A-LEVEL

Biology

BIOL1 – Biology and disease

Mark scheme

2410
June 2015

Version: 1 Final Mark Scheme

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.

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Question	Marking Guidance	Mark	Comments
1(a)	C;	1	Ignore name of organ.
1(b)	E;	1	Ignore name of organ.
1(c)	1. Active site (of enzyme) has (specific) shape/tertiary structure / active site complementary to substrate/maltose; 2. (Only) maltose can bind/fit; 3. To form enzyme substrate complex;	3	1. Reject active site on substrate. Must have idea of shape 1. Assume "it" = maltase 1. Accept (specific) 3D active site 1. Reject has same shape. 2. Accept "substrate" for "maltose" 3. Accept E-S complex

<table>
<tr><th>Question</th><th>Marking Guidance</th><th>Mark</th><th>Comments</th></tr>
<tr><td>2(a)</td><td><table><tr><td>Protein synthesis</td><td>L;</td></tr><tr><td>Modifies protein</td><td>H;</td></tr><tr><td>Aerobic respiration</td><td>N;</td></tr></table></td><td>3</td><td></td></tr>
<tr><td>2(b)</td><td>1800–2200;;
1 mark for an incorrect answer in which student clearly divides measured length by actual length (of scale);</td><td>2</td><td>1.8, 2.0 or 2.2 in working or answer = 1 mark.
Ignore units in answer.
Accept I/A or I/O for 1 mark but ignore triangle.
Accept approx 60mm divided by 30μm for 1 mark</td></tr>
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Question	Marking Guidance	Mark	Comments
3(a)	1. (Releases) toxins; 2. Kills cells/tissues;	2	2. Accept any reference to cell/tissue damage. Ignore infecting/invading cells
3(b)	1. Water potential in (bacterial) cells higher (than in honey) / water potential in honey lower (than in bacterial cells); 2. Water leaves bacteria/cells by osmosis; 3. (Loss of water) stops (metabolic) reactions;	3	Q candidates must express themselves clearly 1. Must be comparative Eg high WP in cell and low WP in honey 3. Needs a reason why lack of water kills the cell

Question	Marking Guidance	Mark	Comments
4(a)	Accept **three** suitable suggestions: 1. (Lactase/beads) can be reused/not washed away; 2. No need to remove from milk; 3. Allows continuous process; 4. The enzyme is more stable; 5. Avoid end-product inhibition;	3 max	1. Accept lactase/beads not wasted. 1. Less lactase used is insufficient 2. Accept lactase not present in milk. Ignore ref to SA
4(b)	1. (Lactose hydrolysed to) galactose and glucose; 2. (So) more sugar molecules; 3. (So) more/different receptors stimulated / sugars produced are sweeter (than lactose);	2 max	2. Idea of **more** sugars essential

Question	Marking Guidance	Mark	Comments
5(a)	Any **two** from: 1. (Decrease linked to) few(er) cases of whooping cough; 2. (Decrease linked to) risk of/fear of side effects; 3. Insufficient vaccine available / too expensive to produce/distribute;	2 max	3. Too expensive unqualified is insufficient for mark
5(b)	1. Vaccination rate increases; 2. Fewer people to spread the disease/ whooping cough / more people immune / fewer susceptible;	2	2. Neutral - greater herd effect. 2. Allow description of immune **Q** Reject 'resistant'.
5(c)	1. More people are immune / fewer people carry the pathogen; 2. So susceptible/unvaccinated people less likely to contact infected people;	2	If neither point 1 or 2 awarded Herd immunity = 1 mark. Unvaccinated does not mean infected 1. **Q** Do not accept disease for pathogen

