



# **General Certificate of Education**

## **Biology 6811**

**AEA          Biology**

## **Mark Scheme**

*2007 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.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' 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.

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**Question 1**

- (a) Light for photosynthesis;  
Phytoplankton/producers near surface;  
*(Ignore plants)*  
Support food chains (at surface);  
Fall to bottom/sink when they die; 3 max
- (b) (i) Idea that food is spread thinly/scarce;  
Often large in size; 2
- (ii) (Parasitic habit) keeps male and female together;  
Otherwise low population density makes/reduces chances of mating/  
fertilisation/male encountering female;  
(Small size linked with) minimal impact on resources / specific effect  
on female; 3
- (c) Large surface area linked with structures being long/branched/many in  
number/microvilli;  
Large number of capillaries/blood vessels for diffusion;  
Covered with thin/squamous epithelium/few cell layers (between water  
and blood) meaning short diffusion / concentration pathway;  
Counter current maintaining diffusion gradient; 3 max  
*(Mark scheme here reflects degree of detail required. Marks should not  
be awarded for minimalistic and superficial answers lacking use of  
appropriate terminology.)*
- (d) Hydrogen/electrons released (by oxidation of hydrogen sulphide);  
Provides reduced coenzyme/reduced NADP;  
Which will reduce glycerate 3-phosphate/GP;  
And ATP which provides energy (for reduction of GP);  
Phosphate for regeneration of ribulose biphosphate/RuBP; 3 max
- (e) Sulphur bacteria provide tubeworm with products of carbon fixation/  
organic carbon compounds/named compound;  
Tubeworm provides sulphur bacteria with hydrogen sulphide and  
carbon dioxide; 2  
*(Ignore references to places to live and other non-nutritional benefits.)*
- (f) Sensitivity associated with impurity suggests some other substance is  
involved;  
Bright red colour of impure preparation suggests this might be  
haemoglobin/oxyhaemoglobin;  
May continue to work because there is a high concentration of oxygen  
in the surroundings; 2 max
- (g) Human haemoglobin is a smaller molecule;  
Could be lost through capillary/glomerular walls;  
As a result of ultrafiltration/hydrostatic pressure of blood;  
Would increase viscosity of blood;  
Would lower water potential/have osmotic effect; 4 max

- (h) Oxygen solubility is low in hot water/low concentration as far from surface;  
 Partial pressure of oxygen in water is low;  
 High affinity for oxygen means that tubeworm haemoglobin will be saturated at low partial pressure of oxygen; 3

**Total 25****Question 2**

- (a) Initial heat transfer from body of kangaroo;  
 Excess heat (from fermentation) transferred to kangaroo;  
 Dissipated by kangaroo's heat loss mechanisms;  
 Buffering;  
 By substances released from cells/bacterial metabolism/saliva;  
 Proteins/phosphates/hydrogencarbonate; 4 max
- (b) (i) Stored in liver;  
 As glycogen;
- (ii) Glucose synthesised in the liver;  
 Presumably from short-chain fatty acids;  
 As little glucose absorbed;  
 Insufficient glucose absorbed to convert to glycogen; 3 max
- (c) Less water needed to dissolve urea;  
 So less urine produced;  
 Protein content of diet likely to be low;  
 Provides microorganisms (and hence kangaroo) with a nitrogen source; 3 max
- (d) Concentration remains more or less constant with a slight peak at around 250 days;  
 Unlikely to be significant as SD bars show considerable variation/overlap; 2
- (e) Higher lipid concentration gives a higher energy yield;  
 Older kangaroo is likely to be more active/have higher metabolic demand;  
 Newborn may not have biochemical/enzyme pathways to digest/metabolise lipid;  
 Requires more energy for mother to synthesise lipids than carbohydrate; 3 max
- (f) Prolactin will be transported in blood;  
 Same concentrations to both mammary glands;  
 Effect on each likely to be different/expect same effect;  
 As different volumes/concentrations of substances in the milk produced; 3 max
- (g) Allows a comparison between mammary glands to be made;  
 Will take into account differences in number of cells / cells capable of synthesising receptors / size of cells; 2

- (h) Suckling association with increase in receptors;  
 Iduces formation;  
 Enabling prolactin to target specific gland;  
 Prolactin likely to stimulate synthesis of relevant enzymes;

3

**Total 25****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)**

<b>Mark</b>	<b>Descriptor</b>
<b>16</b>	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	
<b>12</b>	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	
<b>8</b>	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	
<b>4</b>	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	
<b>0</b>	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