

**INTERNATIONAL AS  
BIOLOGY (9610)**

**BL01**

Unit 1 The Diversity of Living Organisms

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Mark scheme

June 2024

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Version: 1.0 Final



2 4 6 X B L 0 1 / M S

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Question	Marking guidance	Mark	Comments
01.1	A. (Circular) DNA; B. Ribosome; C. Plasmid;	3	A. Allow Chromosome/nucleoid

Question	Marking guidance	Mark	Comments
01.2	0.93-0.95 $\mu\text{m}$ ;;	2	Allow 9.3-9.5 x 10 <sup>-1</sup> ;; <b>one mark</b> if not to 2 significant figures

Question	Marking guidance	Mark	Comments
01.3	1. Water enters the cell via <u>osmosis/diffusion</u> ; 2. Down a water potential gradient/from a high to a low water potential gradient; 3. Cell expands and breaks the cell surface membrane (because no cell wall);	3	3.Allow cell bursts/cell lysis 3.Ignore cell content leaks out

Question	Marking guidance	Mark	Comments
01.4	(Human cells) don't have cell walls;	1	Reject idea that all eukaryotic cells do not have cell walls Ignore reference to human cells being eukaryotic

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Question	Marking guidance	Mark	Comments
01.5	Use a graduated pipette / syringe / $\leq 100 \text{ cm}^3$ measuring cylinder / a beaker <u>with smaller intervals</u> on the scale;	1	

Question	Marking guidance	Mark	Comments
01.6	1. Optimum temperature for <u>enzyme</u> activity; 2. Prokaryotic cells grow quickly / more cell division / involved in synthesis of molecules for new cells;	2	1. Allow best temperature for <u>enzymes</u> / idea of optimising <u>enzyme</u> reactions 2. Allow it is the optimum temperature for growth

Question	Marking guidance	Mark	Comments
01.7	1. Antibiotic disc 1 has 2 x diameter/radius, therefore (appears to be) more effective than Antibiotic disc 2; 2. Evidence of a calculation of (area 1) $314 \text{ mm}^2$ and of (area 2) $78/79 \text{ mm}^2$ ; 3. It is 4x more effective / larger; 4. Only one investigation / no repeats;	3 max	1. Need idea of (appears to be) twice as effective; 2. Allow $3.14 \text{ cm}^3$ and $0.78/0.79 \text{ cm}^3$ 3. Allow 4 x more effective / larger for 2 marks (=mp2 + mp3)

Question	Marking guidance	Mark	Comments
02.1	G = Phosphate (group); H = <u>Deoxyribose</u> / pentose (sugar); I = Hydrogen bonds; J = nitrogenous / organic base;	4	Ignore phosphoric acid  Ignore H bond  Allow nitrogen-containing base/adenine/thymine

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Question	Marking guidance	Mark	Comments
02.2	$1.24 \times 10^8$ ;	2	Allow <b>one mark</b> for 124 000 000

Question	Marking guidance	Mark	Comments
02.3	<p><u>TTG</u>    <u>CAT</u>    <u>GGA</u>;</p> <p>AAC    GUA    CCU</p> <p><u>UUG</u>    <u>CAU</u>    <u>GGA</u>;</p>	2	

Question	Marking guidance	Mark	Comments
02.4	(eukaryotic) contains introns / non coding regions / needs to be spliced;	1	

Question	Marking guidance	Mark	Comments
02.5	<p>1. <u>Biuret</u> (reagent);</p> <p>2. Turns purple;</p>	2	<p>1. Allow sodium hydroxide <b>and</b> copper sulphate (solutions)</p> <p>2. Allow alternative colours for purple eg lilac, mauve</p>

Question	Marking guidance	Mark	Comments
03.1	<p>1. Used pen to draw starting line;</p> <p>2. Should use pencil;</p>	4 max	Mark in pairs 1 and 2, 3 and 4, 5 and 6

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	3. Paper is touching the sides of beaker; 4. Cut the paper / use narrower paper; 5. The level of the solvent is above the sample; 6. Solvent level should be below the sample (starting point);		
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Question	Marking guidance	Mark	Comments
03.2	1. Cysteine; 2. R <sub>f</sub> value is 0.4(3);	2	2. Allow L has same R <sub>f</sub> as cysteine

Question	Marking guidance	Mark	Comments
03.3	1. Use 2 way chromatography / rotate the paper 90°; 2. Use a different solvent; 3. Use longer paper <b>OR</b> wait for a longer time;	2	Allow use electrophoresis Allow use mass spectrometry

Question	Marking guidance	Mark	Comments
04.1	Fluid 1. Molecules can move / not in a fixed position / membrane can change shape (without breaking);	2	1.Allow flexible

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	<p>Mosaic</p> <p>2. Contains <u>proteins and phospholipids</u>;</p>		<p>2. Allow only mention of proteins if phospholipids mentioned in mp1, and vice versa</p>
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Question	Marking guidance	Mark	Comments
04.2	<p>1. Phospholipid;</p> <p>2. Regulates fluidity/stability of the membrane;</p> <p>3. Protein / glycoprotein;</p>	3	<p>1. Ignore fatty acid tails</p> <p>2. Allow adds strength/support/ increases rigidity/ restricts movement of other molecules</p> <p>3. Allow glycolipid</p>

