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Mark Scheme (Results)

January 2015

Pearson Edexcel International Advanced Subsidiary Level in Biology (WBI01) Paper 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.

Question Number	Answer	Mark
1(a)(i)	C ; ribose	**(1)**

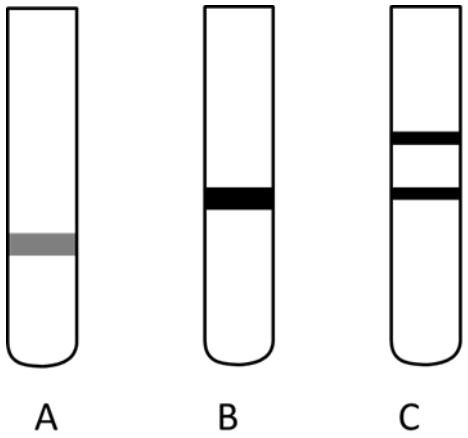
Question Number	Answer	Mark
1(a)(ii)	C ; hydrogen bonds between bases	**(1)**

Question Number	Answer	Mark
1(a)(iii)	D ; uracil	**(1)**

Question Number	Answer	Mark
1(a)(iv)	D ; phosphodiester bonds	**(1)**

Question Number	Answer	Mark
1(a)(v)	B ; cytosine	**(1)**

Question Number	Answer	Additional Guidance	Mark
1(b)(i)	1. idea that (new) DNA is synthesised ; 2. idea of a new DNA contains original strand and new strand ;	IGNORE DNA is replicated	**(2)**

Question Number	Answer	Additional Guidance	Mark
1(b)(ii)	1. one band in correct position in B ; 2. two bands in correct position in C ;  	IGNORE width of bands B one band higher than the band in A C one band at the same level as the band in B and also one band higher	**(2)**

Question Number	Answer	Additional Guidance	Mark
2(a)(i)	**A;** an ester bond formed by a condensation reaction		**(1)**

Question Number	Answer	Additional Guidance	Mark
2(a)(ii)	1. carbon – carbon double bond present in unsaturated lipid OR saturated lipid has only single bonds between carbons ; 2. idea that hydrogen to carbon ratio is larger in saturated lipid ; 3. idea that unsaturated FA chain is bent / saturated FA chain is straight ;	2. IGNORE more hydrogen ACCEPT more hydrogen on each carbon 3. ACCEPT unsaturated fatty acid chain has kinks IGNORE lipids are bent / have kinks	**(2)**

Question Number	Answer	Additional Guidance	Mark
2(b)	1. consists of (α) glucose / eq ; 2. (joined) by glycosidic bonds / eq ; 3. 1,4 and 1,6 (glycosidic bonds) ; 4. branched structure / eq ;	DO NOT ACCEPT β-glucose 1,4 and 1,6 glycosidic bonds would also gain mp2	**(3)**

Question Number	Answer	Additional Guidance	Mark
2(c	1. increasing intensity decreased lipid use / eq ; 2. increasing intensity increased carbohydrate use / eq ; 3. correct use of figures to support both mp1 **and** mp2 ;		**(3)**

Question Number	Answer	Additional Guidance	Mark
3(a)	1. plaques / atheroma; 2. arteries / artery ; 3. narrow / thicken / block / eq ; 4. blood / oxygen / 0_2 / nutrients / glucose / eq ; 5. brain / carotid artery ;	3. IGNORE constrict / loss of elasticity 4. ACCEPT metabolite 5. ACCEPT artery to brain **OR** in brain	**(5)**

Question Number	Answer	Additional Guidance	Mark
3(b)(i)	positive correlation between risk of death and blood cholesterol concentration / as blood cholesterol concentration increases the risk of death from CHD increases / eq ;		**(1)**

Question Number	Answer	Additional Guidance	Mark
3(b)(ii)	1. for each cholesterol level the risk is higher for people living in Asia (up to 5.8 blood cholesterol) ; 2. idea that in Asia there is a continual increase in risk and in Australia and New Zealand it is not linear ;	1. ACCEPT idea that higher concentrations of cholesterol are required to bring about same increase in risk in Australians and New Zealanders ;	**(2)**

