

GCSE Biology (9 – 1)

Foundations of Ecology

Name:

Group:



Instructions

- Read each question carefully before you begin to answer it.
- Use black ink or black ball-point pen for your answers.
- Fill in the boxes at the top of this page with your name and group.
- Attempt to answer every question in the booklet.
- Answer the questions in the spaces provided – there may be more space than you need in some answer spaces.
- Calculators may be used for this booklet.
- For any calculations, you **must** show all your working.
- Any and all drawings or graphs should be completed in pencil.

For markers use	
Question	Mark
1	/3
2	/12
3	/6
4	/7
5	/6
6	/10
Total	/44
%	
Grade	

Information

- The maximum mark for this paper is 44 marks.
- The marks for each question are shown in brackets.
- Please be aware that good English and clear presentation are required in your answers.



1. Ecology is the study of how living organisms interact with each other and with their environment, helping us understand the delicate balance that sustains life on Earth.

Circle the letter of the correct answer for each.

- a) Which of the following statements best describes a '**community**' in ecological terms?

- A** All the non-living factors, such as temperature and rainfall, in a particular area.
- B** All the organisms of a single species living together in a particular area.
- C** All the different populations of living organisms interacting with each other in a particular area.
- D** The interaction between all living organisms and the physical conditions in a particular area.

(1 mark)

- b) A cactus plant has a thick, fleshy stem capable of storing large amounts of water and a widespread, shallow root system.

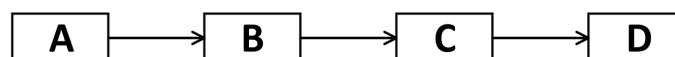


These features primarily help the cactus to:

- A** Attract pollinators for reproduction.
- B** Survive in conditions where water is scarce.
- C** Defend itself against herbivores.
- D** Compete for sunlight with other plants.

(1 mark)

- c) Imagine a simple diagram with four boxes, labelled A, B, C, and D, showing increasing levels of ecological organisation.



- **Box A:** represents a single deer.
- **Box B:** represents a group of several deer (the same species).
- **Box C:** represents the group of deer, along with some rabbits, grasses, and trees.
- **Box D:** represents everything in Box C, plus sunlight, soil, and a stream.

Which box in the diagram best represents an **ecosystem**?

A

B

C

D

(1 mark)

(Total for Question 1 is 3 marks)

2. A group of students is studying a local woodland ecosystem.
They observe oak trees, grass, rabbits, foxes, owls, and various bacteria and fungi in the soil.

a) Define the term ecosystem.

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(1 mark)

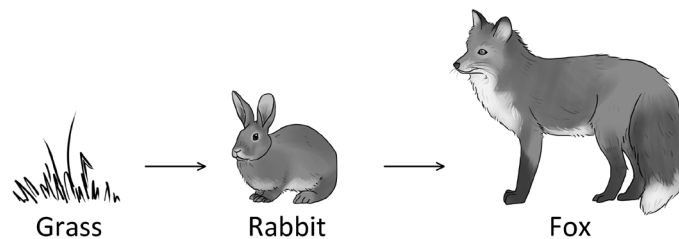
b) From the woodland description, state one example of a population.

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(1 mark)

c) The students identify the following food chain in the woodland:



i. Name the producer in this food chain.

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(1 mark)

ii. What term is used to describe the rabbit in this food chain?

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(1 mark)

iii. Explain what would likely happen to the fox population if a disease significantly reduced the rabbit population.

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(2 marks)

- d) Other than the organisms mentioned, list two abiotic factors that could affect the growth of the oak trees in the woodland.

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(2 marks)

- e) Explain how one of the abiotic factors you listed in (d) could affect the growth of the oak trees.

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(2 marks)

- f) Bacteria and fungi in the soil are decomposers.
Describe the role of decomposers in an ecosystem.

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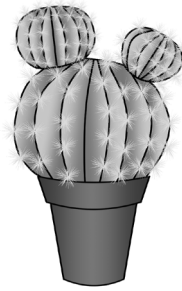
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(2 marks)

(Total for Question 2 is 12 marks)

4. The image below shows a cactus plant, which is commonly found in hot, dry desert environments.



a) Describe **two** structural adaptations of a cactus plant that help it to reduce water loss.
For each adaptation, explain how it helps to reduce water loss.

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(4 marks)

b) Cacti have very shallow, widespread root systems or very deep taproots.
Explain how one of these root system types is an adaptation for survival in a desert environment.

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(2 marks)

c) Some species of cactus open their stomata only at night to take in carbon dioxide for photosynthesis, which then occurs during the day. Suggest how this behaviour is an adaptation to its desert environment.

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(1 mark)

(Total for Question 4 is 7 marks)

5. The diagram below shows **two** species of bird, Bird A and Bird B, that live in the same woodland and feed on insects found on oak trees.



- a) Define the term 'community'.

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(1 mark)

- b) State the resource that Bird A and Bird B are most likely competing for.

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(1 mark)

- c) Scientists observed that Bird A tends to feed on insects found on the thicker branches and trunk of the oak trees, while Bird B mainly feeds on insects found on the thinner, outer twigs and leaves.

Explain how this difference in feeding behaviour benefits both bird species.

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(2 marks)

- d) A disease suddenly kills a large number of the oak trees in the woodland.
Suggest how this decrease in oak trees might affect the population size of Bird A. Explain your answer.

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(2 marks)

(Total for Question 5 is 6 marks)

6. A biologist is studying a freshwater pond ecosystem.

The pond contains populations of stickleback fish, pond snails, dragonfly larvae, and pondweed. Herons occasionally visit the pond to feed. The biologist also measures factors like water temperature, light intensity, and oxygen concentration.

a) Define the term 'population' using an example from the pond ecosystem.

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(1 mark)

b) All the different populations living together in the pond form a 'community'.

Name **one** other organism that would be part of this pond community, but is not explicitly listed in the description above.

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(1 mark)

c) From the information given about the pond:

i. List **two biotic (living) factors** that could directly affect the population size of the stickleback fish.

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(2 marks)

ii. List **two abiotic (non-living) factors** that could affect the growth of the pondweed.

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(2 marks)

- d) Explain how a significant decrease in the population of pond snails could affect the population of dragonfly larvae in the pond. Assume dragonfly larvae feed on pond snails.

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(2 marks)

- e) Pondweed is a producer.

Explain **one** reason why producers like pondweed are essential for the survival of animals, such as the stickleback fish, in the pond ecosystem.

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(2 marks)

(Total for Question 6 is 10 marks)