

**OXFORD**

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

June 2023

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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 Examiner.

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Question	Marking guidance	Mark	Comments
01.1	A Phospholipid/lipid; B Peptidoglycan/murein/glycoprotein;	2	

Question	Marking guidance	Mark	Comments
01.2	<b>Capsule</b> 1. protects from drying out / protects from phagocytosis / attachment to surfaces or other cells;  <b>Pilus</b> 2.movement / attachment to surfaces or other cells / exchange of plasmids / conjugation;	2	INGORE sexual reproduction

Question	Marking guidance	Mark	Comments
01.3	37(nm);;	2	Allow <b>one mark</b> for (25 mm÷670 000) or (25 000µm÷670 000) or (2.5cm÷670 000) or 37.3

Question	Marking guidance	Mark	Comments
01.4	$3.6 \times 10^6$ ;;	2	Allow <b>one mark</b> for 3 600 000

MARK SCHEME – INTERNATIONAL AS BIOLOGY – BL01 – JUNE 2023

Question	Marking guidance	Mark	Comments
01.5	Any <b>one</b> from <ul style="list-style-type: none"> <li>• Not a representative sample;</li> <li>• Not mixed evenly / cells overlapping;</li> <li>• Not all cells stained so not all visible;</li> <li>• A difference of one (a few) cells is multiplied each time the sample is diluted;</li> <li>• The stain dilutes the sample more;</li> </ul>	1	

Question	Marking guidance	Mark	Comments																		
01.6	<table border="1"> <thead> <tr> <th data-bbox="264 419 719 496">Eukaryote</th> <th data-bbox="719 419 1173 496">Prokaryote</th> </tr> </thead> <tbody> <tr> <td data-bbox="264 496 719 572">nucleus/nucleolus</td> <td data-bbox="719 496 1173 572">no nucleus/no nucleolus;</td> </tr> <tr> <td data-bbox="264 572 719 649">larger ribosomes (80s)</td> <td data-bbox="719 572 1173 649">smaller ribosomes (70s);</td> </tr> <tr> <td data-bbox="264 649 719 726">Linear DNA/chromosomes/has histones</td> <td data-bbox="719 649 1173 726">circular DNA/single chromosome /does not have histones;</td> </tr> <tr> <td data-bbox="264 726 719 802">no plasmids</td> <td data-bbox="719 726 1173 802">plasmids;</td> </tr> <tr> <td data-bbox="264 802 719 879">no mesosomes</td> <td data-bbox="719 802 1173 879">mesosomes;</td> </tr> <tr> <td data-bbox="264 879 719 956">eukaryotic cells are larger</td> <td data-bbox="719 879 1173 956">prokaryotic cells are smaller;</td> </tr> <tr> <td data-bbox="264 956 719 1032">(named) membrane bound cytoplasmic organelles</td> <td data-bbox="719 956 1173 1032">no (named) membrane bound cytoplasmic organelles;</td> </tr> <tr> <td data-bbox="264 1032 719 1109">no flagellum/pili</td> <td data-bbox="719 1032 1173 1109">(some have) flagellum/pili;</td> </tr> </tbody> </table>	Eukaryote	Prokaryote	nucleus/nucleolus	no nucleus/no nucleolus;	larger ribosomes (80s)	smaller ribosomes (70s);	Linear DNA/chromosomes/has histones	circular DNA/single chromosome /does not have histones;	no plasmids	plasmids;	no mesosomes	mesosomes;	eukaryotic cells are larger	prokaryotic cells are smaller;	(named) membrane bound cytoplasmic organelles	no (named) membrane bound cytoplasmic organelles;	no flagellum/pili	(some have) flagellum/pili;	2 max	<p>Allow <b>two marks</b> for 3 differences                      Allow <b>one mark</b> for 1 or 2 differences                      The <u>difference</u> must be clear</p> <p><b>ALLOW</b> description of no nucleus e.g. DNA in cytoplasm</p> <p><b>IGNORE</b> proteins unqualified</p> <p><b>ALLOW</b> one named example of an organelle</p>
Eukaryote	Prokaryote																				
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(named) membrane bound cytoplasmic organelles	no (named) membrane bound cytoplasmic organelles;																				
no flagellum/pili	(some have) flagellum/pili;																				

