

# Mark Scheme (Final) Summer 2008

GCE

GCE Biology (6104/03)

## General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

**PRE-STANDARDISATION MARK SCHEME - UNIT 4C (6104/03)**  
**A2 BIOLOGY / BIOLOGY (HUMAN) June 2008**

**STRICTLY CONFIDENTIAL**

Principal Examiner: Mrs C Natt, 12 Kingswood Road, Monmouth, NP25 5BX  
Tel: 01600 772997  
Email: [clairenatt1968@yahoo.co.uk](mailto:clairenatt1968@yahoo.co.uk)

Team Leader: James Stutchbury, Cedar Cottage, Poole Keynes, Cirencester, Glos,  
GL7 6EG  
Tel: 01285 770 190  
Email: [StutchburyJH@rendcomb.gloucs.sch.uk](mailto:StutchburyJH@rendcomb.gloucs.sch.uk)

- (1) You must have provisionally marked 15 of every item **ONLINE** before the Standardisation Meeting on **24/06/2008** in order to familiarise yourself with the Pre-standardisation mark scheme.
- (2) At the meeting the mark scheme will be discussed and amplified. It will be amended in the light of the discussion and of marking experience. Assistant Examiners will then be asked to take part in an Agreement Trial. The marks will be compared and discussed. Scripts used in Agreement Trials may be taken away from the meeting for reference purposes; these must be **destroyed** at the conclusion of marking.
- (3) Within **48 hours** of the Standardisation meeting, Assistant Examiners must mark fully, **ONLINE**, a sample of **10** of every item in the light of the amended **FINAL** mark scheme which you will be able to access **ONLINE**. Please note that you will not be able to mark any more responses until after you have received clearance from your Team Leader, and any differences are resolved.
- (4) Once clearance has been received from the Team Leader, you **MUST** start marking and all your marking **MUST** be done by **the contract completion date on your contract**.
- (5) Further checks on your marking will be made by your Team Leader at any point throughout the marking period to ensure that your marking is accurate.

Please contact the ePEN helpdesk for technical queries:

Online Associates Helpdesk

Telephone 0800 169 9202

Email [UKservicedesk@pearson.com](mailto:UKservicedesk@pearson.com)

## GCE Biology / Biology (Human) Exam Management Contact Details

<b>QDAM</b>	<b>Damian Riddle</b>
<b>Telephone</b>	<b>0207 190 5024</b>
<b>Email</b>	<b><u><a href="mailto:damian.riddle@edexcel.org.uk">damian.riddle@edexcel.org.uk</a></u></b>
<b>Address</b>	Edexcel 5 <sup>th</sup> Floor 190 High Holborn London WC1V 7BH

<b>Subject Leader</b>	<b>Assie Yamin</b>
<b>Tel</b>	<b>0207 190 4741</b>
<b>Email</b>	<b><a href="mailto:assie.yamin@edexcel.org.uk">assie.yamin@edexcel.org.uk</a></b>
<b>Address</b>	Edexcel 5 <sup>th</sup> Floor 190 High Holborn London WC1V 7BH

<b>Exams Coordinator</b>	<b>Katerina Keplova</b>
<b>Tel</b>	<b>0207 190 4367</b>
<b>Email</b>	<b><a href="mailto:katerina.keplova@edexcel.org.uk">katerina.keplova@edexcel.org.uk</a></b>
<b>Address</b>	Edexcel 5 <sup>th</sup> Floor 190 High Holborn London WC1V 7BH

Question Number	Answer	Mark															
1(a)	<table border="1"> <thead> <tr> <th data-bbox="397 369 606 461">Hormone</th> <th data-bbox="606 369 796 461">Site of secretion</th> <th data-bbox="796 369 1158 461">One function</th> </tr> </thead> <tbody> <tr> <td data-bbox="397 461 606 564">glucagon;</td> <td data-bbox="606 461 796 564"></td> <td data-bbox="796 461 1158 564"></td> </tr> <tr> <td data-bbox="397 564 606 667">oxytocin;</td> <td data-bbox="606 564 796 667"></td> <td data-bbox="796 564 1158 667"></td> </tr> <tr> <td data-bbox="397 667 606 840"></td> <td data-bbox="606 667 796 840">anterior pituitary (gland);</td> <td data-bbox="796 667 1158 840"></td> </tr> <tr> <td data-bbox="397 840 606 1314"></td> <td data-bbox="606 840 796 1314"></td> <td data-bbox="796 840 1158 1314">           raises blood glucose concentration/increases heart rate / increases stroke volume / dilates pupils / constricts arterioles in skin / dilates arterioles in muscles / suppresses immune system / increases breathing rate / causes conversion of glycogen to glucose ;         </td> </tr> </tbody> </table>	Hormone	Site of secretion	One function	glucagon;			oxytocin;				anterior pituitary (gland);				raises blood glucose concentration/increases heart rate / increases stroke volume / dilates pupils / constricts arterioles in skin / dilates arterioles in muscles / suppresses immune system / increases breathing rate / causes conversion of glycogen to glucose ;	(4)
Hormone	Site of secretion	One function															
glucagon;																	
oxytocin;																	
	anterior pituitary (gland);																
		raises blood glucose concentration/increases heart rate / increases stroke volume / dilates pupils / constricts arterioles in skin / dilates arterioles in muscles / suppresses immune system / increases breathing rate / causes conversion of glycogen to glucose ;															

