GCE AS MARKING SCHEME

AUTUMN 2021

AS LEVEL
BIOLOGY - COMPONENT 2
B400U20-1

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INTRODUCTION

This marking scheme was used by WJEC for the 2021 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.

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EDUQAS GCE AS COMPONENT 2

BIODIVERSITY AND PHYSIOLOGY OF BODY SYSTEMS

AUTUMN 2021 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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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
1	(a)	(i)		A- bronchiole B- alveolus C- pleural membranes All correct for 1 mark	1			1		
		(ii)		4.75/ 4.8/ 4.88/ 4.9 mm = 2 marks (39 or 38)/8= 1 mark Reject measurements to a fraction of a millimetre but allow second mark for correct use of calculation		2		2	2	2
	(b)	(i)	I	(external) intercostal muscles contract + ribcage moves up and outwards (1) Diaphragm contracts and flattens (1) Ref to role of Pleural membrane (1)	3			3		
			II	Pressure decreases in alveoli as thoracic volume increases/ correct reference to pressure in alveoli (1) Pressure increases as air enters the alveoli (1)		2		2		
		(ii)		(Alveoli) coated in surfactant (1) Reduces surface tension (1)	2			2		
				Question 1 total	**6**	**4**	**0**	**10**	**2**	**2**

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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
2	(a)	(i)		<table><tr><td>Kingdom</td><td></td></tr><tr><td>Plantae (1)</td><td></td></tr><tr><td>Animalia (1)</td><td></td></tr><tr><td></td><td>• Chitin cell wall • Hyphae/ spores • Heterotrophic/ saprotrophic (all for 1)</td></tr><tr><td>Protoctista (1)</td><td></td></tr></table> 1 mark per row	4			4		
	(b)	(i)		The number **and** variety of organisms found within a specified geographical area / number of species **and** number of individuals of each species in a given environment (1)	1			1		
		(ii)		Natural selection/survival of the fittest (1) Selective predation/some organisms survive and reproduce (1) lots of niches therefore lots of different adaptations (1)	2	1		3		
	(c)			Tropical rain forest {as SI nearer to 1/ nearer to 1 is more diverse (1) 1 mark for one of the following reasons for diversity: Higher rain fall/longer days/warmer temperature/more daylight (1)		1	1	2		1
				Question 2 total	**7**	**2**	**1**	**10**	**0**	**1**

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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
3	(a)	(i)		Fenestrations/ gaps/pores (between the endothelial cells) (1)	1			1		
		(ii)		**Any four (×1) from:** • High (capillary) hydrostatic pressure at arteriole end (1) • Due to pumping by heart/ closer to left ventricle (1) • Hydrostatic pressure decreases as move towards venule end/along the capillary (1) • loss of fluid from capillary/reduced blood volume (1) • Friction/resistance of the walls/increased cross sectional area of capillaries (1)		4		4		
			II	**Any three (×1) from:** • Plasma proteins are too large to leave the capillary and maintain the low water potential of the blood (1) • At venule end OP tissue fluid > OP blood/ Water potential of tissue fluid is higher than blood (1) • HP of blood is lower at venule end (1) • Water moves into capillary by osmosis down a water potential gradient (1)	2	1		3		
		(iii)	I	-8 + 25= 17		1		1	1	
			II	51% (2) Allow 51.4% If incorrect award 1 mark 35-17/35 x 100 (1)		2		2	2	
	(b)			Excess usually goes into lymph vessels/excess can't be taken away by blocked lymphatic vessels (1)			1	1		
				Question 3 total	3	8	1	12	**3**	**0**

