


1. Using timber production in a temperate country as an example, explain how ecosystems can be managed in a sustainable way.

 *In your answer, you should make clear how the management is sustainable.*

[Total 7 marks]

2. In woodlands that are managed, a conflict exists between the economic yield and the maintenance of biodiversity.

Below is a photograph of an area of coppice and standard woodland.



(i) Describe the process of coppicing **and** explain how it is used in the sustainable management of a woodland.

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[3]

(ii) State **two** ways in which managing woodland as a mix of standard and coppiced trees can be of **economic** benefit to the owner.

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[2]

[Total 5 marks]

3. Hedgerows and other semi-natural habitats can act as 'wildlife corridors' in the fragmented landscape of arable farmland. Hedgerows also provide refuges for beneficial invertebrates including natural predators of pest species.

Suggest what is meant by the term 'wildlife corridor'.

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[Total 2 marks]

4. The use of natural predators is a form of biological pest control. Some farmers rely only on biological pest control.

Describe **two** disadvantages of biological pest control.

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[Total: 2 marks]

5. Suggest **two** advantages, **other than predation of pests**, of maintaining invertebrate populations in arable land.

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[Total: 2 marks]

6. Farmers who only use biological pest control on their crops can often market their produce as organic. Describe **three** advantages of organic farming.

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2

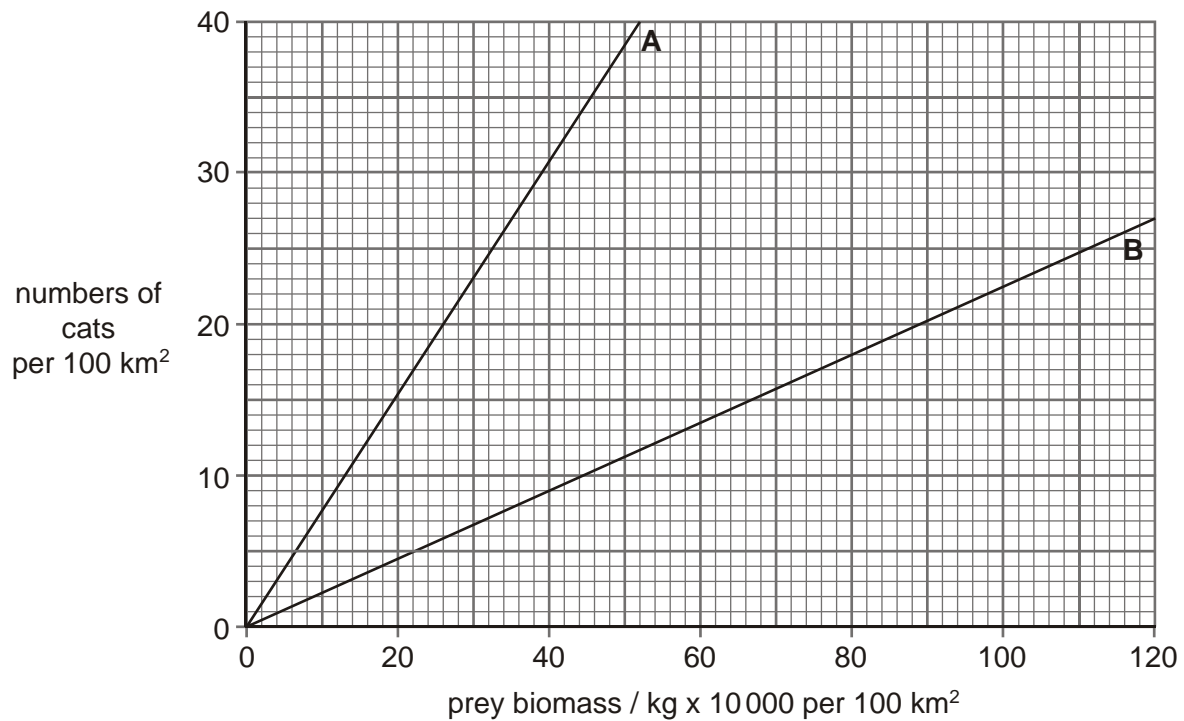
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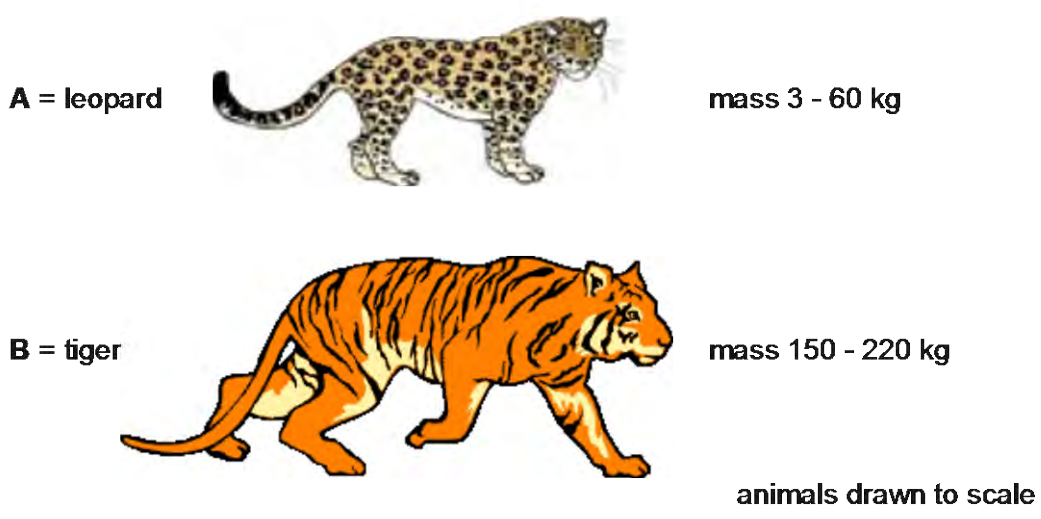
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[Total: 3 marks]

