Level 3 Biology: practice paper 2026

AS 91603 Demonstrate understanding of the responses of plants and animals to their external environment · 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) Tree wētā are nocturnal insects found in New Zealand forests. A wētā was kept in a cage with an exercise wheel. For 6 days the lights were on from 6 am to 6 pm (12 hours light, 12 hours dark), and it became active at about 6 pm each day. It was then kept in constant darkness for 8 days. Its activity started about 30 minutes earlier each day.
Describe what is meant by a circadian rhythm, an actogram and a zeitgeber, using this example.

(b) Explain what the wētā's activity in constant darkness shows about its biological clock, and calculate its free-running period.

(c) Discuss the advantages to the wētā of having an endogenous clock that is entrained by light, rather than simply becoming active whenever it gets dark.

QUESTION TWO

(a) Chrysanthemums are short-day (long-night) plants: they flower only when the night is longer than a critical length. Growers in New Zealand use this to have them flowering for Mother's Day.
Describe the role of phytochrome in detecting night length.

(b) A grower gives chrysanthemums long nights, but switches on a red light for a few minutes in the middle of each night. The plants do not flower. Another group gets the red flash followed straight away by a far-red flash, and these plants do flower.
Explain these results.

(c) Seedlings on a windowsill bend towards the light. In an experiment, seedlings with their tips cut off did not bend, and seedlings with a thin sheet of mica (which auxin cannot pass through) inserted on the shaded side just below the tip did not bend either.
Discuss how auxin causes the shoot to bend towards the light, using the evidence from the experiment, and the advantage of this response.

QUESTION THREE

(a) In a North Island forest, kererū eat the large fruit of tawa and taraire trees and pass the seeds out elsewhere. Possums also eat these fruit. Stoats eat kererū eggs and chicks.
Name and describe the type of relationship between each pair: kererū and tawa; kererū and possums; stoats and kererū.

(b) In spring, a tūī chases other tūī and bellbirds away from a flowering kōwhai tree, often calling loudly and diving at them.
Explain this behaviour, including the costs and benefits to the tūī.

(c) Pūkeko often live in groups. Several adults, including young pūkeko from earlier breeding seasons, help to incubate eggs and feed the chicks of the breeding birds, instead of breeding themselves. Discuss why this cooperative breeding could have evolved, considering altruism and kin selection.

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