

Classification & Taxonomy

Key ideas

Taxonomy is the science of naming and classifying organisms. Levels from broadest to most specific: domain, kingdom, phylum, class, order, family, genus, species ("Dear King Philip Came Over For Good Soup").

Binomial nomenclature: every species has a two-part scientific name, *Genus species*. The genus is capitalized, the species is lowercase, and the whole name is italicized (underlined when handwritten).

Three domains: Bacteria, Archaea and Eukarya. **Six kingdoms:** Eubacteria, Archaeobacteria, Protista, Fungi, Plantae and Animalia. A **cladogram** groups organisms by shared derived traits.

A Levels of classification

2 marks

1. Put the eight levels in order from **broadest** to **most specific**.

Order Kingdom Species Phylum Genus Domain Family Class

_____ → _____ → _____ → _____ → _____ → _____ → _____

B Reading a classification table

4 marks

Level	Human	Grey wolf	Domestic cat	Coyote
Domain	Eukarya	Eukarya	Eukarya	Eukarya
Kingdom	Animalia	Animalia	Animalia	Animalia
Phylum	Chordata	Chordata	Chordata	Chordata
Class	Mammalia	Mammalia	Mammalia	Mammalia
Order	Primates	Carnivora	Carnivora	Carnivora
Family	Hominidae	Canidae	Felidae	Canidae
Genus	<i>Homo</i>	<i>Canis</i>	<i>Felis</i>	<i>Canis</i>
Species	<i>sapiens</i>	<i>lupus</i>	<i>catus</i>	<i>latrans</i>

2. Which two organisms are most closely related? Explain how you know.

3. What is the most specific level that all four organisms share?

4. What is the most specific level shared by the domestic cat and the grey wolf?

5. Write the scientific name of the coyote correctly.

C Binomial nomenclature

2 marks

½ mark each.

	Name as written	Written correctly?	If not, write it correctly
6.	<i>Homo sapiens</i>		
7.	homo Sapiens		
8.	<i>Acer saccharum</i> (sugar maple)		
9.	<i>Ursus Maritimus</i> (polar bear)		

D The six kingdoms

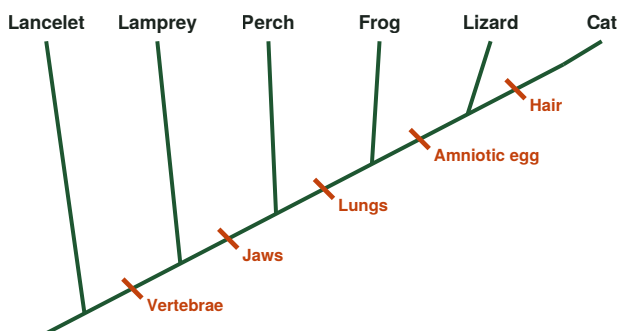
6 marks

Fill in the blank cells (1 mark per row). Domains: Bacteria, Archaea or Eukarya.

	Kingdom	Domain	Cell type	Number of cells	Nutrition	Example
10.	Eubacteria			Unicellular	Autotroph or heterotroph	
11.	Archaeobacteria		Prokaryotic			Methanogens in hot springs
12.	Protista	Eukarya		Mostly unicellular	Autotroph or heterotroph	
13.	Fungi		Eukaryotic	Mostly multicellular		Mushroom, yeast
14.	Plantae	Eukarya	Eukaryotic			Sugar maple
15.	Animalia			Multicellular		Grey wolf

E Reading a cladogram

4 marks



16. Which derived trait is shared by the frog, lizard and cat, but not the perch?

17. Which organism is most closely related to the lizard?

18. Which organism has vertebrae but no jaws?

19. List every derived trait the frog has.

F Thinking about classification

6 marks

20. The cougar is also called the puma and the mountain lion, but it has only one scientific name, *Puma concolor*. Give two reasons scientists use scientific names instead of common names. (2 marks)

21. Fungi were once classified as plants. Today DNA evidence shows fungi are more closely related to animals. Explain why classification systems change over time. (2 marks)

22. Why are viruses not placed in any of the six kingdoms? (2 marks)

G Spot the mistake

2 marks

23. A student writes: "Organisms in the same class are more closely related than organisms in the same genus." Explain the error and correct it.

24. A student writes: "Mushrooms are plants because they grow in soil and don't move." Explain the error and correct it.

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ANSWER KEY**Key ideas**

Taxonomy is the science of naming and classifying organisms. Levels from broadest to most specific: domain, kingdom, phylum, class, order, family, genus, species ("Dear King Philip Came Over For Good Soup").

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A **cladogram** groups organisms by shared derived traits.

