

CHERRY HILL TUITION OCR BIOLOGY AS PAPER 14 MARK SCHEME

1)

(a)		<p>1 nucleus / nuclei ;</p> <p>2 other named organelle / membrane bound organelles ;</p> <p>3 linear chromosomes ;</p> <p>4 DNA, associated with / AW, histones / protein ;</p> <p>5 80S / 22nm / large, ribosomes ;</p> <p>6 large cells / AW ;</p> <p>7 no cell wall ;</p>	2 max	<p>Mark the first answer on each prompt line. ACCEPT ora throughout</p> <p>1 ACCEPT 'DNA not free'</p> <p>2 e.g. mitochondria / Golgi / etc 2 ACCEPT compartmentalized organelles 2 ACCEPT don't have a mesosome</p> <p>4 ACCEPT 'DNA not naked'</p>
(b)		<p>capital letter on, specific name / Vivax ;</p> <p>not italicised / not underlined ;</p>	1 max	<p>Mark the first answer ACCEPT ora for what student should have typed</p> <p>ACCEPT 'the parasite is Plasmodium falciparum / malariae / ovale' if candidate uses capital 'P' and lower case 'f / m / o'</p>
(c)	(i)	<p>1 (mosquito), is <u>vector</u> ;</p> <p>2 <i>Plasmodium</i> / parasite, present in (mosquito), saliva / salivary gland ;</p> <p>3 <i>idea that</i> infected mosquito, feeds on / bites, human ;</p> <p>4 <i>Plasmodium</i> / parasite, passes (from saliva) to blood ;</p>	3 max	<p>IGNORE references to stages of life-cycle Max 2 if virus / bacterium appears anywhere</p> <p>3 IGNORE case of initial 'P' 3 Must be in context of transmission from mosquito to human 4 'blood' can be inferred, e.g. from refs to anticoagulant 4 IGNORE ref to parasite in blood after liver</p>
(c)	(ii)	<p>destruction of a species is, morally / ethically, wrong ;</p> <p>might cause unintended health problems in humans ;</p> <p>might harm, other / unintended, species ;</p> <p><i>idea of</i> bioaccumulation / biomagnification ;</p>	1 max	<p>Mark the first suggestion</p> <p>IGNORE 'might enter human food' unqualified Answers must imply idea of harm</p>
(c)	(iii)	<p><i>Field investigation</i></p> <p>F1 (sampling) before and after insecticide treatment ;</p> <p>F2 <i>idea of</i>, unbiased / random, sampling of population ;</p> <p>F3 example of sampling technique ;</p> <p>F4 (sampling in) different, times / weather ;</p> <p>F5 <u>large</u> number of samples taken ;</p> <p>F6 <i>idea of</i> standardised sampling procedure ;</p> <p>F7 <i>idea of</i> preventing counting same individual more than once ;</p> <p>F8 <i>idea of</i> capture – recapture ;</p> <p>F9 calculate mean / calculate standard deviation / apply statistical test ;</p>	5 max	<p>Award marks for either a field or laboratory investigation – must read whole answer before beginning to mark to decide if field or laboratory.</p> <p>If candidates answer in terms of incidence of malaria award no marks as question states population of mosquitoes but read whole question in case mosquito study described in addition.</p> <p>If the investigation is in the both field and laboratory mark the investigation which gives candidate most marks.</p> <p>F1 IGNORE refs to treated and untreated areas as stem refers to 'a population'</p> <p>F3 e.g. sweep net, pond net, light trap F3 ACCEPT insect net F3 IGNORE 'net' or 'trap' unqualified</p> <p>F4 IGNORE intervals unqualified. Answers must refer to time or weather</p> <p>F5 Must imply large number or state five or more F6 ACCEPT <u>idea of counting by the same method</u></p> <p style="text-align: right;">Continued.....</p>

