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INTERNATIONAL  
AQA EXAMINATIONS

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# INTERNATIONAL AS BIOLOGY (9610)

## **BL01**

Unit 1 The Diversity of Living Organisms

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Mark scheme

January 2022

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Version: 1.0 Final



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MARK SCHEME – INTERNATIONAL AS BIOLOGY – BL01 – JANUARY 2022

Question	Marking guidance	Mark	Comments
01.1	(Glucose) 6; (Ribose) 5;	2	

Question	Marking guidance	Mark	Comments
01.2	Nitrogen;	1	Ignore N

Question	Marking guidance	Mark	Comments
01.3	R-groups/side chains are <b>different</b> / contain <b>different</b> numbers of carbon atoms;	1	

Question	Marking guidance	Mark	Comments
01.4	1. Heat with Benedict's solution <b>to</b> confirm a negative result / sucrose is not a reducing sugar; 2. Boil/heat (sucrose) with an acid then <b>neutralise</b> with alkali; 3. Heat with Benedict's solution and red/orange colour indicates sucrose is a non-reducing sugar;	3	1. For 'confirm a negative result' accept stays blue or no colour change 2. Accept named examples of acids/alkalis 3. Award only if mp2 has been attempted 3. For 'heat' ignore 'warm'/'heat gently'/'put in a water bath' but accept stated temperatures $\geq 60$ °C 3. Heat must be stated again, do not accept using residual heat from mp2

MARK SCHEME – INTERNATIONAL AS BIOLOGY – BL01 – JANUARY 2022

Question	Marking guidance	Mark	Comments
02.1	<p>1. <b>A</b> = Phosphate (group);</p> <p>2. <b>B</b> = Deoxyribose;</p> <p>3. <b>C</b> = Nitrogen-containing/nitrogenous/organic base;</p>	3	<p>1. Reject phosphorus</p> <p>1. Accept P/PO<sub>4</sub><sup>3-</sup></p> <p>2. Ignore pentose/sugar</p> <p>2. Reject ribose</p> <p>3. Accept Adenine and Thymine and Cytosine and Guanine</p> <p>3. Reject uracil</p>

Question	Marking guidance	Mark	Comments
02.2	1088 / 1.088 x 10 <sup>3</sup> (mm);	2	<p>Allow 1.09 x 10<sup>3</sup> (mm);</p> <p>One mark for correct answer given in μm</p> <p>One mark for correct answer given in the incorrect order of magnitude</p> <p>One mark for correct working but incorrect answer eg (0.34÷1000) x 3.2x10<sup>9</sup> x 10<sup>-3</sup></p>

Question	Marking guidance	Mark	Comments
<b>02.3</b>	1. DNA in mitochondria is circular <b>and</b> DNA in the nucleus is linear; 2. DNA in mitochondria is not associated with proteins Or DNA in the nucleus is associated with proteins/histones;	2	Allow DNA in mitochondria has no/fewer introns;

Question	Marking guidance	Mark	Comments
<b>02.4</b>	1. (DNA) helicase breaks hydrogen bonds (between DNA strands); Or (DNA) helicase separates the DNA strands (between 2 DNA strands); 2. Both strands act as templates Or Each strand acts as a template; 3. (Free) nucleotides attach by complementary / specific base pairing / AT and GC; 4. DNA polymerase joins nucleotides (to the new DNA strand); 5. Reference to condensation reactions / formation of phosphodiester bonds (between nucleotides);	5	1. Accept H bonds for hydrogen bonds 1. Reject 'hydrolyses hydrogen bonds'  2. Allow description of both DNA strands being copied  4. Reject if DNA polymerase catalyses complementary base pairing or if DNA polymerase catalyses nucleotides joining to template strand

MARK SCHEME – INTERNATIONAL AS BIOLOGY – BL01 – JANUARY 2022

Question	Marking guidance	Mark	Comments
03.1	(Number of chromosomes per cell) 2, 2; (Mass of DNA per cell) 400, 200;	2	Mark per column

Question	Marking guidance	Mark	Comments
03.2	<b>(Meiosis 1)</b> 1. Homologous chromosomes separate/are pulled/move apart (to opposite poles); <b>(Meiosis 2)</b> 2. (Sister) chromatids separate/are pulled/move apart (to opposite poles);	2	1. Allow chromosomes of each pair for homologous chromosomes

Question	Marking guidance	Mark	Comments
03.3	(Random) fertilisation/fusion of gametes;	1	Allow mutations Ignore random mating/interbreeding

