General Certificate of Education (A-level)
June 2013

Biology BIOL1

(Specification 2410)

Unit 1: Biology and Disease

Final

Mark Scheme

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all examiners participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for standardisation each examiner analyses a number of students' scripts: alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, examiners encounter unusual answers which have not been raised they are required to refer these to the Principal Examiner.

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Question	Marking Guidelines	Marks	Comments
1(a)	1. **A**: phospholipid (layer); 2. **B**: pore/channel/pump/carrier/ transmembrane/intrinsic/transport <u>protein</u>;	2	1. Reject hydrophobic / hydrophilic phospholipid 2. Ignore unqualified reference to protein
1(b)(i)	Condensation (reaction);	1	
1(b)(ii)	Organelle named; Function in protein production/secretion; eg 1. Golgi (apparatus); 2. Package/process proteins; ***OR*** 3. Rough endoplasmic reticulum/ribosomes; 4. Make polypeptide/protein/forming peptide bonds; ***OR*** 5. Mitochondria; 6. Release of energy/make ATP; ***OR*** 7. Vesicles; 8. Secretion/transport of protein;	2	Function must be for organelle named Incorrect organelle = 0 1. Accept smooth endoplasmic reticulum 3. Accept alternative correct functions of rough endoplasmic reticulum. ER/RER is insufficient 3. Accept folding polypeptide/protein 6. Reject produce/make energy 6. Accept produce energy in the form of ATP

Question	Marking Guidelines	Marks	Comments
2(a)	1. (Enzyme has) <u>active site</u>; 2. Only substrate fits (the active site);	2	1. Reject active site is same shape as substrate 1. Reject active site is on the substrate 1. Accept active site forms during induced fit 2. Accept converse statement
2(b)	1. (Allopurinol) is a similar shape to xanthine; 2. (Allopurinol) enters active site / is a competitive inhibitor; 3. Less xanthine binds/fewer e-s complexes/fewer uric acid crystals formed/less uric acid formed;	3	Assume "it" = allopurinol 1. Reject <u>same</u> shape. Accept similar structure 2. Ignore e-s complexes in relation to inhibitor 2. Reject non-competitive inhibitor in the context of binding to the active site 2. Ignore complementary/fits 3. Reject <u>no</u> e-s complexes/xanthine <u>cannot</u> enter active site, <u>no</u> uric acid 3. Can award in context of non-competitive inhibition

Question	Marking Guidelines	Marks	Comments
3(a)(i)	(Simple) diffusion;	1	Reject facilitated diffusion Accept lipid diffusion
3(a)(ii)	1. Thin walls/cells; 2. (Total) surface area is large;	2	1. 'Short diffusion pathway' alone is an explanation not a description 1. Accept squamous epithelia / one cell thick 2. Ignore references to 'volume ratio'
3(b)	1. Loss of elasticity/elastic tissue; 2. Scar tissue; 3. Less recoil;	2 max	1. Accept elastin

Question	Marking Guidelines	Marks	Comments
4(a)	1. Toxin (produced by bacterium) causes (chloride) ions to move into (lumen of) intestine; 2. Water potential (of intestine contents) falls / water moves by osmosis into intestine/out of cells;	2	1. Reject incorrect ion 1. Direction of ion movement must be clear 2. Ignore movement of water from blood (rather than cells)
4(b)	1. Both show little/no increase/remain constant in January/February; 2. (Up to May) sea temperature rises more quickly/before increase in cholera; 3. Both reach a peak in/decline after April/May;	2 max	Ignore references to correlation Accept May to June
4(c)	1. Positive correlation from January to September/October (between sea temperature and cholera cases); 2. Only records people in hospital with cholera / may be people with cholera not in hospital; 3. Negative correlation/cases rising as sea temperature falls in October/November;	2 max	1. Ignore as sea temperature rises, cholera cases rise, as in stem 1. Accept any two months within range 3. 'At end of year' insufficient

4(d)	Suitable suggestion with explanation;; 1. Have produced memory cells; 2. After previous infection/vaccination; ***OR*** 3. Different forms of cholera; 4. Some don't produce much/any toxins; ***OR*** 5. Few bacteria ingested; 6. Not enough toxin to produce symptoms; ***OR*** 7. Some people naturally resistant to bacterium; 8. Because of structure of cell membranes / amount of secretions eg bile/pancreatic juices;	2	1. 'Have become immune' is not enough 2. Accept 'produces secondary response' 3. Accept types /strains /variety

