

Mark Scheme for June 2013

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.













All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

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Annotations

Annotation	Meaning
	Correct answer
	Incorrect response
	Benefit of Doubt
	Not Benefit of Doubt
	Error Carried Forward
	Given mark
	Underline (for ambiguous/contradictory wording)
	Omission mark
	Ignore
	Correct response (for a QWC question)
	QWC* mark awarded
	a correct response is associated with a piece of clearly incorrect science within the same statement and award no mark

*Quality of Written Communication

Subject-specific Marking Instructions

- For questions in which the command word is 'suggest' ignore incorrect responses and credit a correct response wherever it occurs
- Accept phonetic spellings unless otherwise indicated
- All marks are stand-alone unless otherwise stated in Additional Guidance
- For 'idea of' marking points a wide range of wording is acceptable. The mark is to be awarded for the idea.

Question			Answer	Marks	Guidance
1	(a)	(i)	<u>primary structure</u> ;	1	ACCEPT 1° structure IGNORE polypeptide
1	(a)	(ii)	NH ₂ at one end ; COOH at opposite end ; C in centre (of a single amino acid) bonded (separately) to one R and one H ;	3	If R group not shown as ' R ' then award max 2 (as general structure asked for in Q) IGNORE labels ACCEPT displayed structure of NH ₂ / HNH ACCEPT displayed structure of COOH if correct double bond shown AWARD only if the candidate has drawn a single 'amino acid' molecule $ \begin{array}{c} \text{H} \\ \\ \text{H}_2\text{N} - \text{C} - \text{COOH} \\ \\ \text{R} \end{array} $
1	(b)	(i)	strength / toughness / insolubility ;	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 ACCEPT strong / tough IGNORE flexible / inelastic IGNORE withstand pressure

Question			Answer	Marks	Guidance
1	(b)	(ii)	<p>1 peptide bonds , between amino acids / in polypeptide ;</p> <p>2 every 3rd amino acids is , same / glycine ;</p> <p>3 coil / twist / spiral / helix ;</p> <p>4 left-handed (helix) ;</p> <p>5 glycine / small R group , allows closeness / twisting (of polypeptide chains) ;</p> <p>6 three polypeptide chains ;</p> <p>7 hydrogen / H , bonds between (polypeptide) chains ;</p> <p>8 no / few, hydrophilic (R) groups on outside (of molecule) ;</p> <p>9 (adjacent molecules joined by) crosslinks ;</p> <p>10 crosslinks / ends of molecules , being staggered ;</p> <p>11 <u>fibril</u> ;</p>	6	<p>One molecule of collagen is 3 polypeptide chains twisted around each other. CREDIT annotated diagrams unless contradicted by text</p> <p>2 ACCEPT high proportion of / 35% , glycine / same amino acid</p> <p>3 CREDIT in context of single polypeptide or 3 polypeptides but DO NOT CREDIT 'α-helix' in the context of a single polypeptide 3 IGNORE wound</p> <p>4 'α-helix, which is left handed' – AWARD mp4 but DO NOT CREDIT mp3</p> <p>7 Must be in correct context 7 DO NOT CREDIT H⁺ / H₂ bonds</p> <p>9 ACCEPT covalent bonds between adjacent molecules 9 DO NOT CREDIT in context of bonding between 3 polypeptides 9 IGNORE disulfide</p> <p>11 IGNORE micro</p>

Question			Answer	Marks	Guidance
1	(c)	(i)	transport / AW , of, oxygen / O ₂ ;	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>ACCEPT buffering blood / carrying CO₂ / storing oxygen IGNORE binding oxygen IGNORE Iron</p>
1	(c)	(ii)	<p><i>haemoglobin (has / is):</i></p> <p>1 globular ;</p> <p>2 hydrophobic (R) groups on inside / hydrophilic (R) groups on outside ;</p> <p>3 4 , chains / sub-units / polypeptides ;</p> <p>4 <i>idea that</i> subunits are (two) different types ;</p> <p>5 α / alpha , helix ;</p> <p>6 <i>idea that</i> proportion of glycine similar to that , of other amino acids / in other proteins ;</p>	3	<p>IGNORE prompt lines – mark as prose but max 2 if an incorrect statement about haemoglobin is given</p> <p>IGNORE statements about collagen even if incorrect, answers must refer to haemoglobin</p> <p>1 IGNORE not fibrous / ball shaped</p> <p>3 IGNORE strands / molecules / proteins 4 ACCEPT in haemoglobin the subunits are not all the same</p> <p>3&4 “two alpha and two beta chains” = 2 marks (mp 3 and 4)</p> <p>5 ACCEPT a-helix</p> <p>6 ACCEPT wide(r) range of amino acids</p> <p>IGNORE refs to Fe (as part of prosthetic group)</p>
			Total	15	

