

# Mark Scheme (Results) Summer 2007

GCE

GCE Biology (6112/01)

## 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**

salivary glands ;

amylase / ptyalin ;

epithelium / mucosa / epithelial cells ;

glucose ;

fructose ;

[NB Last two (glucose and fructose) may be either way round]

**5 marks**

**Question 2**

**Maximum mark**

(a)(i) spermatids ;

**1 mark**

(a)(ii) spermatogonia / spermatogonium ;

primary spermatocytes / primary spermatocyte ;

**2 marks**

(b) 1 meiosis / reduction division ;

2 reference to halving the number of chromosomes ;

3 idea that {the diploid number /  $2n$  } restored at fertilisation / eq;

**3 marks**

**Total 6 marks**

**Question 3****Maximum marks**

- (a) A right ventricle ;  
B aorta / aortic arch ;  
C (left) atrioventricular valve / mitral valve / bicuspid valve ;

**3 marks**

- (b) 1 sequence of events each time the heart beats / eq ;  
2 (starts with) atrial systole ;  
3 (then) ventricular systole ;  
4 (then) diastole ;

**3 marks**

- (c) 1 ability of heart (muscle) to {contract / beat / pump } ;  
2 spontaneously / on its own / without nervous stimulation / eq ;

**2 marks****Total 8 marks**

**Question 4****Maximum marks**

(a) A ;

**1 mark**

- (b)
- 1 ref to control by the {medulla / inspiratory control centre / nerve impulses} ;
  - 2 diaphragm contracts ;
  - 3 (and) {moves / pulls} downwards / flattens ;
  - 4 external intercostal (muscles) contract ;
  - 5 rib (cage) moves upwards / rib (cage) moves outwards / sternum moves upwards / ribcage expands ;

**4 marks**(c) **TWO OF:**

- 1 exercise / increase in metabolic activity ;
- 2 increase in carbon dioxide concentration / drop in pH (of blood) / increase in  $H^+$  / increase in acidity ;
- 3 adrenaline / shock / stress / fear / excitement / panic ;
- 4 high altitude / eq / low (partial pressure) of oxygen ;
- 5 rise in temperature ;

**2 marks****Total 7 marks**

## Question 5

Maximum marks

- (a) A seminal vesicle ;  
B prostate ;  
C testis / testes / testicles ;

3 marks

- (b) (fructose) to act as an {energy source/ nutrient /respiratory substrate} for sperm ;  
(mucus) ref. to lubrication ;

2 marks

- (c) ref. to {increased temperature / (electromagnetic) radiation};

1 mark

- (d) reduced fertility / eq ;

1 mark

Total 7 marks

## Question 6

Maximum marks

- (a) physiological changes / eq ;  
which occur over a period of time ;

2 marks

- (b)
- 1 increased number of red blood cells ;
  - 2 increased carrying capacity of blood / eq ;
  - 3 increased haemoglobin ;
  - 4 increased carrying capacity of blood /eq ;
  - 5 increased cardiac output / eq ;
  - 6 increased delivery of oxygen to tissues / eq ;
  - 7 increased pulmonary capillaries / increased blood flow in pulmonary capillaries / eq ;
  - 8 increased uptake of oxygen / increased oxygen diffusion capacity / eq ;
  - 9 increased affinity of haemoglobin ;
  - 10 increased uptake of oxygen / eq ;

[For full marks the answer must include 3 circulatory adaptations]

3 x 2 = 6 marks

Total 8 marks

**Question 7****Maximum marks**

- (a)
- 1 {secrete / eq} {sweat / eq} ;
  - 2 water (in sweat) evaporates ;
  - 3 (evaporates and) has a cooling effect / eq ;
  - 4 reference to latent heat ;
  - 5 ref. to changes in rate of sweating in relation to temperature ;
- 3 marks**
- (b) (i)
- 1 as skin temperature decreases, internal heat production increases ;
  - 2 steadily / linear / eq ;
  - 3 credit a manipulated, quantitative comment ;
- 2 marks**
- (b) (ii)
- 1 as skin temperature decreases, internal heat production increases in both ;
  - 2 Inuits' heat production (always) higher than Europeans ;
  - 3 ref. to greater change in heat production in Europeans ;
  - 4 credit a manipulated quantitative comparative comment (e.g. 58 and 40 kJ) ;
- 3 marks**
- (b) (iii)
- 1 increased heat production ;
  - 2 increased metabolism / eq ;
  - 3 maintains body temperature / compensates for heat loss ;
  - 4 more tolerant to temperature change ;

**2 marks**

**Total 10 marks**

**Question 8****Maximum marks**

- (a)
- 1 appropriate reference to shape ;
  - 2 increased surface area ;
  - 3 cells are thin ;
  - 4 for increased diffusion (of oxygen) / decreased diffusion distance ;
  - 5 presence of haemoglobin ;
  - 6 reference to haemoglobin carrying / picking up oxygen / eq;
  - 7 no nucleus / no {organelles / named examples} ;
  - 8 idea that this gives more space for haemoglobin ;
  - 9 small / flexible ;
  - 10 to allow cells to pass {along / through} capillaries ;

**4 marks**

**Question 8 continued****Maximum Marks**

- (b)
- 1 carbon dioxide {diffuses / eq } into red blood cell ;
  - 2 where it combines with water ;
  - 3 to form carbonic acid ;
  - 4 this dissociates into hydrogencarbonate (and proton) ;
  - 5 reference to carbonic anhydrase ;
  - 6 {proton / H<sup>+</sup>} {combines with / buffered by / mopped up by} haemoglobin ;
  - 7 forming {haemoglobinic acid / HHb} ;
  - 8 hydrogencarbonate (ions) diffuse {into plasma / out of red cell} ;
  - 9 reference to attachment (of carbon dioxide) to haemoglobin ;
  - 10 forming {carbaminohaemoglobin / carbamino compound} ;
  - 11 ref to carbon dioxide {carried in solution / dissolved} in RBC;

**5 marks****Total 9 marks**