<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>1</td><td>(a)</td><td>(i)</td><td>
<table>
<tr><th></th><th>Discontinuous</th><th>Continuous</th></tr>
<tr><td>Species identified by letter</td><td>S and T ;</td><td>R ;</td></tr>
</table>
</td><td>2</td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td>statement 1 in S and T only ;
statement 8 in S and T only ;

statements 2 and 3 in R only ;
statement 5 in R only ;

statements 4 and 7 in T only ;
statement 6 in S only ;</td><td>6</td><td>
<table>
<tr><th>Species</th><th>Statement number(s)</th></tr>
<tr><td>R</td><td>2 3 5</td></tr>
<tr><td>S</td><td>1 6 8</td></tr>
<tr><td>T</td><td>1 4 7 8</td></tr>
</table>
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Question			Answer	Marks	Guidance
	(b)		*collection* **1.** named equipment for collecting from, dogs / fields **;** **2.** get**,** large number / over 100 (fleas) **;** **3.** use several, dogs / fields **;** **4.** *idea of* random sampling (dogs / field) **;** *testing* **5.** (named) container **;** **6.** correct dose / range (of concentrations)**,** tested **;** **7.** control without flea killer **;** **8.** delivery method described **;** *processing* **9.** leave for set time **;** **10.** count number of, dead / live**,** fleas (after testing) **;** **11.** calculate percentage (frequency) of**,** alive / dead / resistant / non-resistant **;**	6	**1 CREDIT** pooter, forceps, tweezers, pipette, (flea) comb, sweep net, sticky traps, light traps (in correct context) **5 CREDIT** tank, jam jar, boiling tube, petri dish. **6 ACCEPT** 'dose according to manufacturer's instructions' **IGNORE** same, volume / concentration **8** e.g. flea-killer sprayed / left to evaporate from cotton wool / fed in blood or food **9 ACCEPT** leave for same amount of time **10 IGNORE** how many were left, how many were resistant **IGNORE** identify – must be counting number
			QWC ;	1	Award if the **first mark point awarded in each section** is ***in the correct section order***: collection **1 to 4** **then** testing **5 to 8** **then** obtaining and processing results **9 to 11** *e.g. if the first mark of each section is awarded in the wrong order (such as mp 1, then mp 10, with nothing from the testing section inbetween)* ***then do not award QWC***
			Total	**15**	

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<tr><td>2</td><td>(a)</td><td></td><td>
<table>
<tr><th>kingdom</th><th>membrane -boun organelles</th><th>cell wall</th><th>type(s) of nutrition</th></tr>
<tr><td></td><td></td><td></td><td>heterotrophic and autotrophic ;</td></tr>
<tr><td>protoctist(s)/ Protoctista ;</td><td></td><td></td><td></td></tr>
<tr><td></td><td>present ;</td><td></td><td></td></tr>
<tr><td>plant(s) / Plantae ;</td><td></td><td>(present and made of) cellulose ;</td><td></td></tr>
<tr><td></td><td>present ;</td><td></td><td></td></tr>
</table>
</td><td>6</td><td>Mark the first answer in each box. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks

IGNORE case of initial ‘P’

ACCEPT ‘✓’ or ‘yes’

IGNORE case of initial ‘P’

ACCEPT ‘✓’ or ‘yes’</td></tr>
<tr><td></td><td>(b)</td><td></td><td>fungi ;</td><td>1</td><td>Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks

ALLOW fungus / fungal / fungae
IGNORE case of initial ‘f’</td></tr>
</table>

Question			answer		Marks	Guidance
	(c)			*Assume answers refer to 3 domain classification unless otherwise stated*	3 max	**CREDIT** Latin forms of domain names throughout **IGNORE** case of initial letter
			1	based on (differences in) , DNA / RNA / nucleic acids / polynucleotides **;**		**1 CREDIT** in the context of an example
			2	*idea that* more accurately reflects origins (of, prokaryotes / eukaryotes) **;**		
			3	(domain) divides / AW , prokaryotes **; ora**		**3** 'prokaryotes are split into groups because bacteria and archaea are different' = 2 marks (mp 3 and 4)
			4	*idea that* domain reflects differences / AW , between (eu)bacteria and archaea **;**		**4 ACCEPT** phonetic spellings of 'archaea' **4 ACCEPT** 'archaebacteria' **4 IGNORE** multiple examples for this mp, must be a general statement
			5	example of two differences to support point 3 or 4 **;**		**5 IGNORE** if mp 3 or 4 not awarded **5** e.g. (differences between) cell wall / cell membrane / flagella / (named) RNA enzymes / ATPase / proteins bound to genetic material / DNA replication / transcription etc
			6	(domain) groups / AW , eukaryotes together **; ora**		**6 IGNORE** as part of a list of domains. Answer must state that eukaryotes have been placed in the same group. **6** 'eukaryotes are placed in the same group because they have similarities' = 2 marks (mp 6 and 7) **6 IGNORE** 'are similar'
			7	*idea that* domain reflects the fact that there are similarities between eukaryotic kingdoms **;**		**7 IGNORE** multiple examples for this mp, must be a general statement
			8	example of two or more similarities to support point 6 or 7 **;**		**8 IGNORE** if mp 6 or 7 not awarded **8** e.g. all eukaryotes have, nuclei / membrane bound organelles / 80S ribosomes / large cell size / linear DNA / chromosomes / histones etc.
				Total	10	