Question Number	Answer	Mark
2(a)(i)	pyruvate / pyruvic acid ;	(1)

Question Number	Answer	Mark
2(a)(ii)	<ol style="list-style-type: none"> <li>1. (stage) 1;</li> <li>2. (stage) 3;</li> </ol>	(2)

Question Number	Answer	Mark
2(b)(i)	a {series / sequence / eq} of (chemical) reactions / each step is controlled by an enzyme / product of one reaction is the substrate for the next / eq ;	(1)

Question Number	Answer	Mark
2(b)(ii)	matrix of a mitochondrion;	(1)

Question Number	Answer	Mark
2(c)	(stages) B, C, D (and) F;	(1)

Question Number	Answer	Mark
3(a)	<ol style="list-style-type: none"> <li>1. (rods contain) rhodopsin;</li> <li>2. reference to convergence / summation / eq ;</li> <li>3. therefore the dog will have better {vision in dim light /night vision} / eq ;</li> <li>4. idea that dog can look directly at object (in dark) / eq ;</li> <li>5. dogs are {more active at night / nocturnal} / eq ;</li> </ol>	max (3)

Question Number	Answer	Mark
3(b)	<ol style="list-style-type: none"> <li>1. idea that in dogs only one type of cone stimulated ;</li> <li>2. therefore the brain receives similar impulses / information / eq ;</li> <li>3. idea that in humans two types of cone are stimulated ;</li> <li>4. idea that the colour perceived by the brain depends on the relative stimulation of each photoreceptor ;</li> </ol>	max (2)

Question Number	Answer	Mark
3(c)	<ol style="list-style-type: none"> <li>1. reference to phytochromes ;</li> <li>2. name two forms {PFR and PR / P<sub>730</sub> and P<sub>660</sub>} ;</li> <li>3. reference to absorption of light (by phytochromes) ;</li> <li>4. conversion of PR to PFR <b>AND</b> reference to red light ;</li> <li>5. conversion of PFR to PR <b>AND</b> reference to far red light ;</li> </ol>	max (3)

Question Number	Answer	Mark
4(a)(i)	A = Bowman's capsule B = proximal convoluted tubule ;	(1)

Question Number	Answer	Mark
4(a)(ii)	<ol style="list-style-type: none"> <li>1. reference to facilitated diffusion / eq ;</li> <li>2. active transport / eq ;</li> <li>3. correct reference to involvement of proteins ;</li> <li>4. co-transport with Na<sup>+</sup> / eq ;</li> <li>5. reference to microvilli providing large surface area ;</li> </ol>	max (2)

Question Number	Answer	Mark
4(b)(i)	<ol style="list-style-type: none"> <li>1. correct readings from graph (300 and 60) ;</li> <li>2. correct subtraction 300 - 60 ( x 100);</li> <li>3. correct division ÷ 300 ( = 80%);</li> </ol> <p><b>ALLOW</b> alternative routes to correct answer (80%)</p>	(3)



Question Number	Answer	Mark
4(b)(ii)	<ol style="list-style-type: none"> <li>1. overall, an increase in concentration with high ADH and a decrease in concentration with low ADH / eq ;</li> <li>2. {A to D / eq}: the change in concentrations are the same with low or high ADH / eq ;</li> <li>3. C / D to E : greater decrease with low ADH / eq ;</li> <li>4. E to F / G: the concentration rises when ADH is high but {decreases / stays the same} when ADH is low / eq ;</li> <li>5. comparative use of figures ;</li> </ol>	max (3)

Question Number	Answer	Mark
4(b)(iii)	<ol style="list-style-type: none"> <li>1. reference to increase in concentration (of fluid) at { E / F / G / collecting duct / distal convoluted tubule } ;</li> <li>2. (rise in ADH) increases permeability of {collecting ducts / distal convoluted tubule / E / F / G} to water / eq ;</li> <li>3. more water is reabsorbed / eq ;</li> <li>4. by osmosis ;</li> <li>5. reference to aquaporins ;</li> <li>6. idea that same amount of solute in less water so that solution is more concentrated ;</li> </ol>	max (3)

