

GCE



Edexcel GCE

Biology (6102/01)

Summer 2005

advancing learning, changing lives

Mark Scheme (Results)

## 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**

Monocytes / eosinophils / basophils ;

Round / rounded / circular / spherical ;

Phagocytosis / endocytosis ;

Antibodies / immunoglobulins ;

**Total 4 marks**

## Question 2

Maximum mark

- (a)
1. Pick up and release oxygen ;
  2. High affinity for O<sub>2</sub> at high {pp / concentrations} of O<sub>2</sub> / converse ;
  3. Carries {4 molecules / 8 atoms} of oxygen ;
  4. Reference to co-operative bonding / eq ;
  5. Reference to {picks up / transports} CO<sub>2</sub> (at high {pp / concentration} of CO<sub>2</sub> / converse) ;
  6. Reference to Bohr effect {qualified / described} ;

[Maximum 2 marks if referring to red blood cells (rather than haemoglobin)]

3 marks

- (b)
1. O<sub>2</sub> storage ;
  2. {High affinity for O<sub>2</sub> / greater affinity for O<sub>2</sub> / picks up O<sub>2</sub> more readily / eq} (than haemoglobin) ;
  3. (So) takes up O<sub>2</sub> from (circulating) {red blood cells / blood / haemoglobin} ;
  4. Releases O<sub>2</sub> at (very) low {pp / concentration } O<sub>2</sub> ;
  5. Provides O<sub>2</sub> during {strenuous / eq} activity / allows muscle to respire aerobically for longer ;

3 marks

Total 6 marks

Question 3

Maximum mark

(a) Ventricular systole ;

1 mark

- (b)
1. Relaxation of atria and ventricles ;
  2. Reduces pressure (inside heart) / eq ;
  3. Refilling / eq ;
  4. AV valves are open ;

2 marks

- (c)
1. Correct reference to the coronary circulation ;
  2. Via the coronary artery ;
  3. From the aorta ;
  4. Reference to capillaries (within) cardiac muscles ;
  5. Reference to {red blood cells / haemoglobin} {carrying / releasing} oxygen ;

3 marks

Total 6 marks

## Question 4

Maximum mark

- (a)
1. Microvillus / brush border ;
  2. Large surface area ;
  3. Increased (rate of) {absorption / diffusion / uptake} ;
  4. Reference to transport proteins ;

3 marks

1. Capillary ;
2. Reference to thin wall / presence of pores ;
3. Reference to {high permeability / short diffusion distance / increased diffusion} ;
4. Maintains {diffusion / concentration} gradient (by removal of absorbed glucose) ;

3 marks

- (b)
1. Concentration of glucose increases (steadily) ;
  2. Rate of glucose absorption does not increase / rate of absorption is constant ;
  3. Reference to sodium co-transport mechanism ;
  4. Reference to (specific glucose) transport protein (on cell surface membrane) ;
  5. Active transport ;
  6. {Energy / ATP} required ;
  7. (Can be absorbed) against a concentration gradient / eq ;

4 marks

Total 10 marks

## Question 5

Maximum mark

- (a) (i) 1. Oxygen concentration decreases as depth increases / converse ;  
2. Reference to greatest change below surface of mud / eq / converse ;  
3. Credit a quantitative description ;

2 marks

- (ii) 1. Reference to (very) low {oxygen /  $pO_2$ } (3 cm below surface of sediment) ;  
2. Presence of {haemoglobin / respiratory pigment} ;  
3. With a high affinity for oxygen ;  
4. Reference to structure reaching water {at / above} surface (of mud) ;  
5. Idea that they live in burrows and aerate by movement ;  
6. Reference to anaerobic respiration ;  
7. Gills qualified ;

3 marks

- (b) Gills ;  
(Provide a large surface area) for uptake of oxygen / gas exchange ;  
OR  
Tail (fins) ;  
Adaptation to swimming / eq ;  
OR  
Feet / eq ;  
Gripping bottom (to move) ;  
OR  
Streamline shape ;  
Less resistance when swimming ;

2 marks

Total 7 marks

**Question 6**

**Maximum mark**

(a) Anther / pollen sac / microsporangium / pollen mother cell ; **1 mark**

(b) Anaphase ;  
II ; **2 marks**

(c) 7 ;  
7 ;  
14 ;  
21 ; **4 marks**

**Total 7 marks**



## Question 7

Maximum mark

(a) (i) Spongy (tissue) / spongy mesophyll ;

1 mark

- (ii) 1. Large surface area ;  
2. Cells irregular in shape ;  
3. Reference to air spaces ;  
4. Thin (cell) walls (increase rate of diffusion) ;  
5. Reference to diffusion (of gases) ;

3 marks

(b) (i) That the volumes are the same / eq ;

1 mark

(ii) Difference = 7 (cm<sup>3</sup>) ;

Calculation mark ( $7 \div 3$ ) ;

= 2.3 cm<sup>3</sup> (per day) ; [allow CE]

[Reference to cm<sup>3</sup> once for full marks]

[2.3 cm<sup>3</sup>, with no working = 1 mark only]

3 marks

Total 8 marks

## Question 8

Maximum mark

- (a) (i) M written between secondary follicle and part Q ; 1 mark
- (ii) Graafian follicle / mature follicle ; 1 mark
- (iii) Oestrogen ;  
Progesterone ; 2 marks
- (b) 1. Sperm in {Fallopian tube / eq} ;  
2. Release of enzymes (from acrosome) ;  
3. Idea that enzymes digest channel on layers around secondary oocyte / eq ;  
[accept ovum]  
4. Fusion of membranes ;  
5. Reference to second meiotic division (of secondary oocyte) ;  
6. Reference to fusion of two nuclei ;  
7. Reference to change in permeability of egg membrane ; 3 marks

## Question 8 continued

Maximum mark

- (c)
1. Reference to keeping maternal and fetal blood separate ;
  2. Protects fetus from high maternal blood pressure / prevents agglutination ;
  3. Exchange (of materials) between fetal and maternal blood ;
  4. Correct reference to exchanges of {respiratory gases / oxygen / carbon dioxide} ;
  5. Correct reference to transfer of {nutrients / named example} ;
  6. Correct reference to transfer of urea ;
  7. {Secretion / synthesis} of {hormones / HCG / oestrogen / progesterone / relaxin} ;
  8. Allows transfer of antibodies (to fetus) ;

5 marks

Total 12 marks