

 Essential Knowledge Questions

1. Give examples of human actions that could expand a species' distribution by changing its (a) dispersal or (b) biotic interactions.
2. Describe three ways in which an animal's environment can influence the development of its behavior.
3. How might associative learning explain why unrelated distasteful or stinging insects have similar colors?
4. Explain why geographic variation in garter snake foraging behavior might demonstrate that the behavior evolved by natural selection.
5. Why is male parental care more likely to evolve among species with external fertilization than among species with internal fertilization?
6. How is a female bird's fitness associated with her ability to choose a mate by discerning among displays and adornments that "advertise" the health of the male?
7. What is the ultimate cause for altruistic behavior among kin?
8. What hypothesis could explain cooperative behavior among nonrelated animals? Explain.
9. Consider two rivers: one is spring fed and is constant in water volume and temperature year-round; the other drains a desert landscape and floods and dries out at unpredictable intervals. Which is more likely to support many species of iteroparous animals? Why?
10. Explain why a constant rate of increase ( $r_{max}$ ) for a population produces a growth graph that is J-shaped rather than a straight line.
11. Where is exponential growth by a plant population more likely—on a newly formed volcanic island or in a mature, undisturbed rain forest? Why?
12. What are the relationships among carrying capacity, ecological capacity, and ecological footprint for a country's population? Define each term in your answer.
13. Explain how interspecific competition, predation, and mutualism differ in their effects on the interaction populations of two species.
14. Is the evolution of Batesian mimicry an example of coevolution? Explain your answer.
15. Who do primary and secondary succession differ? In both types of succession, how might the early species facilitate the arrival of other species?
16. Describe at least 1 hypothesis that explains why species diversity is greater in tropical regions than in temperate and Polar Regions.
17. Describe how an island's size and distance from the mainland affect the island's species richness.
18. How does the second law of thermodynamics explain why an ecosystem's energy supply must be continually replenished?
19. How can the addition of excess nutrients to a lake threaten its fish populations?
20. How can clear cutting a forest damage the water quality of nearby lakes?
21. In the face of biological magnification of toxins, is it healthier to feed at a lower or higher trophic level? Explain.
22. There are fast stores of organic matter in the frozen soils of the Arctic. Why might this be a cause for concern by scientist studying global warming?
23. Describe the 4 main threats to biodiversity and how each one damages diversity.
24. Explain why it is too narrow to define the biodiversity crisis as simply a loss of species.
25. How can the loss of genetic diversity within an agricultural crop species be tied to human impact?
26. Environments change and can act as a selective mechanisms on populations. How can changes in flowering time for different angiosperms be related to global climate change be a model for this type of selection?
27. Define endothermy and ectothermy. How are they similar...how are they different?

28. Changes in free energy availability can result in \_\_\_\_\_ to an ecosystem. Change in the \_\_\_\_\_ level can affect the number and size of other trophic levels in an ecosystem. Photosynthetic organisms capture \_\_\_\_\_ energy present in sunlight. Chemosynthetic organism capture free energy from small inorganic molecules present in their environment, and this process can occur in the \_\_\_\_\_ of oxygen. \_\_\_\_\_ capture free energy present in carbon compounds produced by other organisms.
29. Review and summarize in 4-5 sentences the carbon cycle.
30. Review and summarize in 4-5 sentences the nitrogen cycle.
31. Summarize the three types of symbiosis (biology level question).
32. Explain how biotic and abiotic factors can affect the stability of a population, community and ecosystem in the following situations.
- Water and nutrient availability
  - Availability of nesting materials and sites
  - Food chains and food webs
  - Species diversity
  - Population density
  - Algal blooms
33. Animal behaviors become synchronized with ecological cycles. Explain the following to demonstrate this statement.
- Hibernation
  - Estivation
  - Migration
  - Courtship
34. Organisms exchange information with each other in response to internal changes and external cues, which can change BEHAVIOR. Demonstrate your understanding of this statement using the following examples
- Fight or flight response
  - Protection of young
  - Avoidance responses
35. Cooperative behavior tends to increase the fitness of the individual and the survival of the population. Demonstrate your understanding of this concept by explaining the following examples.
- Pack behavior in animals
  - Colony and swarming behavior in insects
36. Introduction of new diseases can devastate native species. Explain the following examples as a function of this concept. You will need to use the internet ;-)
- Dutch elm disease
  - Small pox (historic example for Native Americans)
37. Explain how environmental factors...not completely genetic...can either directly or indirectly influence traits. Choose 2 of the examples below and explain them.
- Height and weight in humans
  - Seasonal fur color in arctic animals
  - Flower color based on soil pH
38. What is the main reason that the following populations are in risk of extinction? California condors, prairie chickens, Tasmanian devils.
39. What is a keystone species? Why might their removal from an ecosystem be a major issue even though they may not be large in number in the first place?