Question		Answer		Marks	Guidance
2	(a)		enzymes ;	1	IGNORE protein / catalysts ACCEPT enzymic
2	(b)	(i)	<p>1 similar, shape / structure ;</p> <p>2 example of similarity ;</p> <p>3 both , will fit into / complementary (shape) to / bind to / bond to , <u>active site</u> (of alcohol dehydrogenase) ;</p>	3	<p>1 IGNORE same shape 1 ACCEPT 'ethanol same shape as part of DEG'</p> <p>2 IGNORE they contain C, H and O 2 IGNORE the end is the same 2 ACCEPT e.g. they both have OH 2 ACCEPT similar parts identified on diagram if they are clearly indicating an example of similarity</p> <p>3 ACCEPT implication of both 3 IGNORE attach / enter 3 IGNORE both will form ESC (with alcohol dehydrogenase)</p>
2	(b)	(ii)	<p>1 (ethanol) <u>competes</u> with DEG ; ora</p> <p>2 (when at high(er) concentration) ethanol more likely to , collide with / bind to / bond to , active site ; ora</p> <p>3 less , DEG breakdown / toxic product ; ora</p>	3	<p>1 ACCEPT ethanol / DEG , is , a <u>competitive</u> inhibitor</p> <p>2 ACCEPT 'ethanol more likely to form ESC' 2 ACCEPT implication of 'more likely' from context 2 IGNORE attach / enter</p> <p>3 ACCEPT DEG product is diluted 3 ACCEPT no DEG breakdown</p> <p>IGNORE 'you will drink less of it'</p>
Total				7	

Question			Answer	Marks	Guidance
3	(a)	(i)	B <u>and</u> C ;	1	Both need to be given for the mark to be awarded. DO NOT CREDIT if A also given.
3	(a)	(ii)	(involved) after , pathogen / AW , has entered the body ;	1	IGNORE ref to primary defence without the clear idea that the pathogen has <u>entered the body</u> IGNORE refs to mechanisms of action, e.g. 'phagocytes do not make antibodies' ACCEPT attacking foreign bodies after they have <u>passed through the skin</u>
3	(a)	(iii)	(phagocytes) able to, digest / break down / engulf / target / deal with, a range of / many different , pathogens ; ora	1	ACCEPT bacteria or virus as synonym for pathogen if the idea of a variety is clearly present ACCEPT phagocytes can break down <i>any</i> pathogen ACCEPT phagocytes do not have (antigen-)specific receptors IGNORE phagocytes do not make memory cells IGNORE antigen if used as synonym for pathogen
3	(a)	(iv)	<p>1 lobed / narrow , nucleus ;</p> <p>2 (cells) can change shape ;</p> <p>3 can squeeze / move / fit / AW , between cells / through pores , in (walls of) capillaries ;</p> <p>4 histamine makes , capillary walls / endothelium , leaky ;</p>	2	<p>2 ACCEPT in context of cell or nucleus</p> <p>2 ACCEPT cells , are plastic / have flexible structure / have flexible membrane</p> <p>2 IGNORE squashable / stretch</p> <p>3 ACCEPT holes / gaps / fenestrations</p>

