GCE

# Biology

Advanced GCE **A2 H421**

Advanced Subsidiary GCE **AS H021**

# Mark Scheme for the Units

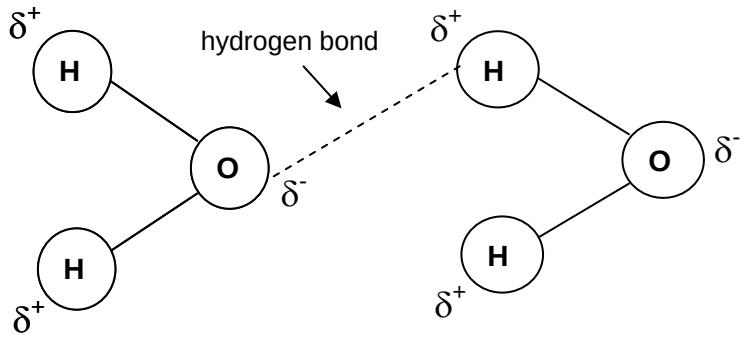
# January 2010

**HX21/MS/R/10J**

# F212 Molecules, Biodiversity, Food and Health

| Question | | | Expected Answers | Marks | Additional Guidance |
|---|---|---|---|---|---|
| 1 | (a) | | obese **;**<br>iron **;**<br>haemoglobin **;** | **3** | |
| 1 | (b) | | 24.7 **; ;** | **2** | If answer incorrect or to the wrong number of dp, then<br>**ALLOW** one mark for working:<br>$69 \div 1.67^2$<br>24.74 = one mark<br>**IGNORE** 25 and look for working mark<br>If units are given, they **must** be $kg\,m^{-2}$ (or $kg/m^2$)<br>Max 1 for incorrect units |
| 1 | (c) | (i) | overweight / borderline overweight **;** | **1** | **DO NOT CREDIT** if more than one answer given |
| 1 | (c) | (ii) | **1** very close to border / AW **;**<br>**2** graph does not distinguish between male and female **;**<br>**3** does not measure actual fat / AW **;**<br>**4** has, more / less, muscle / bone (than normal)<br>**OR**<br>(does not take into account) muscle / bone, mass / density / weight **;**<br>**5** muscle / bone, heavier / denser, than fat / AW **;**<br>**6** pregnant **;** | **2 max** | **1 DO NOT CREDIT** mistake reading graph<br>**4** Must refer to idea of amount of muscle / bone being different from normal.<br>**DO NOT CREDIT** muscle / bone unqualified<br>**CREDIT** has osteoporosis as ref. to different bone density |

| Question | | | Expected Answers | Marks | Additional Guidance |
|---|---|---|---|---|---|
| 1 | (d) | | **1** coronary heart disease / CHD / atherosclerosis / angina / coronary thrombosis / myocardial infarction / heart attack / cardiac arrest / cardiovascular disease / stroke **;**<br><br>**2** (osteo)arthritis **;**<br>**3** (Type 2) diabetes **;**<br>**4** high blood pressure / hypertension **;**<br>**5** gallstones **;**<br>**6** cancer **;** | **2 max** | **1 DO NOT CREDIT** heart disease alone / arteriosclerosis<br><br>**2 DO NOT CREDIT** rheumatoid arthritis<br>**3 DO NOT CREDIT** Type 1 diabetes<br><br>**6 ACCEPT** any type of cancer |
| | | | **Total** | **10** | |

| Question | | | Expected Answers | Marks | Additional Guidance |
|---|---|---|---|---|---|
| 2 | (a) | | **1** hydrogen bond represented as, horizontal / vertical, dashed line between **O** on one molecule and **H** on the adjacent molecule **;**<br><br>**2** hydrogen / **H**, bond label (on any drawn bond between 2 molecules) **;**<br><br>**3** (delta positive) $\delta^+$ on **each** drawn **H** **and** (delta negative) (2) $\delta^-$ on **each** drawn **O ;** | **3** |  <br>**1** **DO NOT CREDIT** if >1 H bond is drawn between the same two molecules<br>**3** if both molecules drawn, $\delta^+$ and $\delta^-$ on **all** atoms.<br>**ACCEPT** d (lower case) for $\delta$ |

