GCE A LEVEL MARKING SCHEME

SUMMER 2018

A LEVEL
BIOLOGY - COMPONENT 2
A400U20-1

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 A LEVEL COMPONENT 2
CONTINUITY OF LIFE

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.

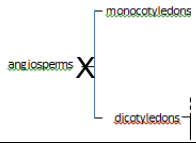
cao = correct answer only
ecf = error carried forward
bod = benefit of doubt

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
1	(a)			Correctly labelled lysosome (1) Golgi (apparatus/body) (1) Contain {hydrolytic/digestive} enzymes/{Break down/recycle} {organelles/macromolecules/debris}(1) Accept {transport/release} of enzymes within cell Reject disposal of waste unqualified/secrete enzymes	3			3		
	(b)	(i)		Myelin sheath drawn with nodes (1) Myelin correctly labelled(1)	2			2		
		(ii)		Any three (x1) from: It speeds up transmission (1) By extending the range of local currents/reference to (electrical) insulation/myelin prevents movement of ions (1) So that action potentials only have to be generated at nodes(1) leap from node to node/saltatory conduction (1) Accept reverse argument for each point if refer to Tay Sachs/accumulation of fatty substances	3			3		
	(c)	(i)		f labelled on any part of X chromosome not matched on Y		1		1		
		(ii)	I	Females have two {X chromosomes/alleles} and males only have one/ Only females can be {carriers/heterozygous}/ Males have no equivalent allele on the Y chromosome NOT Y chromosome is smaller	1			1		
			II	Both males and females can {be carriers/be heterozygous/have two alleles} /OWTTE	1			1		
	(d)			X^FY $X^F X^f$ (1)  accept alternative convention correct gametes (1) correct completion of punnet square/outcomes (1) 0.25/25%/¼ ecf (1) Accept 3:1 or 1:3 if unambiguous		3	1	4	2	

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(e)	(i)		acts as shock absorber/protection (from physical damage)(1) reject reference to amniotic fluid acting as a barrier	1			1		
		(ii)		males {are more likely/have a 50% chance of} suffer Fabry/only males will suffer Fabry(1) Whether to terminate the pregnancy if the embryo is male (1)		2		2		
	(f)	(i)		398 = 3 marks If incorrect award 2 marks for: 2pq = 2 X 0.995 X 0.005 = 2 marks 2pq = 0.00995 = 2 marks accept 9.95×10^{-3} If incorrect award 1 mark for one of: p =0.995 q=0.005 accept 5×10^{-3}		3		3	2	
		(ii)		(Hardy Weinberg principle does not apply because) {population is small/genetic drift/founder effect/small gene pool/no migration/no immigration}/higher probability of two carriers having children (1) Decrease because h alleles will be lost from gene pool when sufferers die in childhood/selective abortion/selected against/selective disadvantage/less likely to reproduce (1)		2		2		
				Question 1 total	**11**	**11**	**1**	**23**	**4**	**0**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
2	(a)	(i)		They have no nucleus/chromosomes NOT DNA	1			1		
		(ii)		Male **+** Not all homologous/ Different sex chromosomes/ there is one pair where the chromosomes are different/ one large and one small/ X and Y chromosomes It has a Y chromosome	1			1		
		(iii)		I = 6 chromosomes/3pairs **+** II = 3 chromosomes	1			1		
		(iv)		One large X shaped chromosome and one small ^ shaped chromosome drawn either side of the equator (1) Spindle fibres drawn (1)		2		2		
	(b)			A. Hypothesis-The greater the concentration of calcium ions the greater the {re-initiation/meiosis/disappearance of germinal vesicles}/above a certain concentration of calcium ions {re-initiation/meiosis/disappearance of germinal vesicles} occurs (1) Accept the null hypothesis: concentration of calcium ions has no effect on {re-initiation/meiosis/the disappearance of germinal vesicles} B. At least 5 values for independent variable(1) C. Around 400 with suitable intervals (1) D. <u>Dependent</u> variable-{Number/rate/percentage} of re-initiations/disappearance of Germinal Vesicles (1) Accept 'time taken for germinal vesicle to disappear'if the hypothesis uses rate of initiation **any 2** (x1) from: (E1 and E2) E. Controlled variables: Temperature/volume/concentration of other ions in medium/pH/glucose concentration/same starfish/time in solution/concentration/number of oocytes NOT same species			6	6		6

