

GCE



Edexcel GCE

Biology / Biology (Human) (6104/03)

Summer 2005

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Mark Scheme (Results)

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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)

Feature	Nervous coordination	Hormonal coordination
	Electrical / {along neurones / eq} / as action potential	Chemical / in the blood ;
	Fast	Slow ;
	Short	Long ;

[one mark for each correct row]

3 marks

(b)

Idea that hormones and neurotransmitters are both chemicals

OR

Reference to use of receptors ;

1 mark

Total 4 marks

Question 2**Maximum mark**

(a) Adrenaline / epinephrine ;

1 mark

- (b)
1. Muscles will be {working harder / contracting more} (during the exercise) ;
 2. Respiration will be greater (in the muscle cells) ;
 3. To produce ATP (for increased contraction) ;
 4. (Glycogen is broken down into) glucose ;
 5. (Glucose) will be produced where it is going to be needed ;
 6. {More efficient / eq} than transporting glucose (to the muscle) ;

4 marks

(c) Insulin ;

1 mark**Total 6 marks**

Question 3**Maximum mark**

- (a)
1. H^+ {binds to / picked up by} {NAD / FAD} ;
 2. (Reduced coenzyme) passes H^+ to {electron transport chain / carriers} ;
 3. In the {inner mitochondrial membrane / cristae} ;
 4. H^+ passed into inter membrane space ;
 5. Pass back through {ATPase /stalked particles} ;
 6. $ADP + P_i \rightarrow ATP$;
 7. Reference to oxidative phosphorylation ;
 8. Reference to {chemiosmosis / H^+ gradient} ;
- 4 marks**
- (b) 20 ;
- 1 mark**
- (c) (i) 12 ;
- 1 mark**
- (ii)
1. Krebs cycle only occurs under aerobic conditions ;
 2. Reference to formation of reduced {NAD / FAD} (in Krebs) ;
 3. (This) has to be reoxidised ;
 4. Oxygen acts as electron acceptor / eq ;
 5. Idea that {electron transport chain won't work / oxidative phosphorylation can't occur} ;
 6. If no oxygen { H^+ / acetyl coA} would accumulate ;
- 3 marks**

Total 9 marks

Question 4

Maximum mark

(a) (Posterior) pituitary;

1 mark

(b) 1. {Decrease in urine production / urine production inhibited} in first 10 minutes (after injection) ;

2. Increase in urine production in next 15 minutes ;

3. Effect of ADH is temporary / eq ;

4. Rate has not returned to original level ;

5. Rate {decrease of $4.3 \text{ cm}^3 \text{ min}^{-1}$ / increase of $3.5 \text{ cm}^3 \text{ min}^{-1}$ / overall decrease of $0.8 \text{ cm}^3 \text{ min}^{-1}$ } ;

3 marks

(c) 1. Increased permeability to water ;

2. Of {collecting duct / distal convoluted tubule} ;

3. Reference to {aquaporins / water channels} ;

4. More water {reabsorbed / absorbed into the blood} (from the collecting duct / distal convoluted tubule) ;

5. By osmosis ;

4 marks

(d) 1. (Sodium chloride) increases the (salt) concentration of blood ;

2. Detected by osmoreceptors ;

3. In hypothalamus ;

4. Detail of ADH {production / secretion} ;

5. Increased levels of ADH in the blood (plasma) ;

3 marks

Total 11 marks

Question 5**Maximum mark**

Write an account of the location and functions of each of the following areas of the mammalian brain: cerebral hemispheres, cerebellum and medulla.

