

AP BIOLOGY SUMMER ASSIGNMENTS

GENERAL DIRECTIONS: Ecology and Behavior are important units in the AP Biology Curriculum. It is your responsibility to study these sections during the summer and complete the assignments. Since these are very important topics, you are to work on these assignments individually (**no group or shared work**).

The following items are included in this folder:

- Assignments for Chapter 52, 53, 54, 55 & 56. Please hand write the assignments directly on the paper.
- Chapter 52, 53, 54, 55 and 56 Review questions (objective questions). You may mark the correct choice, directly on the paper.
- This is due the first day that we meet formally as a class.
- This is the book used for summer assignments.

- Have a great summer! If you have any questions please contact Mrs. Hannahoe by e-mail at:
dhannahoe@berkscatholic.org

CHAPTER 51 REVIEW

NAME: _____

Directions: Write the answers to the questions on this paper.

Typing the answers is unacceptable.

1. Many animals breed in the spring or early summer.
 - a. What is the probable proximate cause of this behavior?

 - b. What is the probable ultimate cause of this behavior?

2. 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.

3. Why is most communication among mammals olfactory and auditory, whereas communication among birds is visual and auditory?

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 with harsh discipline, hides any time paper towels are used.

8. According to kin selections, would an individual be more likely to exhibit altruistic behavior toward a parent, sibling or a first(full) cousin?

Explain your answer in terms of the coefficient of relatedness and Hamilton's rule.

Chapter 52 Review

Name: _____

Directions: Write the answers to the questions directly on this paper. **Typing** the answers is unacceptable.

1. List the six areas of ecological study and describe the focus of research at each level.

a.

b.

c.

d.

e.

3. Mountains affect local climate. Describe their influence in the following areas:

a. solar radiation

b. temperature

c. rainfall

4. Indicate with a + or - whether the following are relatively high or low in oxygen level, nutrient content, and productivity.

BIOME	OXYGEN LEVEL	NUTRIENT CONTENT	PRODUCTIVITY
Oligotrophic lake			
Eutrophic lake			
Headwater of stream			
Turbid river			
Wetlands			
Estuary			

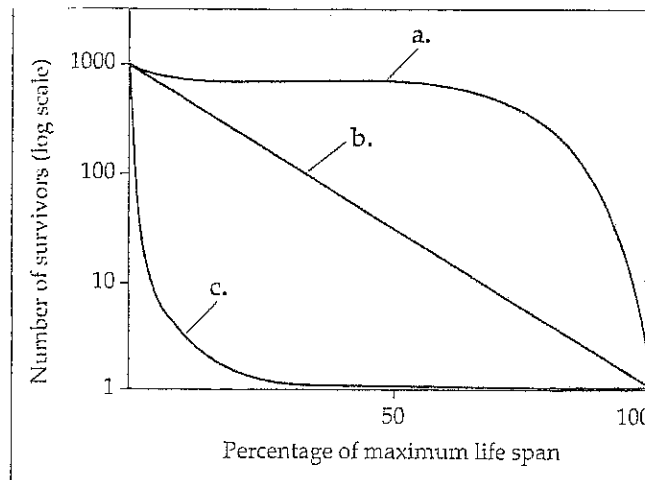
CHAPTER 53 REVIEW

NAME: _____

Directions: Write the answers to the questions directly on this paper. **Typing** the answers is unacceptable.

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 are marked. What is her estimate of the vole population in that area?

2. Identify the types of survivorship curves shown below. Give examples and describe the characteristics of species that exhibit each curve.



5. Indicate whether the following would be considered to be r-selected or K-selected life history traits.

a. early age at first reproduction; many small offspring produced

b. few, relatively large offspring produced every year

6. List some density-dependent factors that may limit population growth.

List some abiotic factors that may cause population fluctuations.

7. Give an example of bioremediation and biological augmentation.

CHAPTER 54

NAME: _____

Directions: Write the answers to the questions directly on this paper. **Typing** the answers is unacceptable.

1. Name the following two types of mimicry:
 - a. harmless species resembling a poisonous or distasteful species.

 - b. mutual imitation by two or more distasteful species.

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

	INTERACTION	EXAMPLES
+/-	a.	
+/-	b.	
+/-	c.	
+/-	d.	
+/-	e.	
+/-	f.	

3. Compute the Shannon diversity of the sea urchin communities in the two tide pools.

Pool 1 has three species with the following numbers:

A=14, B=6, C=6.

Pool 2 has four species of sea urchins with the following numbers: A=14, B=2, C=2, D=2.

