

Biology GCSE Revision

Topic 6

Inheritance, Variation & Evolution

Booklet 2 of 2

- Genetic Engineering
 - Natural Selection
 - Evolution

Mark Scheme

BL1HP

Question 6

question	answers	extra information	mark
6 (a)	(jellyfish) gene(s) cut out		1
	ref to enzymes (at any stage)		1
	(gene) transferred to zebra fish at early stage of development / embryo / egg	ignore removal of zebra fish genes	1
6 (b)	any two from: <ul style="list-style-type: none"> • could transfer gene to other (fish) species • effects on food chains • effects on zebra fish themselves, eg may out compete non GM zebra fish 	ignore unethical / religious / unnatural accept effects on other species / humans who eat them	2
Total			5

COMPONENT NUMBER: BL1HP**Question 5**

question	answers	extra information	mark
5(a)	<u>mutation</u>	correct spelling only ignore other adjectives eg random / spontaneous	1
5(b)	idea of mutant gene / new form / this allows <u>hatching</u> (of males)	ignore references to X / Y chromosomes	1
	(individual with advantage) (more) survive / (more) live / (more) don't die	allow immunity rather than resistance throughout	1
	(so survivors) breed / reproduce		1
	mutation / gene passed (from survivors) to offspring / next generation	allow resistance / characteristic for gene 'gene passed on' is insufficient	1
Total			5

Question	Answers	Extra information	Mark	AO / spec ref.
8(a)	any three from: <ul style="list-style-type: none"> • (gene) cut out • (gene / cut out) from (bacterial) chromosome / DNA • ref to enzymes (at any point) • (gene spliced) into maize chromosome / DNA • (gene added) at an early stage of development 	accept (gene / cut out) from (bacterial) plasmid	3	AO1 1.7.2d, e
8(b)	any four from: <ul style="list-style-type: none"> • justification based on comparison of the relative merits of at least one advantage and one disadvantage Advantages: <ul style="list-style-type: none"> • less effort for farmer or less likely to harm farmer • (pesticide) always there or doesn't wash away • less insects to eat crop / maize or carry disease • so greater crop production / yield Disadvantages: <ul style="list-style-type: none"> • (toxin) kills other insects • so (some) crops don't get pollinated / (sexually) reproduce • possible harm when eaten by humans / animals • damage to food chains • gene may spread to other species 	max 3 marks if only advantages or disadvantages given ignore ref to cost allow examples eg no need to spray allow pesticide doesn't contaminate water courses ignore ref to cost allow maize not pollinated allow may have unpleasant taste allow reduced biodiversity	4	AO3 1.7.2e, f
Total			7	

BL2HP

Question 6

question	answers	extra information	mark
6(a)	fossil is (remains / impression of) organism that lived a long time ago	if numbers, ≥ 1000 s years	1
	fossils show changes over time or older fossils simpler or fossils simpler than present-day species		1
	fossils have similar features to present-day species	allow fossils allow us to compare old species with present-day species	1
6(b)	isolation / separation / splitting		1
	by geographical barrier / sea	ignore other examples	1
	there was variation (in these isolated populations) / different alleles	accept mutation	1
	different environmental conditions or example eg climate / predators / food		1
	natural selection acted on the isolated populations	accept became adapted in each area	1
	OR only certain allele(s) passed on to offspring / different alleles passed on in different environments	allow genes	
	so differences lead to inability to interbreed	allow differences described – eg mismatch of genitalia / different courtship displays / different breeding seasons	1
Total			9

