

Biodiversity

Question Paper 1

Level	A Level
Subject	Biology
Exam Board	OCR
Module	Biodiversity, evolution and disease
Topic	Biodiversity
Booklet	Question Paper 1

Time allowed: 59 minutes

Score: /44

Percentage: /100

Grade Boundaries:

A*	A	B	C	D	E
>69%	56%	50%	42%	34%	26%

Question 1

The Millennium Seed Bank has over two billion seeds in storage.

Which of the options, **A** to **D**, describes the type of conservation carried out at the Millennium Seed Bank?

- A** in-situ conservation of species biodiversity
- B** in-situ conservation of habitat biodiversity
- C** ex-situ conservation of species biodiversity
- D** ex-situ conservation of habitat biodiversity

[1]

Question 2

The genetic diversity of a population can be estimated using the following formula:

$$\text{proportion of polymorphic gene loci} = \frac{\text{number of polymorphic gene loci}}{\text{total number of loci}}$$

In 1992 a study estimated the genetic diversity of four isolated populations of lions. They recorded the number of gene variants at a selection of gene loci in each population.

Which of the following populations of lions has the greatest proportion of polymorphic gene loci?

- A. Asiatic Lion: 73 polymorphic loci out of 1927.
- B. Transvaal Lion: 1110 polymorphic loci out of 2156.
- C. Masai Lion: 1030 polymorphic loci out of 2315.
- D. West African Lion: 1004 polymorphic loci out of 2008.

[1]

Question 3

Tropical rainforests have a very high biodiversity of plant species.

Which of the statements, **A** to **D**, is an economic benefit of high biodiversity?

- A** High plant biodiversity decreases the animal biodiversity in the rainforest.
- B** High plant biodiversity increases the organic matter in rainforest soils.
- C** High plant biodiversity supports drug discovery and development.
- D** High plant biodiversity protects the ecosystem from environmental changes.

[1]

Question 4

Which of the statements, **A** to **D**, best defines the term *species evenness*?

- A. the number of species in an area
- B. the relative abundance of each species in an area
- C. the relative number of individuals of a species in an area
- D. the spread of species over an area

[1]

Question 5

(a) The cassowary is a large, flightless bird found in the rainforest in parts of Australia. It feeds mainly on fruit. The seeds of the fruit are deposited on the rainforest floor.

(i) The cassowary is known as a *keystone species*. This means it is important for the survival of other species.

Suggest what role the cassowary plays in the survival of other species. [1]

(ii) The cassowary needs to be conserved for ecological reasons.

State **two** other reasons for maintaining biodiversity. [2]

(b) The mountain gorilla is an endangered species with as few as 880 individuals surviving in the wild. Many of the animals have been ‘habituated’ to human contact. The health of these animals is monitored and medical assistance is given when necessary. Animals that are not habituated are rarely visited.

(i) Suggest one advantage **and** one disadvantage of keeping some gorilla families that have not been habituated.

[2]

- (ii) The gorilla population in one area, Virunga, has been regularly monitored (**Table 24.1**). The data have been collected by indirect methods such as collecting dung samples at nest sites. However, DNA analysis of another gorilla population suggests that estimates made by these indirect methods may be up to 6% inaccurate.

Year	Population in Virunga
1981	254
1989	320
2003	380
2010	480

Table 24.1

Calculate the mean annual percentage rate of growth of the gorilla population in Virunga between 1981 and 2010. [2]

- (iii) In 1993 the Rio Convention on Biodiversity came into force. In 2010, one conservationist commented that the Rio Convention had had a real effect on the gorilla population.

Use the information above to evaluate the effect that the Rio Convention on Biodiversity has had on the gorillas in Virunga. [3]

[Total: 10]

Question 6

The Royal Botanic Gardens at Kew plays an important role in plant conservation. One plant that has been conserved at Kew is the world's smallest water lily, the thermal lily, *Nymphaea thermarum*.

In its natural habitat, the thermal lily grows in hot water springs in central Africa.

(a) State the genus to which the thermal lily belongs. [1]

(b) Explain why it is sometimes necessary to conserve a plant species, such as *N. thermarum*, outside its natural habitat (*ex situ*). [3]

(c) The Royal Botanic Gardens also manages the Millennium Seed Bank, which aims to store seeds from one quarter of all plant species.

Give **three** advantages of conserving plant species as seeds and **not** as adult plants. [3]

- (d) When measuring the biodiversity of a habitat, it is difficult to count every organism. It is therefore necessary to sample a proportion of the habitat. The sampling process must not be biased.

Outline an unbiased sampling method that can be used to measure the biodiversity of plant species in grassland. **[4]**

- (e) Scientists try to estimate the total number of species on Earth.

Suggest **three** reasons why such estimates are not likely to be accurate. **[3]**

[Total: 14]

Question 7

The population of the white-backed vulture, *Gyps bengalensis*, in India has fallen by 97% to an estimated 4 000 vultures. This vulture is now considered to be 'critically endangered'. Reasons for the decline in numbers include:

- vultures feed on carcasses including those from farm animals.
- these farm animals may have been treated with a pain killer. This particular pain killer causes kidney failure in the vultures.
- the use of this pain killer is being phased out. However, many farmers continue to use up their stocks of the drug.
- this pain killer is not easily biodegradable and will remain in the environment for many years.

(a) (i) Suggest what is meant by *critically endangered*. [1]

(ii) Calculate the **original** population of the white-backed vulture.
Show your working. [2]

(b) A captive breeding programme has been set up in an effort to save the white-backed vulture.

Three centres in India have been built, each housing up to 40 individuals. These vultures have been collected from different areas of the Indian subcontinent.

(i) Explain why the decision was made to conserve the species in captivity (*ex situ*) rather than in the wild (*in situ*). [4]

- (ii) Explain why the white-backed vultures in the captive breeding programme were,
- collected from several different areas
 - housed in three separate centres.
- [3]

(c) Outline **three** reasons why the conservation of the white-backed vulture is important. [3]

(d) Once the captive bred individuals have been released into the wild, suggest **three** measures that could be taken **in the long term** to preserve the numbers of white-backed vultures. [3]

[Total: 16]