Version 1.0: 0209

ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Education

Biology 1411

BIOL1 Biology and Disease

Mark Scheme

2009 examination - June 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.

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.

Set and published by the Assessment and Qualifications Alliance.

The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales (company number 3644723) and a registered charity (registered charity number 1073334).
Registered address: AQA, Devas Street, Manchester M15 6EX *Dr Michael Cresswell Director General*

Question	Part	Sub Part	Marking Guidance	Mark	Comments
1	(a)	(i)	Crista/inner membrane;	1	
1	(a)	(ii)	Matrix;	1	
1	(b)		B;	1	
1	(c)	(i)	Reduce/prevent enzyme activity;	1	
1	(c)	(ii)	Prevents osmosis / no (net) movement of water; So organelle/named organelle does not burst/shrivel;	2	**Q** Allow reference to cell rather than organelle for first mark point only. Regard damage as neutral
1	(d)		(Mitochondria) use aerobic respiration; Mitochondria produce ATP/release energy; Energy/ATP required for muscles (to contract);	2 max	**Q** Do not accept reference to making/producing energy.

Question	Part	Sub Part	Marking Guidance	Mark	Comments
2	(a)		Sends out electrical activity/ impulses; Initiates the heartbeat / acts as a pacemaker / (stimulates) contraction of atria;	2	**Q** Ignore reference to ventricles.
2	(b)		Fluctuation and overall decrease; Steep decrease first/after two years and then gradual decrease;	2	
2	(c)		Diet low in cholesterol/LDLs; Less absorbed into blood/ from intestines;	2	
2	(d)		Diet has greater effect in decreasing blood cholesterol concentration; Difficult to judge effect of drug as it is used at same time as diet / drug is not used on its own; Decrease in blood cholesterol concentration linked to reduced risk of heart disease;	2 max	**Q** Allow converse for third marking point.

Question	Part	Sub Part	Marking Guidance	Mark	Comments
3	(a)		Enzyme/active site has a (specific) tertiary structure; Only glucose has correct shape / is complementary / will bind/fit; To active site; (Forming) enzyme-substrate complex;	3 max	**Q** Allow second mark if candidate refers to correct shape or complementary in terms of the enzyme. Do not allow 'same' shape **Q** Do not allow third mark if active site is described as being on substrate.
3	(b)		(Only detects glucose whereas) Benedict's detects (all) reducing sugars/named examples; Provides a reading / is quantitative / Benedict's only provides a colour / doesn't measure concentration / is qualitative/semi-quantitative; Is more sensitive / detects low concentration; Red colour/colour of blood masks result; Can monitor blood glucose concentration continuously;	2 max	**Q** Do not credit quicker/more accurate unless qualified. **Q** Allow Benedict's detects monosaccharides for first mark point.
3	(c)	(i)	Broken down by enzymes / digested / denatured (by pH) too large to be absorbed;	1	
3	(c)	(ii)	Study not carried out on humans / only carried out on rats; Long-term/side effects not known; Scientists have vested interest; Study should be repeated / further studies / sample size not known;	2 max	

Question	Part	Sub Part	Marking Guidance	Mark	Comments
4	(a)		Damage/destruction of cells/tissues; Production of toxins;	2	
4	(b)		Contains antigen/proteins / dead/weakened microorganism/pathogen/virus/bacteria; Stimulates production of antibodies/plasma cells/memory cells;	2	**Q** Do not credit immune response unless qualified.
4	(c)	(i)	Age; Sex; Ethinicity; All healthy / not on other medication; Not previously vaccinated/infected with TB;	2 max	**Q** Do not credit sample size. **Q** Allow any suitable reference to health not being affected for fourth marking point e.g. smoking, 'depressed immune system' etc.
4	(c)	(ii)	Contain the same antigens;	1	

Question	Part	Sub Part	Marking Guidance	Mark	Comments
5	(a)		Nucleus;	1	
5	(b)		Enables organism to remain in area (of food source) / prevent its removal;	1	**Q** 'To attach' is not sufficient unless qualified;
5	(c)	(i)	Correct answer of 222(%);; Incorrect answer that clearly identifies difference in number of cases as 5800 –1800 or 5.8 – 1.8;	2	Correct answer gains two marks
5	(c)	(ii)	More water-related activities / more 'organisms' with increased temperature;	1	**Q** Allow any reference to growth or replication of 'organisms'. Do not penalise reference to bacteria. **Q** Do not allow increase in water consumption.
5	(d)	(i)	All have same shape / only binds to *Giardia*/one type of/specific antigen;	1	
5	(d)	(ii)	Has complementary (shape) / due to (specific) tertiary structure / variable region (of antibody);	1	**Q** Binds/fits not sufficient unless qualified;
5	(d)	(iii)	Enzyme/second antibody would remain / is removed by washing; Enzyme can react with substrate (when no antigen is present);	2	

Question	Part	Sub Part	Marking Guidance	Mark	Comments
6	(a)		Phagocytes engulf/ingest pathogens/microorganisms/bacteria/viruses; Phagocytes destroy pathogens/microorganisms/bacteria/viruses; Lung diseases are caused by pathogens/microorganisms/bacteria/viruses;	2 max	**Q** Allow description of process of engulfing;
6	(b)	(i)	Alveoli/lungs will not inflate/deflate fully/reduced lung capacity; Breathing out particularly affected/no longer passive; Concentration/diffusion gradient / rate of diffusion reduced;	2 max	
6	(b)	(ii)	Alveolar walls thicken; Longer diffusion pathway; Scarred/fibrous tissue; Reduces surface area (for gaseous exchange);	4	**Q** Diffusion is essential for 2nd point and surface area for 4th point.
6	(c)	(i)	Cancer develops 20 – 30 years after exposure (to asbestos);	1	
6	(c)	(ii)	Smoking / air pollution / specified industrial source;	1	

Question	Part	Sub Part	Marking Guidance	Mark	Comments
7	(a)		Amylase; (Starch) to maltose: Maltase; Maltose to glucose; Hydrolysis; (Of) glycosidic bond;	5 max	**Q** Do not penalise incorrect site for digestion or incorrect site of enzyme production.
7	(b)		Glucose moves in with sodium (into epithelial cell); Via (carrier/channel) protein/symport; Sodium removed (from epithelial cell) by active transport/sodium-potassium pump; Into blood; Maintaining low concentration of sodium (in epithelial cell) / maintaining sodium concentration gradient (between lumen and epithelial cell); Glucose moves into blood; By (facilitated) diffusion;	5 max	**Q** Only allow diffusion mark in context of movement of glucose into the blood.