

## REVIEW UNIT 1: ECOLOGY — SAMPLE QUESTIONS (Chapters 51-56)

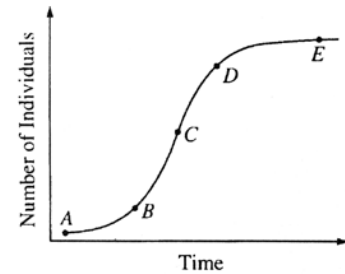
### Multiple Choice Sample Questions

1. \_\_\_\_ All of the following are density-dependent factors that limit animal populations EXCEPT
  - A. weather
  - B. predation
  - C. birthrate
  - D. food competition
  - E. mortality
2. \_\_\_\_ During the carbon cycle, which of the following carbon compounds would be utilized as an energy source by heterotrophs?
  - A. calcium carbonate
  - B. carbonic acid
  - C. organic molecules
  - D. carbon dioxide
  - E. carbon monoxide
3. \_\_\_\_ All of the following statements concerning characteristics of predator-prey relationships are correct EXCEPT:
  - A. A rise in the population of prey is often followed by a rise in the population of predators.
  - B. A rise in the population of predators is followed by a decrease in the population of prey.
  - C. Camouflage is an adaptation that protects prey.
  - D. The production of large numbers of offspring within very short periods of time ensures the survival of some prey populations.
  - E. The population of predators most often eliminates the population of prey.
4. \_\_\_\_ Which of the following is true about secondary consumers in an ecosystem?
  - A. They eat only plants.
  - B. They are eaten by primary consumers.
  - C. They are smaller and weaker than are primary consumers.
  - D. They are fewer in number than are primary consumers.
  - E. They contain the greatest total biomass in the system.
5. \_\_\_\_ In the nitrogen cycle, the transformation of gaseous nitrogen into nitrogen-containing compounds is performed primarily by
  - A. Fungi
  - B. Bacteria
  - C. green plants
  - D. herbivores
  - E. carnivores

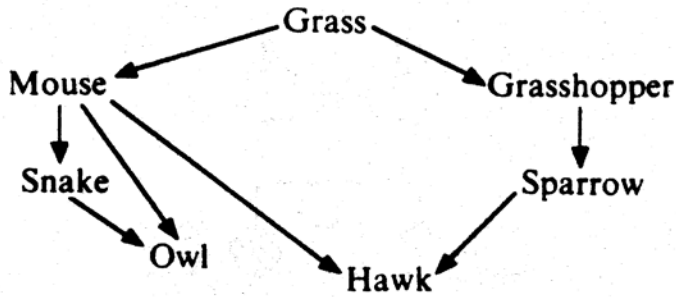
### Use the following biomes to answer questions 6-10

- A. tropical rain forest
  - B. taiga
  - C. arctic tundra
  - D. temperate grassland
  - E. desert
6. \_\_\_\_ Permafrost; temperatures range from approximately -50°C to +25°C; a growing season of 60 days or less
  7. \_\_\_\_ Over 10 inches of precipitation per year; long, cold winters and short summers; dominant vegetation is gymnosperm
  8. \_\_\_\_ Lack of water common in summer; seasonal temperature variations; maintained by periodic fires (
  9. \_\_\_\_ Less than 10 inches of precipitation per year; extremes of hot and cold throughout the year; large daily temperature variations
  10. \_\_\_\_ This biome has the greatest diversity of species.

11. \_\_\_\_ Which point on the curve in the diagram above best represents the carrying capacity of the environment for the population shown.

