AQA

AS-level
Biology

BIOL1 – Biology and disease
Mark scheme

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Mark schemes are prepared by the Lead Assessment Writer 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 associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts. Alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Assessment Writer.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' 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.

Further copies of this mark scheme are available from aqa.org.uk

Question	Marking Guidance	Mark	Comments
1(a)(i)	Glucose **and** fructose;	1	Ignore reference to alpha and beta Either way round
1(a)(ii)	Glucose **and** galactose;	1	Ignore reference to alpha and beta Either way round
1(b)	1. (Amylase) pancreas, produces maltose; 2. (Maltase) in/on epithelium (of small intestine), produces glucose;	2	Place and product = 1 mark (mark horizontally) Ignore references to salivary glands or saliva 2. Accept wall/lining of small intestine 2. Ignore reference to cells alone Ignore reference to ribosomes/rER

Question	Marking Guidance	Mark	Comments
2(a)	1. Flagellum;	1	Accept flagella
2(b)	1. Cell wall 2. Capsule 3. Circular DNA 4. Plasmid	2 max	Ignore 70S ribosomes (found in mitochondria)
2(c)	Two marks for correct answer of 0.44 One mark for incorrect answers in which candidate clearly divides measured width by magnification;	2	Correct answer = 2 marks outright Accept: 0.4 or 0.5 only if working is correct for 2 marks Do not award a mark for 0.4 or 0.5 if there is no working out Ignore rounding up
2(d)	1. As height increases, the number of deaths decreases / inversely proportional / negative correlation; 2. Correct reference to increase / decrease at 14-30m;	2	Accept: converse statement Must give a trend and not simply give individual points Do not penalise for 'more likely to get cholera'

Question	Marking Guidance	Mark	Comments
3(a)	☐ ☐ ✓ In a bilayer with fatty acids to the inside and phosphate groups to the outside of the bilayer. ☐	1	No mark if more than correct box with tick
3(b)(i)	1. (Rough endoplasmic reticulum has) ribosomes; 2. That make protein (which an enzyme is);	2	1. Accept 'contains / stores' 2. Accept amino acids joined together / (poly)peptide 2. Reject makes amino acids 2. Ignore glycoprotein
3(b)(ii)	(Golgi apparatus) modifies (protein) **OR** packages / put into (Golgi) vesicles **OR** transport to cell surface / vacuole;	1	Accept protein has sugar added Reject protein synthesis Accept lysosome formation
3(c)(i)	(Substance A) moves across membrane when no concentration gradient;	1	
3(c)(ii)	1. Moves faster as concentration gradient increases (up to a point); 2. Rate levels off (because all carriers in use at given time);	2	

Question	Marking Guidance	Mark	Comments
4(a)(i)	1. Active site / enzyme not complementary; 2. Active site changes (shape) / is flexible; 3. (Change in enzyme allows) substrate to fit / E-S complex to form;	2 max	Active site becomes complementary / wraps around substrate = 2 marks 2. Allow: 'binding site' but not 'enzyme' For mark point 2. can only have enzyme changes (shape) if active site has been mentioned earlier 3. must have context Reject: active site on substrate for second marking point only Accept: diagrams only if suitably labelled or annotated
4(a)(ii)	(In lock and key) active site does not change (shape) / is fixed (shape) / is rigid / does not wrap around substrate / (already) fits the substrate / is complementary (before binding);	1	Assume that 'it' refers to lock and key
4(b)	1. Similar structure / shape (HMG-CoA) / both complementary; 2. Competes for / binds to active site / competitive inhibitor; 3. Less HMG-CoA binds / fewer E-S complexes; **OR** 1. Specific reference to different structure / shape (to HMG-CoA) using the diagram; 2. Binds to position other than active site / binds to allosteric site / binds to inhibitor site / non-competitive inhibitor; 3. Changes the active site so substrate cannot bind / less HMG-CoA binds / less E-S complexes;	3 max	**Q** Reject: same structure / shape Assume that 'it' refers to Lovastatin Accept: HMG-CoA/ substrate cannot bind Neutral: less product produced as in question stem Neutral: different structure / shape to HMG-CoA Reject: active site on substrate for second marking point only

Question	Marking Guidance	Mark	Comments
5(a)(i)	Left ventricle;	1	
5(a)(ii)	Thick muscle/thick walls;	1	Accept more muscle/more muscular Ignore stronger muscle
5(b)(i)	85.7/86;	1	Accept 85 Ignore additional decimal places
5(b)(ii)	Two marks for correct answer of 8741– 8772; **or** 102 × their 5(b)(i) One mark for incorrect answer in which candidate provides evidence of multiplying heart rate by stroke volume;	2	Accept either formula or illustration with figures from table
5(c)	1. Closed open; 2. Open closed;	2	

