A-level BIOLOGY 7402/2

Paper 2

Mark scheme

June 2025

Version: 1.0 Final

256A7402/2/MS

Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts. Alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

No student should be disadvantaged on the basis of their gender identity and/or how they refer to the gender identity of others in their exam responses.

A consistent use of 'they/them' as a singular and pronouns beyond 'she/her' or 'he/him' will be credited in exam responses in line with existing mark scheme criteria.

Further copies of this mark scheme are available from aqa.org.uk

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Mark scheme instructions to examiners

1. General

The mark scheme for each question shows:

- the marks available for each part of the question
- the total marks available for the question
- the typical answer or answers which are expected
- extra information to help the examiner make his or her judgement and help to delineate what is acceptable or not worthy of credit or, in discursive answers, to give an overview of the area in which a mark or marks may be awarded.

The extra information in the 'Comments' column is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme. At the beginning of a part of a question a reminder may be given, for example: where consequential marking needs to be considered in a calculation; or the answer may be on the diagram or at a different place on the script.

In general the right-hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent.

2. Emboldening

2.1 In a list of acceptable answers where more than one mark is available 'any **two** from' is used, with the number of marks emboldened. Each of the following bullet points is a potential mark.

2.2 A bold **and** is used to indicate that both parts of the answer are required to award the mark.

2.3 Alternative answers acceptable for the same mark are indicated by the use of **OR**. Different terms in the mark scheme are shown by a/; eg allow smooth/free movement.

3. Marking points

3.1 Marking of lists

This applies to questions requiring a set number of responses, but for which students have provided extra responses. The general principle to be followed in such a situation is that 'right + wrong = wrong'.

Each error/contradiction negates each correct response. So, if the number of errors/contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (often prefaced by 'Ignore' in the 'Comments' column of the mark scheme) are not penalised.

3.2 Marking procedure for calculations

Full marks can be given for a correct numerical answer, without any working shown.

However, if the answer is incorrect, mark(s) can usually be gained by correct substitution/working and this is shown in the 'Comments' column or by each stage of a longer calculation.

3.3 Interpretation of 'it'

Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

3.4 Errors carried forward, consequential marking and arithmetic errors

Allowances for errors carried forward are most likely to be restricted to calculation questions and should be shown by the abbreviation ECF or consequential in the mark scheme.

An arithmetic error should be penalised for one mark only unless otherwise amplified in the mark scheme. Arithmetic errors may arise from a slip in a calculation or from an incorrect transfer of a numerical value from data given in a question.

3.5 Phonetic spelling

The phonetic spelling of correct scientific terminology should be credited **unless** there is a possible confusion with another technical term.

3.6 Brackets

(…..) are used to indicate information which is not essential for the mark to be awarded but is included to help the examiner identify the sense of the answer required.

3.7 Ignore/Insufficient/Do <u>not</u> allow

Ignore or insufficient is used when the information given is irrelevant to the question or not enough to gain the marking point. Any further correct amplification could gain the marking point.

Do **not** allow means that this is a wrong answer which, even if the correct answer is given, will still mean that the mark is not awarded.

Question	Marking Guidance	Mark	Comments
01.1	1. Cytoplasm 2. Phosphorylation 3. Pyruvate 4. NAD;;	2 max (2 x AO1)	4 correct = **2 marks** 2–3 correct = **1 mark** 0–1 correct = **0 marks** 2. Reject substrate-level or oxidative phosphorylation 3. Accept pyruvic acid 4. Reject NADP but accept any reduced form of NAD e.g. NADH / $NADH_2$ / NADH + H

Question	Marking Guidance	Mark	Comments
01.2	**Mark in pairs, 1 and 2 OR 3 and 4**. (Pair 1 and 2) 1. One carbon dioxide from the link reaction and two carbon dioxide from the Krebs cycle; 2. Link reaction and Krebs cycle occur twice (per glucose) **OR** Two pyruvate (per glucose); (Pair 3 and 4) 3. (Overall/per glucose) two carbon dioxide from the link reaction; 4. (Overall/per glucose) four carbon dioxide from the Krebs cycle;	2 (2 x AO2)	1, 2, 3 and 4. Accept 'carbon(s)' for carbon dioxide 1. Accept release of carbon dioxide from specified link and Krebs cycle reactions 1, 3 and 4. Accept 'decarboxylation' for 'carbon dioxide' 1 and 2. Accept in a diagram 2. Accept pyruvic acid

