

1. Despite its incredible diversity, life on earth also shares incredible unity. Specifically, all life on earth
  - a) contains chlorophyll.
  - b) uses the same underlying mechanism to transmit information from one generation to the next.
  - c) has the ability to capture and store energy.
  - d) a) and c) above.
  - e) b) and c) above.
2. An organism that produces its own food, either through photosynthesis or chemosynthesis, is called a(n)
  - a) autotroph
  - b) heterotroph
  - c) primary producer
  - d) a) and c)
  - e) b) and c)
3. An organism that consumes heterotrophs is called a(n)
  - a) autotroph
  - b) heterotroph
  - c) primary consumer
  - d) a) and b)
  - e) a) and c)
4. All life on Earth is composed primarily of 17 elements, of which only 4 make up 99% of the mass of living things. These 4 elements are
  - a) hydrogen, helium, lithium, and beryllium.
  - b) hydrogen, oxygen, nitrogen, and carbon.
  - c) hydrogen, oxygen, sodium, and chlorine.
  - d) hydrogen, oxygen, carbon, and chlorine.
  - e) hydrogen, oxygen, carbon, and sodium.
5. What is a biogeochemical cycle?
  - a) A description of how biologically important elements like carbon or nitrogen can move between living organisms and the atmosphere.
  - b) A description of how biologically important elements like carbon or nitrogen can move between living organisms and molecules dissolved in the ocean.
  - c) A description of how biologically important elements like carbon or nitrogen can move between molecules and ionic groups dissolved in the ocean and the sediments.
  - d) A description of how biologically important elements like carbon or nitrogen can move between dead organisms and dissolved organic molecules.
  - e) all of the above.
6. In the carbon cycle animals
  - a) release carbon as carbon dioxide (CO<sub>2</sub>).
  - b) use carbon dioxide (CO<sub>2</sub>) to manufacture carbohydrates.
  - c) release carbon as methane (CH<sub>4</sub>).
  - d) use methane (CH<sub>4</sub>) to manufacture carbohydrates.
7. What happens to dissolved organic carbon (DOC) in the microbial loop?
  - a) It is consumed by bacteria, which are in turn consumed by fish, then zooplankton, then protozoans.
  - b) It is consumed by fish, which are in turn consumed by zooplankton, then protozoans, then bacteria.
  - c) It is consumed by bacteria, which are in turn consumed by zooplankton, then fish, then protozoans.
  - d) It is consumed by protozoans, which are in turn consumed by bacteria, then zooplankton, then fish.
  - e) It is consumed by bacteria, which are in turn consumed by protozoans, then zooplankton, then fish.

8. In which of the following forms is the nitrogen needed for proteins, chlorophyll, and nucleic acids *unavailable* to most marine organisms?
- nitrate ( $\text{NO}_3^-$ )
  - nitrite ( $\text{NO}_2^-$ )
  - ammonium ( $\text{NH}_4^+$ )
  - dissolved organic nitrogen (DON)
  - dissolved nitrogen gas ( $\text{N}_2$ )
9. Given enough food, space, oxygen, nutrients, etc., any organism is capable of producing multiple offspring, which in turn will produce multiple offspring and so forth until the descendants of the original organism cover the earth. Usually there is one factor that keeps this from happening, called a(n)
- minimal factor.
  - limiting factor.
  - lethal parameter.
  - homeostatic parameter.
  - isolating parameter.
10. The difference between the euphotic and disphotic depth zones is
- the euphotic zone is where light is present and the disphotic zone is where light is absent.
  - the euphotic zone is where light is absent and the disphotic zone is where light is present.
  - the euphotic zone is where photosynthetic production exceeds respiration while the disphotic zone is where respiration exceeds photosynthetic production. Light is present in both zones.
  - b) the euphotic zone is where respiration exceeds photosynthetic production while the disphotic zone is where photosynthetic production exceeds respiration. Light is present in both zones.
11. Which of the following types of organisms are endothermic?
- only mammals
  - only birds
  - all mammals and birds, and a few fish species
  - all mammals, birds, and fish
  - only mammals and birds.
12. Animals living at the bottom of the ocean, under extremely high hydrostatic pressure, experience
- crushing.
  - increased solubility of gases.
  - higher metabolic rates for a given temperature.
  - all of the above.
  - b) and c) above.
13. The cells of a freshwater algae placed in seawater would probably
- swell and possibly burst.
  - shrivel.
  - turn more green.
  - turn more red.
  - remain unaltered.
14. If a cell increases in size, its surface-to-volume ratio will \_\_\_\_\_ and the diffusion of nutrients, gases, and waste will \_\_\_\_\_
- increase ...become more efficient.
  - increase ... become less efficient.
  - decrease ... become more efficient.
  - decrease ... become less efficient.

