GCE AS MARKING SCHEME

SUMMER 2017

AS (NEW)
BIOLOGY - COMPONENT 2
B400U20-1

INTRODUCTION

This marking scheme was used by WJEC for the 2017 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.

COMPONENT 2 - Biodiversity and Physiology of Body Systems

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

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<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>1</td><td>(a)</td><td>(i)</td><td></td><td>Electro cardiogram/ electrocardiograph (accept ecg)</td><td>1</td><td></td><td></td><td>1</td><td></td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td></td><td><u>15 x 0.04</u> = 100 beats per minute / bpm = 2 marks
60

One beat takes 15 x 0.04 = 0.6 seconds = 1 mark</td><td></td><td>2</td><td></td><td>2</td><td>2</td><td></td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td></td><td>All correct for 2 mark
2 correct 1 mark

<table><tr><td>Cardiac cycle events</td><td>Section of trace</td></tr><tr><td>Ventricular diastole</td><td>T</td></tr><tr><td>Atrial systole</td><td>P</td></tr><tr><td>Ventricular systole</td><td>QRS</td></tr></table></td><td>2</td><td></td><td></td><td>2</td><td></td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td>I</td><td>SAN:
Initiates {the cardiac cycle / an impulse/ wave of excitation/ depolarisation/ electrical signal} /(acts as) pacemaker (1)
NOT message/ signal
causes atria to contract/ atrial systole (1)</td><td>2</td><td></td><td></td><td>2</td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td>II</td><td>AVN:
passes {impulse/ electrical signal} down {Purkinje/ Purkyne fibres/ Bundle of His} (1)
Results in delay (1)</td><td>2</td><td></td><td></td><td>2</td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td>III</td><td>Bundle of His and Purkyne:
{Carries/conducts} {impulse/ electrical signal} (from AVN) down to apex of heart (1)
causes ventricles to contract from {apex/ bottom} upwards (1)</td><td>2</td><td></td><td></td><td>2</td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td>Question 1 total</td><td>9</td><td>2</td><td>0</td><td>11</td><td>2</td><td>0</td></tr>
</table>

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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
2	(a)	(i)		Potometer	1			1		1
		(ii)		{Air bubbles block/ water column interrupted in} xylem (vessels)/ OWTTE Ignore phloem		1		1		
		(iii)		**Any 2 (x1) from:** Cut shoot under water (1) assemble {apparatus/ named apparatus} underwater (1) seal all {gaps / joints} with grease (1)	2			2		2
	(b)	(i)		**Temperature: Any one from:** • increase in temperature increases kinetic energy/ or description of / • decrease in temperature decreases kinetic energy **Light intensity: Any one from:** • increase in intensity increases stomatal opening/ • (increased light intensity) increased rate of photosynthesis increases {use/ uptake} of water/ • decrease in intensity decreases stomatal opening / • (decreased light intensity) decreased rate of photosynthesis decreases {use/ uptake} of water increase evaporation/ increases (rate of) diffusion of water vapour/ increased loss of water vapour/ increases transpiration/ORA (1) (credit in either temperature or light intensity) must be linked to correct explanation		3		3		2
		(ii)		• Axes assigned with correct labels (time + total volume of water taken up by the leafy shoot) + units ({minutes/min} + cm^3) (1) • Appropriate linear scales, **including origin** + use of ½ graph paper (1) • All plots correctly plotted (1) [tolerance ±½ small square] • Plotted points joined with dot to dot with ruler or a curve **+** key/ label (1) No extrapolation with dot to dot, allow 5 small squares extrapolation on a lobf. Reject sketchy/ thick lines/lobf, if line does not pass through centre of more than one plotted point		4		4	4	

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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
2	(b)	(iii)		**Any 5 (x1) from:** A. Polythene bag: Initial increase but (after 20 mins) {no further increase / curve plateaus} **and n**o bag: {(steady) increase /constant rate of uptake} (1) B. water vapour {trapped inside polythene bag / cannot diffuse away from leaves} / increased humidity inside bag (1) C. {no diffusion gradient / no concentration gradient/ equilibrium reached / correct description of equilibrium} in the bag(1) D. water uptake stopped / no more water vapour diffuses out of stomata (1) must be linked to the idea of no diffusion gradient E. with no bag, there is a {diffusion/ concentration/ water potential} gradient (1) F. because {diffusion shells {are removed/ do not build up}/ water vapour removed from (lower) surface of leaf/ ORA} (1)		4	1	5		
				Question 2 total	**3**	**12**	**1**	**16**	**4**	**5**

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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
3	(a)			1 epu= 200/90 = 2.2 µm = 2 marks (ignore additional decimal places) 90 epu = 20 smd / 45 epu = 10 smd for 1 mark Allow 22.2/ 22 for 1 mark (incorrect reading from scale)		2		2	2	2
	(b)	(i)		Serosa (1) Mucosa (1) circular muscle (1) longitudinal muscle	4			4		
		(ii)		20 x 2.2 = 44 µm (1) Accept 440/444 (ECF)		1		1		1
		(iii)		not in proportion to original section (1) must be attempt at numerically qualification epu shows ratio of 4:5 or equivalent (1) diagram shows ratio of 2:3 or equivalent (1)			3	3		3
	(c)	(i)		Active form would {digest/ break down} cells/ autolysis/ ORA	1			1		
		(ii)		Alkaline secretion/ bile (1) from Brunner's glands / pancreas/ liver cells/ gall bladder (1) Neutralise acid from stomach / increase pH / act as buffer (1)	3			3		
				Question 3 total	**8**	**3**	**3**	**14**	**2**	**6**