| Question | | | Expected Answers | Marks | Additional Guidance |
|---|---|---|---|---|---|
| 2 | (b) | | *ice floats* | | |
| | | **P1** | (ice less dense because) molecules spread out **;** | | |
| | | **P2** | molecules form, crystal structure / lattice / AW **;** | | |
| | | **P3** | ice forms insulating layer / clearly described **;** | | **P3** e.g. acts as a barrier to the cold |
| | | **P4** | water (below ice), does not freeze / still liquid / remains water / kept at higher temperature **;** | | |
| | | **S1** | organisms do not freeze **;** | | **S1 DO NOT ACCEPT** die (because 'survival' stated in stem) |
| | | **S2** | animals / organisms, can still, swim / move **;** | | |
| | | **S3** | allows, currents / nutrients, to circulate **;** | | |
| | | | *solubility* | | |
| | | **P5** | ions / named ion, polar / charged **;** | | |
| | | **P6** | ions /named ion, attracted to / bind to / interact with, water; | | |
| | | **S4** | (named) organisms / plants / animals, uptake / AW, minerals / named mineral / nutrients **;** | | **S4 ACCEPT** obtain / enters / goes in / gets |
| | | **S5** | correct use of named, mineral / nutrient, in organism **;** | | **S5** needs to be more specific than 'for growth / metabolism' suitable examples include but are not limited to: nitrates for amino acids / protein / (named) nucleic acid / phosphate for ATP / phospholipids / plasma membrane / magnesium for chlorophyll etc |

| | | | | | |
|---|---|---|---|---|---|
| | | | *temperature stability* | | |
| | | **P7** | many / stable, (hydrogen) bonds between molecules **;** | | **P7** Many hydrogen bonds between molecules = 2 marks (gets P7 and H) |
| | | **P8** | at lot of energy to, force apart molecules / break bonds **;** | | **P8** **ACCEPT** heat as alternative to energy |
| | | **P9** | high (specific) heat capacity **;** | | **P9** **DO NOT CREDIT** latent heat capacity |
| | | **S6** | temperature does not change much / small variation in temperature **;** | | **S6** could refer to organisms **or** surrounding water<br>**ACCEPT** stays cool in summer / stays warm in winter<br>**DO NOT CREDIT** constant alone |
| | | **S7** | effect of temperature on **,** enzymes / metabolic rate **;** | | **S7** **ACCEPT** any reference to temperature affecting enzyme activity / metabolic rate |
| | | **S8** | gases remain soluble **;** | | |
| | | **H** | *Award once in any section*<br>hydrogen bonds **;** | **7 max** | **DO NOT CREDIT** if in incorrect context (e.g. they are strong bonds) |
| | | | **QWC** - Award if you see a P mark **and** an S mark within the **same** section **;** | **1** | Look for the **S** mark first, then award QWC if there is a **P** mark **in the same section** in the mark scheme |
| **2** | **(c)** | | hydrolysis / hydrolytic **;**<br>hydrophilic **;** | **2** | **ACCEPT** phonetic spelling throughout<br>**IGNORE** head |
| | | | **Total** | **13** | |

