

GCE



Edexcel GCE

Biology (Human) (6106/03)

Summer 2006

advancing learning, changing lives

Mark Scheme (Results)

Edexcel GCE  
Biology (Human) (6106/03)

# 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 mark

- (a)
1. Combines reversibly/eq ;
  2. Has a {high affinity/eq} for oxygen at high {partial pressure of oxygen / eq} ;
  3. {Low affinity for /eq} oxygen at low {partial pressures of oxygen / eq} ;
  4. {Able to transport / combine with} carbon dioxide /eq ;
  5. Each haemoglobin molecule can carry {four molecules / eight atoms of oxygen} ;
  6. Bohr effect explained /eq ;

2 marks

- (b) (i) Fetal haemoglobin: 1.44 /1.45 /1.46  
AND  
Maternal haemoglobin: 1.94 / 1.95 /1.96 ;

1 mark

- (ii)
1. Reference to higher affinity for oxygen (than maternal haemoglobin)/converse;
  2. At given partial pressure of oxygen ;
  3. Oxygen transferred from maternal {haemoglobin/blood/eq} (to fetal haemoglobin)  
;
  4. In placenta ;

3 marks

- (c)
- Gametes shown clearly ;
- Correct genotypes of offspring ;
- Probability {0.5 /  $\frac{1}{2}$  / 50% / 1 in 2} ;

3 marks

Total 9 marks

## Question 2

Maximum mark

- (a)
1. An organism which contains {a new gene / new DNA/recombinant DNA} ;
  2. Transferred from another species ;
  3. (DNA altered) by {gene technology / genetic engineering} ;

2 marks

- (b)
1. They {eat/reduce numbers of/eq} {insect / pests / named example} ;
  2. Which {eat/eq} the (crop) plants / eq ;
  3. Reference to biological control ;
  4. Act as pollinators / eq ;

2 marks

## Question 2 continued

Maximum mark

- (c)
1. (Herbivores) provide {food / energy source} for {carnivores / secondary consumers / higher trophic levels/eq} ;
  2. Limit growth of {producers / other herbivores /predators/ eq} ;
  3. (Decomposers) break down organic remains / eq ;
  4. Reference to {recycling / release of} {nutrients / named example} ;

3 marks

- (d) (i)
1. Use a quadrat ;
  2. Suitable stated size of quadrat (e.g. 0.5 m<sup>2</sup>) ;
  3. Reference to random sampling ;
  4. Count number of weeds in quadrat ;
  5. Replication ;
  6. Density = numbers per (unit) area / explanation of how density calculated ;

4 marks

- (ii)
- (GM) maize ;
- Weeds/surface invertebrates increase/ eq ;

2 marks

- (e)
- {Resistance to herbicide in other plants / eq} /
- {Adverse effect on food chains / eq} ;

1 mark

Total 14 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

Maximum mark

Introduction could include outline structure and properties of the cell surface membrane -

Specific membrane transport process to include:

Diffusion -

Facilitated diffusion -

Osmosis -

Active transport -

Endocytosis -

Exocytosis -



[Unit 1]

Illustrated with reference to specific examples such as:

Diffusion and gas exchange -

[Unit 2 & Unit 5B]

Absorption of monosaccharides -

[Unit 2]

Reabsorption of solutes and water in the nephron -

[Unit 4]

Movement of ions and release of transmitter substances -

[Unit 4]

Scientific content 11 marks

Balance 2 marks

Coherence 2 marks

Total 15 marks



Question 4B

Maximum mark

Introduction could include reference to the need for the detection of external stimuli -

- Detection of light by the mammalian eye -
  - Structure of the retina -
  - Rods and cones -
  - Retinal pigments -
  - Rhodopsin and monochromatic light -
  - Cones and colour perception -
  - Phytochrome and flowering plants -
  - $P_R$  and  $P_{FR}$  in relation to photoperiod -
  - Detection of light direction and auxin -
- [Unit 4]
- [Unit 5B]

Scientific content 11 marks  
Balance 2 marks  
Coherence 2 marks  
Total 15 marks

Question 5H

Maximum mark

Introduction could include reference to the structures and functions of the male and female reproductive systems -

Gamete formation involves meiosis -

Oogenesis -

Spermatogenesis -

Transfer of male gametes leading to fertilisation -

[Unit 2H]

Amniocentesis described as removal of amniotic fluid -

Culture of fetal cells -

Preparation of karyotype -

Interpretation of karyotype - e.g. reference to Down's syndrome -

Possible courses of action -

Social, ethical and legal implications -

[Unit 5H]

Scientific content 11 marks

Balance 2 marks

Coherence 2 marks

Total 15 marks

