edexcel
advancing learning, changing lives

Mark Scheme (Results)
January 2007

GCE

GCE Biology (8040/9040)

Edexcel Limited. Registered in England and Wales No. 4496750
Registered Office: One90 High Holborn, London WC1V 7BH

A PEARSON COMPANY

General Principles

Symbols used in the mark scheme

Symbol	Meaning of symbol
; semi colon	Indicates the end of a marking point.
eq	Indicates that credit should be given for other correct alternatives to a word or statement, as discussed in the Standardisation meeting. It is used because it is not always possible to list every alternative answer that a candidate may write that is worthy of credit.
/ oblique	Words or phrases separated by an oblique are alternatives to each other.
{} curly brackets	Indicate the beginning and end of a list of alternatives (separated by obliques) where necessary to avoid confusion.
() round brackets	Words inside round brackets are to aid understanding of the marking point but are not required to award the point.
[] square brackets	Words inside square brackets are instructions or guidance for examiners.

Crossed out work

If a candidate has crossed out an answer and written new text, the crossed out work can be ignored. If the candidate has crossed out work but written no new text, the crossed out work for that question or part question should be marked, as far as it is possible to do so.

Spelling and clarity

In general, an error made in an early part of a question is penalised when it occurs but not subsequently. The candidate is penalised once only and can gain credit in later parts of the question by correct reasoning from the earlier incorrect answer.

No marks are awarded specifically for quality of language in the written papers, except for the essays in the synoptic paper. Use of English is however taken into account as follows:

- the spelling of technical terms must be sufficiently correct for the answer to be unambiguous
  e.g. for amylase, 'ammalase' is acceptable whereas 'amylose' is not
  e.g. for glycogen, 'glicojen' is acceptable whereas 'glucagen' is not
  e.g. for ileum, 'illeum' is acceptable whereas 'ilium' is not
  e.g. for mitosis, 'mytosis' is acceptable whereas 'meitosis' is not

- candidates must make their meaning clear to the examiner to gain the mark.

- a correct statement that is contradicted by an incorrect statement in the same part of an answer gains no mark – irrelevant material should be ignored.

Question 1 **Maximum Marks**

(a) (i) condensation / polymerisation ;

1 mark

(ii) glycosidic / covalent ;

1 mark

(b) 1 ref. to (high) {blood pressure / hydrostatic pressure} in (glomerular) capillaries ;

2 low RMM solutes /eq ;

3 {forced out /eq} of capillaries ;

4 ref. to (high) permeability of capillaries /eq ;

3 marks

(c) small enough / low RMM / only 5500 / RMM of 5500 / less than 70 000 / eq (to pass through capillary wall / pores) ;

1 mark

(d) 125 ;

$cm^3\ min^{-1}$ / eq ;

2 marks

Total 8 marks

Question 2 **Maximum Marks**

(a) 1 (stem cuttings) are genetically uniform / same genotype / eq ;

2 because they are produced by mitosis ;

3 grow / established quickly / eq ;

4 if high yielding, offspring will also be high yielding / reference to adapted to conditions /eq ;

2 marks

(b) (i) 1 they eat {roots / shoots / leaves / sap / eq} ;

2 reduce yield (of crop) ;

3 may spread diseases /eq ;

4 reduce value (of crop) / eq ;

3 marks

(ii) 1 ref. to specificity / no harm to non-target species / eq ;

2 ref. to no residues (of chemical control) / no run off /eq ;

3 no bioaccumulation / eq ;

4 no need to re-apply / self-sustaining idea / no pest resurgence ;

5 pest unlikely to become resistant ;

3 marks

Question 2 Continued **Maximum Marks**

(c) (i) 1 mites are ectothermic /eq ;

2 temperature affects enzyme activity / eq ;

3 temperature affects metabolism (of mites) ;

4 may affect number of eggs they eat / eq ;

2 marks

(ii) number of eggs eaten increases as number of eggs increases /eq ;

credit a manipulated, quantitative comment ;

2 marks

(iii) 1 *T. aripo* ;

2 eats more eggs (at high prey density) (than *G. annectens*) / eq;

3 number of eggs eaten by *G. annectens* decreases at high prey density ;

4 comparative quantitative reference ;

3 marks

Total 15 marks

ESSAY MARK SCHEME

Outline Scheme for Marking Essay Questions 3, 4B and 5H

Total maximum mark available: 15

11 available for Scientific content
2 available for Balance
2 available for Coherence

Scientific content (S)

Scientific content (S)	Description
11 (good)	The essay demonstrates a sound understanding of the topic, contains a significant amount of material relevant to two (or more) Units (including A2 units) of the specification, and includes suitable examples where appropriate. 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 two (or more) Units (including the A2 units), and examples where appropriate. There may be some minor factual errors.
7 (average)	The essay includes relevant information from two (or more) Units (including A2 units), and 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 Unit. However, the discussion lacks details, particularly of A2 Units.
3 (poor)	There are some correct facts, but the essay lacks depth and accuracy. Little or no relevant information from A2 Units is included.
1 (poor)	There are very few correct facts. The essay is generally superficial and inaccurate.
0 (poor)	No correct, or relevant, information 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.

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 3

Introduction could include reference to liver cell as a eukaryotic cell and range of functions –

Shape of cell –

Surface membrane –

Organelles:

- Nucleus + nuclear membrane -
- Endoplasmic reticulum –
- Mitochondria –
- Lysosomes –
- Golgi apparatus –

} Unit 1

Functions:

- Deamination and urea synthesis –
- Glucose – glycogen metabolism –
- Credit other relevant functions -

} Unit 4

Scientific content 11 marks
Balance 2 marks
Coherence 2 marks

Total 15 marks

Question 4B

Introduction could include explanation of the term pigment and the range of functions of pigments in flowering plants –

Structure of chloroplast and location of pigments –	Units 1 and 5B
Detection of light by phytochrome –	Units 4 and 5B
Roles of chloroplast pigments –	Unit 5B
Chlorophyll a and b –	
Carotenoids –	
Absorption spectra –	
Light dependent reactions –	
Ref. to pigments in flowers in relation to insect pollination –	Unit 2B

Scientific content 11 marks
Balance 2 marks
Coherence 2 marks

Total 15 marks

Question 5H

Introduction could include reference to the significance of meiosis –

Gamete formation involves meiosis – Unit 2H

First and second divisions of meiosis –

Chiasmata formation –

Random fertilisation as a source of genetic variation –

Non-disjunction – Unit 5H

Polysomy and polyploidy –

Specific reference to Down's syndrome –

Could also include detection of chromosome mutations and karyotypes –

Scientific content 11 marks
Balance 2 marks
Coherence 2 marks

Total 15 marks