

Mark Scheme (Final)

January 2009

GCE

GCE Biology (6106/03)

General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Question Number	Answer	Mark
1(c)	<p>1. conduction of nerve impulses would {stop / slow down}/ eq ;</p> <p>2. active transport stops / eq ;</p> <p>Comment ACCEPT 'sodium pumps no longer work'</p> <p>3. {ion / named e.g. of ion} gradients not maintained / eq ;</p> <p>4. (because) sodium <u>and</u> potassium ions not re-exchanged /eq ;</p>	(3)

Question Number	Answer	Mark
2(a)(i)	<ol style="list-style-type: none"> 1. some light is reflected (by the leaf) / eq ; 2. some will {be transmitted / not absorbed /eq}; 3. some inappropriate wavelength / eq ; 4. inefficiency of photosynthesis /eq ; 5. light energy used to evaporate water / eq ; 6. ref to saturation of chlorophyll with light (at high light intensity) ; 	(3)

Question Number	Answer	Mark
2(a)(ii)	2000 $\text{kJ m}^{-2} \text{yr}^{-1}$; Comment Expect correct units for the mark	(1)

Question Number	Answer	Mark
2(a)(iii)	appropriate calculation ; (e.g. $8000 \div 1000\ 000 \times 100$) 0.8 (%) ;	(2)

Question Number	Answer	Mark
2(b)(i)	<ol style="list-style-type: none"> overall {greater / faster / eq} (growth) on diet containing maltose (or converse for glucose) /eq ; little difference up to 12 days / greater difference from 12 to 18 days /eq ; manipulated quantitative <u>comparison</u> ; <p>e.g.</p> <p>'mean mass when fed on diet containing maltose is 110 mg higher than on diet containing glucose at 18 days'</p> <p>'increase in mass on maltose diet is 535 g, but 425 g on glucose diet'</p> <p>'mass of locusts on maltose diet is 24% higher (than those on glucose diet) at 18 days'</p>	(2)

Question Number	Answer	Mark
2(b)(ii)	<ol style="list-style-type: none"> ref to use (as substrates) for respiration / used to produce ATP ; <p>Comment IGNORE 'used to produce energy'</p> <ol style="list-style-type: none"> ref to energy for flight / movement / active transport / growth / eq ; ref to synthesis of{new substances / named example (amino acids / lipids / chitin / etc.)} ; conversion to storage compounds / eq ; 	(2)

Question Number	Answer	Mark
2(c)	<ol style="list-style-type: none"> 1. biopesticides are specific to locusts / no harm to non-target species / eq ; 2. locusts are unlikely to become <u>resistant</u> ; 3. biopesticide may only need to be applied once / self sustaining idea / eq ; 4. no bioaccumulation / no harmful residues in crops / ref to {persistence / stability} of chemical insecticides ; 5. ref to no resurgence / eq ; <p>Comments ACCEPT converse points related to chemical insecticides IGNORE refs to cost and vague refs to 'harm to the environment'</p>	(4)

Quick guide to the scientific content mark

AS content	A2 content	S mark
No relevant or accurate content at all		0
Very few correct facts		1
Some correct facts	Little or no relevant A2 content	3
Generally accurate AS content	Some A2 content, but lacks depth and accurate details	5
Generally accurate AS content	Average A2 content	7
Accurate and relevant AS content must be present	Good A2 content	9
Accurate and relevant AS content must be present	Excellent A2 content	11

AS content ONLY	S = 3 max
A2 content ONLY	S = 7 max

ESSAY MARK SCHEME

Outline scheme for marking essay questions 3, 4B and 5H

11 available for Scientific content (S)

2 available for Balance (B)

2 available for Coherence (C)

Total maximum mark available: 15

Scientific content (S)

Scientific content (S)	Description
11 (good)	The essay demonstrates a sound understanding of the topic and contains a significant amount of material from most areas of the mark scheme, including A2 content . Suitable examples are included and the candidate has clearly and coherently linked together information from different parts of the specification.
9 (above average)	An above average essay, with accurate content. The essay includes a good balance of material from several areas of the mark scheme, including A2 content , and examples where appropriate. There may be some minor factual errors.
7 (average)	The essay includes relevant information from some areas of the mark scheme, including A2 content . The candidate links together some facts and principles. Some examples are included. There may be some minor factual errors.
5 (below average)	The essay includes some generally factually accurate and relevant material, and there is some attempt to link material from more than one area of the mark scheme. The A2 content, in particular, lacks depth and accurate details.
3 (poor)	There are some correct facts, but the essay lacks depth and accuracy. The essay contains little or no relevant information from the A2 content .
1 (poor)	There are very few correct facts. The essay is generally superficial and inaccurate.
0 (poor)	No correct or relevant material is included.

