



GCE

Biology

Advanced GCE F212

Molecules, Biodiversity, Food and Health

Mark Scheme for June 2010

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Question		Expected Answer				Mark	Additional Guidance																									
1	(a) (i)	<table border="1"> <thead> <tr> <th>reagent</th> <th>observation</th> <th>molecule</th> <th>present or absent</th> <th></th> </tr> </thead> <tbody> <tr> <td>ethanol and water</td> <td>white emulsion</td> <td>lipid</td> <td>present</td> <td></td> </tr> <tr> <td>Benedict's solution</td> <td>brick-red precipitate</td> <td>reducing sugar / lactose / glucose / galactose / monosaccharides</td> <td>present</td> <td>;</td> </tr> <tr> <td>biuret I and II</td> <td>lilac colour</td> <td>protein / named milk protein</td> <td>present</td> <td>;</td> </tr> <tr> <td>iodine solution</td> <td>yellow / brown</td> <td>starch / amylose</td> <td>absent</td> <td>;</td> </tr> </tbody> </table>				reagent	observation	molecule	present or absent		ethanol and water	white emulsion	lipid	present		Benedict's solution	brick-red precipitate	reducing sugar / lactose / glucose / galactose / monosaccharides	present	;	biuret I and II	lilac colour	protein / named milk protein	present	;	iodine solution	yellow / brown	starch / amylose	absent	;	3	One mark per correct row. IGNORE 'yes', 'no' and ticks and crosses DO NOT CREDIT if anything incorrect is written in any box in the molecule column. e.g. 'starch or cellulose' = 0 mark ACCEPT maltose DO NOT CREDIT sucrose ACCEPT casein / lactoglobulin / lactalbumin / polypeptide IGNORE amylopectin
reagent	observation	molecule	present or absent																													
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1	(a) (ii)	milk is already, cloudy / an emulsion / white / AW ;				1	ACCEPT idea of difficulty in detecting change because of the appearance of milk																									
1	(a) (iii)	(one) glycerol / glyceride ; 3 fatty acids ; ester bond (between glycerol and fatty acid) ;				3	ACCEPT marking points from clearly labelled diagram but DO NOT CREDIT if contradicted in text. IGNORE individual atoms on diagram and look for correct position of labels MAX 2 if phosphate group included (as could be confused with phospholipid) ACCEPT on diagram if 3 shown and at least one labelled ACCEPT triglycerides are esters																									

Question	Expected Answer	Mark	Additional Guidance
<p>1 (b)</p>	<p>1 (thermal) insulation ; 2 energy, store / source / release ;</p> <p>3 protection ; 4 membranes / phospholipid bilayer / control entry and exit into cells ; 5 (steroid) hormones / named steroid hormone ; 6 buoyancy ; 7 waterproofing ; 8 source of water (from respiration) ; 9 (electrical insulation) in myelin / around neurones / around axons / around dendrons ; 10 aid, absorption / storage / production, of, fat soluble / A / D / E / K, vitamins ;</p>	<p>3</p>	<p>MARK THE FIRST RESPONSE ON EACH NUMBERED LINE</p> <p>1 ALLOW 'warmth' 2 CREDIT answers that refer to the idea of lipid as a respiratory substrate but DO NOT CREDIT 'for respiration' unqualified IGNORE 'fat contains energy' without further qualification DO NOT CREDIT refs to producing energy or to quick energy release ACCEPT 'provides energy'</p> <p>4 CREDIT ref to cholesterol in membranes</p> <p>9 CREDIT nerve fibres / saltatory conduction IGNORE nerves</p>
<p>1 (c) (i)</p>	<p>saturated ; (fatty acids have) no / fewer, double bonds ; solid at room temperature ;</p>	<p>1 max</p>	<p>Assume answers refer to animal fats unless otherwise stated ACCEPT reverse argument IGNORE ref to fats and oils (as stated in question)</p> <p>ACCEPT 'fatty acids are not kinked' ACCEPT reasonable temperature quoted</p>