Question			Answer	Marks	Guidance
3	(a)	(v)	<p>1 (pathogen) engulfed / enveloped / surrounded by cytoplasm (from phagocyte) ;</p> <p>2 <u>endocytosis</u> / <u>phagocytosis</u> ;</p> <p>3 (formation of) <u>phagosome</u> / <u>phagocytic vacuole</u> / <u>phagocytic vesicle</u> ;</p> <p>4 (phago) <u>lysosomes</u> ;</p> <p>5 (lysosomes / phagosome) move towards / fuse with (each other) ;</p> <p>6 (named) enzyme(s) / lysins / hydrogen peroxide / free radicals (in lysosomes) ;</p> <p>7 (pathogen) digested / broken down / hydrolysed ;</p> <p>8 (to) amino acid / sugar / glucose / fatty acid / glycerol ;</p> <p>9 (break down products) absorbed / AW (into cytoplasm) or unwanted products removed (by exocytosis) ;</p> <p>10 cytoskeleton involved in (endocytosis / movement of vesicles) ;</p>	6	<p>ACCEPT phonetic spellings throughout</p> <p>1 ACCEPT 'pseudopodia / cytoplasm / cell membrane , extend from phagocyte'</p> <p>1 DO NOT CREDIT eaten. ACCEPT ingested</p> <p>3 CREDIT in correct context only</p> <p>5 ACCEPT attracted to / joins</p> <p>7 IGNORE destroyed / broken up / killed</p> <p>9 IGNORE refs to antigen presentation 9 ACCEPT enter cytoplasm</p>
			<p>QWC key points in sequence ;</p>	1	<p>Award if the following mark points have been awarded: mp 1 or 2 followed by mp 6 or 7</p>

Question			Answer	Marks	Guidance
3	(b)	(i)	<u>Mycobacterium</u> / <i>M. tuberculosis</i> / <i>M. bovis</i> ;	1	ACCEPT phonetic spellings IGNORE case of initial letter No need to underline
3	(b)	(ii)	droplets (containing pathogen) ; (released by) coughing / sneezing ; inhaled by (uninfected) , individual / AW ;	2	IGNORE airborne IGNORE laughing / talking / kissing / breathed out

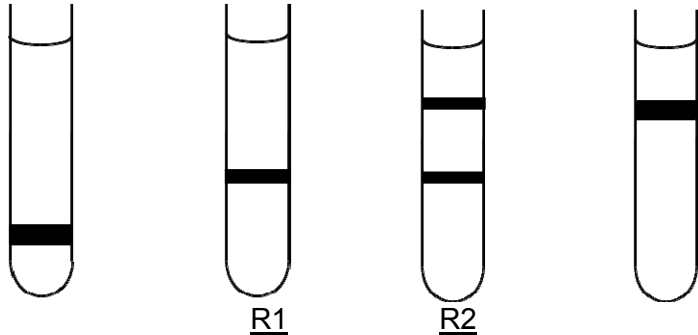
Question			Answer	Marks	Guidance
3	(c)	(i)	<p>1 <u>in both years</u> incidence (of TB) , decreases / AW , as income , increases / AW ; ora</p> <p>2 no change in, low / lower middle, (income groups) ;</p> <p>3 increase in upper middle (income group) ;</p> <p>4 decrease in high (income group) ;</p> <p>5 <i>idea of overall very little change between 2000 and 2008 ;</i></p> <p>6 <u>calculated difference</u> in figures with units to support points 3 to 5 ;</p>	3	<p>Mark points 1-5 cannot be inferred from figures</p> <p>1 ACCEPT 'incidence is higher in low income group and lower in high income group, in both years / always'</p> <p>3 ACCEPT upper middle less in 2000</p> <p>4 ACCEPT high (group) more in 2000</p> <p>6 ACCEPT any increase or decrease e.g., high group has gone down by 3 per 100000</p> <p>6 ACCEPT also</p> <ul style="list-style-type: none"> • 10% increase in upper middle group • 17.6% / 18% , decrease in high income group • 1% / 1.3% , increase overall • high income group in 2008 is , 82.4% / 82% / 0.824 / 0.82 , of original value <p>6 IGNORE 0% increase in low / lower middle income groups</p> <p>There is no need to refer to years as only 2 are shown</p>

