

Diversity of organisms · supported focus

International Baccalaureate · IB Diploma · Biology · SL

Scope and prerequisites

Supported SL focus. First assessment 2025; current subject brief acquired; full Biology guide not acquired. Remaining guide, assessment and practical requirements retain their recorded holds.

Prerequisites: read the stated quantities and units, use arithmetic and the model conditions below. Each lesson develops its own method before independent transfer.

These are original or explicitly fictional teaching examples, not actual measurements or completed assessed learner investigations.

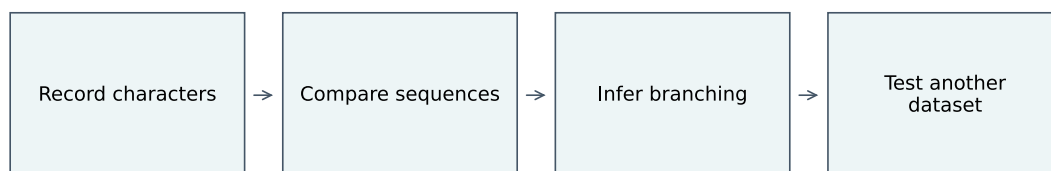
Diversity, classification and a branching model

■ What would explain this observation?

- Two species look similar but their DNA comparison places them in different branches. Classification uses several kinds of evidence rather than appearance alone.
- Start with a prediction. State the quantities or features you would compare, then decide what evidence could distinguish two explanations.

■ Build the model

- A species is a biological grouping; a **taxon** is a named classification group. A cladogram represents a hypothesis of relationships based on shared derived characteristics or molecular evidence. A branch point represents a common ancestor, not an individual alive today.
- taxon: A named group in a classification; **clade** : A common ancestor and all its descendants.



■ Choose evidence that can test it

- Read relationships from the branching order. Rotating branches at a node does not change ancestry. A branch length represents time or change only when the diagram gives a scale.
- Record character states in a matrix before drawing a tree. Define which state is ancestral using an appropriate comparison. Test whether a new molecular dataset supports the same grouping.

■ Work from known quantities

- State the known values and their units. Choose the relation because its assumptions fit this case, then rearrange before substitution.
- Known: an alignment contains 40 sites, with 6 differences. Difference proportion = $6/40 = 0.15$, or 15%. This is an observed comparison, not a calibrated molecular clock unless rate assumptions and corrections are supplied.

Example:

There are 8 differences in 50 aligned sites. Calculate percentage difference. Use the same sequence: known quantities → model → relation → substitution → unit and interpretation.

■ Check the conclusion and its limits

- A modern species is not automatically the ancestor of another modern species. Similarity caused by convergent evolution can mislead a classification based on one trait.
- Return to the original observation. Explain what the result supports, which conditions it assumes, and one way to test a competing explanation.

Warn:

Every cladogram branch length is a measurement of elapsed time. This claim is false: A modern species is not automatically the ancestor of another modern species. Similarity caused by convergent evolution can mislead a classification based on one trait.

Key:

Diversity, classification and a branching model: Read relationships from the branching order. Rotating branches at a node does not change ancestry. A branch length represents time or change only when the diagram gives a scale.