Question		Expected Answer	Mark	Additional Guidance
1	(c) (ii)	<p>1 (death rate for) men greater (at any concentration) / AW ;</p> <p>2 (death rates) rise with increasing cholesterol / AW ;</p> <p>3 death rate for men, initially / AW, falls ;</p> <p>4 steep(er) / AW, rise (in, males / both) at higher cholesterol levels ;</p> <p>5 comparative figures with unit for (blood) cholesterol to support any of the above points ;</p>	3 max	<p>1 ACCEPT ora</p> <p>2 ACCEPT 'positive correlation' (between death and cholesterol)</p> <p>3 ACCEPT 4.8 or below as 'initially'.</p> <p>4 Answers must refer to latter part of graph only (5.7 or above). ACCEPT difference (between sexes) greater at high concentration</p> <p>5 There are 3 ways of getting this mark:</p> <ul style="list-style-type: none"> • values for both sexes at single concentration • two values for single sex at two concentrations • subtraction / calculation, that shows comparison <p>IGNORE terms like 'about'</p> <p>See table for acceptable examples of x and y values – if intermediate cholesterol values are used, refer to the graph for the data</p>

blood cholesterol (mmol dm ⁻³)	deaths per 10 000	
	women	men
3.6	13.2 - 14.1	31.2 - 32.1
4.3	15.0 - 15.9	26.0 - 26.9
4.8	14.0 - 14.9	24.0 - 24.9
5.2	15.1 - 16.0	24.6 - 25.5
5.7	17.4 - 18.3	25.8 - 26.7
6.2	17.8 - 18.7	33.2 - 34.1
6.7	23.5 - 24.3	31.3 - 32.2
7.3	22.0 - 22.9	44.1 - 45.0
8.2	31.7 - 32.6	59.5 - 60.4

Must include (blood) cholesterol units

Any figure within a particular range is acceptable

Question			Expected Answer	Mark	Additional Guidance
1	(c)	(iii)	<p>1 coronary heart disease / CHD / cardio-vascular diseases / heart attack / cardiac arrest / myocardial infarction / MI / angina ;</p> <p>2 <u>a</u>therosclerosis / atheroma ;</p> <p>3 stroke ;</p> <p>4 <u>T</u>ype 2 diabetes ;</p>	2	<p>Mark first two in list</p> <p>1 DO NOT CREDIT heart disease alone or 'conary' ACCEPT hypertension / high blood pressure</p> <p>2 DO NOT CREDIT arteriosclerosis</p>
			Total	16	

Question	Expected Answer	Mark	Additional Guidance
2 (a)	placing, living things / organisms / named organisms, into, groups / categories / taxa / named taxonomic groups ; based on / AW, similarity / difference ;	2	ACCEPT 'grouping living things' Look for the idea of similar organisms being placed in the same group or different organisms being placed in different groups
2 (b) (i)	<p>1 morphology / anatomy / (observable / physical) features / appearance / AW ;</p> <p>2 biochemistry / cytochrome C ;</p> <p>3 genes / DNA / genetics / RNA ;</p> <p>4 behaviour / physiology / embryology ;</p> <p>5 idea of shared, evolutionary past / phylogeny ;</p>	3 max	<p>ACCEPT suitable examples for mps 1 to 4</p> <p>1 CREDIT cell features e.g. nucleus / membrane-bound organelles / cell wall / prokaryotic-eukaryotic features / unicellular</p> <p>2 CREDIT component of cell wall</p> <p>3 IGNORE chromosomes</p> <p>4 ACCEPT 'how they feed' / nutrition / 'how they reproduce'</p> <p>5 ACCEPT 'how closely related' IGNORE refs to interbreeding / fertile offspring</p>
2 (b) (ii)	T S R W U Q ; ; ;	3	<p>Mark the order of letters (ignoring the dotted lines)</p> <p>All 6 in correct order = 3 marks</p> <p>If any incorrect, then credit</p> <p>T S in order at beginning = 1 mark</p> <p>U Q in order at end = 1 mark</p> <p>R before W anywhere in the sequence = 1 mark</p>

