Chapter 50 Sample Questions & Answers:

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) Important abiotic factors in ecosystems include which of the following?
I. temperature
II. water
III. wind
A) I only B) II only C) III only D) I and II only E) I, II, and III

2) All of the following statements about ecology are correct except:
A) Ecology is the study of the interactions between biotic and abiotic aspects of the environment.
B) Ecology is a discipline that is independent from natural selection and evolutionary history.
C) Ecologists may study populations and communities of organisms.
D) Ecology spans increasingly comprehensive levels of organization, from individuals to ecosystems.
E) Ecological studies may involve the use of models and computers.

3) Which of the following levels of organization is arranged in the correct sequence from most to least inclusive?
A) ecosystem, community, population, individual
B) community, ecosystem, individual, population
C) individual, population, community, ecosystem
D) population, ecosystem, individual, community
E) individual, community, population, ecosystem

4) Which of the following are important biotic factors that can affect the structure and organization of biological communities?
A) nutrient availability, soil pH, light intensity
B) precipitation, wind, temperature
C) predation, competition, disease
D) A and B only
E) A, B, and C

5) Landscape ecology is best described as the study of
A) the array of interacting species within a community.
B) abiotic factors and the community of species that exist in a particular area.
C) the factors affecting the abundance of single species.
D) physiological and behavioral ways in which organisms meet the challenges of their environment.
E) related arrays of ecosystems.

6) Ecology as a discipline directly deals with all of the following levels of biological organization except

7) "How does the foraging of animals on tree seeds affect the distribution and abundance of the trees?" This question
A) is difficult to answer because a long-term experiment would be required.
B) is a valid ecological question.
C) is difficult to answer because a large experimental area would be required.
D) Both A and B are correct.
E) A, B, and C are correct.
8) You are working for the Environmental Protection Agency considering the effect of a potentially toxic chemical in drinking water. There is as yet no documented scientific evidence against the chemical, but many suspect it to be a health hazard. Using the Precautionary Principle, what would be a reasonable environmental policy?
A) Establish a contingency fund to handle insurance claims in the event that the chemical turns out to produce negative health effects.
B) Caution individuals to use their own judgment in deciding whether to drink water from a potentially contaminated area.
C) Set the acceptable levels conservatively low, and keep them there unless future studies show that they can be safely raised.
D) Set the acceptable levels at the highest levels encountered, and keep them there unless future studies demonstrate negative health effects.
E) Establish no regulations until there are conclusive scientific studies.

9) All of the following would have a direct effect on the amount of precipitation in an area except
A) mountain ranges.
B) air circulation cells.
C) continental drift.
D) ocean currents.
E) evaporation from vegetation.

10) The biogeographic realms described by Darwin, Wallace, and others are associated with patterns of
A) light intensity.
B) precipitation and temperature.
C) continental drift.
D) climate.
E) rocks and soil.

11) Species transplants are one way of
A) determining the distribution of a species in a specified area.
B) consolidating a landscape into a single ecosystem.
C) developing mathematical models for distribution and abundance.
D) determining if dispersal is a key factor in limiting distribution.
E) determining the abundance of a species in a specified area.

12) Zebra mussel populations are growing explosively in the river systems of the central United States. The best explanation for this unchecked population growth is that
A) they muddy the water around them, making it difficult for their natural enemies to see them.
B) predators are too few to slow down population growth of the mussels.
C) a mutation caused by pollution has increased their reproductive rate.
D) they are better adapted to the environment than competing species.
E) they are feeding on a source of food that had previously been underutilized.

13) Introduced species
A) can disrupt the balance of the natural species with which they become associated.
B) often fail to colonize the new area.
C) may become common enough to become pests.
D) Both B and C are correct.
E) A, B, and C are all correct.