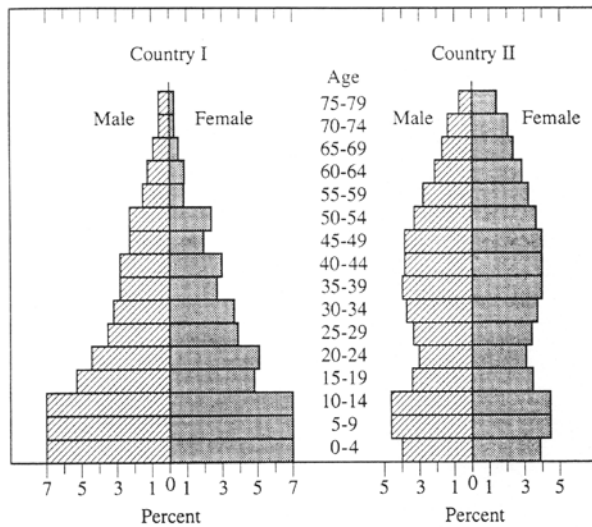


Questions 12–14 refer to the food web below



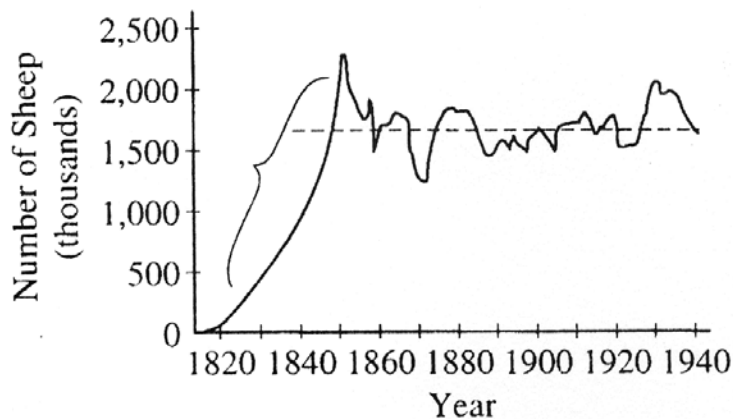
12. \_\_\_\_ Which of the following organisms is most likely to be located at the apex of the pyramid of biomass?
- |                |          |
|----------------|----------|
| A. grass       | D. mouse |
| B. grasshopper | E. hawk  |
| C. snake       |          |
13. \_\_\_\_ All of the following statements about the diagram are correct EXCEPT:
- The grasshopper is an herbivore.
  - Only two trophic levels are depicted.
  - The mouse and grasshopper are at the same trophic level.
  - The grass is a producer.
  - All of the organisms except grass are consumers, regardless of position.
14. \_\_\_\_ The organic and inorganic materials in all the organisms in the diagram will eventually return to the environment by the action of
- |                      |                        |
|----------------------|------------------------|
| A. decomposers       | D. secondary consumers |
| B. producers         | E. top carnivores      |
| C. primary consumers |                        |
15. \_\_\_\_ Which of the following best explains why there are seldom more than five trophic levels in a food chain?
- Most carnivores function at more than one trophic level.
  - Trophic levels above this number contain too many individuals.
  - Top carnivores are too few in number to prey effectively.
  - The ecosystem contains too much biomass.
  - Energy is lost from each trophic level.

**Questions 16-19.** The illustrations below show the age and sex of the human populations in Country 1 and Country 2. The ages are grouped by 5-year classes, and the sexes are represented separately. The percentages in the different age classes are shown by the relative widths of successive horizontal bars.



16. \_\_\_\_ In Country 1, approximately what percentage of the individuals were younger than fifteen years of age?
- 10%
  - 21%
  - 42%
  - 52%
  - It cannot be estimated from the graph.
17. \_\_\_\_ Which of the following best approximates the ratio of males to females among individuals below fifteen years of age?
- |    | Country 1 | Country 2 |
|----|-----------|-----------|
| A. | 1 : 1     | 1 : 1     |
| B. | 0.75 : 1  | 0.75 : 1  |
| C. | 0.5 : 1   | 0.5 : 1   |
| D. | 1 : 1     | 0.5 : 1   |
| E. | 0.75 : 1  | 1 : 1     |
18. \_\_\_\_ If, in Country 1, infant mortality declined and the birth rate remained the same, then initially the population would be expected to
- be more evenly distributed among the age classes
  - be even more concentrated in the young age classes
  - stabilize at the illustrated level for all age classes
  - increase in the oldest age classes
  - increase in the median age classes
19. \_\_\_\_ Over the next 10-15 years, the stabilization of Country 1's population at its current size would require that
- infant mortality be reduced to about half the present level
  - the death rate be reduced drastically
  - each couple produce fewer children than the number required to replace themselves
  - about 15 years be added to the life expectancy of each person
  - couples have an average of only 3 children