6. During the succession following glacial retreat, describe the effects of the alder stage on soil fertility.

What is the effect of the spruce forest on soil pH?

7. Why would the fact that tropical communities are "older" than temperate or polar communities contribute to greater species diversity?
8. Many biogeographic studies have found that large islands have greater species richness than small islands. Label the lines on the following graph that show how immigration rate and extinction rate vary with the number of species on large and small islands. Indicate the location of the equilibrium number on the x axis for a small and a large island.

CHAPTER 55 REVIEW

NAME: _____

Directions: Write the answers to the questions directly on this paper. **Typing** the answers is unacceptable.

1. What may happen if an element's output from an ecosystem is greater than its input?

2. Compare the movement of energy and chemical nutrients in ecosystems.

3.
 - a. List some ecosystems with high primary production.

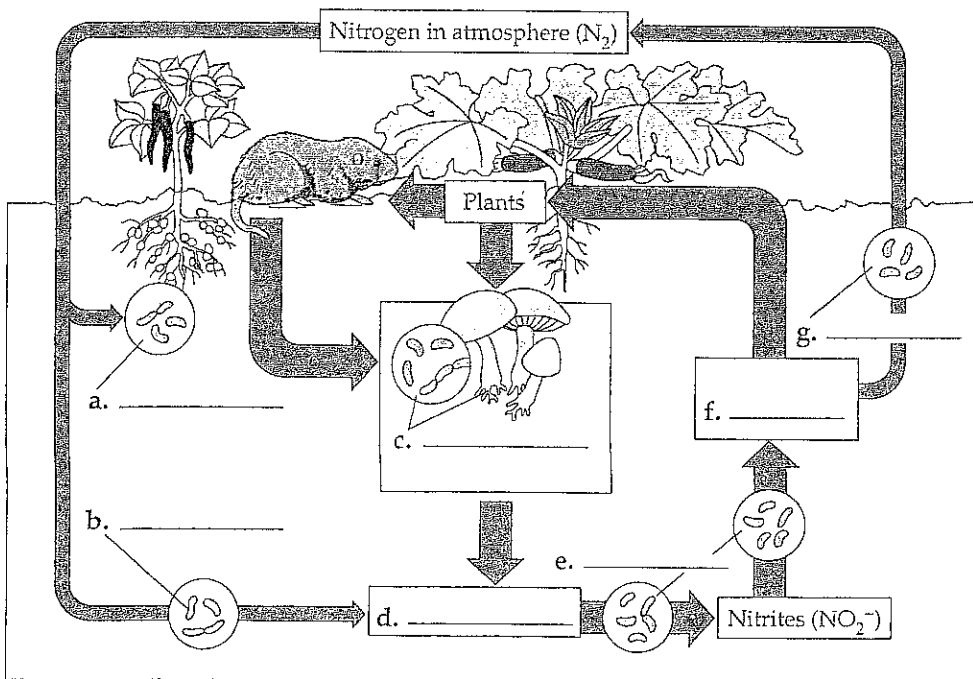
 - b. List some ecosystems with low primary production.

 - c. The oceans have low primary production yet contribute as much global net primary production as terrestrial areas. Explain.

6.
 - a. In which natural ecosystem do nutrients cycle the fastest? Why?
 - b. In which natural ecosystems do nutrients cycle slowly?
 - c. What is the effect of loss of vegetation in nutrient cycling?

7. List some of the potential consequences of global warming.

8. Label the organisms and compounds that are illustrated in this terrestrial nitrogen cycle.



CHAPTER 56 REVIEW

NAME _____

Directions: Write the answers to the questions directly on this paper. **Typing** the answers is unacceptable.

1. Give an example of how each of the following threats to biodiversity has reduced population numbers or caused extinctions.

a. habitat destruction

b. introduced species

c. overexploitation

2. Is the effective population size usually larger or smaller than the actual number of individuals in the population? Explain.

