Version 1

General Certificate of Education (A-level)
June 2011

Human Biology HBIO1

(Specification 2405)

Unit 1: The Body and its Diseases

Final

Mark Scheme

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 events which all examiners participate in and is the scheme which was used by them in this examination. The standardisation process 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 standardisation each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, examiners encounter unusual answers which have not been raised they are required to refer these to the Principal Examiner.

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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, Virus in blood; Transferred on needle;	3 max	 Accept virus present in sperm 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; Examples Viruses do not have metabolism/eq; 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;	2 max	 Accept named example/s of metabolism

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; Droplets (of mucus/saliva/fluid containing bacteria/TB) inhaled; More likely to occur when people are close together/reduced ventilation/explained;	3	
4(b)	(Yes) 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; Rise in TB in London before rise in overcrowding; Rest of England overcrowding falling but not TB;	4 max	Max 3 for only one side of the argument Accept smoking/pollution

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 HCl/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; 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;	6 max	
10(b)(i)	(Age because) have had same time to develop atheroma; Atheroma development not yet at a stage where symptoms produced; Ensures heart not already damaged; To eliminate confounding variables;	3 max	

10(b)(ii)	One suitable factor with explanation e.g. 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;	2 max	
10(b)(iii)	Recorded incidence of heart disease in placebo group; Recorded incidence of heart disease in statin group; (Incidence of heart disease in placebo group – incidence of heart disease in statin group)/difference; Above divided by incidence of heart disease of heart disease in placebo group; x 100%;	3 max	Max 2 if calculation incorrect Accept subtract % difference for one group from % difference for other group

10(c)	(Yes) 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;	6 max	Max 5 for only one side of the argument

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