Question	Marking Guidance	Mark	Comments
01.3	**Mark points 1 and 2 can be awarded in either of the first two sub-headings.** (Oxygen uptake decreased)	3 (3 x AO2)	1. Accept less/no oxygen to join to protons/H^+ **and** electrons 2. Ignore 'hydrogen'

	1. (Less/no) oxygen (required as) is final electron acceptor **OR** (Less/no) oxygen (required as) at end of electron transfer/carrier chain; (ATP production decreased) 2. Less/no oxidative phosphorylation **OR** Less/no proton/H^+ movement/gradient **OR** Less/no chemiosmosis; (Ethanol was produced) 3. Anaerobic respiration occurs **OR** Pyruvate is reduced (to ethanol);		3. Accept equation showing reduction of pyruvate by reduced NAD to ethanol 3. Ignore fermentation 3. Reject reference to lactic acid

Question	Marking Guidance	Mark	Comments
02.1	Homeostasis;	1 (1 x AO1)	Accept homeostatic Accept homeostatis, homestasis homostasis and phonetic spellings of homeostasis

Question	Marking Guidance	Mark	Comments
02.2	1. Water potential of blood decreases/low(ers) **OR** Water potential of blood becomes more negative; 2. (Body cells) lose water by <u>osmosis</u>;	2 (2 x AO2)	1. Accept increase in water potential gradient between blood and cells 1. Accept Ψ for 'water potential', but ignore WP 1. Accept Ψ of cells/ tissues higher than blood but not if context suggests due to increase of Ψ of cells 2. Accept water enters blood by osmosis Ignore any references to insulin, or to glucose entering cells

Question	Marking Guidance	Mark	Comments
02.3	Activation of cyclic AMP hydrolysis;	1 (1 x AO1)	

Question	Marking Guidance	Mark	Comments
02.4	1. Increase/decrease/change in pH is detected **OR** Increase/decrease/change in pH affects (stimulation of chemo)receptors **OR** Separate mechanisms/systems controls increase/decrease/change	2 (2 x AO2)	

	OR Separate mechanisms/systems gives greater (degree of) control; 2. Returned/restored to norm/set point/original **OR** (pH) returned/restored to 7.35 - 7.45;		2. Accept other terms for norm/set point/original e.g. optimum 2. Accept any pH value from pH 7.35 to 7.45

Question	**Marking Guidance**	**Mark**	**Comments**
02.5	1. (Increase in aerobic) respiration produces more carbon dioxide **OR** Increase in respiration produces (more) carbon dioxide **OR** Anaerobic respiration produces lactate; 2. Decrease in (blood) pH and (increased stimulation of) chemoreceptors increase (rate of) ventilation;	2 (2 x AO2)	1. The idea of 'more' carbon dioxide or more respiration must be conveyed 1. Accept lactic acid for lactate 1. Reject anaerobic respiration produces lactate and carbon dioxide Ignore any references to heart rate 2. Accept increase in acidity/H^+ or gives pH value below 7.35 for decrease in pH

Question	Marking Guidance	Mark	Comments
03.1	1. Heat and (then) weigh; 2. (Until) mass is constant;	2 (2 x AO3)	Accept 'heat until sample remains the same mass' for 2 marks 1. Accept any specified temperature for 'heat' 1. Ignore length of time heated 1. Reject 'burn' 2. Accept weight for mass

Question	Marking Guidance	Mark	Comments
03.2	7.6 / 7.61 / 7.608 / 7.6076 (kJ g^{-1}) = **2 marks**;; Incorrect, but **answer** shows 76 (ignore any subsequent numbers, position of decimal point and preceding/subsequent zeros i.e. incorrect conversion) = **1 mark** **OR** Incorrect **answer** of 11.4 (kJ g^{-1}) (ignore any subsequent numbers i.e. no division by 1.5.) = **1 mark** **OR** Incorrect **answer** of 0.05 (kJ g^{-1}) (ignore any subsequent numbers i.e. not multiplied by 150) = **1 mark** **OR** Incorrect **answer** of 1.8 (kJ g^{-1}) (ignore any subsequent numbers i.e. not multiplied by 4.18) = **1 mark** **OR** Incorrect **answer** of 0.418 / 0.42 (kJ g^{-1}) (ignore any subsequent numbers i.e. not multiplied by 18.2) = **1 mark** **OR** Incorrect **answer** of 17 (kJ g^{-1}) (ignore any subsequent numbers i.e. multiplied rather than divided by 1.5) = **1 mark;**	2 (2 x AO2)	Accept 8 for **2 marks**.