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
	(c)	(i)		{transmembrane/intrinsic/channel/description of } <u>protein</u> (1) With a channel that can be opened (and closed) to allow (or prevent) Ca^{2+} through (1) Reject active transport/carrier protein	1	1		2		
		(ii)		Ca ions enter (the oocyte) (1) Ca ions stimulate (re-initiation of) meiosis (1)		2		2		
				Question 2 total	**4**	**5**	**6**	**15**	**0**	**6**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
3	(a)	(i)		P – anther , Q - stigma	1			1		
		(ii)		30/10 (1 mark) = 3 (2 marks)		2		2	2	2
		(iii)		Any **two** for **1 mark** from, large anthers/ anthers outside flower/ feathery stigmas/ stigmas outside flower/ absence of petals/ not coloured/green colour Accept reverse argument for insect pollinated	1			1		
	(b)	(i)		Fruit retains ovary wall/ovary wall and testa are fused (1) seed would only have a testa (1)		2		2		
		(ii)		One (nucleus) fuses with the {ovum/egg/female gamete} and the other fuses with (two) polar nuclei (1) The first forms the zygote and the second forms the endosperm nucleus (1)	2			2		
	(c)	(i)				1		1		
		(ii)		Dicotyledons, Brassicales (1) Commelinids, Poaceae (1)			2			
		(iii)		Wheat stores in endosperm (1) Field mustard stores in cotyledon (1)		2		2		
	(d)	(i)		The (more) closely related the fewer differences there will be/the fewer differences the more recent common ancestor/ORA	1			1		
		(ii)		4			1	1		2
		(iii)		1 3 2/1 2 3 = 2 marks			2	2		2
				Question 3 total	**5**	**7**	**5**	**17**	**2**	**6**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)			Discontinuous -Colour/hairs/smooth/wrinkled coat/shape **+** Continuous – length/width/size (1) **1 mark FOR BOTH** Continuous - shows a gradation from one extreme to another/controlled by more than one gene (1) Discontinuous-. When characters are clear-cut/controlled by a single gene (1)		3		3		
	(b)	(i)		100			1	1		
		(ii)		mode = 6.45 (1) It is in the {most common class/6.40-6.49 class}/it has the greatest number at 25/it is the highest bar/the median is the middle value which would be the 50th grain which is in the 6.50-6.59 class (1)			2	2		
		(iii)		Mean, Mode and median are not the same/ correct reference to shape not being tallest in the middle/not bell shaped/not symmetrical/skewed to left			1	1		
		(iv)		{Samples/hybrids} have more similar {mean/median/mode} to parent B (than parent A) (1) Null (hypothesis)(1) (students) t test(1) Accept Spearmans rank/Mann Whitney	2	1		3	3	
	(c)	(i)		Correct reference to increased grain fill time/or description of NOT larger grain size unqualified		1		1		
		(ii)		Any three (x1) from: Plants absorb nitrates to make {protein/amino acids/chlorophyll/nucleic acids} (1) Which is used for growth of leaves (1) Which increases photosynthetic product to fill grains. (1) Grain {contains/produces} more {amino acids/proteins} (1)		3		3		
		(iii)		Fungicides {will prevent disease/kills fungus}(1) less disease, the more photosynthesis (more photosynthetic product)/less disease = less nutrients taken from grain (1) NOT competition with the plant		2		2		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(d)			Accept any value in range 40-45 (1) Advantage – more accurate/takes account of quality of grains/internationally understood unit/seeds settle over time decreasing volume (1) Disadvantage – need to weigh the grains/grains dry over time(1)		1	2	3	1	
				Question 4 total	**2**	**11**	**6**	**19**	**8**	

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(a)			{within range of 1750- 1800/at the beginning} population was regulated by density dependent factors (1) e.g. {competition for/limited availability of} {food/mating sites/mates}/disease/predation (1) within range1780-1830 population was subject to density independent factors (1) Eg. hunting (1)	2	2		4		
	(b)			The population number crashes to a {very small number/4000}(1) Then the number of seals recovered (almost to the same level as before) (1)	1	1		2		
	(c)	(i)		Polymerase chain reaction/PCR	1			1		
		(ii)		Sample size for nineteenth century seals is {small/only 22}/only one gene locus {used/sampled}			1	1		1
		(iii)		(Population bottleneck) has caused decrease in genetic diversity (1) only 2 different sequences in modern but all 5 found in 19th C/GAA GAG AAA are missing in present day/ there is a wider range of different sequences in nineteenth C(1)			2	2		2
	(d)			skulls less symmetrical (1) Points on graph for modern seals show a shallower gradient/greater scatter of data/reference to outliers/more deviation from the line/less correlation/ lower correlation (1)			2	2		2
	(e)	(i)		Same genus/both belong to Mirounga		1		1		
		(ii)		They form a control group/to compare with similar species <u>that have not suffered a bottleneck</u>. NOT compare unqualified/more data available to calculate mean			1	1		1
		(iii)		line must produce symmetrical shapes			1	1		1
	(f)			The <u>reduction in genetic diversity</u> might mean the species will not be able to adapt to a change in the environment (1) <u>Loss of symmetry</u> might mean they are less able to compete for food/mates/jaw is not symmetrical so they cannot catch food as easily (1)		2		2		
				Question 5 total	**4**	**6**	**7**	**17**	**0**	**7**

Question	Marking details	Marks available					
		AO1	AO2	AO3	Total	Maths	Prac
6	**Indicative content** **Sequence and data:** • the order of nucleotides/bases in the DNA • Sanger sequencing • descriptions of methods used • data/information would give {loci/sequences} of individual genes • coding for specific amino acid/proteins • descriptions of introns and exons (correct context) **100 000 Genomes Project:** • Next Generation Sequencing/NGS • locate genes responsible for {rare genetic disorder/cancers}/mutated sequences • by comparing genomes of sufferers with {normal genome/large number of individuals} • Predisposition to disease/{diagnosis/ understanding causes} of diseases • developing treatments/gene therapy. • Use in prenatal diagnosis **Benefits and ethics:** • Sharon would find out if the drug would give her liver damage/benefit is matching drugs to genetic make up of patient/personalised medication • ethical dilemma is over rights of access to genomic information • {Misuse of genetic information} by Employers/insurers • Wider implications on family health • {Anxiety/distress} caused by knowledge • Social discrimination/OWTTE						

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
				7-9 marks Indicative content of this level must address all three parts: *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 addresses at least two parts. *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 addresses at least one part. *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	**4**	**5**	**0**	**9**	**0**	**0**

COMPONENT 2 – CONTINUITY OF LIFE

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	**11**	**11**	**1**	**23**	**4**	**0**
2	**4**	**5**	**6**	**15**	**0**	**7**
3	**5**	**7**	**5**	**17**	**2**	**6**
4	**2**	**11**	**6**	**19**	**8**	**0**
5	**4**	**6**	**7**	**17**	**0**	**7**
6	**4**	**5**	**0**	**9**	**0**	**0**
TOTAL	**30**	**45**	**25**	**100**	**14**	**20**