GCE A LEVEL MARKING SCHEME

SUMMER 2017

A LEVEL (NEW)
BIOLOGY - COMPONENT 2
A400U20-1

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 – Continuity of Life

SUMMER 2017 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)		mitosis	1			1		
		(ii)		Metaphase – 3 (1) Anaphase – 7 (1)	2			2		2
		(iii)		Metaphase – 34/33.75/ 33.8 (1)ECF Anaphase – 79/ 78.75/78.8(1)ECF	2			2		2
		(iv)		Metaphase -5/ 4/ 4.72/ 4.7 (1) ECF Anaphase – 11/10/ 10.97/ 10.9 (1)ECF	2			2		2
	(b)			In animal cells there will be centrioles/ ORA for plants (1) In animal cell there will be no cell plate formation/ there will be constriction of the cytoplasm/ ORA for plants	2			2		
	(c)	(i)		cancer	1			1		
		(ii)		**Any 3** correct labels from: phospholipid bilayer, transmembrane protein, carbohydrate chain (1) reasonable quality drawing – phospholipid bilayer+ transmembrane protein + side chain(1)Accept one tail Second drawing with shorter carbohydrate chain (1)	2	1		3		
		(iii)		Any two (x1)from: Correct reference to cell recognition/ cell signalling/ cell communication/ suitable example (1) Correct reference to cell {adhesion/ binding} (1) NOT binding to substrate Correct reference to act as a receptor (1)		2		2		
				Question 1 total	**12**	**3**	**0**	**15**	**0**	**6**

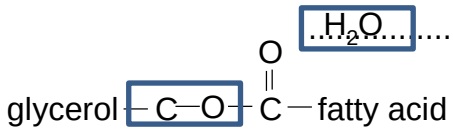
Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
2	(a)	(i)		2.5 µm = 2 marks If incorrect allow 1 mark for: 80 eyepiece units=2 x 100 µm 40 eyepiece units=1x 100 µm 1epu = 200/80 1epu = 100/40		2		2	2	2
		(ii)		1,5,7 2marks for 3 correct ,1 for 2 correct	2			2		
		(iii)		2.5, 12.5/ 15.0, 17.5 Accept rounding up 3, 13, 18 2marks for 3 correct ,1 for 2 correct **ecf from ai and aii**		2		2	2	2
		(iv)		**Ecf from aiii** Scale – linear, include 0 at origin, sensible scale(1) 1mark for plots +/- ½ small square tolerance(1) 1 mark for line dot to dot through centres/ good curve of best fit ; (1)		3		3	3	
		(v)		{Measure more tubes/ repeat} **and** calculate a {mean/ average};			1	1		1
	(b)			Place pollen grains in range of {pH (solutions)/ pH (buffers)/ pHs by adding acid or alkali} (1) measure lengths at a set time/ time intervals/every 20 min (1) NOT different time intervals **Any 2 (x1) from:** same (species/ type of) plant (1) same concentration of solution (1) {same/ control} temperature (1) Same {mass/ volume/ amount/ age} of pollen grains (1) Light intensity (1)			4	4		4

