OCR
Oxford Cambridge and RSA

# GCE

# Biology

Unit **F212:** Molecules, Biodiversity, Food and Health

Advanced Subsidiary GCE

# Mark Scheme for June 2014

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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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These are the annotations, (including abbreviations), including those used in scoris, which are used when marking

| Annotation | Meaning |
|---|---|
| BP | Blank Page – this annotation **must** be used on all blank pages within an answer booklet (structured or unstructured) and on each additional page where there is no candidate response. |
|  | Correct answer |
|  | Incorrect response |
| BOD | Benefit of Doubt |
| NBOD | Not Benefit of Doubt |
| ECF | Error Carried Forward |
| GM | Given mark |
|  | Underline (for ambiguous/contradictory wording) |
|  | Omission mark |
| I | Ignore |
|  | Marking point partially met |
| QWC+ | QWC* element met |
| CON | A response that would gain credit is associated with some clearly incorrect science. Do not award the mark. |

| Question | | | Answer | Mark | Guidance |
|---|---|---|---|---|---|
| 1 | (a) | (i) | fins ;<br>streamlining / streamlined shape ; | 1 max | **Mark the first answer.** If the answer is correct and another answer is given that is incorrect or contradicts the original answer, then = **0 marks**<br><br>**ACCEPT** reasonable attempt to describe streamlined shape<br>**ACCEPT** aerodynamic<br>**ACCEPT** articulated / flexible , spine |
| 1 | (a) | (ii) | eyes on top of head ; | 1 | **Mark the first answer.** If the answer is correct and a further answer is given that is incorrect or contradicts the correct answer then **= 0 marks**<br><br>**ACCEPT** the position of the eyes / eyes that can see above<br>**IGNORE** eyes facing forward<br>**IGNORE** fin<br>**IGNORE** eyes close together<br>**IGNORE** refs to shape |
| 1 | (b) | | **1** (cellulose) cell wall ;<br><br>**2** chloroplast(s) ;<br><br>**3** (large / permanent) vacuole ;<br><br>**4** starch granules ; | 2 | **Mark the first answer on each prompt line.** If the answer is correct and another answer is given that is incorrect or contradicts the original answer, then = **0 marks**<br><br>**2 CREDIT** plastids / dictysomes / many small Golgi<br>**3 IGNORE** chlorophyll<br><br>**3 CREDIT** tonoplast<br><br>**4 CREDIT** druses / raphides / crystalline inclusions / Ca oxalate |

| Question | | | Answer | Mark | Guidance |
|---|---|---|---|---|---|
| 1 | (c) | | **1** (similarities / differences in) genes / genetics / DNA / RNA / molecules / biochemistry ;<br><br>**2** (similarities / differences in) nucleotide / base , sequence / order ;<br><br>**3** (similarities / differences in) cytochrome c / haemoglobin / ATP synthase / RNA polymerase;<br><br>**4** (similarities / differences in) sequence / order , of amino acids (in proteins) ;<br><br>**5** *idea that* similarities between any of the above implies (close) relationship ; **ora** | 5 max | **1 ACCEPT** molecular / biochemical evidence<br><br>**5 CREDIT** if their genes are similar they must share a recent common ancestor<br>**5 AWARD** as a general statement or with an example, e.g. 'chimps and humans share large proportion of DNA and this means that they are related gets mp **1** and **5.** 'Chimps and humans are closely related' = 0 marks unless linked to a marking point from 1 – 4. |
| | | | **6** *idea of* evolution within human history ;<br><br>**7** similarities in / differences in / comparison of , embryology / morphology / anatomy / physiology / behaviour ; | | **6 CREDIT** in the context of an example of evolution in action, e.g. MRSA resistance to antibiotics **or** as a general statement<br>**6 CREDIT** selective breeding (artificial selection) example<br><br>**7 CREDIT e.g.** similar finches occupying different niches on neighbouring Galapagos islands<br>**7 CREDIT** e.g. vertebrate pentadactyl limb etc.<br>**7 ACCEPT** idea of vestigial organs ;<br>**7 IGNORE** appearance / features / adaptations |
| | | | QWC **;** One mark from 1-4 and 1 mark from 6-7 | 1 | Marking point **5** is not part of QWC |
| | | | | 6 | |
| | | | **Total** | **10** | |

