A-level
BIOLOGY
7402/2

Paper 2

Mark scheme

June 2024

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246A7402/2/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

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 not 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	A = mitochondrion B = presynaptic membrane/neurone C = (synaptic) vesicle(s) D = synaptic gap/cleft;;	2 (2 x AO1)	4 correct = **2 marks** 2–3 correct = **1 mark** 0–1 correct = **0 marks** A. Accept mitochondria/crista(e). B. Accept synaptic knob/bulb or motor neurone. B. Accept nerve cell for neurone.

Question	Marking Guidance	Mark	Comments
01.2	1. Acetylcholine/neurotransmitter <u>diffuses</u> (across synaptic cleft); 2. (Acetylcholine/neurotransmitter) attaches to <u>receptors</u> on the sarcolemma; 3. Sodium <u>ions</u> enter leading to depolarisation/action potential; 4. Calcium (ions) released by endoplasmic/sarcoplasmic reticulum;	4 (4 x AO1)	**Incorrect sequence, penalise one mark.** 1 and 2. Accept abbreviations for acetylcholine as term is in the question. 1, 2 and 3. Accept mark points in 'context of a postsynaptic neurone'. 2. Accept postsynaptic <u>membrane</u> for sarcolemma. 3. Accept Na^+ for sodium ions. 3. 'Sodium ion channels opening' on its own is not enough. 4. Accept Ca^{2+} / Ca (ions not required as given in question).

Question	Marking Guidance	Mark	Comments
01.3	1. (Inside postsynaptic neurone/membrane/axon) is more negative **OR** Membrane/neurone/axon) potential is below resting potential	2 (2 x AO1)	1. Accept answers which refer to a numerical decrease in the resting potential.

	OR Potential difference (across membrane) is greater; 2. More sodium ions (required to enter) for depolarisation **OR** More sodium ions (required to enter) for action potential **OR** Prevents sodium ions causing depolarisation;		1. Accept answers which refer to a 'decrease in the resting potential'. 1. Accept answers which refer to 'reduces/lowers potential' but not 'reduces potential difference'. 1. Accept p d for potential difference. 2. Accept to 'reach threshold' or 'generator potential' for 'action potential'. 2. Accept Na^+ for sodium ions.

Question	**Marking Guidance**	**Mark**	**Comments**
02.1	Correct answer of 5 / 5.4 / 5.44 x 10^{-2} = **2 marks**;; Incorrect answer but shows 5 / 54 / 544 (ignore position of any decimal point or preceding/subsequent zeros) = **1 mark**;	2 (2 x AO2)	10^{-2} is essential for **two marks**.

Question	**Marking Guidance**	**Mark**	**Comments**
02.2	H-zone decreases, I-band decreases, A-band no change;	1 (1 x AO1)	

Question	**Marking Guidance**	**Mark**	**Comments**
02.3	1. Fast (fibres) <u>contract</u> quickly whereas slow (fibres) <u>contract</u> slowly **OR** Fast (fibres) used for short time whereas slow(fibres) used for long time; 2. Fast (fibres mainly) use anaerobic respiration **OR** Slow (fibres) use aerobic respiration;	4 (4 x AO2)	1. Accept fast <u>contract</u> quick<u>er</u> **OR** slow <u>contract</u> slow<u>er</u> **OR** fast used for short<u>er</u> time **OR** slow used for long<u>er</u> time. 1. Accept examples of short-time / power exercise e.g., sprinting, weightlifting

	3. Fast (fibres) produce ATP quickly **OR** Slow (fibres) produce ATP slowly **OR** Less ATP/energy (per glucose) from anaerobic respiration **OR** More ATP/energy (per glucose) from aerobic respiration; 4. Glycogen is a store of glucose **OR** Glycogen hydrolysed to glucose **OR** Glycogenolysis;		and long-time exercise e.g., marathon, endurance. 3. Accept 'release energy' for 'produce ATP' in first and second statements. 3. Reject 'produce energy'. 3. Ignore number of ATP molecules produced but comparison must be correct.