Question	Expected Answer	Mark	Additional Guidance
2 (c)	<p>1 <u>3</u> domains AND <u>5</u> kingdoms ;</p> <p>2 domains are, bacteria / eubacteria, AND, archaea / archaeobacteria, AND, eukarya / eukaryotes ;</p> <p>3 kingdoms are prokaryotes AND prototists AND fungi AND plants AND animals ;</p> <p>4 eukaryotes split into different kingdoms / all eukaryotes are in the same domain ;</p> <p>5 all prokaryotes are in the same kingdom / prokaryotes split into different domains ;</p> <p>6 domain classification based on, rRNA / ribosomes / RNA polymerase / protein synthesis / enzymes / flagella / membrane structure ;</p>	4 max	<p>ACCEPT phonetic spellings throughout ACCEPT alternative terms for names of kingdoms and domains throughout (e.g. plants / plantae)</p> <p>2 ACCEPT 'eukaryota'</p> <p>3 DO NOT CREDIT protists / protozoa</p> <p>6 IGNORE RNA unqualified DO NOT CREDIT other forms of RNA ACCEPT any detail of protein synthesis</p>
	Total	12	

Question		Expected Answer	Mark	Additional Guidance
3	(a)	<p>young / elderly / HIV infected / malnourished / post-operative / on immunosuppressants / leukaemia / undergoing cancer treatment / anorexics ;</p> <p>immature / compromised / weak / AW, immune system ;</p>	2	<p>IGNORE prompt lines and mark the answer as a whole</p> <p>ACCEPT AW for young / elderly etc</p> <p>IGNORE 'ill' or 'unfit'</p> <p>IGNORE any reference to populations e.g. those living in vicinity of outbreak</p> <p>ACCEPT description</p> <p>ACCEPT no immunity</p>
3	(b)	(i)		<p>DO NOT CREDIT 'mould' – penalise once only</p> <p>1 IGNORE 'growth' DO NOT CREDIT 'mitosis'</p> <p>2 DO NOT CREDIT excrete Answer should not imply intracellular enzymes</p> <p>4b IGNORE cholesterol</p> <p>4c ACCEPT other correct carbohydrate breakdown</p> <p>6 CREDIT suitable example e.g. 'goes mushy'</p>
		<p>1 bacteria / (bacterial) cells, divide / increase in number / multiply / reproduce / proliferate / replicate ;</p> <p>2 (secrete) enzymes / named enzyme ;</p> <p>3 food, digested / broken down ;</p> <p>4a protein / named protein / polypeptides → peptides / amino acids OR</p> <p>4b fat / triglycerides → fatty acids OR</p> <p>4c starch / amylose / glycogen → glucose / sugar ;</p> <p>5 production / release / excretion / secretion, of, toxins / named toxin / waste products ;</p> <p>6 (causes) change in, appearance / smell / texture / taste ;</p>	3 max	

Question			Expected Answer	Mark	Additional Guidance
3	(b)	(ii)	<p>1 bacteria, reproduce / AW, more rapidly / faster ;</p> <p>2 (so) more bacteria present ;</p> <p>3 more, toxins / waste, produced / released / AW ;</p> <p>4 more enzymes, secreted / AW ;</p> <p>5 enzyme, action faster / works better / more effective, at higher temperatures ;</p> <p>6 (substrate and enzymes have) more <u>kinetic</u> energy ;</p> <p>7 more, enzyme-substrate complexes / ESC / (successful) collisions <u>between substrate and active site</u> ;</p>	3 max	<p>Idea of 'more' is needed for all marking points but it can be stated once and linked to more than one point.</p> <ul style="list-style-type: none"> e.g. 'more bacteria secreting enzymes' = mp 2 and 4 <p>ACCEPT converse argument throughout</p> <p>ACCEPT 'fungi' / 'mould' in place of bacteria as question stem does not specify</p> <p>1 IGNORE 'grow' IGNORE 'more easily' or 'effectively' DO NOT CREDIT if the candidate thinks there is no reproduction at 5°C</p> <p>4 DO NOT CREDIT excreted</p> <p>5 IGNORE optimum</p>