| Question | | | Answer | Mark | Guidance |
|---|---|---|---|---|---|
| 2 | (a) | | (works) outside cells **;** | 1 | **ACCEPT** secreted / AW , from cells<br>**ACCEPT** works in named extracellular environment e.g. digestive tract<br>**IGNORE** doesn't work in cells |
| 2 | (b) | (i) | time / time taken **;** | 1 | **Mark the first answer.** If the answer is correct and another answer is given that is incorrect or contradicts the original answer, then **= 0 marks**<br><br>**ACCEPT** 'how long it took …' |

| Question | | | Answer | Mark | Guidance |
|---|---|---|---|---|---|
| 2 | (b) | (ii) | | 5 max | **ACCEPT** glucose / maltose for product throughout<br>**ACCEPT** substrate for starch throughout |
| | | | *linear part of the graph means…* | | |
| | | | **1** more (successful) collisions with (amylase) active site (at increasing starch concentration) **; ora** | | **1 ACCEPT** few(er) active sites occupied at low starch concentrations |
| | | | **2** more ESC (at increasing starch concentration) **; ora** | | **2 ACCEPT** ESC formed more easily |
| | | | **3** so more product formation in a given time (at increasing starch concentration) **; ora** | | **3 AWARD** only if linked to the context of marking points **1 or 2** e.g. **'**more product formation in a given time because of more collisions with the enzyme' gets mp3 but not mp1 because active site not mentioned<br>**3 IGNORE *rate*** as this is a description of graph |
| | | | *curve / plateau , means…* | | |
| | | | **4** all / most , active sites (of amylase) are occupied **;** | | **4 ACCEPT** all active sites are full of substrate |
| | | | **5** enzyme / amylase , working , at / near, maximum rate / $V_{max}$ **;** | | **5 ACCEPT** enzyme at full capacity |
| | | | **6** (so) further increase in starch concentration has no effect (on rate) **;** | | **6** Must link to **4** or **5**<br>**6 AWARD** only if mp 4 or 5 given<br>**6 DO NOT CREDIT** rate decreases |
| | | | **7** enzyme concentration , is / becomes , limiting factor **;** | | **7 ACCEPT** the increasing part of the graph is because starch concentration is the limiting factor |

| Question | | | Answer | Mark | Guidance |
|---|---|---|---|---|---|
| 2 | (b) | (iii) | | 3 max | The mark points refer to a constant pH preventing damage to the enzyme. **CREDIT** throughout the appropriate marking point for an answer that describes what would happen if the pH changed. |
| | | | **1** (so) charges in active site do not change **; ora** | | |
| | | | **2** (so) hydrogen / ionic **,** bonds unaffected **; ora** | | **2 DO NOT CREDIT** peptide / disulphide **,** bonds break<br>**2 DO NOT CREDIT** in context of heat / vibration<br>**2 IGNORE** hydrophobic / hydrophilic |
| | | | **3** (so) tertiary structure / 3D shape / active site **,** unaltered **; ora** | | **3 IGNORE** ref to denaturing active site<br>**3 IGNORE** tertiary structure breaks<br>**3 ACCEPT** tertiary structure affected<br>**3** Cannot be inferred from mp5 – must be stated |
| | | | **4** (so) enzyme / tertiary structure **,** does not denature **; ora** | | **4 IGNORE** ref to denaturing active site<br>**4 DO NOT CREDIT** kill / die |
| | | | **5** (so) substrate , fits / is complementary shape to , active site **; ora** | | **5 IGNORE** enters / binds with |
| | | | **6** so the results are valid / as the rate (of reaction) will vary if pH varies / so that only one (independent) variable is changed ; | | **6 IGNORE** fair test / reliable / accurate |