| Question | | | Expected Answers | Marks | Additional Guidance |
|---|---|---|---|---|---|
| 3 | (a) | (i) | X ; | 1 | |
| | | | | | |
| 3 | (a) | (ii) | **1** substrate / PABA, **and**, inhibitor / sulfonamide, similar shape**;**<br>**2** able to, bind / fit into / block, active site **;**<br>**3** (shape) complimentary to active site **;**<br><br>**4** both have, hex / benzene / 6-C, (ring) **;**<br>**5** both have, $NH_2$ / amine **;**<br>**6** correct ref to a difference between sulfonamide and PABA **;** | **3 max** | **1 ACCEPT** similar structure **DO NOT CREDIT** same shape<br><br>**3 DO NOT CREDIT** refs to PABA and sulfonamide being complementary to each other or to the enzyme (alone)<br><br>**6** e.g. only sulfonamide contains S<br>sulfonamide has 1 more $NH_2$ group<br>sulfonamide has $SONH_2$ but PABA has $N_2$<br>only PABA has COOH group |
| | | | | | |
| 3 | (b) | (i) | *without inhibitor*<br>**1** more, PABA / substrate, molecules enter active site **;**<br><br>**2** more, enzyme substrate complexes / ESCs, formed **;**<br><br>**3** at low concentration not all active sites occupied /<br>at high concentration all active sites occupied **;**<br><br>**4** achieves / reaches, max (turnover) rate / $V_{max}$ **;**<br><br>**5** (at high substrate concentration) enzyme concentration limiting **;** | **3 max** | **1 ACCEPT** more successful collisions between substrate and active site<br><br>**3 ACCEPT** active sites filled / no free active sites<br>**DO NOT CREDIT** active sites run out<br><br>**4 ACCEPT** 'cannot work any quicker'<br>**DO NOT CREDIT** 'optimum rate' or 'rate levels off' |

| Question | | | Expected Answers | Marks | Additional Guidance |
|---|---|---|---|---|---|
| 3 | (b) | (ii) | *with inhibitor*<br>**1** inhibitor / sulfonamide, can, fit / block / bind to / compete for, <u>active site</u> **;**<br>**2** (occupies it) for a short time / temporary / reversibly **;**<br>**3** fewer active sites available (for substrate) / AW **;**<br>**4** (idea of) more substrate reduces chance of inhibitor getting in**;** | **2 max** | **3 ACCEPT** substrate can't access active site<br>**4 ACCEPT** more ESC formed in context of overcoming inhibition / substrate can out-compete inhibitor |
| 3 | (c) | | **1** mutation **;**<br>**2** sulfonamide is <u>selective</u>, agent / pressure **;**<br>**3** resistant survive / non resistant die **;**<br>**4** (resistance) allele / gene / mutation, passed to, offspring / next generation **;**<br>**5** (happens) over many generations **;**<br>**6** AVP **;** | **4 max** | **DO NOT CREDIT** immune for **any** mark point<br>**3 IGNORE** refs to (survivors) breed / reproduce **;**<br>**5 IGNORE** refs to time. Look for generations<br>**6** e.g. mutation is, **random** / spontaneous allele / gene, passed on by, plasmids / horizontal transmission |
| | | | | | |
| 3 | (d) | (i) | <u>bacteria</u>, killed / destroyed / cannot grow / lyse, in presence of antibiotic **;** | **1** | **DO NOT CREDIT** 'antibiotic works better' **or** 'there are no bacteria there' **or** 'bacteria are broken down' |
| | | | | | |
| 3 | (d) | (ii) | streptomycin **;** | **1** | **IGNORE** '4' as it is the number rather than the name |

| Question | | | Expected Answers | Marks | Additional Guidance |
|---|---|---|---|---|---|
| 3 | (d) | (iii) | **1** cheap / AW **;**<br>**2** (test is) quick to carry out / (deals with several antibiotics) at same time / AW **;**<br>**3** (idea of) allowing early treatment of patient **;**<br>**4** (idea of) compares antibiotics under same conditions **;**<br>**5** (correct antibiotic first time) to prevent antibiotic resistance developing **;** | **3 max** | **DO NOT CREDIT** responses which simply refer to selecting the best antibiotic<br><br>**2 DO NOT CREDIT** speed of antibiotic action |
| | | | | | |
| 3 | (e) | | (new) drugs come from (named) organisms **;**<br>biodiversity is reducing **;**<br>habitats / named habitat, destroyed / lost **;**<br>reason for habitat destruction **;** | **2 max** | **ACCEPT** plants / animals / fungi / species / etc.<br><br>**ACCEPT** deforestation / natural environment lost<br>e.g. global warming<br>logging<br>fuel<br>crops<br>construction / industrialisation<br>mining<br>fishing<br>pollution<br>tourism<br>**ACCEPT** any other valid reason that will destroy natural habitats but **not** general statements such as 'human development' or 'business' |
| | | | **Total** | **20** | |