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	<p>OR</p> <p><i>Laboratory investigation</i></p> <p><i>idea of:</i></p> <p>L1 with and without insecticide exposure ;</p> <p>L2 measuring <u>mosquito</u> survival / count surviving mosquitoes ;</p> <p>L3 controlling one named key variable ;</p> <p>L4 controlling second named key variable ;</p> <p>L5 <i>idea of using a range of insecticide concentrations ;</i></p> <p>L6 replicates ;</p> <p>L7 calculate <u>mean</u> / calculate standard deviation / apply statistical test ;</p>		<p>Laboratory investigation could be done outside</p> <p>L1 is for changing the independent variable</p> <p>L2 is for measuring the dependent variable ACCEPT count the number of dead ones</p> <p>L3 and L4 <i>award up to 2 marks for</i> exposure time species of mosquito stage of mosquito life cycle sex of mosquito number of mosquitos insecticide type insecticide concentration volume of insecticide temperature</p> <p>L6 Minimum of 3 in total, i.e. original plus two</p> <p>L7 IGNORE average</p>
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2)

(a)	<p>taxonomy / taxonomic ; hierarchy ; phylogeny / phylogenetic ;</p>	3	<p>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</p> <p>ACCEPT phonetic spelling throughout</p> <p>ACCEPT hierarchical system</p>
(b) (i)	<p>1 (cells have) no cell wall ;</p> <p>2 <u>heterotrophic</u> ;</p> <p>3 eukaryotic ;</p> <p>4 multicellular ;</p> <p>5 (fertilized eggs develop into), blastula / ball of cells ;</p> <p>6 high degree of mobility / AW ;</p>	2 max	<p>Mark the first answer on each prompt line.</p> <p>1 DO NOT CREDIT absence of a qualified cell wall, e.g. 'no cellulose cell wall'</p> <p>2 ACCEPT phonetic spelling</p> <p>3 ACCEPT named eukaryotic cell feature</p> <p>4 IGNORE references to tissues</p> <p>6 DO NOT CREDIT unqualified references to movement ACCEPT refs to mobility during part of life cycle IGNORE cilia / flagella</p>
(ii)	<p>Eukaryota(e) / Eukarya / eukaryote(s) ;</p>	1	<p>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</p> <p>IGNORE case of initial letter</p>

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	(iii)	<p>1 <u>all</u> are in same <u>family</u> as all, are closely related ;</p> <p>2 kea and kaka are both, same genus / <i>Nestor</i> ; ora for kakapo</p> <p>3 kea and kaka, are more closely related / share more recent common ancestor, (than with kakapo) ;</p> <p>4 kea and kaka have <u>more</u> genes in common / AW (than with kakapo) ;</p> <p>5 example of genetic similarity (between kaka and kea) evident from Fig 4.1 ;</p> <p>6 differences between, kea and kaka / all three, are great enough for each to be described as a different <u>species</u> ;</p>	4 max	<p>Candidates may refer to individual species using common or scientific names. ACCEPT use of either or both. IGNORE case of initial letter</p> <p>1 idea of link between family and close relationship must be made</p> <p>3 ACCEPT ora for less close relationship between kakapo and others</p> <p>4 ACCEPT ora 4 Answers must refer to genes / genetics / DNA 4 IGNORE cytochrome c</p> <p>5 E.g. kaka and kea both brown / kaka and kea both have similar shaped beaks 5 IGNORE unqualified references to appearance</p>
(c)	(i)	<p>differences ; in / <u>within</u> / <u>between</u>, species ;</p>	2	ACCEPT within a population
(c)	(ii)	<p>genetic differences / different alleles / inherited differences ;</p> <p>environment / diet / disease ;</p>	2	<p>Mark the first suggestion on each prompt line. ACCEPT different genes ACCEPT mutation ACCEPT sex IGNORE 'different habitat'</p>
(c)	(iii)	<p>only small number have been sampled / AW ;</p> <p><i>idea that</i> individuals sampled may not be representative of population ;</p> <p>data collected when population was larger / smaller population may mean range has changed ;</p>	2	<p>Mark the first two reasons – ignore prompt lines. ACCEPT 'whole population has not been sampled'</p> <p>IGNORE rare unqualified ACCEPT larger ones more likely to be caught / measured</p> <p>ACCEPT individuals sampled from one area might be different from average of whole population</p>
(d)		<p><i>Name</i> 1 <u>speciation</u> ;</p> <p><i>Mechanism – max 2 marks</i> 2 <u>isolation</u> / <u>separation</u>, (of populations) ;</p> <p>3 further detail of isolating mechanism ;</p> <p>4 mutation / genetic variation ;</p> <p>5 natural selection / description of natural selection ;</p> <p>6 different <u>selection pressure(s)</u> (in different environment) ;</p> <p>7 (enough) time to allow changes in population to prevent interbreeding / AW ;</p>	3 max	<p>1 IGNORE 'natural selection' on name line</p> <p>2 IGNORE barrier</p> <p>3 e.g. river, mountain, reproductive, geographical, temporal, polyploidy, qualified barrier 3 IGNORE allopatric / sympatric unqualified</p> <p>5 description must mention differential survival and genes being passed on 6 IGNORE selection pressure unqualified 6 'different' can be described using an example</p>

