# Level 3 Biology: practice paper 2026

AS 91605 Demonstrate understanding of evolutionary processes leading to speciation · Vertex Academy practice paper, not an NZQA paper

Attempt ALL the questions. Show ALL working. Write your answers on lined paper, or in the space under each question.

## QUESTION ONE

**(a)** New Zealand has about 14 species of alpine buttercup (Ranunculus). DNA evidence suggests they evolved from a common ancestor in the last few million years, as the Southern Alps rose and glaciers repeatedly advanced and retreated.
Describe allopatric speciation, and name and describe two prezygotic isolating mechanisms.

**(b)** Explain how the uplift of the Southern Alps and repeated glaciation could have led to the adaptive radiation of New Zealand alpine buttercups.

**(c)** Some plant species have formed without any geographical isolation, through polyploidy: a hybrid between two species doubles its chromosome number.
Discuss how polyploidy can produce a new species in a single generation, and compare this with allopatric speciation.

## QUESTION TWO

**(a)** Describe stabilising, directional and disruptive selection. For each, state which phenotypes are favoured and what happens to the distribution of the characteristic.

**(b)** House sparrows were brought to New Zealand from Britain by acclimatisation societies in the 1860s. Only a few hundred birds were released, and today there are millions.
Explain how the founder effect and genetic drift would have affected the gene pool of New Zealand house sparrows compared with the British population.

**(c)** In a model, a population of an insect pest on a Pukekohe vegetable farm is sprayed with the same insecticide every season. Before spraying began, 1% of the insects carried an allele, R, that makes them resistant. After 10 seasons, 80% carry R. When the farmer changes to a different insecticide, the frequency of R slowly falls.
Discuss the evolutionary processes that changed the frequency of R, and why it falls after the change.

## QUESTION THREE

**(a)** Describe what is meant by a phylogeny, a clade and convergent evolution.

**(b)** Ancient DNA has been extracted from moa bones and from the bones of the extinct elephant birds of Madagascar, and compared with the DNA of living birds.
Explain how mitochondrial DNA (mtDNA) is used to work out how closely related species are.

**(c)** Flightless ratites (kiwi, moa, emu, ostriches, rheas and the extinct elephant birds) were once thought to have evolved from one flightless ancestor that lived on the supercontinent Gondwana, and to have drifted apart on the separating continents. DNA studies now show that kiwi are most closely related to the elephant birds of Madagascar, and that moa are most closely related to the tinamous of South America, which can fly.
Discuss what this evidence suggests about how flightlessness evolved in ratites.

© Vertex Academy 2026. Free to copy for study. vertexacademy.co.nz/ncea-level-3-biology-speciation-practice-paper