Question			answer		Marks	Guidance
3	(a)		1	natural / directional , selection ;	4 max	
			2	mutation ;		2 **DO NOT CREDIT** if implied as a consequence of selection pressure
			3	(mutation / genetic variation, is) random / due to chance / spontaneous / pre-existing ;		
			4	selection pressure is lack of / competition for , food / prey ;		4 **ACCEPT** 'selection pressure is ability to hunt' 4 **ACCEPT** 'selective pressure'
			5	individuals with mutation(s) / allele(s) / gene(s) (for echolocation) , survive ; **ora**		5 **IGNORE** refs to breeding / reproduction 5 **ACCEPT** 'individuals that can echolocate survive' **ora** 5 **DO NOT CREDIT** if answer implies that echolocation is a learned behaviour
			6	(echolocation) allele(s) / gene(s) / mutation(s) , passed on (to next generation) ;		6 **IGNORE** 'genetic trait(s)'
			7	over many generations frequency of , echolocation / allele / characteristic , increases ;		7 Answers must imply multiple generations 7 **ACCEPT** 'over time' as an alternative to 'over many generations' but must be further qualified
	(b)	(			1	**Mark the first answer.** If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = **0 marks**
				Pipistrellus ;		**IGNORE** case of initial letter 'P' **DO NOT CREDIT** if species name given as well

Question			Answer		Marks	Guidance
3	(b)	(i	similar / same, (body) mass ;		1 max	**Mark the first answer.** If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = **0 marks** **IGNORE** 'similar appearance' **ACCEPT** 'both 5.5 g'
			similar wingspan ;			**IGNORE** 'same' **ACCEPT** 'almost the same' or 'small difference' or ref to figures
			`similar / same, colour ;			**ACCEPT** 'both (medium to dark) brown'
			all characteristics , similar / same, except echolocation / wingspan ;			
			previously unable to measure echolocation (frequency) ;			
	(b)	(i	**1**	genetics / genes / DNA ;	2 max	**Mark the first two answers only.** **1 IGNORE** chromosomes **1 ACCEPT** (named) bases **1 or 2 CREDIT** 'nucleotide sequence / polynucleotide base sequence' for 1 mark if neither of mp 1 nor mp 2 have been awarded
			2	RNA ;		
			3	amino acid sequences ;		**3 ACCEPT** primary structure of polypeptide
			4	cytochrome C / fibrinopeptide ;		**4 ACCEPT** haemoglobin

Question			Answer	Marks	Guidance
3	(b)	(iv)	(inter)breed / AW **;** determine if offspring are fertile **;** if offspring are infertile / no offspring produced, then different species **; ora**	2 max	**ACCEPT** 'mate' / 'reproduce' **CREDIT** 'observe to see if populations are reproductively isolated' as resitting A2 candidate might consider phylogenetic species definition This mark is for assessing the fertility of the offspring 'if they belong to the same species they will be able to breed with each other and produce fertile offspring' = 2 marks (1st and 3rd)

Question				Answer	Marks	Guidance
3	(c)			***Most marks*** *(apart from **C2**, **C5** and **D5**) are stand alone and do not need to be linked to context. However, **max 5** if any statements are mismatched.*	**6 max**	*For example* ' some variation is controlled by only one gene this variation will have intermediates' **AWARD D2** and **C4** but **max 5** for the whole question and **DO NOT AWARD QWC** and put **CON** in the margin
			C1	continuous ;		
			C2	(continuous / AW , is) effect of , many genes / polygenic / genes and environment / genetic and environmental / environment **;**		**C2 IGNORE** alleles **C2 IGNORE** example of environmental factor, e.g.diet **C2** Must be linked to context of continuous variation
			C3	quantitative **;**		**C3** No ora for discontinuous
			C4	there is a range / any value is possible / intermediate values / no distinct groups / AW **;**		
			C5	*example* to illustrate any C marking point **;**		**C5 must be linked to another C mark** **CREDIT** only , body mass / wingspan / colour / range of pitch within species
			D1	discontinuous ;		
			D2	(effect of) one / few, genes **;**		**D2 ACCEPT** 'there is a gene for pitch' or 'there are high-pitched and low-pitched alleles' **D2 ACCEPT** any suggestion of a low number of genes **D2 IGNORE '**variation is genetic'
			D3	little / no, environmental effect **;**		**D3 ACCEPT** 'only influences by genes' / AW **D3 IGNORE** unqualified refs to genes
			D4	discrete categories / no intermediates / AW **;**		**D4 ACCEPT** 'set groups'
			D5	*example* to illustrate any D marking point **;**		**D5 Must be linked to another D mark** **D5 CREDIT** only these examples: low-pitched or high-pitched / pitch variation between species / sex / no bat call between 47 and 52 Hz **D5 IGNORE** 'colour' as an example to support a D mark

