GCE AS MARKING SCHEME

SUMMER 2022

AS
BIOLOGY - UNIT 2
2400U20-1

INTRODUCTION

This marking scheme was used by WJEC for the 2022 examination. 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.

WJEC GCE AS BIOLOGY

UNIT 2 - BIODIVERSITY AND PHYSIOLOGY OF BODY SYSTEMS

SUMMER 2022 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)		Right ventricle		1		1		1
		(ii)		{thinner layer of/ less} {muscle/ wall}/ ORA Ignore side	1			1		1
	(b)	(i)		Any point on the graph between 2 and 3 on either cycle Accept arrow at point 2 but not at point 3		1		1		
		(ii)		1. {Bicuspid/ mitral/ atrioventricular} (valve) + CLOSING (1) Reject tricuspid 3. {Aortic/semilunar} (valve) + CLOSING (1)		2		2		
		(iii)		66.67/ 66.7/ 67 = 1 mark Accept any correct rounding		1		1	1	
	(c)			70 = 2 marks If incorrect award 1 mark for 5.25 / 75 5250/75 0.07		2		2	2	
	(d)	(i)		A = tunica media B = tunica {intima / interna} /endothelium C = tunica externa / adventitia All 3 = 2 marks 2 = 1 mark 0 / 1 = 0 marks	2			2		2

Question				Marking details	Marks Available					
					AO1	**AO2**	**AO3**	**Total**	**Maths**	**Prac**
		(ii)		(Tunica media / middle layer / A) contains elastic fibres/ (Artery/ aorta){has a narrow lumen/ has thick walls} (1) ignore ref to muscle/ collagen (Elastic) recoil (1) Reject contract	2			2		
				Question 1 total	**5**	**7**	**0**	**12**	**2**	**4**

Question				Marking details	Marks Available					
					AO1	**AO2**	**AO3**	**Total**	**Maths**	**Prac**
2.	(a)	(i)		Large surface area (relative to volume of organism)	1			1		
		(ii)		• {longer diffusion distance/ use of cross section data} in Lumbricus (1) • so diffusion alone cannot meet (O$_2$/ metabolic) demands / OWTTE (1) • {circulatory system / Hb/ blood} can deliver <u>oxygen</u> {to tissues / cells/ over greater distances}. (1)	3			3		
		(iii)		Tracheal system / tracheoles (1) ignore trachea <u>Oxygen</u> delivered <u>directly</u> to {tissues/ cells/ muscles} (1) Ignore reference to open circulation	2			2		
	(b)	(i)		Increase surface area (: vol ratio)/ contain capillary (network) (1)			1	1		
		(ii)		**Any five (×1) from:** <table><tr><td>*Nereis*</td><td>*Lumbricus*</td></tr><tr><td>A. {fast-moving/ predator} so has a greater O$_2$ requirement /</td><td>{slow-moving/ detritivore} so has a smaller O$_2$ requirement (1)</td></tr><tr><td>B. <u>Hb</u> lower affinity for O$_2$ /</td><td><u>Hb</u> higher affinity for O$_2$ (1)</td></tr><tr><td>C. <u>Hb</u> dissociates {more readily/ more efficiently/ at higher pO$_2$}/ more oxygen released (1) reject faster</td><td>E. <u>Hb</u> {fully saturated/ higher saturation} at lower pO$_2$ (1)</td></tr><tr><td>D. to respiring tissues. (1)</td><td>F. As habitat has low oxygen availability (1)</td></tr></table>	3	2		5		
				Question 2 total	**6**	**3**	**3**	**12**	**0**	**0**

