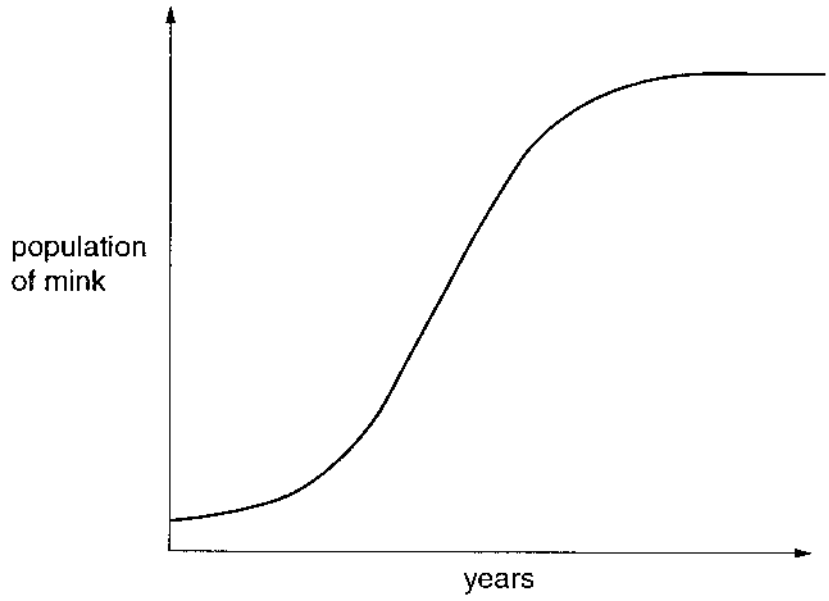
Core 1

In the summer of 1998 about 2000 mink were released from captivity into one area of forest in southern Britain. Mink are aggressive carnivorous mammals.
The graph shows how the population of mink might change over a few years if there were no human interference.



(a) State **three** factors which would cause the mink population to become constant.

1. .....

.....

2. .....

.....

3. .....

.....[3]

(b) It might be expected that a graph for human world population would show a similar pattern. However, it is now thought that the human population will continue to grow steadily. Suggest **three** reasons why this might happen.

1. .....

.....

2. .....

.....

3. .....

.....[3]

[Total : 6]

Core 2

Fig. 1 shows a food web which includes some organisms in the African grasslands.

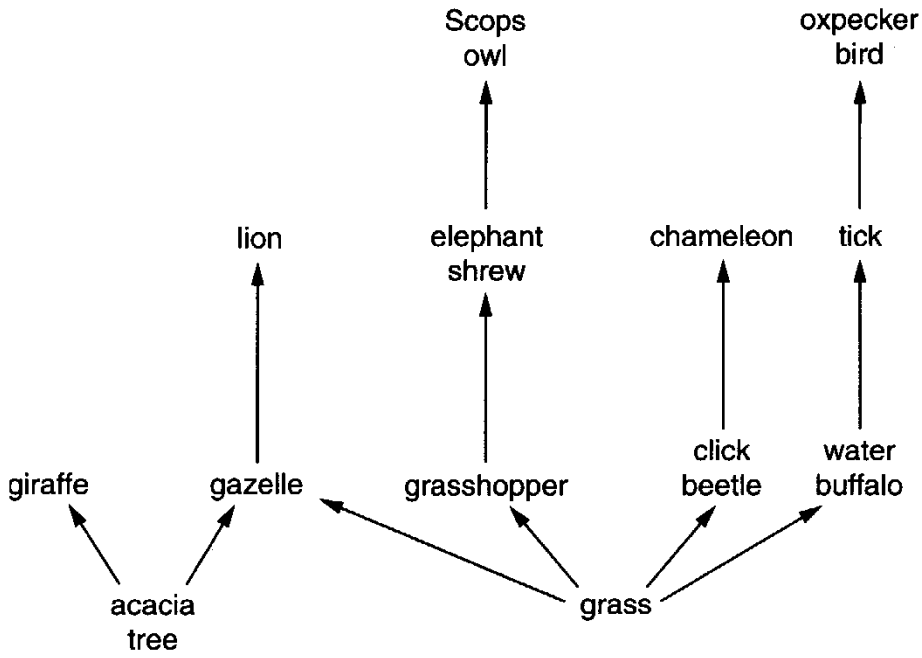


Fig. 1

(a) (i) In the space below draw a food chain consisting of **four** organisms. The organisms must be part of the food web.