Question			Answer	Marks	Guidance
3	(c)	(ii)	<p>1 overcrowded / AW (living space) ;</p> <p>2 poorly ventilated (living space) ;</p> <p>3 poor diet / malnourished ;</p> <p>4 poor health ;</p> <p>5 homelessness ;</p> <p>6 <i>idea that</i> more likely to consume , meat / milk, from infected cattle ;</p> <p>7 <i>idea of</i> vaccination / medical treatment , more difficult to access ;</p>	3	<p>IGNORE prompt lines and mark as prose</p> <p>1 ACCEPT cramped</p> <p>4 ACCEPT poor immune system 4 IGNORE hygiene / standard of living</p> <p>7 CREDIT healthcare more expensive 7 ACCEPT poor healthcare 7 IGNORE less aware of the risks</p>
			Total	21	

Question			Answer				Marks	Guidance
4	(a)	(i)	species	number of individuals (n)	n/N	(n/N) ²	3	<p>Award 3 marks for the correct answer (0.6366)</p> <p>If answer is incorrect:</p> <p>IGNORE numbers in first 4 rows</p> <p>'N = 100' = 1 mark</p> <p>$\Sigma(n/N)^2$</p> <p>ALLOW ecf for correct calculation from candidate's incorrect N value</p> <p>$1-(\Sigma(n/N)^2)$</p> <p>ALLOW ecf for correct calculation from candidate's $\Sigma(n/N)^2$ value</p> <p>Answer must be given to 4 dp for ecf</p>
			Dog's mercury	40	0.40	0.1600		
			Wild strawberry	13	0.13	0.0169		
			Common avens	43	0.43	0.1849		
			Wood sorrel	4	0.04	0.0016		
				N = 100		$\Sigma(n/N)^2 = 0.3634$ $1-(\Sigma(n/N)^2) = 0.6366$		
4	(a)	(ii)	<p><i>species richness</i> number of <u>species</u> (in an area / habitat) ;</p> <p><i>species evenness</i> number of / how many, <u>individuals</u> there are of, <u>each / every, species</u> (in an area / habitat) ;</p>				2	<p>IGNORE organisms / abundance / quantity / variety DO NOT CREDIT amount</p> <p>ACCEPT 'organisms' as AW for individuals CREDIT relative abundance of (each) species / population size of each species</p> <p>IGNORE relative abundance of, a / one, species DO NOT CREDIT amount</p>

Question			Answer	Marks	Guidance
4	(a)	(iii)	(habitat) dominated by, one / few / AW, species ; change in one species , likely to affect whole habitat / AW ; community / ecosystem / habitat / area , is unstable / not able to withstand change / <u>easily</u> damaged ;	2	ACCEPT high number of one species IGNORE environment / biodiversity as AW for community IGNORE the community / AW will be damaged
4	(b)		<p>1 <i>idea of</i> random sampling ;</p> <p>2 standardisation of technique ;</p> <p>3 use of, key/identification chart ;</p> <p>4 survey at different , times of year / season ;</p> <p>5 include , trees / species larger than quadrat ;</p>	2	IGNORE prompt lines and mark as prose 1 ACCEPT description of randomisation method 2 ACCEPT description of standardisation method 2 ACCEPT count the same way each time 4 IGNORE 'repeat' unqualified 4 IGNORE different times of day / different times
			Total	9	

Question			Answer	Marks	Guidance
5	(a)	(i)	X cytosine / pyrimidine ; Y nucleotide ;	2	Mark the first answer on each prompt line. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks X ACCEPT <u>nitrogenous</u> base / <u>organic</u> base X IGNORE C
5	(a)	(ii)	at least one line between all opposite bases ; two lines between A and T and three lines between both instances of C and G ;	2	IGNORE bond labels / H / O / δ^+ / δ^- Bases on left strand do not need to be labelled but CON this mark if incorrectly labelled
5	(a)	(iii)	polypeptide ; ribosome ;	2	ACCEPT protein
5	(a)	(iv)	(usually) single stranded / would not have 2 strands ; uracil / U, instead of thymine / T ;	2	Mark the first answer on each prompt line. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks IGNORE shorter ACCEPT only one backbone DO NOT CREDIT incorrect spelling of thymine with 'a' IGNORE difference in sugar as on the diagram ribose and deoxyribose would appear the same
5	(b)	(i)	<u>one</u> strand, from original DNA and <u>one</u> strand newly formed ; an , (original) strand / polynucleotide , acts as template (for new strand) ;	2	ACCEPT one old and one new strand ACCEPT each strand is copied

