



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

Question	Marking Guidance	Mark	Comments
3(a)	<ol style="list-style-type: none"> 1. Source of fibre; 2. Slows absorption of sugars/lowers GI/prevents constipation/promotes healthy gut flora/protects against colon cancer/promotes fullness; 3. High in vitamins; 4. High in minerals; 5. Specific effect of vitamin/mineral; 	2 max	Reject Vitamin D
3(b)	<p>Any four suitable reasons ;;;;</p> <p>e.g. No</p> <ol style="list-style-type: none"> 1. Does not give quantities/portion size; 2. So you don't know how much energy; 3. Different people/sex/activity level; 4. Does not give information about processed foods/ how food is prepared; 5. Does not distinguish wholemeal/white bread; 6. Does not distinguish chicken/red meat; 7. Does not distinguish whole/skimmed milk; <p>e.g. Yes</p> <ol style="list-style-type: none"> 8. Is of use because tells us which foods to eat more/less of; 9. Gives picture clues/examples of types of food; 	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"> 1. Movement of sodium ions from blood / into tissue fluid; 2. Lower water potential in tissue fluid; 3. Reduced water potential gradient (between tissue fluid and capillary); 4. Less water from tissue fluid enters capillaries; 5. By osmosis; 6. Builds up in tissues (causing oedema) / not drained by lymphatic system; 	3 max	

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

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

Question	Marking Guidance	Mark	Comments
7(a)(i)	<ol style="list-style-type: none"> 1. Swab known area/1cm²; 2. For fixed amount of time; 3. (Place) chosen at random; 4. Repeat/take several swabs; 	2 max	
7(a)(ii)	<ol style="list-style-type: none"> 1. To prevent (unwanted/environmental) bacteria getting onto swab / into culture medium; 2. To prevent bacteria (from culture) entering/escaping into environment; 	2	
7(b)(i)	105, 39, 170;	1	
7(b)(ii)	<ol style="list-style-type: none"> 1. All bacterial counts above guidelines; 2. Faecal bacteria many/170 times higher than guidelines; 3. Faecal bacteria most likely to cause disease; 4. e.g. named example of disease; 5. indicates poor (personal) hygiene; 6. Phone could transfer disease; 	3 max	

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

Question	Marking Guidance	Mark	Comments
10(a)	<ol style="list-style-type: none"> 1. Consuming food/drink contaminated (with bacteria); 2. Bacteria from faeces; 3. Eggs/meat inadequately cooked; 4. Large number (of bacteria) needed to cause harm; 5. Bacteria invade gut cells; 6. Reproduce/divide; 7. (Bacterial) cells <u>die and</u> release (endo)toxin; 8. That damages/kills cells; 9. Diarrhoea/sickness/abdominal pain/fever; 	6 max	two symptoms needed for 1 mark
10(b)	<ol style="list-style-type: none"> 1. HIV infects T-cells; 2. Envelope of HIV fuses with membrane of T-cell; 3. Destroys T-cells; 4. T cells no longer activate B-cells/stimulate antibody production; 5. B-cells don't divide; 6. Don't produce plasma cells; 7. Plasma/B-cells don't produce antibodies; 8. Antibodies specific; 	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"> 1. To increase reliability; 2. Reduce effect of anomalies; 3. Reduces effect of other variables/ no need to match samples; 	2 max	<p>Ignore validity</p> <p>Accept outliers</p>
10(d)	<ol style="list-style-type: none"> 1. They may re-use/share needles; 2. Blood containing HIV from one person transferred to another; 	2	
10(e)	<p>(Yes)</p> <ol style="list-style-type: none"> 1. Mice with morphine more likely to die of Salmonella; 2. Increase in food poisoning in AIDS patients, who may take morphine; 3. Mice similar to humans; 4. Large sample size; <p>(No)</p> <ol style="list-style-type: none"> 5. Mice different species, so different reaction from humans to morphine; 6. Did not investigate the effect of HIV; 7. Some salmonella deaths in mice given placebo; 	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>