[2]

(ii) Using examples from the food web, explain the difference between producers and consumers.

.....

.....

.....

.....

.....[4]

(b) When weather conditions are favourable the grasshopper population can suddenly increase enormously.

Predict and explain the effect this might have on the

(i) Scops owl population;

.....

.....

.....[2]

(ii) water buffalo population;

.....

.....

.....[2]

(iii) giraffe population.

.....

.....

.....

.....[3]

[Total : 13]

Core 3

Sheep were first taken to the island of Tasmania in 1814. Fig. 2 shows changes in the size of the sheep population in Tasmania between 1818 and 1930.

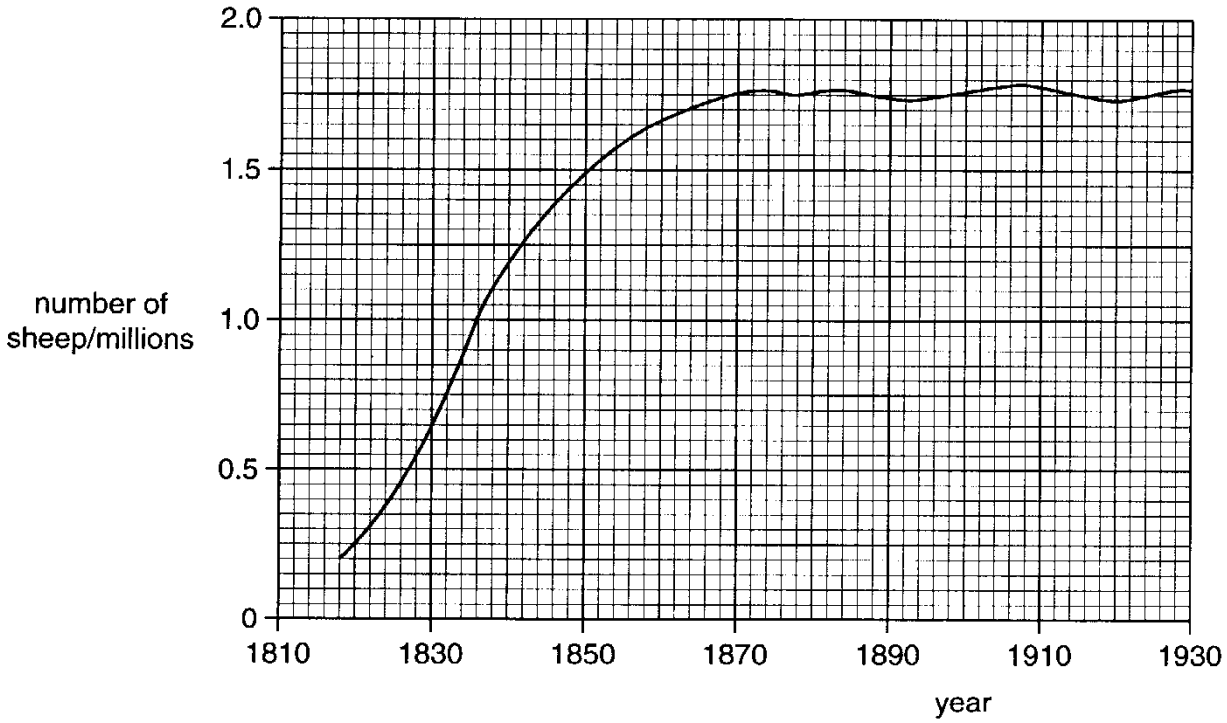


Fig. 2

(a) State the size of the sheep population in 1842.

.....[1]

(b) **(i)** Suggest biological reasons for the steep rise in the number of sheep between 1830 and 1840.

.....

.....

.....[2]

(ii) Suggest biological reasons for the shape of the curve between 1870 and 1890.

.....

.....

.....[2]

[Total : 5]

Alternative to Practical 1

Samples of animals living on the surface of logs in a woodland were collected.

The animals found on the top and sides were brushed carefully into a tray.

The animals found on the underside of the logs were brushed carefully into a second tray.

The animals were identified, sorted into groups and counted. This information was recorded in Table 2 1

Table 1

animal group	feeding category	number of animals	
		top and sides of log	underside of log
snails	herbivores	4	3
mites	herbivores	12	9
larvae of flies	herbivores	1	8
centipedes	carnivores	0	5
spiders	carnivores	2	7
beetles	carnivores	2	4
woodlice	detritivores*	2	10
millipedes	detritivores*	1	4

* Detritivores are animals that eat dead matter such as fallen leaves.

