



General Certificate of Education

Human Biology 1406

HBIO1 The body and its diseases

Mark Scheme

2010 examination – January series

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Question	Part	Sub Part	Marking Guidance	Mark	Comments
1	a		Cell X (produces mucus) to trap pathogens; Cell Y moves mucus away from lungs;	2	Accept bacteria/viruses/other named pathogen
1	b		Ribosomes synthesise protein; Golgi body adds carbohydrate/modifies protein/packages protein/mucus; Vesicles carry mucus to cell membrane/out of cell;	3	

Question	Part	Sub Part	Marking Guidance	Mark	Comments
2	a		Atheroma narrows lumen of/reduces flow in artery; Coronary artery (affected); Reduces oxygen/glucose to heart muscle; Build up of lactic acid/toxins leading to pain/angina;	3 max	
2	b		Stent inserted; (into) coronary artery/artery to heart <u>muscle</u>; via a (catheter in) suitable blood vessel; (after blood vessel is) inflated using a balloon;	3 max	Qualify For vessel in groin accept reference to vein or artery but reject reference to capillary. Accept 'needle' for catheter Accept stent described

Question	Part	Sub Part	Marking Guidance	Mark	Comments
3	a	i	D BAEC;	1	
3	a	ii	Allows ventricles to empty completely; pushes blood upwards/towards arteries/aorta/pulmonary arteries;	1 max	
3	b		Less blood (enters the aorta); Lower blood pressure; Blood flows back to atrium;	2 max	Accept. Lower stroke volume as alternative to first marking point
3	c		Supplies (electrical) impulses to heart; Replaces action of (damaged) conducting tissue; Provides regular electrical pulses;	2 max	Reject messages Accept ONE further detail, e.g. supplies impulses to ventricle at corresponding rate to atrium

Question	Part	Sub Part	Marking Guidance	Mark	Comments
4	a		Advantage: A suitable explanation relating to the amounts of substances in food, e.g. control their intake of any named nutrient/energy; Disadvantage: Idea that a person may not require the 'typical'/average amount;	2	Ignore reference to economic factors
4	b		$19/27.1 \times 100$; 70.1g (accept 70g and 70.11g);	2	Correct answer gains 2 marks
4	c		Other carbohydrates/starch will be present/cellulose present;	1	

Question	Part	Sub Part	Marking Guidance	Mark	Comments
5	a	i	A = capsule; B = flagellum;	2	Accept. Slime layer
5	a	ii	Prevents drying out/contains toxins/protects against phagocytosis;	1	Accept valid answer to candidates answer to (a)(i) Accept protects against antibiotics/antibodies
5	b		Inhale droplets containing bacteria/droplet infection; Released by another (infected) person;	2	Accept. Drinking milk infected with bacteria; Bacteria invade cells/named cells (e.g. bones);
5	c	i	Prevents/reduces chance of antibiotic resistance developing; So we don't run out of drugs with which to treat TB; Idea that if one antibiotic is ineffective/bacteria resistant; Another one will work/bacteria not resistant;	3 max (for i and ii)	(Accept once in either (i) or (ii)) Reject immunity
5	c	ii	To ensure all bacteria are killed; Bacteria present in tubercles/described; Takes time for antibiotics to penetrate mucus;	3 max (for i and ii)	

Question	Part	Sub Part	Marking Guidance	Mark	Comments
6	a		pH changes tertiary structure of enzyme/shape of active site; The different enzymes have different optimum pH; Hydrogen/ionic bonds break; Idea that some capsules more resistant to acid than others; So they release the enzymes later (into acid);	2 max	Accept denatures
6	b		Results expressed as percentage of starting activity; Capsule (C) may have had low activity at start/lower activity than others; Concentration of enzymes may be different (in each capsule); Not tested in vivo; Only tested three kinds of capsule; Suitable reference to repeats; Factors other than acid resistance need to be considered;	2 max	Accept one valid suggestion. E.g. ease of taking capsule