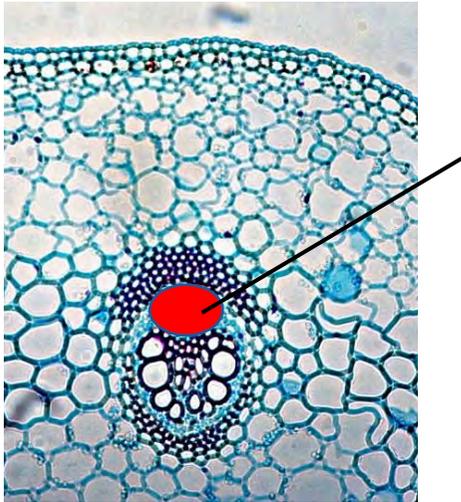| Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
3.	(a)			• Mechanical digestion {breaks food down into smaller pieces/ increases its (total) surface area} (1) Reject molecules • Chemical digestion involves {hydrolysis/ use of enzymes/ larger into smaller <u>molecules</u>/ insoluble into soluble <u>molecules</u>} (1)	2			2		
	(b)	(i)		**Both correct for one mark** Lipase = C Accept pancreas Bile = H Accept liver	1			1		
		(ii)		Help to neutralise the acid(ic) {chyme/ from the stomach} (1) Help to provide the {optimum pH/ alkaline (environment)} for the enzymes (in the duodenum) / prevents denaturing of enzymes (1)	2			2		
	(c)	(i)		To ensure that the {pH was {above/at} pH 10 / the contents of the tubes were pink} (at the start of the experiment) (1)		1		1		1
		(ii)		To ensure that the <u>concentration</u> of {lipids/ sodium carbonate solution/ phenolphthalein} remained the same (in each test tube) (1)		1		1		1

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
(d)	(i)		**Any four (×1) from:** A. (In tube A and B) the lipase {hydrolyses/ breaks down} the lipids (1) B. fatty acids {lower the pH/ make the solution more acidic} (1) C. (lowering the pH causes) (the phenolphthalein to) decolourise/ or description of (1) D. In tube B the bile salts {emulsifies / or description of} (1) E. Which creates a larger (total) surface area of the lipids (1) F. {Hydrolysis/ fatty acid production} occurs at a faster rate (1) ignore decolourises faster	2	2		4		4
	(ii)		To show bile (salts) cannot {hydrolyse lipids/ cause the production of fatty acids} on its own/ to see if bile salts can hydrolyse lipids on its own / to show lipase is needed to hydrolyse lipids			1	1		1
	(iii)		Inaccuracy: results are {qualitative/ subjective/ or description of} / starting pH may have been different (1) Improvement: use a pH {meter/probe} /to record the actual change in pH over a fixed time period)/ use colorimeter / measure {light transmission/absorbance by the solution} (1)			2	2		2
			Question 3 total	**5**	**4**	**5**	**14**		**9**

Question				Marking details	Marks available					
					AO1	**AO2**	**AO3**	**Total**	**Maths**	**Prac**
4.	(a)	(i)		16.8%/ 17%		1		1		
		(ii)		UK is close(r) to {Europe / other countries}/ Hawaii great(er) distance from North America / species can easily {migrate/ fly} to UK / Hawaii isolated/ Hawaii relatively young		1		1		
	(b)			Eukarya / Eukaryota/ Eukaryote (1) Order and Family (1) *Himatione* and *sanguinea (1) correct spelling and cases should be used*	2	1		3		
	(c)	(i)		(apapane) finch (1) oriole **+** tanager **Both** correct = 1 mark			2	2		
		(ii)		**Any three (×1) from:** In the context of the two most closely related species A. The {base/ DNA} <u>sequences</u> are {most/ more} similar/ {most/ more} bases which are complementary (1) B. {most/ more} hydrogen bonds will form (1) C. The lower difference in separation temperature/ highest separation temperature (1) D. They share the {most/ more} recent common ancestor (1) Cannot award D in isolation Accept reverse answer for least closely related	1	2		3		

