

# 4.1 Species, Communities, Ecosystems & Energy Flow

## Question Paper

Course	DPIB Biology
Section	4. Ecology
Topic	4.1 Species, Communities, Ecosystems & Energy Flow
Difficulty	Easy

**Time allowed:** 60  
**Score:** /48  
**Percentage:** /100

### Question 1a

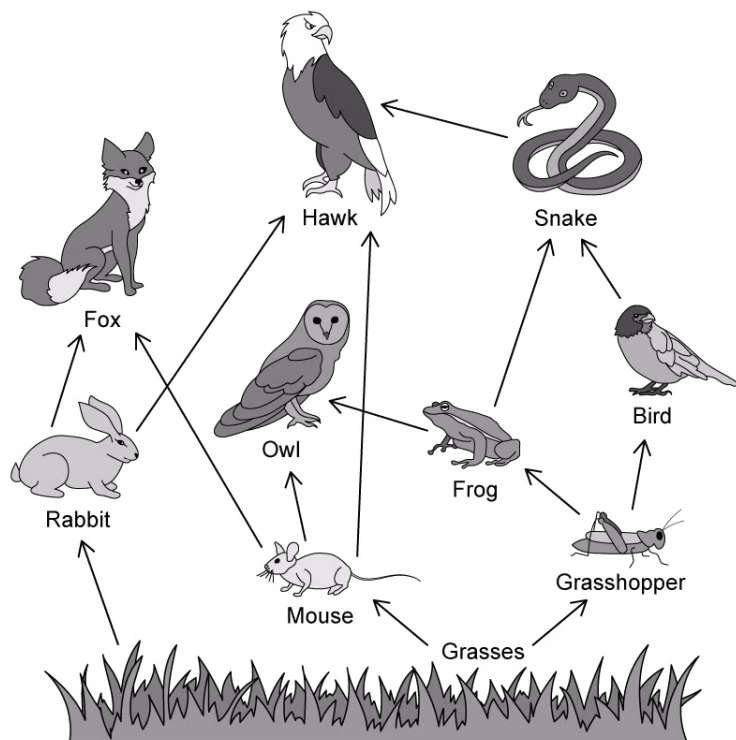
a)  
Give the definition of a species.

[1 mark]

[1 mark]

### Question 1b

b)  
The image shows a woodland food web.



What word is used to collectively describe all the interbreeding foxes in the woodland represented by this food web?

[1 mark]

[1 mark]

### Question 1c

c)  
Identify all the primary consumers from the forest food web.

[1 mark]

[1 mark]

**Question 1d**

d)  
Consumers in this forest food web obtain organic molecules through eating organisms in the trophic level before.

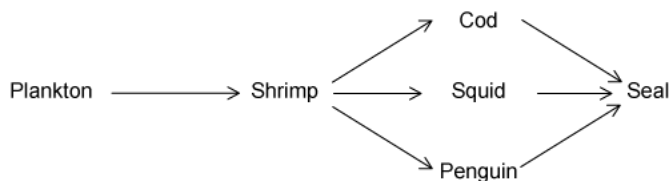
Which two elements do all organic molecules contain?

[2 marks]

[2 marks]

**Question 2a**

a)  
This is a simple food web found in an ocean ecosystem.



Identify an example of an organism from the food web which obtains food using the method of nutrition named in the table.

<b>Autotroph</b>	
<b>Heterotroph</b>	

[2 marks]

[2 marks]

**Question 2b**

b)  
Identify an organism (or a group of organisms), not shown in the ocean food web, which feeds on all trophic levels of the food chain.

[1 mark]

[1 mark]

### Question 2c

c)

Each of the three sentences about ecosystems contains **one** error.

- In a functioning ecosystem, organisms are constantly recycled.
- Detritivores obtain inorganic nutrients from the abiotic environment and convert them to organic molecules during photosynthesis.
- Decomposition is fundamental in ensuring that ecosystems remain unsustainable over long periods of time.

Identify and replace the incorrect word in each sentence.

[3 marks]

[3 marks]

### Question 2d

d)

Where does the organism in the first trophic level of this ocean food web obtain the carbon that it uses to build organic molecules?

[2 marks]

[2 marks]

### Question 3a

a)

Place a (✓) or (X) in the correct columns for each of the factors listed in the table below:

	<b>Biotic</b>	<b>Abiotic</b>
<b>Sunlight</b>		
<b>Predation</b>		
<b>Food availability</b>		
<b>Mineral availability</b>		
<b>Temperature</b>		

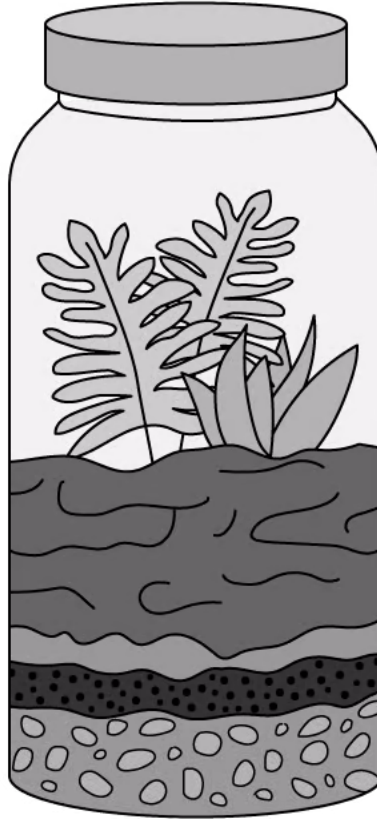
[5 marks]

[5 marks]

### Question 3b

b)

Abiotic factors can be controlled in order to study the response of a naturally occurring ecosystem using the set up below.