Question	Marking Guidance	Mark	Comments
03.1	1. (Percentage of light absorbed at each wavelength) correlates (with rate of photosynthesis); 2. High(er)/increases (rate of photosynthesis) with blue **and** red light **and** low(er) /decreases (rate of photosynthesis) with green light;	2 (2 x AO3)	1. Accept description of correlates e.g. as % light absorbed increases so does photosynthesis or converse. 1. Ignore directly proportional. 2. Ignore wavelength. 2. Reject '**no** photosynthesis with green light'. 2. Accept other words which are equivalent to 'high(er)' and 'low(er)'.

Question	Marking Guidance	Mark	Comments
03.2	1. Intensity/brightness of light (at each wavelength) 2. Carbon dioxide concentration 3. Temperature 4. Water **OR**	2 max (2 x AO2)	3 correct = **2 marks** 2 correct = **1 mark** 0–1 correct = **0 marks** Ignore pH and nutrients.

	Humidity;;		1. Accept 'distance of/from light source'. 1. Reject sunlight. 2. Accept conc. for concentration. 4. Accept water potential/Ψ (of soil).

Question	Marking Guidance	Mark	Comments
03.3	1. ATP and reduced NADP; 2. ATP provides <u>energy;</u> 3. GP reduced to triose phosphate;	3 (3 x AO1)	1 Accept NADPH or $NADPH_2$ or NADP + H for reduced NADP. 3. Must have idea of reduction. This may be conveyed by stating GP converted to triose phosphate using reduced NADP. 3. Accept TP for triose phosphate as triose phosphate is named in the question. 3. If GP named it must be correct.

Question	Marking Guidance	Mark	Comments
04.1	1. Cross with homozygous recessive (fly) **OR** Cross with a black (fly) **OR** Cross with gg (fly); 2. Black offspring/flies then is heterozygous/Gg **OR** Black and grey offspring/flies then is Heterozygous/Gg **OR** No black offspring/flies then is homozygous/GG **OR** All grey offspring/flies then is homozygous/GG;	2 (2 x AO2)	1. Accept cross with heterozygous (fly) **Alternative mark scheme, if cross not used**. **Mark as pairs 3 with 4, and 5 with 6.** 3. <u>DNA</u> base sequencing; 4. Compare <u>base</u> sequence with known <u>alleles</u>; 5. Separate alleles using electrophoresis; 6. Use gene/DNA probes to identify alleles **OR** Compare position/banding with known alleles **OR** Homozygous forms one band, heterozygous forms two bands;

Question	Marking Guidance	Mark	Comments
04.2	(If sex-linked) grey/male fly would only have / pass on grey/dominant allele **OR** (If sex-linked) females would receive the grey/ dominant allele **OR** (If sex-linked) grey/male fly would **not** have / pass on black/recessive allele **OR** (If sex-linked) female (offspring) would be grey **OR** (If sex-linked) no female (offspring) would be black	1 (1 x AO2)	Accept G for dominant allele and g for recessive allele.

	OR (If sex-linked) male (parent) could **not** have been heterozygous; **OR** (If sex-linked) only black male (parent) could produce a black bodied female;		

Question	Marking Guidance	Mark	Comments
04.3	1. Correct answer of 18 (%) = **2 marks**;; 2. Incorrect answer but shows understanding that 2pq = heterozygous/carriers = **1 mark** **OR** Incorrect answer but shows understanding that $1 – (p^2 + q^2)$ = heterozygous/carriers = **1 mark**;	2 (2 x AO2)	1. Accept 0.18 for **one mark**. 2. Accept understanding of 2pq by using a calculation involving 2 x two different numbers.

Question	Marking Guidance	Mark	Comments
04.4	1. RrGG and Rrgg; 2. RrGg, (x2), rrGg, (and RRGg); 3. Curly(-winged), grey(-bodied) and Normal(-winged), grey(-bodied) **and** ratio 2 : 1;	3 (3 x AO2)	1 and 2. Accept the alleles in any order e.g. RGrG and accept if not shown on answer lines. Accept if different letters than shown are used for the alleles. 3. Accept ratios equivalent to 2 : 1. Note: If no mark awarded allow **one** (principle) **mark** when parental genotypes are incorrect but correct dihybrid genotypes shown for offspring from this cross.