Question				Marking details	Marks available					
					AO1	**AO2**	**AO3**	**Total**	**Maths**	**Prac**
	(d)	(i)		As they are unable to {interbreed/ reproduce with each other} to produce fertile offspring. (1)	1			1		
		(ii)		**Any four (×1) from:** A. Adaptive radiation/ divergent evolution (1) B. Variation in beak shape evolved from the original species/ variation in beak shape in the population of the original species (1) C. As the population (of the ancestral species) increased there would have been increased competition for food/ owtte (1) D. Ref to particular beak shape for particular food / variety of beaks for variety of foods (1) E. would have a selective advantage/ Natural selection/ survival of fittest/ or description of (1)	1	1	2	4		
				Question 4 total	**4**	**5**	**6**	**15**	**0**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
5.	(a)	(i)		Lignin (1) To prevent the collapse of the xylem/ provide (mechanical) support (1) ignore strength/ waterproofing/ rigidity	2			2		1
		(ii)		Any value between 238-254 μm = 2 marks If incorrect award 1 mark for Any value between 0.238-0.254mm measurement/130		2		2	2	
		(iii)		Any value between 0.85-0.91 = 3 marks If incorrect award 2 marks Any value between 238-254/280 Any value between 0.238-0.254/ 0.280 If incorrect award 1 mark for sight of Any value between 238-254/0.28 Any value between 878-879 ECF from (ii) Award 1 mark for: answer from aii/0.28 Award 2 marks for: answer from aii/280 or (answer from aii/1000)/0.28 Award 3 marks for: correct calculation from above		3		3	3	

Question			Marking details	Marks available					
				AO1	**AO2**	**AO3**	**Total**	**Maths**	**Prac**
(b)			A. Xylem contents under lower pressure (than air) (1) B. contents pulled (upwards through the xylem) due to {transpiration stream / cohesion-tension / adhesion/ evaporation of water vapour from the leaves} (1) C. Phloem contents under higher pressure (than air) (1) D. contents {pushed/forced} through phloem by {mass flow/ active transport/ hydrostatic pressure} (1)		4	0	4		4
(c)	(i)		Amino acid/named amino acid / (named) hormone (1)	1			1		
	(ii)		**Any four (x1) from:** A. There are (high levels of) radioactivity in young leaves (1) B. Young leaves are sinks (1) C. so {using/importing} sucrose/ sucrose transported to young leaves (1) D. (as an energy source) for {growth/cell division} (1) E. Lack of radioactivity in older leaves as {they are sources/ produce their own sucrose} (1)		2	2	4		4
	(iii)		Bidirectional flow/ both up and down (the stem)/ both directions		1		1		1

Question				Marking details	Marks available					
					AO1	**AO2**	**AO3**	**Total**	**Maths**	**Prac**
		(iv)		Phloem labelled in this region		1		1		1
	7			**Question 5 total**	**3**	**13**	**2**	**18**	**5**	**7**

Question					Marking details	Marks available					
						AO1	AO2	AO3	Total	Maths	Prac
6.					**General Adaptations:** • Heterotrophic • Obtain nutrition from the host • Produce large numbers of eggs / offspring • Resistant stages / eggs **Specific Adaptations (*Taenia*):** • Endoparasite • {2 / primary & secondary / intermediate} hosts • scolex / hooks / suckers — to prevent removal (by peristalsis)/ attach to gut wall • Long & flat / no digestive system — Large sa: volume ratio to absorb pre-digested nutrients / pre-digested nutrients absorbed across {cuticle / body surface} • Thick cuticle/ mucus — to prevent digestion by host's enzymes/ immune system • Hermaphrodite/ or description of — self-fertilisation/ unable to find mate / allows them to reproduce **Specific Adaptations (*Pediculus*):** • Ectoparasite • Single host • claws (adult) / "glue" (eggs / nits) — to prevent removal (by scratching)/ to attach to hairs • holozoic — has gut for {digestion / absorption} • Piercing mouthparts — sucks blood • Separate sexes — as a mate is easy to find	5	4		9		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
				7-9 marks Detailed account of 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** Detail from two sections or less detailed account of three sections *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** Detail from any one area *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	**5**	**4**	**0**	**9**		

UNIT 2: BIODIVERSITY AND PHYSIOLOGY OF BODY SYSTEMS

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	5	7	0	12	3	4
2	6	3	3	12	0	0
3	5	4	5	14	0	9
4	4	5	6	15	0	0
5	3	13	2	18	5	7
6	5	4	0	9	0	0
TOTAL	28	36	16	80	8	20

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