Question	Marking Guidelines	Marks	Comments
5(a)	1. To allow comparison; 2. Because different number of cells in samples / different times for incubation / numbers become easier to manipulate;	2	
5(b)	203.7(%);;	2	Allow 1 mark for 21.8/10.7 Allow 1 mark for correct answer (203.74) but not correctly to 1 dp 204= 1 mark
5(c)(i)	1. (At every concentration) uptake is faster at 37^{o}C/at higher temperature; 2. Due to faster respiration/ATP production;	2	
5(c)(ii)	1. Uptake at 37^{o}C only small increase /levelling off/almost constant; 2. As carrier proteins full; 3. Concentration of imatinib is not the limiting factor;	2 max	Accept 'no (significant) change' Ignore use of numbers

Question	Marking Guidelines	Marks	Comments
6(a)	1. Add iodine/potassium iodide solution to the food sample; 2. Blue/black/purple indicates starch is present;	2	1. Allow 'iodine' 2. Must be in the context of the correct reagent
6(b)	1. Starch digested to maltose/by amylase; 2. Maltose digested to glucose/by maltase; 3. Digestion of sucrose is a single step/only one enzyme/sucrase;	3	Ignore 'hard to digest/easily digested' 3. Accept converse for starch 3. Do not accept digestion of sucrose is faster
6(c)	1. Smoking increases risk of CHD; 2. Introduces another variable;	1 max	
6(d)(i)	1. No effect on risk with diet group 1 and 2/lowest glycaemic load; 2. Above diet group 2/in higher groups, risk increases as glycaemic load increases;	1 max	Simple statement of correlation is not enough for this mark
6(d)(ii)	1. For diet group 2 and above, increase in risk of CHD as GL increases; 2. (Higher GL diets lead to) more (harmful) lipids (in blood), so greater risk of atheroma; 3. Atheroma leads to blockage of <u>coronary artery</u> / increased risk of blood clot in <u>coronary artery</u>;	2 max	Ignore reference to lipids in diet Ignore references to myocardial infarction/heart attack

Question	Marking Guidelines	Marks	Comments
7(a)	1. Microvilli; 2. Carrier proteins/co-transport proteins/membrane-bound enzymes; 3. Many mitochondria;	2 max	1. Accept large surface area Accept lots of ATP produced
7(b)(i)	Substance that causes an immune response/production of antibodies;	1	Ignore foreign/non-self
7(b)(ii)	1. Not lipid soluble; 2. Too large (to diffuse through the membrane); 3. Antigens do not have the complementary shape/cannot bind to receptor/channel/carrier proteins (in membranes of other epithelial cells);	2 max	
7(c)	1. (Vaccine contains) antigen/attenuated/dead pathogen; 2. Microfold cells take up/bind and present/transport antigen (to immune system/lymphocytes/T-cells); 3. T-cells activate B-cells; 4. B-cells divide/form clone/undergo mitosis; 5. B-cells produce antibodies; 6. Memory cells produced; 7. More antibodies/antibodies produced faster in secondary response/on reinfection;	5 max	1. Reject if in context of injection of vaccine 3. Accept T-cells release cytokines 4. Accept plasma cells for B-cells 6. Ignore T/B in reference to memory cells 7. Must be comparative

Question	Marking Guidelines	Marks	Comments
8(a)	1. SAN sends wave of electrical activity / impulses (across atria) causing atrial contraction; 2. Non-conducting tissue prevents immediate contraction of ventricles/prevents impulses reaching the ventricles; 3. AVN delays (impulse) whilst blood leaves atria/ventricles fill; 4. (AVN) sends wave of electrical activity / impulses down Bundle of His; 5. Causing ventricles to contract from base up;	5	Accept excitation 4. Allow Purkyne fibres/tissue
8(b)	1. Atrium has higher pressure than ventricle (due to filling/contraction); 2. Atrioventricular valve opens; 3. Ventricle has higher pressure than atrium (due to filling/contraction); 4. Atrioventricular valve closes; 5. Ventricle has higher pressure than aorta; 6. Semilunar valve opens; 7. Higher pressure in aorta than ventricle (as heart relaxes); 8. Semilunar valve closes; 9. (Muscle/atrial/ventricular) <u>contraction</u> causes increase in pressure;	5 max	Start anywhere in sequence, but events must be in the correct order. 2. Accept bicuspid, reject tricuspid 2. Allow: blood passes through the valve = valve open / blood stopped from passing through the valve = valve closed 4. 'prevents backflow' is not enough Points 1, 3, 5, and 7 must be comparative: eg high<u>er</u> 6. Allow aortic valve Marks 2, 4, 6, 8 given in the correct sequence can gain 4 marks 8. Allow aortic valve 8. 'prevents backflow' is not enough