7. Tigers prey mainly upon large mammals. One of the threats to the survival of the tiger is a reduction in numbers of prey. The figure below shows the relationship between the numbers of two cat species, **A** and **B**, and the prey biomass.





Use the figure to determine the number of **(i)** leopards and **(ii)** tigers per 100 km² that can be expected to be supported by a biomass of 300 000 kg of prey per 100 km².

- (i) leopards per 100 km²
- (ii) tigers per 100 km²

[Total 2 marks]

8. In 1971, an international treaty was signed to protect over 1800 wetland sites. Known as the Convention on Wetlands, it was designed to provide a framework for dynamic conservation of the wetlands and their resources which are diverse and complex habitats.

Explain what is meant by *dynamic conservation*.

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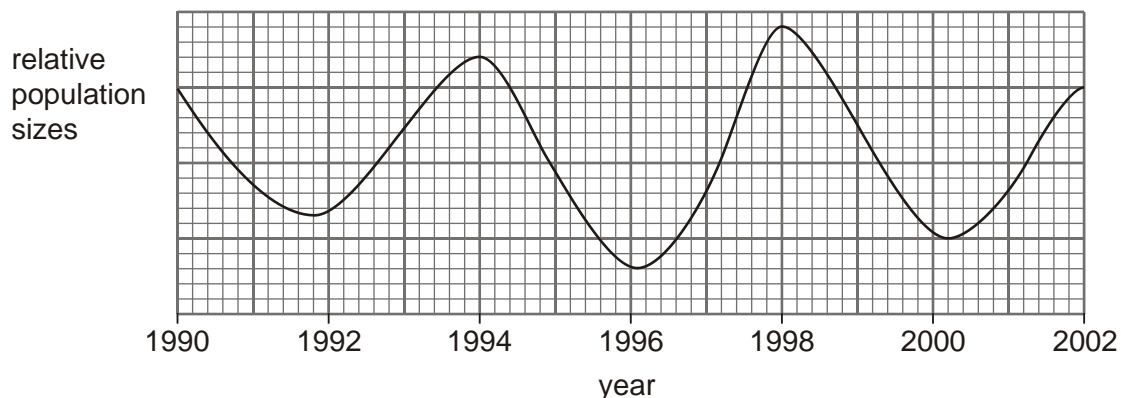
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[Total 2 marks]

9. Lemmings are small mammals that live near the Arctic circle. Their populations show regular patterns of increase and decrease. In 2003, scientists published results based on a long-term project in East Greenland. They made the following observations.

- Population peaks occurred in regular four year cycles.
- Four main predators feed on the lemmings: Arctic owls, Arctic foxes, long-tailed skuas and stoats.
- Stoats feed only on lemmings; the other predators feed on a range of prey species.
- Stoats reproduce more slowly than lemmings.

(a) The figure below shows the changes in the population of lemmings in the East Greenland project area from 1990 to 2002.



(i) Sketch **on the figure** the likely changes in the population size of stoats.

[2]

(ii) Suggest three environmental conditions, **other than climatic**, that are required for a population explosion of lemmings.

