

Brett Robbins Academic Consulting

Biology 20 Practice Test

Unit 1: Energy and Matter Exchange in the Biosphere

25 Questions

Original practice questions written to the Alberta curriculum, in the style of past diploma examinations. Work through each question, then check your answers with the key at the end.

This practice test was made by AI and there may be mistakes. If a question or answer looks wrong, contact Brett for clarification.

Question 1

The biosphere is best described as

- A) the thin layer of Earth in which living organisms exist
- B) all of the water on the surface of Earth
- C) the layer of gases that surrounds Earth
- D) all of the rock and soil that forms the crust of Earth

Question 2

Which process removes carbon dioxide from the atmosphere and stores the carbon in glucose?

- | | |
|-------------------------|-------------------|
| A) Cellular respiration | B) Photosynthesis |
| C) Combustion | D) Decomposition |

Question 3

A deer feeds on grasses and shrubs. In this relationship, the deer is a

- | | |
|---------------------|-----------------------|
| A) producer | B) secondary consumer |
| C) primary consumer | D) decomposer |

Question 4

Decomposers such as bacteria and fungi are essential to an ecosystem because they

- A) capture energy from sunlight for producers
- B) convert nitrogen gas into usable nitrates
- C) transfer energy from consumers back to producers
- D) break down dead matter and release nutrients into the soil

Question 5

The producers in a grassland store 500000 kJ of energy.

Using the 10% rule, the energy transferred to the primary consumers, in kJ, is ____

Question 6

A food chain in a wetland is shown below.

cattails → snails → frogs → herons

In this food chain, the frog is a

- | | |
|----------------------|-----------------------|
| A) producer | B) primary consumer |
| C) tertiary consumer | D) secondary consumer |

Question 7

As energy moves from one trophic level to the next, most of the energy is

- A) lost as heat to the surroundings
- B) stored permanently in body tissues
- C) converted into new producers
- D) recycled back to the Sun

Question 8

Nitrogen gas in the atmosphere is converted into compounds that plants can use by the process of

- | | |
|----------------------|------------------|
| A) denitrification | B) nitrification |
| C) nitrogen fixation | D) decomposition |

Question 9

Phytoplankton in a lake capture 2400000 kJ of energy.

Using the 10% rule, the energy available to the tertiary consumers (the fourth trophic level), in kJ, is ____

Question 10

The phosphorus cycle differs from the carbon and nitrogen cycles because phosphorus

- A) cycles only through the atmosphere
- B) has no important gas phase and moves mainly through rock, soil, and water
- C) is not required by living organisms
- D) is converted into a gas by bacteria in root nodules

Question 11

A pyramid of numbers can be inverted, with fewer organisms at the base than above it, when

- A) producers reproduce more quickly than consumers
- B) one large producer, such as a tree, supports many small consumers
- C) consumers are larger than the producers
- D) energy is lost as heat at each transfer

Question 12

DDT sprayed on crops washed into a lake. Because of biomagnification, the organisms most seriously harmed by the DDT would be the

- A) algae in the lake
- B) zooplankton
- C) small fish
- D) top predators, such as ospreys

Question 13

Using the 10% rule, the primary consumers in an ecosystem receive 45000 kJ of energy. The energy originally stored by the producers, in kJ, was ____

Question 14

Carbon stored underground for millions of years is returned to the atmosphere most directly by

- A) photosynthesis in forests
- B) the respiration of animals
- C) the burning of fossil fuels
- D) the weathering of limestone rock

Question 15

Denitrifying bacteria in the soil convert

- | | |
|------------------------------|-------------------------------|
| A) nitrogen gas into ammonia | B) nitrates into nitrogen gas |
| C) ammonia into nitrites | D) proteins into ammonia |

Question 16

Bacteria living near deep-sea vents, where no sunlight reaches, produce food by

- A) photosynthesis
- B) cellular respiration
- C) fermentation
- D) chemosynthesis

Question 17

An earthworm that feeds on dead leaves lying on the forest floor is classified as a

- A) detritivore
- B) decomposer
- C) producer
- D) parasite

Question 18

Wheat in a field stores 900000 kJ of energy. Cattle eat the wheat, and people eat the cattle. Using the 10% rule, the energy from the wheat that reaches the people, in kJ, is ____

Question 19

Compared with a simple food chain, a food web usually makes an ecosystem more stable because

- A) producers create more energy in a web
- B) each species feeds on only one other species
- C) decomposers are no longer needed
- D) if one species declines, most consumers have alternative food sources

Question 20

In the nitrogen cycle, nitrification is the conversion of

- A) nitrates into nitrogen gas by bacteria
- B) ammonia into nitrites and then into nitrates by bacteria
- C) nitrogen gas into ammonia by lightning
- D) nitrates into proteins by plants

Question 21

Which sequence shows the correct direction of energy flow in an ecosystem?

- A) Sun → producer → herbivore → carnivore
- B) Sun → herbivore → producer → carnivore
- C) producer → Sun → herbivore → carnivore
- D) herbivore → carnivore → producer → Sun

Question 22

Phytoplankton in a lake contain DDT at a concentration of 0.5 ppm. At each step of the food chain, the concentration increases tenfold. Zooplankton eat the phytoplankton, small fish eat the zooplankton, and herons eat the small fish.

The concentration of DDT in the herons, in ppm, is ____

Question 23

When nitrogen compounds are assimilated by a plant, the nitrogen is used mainly to build

- A) amino acids and proteins
- B) glucose and starch
- C) fats and oils
- D) cellulose and lignin

Question 24

Phosphorus becomes available to plants in the soil mainly when

- A) lightning strikes the ground
- B) bacteria take it in from the air
- C) rocks containing phosphate weather and erode
- D) animals die and decompose

Question 25

In a grassland food web, grass is eaten by mice. Mice are eaten by both snakes and owls, and owls also eat snakes. The number of different trophic levels at which the owl feeds is ____

Answer Key

- | | | |
|----------|------------|---------|
| 1. A | 10. B | 19. D |
| 2. B | 11. B | 20. B |
| 3. C | 12. D | 21. A |
| 4. D | 13. 450000 | 22. 500 |
| 5. 50000 | 14. C | 23. A |
| 6. D | 15. B | 24. C |
| 7. A | 16. D | 25. 2 |
| 8. C | 17. A | |
| 9. 2400 | 18. 9000 | |

This practice test was made by AI and there may be mistakes. If a question or answer looks wrong, contact Brett for clarification.