

18. Variation and selection

18.3 Selection

Paper 3 and 4

Marking Scheme

Q1.

(d)	reproduced / AW ; environment / coral reef ; alleles ; natural ;	4	
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Q2.

(c)	lay the most eggs / AW ; breed / cross / reproduce / mate / produce offspring / AW ; generations ;	3	
(d)	any two from: insecticides / pesticides ; herbicides ; fertilisers ; agricultural machinery ; genetic modification ; AVP ;	2	

Q3.

(a)	any three from: farmer selects goats with high(est) milk yield ; (two) goats are bred together / crossed ; farmer selects offspring with high(est) milk yield ; process is repeated ; over many generations / AW ; AVP ;	3	
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Q4.

(b)	<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">Selective breeding</div> <div style="display: flex; flex-direction: column; gap: 10px;"> <div style="border: 1px solid black; padding: 5px; width: 150px;">involves one parent only.</div> <div style="border: 1px solid black; padding: 5px; width: 150px;">is carried out over many generations.</div> <div style="border: 1px solid black; padding: 5px; width: 150px;">is caused by mutation.</div> <div style="border: 1px solid black; padding: 5px; width: 150px;">is caused by the environment.</div> <div style="border: 1px solid black; padding: 5px; width: 150px;">requires human involvement.</div> </div> </div>	2	R each additional line
(c)	1 ; 5 ;	2	

Q5.

(c)	B E ; (A) C D ;	2	
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Q6.

(b)	1 (first) ; (then) 3, 5, 2 ; 4 (at the end) ;	3	
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Q7.

(d)	use selective breeding ; breed / cross / mate, two white goats ; select offspring with white coats and breed again / do not breed the offspring with black coats or remove black goats ; <i>idea of</i> (breeding) over many generations ; correct ref. to homozygous dominant ;	3	
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Q8.

(a)	Merino ; it has, good wool yield / good meat yield / very good wool quality ;	2	
(b)	use Awassi and Merino sheep ; breed / cross / mate (together) ; pick / select / choose, the offspring with required characteristics ; allow these (chosen) offspring to breed ; breed the (chosen) offspring with Awassi / Merino sheep ; repeat for (many / several) generations ;	4	

Q9.

(c)	antibiotics ; natural ; sequence ; alleles ; ionising ; meiosis ;	6	
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Q10.

(d)	humans choose, specific feature(s) / desired features ; humans choose, individuals / offspring, to reproduce ; selection not influenced by environment / humans manipulate environment ; decreases (genetic) variation / decreases size of gene pool ; faster / shorter ; for economic / aesthetic, reasons ; no / less, evolution ; AVP ;	3	e.g. decrease in fitness
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Q11.

(b)(i)	any three from: 1 variation (in the bacteria) ; 2 ref. to mutations / described ; 3 mutations, give bacteria an advantage ; 4 non-resistant bacteria, killed / inhibited / AW (by antibiotic) ; 5 competition with non-resistant bacteria ; 6 resistant bacteria reproduce ; 7 pass on, gene / allele (for resistance) ; 8 <u>natural selection</u> ; 9 AVP ;	3	e.g. horizontal gene transmission / described as gene(s) passed from one bacterium to another
(b)(ii)	any one from: 1 no difference in appearance (of different strains of MRSA) / AW ; 2 no need to culture the bacteria ; 3 (gene sequencing is an) automated process / AW ; / easy to do / AW ; 4 only need small, number / quantity / amount (of bacteria) ; 5 more, accurate / precise (than traditional methods) / AW ; 6 explained in terms of comparing base sequences of different, strains / AW ; 7 AVP ;	1	e.g. (DNA sequences) within a species are very similar
(b)(iii)	any two from: (resistant) bacteria will not be killed by antibiotics / AW ; <i>idea that</i> no antibiotic of last resort / AW ; (bacterial diseases) cannot be treated / AW ; infection / disease / (resistant) bacteria, will spread ; AVP ;	2	e.g. new antibiotics need to be developed it takes time to make new antibiotics

Q12.

(b)	any two from: more / number / amount (of), fruits / seeds / kernels ; size of, fruits / seeds / kernels ; ref. to colour (of, fruits / seeds / kernels / cobs) ; length / size / width, of cobs ; ref. to arrangement of, fruits / seeds / kernels ;	2	
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Q13.

(b)	<p>any five from: natural selection ; variation (in beak shapes) ; mutation / description ; those birds with, selective advantage / unique beak shape, more likely to find food and survive ; the birds that survive reproduce ; pass on their alleles ; continues over many generations ; AVP ;</p>	5
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Q14.

(c)	<p>select, parent(s) / sheep / AW, with, fine / thin, hairs (in wool) OR use Merino sheep from South Africa and NZ sheep ;</p> <p>cross them together / use artificial insemination / IVF / AW ; measure / AW, the hairs in the wool of all the offspring ; select offspring with, fine / thin, hairs (in wool) ; cross / AW, offspring together ; continue / repeat, selection and/or breeding ; over many generations ; AVP ;</p>	5	max 4 if no reference to quality of wool
(d)	<p>features are, adaptive / adaptations (for environment) ; caused by / AW, the, environment / surroundings ; competition between individuals for (named) resource(s) ; reference to named selective agent(s) ; slow(er) ; increase in fitness ; explained: ability to survive AND reproduce (in natural environment) ; maintains (genetic) variation / less (genetic) variation in selective breeding ; random mating ;</p>	3	

Q15.

(d)(i)	<p>expose the plants to (stem), rust / fungus ; find out if plants have DNA for rust resistance ; only use those plants that show no symptoms / AW ;</p>	2	
(d)(ii)	<p>to increase the, numbers of plants / population ; incorporate more genes from the high yield variety ; to maximise the yield of wheat from individual plants ; check that the plants keep their resistance to rust ; check the plants grow well in field conditions ; make sure the plants are, pure-breeding / homozygous ;</p>	1	