OXFORD

INTERNATIONAL
AQA EXAMINATIONS

INTERNATIONAL AS

BIOLOGY (9610)

BL01

Unit 1 The diversity of living organisms

Mark scheme

June 2019

Version: 1.0 Final

I96XBL01/MS

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 oxfordaqaexams.org.uk

Question	Marking guidance	Mark	Comments
01.1	**A** – Phospholipid; **Hydrocarbon chain –** E; **C** – (channel/carrier) protein;	1 1 1	
01.2	1. Idea of phospholipid molecules **moving** = fluid; 2. Idea of **proteins** (embedded) **in membrane** in separate locations = mosaic;	1 1	
01.3	Restricts the movement of other molecules making up the membrane;	1	Accept: to give the membrane more rigidity / added strength / helps to maintain the membrane's shape

Question	Marking guidance	Mark	Comments
02.1	P N L J;	1	
02.2	*Andrias_davidianus;*	1	Must be upper case 'A' for *Andrias* and lower case 'd' for *davidianus*
02.3	1. Species B most closely related to species C **as** they share a more/most recent common ancestor; 2. Species B more related to species D and E than to species A **as** they share a more recent ancestor; **OR** Species B least related to species A **as** they share a more/most distant common ancestor/diverged a long time ago/before the other species;	2	
02.4	Suitable suggestion e.g. enzyme involved in (aerobic) respiration / transport protein (in mitochondrial membrane);	1	Accept named examples e.g. ATP synthase.
02.5	1. Reference to base triplet / triplet code / more bases than amino acids / longer base sequence than amino acid sequence; 2. Idea that the genetic code is degenerate;	2	1. Accept reference to codons instead of triplets 2. Accept introns are removed (when pre-mRNA is spliced) Reject once: 'amino acids are formed / produced' The same amino acid may be coded for by different base triplets / codons = 2 marks

Question	Marking guidance	Mark	Comments
02.6	Suitable suggestion e.g. 1. May release individuals with a disease / cause release of pathogen **OR** Species B may increase (interspecific) competition / outcompete other species for resources e.g. food / disrupt food chains **OR** Cross-breeding / may form hybrids; 2. (Leads to) reduced biodiversity / loss of other species;	2	

<table>
<tr><th>Question</th><th>Marking guidance</th><th>Mark</th><th>Comments</th></tr>
<tr><td>03.1</td><td>1. Triplet / three bases on mRNA;

2. That codes for an amino acid;</td><td>1

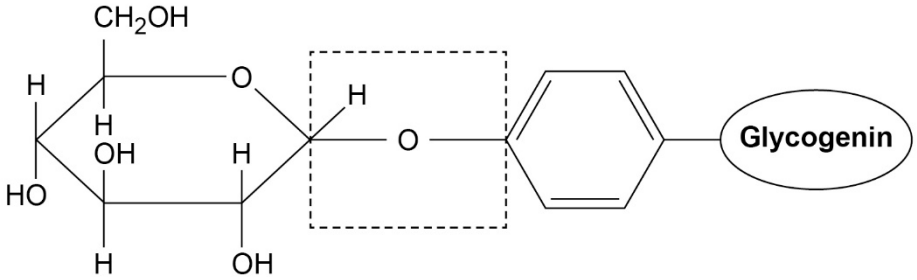
1</td><td>1. Accept nucleotide for base
1. Reject DNA for mRNA
1. Ignore references to RNA unqualified

2. Ignore code for stop / start</td></tr>
<tr><td>03.2</td><td><table>
<tr><td>DNA</td><td>C</td><td>T</td><td>A</td><td>C</td><td>C</td><td>G</td><td>T</td><td>C</td><td>A</td><td>G</td><td>A</td><td>C</td><td>T</td><td>C</td><td>G</td></tr>
<tr><td>mRNA</td><td>G</td><td>A</td><td>U</td><td>G</td><td>G</td><td>C</td><td>A</td><td>G</td><td>U</td><td>C</td><td>U</td><td>G</td><td>A</td><td>G</td><td>C</td></tr>
<tr><td>Amino acid</td><td colspan="3">Asp</td><td colspan="3">Gly</td><td colspan="3">Ser</td><td colspan="3">Leu</td><td colspan="3">Ser</td></tr>
</table></td><td>3</td><td>2 marks for correct DNA sequence
(1 mark = complementary bases; 1 mark = T not U;)
1 mark for correct amino acid sequence;</td></tr>
<tr><td>03.3</td><td>Uracil.</td><td>1</td><td>Do not accept U by itself</td></tr>
<tr><td>03.4</td><td>G A U G G C A G U C U G A G C;</td><td>1</td><td>Allow a circle around the 9th base (U) instead</td></tr>
<tr><td>03.5</td><td>As the 4th codon forms a stop codon / 4th codon now UGA which is a stop code;</td><td>1</td><td>Allow even if 4th not specified</td></tr>
</table>

