

## Sustainable Ecosystems Unit Test Review

1. What are the 3 main ways that organisms in a community interact?

The 3 main ways that organisms in a community interact are:

1. Competition
2. Predation
3. Symbiosis

2. Define predation. Give an example of a predator/prey relationship.

Predation occurs when one organism eats another to obtain food.

Ex. Lynx/Hare, Deer/Wolf

3. What is symbiosis and what are the 3 main types?

Symbiosis is a close interaction between 2 different species in which members of one species live in, on, or near members of another species.

There are 3 main types of symbiosis:

1. Mutualism

- 2. Commensalism
- 3. Parasitism

4. What is mutualism?

Both species benefit from a symbiotic partnership

5. What is commensalism?

One species benefits, the other species is not affected

6. What is parasitism?

One species benefits at the expense of another species

7. What happens to a population in the absence of limiting factors?

In the absence of limiting factors, organisms can reproduce exponentially. If there is unlimited food, water, and space, populations can grow very quickly.

8. Identify the following factors as Abiotic or Biotic using an x.

Factor	Abiotic	Biotic
1. Sunlight	x	
2. Plants		x

3. Nutrients	x	
4. Water	x	
5. Animals		x
6. Bacteria		x
7. Oxygen	x	
8. Temperature	x	
9. Soil/Sediment	x	

9. List 4 abiotic limiting factors.

- *Amount of sunlight*
- *Amount of Water*
- *Soil quality*
- *Air flow*
- *Natural disturbances such as storms, fire or droughts*
- *Human disturbances such as logging*

10. List 4 biotic limiting factors.

- *Competition among organisms for resources*
- *Presence of predators*
- *Reliance on other organisms for survival*
- *Presence of disease causing organisms*

11. Equilibrium usually occurs when an ecosystem reaches its carrying capacity. What does it mean to reach carrying capacity?

**Carrying capacity** is the maximum number of individuals that an ecosystem can support indefinitely

12. What is the source of all energy for ecosystems on Earth?

## The Sun

13. What is the name of the process that converts Sun's energy into food energy? Write out the chemical reaction for this process.

## Photosynthesis



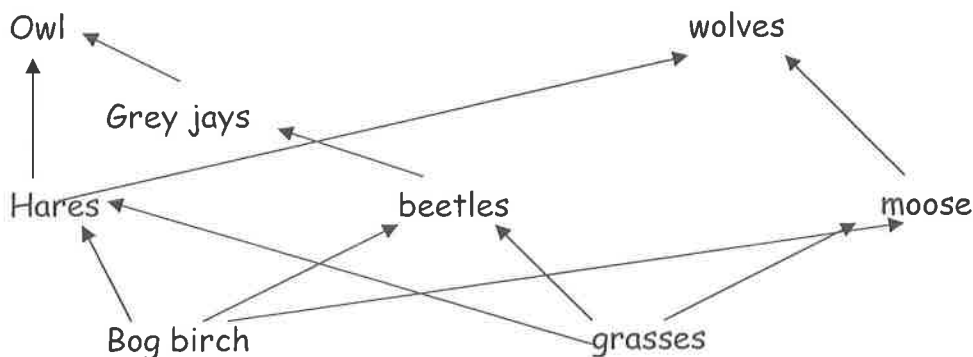
14. Write out the chemical reaction for cellular respiration.



15. Read the following passage describing the feeding relationships in an ecosystem:

The primary consumers in this ecosystem are snowshoe hares, moose and beetle that feed on bog birch and grass. Grey jays eat the beetles; owls feed upon the grey jays and snowshoe hares. Wolves eat the moose and snowshoe hares.

a) Draw a food web for this ecosystem.



b) What are the producers in this ecosystem?

Bog birch and grasses

c) Name the carnivores and herbivores in this ecosystem.