Question	Expected Answer	Mark	Additional Guidance
<p>3 (b) (iii)</p>	<p>max 2 for 2 distinct methods max 2 for 2 correctly linked explanations Only credit the explanation mark if the method mark has been awarded.</p> <p>M1 salting ; E1 lack of <u>water</u> due to, osmosis / low water potential (outside cell) ;</p> <p>M2 sugar ; E2 lack of <u>water</u> due to, osmosis / low water potential (outside cell) ;</p> <p>M3 (air / freeze) drying ; E3 <i>idea that enzymes cannot mobilise /</i> intracellular transport impaired / reactions have no medium in which to occur / (microbes) cannot move ;</p> <p>M4 pickling / (use of) vinegar ; E4 (low pH) denatures / changes tertiary structure of / changes 3D shape of, enzymes / proteins</p> <p>OR substrate no longer fits active site / active site shape changes / prevents ESC ;</p> <p>M5 heat treatment / cooking ; E5 denatures / changes tertiary structure of / changes 3D shape of, enzymes / proteins</p> <p>OR substrate no longer fits active site / active site shape changes / prevents ESC ;</p> <p>M6 irradiation / UV / gamma rays / X-rays / <u>ionising</u> radiation ; E6 destroys / damages / changes / mutates, DNA / genes / genetic material ;</p> <p>M7 smoking ; E7 (so exposed to) antibacterial / named antibacterial, chemical(s) ;</p> <p>M8 vacuum packing / canning / bottling ; E8 microorganisms cannot respire <u>aerobically</u> ;</p>	<p>4</p>	<p>Where more than one method is given, mark first on line and assume explanation linked with that DO NOT CREDIT chilling or freezing (as in question)</p> <p>M1 IGNORE drying E1 ALLOW low Ψ / high solute potential</p> <p>M2 IGNORE drying E2 ALLOW low Ψ / high solute potential</p> <p>E4 DO NOT CREDIT high pH</p> <p>M5 ACCEPT pasteurising IGNORE canning for this mp</p> <p>E5, E 6 & E7 ACCEPT 'kills bacteria' or 'kills microbes' as a reason supporting heat treatment, irradiation or smoking only once</p> <p>M6 CREDIT radiation if correctly qualified in explanation</p> <p>M7 CREDIT addition of, sulphites / sodium benzoate / alcohol</p> <p>E8 IGNORE 'denaturing' as a consequence of canning / bottling</p>

Question	Expected Answer	Mark	Additional Guidance
3 (c)	<p>This is a QWC question</p> <p>Ignore sections and mark as continuous prose</p> <p>1 low(er) / less, <u>energy</u> (than beef) ; 2 useful for, slimming / weight control / AW ;</p> <p>3 low(er) / less, (total) fat ; 4 (very) low / (much) less, saturated fat ; 5 lower, cholesterol OR lower risk of, (coronary) heart disease / CHD / cardio-vascular diseases / heart attack / cardiac arrest / myocardial infarction / MI / angina / <u>atherosclerosis</u> / atheroma / stroke / hypertension ;</p> <p>6 contains carbohydrate / AW ;</p> <p>7 low(er) / less, iron content ; 8 (increased risk of) anaemia / fewer RBCs / less haemoglobin / reduced oxygen carrying capacity of blood ;</p> <p>9 low(er) / less, protein ;</p> <p>10 (mycoprotein provides) more <u>balanced</u> diet ; 11 need larger intake to meet requirements / AW ;</p>	7 max	<p>Assume candidate is talking about mycoprotein unless otherwise stated. CREDIT ora for beef throughout. IGNORE use of figures alone when awarding mps 1, 3, 6, 7, 9 – look for descriptive statement, e.g.</p> <ul style="list-style-type: none"> • '12 g of protein' = no mark • 'only 12 g protein' = 1 mark (mp 9) <p>2 ACCEPT preventing obesity ACCEPT 'less energy to burn off <i>during exercise</i>' DO NOT CREDIT 'burn off' unqualified</p> <p>6 ACCEPT 'more carbohydrate than beef' IGNORE 'carbs'</p> <p>8 IGNORE answers phrased in terms of role of iron alone e.g. 'haemoglobin contains iron' = 0 Answers must show consequence of deficiency e.g. 'less haemoglobin' = 1</p>
	<p>QWC – award for 2 clear references to the table ;</p>	1	<p>Award for 2 sets of comparative figures (stated or calculated) with units – 'content per 100g' not needed IGNORE vague terms like 'about' as long as figs are correct</p>
	Total	20	