Question	Marking Guidance	Mark	Comments
03.3	1. Net primary production = gross primary production minus respiratory losses **OR** NPP = GPP – R; 2. (At higher temperature) photosynthesis/GPP decreases **OR** (At higher temperature) respiration increases **OR** (At higher temperature) enzymes for photosynthesis denature;	2 (1 x AO1, 1 x AO2)	1. Accept 'is' for = sign 1. Accept RL (respiratory losses) for R 1. Accept respiration for 'respiratory losses' 2. Accept 'respiratory losses' for respiration 2. Reject enzymes for photosynthesis and respiration denature 2.Reject 'more energy used in respiration'

Question	Marking Guidance	Mark	Comments
04.1	1. Change in sequence of <u>DNA</u> bases **OR** <u>DNA</u> base sequence inverted/reversed; 2. Change in (sequence of) amino acid(s) **OR** Change in primary structure; 3. Change in hydrogen/ionic/disulfide bonds; 4. Alters tertiary/3° structure (of protein);	4 (4 x AO2)	1. Accept if answer refers to DNA and shows base sequence inverted e.g. TATGC to CGTAT 1. Accept nucleotides for bases 1. Accept changes DNA triplet(s) 2. Reject amino acids are 'formed' or 'produced' 2. Accept shorter amino acid sequence or terminated 4. Reject active site/enzyme 4. Ignore quaternary 4. Ignore 3D

Question	Marking Guidance	Mark	Comments
04.2	**Mark point 1 required for maximum marks**. **Max 3 marks from mark points 4 to 7** **(For)** 1. SDs do not overlap so significant difference/decrease/change (with Roctavian); 2. Only one injection/treatment is required **OR** Weekly/monthly/regular treatments/injections not required; 3. (Investigation) compares same volunteers; **(Against)** 4. Only males (investigated/treated) OR No females (investigated/treated); 5. (Possible) side effects; 6. At least 18 (years of age investigated/treated) **OR** No under 18 (years of age investigated/treated); 7. Only severe HA (investigated/treated);	5 max (5 x AO3)	1. Reject 'results are significant' 1. Accept 'not due to chance' for 'significant' 2. Accept fewer/less for 'one' Ignore 'sample size' 'length of investigation' and 'repeat studies required' Ignore reference to statistical test 6. Accept children/young for under 18 6. Reject only 18 years of age treated

Question	Marking Guidance	Mark	Comments
04.3	0.125 / 12.5% / $^{1}/_{8}$;	1 (1 x AO2)	Reject 1 : 8 or 8 : 1 Accept 1 in 8 Reject 12.5 without %

Question	Marking Guidance	Mark	Comments
05.1	1. Expression/appearance/characteristic/feature /trait due to genetic constitution / genotype /allele(s); 2. (And due to interaction with the) environment;	2 (2 x AO1)	1. Accept: named characteristic 1. Accept: homozygous/ heterozygous/genes /DNA for 'genotype' 1. Ignore: chromosomes

Question	Marking Guidance	Mark	Comments
05.2	1. Small sample size; 2. Crossing over; 3. Random fusion of gametes **OR** Random fertilisation; 4. Epistasis; 5. Lethal genotypes/alleles/genes; 6. Epigenetics;	2 max (2 x AO2)	Ignore mutation and independent segregation 3. Ignore random breeding/mating 5. Ignore lethal phenotypes

Question	Marking Guidance	Mark	Comments
05.3	1. Genes are on the same chromosome/autosome; 2. Crossing over **OR** Recombination; 3. Fewer F l and f L (gametes) **OR** More F L and f l (gametes);	3 (1 x AO1, 2 x AO2)	1. Accept chromatid for chromosome 1. Accept alleles of different genes but not alleles unqualified 1. Accept alleles at different loci on same chromosome 2. Accept chiasma(ta) for crossing over 3. Accept if different letters used e.g. P and p for F and f

Question	Marking Guidance	Mark	Comments
06.1	A. Cell body **OR** Soma **OR** Dendron/dendrite(s) B. Axon **OR** Axoplasm C. Node of Ranvier D. Schwann cell;;	2 (2 x AO1)	4 correct = **2 marks** 2–3 correct = **1 mark** 0–1 correct = **0 marks** For B ignore cytoplasm For D accept shwan(n), scwan(n), scwaan and phonetic spellings of schwann but reject 'swan'