Chapter 51

Name: _____

- Behavioral ecology is the
 - study of the behavior of animals, focusing on stimulus and response.
 - application of human emotions and thoughts to other animals.
 - study of animal cognition.
 - study of animal behavior from an evolutionary perspective of fitness.
 - behavioral study of ecology.
- Proximate causes
 - explain the evolutionary significance of a behavior.
 - are immediate causes of behavior such as environmental stimuli.
 - are environmental, whereas ultimate causes are genetic.
 - are endogenous, although they may be set by exogenous cues.
 - show that nature is more important than nurture.
- What is the behavior called that maximizes an animal's energy intake-to-expenditure ratio?
 - optimal foraging
 - Hamilton's rule
 - a fixed-action pattern
 - cognition
 - learning
- Which of the following is an example of a fixed-action pattern?
 - a crane in a captive-breeding program imprinting on its human caregiver
 - a goose rolling an egg back toward its nest with its head and beak
 - a blackcap migrating to its winter territory
 - a songbird learning its song after listening to a taped song of its species
 - a digger wasp returning to its nest using landmarks
- A kinesis
 - is a randomly directed movement that is not caused by external stimuli.
 - is a movement that is directed toward or away from a stimulus.
 - is a change in activity in response to a stimulus.
 - is illustrated by trout swimming upstream.
 - may involve landmarks but not cognitive maps.
- A sensitive period
 - is the time right after birth.
 - usually follows the receiving of a sign stimulus.
 - is a limited time in which imprinting can occur.
 - is the period during which birds can learn to fly.
 - is the time during which mate selection occurs.
- In operant conditioning,
 - an animal improves its performance of a fixed-action pattern.
 - an animal learns as a result of trial and error.
 - sensitivity to unimportant or repetitive stimuli decreases.
 - a bird can learn the song of a related species if it hears only that song.
 - an irrelevant stimulus can elicit a response because of its association with a normal stimulus.
- Which type of intraspecies communication signal would be best suited to a nocturnal species such as an owl?
 - auditory
 - visual
 - chemical
 - tactile
 - electrical
- A female bird would most likely increase her fitness by
 - mating with as many males as possible.
 - being polygynous.
 - reproducing only once in her lifetime.
 - choosing a mate based on evidence that he has "good genes."
 - always foraging in a large flock.
- Which of the following examples of behavior provide evidence of animal cognition?
 - chimpanzee stacking up boxes to reach a banana
 - ravens pulling up string to obtain attached food item
 - trained honeybees that can match colors or patterns, indicating their concept of "same" and "different"
 - chimpanzee learning to crack palm nuts with stones by watching others
 - All of the above show evidence of information processing and animal cognition.
- In a species in which females provide all the needed food and protection for the young,
 - males are likely to be promiscuous.
 - mating systems are likely to be monogamous.
 - mating systems are likely to be polyandrous.
 - females will bond in social groups.
 - females will have a higher fitness than males.

12. A crow that aids its parents in raising siblings is increasing its
- reproductive success.
 - altruistic behavior.
 - inclusive fitness.
 - coefficient of relatedness.
 - certainty of paternity.
13. Sociobiology
- explores the evolutionary basis of behavioral characteristics within animal societies.
 - applies evolutionary explanations to human social behaviors.
 - studies the roles of culture and genetics in human social behavior.
 - considers communication, mating systems, and altruism from the viewpoint of fitness.
 - does all of the above.
14. According to the concept of kin selection,
- an animal would be more likely to aid a stranger if the "kindness" could be reciprocated.
 - an animal would aid its parent before it would help its sibling.
 - animals are more likely to choose close relatives as mates.
 - examples of altruism usually involve close relatives and increase an animal's inclusive fitness.
 - evolution is the ultimate cause of animal behavior.
15. According to Hamilton's rule, natural selection would favor altruistic acts when
- the probability that the altruist will lose its life is less than 0.5 and the coefficient of relatedness is greater than 0.25 ($rC = B$).
 - the cost to the altruist times the coefficient of relatedness is less than the benefit to the receiver ($rC < B$).
 - the benefit to the receiver times the coefficient of relatedness is greater than the cost to the altruist ($rB > C$).
 - the cost to the receiver times the coefficient of relatedness is greater than the cost to the altruist ($rC > B$).
 - the benefit to the altruist times the coefficient of relatedness is less than the cost to the receiver ($rB < C$).
-
16. The cross-fostering of California mice in white-footed mice nests provides evidence for
- the genetic control of aggression and parenting behavior.
 - the relationship between the distribution of vasopressin receptors and parenting behavior.
 - an imprinting period during which behaviors related to aggression and parenting are set.
 - the influence of the early social environment on the expression of aggressive and parental behaviors.
 - the cognitive ability of mice to change their behavior in different environments.
17. Which of the following provides a way of analyzing situations in which the fitness of one behavioral phenotype is influenced by other phenotypes in the populations?
- zero sum game
 - inclusive fitness
 - social learning
 - reciprocal altruism
 - game theory
18. Which of the following is *not* an example of social learning?
- garter snakes from coastal areas eating slugs
 - mate choice copying in guppies
 - alarm calls of vervet monkeys
 - human culture
 - chimpanzees using stones to crack nuts
-

Chapter 52

Name: _____

MULTIPLE CHOICE: Choose the one best answer.

