

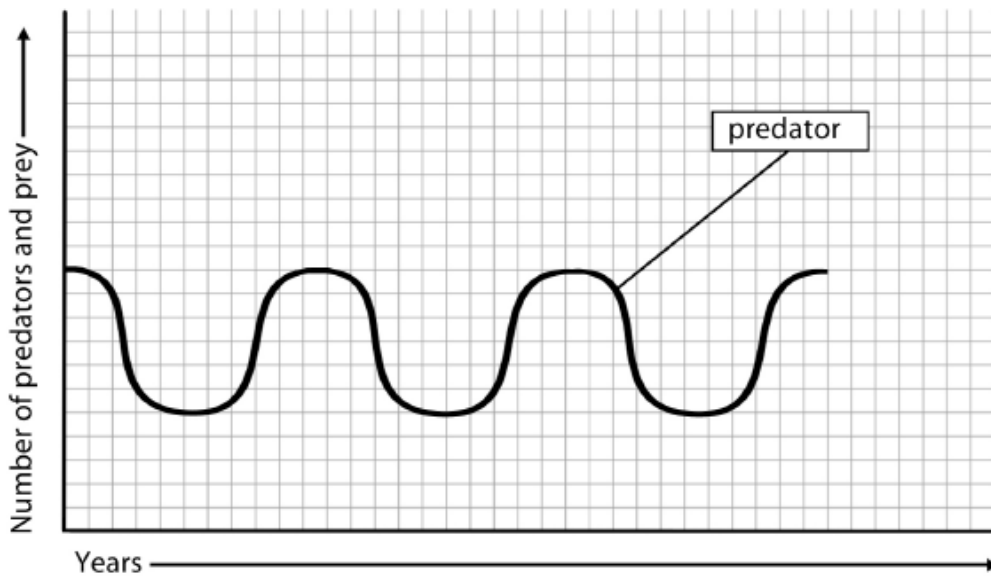


Biology Leaving Certificate Higher Level

Past Exam Questions on:

Ecology and Ecosystem

- (c) The graph below shows the fluctuations in the population of a predatory species over many years.



- (i) Copy the graph into your answer book.
Then, on the same axes and using a dashed line (- - -), show how you think the population of the predator's main prey species might vary over the same timespan.
- (ii) Give an explanation of the graph that you have drawn for the prey species.
- (iii) Do you think that population graphs for a host species and its main parasite would show similar fluctuations? Explain your answer.
- (iv) Suggest a role for parasites in the overall scheme of nature.
- (v)
 1. Name two predators.
 2. Give one adaptive technique in the case of each predator.

Q 11 2012

11. (a) (i) Distinguish between a food chain and a food web.
Include a clear reference to each in your answer.
- (ii) What do ecologists mean by a *pyramid of numbers*? (9)
- (b) Organisms that are introduced into new environments outside their natural ranges are referred to as exotic species. In some cases these introductions have been deliberate and in other cases accidental e.g. when a species kept in captivity in a new country escapes and gives rise to a wild population. Worldwide, the great majority of deliberate attempted introductions have been unsuccessful.
- (i) Suggest a reason for attempting to establish an exotic species in a new country.
- (ii) Suggest **two** reasons why the great majority of attempted introductions have been unsuccessful.
- (iii) Use your knowledge of the life cycle of flowering plants to suggest how an exotic plant may escape from captivity.
- (iv) Use the knowledge that you have gained in your studies of ecology to suggest how the introduction of an exotic species may:
1. impact negatively on an existing community.
 2. impact positively on an existing community.
- (v) It has been stated that an exotic species has a good chance of becoming established in a new environment if there is a vacant niche.
1. Explain the term *niche* in this context.
 2. Do you agree with the above statement?
 3. Explain your answer. (27)
- (c) **Name the ecosystem** which you investigated during your study of ecology.
- (i) Explain the terms
1. *Flora*,
 2. *Fauna*.
- (ii) Name **one** animal from your named ecosystem **and** describe how you carried out a quantitative study of that animal.
- (iii) Suggest **one** way in which marking an animal might endanger it.
- (iv) Ecosystems are subject to changes, both natural and artificial.
Mention **one** of **each** type of change as it applies to your named ecosystem. (24)

