GCE AS MARKING SCHEME

SUMMER 2018

AS
BIOLOGY - COMPONENT 1
B400U10-1

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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.

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EDUQAS AS COMPONENT 1
BASIC BIOCHEMISTRY AND CELL ORGANISATION

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.

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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

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Question				Marking details		Marks Available					
						AO1	AO2	AO3	Total	Maths	Prac
1	(a)	(i)		{A has/meiosis I results in} two {cells/nuclei} and {B has/ meiosis II results in} 4 / A results from one division and B results from two divisions (1)			1		1		1
		(ii)		plane/angle of section of through cell may not include a nucleus (1) (where nucleus visible) may have been cut at different {levels/planes} (1)		1	1		2		2
	(b)			anaphase II meiosis (1) **Any two (x1) from:** Cell is haploid as only 4 chromosomes / resulting cells will {only have one copy of each chromosome/be haploid} (1) if mitosis two copies of each chromosome / lack of homologous pairs (1) if anaphase I each chromosome would have 2 chromatids / (anaphase II) involves the separation of (sister) chromatids (1)			2	1	3		
				Question 1 total		**1**	**4**	**1**	**6**	**0**	**3**

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Question				Marking details		Marks Available					
					S	AO1	AO2	AO3	Total	Maths	Prac
2	(a)	(i)		F B D All 3 ✓ =2, 2 ✓ = 1;		2			2		
	(b)	(i)		ATP can be regenerated quickly/More ATP for <u>muscle contraction</u> (1) Not: more energy produced			1		1		
		(ii)		lock and key <u>active site</u> shape already 'fixed'/ 'perfectly complementary' (1) (3D) active site changes shape when substrate binds/OWTTE (1)		2			2		
	(c)	(i)		intra act within a cell + extra outside a cell (1)		1			1		
		(ii)		contains {N/amine group} polysaccharides only CHO (1)		1			1		
		(iii)		same {molecular/chemical} formula but different {structural formulae / structure / arrangement of atoms} (1)		1			1		
		(iv)		beta because {–OH/-O-/glycosidic bond) is above C_1/H is below C_1 (1)			1		1		
		(v)		alternate monomers rotated 180^o / forms (long) straight chains (1) enables H-bonding between {adjacent/parallel} chains (1) H bonds weaker/ {peptide/covalent} bonds much stronger (1)		2	1		3		
				Question 2 total		**9**	**3**	**0**	**12**	**0**	**0**

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Question				Marking details		Marks Available					
					S	AO1	AO2	AO3	Total	Maths	Prac
3	(a)	(i)		ribosome + rRNA is ribosomal RNA/constituent of ribosomes (1) OR Nucleolus + synthesis of RNA			1		1		
		(ii)		15.5/100 x 50 000 000 000 = 1 mark = 7 750 000 000 / 7.75 x 10^9 = 2 marks = 7.8 x 10^9 = 3 marks			3		3	3	
		(iii)		different mRNA for every {protein/polypeptide}/many different genes/one gene one polypeptide/OWTTE (1) ref to base triplet code hypothesis (in mRNA/DNA) giving {64/4^3} triplets (1) tRNA molecules have anticodons which have three bases (which are complementary to codons)/tRNA are specific to one amino acid(1)			3		3		
	(b)			peptide (1) bond could form due to loss of OH from methionine or from glycine/amino end and carboxyl end / depends upon the {DNA/mRNA} base sequence (1)		1	1		2		
				Question 3 total		**1**	**8**	**0**	**9**	**3**	**0**

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Question				Marking details		Marks Available					
					S	AO1	AO2	AO3	Total	Maths	Prac
4	(a)	(i)		longitudinal (1) cells have been cut {vertically/down}/(in LS) cells appear rectangular/in TS cells would appear more 'round'/shape of thickening / several rings of lignin can be seen (1)			2		2		2
		(ii)		correct label of a xylem vessel (1) only one type of cell/similar cells aggregated to perform the same function/OWTTE (1)		2			2		1
	(b)	(i)		$H^{\delta+}$ / slight positive charge (1) $O^{\delta-}$ / slight negative charge (1) Accept shown on diagram uneven distribution of charge/electrons / dipole / hydrogen has positive charge and oxygen has a negative charge = 1 mark		2			2		
		(ii)		**Any four (x1)from:** **cohesion** between between H_2O molecules (1) **Hydrogen bonding** (between $H^{\delta+}$ and $O^{\delta-}$) in context (1) {evaporation/loss} of water from leaves {places **tension** on water column in xylem / reduces pressure at the top of the xylem} (1) pulls water up the xylem/transpiration stream (1) **adhesion** of water molecules to xylem (1)		4			4		
	(c)	(i)		**Mg^{2+}** chlorophyll **NO_3^-** **(**N source) for protein/nucleic acid/ATP/amino acids/		2			2		
		(ii)		**Hypothesis 1** higher $[NO_3^-]$ in xylem than phloem/moving down concentration gradient (1) Accept use of figures plasmodesmata provide (cytoplasmic) channels for movement 1) **Hypothesis 2** higher $[PO_4^{3-}]$ in phloem than xylem (1) Accept use of figures movement is against concentration gradient (1) through <u>carrier</u> proteins embedded in cell membranes (1)		1 1 	1 2		2 3		