14) Which ecological unit or relationship is least related to abiotic factors?
A) community B) symbiosis C) population D) species E) ecosystem
15) Which of the following are correct statements about light in aquatic environments?
I. Water selectively reflects and absorbs certain wavelengths of light.
II. Photosynthetic organisms that live in deep water probably utilize red light.
III. Light intensity is an important abiotic factor in limiting the distribution of photosynthetic organisms.
A) I only  B) II only  C) I and III only  D) II and III only  E) I, II, and III


Chapter 51 Sample Questions & Answers:

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) When, during a field trip, the instructor touched the body of a moth that was sitting on a tree trunk, the moth raised its forewings to reveal large eye-spots on its hind wings. The instructor asked the class why the moth lifted its wings. One student said that certain sensory receptors had fired and triggered a neuronal reflex culminating in the contraction of certain muscles. A second student responded that the behavior might frighten would-be predators. What can you say about the explanations of these two students?
A) The first response is correct, while the second is incorrect.
B) Both explanations are reasonable and simply represent a difference of opinion.
C) The first response answers a proximate question, while the second answers an ultimate question.
D) The first response is biological, while the second is philosophical.
E) The first explanation is testable as a scientific hypothesis, while the second is not. Use the following information to answer the questions below. When a female cat comes into heat, she urinates more frequently and in a large number of places. Male cats from the neighborhood congregate near urine deposits and fight with each other.

2) Which of the following is a proximate cause of this behavior of increased urination?
A) It is a result of hormonal changes associated with her reproductive cycle.
B) In the past, when she did it, more males were attracted.
C) The female cat saw other cats doing it, and it worked for them.
D) Female cats that did this in the past attracted more males.
E) It announces to the males that she is in heat.

3) Which of the following would be an ultimate cause of the male cats' response to the female's urinating behavior?
A) Male cats' hormones are triggered by the odor released by the female.
B) By smelling the odor, various neurons in the males' brains are stimulated.
C) The males have learned to recognize the specific odor of the urine of a female in heat.
D) The odor serves as a releaser for the instinctive behavior of the males.
E) Male cats respond to the odor because it is a means of locating females in heat.

4) Which of the following is a behavioral pattern that results from a proximate cause?
A) A male sheep fights with another male because it helps it to improve its social position and find a mate.
B) A goose squats and freezes motionless because that helps it to escape a predator.
C) A female bird lays its eggs because the amount of daylight is decreasing slightly each day.
D) A cat kills a mouse to obtain food.
E) A cockroach runs into a crack in the wall and avoids being stepped on.

5) Which of the following is a behavioral pattern resulting from an ultimate cause?
A) A male robin attacks a red tennis ball because a part of its brain is stimulated by objects that are red.
B) A male robin attacks a red tennis ball because several times in the past, red tennis balls have been thrown at it, and it has learned that they are dangerous.
C) A male robin attacks a red tennis ball because it is spring and hormonal changes increase its aggression.
D) A male robin attacks a red tennis ball because it confuses it with an encroaching male, and if it does not attack rival males it will lose its territory.
E) A male robin attacks a red tennis ball because it is much like the breast of another male.

6) After eating a monarch butterfly and regurgitating, a bird will subsequently avoid orange and black butterflies. This is not an example of
A) trial-and-error learning.
B) associative learning.
C) innate behavior.
D) adaptive behavior.
E) operant conditioning.

7) In the territorial behavior of the stickleback fish, the red belly of one male elicits attack from another male by functioning as
A) a search image.
B) a fixed action pattern.
C) a sign stimulus.
D) a pheromone.
E) an imprint stimulus.

8) A cage with male mosquitoes in it has a small earphone placed on top, through which the sound of a female mosquito is played. All the males immediately fly to the earphone and thrust their abdomens through the fabric of the cage. Which of the following best describes this?
A) Copulation is a fixed action pattern, and the female flight sound is a sign stimulus that initiates it.
B) Through classical conditioning, the male mosquitoes have associated the inappropriate stimulus from the earphone with the normal response of copulation.
C) The reproductive drive is so strong that when males are deprived of females, they will attempt to mate with anything that has even the slightest female characteristic.
D) The males learn to associate the sound with a female and are thus attracted to it.
E) The sound from the earphone irritated the male mosquitoes, causing them to attempt to sting it.

