GCE AS MARKING SCHEME

SUMMER 2022

AS
BIOLOGY – COMPONENT 2
B400U20-1

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.

GCE AS BIOLOGY

COMPONENT 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)		Internal digestion of food / Ingestion/digestion/absorption/egestion or internal digestive system	1			1		
		(ii)		External digestion of food/ secretion of enzymes onto food/ extra cellular digestion Accept reference to dead/ decaying material	1			1		
		(iii)		Formation of organic molecules from inorganic molecules using light energy	1			1		
	(b)			Pancreas Liver Mouth/stomach Colon/ ileum All 4 correct for 2 marks 2 or 3 correct for 1 mark 0/1 correct = 0 marks	2			2		
	(c)	(i)		See more {structures/ detail}/ to see differences between tissue layers/ more contrast between structures Accept see more difference between areas/ compartments	1			1		1

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
		(ii)		1255/ 1255.357 (using 37) or 1289.28571/ 1289(using 38) = 2 marks If incorrect award 1 mark for 37 or 38 /28 x 950 Accept 1260 (3 sig fig)		2		2	2	
		(iii)		digestion/ absorption of nutrients + large surface area accept products of digestion	1			1		
		(iv)		Calcium (to strengthen) bones or teeth (1) Phosphate to make phospholipids/used in bones/ ATP/ nucleic acids/ named nucleic acid/ nucleotides (1) Accept cell membrane	2			2		
		(v)		As food is more solid in oesophagus / ORA (1) Increased force/ More peristalsis/stronger muscle (circular and longitudinal) contraction in the oesophagus/ ORA (1)		2		2		
				Question 1 total	**9**	**4**	**0**	**13**	**2**	**1**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
2	(a)			Phylogenetic tree (1) Accept cladogram The more recent the branching the more related the cone snails/ the lower down the branches the more related (1)	2			2		
	(b)			binomial name {made of two parts/genus then species} (1) *Bursa* = genus and *nobilis* = species (1) spelling + letter cases must be correct Common name could vary regionally/ different languages/ Could cause confusion when identifying species (1)	2	1		3		
	(c)			Carry out (DNA) <u>base sequencing/ profiling/ hybridisation</u> (1) More similarity closer related / owtte (1)		2		2		
	(d)			**Any one (×1) from:** By looking at the number of alleles for a particular gene (1) Analyse the proportion of the population with a particular allele (1) (single gene) Analysing the proportion of polymorphic loci across the genome of the cone snail species (1) (whole genome)	1			1		
	(e)			The cone snails were different species/ one is capitaneus, other is omaria Accept explanation of how the offspring would be infertile e.g. cannot form gametes		1		1		
				Question 2 total	**5**	**4**	**0**	**9**	**0**	**0**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
3	(a)	(i)		525 = 2 marks If incorrect award 1 mark for 21/0.04 21/ (0.2 x 0.2) 20/0.04		2		2	2	
		(ii)		**Any four (x1) from:** A. K^+ {pumped / using active transport/energy} into guard cells (when light) (1) B. Starch converted to malate (ions) (1) C. Lowering water potential in guard cells (1) accept symbol for WP D. Water moves in by osmosis (1) accept definition of osmosis E. Guard cells become turgid (1) F. Uneven bending of guard cells due to thickening of cell wall (1)	4			4		
	(b)	(i)		Xerophyte (1) Sunken stomata/stomata in pits + less air movement (1) Trichomes/hairs + {to trap water vapour/ reduce the gradient} (1) <u>Thick</u> {cuticle/ epidermis} + reduce evaporation (1)		4		4		
		(ii)		Stomata are {hidden/sunken} in pits/ not on surface/ owtte			1	1		1
		(iii)		Apply the nail varnish to the upper surface			1	1		1
				Question 3 total	**4**	**6**	**2**	**12**	**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>4</td><td>(a)</td><td>(i)</td><td></td><td>
<table>
<tr><td>Hazard</td><td>Risk</td><td>Control measure</td></tr>
<tr><td>{Dissecting instruments / scalpel} are <u>sharp</u> (1)</td><td>The skin could be cut or pierced when scalpel being used</td><td>Cut onto white tile/ cut away from body (1)</td></tr>
</table>
1 mark for hazard
1 mark for risk + control measure (must match)
</td><td></td><td>2</td><td></td><td>2</td><td></td><td>2</td></tr>
<tr><td></td><td></td><td>(ii)</td><td></td><td>A. (Lots of) gill filaments/gill plates/lamellae + to increase surface area (1)
B. {Good/ rich} blood supply to the gill plates/filaments + to maintain concentration gradient for oxygen (1)
C. {Counter current flow of blood/ owtte} + to maintain concentration gradient (1)
D. One cell thick epithelium + for short diffusion distance (1)</td><td>4</td><td></td><td></td><td>4</td><td></td><td></td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td></td><td>Salmon = A + Shark = C for one mark</td><td></td><td></td><td>1</td><td>1</td><td></td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td></td><td>Correct arrows drawn showing direction of flow ecf (i)</td><td></td><td>1</td><td></td><td>1</td><td></td><td></td></tr>
<tr><td></td><td></td><td>(iii)</td><td></td><td>Blood and water flow in opposite directions across the gill plate (1)
concentration gradient maintained/diffusion occurs along whole gill plate/ equilibrium not reached (1)
Higher oxygen concentration in blood (1)
Accept use of figures of mp 3</td><td></td><td>3</td><td></td><td>3</td><td></td><td></td></tr>
<tr><td></td><td>(c)</td><td></td><td></td><td>More ventilation moves more water across the gills (per minute) (1)
To get {same volume of / sufficient} oxygen (1) ORA
To meet metabolic needs/ respiration requirement/ to reach its oxygen demand (1)</td><td></td><td></td><td>3</td><td>3</td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td>Question 4 total</td><td>4</td><td>6</td><td>4</td><td>14</td><td>0</td><td>2</td></tr>
</table>

