A3.2 Classification and cladistics (HL)

What the Cell · DP Biology · worksheet · HL statements A3.2.1–9

Name _____ **Date** _____ **Total** _____ / 40

About 40 minutes, or one section at a time. The number of marks shows how many separate points to make.

Section A: Recall

7 marks

1 **List** the seven ranks of the traditional hierarchy, from kingdom to species. A3.2.2 **[2]**

2 **Define** clade. A3.2.4 **[1]**

3 **Name** the three domains. A3.2.9 **[1]**

4 **Name** the molecule whose base sequences led to the three-domain system. A3.2.9 **[1]**

5 **State** what a node on a cladogram represents. A3.2.7 **[1]**

6 **State** one reason why the molecular clock gives only an estimate. A3.2.5 **[1]**

Section B: Understanding

14 marks

7 **Explain** why the traditional hierarchy of taxa does not always match evolutionary relationships. A3.2.2 **[3]**

8 **Explain** why organisms are classified, and the advantage of basing classification on evolutionary relationships. A3.2.1, A3.2.3 **[3]**

9 **Explain** how differences in sequences can be used to estimate when two clades diverged. A3.2.5 [3]

10 **Explain** why base sequences are stronger evidence for clades than morphology. A3.2.4 [2]

11 **Outline** how cladistics led to the reclassification of the figwort family. A3.2.8 [3]

Section C: Working with evidence

12 marks

The data in this section are simplified for practice. The pattern matches real findings.

12 A3.2.5, A3.2.6, A3.2.7

The table shows the number of differences in the amino acid sequences of a set of proteins between five apes.

	Human	Chimpanzee	Gorilla	Orangutan	Gibbon
Human	–	1	2	5	7
Chimpanzee		–	2	5	7
Gorilla			–	5	7
Orangutan				–	7

a **Identify** the two most closely related species. **[1]**

b **Construct** a cladogram for the five species. **[3]**

c **Calculate** when humans and gorillas diverged, if the orangutan lineage split off 15 million years ago. **[2]**

d **Suggest** two reasons why your answer to c may be inaccurate. **[2]**

e **Deduce** whether chimpanzees, gorillas and orangutans, without humans, form a clade. **[2]**

f **Explain** why many proteins were compared rather than just one. **[2]**

Section D: Longer answer

7 marks

13 **Explain** how evidence from rRNA led to the three-domain system, and compare the three domains. A3.2.9 **[7]**