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Mark Scheme (FINAL)
Summer 2008

GCE

GCE Biology (6102/01)

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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 2B (6102)
AS BIOLOGY / BIOLOGY (HUMAN) June 2008

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Question Number	Answer	Mark
1	1. anterior ; 2. follicle stimulating hormone / FSH ; **NOT** 'FSH **and** LH' **IGNORE** gonadotrophin 3. follicles ; **NOT** 'Graafian follicles' 4. secondary oocyte / 2° oocyte ; **IGNORE** 'egg' or 'ovum' so 'secondary oocyte (ovum)' is acceptable. **Comments** **ACCEPT** reasonable spellings **e.g**. 'follical', 'ocyte', 'oosite'.	**(4)**

Question Number	Answer	Mark
2(a)	**A** erythrocyte / red blood cell / red blood corpuscle ; **ACCEPT** 'RBC' **B** lymphocyte /agranulocyte ; **IGNORE** 'white blood cell' or 'leucocyte' **ACCEPT** reasonable spelling e.g. limphosite, limfosite	**(2)**

Question Number	Answer	Mark
2(b)	1. reference to biconcave (disc) / thin / large surface area / description of shape ; **ACCEPT** clear diagram 2. reference to <u>diffusion</u> of respiratory gases / oxygen / carbon dioxide ; **e.g**. a reference 'to shorter diffusion distance for oxygen' **or** 'oxygen can diffuse easily' **OR** 1. small / flexible / eq ; 2. to pass through <u>capillaries</u> ; **NOT** 'arteries, veins and capillaries' or 'blood vessels' **Comments** Explanation should be related to shape.	**(2)**

Question Number	Answer	Mark
2(c)	1. {**neutrophils** / **eosinophils**} are {phagocytic / eq} ; 2. **monocytes** are {phagocytic / eq} ; 3. reference to phagocytosis of {bacteria /eq} ; **ACCEPT** a description of the process, e.g. 'bacteria are engulfed' **ACCEPT** alternatives for bacteria, such as pathogens or microorganisms, but **not** 'foreign bodies', or 'germs' 4. (B) **lymphocytes** secrete antibodies /eq ; **ACCEPT** 'plasma cells secrete antibodies' 'release' as equivalent to 'secrete' 5. in presence of antigens / function of antibody / antitoxins / eq ; 6. reference to production of memory cells **;** **ACCEPT** a correct reference to T lymphocytes **e.g.** a reference to 'T helper cells' or 'T killer cells' is acceptable **ACCEPT** eosinophils {secrete major basic protein / are involved in defence against worm infection} **ACCEPT** basophils secrete {heparin / histamine} **Comments** Mark points 3, 5 and 6 could be awarded as stand-alone points e.g. in the context of wbc or leucocytes 'they engulf bacteria and produce antibodies in the presence of antigens' gains mark points 3 and 5 but not 4 Mark points 1, 2 and 4 must be linked to the correct type of cell 'neutrophils engulf bacteria' gains mark points 1 **and** 3	**max (3)**

Question Number	Answer	Mark
3(a)	1. capillaries {have thin walls / made of flattened epithelium / thin cells / eq} ; **NOT** 'one cell thick' or 'thin membrane' or 'thin cell wall' **ACCEPT** endothelium 2. reference to presence of <u>pores</u> ; 3. reference to basement membrane ; 4. reference to permeability of capillary wall /eq ; **e.g**. 'permeable to small molecules', 'selectively permeable' or 'semi-permeable' or 'allows small molecules to pass out' **ACCEPT** named examples of small molecules, such as glucose and water	**max (3)**

Question Number	Answer	Mark
3(b)	1. proteins are large (molecules) ; **ACCEPT** 'proteins have a high RMM' 2. cannot pass through capillary wall / eq ; **e.g**. 'cannot pass through pores' **Comments** 'Protein molecules are too big to pass through the pores' gains both marks	**(2)**