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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)	(i)		Goose Haemoglobin: • Higher affinity for oxygen (1) • is more highly saturated at low partial pressures/ reaches saturation at lower partial pressures (1) • Only dissociates oxygen at very low partial pressures/ dissociates less readily at low partial pressures (1) • a small change in partial pressure results in a larger change in saturation (1) ORA for duck	1	2		3		
		(ii)		low oxygen environment (1) more oxygen can be absorbed (from inhaled air) (1)		1	1	2		
		(iii)		2.9 x 10^{6} / 2900000 (3) If incorrect award 2 marks for: 2 920 000/ 2.92 x 10^{6} If incorrect award 1 mark for: 1.46 x 10^{12} / 5 x 10^{5}		3		3	3	
		(iv)		(Increased rbc in the goose) so more haemoglobin (1) Increased oxygen {transport/ absorption} (1) ORA for duck			2	2		
	(b)	(i)		As the pH gets lower the % saturation of haemoglobin decreases/ lower pH lower affinity of Hb (1) Oxygen has dissociated from the haemoglobin (1)		2		2		

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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
		(ii)		Bohr effect (1) Lower pH more H^+ (1) Decreases affinity of Hb to Oxygen/ higher affinity for H^+ (1) Oxygen released more readily at higher ppO_2 (1)	1		3	4		
	(c)			Enzyme (lipase) secreted from the pancreas (1) Hydrolysis of triglycerides (lipids) to monoglycerides/glycerol and fatty acids (1)	2			2		
				Question 4 total	**4**	**8**	**6**	**18**	**3**	**0**

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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(a)	(i)		A =Phloem + sieve plates (1) B = Xylem + lignin (1)	2			2		2
		(ii)		**Any four (×1) from:** A. Carried via apoplast pathway until the endodermis (1) B. Casparian strip stops apoplast pathway (1) C. Suberin/waterproof (1) D. Mineral ions moved by active transport into endodermis (1) E. Mineral ions moved in symplast pathway/plasmodesmata (1) F. Across membrane so control/ mineral ions actively transported into root hair cells (1)	4			4		
	(b)	(i)		Mass flow/translocation (1)	1			1		
		(ii)		• Mature leaves are not growing/no cell division (1) • (Root and shoot tips are) Meristems act as a sink/where AsA is used (1) • Used for respiration/cell division/growth (of tips) (1)		1	2	3		3
		(iii)		^{14}C-AsA levels decreased between 6-12 hours (1) ^{14}C-AsA has been used in metabolic processes / been stored as other carbohydrate (1)		1	1	2		
		(iv)		Temperature and sunlight/light intensity (during the 12 hours) (1)			1	1		**1**
	(c)			Limited reliability + No repeats so not sure that the readings are true (1)			1	1		**1**

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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
	(d)			Measure distance the ASA travels from the leaf (1) Reference to time (1)			2	2		**2**
				Question 5 total	**7**	**2**	**7**	**16**	**0**	**9**

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Question	Marking details	Marks Available					
		AO1	AO2	AO3	Total	Maths	Prac
6	*Paramecium* adaptations • diffusion over cell membrane/external surface/ diffusion over body surface • high sa:vol • short diffusion path • low metabolic demand • Lower oxygen in water than on land • Diffusion rate sufficient to meet needs Flatworm and annelid adaptations for larger size *Pseudoceros ferrugineus* Flat worm • External surface for diffusion • Lower sa:vol as multicellular • Flat shape to increase sa:vol • Thin so short diffusion path • Higher metabolic demand as more cells *Eisenia fetida* Annelid • External surface for diffusion • Lower sa:vol as multicellular/cylindrical • Cylindrical shape to increase sa:vol • Mucus layer for diffusion of gases/ oxygen dissolving in mucus • High metabolic demand as more cells • ref to Haemoglobin binding to and transporting oxygen • ref to blood vessels to transport of oxygen to cells far from body surface	0	9	0	9	0	0

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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
				7-9 marks Indicative content of this level is… *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… *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… *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	**0**	**9**	**0**	**9**	**0**	**0**

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SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	6	4	0	10	2	2
2	7	2	1	10	0	1
3	3	8	1	12	3	0
4	4	8	6	18	3	0
5	7	2	7	16	0	9
6	0	9	0	9	0	0
TOTAL	**27**	**33**	**15**	**75**	**8**	**12**

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