Question			Expected Answer	Mark	Additional Guidance
4	(a)	(i)	<p>1 (m)RNA is single stranded / DNA is double stranded ;</p> <p>2 (m)RNA is non helical / DNA is helical ;</p>	1	<p>Mark the first response but do not award the mark if a further answer is incorrect or contradictory DO NOT CREDIT refs to length as given in stem</p> <p>1 ACCEPT DNA is a double helix (as stranded is implied) for this mp DO NOT CREDIT DNA is a double <i>molecule</i></p> <p>2 ACCEPT (mRNA) not twisted / not coiled / not spiral / straight / ora</p>
4	(a)	(ii)	<p>1 RNA contains ribose and DNA contains deoxyribose ;</p> <p>2 RNA contains, uracil / U, and DNA contains, thymine / T ;</p> <p>3 3 / more than 1, forms of RNA ;</p> <p>4 RNA is, single <u>stranded</u> / non helical, and DNA is, double <u>stranded</u> / helical ; <i>if not already awarded as answer in (i)</i></p>	1	<p>Mark the first response to (a)(ii) – but do not award the mark if a further answer is incorrect or contradictory</p> <p>2 DO NOT CREDIT thya<u>mi</u>ne</p> <p>3 ACCEPT ‘one form of DNA’</p>
4	(a)	(iii)	<u>gene</u> ;	1	IGNORE allele / operon
4	(a)	(iv)	too big to / does not, fit through <u>pore</u> (in nuclear envelope) ;	1	ACCEPT ‘too long to fit ... pore’
4	(a)	(v)	<p><i>idea that</i> only copies one, gene / section / part / AW, (of DNA) ;</p> <p><i>idea that</i> DNA comprises many, genes / alleles ;</p>	2	<p>e.g. mRNA only codes for 1 protein</p> <p>DO NOT CREDIT ‘1 DNA molecule contains <u>all</u> the genes’ ‘mRNA only codes for 1 protein but DNA codes for many proteins’ = 2 marks</p>

Question			Expected Answer	Mark	Additional Guidance
4	(b)	(i)	<ol style="list-style-type: none"> 1 <u>non</u>-competitive (inhibitor) ; 2 (α-amanitin / inhibitor / toxin) fits into, allosteric site / a place other than active site ; 3 <u>active site</u> changes, shape / configuration / conformation / structure ; 4 substrate no longer, fits / complementary to, <u>active site</u> ; 	2 max	<ol style="list-style-type: none"> 3 ACCEPT 'distortion of active site' 4 Mark to be awarded in context of active site (although need not be repeated if stated in mp 3) IGNORE ESC
4	(b)	(ii)	<ol style="list-style-type: none"> 1 inhibits production of mRNA / mRNA not produced ; 2 prevents protein synthesis / AW ; 3 e.g. of, specific named protein / (vital) process, that may be affected ; 	2 max	<ol style="list-style-type: none"> 1 CREDIT prevents transcription 2 CREDIT translation 3 e.g. respiration / photosynthesis (as question refers to 'an organism') / haemoglobin / cytochrome C oxidase
4	(c)	(i)	sequence / order, of amino acids ;	1	IGNORE number / organisation
	(c)	(ii)	A = ionic ; B = hydrogen ; C = <u>disulfide</u> (bond / bridge) ;	3	ALLOW phonetic spelling DO NOT CREDIT <u>disulfate</u>
4	(d)		<ol style="list-style-type: none"> 1 increased <u>kinetic</u> energy ; 2 (any part of protein molecule) vibrates ; 3 hydrophilic / hydrophobic / hydrogen / ionic, bonds / interactions, break ; 4 change in, <u>3D</u> shape / conformation (of protein) ; 5 <u>denatures</u> ; 	3 max	<ol style="list-style-type: none"> 1 must contain the idea of <u>more</u> than normal 3 IGNORE Van der Waals DO NOT CREDIT if disulfide / covalent / peptide bonds are included 4 IGNORE tertiary / structure (as in question) IGNORE refs to, active site / enzymes
			Total	17	

