GCE A LEVEL MARKING SCHEME

SUMMER 2019

A LEVEL
BIOLOGY - COMPONENT 2
A400U20-1

INTRODUCTION

This marking scheme was used by WJEC for the 2019 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 A LEVEL COMPONENT 2
CONTINUITY OF LIFE

MARK SCHEME SUMMER 2019

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

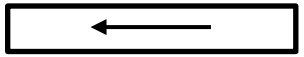
Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
1	*(a)*	(i)		Plants are Autotrophs/ or description of (1) Fungi are saprotrophs/ or description of (1) Animals are holozoic/ or description of (1)		3		3		
		(ii)		fungi	1			1		
	(b)	(i)		domain	1			1		
		(ii)		{DNA/ genetic} {fingerprinting/profiling}/ DNA sequencing/ amino acid sequencing/ immunological comparisons/ DNA hybridisation/ RNA sequencing/ Sanger sequencing/ electrophoresis NOT immunology	1			1		1
		(iii)		X after node for archaea up to and including node formed by 19 (on or close to line)		1		1		
	(c)	(i)		x- genus, y-order, z-phylum	1			1		
		(ii)		Order **All four correct = 1 mark** Midge larva/ *C. thumni* Dragonfly/ *A. juncea* Water louse/ *A. aquaticus* Bloodworm/ *S. vulgaris*		1		1		
				Question 1 total	**4**	**5**	**0**	**9**	0	1

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
2	*(a)*			• Double stranded {not single/ RNA is single stranded}/ double helix vs {not double helix/ single stranded} • deoxyribose not ribose • thymine not uracil Accept letters • Longer molecule **2 marks for 3 correct** **1 mark for 2 correct**	2			2		
	(b)			It cuts DNA/ or description (1) Ignore reference to RNA At a specific (base) sequence(1)	2			2		
	(c)			Any **three** (×1) from: • Make guide RNA (with complementary sequence) of {target gene/ fertility gene} (1) • Insert {CRISPR/ Cas9} into {eggs/ cells} (1) NOT mosquitoes alone • and incubate/allow to {grow/mature} (1) • remove the gene that {makes them fertile/ affects meiosis} (1)		3		3		
	(d)			• Reference to reduced fertility in mosquitoes (1) • Less mosquitoes = less malaria (1) • Any **one** (×1) from Reference to right of humans to make another species extinct / Effect on {removal from food chain/ ecosystems/ biodiversity} Unknown effects of GM mosquitoes in the environment (1)		2	1	3		
				Question 2 total	**4**	**5**	**1**	**10**	**0**	**0**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
3	*(a)*			• Use of {random number tables/ random number generator/ 20 sided die or equivalent} / use random coordinates for sampling (1) • Use {many/ a large enough number of} quadrats (to ensure a consistent number of species)/ owtte (1) • Carry out both sites at same time of year/ Repeat investigation at different times of the year (1)	3			3		3
	(b)			D=0.15/ 0.145= 3 marks If incorrect award **one mark** for each of: ∑n(n-1) =160 642 (1) N(N-1) =187 922 (1)		3		3	3	3
	(c)			Biodiversity reduced (1) must match answer from(b) due to regular/ frequent mowing (1) ORA			2	2		

