GCE AS MARKING SCHEME

SUMMER 2024

AS
BIOLOGY – COMPONENT 1
B400U10-1

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About this marking scheme

The purpose of this marking scheme is to provide teachers, learners, and other interested parties, with an understanding of the assessment criteria used to assess this specific assessment.

This marking scheme reflects the criteria by which this assessment was marked in a live series and was finalised following detailed discussion at an examiners' conference. A team of qualified examiners were trained specifically in the application of this marking scheme. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners. It may not be possible, or appropriate, to capture every variation that a candidate may present in their responses within this marking scheme. However, during the training conference, examiners were guided in using their professional judgement to credit alternative valid responses as instructed by the document, and through reviewing exemplar responses.

Without the benefit of participation in the examiners' conference, teachers, learners and other users, may have different views on certain matters of detail or interpretation. Therefore, it is strongly recommended that this marking scheme is used alongside other guidance, such as published exemplar materials or Guidance for Teaching. This marking scheme is final and will not be changed, unless in the event that a clear error is identified, as it reflects the criteria used to assess candidate responses during the live series.

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EDUQAS GCE AS BIOLOGY – COMPONENT 1

SUMMER 2024 MARK SCHEME

GENERAL INSTRUCTIONS

Recording of marks

Examiners must mark in red ink.

One tick must equate to one mark (apart from the questions where a level of response mark scheme is applied).

Question totals should be written in the box at the end of the question.

Question totals should be entered onto the grid on the front cover and these should be added to give the script total for each candidate.

Marking rules

All work should be seen to have been marked.

Marking schemes will indicate when explicit working is deemed to be a necessary part of a correct answer.

Crossed out responses not replaced should be marked.

Credit will be given for correct and relevant alternative responses which are not recorded in the mark scheme.

Extended response question

A level of response mark scheme is used. Before applying the mark scheme please read through the whole answer from start to finish. Firstly, decide which level descriptor matches best with the candidate's response: remember that you should be considering the overall quality of the response. Then decide which mark to award within the level. Award the higher mark in the level if there is a good match with both the content statements and the communication statement. Award the middle mark in the level if most of the content statements are given and the communication statement is partially met. Award the lower mark if only the content statements are matched.

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Marking abbreviations

The following may be used in marking schemes or in the marking of scripts to indicate reasons for the marks awarded.

cao = correct answer only
ecf = error carried forward
bod = benefit of doubt

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<table>
<tr><th colspan="4" rowspan="2">Question</th><th rowspan="2">Marking details</th><th colspan="6">Marks available</th></tr>
<tr><th>AO1</th><th>AO2</th><th>AO3</th><th>Total</th><th>Maths</th><th>Prac</th></tr>
<tr><td>1</td><td>(a)</td><td>(i)</td><td></td><td>Hydrogen bonds (1)
Water is a dipole / polar / uneven distribution of charge / O - and H+ / OWTTE (1)</td><td>2</td><td></td><td></td><td>2</td><td></td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td></td><td>Cohesion (1)
Adhesion (1)</td><td>2</td><td></td><td></td><td>2</td><td></td><td></td></tr>
<tr><td></td><td></td><td>(iii)</td><td></td><td>Water moving into (the base of) the xylem (1)
Pushes up water already in the xylem (1)</td><td>2</td><td></td><td></td><td>2</td><td></td><td></td></tr>
<tr><td></td><td>(b)</td><td></td><td></td><td>
<table>
<tr><th>Property of water</th><th>Advantage to living organisms</th></tr>
<tr><td>Takes a large amount of energy to raise its temperature</td><td>Stable aquatic environments / cell cytoplasm temperature remains stable / maintain stable body temperature / owtte (1)
Reject – thermostatically</td></tr>
<tr><td>Takes a large amount of energy to evaporate</td><td>Sweating allows temperature control / cooling / heat removed as sweat evaporates / aquatic habitats do not dry up easily (1)</td></tr>
</table>
</td><td>2</td><td></td><td></td><td>2</td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td>Question 1 total</td><td>8</td><td>0</td><td>0</td><td>8</td><td>0</td><td>0</td></tr>
</table>