Question Number	Answer	Additional Guidance	Mark
3(b)(iii)	Any **one** risk from: 1. more smoking in Asia 2. idea of differences in diet 3. idea of differences in health care 4. genetic differences (between Asians and Australians / New Zealanders) 5. idea of different level of activity ;		**(1)**

Question Number	Answer	Additional Guidance	Mark
3(b)(iv)	1. idea of identifying higher (CVD) risk in Asia and suggest or implement a change to reduce the risk ;	Need to link risk and what to do about it to gain mark	**(1)**

Question Number	Answer	Additional Guidance	Mark
4(a)	1. correctly drawn amino and carboxylic acid groups ; 2. central carbon with R group and hydrogen ;	ACCEPT $-NH_3^+$ and $-COO^-$	**(2)**

Question Number	Answer	Additional Guidance	Mark
4(b)*	***QWC Emphasis on spelling** 1. *transcription* of mRNA (takes place in the *nucleus)* ; 2. mRNA contains the code for new {protein / polypeptide / eq} / eq ; 3. mRNA {moves to the *cytoplasm* / leaves the *nucleus*} ; 4. idea that mRNA associates with a *ribosome* ; 5. idea that tRNA molecules attached to {specific / eq } amino acids ; 6. idea that tRNA molecules transport amino acids to the {*ribosome* / mRNA} ;	**QWC - Emphasis on spelling.** penalise once only for the entire response 1 .ACCEPT a description of mRNA synthesis	**(5)**

Question Number	Answer	Additional Guidance	Mark
4(c)	1. idea of (change in DNA sequence leads to) change in primary structure ; 2. idea of polypeptide chain will fold differently ; 3. idea that active site will have a different {shape / charge / ionisation} ; 4. idea that {substrate / phenylalanine} will no longer bind to active site ;	1. ACCEPT change in the amino acids 2. ACCEPT change in 3D / protein shape Alternative answer : Mp2 reference to stop codons Mp3 could result in no enzyme being synthesised Mp4 substrate has nothing to bind with	**(3)**

Question Number	Answer	Additional Guidance	Mark
4(d)	1. idea that (recessive condition so individual) 8 must have inherited one copy of the recessive allele from each parent ; 2. idea that neither 5 or 6 is affected so {they can't be homozygous / must be heterozygous} for the condition ;	1. ACCEPT individual person 8 is homozygous recessive / aa 2. ACCEPT (therefore) 5 and 6 are both Aa	**(2)**

Question Number	Answer	Additional Guidance	Mark
5(a)	1. many (small) alveoli ; 2. covered by extensive network of capillaries / eq ; 3. ensuring large surface area (for gas exchange) / eq ; 4. idea of thin {capillary walls / alveolar walls} ; 5. increases diffusion ;	IGNORE reference to moisture 1. ACCEPT "air sacs" ; 4. DO NOT ACCEPT thin lining 5. ACCEPT any correct reference to diffusion	**(4)**

Question Number	Answer	Additional Guidance	Mark
5(b)	1. idea that only a short distance from surface *of C. elegans* to cells inside body ; 2. idea that diffusion (alone) is sufficient ; 3. idea that *C. elegans* has low activity ;	1. ACCEPT large surface area to volume ratio ;	**(2)**

Question Number	Answer	Additional Guidance	Mark
6(a)	1. fatty acid chains (on phospholipid) are hydrophobic / eq ; 2. and {aggregate / group / eq} together ; 3. phosphate groups (on the phospholipid) are hydrophilic / eq ; 4. and associate with water ; 5. two monolayers form a bilayer ;	1. ACCEPT tails / hydrocarbon chains in place of fatty acid chains ; 2. ACCEPT orientate away from water ; 3. ACCEPT heads in place of phosphate group ;	**(3)**

Question Number	Answer	Additional Guidance	Mark
6(b)	1. phospholipids can move (in the plasma membrane) ; 2. proteins randomly inserted (in plasma membrane) / eq ;	1. ACCEPT {proteins / molecules / eq} can move around within the phospholipid (mono)layer ; 2. ACCEPT variety of different {proteins / glycoproteins} ; ACCEPT proteins scattered in the membrane ;	**(2)**