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Question				Marking details		Marks Available					
					S	AO1	AO2	AO3	Total	Maths	Prac
	(d)	(i)		5s = distance^2 x 1/5 x 10^4 distance^2 = 250000 / distance^2 = 5 x 5 x 10^4 = 1 mark (rearrangement of equation) distance = √ 250000 or √25 x 10^4 = 2 marks = 500µm = 3 marks			3		3	3	
		(ii)		increase in KE increases speed of movement of molecules (1)		1			1		
				Question 4 total		**13**	**8**	**0**	**21**	**3**	**3**

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Question				Marking details		Marks Available					
					S	AO1	AO2	AO3	Total	Maths	Prac
5	(a)			chloroplast/cellulose cell wall/starch grains = plant (1) flagellum/ small vacuoles/eyespot = animal (1) Not mitochondria (golgi body neutral)			2		2		
	(b)	(i)		4/3 x 3.142 x 1^3 = 4.189/4.19/4.2 (μm^3)1 mark for volume volume of water released at -0.24MPa = 15.5μm^3 1 mark for graph reading 15.5/4.189 = 3.7 = 3 marks **ecf if incorrect volume used**			3		3	3	
		(ii)		**Any four (x1)from:** 1. water moves into {cell/contractile vacuoles}(1) 2. by osmosis (1) 3. down a water potential gradient / from a hyopotonic solution to a hypertonic soltion / water potential inside (cell/contractile vacuoles) lower than water potential outside (1) 4. (as the water potential of the external solution increase) the water potential gradient becomes steeper (1) 5. Rate of osmosis increases / water moves into the cell faster (1) 6. contractile vacuoles empty to get rid of excess water from the cell (1)		1	3		4		
	(c)	(i)		chromosome broken down {into fragments/pieces of different sizes} (1) travel different distances from top of centrifuge tube (1)				2	2		2
		(ii)		No/less digestion of the {DNA/chromosomes} (1) fewer fragments/less variation in distances travelled (1) different peaks seen for each chromosome (1)				3	3		2
		(iii)		cold temperature – to reduce {activity/KE} of enzymes (1) buffer – to maintain pH (1)				2	2		3

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Question				Marking details		Marks Available					
					S	AO1	AO2	AO3	Total	Maths	Prac
		(iv)		**Any two (x1)from:** single peak/spike for DNA from both organelles (1) Therefore there is only one molecule of DNA present (1) could be arranged as plasmids/circular DNA as found in bacteria (1)				2	2		1
				Question 5 total	**2**	**1**	**8**	**9**	**18**	**3**	**8**

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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
6.				**Indicative content** • description of experiment including details of use of heavy and light isotopes of N and use of ultracentrifugation • explanation of how bands seen in centrifuge tube are formed giving details of heavy and light strands for each generation in terms of the heavy and light isotopes of N • the relative amounts of DNA in each band are explained conservative replication: • always some heavy DNA present • increasing mass of light DNA • no intermediate DNA • because original heavy DNA is not split Dispersive replication: • apart from G_0, all DNA would be intermediate in molecular mass • getting lighter between Go and G3 • because original heavy DNA split between all new molecules	2	2	5	9		

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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
				7-9 marks • detailed description of experimental procedure and explanation of results • correct detailed explanation to reject conservative theory • correct detailed explanation to reject dispersive theory *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** • description of experimental procedure and explanation of results • correct explanation to reject conservative theory • correct explanation to reject dispersive theory OR • detailed description of experimental procedure and explanation of results • correct detailed explanation to reject either conservative theory or dispersive theory *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.*						

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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
				1-3 marks • some description of experimental procedure and/or explanation of results OR • correct explanation to reject conservative theory OR • correct explanation to reject dispersive theory *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.*						
				Question 6 total	**2**	**2**	**5**	**9**		

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COMPONENT 1 – AS BIOLOGY EDUQAS 2017

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

Q	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	**1**	**4**	**1**	**6**	**0**	**3**
2	**9**	**3**	**0**	**12**	**0**	**0**
3	**1**	**8**	**0**	**9**	**3**	**0**
4	**13**	**8**	**0**	**21**	**3**	**3**
5	**1**	**8**	**9**	**18**	**3**	**8**
6	**2**	**2**	**5**	**9**	**0**	**2**
TOTAL	**27**	**33**	**15**	**75**	**9**	**16**

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