Ecological Succession
Symbiosis	Abiotic Factors	Parasitism	

- The living (organic) parts of an ecosystem **biotic factors**_____
- The non-living (inorganic) parts of an ecosystem **abiotic factors**_____
- Process whereby two organisms attempt to use the same ecological resource in the same place at the same time **competition**_____
- The process whereby certain gases in the atmosphere trap heat against the surface of the earth: **greenhouse effect**_____
- Type of symbiosis in which one organism benefits and the other is harmed: **parasitism**_____
- Type of symbiosis in which one organism benefits and the other is not helped or harmed: **commensalism**_____
- Type of symbiosis in which both organisms benefit: **mutualism**_____
- The role an organism plays in the environment, including the full range of physical and biological conditions in which an organism lives and the ways in which it uses those conditions **niche**_____
- The area where an organism lives, including both the abiotic and biotic factors that make it up **habitat**_____
- Any relationship in which two species live closely together **symbiosis**_____
- Process whereby the composition of an ecosystem gradually changes over time **ecological succession**_____

Ecology: Chapter 4

1. What are the two main factors of climate? 1) **temperature** 2) **humidity/precipitation**
2. How is weather different from climate? **Weather refers to the daily temperature and humidity while climate refers to the average temperature and humidity over many years**
3. What main factors determine a region's climate?
How much direct sunlight a region receives plays a large role in determining its temperature, and its geography (the layout of the landscape) plays a large role in determining its humidity. For example, land that is next to or near a body of water will usually be more humid. Also, regions on the seaward side of a mountain will receive more precipitation than the leeward side.
4. Name three greenhouse gases that trap heat in earth's atmosphere:
1) **carbon dioxide** 2) **methane** 3) **water vapor**
5. Why do polar zones tend to be colder than all other zones throughout the year?
they do not receive any direct sunlight, sunlight only strikes them at a very low angle
6. Why do temperate zones experience seasonal changes?
because earth is tilted on its axis so as it orbits the sun, during parts of the year the upper hemisphere is tilted towards the sun and receives direct sunlight and during parts of the northern hemisphere is tilted away from the sun and does not receive direct sunlight – the opposite is happening in the southern hemisphere during each season



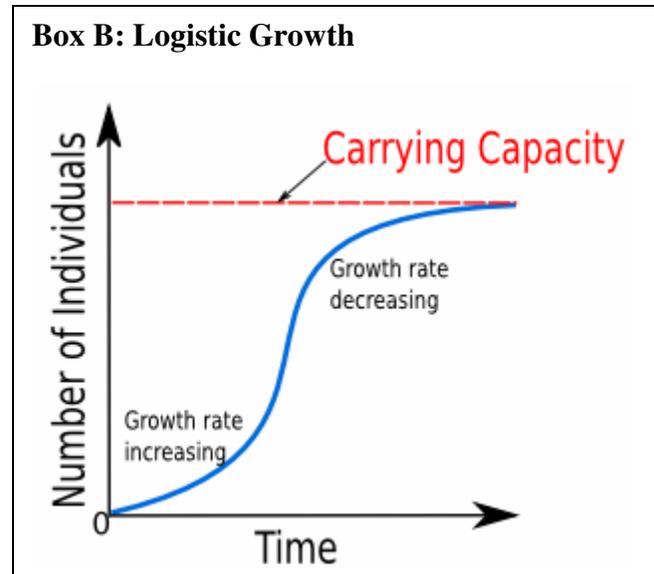
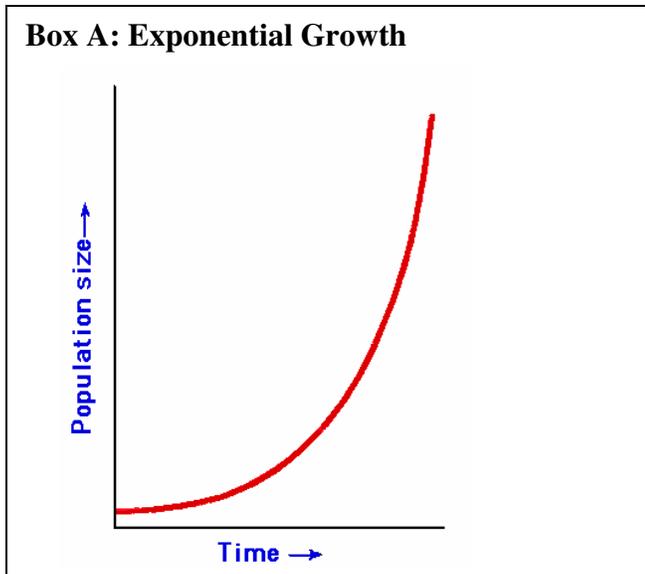
7. Why do tropical zones tend to be consistently hot throughout the year? **They receive direct sunlight all year long**
8. For each of the following, identify whether it is a biotic or an abiotic factor:

a. Wind: abiotic _____	d. Detritus: biotic _____	g. Producers: biotic _____
b. Sand: abiotic _____	e. Precipitation: abiotic _____	h. Consumers: biotic _____
c. Algae: biotic _____	f. Temperature: abiotic _____	i. Bacteria: biotic _____
9. Why is it not possible for two species to share the same niche? **The would compete for all of the same resources and one would inevitably out-compete the other driving it to extinction**
10. What are the three types of symbiosis? Define each and then for each one, describe the book's example and then make up your own example.
 - 1) **parasitism** - Definition: **one organism feeds on or uses another organism in a way that helps the "user" but harms the other organism** Book's Example: **ticks and mosquitoes feed on the blood of animals and may transmit disease**
My Example: **student response**
 - 2) **commensalism** - Definition: **one organism feeds on or uses another organism in a way that helps the "user" and doesn't hurt or help the organism being used** Book's Example: **orchids live on trees without harming them**
My Example: **student response**
 - 2) **mutualism** - Definition: **two organisms interact in a way that benefits both** Book's Example: **ants care for aphids and aphids provide a sweet liquid for the ants to drink**
My Example: **student response**

11. What is the main difference between primary succession and secondary succession?
primary success occurs in ecosystems where there is no soil, only rock to start with, while secondary succession occurs in ecosystems that have soil

Ecology: Chapter 5

1. How is the density of a population calculated? Divide the total number of individuals by the number of units of area (for example 1000 people in a two mile square area is 500/square mile)
2. How does the population density of plants in a desert compare to that of a rainforest? There is greater plant density in a rain forest than there is in a desert due to the greater amount of available water in a rainforest
3. How does immigration affect a population's size? Immigration increases population size since individuals are moving in
4. How does emigration affect a population's size? Emigration decreases population size since individuals are moving out
5. Draw a graph showing exponential growth in Box A below and logistic growth in Box B below:



6. Under what conditions does a population experience exponential growth? When there are unlimited resources (water, nutrients, mates, living space, etc)
7. What prevents populations from growing exponentially and causes them to grow logistically instead? Limiting nutrients
8. What is the carrying capacity of a population? The largest number of individuals that a given environment can support
9. Name the five limiting factors that affect populations and describe how each increases the death rate in a population:
 - 1) competition – organisms compete for limited resources and those that don't get what they need die
 - 2) predation – predators limit the population of their prey by killing them
 - 3) parasitism – parasites can harm their hosts and thus make them grow poorly or more vulnerable to death by other causes
 - 4) diseases can kill organisms
 - 5) density-independent factors – things like habitat destruction and random natural disasters can kill organisms
10. Which of those above are density-dependent limiting factors? The first four
11. Prior to the modern age, what were some of the limiting factors that kept the human population growth rate low? humans often died due to starvation and disease
12. What main factors have enabled the human population to grow so rapidly during the modern era? Technology has increasingly enabled humans to obtain the resources they need to survive, starting with the advent of farming 10,000 years ago and continuing today with ever-increasing medical technologies and genetic engineering of crops

