

Model Answers: Easy

1a

(a) Table 1 should be completed as shown below...

One mark awarded for each correct column:

| | |
|--|--|
| Kingdom | Animalia |
| Phylum | Chordata |
| Class | Mammalia |
| Order | Carnivora |
| Family | Canidae |
| Genus | <i>Canis</i> |
| Species | <i>familiaris</i> |
| <i>All correct in column; [1 mark]</i> | <i>All correct in column; [1 mark]</i> |

[Total: 2 marks]

Here is a useful phrase for remembering the different classification groups:

Kings **P**lay **C**hess **O**n **F**ancy **G**old **S**quares**K**ingdom **P**hylum **C**lass **O**rders **F**amily **G**enus **S**pecies

1b

(b) Another species concept that biologists may use to help determine if two animals are different species is...

Either of the following pairs of names/descriptions:

- The morphological (species concept); [1 mark]
- (Which involves) comparing/looking at (similarities in) the anatomy / outward appearance / physical features / homologous features / *named feature* e.g. skull shape; [1 mark]

OR

- The ecological (species concept); [1 mark]
- (Which involves) comparing/looking at populations with the same features that live in the same habitat at the same time **OR** comparing/looking at the ecological niches filled by different organisms; [1 mark]

[Total: 2 marks]

The biological species concept (whether two individuals can interbreed to produce fertile offspring) is one way of distinguishing species, but as seen above there are two other species concepts that are also used. Combinations of these three concepts can be used to try and determine between different species. For example, it may be difficult to test out the biological species concept as it may be tricky to actually observe whether two organisms from wild populations have bred successfully together or not (genetic testing can also be

very expensive or not a practical option). In this case, using the morphological and ecological species concepts may be a more practical and realistic option!

1c

(c) A hierarchical system is one in which...

- Larger groups contain smaller groups; [1 mark]
- With no overlap (between groups); [1 mark]

[Total: 2 marks]

1d

(d) A taxonomic rank is...

- A unit of classification **OR** a category that indicates the level (of an organism) in the classification (system); [1 mark]
- *One example from:* domain, kingdom, phylum, class, order, family, genus, species; [1 mark]

[Total: 2 marks]

In Biology, taxonomy is the practice of categorisation or classification of organisms. A taxonomy (or taxonomical classification) is a hierarchical scheme of classification, in which organisms are organised into groups. Taxonomy sorts all life into different taxonomic units known as "taxa" (singular "taxon").

2a

(a) The other two domains of life on Earth are...

- Bacteria; [1 mark]
- Eukarya **OR** Eukaryota; [1 mark]

[Total: 2 marks]

Be careful - the technical name for the domain that contains all eukaryotes (organisms that are eukaryotic i.e. their cells have a clearly defined nucleus enclosed within a nuclear envelope) is the '**Eukarya**' or '**Eukaryota**'. Ideally, you should also capitalise these domain names, although you would still gain the marks here if you have not.

2b

(b) The features of *Archaea* that means they are classified as a distinct domain in the three domains system of classification include...

Any **four** of the following:

- RNA analysis shows that there were two distinct groups of prokaryote; [1 mark]
- The small subunit of Archaeal ribosomes is more similar to eukaryotic ribosomes than to those of the rest of the prokaryotes; [1 mark]
- (Archaea have) unique/different ribosomal RNA / rRNA / proteins **OR** the sequences of bases / amino acids in their rRNA / ribosomal proteins are unique/different; [1 mark]
- The cell walls (of the Archaea) are distinct from those of the rest of the prokaryotes **OR** their cells walls do not contain peptidoglycans; [1 mark]
- The lipids of the cell membranes (of the Archaea) are different from those of the other cell types; [1 mark]
- They have histone proteins in their DNA, unlike the rest of the prokaryotes; [1 mark]
- They have (some) introns in their DNA, a rare/absent feature in the rest of the prokaryotes; [1 mark]

[Total: 4 marks]

2c

(c) Other ways in which bacterial cells differ from animal cells include...

Any **three** of the following:

- Bacterial cells do not contain membrane-bound organelles / *named example e.g. mitochondria* **WHEREAS** animal cells do; [1 mark]
- Bacterial cells have a cell wall **WHEREAS** animal cells do not; [1 mark]
- Bacterial cells are (much) smaller (than animal cells) **OR** bacterial cells are (relatively) small **WHEREAS** animal cells are (relatively) large; [1 mark]
- Bacterial cells have a circular chromosome **WHEREAS** animal cells have linear chromosomes; [1 mark]
- Bacterial cells contain plasmids **WHEREAS** animal cells do not; [1 mark]
- Bacterial cells contain 70S ribosomes (only) **WHEREAS** animal cells contain (both) 80S ribosomes (in the cytosol) and 70S (in mitochondria and chloroplasts); [1 mark]

[Total: 3 marks]

As the question asks for contrasts, **paired statements** are required in order to gain the marks. Always look for clues in the question itself - you are given an example of a paired statement so you should follow this example!

3

a) The characteristic features of organisms in the domain Bacteria are...

Any **eight** of the following:

- No nucleus / nuclear envelope; [1 mark]
- Circular DNA; [1 mark]
- Histone-like / (named) proteins associated with DNA; [1 mark]
- No membrane-bound organelles; [1 mark]
- Named example of absent organelle, e.g. vacuole, mitochondria, vacuole; [1 mark]
- 70S / 18 nm ribosomes; [1 mark]
- Cell wall made of peptidoglycan/murein; [1 mark]
- Reproduce by binary fission; [1 mark]
- Unicellular; [1 mark]
- Spherical / rod / spiral / comma / corkscrew shape **OR** may form pairs / tetrads / filaments / clusters; [1 mark]
- Size detail, e.g. maximum size of 2 μm / always smaller in size than eukaryotic cells; [1 mark]
- Gram-negative cells have an extra/second/outer membrane; [1 mark]

[Total: 8 marks]

Be careful not to confuse **circular DNA**, which is the DNA arrangement that all bacteria have, with plasmids, which are tiny loops of additional DNA found in some bacteria.