

General Certificate of Education (A-level)
June 2011

Human Biology

HBI01

(Specification 2405)

Unit 1: The Body and its Diseases

Final

Mark Scheme

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Question	Marking Guidance	Mark	Additional Guidance
1(a)	A= Golgi (body)/Golgi (apparatus)/vesicle; B = mitochondrion/matrix;	2	Accept mitochondria
1(b)	Flagellum; Plasmid; Capsule; Cell wall; Smaller ribosomes/70S ribosomes; Circular DNA;	2 max	Accept nucleoid/naked DNA/mesosome Reject cellulose cell wall
1(c)	Moves mucus away from lungs/towards throat; Mucus traps pathogens;	2	Q Do not accept 'germs' but accept microbes, microorganisms, bacteria, viruses, spores, fungi, named pathogen Ignore dirt/dust

Question	Marking Guidance	Mark	Additional Guidance
2(a)(i)	Unprotected sexual intercourse, Virus present in body fluids/semen; Enters body through sores/cuts/abrasions; Intravenous drug abuse,	3 max	Accept virus present in sperm
	Virus in blood; Transferred on needle;		Ignore cells
2(a)(ii)	Via breastfeeding/placenta/(contaminated) blood transfusion;	1	Accept needle stick injury/blood to blood contact/contaminated medical equipment
2(b)	One reason; with explanation;	2 max	
	Examples		
	Viruses do not have metabolism/eq;		Accept named example/s of metabolism
	Antibiotics interfere with metabolism;		
	OR		
	Viruses do not have cell walls;		
	Antibiotics interfere with cell wall synthesis;		
	OR		
	Viruses are inside cell;		
	Antibiotics have to enter cell/cannot get to them;		
	OR		
	Viruses aren't cells;		
	Antibiotics work against cells;		

Question	Marking guidance	Mark	Additional Guidance
3(a)	Microorganism alive/active; But does not cause symptoms of disease/Avirulent;	2	Accept does not make you ill/harm
3(b)(i)	(Takes time for) antigen to be recognised; (Takes time for) T cells to be activated; B-cell activation/clonal selection/expansion; Plasma cells to make (specific) antibodies; Time for enough antibodies to measure;	2 max	Accept reference to presentation by macrophage for first marking point Accept primary (immune) response
3(b)(ii)	Memory cells(present); Respond immediately / can produce antibodies immediately;	2	Accept secondary (immune) response

Question	Marking Guidance	Mark	Additional Guidance
4(a)	Droplet infection;	3	
	Droplets (of mucus/saliva/fluid containing bacteria/TB) inhaled;		
	More likely to occur when people are close together/reduced ventilation/explained;		
4(b)	(Yes)	4 max	Max 3 for only one side of the argument
	Shows correlation/description;		
	Evidence from graph to support;		
	(No)		
	Correlation is not exact/trends sometimes in opposite directions;		
	Evidence from graph to support;		
	Correlation does not prove cause and effect;		
	Another factor may be responsible;		
	Suitable named factor, e.g. immigration, drug abuse, HIV/AIDS;		Accept smoking/pollution
	Rise in TB in London before rise in overcrowding;		
	Rest of England overcrowding falling but not TB;		

Question	Marking Guidance	Mark	Additional Guidance
5(a)(i)	Hydrolysis;	1	
5(a)(ii)	Enzyme can be used over and over again/not used up;	1	
5(b)	Ink would dissolve (in solvent) / get washed out/move up paper;	1	
5(c)	Aspartic acid; Distance moved by spot/distance moved by solvent; 74 to 79mm ÷145 to147mm (= 0.52);	3	Max 1 if solvent measured from base of paper Max 2 for correct calculation giving valine
5(d)	(Yes) Minimises measurement errors/spots separate better; OR (No) Ratio (of distance travelled by spot and solvent front) is still the same/more evaporation of solvent/spots more spread out;	1 max	

Question	Marking Guidance	Mark	Additional Guidance
6 (a)	(Presence of) thick mucus; Blocks pancreatic duct/prevents release of enzymes; Reduced digestion; Reduced absorption (of digested food);	2 max	
6 (b)	As concentration of alpha-1-antitrypsin increases inhibition of trypsin increases and then levels out; Levels out at 4.5 units of alpha-1-antitrypsin / 85% inhibition;	2	
6 (c)	Avoids overdosing people/dangerous to give people too much (alpha-1-antitrypsin); Ensures patient given enough to be effective; Cost of overdosing/underdosing;	2 max	

