



## B7F Ecology: Foundation Tier Practice

AQA 8461 · Calculator allowed · about 85 minutes

Total Marks

Name: \_\_\_\_\_ Date: \_\_\_\_ / \_\_\_\_ / \_\_\_\_

**Answer ALL questions. Show all your working.**

- 1** An oak tree, insects and birds are found in a park. The oak tree produces leaves which provide food for the insects. Some birds eat the insects.
- (a) Give the name for an organism that makes its own food by photosynthesis. (1)
- (b) Give the name for an organism that eats other animals. (1)

(Total for Question 1 is 2 marks)

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- 2** A simple food chain in a pond is: algae → water snails → small fish → heron.
- (a) State the producer in this food chain. (1)
- (b) State the tertiary consumer in this food chain. (1)

(Total for Question 2 is 2 marks)

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- 3** Ecologists measured the number of daisies in two fields. Field A had 40 daisies in a 2 m squared area. Field B had 30 daisies in a 1 m squared area.
- (a) Calculate the density of daisies (number per m squared) in Field A. (1)
- .....
- (b) Which field has the higher density of daisies? Give a reason using your calculation. (1)

(Total for Question 3 is 2 marks)

**4** A student samples plants using a quadrat. She records the following numbers of white clover in four quadrats: 3, 5, 4 and 6.

**(a)** Calculate the mean number of white clover per quadrat from these results. (2)

.....  
**(b)** Suggest one reason why repeating the quadrat sampling more times would give a better estimate of abundance. (1)

**(Total for Question 4 is 3 marks)**

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**5** Look at the simplified energy transfer: grass (1000 units) → rabbit → fox. Only 10% of energy is transferred at each step.

**(a)** Calculate the energy available to the rabbit. (1)

.....  
**(b)** Calculate the energy available to the fox. (1)

.....  
**(c)** State one implication of only 10% transfer for the number of top predators an area can support. (1)

**(Total for Question 5 is 3 marks)**

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**6** Which of the following is an abiotic factor in an ecosystem? Choose one: temperature, bacteria, rabbit, fungus.

- ☐ temperature
- ☐ bacteria
- ☐ rabbit
- ☐ fungus

**(Total for Question 6 is 1 mark)**

**7** A river has a population of mayfly larvae. A pollution event reduces oxygen levels and many larvae die. State two biotic or abiotic factors that could explain why some larvae survived while others died.

**(a)** Give one abiotic factor that could have helped some larvae survive the pollution and explain why it would help. (2)

**(b)** Give one biotic factor that could have helped some larvae survive, and explain why. (2)

**(Total for Question 7 is 4 marks)**

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**8** A field survey records the number of different plant species in three habitats: hedgerow, meadow and woodland. The species counts found were: hedgerow 12, meadow 8, woodland 5. Use the word 'biodiversity' in your answers.

**(a)** State which habitat has the greatest biodiversity and give one reason based on the species counts. (2)

**(b)** Suggest one management action that could increase biodiversity in the meadow and explain how it would help. (2)

**(Total for Question 8 is 4 marks)**

- 9** A student investigates how light affects the growth of seedlings. She grows seedlings in three trays: Tray 1 in full light, Tray 2 in dim light, Tray 3 in darkness. After two weeks the mean shoot lengths are: Tray 1 = 10 cm, Tray 2 = 6 cm, Tray 3 = 2 cm. The student concludes that more light increases shoot growth.

(Total for Question 9 is 6 marks)

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- 10** A conservation group plans to reintroduce hedgehogs to a local park. They estimate food availability by counting invertebrates. In a sample area of 2 m squared they find 50 invertebrates. They want to estimate how many invertebrates there are per 1 m squared so they can compare with other sites.