MARK SCHEME – INTERNATIONAL AS BIOLOGY – BL01 – JANUARY 2022

Question	Marking guidance	Mark	Comments
<b>04.1</b>	<p>1. The rate is the same up to 20–30 minutes/eq;</p> <p>2. Faster uptake for <b>P</b> than <b>Q</b>;</p> <p>3. (Uptake of) <b>P</b> is linear/increases throughout/does not level off <b>and</b> uptake of <b>Q</b> levels off/stops;</p> <p>4. Correct manipulation of comparative figures eg <b>P</b> 9.5 <math>\mu\text{g cm}^{-3}</math> higher than <b>Q</b> at 10 hours/max concentration eg <b>P</b> 14 <math>\mu\text{g cm}^{-3}</math> and <b>Q</b> 4.5 <math>\mu\text{g cm}^{-3}</math></p> <p><b>OR</b></p> <p>Other relevant figures eg uptake of <b>Q</b> levels off in the range of 3.8 to 4.2 hours / at 4.5 <math>\mu\text{g cm}^{-3}</math>;</p>	3 max	<p>1. Accept initial rates are the same</p> <p>For full marks must have marking point 4 plus any other 2 marking points</p>

Question	Marking guidance	Mark	Comments
<b>04.2</b>	<p>1. Active transport is against a concentration gradient <b>and</b> diffusion is down a concentration gradient;</p> <p>2. Active transport requires (energy in the form of) ATP (diffusion does not);</p> <p>3. Active transport requires membrane/carrier proteins (simple diffusion does not involve proteins);</p>	2 max	<p>2. Ignore active transport requires energy unqualified</p>





MARK SCHEME – INTERNATIONAL AS BIOLOGY – BL01 – JANUARY 2022

Question	Marking guidance	Mark	Comments
05.1	32;;	2	One mark for correct answer but with incorrect number of significant figures (eg 32.0 / 32.3 / 32.26) or with incorrect rounding (eg 32.2)

Question	Marking guidance	Mark	Comments
05.2	1. Bacteria have a large surface area to volume ratio;  2. Idea that bacteria can just use diffusion (through cell membranes to exchange gases) Or Idea of bacteria having a short diffusion distance;	2	Accept converse

Question	Marking guidance	Mark	Comments
05.3	1. Many alveoli/capillaries <b>so</b> provide a large surface area;  2. Thin epithelium/wall/surface of alveoli/capillaries <b>so</b> short <u>diffusion</u> distance/pathway;  3. Constant ventilation/breathing/circulation <b>so</b> maintains concentration gradient;	3	Both feature and explanation needed for each mark point  2. Ignore reference to thin cell membrane

MARK SCHEME – INTERNATIONAL AS BIOLOGY – BL01 – JANUARY 2022

Question	Marking guidance	Mark	Comments
06.1	<p>1. So that sequence/order of movement (of amino acids/polypeptide/proteins) through organelles can be tracked/recorded Or To identify organelles with (radioactively labelled) amino acids;</p> <p>2. (So) a comparison could be made between organelles/to control for differences in radioactivity take up between cells;</p>	2	1. Accept converse eg 'non-labelled amino acids cannot be tracked' etc

Question	Marking guidance	Mark	Comments
06.2	Translation;	1	

Question	Marking guidance	Mark	Comments
06.3	<p>1. Named bonds form eg hydrogen/ionic/disulfide/hydrophobic;</p> <p>2. Chaperone proteins assist in the folding (of polypeptides);</p> <p>3. The polypeptide folds into the secondary/tertiary structure;</p>	3	<p>Reject peptide bond</p> <p>3. Allow forms alpha-helix or beta-pleated sheets for secondary structure;</p>

MARK SCHEME – INTERNATIONAL AS BIOLOGY – BL01 – JANUARY 2022

Question	Marking guidance	Mark	Comments
06.4	Organelle X Rough endoplasmic reticulum/RER/ <u>transport vesicle/ribosome</u> ; Organelle Z (Secretory) vesicle/lysosome;	1	Both need to be correct

Question	Marking guidance	Mark	Comments
06.5	Vesicles containing radioactive amino acids/polypeptides fuse to create the Golgi Or (Radioactive) polypeptides/proteins enter the Golgi apparatus to be modified/packaged/transported;	1	

Question	Marking guidance	Mark	Comments
06.6	1.5;	1	Accept –1.5

Question	Marking guidance	Mark	Comments
06.7	1. (Secretory) vesicles (containing radioactive amino acids) fused with the cell membrane/carried out exocytosis/leave the cell; 2. (Radioactive) amino acids/polypeptides move into other organelles/form lysosomes;	2	Accept decreased due to radioactive decay