- Which level of ecology considers the effects of predation, parasitism, and competition on species distribution?
 - landscape
 - community
 - ecosystem
 - organismal
 - population
- Ecologists often use mathematical models and computer simulations because
 - ecological experiments are always too broad in scope to be performed.
 - most of them are mathematicians.
 - ecology is becoming a more descriptive science.
 - these approaches allow them to study the interactions of multiple variables and simulate large-scale experiments.
 - variables can be manipulated with computers but cannot be manipulated in field experiments.
- In which of the following biomes would you expect to find organisms with adaptations for tolerating changes in salinity?
 - oligotrophic lake
 - wetland
 - deep-sea hydrothermal vent
 - estuary
 - intertidal zone
- Which of the following would affect the distribution of a species?
 - dispersal ability
 - interactions with mutualistic symbionts
 - climate and physical factors of the environment
 - behavior, such as habitat selection
 - All of the above influence where species are found.
- Why do the tropics and the windward side of mountains receive more rainfall than areas around 30° latitude or the leeward side of mountains?
 - Rising air expands, cools, and drops its moisture.
 - Descending air condenses and drops its moisture.
 - The tropics and the windward side of mountains are closer to the ocean.
 - There is more solar radiation in the tropics and on the windward side of mountains.
 - The rotation of Earth determines global wind patterns.
- Which of the following is a concern about the effects of global warming on tree species?
 - The increased ozone may damage leaf cells, reducing photosynthetic rates.
 - Trees may not be able to disperse fast enough to reach new habitats that meet their climatic requirements.
 - Warmer temperatures may speed tree growth, producing trees that are too tall and spindly.
 - The additional CO₂ in the atmosphere may actually increase photosynthetic rates and prove beneficial to tree growth.
 - All of the above are correct.
- In which of the following biomes is light most likely to be a limiting factor?
 - desert
 - estuary
 - coral reef
 - grassland
 - ocean pelagic zone
- Which of the following is *incorrectly* paired with its description?
 - neritic zone—shallow region of ocean over continental shelf
 - abyssal zone—very deep benthic region of ocean
 - limnetic zone—shallow waters close to shore in a lake
 - intertidal zone—shallow area where land meets water
 - pelagic zone—area of open water

9. Phytoplankton are the basis of the food chain in
 - a. the headwater of streams.
 - b. wetlands.
 - c. the oceanic photic zone.
 - d. rocky intertidal zones.
 - e. deep-sea hydrothermal vents.
10. The ample rainfall of the tropics and the arid areas around 30° north and south latitudes are caused by
 - a. ocean currents that flow clockwise in the northern hemisphere and counterclockwise in the southern hemisphere.
 - b. the global circulation of air initiated by intense solar radiation near the equator producing wet and warm air.
 - c. the tilting of Earth on its axis and the resulting seasonal changes in climate.
 - d. the heavier rain on the windward side of mountain ranges and the drier climate on the leeward side.
 - e. the location of tropical rain forests and deserts.
11. The permafrost of the arctic tundra
 - a. prevents plants from getting established and growing.
 - b. protects small animals during the long winters.
 - c. anchors plant roots in the frozen soil, helping them withstand the area's high winds.
 - d. prevents plant roots from penetrating deep in the soil.
 - e. Both b and c are correct.
12. Many plant species have adaptations for dealing with the periodic fires typical of a
 - a. savanna.
 - b. chaparral.
 - c. temperate grassland.
 - d. temperate broadleaf forest.
 - e. a, b, and c.
13. Two communities have the same annual mean temperature and rainfall but very different biota and characteristics. The best explanation for this phenomenon is that the two
 - a. are found at different altitudes.
 - b. are composed of species that have very low dispersal rates.
 - c. are found on different continents.
 - d. receive different amounts of sunlight.
 - e. have different seasonal temperatures and patterns of rainfall throughout the year.

14. Upwellings in oceans
 - a. support reef communities.
 - b. occur over deep-sea hydrothermal vents.
 - c. are responsible for ocean currents.
 - d. bring nutrient-rich water to the surface.
 - e. are most common in tropical waters, where they bring oxygen-rich water to the surface.

MATCHING: Match the biotic description with its biome.