Question	Marking Guidance	Mark	Comments
06.2	1. No/less saltatory conduction **OR** Depolarisation/impulses doesn't occur from node to node **OR** Depolarisation/impulses/ions pass to other neurones **OR** Depolarisation/impulses occurs along whole length (of axon); 2. (Nerve) impulses slowed; 3. (Affects/involves) relay neurones (in brain) **OR** (Affects transmission) to motor neurone/s **OR** (Involves) muscle/effector/neuromuscular junction;	3 (3 x AO2)	1 and 2. Ignore 'messages' or 'signals' 1 and 2. Accept 'action potential(s)' for 'depolarisation/impulses' 2. Accept 'impulse(s) take longer to travel' Mark points 1 and 3 can still be awarded if answer indicates nerve impulses travel faster

Question	Marking Guidance	Mark	Comments
06.3	1. Less/no acetylcholine binds (to receptors); 2. Fewer/no impulse(s)/action potentials (at synapse before SAN) **OR** Less/no depolarisation by PNS (at synapse before SAN) **OR** PNS/acetylcholine decreases heart rate **OR** More depolarisation occurs (as acetylcholine is inhibitory at SAN) **OR** Less/no inhibition by PNS/acetylcholine (at SAN); 3. (Refers to) SAN;	3 (3 x AO1)	1 and 2. Accept neurotransmitter or abbreviations for e.g. ACh, Ach (as named in question) for 'acetylcholine' 1. Ignore competitive inhibition unless it refers to enzyme or active site, then reject 2. Note: First two options relate to atropine acting at synapse in PNS before SAN. Last 2 options relate to atropine acting directly on SAN 2. Ignore 'messages' or 'signals'

Question	Marking Guidance	Mark	Comments
06.4	Correct answer of 0.687 = **2 marks**;; Answer shows 687 (ignore position of decimal point and preceding / subsequent zeros i.e. incorrect order of magnitude) = **1 mark** **OR** Answer of 0.687 (to more than 3 significant figures e.g. 0.6874 / 0.68737) = **1 mark** **OR** Answer of 0.69 / 0.7 (i.e. to fewer than 3 significant figures) = **1 mark** **OR** Answer of 0.688 (incorrect rounding) = **1 mark** **OR**	2 (2 x AO2)	

	Answer of 1.54 (added rather than multiplied by BMI) = **1 mark** **OR** Answer of 1.81 x 10^{-4} (multiplied by (216 x BMI) rather than added) = **1 mark;**		

Question	Marking Guidance	Mark	Comments
07.1	1. Same/stream water/gravel so natural/usual/ normal habitat/environment **OR** Same/stream water/gravel so normal/usual behaviour **OR** Same/stream water/gravel so variables controlled/same **OR** Same/stream water so oxygen/pH controlled/ same; 2. 30/large sample so representative/reliable; 3. (Placed at) centre so same distance to each segment/light intensity **OR** (Placed at) centre so no bias; 4. (10 minute) delay so shrimps can acclimatise/equilibrate; **OR** (10 minute) delay so shrimps enough time to respond/react/distribute **OR** (10 minute) delay so shrimps not stressed;	3 max (3 x AO3)	1. First 3 options can refer to same stream/water/gravel or stream water/gravel 1. Accept 'so light is the only variable' for 'so variables controlled' 2. Accept 30/large sample so reduces effect of anomalies 2. Ignore 'so reliable mean' obtained 4. Accept 'get used to the conditions' for acclimatise 4. Enough time to move 'without qualification' is insufficient for mark

Question	Marking Guidance	Mark	Comments
07.2	1. (Negative photo) taxis; 2. Predation less likely **OR** Less visible to predators/prey **OR** Less likely to be prey **OR** Move away from heat **OR** Move towards food;	2 (2 x AO2)	2. Accept 'consumers' for 'predators' 2. Accept 'stops predation' 2. Accept 'hides from predator/prey' 2. Accept descriptions of reduced predation e.g. 'fewer are eaten' 2. Accept 'move to cooler place /conditions'

Question	Marking Guidance	Mark	Comments
07.3	1. There is no (significant) difference in the distribution/ movement /behaviour/number of shrimps at different light intensities **OR** (Different) light intensity/intensities has/have **no** effect/relationship on/with the distribution/movement/behaviour of shrimp(s); 2. The data are discrete/categoric **OR** (To determine) if there is a difference between the observed and expected (results/data/values/frequencies);	2 (2 x AO2)	1.Accept 'shrimps show **no** preference for (different) light intensity/intensities 1. Accept correlation for mark point 1 but ignore for mark point 2.

