

OXFORD

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INTERNATIONAL AS BIOLOGY (9610)

BL01

Unit 1 The Diversity of Living Organisms

Mark scheme

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2 3 1 X B L 0 1 / M S

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Question	Marking guidance	Mark	Comments
01.1	Light (rays) have longer wavelengths OR electron (beams) have shorter wavelengths;	1	Must be comparative

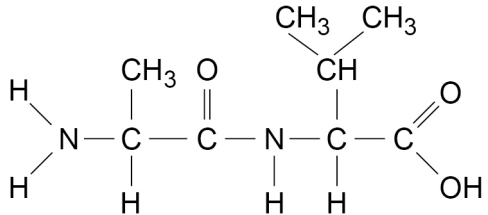
Question	Marking guidance	Mark	Comments
01.2	Any two from: • Cannot look at living material OR must be in a vacuum OR specimen must be dehydrated; • Specimen must be thin; • Artefacts may be present; • Complex staining method OR long preparation time; • Image not in 3D OR only 2D images produced; • Image only in black and white OR image not in colour;	Max 2	

Question	Marking guidance	Mark	Comments
01.3	Any two from: • Produces mRNA/tRNA; • Contains the DNA/genetic material of the cell OR contains chromosomes OR contains the code for proteins/enzymes; • Makes ribosomal RNA/rRNA/ribosomes;	Max 2	

Question	Marking guidance	Mark	Comments
01.4	13;;	2	Award 1 mark for correct answer not given to 2 sf in the range 12.27 – 12.72 μm Award 1 mark for correct digits given to 2 sf with incorrect order of magnitude Accept 12 for 2 marks (for measurement of e.g. 54.5mm)

Question	Marking guidance	Mark	Comments
01.5	(Organelle A/mitochondrion) makes ATP; (ATP) provides <u>energy</u> for peptide bond formation OR provides <u>energy</u> for joining amino acids ;	2	Allow one mark for A contains ribosomes/DNA (for protein synthesis)

Question	Marking guidance	Mark	Comments
01.6	Condensation;	1	

Question	Marking guidance	Mark	Comments
01.7	Peptide bond between C-N correctly drawn; Rest of dipeptide correctly drawn;	2	

Question	Marking guidance	Mark	Comments
01.8	1. Spin at increasing speed; 2. Separates organelles depending on mass/density;	2	Allow for 2 marks: Use of sucrose density gradient; Organelles settle in layer of same density (then pierce bottom of plastic tube & collect fractions);

Question	Marking guidance	Mark	Comments
01.9	29.5 (%);;	2	1 mark for %C = %G and %A = %T OR A + T = 59%

Question	Marking guidance	Mark	Comments
02.1	1. Count a large number of cells; 2. Suitable sampling method, eg regular intervals / random sampling;	2	1. If number of cells stated, must be more than 20 cells

Question	Marking guidance	Mark	Comments
02.2	1. (In 6% of cells) the <u>water potential</u> of the solution is lower than inside the cell; OR (In 94% of cells) the <u>water potential</u> of the solution is higher/similar than inside the cell; 2. Water is moving by <u>osmosis</u> ; 3. Correct direction of (net) movement;	3	2. Accept <u>diffusion</u> of water 3. Out for 6%, in for 94%

Question	Marking guidance	Mark	Comments
02.3	1. Line graph with concentration on x-axis and percentage of plasmolysed cells on y-axis <u>and</u> linear scales <u>and</u> correct units on both axes; 2. All five points correctly plotted; 3. Smooth curve of best fit OR points connected with straight ruled lines <u>and</u> no extrapolation;	3	

Question	Marking guidance	Mark	Comments
02.4	0.42 – 0.43 (mol dm ⁻³);	1	Credit correct answer from candidate's graph in 02.3

Question	Marking guidance	Mark	Comments
02.5	1. Use smaller intervals; 2. Between 0.4 and 0.5;	2	

Question	Marking guidance	Mark	Comments
02.6	<i>Idea that</i> methylene blue might alter water potential of solution/cells so changes percentage of cells plasmolysed;	1	Allow correct reference to concentration of solution/cells

Question	Marking guidance	Mark	Comments
02.7	1. Lines should be continuous OR lines should not be sketched; 2. No shading; 3. Label the cell membrane;	2	

Question	Marking guidance	Mark	Comments
03.1	Chromosomes are in (homologous) pairs OR synapsis is occurring OR bivalents have formed; Chromatids are wrapped around each other OR crossing over is occurring;	2	

Question	Marking guidance	Mark	Comments
03.2	1. Crossing over (between homologous chromosomes); 2. Causes new combinations of <u>alleles</u> ; OR 3. Independent segregation (of homologous chromosomes); 4. Different combinations of (maternal and paternal) chromosomes/alleles;	2	Mark as pairs 2. Reject: produces new alleles 3. Allow description of independent segregation

Question	Marking guidance	Mark	Comments
03.3	Histones; Exons; Introns;	3	

Question	Marking guidance	Mark	Comments
04.1	6 / 6.1 / 6.07 / 6.068;;	2	Award 2 marks for correct answer to any number of decimal places If answer is incorrect allow 1 mark for $4830 \div 796$

Question	Marking guidance	Mark	Comments
04.2	1. (Index of diversity takes into account) number of species present; 2. (And) number of individuals of each species;	2	

