18. Variation and selection

18.1 Variation

Paper 3 and 4

Question Paper

Q1.

(b)(i)	(it) increases and then decreases ;	1	
(b)(ii)	58 (µm) ;	1	
(b)(iii)	6 (arbitrary units) ;	1	

Q2.

(a)(i)	differences between, individuals / organisms ; of the same species ;	2	

(a)(ii)	<table><tr><th>statement</th><th>continuous variation</th><th>discontinuous variation</th></tr><tr><td>no intermediate phenotypes</td><td></td><td>✓</td></tr><tr><td>range of phenotypes between two extremes</td><td>✓</td><td></td></tr><tr><td>usually caused by genes and environment</td><td>✓</td><td></td></tr></table> ;;;	3	*one mark for each correct row* **R** each additional tick
(a)(iii)	*discontinuous (top) graph:* (ABO) blood groups / seed shape in peas / seed colour in peas / AVP ; *continuous (bottom) graph:* body length / body mass / AVP ;	2	
(b)	genetic ; alleles ; ionising ;	3	

Q3.

(c)	second row ticked: variation is the differences between individuals of the same species ;	1	**R** each additional tick

Q4.

(a)(i)	**AB** ; **B** ; **O** ; 30 ;	4	
(a)(ii)	discontinuous ; limited number of phenotypes / no intermediates ;	2	
(b)	decreases ;	1	

Q5.

(a)(i)	17 ;	1	
(a)(ii)	1 ;	1	
(a)(iii)	two / limited / discrete / distinct, categories / groups ; no, intermediates / range / intervals ;	2	
(a)(iv)	tongue rolling / AVP ;	1	
(a)(v)	height / AVP ;	1	
(b)	genetic ; alleles ; ionising ; increase ;	4	

Q6.

(c)(i)	4 ;	1	
(c)(ii)	marmots and lynx have a higher percentage of body fat in Alaska than in Virginia /AW ; **ora** marmots have a greater difference in percentage body fat (than lynx) ; **ora** marmots have the higher percentage body fat than lynx in Alaska / lynx have a higher percentage body fat than marmots in Virginia ; **ora**	2	
(c)(iii)	*(Alaska is colder than Virginia)* so (more) fat is needed : **ora** for insulation ; fat helps to, maintain body temperature / keep (mammal) warm / AW ; (lynx and marmots) are mammals so they regulate their body temperature ;	2	

Q7.

(a)	limited number of, phenotypes / categories / groups ; no intermediates / AW ;	1	
(b)	attached or unattached earlobes ✓ foot length gender (male or female) ✓ height tongue rolling ✓ weight ;;;	3	deduct one for each additional box ticked
(c)	is a genetic change ; forms new alleles ; can be caused by ionising radiation ;	3	deduct one for each additional line

Q8.

(c)(i)	(random) change in base sequence ; of DNA ;	**2**	

(c)(ii)	*any three from:* insulin, pump / injections ; monitor glucose concentration of the blood or urine ; *idea of* control of carbohydrate intake ; exercise (after eating) ; AVP ;	**3**	

Q9.

(b)	limited number of phenotypes / AW ; no intermediates / AW ;	**2**	
(c)	seed shape / seed colour / AVP ;	**1**	

Q10.

(b)(i)	random ; change in the base sequence of DNA ;	**2**	
(b)(ii)	ionising radiation ; (named) chemicals ; AVP ;	**2**	

Q11.

(e)	*any two from:* meiosis ; random mating / cross pollination / crossbreeding ; random fertilisation ; AVP ;;	**2**	e.g., immigration