Biome	Biotic Description
_____ 1. chaparral	A. broad-leaved deciduous trees
_____ 2. desert	B. lush growth, vertical layers
_____ 3. savanna	C. evergreen shrubs, fire-adapted vegetation
_____ 4. coniferous forest	D. scattered thorny trees, grasses, and forbs
_____ 5. temperate broadleaf forest	E. tall stands of cone-bearing trees
_____ 6. temperate grassland	F. low shrubby or grassland matlike vegetation
_____ 7. tropical rain forest	G. grasses adapted to fire and drought
_____ 8. tundra	H. widely scattered shrubs, cacti, succulents

Chapter 53

name:

MULTIPLE CHOICE: Choose the one best answer.

- In an area with a heterogeneous distribution of suitable habitats, the dispersion pattern of a population probably would be
 - clumped.
 - uniform.
 - random.
 - unpredictable.
 - dense.
- Which of the following is *not* true of life tables?
 - They were first used by life insurance companies to estimate survival patterns.
 - They show the age-specific death rate for a population.
 - They are used to predict logistic growth.
 - They can be used to construct survivorship curves.
 - They are often constructed by following a cohort from birth to death.
- In a population in which offspring survival is quite low and the environment is inconsistent, one might expect
 - the production of a small number of large offspring.
 - the production of a large number of large offspring.
 - iteroparity or repeated reproduction with a small number of offspring.
 - semelparity or big-bang reproduction.
 - more K -selected traits.
- A Type I survivorship curve is level at first, with a rapid increase in mortality in old age. This type of curve is
 - typical of many invertebrates that produce large numbers of offspring.
 - typical of humans and other large mammals.
 - found most often in r -selected populations.
 - almost never found in nature.
 - typical of most species of birds.
- The middle of the S-shaped growth curve in the logistic growth model
 - shows that at middle densities, individuals of a population do not affect each other.
 - is best described by the term rN .
 - is the point where population growth begins to slow due to the Allee effect.
 - is the period when competition for resources is highest.
 - is the period when the population growth rate is the highest.
- In which of the following would immigration and emigration likely play a role in population dynamics?
 - metapopulations
 - exponential growth
 - demographic transition
 - big-bang reproduction
 - territoriality
- The term $(K - N)/K$
 - is the carrying capacity for a population.
 - is greatest when K is very large.
 - is zero when population size equals carrying capacity.
 - increases in value as N approaches K .
 - accounts for the overshoot of carrying capacity.
- Which of the following would *not* be a density-dependent factor limiting a population's growth?
 - increased specialization by a predator
 - a limited number of available nesting sites
 - a stress syndrome that alters hormone levels
 - a very early fall frost
 - intraspecific competition

Chapter 54

Name:

MULTIPLE CHOICE: Choose the one best answer.

- Two allopatric species of Galápagos finches have beaks of similar size. There is a significant difference in beak size when the two species occur on the same island. What is this an example of?
 - competitive exclusion
 - species diversity
 - commensalism
 - character displacement
 - trophic cascade
- Two species, A and B, occupy adjoining environmental patches that differ in several abiotic factors. When species A is experimentally removed from a portion of its patch, species B colonizes the vacated area and thrives. When species B is experimentally removed from a portion of its patch, species A does not successfully colonize the area. What might you conclude from these results?
 - Both species A and species B are limited to their range by abiotic factors.
 - Species A is limited to its range by competition, and species B is limited by abiotic factors.
 - Both species are limited to their range by competition.
 - Species A is limited to its range by abiotic factors, and species B is limited to its range because it cannot compete with species A.
 - Species A is a predator of species B.
- The species richness of a community refers to
 - the relative numbers of individuals in each species.
 - the number of different species found in a community.
 - the feeding relationships or trophic structure within the community.
 - the species diversity of that community.
 - its stability or ability to persist through disturbances.
- Aposematic coloring is most commonly found in
 - prey whose body morphology is cryptic.
 - predators who are able to sequester toxic plant compounds in their bodies.
 - prey species that have chemical defenses.
 - good-tasting prey that evolve to look like each other.
 - plants that have toxic secondary compounds.
- Through resource partitioning,
 - two species can compete for the same prey item.
 - slight variations in niche allow closely related species to coexist in the same habitat.
 - two species can share identical niches in a habitat.
 - competitive exclusion results in the success of the superior species.
 - two species with identical niches do not share the same habitat and thus avoid competition.
- Which of the following organisms is mismatched with its *accompanying* trophic level?
 - algae—producer
 - phytoplankton—primary consumer
 - fungi—decomposer
 - carnivorous fish larvae—secondary consumer
 - eagle—tertiary or quaternary consumer
- Ecologists survey the tree species in two forest plots of different ages. Plot 1 has six different species and 95% of all trees belong to just one species. Plot 2 has five different species, each of which is represented by approximately 20% of the trees. How would you describe plot 2 as compared with plot 1?
 - higher species richness
 - greater species diversity
 - lower relative abundance
 - lower species richness
 - Both b and d are correct.
- A palatable (good-tasting) prey species may defend against predation by
 - Müllerian mimicry.
 - Batesian mimicry.
 - secondary compounds.
 - aposematic coloration.
 - either a or b.
- When one species was removed from a tidepool, the species richness became significantly reduced. The removed species was probably
 - a strong competitor.
 - a potent parasite.
 - a resource partitioner.
 - a keystone species.
 - the species with the highest relative abundance.

