

Exercise walk-through

Phylogeny ■ 7.9

eXercise

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

Method — 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.

Method — 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.

Method — Reading relatedness

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

Method — 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.

Practice 2.1 ■ 1 mark

What does a node (branch point) on a tree represent?

Solution 2.1

Method: Shared derived traits

Worked steps

A common ancestor **B1**.

Practice 2.2 ■ 1 mark

How do you find the most recent common ancestor of two species?

Solution 2.2

Method: Most recent common ancestor

Worked steps

Trace both species' lines back until they meet at a shared node **B1**.

Practice 2.3 ■ 1 mark

Are two species that branch off close together more or less related?

Solution 2.3

Method: What a tree shows

Worked steps

More related [B1](#).

Exam-style 3.1 ■ 1 mark

On a phylogenetic tree, the tips represent

A common ancestors

B species (or groups)

C mutations

D fossils only

Solution 3.1

Method: What a tree shows

A common ancestors

B species (or groups) 

C mutations

D fossils only

Worked steps

B — species (or groups).

Exam-style 3.2 ■ 1 mark

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

- (a) Which two species are most closely related?
- (b) Explain your reasoning using the tree.

Solution 3.2

Method: Reading relatedness

Worked steps

(a) A and B **B1**. (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 **M1 A1**.

Exam-style 3.3 ■ 2 marks

Explain how shared derived traits are used to group species on a tree.

Solution 3.3

Method: Shared derived traits

Worked steps

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 **M1** **A1**.