Q10 2011

10. (a) (i) Distinguish between *contest competition* and *scramble competition* by writing a sentence about each.
(ii) Name a factor, other than competition, that controls wild populations. (9)
- (b) What deduction is it possible to make from each of the following observations?
(i) In a particular area the population of a predator did not decline following a big reduction in the population of its main prey.
(ii) Mortality levels resulting from infection by a particular virus tend to decline over the years.
(iii) Where some members of a species remain in the same general area throughout life and some members are migratory, mortality levels tend to be higher in the migratory part of the population.
(iv) There is a greater variety of herbaceous (non woody) plants in areas where grazing species, such as rabbits, are more plentiful than in areas where grazing species are less plentiful.
(v) In some species of migratory ducks in the northern hemisphere it is found that the wintering grounds of the males lie further south than those of the females. (27)
- (c) (i) In relation to a study of an ecosystem distinguish clearly between *qualitative* and *quantitative* surveys by writing a sentence about each.
(ii) How were you able to identify the different plants in the ecosystem that you investigated?
(iii) Describe how you carried out a quantitative survey of the major plant species.
(iv) Give **two** possible sources of error that may have arisen in the course of your survey. (24)

Q5 2010

5. Explain each of the following terms from your study of ecology.

- (a) Biosphere
- (b) Ecosystem
- (c) Habitat
- (d) Symbiosis
- (e) Biotic factor
- (f) Food Web
- (g) Fauna

Q 112009

11. (a) (i) What does an ecologist mean by the term *conservation*?
(ii) Give an outline of **one** conservation practice used in agriculture **or** fisheries **or** forestry. (9)
- (b) Read the following passage about foxes and answer the questions that follow:

Red foxes are found in many ecosystems. A pair of foxes will occupy a territory and will defend it from other foxes in the breeding season. Territory boundaries are marked with scent and urine. Red foxes are usually solitary and hunt alone except during the breeding season, when they hunt in family groups. The young accompany the parents while hunting and foraging in order to learn skills. Red foxes do not hibernate and are active all year round though they are nocturnal in habit. They are omnivores but they prefer animals such as small rodents, frogs, insects and birds. Preferred plant foods include acorns, grasses, fruits and berries. In urban areas they scavenge for discarded human food. They also eat roadkill whether in a rural or urban setting. (Adapted from: Ontario Ministry of Natural Resources fact sheet: Red fox ecology, 6th June 2007)

1. Give **two** activities of adult foxes, apart from breeding itself, which are associated with the breeding season.
2. How is the territorial boundary marked?
3. How do young foxes learn to hunt?
4. Suggest a reason why wheelie bins are making life more difficult for urban foxes.
5. What is meant by the term *omnivore*?
6. Suggest an advantage to the fox of being “nocturnal in habit”.
7. In general, are urban foxes or rural foxes more successful at finding food? Give a reason for your answer. (27)

- (c) (i) In relation to ecological surveys, explain the meaning of the terms:
1. *Qualitative*.
2. *Quantitative*.
- (ii) In the course of your ecological studies you investigated an ecosystem. Name this ecosystem and describe how you conducted a **quantitative** survey of plants present in it.
- (iii) How did you present the results of your survey?
- (iv) Suggest a possible source of error in your survey. (24)

Q 3 2009

3. (a) Define *predation*. _____

- (b) Give an example of predation by naming a predator and its prey.
Predator: _____
Its prey: _____
- (c) Explain the term *niche*. _____

- (d) Name an anabolic process carried out by plants. _____
- (e) Explain the term *edaphic*. _____

- (f) Give an example of an edaphic factor. _____

Q 7– 2008

7. (a) What is a habitat?
What is an ecosystem?

(b) Answer the following questions by reference to a named ecosystem that you have investigated.

Name of ecosystem

(i) List **three** abiotic factors that you investigated.

1. 2. 3.

(ii) For each of the three abiotic factors that you have listed describe how you carried out the investigation.

Factor 1

Factor 2

Factor 3.....

(iii) In the case of a named organism give an adaptation feature that you noted.