Question			Answer	Marks	Guidance
5	(b)	(ii)	(DNA) can be replicated without error / same sequence of nucleotides is produced ; reduces occurrence of mutation ; allows (re-)formation of , hydrogen / H , bonds ;	2	ACCEPT formation of identical DNA ACCEPT same / correct , order / sequence , of bases This mark point is for the correct use of the term 'mutation' and does not imply without error. ACCEPT prevents mutation DO NOT CREDIT H ⁺ / H ₂ bonds
5	(c)	(i)	horizontal band drawn in tube <u>R1</u> clearly higher than band in ¹⁵ N tube and clearly lower than band in ¹⁴ N tube ;	1	DO NOT CREDIT if more than one band drawn IGNORE thickness of bands and whether bands are shaded DO NOT CREDIT if there is any overlap with a band in another tube 
5	(c)	(ii)	one band (in <u>R2</u>) clearly at the same height as that in tube <u>R1</u> and one band (in <u>R2</u>) clearly at the same height as that in the ¹⁴ N tube ;	1	DO NOT CREDIT if more than two bands drawn IGNORE thickness of bands and whether bands are shaded

Question		Answer	Marks	Guidance
5	(d)	<p>same concentration of sugar (solution in each tube) ; same volume of, mixture / solution / sugar solution (in each tube) ;</p> <p>spin (all tubes) at same , speed / acceleration ; spin (all tubes) for same (length of) time ;</p>	3	<p>IGNORE prompt lines - mark as prose IGNORE amount throughout</p> <p>IGNORE mass IGNORE mass IGNORE volume , of sugar / DNA extract</p> <p>ACCEPT tubes spun at constant speed</p> <p>IGNORE temperature / pH IGNORE mass of DNA</p>
		Total	17	

Question			Answer	Marks	Guidance
6	(a)	(i)	<p>range / variety / number , of species (in an area) ;</p> <p>range / variety of, habitats / ecosystems ;</p> <p>variety of , alleles / genes ;</p>	2	<p>IGNORE amount throughout</p> <p>ACCEPT a combination of species richness and species evenness</p> <p>ACCEPT abundance</p> <p>IGNORE organisms</p> <p>ACCEPT number of habitats</p>
6	(a)	(ii)	<p>1 part of (local) food , chain / web ;</p> <p>2 tourism ;</p> <p>3 native species / <i>idea of</i> heritage of the area ;</p> <p>4 to protect a neighbouring red squirrel population ;</p> <p>5 <i>idea that</i> Northumberland red squirrel population is nationally significant ;</p>	2	<p>IGNORE prompt lines and any reference to biodiversity</p> <p>CREDIT a correct response anywhere in the answer</p> <p>IGNORE unspecified refs to ethical, aesthetic or economic</p> <p>1 ACCEPT keystone species</p> <p>3 ACCEPT native to UK</p> <p>5 e.g. Northumberland has significant proportion of total population so loss of this population might jeopardise all British squirrels</p> <p>IGNORE refs to genetic resource as no suggestion that this population is distinct from red squirrels elsewhere.</p>

Question			Answer	Marks	Guidance
6	(a)	(iii)	<p><i>idea that:</i> it is wrong to interfere with nature ;</p> <p>it is wrong to kill animals ;</p> <p>grey has (as much) right to live there (as red) ; <i>idea that</i> might be useful in the future / enjoyed by future generations ; grey will be part of food chain ;</p>	1	<p>ACCEPT qualified refs to , moral / ethical / religious , reasons IGNORE it's wrong to play God</p> <p>ACCEPT it is cruel</p>
6	(b)		<p><i>idea that:</i></p> <p>1 harder to see ; ora</p> <p>2 (harder to see because) more timid / frightened of people / spend less time on ground / smaller ; ora</p> <p>3 species may be wrongly identified ;</p> <p>4 grey squirrels more likely to visit gardens / parks / public areas ; ora</p> <p>5 people are more inclined to report grey sightings ; ora</p> <p>6 AVP : ora</p>	2	<p>IGNORE prompt lines and mark as prose CREDIT correct response where seen</p> <p>1 ACCEPT 'they remain hidden'. IGNORE 'they may be hiding'</p> <p>2 IGNORE 'they may be hiding'</p> <p>6 ACCEPT grey squirrels might be less camouflaged (so easier to see)</p> <p>6 ACCEPT red squirrels might be (more) nocturnal / AW 6 IGNORE squirrel species hard to distinguish / same individual counted more than once</p>