15. Two main life zones in the ocean are the pelagic zone, and the benthic zone.
- Pelagic refers to the open water, whereas benthic refers to the bottom.
  - Pelagic refers to the bottom, whereas benthic refers to the open water.
  - Pelagic refers to water beyond the continental shelf whereas benthic refers to shelf water.
  - Pelagic refers to the intertidal zone, whereas benthic refers to seabed from the continental slopes to the deepest water.
16. Which of the following is *not* needed for Darwinian evolution to take place?
- Organisms typically produce more offspring than the environment can support.
  - Mutations can be passed on to offspring through reproduction.
  - Mutations occur only when it is necessary to produce more "fit" individuals.
  - Some mutations increase the probability of survival. These are called "favorable traits."
  - Individuals with favorable traits are more likely to reproduce.
17. *Convergent evolution* refers to
- the idea that organisms evolve faster when placed in close proximity to each other.
  - evolution of similar characteristics in different species in response to similar environmental conditions.
  - predators continuously evolving to take advantage of prey, which are also evolving.
  - prey species evolving to reduce their vulnerability to newly evolved predators.
18. Taxonomy is the
- study of the role of taxation in the economy.
  - preservation of animals for display in museums.
  - study of biological classification.
  - study of how organisms relate to their environment.
  - study of how plants derive nutrients and energy from their environment.
19. The system of classifying organisms into kingdoms, genus, species, etc. is based on
- their evolutionary relationships.
  - their ecological relationships.
  - their means of locomotion (flying, swimming, walking).
  - their appearance.
  - their behavior.
20. The scientific name of the bottlenose dolphin is *Tursiops truncatus*. *Tursiops* denotes the \_\_\_\_ while *truncatus* denotes the \_\_\_\_.
- order ... species
  - species ... genus
  - order ... genus
  - genus ... order
  - genus ... species
21. The hierarchical system of classification developed by Linnaeus goes as follows:
- kingdom, phylum, class, family, order, genus, species.
  - kingdom, class, family, order, phylum, genus, species.
  - kingdom, genus, phylum, class, order, family, genus.
  - kingdom, phylum, class, order, family, genus, species.
  - kingdom, genus, phylum, order, class, family, species.
22. Bacteria and archaea are called *prokaryotes*, whereas all other living things are called *eukaryotes*. The main difference between prokaryote cells and eukaryote cells is that
- prokaryote cells lack nuclei and organelles whereas eukaryote cells have them.
  - eukaryote cells lack nuclei and organelles whereas prokaryote cells have them.
  - prokaryotes have nuclei but lack organelles, whereas eukaryote cells have organelles but lack nuclei.
  - prokaryote cells form diamonds (much like oysters form pearls) whereas eukaryote cells cannot.
  - eukaryote cells form diamonds (much like oysters form pearls) whereas prokaryote cells cannot.

23. Explain the theory of evolution to your grandmother. Include in your explanation the concept of *natural selection*, and the requirement that organisms produce many offspring.
24. What is the difference between *plankton*, *nekton*, and *benthos*?
25. What is the difference between an *autotroph* and a *heterotroph*?
26. Explain the concept of a trophic *pyramid*.
27. Explain how each of the following physical phenomena affect how life is conducted in seawater compared to how it is conducted in air? 1) buoyancy, 2) viscosity, 3) temperature, 4) molecular diffusion, 5) light.
28. Explain the notion of a *limiting factor* in ecology.