Herbivores: Moose, snowshoe hare, beetles

Carnivores: Owl, Wolves

d) Write a food chain with 4 trophic levels with the owl as the top carnivore. Label the producers, the primary consumers, the secondary consumers, and the tertiary consumers. (3 marks)

grasses → beetles → grey jays → owl  
(producer) (primary consumer) (secondary consumer) (tertiary consumer)

16. Answer the questions based on the food chain in Q. 15 (d).

It has been determined that the secondary consumers use 35 000 kJ/m<sup>2</sup> of energy. Show your work for the questions below

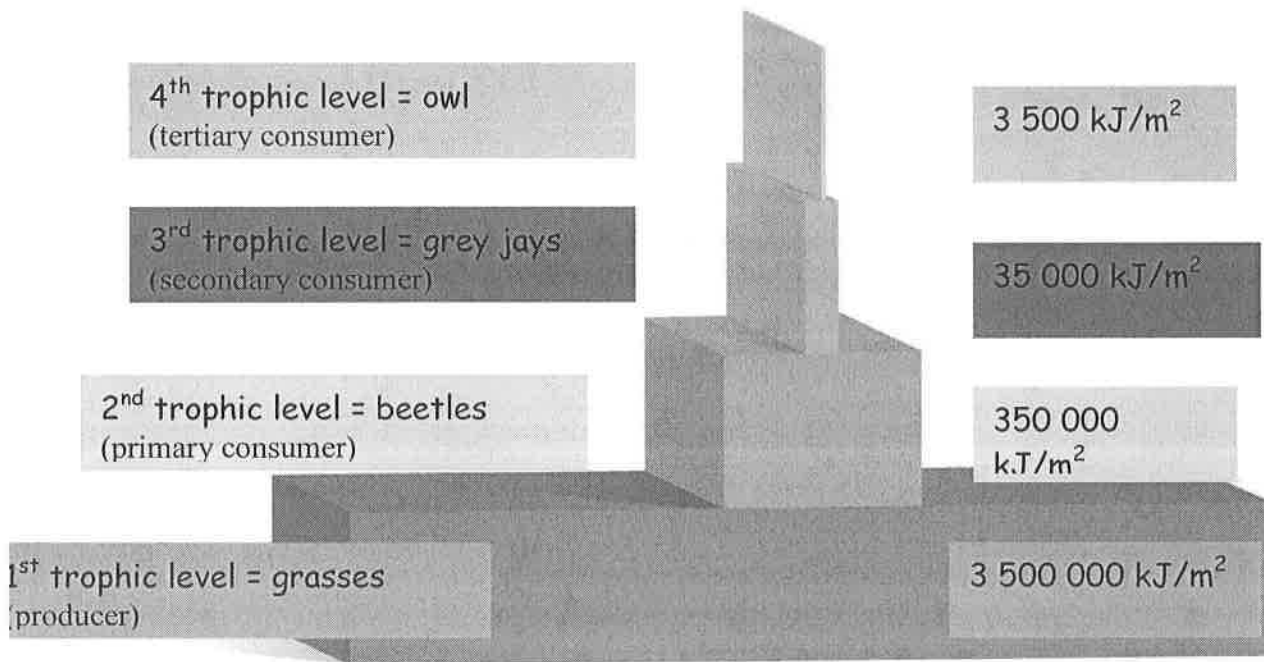
a) How much energy was stored in the producers in that same food chain?

3 500 000 kJ/m<sup>2</sup>

b) How much energy would be used by the tertiary consumers in the same food chain?

3 500 kJ/m<sup>2</sup>

c) Draw an energy pyramid to represent this food chain. Label all levels in the pyramid.



**Figure 1.32** An energy pyramid shows the flow of energy through an ecosystem. The top level shows the amount of energy from the bottom level that is still available.

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17. Why are nutrient cycles necessary for life to exist on Earth?

Nothing new is added to the Earth's biosphere.  
Since new matter cannot be created, it is essential

that living things be able to reuse existing matter over and over again.