Question			Answer	Marks	Guidance
3	(c)		**QWC** – Award for successfully relating continuous or discontinuous variation to the effect of genes or environment **;**	**1**	Award if candidates have been awarded **either** **C2 and any other C mark** **or** **D2 / D3 and one of D1, D4 or D5** **DO NOT AWARD QWC** if any mark has been given in the wrong context
			Total	**17**	

Question			Answer	Marks	Guidance
4	(a)		taxonomy / taxonomic **;** hierarchy **;** phylogeny / phylogenetic **;**	3	**Mark the first answer**. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = **0 marks** **ACCEPT** phonetic spelling throughout **ACCEPT** hierarchical system
	(b)	(	**1** (cells have) no cell wall **;** **2** heterotrophic **;** **3** eukaryotic **;** **4** multicellular **;** **5** (fertilized eggs develop into), blastula / ball of cells **;** **6** high degree of mobility / AW **;**	2 max	**Mark the first answer on each prompt line.** **1 DO NOT CREDIT** absence of a qualified cell wall, e.g. 'no cellulose cell wall' **2 ACCEPT** phonetic spelling **3 ACCEPT** named eukaryotic cell feature **4 IGNORE** references to tissues **6 DO NOT CREDIT** unqualified references to movement **ACCEPT** refs to mobility during part of life cycle **IGNORE** cilia / flagella
		(ii)	Eukaryota(e) / Eukarya / eukaryote(s) **;**	1	**Mark the first answer**. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = **0 marks** **IGNORE** case of initial letter

Question			Answer	Marks	Guidance
		(iii)		4 max	*Candidates may refer to individual species using common or scientific names.* ***ACCEPT*** *use of either or both.* ***IGNORE*** *case of initial letter*
			1 all are in same family as all, are closely related **;**		**1** idea of link between family and close relationship must be made
			2 kea and kaka are both, same genus / *Nestor* **;** **ora** for kakapo		
			3 kea and kaka, are more closely related / share more recent common ancestor, (than with kakapo) **;**		**3 ACCEPT** ora for less close relationship between kakapo and others
			4 kea and kaka have more genes in common / AW (than with kakapo) **;**		**4 ACCEPT ora** **4** Answers must refer to genes / genetics / DNA **4 IGNORE** cytochrome c
			5 example of genetic similarity (between kaka and kea) evident from Fig 4.1 **;**		**5** E.g. kaka and kea both brown / kaka and kea both have similar shaped beaks **5 IGNORE** unqualified references to appearance
			6 differences between, kea and kaka / all three, are great enough for each to be described as a different species **;**		
	(c)	(	differences **;** in / within / between, species **;**	2	**ACCEPT** within a population

Question			Answer	Marks	Guidance
	(c)	(i	genetic differences / different alleles / inherited differences **;** environment / diet / disease **;**	2	**Mark the first suggestion on each prompt line.** **ACCEPT** different genes **ACCEPT** mutation **ACCEPT** sex **IGNORE '**different habitat'
	(c)	(ii	only small number have been sampled / AW **;** *idea that* individuals sampled may not be representative of population **;** data collected when population was larger / smaller population may mean range has changed **;**	2	**Mark the first two reasons – ignore prompt lines.** **ACCEPT** 'whole population has not been sampled' **IGNORE** rare unqualified **ACCEPT** larger ones more likely to be caught / measured **ACCEPT** individuals sampled from one area might be different from average of whole population

Question			Answer	Marks	Guidance
4	(d)		*Name* **1** speciation **;** *Mechanism – max 2 marks* **2** isolation / separation, (of populations) **;** **3** further detail of isolating mechanism **;** **4** mutation / genetic variation **;** **5** natural selection / description of natural selection **;** **6** different selection pressure(s) (in different environment) **;** **7** (enough) time to allow changes in population to prevent interbreeding / AW **;**	3 max	**1 IGNORE** 'natural selection' on name line **2 IGNORE** barrier **3** e.g. river, mountain, reproductive, geographical, temporal, polyploidy, qualified barrier **3 IGNORE** allopatric / sympatric unqualified **5** description must mention differential survival **and** genes being passed on **6 IGNORE** selection pressure unqualified **6** 'different' can be described using an example
			Total	**19**	