Unit Review Answers (Student textbook pages 84–87)

1. Answers may vary. For example: Like any other living organism, humans require energy and nutrients. We can only obtain this by consuming other organisms in our ecosystems. In addition to this, we contribute to the ecosystem with our byproducts of cellular respiration fueling photosynthesis and our wastes contributing nutrients back to the soil. To survive, we must work with the environment, not separate from it.

2. Answers may vary. The graphic organizer should demonstrate an understanding that the sustainability of ecosystems depends on balanced interactions between their components using key concepts from the unit.

3. Answers may vary. For example: I would vote against this proposal because it is easier to create jobs than to create wetlands and sustainable ecosystems.

4. Definitions and matching pictures may vary. Sample definitions:

Key Term	Definition
Ecology	a branch of science that studies the relationships between living things and the environment
Biotic	a living part of the ecosystem
Abiotic	a non-living part of the ecosystem
Ecosystem	a system that is made up of all the interacting biotic and abiotic parts of a certain place
Terrestrial Ecosystem	an ecosystem that is based on mostly or totally on land
Aquatic Ecosystem	an ecosystem that is based mostly or totally in water
Photosynthesis	a process in the cells of plants, algae, and some bacteria that converts light energy from the Sun into stored chemical energy
Cellular Respiration	a process in the cells of most organisms that converts the energy stored in chemical compounds into usable energy
Producer	any living thing that gets the energy it needs by making its own food
Consumer	any living thing that gets the energy it needs by eating producers or other consumers
Food Chain	a model that describes how the energy that is stored in food is transferred from one living thing to another
Food Web	a model that describes how energy in an ecosystem is transferred through two or more food chains
Decomposer	organism that obtains energy by consuming dead plant and animal matter
Nutrient	any substance that a living thing needs to sustain its life
Nutrient Cycle	the pattern of continual use and re-use of a nutrient
Population	all the individuals of a species that live in a certain place at a certain time
Carrying Capacity	the largest population size that an ecosystem can sustain
Limiting Factor	any resources that limit the size to which a population can grow
Introduced Species	any species that has been introduced into and lives in an ecosystem where it is not found naturally
Species Diversity	the number and variety of different species of living things in an area
Watershed	any area of land (either natural or human-made or both) that drains into a body of water
Sustainability	maintaining an ecosystem so that present populations can get the resources they need without risking the ability of future generations to get the resources that they will need
Biodiversity	all the diversity of species that live in an ecosystem, as well as all the diversity of ecosystems within and beyond that ecosystem
Equilibrium	a state of balance in an ecosystem

5. Answers may vary. For example:

Terrestrial	Aquatic
Forests	Oceans
Deserts	Rivers
Cities	Ponds
Our bodies	Lakes
Trees	Marshes

6. Answers may vary. Student answers should reflect the understanding that watersheds connect terrestrial and aquatic ecosystems, therefore whatever we do to the land affects the water.

7. The Sun is the basis of energy for all living things on the Earth. Consumers may eat producers or other consumers, but all the energy absorbed from this consumption is the Sun's energy which has been converted into a usable form of energy like glucose

during photosynthesis. Without the Sun, the food consumers eat would have no energy.

8. Energy is lost in the form of heat in every step of the chain. Thus, the farther along the consumer is from the producer, the less of the producer's energy the consumer will get.

9. Photosynthesis converts the Sun's energy into a usable form that we consume to give us energy. Photosynthesis also provides us with oxygen that we need to breathe. Cellular respiration releases the energy we absorbed from consumption to fuel our bodies.

10. *Food chain only*: simple, shown as a straight line
Food web only: complex, shown like a web, includes many different food chains
Intersection: describe energy flow in an ecosystem from producers to consumers, can be terrestrial or aquatic

11. Wolverines eat consumers that have eaten producers.

12. While the materials required and byproducts are similar and complementary, they are not quite opposites. The energy used for photosynthesis is light energy while the byproduct of cellular respiration is energy in the form of heat and chemical energy used for metabolism. So reversing the process of cellular respiration will not be the same as photosynthesis because the forms of energy are different.

13. Student answers should reflect understanding of biotic and abiotic limiting factors in an ecosystem. Examples:
Biotic: Food supply, predation, disease, parasites, competition
Abiotic: oxygen (if aquatic), living space, sunlight, water, shelter, weather, nutrients

14. Answers may vary. For example:

Add Carbon Dioxide	Remove Carbon Dioxide
driving cars cellular respiration burning wood	photosynthesis

15. The fertilizer run-off could create an algal bloom in the watershed. This could cover the surface of the water which would lead to lower plants dying due to lack of sunlight. There would be more decomposers due to the increase of dead plants which would increase the carbon dioxide levels due to both the decrease in photosynthesis and the increase of cellular respiration. This would eventually cause fish to suffocate and die which would greatly reduce the biodiversity in that ecosystem.