Question	Marking guidance	Mark	Comments
04.3	Difficult to catch all the fish OR fish can migrate up/down river;	1	Accept examples e.g. fish under rocks OR in weeds

Question	Marking guidance	Mark	Comments
04.4	(Dace and chub) have the same genus name OR both are <i>Leuciscus</i> ;	1	

Question	Marking guidance	Mark	Comments
05.1	Any two from: • Plasmids; • Capsule; • Circular DNA; • 70S/small ribosomes; • Pili/fimbriae;	Max 2	Allow flagellum/flagella

Question	Marking guidance	Mark	Comments
05.2	Made of many repeating (sub)units OR made of many monomers;	1	

Question	Marking guidance	Mark	Comments
05.3	Nitrogen;	1	Accept sulfur

Question	Marking guidance	Mark	Comments
05.4	8.6×10^6 ;	3	Accept for 1 mark: 42×200 cells in $1 \text{ mm}^3 = 8400$ OR $42 \div 0.005 = 8400$ Accept for 1 mark: 42×2^{10} after 4 hours = 43008 Accept for 2 marks: 8 601 600 OR 8.4×10^3 OR 4.3×10^4

Question	Marking guidance	Mark	Comments
05.5	1. Prevents synthesis of (new) cell walls; 2. So bacteria cannot reproduce; OR 3. Weakens cell wall; 4. So cell contents leak out OR lysis/bursting of cells;	Max 2	Mark as pairs

Question	Marking guidance	Mark	Comments
06.1	A collection of similar/identical cells that perform a specific function;	1	Allow: A collection of a few types of cells that perform a specific function

Question	Marking guidance	Mark	Comments
06.2	1. (Plants/acacias are large so) have a small surface area to volume ratio OR (Plants/acacias have) long distances for transport; 2. (small SA:Vol so) mass transport needed for efficient supply of materials OR diffusion too slow;	2	1. Accept have a small SA:Vol 3. Accept named material

Question	Marking guidance	Mark	Comments
06.3	(Similarity) Any two from: Contain (alpha) glucose; Composed of carbon, hydrogen <u>and</u> oxygen; $C_{12}H_{22}O_{11}$ OR both formed from two monomers with formula $C_6H_{12}O_6$; (Joined by) glycosidic bond; (Difference) Maltose formed from glucose <u>and</u> sucrose formed from glucose and fructose;	3	Must have two similarities and one difference Allow sucrose contains fructose (but maltose does not)

Question	Marking guidance	Mark	Comments
06.4	Dry OR arid;	1	Accept any condition linked to lack of water e.g. desert, low humidity, frozen, salt/saline

Question	Marking guidance	Mark	Comments
06.5	5600;	1	Accept 5.6×10^3

Question	Marking guidance	Mark	Comments
06.6	1. (Small so) reduces surface area for gas exchange OR fewer stomata for gas exchange OR reduces surface area for photosynthesis/light absorption; 2. (Thick, waxy cuticle so) increases diffusion distance for gases OR diffusion of gases cannot occur;	2	1. Accept gas entry or CO ₂ entry for gas exchange

Question	Marking guidance	Mark	Comments
06.7	1. (Method of applying pigment) Draw pencil line across bottom of chromatography/filter paper and apply pigment to origin; 2. (Method of concentrating pigment) Repeated application of pigment; 3. (Method of putting paper in solvent) Stand the paper in a solvent with solvent below the origin; 4. (Precaution) Make sure paper is not touching the sides OR don't move the tube; 5. Remove when solvent near top of paper and mark solvent front; 6. (Method of standardising technique) Same solvent OR same method of measuring distance travelled by pigments; 7. (Method of finding R_f values) distance travelled by pigment divided by distance travelled by solvent; 8. (Method of comparison) Compare R_f values of pigments OR compare positions of spots on chromatogram OR identify pigments from known R_f values;	5 Max	

Question	Marking guidance	Mark	Comments
07.1	1. Diaphragm (muscles) contract and the diaphragm flattens/moves down; 2. Volume of the lungs/thoracic cavity increases and the pressure decreases (below atmospheric pressure);	2	Allow for 1 mark: Diaphragm (muscles) contract <u>and</u> volume of lungs/thoracic cavity increases;

Question	Marking guidance	Mark	Comments
07.2	1. More than one polypeptide (chain) OR quaternary structure OR four polypeptide (chains); 2. (Each polypeptide) associated with iron-containing/haem group;	2	

Question	Marking guidance	Mark	Comments
07.3	1. (Curve to left so) Hb has higher affinity for oxygen; 2. (so) oxygen only released to tissues when partial pressure of oxygen/pO ₂ is very low OR (so) less oxygen released to tissues;	2	1. Accept description of higher affinity, eg dissociates less readily OR remains highly saturated at low pO ₂ 2. Accept use of figures

Question	Marking guidance	Mark	Comments
07.4	1. (CO) competes with oxygen for binding site(s) OR CO similar shape to O₂ so fits/combines with binding site on Hb OR Prevents oxygen from binding OR Blocks (oxygen) binding sites; 2. Increasing oxygen concentration decreases effect (of inhibitor/carbon monoxide);	2	1. Reject active site(s)/enzyme