Note: If a scientific content mark of 0, 1, or 3 is awarded, it is very unlikely that a balance mark of more than 1 is appropriate.

An essay containing **AS** content **only** can be awarded a **max of 3** for scientific content.

An essay containing **A2** content **only** can be awarded a **max of 7** for scientific content.

S = 11 marks

Balance (B)

- 2 Most of the main topic areas outlined are covered
Some discussion of each of the areas chosen, illustrated with suitable examples where appropriate
Material included is all relevant to the topic and the candidate has linked information from more than one area of the specification.
Few, if any, errors
- 1 Some of the main topic areas outlined are covered.
Some discussion of each of the areas chosen.
Some irrelevant material included.
There are some examples which link together different areas of the specification. Some errors.
- 0 Very limited account, possibly only one aspect chosen
Material mostly irrelevant
No examples of the candidate linking information from different topics
Large number of errors

B = 2 marks

Coherence (C)

- 2 Material logically presented, with little or no repetition
Essay has coherence, ideas are developed well; continuous prose used throughout
Essay has an introduction and a conclusion, summing up the main points
Technical terms have been used correctly
Spelling, punctuation and grammar are sound
- 1 Material is presented in an orderly way and some ideas developed
Continuous prose used throughout
The introduction and conclusion may be present, but brief
Technical terms are used and generally in the correct context
Spelling, punctuation and grammar are generally sound
- 0 Essay style not used
Material in note form or numbered points
Very poor standard of spelling, punctuation and grammar

C = 2 marks

Question Number	Answer	Mark
3	<p>Introduction could include overview of DNA, RNA and the genetic code -</p> <p>Basic structure of a mononucleotide -</p> <p>Phosphate, pentose and base -</p> <p>Purine and pyrimidine bases -</p> <p>Formation of a polynucleotide -</p> <p>Complementary base pairing-</p> <p>the double helix -</p> <p>Base sequence and the genetic code -</p> <p>Point mutation defined -</p> <p>Specific reference to <u>effect</u> of point mutation on the genetic code and amino acid sequence -</p> <p>Frame shift -</p> <p>Specific reference to sickle cell anaemia -</p> <p>Credit other examples of point mutations e.g. PKU -</p>	<p>Scientific content 11 marks</p> <p>Balance 2 marks</p> <p>Coherence 2 marks</p> <p>(15)</p>

Question Number	Answer	Mark
4B	<p>Introduction could include reference to the properties of water (Unit 1) -</p> <p>Uptake and transport of water -</p> <p>Symplast, apoplast and vacuolar pathways -</p> <p>Role of the endodermis and the Casparian strip -</p> <p>Transport in xylem -</p> <p>Cohesion-tension theory -</p> <p>The transpiration stream -</p> <p>Water as a solvent for the uptake and transport of mineral ions -</p> <p>Reference to phosphate, nitrate and magnesium ions -</p> <p>Water as a solvent for transport of organic solutes in phloem -</p> <p>Water in the light-dependent reactions of photosynthesis -</p> <p>Evaporative cooling -</p> <p>Changes in turgor and stomatal mechanisms -</p> <p>Turgor and support -</p>	<p>Scientific content 11 marks</p> <p>Balance 2 marks</p> <p>Coherence 2 marks</p> <p>(15)</p>

Question Number	Answer	Mark
5H	<p>introduction could include a reference to the growth of human populations and outline of desertification -</p> <p>factors affecting growth of human populations -</p> <p>variations in fertility -</p> <p>birth rates -</p> <p>death rates -</p> <p>growth curves and population pyramids -</p> <p>implications of world population trends -</p> <p>causes of desertification -</p> <p style="padding-left: 40px;">climatic factors -</p> <p style="padding-left: 40px;">human population pressures -</p> <p>effects of desertification -</p> <p style="padding-left: 40px;">soil erosion -</p> <p style="padding-left: 40px;">salinisation -</p> <p style="padding-left: 40px;">reduction of biodiversity -</p>	<p>Scientific content 11 marks</p> <p>Balance 2 marks</p> <p>Coherence 2 marks</p> <p>(15)</p>