

Mark Scheme (Final)

Summer 2008

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.

PRE-STANDARDISATION MARK SCHEME - UNIT 6 (6106/03)
A2 BIOLOGY / BIOLOGY (HUMAN) June 2008
STRICTLY CONFIDENTIAL

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- (1) You must have provisionally marked 15 of every item **ONLINE** before the Standardisation Meeting on **25/06/2008** in order to familiarise yourself with the Pre-standardisation mark scheme.
- (2) At the meeting the mark scheme will be discussed and amplified. It will be amended in the light of the discussion and of marking experience. Assistant Examiners will then be asked to take part in an Agreement Trial. The marks will be compared and discussed. Scripts used in Agreement Trials may be taken away from the meeting for reference purposes; these must be **destroyed** at the conclusion of marking.
- (3) Within **48 hours** of the Standardisation meeting, Assistant Examiners must mark fully, **ONLINE**, a sample of **10** of every item in the light of the amended **FINAL** mark scheme which you will be able to access **ONLINE**. Please note that you will not be able to mark any more responses until after you have received clearance from your Team Leader, and any differences are resolved.
- (4) Once clearance has been received from the Team Leader, you **MUST** start marking and all your marking **MUST** be done by the **contract completion date on your contracts**.
- (5) Further checks on your marking will be made by your Team Leader at any point throughout the marking period to ensure that your marking is accurate.

Please contact the ePEN helpdesk for technical queries:

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Question Number	Answer	Mark
1(a)	methane and carbon dioxide / formulae ; ACCEPT CH ₄ and CO ₂	(1)

Question Number	Answer	Mark
1(b)(i)	<p>1. (pH) decreases from day 0 to day 10 ; ACCEPT 'from the start to day 10' or 'for the first 10 days'</p> <p>2. increases from <u>day 10</u> to day 30 ; ACCEPT 'increases after day 10'</p> <p>3. rate of decrease greater than rate of increase / eq ; ACCEPT 'it goes down faster than it goes up'</p> <p>4. credit a manipulated quantitative comment ; e.g. 'an overall change of 0.5' gains mp 4 'a decrease of 1.5 over the first 10 days' - gains m.ps. 1 and 4 ACCEPT reference to acidity as equivalent to pH</p>	max (2)

Question Number	Answer	Mark
1(b)(ii)	<p>Day 0 to day 10:</p> <ol style="list-style-type: none"> 1. ref to the production of carbon dioxide / CO₂ ; 2. reference to production of organic acids / named examples ; <p>ACCEPT e.g. 'methanoic', 'lactic', 'acetic', 'amino acids' 'fatty acids' etc. or chemical formula</p> <p>IGNORE 'acid' on its own and 'H⁺', IGNORE references to other compounds</p> <p>Day 10 to day 30:</p> <ol style="list-style-type: none"> 3. {organic acids / named example} converted to {methane / non-acidic compounds} ; <p>IGNORE 'carbon dioxide' in this context</p> <ol style="list-style-type: none"> 4. reference to activity of microorganisms ; <p>ACCEPT 'decomposers', 'bacteria', 'methanogens', 'fungi', microbes</p> <p>ALLOW mp 4 once in either section</p> <p>NOT bugs</p>	<p>max (3)</p>

Question Number	Answer	Mark
1(c)	<p>1. (ions of heavy metals) are enzyme inhibitors / eq ;</p> <p>ACCEPT 'reduce enzyme activities', 'denature enzymes' NOT 'kills enzymes'</p> <p>2. credit further detail of inhibitors e.g. (non) active site-directed or active site-directed ;</p> <p>ACCEPT 'block the active site', 'change the shape of the active site'</p> <p>'heavy metals are non-active site-directed enzyme inhibitors' gains m.ps. 1 and 2</p> <p>3. may {be toxic / eq} to microorganisms /eq ;</p> <p>ACCEPT 'kill microorganisms' ACCEPT 'inhibits growth of organisms'</p> <p>4. {reduces / stops} production of biogas / eq ;</p> <p>ACCEPT 'stops production of gas'</p>	<p>max (2)</p>

