Chapter 02
Environmental Systems: Connections, Cycles, Flows and Feedback Loops

Multiple Choice Questions

1. The relationship among atoms, elements, and compounds is most like the relationship among
A. bricks, brick houses, and large brick buildings.
B. grains of sand, rocks, and continents.
C. bricks, sidewalks, and paved roads.
D. ponds, lakes, and oceans.
E. grains of sugar, sugar, and sweetened iced tea.

Bloom's Level: 3. Apply
Section: 2.02
Topic: Chemistry

2. Which of the following is not a molecule?
A. O_3
B. O_2
C. C
D. DNA
E. H_2O

Bloom's Level: 2. Understand
Section: 2.02
Topic: Chemistry

3. Which of the following statements would change this into a true statement: "Most, but not all, living organisms are made up of organic compounds"?
A. All living organisms are made up of organic compounds.
B. All living organisms are made up of inorganic compounds.
C. Most, but not all, living organisms are made up of inorganic compounds.
D. Most, but not all, living organisms are made up of organic elements.
E. Most, but not all, living organisms are made up of inorganic elements.

Bloom's Level: 2. Understand
Section: 2.02
Topic: Chemistry

4. Energy is the ability to
A. move objects.
B. become heated.
C. transfer heat from one object to another.
D. All of these are true.
E. Both move objects and transfer heat from one object to another are true.

Bloom's Level: 1. Remember
Section: 2.03
Topic: Energy

5. Potential energy is _____ energy.
A. electrical
B. motion
C. stored
D. heat
E. latent

Bloom's Level: 1. Remember
Section: 2.03
Topic: Energy

6. The motion of a rock rolling downhill is known as _____ energy.
A. kinetic
B. latent
C. potential
D. electrical
E. mechanical

Bloom's Level: 1. Remember
Section: 2.03
Topic: Energy

7. Metabolism can be seen as the process of converting
A. energy into matter.
B. potential energy into kinetic energy.
C. kinetic energy into potential energy.
D. atoms into compounds.
E. matter into potential energy.

Bloom's Level: 3. Apply
Section: 2.03
Topic: Energy

8. The law of conservation of matter tells us that matter
A. can never be reused.
B. needs to be conserved or it will not be available for future generations.
C. can be destroyed.
D. can be conserved by some adaptive strategies.
E. is used repeatedly.

Bloom's Level: 2. Understand
Section: 2.02
Topic: Chemistry

9. What implication(s) does the law of conservation of matter have for humans?
A. We cannot create energy because it is neither created nor destroyed.
B. As matter is recycled it loses some of its integrity so we need to be careful when we dispose of goods.
C. Natural resources are unlimited because they are used and reused by living organisms.
D. Disposable goods are not going "away" when we throw them out.
E. All of these are implications of the law of conservation of matter.

Bloom's Level: 2. Understand
Section: 2.02
Topic: Chemistry

10. The first law of thermodynamics and the law of conservation of matter are similar in that

A. under normal circumstances neither energy nor matter is created nor destroyed.
B. both energy and matter are recycled through biological systems.
C. both energy and matter flow in a one-way path through biological systems.
D. under normal circumstances energy and matter are destroyed as they pass through biological systems.
E. The first law of thermodynamics and the law of conservation of matter are not similar.

Bloom's Level: 1. Remember
Section: 2.03
Topic: Energy

11. What implication(s) does the second law of thermodynamics have for biological systems?

A. Systems cannot create energy because energy is neither created nor destroyed.
B. With each transformation, less available energy is available to do work so older systems have less energy.
C. A constant supply of energy is necessary for maintenance of biological systems.
D. Energy is unlimited because it is used and reused by living organisms.
E. None of these is an implication of the second law of thermodynamics.

Bloom's Level: 1. Remember
Section: 2.03
Topic: Energy

12. Photosynthesis is the process of converting _____ into _____ energy.
A. chemical bond energy; kinetic
B. sunlight; chemical bond
C. solar energy; kinetic
D. solar electrical energy; heat
E. chemical bond energy; potential

Bloom's Level: 1. Remember
Section: 2.04
Topic: Photosynthesis

13. Photosynthesis produces sugars from
A. water, carbon dioxide, and energy.
B. water, other sugars, and oxygen.
C. oxygen, carbon dioxide, and water.
D. carbon dioxide, enzymes, and energy.
E. oxygen, water, and energy.

Bloom's Level: 1. Remember
Section: 2.04
Topic: Photosynthesis

14. The process of photosynthesis and cellular respiration are similar in that they both
A. capture energy in the form of sugar.
B. occur in all living organisms.
C. temporarily store energy in chemical bonds.
D. capture energy from the sun.
E. none of these are correct.

Bloom's Level: 2. Understand
Section: 2.04
Topic: Photosynthesis

15. The process of cellular respiration
A. helps primary producers store energy accumulated by chloroplasts.
B. releases energy from chemical bonds of molecules such as glucose.
C. eliminates the need for enzymes in metabolism.
D. does not occur in primary producers.
E. does not occur in detritivores.

Bloom's Level: 1. Remember
Section: 2.04
Topic: Cellular Respiration

16. All members of a species that live in the same area at the same time make up a(an)
A. species.
B. ecosystem.
C. community.
D. population.
E. biome.