9) Mayflies laying eggs on roads instead of in water involves which of the following?
A) insecticide poisoning
B) a defective behavioral gene
C) trial-and-error learning
D) natural behavioral variation in the mayfly population
E) misdirected response to a sign stimulus

10) Which of the following statements is (are) true of fixed action patterns?
A) They are triggered by sign stimuli in the environment and, once begun, are continued to completion.
B) They are highly stereotyped, instinctive behaviors.
C) An inappropriate stimulus can sometimes trigger them.
D) Only A and B are correct.
E) A, B, and C are correct.
11) The proximate causes of behavior are interactions with the environment, but behavior is ultimately shaped by
A) evolution.
B) the nervous system.
C) sexuality.
D) pheromones.
E) hormones.

12) Which of the following is least related to the others?
A) pheromones
B) sign stimulus
C) fixed action pattern
D) optimal foraging
E) hormones

13) During a trip to the north woods, you discover a patch of blueberries. There are not very many of them, as it is a dry year, so you pick every one you find in order to have enough for pancakes the next morning. The next year you return to the same spot and find berries everywhere. Now you pick only the largest berries and only from the tops of the plants where they are easier to see. This is a good example of
A) trial-and-error learning.
B) associative learning.
C) operant conditioning.
D) cognitive thinking.
E) optimal foraging.

14) In the evolution of whelk-eating behavior in the crows studied by Zack, which of the following was being minimized by natural selection?
A) the average number of drops required to break the shell
B) the average height a bird flew to drop a shell
C) the average thickness of the shells dropped by the birds
D) the average size of the shells dropped by the birds
E) the average total energy used to break shells

15) Animals tend to maximize their energy intake-to-expenditure ratio. What is this behavior called?
A) dominance hierarchies
B) animal cognition
C) optimal foraging
D) territoriality
E) agonistic behavior

Chapter 52 Sample Questions & Answers:

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) A population is correctly defined as having which of the following characteristics?
I. inhabiting the same general area
II. individuals belonging to the same species
III. possessing a constant and uniform density and dispersion
A) I only B) III only C) I and II only D) II and III only E) I, II, and III

2) A biologist reported that a sample of ocean water had 5 million diatoms of the species Coscinodiscus centralis per cubic meter. What was the biologist measuring?
A) range
B) dispersion
C) density
D) carrying capacity
E) quadrats

3) All of the following phrases could characterize a population except
A) dispersion.
B) interacting individuals.
C) density.
D) boundaries.
E) several species.

4) To measure the population density of monarch butterflies occupying a particular park, 100 butterflies are captured, marked with a small dot on a wing, and then released. The next day, another 100 butterflies are captured, including the recapture of 20 marked butterflies. One would correctly estimate the population to be
A) 500.
B) 200.
C) 1,000.
D) 900,000.
E) 10,000.

5) The most common kind of dispersion in nature is
A) uniform.
B) clumped.
C) dispersive.
D) random.
E) indeterminate.

6) How would the dispersion of humans in the United States best be described?
A) clumped
B) random
C) uniform
D) dense
E) intrinsic

7) The pattern of dispersion for a certain species of kelp is clumped. The pattern of dispersion for a certain species of snail that lives only on this kelp would likely be
A) clumped.
B) demographic.
C) random.
D) absolute.
E) uniform.

8) Uniform spacing patterns in plants such as the creosote bush are most often associated with which of the following?
A) the random distribution of seeds
B) the concentration of resources within the population's range
C) antagonistic interactions among individuals in the population
D) patterns of high humidity
E) chance

9) Which of the following would be most likely to exhibit uniform dispersion?
A) cattails, which grow primarily at edges of lakes and streams
B) dwarf mistletoes, which parasitize particular species of forest trees
C) lake trout, which seek out deep water
D) tassel-eared squirrels, which are nonterritorial
E) red squirrels, which hide food and actively defend territories

10) A table listing such items as age, observed number of organisms alive each year, and life expectancy is known as a(an)
A) insurance table.
11) Life tables are useful in determining which of the following?
I. carrying capacity
II. mortality rates
III. the fate of a cohort of newborn organisms throughout their lives
A) I only  B) II only  C) III only  D) I and III only  E) II and III only

12) Which of the following statements about human birth and death rates in populations is correct?
A) Death rates are highest in the elderly, whereas birth rates are highest in newborns.
B) Death rates are highest in middle-aged adults, whereas the birth rates are highest in teenagers.
C) Death rates are highest in newborns and in the elderly, whereas birth rates are highest in 20-year-olds.
D) Both death rates and birth rates are highest in teenagers.
E) Both death rates and birth rates are highest in 30-year-olds.