| Question | | | Expected Answers | Marks | Additional Guidance |
|---|---|---|---|---|---|
| 4 | (a) | (i) | L ;<br>M ;<br>J ; | 3 | If 2nd letter given, no mark |
| | | | | | |
| 4 | (a) | (ii) | **1** peptide bond ;<br>**2** between, amine / **J** group (of one amino acid) and carboxyl / **L** group (of another) ;<br>**3** H (from amine group ) combines with OH (from carboxyl group) ;<br>**4** condensation reaction<br>**OR**<br>water, lost / eliminated / produced / created / AW ;<br>**5** covalent ; | 3 max | **CREDIT** answers from clearly drawn diagrams with bonds labelled<br>**1 ACCEPT** peptide link |
| | | | | | |
| 4 | (b) | | **1** some R groups, attract / repel ;<br>**2** disulfide, bridges / bond ;<br>**3** between, cysteine / SH / S (atoms) ;<br>**4** hydrogen / H, bonds ;<br>**5** ionic bonds between, oppositely charged / + and -, R groups ;<br>**6** hydrophilic R groups, on outside of molecule / in contact with water (molecules) ;<br>**7** hydrophobic R groups, on inside of molecule / shielded from water (molecules) ; | 4 max | **4 DO NOT CREDIT** in context of **secondary** structure |

<table>
<tr><th colspan="3">Question</th><th>Expected Answers</th><th>Marks</th><th>Additional Guidance</th></tr>
<tr><td>4</td><td>(c)</td><td>(i)</td><td>
<table>
<tr><th></th><th>glycogen</th><th>collagen</th><th></th></tr>
<tr><td>1</td><td>carbohydrate / polysaccharide</td><td>protein / polypeptide</td><td>;</td></tr>
<tr><td>2</td><td>(alpha) glucose (units)</td><td>amino acid (units)</td><td>;</td></tr>
<tr><td>3</td><td>identical units</td><td>different amino acid units</td><td>;</td></tr>
<tr><td>4</td><td>glycosidic, bonds / links</td><td>peptide, bonds / links</td><td>;</td></tr>
<tr><td>5</td><td>branched</td><td>unbranched / linear</td><td>;</td></tr>
<tr><td>6</td><td>non-helical</td><td>helical</td><td>;</td></tr>
<tr><td>7</td><td>one chain (per molecule)</td><td>three chains (per molecule)</td><td>;</td></tr>
<tr><td>8</td><td>no cross links</td><td>cross links (between chains)</td><td>;</td></tr>
<tr><td>9</td><td>contains C H O</td><td>contains C H O N</td><td>;</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>
</td><td>3 max</td><td>AWARD 1 mark per correct row<br>Comparative statements must be made in a row<br><br>2 DO NOT CREDIT beta<br><br>5 ALLOW straight<br><br>7 DO NOT CREDIT strands<br><br>9 IGNORE S (for collagen)</td></tr>
<tr><td>4</td><td>(c)</td><td>(ii)</td><td>(high tensile) strength / strong ;<br>does not stretch / is not elastic ;<br>insoluble ;<br>flexible ;</td><td>2 max</td><td>Mark the 1st answer on each numbered line<br>IGNORE fibrous / tough</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>15</td><td></td></tr>
</table>

| Question | | | Expected Answers | Marks | Additional Guidance |
|---|---|---|---|---|---|
| 5 | (a) | (i) | (diagram shows that some) individuals have more than one risk factor **;** | **1** | **DO NOT CREDIT** CHD is multifactorial |
| | | | | | |
| 5 | (a) | (ii) | **1** high, saturated / animal, fat diet **;**<br>**2** high salt intake **;**<br>**3** (diet) low in (named) antioxidants / vitamin A / vitamin C / vitamin E **;**<br>**4** obesity **;**<br>**5** genetic / heredity / inherited / ethnicity / race **;**<br>**6** gender / sex **;**<br>**7** excess alcohol consumption **;**<br>**8** (increasing) age **;**<br>**9** diabetes **;**<br>**10** stress **;** | **2 max** | Mark the 1st answer on each numbered line.<br>**1 ACCEPT** absence of polyunsaturated fats<br>**7** must indicate, excess / high levels |

