

Mark scheme – Natural Selection and Evolution (F)

Question	Answer/Indicative content	Marks	Guidance
1	A ✓	1 (AO1.1)	
	Total	1	
2	B ✓	1 (AO1.1)	
	Total	1	
3	C	1	
	Total	1	
4	C ✓	1 (AO1.1)	<p><u>Examiner's Comments</u></p> <p>This question proved to be the most challenging question in section A. Many candidates did not recognise this was an example of natural selection. The most common incorrect answer was genetic modification, answering A instead of C.</p>
	Total	1	

5	i	<p>Yes (no marks) cooler than black/grey skin</p> <p>OR</p> <p>Yes (no marks) lighter skin is cooler</p> <p>OR</p> <p>No (no marks) zebra skin was similar temperature to the other barrels</p> <p>OR</p> <p>No (no marks) idea it is warmer than the barrel covered by the white skin / ORA ✓</p>	1 (AO3.2 a)	argument must support decision
	ii	<p>paint the barrels different colours rather than using the skins / use the same type of skin painted different colours</p> <p>OR</p> <p>idea to make sure that thicknesses/SA/V /volume/temperature of water in barrel need to be controlled ✓</p>	1 (AO3.3 a)	<p>ALLOW use painted towels to cover barrels</p> <p>ALLOW for same type of skin e.g. hair-free skin</p>
		Total	2	

6	c	<p>Any three from:</p> <p>variation with some rats resistant and some who are not ✓</p> <p>(resistant rats) more likely to survive/less likely to be killed ORA ✓</p> <p>(resistant rats more likely) reproduce ORA ✓</p> <p>pass on the allele / gene for resistance ORA ✓</p>	3 (AO 2.1)	<p>IGNORE selective breeding</p> <p>ALLOW mutation for resistance</p> <p>ALLOW offspring produced / breed together</p> <p>ALLOW pass on advantageous gene</p> <p>IGNORE trait is passed on / genes are passed on</p> <p><u>Examiner's Comments</u></p> <p>Candidates had to apply their knowledge of natural selection to explain why the percentage of resistant rats was increasing. There were a range of marks given for this question. Most none scoring responses were too vague and not using key terms. Most candidates did not appreciate that there was variation for resistance within the population.</p>
	d	<p>Any two from:</p> <p>(stops/less) respiration ✓</p> <p>(no/less) energy/ATP ✓</p> <p>key process interrupted e.g. cell metabolism/protein synthesis/chemical reactions/active transport ✓</p>	3 (AO 2.1)	<p><u>Examiner's Comments</u></p> <p>This question was one of the most challenging application of knowledge and understanding questions. The most common awarded mark was appreciation that energy release would be affected. A lot of responses were very general and would say the rat can't breathe or can't get any oxygen.</p>
		Total	11	
7		process involves natural selection (1)	1	
		mice fed on by snakes / owls (1)	1	
		black mice less likely to get eaten by snakes / owls (1)	1	
		can pass on the gene for black colour (1)	1	
		Total	4	

8	i	<p>Any two from:</p> <p>zebras with stripes attracts less/fewer insects / ORA ✓</p> <p>narrower stripes attract less insects / ORA ✓</p> <p>stripe width for least number of insects/optimum protection is about 8cm / stripe width for most number of insects is about 25cm ✓</p>	2 (AO2 x 3.1a)	<p>ALLOW insect bites for insects</p> <p>IGNORE length of stripe</p> <p>ALLOW width range between 5-10cm for least number of insects / most number of insects is 22-27cm</p>
	ii	<p>stripe width of 8cm because it is the lowest point on the graph/fewest number of insects ✓</p>	1 (AO3.2 a)	<p>ALLOW width tolerance between 7-9cm and least number of insects (on tape)</p>
	iii	<p>Any three from:</p> <p>stripes developed as a mutation / variation for skin stripes ✓</p> <p>(animals with stripes) less likely to be bitten by insects / more healthy / spread less pathogens / ORA ✓</p> <p>(striped animals) more likely to survive ✓</p> <p>(striped animals) more likely to reproduce ✓</p> <p>pass on allele/gene for stripes / ORA ✓</p> <p>process occurs over many generations ✓</p>	3 (AO3 x 2.1)	<p>ALLOW some more striped than others</p> <p>ALLOW offspring produced / breed together</p> <p>IGNORE selective breeding</p> <p>ALLOW pass on advantageous gene</p> <p>IGNORE trait is passed on / genes are passed on</p> <p>IGNORE over time</p>
		Total	6	
9	i	<p>in country/advantage/where badgers live, if it rolls up in a ball then will provide more protection / less attacks from badgers/predators ✓</p> <p>in cities/disadvantage/many roads, it will be run over by cars ✓</p>	2 (AO 2 x 2.1)	<p>ALLOW in country/advantage/where badgers live hedgehogs have defence against predators/badgers</p> <p>ALLOW hedgehogs have a reduced risk of being eaten</p> <p>Examiner's Comments</p> <p>More than half of candidates achieved at least one mark here. This question differentiated well between all abilities. Those candidates that didn't score did not link the hedgehogs to each conclusion properly. E.g. advantage/in country/where badgers live to correct conclusion. Exemplar 9 was credited 1 mark for the advantage</p>

				<p>conclusion.</p> <p>Exemplar 9</p> <p>In country areas, when badgers come to an hedgehog's, the hedgehogs have protection badgers are protected. They even go to attack the hedgehogs.</p>
	ii	<p>hedgehogs that run away are more likely to survive / less likely to get run over ✓</p> <p>they will reproduce ✓</p> <p>pass on the allele/gene for running away ✓</p> <p>over time/many generations (running away will become more common) ✓</p>	<p>4 (AO 4 × 2.1)</p>	<p>ALLOW ORA for each marking point</p> <p>ALLOW reference to how change occurred e.g. mutation for running away</p> <p>ALLOW offspring produced / breed together</p> <p>ALLOW pass on advantageous gene</p> <p>IGNORE trait is pass on / genes are passed on</p> <p>Examiner's Comments</p> <p>A number of candidates achieved at least 1 mark, mainly that hedgehogs which run away are more likely to survive. A small number of candidates confused natural selection with genetic engineering. Exemplar 10 shows an answer credited 3 out of 4 marks.</p> <p>Exemplar 10</p> <p>because these Hedgehogs don't stay and run away they can't get ran as easily and they don't get e by predators that can get through th This could be natural selection as Hedge hogs who have survived are to pass on these genes to offspr.</p>
		Total	6	