(a) Calculate the number of invertebrates per 1 m squared in this sample area. (2)

(b) Give one reason why this estimate might not represent the whole park and suggest one improvement to the sampling method. (3)

(Total for Question 10 is 5 marks)

## Mark scheme · B7F Ecology: Foundation Tier Practice

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### Question 1

- (a) **B1** producer (accept green plant or autotroph)
- (a) **Answer: Producer**
- (b) **B1** consumer (accept carnivore or predator)
- (b) **Answer: Consumer**

### Question 2

- (a) **B1** algae cao
- (a) **Answer: Algae**
- (b) **B1** heron cao
- (b) **Answer: Heron**

### Question 3

- (a) **B1** density =  $40 / 2 = 20$  per m squared
- (a) **Answer: 20 per m squared**
- (b) **B1** Field B, because its density is 30 per m squared which is greater than 20 per m squared, oe
- (b) **Answer: Field B, because density is 30 per m squared which is greater than 20 per m squared.**

### Question 4

- (a) **M1** adds values and divides by 4:  $(3 + 5 + 4 + 6) / 4$
- (a) **A1** 4.5 cao
- (a) **Answer: 4.5**
- (b) **B1** reduces the effect of random variation or chance; increases reliability of the estimate, oe
- (b) **Answer: Repeating reduces random variation and increases the reliability of the estimate.**

### Question 5

- (a) **B1** calculates 10% of 1000 = 100 units
- (a) **Answer: 100 units**
- (b) **B1** calculates 10% of 100 = 10 units
- (b) **Answer: 10 units**
- (c) **B1** there will be fewer top predators because little energy is available at higher trophic levels, oe
- (c) **Answer: Fewer top predators because little energy is available at higher trophic levels.**

### Question 6

- **B1** temperature cao
- **Answer: temperature**

### Question 7

- (a) **M1** identifies an abiotic factor and links it to survival (e.g. higher oxygen pockets, faster flow, cooler temperature)
- (a) **A1** explanation: such a factor gives more oxygen or reduces toxic concentration so larvae survive, oe
- (a) **Answer: Any abiotic factor linked to survival, for example: patches of water with higher oxygen due to faster flow, so larvae in those patches had more oxygen and survived.**
- (b) **M1** identifies a biotic factor and links it to survival (e.g. presence of tolerant species, food availability, fewer predators)
- (b) **A1** explanation: this factor increases chance of survival for some larvae (e.g. tolerant species reduce competition or predators were fewer), oe
- (b) **Answer: Any biotic factor linked to survival, for example: areas with more food meant larvae could develop faster and were less affected by pollution.**

### Question 8

- (a) **B1** hedgerow has the greatest biodiversity (12 species) cao
- (a) **B1** reason: higher number of species recorded means greater variety of organisms, oe
- (a) **Answer: Hedgerow, because it has 12 species which is more species and so higher biodiversity.**
- (b) **M1** suggests a reasonable action (e.g. reduce mowing frequency, introduce wildflowers, create pond)
- (b) **A1** explains how it helps: increases habitat variety or food resources, allowing more species to establish, oe
- (b) **Answer: Example: reduce mowing so wildflowers can set seed; this increases plant variety and food/habitats so more species can live there.**

### Question 9

- **Level 3** (5-6): Detailed explanation with clear judgement and reference to data and experimental factors.
- **Level 2** (3-4): Some explanation with reference to the data and at least one evaluation point.
- **Level 1** (1-2): Simple statements about the pattern in the data with little or no evaluation.
- **Indicative content:**
  - Describe the pattern in the data: mean lengths 10, 6, 2 cm showing greater light gives greater growth.
  - Explain biologically: light provides energy for photosynthesis so seedlings in more light produce more sugars for growth.
  - Consider alternative explanations or limitations: other factors not controlled (temperature, water, nutrients), seeds may vary in vigour, small sample sizes.
  - Evaluate the conclusion: data supports that more light increases shoot growth but only if other variables were controlled; suggest repeating with controls or measuring more replicates.
  - Suggest improvements: use same seed batch, control water and temperature, increase number of seedlings per tray.

### Question 10

- (a) **M1** substitutes: density = 50 / 2
- (a) **A1** 25 per m squared cao
- (a) **Answer: 25 per m squared**
- (b) **M1** identifies a limitation (e.g. only one small sample, habitat variation across park, time of day/season affects invertebrate numbers)
- (b) **M1** suggests a sensible improvement (e.g. take many samples in different parts of the park, sample at different times or seasons)
- (b) **A1** links improvement to why it gives a better estimate (e.g. increases representativeness and reduces chance effects), oe
- (b) **Answer: The sample may not represent the whole park because habitats vary and invertebrate numbers change with location or time. Improvement: take many random samples across the park and at different times; this increases representativeness and reduces chance variation.**