GCE A LEVEL MARKING SCHEME

SUMMER 2018

A LEVEL (NEW)
BIOLOGY - UNIT 3
1400U30-1

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.

WJEC GCE Biology
Unit 3
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)		Labelled Motor Neurone on ventral side and labelled sensory neurone on dorsal side (1) Labelled Cell body of sensory nerve in ganglion (1) Labelled cell Body of motor nerve in grey matter (1)	3			3		
		(ii)		Protective/prevents {damage/injury/harm} NOT defence mechanism	1			1		
	(b)	(i)		Nerve net	1			1		
		(ii)		Impulse must pass along whole length of {neurone/membrane/axon} (1) Mammals have {myelin/nodes} which cause {saltatory conduction/or description of} (1) ORA for non myelinated		2		2		
				Question 1 total	**5**	**2**	**0**	**7**	**0**	**0**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
2	(a)	(i)		5.81×10^{-4} or 5.8×10^{-4} = 2 marks (accept any d.ps) If incorrect award 1 mark for 18/3099100 x100 0.00058081 5.80×10^{-4}		2		2	2	
	(b)	(i)		Gram – have capsule/lipopolysaccharide (1) Bacillus rod shaped (1)	2			2		
	(c)	(i)		172000 = 2 marks Accept standard form If incorrect award 1 mark for 86000× 2 86000 (no dilution factor)		2		2	2	
		(ii)	I	there were too many <u>colonies</u> to count/<u>colonies</u> {merged/clumping}			1	1		1
			II	The extra dilution gives additional error/may not have mixed fully/inaccurate representation of whole sample/not valid to count less than 30 colonies/too few to be statistically significant			1	1		1
	(d)			azithromycin (no mark for name only) need to use less antibiotic/use of data e.g. Anti A only needs 10% to kill all bacteria. C needs 30% to kill all bacteria(1) so cheaper for government/less likely to lead to antibiotic resistance (1)			2	2		
				Question 2 total	**2**	**4**	**4**	**10**	**4**	**2**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
3	(a)	(i)		1. Carbon in the (molecules of) dead insects/ant faeces (1) 2. Ref to role of decomposers/decomposed by {<u>bacteria/fungi</u>} (1) 3. Carbon dioxide released (1) 4. from respiration (1) Accept respiration of ants or decomposers for MP3 and MP4	2	2		4		
		(ii)		**Any 3 × (1) from:** {Decomposers/bacteria/fungi} release ammonium ions/NH_4^+ ammonification/putrefaction (1) Ammonium/NH_4^+ converted to nitrite/NO_2^- (1) Reject ammonia Nitrite/NO_2^- converted to nitrate/NO_3^- (1) By (both named) nitrifying bacteria/nitrification (1) If allocate named bacteria to each reaction, must be correct	3			3		
	(b)	(i)		**Any 2 × (1) from:** less CO_2 used in photosynthesis (1) More CO_2 produced in combustion (1) More decomposition so more CO_2 (1)		2		2		
		(ii)		Less respiration (by plants/animals/decomposers)		1		1		
				Question 3 total	**5**	**5**	**0**	**10**	**0**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)	(i)		Ice-cold: {to prevent/slow down} any <u>enzyme</u> reactions (from the broken cell) (1) Isotonic: prevent lysis/prevent osmotic activity/or description of (1) NOT in context of cells			2	2		2
		(ii)		Increase reliability/minimise error due to chance/identify anomalous results/check repeatability/check consistency Reject accuracy/validity/fair test	1			1		1
		(iii)		**Any three (x1) from** 1. **Tube 3** shows it was not the cold solution caused the DCPIP to decolourise(1) 2. **Tube {3/4}** shows that it was the chloroplasts that caused (the DCPIP to) decolourise (1) 3. **Tube 4** shows that it is DCPIP that undergoes the colour change (1) 4. Both show DCPIP is not decolourised by light (1)		3		3		3
	(b)			Electrons are {released/excited/emitted} (1) By Photolysis splitting the water molecule/from photosystems/from reaction centre/from chlorophyll a (1) DCPIP is <u>reduced</u> (instead of NADP) (1)		2	1	3		
	(c)			Tube 2/tube in the dark (1) (Aerobic) respiration still occurs in the dark but not photosynthesis (1) But the DCPIP is not reduced/colourless/no colour change (1)			3	3		3
	(d)			The DCPIP is reduced due to the light dependent reaction/or description of (1) Carbon dioxide is only involved in the light independent reaction/Calvin cycle/or description of/carbon dioxide is not involved in the light dependent reaction(1)		2		2		
				Question 4 total	1	7	6	14	0	**9**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(a)			No photosynthesis (1) {Biomass/named respiratory substrate} used in respiration (1)			2	2		
	(b)			2.43 (2 marks) If incorrect award 1 mark for sight of: $\frac{107-73}{14}$ = (2.428 only = 1mark)		2		2	2	
	(c)			Sampling area only covers 1m^2/sample area is too small (1) Trees are {too large to be covered in black plastic/to fit in the sample area} (1) More difficult to find identical areas in the rainforest/higher biodiversity therefore the sample areas may not be representative (1)			2	2		2
	(d)			Repeat until constant mass recorded (1) No burning or combustion (1)			2	2		2
				Question 5 total	**0**	**2**	**6**	**8**	**2**	**4**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
6	(a)			Water/H_2O	1			1		
	(b)	(i)		It is the active site (1) It is complementary in shape to the cytochrome c (1) OR {Genetic code/DNA base sequence} for polypeptide chains similar in all organism/Has not mutated (1) So amino acid sequence/polypeptide chains similar/1° structure similar (1)	2			2		
		(ii)		It changes shape (1) So no longer complimentary shape to the active site/does not fit into active site any more/can no longer form enzyme substrate complexes (1)		2		2		
	(c)			{Increases/becomes} {more alkaline/less acidic} (1) Less {H^{+}/protons} present as they are not {pumped/transported} (into the intermembrane space) (1)		2		2		
	(d)	(i)		Protons do not bind to electrons and oxygen (1) Electron carrier system stops/reduced NAD can't pass on the protons (1) MUST BE IN CONTEXT OF WHEN INHIBITOR IS ADDED			2	2		
		(ii)		**Any 2× (1) from:** (Lactate is end product) of anaerobic respiration(1) pyruvate is reduced to regenerate NAD/pyruvate is reduced by using reduced NAD (1) for glycolysis to continue (1)			2	2		
				Question 6 total	**3**	**4**	**4**	**11**	**0**	**0**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
7	(a)	(i)		Between glomerulus and Bowman's capsule	1			1		1
		ii		Correct answer = 30000 = 2 marks $\frac{15mm \times 10^6}{500}$ (1) Evidence of Image/Actual		2		2	2	
	(b)	(i)		8 – 4 – 2.6 = 1.4 kPa		1		1	1	
		(ii)		1. There is less protein in the {plasma/blood} (1) 2. So the osmotic pressure decreases/water potential higher/water potential less negative (1) 3. So overall pressure increases **and** {more filtrate is produced/rate is faster}(1)		3		3		
		(iii)		Dilate the afferent vessel/afferent vessel gets wider/ muscle (in walls) relaxes (1) Constrict the efferent vessel/efferent gets narrower/ muscles (in walls) contract (1)			2	2		
	(c)			They are too large to {diffuse back in/pass through/to be reabsorbed}(1) There are no {specific carriers/transport proteins/carrier proteins/channel proteins} for them (1)			2	2		

