



Ecological niches: practice questions

8 questions • 25 marks • mark scheme at the back

For IB Diploma Biology, Standard Level and Higher Level (first assessment 2025). **HL only** is additional higher level content, for HL students only.

Name

Total / 25

1 PAPER 1A STYLE [1 mark]

A bacterium grows only at the bottom of a tube of broth, where no oxygen is present. Which type of organism is it?

- A. ☐ Obligate aerobe
- B. ☐ Facultative anaerobe
- C. ☐ Obligate anaerobe
- D. ☐ Facultative mixotroph

2 PAPER 1A STYLE [1 mark]

What distinguishes saprotrophic nutrition from holozoic nutrition?

- A. ☐ Saprotrophs are autotrophic, whereas holozoic organisms are heterotrophic
- B. ☐ Saprotrophs digest food outside their cells, whereas holozoic organisms digest food internally
- C. ☐ Saprotrophs ingest food, whereas holozoic organisms absorb food directly
- D. ☐ Saprotrophs feed on living organisms, whereas holozoic organisms feed only on dead matter

3 PAPER 1A STYLE [1 mark]

Which forest plant starts life on the branch of a tree and later sends roots down to the soil that enclose the host trunk?

- A. ☐ Liana
- B. ☐ Strangler epiphyte
- C. ☐ Shade-tolerant herb
- D. ☐ Canopy tree

4 PAPER 2A STYLE [3 marks]

Euglena is a freshwater protist that contains chloroplasts. Outline why *Euglena* is described as a facultative mixotroph.

[3 marks]

[illegible]

[5 marks]

Population density of two Paramecium species (practice data)				
Day	A alone / cells per cm ³	B alone / cells per cm ³	A in mixed culture / cells per cm ³	B in mixed culture / cells per cm ³
0	2	2	2	2
4	60	40	50	30
8	190	120	150	40
12	200	130	180	15
16	200	125	195	5

[illegible]

[3 marks]

[illegible]

Describe adaptations of herbivores for feeding on plants and of plants for resisting herbivory, and outline chemical, physical and behavioural adaptations of prey animals for resisting predation.

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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]

C C [1]

2. [1]

B B [1]

3. [1]

B B [1]

4. [3]

- mixotroph: both autotrophic and heterotrophic [1]
- photosynthesises / autotrophic in light, using chloroplasts [1]
- takes in / absorbs carbon compounds from surroundings (heterotrophic) [1]
- facultative: can survive using one mode alone, e.g. heterotrophically in the dark [1]
- max 3

5. [3]

- herbivorous / tough, hard plant material, e.g. seeds, roots, tubers [1]
- large flat molars give large surface area for grinding [1]
- thick enamel resists wear from hard / abrasive food [1]
- sagittal crest anchors large jaw / temporalis muscles for powerful chewing [1]
- max 3

6. [5]

- (a) $(125 - 5) \div 125 \times 100$ [1]
- (a) = 96% [1]
- (b) both species occupy the same niche / compete for the same food [1]
- (b) species A is the better competitor / uses the bacteria more efficiently [1]
- (b) species B is eliminated / declines towards extinction in mixed culture [1]
- (b) two species cannot share the same niche indefinitely / competitive exclusion [1]
- (b) species A reaches similar density in mixed culture as alone, so is little affected [1]
- max 5; ECF in (a)

7. [3]

- fundamental niche is the potential niche based on adaptations / tolerance limits [1]
- realized niche is the actual extent of the niche when in competition with other species [1]
- realized niche is usually smaller than / part of the fundamental niche [1]
- example, e.g. barnacle *Chthamalus* restricted to upper shore by competition from *Semibalanus* [1]
- max 3

8. [8]

- chewing mouthparts / mandibles in leaf-eating insects, e.g. caterpillars, bite and grind leaves [1]
- piercing mouthparts / stylets of insects, e.g. aphids, reach phloem sap [1]
- plants have thorns / spines / physical structures that deter herbivores [1]
- plants produce toxic secondary compounds in seeds and leaves [1]
- named toxin, e.g. alkaloids / nicotine / cyanogenic glycosides [1]
- some herbivores have metabolic adaptations to detoxify the toxins, e.g. koala / eucalyptus [1]
- prey chemical adaptation, e.g. toxins / distasteful chemicals / defensive sprays [1]
- prey physical adaptation, e.g. camouflage / spines / shells / speed [1]
- warning colours advertise toxicity, so predators learn to avoid prey [1]
- prey behavioural adaptation, e.g. herding / shoaling / alarm calls / fleeing / playing dead [1]
- max 8