1 Scientists have identified approximately 1.8 million different species. The number of species that actually exist is likely to be significantly higher than 1.8 million.

(a) Suggest **two** reasons why the number of species identified is likely to be lower than the actual number of species present on Earth.

1 .....

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2 .....

.....

[2]

(b) Many organisations, such as the International Union for the Conservation of Nature (IUCN), gather annual data about the number of species that are known to exist and to what extent they are considered to be endangered.

Fig. 5.1 shows the total number of species assessed by the IUCN over a 10 year period and the number of those species assessed that are considered to be threatened with extinction.

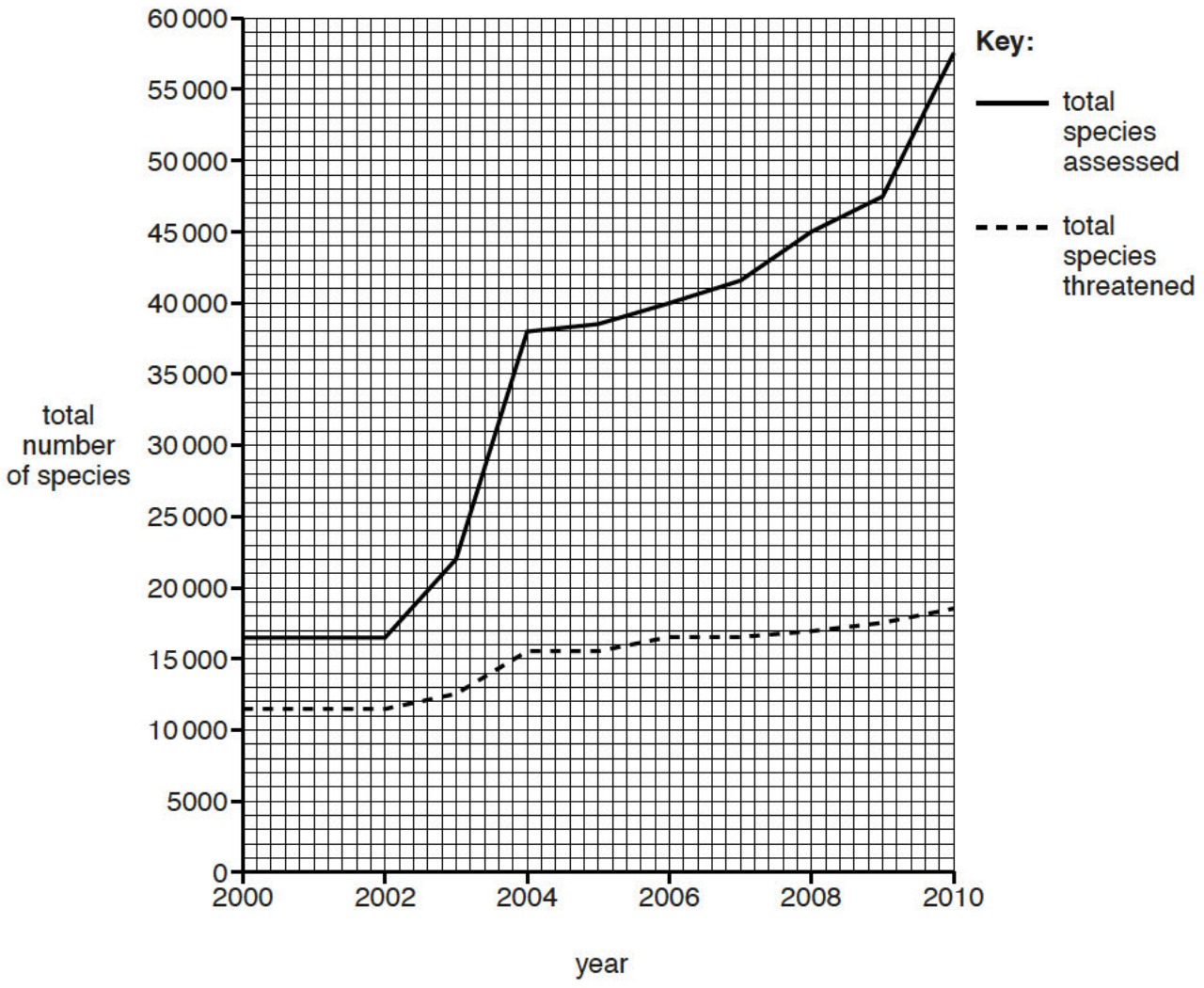


Fig. 5.1

(i) Using Fig. 5.1, **compare** the changes in the total number of species assessed with the changes in the total number of threatened species over the 10 year period.

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..... **[3]**

(ii) Using Fig. 5.1, calculate the percentage of species assessed that were threatened with extinction in **2010**.

Show your working. Give your answer to the **nearest whole number**.

Answer = ... % **[2]**

(iii) Suggest explanations for the shape of the two curves between **2005** and **2010**.

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..... **[2]**

(c) A study of the biodiversity of an area considers not only the total number of species but also the relative number of individuals within each species.

