



General Certificate of Education (A-level)
June 2013

Human Biology

HBIO1

(Specification 2405)

Unit 1: The Body and its Diseases

Final

Mark Scheme

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Question	Marking Guidance	Mark	Comments
1 (a) (i)	Amino acid;	1	
1 (a) (ii)	pH/temperature/substrate concentration;	1	Accept presence of inhibitors/enzyme concentration
1 (b)	<ol style="list-style-type: none"> 1. Starch and cellulose have different shapes; 2. Only starch fits active site; 3. Cellulose will not form ES complex; 	2 max	
1 (c)	<ol style="list-style-type: none"> 1. Line following shape of middle part of curve, but lower; 2. Starts level with initial straight line and ends level with final straight line; 	2	

Question	Marking Guidance	Mark	Comments
2 (a)	<ol style="list-style-type: none"> 1. (Ribosome) making protein; 2. (Vesicle) carrying mucus/protein to cell surface/Golgi body; 	2	
2 (b)	<ol style="list-style-type: none"> 1. Faulty CFTR protein; 2. Chloride ions do not move out of cell; 3. WP of mucus too high/not lowered; 4. Water remains in epithelial cell/does not move out of cell; 5. By osmosis; 	3 max	<ol style="list-style-type: none"> 1. Accept CFTR protein not incorporated into membrane

Question	Marking Guidance	Mark	Comments
3 (a)	1. Protein; 2. Starch; 3. Triglyceride;	3	1. Accept enzymes, named examples of proteins 3. Accept lipid/fat/oil/phospholipid
3 (b) (i)	Glucose;	1	
3 (b) (ii)	1. Level with A/spot in the mixture; 2. Glucose produced when maltose hydrolysed/digested/broken down (by/incubated with maltase);	2	MP1 can be awarded if wrong sugar identified

Question	Marking Guidance	Mark	Comments
4 (a)	<ol style="list-style-type: none"> 1. (Antibodies that are all) same shape/structure; 2. Bind to one (specific) antigen; 3. Produced from one B cell/same clone of plasma cells; 	2 max	<ol style="list-style-type: none"> 3. Accept produced from hybridoma cells
4 (b) (i)	<ol style="list-style-type: none"> 1. (Binds to HER-2 receptors) so hormone cannot bind; 2. (Therefore) cell division not stimulated/cells divide normally; 	2	
4 (b) (ii)	Some kinds of breast cancer do not involve HER-2 receptors;	1	

Question	Marking Guidance	Mark	Comments
5 (a) (i)	1. Lower in energy; 2. Less likely to cause obesity; OR 3. Lower in fat/saturated fats; 4. Less likely to lead to CHD/obesity; OR 5. Lower in salt; 6. Less likely to raise blood pressure;	2 max	
5 (a) (ii)	1. Higher in sugar; 2. Leads to tooth decay/diabetes/obesity; OR 3. Don't know figures for protein; 4. Protein important for growth/repair; OR 5. Don't know figures for fibre; 6. Important for digestive transit/reduces GI/reduces risk of colon cancer;	2 max	Credit other valid points, eg don't know vitamin content
5 (b)	23.1g/23g;; Allow one mark for dividing 3 by 13;	2	Accept any figure between 23 and 23.1

Question	Marking Guidance	Mark	Comments
6 (a) (i)	Allows time for atria to empty (completely)/allows ventricles to be filled before contracting/allows atria to contract before ventricles;	1	
6 (a) (ii)	<ol style="list-style-type: none"> (Allows ventricles to) contract from bottom up; Emptying completely/pushes blood into arteries; 	2	
6 (b) (i)	<ol style="list-style-type: none"> Less blood leaving heart/lower stroke volume; (because) Ventricle lumen smaller/filled ventricle contains less blood; (Some) blood passes from ventricle back (to atrium through leaky atrioventricular valve)/backflow of blood from ventricle; Narrowed opening of aorta may reduce amount of blood entering it/leaving ventricle; 	3 max	
6 (b) (ii)	<ol style="list-style-type: none"> (Thick muscle) has high rate of respiration; Heart muscle fatigues/cramps/ lactate builds up; Uses more oxygen/glucose; Coronary arteries cannot supply enough (oxygen/glucose); <p>OR</p> <ol style="list-style-type: none"> Not enough blood along coronary artery; Not enough oxygen getting to heart muscle cells; 	2 max	

Question	Marking Guidance	Mark	Comments
7 (a)	<ol style="list-style-type: none"> 1. Same water potential; 2. As body cells/tissues/fluids; 	2	
7 (b) (i)	Whether isotonic drinks improve the time taken to complete a run;	1	Accept other forms of wording that mean 'finding out whether isotonic sports drinks improve athletic performance'
7 (b) (ii)	<ol style="list-style-type: none"> 1. Small numbers in study; 2. Random grouping could produce very different groups; <p>OR</p> <ol style="list-style-type: none"> 3. To make sure the average performance of each group of athletes was similar; 4. So groups could be compared; 	2	Accept comment showing clear understanding that with the small numbers involved in the study, random grouping could have produced very different groups (for 2 marks)
7 (c)	<ol style="list-style-type: none"> 1. Isotonic drink contains sugars; 2. Provides energy; 3. Used for respiration; 4. Contains salts/electrolytes; 5. Replaces salts lost (in sweating); 	2 max	

