

The organism in the environment: practice questions

7 questions · 23 marks · mark scheme at the back

For Pearson Edexcel International GCSE Biology 4BI1 and Science (Double Award) 4SD0. **Biology only** is not in the Double Award and is only examined on Paper 2.

Name

Total / 23

- 1** All the organisms of different species living together in a wood form which of the following? **[1 mark]**
- A. ☐ A population
- B. ☐ A community
- C. ☐ A habitat
- D. ☐ An ecosystem
- 2** A pond contains frogs, fish, water plants and water. State the ecological term for each of the following. (a) All the frogs in the pond. (b) The place where the frogs live. (c) The frogs, fish and plants together with the water, light and temperature of the pond. **[3 marks]**

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- 3** A field has an area of 400 m². A student used a 0.25 m² quadrat to count buttercups at six random positions. The results are shown in the table. Estimate the number of buttercups in the field. **[3 marks]**

Buttercups counted in each quadrat						
Quadrat	1	2	3	4	5	6
Number of buttercups	4	7	5	6	3	5

Answer =

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- 4** A student wants to compare the population size of daisies in a shaded part of a lawn and in a sunny part of the same lawn, using quadrats. Describe how the student should do this. **[4 marks]**

- 5** **Biology only** **[2 marks]**
State what is meant by the term biodiversity.

- 6** **Biology only** **[4 marks]**
A student investigated the distribution of a plant species from a shaded woodland edge out into a sunny field, and also measured the biodiversity of the field. Describe how the student could do this using quadrats.

7 Describe and explain how abiotic and biotic factors can affect the population size and distribution of organisms in a woodland. **[6 marks]**

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Mark scheme

One mark for each point unless a maximum is given. Words in brackets are not needed for the mark.

1. [1]

B B (1)

2. [3]

- population (1)
- habitat (1)
- ecosystem (1)

3. [3]

- mean = $(4 + 7 + 5 + 6 + 3 + 5) \div 6 = 5$ per quadrat (1)
- number of quadrat areas in the field = $400 \div 0.25 = 1600$ (1)
- estimated population = $5 \times 1600 = 8000$ (buttercups) (1)
- award 3 marks for the correct answer with no working; allow error carried forward from an incorrect mean

4. [4]

- place quadrats at random / use random coordinates from a random number generator (1)
- count the number of daisies inside each quadrat (1)
- use the same size of quadrat and the same number of quadrats in each area, with many quadrats (1)
- calculate the mean number of daisies per quadrat for each area and compare (1)

5. [2] **Biology only**

- the variety / number of different species (1)
- in a habitat / ecosystem / on Earth (1)
- do not accept: the number of organisms

6. [4] **Biology only**

- lay a tape measure / transect line across the habitat from the shade into the field (1)
- place a quadrat at regular intervals along the line and count the plants of the species in each (1)
- for biodiversity, place quadrats randomly in the field (1)
- count the number of different species in each quadrat and calculate the mean number of species (1)
- allow measuring light intensity at each position with a light meter

7. [6]

Level 3 5-6	A detailed, well-structured answer that describes and explains the effect of at least two abiotic factors and at least two biotic factors, linking each to population size or distribution, with correct scientific terms.
Level 2 3-4	Describes the effect of both abiotic and biotic factors, with some explanation. The links to population size or distribution may be incomplete.
Level 1 1-2	Names one or more factors, with a limited or no explanation of their effect.

Indicative content

- abiotic: light (less light means fewer plants can photosynthesise, so fewer plants and fewer animals that depend on them; shade-tolerant plants found where light is low)
- abiotic: temperature (affects enzyme-controlled reactions, so growth and survival; species only survive within a range)
- abiotic: water (organisms need water; fewer survive in dry areas, those adapted to dry conditions found there)
- biotic: competition for light, water, mineral ions, food, space (better-adapted species survive and reproduce more, so the other species decrease)
- biotic: predation (predator numbers rise when prey numbers rise; prey numbers then fall; predator peak follows prey peak)