



**General Certificate of Education
June 2010**

Human Biology

HBIO1

The body and its diseases

Unit 1

Final

<i>Mark Scheme</i>

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this Mark Scheme are available to download from the AQA Website: www.aqa.org.uk

Copyright © 2010 AQA and its licensors. All rights reserved.

COPYRIGHT

AQA retains the copyright on all its publications. However, registered centres for AQA are permitted to copy material from this booklet for their own internal use, with the following important exception: AQA cannot give permission to centres to photocopy any material that is acknowledged to a third party even for internal use within the centre.

Set and published by the Assessment and Qualifications Alliance.

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	Q <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 A inhibited/killed by tetracycline/tetracycline has little effect on bacterium B ; Bacterium B inhibited/killed by penicillin/ bacterium A resistant to penicillin; Both kinds of bacteria resistant to streptomycin;	4 max	Q 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	Q 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	Q 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 ₁ 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 ₁ /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>