Bloom's Level: 1. Remember
Section: 2.05
Topic: Populations

17. A biological community consists of all
A. populations living and interacting in an area.
B. members of a species living in the same area.
C. living things on Earth.
D. populations of a given species.
E. members of a species living in the same biome.

Bloom's Level: 1. Remember
Section: 2.05
Topic: Communities

18. An ecosystem consists of
A. a physical environment within which a biological community lives.
B. the species with which a biological community interacts.
C. a biological community and its physical environment.
D. the primary producers within a biological community.
E. all the species in a biological community.

Bloom's Level: 1. Remember
Section: 2.05
Topic: Ecosystems

19. The length and complexity of a food web in the Arctic would be _____ when compared to one in the tropical rainforest.
A. short and less complex
B. short and more complex
C. long and less complex
D. long and more complex
E. about the same

Bloom's Level: 3. Apply
Section: 2.05
Topic: Trophic Levels

20. Producers rely on _____ to release chemical energy and consumers rely on _____ to release chemical energy.
A. cellular respiration; photosynthesis
B. cellular respiration; cellular respiration
C. photosynthesis; cellular respiration
D. photosynthesis; photosynthesis
E. the sun; the sun

Bloom's Level: 2. Understand
Section: 2.05
Topic: Trophic Levels

21. Primary consumers are also known as
A. carnivores.
B. scavengers.
C. decomposers.
D. herbivores.
E. top carnivores

Bloom's Level: 1. Remember
Section: 2.05
Topic: Trophic Levels

22. Energy enters a system as sunlight and a producer is able to produce 10 kilograms of tissue. If eaten, the producer would produce about _____ kilograms of consumer tissue that would provide about _____ kilograms of tissue for a secondary consumer.
A. 100; 10
B. 10; 1
C. 100; 1
D. 1; 0.1
E. 10; 0.1

Bloom's Level: 3. Apply
Section: 2.05
Topic: Trophic Levels

23. Living vegetation and the ocean are known as "carbon sinks" because
A. they are made of carbon.
B. they create carbon.
C. they destroy carbon.
D. they store carbon.
E. due to gravity, carbon is found closer to the ground.

Bloom's Level: 2. Understand
Section: 2.06
Topic: Biogeochemical Cycles

24. _____ are characteristics of an entire system that are greater than the sum of its parts.
A. Open systems
B. Closed systems
C. Disturbances
D. Emergent properties
E. Feedback loops

Bloom's Level: 1. Remember
Section: 2.01
Topic: Ecosystems

25. Which is the best example of a closed system?
A. a space station
B. a forest
C. a hotel
D. a lake
E. none of these are correct.

Bloom's Level: 3. Apply
Section: 2.01
Topic: Ecosystems

26. Which is not a characteristic of acids?
A. they readily give up hydrogen ions
B. they have a pH of less than 7
C. they react easily with living tissue
D. they react easily with nonliving minerals
E. all of these are characteristic of acids

Bloom's Level: 1. Remember
Section: 2.02
Topic: Chemistry

27. How do the organisms living around Yellowstone's hot springs get energy?
A. by eating alga
B. from the heat in the hot spring
C. from photosynthesis
D. from chemosynthesis
E. no organisms can live at the depths of black smokers

Bloom's Level: 1. Remember
Section: 2.04
Topic: Energy

True / False Questions

28. Nitrogen is an essential component of amino acids and proteins.
TRUE

Bloom's Level: 1. Remember
Section: 2.02
Topic: Chemistry

29. Photosynthesis is a step in the global nitrogen cycle.
FALSE

Bloom's Level: 2. Understand
Section: 2.04
Topic: Photosynthesis

30. Water expands when it crystallizes.
TRUE

Bloom's Level: 1. Remember
Section: A Water Planet
Topic: Properties of Water

Multiple Choice Questions

31. Based on what you know of photosynthesis, what effect would clearcutting of large forests have on the amount of carbon dioxide in the atmosphere?
A. It would increase the level of carbon dioxide since less photosynthesis would be taking place.
B. The amount of carbon dioxide would be decreased since the trees would no longer be living.
C. There would be no change in carbon dioxide levels since humans put carbon dioxide into the atmosphere by burning fossil fuels.
D. The amount of carbon dioxide would be the same since the reaction rates of photosynthesis and respiration are equal.

Bloom's Level: 5. Evaluate
Section: 2.04
Topic: Photosynthesis

32. If you were to remove the top predator in a food web or food chain
A. there would be an increase in the number of producers.
B. the producer population will be depleted because there are more primary consumers or herbivores.
C. another predator would move in and take its place as top predator.
D. there would be no change in the exchange of energy since predators get very little (only 10%) of the energy from their food source.

Bloom's Level: 3. Apply
Section: 2.05
Topic: Trophic Levels

33. Which biogeochemical cycle lacks an atmospheric component?
A. The hydrologic cycle.
B. The carbon cycle.
C. The nitrogen cycle.
D. The phosphorous cycle.

Bloom's Level: 2. Understand
Section: 2.06
Topic: Biogeochemical Cycles

34. Water supplies contaminated with algae that produce toxins making the water unfit to drink is a result of the human impact to the
A. hydrologic cycle.
B. carbon cycle.
C. nitrogen cycle.
D. sulfur cycle.

Bloom's Level: 3. Apply
Section: 2.06
Topic: Biogeochemical Cycles