18. Draw and label the Water Cycle.

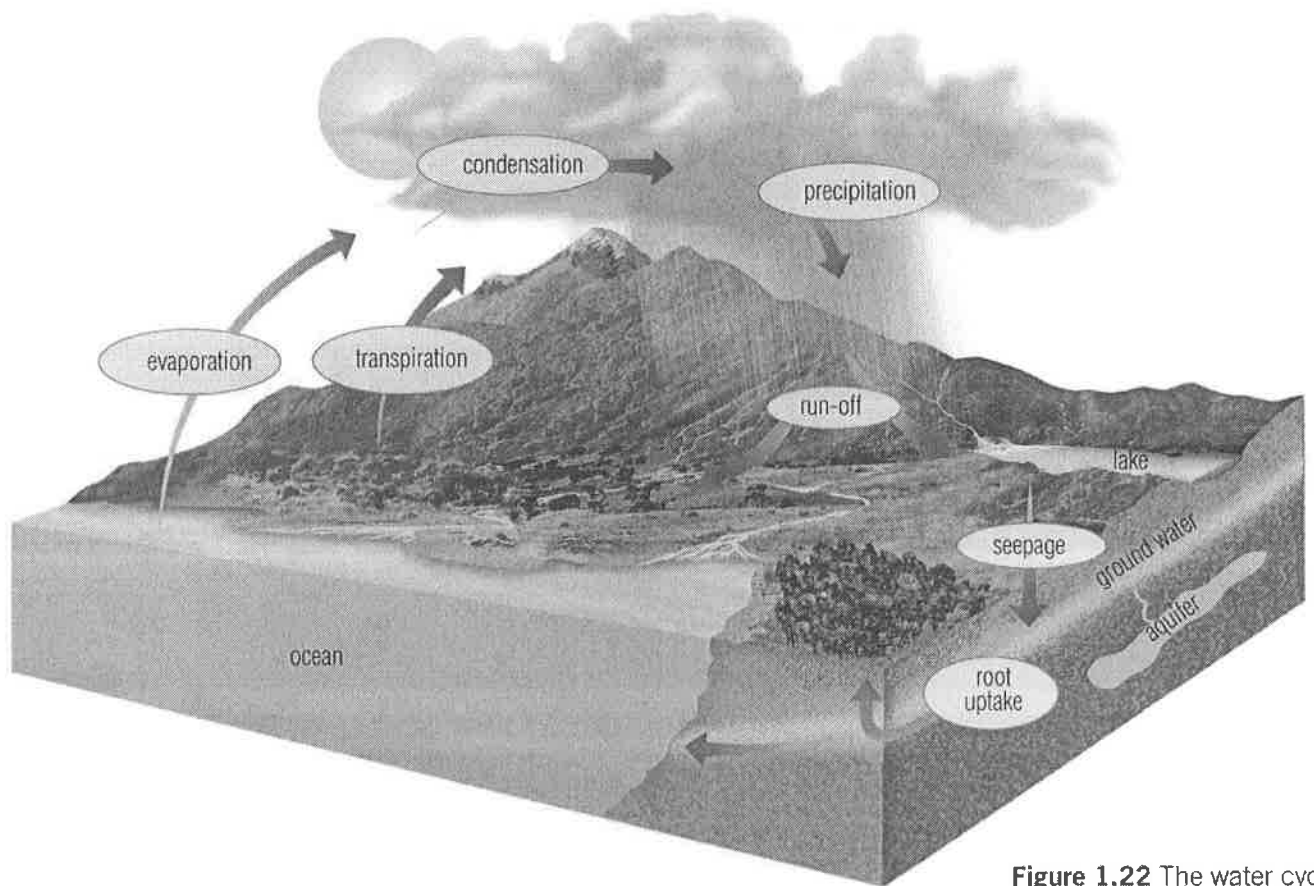


Figure 1.22 The water cycle

19. Give a detailed explanation of steps involved in the Nitrogen Cycle. Draw a diagram and label each step on the diagram.