Question		Answer	Marks	Guidance
6	(c)	<p>1 size (of development) ;</p> <p>2 <i>idea of environmental sensitivity / which species present / which habitats present , in the area ;</i></p> <p>3 potential damage (to area / organisms) ;</p> <p>4 <i>idea of potential strategies to minimise impact ;</i></p>	3	<p>IGNORE prompt lines and mark as prose IGNORE refs to benefits of development Answers should be given in terms of assessing aspects of the development.</p> <p>1 ACCEPT 'how big will it be?'</p> <p>2 ACCEPT e.g. 'what lives there?' / 'whether a rare species live there' 'whether red squirrels live there' / 'the biodiversity of the area' / is it an SSSI? / species richness</p> <p>3 ACCEPT e.g. 'how much damage will it do?' / effect on ecosystem / how much it would be destroyed / how many organisms will it kill?</p> <p>4 ACCEPT e.g. 'what can be done about it?' / possible change to reduce impact 4 Must be a general statement 4 IGNORE stated example without the general idea</p>
Total			10	

Question			Answer	Marks	Guidance
7	(a)	(i)	<i>idea of</i> if one susceptible to, this / the disease, all likely to be ;	1	DO NOT CREDIT if the response is referring to diseases in general
7	(a)	(ii)	<p>1 environment / environmental factor ;</p> <p>2 (variation in) weather conditions / temperature ;</p> <p>3 rainfall / soil water content ;</p> <p>4 soil , (named) mineral / nitrate , content / AW ;</p> <p>5 (named) biotic factor (might vary) ;</p>	2	<p>2 ACCEPT climate</p> <p>3 IGNORE 'availability of water' unqualified</p> <p>4 IGNORE nutrient</p> <p>4 ACCEPT mineral availability / amount of fertiliser added</p> <p>5 e.g. number of pests / competition from other plants / disease</p>
7	(a)	(iii)	mutation ;	1	<p>ACCEPT deletion etc.</p> <p>IGNORE (named) mutagenic agent</p>

Question		Answer	Marks	Guidance
7	(b)	<p>1 cross / breed, with disease resistant variety ;</p> <p>2 method to test offspring for disease resistance ;</p> <p>3 select , best offspring / offspring with resistance ;</p> <p>4 (inter)breed, offspring with resistance / best offspring ;</p> <p>5 (continue process) for (many) generations ;</p> <p>6 <i>idea of</i> avoid breeding, closely related / AW , individuals to preserve genetic diversity ; ora</p> <p>7 (regularly back) cross with, wild variety ;</p> <p>8 <i>idea of</i> preserving rare varieties in case they are needed in the future ;</p> <p>9 AVP ;</p>	6	<p>If a candidate describes resistance as immunity DO NOT CREDIT the first time it is seen but apply ECF thereafter</p> <p>1 ACCEPT make two disease resistant individuals reproduce 1 IGNORE crossbreed two best individuals</p> <p>2 ACCEPT general statement or example e.g: 'germinate seeds, expose to disease, see if die'</p> <p>3 ACCEPT seeds / tubers / potatoes 3 IGNORE children / babies</p> <p>5 IGNORE many years</p> <p>6 ACCEPT avoid , inbreeding / inline breeding 6 ACCEPT 'maintain genetic diversity by breeding with plants from different field / area' 6 ACCEPT breed with different varieties to widen the gene pool</p> <p>8 ACCEPT use of seed bank to preserve range of alleles</p> <p>9 e.g, ref. to marker assisted selection / detail of pollination method / prevention of self-pollination / asexual reproduction of desired variety</p>
		QWC ;	1	Award if the answer has been given one mark from marking points 1–5 and one mark from marking points 6–8
Total			11	