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
2	(a)	(i)		A = Chloroplast and B = Vacuole (1)	1			1		1
		(ii)		Plantae/plant(s) (1)		1		1		
		(iii)		Resolution too low / Not high enough magnification (1)		1		1		1
	(b)	(i)		Tissue – one type of cell **and** Organ – many types of cell / many tissues / more than one tissue (1) Accept a tissue is a group of similar cells working together to perform a function whereas an organ is a group of tissues working together to perform a function	1			1		
		(ii)		Example of tissue in plant e.g. xylem / phloem / parenchyma / palisade mesophyll / epidermis / meristem (1) Example of organ in plant e.g. leaf / flower / root / stem / ovary / anther (1)	2			2		
		(iii)		**1 mark per image for tissue and function** **Image 2.2A** Tissue - Ciliated epithelium (both needed) Ignore columnar Function - {waft / move} {mucus / embryo / suitable example} **Image 2.2B** Tissue - (Skeletal) muscle reject smooth / cardiac Function – movement / locomotion / contract **Image 2.2C** Tissue - Connective tissue Function - {connects / supports / separates} tissues / example		3		3		3
				Question 2 total	**4**	**5**	**0**	**9**	**0**	**5**

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
3	(a)	(i)		Beta (glucose) Accept b	1			1		
		(ii)		**Any three (x1) from:** Chains of glucose linked by (beta) glycosidic bonds (1) alternate glucose molecules rotated by 180 degrees (1) chains cross linked by hydrogen bonds (1) Forming microfibrils (1)	3			3		
		(iii)	I	Condensation reaction(1)	1			1		
			II	Similarity – alternate sugar monomers are rotated 180° / joined by (beta) glycosidic link / hexose sugar (1) Difference - **Any one from** carbon 6 group varies between the monomers in pectin (1) ORA for cellulose Hydrogen on carbon 4 below ring in pectin / AVP (1)		2		2		
	(b)	(i)		**Both correct for one mark** Independent: concentration of pectinase (%) Dependent: volume of juice (cm^3)		1		1		1
		(ii)		**Any two (x1) from:** Ripeness / age of the pineapples (1) Variety / species of pineapple (1) Mass of pineapple (1) pH (1) rate of stirring (1)			2	2		2

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
		(iii)		filter blocked by pulp / not left for long enough / juice absorbed by filter paper / did not squeeze the pulp / owtte (1)			1	1		1
	(c)	(i)		All points plotted correctly (1) Axis labels (1) Units (1) points joined (with no extrapolation) / line of best fit (1)	2	2		4	4	4
		(ii)		**Any four (x1) from** A - As the concentration of enzyme increases, juice volume increases (1) B – {Above 0.6% / at 1%}the increase in volume is not as great / same volume (1) C - Increased successful collisions / increase E-S complexes formed (1) D - At low concentrations (there is lower volume due to) enzyme concentration being a limiting factor (1) E - At higher enzyme concentrations (0.6 – 1.0%), Pectin is (becoming) the limiting factor / not enough substrate / substrate all broken down (1)		2	2	4	1	4
	(d)			volume reduced (1) Less successful collisions / less KE / Less ES complexes / explanation of less walls broken down / owtte (1)			2	2		2
				Question 3 total	**7**	**7**	**7**	**21**	**5**	**14**

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)	(i)		**Similarities** **Any one (x1) from:** Phosphate Sugar / ribose / pentose (reject deoxyribose) {Organic / nitrogenous} base / adenine Both have NH_2 **Differences** **Any two (x1) from:** ATP 3 x phosphates and NAD 2 x phosphates (1) ATP one sugar and NAD 2 sugars (1) ATP one nucleotide and NAD two nucleotides joined together (1) ATP one base and NAD two bases (1) Accept ref to purine / pyrimidine. ATP doesn't have N^+ ATP one amine group / NH_2 and NAD has 2 amine groups		1	2	3		
		(ii)		Single reaction to release energy (1) Only one enzyme needed / ATPase (1) Small amounts of energy released / 30.6kJ (1)	3			3		
	(b)	(i)		{Organic / Nitrogenous} bases / named base / base (1)	1			1		
		(ii)		So the original mass of the DNA could be used to compare with other generations / so the mass of all ^{15}N DNA can be shown / to show the maximum density / owtte (1)			1	1		1