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Mark</th><th>Guidance</th></tr>
<tr><td>2</td><td>(b)</td><td>(iv)</td><td>temperature (of the reaction mixture) ;<br>enzyme / amylase , concentration ;<br><br>(total) volume of (reaction) solution ;<br><br>concentration of , cofactors / chloride ions / $Cl^-$ ;</td><td>2 max</td><td>Mark the first answer on each prompt line. If the answer is correct and another answer is given that is incorrect or contradicts the original answer, then = 0 marks<br>DO NOT CREDIT substrate / starch , concentration (as this is the independent variable)<br><br>DO NOT CREDIT amount<br><br>ACCEPT volume of enzyme solution<br>DO NOT CREDIT amount<br><br>ACCEPT concentration of coenzymes<br><br>IGNORE time / agitation / inhibitors</td></tr>
<tr><td>2</td><td>(c)</td><td>(i)</td><td>
<table>
<tr><th>Amylose</th><th>Cellulose</th></tr>
<tr><td>coiled</td><td>no coiling</td></tr>
<tr><td>(contains) α / alpha / A / a ,-glucose</td><td>(contains) β / beta / B / b , -glucose ;</td></tr>
<tr><td>α / alpha / A / a 1-4 glycosidic bonds</td><td>β / beta / B / b 1-4 glycosidic bonds ;</td></tr>
<tr><td>all , monomers / AW , in same orientation</td><td>alternate monomers at , 180° / AW , to each other ;</td></tr>
<tr><td>granular / not fibrous</td><td>fibrous / not granular ;</td></tr>
<tr><td>H bonds within molecule / no (H) bonds (between molecules)</td><td>(H) bonds between adjacent molecules ;</td></tr>
</table>
</td><td>3</td><td>Mark the first 3 responses<br>AWARD 1 mark for each correct row irrespective of boxes<br>Three correct rows of responses written within the same box can be awarded 3 points.<br><br>ACCEPT every second one is flipped<br><br>ACCEPT fibres / microfibrils / fibrils / macrofibrils<br>DO NOT CREDIT myofibrils<br>ACCEPT grains<br><br>ACCEPT ‘(cross)links’ as AW for ‘bonds’</td></tr>
</table>

| Question | | | Answer | Mark | Guidance |
|---|---|---|---|---|---|
| 2 | (c) | (ii) | (tensile) strength / strong **;**<br><br>(H) bonds / links , can form (between adjacent fibrils) **;**<br><br>insoluble **;** | 2 max | **ACCEPT** mechanical strength<br>**IGNORE** fibrous / rigid<br><br>**ACCEPT** fibres / microfibrils / fibrils / macrofibrils<br>**IGNORE** refs to bonding with water<br>**IGNORE** ionic / myofibrils<br>**ACCEPT** crosslinks<br>**DO NOT CREDIT** peptide / covalent / glycosidic / disulfide etc |
| | | | **Total** | **17** | |

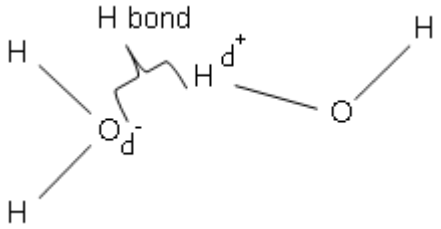
| Question | | | Answer | Mark | Guidance |
|---|---|---|---|---|---|
| 3 | (a) | | Nymphaea ; | 1 | **NOTE**: the first letter must clearly be in upper case and the others in lower case and the spelling correct |
| 3 | (b) | | | 3 max | **IGNORE** can be in optimum conditions throughout |
| | | | **1** (natural) habitat / ecosystem , lost due to / destroyed by **/** under threat from , climate change / (named) human activity **;** | | **1** The essence of this marking point is habitat loss plus reason. Award tick when both these ideas have been seen.<br>**1 ACCEPT** natural disaster / deforestation , as reason for habitat loss |
| | | | **2** number / population , (in natural habitat) is very low **;** | | **2 IGNORE** reference to , extinct / endangered |
| | | | **3** *idea that* in the wild, (sexual) reproduction is difficult (if numbers are low) **; ora** | | **3 ACCEPT** e.g. fertilization can be carried out using a paintbrush |
| | | | **4** (breeding *ex situ* can) maintain , the gene pool / genetic / allelic , diversity**; ora** | | |
| | | | **5** *idea that* allows protection from **,** grazers / herbivores / plant collectors / competing species **; ora** | | **5 ACCEPT** habitat contains organisms that are a threat<br>**5 ACCEPT** protection from , predators / poachers / hunters |
| | | | **6** *idea of* protection from **,** pathogen / parasites / disease **; ora** | | **6 ACCEPT** pests |