Question	Marking Guidance	Mark	Comments
05.1	1. Use a grid **OR** Divide field/area into squares; 2. Method of obtaining random coordinates/numbers e.g. calculator/computer/random numbers table/generator; 3. Count number/frequency in a quadrat; 4. Large sample and calculate mean number (per quadrat); 5. Multiply mean number of plants per m^2 by area of field **OR** Divide area of field by area of quadrat x mean number of plants per quadrat **OR** Multiply mean number of plants per quadrat/section by number of quadrats/sections in field;	5 (5 x AO1)	1. Accept use of tape measures/map/area with coordinates. 1. Accept Belt transect. 2. If transect method used accept quadrats at regular intervals. 3. Ignore amount/abundance. 3, 4 and 5. Accept sections/squares for quadrats. 4 and 5. Accept 'average' for 'mean'. 4. Accept large sample and method of calculating mean. 4. Accept many/multiple for large sample but ignore several. 4. If a specific number is given it must be 10 or more. 5. Do not allow 'scale up' without further qualification.

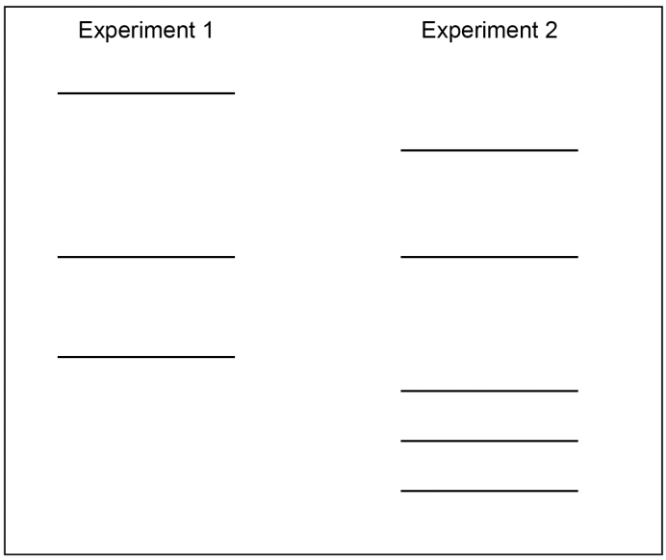
Question	Marking Guidance	Mark	Comments
05.2	1. Interspecific (competition); 2. Less/no light (for potato plant) **so** less/no photosynthesis; 3. Less nitrates/nitrogen to produce amino acids/protein/DNA/RNA/ATP **OR** Less phosphate/phosphorus to produce DNA/RNA/phospholipids/RuBP/GP/triose phosphate/NADP/ATP;	3 (3 x AO2)	3. Accept any named organic nitrogen or phosphorus containing molecule.

Question	Marking Guidance	Mark	Comments
05.3	Correct answer of 6.69 / 6.7 = **2 marks**;; Incorrect answer but shows 669 / 67 (ignore position of any decimal point or preceding / subsequent zeros or numbers following 669) = **1 mark** **OR** Shows 0.012 **= 1 mark** **OR** Shows 8.47 / 8.5 **= 1 mark** **OR** Shows 8.69 **= 1 mark** **OR** Shows 3.35 x 10^{-4} (in any correct mathematical form) **= 1 mark;**	2 (2 x AO2)	Ignore any numbers after 6.69 Ignore any numbers after 0.012 Ignore any numbers after 8.47 / 8.5 Accept answers which would round to 3.35 x 10^{-4} for **1 mark**.

or

Question	Marking Guidance	Mark	Comments
06.1	1. SAN releases (wave of) electrical activity; 2. (So) atria contract (at the same time); 3. AVN relays/passes electrical activity after a (short) delay; 4. (Via) Purkyne tissue in/and bundle of His; 5. (So) ventricles contract (at the same time from bottom upwards);	5 (5 x AO1)	Penalise **one** mark for incorrect sequence. 1 and 3. Accept 'impulse/s' or 'wave of depolarisation' for electrical activity but reject 'signal', 'message' **once** only. 1 and 3. Accept 'wave of excitation'. 2 and 5. Accept systole for 'contract'. 4. Accept 'Purkinje' for Purkyne or similar spelling. If only the cardiac cycle is described allow one mark max atria contract and then ventricles contract.

