GCE AS MARKING SCHEME

SUMMER 2018

AS
BIOLOGY - COMPONENT 2
B400U20-1

INTRODUCTION

This marking scheme was used by WJEC for the 2018 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.

EDUQAS AS COMPONENT 2
BIODIVERSITY AND PHYSIOLOGY OF BODY SYSTEMS

MARK SCHEME SUMMER 2018

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)			Enzymes secreted outside of the body/extracellular digestion **and** the products of digestion are absorbed (1)	1			1		
	(b)	(i)		Scolex/hooks and suckers + attach to gut wall	1			1		
		(ii)		Nutrients absorbed through its body surface (so it doesn't need a mouth)(1) Food is pre-digested (so does not need an alimentary canal) (1)	2			2		
		(iii)		Oxygen levels are too low for aerobic respiration in the intestine/ It has a low metabolic rate and {does not require aerobic respiration/does not move much/owtte (1)		1		1		
	(c)	(i)		**Any four (x1) from** (Thick) cuticle protects the worm from the effects of {acids/ enzymes} (1) Lime cell secretion neutralises acid (1) Microtriches increase surface area for absorption of digested food (1) Glands secrete mucus to protect the worm from digestive enzymes (1) Muscles allow tapeworm to increase contact with digested food (1)		4		4		
		(ii)		Enable the worm to absorb ions/amino acids/glucose/correct named product of digestion(1) Against concentration gradient (1)			2	2		
				Question 1 total	4	5	2	11	**0**	**0**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
2	(a)			raccoon (1) There is only 1 base difference between red panda and racoon/more bases in common between red panda and racoon/ there are more differences between red panda and giant panda and black bear(1)		2		2		
	(b)			17 differences/3.95 x 10^{-7} = 43037974.68 1 mark = 43 000 000 2 marks = 4.3 x 10^{7} years 3 marks		3		3	3	
	(c)			Analogous structures (evolve separately) are different structures to perform a similar function/or example (1) Homologous structures (evolve from a common ancestor) similar structure performing different functions/or example (1) Analogous structures arise through convergent evolution/OWTTE (1)	3			3		
	(d)			Eukaryota (1) Contains membrane bound organelles/DNA bound in nuclear envelope/80S ribosomes/multicellular (1)	1	1		2		
				Question 2 total	4	6	**0**	10	**3**	**0**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
3	(a)			Sunken stomata + Water vapour builds up in pits (1) Reduces diffusion gradient (1) Rate of transpiration reduced Ligustrum has no pits/stomata nearer surface + Moving air can easily disrupt diffusion shells/blow away water vapour. (1)	3			3		
	(b)	(i)		Obtain impression using nail varnish or PVA/owtte (1) Prepare a slide using impression and observe under microscope (1) Count number of stomata in known area (1) Repeat to obtain mean (1)	4			4		4
		(ii)		13/14 stomata in field of view Area shown = $3.142 \times 0.5^2 = 0.7855\ mm^2$ If 13 Density = $16.5499682\ mm^{-2} = 16.55$ stomata mm^{-2} (2 d.p.) If 14 Density = $17.8230426\ mm^{-2} = 17.82$ stomata mm^{-2} (2 d.p.) Correct answer to 2 dp = 3 marks Correct answer not to 2 dp = 2 marks If use diameter instead of radius = 2 marks Sight of $3.142 \times 0.5^2 = 1$ mark		3		3	3	3
		(iii)		Stomata are sunken/in pits so will not show up on impression/AVP (1)		1		1		1
	(c)			Species A **and** has lowest stomatal density/least stomata/higher percentage of stomata on the lower surface (1) So lower rate of water loss/transpiration (1)			2	2		
				Question 3 total	7	4	2	13	**3**	**8**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)	(i)		= 27/5 (1) = x 5.4 (2)		2		2	2	2
		(ii)		Ring of cartilage (1) Prevents the trachea collapsing (due to air pressure decrease during inspiration) (1)		2		2		
	(b)			**Any 3 (x1) from:** External intercostal muscles contract + ribs move up and out + diaphragm contracts and flattens (1) Correct reference to role of pleural membranes (1) Volume of thorax increases therefore pressure decreases (1) air pressure in alveolus falls to {-1 a.u./below atmospheric pressure} and air rushes in (1)	3			3		
	(c)	(i)	I	PP O_2 in capillary blood rises from 5.5 kPa to 14 kPa then remains constant (1) because of initial large concentration gradient so oxygen diffuses into blood (1) plateau because of equilibrium at 14 kPa/OWTTE (1)		2		2		
