OXFORD**AQA**
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INTERNATIONAL AS
BIOLOGY (9610)
BL01
Unit 1 The Diversity of Living Organisms

Mark scheme

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Version: 1.1 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 Examiner.

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 oxfordaqa.com

Question	Marking guidance	Mark	Comments
01.1	Arrow point to anywhere that the end of a tracheole would meet the muscle;	1	

Question	Marking guidance	Mark	Comments
01.2	= 3.5mm^3;;	2	Allow one mark for Use of × 50 **OR** Use of 0.07

Question	Marking guidance	Mark	Comments
01.3	1.Many tracheae: one trachea; 2.No alveoli/no bronchioles/has tracheoles: alveoli/bronchioles/no tracheoles; 3.(Many) spiracle<u>s</u>: no spiracle<u>s</u>; 4.Direct to tissues: via blood/capillaries;	3 max	1.Allow has chitin/no cartilage: no chitin/has cartilage 2.Allow fluid-filled terminal tracheoles: alveoli with fluid lining

Question	Marking guidance	Mark	Comments
01.4	**Advantage** 1.Gas exchange direct with muscle/tissue/cells **OR** No need for a circulatory system (to transport gases); **Disadvantage** 2.Limits (insects) size **OR** Takes up a lot of space;	2	1.Allow short diffusion distance/faster diffusion 1.Allow spiracles closing to reduce water loss

Question	Marking guidance	Mark	Comments
01.5	1. Increasing the trachea length increases the percentage respiratory increase (at all flutter speeds); 2. The higher the flutter rate, the greater increase in the percentage respiratory increase; 3. Little difference in the percentage respiratory increase between flutter speeds of 14 and $24s^{-1}$; 4. Flutter speeds of 14 and $24s^{-1}$/higher flutter speeds begin to level off **and** flutter speed of 4/low flutter speed does not level off;	3 max	2.Allow low/$4s^{-1}$ flutter rate gives least increase in the percentage respiratory increase **OR** $24s^{-1}$ flutter rate gives the greatest increase in the percentage respiratory increase

Question	Marking guidance	Mark	Comments
02.1	Correctly drawn amino acid;	1	

Question	Marking guidance	Mark	Comments
02.2	(Di)peptide; Water;	2	Reject polypeptide

Question	Marking guidance	Mark	Comments
02.3	Yeast, Frog, Turtle, Penguin, Kangaroo, Donkey, **Rabbit**;	2	Allow one mark for 4 species in the correct order

Question	Marking guidance	Mark	Comments
02.4	**Advantage:** 1.Same/similar amino acid sequence in all individuals of the same species; 2.Cytochrome c is present in all species (so you can compare eukaryotes); **Disadvantage:** 3.Cannot be used on extinct species/prokaryotes **OR** Amino acid sequences not as accurate as using DNA/mRNA sequences **OR** Other proteins may differ more (than cytochrome c) so differences not seen;	2	3.Allow idea of code being degenerate

Question	Marking guidance	Mark	Comments
03.1		4 max	Mark in pairs: Improvement and Explanation
			Only allow explanation after a suitable improvement
	1.Improvement – Use intermediate concentrations of sucrose solution;		1.Ignore use more concentrations
	2.Explanation – To obtain a more accurate value for the concentration that gives no change in mass;		
	3.Improvement – Carry out repeats (at the same concentration);		
	4.Explanation – Allows a mean to be calculated/reduces the effect of anomalies/allows anomalies to be identified;		4.Allow take/find an average
			4.Reject prevents anomalies
	5.Improvement - Use <u>same</u> cork borer;		5. Allow one/a cork borer
	6.Explanation – To get the same diameter/width/SA:vol;		6. Ignore same size
	7.Improvement – Blot melon directly after cutting;		
	8.Explanation – To remove excess liquid;		
	9.Improvement – Use same (type/age of) melon;		9.Allow same location of sample/ remove 'skin'
	10.Explanation – Water potential may differ between melons;		10. Allow solute potential
			10.Ignore sucrose concentration may differ between melons

Question	Marking guidance	Mark	Comments
03.2	Cork borer/scalpel – cut downwards onto a tile/away from you; **OR** Broken glass – keep test tubes away from the edge of the desk;	1	

Question	Marking guidance	Mark	Comments
03.3	-26.04;;	2	Allow one mark for 0.69 **or** 26.04 **or** -26 / -26.0 / -26.03 / -26.0377

Question	Marking guidance	Mark	Comments
03.4	Allows a comparison despite starting masses being different;	1	

Question	Marking guidance	Mark	Comments
03.5	The mass of the cylinders will become constant (after 24 hours);	1	Allow reference to equilibrium/described reached

Question	Marking guidance	Mark	Comments
03.6	1.Prevents evaporation/loss of <u>water/solvent</u> from the sucrose solution overnight; 2.Increasing the concentration/decreasing the water potential;	2	1.Reject evaporation/loss of solution

Question	Marking guidance	Mark	Comments
03.7	1.Water potential is higher in the sucrose solution than the melon tissue; 2.Water enters the melon cells/cylinder by <u>osmosis/diffusion</u>;	2	Reject sucrose solution enters the cells