1. Receives information from sensory organs / reference to sensory input ;
2. Idea of {interpretation / coordination} of information ;
3. {Initiates / transmits} impulses (to effector) ;

Cerebral hemispheres / cerebrum

4. At the front of the brain / frontal lobes / fore brain ;
5. Reference to voluntary action ;
6. Reference to a named sense ;
7. Reference to {thought / learning / intelligence / memory / personality / emotion / speech / language} ;

Cerebellum

8. At the back of the brain / hind brain ;
9. Idea of (controls) {skeletal / muscular} movement ;
10. Reference to {modification of movement / named example e.g. talking} ;
11. Balance / posture / muscle tone ;

Medulla

12. At top of spinal cord / hind brain / below pons ;
13. Reference to involuntary action ;
14. Involved in homeostatic control / correct named example ;
16. Reference to {simple reflex centre / named example} ;

Total 10 marks

Question 6**Maximum mark**

- (a) (i) 10 ; **1 mark**
- (ii) Z line / band ; [ignore actin] **1 mark**
- (b) Correct measurement divided by 1.6 ;
Conversion to μm and correct answer ; **2 marks**
- (c) 1. {Strands / fibres} of (fresh) meat / eq ;
2. In Ringer's solution ;
3. Place on (microscope) slide / eq ;
4. Record {length before and after / change in length} ;
5. Add (1 drop of) ATP (solution) ;
6. Reference to use of control ; **3 marks**

Total 7 marks

Question 7

Maximum mark

(a) Lung(s) ;

1 mark

- (b)
1. They {are immune / are resistant / have been vaccinated / have had BCG} ;
 2. Have antibodies / have memory cells ;
 3. Bacteria destroyed before they cause damage / eq ;

2 marks

- (c)
1. Prolonged drug treatment (3-9 months) / eq ;
 2. Antibiotics / isoniazid / eq ;
 3. At least 3 (antibiotics) are used / eq ;
 4. Rest / healthy diet / direct observation therapy ;

3 marks

Total 6 marks

Question 8

Maximum mark

- (a)
1. Release of adrenalin causing anticipatory rise / eq ;
 2. Increased exercise / increased (rate of) respiration ;
 3. Increase in concentration of carbon dioxide in the blood / pH of blood lowered / eq ;
 4. Detected by chemoreceptors ;
 5. In {carotid / aortic} body ;
 6. {Stimulate / eq} breathing centres in medulla ;
 7. Increase {frequency / eq} of impulses {to diaphragm and intercostal muscles / along phrenic nerve} ;
 8. Increase in rate of {contraction / relaxation} ;

[Accept converse for any marking point]

4 marks

- (b)
1. Small rise (beginning 2 minutes) before exercise starts ;
 2. {Rapid / steep / sharp} increase {in / during} first 2 minutes (of exercise) / eq ;
 3. After {first 2 minutes (of exercise) / eq} slower increase / eq ;
 4. 2 minutes before exercise increase by $8 \text{ dm}^3 \text{ min}^{-1}$ / first 2 minutes of exercise increases by $80 \text{ dm}^3 \text{ min}^{-1}$ / 8 to 16 minutes of exercise increases by $24 \text{ dm}^3 \text{ min}^{-1}$ / eq ;

3 marks

- (c)
- Ventilation rate {goes higher / rises more steeply} ;
- {Longer / slower} {recovery / return to normal level} ;

2 marks

Total 9 marks

Question 9

Maximum mark

(a) SA node / SAN / sinoatrial node ; 1 mark

(b) (i) Bainbridge (reflex) ; 1 mark

- (ii)
1. Increased blood pressure (in vena cava / right atrium) ;
 2. Baroreceptors stimulated ;
 3. {Cardiovascular centre / medulla} initiate impulses in {sympathetic / accelerator} nerve ;
 4. {Stimulation of SAN increased / eq} / decreased delay at AVN ;
 5. Heart rate increased / eq ;
- 3 marks

- (c)
1. Placed under the skin on the chest wall / eq ;
 2. Wired to {wall / muscle} of heart / eq ;
 3. Can detect heart's beat ;
 4. Generates {impulses / eq} ;
 5. {Stimulate / eq} (regular) contraction of cardiac muscle / mimics action of SAN (and AVN) / eq ;
- 3 marks

Total 8 marks