

Mark Scheme (Results) Summer 2007

GCE

GCE Biology SNAB (6135/01)

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

(a) medulla (oblongata);

1 mark

(b) 1. ref. to increase in rate of (anaerobic / aerobic) respiration ;

2. {increase in carbon dioxide levels / increase in {lactic acid / lactate} levels / decrease of pH / increase in {hydrogen ions / H⁺} / increase in carbonic acid} in the blood;

3. ref. to chemoreceptors;

4. {aortic / carotid} bodies or ref. to carotid {artery / aorta};

5. {cardiac / cardiovascular} centre (in medulla);

6. {more / increase in frequency} of impulses along sympathetic nerve;

7. ref. to SAN / sinoatrial node;

4 marks

Total 5 marks

Question 2

Maximum mark

- (a) 1. food (alone) leads to salivation, bell and food leads to salivation (bell alone leads to salivation) ;
2. food - unconditioned stimulus ;
3. bell - neutral stimulus ;
4. salivation is the conditioned response ;
- 3 marks
- (b) 1. (peck key / colour) by {accident / chance / trial and error / random} ;
2. (correct key) obtain {food / reward} / (wrong key) receive punishment ;
3. repeats behaviour in order to get reward ;
- 2 marks
- (c) 1. all animals have common evolutionary origin / share genes / eq / OR human and mammal brains are similar ;
2. {nervous system / neurones / synapses / neurotransmitters / eq} work in a similar way in all animals ;
3. ref. to studies of {*Aplysia* / sea slug / chimpanzees (Kohler)} ;
4. details of {*Aplysia* / sea slug / chimpanzees (Kohler)} studies;
5. ref to limitations of animals in explaining learning in humans/eq ;
- 2 marks
- (d) 1. (fMRI) shows which parts of the brain are active / eq ;
2. oxyhaemoglobin does not absorb radio signals / deoxyhaemoglobin absorbs radio signals ;
3. active parts of brain absorb fewer radio signals;
4. rapid image production / 3D image ;
5. non-invasive / brain of living person ;
- 2 marks
- Total 9 marks**

Question 3

Maximum mark

- (a)
1. {calcium ions / Ca^{2+} } released from sarcoplasmic reticulum ;
 2. calcium (ions) binds to troponin ;
 3. (troponin) causes tropomyosin to move ;
 4. exposing (myosin) binding sites (on actin);
 5. myosin head attaches to binding site / cross bridge formation ;
 6. myosin head {moves / nods forward / eq} ;
 7. release of ADP and inorganic phosphate ;
 8. actin slides over the myosin ;
 9. (ATP causes) myosin head to detach ;
 10. {ATP hydrolysis / ATPase} ;

5 marks

- (b)
1. ref to prevention of release of neurotransmitter from presynaptic membrane ;
 2. similar shape (to neurotransmitter) ;
 3. {binds / blocks / fits into} receptor on postsynaptic membrane ;
 4. ref to {sodium ion / Na^+ / cation} channels / hyperpolarisation / permanent depolarisation} of postsynaptic membrane ;
 5. no nerve impulses / action potentials / continuous action potential / eq ;
 6. inhibits acetylcholinesterase / breakdown enzyme / (bungarotoxin) not affected by breakdown enzyme ;

3 marks

Total 8 marks

Question 4

Maximum mark

Immune suppression:

1. fewer infections / immune system most effective with moderate exercise
OR
{too little / too much} exercise {suppresses immune system / more infections} ;
2. fewer natural killer cells ;
3. details of changes (to cells) of the immune system after vigorous exercise ;
4. inflammatory response in muscles reduces (non-specific) immune response elsewhere ;

Joint damage:

5. (articular) cartilage / patella / bursae / ligaments / muscle (fibre) ;
6. further details of damage ;
7. detail of how damage occurs ;

Benefits to cardiovascular system:

NB max of 4 marks from this section

8. moderate exercise lowers (resting) blood pressure ;
9. due to increased arterial vasodilation ;
10. improves ratio of HDL to LDL / increases levels of HDL / reduces levels of LDL ;
11. beneficial effects of exercise on obesity / BMI ;
12. ref. to prevention (type II) diabetes;

Total 6 marks

Question 5

Maximum mark

- (a) (i) 1. (light hits) photoreceptors (on the retina);
2. impulses pass to the brain ;
3. ref. to sensory neurone ;
4. ref. to innate / inborn / autonomic response ;
5. impulses along parasympathetic nerve ;
6. ref to motor neurone ;
7. circular muscles contract / radial muscles relax ;
8. pupil {contracts / constricts / becomes smaller} ;
- 4 marks
- (ii) 1. {faster / eq} impulses due to ;
2. myelin acting as an {electrical/ eq} insulator ;
3. ref to Schwann cells producing myelin ;
4. depolarisation only occurs at the nodes of Ranvier ;
5. ref. to saltatory conduction ;
6. need rapid response to protect retina ;
- 3 marks
- (b) 1. visual stimulation is essential for visual development ;
2. ref. to critical window / critical period / sensitive period ;
3. ref. to visual cortex ;
4. growth of axons / formation of synapses / inactive synapses eliminated ;
5. kittens less than 4 weeks old have not developed (visual cortex)
{connectionssynapses}
OR
kittens over 5weeks old have already developed (visual cortex)
{connections / synapses}
- 3 marks

Question 5 continued

Maximum mark

- (c)
1. ref. to animal experiments helping to test {medicines / treatments} / give greater understanding of the {human / animal} body ;
 2. ref. to utilitarian philosophy ;
 3. expected benefits greater than expected harms / eq ;
 4. reduces chances of harm when testing on people ;

2 marks

Total 12 marks

PAPER TOTAL 40 MARKS