Question	Marking Guidance	Mark	Comments
6(a)	Lining inflamed/swollen /muscle (around the airways) contracts/ more mucus produced;	1	Accept reference to histamine. Inflammation alone insufficient for mark
6(b)	1. Fewer children/less likely that children with asthma eat fish; 2. Fewer children/less likely that children with asthma eat oily fish; 3. Little/only 2%/no difference in (children with or without asthma who eat) non-oily fish;	3	Accept converse. MP1 and 2 - Allow use of numbers. Do not accept arguments related to amount of fish eaten
6(c)	1. (Shake with) ethanol/alcohol; 2. Then add (to) water; 3. White/milky/cloudy (layer indicates oil);	3	1. Accept named alcohol 2. Order must be correct 3. Ignore forms emulsion as in stem 3. Ignore precipitate

Question	Marking Guidance	Mark	Comments
7(a)	53–70 / 70-53 / 17 (beats per minute);	1	
7(b)	13.6/13.58/14;;	2	If answer is incorrect, 1 mark for the principle of difference (11) divided by initial heart rate (81). $\frac{70-81}{81}$ or $\frac{81-70}{81}$ for 1 mark Ignore + or - signs
7(c)	1. Allows comparison; 2. (Initial/resting) heart rates different (between males and females);	2	
7(d)	1. Cardiac output = stroke volume × heart rate; 2. (So) stroke volume increases / increased size or volume of ventricles;	2 max	1. Accept CO = SV x HR 2. Neutral: more blood leaves heart. 2. If the term stroke volume is not used, it must be defined.

Question	Marking Guidance	Mark	Comments
8(a)	Regulator protein;	1	Accept regulator protein antigen. Reject regulator protein receptor. Ignore regular protein
8(b)	1. Lipid soluble / hydrophobic; 2. Enters through (phospholipid) bilayer; ***OR*** 3. (Protein part of) LDL attaches to receptor; 4. Goes through carrier/channel protein;	2	4. Accept by facilitated diffusion or active transport. 4. Reject active transport through channel protein
8(c)	Any **two** from: 1. (Monoclonal antibody) has a specific tertiary structure/variable region / is complementary to regulator protein; 2. Binds to / forms complex with (regulator protein); 3. (So regulator protein) would not fit/bind to the receptor / is not complementary to receptor;	2 max	Do not award MP1 if reference to active site. "It" refers to monoclonal antibody in MP1 and MP2 3. Reject receptor on LDL
8(d)	1. Less LDL in blood / more LDL taken up (by liver cells); 2. So less atheroma/less chance of blood clot in coronary artery; 3. (So) less chance of reduced/no blood flow/oxygen to heart muscle/cells/tissues;	3	
8(e)	1. Injection with salt solution; 2. Otherwise treated the same;	2	1. Accept inject placebo in salt solution

Question	Marking Guidance	Mark	Comments
9(a)	Any **five** from: 1. Cell homogenisation to break open cells; 2. Filter to remove (large) debris/whole cells; 3. Use isotonic solution to prevent damage to mitochondria/organelles; 4. Keep cold to prevent/reduce damage by enzymes / use buffer to prevent protein/enzyme denaturation; 5. Centrifuge (at lower speed/1000 g) to separate nuclei/cell fragments/ heavy organelles; 6. Re-spin (supernatant / after nuclei/pellet removed) at higher speed to get mitochondria in pellet/at bottom;	5 max	1. Accept suitable method of breaking open cells. 2. Reject removes cell walls. 3. Ignore to prevent damage to cells. 5. Ignore incorrect numerical values. 6. Must have location Reject ref to plant cell organelles only once
9(b)	<u>Principles:</u> 1. Electrons pass through/enter (thin) specimen; 2. Denser parts absorb more electrons; 3. (So) denser parts appear darker; 4. Electrons have short wavelength so give high resolution; <u>Limitations:</u> 5. Cannot look at living material / Must be in a vacuum; 6. Specimen must be (very) thin; 7. Artefacts present; 8. Complex staining method / complex/long preparation time; 9. Image not in 3D / only 2D images produced;	5 max	Principles: Allow maximum of 3 marks <u>Limitations:</u> Context of limitation must be clear, not simply explaining how TEM works Eg “allows you to see organelles as a thin section is used” is not a limitation Allow maximum of 3 marks Ignore ref to colour