

Evolution and speciation · supported focus

Supported focus · HL

Supported scope

- Supported HL focus. First assessment 2025; current subject brief acquired; full Biology guide not acquired. Remaining guide, assessment and practical requirements retain their recorded holds.
- State model conditions and distinguish fictional data from measurements.

Adaptation · 1.1

Reasoning

Leaves in dry environments often have features that reduce water loss. The value of a feature depends on environmental conditions and trade-offs. Start with a prediction. State the quantities or features you would compare, then decide what evidence could distinguish two explanations.

Adaptation · 2.1

Reasoning

An adaptation is a heritable feature associated with improved survival or reproduction in particular conditions. A thick cuticle can reduce evaporation; stomatal control affects gas exchange and water loss. Acclimatization is an individual response during life and is different from evolutionary adaptation. adaptation: A heritable feature benefiting survival or reproduction in a context; acclimatization: An individual adjustment to changed conditions during life.

Adaptation · 3.1

Reasoning

Explain both a benefit and a cost. Reducing stomatal opening conserves water but can limit carbon dioxide entry. A feature cannot be judged as universally best without its ecological context. Compare replicated observations across a measured environmental gradient. Account for relatedness, leaf area and age. Use local permitted plant observations rather than removing protected species.

Adaptation · 4.1

Reasoning

State the known values and their units. Choose the relation because its assumptions fit this case, then rearrange before substitution. Known: water loss is 12 g from 0.20 square metres of leaf area over 2 h. Area-time-normalized rate = $12 / (0.20 \times 2) = 30 \text{ g}/(\text{m}^2 \text{ h})$. Comparisons require the same humidity and temperature.

Adaptation · 4.2

Reasoning

Water loss is 8 g from 0.20 m² over 2 h. Calculate rate per area per hour. Use the same sequence: known quantities → model → relation → substitution → unit and interpretation.

Adaptation · 5.1

Reasoning

An individual organism does not evolve a new inherited trait because it needs it. A plausible story about function is a hypothesis requiring evidence. Return to the original observation. Explain what the result supports, which conditions it assumes, and one way to test a competing explanation.

Adaptation · 5.2

Reasoning

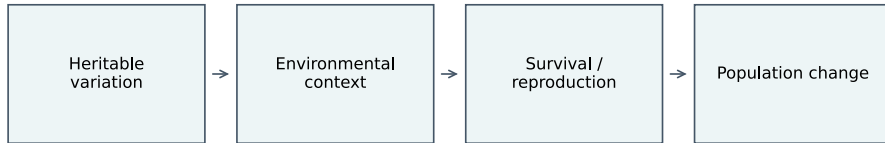
Every useful individual response is evidence of a newly evolved inherited trait. This claim is false: An individual organism does not evolve a new inherited trait because it needs it. A plausible story about function is a hypothesis requiring evidence.

Adaptation · 5.3

Reasoning

Adaptation: a function in an environment: Explain both a benefit and a cost.
Reducing stomatal opening conserves water but can limit carbon dioxide entry. A feature cannot be judged as universally best without its ecological context.

Adaptation · diagram



- Original teaching diagram: Adaptation : a function in an environment
- Use the labels and the stated model together.

Adaptation · original transfer

Your turn

Fictional plants lose 12 g from 0.20 m² in 2 h and 9 g from 0.10 m² in 3 h. Compare normalized rates. Can this alone prove which is better adapted?

Adaptation · transfer reasoning

Method and interpretation

Both give $30 \text{ g}/(\text{m}^2 \text{ h})$. Match humidity, temperature and plant condition; equal recorded water loss is not proof of equal survival or adaptation. Repeat with representative samples.

Check yourself

- Explain adaptation using the stated model.
- Explain acclimatization using the stated model.
- Change one value in the original transfer; explain which assumption still matters.