Question Number	Answer	Mark
3(c)	1. idea of reduced concentration of plasma proteins / eq ; **Comments** It should be clear that proteins are in the blood / plasma / inside capillaries, rather than dietary proteins 2. therefore reduced osmotic effect / eq ; **ACCEPT** references to solute potential, or water potential 'lower' / 'less' / 'smaller' are equivalent to reduced 'no protein therefore no osmotic effect' gains both marks	**(2)**

Question Number	Answer	Mark
4(a)	1. reference to (salivary / pancreatic) amylase ; **ACCEPT** amalase but **NOT** amylyse 2. breaks down starch to <u>maltose</u> (and dextrins) ; 3. maltase ; 4. breaks down maltose to (α) <u>glucose</u> ; **NOT** β glucose	**max (3)**

Question Number	Answer	Mark
4(b)(i)	1. (villi) increase the surface area ; 2. reference to increasing <u>diffusion</u> ; **NOT** 'increasing uptake'	**(2)**

Question Number	Answer	Mark
4(b)(ii)	1. reference to transport (of (absorbed) monosaccharides / named monosaccharides) ; 2. maintains {diffusion / concentration} gradient / eq ; **e.g.** 'glucose is taken away in the blood and this maintains a diffusion gradient' gains both mark points 'glucose is absorbed by blood because it has a low concentration' gains m pt 2	**(2)**

Question Number	Answer	Mark
4(c)(i)	1. uptake of **galactose** is {**fastest** / faster than glucose / fructose} ; 2. uptake of **fructose** is {**slowest** / slower than glucose / galactose} ; 3. glucose and galactose have similar rates of uptake ; **Comments** **ACCEPT** converse comparisons **ACCEPT** 'absorption' as equivalent to 'uptake' and 'higher' as equivalent to 'faster' Expect **comparative** points 'uptake of glucose is faster than fructose but slower than galactose' gains both marks 'fructose is slower than glucose which is slower than galactose' is worth 2 marks	**max (2)**

Question Number	Answer	Mark
4(c)(ii)	reference to {specific / more} glucose {carrier proteins / eq} / glucose is absorbed actively, but fructose by (facilitated) diffusion / glucose is absorbed by glucose-sodium co-transport, fructose by diffusion ;	**(1)**

Question Number	Answer	Mark
5(a)	**Look for structural points first, then explanations or qualifications** 1. **thick cuticle** ; 2. reduces {transpiration / water loss / eq} ; 3. **leaves rolled** / folded / curled up / eq ; 4. reduces (exposed) surface area / stomata enclosed / reduces air movements / eq ; 5. **sunken** / **fewer stomata** ; 6. reduces {transpiration / water loss / eq} ; 7. presence of **spines** / **spikes** / **hairs** ; 8. trap water vapour near leaf / reduces air movement / eq ; **Comment: m pt 8 could also be accepted in the context of 3, 5 and 9** 9. reference to **hinge cells** ; 10. (which) cause the leaf to roll up / eq ; **Comments** **IGNORE** the 1, 2 and 3 printed on the question paper Expect **three structural** points for full marks, otherwise **5 max** **ACCEPT** references to **reducing** transpiration, but **not** 'stopping' or 'preventing' water loss Mark point 2 could be awarded more than once in the context of mark points 1, 3, 7 or 9 It is acceptable for candidates to combine points, e.g. 'the leaves have a thick cuticle and are rolled up to reduce the surface area and this reduces transpiration' gains mark points 1, 4, 3 and 2 **ACCEPT** reasonable alternatives to water vapour, such as 'humid air' or moist air', but not 'water' or 'moisture' on their own **IGNORE** references to roots / stems	**max (6)**

Question Number	Answer	Mark
5(b)	leaf not rolled / no hairs / no spines / thin cuticle / no cuticle / air spaces / aerenchyma / no stomata / stomata on upper epidermis only / stomata on upper surface only / less supporting tissue / stomata not sunken / leaves feathery / eq ;	**(1)**

Question Number	Answer	Mark
6(a)(i)	to {reset / level the} **liquid** in capillary tube / to calibrate the scale / eq ; **ACCEPT** reference to moving the liquid back to the beginning of the scale, or resetting the experiment (so it can be repeated), but **NOT** moving 'the air bubble'	**(1)**