16. Purple loosestrife competes with many native species in the ecosystem and typically takes all the nutrients, causing the purple loosestrife to thrive while other wetland plants die.

17. a) With the introduction of a new limiting factor, the carrying capacity for the minnows should decrease.

b) Everything is connected. The predatory fish could also decrease the levels of other potential prey. Any other organisms that would eat minnows would face increased competition and their carrying capacity would probably decrease as well.

18. a) Answers may vary. For example, use a T-chart to document all the abiotic and biotic parts of the schoolyard.

b) Answers may vary. For example, create a flowchart showing the relationships of abiotic and biotic parts of an ecosystem interact. An ecosystem should be chosen and the abiotic and biotic components will need to be determined.

c) Answers may vary. For example, find information on human activities and investigate how these activities affected the environment. Use a cause and effect map to summarize the data.

19. Answers may vary. For example: Observe the lake to see if there is an abundance of algae. Take a water sample to check the nitrogen concentrations.

20. Answers may vary. For example: The effects of lack of food and water are much more immediate to the entire population than other limiting factors such as living space.

21. a) The wolf population was increasing and the moose population was decreasing.

b) Wolves will control the population of moose by eating them.

c) Answers may vary. For example: Food supply, space, competition, water, disease, hunting, or parasites.

22. Either yes or no is acceptable as long as students support their opinion with factual information.

23. *Photosynthesis only*: uses carbon dioxide, water, and light energy; produces oxygen and glucose
Cellular Respiration only: occurs in animals; uses oxygen and glucose; produces carbon dioxide, water, and energy.
Similarities (middle): occurs in plants; chemical reaction

24. Answers may vary. Story or comic should include nutrients not being recycled into the soil, plants not growing due to lack of nutrients, and consumers dying due to lack of producers. The loss of decomposers would shift the balance to have more oxygen because there is less cellular respiration. Once the plants die, the balance will shift to having too much carbon.

25. Students' answers should include photosynthesis in pond plants and cellular respiration by pond plants/animals.

26. Answers may vary. Cartoon should demonstrate understanding of key concepts, demonstrate creativity, and be appropriate for Grade 3 students.

27. Answers may vary. Answer should demonstrate understanding of key concepts and effectively express information and ideas.

28. The grass clippings will get decomposed and the nutrients will be recycled into the soil.

29. Answers may vary. For example:
Everything is connected. The carbon dioxide emissions contribute to greenhouse gases which will cause global warming.

30. Answers may vary. For example:

a) The construction destroyed an existing field ecosystem. The loss of so much grass and green plants will reduce the amount of oxygen and the burning of fossil fuels will increase the amount of carbon dioxide concentrations. Removing an ecosystem would probably kill or displace the organisms living there and the sound pollution could displace organisms near the construction area.

b) A rabbit is limited by predators such as hawks, owls, and foxes, by food such as grass and plants, by competition from other rabbits and other herbivores such as mice, and by space as humans reduce the size of their ecosystems.

31. a) Answers may vary. For example:

Pros:

- reduces amount of waste that goes to landfill
- compost can be used for lawns and gardens
- municipalities can earn money by selling the compost

Cons:

- most programs do not accommodate offices, schools, apartments, or condominiums
- residents need to separate garbage which can be time consuming
- some people can choose not to participate

b) Students letters should be a polite summary of the above points.

32. a) Answers may vary. For example: Pesticides will often reach destinations that were untargeted by spreading through the air, water, or other organisms. Pesticides are very poisonous and can cause dizziness, headaches, vomiting, skin and eye problems, cancer, birth defects, and even death.

b) Answers may vary. For example:

- Mow lawns frequently before the dandelions blossom and release their seeds.
- Weeds can be directly removed out of the ground.
- Corn gluten meal, boiling water, or vinegar can be poured over weeds to kill them.
- Weeds prefer acidic soil with relatively low nutrient contents. If compost and mulch is added to the soil, this will be ideal conditions for wanted plants and weeds will be less common.

33. Answers may vary. For example: By planting trees and using an organic compost instead of fertilizers, we can reduce waste and improve the environment around us.

34. b)

35. b)

36. c)

37. c)

38. A population is all the organisms of the same species in the same place and time. Populations are made up of individuals and can change over time.