1 Biodiversity, including both species richness and genetic diversity, is an important concept to be considered when organising captive breeding programmes.

(a) Explain what is meant by each of the following terms.

(3)

Niche .....

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Species richness .....

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(b) One way to measure genetic diversity is to find the percentage of genes that have different alleles.

The table below shows the percentage of genes that have different alleles in four types of cat.

Type of cat	Percentage of genes with different alleles (%)
Cheetah	4
Domestic cat	23
Lion	12
Ocelot	21

*(i) Using the information in the table above and your own knowledge, suggest why the cheetah is the cat at most risk if the environment changes.

(3)

(ii) Cheetahs are unusual amongst the big cats.

Cheetah and cub

Dr P. Marazzi / Science Photo Library

A female cheetah often mates with several different males and gives birth to two or three cubs at a time, each having a different father.

Suggest why this may be advantageous to cheetahs.

(2)

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(c) Rafa was a male cheetah involved in breeding programmes in several zoos. The table below shows some data from Rafa's studbook.

Name of zoo housing Rafa	Event	Date of event
WINSTON	Birth of Rafa	24 Dec 1974
SD-WAP	Transfer	26 Nov 1980
LAGUNA HI	Transfer	9 Apr 1982
SD-WAP	Transfer	5 Dec 1984
BATON ROUGE	Transfer	11 Feb 1986

Suggest what effect transferring Rafa from one zoo to another had on genetic diversity in this species.

(2)

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(d) Place a cross ☒ in the box to the right of the statement that correctly describes an endemic animal.

(1)

Statement	
Ducks that migrate from one continent to another	☒
House fly that is found in all continents except Antarctica	☒
Cheetahs that are exclusive to one continent	☒

(Total for Question 1 = 11 marks)

2 The diversity of ant species in a habitat can be used as an indicator of environmental conditions and conservation status.

(a) A study of the effect of high copper levels on ant diversity was undertaken in Brazil. Ants were collected in the same way at three different sites in one habitat. The number of different species at each site was recorded. Site 1 and Site 2 were near a copper mine and had high levels of copper present. Site 3 had normal levels of copper. The amount of vegetation present at each site was also recorded.

The results are shown in the table below.

Site	Number of ant species found	Amount of vegetation present
1	14	Very little
2	16	Little
3	45	Rich and dense

(i) Using the information in the table, what is the evidence that ant diversity can be used as an indicator of environmental conditions?

(1)

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(ii) It has been suggested that there is no **direct** effect of copper on ants. Suggest how the data in the table support this suggestion.

(2)

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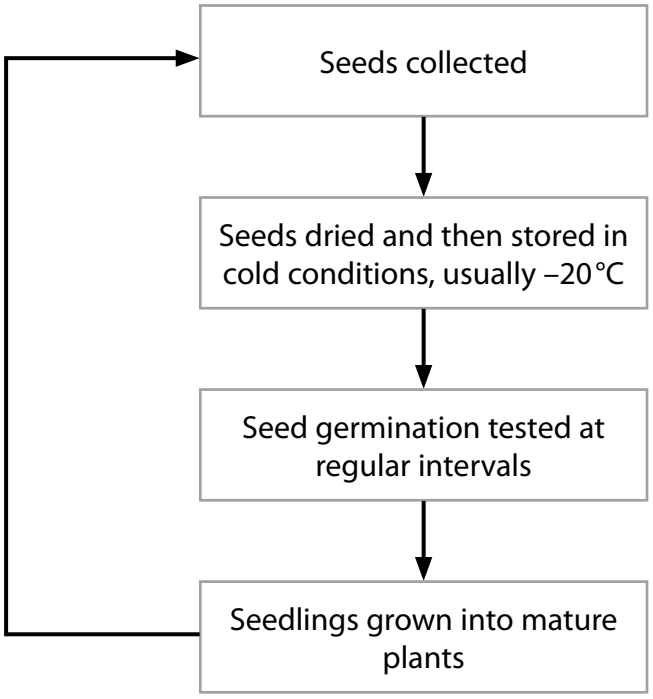
(b) Seedbanks have been set up around the world to help conserve rare plant species. The process for storing seeds includes the following stages.



(i) Suggest **two** reasons why the seeds need to be dried and then stored in cold conditions.

(2)

1 .....

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2 .....

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(ii) Suggest why seed germination is tested at regular intervals.

(2)

(c) One of the aims of both seedbanks and zoos is to conserve endangered species.

Give **two** ways in which zoos help to conserve endangered species.

(2)

1

2

(Total for Question 2 = 9 marks)

3 In 2014 at Longleat Safari Park, a decision was made to humanely kill a female lion and four of her cubs. These lions showed violent and aggressive behaviour to other lions.

These lions had serious genetic defects caused by inbreeding.

(a) (i) Suggest how inbreeding could have led to genetic defects in these lions.

(2)

(ii) Describe how breeding programmes at zoos are designed to reduce the risk of inbreeding.

(4)

(b) When the female lion was first brought to Longleat Safari Park, the zookeepers noted symptoms including tremors, uncoordinated movements and aggressive behaviour.

It was thought that these problems were due to a poor diet when she was younger.

Her cubs were given a better diet at Longleat but they had the same symptoms as their mother.

Suggest what could have been the main cause of the problems in these lions.
Give a reason for your answer.