Question			Expected Answer	Mark	Additional Guidance
5	(a)	(i)	mucus traps, bacteria / microbes / pathogens / microorganisms / viruses / spores ; cilia, sweep / move / waft, mucus / bacteria / pathogens / microorganisms / viruses / spore, upwards / AW ;	2	For both marking points ACCEPT ora for what would happen if they didn't work IGNORE ref to dirt / dust / etc ACCEPT answers that imply out of airways e.g. to the throat / coughed / swallowed

Question			Expected Answer	Mark	Additional Guidance
5	(a)	(ii)	<p><i>stage A</i></p> <p>1 phagocyte, attaches / binds / AW, to bacterium / pathogen ;</p> <p>2 <u>receptor</u> (on phagocyte), attaches to / binds to / recognises / AW, <u>antigen</u> (on bacterium) ;</p> <p><i>stage B</i></p> <p>3 bacterium, engulfed / enters by endocytosis / enters by phagocytosis / AW ;</p> <p>4 (formation of) <u>phagosome</u> / phagocytic vacuole ;</p> <p><i>stage C</i></p> <p>5 <u>lysosomes</u>, fuse with / join with / move towards (phagosome) ;</p> <p>6 release / secrete, enzymes / lysins / named enzyme / hydrogen peroxide / free radicals (into phagosome) ;</p> <p><i>stage C/D</i></p> <p>7 bacterium, digested / broken down / hydrolysed ;</p> <p>8 (to) amino acid / sugar / glucose / fatty acid / glycerol ;</p> <p><i>stage D</i></p> <p>9 absorbed / AW, into, <u>cytoplasm</u> / <u>cytosol</u> ;</p> <p>10 by, (facilitated / simple) diffusion / active transport ;</p>	6 max	<p>IGNORE stage letters and look for correct sequence DO NOT CREDIT steps that are biologically out of sequence, e.g. mp6 before mp5. Penalise once only. ACCEPT 'bacteria' throughout</p> <p>2 CREDIT PAMP / antibody marker / complement marker, as AW for antigen</p> <p>3 DO NOT CREDIT 'eaten' IGNORE pseudopodia or any other structure</p> <p>5 DO NOT CREDIT 'binds with'</p> <p>7 DO NOT CREDIT destroyed (as in the question)</p> <p>IGNORE refs to antigen presentation as this happens after the stage shown in the diagram</p>
5	(b)	(i)	plasma (cell) ;	1	<p>ACCEPT B lymphocyte ACCEPT effector <u>cell</u> DO NOT CREDIT lymphocyte unqualified</p>

Question	Expected Answer	Mark	Additional Guidance
<p>5 (b) (ii)</p>	<p>This is a QWC question</p> <p>1 Y-shaped molecule / light and heavy chains / disulfide bonds / 4 polypeptide chains ;</p> <p>2 <u>constant</u> region ;</p> <p>3 marker for / binds to, phagocytes / AW ;</p> <p>4 <u>variable</u> region ;</p> <p>5 (antibody) <u>specificity</u> ;</p> <p>6 (has) <u>complementary shape</u> to antigen (on pathogen) ;</p> <p>7 <u>hinge</u> (region) ;</p> <p>8 allows flexibility ;</p> <p>9 more than one variable region :</p> <p>10 allows, agglutination / description of agglutination or attachment to more than one, pathogen / antigen ;</p> <p>11 neutralisation / blocking pathogen's binding sites ;</p>	<p>6 max</p>	<p>CREDIT a correctly labelled diagram that is clearly an antibody CON if diagram and text are contradictory MPs 3, 5, 6, 8, 10 are stand alone but DO NOT CREDIT if context is clearly incorrect. e.g. 'constant region gives specificity' AWARD mp 2 but not mp 5</p> <p>3 ACCEPT ref to opsonisation</p> <p>'Complimentary shape to specific antigen' = 2 marks (mps 5 & 6)</p> <p>8 IGNORE 'movement' unqualified</p> <p>9 DO NOT CREDIT from diagram unless more than one is explicitly labelled or clearly keyed (e.g. by shading)</p> <p>11 ACCEPT ref. to antitoxin</p>
	<p>QWC – award when 2 marks are given in any two of the grouped sections ;</p>	<p>1</p>	<p>2 marks had been awarded from 2 of the following groups of marks (4 marks in total)</p> <p>mps 2 & 3 mps 4 & 5/6 mps 7 & 8 mps 9 & 10</p>