13) A demographer studying a population of a particular organism would be least likely to be engaged in which of the following?
A) constructing a life table for the organism
B) measuring birth and death rates
C) sampling the population and determining the sex ratio
D) estimating how long an individual of a given age will live
E) studying courtship behavior between males and females

14) Life history strategies result from
A) natural selection.
B) environmental pressures.
C) conscious choice.
D) both A and B.
E) A, B, and C.

15) Which of the following is a life history characteristic that would not be associated with big-bang reproduction?
A) death of the parent following reproduction
B) a life cycle that may require a number of years of maturing before reproduction
C) many gametes produced at reproductive maturity
D) reproduction triggered by an unpredictable event
E) repeated reproductive events over a long life span


**Chapter 53 Sample Questions & Answers:**

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) Which of the following statements is most consistent with F. E. Clements's interactive hypothesis?
A) The composition of plant species seems to change on a continuum.
B) The community functions as an integrated unit.
C) Communities lack discrete geographic boundaries.
D) The community is a chance assemblage of species.
E) Species are distributed independently of other species.

2) All of the following statements about communities are correct except:
A) The distribution of almost all organisms is probably affected to some extent by both abiotic gradients and interactions with other species.
B) Some animal species distributions within a community are linked to other species.
C) The trophic structure of a community describes abiotic factors such as rainfall and temperature affecting members of the community.
D) Ecologists refer to species richness as the number of species within a community.
E) Many plant species in communities seem to be independently distributed.

3) A biologist measures predation rates by crab spiders on flower-visiting insects in a particular field community and then experimentally removes as many of the spiders as she can. She discovers that predation rates remain the same but that the major predators shift from spiders to ambush bugs. Which of the following community structure models is most consistent with her findings?
A) manipulative B) interactive C) redundancy D) individualistic E) rivet

4) Communities can be linked by which of the following?
I. predation
II. systematics
III. competition
A) I only B) III only C) I and II only D) I and III only E) I, II, and III

5) Which of the following statements is consistent with the competitive exclusion principle?
A) The density of one competing species will have a positive impact on the population growth of the other competing species.
B) Two species with the same fundamental niche will exclude other competing species.
C) Even a slight reproductive advantage will eventually lead to the elimination of inferior species.
D) Bird species generally do not compete for nesting sites.
E) Evolution tends to increase competition between related species.

6) All of the following act to increase species diversity except
A) competitive exclusion.
B) patchy environments.
C) keystone predators.
D) migration of populations.
E) moderate disturbances.

7) According to the competitive exclusion principle, two species cannot continue to occupy the same

8) The sum total of an organism's interaction with the biotic and abiotic resources of its environment is called its
A) habitat.
B) logistic growth.
C) biotic potential.
D) ecological niche.
E) microclimax.
9) A species of fish is found to require a certain temperature, a particular oxygen content of the water, a particular depth, and a rocky substrate on the bottom. These requirements are part of its
A) ecological niche.
B) prime habitat.
C) resource partition.
D) home base.
E) dimensional profile.

10) Resource partitioning is best described by which of the following statements?
A) Species diversity is maintained by switching between prey species.
B) A climax community is reached when no new niches are available.
C) Slight variations in niche allow similar species to coexist.
D) Two species can coevolve and share the same niche.
E) Competitive exclusion results in the success of the superior species.

11) Two barnacles, Balanus and Chthamalus, can both survive on the lower rocks just above the low tide line on the Scottish coast, but only Balanus actually does so, with Chthamalus adopting a higher zone. Which of the following best accounts for this niche separation?
A) mutualism
B) predation of Chthamalus by Balanus
C) primary succession
D) cooperative displacement
E) competitive exclusion

12) Resource partitioning would be most likely to occur between
A) sympatric populations of species with similar ecological niches.
B) allopatric populations of species with similar ecological niches.
C) sympatric populations of a predator and its prey.
D) allopatric populations of the same animal species.
E) sympatric populations of a flowering plant and its specialized insect pollinator.