Question	Marking guidance	Mark	Comments
04.1	1. (Draw) start line / origin in pencil; 2. Use pipette / glass rod / capillary tube / pin (to transfer solution) onto start line / origin; 3. Apply several drops on the same spot; 4. Allow to dry between each application;	3 max	1. Allow other descriptions of start line but must be in pencil. Allow reference to supporting paper (e.g. with a glass rod) so the origin does not touch a solid surface (e.g. the bench)
04.2	Any **two** from: 1. The solvent should start below the pencil line; 2. Stop before the solvent reaches the top of the paper/draw (pencil) line for solvent front before the solvent dries; 3. Don't allow the paper to touch the sides of the jar / don't move the jar during the investigation; 4. Use a fume cupboard; 5. Don't touch the paper with bare hands/wear gloves when touching the paper; 6. No flames near the solvent;	2	
04.3	1. Tyrosine; 2. Calculated R_f in range of 0.44–0.47; **OR** Statement that calculated R_f value is the closest / same as value for Tyrosine;	1 1	

Question	Marking guidance	Mark	Comments
04.4	R / variable group;	1	Accept side chain
04.5	Any **two** from: 1. Turn the chromatogram 90° / run at right angle; 2. Using a different solvent; 3. Run chromatography for longer time;	2 max	

<table>
<tr><th>Question</th><th>Marking guidance</th><th>Mark</th><th>Comments</th></tr>
<tr><td>05.1</td><td>(Large molecule) made up of many (repeating / identical / similar) monomers / (smaller) molecules / subunits;</td><td>1</td><td>Not necessary to refer to similarity with monomers</td></tr>
<tr><td>05.2</td><td>A tick in the α box;</td><td>1</td><td>No marks if any other ticks in other boxes unless crossed through clearly</td></tr>
<tr><td>05.3</td><td>Maltose;</td><td>1</td><td></td></tr>
<tr><td>05.4</td><td><table><tr><th>Test</th><th>Final colour</th></tr><tr><td>Add Benedict’s solution and heat</td><td>Blue (solution)</td></tr><tr><td>Add biuret reagent</td><td>Purple / lilac / mauve / violet;</td></tr></table></td><td>1
1</td><td>Add biuret reagent – do not allow blue or pink</td></tr>
<tr><td>05.5</td><td>1. Protein present / the enzyme / glycogenin is a protein
OR
2. (Protein) contains peptide bonds that react with the biuret reagent
OR
3. (Protein) not used up in the reaction / still present at the end of the reaction;</td><td>1</td><td></td></tr>
</table>

Question	Marking guidance	Mark	Comments
05.6	Box shows bond drawn correctly; H and O atoms + correct bonds drawn in box:  	1	Ignore water molecule
05.7	$\frac{323-61}{61} \times 100 = 429.5\%$;;	2	2 marks for correct answer with no working 1 mark for correct working, but wrong answer Allow 430 Allow max. 1 mark for 429
05.8	1. Enzymes only break down the glycogen from the end glucose molecules; 2. Fewer branches mean fewer ends available (for the enzymes to hydrolyse);	1 1	1. Accept breaks penultimate glyosidic bonds to produce maltose 2. Allow the converse

Question	Marking guidance	Mark	Comments
05.9	(1 ÷ 228) x 60 = 0.26 ;; **OR** $1 \div \left(\frac{228}{60}\right)$	2	2 marks for correct answer Accept 0.263 1 mark for correct calculation but wrong answer