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
	(d)	(i)		(Only) water reabsorbed/water leaves tubule by osmosis/diffusion (1)		1		1		
		(ii)		point drawn at 40 au/100% (1) Line drawn with ruler between points (1) No extrapolation/sketchy line		2		2	2	
	(e)	(i)		{Provide/Release} energy/{produce/provide/release/synthesise} ATP (1) Reject produce/make energy For active {transport/uptake}/for pumping correct named molecule (1)	2			2		
		(ii)		{Give larger/increased/large} surface area <u>for absorption/or description of</u>	1			1		
	(f)			**Any 4 × (1) from:** 1. Ammonia is <u>more</u> toxic than urea (1) 2. so needs to be diluted/washed away constantly/more soluble than urea (1) 3. Mud: Need to conserve water(1) 4. Urea needs less water for excretion/if ammonia was used, a lot of water would be lost (1) 5. Urea can be stored (because it is less toxic) (1)		2	2	4		
				Question 7 total	**4**	**11**	**6**	**21**	**5**	**0**

Question	Marking details	Marks available					
		AO1	AO2	AO3	Total	Maths	Prac
8	**<u>Indicative content</u>** **Region A** • Carrying capacity determines maximum population size that can be supported • This will be determined by biotic and abiotic factors/environmental resistance • Explanation of predator prey relationship • Examples of biotic factors such as number of prey/disease/parasitism/ • Examples of abiotic factors such as water availability • Description of Interspecific/ intraspecific competition **Region B** • Human influence due to Hunting/killing due to cheetahs destroying livestock • Lack of food due to prey being hunted • Habitat destruction + reasons • Density dependent factors /example of e.g. new disease • Density independent factors/example of e.g. bush fire/new predator **Region C** **Method + explanation for each** • {Zoos/Reintroduction/outbreeding} program • {Embryo/sperm/egg} banks • Education of locals • Ecotourism • National parks/Game reserves/prevention of poaching • Political pressures/CITES/legislation	4	5		9		

Question	Marking details	Marks available					
		AO1	AO2	AO3	Total	Maths	Prac
	7 -9 marks Detailed explanation of region A Detailed explanation of region B Detailed explanation of methods of strategies to overcome problem The candidate 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** Any two from: explanation of region A explanation of region B explanation of methods of strategies to overcome problem 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.						

Question	Marking details	Marks available					
		AO1	AO2	AO3	Total	Maths	Prac
	1-3 marks Any one from: Brief explanation of region A Brief explanation of region B Brief explanation of methods of strategies to overcome problem/list of methods 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	**4**	**5**	**0**	**9**		

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	5	2	0	7		
2	2	4	4	10	5	2
3	5	5	0	10		
4	1	7	6	14		9
5	0	2	6	8	2	4
6	3	4	4	11		
7	**4**	**11**	**6**	**21**	3	1
8	4	5	0	9		
TOTAL	**24**	**40**	**26**	**90**	**9**	**14**