MARK SCHEME – INTERNATIONAL AS BIOLOGY – BL01 – JANUARY 2022

Question	Marking guidance	Mark	Comments
07.1	30.4 / 30 (range 29–31);;	2	Allow for one mark for: <u>(6.9 – 4.8);</u> 6.9 Or 0.304; Allow one mark for correct answer from use of 6.8 or 7.0 instead of 6.9

Question	Marking guidance	Mark	Comments
07.2	H <sup>+</sup> increases / products are acidic / (fatty) acids produced;	1	Accept fatty acid/FFAs concentration increases

Question	Marking guidance	Mark	Comments
07.3	pH probe/meter/sensor;	1	Ignore litmus paper/universal indicator

MARK SCHEME – INTERNATIONAL AS BIOLOGY – BL01 – JANUARY 2022

Question	Marking guidance	Mark	Comments
07.4	<p><b>One</b> from the following:</p> <p>1. Temperature;</p> <p>2. Type/source of milk Or Concentration of milk/concentration of triglycerides/fat in the milk Or Initial pH of milk Or Age of the milk;</p>	1	<p>Ignore amount/volume of milk</p> <p>Ignore concentration of enzymes (in the milk)</p>

Question	Marking guidance	Mark	Comments
07.5	<p>1. Substrate/triglycerides used up/equilibrium reached;</p> <p>2. (pH too low so) enzyme denatured;</p>	2	1. Ignore milk used up

Question	Marking guidance	Mark	Comments
07.6	1. (In pasteurised) lower concentration of enzymes/lipase Or Enzymes/lipase are denatured;  2. (So) fewer successful collisions Or Fewer enzyme-substrate complexes formed;  <b>OR</b>  3. Heating kills (most of) the bacteria;  4. (So in pasteurised) less/no lipase (is released into the milk) Or Only the lipase naturally in the milk is present (so lower concentration);	2	Accept converse

Question	Marking guidance	Mark	Comments
07.7	<ol style="list-style-type: none"> <li>1. Reference to using at least 5 enzyme concentrations;</li> <li>2. Description of how to make enzyme concentration eg serial dilutions etc;</li> <li>3. Equilibrate/eq enzyme and substrate/triglycerides separately at correct temperature;</li> <li>4. Add enzyme/lipase to the substrate/triglycerides;</li> <li>5. Measure the pH at intervals;</li> <li>6. Idea of repeating experiment without enzyme/with denatured enzyme;</li> <li>7. Idea of controlling triglyceride concentration/concentration of milk/temperature/volume of solutions;</li> <li>8. Repeat for each enzyme concentration and calculate a mean;</li> </ol>	5 max	<ol style="list-style-type: none"> <li>6. Do not award if lipase concentration of 0 is stated as one of the enzyme concentrations</li> <li>7. Only accept references to controlling pH if clear that this isn't the dependent variable</li> <li>7. Reject if reference to control of pH / use of buffer solution</li> </ol>

Question	Marking guidance	Mark	Comments
08.1	1. Same genus; 2. Share a <b>recent</b> common ancestor;	2	

Question	Marking guidance	Mark	Comments
08.2	(Comparisons of:) 1. The (base) sequence of DNA or of mRNA; 2. The frequency of specific base sequences or alleles; 3. The amino acid sequence of a particular protein eg haemoglobin;	3	Allow the following or correct descriptions of: 4. Immunological comparison 5. DNA hybridisation 6. Genetic fingerprinting

Question	Marking guidance	Mark	Comments
08.3	Any <b>two</b> from: 1. Described difficulty of measuring penguins in the wild eg difficult to catch or possible damage caused whilst taking measurements / less accurate measurements from living specimens; 2. Difficulty of reaching/locating sampling areas (in extreme conditions); 3. Described problems associated with scientist disturbing nesting sites, breeding etc;	2 max	1. Ignore easier to take measurements unqualified  2. Allow reference to more expensive to sample penguins in the wild



Question	Marking guidance	Mark	Comments
08.4	Idea of: All four species would more likely be protected (as the population sizes would be smaller) rather than treating them as one large population Or Specific conservation plans could be put into place for each population Or Some populations may be more at risk than others so can monitor certain populations more carefully;	1	

Question	Marking guidance	Mark	Comments
08.5	1. Breed individuals from one colony with another; 2. Failure to produce fertile offspring indicates they are different species;	2	