A-LEVEL
BIOLOGY

BIOL1 – Biology and disease

Mark scheme
June 2016

Version: 1.0 Final

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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<table>
<tr><th>Question</th><th>Marking Guidance</th><th>Mark</th><th>Comments</th></tr>
<tr><td>1(a)</td><td><table>
<tr><td>White blood cell</td><td></td><td>✓</td><td>✓</td></tr>
<tr><td>Bacterial cell</td><td>✓</td><td>✓</td><td></td></tr>
</table></td><td>2</td><td></td></tr>
<tr><td>1(b)</td><td>2.80 (μm);;</td><td>2</td><td>Answer in range 2.76–2.83 scores 2 marks
If length incorrect but divided by 30 000, allow 1 mark</td></tr>
<tr><td>1(c)(i)</td><td>Circular DNA / smaller/70S ribosomes / no introns / no histones/proteins associated with DNA;</td><td>1</td><td>Ignore reference to plasmids</td></tr>
<tr><td>1(c)(ii)</td><td>1. Able to respire aerobically;
2. So make (more) ATP/ release (more) energy;</td><td>2</td><td>2.Reject ‘producing energy’ unqualified</td></tr>
</table>

Question	Marking Guidance	Mark	Comments
2(a)(i)	C;	1	Ignore name of vessel
2(a)(ii)	A;	1	Ignore name of vessel
2(b)	Strongest/stronger contractions;	1	Accept most muscle in wall / thickest/thicker muscular wall. A comparative statement is needed Answer must be in context of producing force and not resisting it
2(c)	1. Blood flows from left ventricle to right ventricle/ mixing of oxygenated and deoxygenated blood; 2. Lower volume of (oxygenated) blood leaves left ventricle/flows into aorta/C OR Lower pressure in blood leaving left ventricle/flowing into aorta/C OR Less oxygen in blood leaving left ventricle/aorta/C;	2	

Question	Marking Guidance	Mark	Comments
3(a)	Any **one** from: 1. Numerical readings / not subjective / colour change subjective / gives quantitative data / not qualitative / gives continuous data; 2. Greater accuracy;	1 max	2. Accept greater precision
3(b)	Fatty acids produced;	1	
3(c)	1. No more (fatty) acids produced; 2. All triglycerides/fat//lipids/substrate used up / enzyme denatured;	2	
3(d)	1. Line starting at same point and falling above original line; 2. Levels off at same pH, but later;	2	2. Accept the line still falling at 4 minutes Do not credit if levels off at higher pH

Question	Marking Guidance	Mark	Comments
4(a)	Ribosome/rough endoplasmic reticulum;	1	Ignore RER or endoplasmic reticulum unqualified
4(b)	1. Does not digest protein inside cells; 2. So (pancreatic) cell/tissue/function not destroyed/damaged;	2	1.Accept named examples
4(c)(i)	Peptide (bond);	1	
4(c)(ii)	1. Inhibitor is a similar shape to the substrate; 2. (Inhibitor) blocks <u>active site</u>/is complementary to the <u>active site</u>/binds to the <u>active site</u> (of trypsin); 3. Substrate can't bind to active site / no/fewer ES complexes formed;	3	

Question	Marking Guidance	Mark	Comments
5(a)	1. Diaphragm moves up /becomes dome shaped; 2. Reduces volume of thorax / increase pressure in thorax; 3. Pressure in thorax **higher** than outside (air);	3	2.Accept 'space' for volume, chest/lungs for thorax 3.Accept chest/lungs
5(b)	1. FEV_1 of those who have stopped smoking increased after 1 year whereas the FEV_1 of smokers decreased; 2. (Between years 1 and 5, FEV_1 of both decreases but) the rate of decrease in FEV_1 of smokers is faster than those who stopped smoking;	2	Comparison required Idea of a faster rate of decrease in smokers, not just quoting final FEV values
5(c)	1. Airways are narrowed/blocked; 2. Excess mucus (in airway); 3. Inflammation (of airways); 4. Elasticity is lost/scar tissue builds up;	2 max	Ignore answers in the context of reduced surface area of alveoli or increased diffusion distance.

Question	Marking Guidance	Mark	Comments
6(a)	Add lactase;	1	
6(b)	Would be aware of/able to record (mild) symptoms (during the day/while awake);	1	
6(c)	Eat no other foods containing lactose/untreated dairy foods/untreated milk/any more milk;	1	Accept ref to correctly named dairy foods eg cheese, yoghurt
6(d)	Eliminates variation in the volunteers' response (to lactose) / each group/person acts as its own control / to compare effect of lactose on both groups;	1	Ignore – see the effect of lactose clearly For comparison is insufficient
6(e)(i)	1. Drinking (untreated) milk causes (a little) bloating; 2. Drinking (small amount)of untreated milk has little/no effect on pain/diarrhoea; 3. Difference is small so may not be significant/no standard deviation so cannot judge significance;	3	
6(e)(ii)	(Scale of 0–5) is subjective;	1	Ignore 'lying'

Question	Marking Guidance	Mark	Comments
7(a)	1. Virus can't bind (to receptor)/ can't enter cells; 2. So can't be replicated/ multiply; 3. So, doesn't damage cell(s)/tissues (and cause symptoms);	2 max	2. Accept can't reproduce 3. Accept no toxins released
7(b)	1. Antigen/glycoprotein on Ebola binds to/stimulates (a specific) B cell; 2. (Binding causes) replication/cloning of B cell; 3. Plasma cells/B cells release/produce antibodies;	2 max	1. Accept correct reference to stimulation of B cells by T cells 2. Accept replication/cloning of plasma cell;
7(c)	1. Lots of antibodies (against Ebola) in recovered patient; 2. Transfusion/plasma contains antibodies; 3. Antibodies (specific so) will bind with (Ebola) antigen; 4. (In recipient) virus destroyed/cannot enter cell;	3 max	2. Ignore reference to cells 4. Antigen destroyed is insufficient
7(d)	1. (High mutation rate leads to) antigens change/antigenic variability; 2. Vaccine contains specific antigen; 3. Antibodies not complementary to (changed) antigen / won't bind to (changed) antigens;	3	1. Accept (high mutation rate leads to) changes in base sequence coding for antigen;

Question	Marking Guidance	Mark	Comments
8(a)	1. Na^+ ions leave epithelial cell and enter blood; 2. (Transport out is by) active transport / pump / via carrier protein using ATP; 3. So, Na^+ conc. in cell is lower than in lumen (of gut); 4. Sodium/Na^+ ions enter by facilitated diffusion; 5. Glucose absorbed with Na^+ ions against their concentration/diffusion gradient / glucose absorbed down an electrochemical gradient;	5	Penalise for Na without ions once. 2. Reject channel protein 3. Maintains diffusion gradient for Na^+ from lumen/into cells; 4. Accept diffusion/from high to low concentration through a symport/cotransport protein 5. Accept glucose absorbed with sodium ions by indirect active transport
8(b)	1. Chloride ions water soluble/charged/polar; 2. Cannot cross (lipid) bilayer (of membrane); 3. Chloride ions transported by facilitated diffusion OR diffusion involving channel/carrier protein; 4. Oxygen not charged/non-polar; 5. (Oxygen) soluble in/can diffuse across (lipid) bilayer;	5	Penalise chloride molecules only once Ignore ref to size 1.Accept not lipid soluble 4. Accept oxygen lipid soluble