

Mark Scheme (Results) Summer 2007

GCE

GCE Biology (6102/01)

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 ;

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 ;

[Treat each point independently]

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) P anther ;
Q stigma ;

2 marks

- (b) wind ;

For the other marks, **ACCEPT** references to any **three** of the following:

- 1 no petals / reduced petals / no nectaries ;
- 2 {large / long / versatile / rocking} anthers ;
- 3 produce lots of pollen ;
- 4 {exposed / eq }{anthers / stamens / stigmas / styles} ;
- 5 pollen released into air / blown away by the wind ;
- 6 {feathery / hairy / eq} stigmas / stigmas have a larger surface area ;
- 7 idea that stigmas (are more likely to) catch pollen ;

4 marks

- (c) 1 protandrous / explanation ;
2 protogynous / explanation ;
3 ref to pollen incompatibility ;
4 dioecious / monoecious explanation ;
5 dichogamy ;

2 marks

Total 8 marks

Question 6

Maximum marks

- (a) adaptations that enable a plant to {live in dry conditions / eq } / {reduce water loss / reduce transpiration } ;

1 mark

- (b)
- 1 leaf is rolled / curled up / eq ;
 - 2 to reduce (exposed) surface area ;
 - 3 encloses stomata (on the inside) ;

 - 4 presence of spines / hairs / spikes ;
 - 5 to trap air / trap humid air / trap moisture ;
 - 6 reduces the {diffusion / concentration} gradient ;

 - 7 thick cuticle ;
 - 8 any reference to reducing {transpiration / evaporation / water loss} ;

 - 9 presence of hinge cells ;
 - 10 idea that hinge cells roll the leaf ;

4 marks

Total 5 marks

Question 7

Maximum marks

- (a) 1 reference to transpiration pull ;
2 cohesion of water molecules explained ;
3 adhesion explained ;
4 reference to water potential gradient ;
5 any reference to root pressure ;
3 marks
- (b)(i) 1 distance moved increases as time increases / eq ;
2 steady / (approximately) linear / constant ;
3 credit manipulated figure reference ;
2 marks
- (ii) 1 reference to increased movement / eq ;
2 due to increased uptake of water ;
3 increased {transpiration / evaporation / water loss} ;
4 stomata open wider / more stomata open (in bright light) ;
5 (at high light intensity there is) more photosynthesis ;
3 marks
- (iii) 1 reference to increased {transpiration / evaporation / water loss};
2 reference to dry air / low water (vapour) ;
3 increased diffusion of water (vapour) / increased {diffusion / concentration gradient} for water (vapour) ;
4 reference to increased water potential gradient ;
3 marks
- (b)(iv) temperature / wind (speed) / air movement ;
1 mark
- Total 12 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⁺} {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