Question	Marking guidance	Mark	Comments
06.1	(Protein) composed of more than one polypeptide chain;	1	Accept description of Hb e.g. contains four polypeptide chains so has a quaternary structure;
06.2	1. Given a pill containing no ALA / given a placebo; 2. Otherwise treated exactly the same (as the experimental group);	1 1	
06.3	Any **two** from: 1. To allow comparison with the experimental group / between the two groups; 2. To show any increase / change in EPO concentration was due to ALA; 3. To show any difference was significant / not just chance variation;	2 max	

Question	Marking guidance	Mark	Comments
06.4	**Pros** 1. Experimental group / given ALA had a higher mean concentration of EPO (before/after exercise/at all intervals); 2. Experimental group / given ALA the concentration of EPO continues to increase **whereas** control group increases and then decreases (back to original level); **Cons** 3. Experiment only used 16 students / small sample size; 4. No information about the baseline concentrations before given the pill; 5. Large standard deviations for experimental group at 24 and 48 hours after exercise **so** large spread of data/concentrations; **Neutral** 6. No overlapping SD after 10 days / before start of exercise so suggests there is a significant difference **OR** Overlapping of SD (for all samples) after exercise so suggests there is no significant difference;	4 max	For max marks, answer must contain at least one pro and at least one con 3. Accept valid statements about unknown information about the students e.g. age, ethnicity, level of fitness etc.

Question	Marking guidance	Mark	Comments
06.5	1. (More red blood cells) so more haemoglobin; 2. (More) oxygen can be absorbed / transported for respiration / to respiring tissues / cells; 3. (More) energy released / (more) ATP for muscle **contraction**; 4. Delays the onset of **anaerobic** respiration / delays build-up of lactate / lactic acid;	4	The idea of more needs to be mentioned at least once to gain full marks 3. Reject: 'energy produced or made' but allow 'energy made in the form of ATP'

Question	Marking guidance	Mark	Comments
07.1	Any **two** from: 1. Increase in carbon dioxide concentration (up to a maximum point); 2. (Starts) after the increase in oxygen concentration (when spiracles would have been opened); 3. Reference to correct figures from **Figure 10** to illustrate points made e.g. when carbon dioxide concentration reaches 2.8 AU;	2 max	2. carbon dioxide concentration increases to a maximum value just before spiracles open (as evidence by start of rise in oxygen concentration)
07.2	1. 4 seconds; 2. (Time when) oxygen (concentration) was increasing / oxygen diffusing in; **OR** (Time when) carbon dioxide (concentration) was decreasing / carbon dioxide diffusing out;	1 1	

Question	Marking guidance	Mark	Comments
07.3	Any **three** from: 1. (Larger, active insects) have a higher metabolic rate / rate of respiration **so** have a higher demand for oxygen; 2. (Larger insects) have longer diffusion distance (to tissues) / have a smaller surface area to volume ratio (so require abdominal pumping); 3. (Abdominal expansion) draws oxygen(-rich air) in due to a decrease in pressure; OR (Abdominal contraction) forces carbon dioxide(-rich air) out due to an increase in pressure; 4. (Abdominal pumping forces air in and out) so maintains / increases the concentration gradient for oxygen between the tracheal system and the cells/tissues/muscles;	3 max	1. Needs both aspects for this mark point. For marking points 1 and 2 allow the converse.

Question	Marking guidance	Mark	Comments
08.1	Phosphate group / phosphoric acid;	1	
08.2	Any **two** from: • ATP; • ADP; • Phospholipids; • RNA/mRNA/tRNA/rRNA;	2 max	Accept NADP / NAD / FAD / other correctly-named organophosphate
08.3	DNA polymerase;	1	
08.4	1.5 ÷ 1.275 × 75 = 88% **OR** 1.5 ÷ 1.7 × 100 = 88%;;	2	2 marks for correct answer 1 mark for any other correct proportion workings but without correct answer 1 mark for 88.24 (i.e. not to 2 sf)
08.5	B;	1	

Question	Marking guidance	Mark	Comments
08.6	1. Theory **C**, because it is the only theory which is correct for **both** results / not been disproven by either result; 2. Theory **A** rejected because it would predict that all of the DNA molecules contain 25% radioactivity; **OR** Theory **B** would predict this, but was already excluded by the results after one generation;	2	Allow annotated flow-chart diagram to show what happens to both A and C.