



General Certificate of Education (A-level)
June 2013

Biology

BIOL1

(Specification 2410)

Unit 1: Biology and Disease

Final

Mark Scheme

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

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

| 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) | <ol style="list-style-type: none"> 1. Toxin (produced by bacterium) causes (chloride) ions to move into (lumen of) intestine; 2. <u>Water potential</u> (of intestine contents) falls / water moves by <u>osmosis</u> into intestine/out of cells; | 2 | <ol style="list-style-type: none"> 1. Reject incorrect ion 1. Direction of ion movement must be clear 2. Ignore movement of water from blood (rather than cells) |
| 4(b) | <ol style="list-style-type: none"> 1. Both show little/no increase/remains 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 | <p>Ignore references to correlation</p> <p>Accept May to June</p> |
| 4(c) | <ol style="list-style-type: none"> 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 | <ol style="list-style-type: none"> 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) | <p>Suitable suggestion with explanation;;</p> <ol style="list-style-type: none"> 1. Have produced memory cells; 2. After previous infection/vaccination; <p>OR</p> <ol style="list-style-type: none"> 3. Different forms of cholera; 4. Some don't produce much/any toxins; <p>OR</p> <ol style="list-style-type: none"> 5. Few bacteria ingested; 6. Not enough toxin to produce symptoms; <p>OR</p> <ol style="list-style-type: none"> 7. Some people naturally resistant to bacterium; 8. Because of structure of cell membranes / amount of secretions eg bile/pancreatic juices; | 2 | <ol style="list-style-type: none"> 1. 'Have become immune' is not enough 2. Accept 'produces secondary response' 3. Accept types /strains /variety |
|------|--|---|---|

| Question | Marking Guidelines | Marks | Comments |
|----------|--|-------|--|
| 5(a) | <ol style="list-style-type: none"> To allow comparison; Because different number of cells in samples / different times for incubation / numbers become easier to manipulate; | 2 | |
| 5(b) | 203.7(%);; | 2 | <p>Allow 1 mark for 21.8/10.7</p> <p>Allow 1 mark for correct answer (203.74) but not correctly to 1 dp</p> <p>204= 1 mark</p> |
| 5(c)(i) | <ol style="list-style-type: none"> (At every concentration) uptake is faster at 37°C/at higher temperature; Due to faster respiration/ATP production; | 2 | |
| 5(c)(ii) | <ol style="list-style-type: none"> Uptake at 37°C only small increase /levelling off/almost constant; As carrier proteins full; Concentration of imatinib is not the limiting factor; | 2 max | <p>Accept 'no (significant) change'</p> <p>Ignore use of numbers</p> |

| Question | Marking Guidelines | Marks | Comments |
|----------|---|-------|---|
| 6(a) | <ol style="list-style-type: none"> 1. Add iodine/potassium iodide solution to the food sample; 2. Blue/black/purple indicates starch is present; | 2 | <ol style="list-style-type: none"> 1. Allow 'iodine' 2. Must be in the context of the correct reagent |
| 6(b) | <ol style="list-style-type: none"> 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 | <p>Ignore 'hard to digest/easily digested'</p> <ol style="list-style-type: none"> 3. Accept converse for starch 3. Do not accept digestion of sucrose is faster |
| 6(c) | <ol style="list-style-type: none"> 1. Smoking increases risk of CHD; 2. Introduces another variable; | 1 max | |
| 6(d)(i) | <ol style="list-style-type: none"> 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) | <ol style="list-style-type: none"> 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 | <p>Ignore reference to lipids in diet</p> <p>Ignore references to myocardial infarction/heart attack</p> |

| Question | Marking Guidelines | Marks | Comments |
|----------|---|-------|--|
| 7(a) | <ol style="list-style-type: none"> 1. Microvilli; 2. Carrier proteins/co-transport proteins/membrane-bound enzymes; 3. Many mitochondria; | 2 max | <ol style="list-style-type: none"> 1. Accept large surface area <p>Accept lots of ATP produced</p> |
| 7(b)(i) | Substance that causes an immune response/production of antibodies; | 1 | Ignore foreign/non-self |
| 7(b)(ii) | <ol style="list-style-type: none"> 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) | <ol style="list-style-type: none"> 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 | <ol style="list-style-type: none"> 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) | <ol style="list-style-type: none"> 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 | <p>Accept excitation</p> <p>4. Allow Purkyne fibres/tissue</p> |
| 8(b) | <ol style="list-style-type: none"> 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 | <p>Start anywhere in sequence, but events must be in the correct order.</p> <p>2. Accept bicuspid, reject tricuspid</p> <p>2. Allow: blood passes through the valve = valve open / blood stopped from passing through the valve = valve closed</p> <p>4. 'prevents backflow' is not enough</p> <p>Points 1, 3, 5, and 7 must be comparative: eg <u>higher</u></p> <p>6. Allow aortic valve</p> <p>Marks 2, 4, 6, 8 given in the correct sequence can gain 4 marks</p> <p>8. Allow aortic valve</p> <p>8. 'prevents backflow' is not enough</p> |