GCE AS MARKING SCHEME

SUMMER 2023

AS
BIOLOGY – COMPONENT 2
B400U20-1

This marking scheme was used by WJEC for the 2023examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conference, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.

EDUQAS GCE AS BIOLOGY – COMPONENT 2

SUMMER 2023 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)		**Any two for one mark** DNA/RNA/nucleic acid plasma membrane ribosomes cytoplasm	1			1		
		(ii)	I	B Any <u>one</u> from – Circular DNA/Plasmids/No nucleus	1			1		
			II	C Any <u>one</u> from – No peptidoglycans/no murein/histones present	1			1		
	(b)	(i)		Fewer differences between <u>amino acid</u> sequences indicate species are more closely related/More differences between <u>amino acid</u> sequences indicate organisms are less closely related/ ORA. Reject references to base sequences.		1		1		
		(ii)		7.5 million years/ 7 500 000 = 2 marks If incorrect award one mark for 3/0.1 × 250000 7.5		2		2	2	
		(iii)		X on the horizontal line below tuna		1		1		
		(iv)		Fungi	1			1		
		(v)		Analogous structures have evolved from <u>different structures</u> to perform the same function/ owtte (1) Convergent (evolution) (1)	2			2		

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
	(c)	(i)		52 = 2 marks award one mark for 51.78/51.8 $\frac{25}{14} \times \frac{29}{}$		2		2	2	
		(ii)		**Any two (×1) from** • Moths might be predated/die (between the 1st& 2nd night) (1) • The mark may be removed (1) • Moths might migrate away (from the sampling area) (accept migrate into the sampling area) (1) Reject migration from N to S of England • Marked/captured moths may not have integrated randomly into the population/moths captured previously may have a greater chance of becoming captured a second time (1) • More moths may have emerged. accept hatched (1) Reject 'given birth'/reproduced.		2		2		2
		(iii)		**Any two (×1) from** Type of habitat/type of surrounding vegetation (1) Light intensity of the light source (1) Time of night the light was on (1) Same weather conditions/season/time of year (1) Same size/type of trap (1) Height above ground (1)		2		2		2

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
		(iv)		**Marking points awarded in pairs.** • Increased numbers of (some) {birds/bird species} (1) that predate moths/more food for some bird species (1) • Reduction of (some) plant species/populations (1) because moth caterpillars/larvae eat/graze (the leaves of) particular species (1) • Increase in the numbers of/population size of some plant species (1) because moths may pollinate certain species (increasing reproduction) (1) • Increase in plant biodiversity (1) due to increased pollination (1)			2	2		
				Question 1 total	**6**	**10**	**2**	**18**	**4**	**4**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
2	(a)	(i)	I	Cross on graph at co-ordinate y = 50% and x = 3.5 KPa		1		1	1	
			II	Appropriate shaped curve drawn to the right of the line for mackerel to intersect coordinate from 2 (a) (i) I, maximum saturation the same as for mackerel		1		1		
		(ii)		33% Ecf from (i) I		1		1	1	
		(iii)		Higher rate of respiration produces more CO_2 (1) Lowers Hb affinity for oxygen so dissociates more readily (1) (reject 'faster')		1	1	2		
	(b)	(i)		In plasma		1		1		
		(ii)		**Any three (×1) from** Increased friction + contact between blood and capillary/blood vessel walls (1) slower blood flow/speed of blood transport + more time for diffusion (1) greater sa:vol + more area for absorption of oxygen(1) Shorter diffusion distance (1) Reject references to diffusion distance related to wall of capillary or cell membranes.	3			3		

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
	(c)	(i)		(conclusion is correct because) there is an increase in heart rate with temperature up to 10^{o}C/there is a positive correlation between HR and temp up to 10^{o}C/ owtte (1) (not completely correct as) there is a limit to the increase/increase in heart rate only to 10^{o}C/HR decreases at temperatures above 10^{o}C/no data for temperatures higher than 15^{o}C/ owtte (1)			2	2		2
		(ii)		Myogenic	1			1		
		(iii)		**Any one(×1) from** Heart rate too low to supply (increased) oxygen demand (1) No haemoglobin/plasma alone insufficient, to deliver enough oxygen to tissues (1)			1	1		
				Question 2 total	**4**	**5**	**4**	**13**	**2**	**2**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
3	(a)	(i)		Roots **AND** flowers/fruit/developing seeds/meristems (eq)	1			1		
		(ii)		Sieve plates have (many) pores/sieve tubes have very little cytoplasm/ fewer organelles (1) Reject 'no' cytoplasm/'no' organelles. less flow resistance (for phloem solution) OWTTE (1)	2			2		
		(iii)		Increased sucrose (concentration) lowers water potential/Ψ in the sieve tubes/phloem (1) Water <u>enters</u> (by osmosis)/ volume of water (in the phloem) <u>increases</u> (1)	2			2		
		(iv)		**Any 3 (x1) from** Suggests energy required (for the process)/ATP used/ ORA (1) Low temp slows respiration/ decreases kinetic energy (1) Phosphate needed for production of ATP (1) cyanide inhibits respiration/reference to correct part of respiratory pathway (1)		2	1	3		
	(b)	(i)		18.3; (3) 18.29/18.292/18.293 (2) $75 \div 4.1$; (1) OR 18.5; (3) 18.46/18.458; (2) $55.36 \div 3$; (1)		3		3	3	