(2)

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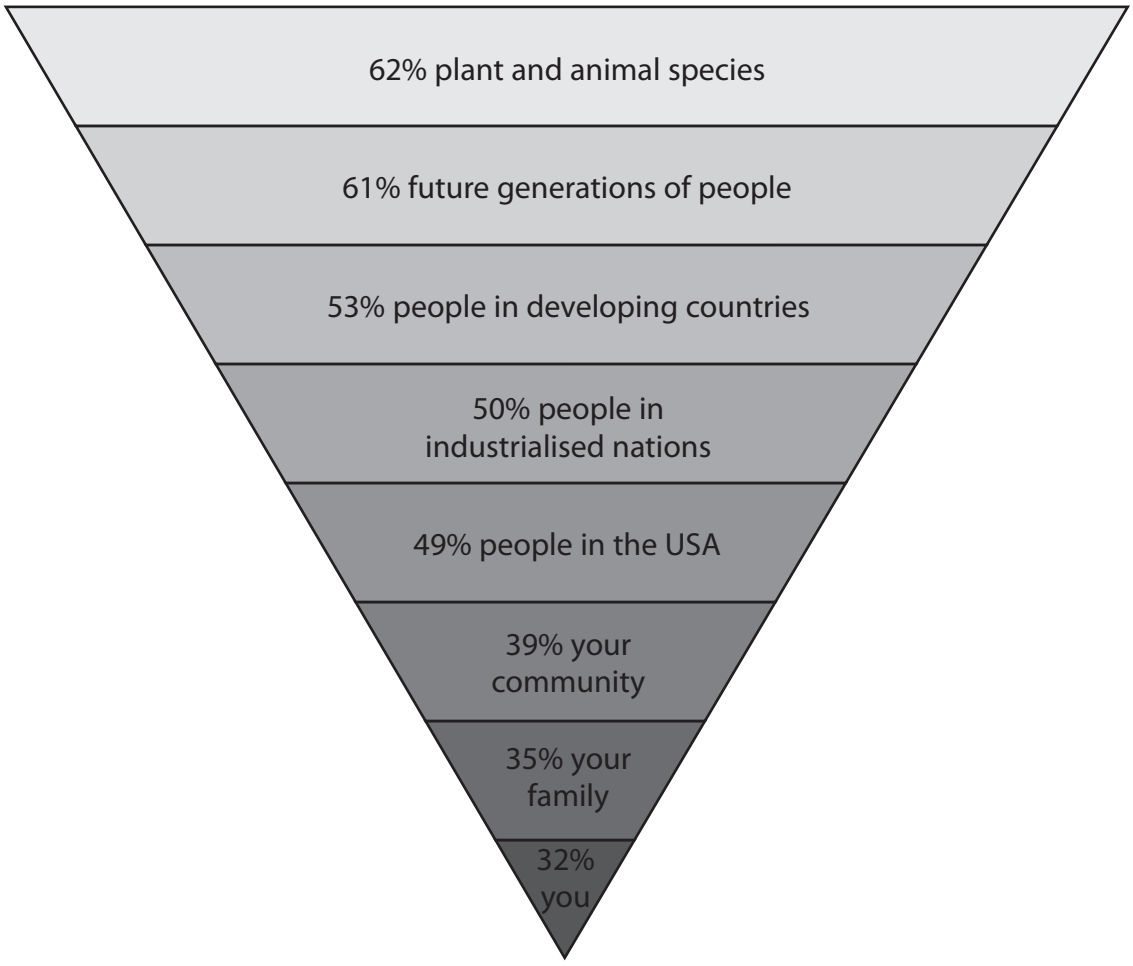
(Total for Question 3 = 8 marks)

4 A survey was conducted in the USA to find out what harm people thought global warming could have.

The people were asked if they thought global warming could harm the eight groups shown in the diagram.

The diagram below shows the percentage of people who thought each group would be harmed.



(a) Explain the meaning of the term **global warming**.

(2)

(b) (i) Describe and explain how global warming could affect plant species.

(4)

(ii) Explain how the effects on plant species could affect animal species.

(3)

(c) This survey shows that 61% thought future generations of people could be harmed by global warming.

Suggest why the rest of the people surveyed thought that future generations of people would **not** be harmed by global warming.

(3)

(Total for Question 4 = 12 marks)

5 During the construction of a motorway in the 1970s, an area of Hampshire heathland, previously used for grazing, was abandoned. With the loss of the grazing animals, succession towards a climax community took place on this heathland.

By the 1990s, a scrubland community had developed. A characteristic of this scrubland is the presence of young trees, such as the Birch (*Betula pendula*).

(a) Explain what is meant by each of the following terms.

(i) Succession

(2)

(ii) Climax community

(2)

(b) In the 1990s, a management strategy was put in place to conserve the rare and endangered heathland plants.

(i) Suggest why it is important to conserve rare and endangered plants.

(2)

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(ii) Using the information given on page 18, suggest **one** management strategy that could have been used to conserve the heathland.

(1)

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(c) A survey of the occurrence of one rare and endangered plant species, Petty Whin (*Genista anglica*) was carried out.

In this study, a line of 8 people at 2 m intervals walked across the study area. They recorded the position, height and width of each specimen of Petty Whin. The direction of the line was changed several times to ensure that the whole area was covered.

(i) Place a cross (☒) in the box next to the term that describes the method used to collect data in this survey.

(1)

☒ **A** permanent

☒ **B** random

☒ **C** systematic

☒ **D** trial-and-error

(ii) A statistical analysis of the data obtained gave a correlation value of 0.565 between height and width of Petty Whin. This correlation was not statistically significant.

Suggest reasons why the correlation was not statistically significant.

(2)

(Total for Question 5 = 10 marks)