Biodiversity

Question Paper 2

Level	A Level
Subject	Biology
Exam Board	OCR
Module	Biodiversity,evolution and disease
Topic	Biodiversity
Booklet	Question Paper 2

Time allowed: **63 minutes**

Score: **/47**

Percentage: **/100**

Grade Boundaries:

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

Question 1

Two different fields, field **G** and **H**, were sampled for three common species of wildflower. The results are shown below.

	Number of individuals	
Species	**Field G**	**Field H**
Daisy	300	20
Dandelion	335	49
Buttercup	365	931
Total	1000	1000

Which of the options, **A** to **D**, is correct?

A. Field **G** will have a greater Simpson's diversity index.

B. Field **H** has greater species evenness.

C. Field **H** will have a greater Simpson's diversity index.

D. Field **G** has greater species richness. **[1]**

Question 2

Turtle doves, *Streptopelia turtur*, were once common in farmland in the UK but their numbers have recently been in decline.

Farmers can claim money from the UK government if they farm in ways that encourage the survival of species such as the turtle dove.

Which of the following agreements is/are relevant to the example described above?

1 The Convention on International Trade in Endangered Species (CITES)

2 The Rio Convention on Biological Diversity (CBD)

3 The Countryside Stewardship Scheme (CSS)

A. 1, 2 and 3

B. Only 1 and 2

C. Only 2 and 3

D Only 1 **[1]**

Question 3

Select the most appropriate term from the list below to complete the table.

abundance	**habitat**	**Simpson's diversity index**
biodiversity	**percentage cover**	**species evenness**
biased	**quadrat**	**species richness**
community	**quantitative**	**systematic**
dichotomous	**random**	**taxon**
ecosystem	**sample**	**transect**

definition	term
sampling in which the observer does not decide when and where to take measurements	
a representative group of organisms that are selected from a population	
an area in which an organism lives	
a measure of the relative numbers of individuals in each species	
the frequency of occurrence of plants in a particular area	
the number of species present in a particular area	

[6]

[Total: 6]

Question 4

(a) The black poplar was once a common tree throughout southern Britain. Its numbers have decreased by 94% since 1942 and it is in danger of becoming extinct in the wild.

There are thought to be approximately 2500 black poplars surviving in Britain today. Use the information above to calculate the original number of black poplar trees in 1942.

Show your working. **[2]**

(b) Species such as the black poplar contribute to the biodiversity of the UK.

Suggest **three** reasons why the conservation of the black poplar is important. **[3]**

(c) Botanic gardens are important in the conservation of plant species.

(i) State why the conservation of a species in a botanic garden is described as *ex situ*. **[1]**

(ii) Many botanic gardens use seed banks as a method of plant conservation.

Outline the **advantages** of using a seed bank, as opposed to adult plants, in order to conserve an endangered plant species. **[4]**

(iii) Suggest why it is important to ensure that, for each species, the seeds in a seed bank have been collected from several different sites in the wild. **[3]**

[Total: 13]

Question 5

Part of the Cairngorms National Park in the Scottish Highlands is at an altitude of approximately 1000 metres. It presently supports a range of plants and animals including some that are normally found in sub-arctic conditions.

Table 3.1 shows the breeding success of a number of bird species between 1970 and 2000. Specialist sub-arctic species are marked with an asterisk *.

Table 3.1

species	number of young raised per year			
	1970	1980	1990	2000
snow bunting *	78	69	36	2
Lapland bunting *	7	3	0	0
ptarmigan *	1280	1134	960	876
red grouse	890	920	933	962
wheatear	209	240	190	231
meadow pipit	23	45	48	82
ring ouzel	23	21	29	26
dotterel *	45	43	39	35

* = specialist sub-arctic species

(a) **(i)** Using the data in Table 3.1, compare the breeding success of the sub-arctic species and the non sub-arctic species between 1970 and 2000. **[3]**

(ii) Suggest **two** reasons for the trends described. **[2]**

(b) A study of insects was carried out in the same area of the Cairngorms National Park to determine species richness.

(i) What is meant by species richness? **[1]**

(ii) The insects were sampled using a sweep net method. Fig. 3.1 shows a sweep net being used. With this method, a net is swept through the vegetation. Insects are removed, identified and counted.

Fig. 3.1

Describe **three** ways in which the sampling procedure could be designed to try to make sure that a representative sample was obtained. **[3]**

(iii) Species evenness also contributes to the measurement of biodiversity.

Explain the importance of species evenness in determining the biodiversity in a habitat. **[3]**

[Total: 12]

Question 6

(a) Elephants are protected by the treaty known as the Convention on International Trade in Endangered Species (CITES).

(i) Give **one** aim of CITES. **[1]**

(ii) Between 1913 and 2013 the approximate worldwide population of living elephants dropped from 10 000 000 to 500 000.

Calculate how many orders of magnitude smaller the elephant population is likely to be in 2213 compared to 1913.

Assume that the elephant population continues to decline at the same rate each 100 years.

Show your working. **[2]**

(b) Fig. 5 shows the approximate percentages of elephants that were killed illegally in three different regions of Africa.