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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)	(i)		Total muscle mass = 70 x 60/100 = 42(kg) (1) O_2 capacity of muscle = 42 x 69.8 = 2931.6/ 2932/ 2930 cm^3 = 2 marks		2		2	2	
		(ii)		Much higher myoglobin content in seal muscle than in human (1) Any one from • More O_2 available to be {released/ dissociated} {when the partial pressure of oxygen is low/ when seal holds breath to dive/ when underwater} (1) • Therefore can respire aerobically for longer (1)		2		2		
	(b)			A. More red blood cells in general circulation (1) B. more haemoglobin available (1) C. More oxygen supplied to {muscle / brain / tissue/ cells} (1) D. Aerobic respiration can continue for longer / seal does not need to come to surface {to breathe / for oxygen/ for air} as often / anaerobic respiration is not required(1)			4	4		
	(c)	(i)		A. Myoglobin curve well to left because myoglobin has a higher affinity for oxygen than haemoglobin(1) B. Myoglobin retains high levels of O_2 / is highly saturated at low ppO_2 / reaches saturation at lower ppO_2(1) C. Only dissociates oxygen at low ppO_2/ dissociates more readily at low partial pressures (1) D. At low pp a small change in pp results in large change in saturation (1)		4		4		
		(ii)		Llama haemoglobin has a higher affinity for O_2 than adult human haemoglobin (1) Reference to llama habitat /higher altitude/ environment with has a Low pp O_2 (1)		2		2		
				Question 4 total	**0**	**10**	**4**	**14**	**2**	**0**

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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(a)	(i)		10 µm or less (1) Mesh size needs to be less than {widest part of the smallest organism/ *Pseudo-nitzchia}* (1) **Second marking point can only be awarded if first is awarded**			2	2		2
	(b)	(i)		A. Site 1 is more biodiverse (1) B. (Species richness is same for) both sites as they have the same {number/amount} of species (1) C. site 2 is dominated by one species / site 1 has more evenness in the size of each population/ OWTTE (1) Accept correct calculations for 3 marks Site 1 = 0.74 Site 2 = 0.07		3		3		
		(ii)		Simpson's (index)	1			1		
		(iii)		• Sample in more locations along coastline (1) • Sample more than once in a day / more frequently (1) • Use a {larger diameter/ bigger} net / increase volume of water sampled / increase sample size (1)			3	3		3
		(iv)		{(water) temperatures / light intensities} higher (in summer) (1) Higher {growth/ reproduction} rate of phytoplankton **and** ref to relevant risk to humans/ ORA (1)			2	2		
				Question 5 total	**1**	**3**	**7**	**11**	**0**	**5**

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Question	Marking details	Marks Available					
		AO1	AO2	AO3	Total	Maths	Prac
6	**Indicative content** **Gas exchange adaptations** • {Skin/ body surface} is gas exchange surface • Outer body surfaces folded – further increases surface area for diffusion • Diameter of approximately 3 mm, length up to 45mm - narrow diameter gives short diffusion pathway • Cylindrical shape - high surface area to volume ratio **Behaviour adaptations** • Head and front part of body buried in mud – when highly active, less of the body is buried – more surface in contact with gas exchange medium • Part of the body exposed to the water moves vigorously - maintains steep concentration gradient **Haemoglobin** • Red in colour due to presence of haemoglobin – presence of respiratory pigment increases ability to absorb oxygen • Presence of blood vessels to transport oxygen/ maintain diffusion gradient • Haemoglobin may have higher affinity for oxygen	6	3				

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Question	Marking details	Marks Available					
		AO1	AO2	AO3	Total	Maths	Prac
	7-9 marks Indicative content of this level is… Detailed explanation of gas exchange adaptations Detailed explanation of behavioural adaptations Detailed explanation of role of haemoglobin To award 9 marks a comment linking adaptations to survival in a low oxygen environment is required *The candidates constructs an articulate, integrated account. 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… Any two from: Explanation of gas exchange adaptations Explanation of behavioural adaptations Explanation of role of haemoglobin *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.*						

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Question	Marking details	Marks Available					
		AO1	AO2	AO3	Total	Maths	Prac
	1-3 marks Indicative content of this level is… Brief explanation of gas exchange adaptations OR Brief explanation of behavioural adaptations OR Brief explanation of role of haemoglobin *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	**6**	**3**	**0**	**9**	**0**	**0**

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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**	**2**	**0**	**11**	**2**	**0**
2	**3**	**12**	**1**	**16**	**4**	**5**
3	**8**	**3**	**3**	**14**	**2**	**6**
4	**0**	**10**	**4**	**14**	**2**	**0**
5	**1**	**3**	**7**	**11**	**0**	**5**
6	**6**	**3**	**0**	**9**	**0**	**0**
TOTAL	**27**	**33**	**15**	**75**	**10**	**16**
TARGET	**27**	**33**	**15**	**75**	**8**	**12**

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