

Exercise walk-through

Common Ancestry ■ 7.7

eXercise

You must be able to

- explain evidence for a **common ancestor** 共同祖先 of all life
- cite shared features (DNA, ribosomes, ATP, the genetic code)
- interpret shared traits as descent from a common ancestor

Method — Shared core features

All living things share fundamental features, pointing to a **common ancestor**:

- **DNA/RNA** as genetic material;
- the **same genetic code** (codons);
- **ribosomes** that make proteins;
- **ATP** as energy currency.

Method — Why this is evidence

It would be a huge coincidence for unrelated origins to share the **same code** and machinery. The simplest explanation is that all life **descended** from a shared ancestor that already had them.

Method — Nested similarities

More closely related groups share **more** features (and more similar DNA), forming a nested pattern that maps onto a tree of descent.

Method — A worked reasoning

Because a bacterium and a human both use the same genetic code and ribosomes, they most likely inherited these from a distant common ancestor.

Practice 2.1 ■ 2 marks

Name two features shared by all living things.

Solution 2.1

Method: Shared core features

Worked steps

Any two: DNA/RNA, the same genetic code, ribosomes, ATP **B1** **B1**.

Practice 2.2 ■ 1 mark

What does sharing the same genetic code suggest?

Solution 2.2

Worked steps

That all organisms share a common ancestor **B1**.

Practice 2.3 ■ 1 mark

Do more closely related species share more or fewer features?

Solution 2.3

Method: Nested similarities

Worked steps

More features **B1**.

Exam-style 3.1 ■ 1 mark

The universal genetic code is evidence that all organisms

- A** evolved separately
- B** share a common ancestor
- C** are identical
- D** cannot be related

Solution 3.1

- A** evolved separately
- B** share a common ancestor
- C** are identical
- D** cannot be related



Worked steps

B — share a common ancestor.

Exam-style 3.2 ■ 2 marks

A student notes that bacteria and humans both use ATP and ribosomes.

- (a) Explain how this supports common ancestry.
- (b) State one other shared feature.

Solution 3.2

Worked steps

(a) Both features are complex and identical in function; the simplest explanation is that both inherited them from a shared ancestor rather than evolving them independently **M1 A1**. (b) The same genetic code (or DNA as genetic material) **B1**.

Exam-style 3.3 ■ 2 marks

Explain why the pattern of “more related organisms share more features” fits descent from common ancestors.

Solution 3.3

Method: Nested similarities

Worked steps

Closely related species diverged more recently, so they have had less time to accumulate differences and retain more shared inherited features — exactly what a branching tree of descent predicts **M1** **A1**.