GCE AS MARKING SCHEME

SUMMER 2018

AS (NEW)
BIOLOGY - UNIT 1
2400U10-1

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 AS BIOLOGY

UNIT 1 – Basic Biochemistry and Cell Organisation

SUMMER 2018 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

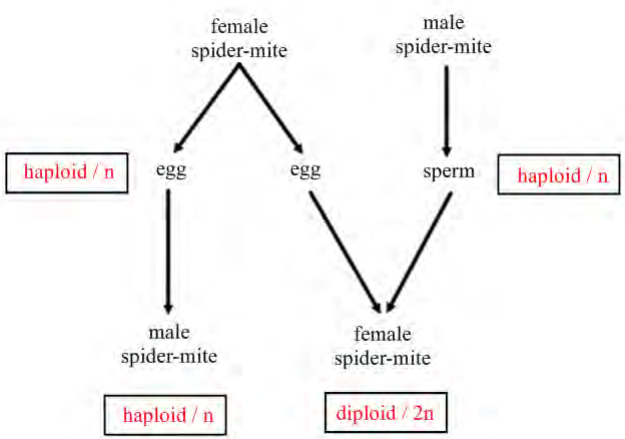
The following may be used in marking schemes or in the marking of scripts to indicate reasons for the marks awarded.

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)			A: Mitochondrion/mitochondria B: Golgi {body/complex/apparatus} C: Ribosome(s) D: Nuclear pore 2 or 3 correct for 1 mark All correct for 2 marks	2			2		
	(b)	(i)		Nucleus/ E: (contains DNA which) codes for the production of {proteins/polypeptides/sequence of amino acids in a polypeptide}/ transcription/ {pre-processing/ production/ synthesis} of mRNA (1) Nuclear pores/ D: allow {mRNA/rRNA} to leave the nucleus (1) Ribosome(s)/C: carry out translation/ protein synthesis/or description of (1)	3			3		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
1	(b)	(ii)		**Any 3 × (1) from:** Rough Endoplasmic Reticulum/ RER/ F: transports proteins {through the cell/ through the cytoplasm}/ transports proteins to golgi body/ package proteins into vesicles (1) Golgi body/ B: {Packaging/Modification} of protein/description of/ activation of enzyme (1) (transport) vesicle/ G: transports {proteins/enzymes} to the {cell membrane/ plasma membrane} (1) Exocytosis (of enzymes from the cell) (1)	3			3		
		(iii)		<u>Provide ATP :</u> {for transcription / translation / protein synthesis} (1) <u>exocytosis</u> (1)		2		2		
				Question 1 total	**8**	**2**	**0**	**10**	**0**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
2	(a)	(i)		X: phosphate Y: ribose Z: adenine NOT adenosine (2 correct = 1 mark, 3 correct = 2 marks)	2			2		
		(ii)		**Any two for one mark** Active transport / DNA replication / protein synthesis/ cell division (1) Accept any correct function for a plant cell	1			1		
	(b)			40.5 = 3 marks If incorrect sig fig 1162.8/2870 × 100 =40.5156794 = 2 marks Accept any correct rounding If answer incorrect 38 x 30.6 = 1162.8 = 1 mark		3		3	3	
				Question 2 total	3	3	0	6	3	

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
3	(a)			J, K & M = 2 marks 2 correct = 1 marks 0/1 correct = 0 marks If use more than three letters then deduct one mark for each additional letter		2		2		
	(b)	(i)		 4 correct for 2 marks 2/3 correct for 1 mark 0/1 correct = 0		2		2		
		(ii)		Eggs/ female gametes/ ova are produced by meiosis (1) Sperm/male gametes are produced by mitosis (1)			2	2		
	(c)	(i)		1. 3.4 units DNA {before replication / in early interphase}/ {quantity of DNA halves/ returns to original value} {following cytokinesis / (at the end of)telophase} (1) 2. {6.8 units of DNA/ DNA doubles} due to DNA replication (1) 3. (6.8 units of DNA will be present during) (Late) interphase/ prophase/ metaphase/ anaphase(1)		3		3		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
		(ii)		{mitosis is faster/ more mitosis} in young spider mites than older spider mites/ ORA (1) Young spider mite - mitosis required for growth (and repair of muscle tissue) / Older spider mite – mitosis required for repair (of muscle tissue only) (1)			2	2		
				Question 3 total	**0**	**7**	**4**	**11**	**0**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)	(i)		Molecules drawn with a peptide bond correct (1) Molecule of <u>water/H_2O</u> also produced (1)	2			2		
		(ii)		peptide bond	1			1		
	(b)	(i)		Quaternary	1			1		
		(ii)		α helix (1) By hydrogen bonding (1) Ignore reference to peptide bonds	2			2		
		(iii)		Two - one for each polypeptide chain (1)			1	1		
	(c)	(i)		360 / 363 / 366 (1)		1		1	1	
		(ii)		**Any five (×1) from:** 1. DNA/ (pre)mRNA contains both introns and exons (1) 2. The entire gene is transcribed (1) 3. Introns are non-coding/ only exons are coding (1) 4. The (pre)mRNA is then edited to remove the introns / introns are removed from (pre)mRNA/ only leave exons(1) 5. 'pre-edited' (pre) mRNA molecules and 'post-edited' mRNA molecules have different masses/ OWTTE (1) 6. only the 'edited' mRNA is used {in translation / to produce the protein} (1)		2	3	5		
				Question 4 total	**6**	**3**	**4**	**13**	**1**	