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(c)			**Any 4 (x1) from:** A. (Secretory) vesicle {contains/ releases} {digestive/hydrolytic} enzymes/ (Secretory) vesicle {contains/ releases} {protease/named enzyme}/ exocytosis B. (The enzymes digest/ hydrolyse) a path through (the tissues) of the style C. Mitochondria provide {ATP/ energy} D. {Rough ER/ribosomes} synthesize the {enzymes/ proteins}/ or description of/transports proteins E. Golgi bodies – formation of vesicle/ {processing/ modifying/ packaging} protein/ or example of Accept for 2 marks (A+B): vesicle contains enzyme that digests path through style		4		4		
				Question 2 total	**2**	**11**	**5**	**18**	**7**	**9**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
3	(a)	(i)		<table><tr><td>Species</td><td>Pattern of orange and white</td></tr><tr><td>*Anolis brevirostris*</td><td>All white</td></tr><tr><td>*Anolis websteri*</td><td>All orange</td></tr><tr><td>*Anolis caudalis*</td><td>part white part orange</td></tr></table> 2 for all 3, 1 for 2 correct		2		2		
		(ii)		*Anolis brevirostris* –South, *Anolis caudalis* –Central, *Anolis websteri*- north All three for 1mark		1		1		
		(iii)		Almost all white in the North to almost all orange in the south/ owtte		1		1		
	(b)			q/d = 0.1/ $^{1}/_{10}$ (1) p/D = 0.9/ $^{9}/_{10}$ (1) 72 = 2 marks If 72 incorrect allow the following for 1 mark 2pq = 2 x 0.1 x 0.9 x 400 0.18 x 400			4	4	4	
	(c)	(i)		Any four (x1) from: A. White (dewlaps) more visible in forest habitat (1) B. <u>Selective</u> advantage (1) C. Males will {attract more/ mate with} females/ {scare/ warn} off {rivals/predators} (1) D. More (males) will pass on {advantageous/ white dewlap} alleles (1) E. Alleles for white dewlaps become more frequent in (gene pool) (1)		1	3	4		
		(ii)		In A.brevirostris allele **D** is selected against and so removed from the <u>gene pool</u> (1) (Although d is a disadvantage in) A.websteri, it is{not expressed/ masked/ passed on} in heterozygotes and therefore remains in the <u>gene pool</u>(1)		2		2		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(d)			They have the {opposite/ different} dewlap colour/ wtte (1) Males will not attract females/ courtship rituals (1) There is a reproductive barrier /behavioural isolation/ genetic drift/ do not interbreed (1)			3	3		
				Question 3 total	**0**	**7**	**10**	**17**	**4**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)	(i)		Phenotype: (Normal) agouti x (normal) agouti (1)NOT black Genotype: AaBb (1) AB Ab aB ab (1) correct completion of punnet square (1)		4		4		
		(ii)		All phenotypes from the table in the ratio 9:3:3:1		1		1		1
	(b)	(i)		Correct values of E 18, 6, 6, 2 (1) $(O-E)^2/E$ 0.89, 0.67, 1.5, 0.5(1) ECF Correct value of χ^2 = 3.56 (1)ECF		3		3	3	3
		(ii)		7.82 circled		1		1		
		(iii)		Accept (1) ecf because calculated value of χ^2 is less than critical value/ probability is greater than 0.05 (1)			2	2		
	(c)	(i)		epigenetics	1			1		
		(ii)		x- transcription (1) y- translation (1)	2			2		
		(iii)		Methylation makes DNA tighter/more tightly would (around histones) The more methylation the {<u>less</u> blocking molecule (<u>abnormal</u>RNA) / more regulator protein} is made (1) The more the gene is switched on and off (1)NOT in different places The more methylation the {more agouti the colour/ the more banding/less yellow} (1)			3	3		
				Question 4 total	**3**	**9**	**5**	**17**	**3**	**4**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(a)			Any 3 from: {Restriction (endonuclease) enzyme/ named enzyme e.g. EcoR1} used to cut out {gene/ DNA} (1) Sticky ends/ or description of (1) Same restriction enzyme used to open DNA in {vector/ plasmid/ virus/ *Camelina*} (1) Ligase used to {insert / anneal / splice} gene into {vector/ plasmid/ viral/ *Camelina}*(1)	3			3		
	(b)			Less wild fish will be harvested (to feed farmed fish)			1	1		
	(c)	(i)		They have a carboxylic acid group/ carboxyl (1) NOT COOH And a long {chain of carbon atoms/ hydrocarbon chain} / (1)		2		2		
		(ii)		They contain {more than one/ six} {C=C / C-C double bond} NOT at least one		1		1		
	(d)	(i)		 Accept water for H_2O	2			2		
		(ii)		Triglyceride– energy source/ energy store/ buoyancy/ protection of organs/ alternative respiratory substrate/ thermal insulation (1) NOT fat store Phospholipid – membrane component/ electrical insulation (1)	2			2		
				Question 5 total	**7**	**3**	**1**	**11**	**0**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
6	(a)			(Secondary oocyte) passes into the {fallopian tube/ oviduct} (1) (Graafian follicle) develops into corpus luteum (1)	2			2		
	(b)	(i)		A. FSH stimulates the production of oestrogen (1) B. oestrogen <u>inhibits</u> the {production/release} of FSH (1) C. from Anterior pituitary (1) D. (so that there is negative feedback) which reduces the production of oestrogen/low levels of FSH inhibit oestrogen release (1) E. allowing ovulation (1) in correct context	4			4		
		(ii)		Oestrogen inhibits {<u>production/release</u>} of FSH (1) Without FSH the follicles do not develop (1)ignore development/ of oocytes/release/ovulation of primary oocytes Without a {mature/ Graafian} follicle, ovulation and subsequent fertilisation cannot take place (1)		3		3		
	(c)	(i)		2-3a-RA-RV-13-(lung)-4-LA-LV-12-10 All correct = 2 marks, one mistake / omission -1		2		2		
		(ii)		More oxygen/ oxygenated (1) lungs (1)		2		2		
				Question 6 total	**6**	**7**	**0**	**13**	**0**	**0**

Question	Marking details	Marks available					
		AO1	AO2	AO3	Total	Maths	Prac
7	**Indicative content** **Use of table** • **Feeding evidence:** supports hypothesis 1, • {feeding / jaw} is different in each fish type suggesting three separate families/ if same family would expect same {feeding / jaw}. • **Gender evidence:** supports hypothesis 2, • the whalefish are all females, the bignoses are all males, the tapetails are all immature. • **Depth evidence** supports hypothesis 2 • the tapetails are all caught above 200 m whalefish and bignoses are caught below 1000m **Use of tree** • **Phylogenetic tree:** supports hypothesis 2, • the ends of the branches of the phylogenetic tree have different types of fish grouped together/ Whalefish are on more than one branch - E.g. Tapetails and whalefish at the end of the same branch in the top half of the tree. - E.g. Bignose and whalefish at the end of the same branch in the lower half. • If they belonged to 3 separate families the ends of the branches would have only whalefish, bignoses or tapetails together at the ends of the last branch. **Conclusion and future change:** • Hypothesis 2 more likely because it is supported by both table and phylogenetic {evidence/ tree}. • The feeding evidence does not rule out hypothesis 2 because different developmental stages could have different feeding mechanism. It might change in future if a larger number of specimens became available.	2			2		

Question	Marking details	Marks Available					
		AO1	AO2	AO3	Total	Maths	Prac
	7-9 marks Indicative content of this level must include Detailed evidence from table Detailed evidence from tree Conclusion *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 Any two from Evidence from table Evidence from tree Conclusion *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 Either basic evidence from table Or basic evidence from tree *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 7 total	**0**	**5**	**4**	**9**	**0**	**0**

COMPONENT 2 – CONTINUITY OF LIFE

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	**12**	**3**	**0**	**15**	**0**	**6**
2	**2**	**11**	**5**	**18**	**7**	**9**
3	**0**	**7**	**10**	**17**	**4**	**0**
4	**3**	**9**	**5**	**17**	**3**	**4**
5	**7**	**3**	**1**	**11**	**0**	**0**
6	**6**	**7**	**0**	**13**	**0**	**0**
7	**0**	**5**	**4**	**9**	**0**	**0**
TOTAL	**30**	**45**	**25**	**100**	**14**	**19**