| Question | | | Answer | Mark | Guidance |
|---|---|---|---|---|---|
| 3 | (c) | | **1** can be collected with minimal damage to (wild) , population / habitat / ecosystem ;<br><br>**2** take up little space / larger numbers can be stored **;** **ora**<br><br>**3** can store great(er) , genetic / allelic , diversity **; ora**<br><br>**4** low(er) maintenance / manpower costs / AW **; ora**<br><br>**5** easy / cheaper, to transport / AW **; ora**<br><br>**6** *idea of* remaining viable for long periods **; ora**<br><br>**7** less , susceptible / vulnerable , to, disease / pests / environmental change **; ora**<br><br>**8** *idea that* prevents fertilisation by undesired pollen **;** | 3 max | **Mark as prose. Ignore numbered lines**.<br><br>**2 ACCEPT** easier to store a large amount<br><br>**4 CREDIT** 'cheaper' only if supported by an explanation<br>**4 IGNORE** easier to keep unqualified<br>**4 ACCEPT** less labour-intensive<br>**4 DO NOT CREDIT** no maintenance costs<br><br>**6 CREDIT** description / example – e.g. kept dry so that they do not rot / regular germination and new seed production<br>**6 IGNORE** 'last a long time' unqualified<br>**6 ACCEPT** 'stay , alive / fertile , for a long time'<br><br>**7 ACCEPT** the adult plant might have a disease<br>**7 IGNORE** prevents |

| Question | | | Answer | Mark | Guidance |
|---|---|---|---|---|---|
| 3 | (d) | | **1** (use of) quadrat **;** | 4 max | **1 ACCEPT** description of a quadrat / point frame<br>**1 IGNORE** quadrant |
| | | | | | ***AWARD either a or b*** *for both marking points **2** and **3**. Do not mix a and b marks. If both a and b marks are present ignore the lower scoring letter.* |
| | | | **2a** random (sampling) **;** | | **2a ACCEPT** bits of paper in a hat / random number generator<br>**2a DO NOT CREDIT** throw |
| | | | **3a** placing measuring tapes (at right angles) / use grid **;**<br><br>**OR**<br><br>**2b** (use of) transect **;**<br>**3b** (quadrat / point frame) placed at regular intervals **;** | | **3a ACCEPT** e.g. bottom left hand corner of quadrat placed at coordinate / two students walk in a straight line from each tape measure<br><br>**3b ACCEPT** systematic sampling |
| | | | **4** (use of identification) key **;** | | |
| | | | **5** example / detail , of method used to determine abundance **;** | | **5 ACCEPT** percentage cover / percentage frequency / number of hits with point frame / ACFOR<br>**5 ACCEPT** strategy for dealing with plants half in or out of quadrat<br>**5 IGNORE** 'count' without further clarification |
| | | | **6** repeat many times / *idea of* considering appropriate number of samples **;** | | **6 ACCEPT** calculate running mean<br>**6 IGNORE** several / a few<br>**6** If number state must be at least 5 |
| | | | **7** sample / AW , at different , seasons / times of year **;** | | **7 ACCEPT** throughout the year |