Question	Marking Guidance	Mark	Comments
06.2	1. Significant with age, hyperthyroidism, and high blood pressure **OR** High risk (of AF) with age, hyperthyroidism and high blood pressure; 2. Most significant with high blood pressure **OR** Highest risk (of AF) with high blood pressure **OR** Least significant with hyperthyroidism; 3. Not significant with high LDL **OR** High LDL is **not** a (AF) risk factor; 4. (With) age, high blood pressure and hyperthyroidism reject the null hypothesis **OR** (With) high LDL accept the null hypothesis;	3 max (3 x AO3)	1, 2 and 3. Reject '<u>results</u> are significant' / '<u>results</u> not significant' **once** only. 1, 2 and 3. Accept 'significant difference' or 'no significant difference'. 1 and 2. Accept 'not due to chance' for 'significant'. 1 and 2. Accept descriptions of 'high and highest (risk) e.g. 'more likely' and 'most likely'. 3. Accept 'due to chance' for 'not significant'.

Question	Marking Guidance	Mark	Comments
07.1	Experiment 1 with 3 bands and experiment 2 with 5 bands in correct positions = **2 marks**;; Experiment 1 with 3 bands and experiment 2 with 5 bands but not in correct positions = **1 mark**;  	2 (2 x AO2)	For **two marks**, the position of the second band from the top must be in the same position for both experiments. The lengths of the bands do not need to be the same, but the relative positions should be similar to the diagram shown.

Question	Marking Guidance	Mark	Comments
07.2	1. (Separate) DNA fragments/ladder of known sizes/lengths; 2. Compare position/distance/bands with unknown fragment(s);	2 (2 x AO2)	1. Ignore mass

Question	Marking Guidance	Mark	Comments
07.3	4 or four;	1 (1 x AO2)	

Question	Marking Guidance	Mark	Comments
07.4	1. Restriction endonucleases/enzymes cuts <u>plasmid</u> **OR** Restriction endonucleases/enzymes produce 'sticky ends'; 2. Ligase joins gene/DNA and plasmid **OR** Ligase joins 'sticky ends' **OR** Ligase forms phosphodiester bonds;	2 (2 x AO1)	1. Accept 'cuts DNA of <u>plasmid</u>'. 1. Ignore restriction enzymes cuts out the gene. 2. Ignore reference to hydrogen bonds or joining complementary base pairs.

Question	Marking Guidance	Mark	Comments
08.1	1. Increasing IAA concentration increases (cell wall) plasticity **OR** IAA activates enzymes which increases (cell wall) plasticity; 2. Increase in (cell wall) plasticity results in cell elongation;	2 (2 x AO2)	1 and 2. Accept 'stretching' for plasticity, Reject 'elasticity' **once** only. 2. Idea of cell elongation or increase in cell length must be conveyed. 2. IAA causing cell elongation on its own is not enough.

Question	Marking Guidance	Mark	Comments
08.2	Correct answer of 570 (%) = **2 marks**;; (**However**, if working shows plasticity values used, e.g. 8 and 1.2 (or difference of 6.8) **and** answer of 570 (%) = **1 mark**) Answer or working shows 560 / 566 / 567 (%) **= 1 mark** (**However**, if working shows plasticity values used, e.g. 8 and 1.2 (or difference of 6.8) **and** answer of 560 / 566 / 567 (%) = **0 marks**) Answer of 120 (%) = **1 mark** **OR** Answer of 230 (%) = **1 mark** **OR** Answer of 340 (%) = **1 mark** **OR** Answer of 780 (%) = **1 mark** **OR** Answer of 1200 (%) = **1 mark;**	2 (2 x AO2)	Accept 566 recurring for one mark. Ignore any numbers after 560 or 566 or 567.

Question	Marking Guidance	Mark	Comments
08.3	1 part/cm^3 of 10^{-1}/stock/GA and/to 9 parts/cm^3 of (distilled) water, then 1 part/cm^3 (of 10^{-2}) and/to 9 parts/cm^3 of (distilled) water **OR**	1 (1 x AO2)	Accept any volumes equivalent in parts to example provided.