Question Number	Answer	Mark
6(a)(ii)	to {absorb / take up / remove} carbon dioxide ; **Comment** **IGNORE** reacts / dissolves **ACCEPT** trap	**(1)**

Question Number	Answer	Mark
6(b)	1. to keep the temperature constant / eq ; 2. idea that temperature affects gas volumes ; 3. idea that temperature affects respiration / metabolic rates ;	**max (2)**

Question Number	Answer	Mark
6(c)	12×0.19 (or 2.28) ; $\div 15$; = 0.15(2) ; **ACCEPT** 0.15 **Comments** An alternative calculation for all three marks is: $12 \div 15 = 0.8$; $\times 0.19$; = 0.15(2) ; **ACCEPT** consequential error if the first mark point is incorrect, but is then **divided by 15** e.g. '$1.28 \div 15 = 0.085$' gains 2 marks	**(3)**

Question Number	Answer	Mark
7(a)	1. apoplast pathway described ; **e.g**. 'water moves through the cell walls' **or** 'water moves through the spaces between cells' 2. symplast pathway described ; **e.g**. 'water moves through the cytoplasm' 3. reference to the vacuolar pathway ; **e.g**. 'water moves through the vacuoles' 4. reference to the endodermis <u>and</u> {Casparian strip / layer of suberin / waxy layer} ; 5. function of the Casparian strip ; **e.g**. 'the Casparian strip is waterproof' or 'stops movement of water in the apoplast pathway'. **Comment** The pathways need to be described Candidates do not need to **name** the pathways in mark points 1 and 2, but if they do, the description must be correct for the named pathway. 'Water moves through the cell walls in the symplast pathway', for example, is incorrect	**max (4)**

Question Number	Answer	Mark
7(b)(i)	1. reference to **increase** from {08.00 / start} until 10 / 12 / 14 ; **ACCEPT** first 2 / 4 / 6 hours 2. reference to **maximum** at 14.00 / peaks at 50 au ; 3. reference to **decrease** from 14.00 ; 4. credit a manipulated quantitative comment ; **e.g.** 'the rate increases by 45 (au) from 08.00 to 14.00' gains mark points 1 and 4	**max (3)**

Question Number	Answer	Mark
7(b)(ii)	**08.00 to 14.00**: stomata open / increase in light (intensity) / increase in temperature / increase in wind speed / decrease in humidity ; **14.00 to 20.00**: converse of points above ; **ACCEPT** sunlight as equivalent to light	**max (2)**

Question Number	Answer	Mark
8(a)(i)	0.6 to 0.65 ;	**(1)**

Question Number	Answer	Mark
8(a)(ii)	3.1 to 3.15 ;	**(1)**

Question Number	Answer	Mark
8(b)	1. idea that oxygen is transferred from haemoglobin to myoglobin ; **e.g**. 'myoglobin takes up oxygen from haemoglobin' **IGNORE** reference to affinity 2. myoglobin acts as a {store / eq} of oxygen ; **e.g**. 'a reserve (supply) of oxygen' **NOT** transports oxygen 3. in muscle (tissue) ; 4. oxygen released from myoglobin at (very) low partial pressures / during {extreme / strenuous / eq} exercise ; **Comments** 'exercise' should be qualified in some way for this point, i.e. not just exercise on its own 5. this allows <u>aerobic</u> respiration to continue / eq ; **e.g**. 'so muscles can keep respiring aerobically' or 'to prevent anaerobic respiration'	**max (3)**

Question Number	Answer	Mark
8(c)	1. idea that respiring {tissues / cells} produce carbon dioxide ; 2. reference to reduced <u>affinity</u> for oxygen ; 3. oxygen is released (more) readily / (more) oxygen is released / haemoglobin is less saturated with oxygen / percentage saturation decreases / eq ; 4. at {a given / the same} partial pressure of oxygen / eq ; 5. (oxygen released) to tissues / cells / muscle /eq ; **e.g**. 'oxygen is available to cells' **or** 'oxygen given to cells' **ACCEPT** oxygen concentration as equivalent to partial pressure of oxygen **Comment** 'oxygen released to muscles' gains m pt 3 and 5	**max (4)**