(a) (i) Complete Table 2 to show the numbers of animals in each feeding category expressed as a percentage of the total number of animals found on the underside of the logs.

Table 2

feeding category	number of animals found on the underside of the logs	percentage %
herbivores	20	
carnivores	16	
detritivores	14	
total	50	100

[2]

(ii) Using Fig. 3, construct a pie chart to show the proportion of herbivores, carnivores and detritivores collected from the underside of the logs.

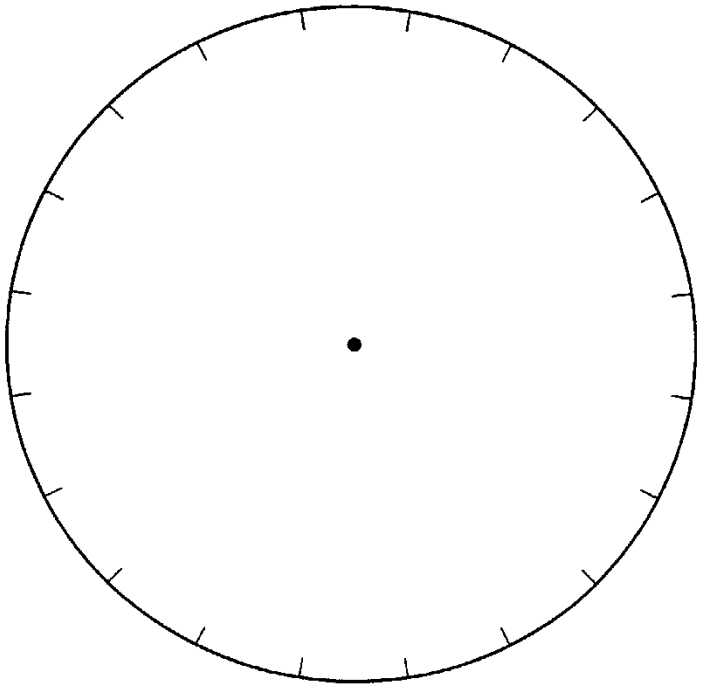


Fig. 3

[2]

(b) Suggest **two** reasons why most animals were found on the underside of the logs.

1. .....

.....

2. .....

.....[2]

(c) Describe an investigation you could carry out to compare the number of animals living amongst fallen leaves in two different woodland habitats.

.....

.....

.....

.....

.....[4]

[Total : 10]

Extension 1

South Uist is a small island which provides one of the few remaining summer habitats for a bird called the Corncrake (*Crex crex*). It lives in hay fields where it feeds on insects, worms and seeds. South Uist provides a good habitat because there are plenty of hay fields where the Corncrake can nest and there are few predators.

However, a small mammal called the Hedgehog (*Erinaceus europaeus*) was released onto the island. The Hedgehog also has few natural predators and will feed on the eggs of Corncrakes, as well as on insects and worms. The number of Hedgehogs on South Uist has risen rapidly to 10 000 while Corncrakes are becoming endangered as their numbers worldwide are falling.

(a) **(i)** State **two** features which birds and mammals have in common.

1. .....

2. .....

(ii) State **two** features which distinguish birds from mammals.

1. .....

2. .....

[4]

(b) Suggest why isolated islands such as South Uist are more easily colonised by birds than mammals.

.....

.....[1]

(c) State **three** reasons why South Uist provides a good habitat for Corncrakes.

1. .....

2. .....

3. .....[3]

(d) Explain why Corncrakes are becoming endangered by Hedgehogs.

.....

.....

.....[2]

Extension 1

(e) Draw a food web to show the feeding relationships described in the passage. Assume that insects and worms feed on leaves.

[4]

(f) Suggest **two** ways by which the extinction of the Corncrake may be prevented.

1. .....

.....

2. .....