	0.1 parts/cm^3 of 10^{-1}/stock/GA and/to 9.9 parts/cm^3 of (distilled) water;		Accept '1 part/cm^3 of 10^{-1}/stock/GA and/to 9 parts/cm^3 of (distilled) water, then repeat'.

Question	Marking Guidance	Mark	Comments
08.4	**Max 3 marks from mark points 3 to 8**. 1. (Use distilled) water (control) **and** different (GA) concentrations **and** 10 (stem) segments in each; 2. Measure (length of) stem/segments at start **and** at end (of investigation) **OR** Determine increase/change in length **OR** Determine percentage change in length; 3. (Place stems in same) volume of solution/GA; 4. (Leave for same period of) time; 5. (Same) temperature; 6. (Same) species/type (of plant); 7. (Same) age (of plant); 8. (Same) diameter/thickness of stem/segments;	5 max (5 x AO2)	1. Accept use of specified number of segments in each dish with repeats, if total used = 60. 2. Accept 'cut to same length' = measure at start. 2. Accept 'growth in length' as 'increase/change in length'. 3 to 8. Ignore pH, carbon dioxide, humidity, nutrients, and light. 4. Accept any 'named period of time'. 6. Accept 'same plant'. 7. Accept (stems) at same stage of growth/development.

Question	Marking Guidance	Mark	Comments
09.1	1. Type I do not produce insulin **OR** Type II do produce insulin; 2. In type II receptors/cells less sensitive/ responsive to insulin **OR** In type II receptors/cells are insulin 'resistant'; 3. Weight **not** linked to type I diabetes **OR** Weight linked to type II diabetes;	2 (2 x AO2)	1. Accept 'Type I lack insulin' or is 'due to an immune response' or 'beta cells non-functional'. 1. Accept 'Type I do not produce enough insulin'. 2. Accept 'In Type II faulty/fewer receptors'. 3. Accept 'obesity' for 'weight'. 3. Accept 'diet' and 'exercise' for 'weight' (as weight-loss programme may involve these). 3. Ignore 'lifestyle'.

Question	Marking Guidance	Mark	Comments
09.2	1. Computer-generated list **so** no bias **OR** Selection of volunteers was random **so** no bias; 2. Large sample size **so** representative/reliable; 3. Two years **so** effect (could be) long term; 4. Control **so** comparison possible; 5. (Large) range/variety of ages **so** (age range) representative **OR** (Large) range/variety of ages **so** age is not a factor;	3 max (3 x AO3)	2. Accept 'large number of health centres' and accept '380/190' for 'large sample size'. 2 and 5. Accept 'generalised' (to the population) for 'representative'. 3. Accept if answer suggests 4 years. 3. Accept 'long period of time' for 'two years'. 5. Accept '25-60 years' for '(large) range'.

Question	Marking Guidance	Mark	Comments
09.3	Correct answer of 71 = **2 marks**;; Answer of 142 = **1 mark** **OR** 80 **OR** 9 in working **= 1 mark** **OR** 79.99 **OR** 8.93 in working = **1 mark;**	2 (2 x AO2)	Accept for **two marks**, an answer that rounds up or down to 71. Accept for **one mark**, an answer that rounds up or down to 142.

Question	Marking Guidance	Mark	Comments
09.4	**Max 3 marks from mark points 5 to 9**. 1. Percentage/number in remission **and** percentage/number with weight loss is higher for group P; 2. High percentage with weight loss (≥15 kg) in both groups achieved remission; 3. Some with weight gain achieved remission; 4. Less than 50% in group P achieved remission; 5.Only shows results for volunteers with less than 5 years of diabetes; 6. No results for those **over** 60 years (of age) **OR** No results for those **under** 25 years of age; 7. No statistical test to see if significant <u>difference</u> (in results); 8. (Only shows remission) not cure **OR** Remission not (necessarily) long term; 9. Mass/weight (of volunteers) at beginning not known;	4 max (4 x AO3)	1 Relates to first two rows of data. 2. Relates to third row of data. 1. and 2. Accept numerical values/% for 'high(er)'. 3. Relates to fourth row of data. 3. Accept '1.9%' for some. 4. Accept '**Only** 42.1%' for less than 'half' but not simply '42.1%'. Idea of a 'low' percentage must be conveyed. 7. Accept 'difference not due to chance' for 'significant difference'. 7. Reject 'to see if results are significant'. 7. Ignore standard deviation/SD.