10. Invasive species often reach a large biomass because
 - a. they are better competitors than native species.
 - b. they are usually producers and not top predators.
 - c. they often lack natural predators or pathogens.
 - d. their superior ability to disperse enables them to spread to new niches.
 - e. they are often protected by the humans who have introduced them.
11. Why do most food chains consist of only three to five links?
 - a. There are only five trophic levels: producers; primary, secondary, and tertiary consumers; and decomposers.
 - b. Most communities are controlled bottom-up by mineral nutrient supply.
 - c. The dominant species in most communities consumes the majority of prey; thus, not enough food is left to support higher predators.
 - d. According to the energetic hypothesis, the inefficiency of energy transfer from one trophic level to the next limits the number of links that can exist.
 - e. According to the trophic cascade model, increasing the biomass of top trophic levels causes a decrease in the biomass of lower levels, so that the top levels can no longer be supported.
12. During succession, inhibition by early species
 - a. may prevent the achievement of a stable community.
 - b. may slow down both the rate of colonization and the rate of extinction, depending on the size of the area and distance from the source of dispersing species.
 - c. results from the frequent disturbances that often eliminate early colonizers.
 - d. may slow down the successful colonization by other species.
 - e. may involve changes in soil pH or accelerated accumulation of humus.
13. According to the nonequilibrium model.
 - a. chance events such as disturbances play major roles in the structure and composition of communities.
 - b. species composition in a community is always in flux as a result of human interventions.
 - c. food chains are limited to a few links because long chains are more unstable in the face of environmental disturbances.
 - d. the communities with the most diversity have the least stability or resistance to change.
 - e. early colonizers inhibit other species, whereas later colonizers facilitate the arrival of new species.
14. An island that is small and far from the mainland, in contrast to a large island close to the mainland, would be expected to
 - a. have lower species diversity.
 - b. be in an earlier successional stage.
 - c. have higher species diversity but a much lower abundance of organisms.
 - e. have a higher rate of colonization but a higher rate of extinction.
 - d. have a lower rate of colonization and a lower rate of extinction.
15. According to the top-down (trophic cascade) model of community control, which trophic level would you *decrease* if you wanted to *increase* the vegetation level in a community?
 - a. nutrients
 - b. vegetation
 - c. secondary consumers (carnivores)
 - d. tertiary consumers
 - e. omnivores
16. A major explanation for the decline in species richness along an equatorial-polar gradient is the correlation of high levels of solar radiation and water availability with biodiversity. Which of the following is also suggested as a factor in the high species richness of tropical communities?
 - a. the inverse relationship between biodiversity and evapotranspiration
 - b. the greater age of these communities (longer growing season and fewer climatic setbacks), providing more time for speciation events
 - c. the larger area of the tropics and corresponding richness predicted by the species-area curve
 - d. the lack of disturbances in tropical areas
 - e. the greater immigration rate and lower extinction rate found on large tropical islands
17. Which of the following organisms is mismatched with its community role?
 - a. beaver—community “engineer”
 - b. black rush *Juncus* in salt marsh—facilitator
 - c. sea otter in North Pacific—keystone predator
 - d. trees in spruce-hemlock forest—dominant species
 - e. alder and *Dryas* (a mat-forming shrub)—inhibitor
18. Which of the following best describes a zoonotic pathogen?
 - a. a pathogen that affects insects
 - b. a pathogen that requires a vector to spread from animal to animal
 - c. a disease-causing agent that is transmitted to humans from other animals
 - d. a pathogen that is found in zoos due to the unnatural habitat provided for animals
 - e. an ectoparasite that is transferred from animals to humans

Chapter 55

Name: _____

MULTIPLE CHOICE: Choose the one best answer.