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(a)			(calculating the percentage change) allows the results to be comparable (1) Initial masses of worm would differ (1)		2		2		2
	(b)	(i)		Linear scale (1) including figure at origin and no break line Correct plots (1) ± ½ small square Line drawn (with no extrapolation) (1) extrapolation is acceptable with a curve of best fit		3		3	3	3
		(ii)		**Any four (x1) from:** 1. Increase to <u>60</u> and then levels off(1) 2. (the body fluids of the marine) worms {are hypertonic to /have a low<u>er</u> water potential than} {the dilute seawater/ the solution}/ ORA(1) 3. The worms gain water by <u>osmosis</u> (resulting in an increase in mass)(1) 4. (during the first 15 mins) the increase in mass is greater due to the steepness of the water potential gradient(1) 5. (after 60 mins there is no change in mass as) equilibrium is reached / isotonic/ no net movement of water/ OWTTE (1)		4		4		3
	(c)			As a control (1) to show that any change in mass was due to the worms being placed in diluted seawater (and no other variable).(1)			2	2		2
	(d)	(i)		The percentage change in mass of *Golfingia* {returns to zero/ decreases} (after 45 mins) whereas the mass of *Nereis* {continued to increase/ plateaus} (1) The maximum percentage increase in mass in *Golfingia* {is much lower / is reached sooner} than that of *Nereis*/ equilibrium is reached quicker in *Golfingia* than in *Nereis*(1)		2		2		2

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(d)	(ii)		increase water potential of the cells of *Golfingia* (1) therefore water moves out by <u>osmosis</u> (1)			2	2		2
				Question 5 total	**0**	**11**	**4**	**15**	**3**	**15**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
6	(a)	(i)		Activation energy	1			1		
		(ii)		Curve drawn with a lower activation energy under existing curve – energy state at beginning and end must be the same.	1			1		
	(b)			{Alcohol dehydrogenase/ enzyme} has a <u>specific</u> {shaped active site/ tertiary structure/ OWTTE} (1) {Ethanol/ substrate} has a <u>complementary</u> (shape) (1) (The two fit together) to form an <u>enzyme-substrate complex</u> (1)	3			3		
	(c)	(i)		Any answer between 0.57 - 0.63 = 2 marks If incorrect award 1 mark for sight of : attempted calculation of gradient		2		2	2	
		(ii)		1. P: the rate of reaction is higher as the concentration of {ethanol/ substrate} is high (1) 2. The concentration of {alcohol dehydrogenase/ enzyme} is limiting the rate of reaction; (1) 3. Q: the rate of reaction is lower the concentration of {ethanol/ substrate} decreases(1) 4. The concentration of {ethanol/ substrate} becomes the limiting factor. (1)		2	2	4		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
6	(d)			1. Ethanol and ethylene glycol must have a similar structure / Ethanol and ethylene glycol must both be complementary to the shape of the active site of {alcohol dehydrogenase/ the enzyme} (1) 2. ethanol acts as a competitive inhibitor (1) 3. When ethanol binds to the active site it prevents ethylene glycol from attaching (1) 4. Fewer enzyme-substrate complexes form (1) 5. Which reduces the rate of production of {glycoaldehyde/ product} (1)		3	2	5		
				Question 6 total	5	7	4	16	2	

Question	Marking details	Marks available					
		AO1	AO2	AO3	Total	Maths	Prac
7	**Starch** • Polymer of α-glucose • Composed of amylose and amylopectin • Amylose contains only 1,4 glycosidic bonds • Forms a helical structure • Amylopectin contains 1,4 and 1,6 glycosidic bonds • Forms a branched structure **Triglycerides/lipids** • Composed of glycerol and three fatty acids • Joined together by ester bonds • Saturated fatty acids contain only C-C single bonds • Unsaturated fatty acids contain at least one C=C double bond • Properties of triglyceride dependent upon the fatty acids they contain **Functions in the seed** • Starch and triglycerides are insoluble so are osmotically inert • Starch's helical/branched structure makes the molecule compact • Hydrolysis provides glucose readily • Required for respiration/produce ATP • Triglycerides also have a compact structure • Triglycerides have many high energy bonds/ provide approximately twice the quantity of energy than starch	6	3				

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
				7-9 marks Indicative content of this level is… • Detailed description of the structure of starch • Detailed description of the structure of lipids/triglycerides • Detailed explanation of how these structures and properties relate to their function in the seed *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… Any two from: • Description of the structure of starch • Description of the structure of lipids/triglycerides • Explanation of how these structures and properties relate to their function in the seed *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 Indicative content of this level is… • Brief description of the structure of starch or • Brief description of the structure of lipids/tryglycerides or • Reference to how these structures and properties relate to their function in the seed *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	**6**	**3**	**0**	**9**	**0**	**0**

COMPONENT 1: BASIC BIOCHEMISTRY AND CELL ORGANISATION

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	8	2	0	10	0	0
2	3	3	0	6	3	0
3	0	7	4	11	0	0
4	6	3	4	13	1	0
5	0	11	4	15	3	15
6	5	7	4	16	2	0
7	6	3	0	9	0	0
Total	**28**	**36**	**16**	**80**	**9**	**15**