Assessment Schedule 2006

Biology: Describe processes and patterns of evolution (90717)

Evidence Statement

Question	Achievement	Achievement with Merit	Achievement with Excellence
1(a)	Description recognises that there would be a change in allele frequency, eg • Alleles coding for longer beaks would become more common in the population.		
1(b)	Describes the key concepts in the operation of natural selection: • There is genetic variation within the species, individuals with longer beaks can gain more food and be reproductively successful. • Individuals best adapted to reach the seeds of the balloon vine tend to leave more offspring.	Explains how longer beaks would give an advantage & so be selected for such that in time the population would change • Some soapberry bugs have longer mouthparts than others and this trait is heritable. Bugs with longest mouthparts can better exploit the new food source (less competition, better fed).These bugs will become more prevalent in the population.	Evaluates or compares the adaptive advantage of inherited longer mouthparts as a means to access a new and increasing food source over that of the short beaked bugs. There is a change in the population with an increasing prevalence of balloon vine as an invasive weed. • Introduced balloon vine presents a new feeding opportunity not available to native insects. • Soapberry bugs with longer mouthparts become more common in the population in areas with balloon vine.
1(c)	Gives a correct definition of speciation, eg • Speciation is the process of forming new biological species.		
1(d)	Recognises that speciation involves the loss of ability to interbreed to produce fertile offspring, or reproductive isolation, but gives no further comment related to the bugs.	Explains that the long-beaked population will be a new species only if: • The bugs with longer mouthparts and feeding on balloon vine were unable to breed with the short-beaked bugs on other food sources. • **OR** gene flow cannot occur between those with longer beaks and those with shorter beaks.	
2(a)	Correctly defines adaptive radiation as, eg • The term given to a range of species evolving (radiating) from an ancestral species to exploit new niches.		

2(b)	Identifies that uplifting creates geographical isolation or new habitats and different selection pressures, eg • rising Southern Alps → new alpine habitats available. • different selection pressures in these new environments. • those individuals with characteristics better suiting them to these environments more likely to reproduce successfully.	Explains origins of new cicada species in terms of allopatric speciation or genetic variation with differential reproductive success, eg • Ancestral cicada popn spread into new habitats. • Genetic variation within popn → some variants better able to exploit new niches. • Successful variants leave more offspring, pass alleles to offspring. • Genes / alleles controlling characteristics that enhance successful exploitation of the new niche increase in frequency with each generation. • Genetic differences eventually → reproductive isolation, & speciation.	
2(c)	Recognises that process may have begun with allopatry from a shared ancestral species: • Cicada populations isolated during glacial periods, evolved into different species while allopatric. **OR** that sympatric speciation occurred in the one location as speciation occurs from a shared ancestral species.	Explains that either speciation process is driven by different selection pressures: • Niche differentiation, competitive exclusion or Gauses principle may be used to explain sympatric speciation. • Explanation of allopatry extends to explain presence of species today in same location due to break down of geographical isolating mechanisms.	Extends answer to evaluate present-day situation of maintenance of separate species in terms of reproductive isolation, eg • different songs • different timing of emergence • different reproductive behaviour.
2(d)	Describes either gradualism or punctuated equilibrium. • Gradualism is thought to occur when species slowly and steadily diverge from one another over time. • Punctuated equilibrium is thought to occur when there are long periods of little change in species and then short bursts of speciation when there is rapid change in the environment or selection pressures.	Explains how data supports punctuated equilibrium by referring to species or groups of cicadas given .	

| 2(e) | Recognises that the birds were exposed to similar selection pressures or convergence. | Explains similarities in terms of natural selection:
• Feeding opportunities are greater for those with long curved beaks able to extract bugs from trunk crevices and this means reproductive success.
• This adaptation evolved independently in unrelated birds exploiting similar ecological niches where bugs are found in crevices of tree trunks. | |

Judgement Statement

Biology: Describe processes and patterns of evolution (90717)

Achievement	Achievement with Merit	Achievement with Excellence
FIVE questions answered correctly. Minumum 5 × A	SEVEN questions answered correctly, including at least FOUR at Merit level. Minimum 4 × M + 3 × A	SEVEN questions answered correctly, including at least FOUR at Merit level and at least ONE at Excellence level. 1 × E + 4 × M + 2 × A