| Question | | | Answer | Mark | Guidance |
|---|---|---|---|---|---|
| 3 | (e) | | | 3 max | **IGNORE** prompt lines and mark as prose |
| | | | **1** reason for not having found all species ; | | **1 ACCEPT** e.g. some (named) habitats inaccessible / microscopic species missed / low numbers of individuals / habitat unexplored / some habitats rare / species are nocturnal |
| | | | **2** may have become extinct , recently / since recording **;** | | **2 ACCEPT** organisms constantly become extinct |
| | | | **3** evolution is on-going / new species are being formed / AW **;** | | **3 ACCEPT** new species are being created |
| | | | **4** *idea that* some (species) difficult to distinguish / some species may be reclassified / AW **;** | | **4 ACCEPT** e.g. might mistake several species for one<br>**4 ACCEPT** scientists might disagree about whether it is a species or not. |
| | | | **Total** | **14** | |

| Question | | | Answer | Mark | Guidance |
|---|---|---|---|---|---|
| 4 | (a) | (i) | *primary* B **and** D **;** | 1 | **DO NOT CREDIT** if another letter is shown |
| | | (ii) | *secondary* A **and** E **;** | 1 | **DO NOT CREDIT** if another letter is shown |
| | | (iii) | *tertiary* F **and** G **;** | 1 | **DO NOT CREDIT** if another letter is shown |
| | | (iv) | *quaternary* C**;** | 1 | **DO NOT CREDIT** if another letter is shown |

| Question | | | Answer | Mark | Guidance |
|---|---|---|---|---|---|
| 4 | (b) | (i) | **1** between O and H (of adjacent molecules) **;**<br>**2** between , electropositive / $\delta^+$ / delta$^+$ (H), and ,<br>electronegative / $\delta^-$ / delta$^-$ (O) **;**<br><br>**3** water molecule **,** is polar / has charge separation **;** | 3 | **1 DO NOT CREDIT** O/H molecules<br>**2 ACCEPT** slightly , positive / negative<br>**2 IGNORE** oxygen is negative / hydrogen is positive<br>**2 DO NOT CREDIT** ions<br>**AWARD** mp **1** and **2** for diagram below, i.e. H bond can be drawn as dotted or dashed or labelled, but **IGNORE** solid line<br>**DO NOT AWARD** mark if diagram contradicts text<br><br><br>**3 ACCEPT** electrons pulled closer to oxygen atom / water is a dipole<br>**3 IGNORE** electronegative / electropositive<br>**3 IGNORE** oxygen is negative / hydrogen is positive<br>**3 DO NOT CREDIT** ions |

| Question | | | Answer | Mark | Guidance |
|---|---|---|---|---|---|
| 4 | (b) | (ii) | **1** medium for (metabolic) reactions **;** | 3 max | **1 ACCEPT** reactions can happen in water<br>**1 ACCEPT** supports metabolic reactions |
| | | | **2** (because) allows (named) ionic compound(s) to separate ; | | |
| | | | **3** transport **;** | | |
| | | | **4** **two** named transport , systems / media<br>**OR**<br>one example of a transport , medium / system , with a named example of what is transported ; | | **4 IGNORE** nutrients<br>**5 ACCEPT** apoplast / sap / blood / symplast / vacuolar pathway / blood / lymph / xylem / phloem / tissue fluid / CSF |
| | | | **5** (organisms can) absorb / take in , (named) minerals / ions / (named) gas / food **;** | | **5 IGNORE** nutrients / substances<br>**5 IGNORE** get / obtain |
| | | | **6** able to dilute toxic substances **;** | | **IGNORE** refs to osmosis |
| | | | **Total** | **10** | |