- A. Large amounts of nitrogen exist in the atmosphere as nitrogen gas ( $N_2$ ).
- B. **Nitrogen-fixing bacteria** in the soil convert the  $N_2$  gas into ammonia.
- C. **Nitrifying bacteria** turn ammonia into nitrites and then nitrates ( $NO_3^-$ ).
- D. Plants absorb the nitrates from the soil into their root system. The plants use the nitrates to synthesize proteins. Consumers use the plant proteins to make protein of their own.
- E. Dead organic matter (dead organisms and their waste) are converted by some bacteria and fungi, called **decomposers**, into nitrites and nitrates.
- F. **Denitrifying bacteria** break down nitrates into nitrogen gas. The gas is released back into the environment. This process is called **denitrification**.

20. Why is the Nitrogen Cycle so important?

The nitrogen cycle is crucial to life on Earth. Nitrogen is required for the synthesis of proteins and DNA (deoxyribonucleic acid). Yet nitrogen in its gaseous form



is almost entirely unusable to life forms. The Nitrogen Cycle converts nitrogen into a usable form.

21. Which type of bacteria in the Nitrogen Cycle removes nitrogen from the atmosphere?

**Nitrogen-fixing bacteria** in the soil convert the  $N_2$  gas into ammonia.

22. Which type of bacteria in the Nitrogen Cycle turns ammonia into a form that plants can use to make protein?

**Nitrifying bacteria** turn ammonia into nitrites and then nitrates ( $NO_3^-$ ) which plants use to make protein.

23. Which type of bacteria convert nitrates back to nitrogen gas and return it to the atmosphere?

**Denitrifying bacteria** convert nitrates back into nitrogen gas, which returns it to the atmosphere

24. What types of organisms act as decomposers in the Carbon Cycle?

**Bacteria and fungi**

25. Give an example of a carbon reservoir (removes carbon from the atmosphere) and an example of a carbon source (adds carbon to the atmosphere).

Reservoir - forest, plants, oceans, etc.

Source - burning fossil fuels

26. The people of Easter Island taught us an important lesson in sustainability. What does it mean when an ecosystem is sustainable?

The ecosystem is able to support the needs of its community for a long period of time.

27. 17. What is an invasive species? Give 1 reason why invasive species often outcompete native species?

An invasive species is a non-native species that causes harm to the ecosystem into which it has been introduced.

Invasive species have no natural predators in the new ecosystem or they reproduce faster than the native species

28. List the layers of soil.

- i. Top soil
- ii. Subsoil
- iii. Bedrock

29. Put the types of soil in order from most fertile to least fertile.

- 1. loam
- 2. clay
- 3. sand

30. What is crop rotation and why is it so important?

Crop Rotation is the practice of planting a different crop in a particular field each year. It is important so that the nutrients in the soil are replenished and prevent soil erosion. This is greatly improves soil quality

31. Explain the processes of bioaccumulation and biomagnification.

A substance (i.e. pesticide) builds up in the body of an organism. The substance increases in concentration at each trophic level in the food chain.

32. Why is the use of pesticides a concern for nursing or pregnant mothers?

The pesticides bioaccumulate in plants. Anything that eats these plants will inherit the toxin. If a nursing or pregnant mother eats either plants or animals that a pesticide has accumulated in, they will store some of the pesticide in their own fat tissue. The harmful toxins in the pesticides will be released into the breast milk of these mothers. The toxin will be passed on to their children.

33. What is an ecological footprint and what does it measure? What are the categories that are used to measure the resources a person consumes?

An ecological footprint is an estimate of how much land and water is needed to support a person's lifestyle.

This includes all of the resources you consume and all the waste you produce :

- i. Food
- ii. Travel (mobility)
- iii. Shelter
- iv. Goods and Services (Stuff that you buy)

34. What are the 4 steps that you could take to decrease your ecological footprint and contribute to environmental stewardship? Give a specific example for each step.

- i. Reduce emissions - walk, ride a bike, take public transit
- ii. Save energy - moderate the thermostat, reduce electricity consumption
- iii. Eat locally grown food - reduces pollution from transporting the food
- iv. Buy wisely - buy only what you really need

**\*\*Review all key terms!!**