Question Number	Answer	Mark
5(a)	<p><b><u>Sensory</u></b></p> <ol style="list-style-type: none"> <li>1. transmits {impulses / action potentials} from sense organ to CNS / eq ;</li> <li>2. pseudo-unipolar cells / cell body in centre of {cell / axon} / single dendrite ;</li> <li>3. myelinated ;</li> </ol> <p><b><u>Relay</u></b></p> <ol style="list-style-type: none"> <li>4. correct reference to (relay neurone transmitting impulses) {between sensory and motor neurone / to other neurones} ;</li> <li>5. short axons ;</li> <li>6. no myelination / eq ;</li> </ol> <p><b><u>Effector (motor)</u></b></p> <ol style="list-style-type: none"> <li>7. transmits {impulses / action potentials} from CNS to {effector / named effector} / eq ;</li> <li>8. multipolar cells / short dendrites / many dendrites from cell body / cell body at end of cell ;</li> <li>9. long axon ;</li> <li>10. myelinated ;</li> </ol> <p><b><u>General</u></b></p> <ol style="list-style-type: none"> <li>11. reference to {Schwann cells / nodes of Ranvier} ;</li> <li>12. reference to myelin causing faster impulse / eq ;</li> <li>13. reference to synapses (between neurones) ;</li> <li>14. reference to secretion of {neurotransmitter / named neurotransmitter} ;</li> <li>15. credit structural detail of synapse e.g. mitochondria in presynaptic knob / receptor molecules on postsynaptic membrane / sodium channels in postsynaptic membrane ;</li> </ol>	<p style="text-align: right;">max (10)</p>

Question Number	Answer	Mark
6	<ol style="list-style-type: none"><li>1. increases;</li><li>2. decreases;</li><li>3. increases;</li><li>4. increases;</li></ol>	(4)

Question Number	Answer	Mark
7(a)	<ol style="list-style-type: none"> <li>1. {surfactants / eq} - to reduce surface tension / prevent collapse ;</li> <li>2. {thin walls / flattened cells / thin endothelium / eq} - {reduces diffusion distance / speeds up {gas exchange / diffusion} } ;</li> <li>3. large surface area - {more / faster} {gas exchange / diffusion} ;</li> <li>4. moist - allows gases to dissolve (and move across) ;</li> </ol>	max (3)

Question Number	Answer	Mark
7(b)	<ol style="list-style-type: none"> <li>1. stimulus e.g. {carbon dioxide / pH levels / H<sup>+</sup>} in the blood ;</li> <li>2. reference to stretch receptors / chemo receptors ;</li> <li>3. reference to medulla (oblongata) ;</li> <li>4. reference to inspiratory centres / expiratory centres ;</li> <li>5. reference to change in frequency of nerve impulses ;</li> <li>6. down the phrenic nerve / intercostal nerves;</li> <li>7. to the { diaphragm / intercostal muscles } ;</li> </ol>	max (3)

Question Number	Answer	Mark
8(a)	<ol style="list-style-type: none"> <li>1. reference to increase in aortic pressure ;</li> <li>2. reference to baroreceptors ;</li> <li>3. in the aortic arch / eq ;</li> <li>4. results in decrease in cardiac output / rate of heart beat ;</li> <li>5. due to suppression of SAN / eq ;</li> <li>6. (and due to) delay at AVN / eq ;</li> <li>7. reference to {release of acetylcholine / vagus nerve parasympathetic nerve} ;</li> </ol> <p>Accept The converse for mp 1, 4, 5 and 7 for a decrease in aortic pressure</p>	max (4)

Question Number	Answer	Mark
8(b)(i)	<ol style="list-style-type: none"> <li>1. both increase / eq ;</li> <li>2. linearly / eq ;</li> <li>3. systolic pressure increases more than diastolic pressure / converse;</li> <li>4. diastolic pressure never rises above systolic pressure / converse ;</li> <li>5. manipulation of figures to compare the increases ;</li> </ol>	max (3)

Question Number	Answer	Mark
8(b)(ii)	<ol style="list-style-type: none"> <li>1. reference to a need to change heart rate to change cardiac output;</li> <li>2. idea that heart rate/cardiac output can be changed by exercise / eq ;</li> <li>3. suitable example of {exercise/stimulus} named;</li> <li>4. reference to use of sphygmomanometer (to measure blood pressure);</li> <li>5. reference to positioning cuff on upper arm;</li> <li>6. reference to recording both (the diastolic and systolic) pressures each time;</li> <li>7. idea that same individual needs to be used throughout;</li> </ol>	<p style="text-align: right;"><b>max (4)</b></p>

Question Number	Answer	Mark
9(a)(i)	<ol style="list-style-type: none"> <li>1. correct readings (38 / 39 and 9/10) ;</li> <li>2. correct subtraction multiplied by 100 ;</li> <li>3. divided by lower reading to give correct answer ;</li> </ol> <p><b>ALLOW</b> alternative routes to correct answer</p>	(3)

Question Number	Answer	Mark
9(a)(ii)	<ol style="list-style-type: none"> <li>1. men with high body fat level more likely to have high blood cholesterol /eq ;</li> <li>2. idea that high fat diet likely to have more cholesterol / eq ;</li> <li>3. (men doing {little / no} exercise) likely to have a high body fat / eq ;</li> <li>4. idea that calorie intake is greater than calorie use ;</li> </ol>	max (3)

Question Number	Answer	Mark
9(b)	<ol style="list-style-type: none"> <li>1. {grasp /pinch / eq} skin ;</li> <li>2. reference to use of (skinfold) callipers ;</li> <li>3. idea of measuring thickness of fold (from callipers);</li> <li>4. name two suitable sites e.g. waist / front upper arm / back upper arm / below shoulder blade ;</li> <li>5. reference to taking more than one reading from each site ;</li> <li>6. compare to tables of data / eq ;</li> </ol>	max (3)