| Question | | | Answer | Mark | Guidance |
|---|---|---|---|---|---|
| 5 | (a) | | characteristics / features / AW , are passed on to / inherited (by the next generation) **;** | 1 | **IGNORE** genes / alleles / DNA as question asks about Darwin's conclusion<br>**ACCEPT** 'appearance' for features<br><br>**DO NOT CREDIT** answers that only refer to beneficial characteristics (as Darwin's other observations would need to be considered to arrive at this conclusion) |
| 5 | (b) | | **1** B **and** C **and** D are more closely related (to each other than to A) **; ora**<br><br>**2** *idea that* A is in different (taxonomic) group (from other 3) **; ora**<br><br>**3** B **and** C **and** D , share more , recent common ancestor **;**<br><br>**4** phylogeny / evolution , of B **and** C **and** D diverged at same point **; ora** | 2 max | **IGNORE** references to relationship with organism (1)<br><br>**1 IGNORE** 'B, C and D are more similar' as this could refer to appearance rather than relationship<br><br>**2 CREDIT** named taxonomic group<br><br>**3 IGNORE** genes etc. |
| 5 | (c) | | fits evidence **;**<br><br>*idea of* more **,** evidence / research (since nineteenth century) **;** | 1 max | **CREDIT** examples, e.g. DNA revolution / more fossils<br>**ACCEPT** improved technology / molecular evidence<br><br>**IGNORE** 'the theory has been proved'<br>**IGNORE** Darwin provided more evidence<br><br>**ACCEPT** changes in religious belief |
| 5 | (d) | (i) | code for (one or more) polypeptide(s) **;** | 1 | **ACCEPT** protein<br>**IGNORE** amino acid sequence |

| Question | | | Answer | Mark | Guidance |
|---|---|---|---|---|---|
| 5 | (d) | (ii) | | 5 max | **AWARD** marks from clearly annotated diagram |
| | | | **1** double stranded **;** | | **1 ACCEPT** double helix **or** two , polynucleotides / strands / chains **or** antiparallel strands<br>**1 IGNORE** one old and one new strand |
| | | | **2** each / both (strands) act as template **;** | | **2 IGNORE** either<br>**NOTE** 'there are 2 strands which act as templates' = 2 marks (mp 1 and 2) |
| | | | **3** hydrogen bonds , easily , break / form , between bases ; | | **3 ACCEPT** weak H bonds between bases break<br>**3 IGNORE** refs to H bonds , breaking / forming , without qualification that the bonds are weak or , form / break , easily |
| | | | **4** complementary (specified) base , pairing / AW **;** | | **4 IGNORE** complementary nucleotides unless qualified with examples of base-pairing |
| | | | **5** purine (only able to) bind to pyrimidine **;**<br>**6** (due to) different sizes of purines and pyrimidines **;** | | |
| | | | **7** hydrogen bonding different between A & T **and** C & G<br>**or**<br>3 H bonds between C & G **and**<br>2 H bonds between A & T **;** | | **7 ACCEPT** names of bases with phonetic spellings<br>**7 DO NOT CREDIT** thyamine<br>**7ACCEPT** A=T **and** C≡G without reference to hydrogen bonds |

| Question | | | Answer | Mark | Guidance |
|---|---|---|---|---|---|
| 5 | (e) | (i) | <u>speciation</u> ; | 1 | |
| 5 | (e) | (ii) | *idea that* different islands have different , selection pressures / habitats / environments / vacant niches **; ora**<br><br>*idea of* isolation **; ora** | 1 max | **CREDIT** ' the Galapagos have a wider range of habitats'<br>**IGNORE** islands have different habitat(s) from the mainland<br><br>e.g. the islands are separated from the mainland / no gene flow / geographic barrier / reproductive barrier<br>**ACCEPT** allopatric (speciation)<br>**IGNORE** sympatric<br><br>**IGNORE** refs to succession or human habitat destruction on the mainland as the question is about evolution |
| | | | **Total** | **12** | |

| Question | | | Answer | Mark | Guidance |
|---|---|---|---|---|---|
| 6 | (a) | | mental and physical well-being **;**<br>absence of disease **;** | 2 | **IGNORE** social<br>**ACCEPT** "not just the absence of disease" |
| 6 | (b) | (i) | 185.2 **; ;** | 2 | **Correct answer = 2 marks**<br>**CREDIT** either in the table or seen in the working space answer should be given to 1dp (to be consistent with the other calculated data)<br><br>If answer incorrect or given to the incorrect number of d.p.<br>**ALLOW** 1 mark for 185 / 185.18 / 185.19 / 185.185 / 185.1 seen anywhere |
| 6 | (b) | (ii) | **1** death from , CHD / lung cancer / both , increased (in smokers) ;<br><br>**2** CHD has bigger increase in number (of deaths) due to smoking (than lung cancer) ; **ora**<br><br>**3** lung cancer has bigger , relative / percentage , increase (in deaths) due to smoking (than CHD) ; **ora** | 2 max | **IGNORE prompt lines – mark as prose**<br><br>**1 ACCEPT** AW<br>**1 IGNORE** figures – must be a comparative statement<br><br>**2 ACCEPT** implication from correct (1388 and 360) calculated increases<br><br>**3 IGNORE** figures – must be a comparative statement<br>**3 IGNORE** bigger impact |