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- 3

[3]

(b) With reference to the species studied in the East Greenland project, distinguish between interspecific and intraspecific competition.

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[3]

(c) The carrying capacities for lemmings and for the various predators in this area are all different.

Explain the term *carrying capacity*.

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[2]

[Total 10 marks]

10. Some manufacturers of paper and timber products claim that their raw materials come from 'sustainable forest resources'.

With reference to paper and timber production, explain what is meant by

(i) *a biological resource*;

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[2]

(ii) *sustainable production.*

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[Total 4 marks]

11. The cyclamen mite is a pest of strawberry crops in California. Populations of these mites are usually kept under control by a species of predatory mite of the genus *Typhlodromus*.

An experiment was carried out to investigate the effectiveness of predation in controlling cyclamen mites.

Both predator and prey mites were released on a group of strawberry plants in a greenhouse and the numbers of both types of mite were monitored over a period of 12 months. The results are summarised in Fig. 1. A second investigation was carried out on a crop of strawberry plants growing in a field. The plants were sprayed periodically with parathion, an insecticide that reduces the number of predators, but does not affect the cyclamen mite. The effects of this on the numbers of cyclamen mites is summarised in Fig. 2.

key:

- = cyclamen mite (prey)
- = *Typhlodromus* (predator)

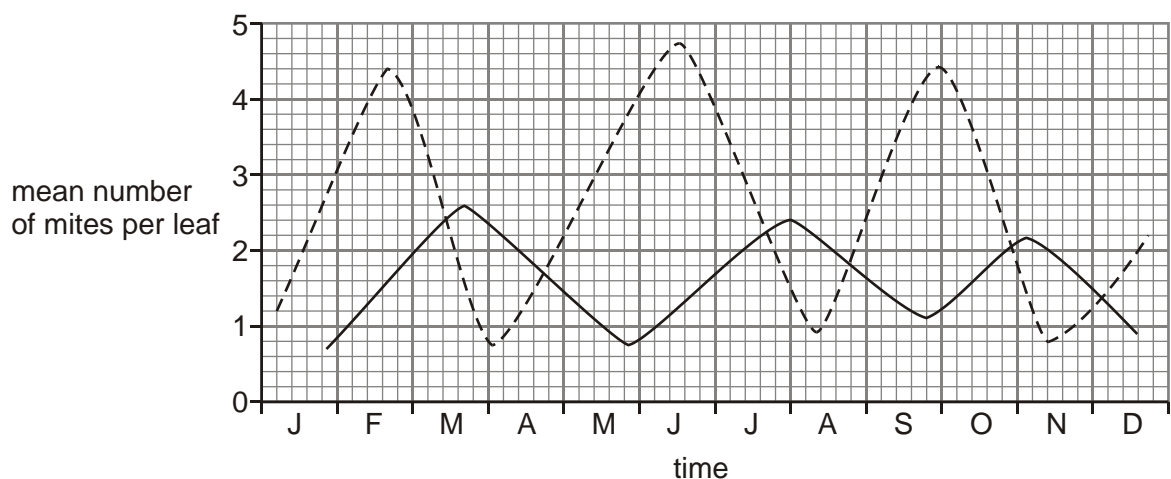


Fig. 1

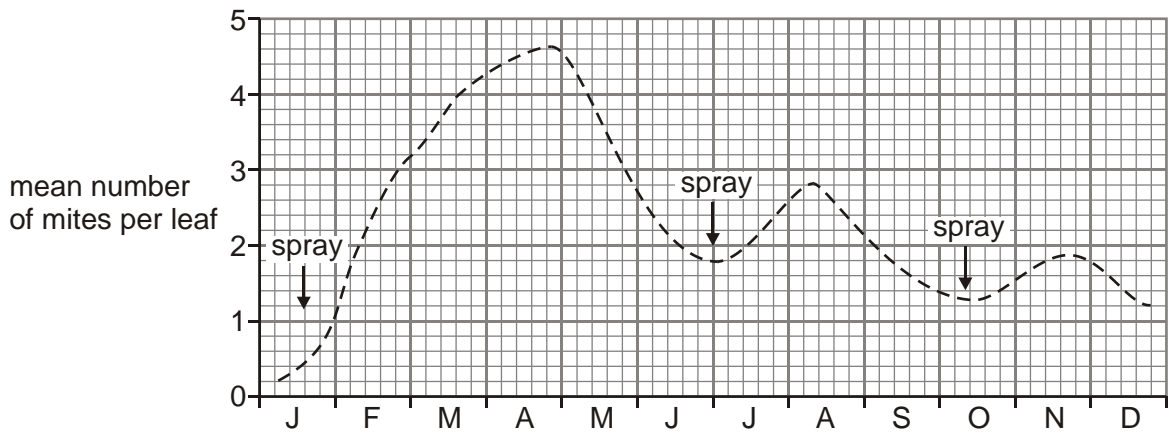


Fig. 2

- (a) The results shown in Fig. 1 illustrate many of the features of a typical predator-prey relationship.