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3)

(a)		41 667 ; ;	2	Award 2 marks for a correct answer, even if no working shown. ALLOW 1 mark for 41 666.666; 41 666.7, 41 666.67, 41 666.667, 41 670, 41 700, 41 666, 41668 or 42 000. If the answer is incorrect ALLOW 1 mark for $\frac{2500 \times 100}{6}$
(b)		<p>1 part of <u>ecosystem</u> / <u>habitat</u> for other organisms ;</p> <p>2 part of food, chain / web ;</p> <p>3 wood useful for specific purpose ;</p> <p>4 (potential) source of medicine ;</p> <p>5 genetic resource ;</p> <p>6 aesthetic value / give pleasure / beautiful trees ;</p> <p>7 ethical reason / moral responsibility ;</p> <p>8 resource for (non-medical) scientific research ;</p>	3	<p>Mark the first three reasons regardless of lines</p> <p>1 IGNORE maintains biodiversity</p> <p>2 ACCEPT food source 2 IGNORE home 3 e.g. making , fences / furniture / boundary marker</p> <p>5 ACCEPT description or example but must refer to genes</p> <p>6 ACCEPT tourism</p> <p>7 ACCEPT <i>idea that they have a right to existence</i> 7 DO NOT CREDIT 'playing God'</p>
(c)	(i)	not in, natural / normal, <u>habitat</u> / <u>environment</u> ;	1	
	(ii)	<p>1 most plants produce an excess ;</p> <p>2 (so) can be collected (from wild) without damaging (wild) , plants / organisms / population / habitat ;</p> <p>3 take up little space ; ora</p> <p>4 able to store, large numbers / more species ; ora</p> <p>5 easy / cheaper, to transport / AW ; ora</p> <p>6 <i>idea of remaining viable</i> for long periods ; ora</p> <p>7 less susceptible to, disease / pests / environmental change ; ora</p>	4 max	<p>5 ACCEPT can easily be sent where wanted</p> <p>6 Answers must have some reference to survival, not just 'can be stored for a long time'</p> <p>7 IGNORE recovery / survival , from disease 7 CREDIT answers that describe (greater) disease resistance as a property of the seeds themselves or that the seed bank is a (more) protected environment for the seeds IGNORE cheaper unqualified</p>
(c)	(iii)	<p>1 (maintain / increase) genetic variation / <u>gene pool</u> ;</p> <p>2 reduced chance of (future), disease / environmental change, affecting (whole) population ;</p> <p>3 reduces chance of <u>inbreeding</u> ;</p> <p>4 maintain, <u>geographical</u> variation / varieties / races / strains / subspecies ;</p>	3 max	<p>1 ACCEPT different alleles 1 DO NOT CREDIT different genes</p> <p>2 ACCEPT 'so if one dies from a disease some might survive' 2 ACCEPT 'to get some plants that are resistant to different diseases'</p> <p>4 IGNORE variation unqualified</p>

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4)

(a)	Characteristics are passed on to the next generation	W	;	3	DO NOT CREDIT if letter is unclear DO NOT CREDIT if more than one letter is given DO NOT CREDIT if an incorrect letter is given DO NOT CREDIT if an incorrect letter is given
	There is a struggle for existence	Y and Z	;		
	Individuals with beneficial characteristics are among the few who survive	X and Y and Z	;		
(b)	MRSA / it, is harder to treat / may become untreatable ; potential for, disease outbreak / epidemic / pandemic / killing many people ; developing new / more powerful, <u>antibiotics</u> , is expensive / takes time ;			2 max	ACCEPT MRSA / it, can't be killed (by antibiotics) ACCEPT antibiotics will no longer work on, MRSA / it IGNORE new antibiotics are hard to discover
(c)	1	fossils show that organisms have changed over time ;		3	1 CREDIT many fossil organisms dissimilar from modern organisms 2 ACCEPT idea of fossils in chronological order 3 e.g. <i>Archaeopteryx</i> / <i>Tiktaalik</i> / horse 3 general trend from, small / simple, to, large / complex
	2	<i>idea that</i> fossils or rocks can be dated ;			
	3	<i>idea of</i> fossils showing intermediate forms / sequences ;			
Total				8	