Question	Marking guidance	Mark	Comments
02.1	1. (concentration of salt) Does not decrease yield by the same amount;  2. Different species have different tolerance points / allow data ranges for any 2 of the 3 species;  3. Species with lower tolerance points decrease yield faster;	2 max	<b>ALLOW</b> e.g. potato has the largest decrease in yield  <b>ALLOW</b> e.g. onions have the highest tolerance point

Question	Marking guidance	Mark	Comments
02.2	Similar salt tolerance / genetically similar;	1	

Question	Marking guidance	Mark	Comments
02.3	1. Volume of (salt/distilled) water; 2. Light intensity / distance of light source / duration of light; 3. Ion/mineral <u>concentration</u> /pH of the <u>soil</u> ;  4. Seeds from the same plant/berry; 5. Distance between the seeds; 6. Humidity;	2 max	2. <b>ACCEPT</b> light / amount of light 3. <b>ACCEPT</b> correctly named ion/mineral concentration/amount 3. <b>IGNORE</b> nutrients unqualified 4. <b>IGNORE</b> variety/type/species

Question	Marking guidance	Mark	Comments
02.4	1. (idea that) Not all the seeds will germinate;  2. Want them to be the same height/size / they have the same starting point;  3. It allows a comparison to be made;  4. To reduce competition;	2 max	<b>ACCEPT</b> not all seeds will grow / some seeds may die / some may be diseased / not all seeds will be healthy

Question	Marking guidance	Mark	Comments
02.5	1. (salt solution) Decreases the (mean) mass;  2. (salt solution) Has very little/no effect on the (mean) dry mass of strawberries;	2	<b>ACCEPT</b> idea that it is <u>only</u> 1g different

Question	Marking guidance	Mark	Comments
02.6	1. T-test / standard error and 95% confidence limits  <b>and</b>  2. Allows a significant difference between two means to be seen;	1	

Question	Marking guidance	Mark	Comments
02.7	(these cells shrink because); 1. Water leaves the cell; 2. by osmosis/diffusion; 3. Water moves down a water potential gradient / from a <u>higher</u> to <u>lower</u> water potential/water potential is higher in the cells;	3	

Question	Marking guidance	Mark	Comments
03.1	<p>Any <b>three</b> from:</p> <ul style="list-style-type: none"> <li>• Use a quadrat;</li> <li>• Key to identify the species;</li> <li>• (Tape measure to) set out a grid/co-ordinates;</li> <li>• Random number generator;</li> </ul>	3 max	<b>ACCEPT</b> idea of separating field into squares

Question	Marking guidance	Mark	Comments
03.2	<p><b>A large number of samples:</b> To minimize the effect of an anomalous result</p> <p><b>OR</b> So that an accurate/valid/reliable <u>mean</u> can be calculated</p> <p><b>OR</b> So that stats tests can be carried out e.g. SD or t-test or standard error 95% confidence limit;</p> <p><b>Random samples:</b> Random to avoid bias;</p> <p><b>Accept once only for either large or random</b> To obtain representative data/samples;</p>	2 max	

Question	Marking guidance	Mark	Comments
03.3	6.4;;;	3	<p>If the answer is incorrect:                      Allow <b>one mark</b> for 3422 or (59x58)                      and                      Allow <b>one mark</b> for 538</p> <p>Allow <b>two marks</b> for 6.36...</p> <p>If the data for the treated field has been used allow <b>two marks</b> for 4.6</p> <p><b>ALLOW ECF</b> for <b>two marks</b> if graph has been mis-read but all other steps are correct</p>

