GCE AS MARKING SCHEME

SUMMER 2024

AS
BIOLOGY – COMPONENT 2
B400U20-1

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.

EDUQAS GCE AS BIOLOGY – COMPONENT 2

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.

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

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
1	(a)	(i)		{B and E / Dascyllus aruanus and Dascyllus reticulates} **and** same genus (1)		1		1		
		(ii)		(different species) are unable to interbreed to produce fertile {hybrids / offspring} / only individuals of the same species are able to interbreed and produce fertile {hybrids / offspring} (1)	1			1		
		(iii)		0.782 / 0.78 / 0.8 (3 marks) If incorrect award 2 marks 0.215 / 0.22 / 0.2 If incorrect award 1 mark each for 9102 41820		3		3	3	
		(iv)		**Any two (x1) from:** Unable to capture all individuals (1) Inaccurate identification (1) Measured area may not be representative of whole reef (1) Population may not be the same at different times of the year / breeding season / times of the day / owtte etc. (1) Method has not been repeated / only one area reef was observed (1)			2	2		2
	(b)	(i)		Estimate is subjective therefore {reduces variability / improves reliability} (if carried out by same person) / owtte (1)		1		1		1
		(ii)		$30m^2$ (1)		1		1	1	

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
	(c)	(i)		Different {group sizes / population sizes} would not be comparable / different numbers of fish in each coral at the start (1)		1		1		1
		(ii)		{Two or more / many} alleles for the same {gene / locus} (1)	1			1		
		(iii)		Reduces biodiversity (of population) (1) MP2 **Any two (×1) from** selection against larger fish / larger fish at a disadvantage (1) larger fish cannot hide so more likely to be predated (1) Insufficient space for larger fish / competition for space / spaces too small for larger fish to survive (1)			3	3		
				Question 1 Total	**2**	**7**	**5**	**14**	**4**	**4**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
2	(a)			**Any two (×1) from** • {Long / pointed} canines for {piercing / seizing} {prey / tissue / muscle} (1) • {Sharp / pointed} incisors / incisors on upper and lower jaw} for {gripping / tearing} (muscle) (1) • {Premolars / molars} have pointed {cusps / description of} for {cutting / slicing / crushing} (accept carnassials, if remainder of description is clear) (1) • (Large) recesses on the {skull / lower jaw} for {large / powerful} muscles (can exert large force on prey) (1)		2		2		
	(b)	(i)		Produces {pepsin / pepsinogen / protease} (1) Optimum pH for pepsin / activation of pepsinogen to pepsin / kills bacteria (1)	1	1		2		
		(ii)		5.76 X 10^{12} (3) **Award two marks for** 5,760,000,000,000 correct answer in incorrect standard form **If incorrect award one mark for any of:** 576 (cm^3) $\frac{16000}{100}$ X 3.6; or $\frac{1.6 \times 10^4}{10^2}$ X 3.6		3		3	3	
		(iii)		**Any two (×1) from** Bacteria able to multiply / produce large numbers / large biomass (1) Cow digests bacterial protein / bacteria / plant protein (1) Digestion of cellulose cell wall releasing plant protein (1)		1	1	2		

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
		(iv)		Food vacuole fuses with lysosome (1) (Lysosomal) enzymes / named enzyme hydrolyses large molecules / named molecule / description of (1)	2			2		
	(c)	(i)		Enzymes (attached to plasma membrane) are not lost in faeces / can be used more than once (after product molecules are released) / fewer enzyme molecules need to be produced. (1) Accept amino acids released in close proximity to {cotransport proteins / eq}.			1	1		
		(ii)		Marks are paired Either; (many) microvilli on epithelial cells / villi on small intestine / small intestine is very long / wall of small intestine is folded. (1) Larger surface area for more {enzyme molecules / digestion} (1) or; Muscles contract to move food / bolus (1) increases contact between contents / substrates and enzyme (active sites) (1) or; intestine is very long (1) more time for digestion (1) or glands produce alkaline secretions (1) to give optimum pH for protease enzymes (1)	2			2		
				Question 2 total	**5**	**7**	**2**	**14**	**3**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
3	(a)	(i)		X – Carbonic anhydrase <u>and</u> Y – Carbonic acid / H_2CO_3 (1 mark for both)	1			1		
		(ii)		{Hydrogen ions / H^+ / protons} combine with haemoglobin / Hb (to make haemoglobinic acid / HHb) (1)	1			1		
		(iii)		**Any one (×1) from;** To balance the outflow of negative ions / HCO^{3-} . (1) To maintain electrochemical balance. (1)	1			1		
		(iv)		**Any one (1) from;** In solution in the plasma. (1) (Bound to Hb) as carbamino-haemoglobin. (1)	1			1		
	(b)	(i)		To equilibrate body temperature (at experimental temperature) / owtte (1) Constant / base line pattern of spiracle opening (and closing) at the start of the experiment (for comparison) / owtte (1)		2		2		2
		(ii)		**Any one (×1) from;** Feeding on mammal / heat from blood would increase insect body temperature. (1) (feeding) provides food for respiration. (1) Increase body mass. (1) Process of digestion would increase respiration. (1)			1	1		1