Question	Marking Guidance	Mark	Comments
07.4	**Route A – 4 max** 1. (The calculated / χ^2 (value)/11.87) is greater than 7.82 / 11.35; 2. The probability of the difference being due to chance is **less** than 5% / 0.05 / 1% / 0.01 **OR** The probability of the difference **not** being due to chance is **more** than 95% / 0.95 / 99% / 0.99; 3. There is a significant difference; 4. Reject the null hypothesis; **Route B – 2 max** **Ignore mark point 1 and 4** 2. The probability of the difference being due to chance is **more** than 5% / 0.05 / 1% / 0.01 **OR** The probability of the difference **not** being due to chance is **less** than 95% / 0.95 / 99% / 0.99; 3. There is no significant difference;	4 (4 x AO3)	**Note. All 4 marks can only be obtained via route A.** **There are 2 max marks for route B ignoring mark points 1 and 4.** **Route B allows credit for understanding of probability although context incorrect.** **Use the route providing most marks.** 2. Reject 0.005% / 0.05% / 50% / 0.001% / 0.01% / 10% 2. Accept P for probability 2 and 3. if no reference to difference is the only error in both 2 and 3 allow one mark 4. Accept Ho for null hypothesis

Question	Marking Guidance	Mark	Comments
08.1	Correct answer of 7 (days) = **2 marks**;; Incorrect answer but shows 7 to incorrect magnitude e.g. 700 (ignore preceding/subsequent zeros and position of decimal point i.e. did not divide by 100 or incorrect use of order of magnitude) = **1 mark** **OR** Incorrect answer of 168 (incorrectly multiplied by 24) = **1 mark** **OR** Incorrect answer shows 9 ignoring subsequent numbers (multiplied rather than divided by 1.14) = **1 mark** **OR** Incorrect but shows 6.93 (incorrect rounding of 7.98) = **1 mark** **OR** Incorrect but shows 7.98 or 8 (did not divide by 1.14) = **1 mark;**	2 (2 x AO2)	

Question	Marking Guidance	Mark	Comments
08.2	1. (*E. coli* / prokaryotes/bacteria) do not have introns /non-coding (DNA) **OR** *(E. coli* / prokaryotes/bacteria) only have exons / coding (DNA) **OR** Eukaryotes contain introns / non-coding (DNA); 2. Eukaryotes contain (more) regulatory genes;	2 (2 x AO1)	1 and 2 Accept 'It' refers to *E. coli* 2. Accept prokaryotes have no/fewer regulatory genes

Question	Marking Guidance	Mark	Comments
08.3	1. (Identification/isolation of) antigens; 2. (Antigens/proteins used to develop) vaccines/antitoxins/antiserums **OR** (Antigens/proteins used) to develop (monoclonal) antibodies;	2 (2 x AO1)	2. Accept descriptions of (active) immunity 2. Ignore antibiotics

Question	Marking Guidance	Mark	Comments
08.4	**Mark points 1 and 2 are required for maximum marks.** 1. Two repeats decreases (risk of) breast cancer; 2. Three **and** four repeats increases (risk of) breast cancer; 3. No results for more than 4 repeats **OR** No results for 1 repeat **OR** Few repeats (studied); 4. Other factors affect (risk of) breast cancer **OR** Named factor (e.g. age) affects (risk of) breast cancer; 5. Breast cancers not all same (type); 6. Sample size not known;	4 max (4 x AO3)	Ignore length of investigation and use of a statistical test 2. Accept 'more than two repeats' 3. Accept only 2,3 and 4 repeats Ignore increase in VNTRs repeats increase risk of breast cancer

<table>
<tr><th>Question</th><th>Marking Guidance</th><th>Mark</th><th>Comments</th></tr>
<tr><td>09.1</td><td>Correct answer in range 238 to 240 = 2 marks;;

OR

In working shows:

16 (ignoring preceding zeros or subsequent numbers and position of decimal point e.g. 0.016) = 1 mark

OR

10909 or 10910 (ignore subsequent numbers and position of decimal point) = 1 mark

OR

1.00656 (ignore subsequent numbers and allow correct rounding) = 1 mark;</td><td>2
(2 x AO2)</td><td></td></tr>
<tr><th>Question</th><th>Marking Guidance</th><th>Mark</th><th>Comments</th></tr>
<tr><td>09.2</td><td>1. (Short) single strand of DNA;