Question	Marking guidance	Mark	Comments
03.4	<p><b>Species richness</b></p> <p>1. Is the total number of different species;</p> <p><b>Index of diversity</b></p> <p>2. Is the total number of different species <b>and</b> includes the number of individuals in each species;</p>	2	

Question	Marking guidance	Mark	Comments
<b>03.5</b>	Accept answers in either order 1. mRNA; 2. Protein/polypeptide;	2	

Question	Marking guidance	Mark	Comments
<b>03.6</b>	Allow any <b>two</b> from: <ul style="list-style-type: none"> <li>● Greater variety of food;</li> <li>● Greater number of habitats/niches;</li> <li>● Herbicide may be toxic to animals;</li> </ul>	2 max	<b>DO NOT ACCEPT</b> more food

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Question	Marking guidance	Mark	Comments
04.1	Active site;	1	

Question	Marking guidance	Mark	Comments
04.2	Water/H <sub>2</sub> O;	1	

Question	Marking guidance	Mark	Comments
04.3	Enzyme-substrate complex/ES complex;	1	

Question	Marking guidance	Mark	Comments
04.4	1. Provides <u>specific</u> shape for the <u>active site</u> ; 2. (so that) substrate fits/is complementary to/binds into/attaches to the active site;	2	

Question	Marking guidance	Mark	Comments
04.5	1. Induced fit; 2. (idea that) the <u>active site</u> changes shape to become complementary/fits/binds <b>OR</b> <u>Active site</u> can't fit/bind/be complementary to the exact shape for just one substrate;	2	

Question	Marking guidance	Mark	Comments											
05.1	<p>A tick in the box representing haploid and 2 cell divisions;</p> <table border="1" data-bbox="264 379 1176 691"> <thead> <tr> <th data-bbox="264 379 568 536" rowspan="2">Type of cells produced</th> <th colspan="2" data-bbox="568 379 1176 459">Number of cell divisions</th> </tr> <tr> <th data-bbox="568 459 875 536">1</th> <th data-bbox="875 459 1176 536">2</th> </tr> </thead> <tbody> <tr> <td data-bbox="264 536 568 616">Haploid</td> <td data-bbox="568 536 875 616"></td> <td data-bbox="875 536 1176 616">✓</td> </tr> <tr> <td data-bbox="264 616 568 691">Diploid</td> <td data-bbox="568 616 875 691"></td> <td data-bbox="875 616 1176 691"></td> </tr> </tbody> </table>	Type of cells produced	Number of cell divisions		1	2	Haploid		✓	Diploid			1	<p><b>ALLOW</b> a cross if the correct box is the only box marked</p> <p><b>ALLOW</b> answers with crosses if only the correct box contains a tick</p>
Type of cells produced	Number of cell divisions													
	1	2												
Haploid		✓												
Diploid														

Question	Marking guidance	Mark	Comments
05.2	<p><b>Crossing over</b></p> <p>1. (Chromatids are produced with) different/new combinations of alleles;</p> <p>2. Correct example e.g. Ef/eF;</p> <p><b>Independent segregation</b></p> <p>3. Different combinations of chromosomes (1 and 2)/maternal and paternal chromosomes are produced;</p> <p>4. Correct example e.g. the alleles EF could be in the same gamete as D or d;</p>	4	<p>1. <b>REJECT</b> new alleles are produced</p> <p>4. <b>ALLOW</b> other correct allele combinations</p>

Question	Marking guidance	Mark	Comments
<p><b>05.3</b></p>	<p>(In meiosis 1)</p> <p>1. Homologous chromosomes/pairs are separated from one another;</p> <p>(In meiosis 2)</p> <p>2. (Sister) chromatids are then separated/split from one another;</p> <p>3. The idea of each chromatid carrying one allele;</p> <p>4. Spindle (fibres) pull the chromosomes/chromatids to opposite poles of the cell;</p>	<p>3 max</p>	<p><b>IGNORE</b> crossing over/independent assortment/reference to stages of meiosis</p> <p><b>ALLOW</b> chromosomes for chromatid if the context is correct</p>

