

## Variety of Life - Questions by Topic

Q1.

The photograph below shows a waxy leaf frog (*Phyllomedusa sauvagii*). This species of frog is found in hot, dry areas of South America.

It has glands that produce waxy lipids to spread over its skin. This reduces water loss. The waxy leaf frog is active only at night, when it hunts for insects in the trees.



Magnification  $\times 0.5$

(a) (i) Describe how the waxy leaf frog is physiologically adapted to its environment.

(1)

.....  
.....

(ii) Describe a behavioural adaptation of the waxy leaf frog to its environment.

(1)

.....  
.....

(iii) Suggest how the behavioural adaptation described enables the waxy leaf frog to survive in this habitat.

(1)

.....  
.....  
.....

(b) With reference to the waxy leaf frog, explain what is meant by the term **niche**.

(2)

.....



Q2.

Madagascar is an island rich in biodiversity.

Lemurs are a diverse group of primates endemic to Madagascar.

Scientists suggest there may be as many as 100 different species of lemur.

(i) State what is meant by the term **endemic**.

(1)

.....  
.....  
.....

(ii) Describe what is meant by **biodiversity**.

(2)

.....  
.....  
.....  
.....  
.....

(iii) Explain how the biodiversity of lemurs in two different parts of Madagascar could be compared.

(3)

.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....

Q3.

Muscular dystrophy is a group of disorders that gradually cause muscles to weaken.

One type of muscular dystrophy, caused by a recessive allele, affects 10 people in 100 000 of the population.

Calculate the number of carriers in a population of 17.02 million.

Use the Hardy-Weinberg equation,  $p^2 + 2pq + q^2 = 1$

(3)

Answer .....

**(Total for question = 3 marks)**

Q4.

(i) A study compared the diversity of species at different places on a shore. On the upper shore the following data were obtained.

Species	Number of individuals found
<i>Pelvetia canaliculata</i>	10
<i>Enteromorpha</i> sp.	3
<i>Patella vulgata</i>	3
<i>Littorina littorea</i>	15
<i>Gibbula</i> sp.	14
Lichens	15

Calculate an index of diversity ( $D$ ) for this site using the formula below.

(3)

$$D = \frac{N(N - 1)}{\sum n(n - 1)}$$

$n$  = total number of organisms of a particular species

$N$  = total number of organisms of all species

Answer .....

(ii) On the middle shore the index was found to be 7.74 with a total individual count of 37.

Comment on the relationship between diversity and the total number of individuals on these two parts of the shore.

(2)

.....

.....

.....

.....

**(Total for question = 5 marks)**

Q5.

In the 1970s, a theory for a new system of taxonomy was proposed by a scientist called Woese.

Describe the process by which the scientific community critically evaluates new theories.

(3)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Q6. The group of birds, known as warblers, contains many species which are very similar in external appearance.

Two of these species, the chiffchaff, *Phylloscopus collybita*, and the willow warbler, *Phylloscopus trochilus*, are so similar that many experts can identify them only by listening to their individually-characteristic songs.

These songs are used during breeding to mark territory and attract mates.

The photographs below show these two warblers.



Chiffchaff



Willow warbler

Magnification  $\times 0.75$

(a) Although chiffchaffs and willow warblers are often found at the same time in the same woodlands, they do not interbreed.

(i) Suggest why successful interbreeding between chiffchaffs and willow warblers would make some scientists doubt their classification as separate species.

(3)

.....

.....

.....

.....

.....

.....

(ii) Suggest reasons why the two species do not interbreed.

(3)

.....

.....

.....

.....  
.....  
.....  
(b) Records show that very little change in the appearance of chiffchaffs and willow warblers has occurred during the last two hundred years.

Suggest why the rate of change in the appearance of these two species is relatively slow.

(3)

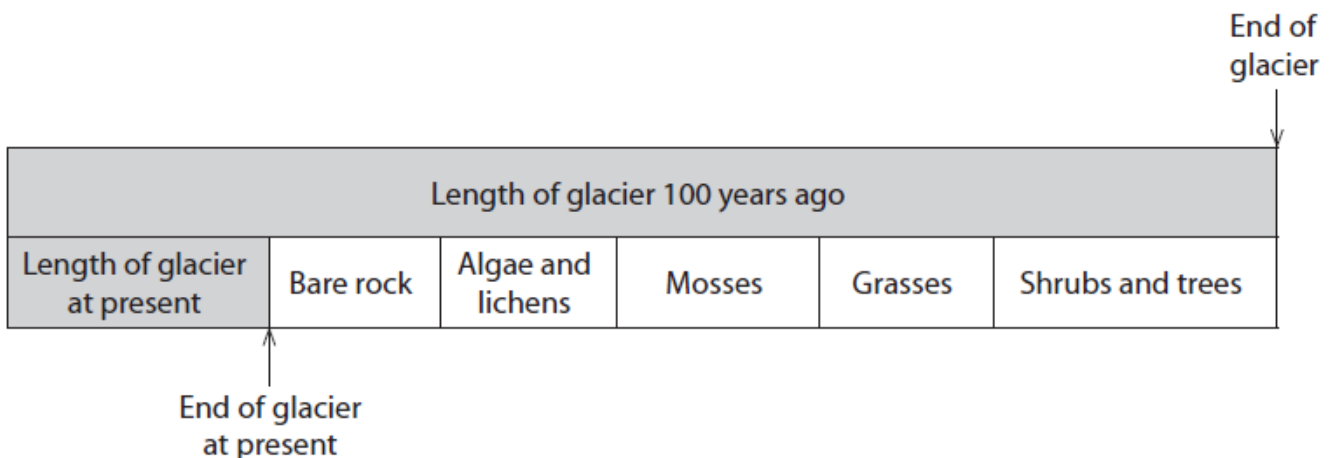
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....

**(Total for Question = 9 marks)**

Q7.

Glaciers are long, large masses of ice that formed thousands of years ago. As a result of warmer climates, more ice is melting. This is reducing the length of the glaciers. As a result, bare rock that was once covered by the glacier becomes exposed.

The diagram below shows the length of a glacier 100 years ago and the glacier at present. It also shows what is now found in a transect taken from where the front edge of the glacier is at present.



(a) Using the information in the diagram, describe and explain the changes in the distribution of organisms with distance from the front edge of this glacier.

(3)

.....

.....

.....

.....

.....

.....

.....

(b) *Epilobium latifolium* is a plant that occupies a niche in an area once covered by this glacier. It is a short flowering plant that grows in clumps.

The photograph below shows three clumps of *Epilobium latifolium*.



} Clump of *Epilobium latifolium*

Magnification  $\times 0.2$

(i) Explain what is meant by the term **niche**, using the plant *Epilobium latifolium* as an example.

(3)

.....

.....

.....

.....

.....

.....

.....