<table>
<tr><th colspan="3">Question</th><th>Expected Answers</th><th>Marks</th><th>Additional Guidance</th></tr>
<tr><td>5</td><td>(a)</td><td>(iii)</td><td>
<table>
<tr><th>effect</th><th>nicotine</th><th>carbon monoxide</th></tr>
<tr><td>increases heart rate</td><td>✓</td><td></td></tr>
<tr><td>constricts arterioles</td><td>✓</td><td></td></tr>
<tr><td>damages the lining of arteries</td><td></td><td>✓</td></tr>
<tr><td>reduces the ability of haemoglobin to carry oxygen</td><td></td><td>✓</td></tr>
<tr><td>makes platelets sticky</td><td>✓</td><td></td></tr>
</table>
;<br>;<br>;<br>;
</td><td>4</td><td>DO NOT CREDIT hybrid ticks<br>IGNORE crosses in the ‘blank’ boxes</td></tr>
</table>

| Question | | | Expected Answers | Marks | Additional Guidance |
|---|---|---|---|---|---|
| 5 | (b) | | **1** damage to endothelium **;**<br>**2** LDLs contain, saturated fat / cholesterol **;**<br>**3** LDLs collect at site of damage **;**<br>**4** fatty substances / cholesterol / LDLs, deposited, in artery wall / under endothelium **;** | **2 max** | **2 DO NOT CREDIT** moves / transports<br>**CREDIT** LDLs are protein **and** saturated fat / cholesterol<br>**3** must be stated<br>**4 ACCEPT** fats / lipids<br>**ACCEPT** under lining of artery wall<br>**DO NOT CREDIT** veins / vessels / capillaries |
| | | | | | |
| 5 | (c) | | **1** increases size / AW, of lumen **;**<br>**2** increases / eases / decreases resistance to, blood flow **;**<br>**3** (therefore) more, $O_2$ / glucose **;**<br>**4** for aerobic respiration **;**<br>**5** in, heart muscle / cardiac muscle / myocardium **;**<br>**6** more $CO_2$ removed **;** | **4 max** | **1 ACCEPT** reduces blockage in lumen<br>**2 ACCEPT** 'more blood' / 'blood flows more freely' / 'blood flows as normal' / 'quicker blood flow'<br>**3** needs idea of more oxygen (than before operation)<br>**CREDIT** idea of preventing oxygen starvation<br>'more oxygenated blood' gets mark points 2 and 3 |
| | | | **Total** | **13** | |

| Question | | | Expected Answers | Marks | Additional Guidance |
|---|---|---|---|---|---|
| 6 | (a) | (i) | deoxyribose (sugar) **;**<br>phosphate (group) **;**<br><br>(nitrogenous / purine or pyrimidine) base /<br>one correctly named base **;** | 3 | **DO NOT CREDIT** dioxyribose<br>**DO NOT CREDIT** phosphate head or phosphate backbone<br><br>**DO NOT CREDIT** letter instead of named base<br>**DO NOT CREDIT** uracil<br>**DO NOT CREDIT** incorrect spelling of thymine with 'a' |
| | | | | | |
| 6 | (a) | (ii) | has ribose **;**<br>uracil / U, instead of, thymine / T **;**<br>single stranded **;**<br>3 forms / AW **;** | 2 max | assume answer refers to RNA unless otherwise stated<br><br>**DO NOT CREDIT** incorrect spelling of thymine with 'a' |

