

Mark Scheme (Final)

Summer 2008

GCE

GCE Biology (6104/01)

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 4A (6104/01)
A2 BIOLOGY / BIOLOGY (HUMAN) June 2008

STRICTLY CONFIDENTIAL

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- (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 (4) from the Team Leader, you **MUST** start marking and all your marking **MUST** be done by **the contract completion date on your contracts**.
- (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:

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Question Number	Answer	Mark															
1(a)	<table border="1"> <thead> <tr> <th data-bbox="395 309 606 398">Hormone</th> <th data-bbox="606 309 796 398">Site of secretion</th> <th data-bbox="796 309 1157 398">One function</th> </tr> </thead> <tbody> <tr> <td data-bbox="395 398 606 504">glucagon;</td> <td data-bbox="606 398 796 504"></td> <td data-bbox="796 398 1157 504"></td> </tr> <tr> <td data-bbox="395 504 606 609">oxytocin;</td> <td data-bbox="606 504 796 609"></td> <td data-bbox="796 504 1157 609"></td> </tr> <tr> <td data-bbox="395 609 606 779"></td> <td data-bbox="606 609 796 779">anterior pituitary (gland);</td> <td data-bbox="796 609 1157 779"></td> </tr> <tr> <td data-bbox="395 779 606 1258"></td> <td data-bbox="606 779 796 1258"></td> <td data-bbox="796 779 1157 1258"> 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)
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Question Number	Answer	Mark
2(a)(i)	pyruvate / pyruvic acid ;	(1)

Question Number	Answer	Mark
2(a)(ii)	1. (stage) 1; 2. (stage) 3;	(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"> 1. (rods contain) rhodopsin; 2. reference to convergence / summation / eq ; 3. therefore the dog will have better {vision in dim light /night vision} / eq ; 4. idea that dog can look directly at object (in dark) / eq ; 5. dogs are {more active at night / nocturnal} / eq ; 	max (3)

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

Question Number	Answer	Mark
3(c)	<ol style="list-style-type: none"> 1. reference to phytochromes ; 2. name two forms {PFR and PR / P₇₃₀ and P₆₆₀} ; 3. reference to absorption of light (by phytochromes) ; 4. conversion of PR to PFR AND reference to red light ; 5. conversion of PFR to PR AND reference to far red light ; 	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"> 1. reference to facilitated diffusion / eq ; 2. active transport / eq ; 3. correct reference to involvement of proteins ; 4. co-transport with Na⁺ / eq ; 5. reference to microvilli providing large surface area ; 	max (2)

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

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

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

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

Question Number	Answer	Mark
6	1. mould / fungus / yeast / eukaryotic ; 2. virus; 3. bacterium / prokaryotic ; 4. bacterium / prokaryotic ; ALLOW named microorganism	(4)

Question Number	Answer	Mark
7(a)	<ol style="list-style-type: none"> 1. selective only allows the growth of some microorganisms / prevents the growth of others /eq ; 2. results in {different coloured colonies / changes in colour medium} ; 3. due to pH changes ; 4. used in isolation / identification ; [award once in either part] 	max (3)

Question Number	Answer	Mark
7(b)	<ol style="list-style-type: none"> 1. <i>Azotobacter</i> ; 2. <i>Clostridium</i>: oxygen supplied / it respire anaerobically / eq ; 3. <i>Nitrosomonas</i>: no ammonium (ions) / no carbon dioxide ; 4. <i>Nitrobacter</i>: no nitrite (ions) / no carbon dioxide ; 	max (3)

Question Number	Answer	Mark
8(a)	<ol style="list-style-type: none"> 1. reference to use of <i>Penicillium</i> ; 2. reference to batch fermentation ; 3. all nutrients added (at start) / no products removed /eq ; 4. reference to {stirring / aeration} ; 5. reference to maintaining {pH / temperature} ; 6. idea that penicillin {produced at end of growth phase / during stationary phase / is a secondary metabolite} ; 7. idea that penicillin is found in the culture fluid ; 	max (4)

Question Number	Answer	Mark
8(b)(i)	<ol style="list-style-type: none"> 1. reference to use of optical methods / counting chambers to obtain total cell count ; 2. credit details of method ; 3. reference to use of dilution plating / exclusion dye (counting chamber) (to obtain viable cell count) ; 4. credit details of method ; 5. idea that samples need to be taken from bacteria cultured with each antibiotic (at a range of concentrations) ; 6. need for thorough mixing when taking samples / aseptic technique ; 7. credit explanation of how percentage viability is calculated ; 	max (4)

Question Number	Answer	Mark
8(b)(ii)	<ol style="list-style-type: none"> 1. antibiotic X kills the bacteria at all concentrations but Y has no effect until 10 / 11 arbitrary units /eq ; 2. (at concentrations above 10 / 11 arbitrary units) the decrease in viability of bacteria is linearly proportional to the concentration of Y but decrease for X is not linear / eq ; 3. idea that gradient of Y is steeper than X ; 4. a lower concentration of Y than X kills all the bacteria / eq ; 5. X is more toxic at lower concentrations (below 26 / 27 arbitrary units) and Y is more toxic at higher concentrations (above 26/ 27 arbitrary units) / eq ; 6. idea of same effect at 26 / 27 au ; 7. credit comparative manipulated figures ; 	max (3)

Question Number	Answer	Mark
9(a)(i)	<ol style="list-style-type: none"> 1. generally as bacteria numbers increase pH decreases /eq ; 2. 0 - {30 / 60 / 90 / 120} minutes rapid increase in bacterial numbers as pH decreases at a rapid rate /eq ; 3. {90 / 120} - 210 minutes rate of increase in bacteria numbers decrease whereas there is a small decrease in pH / eq ; 4. after 210 minutes no change in bacteria numbers and pH remains constant /eq ; 5. credit manipulation of figures ; 	max (3)

Question Number	Answer	Mark
9(a)(ii)	<ol style="list-style-type: none"> 1. correct readings; 2. correct substitution into formula; 3. correct answer given as whole generations / rounded down ; 	(3)

Question Number	Answer	Mark
9(b)	<ol style="list-style-type: none"> 1. reference to production of lactic acid ; 2. idea that lactic acid causes drop in pH ; 3. this causes coagulation of the (milk) proteins /eq ; 4. resulting in thickening of yoghurt / eq ; 5. idea that {metabolites / eq} give (characteristic) flavour (of yoghurt) ; 	max (3)