



**General Certificate of Education  
June 2010**

**Human Biology**

**HBIO1**

**The body and its diseases**

**Unit 1**

**Final**

<b><i>Mark Scheme</i></b>
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Question	Part	Sub Part	Marking Guidance	Mark	Comments			
1	a			3	1 mark for each correct row  Ignore candidates' crosses			
						Proteins	Glycerol	Polysaccharides
			Contains amino acids			√		
			The molecule is a polymer			√		√
			Formed by condensation reactions			√		√
1	b		Fibre reduces constipation / exercises muscles in gut; Causes sugars/fats to be absorbed more slowly/lowers glycaemic load; Reduces chance of (colon) cancer; Encourages healthy gut flora; Reduces overeating/creates feeling of “fullness”;	2 max				

Question	Part	Sub Part	Marking Guidance	Mark	Comments
2	a	i	P = membrane/ lipid envelope/phospholipid bilayer; Q = reverse transcriptase;	2	<i>Accept (host) cell membrane;</i>
2	a	ii	Carries genetic information/to make DNA;	1	<b>Q</b> <i>Do not accept 'information' on its own accept genes, alleles, to make (viral) protein;</i>
2	b		DNA copy made (of viral RNA); Inserted into host DNA/chromosomes; (Uses viral DNA to) make viral proteins/particles; Makes viral RNA; (Host) cell makes new viruses; "Budding off"/wrapped in cell membrane;	3 max	<i>Accept reverse transcriptase makes DNA for 2 marks in correct context;</i>

Question	Part	Sub Part	Marking Guidance	Mark	Comments
3	a		To sterilise/kill bacteria; So that only one kind of bacteria present on agar plate/to prevent contamination (by bacteria);	2	
3	b		Clear zone/inhibition zone is where bacteria have not grown/been inhibited/killed; Antibiotic diffuses out of paper disc/into agar; Bacterium <b>A</b> inhibited/killed by tetracycline/tetracycline has little effect on bacterium <b>B</b> ; Bacterium <b>B</b> inhibited/killed by penicillin/ bacterium <b>A</b> resistant to penicillin; Both kinds of bacteria resistant to streptomycin;	4 max	<b>Q</b> Ignore references to 'immune'

Question	Part	Sub Part	Marking Guidance	Mark	Comments
4	a		Fluid = molecules move around; Mosaic = proteins floating among phospholipids/not just phospholipids/other molecules in it/made of different sorts of molecules;	2	<i>Accept liquid</i>
4	b		Any two from Enzymes; Antigens/cell recognition/cell markers; Receptors; Carriers; Channels;	2 max	<i>Any 2 Accept active transport and facilitated diffusion for 1 mark each</i>
4	c		Active transport; Calcium ions move against a concentration gradient/calcium ion concentration in solution is (much) higher than concentration inside cells;	2	

Question	Part	Sub Part	Marking Guidance	Mark	Comments
5	a	i	Changes shape of antitrypsin; Reference to hydrogen/ionic/disulfide bonds; No longer attaches to/interacts/ reacts with trypsin;	2	<i>Accept protease</i>
5	a	ii	Higher the concentration of hydrogen peroxide, more amino acids/proteins affected; More antitrypsin molecules change shape;	2	
5	b		(Longterm smokers) inhale a lot of hydrogen peroxide; Smokers have more active enzyme that damages lung tissue; Reducing gas exchange surface;	2 max	

Question	Part	Sub Part	Marking Guidance	Mark	Comments
6	a		Highest pressure in artery (so greatest chance of damage); Atheroma starts/forms where lining of vessel damaged;	2	
6	b		Greater surface area for exchange; For diffusion/exchange of named substance; OR Slows rate of flow/increases friction; So more time for exchange; OR Reduced pressure in capillary; So they don't rupture;	2	<i>Accept references to short diffusion pathways</i>
6	c		Many capillaries connect into fewer veins; Blood from capillaries all goes into veins; Veins smaller (total) cross-sectional area, so flow must be greater; Reduced cross-sectional area therefore less friction;	2 max	



