	Answers	Marks	Examiner's tips
1 a) i)	only expressed in phenotype if homozygous;	2	You are only being asked to define the words in italics, that is recessive and codominant. You don't need to explain that alleles are different forms of a gene.
ii)	both expressed in phenotype, if both present		
b) i)	F_1 genotype = $F^B F^W$; F_1 gametes = F^B and F^W; F_2 genotypes = $F^B F^B$ $F^W F^W$ $F^B F^W$	3	Where two parents of different phenotypes produce offspring of a different phenotype, you should always consider the involvement of codominant alleles.
iii)	chance related to mating; random fusion of gametes; small sample size; differential mortality	2	You don't always obtain the expected ratio from a genetic cross. These are important factors in explaining why this happens which should be learned.
2 a)	genetic/reproductive isolation / small gene pool / inbreeding; small founder population / common ancestor(s); high probability of mating with person having recessive allele / high probability of having two recessive alleles	2	The small size of the initial population together with its isolation would result in little genetic variation. Inbreeding would lead to increased homozygosity.
b) i)	8.7% *to* 8.8% *gains 3 marks* 0.087 *to* 0.088 *gains 2 marks*	3	You would obtain 1 mark for showing some correct working, such as *q* = 0.046, with an incorrect answer. Similarly an incorrect answer with some understanding of the Hardy–Weinberg equation, for example 2*pq* = heterozygotes, would gain 1 mark.
ii)	all homozygous recessive die / none with condition survive to become adults / selective disadvantage	1	

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3 a)	geographical isolation of fruit flies; no interbreeding / gene flow; range of habitats / environmental conditions; different selection pressures in separate populations; mutation; variation among fruit flies; some more suited to environment than others / differential survival; beneficial allele passed on; populations unable to produce fertile offspring / reproductively isolated	6	Remember that there would be variation in the population of fruit fly prior to any geographical isolation. This would have been as a result of mutation. Different selection pressures will then favour fruit flies with advantageous phenotypes and there will be an increase in the frequency of particular alleles in the next generation. Eventually the different populations become so distinct that they cannot interbreed to produce fertile offspring.
b)	Hawaiian islands isolated / Britain less isolated; few colonising species; more environments / niches / habitats available; less competition; better adapted; British 0.15%, Hawaiian 7.70% / higher proportion of insects in Hawaii; rapid evolution of species of *Drosophila*	4	Due to the remoteness of Hawaii, *Drosophila* was probably one of the few colonisers of the islands. Less competition from other insects and a more diverse range of habitats could have led to rapid evolution of species of *Drosophila* compared to Britain.

	Answers	Marks	Examiner's tips
4 a)	variation due to mutation; different environments / selection pressures; camouflage / selection by predation; survive to reproduce / pass on advantageous alleles; change in allele frequency in the next generation; no gene flow between populations;	4	It is important to explain the differences and natural selection in terms of changes in allele frequency. A common error is to refer to 'favourable genes' and then to state that these 'genes are passed on' to the next generation.
b)	*Two suitable suggestions, for example* back mutation; migration of banded snakes from mainland; banded could be recessive so still get occasional homozygotes / heterozygous advantage; stabilising selection / description of; selection pressure stays the same;	2	This is a 'suggest' question and there are several possible explanations.