A Levels of classification

2 marks

1. Put the eight levels in order from **broadest** to **most specific**.

Order Kingdom Species Phylum Genus Domain Family Class

Domain → **Kingdom** → **Phylum** → **Class** → **Order** → **Family** → **Genus** → **Species**

B Reading a classification table

4 marks

Level	Human	Grey wolf	Domestic cat	Coyote
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Order	Primates	Carnivora	Carnivora	Carnivora
Family	Hominidae	Canidae	Felidae	Canidae
Genus	<i>Homo</i>	<i>Canis</i>	<i>Felis</i>	<i>Canis</i>
Species	<i>sapiens</i>	<i>lupus</i>	<i>catus</i>	<i>latrans</i>

2. Which two organisms are most closely related? Explain how you know.

The grey wolf and coyote: they share every level down to the same genus (*Canis*).

3. What is the most specific level that all four organisms share?

Class (Mammalia)

4. What is the most specific level shared by the domestic cat and the grey wolf?

Order (Carnivora)

5. Write the scientific name of the coyote correctly.

***Canis latrans* (or underlined when handwritten)**

C Binomial nomenclature

2 marks

½ mark each.

	Name as written	Written correctly?	If not, write it correctly
6.	<i>Homo sapiens</i>	Yes	Correct
7.	homo Sapiens	No	<i>Homo sapiens</i> : genus capitalized, species lowercase
8.	<i>Acer saccharum</i> (sugar maple)	Yes	Correct
9.	<i>Ursus Maritimus</i> (polar bear)	No	<i>Ursus maritimus</i> : species name is lowercase

D The six kingdoms

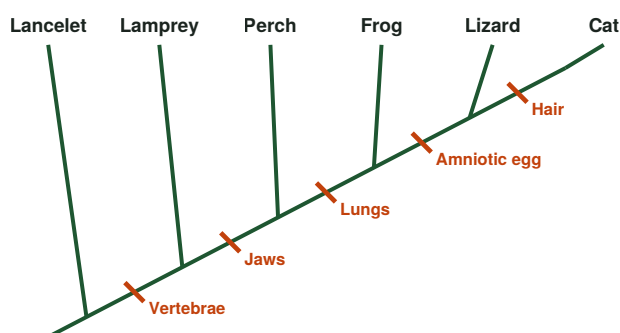
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11.	Archaeobacteria	Archaea	Prokaryotic	Unicellular	Autotroph or heterotroph	Methanogens in hot springs
12.	Protista	Eukarya	Eukaryotic	Mostly unicellular	Autotroph or heterotroph	Amoeba, algae
13.	Fungi	Eukarya	Eukaryotic	Mostly multicellular	Heterotroph (absorbs food)	Mushroom, yeast
14.	Plantae	Eukarya	Eukaryotic	Multicellular	Autotroph (photosynthesis)	Sugar maple
15.	Animalia	Eukarya	Eukaryotic	Multicellular	Heterotroph (ingests food)	Grey wolf

E Reading a cladogram

4 marks



16. Which derived trait is shared by the frog, lizard and cat, but not the perch?

Lungs

17. Which organism is most closely related to the lizard?

Cat (they share the most recent common ancestor)

18. Which organism has vertebrae but no jaws?

Lamprey

19. List every derived trait the frog has.

vertebrae, jaws, lungs

F Thinking about classification

6 marks

20. The cougar is also called the puma and the mountain lion, but it has only one scientific name, *Puma concolor*. Give two reasons scientists use scientific names instead of common names. (2 marks)

Any two: each species has one unique name used worldwide; common names change between languages and regions; one common name can refer to different species; the genus shows relationships between species.

21. Fungi were once classified as plants. Today DNA evidence shows fungi are more closely related to animals. Explain why classification systems change over time. (2 marks)

Classification is based on the best evidence available. New tools such as DNA sequencing and microscopy reveal relationships that body structure alone could not, so groups are revised.

22. Why are viruses not placed in any of the six kingdoms? (2 marks)

Viruses are not made of cells and cannot grow or reproduce on their own; they only reproduce inside a host cell, so they do not meet the characteristics of living things.

G Spot the mistake

2 marks

23. A student writes: "Organisms in the same class are more closely related than organisms in the same genus." Explain the error and correct it.

It is the reverse. Genus is a more specific level, so organisms in the same genus share more traits and a more recent common ancestor than organisms that only share a class.

24. A student writes: "Mushrooms are plants because they grow in soil and don't move." Explain the error and correct it.

Fungi are heterotrophs: they cannot photosynthesize and absorb food from their surroundings. Their cell walls contain chitin, not cellulose, so they belong in kingdom Fungi.