



General Certificate of Education

Biology 2410

BIOL1 Biology and disease

Mark Scheme

2009 examination - January series

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.

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Question	Part	Sub Part	Marking Guidance	Mark	Comments
1	(a)	(i)	Cholesterol/ lipoprotein/ fatty material/cells; In the artery wall/under lining/endothelium of artery/blood vessel;	2	Reject fatty acid Q Do not accept references to veins or capillaries as equivalent to blood vessels
1	(a)	(ii)	(Trapped in) coronary artery/artery supplying heart muscle/ tissue/cells; Prevents oxygen; Reaching (heart muscle/tissue); (Heart muscle) dies/stops respiring;	3 max	i.e. material of heart wall
1	(b)	(i)	Allows comparison; Different number of people in each country;	2	
1	(b)	(ii)	Correlation does not show causation / graph only shows correlation Something else/another named factor may be involved such as lack of fibre/smoking/stress;; Related to both CHD and dairy fat;	2 max	

Question	Part	Sub Part	Marking Guidance	Mark	Comments
2	(a)	(i)	Glucose; Fructose;	2	Any order.
2	(a)	(ii)	Lactose has a different shape/structure; Does not fit/bind to active site of enzyme/sucrase; OR Active site of enzyme/sucrase has a specific shape/structure; Does not fit/bind to lactose;	2	Only allow a second mark if reference is made to the active site. Max 1 mark if active site is described as being on the substrate. Do not accept same shape.
2	(b)	(i)	Rose and fell; Peak at 45 (minutes) / concentration of $6.6 \text{ (mmol dm}^{-3}\text{)}$;	2	
2	(b)	(ii)	Glucose (produced by digestion) is absorbed / enters blood; Decrease as used up/stored;	2	
2	(b)	(iii)	Curve roughly parallel to the x-axis or falling, starting from approximately the same point;	1	

Question	Part	Sub Part	Marking Guidance	Mark	Comments
3	(a)		Lengthways/down the root;		
			Through one tissue only / through same part / same proportion of tissues;	2	
3	(b)		To prevent the water from evaporating / prevent evapoaration;		
			Changing the concentrations / water potential (of solution);	2	
3	(c)	(i)	Plot data on a graph;		
			Find (sucrose concentration) from the graph where the ratio is 1;	2	
3	(c)	(ii)	No, because the results are given as a ratio/as a proportion of initial length;	1	

Question	Part	Sub Part	Marking Guidance	Mark	Comments
4	(a)		Two marks for a correct answer of 0.1s;;		Q Other answers can be accepted if distance clearly estimated as differing from 20µm. Credit is for method, not measuring ability.
			One mark for an incorrect answer where attempt has been made to divide distance by rate of blood flow;	2	Mark can only be awarded if approach is clearly shown
4	(b)	(i)	Replaces it with blood with a low oxygen concentration / removes blood with high oxygen concentration;	1	
4	(b)	(ii)	Asthma attack narrows airways;		Ignore trachea and aveoli
			Air in <u>alveoli</u> not replaced (as efficiently) /less air/oxygen to alveoli;		
			Difference in concentration lower so rate of diffusion lower;	2 max	
4	(c)	(i)	To make sure that nothing else might have produced the results / that patients didn't improve anyway /to allow comparison (with expt group);	1	
4	(c)	(ii)	Inhaler with dummy drug / placebo / with old drug / with no drug;		Q No need for phrase "dummy drug" as long as idea conveyed.
			Otherwise treated exactly the same;	2	

Question	Part	Sub Part	Marking Guidance	Mark	Comments
5	(a)		Phagocytes engulf pathogens/microorganisms; Enclosed in a vacuole / vesicle/ phagosome; Lysosomes have enzymes; That digest/hydrolyse molecules/proteins/lipids/ microorganism;	3 max	
5	(b)	(i)	Get another strain / there are different strains; Therefore does not have memory cells against second strain;	2	Q The second marking point should only be awarded in the context of memory cells.
5	(b)	(ii)	Vaccines only work against certain strains; Because the antigens they possess are different; Enables company to target strain likely to be prevalent later / most common strain;	2 max	

Question	Part	Sub Part	Marking Guidance	Mark	Comments
6	(a)	(i)	Many people do not go to the doctor;	1	
6	(a)	(ii)	36000;	1	No marks awarded for working here as calculation is very straightforward
6	(b)		Increases uptake of sodium ions/glucose/sugars / salts; By <u>co</u> -transport channels/proteins; Lowers water potential in cells/tissue; Water moves out of intestine/into cells; By osmosis;	3 max	Q Accept any correct alternative for lowering water potential in cells.
6	(c)		Same sugars/antigens on bacteria/nerve cells; Bind with antibody/form antigen-antibody complex; Have complementary shape/fit binding site;	3	Do not accept references to same shape as equivalent to complementary. Reject react Reject active site
6	(d)		Diaphragm will not move down/flatten /contract; Thoracic cavity/lung volume not increased so cannot breathe in;	2	Ignore references to breathing out

Question	Part	Sub Part	Marking Guidance	Mark	Comments
7	(a)		1 Cholera bacterium is prokaryote; 2 Does not have a nucleus/nuclear envelope/ has DNA free in cytoplasm/has loop of DNA; 3 and 4 Any two from No membrane-bound organelles/no mitochondria / no golgi/ no endoplasmic reticulum/etc; 5 Small ribosomes only; 6 and 7 Any two from Capsule/flagellum/plasmid / cell wall/etc;	5 max	Maximum of 2 marks for points 3 and 4. Maximum of two marks for points 6 and 7.
7	(b)		Advantages: 1 Small objects can be seen; 2 TEM has high resolution; 3 Wavelength of electrons shorter; Limitations: 4 Cannot look at living cells; 5 Must be in a vacuum; 6 Must cut section / thin specimen; 7 Preparation may create artefact 8 Does not produce colour image;	5 max	Advantages: allow maximum of 3 marks. Accept better Limitations: allow maximum of 3 marks.