5)

(a)	form part of cellular response	<i>both</i>		5													
	mature in thymus	(only) T (lymphocytes) ;															
	secrete substances which kill infected cells	(only) T (lymphocytes) ;															
	manufacture antibodies	(only) B (lymphocytes) ;															
	undergo clonal expansion	both / B and T ;															
	activate other lymphocytes	(only) T (lymphocytes) ;															
(b) (i)	no antibodies detected before 4 days / antibodies appear at 4 days ; increase then decrease / peak ; figures for peak with time and antibody concentration ; decrease less steep than increase / AW ; ora antibody concentration returns to zero at 27 days ;			3 max	ACCEPT 'around 4 days' ACCEPT upper limit of 4.5 days for first appearance of antibodies IGNORE 'before 5 days' IGNORE references to increase at 4 days, answers must imply none to begin with ACCEPT 13 days \pm 0.5 day, 25 units \pm 0.5 units ACCEPT 25 au \pm 0.5 au 9 days \pm 0.5 day after initial appearance												
(b) (ii)	the drawn line should show higher peak and steeper initial increase ; antibodies appear between days 30 and 34 and concentration at 60 days above peak for primary response ;			2	Peak must be at least 30 au Compare gradient with initial increase up to day 10 NBOD if gradients are similar ACCEPT ruled line close to vertical DO NOT CREDIT vertical ACCEPT a line that starts to rise at 30 or 34 days												
(c)	<table border="1"> <thead> <tr> <th>region</th> <th>name</th> <th>function</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>hinge (region) ;</td> <td>flexibility / binding of <u>more than one</u> antigen ;</td> </tr> <tr> <td>B</td> <td><u>constant</u> / Fc (region) ;</td> <td>attachment / binding , to phagocytes ;</td> </tr> <tr> <td>C</td> <td>variable / hypervariable / Fab (region) ;</td> <td>binding / attachment , to <u>antigens</u> ;</td> </tr> </tbody> </table>			region	name	function	A	hinge (region) ;	flexibility / binding of <u>more than one</u> antigen ;	B	<u>constant</u> / Fc (region) ;	attachment / binding , to phagocytes ;	C	variable / hypervariable / Fab (region) ;	binding / attachment , to <u>antigens</u> ;	6	Marks for name and function should be awarded independently. DO NOT CREDIT if incorrect answer appears in same box ACCEPT hinges / hinged ACCEPT neutrophils / macrophages / granulocytes ACCEPT monocytes IGNORE recognise antigens
region	name	function															
A	hinge (region) ;	flexibility / binding of <u>more than one</u> antigen ;															
B	<u>constant</u> / Fc (region) ;	attachment / binding , to phagocytes ;															
C	variable / hypervariable / Fab (region) ;	binding / attachment , to <u>antigens</u> ;															

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6)			
1	<u>natural selection</u> ;		ACCEPT 'tolerance' as AW for resistance If candidates write 'immunity' penalise once and then ect
2	insecticide is the , selective agent / selection pressure ;		
3	idea of mutation / (genetic) variation ;	3	DO NOT CREDIT idea of insecticide or natural selection <i>causing</i> mutation DO NOT CREDIT variation that could be environmental
4	random / naturally occurring ;		
5	resistant survive / non-resistant die ;	5	ACCEPT AW for resistant, e.g. 'the ones with the mutation'
6	(resistants will) pass on , allele / mutation , for resistance (to offspring) ;	6	ACCEPT gene for resistance IGNORE 'pass on resistance / trait'
7	higher proportion of / more , resistant individuals in population ;	7	CREDIT refs to increased allele / gene frequency ACCEPT 'the whole population becomes resistant'
8	idea that resistance allele confers resistance only to a small dose of insecticide ;		
		4 max	