



**General Certificate of Education (A-level)**  
**January 2012**

**Human Biology**

**HBIO1**

**(Specification 2405)**

**Unit 1: The Body and its Diseases**

**Post-Standardisation**

***Mark Scheme***

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Question	Marking Guidance	Mark	Comments
1(a)	Phospholipid/lipid/bilayer;	1	
1(b)(i)	Protein;	1	
1(b)(ii)	2 possible functions;; e.g. carrier; channel;	2	Allow named examples, e.g. facilitated diffusion, active transport  Accept transport of two substances of ion/molecular size
1(c)	Mitochondrion/mitochondria;	1	

Question	Marking Guidance	Mark	Comments
2(a)	<ol style="list-style-type: none"> <li>1. (Blood) vessel/artery/vein used (from other part of body);</li> <li>2. By-passes blockage in (coronary) artery;</li> <li>3. Restores blood supply to heart (muscle);</li> </ol>	2 max	Accept restores oxygen/glucose to the heart
2(b)	<ol style="list-style-type: none"> <li>1. Fit into receptors on heart muscle;</li> <li>2. Block effect of adrenaline/noradrenaline;</li> <li>3. Prevents rise in heart rate/lowers heart rate;</li> <li>4. Reduces blood pressure;</li> <li>5. Reduces likelihood of atheroma/MI/stroke/aneurysm;</li> </ol>	2 max	<p>Reject regulates heart rate</p> <p>Reject artery bursting. Accept thrombus/blood clot</p>
2(c)	<ol style="list-style-type: none"> <li>1. (Angioplasty) opens blocked (coronary) artery;</li> <li>2. Increases blood flow to heart <u>muscle</u> / in coronary artery;</li> <li>3. Increases supply of oxygen / glucose to heart;</li> </ol>	2 max	<p>Do not credit incorrect artery</p> <p>Ignore reduces pressure</p>

Question	Marking Guidance	Mark	Comments
3(a)	<ol style="list-style-type: none"> <li>1. Source of fibre;</li> <li>2. Slows absorption of sugars/lowers GI/prevents constipation/promotes healthy gut flora/protects against colon cancer/promotes fullness;</li> <li>3. High in vitamins;</li> <li>4. High in minerals;</li> <li>5. Specific effect of vitamin/mineral;</li> </ol>	2 max	Reject Vitamin D
3(b)	<p>Any four suitable reasons ;;;;</p> <p>e.g. No</p> <ol style="list-style-type: none"> <li>1. Does not give quantities/portion size;</li> <li>2. So you don't know how much energy;</li> <li>3. Different people/sex/activity level;</li> <li>4. Does not give information about processed foods/ how food is prepared;</li> <li>5. Does not distinguish wholemeal/white bread;</li> <li>6. Does not distinguish chicken/red meat;</li> <li>7. Does not distinguish whole/skimmed milk;</li> </ol> <p>e.g. Yes</p> <ol style="list-style-type: none"> <li>8. Is of use because tells us which foods to eat more/less of;</li> <li>9. Gives picture clues/examples of types of food;</li> </ol>	4 max	Ignore references to water/drinks

Question	Marking Guidance	Mark	Comments
4(a)(i)	A;	1	
4(a)(ii)	A;	1	
4(b)	<ol style="list-style-type: none"> <li>1. Movement of sodium ions from blood / into tissue fluid;</li> <li>2. Lower water potential in tissue fluid;</li> <li>3. Reduced water potential gradient (between tissue fluid and capillary);</li> <li>4. Less water from tissue fluid enters capillaries;</li> <li>5. By osmosis;</li> <li>6. Builds up in tissues (causing oedema) / not drained by lymphatic system;</li> </ol>	3 max	

Question	Marking Guidance	Mark	Comments
5(a)	<ol style="list-style-type: none"> <li>1. Net movement of <u>water</u> across a (selectively permeable) <u>membrane</u>;</li> <li>2. Down a water potential gradient/from high water potential to lower water potential;</li> </ol>	2	Reject along/across a water potential gradient
5(b)	<ol style="list-style-type: none"> <li>1. Red caused by red blood cells/haemoglobin; (Tube 2)</li> <li>2. Has higher water potential than cells;</li> <li>3. So water enters cells (by osmosis);</li> <li>4. Cells burst/swell;</li> <li>5. Haemoglobin released/cell contents in solution;</li> <li>6. Small pellet in tube 2 because fewer cells; (Tube 1)</li> <li>7. Idea that cells are denser than solution;</li> <li>8. Goes yellow because that is the colour of plasma;</li> </ol>	4 max	Accept hypotonic

Question	Marking Guidance	Mark	Comments
6(a)	<ol style="list-style-type: none"> <li>1. No/less/insufficient lactase produced;</li> <li>2. Lactose not digested;</li> <li>3. Lactose lowers water potential in gut;</li> <li>4. Water absorbed into gut, causing diarrhoea;</li> <li>5. Gut bacteria feed on lactose producing gas;</li> <li>6. Leads to abdominal pain/nausea;</li> </ol>	4 max	<p>Accept bloating</p> <p>QWC</p>
6(b)	<ol style="list-style-type: none"> <li>1. Reference to 2.2 or 6.0 – 3.8;</li> <li>2. 58%;;</li> </ol>	2 max	Accept suitable calculation
6(c)	<ol style="list-style-type: none"> <li>1. Glucose concentration (in blood) does not increase / only slightly increases;</li> <li>2. Since unable to digest lactose (to give glucose);</li> </ol>	2	