Question	Part	Sub Part	Marking Guidance	Mark	Comments
7	a	i	2 suitable symptoms, e.g. Vomiting/sickness/nausea; Fever/raised temperature; Diarrhoea; Abdominal/stomach pain;	2 max	<b>Q</b> Do not credit terms like <i>bellyache, chuck up, puke etc.</i>
7	a	ii	Contaminated by chicken faeces; Contaminated by faeces from human/by human carrier; Contaminated from another food/infected work surface/utensil; Chicken not vaccinated;	2 max	<b>Q</b> Do not accept vague references such as <i>'not washing hands after going to the toilet'</i> Accept faeces for 1 mark as an alternative to points one and two
7	b		Water (on its own); To show any effects due to sugars;	2	
7	c		Effective in reducing infection in chickens; Chicken not only source of food poisoning in humans; Chickens may pick up infections later/do not know if treatment works on older chickens; Mannose more effective than lactose; Sugars do not prevent <i>Salmonella</i> infection (of chickens); (With sugars) some chickens still infected might contain high numbers of <i>Salmonella</i> ; Only two types of sugar tested;	3 max	

Question	Part	Sub Part	Marking Guidance	Mark	Comments
8	a		$3/37 \times 100\%$ ; 8.1% / 8.11%;;	2	<i>Correct answer scores 2 marks</i> <i>Accept the answer in the table or in the space below Q8(a)</i>
8	b	i	Prevents blood pooling (in veins); Maintains/increases pressure; Prevents backflow/helps to return blood up leg/ to trunk;	2 max	
8	b	ii	Suitable method, e.g. pull names out of a hat/toss a coin/use a computer/generate random numbers on a calculator;	1	
8	c		Lower percentage of people with DVT; Much smaller number with large DVT; Small sample size; Does not eliminate risk; Other factors/named factor could cause DVT;	3 max	

Question	Part	Sub Part	Marking Guidance	Mark	Comments
9	a	i	Initial (large) change in FEV <sub>1</sub> then slowly falls (over period of study); Higher than placebo (throughout);	2	
9	a	ii	(Thinner mucus) easier to cough up/can be moved by cilia; Less likely to block airways/ increases lung capacity; Makes physiotherapy more effective;	2 max	
9	b		For comparison; People different ages/sizes/lung volumes/FEV <sub>1</sub> /different group sizes;	2	
9	c		We do not know whether it is equally effective on all age groups/at different stages of the disease; Older people with CF tend to have more lung damage; Older people with CF more exposure to environmental factor, e.g. smoking, air pollution;	2	

Question	Part	Sub Part	Marking Guidance	Mark	Comments
10	a	i	Any two of Lack of exercise; Smoking; Stress; Obesity/eating too much food;	2 max	<i>Accept poor dental hygiene;</i>
10	a	ii	1. Fatty deposits/atheroma <u>in wall</u> of <u>artery</u> ; 2. Obstructs blood flow/creates turbulence; 3. Blood clot forms/embolus/ clot breaks off; 4. Blocks coronary artery; 5. Reduces blood/oxygen/glucose supply to heart; 6. Reduces respiration (of heart cells)/stops cells contracting; 7. Heart muscle (cells) die;	4 max	
10	b	i	Antibody has a specific shape/receptor site/variable region ; That is complementary to/fits with antigen/protein/LDL;	2	
10	b	ii	1. (Antigen/macrophage) binds to/activates (receptor protein on) T-cells; 2. T-cells activate B-cells; 3. Antigen binds to antibody/receptor on B-cell; 4. (This) B-cell divides/clonal selection; 5. Plasma cells/B cells secrete antibody; 6. Memory cells formed (B and/or T); 7. Vaccine provokes (primary immune) response; 8. Memory cells give rapid response in future (preventing development of disease/giving immunity); 9. Reduces LDL in blood;	6 max	<i>Accept macrophage/phagocyte presents antigen;</i>

Question	Part	Sub Part	Marking Guidance	Mark	Comments
10	c	i	Injecting antibodies is passive/ not active immunity/no immune response; Plasma/memory cells not formed; No secondary response; Antibodies will not remain/quickly destroyed; Idea that person may produce antibodies against injected antibodies;	2 max	
10	c	ii	Treatment effective in mice; Mice are related to humans/similar so likely to work in humans; Large sample size used; Mice and humans are different/has not been tested in humans; Could have harmful effects in humans; Other factors/named factor may influence atheroma development;	4 max	<i>3 marks max if one side of argument only is given</i>