Question	Marking guidance	Mark	Comments
03.8	1.Draw a graph of percentage change in mass (y–axis) against sucrose concentration (x–axis); 2.Find (the sucrose concentration) where there is 0 mass change/line crossed the x-axis; 3.Find out the water potential of this sucrose concentration;	3	3. Allow biological explanation e.g. sucrose solution being isotonic with melon tissue

Question	Marking guidance	Mark	Comments
04.1	1. **W** = Phosphate (group)/PO_4^-/phosphoric acid; 2. **X** = Nucleotide; 3. **Y** = Deoxyribose (sugar);	3	3.Ignore pentose

Question	Marking guidance	Mark	Comments
04.2	Hydrogen (bond);	1	Ignore H

Question	Marking guidance	Mark	Comments
04.3	X;	1	

Question	Marking guidance	Mark	Comments
04.4	1. Percentages of A and T similar (in all organisms); 2. Percentages of C and G similar (in all organisms); 3. All eukaryotes have higher A and/or T than prokaryotes **OR** All eukaryotes have lower G and/or C than prokaryotes;	2 max	Allow equal content of purines and pyrimidine for 1 mark 3. Allow description using names of all the organisms

Question	Marking guidance	Mark	Comments
04.5	1. C and G show (complementary) base pairing **OR** A and T show (complementary) base pairing; 2. DNA is likely to be a double structure/2 chains eq;	2	

Question	Marking guidance	Mark	Comments
04.6	260;;	2	Allow 26% for one mark Allow 130 for one mark

Question	Marking guidance	Mark	Comments
05.1	1. DNA splits/separates/unzips/hydrogen bonds break; 2. Correct reference to DNA helicase/an enzyme (to separate DNA strands); 3. Complementary sequence/base-pairing; 4. Reference to promoter or stop/start codons; 5. Make mRNA via RNA polymerase; 6. mRNA detaches from the DNA; 7. Introns/junk/non-coding RNA spliced out;	5 max	1. Ignore unwinds 2. Allow RNA polymerase (separates DNA strands)

Question	Marking guidance	Mark	Comments
05.2	mRNA produced from aromatase gene U A A G C G Inserted DNA T A A G C G	2	One mark for mRNA row One mark for DNA row

Question	Marking guidance	Mark	Comments
05.3	1. mRNA (transcribed) from inserted gene binds to mRNA (transcribed) from aromatase gene; 2. Aromatase mRNA cannot bind to ribosome; 3. (Complementary) tRNA molecules cannot bind;	3	

Question	Marking guidance	Mark	Comments
05.4	1.(Same) species/sex/gender; 2.(Same) age/size; 3.Same tissue/size/freshness of tissue; 4.(Same) pH; 5.(Same) temperature; 6.Excess substrate; 7.Collect sample of carp at the same/similar time of day/year;	3	1. Allow same proportion of male and females 2. Allow only sample carp of reproductive age 7. Allow any other suitable controlled variable e.g. only from healthy carp

Question	Marking guidance	Mark	Comments
05.5	1. Fewer carp hatched/produced/less breeding eq; 2. Idea of birth rate less than death rate; 3 Valid ecosystems effect e.g. more predation/disease etc;	1 max	1.Reject carp cannot reproduce 1.Allow infertile offspring produced

Question	Marking guidance	Mark	Comments
06.1	1. **A** = Centromere; 2. **B** = Chromatid; 3. **C** = Chromosome/sister chromatids;	3	 2. Ignore sister 3. Reject chromosome<u>s</u>/sister chromatid

Question	Marking guidance	Mark	Comments
06.2	Meiosis;	1	

Question	Marking guidance	Mark	Comments
06.3	1. Crossing over **OR** Description of crossing over e.g. (non-sister) chromatid in each (homologous) pair twist/cross over around each other; 2. Chromatid breaks and rejoin to chromatid on homologous chromosome **OR** DNA/alleles have been exchanged between homologous chromosomes;	2	1. Allow chiasma(ta) form 2. Reject exchange of genes Needs the idea that a chromatid from one homologue interacts with a chromatid from the other homologue

Question	Marking guidance					Mark	Comments
07.1	Feature	Nuclei	Mitochondria	Prokaryotic cells		3	One mark for each correct column
	Can divide by meiosis	✓					
	Have circular DNA		✓	✓			
	DNA associated with histone proteins	✓					
	May have flagella			✓			
	Surrounded by two membranes	✓	✓				
	DNA found in the cytoplasm or matrix		✓	✓			

Question	Marking guidance	Mark	Comments
07.2	13 750;;	2	27 500 = one mark

Question	Marking guidance	Mark	Comments
07.3	More copies (of the same gene) **so** more likely to be able to detect it;	1	Ignore easier to test for

Question	Marking guidance	Mark	Comments
07.4	1. DNA from mitochondria does not undergo independent assortment/crossing over; 2. (Random) fertilization does not occur/idea of not combining DNA of 2 individuals;	2	1.Allow meiosis doesn't occur in the mitochondria 2.Allow mitochondrial DNA only comes from the mother/ from one parent

Question	Marking guidance	Mark	Comments
07.5	**Allow** any **two** from: 1.Similar behaviours/courtship; 2.Can breed together to produce fertile offspring; 3.(Comparison of) mRNA (base sequences); 4.Use DNA hybridisation; 5.Immunological comparisons; 6.Information from fossils; 7.Similar morphology/anatomy/visible characteristics; 9.Embryology;	2 max	