GCE

Edexcel GCE

Biology / Biology (Human) (6104/02)

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 + Pi $\rightarrow$ 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 cm^3 min^{-1} / increase of 3.5 cm^3 min^{-1} / overall decrease of 0.8 cm^3 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**

Constituent of the diet	Description of one effect of deficiency
Vitamin A / retinol / ß carotene ;	
	Bleeding from {small blood vessels / gums} / lack of collagen synthesis / poor wound healing ;
	{Weak / less dense} {bone / tooth} formation / increased blood clotting time / decreased muscular activity ;
Iron / Fe / Vitamin B12 ;	

Total 4 marks

Question 7 **Maximum mark**

(a)
1. Results in a modified atmosphere ;
2. O_2 used up (as fruit) respires ;
3. (O_2) diffuses slowly into package through film ;
4. Anaerobic condition develops ;
5. Inhibits {respiration / metabolism} ;
6. Reduces ethene production ;
7. So ripening slowed down ;
8. CO_2 produced can escape so pressure in container does not increase / container does not inflate ;

4 marks

(b) Removal of free radicals / prevention of rancidity ;

1 mark

(c)
1. At least 100 °C (for 20-30 minutes) ;
2. (Sterilisation) kills (all) microorganisms (and spores in milk) ;
3. So no {metabolites / eq} produced / so no respiration ;
4. No lactic acid produced ;

3 marks

Total 8 marks

Question 8 **Maximum mark**

(a) (i) 10750 – 6720 (=4030) ;

x $\frac{100}{10750}$; [to give correct answer]

[correct answer with no working = 1 mark]
[no consequential error]

2 marks

(ii) Decreased ;

1 mark

(iii) 1. Intake of energy much greater than energy usage ;

2. (Intake of energy) from eating more carbohydrates / eq ;

3. Energy usage decreased ;

4. Reason, e.g. fewer people doing manual work / use cars rather than walking / sedentary entertainment / eq ;

3 marks

(b) 1. (Container with) known {mass / volume} of water ;

2. Known {mass / weight} (of fat);

3. {Ignited / burnt} in oxygen ;

4. Reference to all sample being burnt ;

5. Measure {temperature change / initial and final temperature} ;

6. Stir to distribute heat (in water) ;

4 marks

Total 10 marks

Question 9 **Maximum mark**

(a) (i) Mortality falls as dietary fibre intake increases ;

Almost linear relationship / negative correlation / inversely proportional ;

Small increase in fibre has large effect ;

Quantitative use of figures ;

3 marks

(ii)
1. Increases bulk of faeces ;
2. Increases speed of {passage / peristalsis} (of faeces through the colon) ;
3. Carcinogens pass through the gut more quickly ;
4. So less chance of their absorption ;
5. Fibre absorbs carcinogens ;

2 marks

(b)
1. Weakening of gut musculature / eq (with age) ;
2. Increase in {pressure / eq} in colon ;
3. Reference to {pouching / formation of pouches} (in the mucosa) ;
4. Lower dietary fibre (in diet of elderly) ;
5. (Because) eating {less food / more convenience food} ;
6. Poor diet when young ;

3 marks

Total 8 marks