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
		(iii)		**Trend I** CO_2 {partial pressure / concentration} {increases / reaches a critical threshold more quickly} (as temperature increases) (1) **Trend II** diffuses out more quickly because of {higher partial pressure / concentration of CO_2 / higher kinetic energy} (1)		2		2		
				Question 3 total	**4**	**4**	**1**	**9**	**0**	**3**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)	(i)		At night: Reduces water (vapour) loss / open stomata would lose water (1) During day: {plant could not take in CO_2 / reduced intake of CO_2} for photosynthesis (1)	2			2		
		(ii)		**Any three (x1) from** • (ATP provides energy for) active transport of {potassium ions / K^+} **into** guard cells (1) • Malate (ions) formed from (stored) starch (1) • lowers the water potential of the guard cell/s (1) • Water enters the guard cell by osmosis. (1)	3			3		
	(b)	(i)		36µm (2); **If incorrect award 1 mark for** 63 1.75		2		2	2	
		(ii)		×500 (2) **If incorrect award 1 mark for either of** 31.5 (1); (calculation) 6.3 X 10^{-2} 6.3 x 10^{-2} /0.063 (1); (conversion of units)		2		2	2	2
		(iii)		Different sized stomata can have the same aspect ratio / allows comparison of different sized stomata. (1)			1	1		1

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
		(iv)		AR value of 1 would be circular / fully open stomata are not circular / the open stoma in 4.1 {is not circular / is oval} / the width of a stoma is always less than its length. (1)			1	1		1
	(c)	(i)		Increased number of stomata (per mm^2 / unit area) / increased density of stomata (1) Greater <u>area</u> for diffusion (1)		1	1	2		
		(ii)		Fewer stomata (per unit area) / lower stomata density (1) less water <u>vapour</u> released / less transpiration. (1)			2	2		
				Question 4 total	**5**	**5**	**5**	**15**	**4**	**4**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(a)	(i)		Advantage; {Diffusion / transport distance} between {blood / fluid} and cells is {decreased / very short}. (1) Disadvantage; {Flow / movement / transport} of {blood / fluid} is slow. (1)	2			2		
		(ii)		Blood passes through the heart twice during each circulation of the body / description of (1)	1			1		
	(b)	(i)		Letter B (1) <u>because</u> pressure begins to increase in the aorta / ventricular pressure becomes higher than aortic pressure (1)	1	1		2		
		(ii)		Blood entering (left) atrium / (left) atrium is filling with blood (1)	1			1		
	(c)	(i)		A measure of how the majority of the data / specified % is spread from the mean / the <u>variation</u> of the data from the mean. (1) Variation in the {quantity / type / intensity / history of participation in} aerobic activity / fitness levels / owtte} within the group (1)	1		1	2		1
		(ii)		**Any one (x1) from**; Individuals were chosen randomly (reduces bias) (1) Large numbers of individuals in each group (more representative) / large number of repeats (to calculate mean) (1) Reduce (confounding) variables / same {gender / age group} / no history of {smoking / CVD}) (1)		1		1		1

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
		(iii)		0.18 (dm^3) (2) 24.3 (1) 135		2		2	2	
		(iv)		Increased stroke volume / volume of blood leaves left ventricle / enters aorta (1) Left ventricle {contracts with greater force / generates more pressure}. (1)		1	1	2		
		(v)		Elastic (tissue) recoil (maintains pressure in the artery) (1)		1		1		
				Question 5 total	**6**	**6**	**2**	**14**	**2**	**2**

<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>6</td><td></td><td></td><td></td><td>A1 {xylem / vascular tissue} arranged in a ring around the periphery / close to the epidermis
A2 Lignified so {resists bending / is strong / provides support}
A3 Many {tubes / vessels} / vascular tissue arranged in a ring provide {rigidity / strength / support}.
A4 Water transport
A5 Ref: Adhesion / cohesion / capillarity

Differences;

<table>
<tr><td>Potamogeton</td><td>Helianthus</td></tr>
<tr><td>B1 Vascular tissue central</td><td>Vascular tissue on periphery (OWTTE)</td></tr>
<tr><td>B2 Vascular tissue / xylem poorly developed</td><td>Vascular tissue / xylem well developed / well structured / description of.</td></tr>
<tr><td>B3 Aerenchyma / air spaces in cortex.</td><td>No aerenchyma / air spaces or tissue / cells tightly packed.</td></tr>
<tr><td>B4 Less lignification / fewer lignified tissues</td><td>(More) lignin in xylem / other tissues.</td></tr>
<tr><td>B5 Single bundle</td><td>Many bundles</td></tr>
</table>

Potamogeton stem –
C1 Vascular tissue is central <u>so</u> allows flexibility in water / resists pulling (from water currents).
C2 Poorly developed xylem.
C3 Little need for water transport as leaves are in / on water.
C4 (very little lignin for support) Supported by {water / leaves floating on surface}.
C5 Air spaces / aerenchyma (in cortex) - Allows (faster) diffusion of O2 / CO2 to / from leaves / forms a reservoir of gases / buoyancy.</td><td>5</td><td>4</td><td>0</td><td>9</td><td></td><td></td></tr>
</table>

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 from 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. *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	**4**	**5**	**0**	**9**	**0**	**0**

COMPONENT 2: Biodiversity and Physiology of Body Systems

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	2	7	5	14	4	4
2	5	7	2	14	3	0
3	4	4	1	9	0	3
4	5	5	5	15	4	4
5	6	6	2	14	2	2
6	5	4	0	9	0	0
TOTAL	**27**	**33**	**15**	**75**	**13**	**13**