| Question | | | Answer | Mark | Guidance |
|---|---|---|---|---|---|
| 6 | (c) | | | 6 max | ***N** marking points* |
| | | | **N1** nicotine ; | | **N1 DO NOT CREDIT** if any **N** mark is associated with a chemical other than nicotine |
| | | | **N2** increases stickiness of platelets ; | | **N2 ACCEPT** makes platelets sticky |
| | | | **N3** thrombosis / formation of blood clot ; | | **N3 ACCEPT** thrombus formation |
| | | | **N4** causes release of adrenaline ; | | |
| | | | **N5** causes constriction of , arterioles / small arteries ; | | **N5 IGNORE** narrowing of lumen |
| | | | **N6** reduced , blood flow / oxygen supply , to (named) extremities ; | | |
| | | | | | ***C** marking points* |
| | | | **C7** carbon monoxide / CO ; | | **C7 DO NOT CREDIT** if any **C** mark is associated with a chemical other than carbon monoxide |
| | | | **C8** combines (permanently) with haemoglobin / forms carboxyhaemoglobin ; | | **C8 IGNORE** carbamino |
| | | | **C9** reduced oxygen carrying capacity of blood ; | | **C9 ACCEPT** reduced amount of oxygen in blood<br>**C9 IGNORE** 'less oxygenated blood is delivered to tissues' as this could imply reduced cardiac output |

| Question | | | Answer | Mark | Guidance |
|---|---|---|---|---|---|
| | | | **10** increased , heart rate / blood pressure ;<br><br>**11** damage to, lining / endothelium , (of blood vessels) ;<br><br>**12** atherosclerosis / atheroma ;<br><br>**13** coronary heart disease / CHD / heart attack / stroke / myocardial infarction / MI / angina **;** | | **10 IGNORE** heart must work harder<br><br>**11 ACCEPT** epithelium<br><br>**12 IGNORE** plaques<br><br>**13 IGNORE** conary / chronic / part of heart dying / cardiac arrest / heart failure |
| | | | **QWC** - **N1 and C7 plus** another **N** mark **or C** mark **and no** discussion of tar | 1 | **DO NOT AWARD** QWC if candidate discusses a lung disease or any non-cardiovascular effects<br><br>**DO NOT AWARD** QWC tar is *discussed* at all<br><br>**IGNORE** nicotine is addictive<br><br>**IGNORE** 'tar' if it appears as a list of chemicals |
| | | | | 7 | |
| | | | **Total** | **13** | |

| Question | | | Answer | Mark | Guidance |
|---|---|---|---|---|---|
| 7 | (a) | (i) | udder size / milk production / meat production / growth rate / muscle (as proportion of body mass) **;** | 1 | **ACCEPT** number of offspring per birth<br>**IGNORE** unqualified references to size<br>**IGNORE** references to , horns / placidity , unless the answer links this with more energy diverted to productivity |
| 7 | (a) | (ii) | **1** artificial <u>selection</u> **;** | 4 max | **1 IGNORE** 'selective breeding' as mentioned in part (i) |
| | | | **2** (selection of) named desired feature (linked to productivity) **;** | | **2 ACCEPT** e.g. weigh them / measure them / see who produces the most milk / choose the biggest / udder size<br>**2 IGNORE** select the best<br>**2 CREDIT** marker assisted selection / progeny testing<br>**2 DO NOT CREDIT** if clearly not in the context of selective breeding, e.g. change their diet to make them produce more milk' |
| | | | **3** (cross)breed , selected / AW , cattle ; | | **3 ACCEPT** 'parents' as AW for 'cattle'<br>**3 ACCEPT** 'reproduce / mate / in<u>ter</u>breed' as AW for 'breed'<br>**3 DO NOT CREDIT** inbreed<br><br>**2&3** 'breed cattle with high milk productivity = 2 marls |
| | | | **4** (cross)breed**,** best / selected / AW, offspring **;** | | **4 IGNORE** 'crossbreed offspring' without qualification. Answer must imply some selection of offspring. |
| | | | **5** over (many) generations **;** | | **5 DO NOT CREDIT** few<br>**5 ACCEPT** several |
| 7 | (b) | (i) | (contains) all / each , of , nutrients / food groups **;** | 2 | **ACCEPT** a list of food groups that contains at least – protein, fat, carbohydrate, vitamins, minerals<br>**IGNORE** components |
| | | | in correct proportions / AW **;** | | **ACCEPT** right amount of |