13) Dwarf mistletoes are flowering plants that grow on certain forest trees. They obtain nutrients and water from the vascular tissues of the trees. The trees derive no known benefits from the dwarf mistletoes. Which of the following best describes the interactions between dwarf mistletoes and trees?
A) competition
B) mutualism
C) parasitism
D) commensalism
E) facilitation

14) Which of the following is not an example of a plant defense against herbivory?
A) cryptic coloration
B) spines
C) nicotine
D) morphine
E) thorns

15) An insect that has evolved to resemble a plant twig will probably be able to avoid

Chapter 54 Sample Questions & Answers:
MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) A cow's herbivorous diet indicates that it is a(n)
   A) secondary consumer.
   B) decomposer.
   C) primary consumer.
   D) autotroph.
   E) producer.

2) Which of the following organisms fix nitrogen in aquatic ecosystems?
   A) fungi
   B) chemoautotrophs
   C) cyanobacteria
   D) legumes
   E) phytoplankton

3) Which of the following statements is (are) true?
   A) At any point in time, it is impossible for consumers to outnumber producers in an ecosystem.
   B) An ecosystem's trophic structure determines the rate at which energy cycles within the system.
   C) Chemoautotrophic prokaryotes near deep-sea vents are primary producers.
   D) There has been a well-documented increase in atmospheric carbon dioxide over the past several decades.
   E) Both C and D are true.

4) Production, consumption, and decomposition are important ecosystem processes. Organisms in which of the following taxa perform decomposition?
   A) invertebrates B) bacteria C) vertebrates D) A and C E) A, B, and C

5) Organisms in which of the following taxa are responsible for most of the conversion of organic materials into inorganic compounds that can be utilized in primary production?
   A) autotrophs B) bacteria C) fungi D) B and C E) A, B, and C

6) The main decomposers in an ecosystem are

7) The fundamental difference between materials and energy is that
   A) energy is cycled through ecosystems; materials are not.
   B) materials can be converted into energy; energy cannot be converted into materials.
   C) energy can be converted into materials; materials cannot be converted into energy.
   D) ecosystems are much more efficient in their transfer of energy than in their transfer of materials.
   E) materials are cycled through ecosystems; energy is not.

8) The concept that energy cannot cycle through an ecosystem is best explained by
   A) the law of conservation of energy.
   B) the principle of biomagnification.
   C) the second law of thermodynamics.
   D) the competitive exclusion principle.
   E) the Green World hypothesis.

9) Subtraction of which of the following will convert gross primary productivity into net primary productivity?
   A) the energy fixed by photosynthesis
B) all solar energy  
C) the energy contained in the standing crop  
D) the energy used by heterotrophs in respiration  
E) the energy used by autotrophs in respiration

10) The difference between net and gross primary productivity would likely be greatest for
A) prairie grasses.  
B) sphagnum moss in a bog.  
C) phytoplankton in the ocean.  
D) corn plants in a farmer's field.  
E) an oak tree in a forest.

11) Which of these ecosystems accounts for the largest amount of Earth's primary productivity?  
A) open ocean  
B) savanna  
C) tundra  
D) salt marsh  
E) tropical rain forest

12) The producers in ecosystems include which of the following?  
I. prokaryotes  
II. algae  
III. plants  
A) I only  
B) II only  
C) III only  
D) I and III only  
E) I, II, and III

13) Which of these ecosystems has the highest primary productivity per square meter?  
A) open ocean  
B) tropical rain forest  
C) boreal forest  
D) temperate forest  
E) savanna

14) The total biomass of photosynthetic autotrophs present in an ecosystem is known as the  
A) net primary productivity.  
B) standing crop.  
C) trophic efficiency.  
D) gross primary productivity.  
E) secondary productivity.

15) Aquatic primary productivity is often limited by which of the following?  
I. light  
II. nutrients  
III. pressure  
A) II only  
B) III only  
C) I and II only  
D) II and III only  
E) I, II, and III


Chapter 55 Sample Questions & Answers:
MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) The total number of extant species is approximately
   A) 1,000 to 50,000.
   B) 50,000 to 150,000.
   C) 500,000 to 1,000,000.
   D) 10,000,000 to 80,000,000.
   E) 5-10 billion.