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
		(ii)		**Advantage – Any one (×1) from** greater {volume/ quantity} of solution/solute/sucrose for analysis (1) Not all stylets may exude sap/some stylets may become blocked/damaged (1) **Disadvantage–Any one (×1) from** Measurement of the (exact) position(s) of aphid/distance between sampling positions less precise (1) Different size/ age aphids extract different volumes (of solution) (so sample volume may be smaller). (1)			2	2		2
		(iii)		**Any one (×1) from** Needles (are rigid) may damage/ block phloem (1) Needles may become blocked (1) Difficulties finding phloem sieve tubes using needle/can't be certain phloem is being sampled (1)			1	1		1
				Question 3 total	**5**	**5**	**4**	**14**	**3**	**3**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)	(i)		(diet) Fox- (proportionally) more products of protein digestion/named product of digestion enters ileum (as it has already been digested in the stomach/duodenum) (1) (length of ileum) so ileum is shorter as less time/s.a. needed for (sufficient) absorption. (1) Accept converse. (diet) Rabbit - fewer products of digestion/named product of digestion/more indigestible or undigested material enters ileum. (1) (length of ileum) so ileum is longer to allow more time/s.a. for absorption (accept continued digestion). (1)	1	1		2		
		(ii)		**Any one (×1) from** Digestion of cellulose/ produce cellulase enzymes (1) Production of fatty acids (1)	1			1		
	(b)	(i)		X 40 Accept range X30-X50		1		1		1
		(ii)		**Any three (×1) from** Glucose <u>enters</u> epithelial cell by co transport (1) With (diffusion of) sodium ions/Na^+ (1) Glucose exits/leaves (epithelial) cell by <u>facilitated diffusion</u> (1) sodium ions/ Na^+ are actively transported out of cells to create a concentration/diffusion gradient (1)	3			3		
		(iii)		Glucose lowers the water potential of the epithelial cells (1) Water moves into epithelial cells/out of lumen (of the ileum) by <u>osmosis</u> (1)		2		2		
				Question 4 total	**5**	**4**	**0**	**9**	**0**	**1**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(a)	(i)		<u>Reduce</u> water loss. (Ignore heat loss)	1			1		
		(ii)		To create/increase/maintain a diffusion gradient for respiratory gases/oxygen/carbon dioxide (at the gas exchange surface)	1			1		
	(b)	(i)		**Any four(×1) from** A. External intercostals muscles contract and rib cage lifts upward and outward (1) B. diaphragm muscles contract and diaphragm flattens (1) C. Outer pleural membrane pulls inner pleural membrane outward/reduced pressure in the pleural cavity pulls inner pleural membrane outward (1) D. Causes increase in lung volume (1) E. Correct use of data (1)	3	1		4		
		(ii)		$8.4\ dm^{-3}$ (2) If incorrect award one mark for Volume of 1 breath = 0.7 (1) Number of breaths in 10 seconds x 6/no of breaths in 20 seconds X 3 = 12 (1)		2		2	2	
		(iii)		Some CO_2 remains in the trachea/bronchi/bronchioles/alveoli.		1		1		
		(iv)		The proportions/quantities of other gases/oxygen/carbon dioxide/ water vapour have changed (so nitrogen is a different proportion of the gas mixture).			1	1		1

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(c)			Award marks for paired marking points • Alveoli/air spaces have become larger/walls between alveoli /air spaces have broken down. (1) Reduced surface area for gas exchange/diffusion. (1) • Tissue between alveoli/air spaces has become thickened (1) Increased diffusion distance (for oxygen/carbon dioxide) (1)		1	1	2		1
				Question 5 total	**5**	**5**	**2**	**12**	**2**	**2**

Question	Marking details	Marks available					
		AO1	AO2	AO3	Total	Maths	Prac
6	**Section A** • Endo(parasite)– parasite that lives, feeds and reproduces inside its host. • (Endo)parasite –causing harm to the host. • Primary host is where parasite undergoes sexual reproduction/adult form exists • Secondary host is where parasite undergoes asexual reproduction/only larval forms exist. **Section B** • Large numbers of eggs produced in primary host increase the number of larvae to infect more secondary host organisms/snails. • Relevant/correct reference to being hermaphrodite. Reject if linked to asexual reproduction • Secondary host/snail ingested/eaten/consumed by primary host/fish • Large numbers of larvae produced in secondary host (at intermediate stages of life cycle) increase probability of infecting/surviving in (primary) host **Section C** • Peristalsis/stomach muscle contractions could detach parasite from stomach wall • Suckers for attachment prevent detachment of parasite • Low pH/stomach enzymes/host immune response damages parasite cells/tissue/could kill parasite • Thick cuticle/mucus protects parasite (tissues) from low pH/enzymes/immune response of host; • Sharp mouthparts to enable feeding through stomach wall.	2	4	3	9		

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 sections *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 detail from two sections or less detail from three *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 indicative content 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	**2**	**4**	**3**	**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	6	10	2	**18**	4	4
2	4	5	4	**13**	2	2
3	5	5	4	**14**	3	3
4	5	4	0	**9**	0	1
5	5	5	2	**12**	2	2
6	2	4	3	**9**	0	0
TOTAL	**27**	**33**	**15**	**75**	**11**	**12**