			II	14 kPa because equilibrium has been reached between ppO2 in the alveoli and the capillary			1	1		
		(ii)		Thin walls in capillary/walls one cell thick (1) Dense network of capillaries/Large total surface area (1) Low velocity of blood/low cross sectional area/small diameter (1)	2			2		
	(d)			hydrostatic pressure is higher than osmotic pressure at the arterial end (1) Forces {water and small soluble molecules/fluid} out of capillary (1) Blood cells and larger protein molecules retained in capillary (1)	3			3		
				Question 4 total	8	6	1	15	**2**	**2**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(a)			Keep all other conditions as experimental plants (1) But do not remove vascular tissue (1)			2	2		2
	(b)	(i)		Removal of leaves above cut reduces photosynthesis (1) Reducing sugar production above the experimental region (1)		2		2		2
		(ii)	I	The cylinder prevents the region from drying out (1)		1		1		1
			II	Replenishing the water stops the build-up of {chemicals/bacteria}/replenish oxygen (1)		1		1		1
	(c)	(i)		Phloem is involved in the translocation of sugar (1) Removal of phloem in A almost completely stopped the upward transport of sugars past the cut/ORA. (1) Growth is reduced in A because of reduced supply of sugars/ORA (1)		1	2	3		
		(ii)		Removal of xylem prevents the transport of water up the plant which will reduce growth of B (1) Less {growth/respiration/energy needed} therefore more sugar remaining in B(1)			2	2		
	(d)	(i)		Repeat the experiment and calculate the mean increase in stem length for each group of plants (1)			1	1		2
		(ii)		Any two for 1 mark from Light intensity/wavelength/Species/Temperature/Surface area of leaves/Age of plant/Size of cut/humidity/air movement			1	1		
	(e)			Arrow pointing at the endodermis (1)	1			1		
	(f)			**Any 3 (x1) from:** Stops apoplast pathway/forces ions into symplast pathway (1) Movement of Ions into xylem requires active transport (1) Cyanide is a respiratory inhibitor/prevents cells respiring/Stops ATP synthesis (1) Lower water potential gradient reduces root pressure/ORA (1)		3		3		
				Question 5 total	**1**	**8**	**8**	**17**	**0**	**8**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
6				Indicative content • Wolves and dogs have carnivore dentition • Sharp incisors and long pointed canines Carnassial teeth for shearing through bone, ligaments and tendons • (Relatively) short gut adapted for protein digestion • Salivary amylase hydrolyses starch to maltose • Optimum pH maintained by mineral salts/buffers in saliva • Starch digestion resumes in duodenum with pancreatic amylase • Maltose digested to glucose by maltase in small intestine • Domestic dogs fed on human food waste containing large amounts of starch • Some dogs better at digesting starch than others • Dogs that could digest starch well more likely to survive and breed/can live on human food waste • Wolves/wild dogs cannot digest starch as there is no selective advantage/wolves cannot produce amylase **7-9 marks** Detailed explanation of carnivore dentition Detailed account of starch digestion Logical explanation of advantage of starch digestion in domesticated dogs *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.*	3	4	2	9		

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
				4-6 marks Any two from: Explanation of carnivore dentition An account of starch digestion Attempt to account for advantage of starch digestion in early dogs *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** Any one from: Brief explanation of carnivore dentition Brief account of starch digestion Attempt to give an advantage for starch digestion in early dogs *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	**3**	**4**	**2**	**9**	**0**	**0**

COMPONENT 2: BIODIVERSITY AND PHYSIOLOGY OF BODY SYSTEMS

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVE

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	**4**	**5**	**2**	**11**	**0**	**0**
2	**4**	**6**	**0**	**10**	**3**	**0**
3	**7**	**4**	**2**	**13**	**3**	**8**
4	**8**	**6**	**1**	**15**	**2**	**2**
5	**1**	**8**	**8**	**17**	**0**	**8**
6	**3**	**4**	**2**	**9**	**0**	**0**
TOTAL	**27**	**33**	**15**	**75**	**8**	**18**