



Advanced Extension Award

Biology 6811

Mark Scheme

2005 examination – June series

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

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Advanced Extension Award (AEA)

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Dr Michael Cresswell Director General.

Question 1

- (a) cellulase enzymes not produced and (therefore cellulose/leaves cannot be broken down/used directly);
other nutrients enclosed by cell wall;
relatively low fat/protein content/named vitamin/named ion;
proteins may have a different balance of amino acids/limited range of amino acids;
toxins in leaves may limit the amount that can be eaten; 3 max
- (b) (i) less heat released during muscle contraction; 1
- (ii) diet is low in fat/carbohydrate;
little surplus to be converted to fat; 2
- (iii) limbs have a large surface area to volume ratio;
(potentially) lose much heat by radiation;
heat transfer from the arteries to the veins;
counter-current system;
venous blood does not cool core temperature; 4 max
- (c) pressure increases with depth;
this will compress the air trapped in the hair;
trapped air responsible for insulating properties of fur; 3
- (d) (i) glycogen converted to glucose;
anaerobic respiration less efficient than aerobic respiration/produces less ATP (per molecule/mole of glucose);
glucose used at a faster rate; 2 max
- (ii) higher (core) temperature in cat;
temperature affects enzyme controlled reactions (involved in muscle contraction);
third point – credit any specific effect on muscle contraction
e.g. diffusion of/ ATP generation; 3
- (e) longer the Schwann cell, the greater the distance apart of/fewer nodes (of Ranvier);
(or converse)
depolarisation/local circuits can only be completed at/through the plasma membrane at these nodes;
greater the length of the "jumps" the faster the rate of conduction; 2 max
- (f) (i) sloths retain more material in bladder/urine/hindgut/faeces;
waste material does not require blood supply;
since this is not involved in metabolism; 2 max
- (ii) heart rate - as heart is comparable in size, it is likely that volume pumped out by ventricle/stroke volume will be similar; 1
- (g) air in trachea not exposed to gas exchange;
expired air is a mixture of air from lungs and tracheal air; 2

Question 2

- (a) mass will fluctuate due to gamete release;
unable to determine how much mass lost this way; 2
- (b) (i) **Q_A** is energy content of food; 1
(ii) **Q_C** is energy (lost) in waste products/urine/faeces; 1
- (c) (i) provide food/plankton/oxygen/prevent accumulation of waste products/
keep TBT constant; 1
(ii) only the TBT in the tissues affects growth; 1
- (d) (i) unit of energy (J or kJ), unit of time (not months or years) and unit
of mass (g or kg) 2
*(two marks for all three, one mark for two. Must be expressed as
appropriate units)*
(ii) up to 5 µg (g⁻¹ dry mass) little or no effect/scope for growth remains constant;
valid comment made about SD related to data
e.g. indicates that any pattern can be accounted for by variation;
then scope for growth decreasing and falling to a negative value; 3
(iii) reduction in amount of food eaten/ increased respiration;
explanation of above; 2
- (e) (i) TBT acts as an inhibitor/denatures enzyme;
testosterone not converted to oestrogen;
testosterone which stimulates development of male characteristics/penis/
vas deferens;
at high concentrations, insufficient oestrogen to maintain female
characteristics/egg production/ovary; 3 max
(ii) higher proportion of males/lower proportion of females as TBT effectively
converting females to males;
fewer young/population older as females unable to breed/fewer females; 2
- (f) (i) compare offspring from Dumpton Gap population and Oldstairs Bay
population when bred in identical conditions with TBT present;
determine the proportions of affected individuals;
carry out a statistical test on the results;
to find out if the results were significant/not due to chance; 3 max
(ii) some females in population are fertile/unaffected;
alleles responsible will be passed on to offspring;
fewer females will become infertile/will display imposex; 2 max
(iii) mutation is rare;
there would be no selection for it /selection against it in the absence of TBT;
explanation as to why possession of the allele would be a disadvantage in the
absence of TBT;
e.g. resources channelled to producing extra tissue, affected females would be
less fertile; 2 max

Sections C and D**General principles for marking questions in these sections**

Four skill areas will be marked: Biological content (C)
 Scope of knowledge (S)
 Relevance (R)
 Quality of written communication (Q)

These skill areas will be marked independently of each other. Providing that there is sufficient evidence and the subject content is relevant to the question answered, it is possible for candidates to obtain maximum credit for skill areas S, R and Q even if they gain few marks for the biological content.

The following descriptors will form the basis for marking

Biological content (maximum 16 marks)

Mark	Descriptor
16	Material accurate and of a high standard throughout, reflecting a comprehensive understanding of the principles involved, and a knowledge of factual detail fully in keeping with a programme of A-level study. In addition, a significant amount of the content involves material which indicates greater depth of study
14	
12	Some minor errors which detract from the overall accuracy. Content reflects understanding of the principles involved and a knowledge of factual detail fully in keeping with a programme of A-level study. In addition, occasional significant references to material which indicates a greater depth of study.
10	
8	Generally accurate and free from fundamental errors. Content reflects understanding of the principles involved and a knowledge of factual detail fully in keeping with a programme of A-level study. No significant reference to material which indicates a greater depth of study.
6	
4	Material largely superficial and either fails to reflect understanding of the principles involved or fails to show a knowledge of factual detail in keeping with a programme of A-level study. If greater depth of knowledge is demonstrated, then there are a number of fundamental inaccuracies. No indication of material which indicates a greater depth of study.
2	
0	Material superficial and inaccurate seldom reflecting the depth expected from a programme of A-level study.

Note: Only marks 0, 2, 4 etc are awarded. This limits the number of categories and improves consistency of marking

Marks intermediate between descriptors may be awarded.

Scope of knowledge (maximum 3 marks)

Mark	Descriptor
3	A balanced account making reference to most if not all areas that might realistically be covered in the relevant parts of an A-level course of study
2	A number of aspects covered but a lack of balance. Some topics essential to treatment at this level not covered.
1	Unbalanced account with all or almost all material based on a single aspect
0	Material mostly irrelevant

Relevance (maximum 3 marks)

Mark	Descriptor
3	All material presented is clearly related to the title. Allowance should be made for judicious use of introductory material
2	Material generally selected in support of the title but some of the main content of the essay is of marginal relevance.
1	Some attempt made to relate material to the title but considerable amounts largely irrelevant
0	Material entirely irrelevant or too limited in quantity to judge

Quality of written communication (maximum 3 marks)

Mark	Descriptor
3	Material is organised and presented clearly and logically. Technical terminology has been used effectively and accurately throughout.
2	Most of the material is organised and presented clearly and logically. Technical terminology has usually been used effectively and accurately.
1	The essay generally poorly constructed and often fails to use an appropriate scientific style and terminology to express ideas.
0	Material entirely irrelevant or too limited in quantity to judge