Ecology: Chapter 6

1. What is a renewable resource? Give some examples of renewable resources. Renewable resources are those that can be replenished either by growing back (like trees) or because they are part of a cycle that brings them back (like oxygen and water) or part of the environment that is ongoing (like sunlight and wind)
2. What is a nonrenewable resource? Give some examples of nonrenewable resources. Nonrenewable resources are those that are not replenished when they are used up, like fossil fuels
3. What is sustainable development? Give an example. A way of using natural resources without depleting them, like planting a new tree when you cut an old one down
4. How does soil erosion help contribute to desertification? Soil erosion wears away the top soil in an ecosystem because the roots and other factors that help hold the soil in place are disrupted. This in turn contributes to the land's inability to provide nutrients for new plant growth. Along with drought and a warm climate, this can lead to the formation of a desert.
5. What types of activities cause deforestation? Deforestation is caused by cutting down and removing the trees
6. What is smog? How does it contribute to acid rain? Smog is a mixture of chemicals given off by auto exhaust and factories or other industrial polluters. Acid rain forms when these chemicals mix with the water vapor in the air.
7. Describe three things we can do to help protect our supply of fresh water:
 - 1) protect the natural systems (like wetlands) and water ways from pollution
 - 2) use less water for agriculture and for watering our yards like using drip irrigation
 - 3) use less water personally, for example take shorter showers
8. Describe at least three reasons why it is important to protect biodiversity:
 - 1) biodiverse plants are the source of current and future potential medicines
 - 2) the organisms on the planet create a delicate balance in each ecosystem that is easily disrupted and can entirely collapse as organisms disappear from it
 - 3) we derive many useful products from the biodiversity of the planet, including food and industrial products like wood, rubber, etc.
9. How do habitat destruction and habitat fragmentation contribute to extinctions?

Habitat destruction leads to extinction because it destroys the habitat of animals and provides them without any place to live. Habitat fragmentation occurs when human development divides ecosystems into fragmented pieces (like a road through a forest) thereby making it more difficult for members of a population to procreate (have sex and reproduce). This, in turn, reduces the amount of genetic variation in populations making them more vulnerable to extinction.
10. Describe how biological magnification led to a decline in the bald eagle population: DDT runoff from crops entered the ocean and was taken up by the producers there, algae and other marine plants. These were eaten by zooplankton. Over time, the DDT built up in their body tissues. These were then eaten by small fish. The more zooplankton they ate, the more DDT built up in their tissues creating a magnified concentration of DDT. The small fish were eaten by larger fish and over their lifetimes DDT built up in their tissues to an even greater extent. Since the DDT built up into higher concentrations via each trophic level, by the time the eagles eat the large fish, they contain a very high concentration of DDT. This caused the shells of the eagles' eggs to be very fragile and break before the babies could fully develop resulting in a drastic decline of eagles.
11. How can invasive species cause native species to go extinct?

Invasive species move into an ecosystem and compete with the organisms there for resources. If they outcompete the native species for resources, they can cause the natives to go extinct.
12. What is conservation? Why is it important?

Conservation is the wise management of natural resources. It is important because it prevents loss of biodiversity and protects renewable and nonrenewable resources.
13. Why is the ozone layer important and how did actions starting in the 1970's help to save the earth's ozone layer?

The ozone layer is critical to protecting the living organisms on the planet from harmful UV radiation from the sun. In the late 1970's and early 1980's countries worked together and laws were passed that prohibited people from using products that released harmful chemicals (CFC's) into the atmosphere that damage the ozone layer.
14. What is global warming? Describe at least three ways global warming is predicted to affect the planet in the future:

Global warming is the term used to describe periods in which the average temperature of the biosphere is increasing. It is predicted that global warming will 1) sea level rise causing flooding of many coastal areas world wide, 2) increased droughts in parts of the world, 3) extinctions of organisms as their habitats change, 4) increase of geographic range of some organisms like mosquitoes, resulting in an increase in tropic diseases world wide