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
	(d)			Any **four** (×1) from A. Meristem is growing point of plant (1) B. {Meristems/stolons/rhizomes} of {ryegrass/ dandelion} {not removed/ below height of mower blade/ at ground level/ unaffected by mowing} C. Meristem of deadnettle is {removed/ above height of mower blade} D. {Ryegrass/ dandelion} can regrow after mowing/ deadnettle {can't regrow/is killed} (1) E. Ryegrass outcompetes other plants/ or description of (1) **ECF from (c) increasing biodiversity** A. Meristem is growing point of plant (1) B. {Meristems/stolons/rhizomes} of ryegrass/ dandelion not removed (1) C. Meristem of deadnettle is removed (1) D. Allows more light to reach ground level (1) E. (Lack of deadnettle) allows {shorter/other} species {to grow / not outcompeted} (1)	1	2	1	4		
				Question 3 total	**4**	**5**	**3**	**12**	**3**	**6**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
4	*(a)*			They can interbreed and produce fertile offspring.	1			1		
	(b)			Genotypes (1) RB × RB any suitable letters but must be capitals; Correct gametes (1) ECF F_1 genotypes (1) ECF Ratio: 1 (chestnut) : 2 (chestnut-black) : 1 (black) ECF		4		4	1	
	(c)			The larger the island the less black forms/ ORA (1) Competition is greater on small islands for {territories / food/ nesting sites/ ORA} (1) Aggression (linked to black gene) {gives a selective advantage/ is selected for/ allows them to outcompete} other forms/ ORA (1)		1	2	3		
	(d)	(i)		{Higher frequency of/ more} black birds on the smaller islands / ORA			1	1		
		(ii)		Birds from Makira breeding with birds from Santa Ana/ Ref to gene flow (1) reference to Santa Ana's proximity to Makira (1)			2	2		
	(e)			Radiation (from nuclear weapons) (1) acts as a mutagen/ causing a mutation / increased rate of mutation/ or description of (1)	2			2		
				Question 4 total	**3**	**5**	**5**	**13**	**1**	**0**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
5	*(a)*			A- vein (1) {thin} (smooth) muscle layer/ large lumen (1) B-artery (1) Thick (smooth) muscle layer/ small lumen (1)		2 2		4		2
	(b)			In through <u>maternal</u> arteriole into {intervillus space/ lacuna} (1) out through <u>maternal</u> venule (1)		2		2		
	(c)			no capillaries present between maternal arteriole and maternal venule (1) One less layers of cells for materials to cross/shorter diffusion path/ (pooling effect of blood) allows more time for diffusion (1) 2nd mp linked to 1st mp		2		2		
	(d)	(i)		17-25 (1) if seen -8 (2 marks)		2		2	2	
		(ii)		  Both correct (1)			1	1		
		(iii)		<u>venous end arterial end (1)</u>  (1) NO ECF			2	2		
	(e)			Water retention/oedema/swelling/ accumulation of tissue fluid			1	1		
	(f)			Reduces surface tension (1) Prevents alveoli collapsing/ keeps alveoli open (1)	2			2		
				Question 5 total	**2**	**10**	**4**	**16**	**2**	**2**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
6	*(a)*			Correct identification of two organelles on diagram = (1) mark Correct linkage of 2 × organelles with function = (1) mark {Rough endoplasmic reticulum/ rer/ ribosomes} (synthesise proteins) Golgi (package proteins)		2		2		2
	(b)			Glucose ⟶ Ethanol + Carbon dioxide (1) {less {energy/ ATP}/ 2ATP} is released/ glucose is not completely broken down (1) NOT energy produced {Alcohol/ethanol} is needed for {beer / alcoholic drinks/ products/ owwte} (1)	3			3		
	(c)	(i)		{Means/ different symbols} for each of the teams shown(1) Reproducibility is good for most days except at 3 days (1) Use of data/ at days {0/6/7} the data is exceptionally close (1)		1	2	3	2	2
		(ii)		standard deviation /variance (1) Repeatability (1) Increase number of repeats (1)	3			3	1	3
		(iii)		(Student's) t test (1) Accept Mann Whitney test	1			1	1	1
		(iv)		The patterns in the graphs for gibberellin conc and rate of amylase production coincide/ accept similar patterns (1) There is a time lag with gibberellin changing first/ amylase production increases after gibberellin production (1)			2	2		
				Question 6 total	**7**	**3**	**4**	**14**	**4**	**6**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
7	*(a)*	(i)		Marked in correct position(1) Vascular bundle/ strand/ xylem + phloem (1) {Supply/ transport} {water/nutrients/ sucrose} (to anther)(1) MP1 must be correct to access MP2 and/or 3		3		3		
		(ii)		Clear indication of which portion is drawn – left hand half		1		1		1
	(b)			Correct measurements 65-67mm **and** 15 - 17mm (1) Accept cm Must have units Calculate actual ratio of X-X : Y-Y = 1080/ 360 or 3:1(1) Calculate ratio of X-X : Y-Y from drawing = 66/16 or 4.13:1 (1) Accept range of 3.82 - 4.47 :1 OR Magnification of X-X = 66000/1080 or 60.2/ 61.1/ 62.0 (1) (Drawing compared to actual) Magnification of Y-Y = 16000/ 360 or 41.6/ 44.4/ 47.2 (1) Correct conclusion drawing is not in proportion (1)		3	1	4	3	4
	(c)	(i)		Any **five** (×1) from: A. Mitosis produces diploid pollen mother cells (1) B. Meiosis produces {a tetrad of/ four} haploid cells from the pollen mother cell (1) C. Mitosis splits {(haploid) nucleus into the generative + pollen tube nuclei/ generative nucleus into two gametes} (1) D. Mitosis is significant {because retains chromosome number/ daughter {cells/ nuclei} are <u>genetically</u> identical/ large numbers of pollen produced/ allows double fertilisation}(1) E. Meiosis is significant because it halves chromosome number to {create the correct number /offset doubling} at fertilisation (1) F. Meiosis increasing genetic variation (1)	5			5		

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
		(ii)		{It provides nutrition/ It produces a {waterproof coat/ outer layer}} for the pollen grain	1			1		
	(d)			Allows walls of {anther/ pollen sacs} break/open (1) when mature (1) releases pollen (1)			3	3		
				Question 7 total	**6**	**7**	**4**	**17**	**3**	**5**

Question	Marking details	Marks Available					
		AO1	AO2	AO3	Total	Maths	Prac
8	**Indicative content** Differences • Long-styled has stigma protruding from corolla/petal tube/ flower + Short-styled have stigma near the middle of the corolla/petal tube/ flower • Long-styled has anthers near the middle of the corolla/petal tube/ flower + Short-styled have anthers near the mouth of corolla/petal tube/ flower • Long-styled has stigma above anthers + Short-styled form has anthers above stigma Promoting Cross pollination • In long-styled flowers stigma above anthers so pollen less likely to fall onto stigma • Ref to position of nectaries at base of flower • Ref to relative positions of anthers and stigmas for transfer of pollen • Position of pollen on bee/ proboscis with regard to transfer Fertility experiments • More seeds with cross pollination because more pollen germinates • pollen might not germinate on own stigma • Reference to {size/ texture} of {stigma / pollen} • so pollen might not attach to own stigma/ be compatible						

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
				7-9 marks Indicative content of this level is… Detailed account from 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** Indicative content of this level is… Detail from two sections/ some detail from 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** Indicative content of this level is… Any clear point from any section *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 8 total	**0**	**5**	**4**	**9**	**0**	**0**

UNIT 2: CONTINUITY OF LIFE

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	**4**	**5**	**0**	**9**	**0**	**1**
2	**4**	**5**	**1**	**10**	**0**	**0**
3	**4**	**5**	**3**	**12**	**3**	**6**
4	**3**	**5**	**5**	**13**	**1**	**0**
5	**2**	**10**	**4**	**16**	**2**	**2**
6	**7**	**3**	**4**	**14**	**4**	**6**
7	**6**	**7**	**4**	**17**	**3**	**5**
8	**0**	**5**	**4**	**9**	**0**	**0**
total	**30**	**45**	**25**	**100**	**13**	**20**