GCE AS MARKING SCHEME

SUMMER 2023

AS
BIOLOGY – COMPONENT 1
B400U10-1

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This marking scheme was used by WJEC for the 2023 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 GCE AS BIOLOGY – COMPONENT 1

SUMMER 2023 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.

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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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<table>
<tr><th colspan="4" rowspan="2">Question</th><th rowspan="2">Marking details</th><th colspan="6">Marks Available</th></tr>
<tr><th>AO1</th><th>AO2</th><th>AO3</th><th>Total</th><th>Maths</th><th>Prac</th></tr>
<tr><td>1</td><td>(a)</td><td></td><td></td><td>Mg $^{2+}$ Component of chlorophyll/ essential for photosynthesis
Fe^{2+} Component of haemoglobin/ transport of oxygen
Reject makes red blood cells
Ca^{2+} Strengthen bones / teeth
PO_4^{3-} Phospholipids/ATP/Nucleic acids e.g. of DNA/RNA/nucleotides NOT plasma membrane

4 correct = 2 marks
2/3 correct = 1 mark
0/1 correct = 0 marks</td><td>2</td><td></td><td></td><td>2</td><td></td><td></td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td></td><td>Any two (x1) from
Comparative statements needed
<table><tr><th>Keratin</th><th>Lysozyme</th></tr><tr><td>fibrous</td><td>globular</td></tr><tr><td>Helical/ coiled/ owtte</td><td>Folded and coils, alpha helices and beta pleated sheets</td></tr><tr><td>Secondary accept quaternary</td><td>tertiary structure</td></tr></table></td><td>2</td><td></td><td></td><td>2</td><td></td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td></td><td>Condensation (1)</td><td>1</td><td></td><td></td><td>1</td><td></td><td></td></tr>
<tr><td></td><td></td><td>(iii)</td><td></td><td>Active site shape changes to fit the substrate (1)
Enzyme-Substrate complex forms (1)
Lowers activation energy (1)
Active site returns to original shape after reaction (1)</td><td>4</td><td></td><td></td><td>4</td><td></td><td></td></tr>
</table>

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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
		(iv)		Substrate complementary shape to active site (1) Reject perfect fit/match Active site does not change shape (1)	2			2		
	(c)	(i)		Add biuret (reagent) / copper sulfate and {sodium/ potassium} hydroxide (1) Lilac/purple colour (1)	2			2		2
		(ii)		0.4 mg cm^{-3}		1		1	1	1
		(iii)		(Chlorophyll presence would mean) {couldn't see colour change/ more light absorbed/ chlorophyll would absorb the light} (1) Reject would affect absorbance unqualified			1	1		1
		(iv)		ACP not only protein present/ Other proteins present (1)			1	1		
		(v)		**Any two (x1) from:** Not enough protein concentrations used (1) Reference to line of best fit being invalid, {as could be drawn in a number of place/ could be a curve/ extrapolation owtte} (1) No range bars drawn/ no repeats (1)			2	2		2
				Question 1 total	**13**	**1**	**4**	**18**	**1**	**6**

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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
2	(a)	(i)		A stain/dye/acceptable example of a stain e.g. Acetic orcein/ toluidine blue/ safranin (1) NOT food colouring or pigment added To make the chromosomes visible (1)	2			2		2
		(ii)		**Any three (×1) from** Some cells have finished cell division (1) Chromosomes are decondensed/ not yet condensed/ not coiled (1) Some cells in interphase (1) Depends where the section is cut/different plane/angle (1) Has not taken up the stain/not enough stain (1)		3		3		1
		(iii)		E D C A B 5 correct = 3 marks 3/ 4 correct = 2 marks 1/2 correct = 1 mark		3		3		3
		(iv)		Interphase (1) Most cells are in this phase (1)		2		2		
	(b)	(i)		8.2 (2 marks) If incorrect award 1 mark for 4/49 x 100 8.16 not rounded		2		2	2	2

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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
		(ii)		Count more field of views for each distance/repeat the experiment (1) not more distances Calculate a mean (1)			2	2		2
		(iii)		**Any three (×1) from** Produces genetically identical cells (1) Used for growth (1) Repair of tissues / replacement of cells owtte (1) Used in asexual reproduction (1)	3			3		
				Question 2 total	**5**	**10**	**2**	**17**	**2**	**10**