Question	Marking Guidance	Mark	Comments
8 (a)	<ol style="list-style-type: none"> 1. Thick mucus (in gut); 2. Prevents enzymes entering (lumen of) gut (to digest food); 3. Mucus blocks pancreatic duct; 	2 max	
8 (b)	<p>Fat intake – fat content of faeces/fat intake x 100%;;</p> <p>Award 1 mark for answer that clearly shows fat absorbed = fat intake – fat content of faeces;</p> <p>OR</p> <p>1 mark for fat absorbed/fat intake x 100%;</p>	2	Accept worked example using figures from the table
8 (c)	<ol style="list-style-type: none"> 1. To see if there is an age related pattern; 2. In fat absorption/fat intake/ enzyme effectiveness; 3. Different degrees of severity of CF/ CF symptoms get worse with age; 4. Mucus may be thicker in older patients; 	2 max	
8 (d)	<p>Suitable suggestion;</p> <p>Explained;</p> <p>Eg</p> <ol style="list-style-type: none"> 1. Enables different brands of capsules to be compared; 2. Enables doctors to find effectiveness of enzyme capsules; <p>OR</p> <ol style="list-style-type: none"> 3. Can prescribe correct dose; 4. to ensure high fat absorption; 	2 max	

Question	Marking Guidance	Mark	Comments
9 (a)	<ol style="list-style-type: none"> 1. Death of cardiac/heart muscle cells; 2. Caused by reduction in blood/oxygen/glucose supply; 3. Clot/atheroma in <u>coronary</u> artery; 	3	
9 (b) (i)	<ol style="list-style-type: none"> 1. More MIs per day during world cup; 2. Differences are greater when German matches played; 3. Differences much greater for men/men have more MIs than women; 4. MIs in women raised only slightly during world cup non-German matches; 	2 max	Accept suitable figures from graph as alternatives to marking points
9 (b) (ii)	<p>YES</p> <ol style="list-style-type: none"> 1. Betablockers reduce heart rate/hypertension; 2. Reduce chances of MI; 3. Chance of MI increased during important football matches; 4. Cheaper to prescribe beta-blockers than to treat MI; <p>NO</p> <ol style="list-style-type: none"> 1. Women show smaller increase in MIs than men; 2. Might be on beta-blockers already; 3. Money might be better spent elsewhere in health service; 4. MI might not be result of hypertension/other factors cause MIs; 5. Difficult to define 'important' football matches/other major sports events may show similar effects; 	4 max	<p>Max 3 if only one side of the argument addressed</p> <p>Ignore cost unqualified</p>

Question	Marking Guidance	Mark	Comments
10 (a)	<ol style="list-style-type: none"> 1. Prevent cell wall <u>synthesis</u>; 2. Prevent protein synthesis; 3. Block metabolism; 	2 max	<p>Damage to cell wall not enough</p> <p>Accept disrupt cell membrane</p>
10 (b)	<ol style="list-style-type: none"> 1&2. Persistent cough/coughs up blood/fever/breathlessness/weight loss/night sweats/chest pain; 3. Bacteria invade lung tissue; 4. Destroy lung tissue; 5. (Damaged lung tissue) reduces gas exchange; 6. Bacteria become surrounded by dead lung tissue/tubercles; 7. Bacteria spread to other parts of the body; 8. Damage caused by white blood cells; 	6 max	<ol style="list-style-type: none"> 1. 1 mark per symptom to maximum of 2
10 (c)	<ol style="list-style-type: none"> 1. HIV infects T cells/T helper cells; 2. Impaired immune response; 3. Any valid description of consequence of infection of T helper cell; 	3	<ol style="list-style-type: none"> 3. Eg opportunistic infection
10 (d) (i)	Condensation;	1	
10 (d) (ii)	<ol style="list-style-type: none"> 1. C₁₂; 2. H₂₂O₁₁; 	2	
10 (e)	Treatment unlikely to harm humans;	1	
10 (f)	<ol style="list-style-type: none"> 1. Take in water by osmosis; 2. Wall cannot withstand pressure; 3. Burst; 	2 max	

10 (g)	To ensure treatment works in living organism/that mouse cells do not affect the inhibition/to ensure treatment is not harmful to mice;	1	Accept test on mice before humans
10 (h)	<ol style="list-style-type: none"> 1. Fits into/blocks active site; 2. No ES complex formed; 3. Prevents trehalose binding; 	2 max	