Question			Expected Answer	Mark	Additional Guidance
5	(b)	(iii)	<p><i>type of immunity</i></p> <p><i>artificial active</i> <input type="checkbox"/></p> <p><i>artificial passive</i> <input type="checkbox"/></p> <p><i>natural active</i> <input type="checkbox"/></p> <p><i>natural passive</i> <input checked="" type="checkbox"/> ;</p>	1	<p>DO NOT CREDIT if more than 1 box is ticked</p> <p>DO NOT CREDIT a cross</p> <p>DO NOT CREDIT a tick that has been crossed out and is a 'hybrid' tick</p>
			Total	17	

Question	Expected Answer	Mark	Additional Guidance
<p>6 (a)</p>	<p>1 <u>biodiversity</u> (of heathland) ;</p> <p>2 rare / endangered, species / plants / animals / fungi / organisms / named organism ;</p> <p>3 rarity of (this) <u>habitat</u> ;</p> <p>4 example of current <i>legal</i> status ;</p> <p>5 (likely) <u>reduction in size</u> of, habitat / ecosystem / heathland ;</p> <p>6 effect of reduced size on <u>viability</u> (of whole ecosystem) ;</p> <p>7 effect on, movement / spread, of, species / named species / plants / animals ;</p> <p>8 a method of minimizing impact / AW / named example ;</p>	<p>3 max</p>	<p>4 e.g. National Park / SSSI / protected species / National Nature Reserves / NNR / other <i>legal</i> example</p> <p>5 IGNORE 'habitat destruction' alone. Must refer to extent or size of destruction.</p> <p>7 CREDIT effect on wildlife corridors Answers could refer to limiting species spread or introduction of species</p> <p>8 e.g. 'toad tunnels' / relocation of population</p> <p>'build toad tunnels so that the toads can still move between the two areas of heathland' = 2 marks (mps 7 and 8)</p>
<p>6 (b) (i)</p>	<p>1 <i>idea of</i> (collect in) different / wider, area ;</p> <p>2 (collect at) different, times of day / times of year / weather conditions ;</p> <p>3 use of named, collecting / identifying, technique ;</p> <p>4 method of ensuring that individuals <u>not counted again</u> ;</p> <p>5 mark-release-recapture / capture-recapture, technique ;</p>	<p>3 max</p>	<p>1 ALLOW several transects e.g. another path</p> <p>3 e.g. (sweep) net / photographs / feeding stations IGNORE pooter (as could only catch larvae) / light trap / use of key / single transect</p> <p>4 This mark refers to an initial or the only sample – it is not linked to mp 5</p> <p>5 CREDIT count marked individuals in 2nd sample / population = $\frac{\text{no. in 1}^{\text{st}} \text{ sample} \times \text{no. in 2}^{\text{nd}} \text{ sample}}{\text{no. retrapped in 2}^{\text{nd}} \text{ sample}}$</p>