What is the name given to the set up shown in the image which allows the study of ecosystems?

[1 mark]

[1 mark]

### Question 3c

c)

Suggest why the experiment set up in part **b)** should include the following features:

- A transparent container
- A lid to seal the container
- Minimal primary consumers and no secondary consumers

[3 marks]

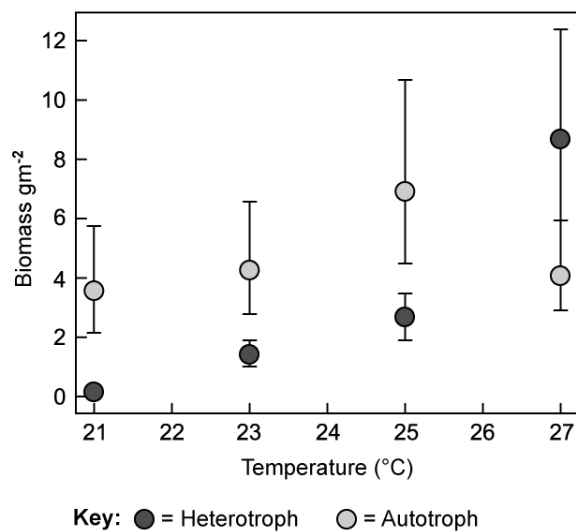
[3 marks]

### Question 3d

d)

A mesocosm was set up to study the effect of increasing global temperatures on the biomass of aquatic autotrophs and heterotrophs.

The graph shows the data collected.



Describe what happened to the biomass of heterotrophs and autotrophs as temperatures increased from 21 °C to 27 °C.

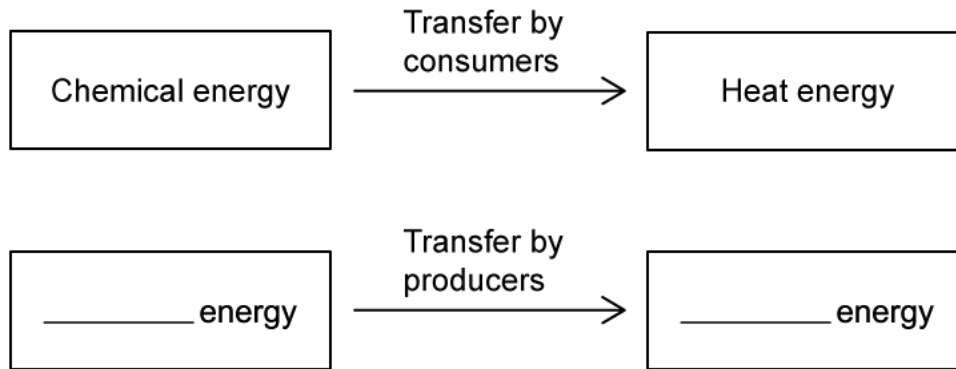
[2 marks]

[2 marks]

**Question 4a**

a)

When a consumer eats another organism, it converts chemical energy into other forms of energy, such as heat energy. This is represented in the energy transfer diagram below.



Complete the diagram to identify the **main** energy transfer carried out by producers in a food chain.

[2 marks]

[2 marks]

**Question 4b**

b)

A blackbird ate snails containing 1150 kJ of energy. Only 10% of this energy was transferred to the blackbird.

Calculate the energy transferred from the snails to the blackbird.

[2 marks]

[2 marks]

**Question 4c**

c)

Identify three functions of life which rely on energy transferred in respiration.

[3 marks]

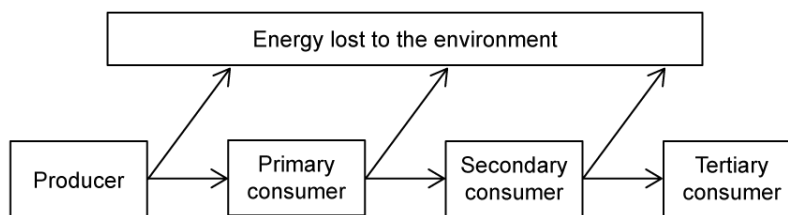
[3 marks]



### Question 4d

d)

The diagram shows the movement of energy through a food web.



Explain why energy is transferred to the environment at each trophic level.

[2 marks]

[2 marks]

### Question 5a

*One mark is available for clarity of communication throughout this question.*

a)

Describe how a quadrat could be used to study the distribution of a particular species of clover plant in a meadow compared to a forest.

[5 marks]

[5 marks]

**Question 5b**

b)

Outline some of the reasons that energy is lost between each trophic level of the food chain.

**[4 marks]****[4 marks]****Question 5c**

c)

Describe, with examples, the different modes of nutrition used by organisms.

**[6 marks]****[6 marks]**