Describe and explain these typical features.

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[4]

- (b) (i) Sketch a curve on Fig. 2 to show the likely effect of spraying on the population of the predatory mite.

[2]

- (ii) Suggest *two* reasons for the gradual decrease in the numbers of cyclamen mites over the year, as shown in Fig. 2.

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2

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[2]

- (c) Many Californian strawberry growers keep the cyclamen mite under control by

ensuring that there are healthy populations of the *Typhlodromus* mite.

- (i) State the name given to this type of pest control.

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[1]

- (ii) Explain why many would regard the use of predatory mites as preferable to the application of insecticides.

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- (d) Suggest *two* methods of pest control other than the use of predatory mites or insecticides.

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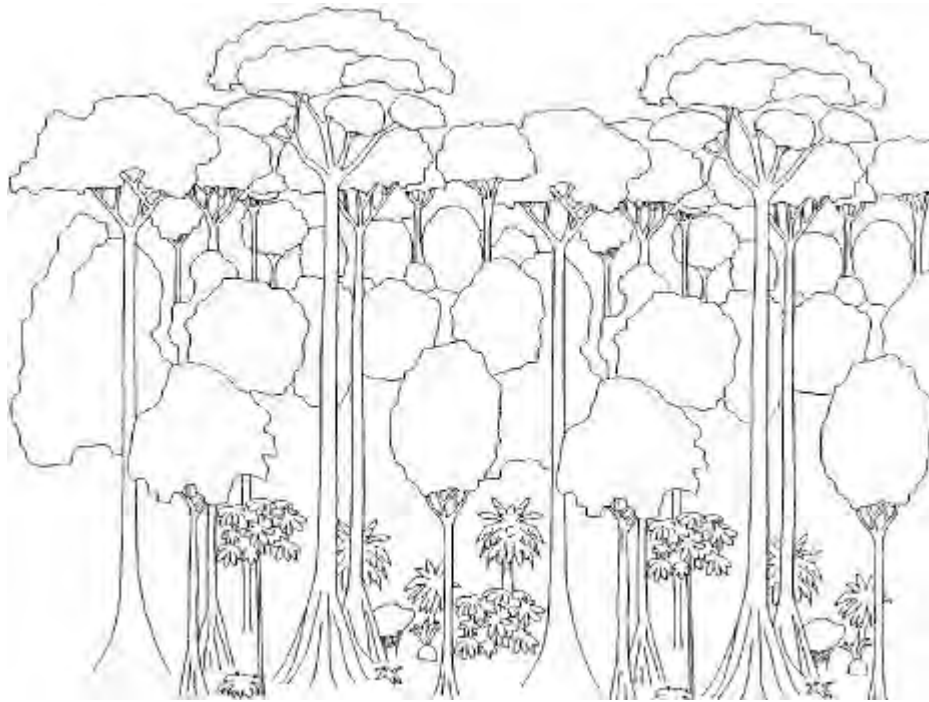
[2]

[Total 16 marks]

12. The climax vegetation in tropical areas with abundant rainfall is rainforest. Although rainforests now cover less than 4% of the land surface of the Earth, they account for more than 20% of the planet's net carbon fixation. By comparison, temperate forests are about half as productive (per unit area), while boreal forests (forests of northern latitudes) and grasslands are only a quarter as productive.

A 13 km² rainforest preserve in Costa Rica has 450 species of trees, more than 1000 other plant species, 400 species of birds, 58 species of bats and 130 species of amphibians and reptiles.

The figure below shows a diagram of a typical area of tropical rainforest.



- (a) List *three* reasons why tropical rainforests have been destroyed, so that they now cover only 4% of the land surface of the Earth.

1

2

3

[3]

- (b) In this question, one mark is available for the quality of use and organisation of scientific terms.

Making use of the information in the passage and the figure, describe the important features of tropical rainforests **and** explain why their disappearance is a cause of considerable concern.

(Allow one line page)

[8]

Quality of Written Communication [1]

(c) Outline the **international** measures that can be taken to try and halt the decline of the tropical rainforests.

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[Total 15 marks]