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
3	(a)	(i)		At point B as the phospholipids are not fluorescing/glowing/flu = 0 (1)		1		1		1
		(ii)		**Any three (×1) from** Fluid mosaic model (1) Dark spot disappears as non-fluorescing move around/ ORA (1) Phospholipids can change position/ Components of the membrane aren't bound together (1) Fluorescence does not return to original level (1)		3		3		
	(b)	(i)		Award two marks for M= 520 000 acc 5.2 x 10^5 If incorrect award one mark for: M = 13 000 000/25 Length of line x 1 000 000 to convert to nm		2		2	2	2
		(ii)		Award two marks for A = 7.7nm 7.69 (1) Ecf from (i) with correct measurement and calculation (1) If incorrect award one mark for: A = 4mm/ 520 000 A= 4 000 000/520 000		2		2	2	2
	(c)			G D A All correct = 2 marks 2 correct = 1 mark 0/1 correct = 0 marks	2			2		2

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(d)	(i)		It would affect kinetic energy of the molecules (1) Would allow more pigment to escape (1) Reference to denaturation (1)		2		2		
		(ii)		0.16 (1)		1		1	1	
		(iii)		As the NaCl concentration increases, the absorbance decreases (1) Less absorbance means less pigment released /More NaCl reduces the pigment released (1) More NaCl the less permeable the membrane (1) Use of data (1)		1	3	4		4
		(iv)		Na^+ attracted to O^- / negative charge / opposite charge on the phosphate heads (1) (More) Na^+ {less movement / Reduces the movement of the phospholipid} (1) Stabilises the membrane/membrane less fluid/ more rigid (1) Less pigment can escape (1)			4	4		
		(v)		Range of temperatures (1) Same NaCl concentration (1) NOT pure water, looking for reference to NaCl concentration e.g. 0% NaCl			2	2		2
				Question 3 total	**2**	**12**	**9**	**23**	**5**	**13**

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)			Uracil rather than thymine (1) NOT T, and U Single stranded rather than double stranded/ 1 helix rather than double helix (1) Ribose sugar not deoxyribose (1)	2			2		
	(b)	(i)		U A C C G G U C A A U U		1		1		
		(ii)		**Any five (x1) from:** A. Translation (1) B. mRNA attaches to a ribosome (1) C. tRNA brings a (specific) amino acid (1) D. Complementary base pairing between mRNA codon and tRNA anticodon/ codon anticodon interaction (or description of) (1) E. Ribosome has room for two tRNA molecules/Brings two amino acids into close proximity/ or description of (1) F. Condensation reaction occurs/peptide bond formed (between amino acids) (1) G. Ribosome moves to the next codon (or description of)/ reference to stop codon (1) H. Post translation processing/ or description of e.g. folding of polypeptide chain/ role of Golgi (1)		5		5		
				Question 4 total	**2**	**6**	**0**	**8**	**0**	**0**

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Question	Marking details	Marks available					
		AO1	AO2	AO3	Total	Maths	Prac
5	Changes in DNA content: Mitosis • {Doubles due to replication / increases to 12pg} during {B/ interphase} • Returns to normal (6pg) at D when chromatids separated • Genetically identical / clones produced • Daughter cells have same mass of DNA as initial cells Meiosis • Doubles due to replication (12pg during B) • Homologous chromosomes are separated at {F/ anaphase I} • Drops to 6pg/DNA mass is half of the original mass • Chromatids are separated at {G /anaphase II} • Drops to 3pg/ Halves again • Original cell is diploid and daughter cells produced are haploid Significance of meiosis • Chromosome number remains constant in each generation • Genetic variation introduced • Independent assortment • Crossing over in prophase I • Allows survival in a changing environment	5	4		9		

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Question	Marking details	Marks available					
		AO1	AO2	AO3	Total	Maths	Prac
	7-9 marks Indicative content of this level is detailed statements from all three areas of the indicative content. *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 detailed statements from two areas of the indicative content. *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 of this level is any correct statement from the indicative content. *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 5 total	**5**	**4**	**0**	**9**	**0**	**0**

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COMPONENT 1:

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	13	1	4	**18**	1	6
2	5	10	2	**17**	2	10
3	2	12	9	**23**	5	13
4	2	6	0	**8**	0	0
5	5	4	0	**9**	0	0
TOTAL	**27**	**33**	**15**	**75**	**8**	**29**

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