**Questions 20–21.** The graph below shows changes in a population of wild sheep that were introduced to the island of Tasmania in the early 1800s.



20. \_\_\_\_ The type of population growth represented by that portion of the graph line enclosed in the bracket is most accurately termed
- stable
  - exponential
  - density-dependent
  - arithmetic
  - decelerating
21. \_\_\_\_ The graph indicates that the sheep population most likely is
- growing in excess of its carrying capacity, since fluctuations in population size occurred after 1850
  - headed for extinction because of the population explosion about 1930
  - regulated by density-independent factors, because there appears to be about a 10-year cycle of sharp declines in size
  - shifting from K-selected strategy to an r-selected strategy
  - stable after 1850 under the effects of density-dependent regulating factors
22. \_\_\_\_ “Mary had a little lamb; its fleece was white as snow. And everywhere that Mary went, the lamb was sure to go.” The behavior of the lamb is best described as
- Habituation
  - Imprinting
  - Operant conditioning
  - Classical conditioning
  - Fixed action pattern
23. P\_\_\_\_avlov’s dogs learned to associate hearing a bell with food. Simply hearing a bell caused them to salivate. This is an example of
- Habituation
  - Operant conditioning
  - Classical conditioning
  - Imprinting
  - A fixed action pattern
24. \_\_\_\_ Many poisonous animals are brightly colored as a warning to predators. This special coloration is called
- Mullerian mimicry
  - Batesian mimicry
  - Aposematic coloration
  - Mutualistic coloration
  - Commensal coloration

25. \_\_\_\_ The most common type of population dispersion in nature is
- A. Random
  - B. Dispersive
  - C. Uniform
  - D. Clumped
  - E. Conforming

### B. Sample Free Response Questions

1. According to fossil records and recent published observations, two species of leaf-eating beetles (species A and B) have existed on an isolated island in the Pacific Ocean for over 100,000 years. In 1964 a third species of leaf-eating beetle (species C) was accidentally introduced on the island. The population size of each species has been regularly monitored as shown in the graph above.
  - a. **Propose** an explanation for the pattern of population density observed in species C.
  - b. **Describe** the effect that the introduction of beetle species C has had on the population density of species A and species B. **Propose** an explanation for the patterns of population density observed in species A and in species B.
  - c. **Predict** the population density of species C in 2014. Provide a biological explanation for your prediction.
  - d. **Explain** why invasive species are often successful in colonizing new habitats.
2. Organisms rarely exist alone in the natural environment. The following are five examples of symbiotic relationships.
  - Plant root nodules
  - Epiphytic plants
  - Digestion of cellulose
  - Anthrax
  - AIDS (acquired immune deficiency syndrome)

Choose FOUR of the above and for each example chosen,

  - a. **identify** the participants involved in the symbiosis and describe the symbiotic relationship, and
  - b. **discuss** the specific benefit or detriment, if any, that each participant receives from the relationship.
3. Compared with other terrestrial biomes, deserts have extremely low productivity.
  - a. **Discuss** how temperature, soil composition, and annual precipitation limit productivity in deserts.
  - b. **Describe** a four-organism food chain that might characterize a desert community, and **identify** the trophic level of each organism.
  - c. **Describe** the results depicted in the graph. **Explain** one anatomical difference and one physiological difference between species **A** and **B** that account for the CO<sub>2</sub> uptake patterns shown. **Discuss** the evolutionary significance of each difference.