Question	Answers	Extra information	Mark	AO / spec ref.
7(a)	lack of fossils / fossils destroyed	allow lack of evidence	1	AO1 2.8, 2.8.1 a,b,c
	(due to soft parts) decaying / geological activity	allow an example – eg vulcanism or earth movements or erosion allow converse points re skeletons, shells, hard parts	1	
7(b)(i)	A and B did not mate successfully	' A and B did not mate' insufficient allow did not produce fertile offspring	1	AO2 2.8.1f
7(b)(ii)	any two from: <ul style="list-style-type: none"> may not be mating season A and B may not find each other attractive this is just a one-off attempt / an anomaly / need repeats may be juvenile / immature may be the same sex 	allow other sensible suggestion eg were put in unfavourable environment or one / both could be infertile	2	AO3 2.8.1f
7(c)	1. (two ancestral populations) separated (by geographical barrier / by land) / were isolated	allow abiotic or biotic example	1	AO1 / AO2 2.8.1f
	2. genetic variation (in each population) or different / new alleles or mutations occur		1	
	3. different environment / conditions		1	
	4. natural selection occurs or some phenotypes survived or some genotypes survived		1	
	5. (favourable) alleles / genes / mutations passed on (in each population)	allow eventually cannot produce fertile offspring	1	
	6. eventually two types cannot interbreed successfully		1	
Total			11	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
6(a)(i)	any two from: <ul style="list-style-type: none"> (dead) animal buried in sediment hard parts / bones do not decay or soft parts do decay mineralisation (of hard parts / bones) 	allow imprint in mud allow (one of) the conditions for decay is missing – accept example, eg oxygen / water / correct temperature / bacteria allow replacement by other materials	2	AO1 / AO2 2.8.1a,b
6(a)(ii)	any two from: <ul style="list-style-type: none"> conditions not right for fossilisation geological activity has destroyed fossils / has destroyed evidence fossils not yet found 	ignore references to soft-bodied allow a named / described example – eg vulcanism / earth movements / erosion allow description of why not yet found	2	AO3 2.8, 2.8.1a,c,d
6(b)	any four from: <ul style="list-style-type: none"> separation / isolation (of different populations) different environmental conditions (between locations) mutation(s) occur or genetic variation (within each population) better adapted survive or natural selection occurs favourable alleles passed on (in each population) eventually different populations unable to breed <u>successfully</u> with each other 	allow 'survival of the fittest' ignore animals adapt to their environment ignore reference to stronger survive allow genes for alleles allow unable to produce fertile offspring	4	AO1 2.8.1e,f
Total			8	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
7(a)(i)	organisms that can breed / mate or organisms that can reproduce together	allow converse points re. 2 different species	1	AO1 2.8.1f
	successfully	allow produces fertile offspring for 2 marks allow can reproduce to form fertile offspring for 2 marks	1	
7(a)(ii)	any two from: <ul style="list-style-type: none"> fossils show how species have changed or show changes over time older fossils are simpler (than later ones or present day species) fossils have features similar to present-day species 	allow fossils enable us to compare old species with present-day species	2	AO1 2.8, 2.8.1a/d

Total		10
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BL1HP

Question 7

question	answers	extra information	mark
7 (a)	in 1978 fewer finches or population smaller		1
	any two from: <ul style="list-style-type: none"> no beaks less than 8mm no beaks greater than 11.5 / 12mm mean / average beak size higher 	if these points not given allow smaller range of beak sizes for 1 mark	2
7 (b)	<u>variation or range or mutation of</u> <u>beak sizes</u>	do not accept idea that drought / seed size caused mutation	1
	birds with larg(er) beaks are better adapted for <u>feeding</u>	accept idea of competition <u>for food</u> / <u>seeds</u> amongst finches	1
	birds with larg(er) beaks survive	accept (only / more) birds with large beaks were better competitors	1
	birds with larg(er) beaks breed or gene / allele for large beak passed on	do not accept large beak passed on	1
Total			7

BL2HP

Question 7

question	answers	extra information	mark
7(a)	organisms that can breed together	accept converse points re. 2 different species	1
	successfully	accept produces fertile offspring	1
7(b)	any two from: (live at)		2
	• different pH of soil		
	• different height above sea level		
	• different flowering times		
	AND		
	genetic variation / mutation / different alleles (produced in isolated populations)		1
	natural selection acts differently on the two populations or different characteristics in the two populations survive or different alleles passed on in the two groups		1
	eventually resulting in interbreeding no longer possible		1
Total			7