| Question | | | Answer | Mark | Guidance |
|---|---|---|---|---|---|
| 7 | (b) | (ii) | | 3 | **Mark the first answer on each prompt line.** If the answer is correct and another answer is given that is incorrect or contradicts the original answer, then **= 0 marks** |
| | | | **A** glycerol **;** | | **A IGNORE** molecule |
| | | | **C** unsaturated fatty acid **;** | | **C ACCEPT** unsaturated hydrocarbon , tail / chain |
| | | | **D** ester , bond / link **;** | | **D IGNORE** covalent |

| Question | | | Answer | Mark | Guidance |
|---|---|---|---|---|---|
| 7 | (b) | (iii) | **1** contains **,** large amounts of energy / more energy than individual needs **;**<br><br>**2** increased , fat / lipid , deposition / storage **;**<br><br>**3** (associated with) obesity **;**<br><br>**4** (lots of meat and dairy in diet could mean) lack of other (named) food groups / AW **;** | 3 max | **1 ACCEPT** contains , too many calories / excess energy<br>**1 ACCEPT** contains a lot of saturated fat<br><br>**2 ACCEPT** in context of arteries and adipose tissue<br>**2 ACCEPT** cholesterol / LDL as AW for fat<br>**2 IGNORE** build up<br><br>**3 IGNORE** CHD (as not malnutrition)<br><br>**4 ACCEPT** nutrients as AW for food groups<br>**4 IGNORE** unbalanced diet<br>**4 IGNORE** fat / protein |
| 7 | (c) | | **1** reduces , water potential / Ψ , outside , microbial / bacterial / fungal , cells **;**<br><br>**2** (microbes) lose water **and** cannot , reproduce / survive / carry out metabolic reactions / AW **;**<br><br>**3** water moves by osmosis **;** | 3 | **1** Cannot be implied from references to water potential gradient<br>**1 ACCEPT** reduces beef water potential<br>**1 IGNORE** solute potential<br>**1 IGNORE** viruses<br><br>**2 ACCEPT** bacteria lose water and die<br>**2 AWARD** only in context of microbes dehydrating<br>**2 IGNORE** viruses<br>**2 IGNORE** beef losing water so microbes cant reproduce<br><br>**3 ACCEPT** in any correct water potential context |
| | | | **Total** | **16** | |

| Question | | | Answer | Mark | Guidance |
|---|---|---|---|---|---|
| 8 | (a) | | antigen(s) ;<br>specific ;<br>memory ;<br><br>strain ;<br>mutation ; | 5 | |
| 8 | (b) | | **1** immunity involves / bacteria do not have , lymphocytes / white blood cells / antibodies / memory cells / plasma cells / an immune system ;<br><br>**2** (correct term is) resistant ;<br><br>**3** bacteria are unicellular / only multicellular organisms (can) have an immune response; | 3 | |
| | | | **Total** | **8** | |

APPENDIX 1 **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.

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 Awarding of QWC mark. Every time an element of QWC is seen put QWC in the left hand margin. When all QWC criteria are met, put a tick next to the final QWC. If QWC not achieved, put a cross next to the pencil icon.

7. ora. Or reverse argument.

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