1. Which of the following is absolutely essential to the functioning of an ecosystem?
 - a. producers and primary consumers
 - b. producers and secondary consumers
 - c. primary, secondary, and tertiary consumers
 - d. primary consumers and detritivores
 - e. producers and detritivores
2. Primary production
 - a. is equal to the standing crop of an ecosystem.
 - b. is limited by light, nutrients, and moisture in all ecosystems.
 - c. is the amount of light energy converted to chemical energy per unit time in an ecosystem.
 - d. is inverted in some aquatic ecosystems.
 - e. is all of the above.
3. Which of the following is an accurate statement about ecosystems?
 - a. Energy is recycled through the trophic structure.
 - b. Energy is usually converted from sunlight by primary producers, passed to secondary producers in the form of organic compounds, and lost to detritivores in the form of heat.
 - c. Chemicals are recycled between the biotic and abiotic sectors, whereas energy makes a one-way trip through the food web and is eventually dissipated as heat.
 - d. There is a continuous process by which energy is lost as heat, and chemical elements leave the ecosystem through runoff.
 - e. A food web shows that all trophic levels may feed off each other.
4. In the experiment in which iron was added to areas of the Pacific Ocean, the growth of eukaryotic phytoplankton was stimulated because
 - a. iron was the limiting nutrient for eukaryotic phytoplankton growth.
 - b. the iron interacted with bottom sediments, releasing nitrogen and phosphorus into the water.
 - c. iron interacted with phosphorus, making that nutrient available to the phytoplankton.
 - d. the iron reached the critical load necessary to promote photosynthesis.
 - e. iron stimulated the growth of nitrogen-fixing cyanobacteria, which then made nitrogen available for phytoplankton growth.
5. The open ocean and tropical rain forest are the two largest contributors to Earth's net primary production because
 - a. both have high rates of net primary production.
 - b. both cover huge surface areas of Earth.
 - c. nutrients cycle rapidly in these two ecosystems.
 - d. the ocean covers a huge surface area and the tropical rain forest has a high rate of production.
 - e. both a and b are correct.
6. Production in terrestrial ecosystems is affected by
 - a. temperature.
 - b. light intensity.
 - c. availability of nutrients.
 - d. availability of water.
 - e. all of the above.
7. Secondary production
 - a. is measured by the standing crop.
 - b. is the rate of biomass production in consumers.
 - c. is greater than primary production.
 - d. is 10% less than primary production.
 - e. is the gross primary production minus the energy used for respiration.
8. Which of the following is *not* true of a pyramid of net production?
 - a. Only about 10% of the energy in one trophic level passes into the next level.
 - b. Because of the loss of energy at each trophic level, most food chains are limited to three to five links.
 - c. The pyramid of production of some aquatic ecosystems is inverted because of the large zooplankton primary consumer level.
 - d. Eating grain-fed beef is an inefficient means of obtaining the energy trapped by photosynthesis.
 - e. A biomass pyramid is usually the same shape as a pyramid of production.
9. In which of the following would you expect production efficiency to be the greatest?
 - a. amphibians
 - b. mammals
 - c. fishes
 - d. insects and microorganisms
 - e. birds

10. Biogeochemical cycles are global for elements
- that are found in the atmosphere.
 - that are found mainly in the soil.
 - such as carbon, nitrogen, and phosphorus.
 - that are dissolved in water.
 - Both a and c are correct.
11. Which of these processes is *incorrectly* paired with its description?
- nitrification—oxidation of ammonium in the soil to nitrite and nitrate
 - nitrogen fixation—reduction of atmospheric nitrogen into ammonia
 - denitrification—return of N_2 to air, occurs when denitrifying bacteria metabolize nitrate
 - ammonification—decomposition of organic compounds into ammonium
 - industrial fixation—nitrogen added to soil in rain or dust particles
12. Clear-cutting tropical forests yields agricultural land with limited productivity because
- it is too hot in the tropics for most food crops.
 - the tropical forest regrows rapidly and chokes out agricultural crops.
 - few of the ecosystem's nutrients are stored in the soil; most are in the forest trees.
 - phosphorus, not nitrogen, is the limiting nutrient in those soils.
 - decomposition rates are high but primary production is low in the tropics.
13. Which of the following was *not* shown by the Hubbard Brook Experimental Forest study?
- Most minerals recycle within a forest ecosystem.
 - Deforestation results in a large increase in water runoff.
 - Mineral losses from a valley were great following deforestation.
 - Nitrate was the mineral that showed the greatest loss.
 - Acid rain increased as a result of deforestation.
14. According to the green world hypothesis, herbivores eat only a small portion of an ecosystem's vegetation because
- primary production is limited by light, nutrients, or moisture, not by primary consumption.
 - plants have a very short turnover time.
 - trophic efficiency is generally only 10%.
 - predators, parasites, competition, and other factors keep herbivore populations in check.
 - the production efficiency of herbivores is very low.
15. The finding of harmful levels of DDT in grebes (fish-eating birds) following years of trying to eliminate bothersome gnat populations in a lakeshore town is an example of
- eutrophication.
 - biological magnification.
 - the biomass pyramid.
 - chemical cycling.
 - increasing resistance to pesticides.
16. Which of the following is a direct effect of the thinning of the ozone layer?
- a reduction in species diversity
 - global warming
 - acid precipitation
 - an increase in harmful UV radiation reaching Earth
 - dead zones in the Antarctic Ocean