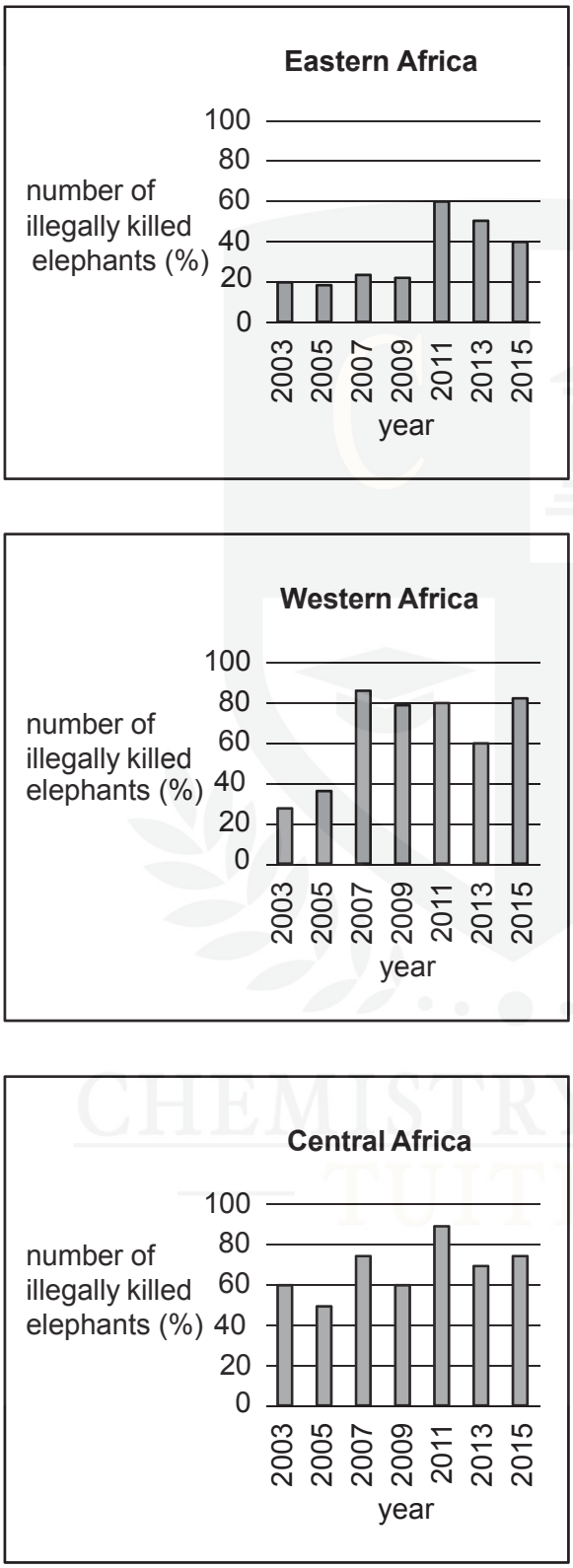

Fig. 5

John Scanlon, the Secretary-General of CITES in 2015, made the following statement:

> "African elephant populations continue to face an immediate threat to their survival from unacceptably high-levels of poaching for their ivory, especially in Central and West Africa where high levels of poaching are still evident. There are some encouraging signs, including in certain parts of Eastern Africa... showing us all what is possible through a sustained and collective effort..."

Give two pieces of evidence to show how the data in Fig. 5 support the statement made by John Scanlon.

Evidence 1 **[2]**

Evidence 2

[Total: 5]

Question 7

On a biology field trip, a pair of students collected some data about plant species in an area of ash woodland. Their results are shown in Table 4.1.

Species	Number of individuals (n)	n/N	$(n/N)^2$
Dog's mercury	40		
Wild strawberry	13	0.13	0.0169
Common avens	43		
Wood sorrel	4		
	N =		$\Sigma(n/N)^2$ =
			$1-(\Sigma(n/N)^2)$ =

Table 4.1

(a) **(i)** Use the information in the table to work out the Simpson's Index of Diversity (D) for the area of woodland sampled using the formula:

$$D = 1-(\Sigma(n/N)^2)$$

Where: n = number of individuals of a particular species.
N = total number of individuals in all species.
Σ = sum of.

Complete Table 4.1.

You may use the space below for your working. **[3]**

(ii) Simpson's Index of Diversity takes into account both species richness and species evenness.

In a school exercise book a student wrote the following definitions:

Species richness is a measure of the amount of species in an area.
Species evenness shows how many individuals there are of a species in an area.

The teacher did not award a mark for either of these statements.

Suggest how each statement could be improved.

Species richness

Species evenness **[2]**

(iii) If the value for Simpson's Index of Diversity is high, this indicates that the biodiversity of the habitat is high.

Outline the **implications** for a habitat if the Simpson's Index of Diversity is **low**. **[2]**

(b) When collecting data on the field trip, the students placed quadrats in 15 locations and calculated a mean number of plants for each species.

Suggest two **other** steps they could have taken to ensure that their value for Simpson's Index of Diversity was as accurate as possible. **[2]**

[Total: 9]