

Classification and biodiversity: practice questions

8 questions • 25 marks • mark scheme at the back

For Pearson Edexcel International AS Biology XBI11 and International A Level Biology YBI11. **A Level only** is IA2 content (Units 4 to 6), not needed for the International AS.

Name

Total / 25

1 UNIT 2 STYLE [1 mark]

Which feature describes a cell of a bacterium rather than an archaeon?

- A. ☐ Cell wall containing peptidoglycan
- B. ☐ Ether-linked lipids in the membrane
- C. ☐ Linear DNA associated with histones
- D. ☐ 80S ribosomes

2 UNIT 2 STYLE [3 marks]

State what is meant by the term species and give one reason why the species concept cannot be used to classify all organisms.

3 UNIT 2 STYLE [4 marks]

Explain how new molecular evidence led to the three-domain system of classification and why the scientific community evaluates new data critically.

State what is meant by the terms biodiversity and endemism.

Describe how human activities are threatening the variety of life on Earth.

Researchers sampled a small, isolated population of a rare plant and determined the genotype at one gene locus for each plant. The results are shown in the table. Calculate the heterozygosity index. Show your working.

Genotypes at one gene locus	
Genotype	Number of plants
RR	25
Rr	6
rr	9

Answer = ...

7 UNIT 2 STYLE

[4 marks]

The table shows the number of individuals of each species found in a survey of a woodland. Use the formula $D = N(N - 1) \div \sum n(n - 1)$ to calculate the index of diversity. Show your working.

Number of individuals of each species	
Species	Number of individuals
A	20
B	10
C	5
D	3
E	1
F	1

Answer = ...

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8 UNIT 2 STYLE

[3 marks]

A pond has 8 species and a stream has 8 species. The index of diversity of the pond is 6.4 and of the stream is 2.1. Explain how the two habitats can have the same species richness but different indices of diversity.

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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]

A A: peptidoglycan cell wall (archaea have no peptidoglycan; eukaryotes have linear DNA with histones and 80S ribosomes)

2. [3]

- a group of organisms with similar characteristics / genes that can interbreed
- to produce fertile offspring
- reason: asexually reproducing organisms (such as bacteria) do not interbreed / fossils cannot be tested / hybrids can form between species (any one)

3. [4]

- comparisons of rRNA / DNA / protein sequences showed that prokaryotes contain two very different groups
- archaea differ from bacteria (for example membrane lipids / cell walls / RNA sequences) and are in some ways more like eukaryotes
- so the organisms were placed into three domains: Archaea, Bacteria and Eukarya
- new data are checked by other scientists / peer review / repeated by others
- to check that the methods and conclusions are valid before classification is changed
- Max 4

4. [3]

- biodiversity: the variety of living organisms / species
- in an area / habitat / on Earth (credit reference to species, genetic or habitat diversity)
- endemism: a species found in only one geographical location / region and nowhere else

5. [4]

- habitat destruction / deforestation / land cleared for agriculture, housing or roads, so species lose their habitats
- pollution damages organisms / habitats
- climate change, so organisms may no longer be adapted to their habitat
- overexploitation / overhunting / overfishing reduces populations
- introduced species outcompete or prey on native species
- Max 4. Each threat must be linked to an effect on species.

6. [3]

- total number of plants = $25 + 6 + 9 = 40$ (1)
- heterozygotes = 6 (1)
- $6 \div 40 = 0.15$ (1)

7. [4]

- $N = 20 + 10 + 5 + 3 + 1 + 1 = 40$ (1)
- $N(N - 1) = 40 \times 39 = 1560$ (1)
- $\Sigma n(n - 1) = 380 + 90 + 20 + 6 + 0 + 0 = 496$ (1)
- $D = 1560 \div 496 = 3.1$ (1); allow 3.15

8. [3]

- species richness counts only the number of species
- the index of diversity also takes into account the number of individuals of each species
- in the stream one species (or a few) probably dominates / individuals are not evenly spread among species, giving a lower D