.....[2]

[Total : 16]

Extension 2

(a) Describe and explain the possible effects of allowing untreated sewage to enter a small lake. [5]

(b) Outline a treatment of sewage which would produce re-usable water. [6]

(c) Describe how a plant living in a dry habitat is adapted to conserve water. [4]

Core 1

a any three of these
- predators of the mink
- competition with other predators for the same food
- prey limited by availability of prey's food
- disease / parasites

b any three of these
- humans have no natural predators
- food supplies may be moved from areas of excess to areas of shortage
- medical advances in disease prevention
- medical advances in curing / treating patients
- humans modify habitats for themselves
- limited use of family planning programmes

Core 2

a(i) grass or plant — grasshopper — elephant shrew — Scops owl / oxpecker
grass or plant — water buffalo — tick
bird

linked by arrows pointing towards the consumers

(ii) named producer example

makes its own food / glucose / gains energy by photosynthesis

named consumer example

gains energy / takes in / eats ready made food / other organisms

b(i) Scops owl population would rise – plague of grasshoppers would increase elephant shrew population / food if Scops owl will increase

water buffalo population would fall – more grass eaten by grasshoppers / less food available for water buffalo

(ii) grasshoppers eat more grass so less food for gazelles

either gazelles eat more acacia so less food for giraffes and population falls

or gazelle population falls and eats less acacia so more food for giraffes so population rises

Core 3

a 1.25 million

b(i) any two from these
- most of offspring surviving
- little / no competition for / plenty of food / space
- few / no natural parasites / predators / diseases
- no limiting factors

(ii) any two of these
- births equal deaths
- some factor / food supply limiting / competition for food / space / because of overcrowding
- introduction of / increase in parasites / disease / predators / competitor species / deliberate husbandry

Alternative to Practical 1

a(i) in order in the table
- 40
- 32
- 28

(ii) the pie chart should show
- correct proportions for the segments
- correct order of segments (largest starting at 12 position and going clockwise in decreasing size)

b wet / damp
darkness (or alternative wording)

c to include four of these points
- hand search and / or Tullgren funnel
- sample standard area
- same time of year
- identify animals and trophic levels
- repetition of samples

Extension 1

a(i) any two from
- four limbs
- body covering (or alternative wording)
- backbone
- warm blooded
- lungs

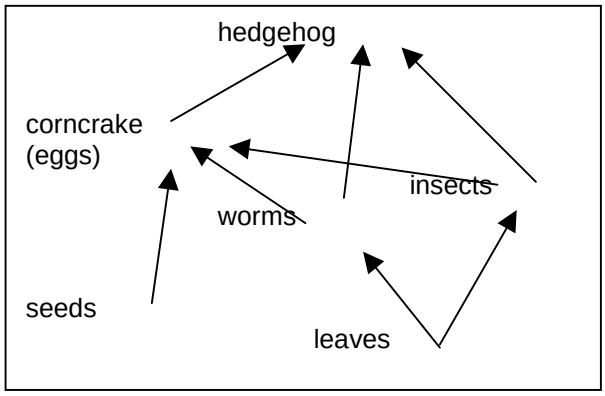
(ii) any two from, provided feature linked to correct group
- birds have feathers / animals have fur
- birds lay eggs / mammals produce live young
- mammals suckle young
- birds have a beak
- birds have scales on legs

b birds can fly over water or it is difficult for mammals to swim long distances

c few predators present
- hay fields present for nesting
- hay fields provide a food source (or alternative wording)

d any two of these
- hedgehogs eat corncrake eggs
- hedgehogs eat the same food / reference to insects or worms
- corncrakes nest on the ground

e



f any two of these
- remove / exterminate hedgehogs from the island
- create corncrake sanctuaries (which are hedgehog-fre)
- introduce corncrakes to other islands
- reference to captive breeding programme

Extension 2

a any five of the following points
- reference to the presence of nitrates / phosphates
- effect of above i.e. plants grow faster
- reference to light blocked out for deeper plants
- plants die (linked of the above points)
- dead plants provide food for bacteria
- numbers of bacteria increase
- animals in water die due to lack of oxygen
- bacteria respire (aerobically), using up oxygen
- reference to eutrophication
- reference to possible presence of disease- causing organisms

b any six of the following points
- sewage screened (or alternative wording) to remove large objects
- settling tanks allow grit to settle out
- sludge allowed to settle out
- reference to anaerobic conditions killing aerobic pathogens, linked to above
- remaining liquid sprayed onto stones or clinker
- reference to presence of protoctists / bacteria
- microorganisms feed on sewage
- harmful substances removed, linked to above
- reference to aerobic stage killing many anaerobic bacteria
- reference to clear water effluent produced (or alternative wording)
- reference to chlorination

c any four of these
- thick cuticle
- reduced number of stomata
- stomata only open at night
- rolled leaves
- hairs on leaves
- leaves reduced to spines
- deep or long roots
- fleshy stem