Name of organism

Adaptation feature

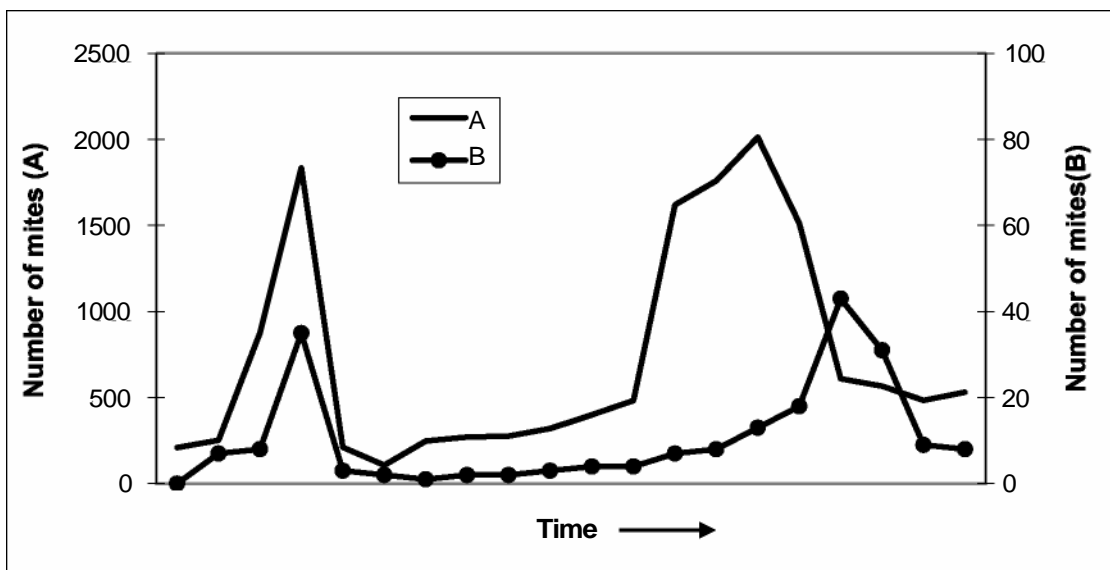
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(iii) Briefly explain how the adaptation feature that you have given in (iii) is of benefit to the organism.

Q10 (a & b) - 2008

10. (a) (i) What does an ecologist mean by competition?
 (ii) Distinguish clearly between contest competition and scramble competition. (9)

(b) Read the following extract, study the graph below and answer the questions that follow.
 “The application of pesticides to strawberry plants in an attempt to destroy cyclamen mites that were damaging the strawberries killed both the cyclamen mites and the carnivorous mites that preyed on them. But the cyclamen mites quickly re-invaded the strawberry fields while the mites that preyed on them returned much more slowly. The result was that the cyclamen mites rapidly increased in density and did more damage to the strawberries than if the pesticide had never been applied.”
 (Adapted from W.T. Keeton and J. L. Gould. *Biological Science*. New York: W.W. Norton & Co., 1993)

- (i) Which graph, A or B represents the carnivorous mites? Explain your answer.
 (ii) What term is used to describe the relationship between the cyclamen mites and the



- carnivorous mites?
 (iii) Suggest **two** reasons why the cyclamen mite managed to quickly re-invade the strawberry fields.
 (iv) Suggest an alternative to the use of pesticides for controlling the cyclamen mite population.
 (v) Draw a pyramid of numbers to include each of the organisms mentioned in the extract above.
 (vi) Apart from competition and the factor illustrated in the above example, state another factor that limits population growth. (27)

Q 2 - 2007

2. (a) In ecology what is meant by a trophic level?
- (b) Complete the pyramid of numbers by naming an organism in each case of A, B, C and D.

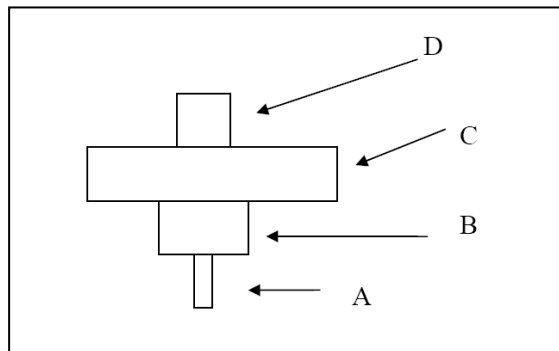
A.....

B

C

D

- (c) Which letter represents the producer in the pyramid?
- (d) Comment on the relative sizes of an individual producer and an individual primary consumer in the pyramid.



Q12 - 2007

12. (a) Explain the following terms that are used in ecology: niche, edaphic factor, symbiosis. (9)
- (b) (i) What is the function of the nitrogen cycle?
 (ii) What is meant by nitrogen fixation?
 (iii) What is meant by nitrification?
 (iv) Describe, using words and/or labelled diagrams, the events of the nitrogen cycle. (27)
- (c) (i) What term do ecologists use to describe an animal which kills and eats other animals?
 (ii) What term is used to describe the animal that is killed and eaten?
 (iii) If the population of the animals in (ii) declines suggest **two** possible consequences for the animals in (i).
 (iv) Give **four** factors that influence the size of the human population. (24)

Q 2 2006

2 Answer the following questions in relation to your study of ecology.

- (a) What is the biosphere?