2. Bases complementary (with DNA allele/gene);</td><td>2
(2 x AO1)</td><td>2. Accept complementary base sequence</td></tr>
<tr><th>Question</th><th>Marking Guidance</th><th>Mark</th><th>Comments</th></tr>
<tr><td>09.3</td><td>1. and 2. 1 mark per correct column;;

<table>
<tr><th>Lane</th><th>Parent or child</th><th>Genotype</th></tr>
<tr><td>1</td><td>Parent</td><td>Ff / fF</td></tr>
<tr><td>2</td><td>Child</td><td>ff</td></tr>
<tr><td>3</td><td>Parent</td><td>Ff / fF</td></tr>
<tr><td>4</td><td>Child</td><td>FF</td></tr>
</table>
3. (Lane 2 only contains) recessive/f allele which travels further due to fewer <u>bases</u>

OR

(Lane 2 only contains) recessive/f allele that travels further due to deletion of (3) <u>bases</u>;</td><td>3
(3 x AO3)</td><td>1 and 2. Accept if columns are reversed

2. Accept heterozygous, homozygous recessive, heterozygous and homozygous dominant

2. Accept use of different letters other than F and f

3. Accept ‘triplet’ for (3) bases

3. Accept F508del or mutation for recessive allele

3.In this instance accept gene for allele</td></tr>
</table>

Question	Marking Guidance	Mark	Comments
10.1	1. (Large) number/variety of plant species/populations; 2. (More/different) habitats/niches; 3. (Greater) variety/types/sources of food;	3 (3 x AO2)	1. Accept high plant species richness or high index of plant diversity 2. Ignore shelter/homes /environments 3. Ignore 'more food'

Question	Marking Guidance	Mark	Comments
10.2	1. (High/optimum) temperature for enzymes /respiration/nitrification/ammonification; 2. Water/moisture for metabolic/enzyme reactions **OR** Water for hydrolysis; 3. (Optimum) pH for enzymes/respiration /nitrification/ammonification; 4. (High) oxygen (concentration) for respiration /nitrification /nitrifying bacteria/ saprobionts;	2 max (2 x AO2)	2. Reject 'water for photosynthesis' 4. Accept: saprophytes or saprotrophs for saprobionts

Question	Marking Guidance	Mark	Comments
10.3	1. Protein/amino acids/DNA into ammonium /ammonia; 2. (By) saprobionts; 3. Ammonium/ammonia into nitrite and (then) into nitrate; 4. (By) nitrifying bacteria/microorganisms;	4 (4 x AO1)	1. Accept any named nitrogen containing compound e.g. urea 2. Accept saprophytes or saprotrophs 1 and 3. Accept marks for conversion even if incorrect type of bacteria named as being involved 2 and 4. Reject marks for type of bacteria if linked to incorrect process e.g. nitrite converted to nitrate by saprobionts 2 and 4. Accept correctly named species Ignore nitrogen fixation and denitrification and bacteria involved.

Question	Marking Guidance	Mark	Comments
10.4	1. (Colonisation by) pioneer species; 2. (Pioneers/species/organisms) change the environment/habitat/conditions/factors; 3. (Environment becomes) less hostile for other/new species **OR** (Environment becomes) more suitable for other/new species **OR** (Environment becomes) less suitable for previous species; 4. Change/increase in diversity/biodiversity; 5. (To) climax community (of rainforest);	4 max (3 x AO1, 1 x AO2)	1. Accept (as secondary succession) 'Seeds/spores (present)' 2.Accept (as secondary succession) 'Soil/humus or organic matter is already present 2. Accept example of change e.g. forms soil/humus/organic matter/ nutrients 2. Must convey idea of change being caused by pioneers/species/ organisms 3. Accept 'favourable' or 'less harsh' for 'suitable' but ignore 'more hospitable' or 'more habitable' 3. Accept previous species out-competed. 4. Ignore increase in genetic diversity

Question	Marking Guidance	Mark	Comments
10.5	1. Growing crops; 2. Animal farming **OR** (Land used for) grazing; 3. Ploughing (land); 4. (Applying) weedkillers/herbicides/pesticides; 5. Burning (fields/plants); 6. Building related to farming (barns/greenhouses);	2 max (2 x AO2)	1 Accept specific examples e.g. growing maize and accept 'monoculture' 2. Accept examples e.g. cattle farming 4. Accept insecticides 5. Reject burning fuel