State **one** further factor that could be taken into account when describing the biodiversity of an area.

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..... **[1]**

(d) In any attempt to protect global biodiversity, cooperation between countries is important.

Two examples of such international cooperation are:

- Convention on International Trade in Endangered Species (CITES)
- Rio Convention on Biological Diversity.

Other than the conservation of biodiversity, state **two** aims for each of these conventions.

Convention on International Trade in Endangered Species .....

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Rio Convention on Biological Diversity .....

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[4]

[Total: 14]

2 **(a)** The traditional English folk song, *The Derby Ram*, contains the lyric:

"As I went out to Derby, all on a market day
I spied the biggest ram, sir, that ever was fed on hay"

The song is likely to have been inspired by the successes of farmers in the eighteenth century who developed a sheep known as the 'Dishly Ram'. This ram gave rise to a breed which grew more quickly, producing more wool and meat than other varieties of sheep.

(i) Explain how it would be possible for farmers in the eighteenth century to produce a larger, more profitable variety of sheep from an existing flock of sheep.

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..... **[3]**

(ii) Since the eighteenth century, other ways of improving productivity in sheep have been developed.

State **one** further way of improving productivity that is used by modern farmers.

..... **[1]**

(b) Crop yield can be improved by the use of fertilisers. In the eighteenth century, these are likely to have been organic fertilisers in the form of manure or compost.

(i) Suggest how organic fertilisers improve the yield of plant crops.

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..... **[3]**

(ii) Inorganic fertilisers are not directly toxic to living organisms. However, the excessive use of these fertilisers can lead to a reduction in the biodiversity of farmland.

Suggest how the excessive use of inorganic fertilisers on **farmland** can cause a reduction in its biodiversity.

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..... **[2]**

(iii) Explain why a reduction in biodiversity may present problems for **agriculture** in the future.

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..... **[3]**

[Total: 12]

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]

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.

Answer = ... **[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.

1 .....

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2 .....

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3 .....

..... **[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*.

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..... **[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.

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..... **[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.

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..... **[3]**

[Total: 13]

5 **(a)** Plants are the producers in most food chains.

Complete the following passage by using the most appropriate terms from the list to fill the gaps.

A term should **not** be used more than once.

cellulose	**nucleic acids**	**respiration**
lipids	**photosynthesis**	**starch**
monomers	**proteins**	**sucrose**

Plants carry out the process of ..... in which energy from the sun is used to produce a storage carbohydrate such as ..... .

Plants also absorb phosphates which are used to produce ..... . When humans eat the plants, the various polymers are hydrolysed to ..... and absorbed, but molecules such as ..... cannot be digested by humans and are egested. **[5]**

(b) Fig. 1.1 shows the yield of rye plants (in tonnes per hectare) grown on the same soil for 80 years. These plants were grown without the addition of nitrogen fertiliser.

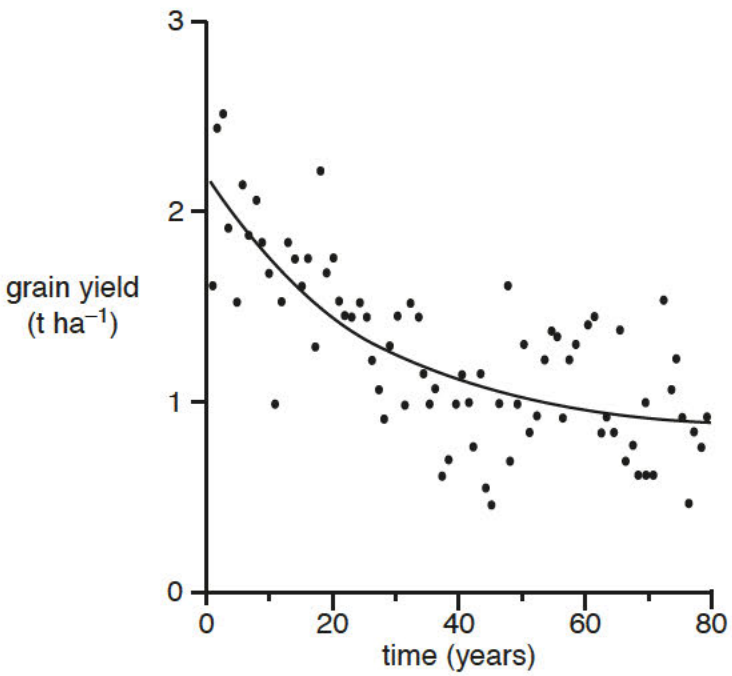


Fig. 1.1

Using Fig. 1.1 and your own knowledge, explain why nitrogen fertiliser needs to be applied to farmland.

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..... **[3]**

(c) Insect pests, such as aphids, can reduce yield in rye plants by piercing the phloem and removing materials.

Aphids can be killed using an insecticide. However, over a period of time, an increasing concentration of insecticide is required to control the aphid population.

Explain why this is the case.

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..... **[4]**

[Total: 12]