Question Number	Answer	Additional Guidance	Mark
6(c)(i)	1. idea that colour intensity increases as the permeability of the membrane increases ; 2. as the concentration (of alcohol above 10%) increases, the permeability of the cell membranes increases / eq ; 3. concentrations (of alcohol) up to 10% have no effect the permeability of the membrane ;	MP2 and MP3 ACCEPT answers in terms of intensity of colour only if correct correlation between colour intensity and permeability has been made for MP1	(2)

Question Number	Answer	Additional Guidance	Mark
6(c)(ii)	**Temperature** 1. if (temperature) increased the rate of diffusion increases / permeability increases / eq ; 2. and the solution may be darker / eq ; **Size of single cube** 3. smaller surface area / less tissue ; 4. solution will be less dark ;	2. and 4. ACCEPT correct reference to colorimeter reading ALTERNATIVE candidates might use several smaller cubes but it must be clear this is the case 3. ACCEPT increased surface area (to volume) 4. ACCEPT solution will be darker	(4)

Question Number	Answer	Additional Guidance	Mark
7(a)	A ; aorta		(1)

Question Number	Answer	Additional Guidance	Mark
7(b)	1. thin walls e.g. one layer of cells 2. so increased diffusion / short diffusion distance ; OR 3. gaps between cells 4. so allows exchange (of materials) ;	paired marks for MP1 and MP2 or MP3 and MP4 1. NOT thin membranes / thin lining / capillary is one cell thick 3. ACCEPT "has pores" ACCEPT "is permeable"	(2)

Question Number	Answer	Additional Guidance	Mark
7(c)	***QWC Emphasis on logical sequence** 1. atria contract / reference to atrial systole ; 2. atrioventricular valves open so blood flows from atria to ventricles ; 3. ventricles contract / reference to ventricular systole ; 4. atrioventricular valve closes to prevent backflow of blood into atria ; 5. semilunar valves open so blood {leaves ventricles / enters named artery} ; 6. ventricles relax / reference to ventricular diastole ; 7. semi lunar valves close ; 8. to prevent backflow of blood {from the aorta or pulmonary arteries / to the ventricle} ;	**Emphasis on logical sequence** penalise once only for entire response candidates can start their answer at any point in the cycle, but must follow the correct sequence although mark point 4 and 5 are interchangeable 2. and 4. ACCEPT named AV valve e.g. mitral (or bicuspid) and tricuspid 6. ACCEPT complete diastole	**(6)**

Question Number	Answer	Additional Guidance	Mark
7(d)	1. idea of oxygen rich and oxygen depleted blood mix / eq ; 2. idea that less blood pumped around body / blood pumped around body has a lower oxygen concentration / less oxygen delivered to body ; OR blood pumped to lungs has a higher oxygen concentration / less efficient gas exchange ; 3. idea that (systemic) blood pressure will be low ;		**(2)**

Question Number	Answer	Additional Guidance	Mark
8(a)(i)	idea of repeating the experiment ;		**(1)**

Question Number	Answer	Additional Guidance	Mark
8(a)(ii)	1. use additional concentration(s) of salt ; 2. between 4.0 and 4.5 g dm^{-3} ;	stated concentration(s) between 4.0 and 4.5 g dm^{-3} gains both marks	**(2)**

Question Number	Answer	Additional Guidance	Mark
8(a)(iii)	1. (they are swelling) as water is entering the cell ; 2. by osmosis ; 3. from an area of {high water / low solute / eq} concentration ; OR to one of {low water / high solute / eq} concentration ;	3. ACCEPT salt concentration is higher inside the cells (than outside cells) ; ACCEPT description of water potential gradient e.g. water moves into the cell down a water potential gradient gains mp1 and mp3;	**(3)**

Question Number	Answer	Additional Guidance	Mark
8(b)(i)	1. cell membrane is (selectively) permeable to potassium ions / eq ; 2. potassium ions diffuse ; 3. cell membrane is impermeable to haemoglobin / eq ;	1. ACCEPT potassium leaves the cell	**(3)**

Question Number	Answer	Additional Guidance	Mark
8(b)(ii)	1. in the presence of glucose, potassium enters the cell / eq ; 2. potassium taken up against a concentration gradient / eq ; 3. need for glucose suggests energy is required / eq ; 4. (suggesting) active transport of potassium ions ;	3. ACCEPT glucose as a respiratory substrate 4. ACCEPT pumping of potassium ions	**(3)**

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