2) Which of the following most directly relates to the current biodiversity crisis?
   A) increased atmospheric carbon dioxide
   B) ozone depletion
   C) the rate of extinction
   D) introduced species
   E) zoned reserves

3) Which of the following terms includes all of the others?
   A) genetic diversity
   B) species diversity
   C) biodiversity
   D) ecosystem diversity

4) In order to better understand the extent of current extinctions it will be necessary to do which of the following?
   A) Focus intensely on identifying more species of mammals and birds.
   B) Monitor atmospheric carbon dioxide levels.
   C) Differentiate between plant extinction and animal extinction.
   D) Use the average extinction rates of vertebrates as a baseline.
   E) Identify more of the yet unknown species of organisms on our planet.

5) Estimates of current rates of extinction
   A) indicate that we have reached a state of unstable equilibrium in which speciation and extinction rates are approximately equal.
   B) suggest that one-half of all animal and plant species may be gone by the year 2100.
   C) indicate that rates may be 1,000 times higher than at any other time in the last 100,000 years.
   D) B and C only are true.
   E) A, B, and C are true.

6) The most accurate assessments of current extinction rates probably come from studies of
   A) reptiles, because they are ectothermic and susceptible to population declines during frequent past glacial periods.
   B) birds and mammals, because they are relatively well-known taxa.
   C) marine invertebrates, because of their relatively long and complete fossil history.
   D) insects, because they comprise the vast majority of extant multicellular organisms.
   E) vascular plants, because they do not move around.

7) Which of the following would not qualify as an ecosystem service?
   A) rain falling to Earth
   B) squirrels burying acorns
   C) leaves falling on a forest floor
   D) blowfly larvae infesting a deer carcass
   E) bees pollinating an apple tree
8) Which of the following is a valid conclusion about the outcome of Biosphere II?
A) Natural ecosystems are complex and not easily duplicated.
B) Humans cannot live in small spaces for an extended period of time.
C) Closed ecosystems must be made airtight.
D) Small populations are more likely to go extinct.
E) Fragmented habitats can reduce species diversity.

9) According to most conservation biologists, the single greatest threat to global biodiversity is
A) insufficient recycling programs for nonrenewable resources.
B) global climate change resulting from a variety of human activities.
C) stratospheric ozone depletion.
D) chemical pollution of water and air.
E) alteration or destruction of the physical habitat.

10) The Nile perch (Lates niloticus) is a good example of a(n)
A) endangered endemic.
B) threatened migratory species.
C) primary consumer.
D) population sink.
E) introduced predator.

11) Which of the following was not presented as an example of an introduced species?
A) red foxes in Australia
B) timber wolves in Minnesota
C) starlings in New York
D) zebra mussels in the Great Lakes
E) kudzu in the southern United States

12) Introduced species can have important effects on biological communities by
A) preying upon native species.
B) displacing native species.
C) reducing biodiversity.
D) competing with native species for resources.
E) doing all of the above.

13) Which of the following does not represent a potential threat to biodiversity?
A) importing a European insect into the United States to control an undesirable weed
B) letting previously used farmland go fallow and begin to fill with weeds and shrubs
C) building a new mall on a previously unoccupied piece of midwestern prairie.
D) harvesting all of the oysters from an oyster bed off the Atlantic coast
E) shooting wolves because they pose a threat to cattle farmers

14) All of the following apply to the concept of the extinction vortex except:
A) Populations of the species entering it are small.
B) It is a concept developed by conservation biologists who adopt the "small population approach."
C) The genetic variation of the species' population decreases.
D) The key factor driving the extinction vortex is intraspecific competition.
E) Interbreeding leads to smaller populations, which leads to more interbreeding, and so on.

15) Which of the following is a method of predicting the likelihood that a species will persist in a particular environment?
A) source-sink analysis
B) minimum viable population size
C) population dynamic analysis
D) population viability analysis
E) None of the above can predict whether a species will persist.