Question	Marking Guidance	Mark	Comments
6(a)	1. Water will affect the mass / only want to measure water taken up or lost; 2. Amount of water on cylinders varies / ensures same amount of water on outside;	2	Neutral: removes water Accept: '(sodium chloride) solution' for water Do not accept 'sodium chloride' Neutral: refs. to fair testing
6(b)(i)	4 cm^3 (of 1.0 mol dm^{-3} sodium chloride solution) and 16 cm^3 (of distilled water);	1	Reject: factors and multiples of these figures eg 2 cm^3 and 8 cm^3, as final volume should be 20 cm^3
6(b)(ii)	1. Allows comparison / shows proportional change; 2. Idea that cylinders have different starting masses / weights;	2	Reject: if comparison is in context of the start and final mass of the same cylinder Neutral: different masses Neutral: different starting sizes
6(b)(iii)	1. (Allows) anomalies to be identified / ignored / effect of anomalies to be reduced / effect of variation in data to be minimised; 2. Makes the average / mean / line of best fit more reliable / allows concordant results;	2	Accept: 'outliers' instead of anomalies **Q** Reject: abnormalities Reject: idea of not recording anomalies / preventing anomalies from occurring Accept: 'cancels out anomalies' as bottom line response **Q** Reject: makes the average / mean more accurate Neutral: makes the average / mean more valid Neutral: makes 'it' / results / conclusion more reliable
6(b)(iv)	1. 0.28; 2. Concentration where no change in mass of potato/no net osmosis;	2	

Question	Marking Guidance	Mark	Comments
7(a)	1. Infected by/susceptible to (other) pathogen(s)/named disease caused by a pathogen (from environment); 2. Pathogen(s) reproduce/cause disease (in host); 3. Damage cells/tissues/organs; 4. Release toxins;	3 max	Context is where immune system cannot prevent or stop these events 3. Allow attack/kill MPs not given in context of HIV
7(b)(i)	1. (HIV enters cells) before antibodies can bind to/destroy it; 2. Antibodies cannot enter cells (to destroy HIV)/stay in blood; **OR** 3. (Enters cells) before (secondary) immune response caused/before memory cells have time to respond; 4. So no antibodies present (to attack HIV); **OR** 5. Vaccine taken up too quickly to cause immune response; 6. So no antibodies/memory cells formed;	2 max	Ignore SAFETY comments 1. and 2. Relate to antibodies 3. and 4. Relate to virus 5. and 6. Relate to vaccine
7(b)(ii)	1. Antigen (on HIV) changes; 2. (Specific) antibody/receptor no longer binds to (new) antigen; **OR** 3. Many different strains of HIV/many antigens present on HIV; 4. Not possible to make a vaccine for all antigens/vaccine may not stimulate an antibody for a particular antigen;	2 max	Accept mutates Ignore SAFETY comments

Question	Marking Guidance	Mark	Comments
7(c)	1. Inactive (virus) may become active; 2. Attenuated (virus) might become harmful; 3. Non-pathogenic (virus) may mutate and (then) harm cells; 4. Genetic information/protein (from HIV) may harm cells; 5. People (may) become/test HIV positive after vaccine used; 6. May continue high risk activities (and pass on HIV);	3 max	**Q** Ignore reference to HIV cells 5. Vaccinated people may develop disease from a different strain to that in the vaccine

Question	Marking Guidance	Mark	Comments
8(a)	1. (Bacteria transmitted in) droplets / aerosol; 2. (Bacteria) engulfed / ingested by phagocytes / macrophages; 3. (Bacteria) encased in named structure e.g. wall / tubercle / granuloma / nodule; 4. (Bacteria) are dormant / not active / not replicating; 5. If immunosuppressed, bacteria activate / replicate / released; 6. Bacteria destroy alveoli / capillary / epithelial cells; 7. (Leads to) fibrosis / scar tissue / cavities /calcification; 8. (Damage) leads to less diffusion /less surface area / increases diffusion distance; 9. (Activation / damage allows bacteria) to enter blood / spreads (to other organs);	5 max	1 Accept: TB / 'it' / the disease / air droplets 1 Neutral: spread through the air / coughs / sneezes 1 Reject: virus 2 Neutral: 'destroyed by'; 2 Accept: white blood cells 3 Neutral: bacteria contained 5 Accept: reference to HIV / old age / stress 7 Accept: fibrous tissue 8 Neutral: reduced gas exchange 8 Accept: reduced SA:
8(b)	1. Many alveoli / alveoli walls folded which provides a large surface area; 2. Many capillaries provide a large surface area; 3. (So) fast diffusion; 4. Alveoli or capillary walls /epithelium /lining are thin; 5. short distance between alveoli and blood; 6. Flattened / squamous epithelium; 7. (So) short diffusion distance/pathway; 8. Ventilation /circulation; 9. Maintains a diffusion /concentration gradient; 10. (So) fast diffusion;	5 max	1. Neutral: alveoli provide a large surface area 3. Neutral: greater / better diffusion 3. Neutral: fast gas exchange 3. Allow 'fast diffusion' only once 4. Reject: thin membranes / cell walls 4. Accept: one cell thick for 'thin' 4. Accept: endothelial 8. Accept: descriptions for ventilation / circulation Do not double penalise if description lacks detail eg thin membranes so a short diffusion distance = 1 mark