Question	Marking guidance	Mark	Comments
06.1	Molecule contains more than one polypeptide (chain);	1	<b>REJECT</b> has a non-protein/prosthetic group/haem

Question	Marking guidance	Mark	Comments
06.2	1. At low <u>partial pressure</u> of oxygen / <u>partial pressure</u> between 0-2, little increase (in saturation of oxygen);  2. At higher <u>partial pressure</u> of oxygen / <u>partial pressure</u> between 2-12, larger/steeper increase (in saturation of oxygen);	2	<b>ALLOW</b> values between 0-2 <b>ALLOW</b> oxygen concentration/amount for partial pressure/kPA  <b>ALLOW</b> values between 2-12 <b>ALLOW</b> oxygen concentration/amount for partial pressure/kPa

Question	Marking guidance	Mark	Comments
06.3	(ensures/results in) greater uptake of oxygen (by Hb) in the lungs/exchange surface;	1	<b>ALLOW</b> more transport of oxygen to the tissues only if in context of greater overall uptake;

Question	Marking guidance	Mark	Comments
06.4	1. <b>X</b> is hepatic artery; 2. <b>Y</b> is hepatic portal vein; 3. <b>Z</b> is hepatic vein;	3	

Question	Marking guidance	Mark	Comments
06.5	2/2.1/1.9;;	2	<b>ALLOW</b> 1 mark if answer is correct but incorrect values have been used e.g. $6.2 - 4.2 = 2.0$ <b>ALLOW</b> 6.5/6.4 and 4.5/4.4 for <b>one mark</b>

Question	Marking guidance	Mark	Comments
06.6	(oxygen lower in diseased rats) because cancer cells are more metabolically active/respiring more;	1	

Question	Marking guidance	Mark	Comments
06.7	Any two from <ul style="list-style-type: none"> <li>• Species;</li> <li>• Sex;</li> <li>• Size;</li> <li>• Age;</li> </ul> Any two from <ul style="list-style-type: none"> <li>• Diet;</li> <li>• Same environment;</li> <li>• Same activity level;</li> <li>• No other diseases present;</li> </ul>	3 max	<b>ALLOW</b> named example e.g. same concentration oxygen in air/temperature

Question	Marking guidance	Mark	Comments
07.1	2857;	1	<b>DO NOT ALLOW</b> 2,857.1 or any other value

Question	Marking guidance	Mark	Comments
07.2	Differences in environmental factors/a combination of the effects of genes and environment;	1	

Question	Marking guidance	Mark	Comments
07.3	1. <i>C. coli</i> and <i>C. jejuni</i> ; 2. They share the same <u>genus</u> ;	2	<b>IGNORE</b> Campylobacter unqualified

Question	Marking guidance	Mark	Comments
07.4	Kingdom;	1	<b>ALLOW</b> name of kingdom e.g. Eubacteria/Monera <b>IGNORE</b> domain/phylum

Question	Marking guidance	Mark	Comments
07.5	1. Asexual reproduction/can't reproduce together and make fertile offspring/can't sexually reproduce; 2. Horizontal transmission/conjugation; 3. Difficult to observe/identify physical characteristics; 4. Issues accessing the bacteria	1 max	

Question	Marking guidance	Mark	Comments
07.6	Less gut inflammation / improved mental health;	1	

Question	Marking guidance	Mark	Comments
07.7	<ol style="list-style-type: none"> <li>1. Diet e.g., sugar/salt/fat/alcohol/meat/dairy/probiotics levels;</li> <li>2. Microorganism exposure/competition with pathogens;</li> <li>3. Lifestyle</li> <li>4. Exposure to antibiotics;</li> </ol>	2 max	<p><b>ALLOW</b> relevant examples e.g., Salmonella</p> <p><b>ALLOW</b> relevant examples e.g., sleeping patterns/exercise levels/fitness level/smoking;</p> <p><b>IGNORE</b> age/gender/body mass</p>