- (b) What is meant by a qualitative survey?

- (c) Construct a grazing food chain containing at least four trophic levels in the space below.

- (d) In your food chain in (c) identify each of the following.
 - 1. A predator
 - 2. A producer
 - 3. A secondary (second order) consumer
 - 4. A primary (first order) consumer

Q 9– 2006

9. (a) What is meant by the term 'fauna'?

In ecological studies what is a key?

(b) Name **five** plants in the ecosystem that you have studied.

1.

2.

3.

4.

5.

(ii) In the space below draw up a simple key which could be used to identify each of these plants.

(iii) Name **five** animals in the ecosystem that you have studied.

1.

2.

3.

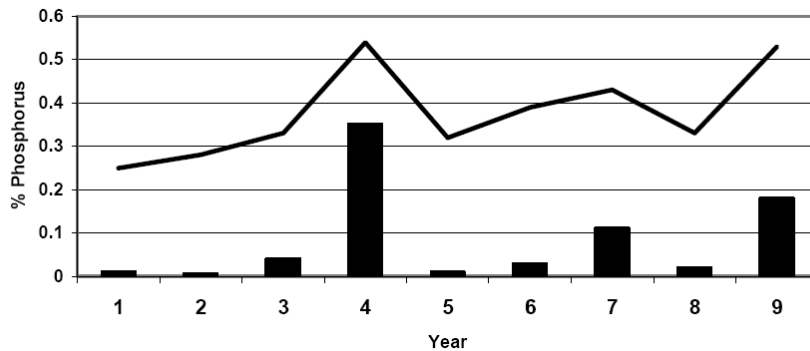
4.

5.

(iv) In the space below draw up a simple key which could be used to identify each of these animals.

Q 10 - 2006

10. (a) The figure below shows the relative sizes of a lemming population (histogram or bars) and the percentage phosphorus in forage (curve) over a number of years.



- (i) What relationship is indicated between the percentage of phosphorus in forage and the size of the lemming population?
- (ii) Suggest an explanation for this relationship. (9)

Q 10 (b)– 2006

- (b) Describe how you carried out a quantitative survey of a **named** animal in the ecosystem that you have studied. (27)

Q 12 (a) and (b) 2005

12. (a) (i) What does an ecologist mean by competition?
- (ii) Competition is generally more intense between members of the same species than between members of different species. Comment on the validity of this statement. (9)

- (b) Read the following extract and then answer the questions below.

“A migratory flight involves preparation. The initial stimulus for spring migration among birds wintering in European latitudes comes from the increase in day length past an initial threshold. Physiological changes encourage the deposition of fat, particularly beneath the skin (subcutaneous) and inside the abdomen (visceral). Fat is the vital fuel used by migrating birds, which often have to cross long stretches of sea or perhaps desert where feeding opportunities are either non-existent or very limited.

Wildfowl preparing for migration, therefore, increase their food intake in order to lay down that vital fat and this shows itself in increased time spent feeding. Conveniently, for plant-eating species such as the grazing geese and wigeon, the onset of spring growth in the plants means higher levels of nutrients in the growing tips on which the birds feed.”

[From Wildfowl, Ogilvie and Pearson, 1994 Hamlyn Limited]

- (i) What is the stimulus for spring migration?
- (ii) Suggest **two** reasons why birds migrate.
- (iii) What is the “vital fuel” used by migrating birds?
- (iv) Give **two** locations in the body in which this vital fuel may be found.
- (v) Suggest what happens to this fuel in the body tissues of the birds.
- (vi) In which part of plants do wigeon find the highest level of nutrients? Suggest a reason for the nutrient levels being highest in this part of the plant (27)

Q 12 (c) – 2005

- (c) (i) Give an account of how you carried out a quantitative survey of a named plant species in an ecosystem that you have studied. In your answer describe how you recorded the results of your survey.
- (ii) As a result of a disease, a species of plant disappeared from an ecosystem. Suggest **three** possible effects of the disappearance of this plant on the populations of other plants and animals in the ecosystem. **(24)**

