AP BIOLOGY • EXERCISE SHEET

7.9 Phylogeny

Name: _____ Class: _____ Date: _____ **Total: 9 marks**

Objective

Build the skills to answer exam questions on **phylogeny** —reading evolutionary trees.

You must be able to:

- read a **phylogenetic tree** 系统发生树 (branches, nodes, common ancestors)
- identify the **most recent common ancestor** of two species
- interpret shared derived traits

1 Worked examples

Study these first. Each one shows the method for a question type used later —follow the steps and you can do the Practice and Exam-style questions yourself.

What a tree shows

A **phylogenetic tree** shows how species are related by descent. **Tips** are species; **nodes** (branch points) are **common ancestors**; the closer two tips branch, the more closely related.

Most recent common ancestor

The **most recent common ancestor** of two species is the node where their lines last join —trace each back until the branches meet.

Reading relatedness

Two species that share a **more recent** node are **more closely related** than either is to a species that branches off earlier.

Shared derived traits

A trait shared by all descendants of a node (and not by outgroups) marks that branch —used to build and read the tree.

2 Practice

Now apply the methods above.

2.1 What does a node (branch point) on a tree represent? [1]

2.2 How do you find the most recent common ancestor of two species? [1]

2.3 Are two species that branch off close together more or less related? [1]

3 Exam-style questions

3.1 On a phylogenetic tree, the tips represent [1]

- **A** common ancestors
- **B** species (or groups)
- **C** mutations
- **D** fossils only

3.2 On a tree, species A and B branch from one node; species C branches off earlier.

(a) Which two species are most closely related? [1]

(b) Explain your reasoning using the tree. [2]

3.3 Explain how shared derived traits are used to group species on a tree. [2]

4 Go further

You are now ready for the real exam questions on this subtopic:

- work through the **7.9 Phylogeny** lesson on the **Learn** page;
- read the **Phylogeny** section of the AP Biology handout on the **Know** page.

Solutions

2.1 A common ancestor.

2.2 Trace both species' lines back until they meet at a shared node.

2.3 More related.

3.1 B —species (or groups).

3.2 (a) A and B. (b) A and B share a more recent common ancestor (node) than either shares with C, which branched off earlier, so A and B are most closely related.

3.3 A trait shared by all descendants of a node (but not by earlier-branching groups) marks that branch, grouping those species together as sharing that derived feature from their common ancestor.