Chapter 50

Name: _____

MULTIPLE CHOICE: Choose the one best answer.

1. According to the Endangered Species Act, what is the definition of a threatened species?
 - a. an exotic species that cannot successfully compete with native organisms
 - b. an endemic species that is found nowhere else in the world
 - c. a species that is found in disturbed habitats
 - d. a species that is in danger of extinction in all or a large part of its range
 - e. a species that is likely to become endangered
2. Ecosystem services include all of the following except
 - a. pollination of crops.
 - b. production of antibiotics and drugs.
 - c. purification of air and water.
 - d. decomposition of wastes.
 - e. reduced impact of weather extremes.
3. Which of the following is the most serious threat to biodiversity?
 - a. competition from introduced species
 - b. commercial harvesting
 - c. habitat destruction
 - d. overexploitation
 - e. disruptions of community dynamics
4. Some grassland and conifer forest preserves have effective fire prevention programs. What is the most likely result of such programs?
 - a. an increase in species diversity because fires are prevented
 - b. a change in community composition because fires are natural disturbances that maintain the community structure
 - c. the preservation of endangered species in the area
 - d. no change in the species composition of the preserved community
 - e. succession to a deciduous forest
5. According to the small population approach, what is the most important remedy for preserving an endangered species?
 - a. establish a large nature reserve around its habitat
 - b. control the populations of its natural predators
 - c. determine the reason for its decline
 - d. encourage dispersal and increase in genetic variability
 - e. set up artificial breeding programs
6. Which of the following is typical of biodiversity hot spots?
 - a. a large number of endemic species
 - b. a high rate of habitat degradation
 - c. little species diversity
 - d. a large land or aquatic area
 - e. large populations of migratory birds
7. Which of the following may occur when a population drops below its minimum viable population size?
 - a. genetic drift
 - b. a further reduction in population size
 - c. inbreeding
 - d. a loss of genetic variability
 - e. All of the above are characteristics of an extinction vortex that the population may enter.
8. What are movement corridors?
 - a. strips or clumps of habitat that connect isolated habitats
 - b. the routes taken by migratory animals
 - c. connections within a landscape that includes several different ecosystems
 - d. the areas forming the boundary or edge between two ecosystems
 - e. buffer zones for human traffic, which promote the long-term viability of protected areas
9. What does it mean if a population's effective population size (N_e) is the same as its actual population size?
 - a. The population is not in danger of becoming extinct.
 - b. The population has high genetic variability.
 - c. All the members of the population breed.
 - d. The population's minimum viable population will not sustain the population.
 - e. The population is being drawn into an extinction vortex.

10. The focus of the declining-population approach to conservation is to
 - a. predict a species' minimum viable population size.
 - b. transplant members from other populations to increase genetic variation.
 - c. perform a population viability analysis to predict the long-term viability of a population in a particular habitat.
 - d. determine the cause of a species' decline and take remedial action.
 - e. establish zoned reserves that ensure that human landscapes surrounding reserves support the protected habitats.
11. With limited resources, conservation biologists need to prioritize their efforts. Of the following choices, which should receive the greatest conservation attention in order to preserve biodiversity?
 - a. the northern spotted owl
 - b. declining keystone species in a community
 - c. a commercially important species
 - d. endangered and threatened vertebrate species
 - e. all declining species
12. Restoration ecology
 - a. uses the zoned reserve system to restore nature reserves.
 - b. identifies biodiversity hot spots for protection.
 - c. may use bioremediation and biological augmentation to return degraded areas to their natural state.
 - d. uses the research agenda of the Sustainable Biosphere Initiative to study biodiversity and preserve Earth's ecosystems.
 - e. uses adaptive management to restore and maintain the productivity of agricultural ecosystems.