Question	Marking Guidance	Mark	Comments
7(a)(i)	<ol style="list-style-type: none"> <li>1. Swab known area/1cm<sup>2</sup>;</li> <li>2. For fixed amount of time;</li> <li>3. (Place) chosen at random;</li> <li>4. Repeat/take several swabs;</li> </ol>	2 max	
7(a)(ii)	<ol style="list-style-type: none"> <li>1. To prevent (unwanted/environmental) bacteria getting onto swab / into culture medium;</li> <li>2. To prevent bacteria (from culture) entering/escaping into environment;</li> </ol>	2	
7(b)(i)	105, 39, 170;	1	
7(b)(ii)	<ol style="list-style-type: none"> <li>1. All bacterial counts above guidelines;</li> <li>2. Faecal bacteria many/170 times higher than guidelines;</li> <li>3. Faecal bacteria most likely to cause disease;</li> <li>4. e.g. named example of disease;</li> <li>5. indicates poor (personal) hygiene;</li> <li>6. Phone could transfer disease;</li> </ol>	3 max	

<b>Question</b>	<b>Marking Guidance</b>	<b>Mark</b>	<b>Comments</b>
8(a)	1. Antibodies have binding/receptor site with specific shape; 2. Only complementary antigen will fit;	2	Reject active site          QWC
8(b)	1. Blue line seen at position 1 if pregnant; 2. Antibody X will have hCG attached; 3. So bind to antibody Y; 4. If not pregnant antibody X attaches at position 2/to (antibody) Z; 5. Antibodies too small to be seen/colourless; 6. Blue bead allows result to be seen;	5 max	

Question	Marking Guidance	Mark	Comments
9(a)(i)	<ol style="list-style-type: none"> <li>1. Enzyme (perhaps) not broken down by UV;</li> <li>2. Enzyme (perhaps) not broken down by temperature;</li> <li>3. Enzyme reacts many times with chemical but vitamin E used up when it binds;</li> <li>4. Enzyme works faster at higher temperatures/40 °C;</li> <li>5. So enzyme protects for longer / breaks down more of the chemical;</li> </ol>	3 max	Accept-Enzyme may not be broken down by UV light (Vit E is);
9(a)(ii)	<ol style="list-style-type: none"> <li>1. Strong bonds / covalent bonds;</li> <li>2. Keep enzyme in its tertiary structure;</li> <li>3. Less likely to denature/change active site;</li> </ol>	2 max	
9(b)	<ol style="list-style-type: none"> <li>1. Nature of people used/age/sex etc;</li> <li>2. How to expose skin to sunlight;</li> <li>3. How you measure the damage;</li> <li>4. How long to run the study;</li> <li>5. Factors affecting composition of the lotion;</li> <li>6. Factors affecting the application of the lotion;</li> <li>7. Cost of enzyme;</li> <li>8. Allergic/toxic effects of enzyme;</li> <li>9. Stability of enzyme;</li> </ol>	4 max	<p>Ignore repeats</p> <p>e.g. formula/pH e.g. amount/where it's put on the skin</p> <p>e.g. UV stable / shelf life</p>

Question	Marking Guidance	Mark	Comments
10(a)	<ol style="list-style-type: none"> <li>1. Consuming food/drink contaminated (with bacteria);</li> <li>2. Bacteria from faeces;</li> <li>3. Eggs/meat inadequately cooked;</li> <li>4. Large number (of bacteria) needed to cause harm;</li> <li>5. Bacteria invade gut cells;</li> <li>6. Reproduce/divide;</li> <li>7. (Bacterial) cells <u>die and</u> release (endo)toxin;</li> <li>8. That damages/kills cells;</li> <li>9. Diarrhoea/sickness/abdominal pain/fever;</li> </ol>	6 max	two symptoms needed for 1 mark
10(b)	<ol style="list-style-type: none"> <li>1. HIV infects T-cells;</li> <li>2. Envelope of HIV fuses with membrane of T-cell;</li> <li>3. Destroys T-cells;</li> <li>4. T cells no longer activate B-cells/stimulate antibody production;</li> <li>5. B-cells don't divide;</li> <li>6. Don't produce plasma cells;</li> <li>7. Plasma/B-cells don't produce antibodies;</li> <li>8. Antibodies specific;</li> </ol>	4 max	
10(c)(i)	To show effect is due to morphine/that no other variable is responsible;	1	Reject control/comparison unqualified

10(c)(ii)	<ol style="list-style-type: none"> <li>1. To increase reliability;</li> <li>2. Reduce effect of anomalies;</li> <li>3. Reduces effect of other variables/ no need to match samples;</li> </ol>	2 max	<p>Ignore validity</p> <p>Accept outliers</p>
10(d)	<ol style="list-style-type: none"> <li>1. They may re-use/share needles;</li> <li>2. Blood containing HIV from one person transferred to another;</li> </ol>	2	
10(e)	<p>(Yes)</p> <ol style="list-style-type: none"> <li>1. Mice with morphine more likely to die of Salmonella;</li> <li>2. Increase in food poisoning in AIDS patients, who may take morphine;</li> <li>3. Mice similar to humans;</li> <li>4. Large sample size;</li> </ol> <p>(No)</p> <ol style="list-style-type: none"> <li>5. Mice different species, so different reaction from humans to morphine;</li> <li>6. Did not investigate the effect of HIV;</li> <li>7. Some salmonella deaths in mice given placebo;</li> </ol>	5 max	<p>Q To get full marks, both sides of the argument should be addressed</p> <p>Accept no statistical analysis for 1 mark</p>