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<tr><td>5</td><td>(a)</td><td>(i)</td><td>I</td><td>The distance the light is from the plant (1)</td><td></td><td></td><td>1</td><td>1</td><td></td><td>1</td></tr>
<tr><td></td><td></td><td></td><td>II</td><td>The distance the {water level dropped/ fell/meniscus moved/water moved/height of water} (1)</td><td></td><td></td><td>1</td><td>1</td><td></td><td>1</td></tr>
<tr><td></td><td></td><td>(ii)</td><td></td><td>Prevents water evaporating from the reservoir (1)
The only route for water loss is through transpiration/ uptake through the roots (1)</td><td></td><td></td><td>2</td><td>2</td><td></td><td>2</td></tr>
<tr><td></td><td></td><td>(iii)</td><td></td><td>Identification of factors any two for one mark
Any matching control 1 mark each
<table><tr><th>Factor</th><th>Justification</th></tr><tr><td>temperature</td><td>Higher temperature would result in increased evaporation/ transpiration ORA</td></tr><tr><td>humidity</td><td>Higher humidity would result in decreased gradient</td></tr><tr><td>air movement</td><td>Higher air movement would result in increased evaporation/ diffusion/ transpiration ORA</td></tr><tr><td>surface area of leaves/ species of plant</td><td>Change stomatal density</td></tr></table></td><td></td><td>1</td><td>2</td><td>3</td><td></td><td>3</td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td></td><td>4.67 = 2 marks
Award 1 mark for
4.66666667
14/3
4.6</td><td></td><td>2</td><td></td><td>2</td><td>2</td><td></td></tr>
</table>

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
		(ii)		2.51 mm^3 min^{-1} = 3 marks accept 2.5 150.72/60 = 2 marks or 150.79644737/ 60 (used π from calculator Award 1 mark for 3.14 x 4^2x3 150.72 / 150.79644737 (used π from calculator) 1.51 if used 300 or 30 = 51.2 or 25.1 ecf 1 mark		3		3	3	
		(iii)		Control light intensity (owtte) (1) Range of 5 wind speeds (1)			2	2		2
		(iv)		Water used in photosynthesis/ hydrolysis/ maintaining turgidity/ water released in respiration (1) Accept reactions		1		1		1
		(v)		Cut shoot under water (1) To prevent air/bubbles entering the xylem (1) So transpiration stream can continue/ air stops {cohesion/breaks transpiration stream} (1)		2	1	3		1
				Question 5 total	**0**	**9**	**9**	**18**	**5**	**11**

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<tr><td>6</td><td></td><td></td><td></td><td>ECG
• P wave – Atria {stimulated/depolarisation} to contract/atrial systole
• Pacemaker/ SAN send {impulse/wave of excitation} across the atria
• Impulse passes to AVN – delayed
• Impulse down bundle of His fibres (and to apex)
• QRS – Depolarisation throughout the ventricles/ (before) ventricular systole
• impulses travel up Purkinje fibres and cause ventricles {to contract /systole} (from base upwards)
• T repolarisation of the ventricles/ T wave corresponds to diastole

Comparison of the normal ECG and the Patient A
<table><tr><td>Normal</td><td>Patient</td></tr><tr><td>One P wave</td><td>Many P waves</td></tr><tr><td>QRS is the same</td><td></td></tr><tr><td>T wave same</td><td></td></tr><tr><td>QRS regular intervals</td><td>Irregular intervals</td></tr><tr><td>fewer cycles /beats per minute in normal ECG</td><td>More cycles/more QRS spikes/more beats per minute/faster heart rate</td></tr></table>
Possible problems
• SAN firing too rapidly
• Atria not contracting normally /
• ref to arrhythmia/ atrial fibrillation
• Atria not able to empty/ fill fully
• Not enough blood to ventricles</td><td>4</td><td>5</td><td></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 a detailed description of all three areas of indicative content *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 a detailed description of two areas of indicative content *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	**5**	**4**	**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	9	4	0	**13**	2	1
2	5	4	0	**9**	0	0
3	4	6	2	**12**	2	2
4	4	6	4	**14**	0	2
5	0	9	9	**18**	5	12
6	5	4	0	**9**	0	0
TOTAL	**27**	**33**	**15**	**75**	**9**	**16**