UMS Conversion Calculator: www.aqa.org.uk/umsconversion

Question	Answers	Extra information	Mark	AO / Spec. Ref.
8(a)	reference to interbreeding successfully between Island types	allow ref. to production of fertile offspring	1	AO1/2 2.8.1f
		allow ref. to DNA analysis / comparison for 1 mark	1	
		ignore ref. to grey fox		
8(b)(i)	(two ancestral populations) separated / isolated (by geographical barrier / sea) and genetic variation (in each population) or different / new alleles or mutations occur under different environment / conditions natural selection occurs or better adapted survived to reproduce so (favourable) alleles / genes / mutations passed on (in each population)	allow abiotic or biotic example allow different selection pressures ignore they adapt to their environment	1	AO1/2 2.8.1f
			1	
			1	
			1	
8(b)(ii)	any one from: <ul style="list-style-type: none"> continued to mate with one another few beneficial mutations (between island varieties) similar conditions on each island so similar adaptations/features fit 		1	AO3 2.8.1f
Total			8	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
2(a)	any three from: <ul style="list-style-type: none"> • mutation or variation • better adapted survive or survival of the fittest • (survivors / better adapted) reproduce • genes passed on 	allow points if given in example allow genetic changes allow differences in appearance allow ref to offspring	3	AO1 1.8.1e/f
2(b)(i)	wanted to discredit theory / Darwin	allow wanted to make Darwin / theory look stupid allow idea that (cartoon shows) humans evolved from monkeys	1	AO3 1.8.1b/c
2(b)(ii)	any two from: <ul style="list-style-type: none"> • Darwin's theory challenged idea that God created life • little / insufficient evidence • there were other (scientific) theories (at the time) • mechanism of inheritance not known 	allow Darwin's theory challenged / against religious ideas/teaching. ignore against religion ignore no evidence allow examples, eg Lamarckism, allow genes / DNA not discovered ignore did not know about inheritance	2	AO1 1.8.1b/c
Total			6	

BL1HP

Question 7

question	answers	extra information	mark
7(a)	variation (between organisms within species)	allow described example	1
	those most suited / fittest survive	allow mutation – but not if caused by change in conditions	1
	genes / alleles passed on (to offspring / next generation)	allow mutation passed on	1
7(b)(i)	any two from: <ul style="list-style-type: none"> • increase in latitude reduces number of (living) species • increase in latitude reduces time for evolution (of new species) • the less the time to evolve the fewer the number of (living) species 	allow converse ignore references to severity of conditions	2
7(b)(ii)	any two from: <ul style="list-style-type: none"> • (increase in latitude reduces number of (living) species because) less food / habitats / more competition <u>at high latitude</u> • increase in latitude reduces time for evolution (of new species) because) severe conditions act more quickly / to a greater extent on the weakest • (the less the time to evolve the fewer the number of (living) species because) species that evolve slowly don't survive 	do not accept intention or need to evolve allow only extremophiles / well-adapted species can survive	2
Total			7

Question 8

question	answers	extra information	mark
8(a)	Lamarck	ignore any first name(s)	1
8(b)(i)	variation / range of sword lengths (in ancestors)	accept mutation produced longer sword	1
	those with long swords get more food	accept those with short swords get less food	1
	swordfish (with long swords) survive and breed	allow have offspring for breed	1
	(survivors) pass on gene(s) / allele(s) (for long sword)	allow mutation for gene(s) / allele(s)	1
8(b)(ii)	any one from: <ul style="list-style-type: none"> more evidence (now) DNA / genes / mechanism of inheritance discovered 	accept examples of evidence, e.g. more fossils allow Lamarck's theory has been disproved ignore religious arguments ignore proof	1
Total			6

Question	Answers	Extra information	Mark	AO / spec ref.
7(a)(i)	variation (in population) / mutation longer nosed individuals get more food / leaves (these) survivors breed (more) pass on genes / alleles / DNA (for long nose)	allow longer nosed individuals more likely to survive allow pass on mutation	1 1 1 1	AO1 / AO2 1.8.1a,d,e,f
7(a)(ii)	Phiomia / ancestor stretched its nose (during its lifetime) to reach food / leaves passed on (stretched nose) to offspring	 allow offspring inherit (stretched nose) do not allow ref to genes	1 1	AO1 / AO2 1.8.1c
7(b)(i)	insufficient evidence / no proof mechanism of inheritance not known	ignore other theories, eg religion do not allow no evidence allow genes / DNA not discovered	1 1	AO1 1.8.1b
7(b)(ii)	God made all living things / them	allow creationism ignore religion	1	AO1 1.8.1b
Total			9	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
5(a)	any two from: <ul style="list-style-type: none"> larger / longer / thicker fewer (bones in total) fewer bones touching the ground 	allow examples eg fewer toes or bones fused allow smaller surface area touching the ground	2	AO2 1.8.1d
5(b)(i)	large(r) surface / area in contact with the ground or low / less pressure on ground (so) less likely to sink into mud / ground or (so) could run fast(er)	 allow easy / easier to escape predators	1 1	AO2 1.4.1c/d
5(b)(ii)	variation (in size / number / arrangement of bones) (and) those with large(r) / few(er) bones more suited to running or run faster (on harder / drier ground) these survive and breed (so) genes / DNA (for larger / fewer bones) passed on	allow mutation(s) (in size / number / arrangement of bones) allow ref to offspring for breed allow alleles passed on	1 1 1 1	AO1 / AO2 1.8.1e/f
Total			8	