A-LEVEL BIOLOGY • EXERCISE SHEET

18.1 Classification

Name: _____ Class: _____ Date: _____ **Total: 11 marks**

Objective

Build the skills to answer exam questions on **classification** —the meaning of **species** 物种, the three **domains** 域, the **taxonomic hierarchy** 分类层级, the four **kingdoms** 界, and how viruses are classified.

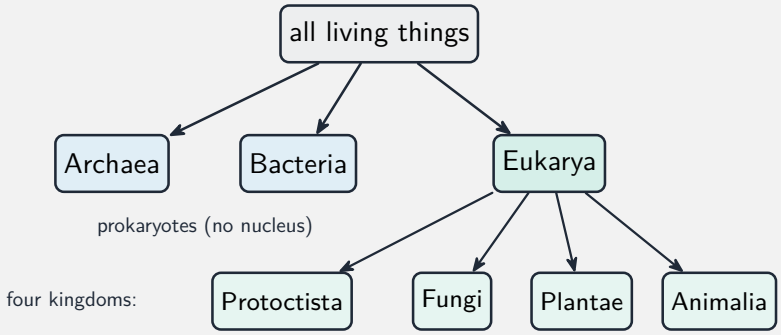
You must be able to:

- discuss the biological, morphological and ecological species concepts
- describe the three domains and the taxonomic hierarchy
- outline the four eukaryotic kingdoms and how viruses are classified

1 Worked examples

Species and domains

A **species** can be defined by the **biological** (can interbreed to give fertile offspring), **morphological** (look alike), or **ecological** (same niche) concept.



Three domains: Archaea and Bacteria are prokaryotes; the Eukarya split into four kingdoms

Archaea 古菌 and **Bacteria** 细菌 are prokaryotes but differ in membrane lipids, ribosomal RNA and cell-wall make-up. **Eukarya** have a nucleus.

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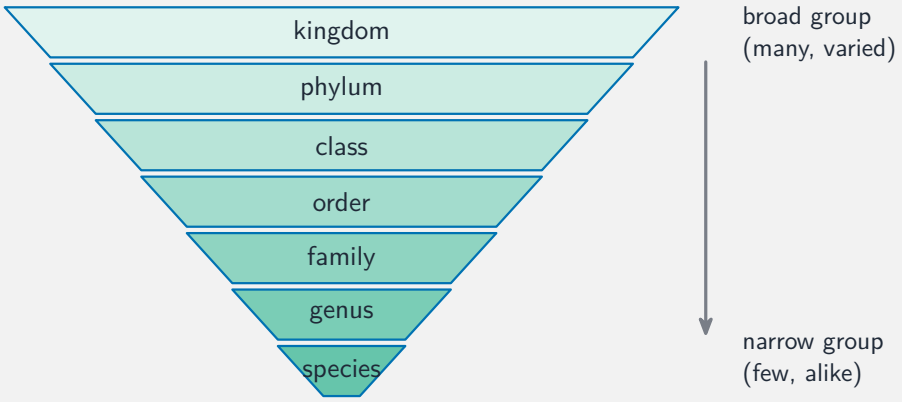

Kingdom → phylum → class → order → family → genus → species

The four eukaryotic kingdoms: **Protoctista** (mostly single-celled), **Fungi** (absorb food, chitin walls), **Plantae** (photosynthesise), **Animalia** (feed on others). **Viruses** are classified by their **nucleic acid** (DNA or RNA) and whether it is single- or double-stranded.

2 Practice

2.1 State the biological species concept. [1]

2.2 Put these in order from largest to smallest group: family, kingdom, genus, order. [2]

3 Exam-style questions

3.1 To which domain do organisms with a nucleus belong? [1]

- **A** Archaea
- **B** Bacteria
- **C** Eukarya
- **D** Protoctista

3.2 Viruses are classified according to: [1]

- **A** the kingdom they belong to

- **B** the type of nucleic acid and whether it is single- or double-stranded
- **C** their cell wall composition
- **D** the number of chromosomes

3.3 (a) State **two** features that distinguish the kingdom Fungi from the kingdom Plantae. [2]

(b) Explain why Archaea and Bacteria are placed in separate domains even though both are prokaryotes. [2]

3.4 Explain a limitation of the biological species concept. [2]

4 Go further

You are now ready for the real exam questions on this subtopic. Open the **18.1 Classification** past-paper sheet in the Library, or try these in **Practice mode**:

- 9700/41 N25 —Q2 (classification, calculation)
- 9700/44 N25 —Q7 (classification)
- 9700/41 J25 —Q9 (taxonomy, calculation)

Solutions

2.1 a group of organisms that can interbreed to produce fertile offspring.

2.2 kingdom → order → family → genus.

3.1 C. Organisms with a nucleus are in the Eukarya domain.

3.2 B. Viruses are classified by nucleic acid type and strandedness.

3.3 (a) Fungi feed by absorbing food (not photosynthesis); Fungi have chitin cell walls (Plantae have cellulose).
(b) they differ in their membrane lipids, ribosomal RNA and cell-wall composition, showing they are only distantly related.

3.4 it cannot be applied to organisms that reproduce asexually / to extinct/fossil species / where two groups rarely meet to test interbreeding.