Question	Part	Sub Part	Marking Guidance	Mark	Comments
7	a		Compete with pathogens/ produce vitamins/ bind toxins/ prevent pathogens attaching to intestine wall;	1	Accept. They help to digest indigestible carbohydrates Reject fight
7	b		Antibiotics kill (healthy/other) gut bacteria; Allow growth of pathogen bacteria;	2	
7	c	i	For comparison with experimental group; To see if yogurt drink with bacteria is effective / to see if yogurt on its own produced any effect;	2	Ignore control
7	c	ii	To avoid bias (in reporting effects);	1	
7	c	iii	At random; Means of achieving random distribution, e.g. pulling names out of hat OR Systematic (grouping), Method, e.g. alternate names on list OR Matching (groups); On basis of ages/genders/relevant named variable in each group;	2	
7	c	iv	Results easier to understand at a glance (than raw data); To compare results; Groups may contain different numbers of people;	2 max	

Question	Part	Sub Part	Marking Guidance	Mark	Comments
8	a	i	Abdominal pain/bloating/nausea/diarrhoea/flatulence; (any 2)	1	Qualify. Ignore terms like throw up, puke, bellyache etc
8	a	ii	Person does not produce enough lactase enzyme; Bacteria feed on (undigested) lactose; Produce gas/toxins;	2 max	
8	b	i	There may be glucose/sugars/carbohydrates in food which may interfere with results; To allow time for glucose level to return to normal;	1 max	
8	b	ii	To find out the person's normal blood glucose concentration/to compare with level after lactose consumed;	1	
8	b	iii	Blood glucose level will increase; Lactose digested (into sugars/glucose/galactose); Absorbed into blood;	3	

Question	Part	Sub Part	Marking Guidance	Mark	Comments
9	a		(Drink with) same concentration/same water potential; as body fluids/blood/cells; Drink intended to maintain normal water potential/concentration of blood;	2 max	
9	b		Different times since eating; Different types/amounts of food; Natural variation; Chance; Not significantly different;	2 max	Accept. Everybody is different; Accept. An explanation of points for extra mark;
9	c		Yes, Isotonic group have higher blood glucose at end; More glucose for respiration; Link between labour/muscular activity and respiration; No, Blood glucose does not fall very much in control group; Don't know length of labour; Other factors may affect results, e.g. age of mother/medication given; Need for repeats; Suitable reference to sample size;	4 max	Max 3 if candidates do not give both sides of the argument; Accept. Don't know differences are (statistically) significant;

Question	Part	Sub Part	Marking Guidance	Mark	Comments
10	a	i	Molecule/protein/glycoprotein; Stimulates immune response; (That causes) production of antibodies;	2 max	
10	a	ii	Antigens on HIV are different (shape); So, antibody will not 'fit'/not complementary (to antigen); Receptor sites on antibody specific to one antigen;	2 max	
10	a	iii	(Has site with) same <u>shape</u> as salmonella antigen so binds to anti-gal antibodies; (Has site with) same <u>shape</u> as receptor molecule so that HIV will bind; Binds to both molecules;	2 max	
10	b		Salmonella pathogen has specific antigen on surface; Salmonella pathogen engulfed by macrophage; T-cells activate B-cells; B-cell with complementary/specific receptor antibody activated/clonal selection; B-cells divide/form clone/clonal expansion; <u>Plasma cells</u> make antibodies; Specific to antigen/bind to salmonella bacterial antigen;	6 max	<i>Accept. Macrophage presents antigen to T/B cells;</i> <i>Accept. T-cells release factors;</i>

10	c	i	HIV binds to specific receptor; Only present on certain cells/ T-cells;	2	
10	c	ii	Antibiotics stop metabolism, viruses don't have metabolism; Viruses hide in cells, antibiotics can't reach; Two suitable cell components antibiotics work against that viruses don't have;; e.g. some antibiotics work against ribosomes, that viruses don't have	2	
10	d	i	Adaptor molecule binds to HIV; (This) prevents the HIV binding to the receptor; Therefore few HIV available to infect cells;	2 max	
10	d	ii	Would need to be complementary to MRSA (antigens); MRSA has different antigens; But would still need to have binding site for anti-gal;	2 max	