Question	Marking Guidance	Mark	Comments
10.1	1. Mutations/genotype/alleles; 2. Environment/habitat **OR** (Natural) selection; 3. Epigenetics; 4. Crossing over; 5. Independent segregation/assortment (of homologous chromosomes); 6. Random fusion of gametes **OR** Random fertilisation;	2 max (2 x AO2)	2. Accept named different habitats, e.g. 'walls' and 'trees/trunks. 2. Accept selection pressure e.g. predation. 4. Accept recombination. 5. Accept 'Random assortment'.

Question	Marking Guidance	Mark	Comments
10.2	1. Provides camouflage; 2. (So) not seen by predators/prey **OR** Less predation **OR** Obtain/catch (more) prey;	2 (2 x AO2)	1. Accept description of camouflage. 2. Accept 'stops predation'. 2. Accept descriptions of reduced predation e.g. 'fewer are eaten'.

Question	Marking Guidance	Mark	Comments
10.3	**Mark point 1 required for max marks** 1. (Geckos in) same habitat/environment/area **OR** No geographical isolation/separation (between geckos); 2. (Possibly) allopatric speciation as different (areas of same) habitat(s)/environment/area **OR** (Possibly) geographical isolation/separation as different (areas of same) habitat(s); 3. (Could lead to) separate gene pools **OR** Reproductive isolation; 4. Mutation(s);	5 max (5 x AO3)	2. Accept 'walls' and 'trees/trunks' as different habitats. 3. Accept 'can't interbreed' in correct context, i.e., not when describing a species. 3. Accept 'no gene flow'. 4. Reject mutation(s) if context incorrect e.g., 'mutate to adapt', 'mutation caused by selection'. 5. Accept description of selection e.g. 'favoured'.

	5. Selection for (both) extremes/colours **OR** Disruptive selection (occurs) as two extremes/ colours; 6. (Analysis shows that) diurnal geckos are a distinct (genetic) group; 7. (Genomes/DNA indicates geckos are) same species;		5. Accept selection against 'middle' 6. Accept 'nocturnal' for 'diurnal'.

Question	Marking Guidance	Mark	Comments
10.4	1. Compare <u>DNA</u> base/nucleotide sequence **OR** Compare banding/position of DNA fragments; 2. A distinct (group) will have different alleles/DNA/banding (from other group/s) **OR** If **not** distinct (group) will have similar alleles/DNA/banding (to other group/s) 3. DNA sequencing is automated/computerised **OR** Genetic/DNA fingerprinting is automated/ computerised **OR** PCR amplifies DNA/genes **OR** Genetic fingerprinting/electrophoresis separates fragments/genes/alleles **OR** Use of DNA probes/hybridisation to identify genes/alleles;	3 (3 x AO2)	1. Idea of 'comparison' must be conveyed. 1. Accept alleles/VNTRs for 'DNA fragments'. 1 and 2. Accept genes for 'DNA fragments' in 1 but reject genes in mark point 2. 1 and 3. Ignore 'gene machine'. 2. Accept in context of either nocturnal or diurnal group being the distinct group. 2. Accept not 'closely related' for 'distinct (group)' and 'closely related' for 'not distinct (group)'. 2. Reject 'species' for 'group'.

Question	Marking Guidance	Mark	Comments
10.5	1. Marking not toxic **so** does not affect survival **OR** Marking not visible to predators **OR**	3 (1 x AO1, 2 x AO2)	1 and 2. Ignore births, deaths, reproduction, immigration, emigration. 1. Accept 'does not cause harm/death' for

	Marking does not wash/rub off **so** recaptured (geckos) identified; 2. Time/delay after release **so** (geckos) spread (in the population) **OR** Time/delay before recapture **so** (geckos) spread (in the population); 3. (Population =) (number in) first sample × (number in) second sample divided by (number) marked in second sample / number recaptured;		'does not affect survival'. 1. Idea of marking affecting visibility required in relation to predators. 2. Accept 'after marking' for 'after release' 3. Accept the correct equation/formula.