Question	Expected Answer	Mark	Additional Guidance																																				
<p>6 (b) (ii)</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;">species</th> <th style="width: 5%;">n</th> <th style="width: 15%;">n/N</th> <th style="width: 50%;">(n/N)²</th> </tr> </thead> <tbody> <tr> <td>Grayling <i>(Hipparchia semele)</i></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Large Heath <i>(Coenonympha tullia)</i></td> <td></td> <td style="text-align: center;">0.3548</td> <td style="text-align: right;">;</td> </tr> <tr> <td>Gatekeeper <i>(Pyronia tythonus)</i></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Green Hairstreak <i>(Callophrys rubi)</i></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Silver-studded Blue <i>(Plebeius argus)</i></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Small Heath <i>(Coenonympha phamhyllus)</i></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td style="text-align: center;">Sum (Σ)</td> <td style="text-align: center;">0.31633 OR 0.31217</td> </tr> <tr> <td></td> <td></td> <td style="text-align: center;">1 - Σ</td> <td style="text-align: center;">D = 0.68367 OR 0.68783</td> </tr> </tbody> </table>	species	n	n/N	(n/N) ²	Grayling <i>(Hipparchia semele)</i>				Large Heath <i>(Coenonympha tullia)</i>		0.3548	;	Gatekeeper <i>(Pyronia tythonus)</i>				Green Hairstreak <i>(Callophrys rubi)</i>				Silver-studded Blue <i>(Plebeius argus)</i>				Small Heath <i>(Coenonympha phamhyllus)</i>						Sum (Σ)	0.31633 OR 0.31217			1 - Σ	D = 0.68367 OR 0.68783	3	<p>Original table on question paper had incorrect figure in (n/N)² column for Grayling row. Answers for mps 2 & 3 take this into account.</p> <p>ACCEPT ecf from incorrect answer for Σ (whether decimal places or rounding)</p>
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<p>6 (b) (iii)</p>	<p>1 many species present / high species richness / all species evenly represented / high species evenness / high biodiversity ;</p> <p>2 (so) should not be developed / development should be modified / development should be reconsidered / should be conserved / AW ;</p>	2	<p>IGNORE refs to relative robustness of habitat</p> <p>1 ACCEPT 'types of butterfly' as AW for species IGNORE 'individuals' or 'organisms'</p> <p>2 DO NOT CREDIT ref to 'planning' alone (as given in question)</p> <p>2 IGNORE responses that imply uncertainty about the development. e.g. 'could' 'might' 'may'</p>																																				

F212

Mark Scheme

June 2010

Question		Expected Answer	Mark	Additional Guidance															
6	(c)	(i)	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 70%;">species</th> <th style="width: 30%;">letter</th> </tr> </thead> <tbody> <tr> <td>Grayling <i>(Hipparchia semele)</i></td> <td>A ;</td> </tr> <tr> <td>Large Heath <i>(Coenonympha tullia)</i></td> <td>D ;</td> </tr> <tr> <td>Gatekeeper <i>(Pyronia tythonus)</i></td> <td>F ;</td> </tr> <tr> <td>Green Hairstreak <i>(Callophrys rubi)</i></td> <td>B ;</td> </tr> <tr> <td>Silver-studded Blue <i>(Plebeius argus)</i></td> <td>C ;</td> </tr> <tr style="background-color: #e0e0e0;"> <td>Small Heath <i>(Coenonympha phamhylus)</i></td> <td>E</td> </tr> </tbody> </table>	species	letter	Grayling <i>(Hipparchia semele)</i>	A ;	Large Heath <i>(Coenonympha tullia)</i>	D ;	Gatekeeper <i>(Pyronia tythonus)</i>	F ;	Green Hairstreak <i>(Callophrys rubi)</i>	B ;	Silver-studded Blue <i>(Plebeius argus)</i>	C ;	Small Heath <i>(Coenonympha phamhylus)</i>	E	5	<p>DO NOT CREDIT if more than one letter given against any individual species</p>
				species	letter														
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6	(c)	(ii)	<p>1 (is) same <u>genus</u> ;</p> <p>2 have, features / characteristics / appearance / behaviour / biochemistry / physiology / anatomy / genes / genetic makeup / DNA, that are, similar / in common ;</p> <p>3 (share a) common, ancestor / phylogeny ;</p>	<p>1 DO NOT CREDIT vague statements like ‘could be in the same genus’ IGNORE <i>Coenonympha</i></p> <p>2 IGNORE ‘similar’ on its own DO NOT CREDIT ‘same’ IGNORE specific examples (e.g. orange wings / large spot)</p> <p>3 ACCEPT closely related ;</p>															
							2 max												
										18									
Total																			

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