| Question | | | | Expected Answers | Marks | Additional Guidance |
|---|---|---|---|---|---|---|
| 6 | (b) | | 1 | untwist / unwind **;** | | **1 DO NOT CREDIT** unravel |
| | | **S** | 2 | unzip / described **;** | | **2 DO NOT CREDIT** strands separating without qualification |
| | | **S** | 3 | H bond breaks **;** | | |
| | | | 4 | both strands act as template **;** | | |
| | | **N** | 5 | (aligning of) free (DNA) <u>nucleotides</u> **;** | | **5 DO NOT CREDIT** bases |
| | | **N** | 6 | <u>complementary</u>, base / nucleotide, pairing **;** | | **6 & 7** Do not consider for **QWC** if mark awarded in the context of breaking apart or DNA structure only, rather than forming new double helix |
| | | **N** | 7 | C to G **<u>and</u>** T to A / purine to pyrimidine **;** | | |
| | | **R** | 8 | hydrogen bonds reform **;** | | |
| | | **R** | 9 | sugar-phosphate back bone forms **;** | | |
| | | **R** | 10 | (using) covalent / phosphodiester, bond **;** | | |
| | | | 11 | <u>semi-conservative</u> replication **;** | | |
| | | | 12 | DNA polymerase **;** | | **12 CREDIT** at any stage in the process |
| | | | 13 | AVP **;** | | **13** e.g. ligase / helicase / gyrase used in correct context<br>C – G 3 H bonds / T – A 2 H bonds<br>activation of free nucleotides (with 2 phosphates)<br>synthesis in the 5’ to 3’ direction<br>Okazaki fragments on lagging strand |
| | | | | | **6 max** | |
| | | | | **QWC** - correct sequence –<br>1 **S** mark, then 1 **N** mark, then 1 **R** mark **;** | **1** | It should be clear that candidate realises that the sequence is S, then N then R – even if not written in that order<br>**DO NOT CREDIT** if any ref to transcription / translation |

| Question | | | Expected Answers | Marks | Additional Guidance |
|---|---|---|---|---|---|
| 6 | (c) | (i) | polypeptide / protein / primary structure / a sequence of amino acids **;** | 1 | **DO NOT CREDIT** 'codes for an amino acid'<br>**IGNORE** enzyme / named protein |
| | | | | | |
| 6 | (c) | (ii) | different, sequence of amino acids / primary structure / AW **;**<br>different protein / protein folds up differently / different tertiary structure **;**<br>(product) no longer functions / different function **;** | 2 max | **DO NOT CREDIT** 'product' or incorrect biochemical (e.g. carbohydrate)<br>**ACCEPT** suitable example, e.g. active site of enzyme no longer complimentary to substrate |
| | | | **Total** | 15 | |

| Question | | | Expected Answers | Marks | Additional Guidance |
|---|---|---|---|---|---|
| 7 | (a) | | *habitat*<br>**1** the place where, an organism / organisms / a population / a community, lives **;** **1 max**<br><br>*biodiversity*<br>**2** variety of life / the range of living organisms found / AW **;**<br><br>**3** variety / range, of, habitats / ecosystems **;**<br>**4** number of different species **;**<br>**5** variety / genetic diversity, within species **;** **2 max** | **3 max** | **1 ACCEPT** animal or plant<br>**ACCEPT** location / environment / area<br>**DO NOT CREDIT** ecosystem<br><br>***max 2*** *for biodiversity*<br>**2 DO NOT CREDIT** ref to variation<br>**ACCEPT** species richness / species diversity<br><br>**4** must have ref to number / how many / etc. |
| | | | | | |
| 7 | (b) | | not random / should have been random **;**<br>unrepresentative / skewed / biased, results **;**<br>creates an over-estimate of diversity **;**<br>may miss some (dominant) species / does not cover full range of species **;** | **2 max** | **DO NOT CREDIT** ref to 'fair test' unless qualified<br><br>'misleading' is not quite good enough<br><br>**CREDIT** plant / animal instead of species |
| | | | | | |
| 7 | (c) | (i) | remove units from the body of the table **and** put units in column heading / AW **;** | **1** | **ALLOW** 'measurement' or 'type of measurement' instead of 'unit'<br>**DO NOT CREDIT** 'units are not necessary in table' |