Question Number	Answer	Mark
2(a)(i)	<p>1. (one of) {alternative / different} forms of a gene / eq ;</p> <p>Comment: this should be clearly stated</p> <p>2. reference to responsible for determining different varieties of one characteristic ;</p> <p>ACCEPT named examples, e.g. blue and brown eye colour, or references to dominant and recessive</p> <p>3. idea of each allele has unique sequence of bases ;</p> <p>4. (allele)situated at a (gene) <u>locus</u> / eq ;</p>	<p>max (2)</p>

Question Number	Answer	Mark
2(a)(ii)	<p>1. appearance / characteristics (of an organism) / eq ;</p> <p>ACCEPT 'expression of the allele / genotypes', named example</p> <p>2. depends on genotype and environment ;</p>	<p>(2)</p>

Question Number	Answer	Mark
2(b)	<p>1. gametes shown correctly ;</p> <p>ACCEPT these as shown on the sides of a Punnet square, etc</p> <p>2. genotypes of offspring ;</p> <p>ACCEPT MM, Mm, Mm and mm</p> <p>3. probability = 0.33 / $\frac{1}{3}$ / 33% ;</p> <p>NOT a ratio e.g. 1:3</p> <p>ACCEPT consequential error if use Mm x mm i.e. probability = 0.5 / $\frac{1}{2}$ / 50 % for maximum of 1 mark</p>	(3)

Question Number	Answer	Mark
2(c)	<p>1. idea that ears etc., have a lower temperature (than the rest of body) ;</p> <p>ACCEPT 'where there is more heat loss'</p> <p>2. (therefore) enzyme is {active / not denatured / eq} ;</p> <p>3. pigment produced / eq ;</p> <p>4. no pigment produced in other parts because enzyme is {inactive / denatured} / eq ;</p>	max (3)

Question Number	Answer	Mark
2(d)(i)	<p>1. a {sequence / series / chain / eq} of reactions ;</p> <p>2. each catalysed by an enzyme / eq ;</p> <p>Comment: 'a series of enzyme-controlled reactions' gains 2 marks</p> <p>3. product of one reaction forms substrate for the next / eq ;</p> <p>ACCEPT correct comments about the given pathway</p>	max (2)

Question Number	Answer	Mark
2(d)(ii)	<p>1. reference to point mutation as a change in a base / eq ;</p> <p>ACCEPT a named example of a point mutation</p> <p>2. reference to point mutation resulting in a change in the amino acid (sequence of tyrosinase) ;</p> <p>Comment: context must be correct, not 'amino acid sequence of DNA' for example</p> <p>3. may change shape of {enzyme / active site} ;</p> <p>ACCEPT 'change shape of protein / tyrosinase'</p> <p>4. {substrate / tyrosine} no longer fits into active site / no enzyme substrate complexes formed / eq ;</p> <p>ACCEPT 'tyrosin no longer binds to enzyme' NOT 'enzyme no longer functions'</p> <p>5. tyrosine not converted to DOPA / eq ;</p> <p>ACCEPT 'no DOPA produced'</p> <p>6. no {melanin / pigment} produced ;</p>	<p>max (3)</p>

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 areas
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><i>Energy flow and succession in ecosystems</i></p> <p>introduction could include references to producers and consumers, food chains and food webs, succession as changes in community structure over time -</p> <p>AS</p> <p>outline of autotrophic nutrition -</p> <p>roles of producers and consumers -</p> <p>food chains and food webs -</p> <p>how energy is transferred through food chains and food webs -</p> <p>why energy is lost between trophic levels -</p> <p>A2</p> <p>ecosystems are dynamic and subject to change -</p> <p>example of succession (grassland or abandoned farmland to woodland) -</p> <p>seral stages -</p> <p>plagio and climatic climax communities -</p> <p style="text-align: right;"> Scientific content 11 marks Balance 2 marks Coherence 2 marks </p>	(15)

Question Number	Answer	Mark
4B	<p><i>Sexual reproduction in flowering plants and genetic variation</i></p> <p>introduction could include reference to sexual reproduction involving the fusion of gametes, leading to genetic variation</p> <p> AS structure and functions of the principal parts of a flower - pollination - adaptations to insect pollination - adaptations to wind pollination - events leading to fertilisation - mechanisms for ensuring cross-pollination - </p> <p> A2 continuous and discontinuous variation - meiosis as a source of genetic variation - random fertilisation - mutations - </p> <p style="text-align: right;"> Scientific content 11 marks Balance 2 marks Coherence 2 marks </p>	(15)