Question	Marking guidance	Mark	Comments
04.3	<p>1. Separates/isolates substances eg enzymes in lysosomes / forms vesicles;</p> <p>2. Controls what enters and leaves organelles;</p> <p>3. Site for attachment eg ribosomes, ATP synthase;</p> <p>4. Allows concentration gradients to form;</p>	2 max	<p>3. Allow allows movement of electrons / electron transport chain / cristae increase surface area for ATP synthesis</p>

Question	Marking guidance	Mark	Comments
04.4	<p>1. Active transport/facilitated diffusion;</p> <p>2. All the carriers/channels have become occupied/saturated at higher concentrations;</p>	2	

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Question	Marking guidance	Mark	Comments
04.5	1. Shallower/less steep at the start; 2. Curve levels off;	2	

Question	Marking guidance	Mark	Comments
05.1	1. More oxygen supplied for respiration / ATP production / energy release in muscles; 2. So, able to exercise harder/faster/longer <b>OR</b> remove more lactic acid/make less lactic acid/remove more CO <sub>2</sub> ;	2	1. Allow more aerobic respiration 2. More muscle contraction must be qualified

Question	Marking guidance	Mark	Comments
05.2	1. Same/similar diameter as a red blood cell; 2. Slow rate of blood flow; 3. More surface area in contact/shorter <u>diffusion</u> distance (for gas exchange); 4. Gives more time for gas exchange;	2 max	

Question	Marking guidance	Mark	Comments
05.3	1. Contains an iron ion/Fe <sup>2+</sup> ; 2. Binds reversibly to an oxygen (molecule);	2	1. Ignore Fe <sup>+</sup> /Fe <sup>3+</sup> 2. Allow idea that it can pick up <b>and</b> drop off oxygen

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Question	Marking guidance	Mark	Comments
05.4	56; 3.6;	2	

Question	Marking guidance	Mark	Comments
05.5	1. More oxygen dissociates (at lower partial pressures)/ haemoglobin has a lower affinity (at lower partial pressures); 2. More oxygen for respiration (in tissues / muscles cells / organs / glands) <b>OR</b> More oxygen released to respiring tissues/muscle;	2	1. Allow oxygen easily released / more released  2. Allow (more oxygen for) ATP production/energy release

Question	Marking guidance	Mark	Comments
06.1	Class <b>and</b> order; <i>Animal(ia) and Esox;</i>	2	

Question	Marking guidance	Mark	Comments
06.2	1. Q and R (and S) share a common ancestor/Q and R (and S) are closely related to each other; 2. All 5 species share a common ancestor;	3 max	

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	3. T and U share a common ancestor/T and U are closely related to each other; 4. T and U diverged most recently;		
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Question	Marking guidance	Mark	Comments
06.3	Idea of mating with (each of the) other species to see if the offspring are infertile <b>OR</b> Compare differences in DNA / mRNA / protein;	1	Needs idea of comparison with other species

Question	Marking guidance	Mark	Comments
06.4	N=Total number of individuals in all species (in the sample); n=The number of individuals in a/one species (in the sample);	2	

Question	Marking guidance	Mark	Comments
06.5	1. Samples are representative / reduces the effect of anomalies / allows anomalies to be identified;	2	1. Ignore references to calculating means 1. Ignore reduces the effect of chance 1. Ignore eliminate anomalies

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	2. Removes bias;		1. Ignore references to accuracy
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Question	Marking guidance	Mark	Comments
07.1	Induced fit;	1	

Question	Marking guidance	Mark	Comments
07.2	Hydrolysis;	1	

Question	Marking guidance	Mark	Comments
07.3	1. Shape of the substrate may be complementary to two <u>active sites</u> ;  2. The <u>active sites</u> might bind to different parts/sides of the substrate;	2	1. Allow fits two <u>active sites</u> 1. Allow both enzymes have <u>active sites</u> complementary to the same substrate 2. Allow endopeptidase <u>active site</u> binds to the middle of a protein AND exopeptidase <u>active site</u> binds to the end

Question	Marking guidance	Mark	Comments
07.4	1. Cofactor binds to/changes the shape of the <u>active site</u> ; 2. <u>Active site</u> becomes complementary to the substrate;	2	2. <u>Active site</u> fits the substrate

Question	Marking guidance	Mark	Comments
07.5	1. (Molecule Z) is a <u>non-competitive inhibitor</u> ; 2. Binds to an allosteric site / site that is not the active site / another site;	3	

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	3. Changes the tertiary/3-D structure / shape of the enzyme/active site;		
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Question	Marking guidance	Mark	Comments
07.6	Increase the enzyme concentration;	1	Allow idea of adding a substance that reacts to / combines with molecule Z Ignore reference to binding to allosteric site