Question		Answer	Marks	Guidance
8	(a)	<p>1 <u>Echiniscus</u> ;</p> <p>2 order ;</p> <p>3 phylum ;</p> <p>4 <u>Animalia</u> ;</p> <p>5 Eukaryota ;</p>	5	<p>Mark the first answer on each prompt line. 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 spellings</p> <p>1 Initial letter must be upper case</p> <p>2 ACCEPT super family / epifamily</p> <p>4 ACCEPT animals</p> <p>4 IGNORE case of initial letter</p> <p>5 ACCEPT eukaryotes / Eukarya / eukaryotic</p> <p>5 IGNORE case of initial letter</p>
8	(b)	<p>1 (phylogeny is) <u>evolutionary</u> relationships (between organisms) ;</p> <p>2 (phylogeny is study of) closeness of (evolutionary) relationships ;</p> <p>3 phylogeny is basis of / used in , natural / scientific / modern, classification ;</p> <p>4 <i>idea that</i> the closer the (evolutionary or genetic) relationship the closer the (taxonomic) grouping ;</p> <p>5 correct use of example ;</p>	3	<p>1 IGNORE 'evolution' without further qualification</p> <p>1&2 phylogeny is the closeness of evolutionary relationships = 2 marks</p> <p>1 ACCEPT phylogeny is evolutionary history</p> <p>3 ACCEPT new</p> <p>3 IGNORE related to classification</p> <p>4 ACCEPT ref to recent common ancestors as AW for close relationship</p> <p>4 ACCEPT named taxonomic group for 'grouping'</p> <p>4 ACCEPT 'if the DNA is very different then the group is not the same'</p> <p>5 e.g. gorillas and chimpanzees (closely grouped)</p>

Question		Answer	Marks	Guidance
8	(c)	<p>too small to see ;</p> <p>(unable to see them) until invention of microscope / development of suitable <u>viewing</u> apparatus / AW ;</p> <p>only 0.3mm in length ;</p>	2	<p>'can only be seen under microscope' = 1 mark (mp1)</p> <p>IGNORE 'can't see it' without the idea of size, e.g. can't see it clearly = 0 marks, can't see its features = 0 marks</p> <p>ACCEPT implication of being too small to see, e.g. 'you need a microscope to see them' = mp1 'people couldn't see them in the past because we didn't have microscopes' = 2marks (mp1 and mp2)</p> <p>IGNORE type of microscope if stated ACCEPT 'magnifying glass'</p> <p>ACCEPT ± 0.1 mm</p>
		Total	10	

Mark Scheme Conventions

The following conventions appear in the Mark Scheme

1. Bracketed words. The words in brackets are there to 'set the scene' and indicate the context in which the answer is expected. They do not need to appear. Award the mark as long as the statement in the brackets is not contradicted.
2. Solidus /. A solidus indicates alternative ways that a mark might be gained for a given Mark Point.
3. Use of the comma in a mark point. This indicates that some information from either side of the comma or commas is needed. It is used in conjunction with the solidus.

In some cases the Guidance column may indicate examples of wording or terms that are acceptable (ACCEPT) or that should be ignored (IGNORE). In the case of IGNORE read on to see if something creditworthy appears later in the response.

4. Underlining.
 - solid underline. The word or part of word underlined is required but minor mis-spellings are acceptable as long as the word is phonetically the same
 - wavy underline. This indicates that whilst the word underlined is not precisely needed, alternative responses need to be closely related in meaning or be a clear description.
5. *idea of*. This is used as a prefix to marking points where there may be a fairly wide range of responses which cover the essence of the required response. This often requires examiner judgement. These often, but not exclusively, appear in questions such as those related to environmental or health issues.
6. ORA: 'or reverse argument' In cases where candidates could be credited for having described a process from the opposite point of view, ora is sometimes used on a mark scheme to save space. For example, in question 6(b) the question could be answered from the point of view of why red squirrels are hard to see or why grey squirrels are easy to see.

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