Question	Marking Guidance	Mark	Additional Guidance
7(a)	Rise in blood glucose (produced by food); Compared to the rise with pure glucose/white bread;	2	Accept – ability to raise blood glucose Ignore – 'affects' blood glucose Ignore – just glucose 'released', since could be digestion Rise in blood glucose may be expressed in terms of absorption
7(b)(i)	Bread with additive, Blood glucose concentration rises more slowly/peaks later; Does not rise so high/ use of figures from graph;	2	Accept converse for bread without additive
7(b)(ii)	Person can still eat same food/bread; But glucose released more slowly/keeps glucose levels more constant;	2	

Question	Marking Guidance	Mark	Additional Guidance
8(a)	Removes carbon dioxide; Supplies oxygen; Maintains concentration gradient; For diffusion;	2 max	
8(b)	(when bellows move out) volume of chamber increases; Pressure in chamber decreases; Higher air / atmospheric pressure (outside) forces air into lungs;	3	
8(c)	Prolonged inactivity; Blood can 'pool' in legs/ deep veins; Leads to clot formation;	2 max	

Question	Marking Guidance	Mark	Additional Guidance
9(a)	To keep concentrations of gelatine constant; To keep concentration of pineapple extract constant; Tube 2 had HCl added / to give same volume as B;	2 max	Accept 'to keep concentration constant' for 1 mark if points 1 and 2 not made
9(b)	Tube A Enzyme (in pineapple) has digested gelatine; So no gelatine / protein to form a jelly; Tube B Enzyme denatured/inhibited/ reference to hydrogen bonds/ change of tertiary structure; By HCI/change of pH;	4	Allow enzyme 'breaks down' gelatine
9(c)	For comparison/as a control; To show that it is an <u>enzyme</u> in pineapple that digested gelatine/stopped gelatine setting in tube 1; Boiling denatures enzyme / Can be described but must be permanent change; Other components of pineapple still present;	3 max	

Question	Marking Guidance	Mark	Additional Guidance
10(a)	Less cholesterol in blood means less/fewer fatty deposits/cholesterol in wall of artery;	6 max	
	Where lining damaged;		
	Obstructs blood flow/creates turbulence;		
	Blood clot forms/embolus/ clot breaks off;		
	Blocks coronary artery;		
	Reduces blood/oxygen/glucose supply to heart muscle;		
	Heart muscle (cells) die;		
10(b)(i)	(Age because) have had same time to develop atheroma;	3 max	
	Atheroma development not yet at a stage where symptoms produced;		
	Ensures heart not already damaged;		
	To eliminate confounding variables;		

40/h)/::)	One suitable factor with evaluation as	2 max	
10(b)(ii)	One suitable factor with explanation e.g.	2 max	
	Smoking;		
	Smoking increases atheroma development/risk of myocardial infarction /blood pressure/cholesterol levels;		
	Exercise;		
	Activity levels reduces atheroma development/risk of myocardial infarction/blood pressure/cholesterol levels;		
	Diet;		
	Fatty diet increases atheroma development/risk of myocardial infarction/blood pressure/cholesterol levels;		
	OR		
	Salt intake increase blood pressure, leading to atheroma development/risk of myocardial infarction /blood pressure/cholesterol levels;		
	Obesity/weight/body mass/BMI;		
	Causes high blood pressure/ affects atheroma development/risk of myocardial infarction/blood pressure/cholesterol levels;		
10(b)(iii)	Recorded incidence of heart disease in placebo group;	3 max	Max 2 if calculation incorrect
	Recorded incidence of heart disease in statin group;		
	(Incidence of heart disease in placebo group – incidence of heart disease in statin group)/difference;		Accept subtract % difference for one group from % difference for other group
	Above divided by incidence of heart disease of heart disease in placebo group;		
	x 100%;		

10(c)	(Yes)	6 max	Max 5 for only one side of the argument
	Suitable suggestions e.g.		
	Statin group had less heart disease;		
	Economic benefits of this, e.g. less time off work/ less cost to NHS;		
	May protect against other health problems/named;		
	(No)		
	Suitable suggestions e.g.		
	Cost of giving statins may not be outweighed by benefits;		
	May have side-effects;		
	Not everyone over 50 has high cholesterol;		
	Other factors cause heart disease, e.g. smoking;		
	A lot of people taking statins already, so unlikely to make much difference;		
	Not tested on women/only tested on men;		
	Reference to age of men;		
	(Either)		
	Comment on reliability linked to length of study;		
	Comment on reliability linked to sample size;		

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