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
		(iii)	I	**Generation 1** (Only) {^{14}N / light isotope} (nucleotides) are available for replication (1) So each molecule retains one strand of ^{15}N and one strand of newly formed DNA of ^{14}N / is made of ^{15}N ^{14}N (1)		2		2		
			II	**Generation 2-3** Generation 2 has 50% for each density / has 50% ^{14}N^{14}N DNA and 50% ^{15}N^{14}N DNA (1) one strand of ^{15}N and one strand of ^{14}N DNA have been used as templates for the formation of new DNA molecules / owtte (1) Generation 3 has {wider band / 75%} of the ^{14}N^{14}N because <u>more</u> ^{14}N DNA (strands) are used as template / owtte (1)		3		3		
		(iv)		The proportion of ^{15}N DNA to ^{14}N DNA is reducing in successive generations / no more ^{15}N is available for making DNA / number of ^{14}N^{14}N DNA has increased / owtte (1)			1	1		
				Question 4 total	**4**	**6**	**4**	**14**	**0**	**1**

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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(a)	(i)	I	SA = 4710 using 3.14 or 4712 using calc pi (2) If incorrect award 1 mark for 2 x 3.14 x 7.5 x 5 or 235.5 (using 3.14) 235.6 (using calculator) 2 x 3.14 x 7.5^2 or 353.25 353.4 (using calculator) 588.75 (not multiplied by n)		2		2	2	2
			II	SA:Vol = 0.67 (1) rej 0.66 Ecf from (i) (with correct rounding)		1		1	1	1
		(ii)		**Any five (x1) from:** A - The higher the number of pieces the greater the change in mass (1) B - {Less of an increase / levelling off} at {higher surface areas / number of pieces} (1) C - The greater the number of pieces the greater the surface area (1) D - (increased exposed membrane) for osmosis to take place over (1) E - External solution had a higher water potential than the carrot cells / ORA (1) F - Water moved into the cylinders (by osmosis) (1) G - Increased mass due to increased water in the cells (1)	2	3		5		3
		(iii)		All cells are turgid / cells have reached equilibrium / owtte (1)			1	1		1

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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
	(b)	(i)		**Any two (x1) from:** Calculate <u>percentage</u> change in mass (1) Draw graph to estimate concentration where no change in mass / or description of (1) Use solute potential table to infer water potential / owtte (1)		2		2		2
		(ii)		Makes the water potential higher (1) Starch is insoluble / has no osmotic effect (1) less sugar present (1) Solute potential increases (1)		1	2	3		
				Question 5 total	**2**	**9**	**3**	**14**	**3**	**9**

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
6				**Genetic code and protein synthesis** A1 Gene codes for a polypeptide A2 Triplet code = one amino acid A3 No mRNA code for missing amino acid / deletion of 3 bases or triplet / codes for stop codon instead A4 No codon-anticodon complex for that particular aa A5 Amino acid missing from the primary sequence / polypeptide chain **Structure of the CFTR protein** B1 Different primary structure / different amino acid sequence / shorter B2 Different secondary structure e.g. different hydrogen bonds B3 Different tertiary structure B4 Bonds form in different places / R groups B5 3D shape changed **Function of protein** C1 Transport protein is not correct shape / complementary C2 Cl^- doesn't fit through / is not transported C3 So mucus viscosity not regulated / owtte C4 May no longer span the membrane as an intrinsic protein C5 Hydrophobic and hydrophilic regions may now not be in correct position	2	6	1	9		

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
				7-9 marks Indicative content of this level is detailed content from all three areas *The candidate constructs an articulate, integrated account, correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses scientific conventions and vocabulary appropriately and accurately.* **4-6 marks** Indicative content of this level is detailed content of any two areas. *The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate usually uses scientific conventions and vocabulary appropriately and accurately.* **1-3 marks** Indicative content of this level is any correct statement from the indicative content *The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate has limited use of scientific conventions and vocabulary.* **0 marks** *The candidate does not make any attempt or give a relevant answer worthy of credit.*						
				Question 6 total	**2**	**6**	**1**	**9**	**0**	**0**

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COMPONENT 1: Biodiversity and Physiology of Body Systems

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	8	0	0	8	0	0
2	4	5	0	9	0	5
3	7	7	7	21	5	14
4	4	6	4	14	0	1
5	2	9	3	14	3	9
6	2	6	1	9	0	0
TOTAL	**27**	**33**	**15**	**75**	**8**	**29**

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