| Question | | | Expected Answers | Marks | Additional Guidance |
|---|---|---|---|---|---|
| 7 | (c) | (ii) | bell shaped **;**<br><br>peak / highest point, for ling between peaks for bracken and cotton grass (on horizontal axis) **;**<br>peak / highest point, for ling lower than both bracken and cotton grass (on vertical axis) **;** | **3** | • must start at 0% cover and after 0m and finish at 0% cover and before 100m<br>• line must cross the line for bracken<br>• allow sharp angle for peak of bell |
| 7 | (c) | (iii) | **1** absent at bottom of slope / present at top of slope **;**<br><br>**2** amount of bracken / percentage cover, increases with increasing distance **;**<br>**3** comparative figs. with units **;** | **2 max** | **1 DO NOT CREDIT** that bracken is present at top if answer also implies that some bracken is present at the bottom<br>**ALLOW** 'before 40 - 50m' as AW for 'bottom'<br>**ALLOW** 'after 40 - 50m' as AW for 'top'<br>**ALLOW** 'start' instead of 'bottom' and 'finish' or 'end' or 'higher up' instead of 'top'<br>Needs to be stated – cannot be implied from mp 2<br><br>**3** two percentages at two stated distances (must be from table) e.g. 0% at 0m and 74% at 100m<br>**or** percentage difference between two stated distances<br>**ALLOW** 'percentage cover' instead of % for units<br>**DO NOT CREDIT** 0% at the bottom and 74% at the top (as no distance has been quoted) |

| Question | | | Expected Answers | Marks | Additional Guidance |
|---|---|---|---|---|---|
| 7 | (d) | (i) | record / identify / list / AW, all species / (all) other plants **;**<br><br>(count / estimate) numbers of individuals within each species / AW **;** | **2 max** | **IGNORE** observe<br>**IGNORE** animals *for this habitat*<br>**IGNORE** 'species richness' and any other calculation<br>**ACCEPT** the number of plants / species<br><br>If the formula is given, only credit this mark if 'n' is explained in terms of the number of individuals within the species |
| 7 | (d) | (ii) | not stable / at risk / low ability to withstand change / AW **;**<br>more likely to lose species **;** | **1 max** | **IGNORE** 'biodiversity is low' as this is given in the question<br>**IGNORE** 'only a few species' or 'dominated by a few species' as these are descriptions of low biodiversity |
| | | | **Total** | **14** | |

# Grade Thresholds

**Advanced GCE (Biology) (H021 H421)**
**January 2010 Examination Series**

**Unit Threshold Marks**

| Unit | | Maximum Mark | A | B | C | D | E | U |
|---|---|---|---|---|---|---|---|---|
| **F211** | Raw | 60 | 40 | 35 | 31 | 27 | 23 | 0 |
| | UMS | 90 | 72 | 63 | 54 | 45 | 36 | 0 |
| **F212** | Raw | 100 | 69 | 62 | 56 | 50 | 44 | 0 |
| | UMS | 150 | 120 | 105 | 90 | 75 | 60 | 0 |
| **F214** | Raw | 60 | 40 | 36 | 32 | 28 | 25 | 0 |
| | UMS | 90 | 72 | 63 | 54 | 45 | 36 | 0 |

**Specification Aggregation Results**

Overall threshold marks in UMS (ie after conversion of raw marks to uniform marks)

| | Maximum Mark | A | B | C | D | E | U |
|---|---|---|---|---|---|---|---|
| **H021** | 300 | 240 | 210 | 180 | 150 | 120 | 0 |

The cumulative percentage of candidates awarded each grade was as follows:

| | A | B | C | D | E | U | Total Number of Candidates |
|---|---|---|---|---|---|---|---|
| **H021** | 8.8 | 28.6 | 54.1 | 78.4 | 95.1 | 100.0 | 1505 |

**1505 candidates aggregated this series**

For a description of how UMS marks are calculated see:

http://www.ocr.org.uk/learners/ums/index.html

Statistics are correct at the time of publication.