GCE AS MARKING SCHEME

AUTUMN 2021

AS
BIOLOGY – COMPONENT 1
B400U10-1

INTRODUCTION

This marking scheme was used by WJEC for the 2021 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 GCE AS COMPONENT 1

UNIT 1 - BASIC BIOCHEMISTRY AND CELL ORGANISATION

AUTUMN 2021 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)		Unequal charges (1) Hydrogen +ive, Oxygen -ive (1)	2			2		
		(ii)		Can dissolve polar / charged molecules (1) Minerals/ Oxygen/ CO_2 can dissolve in the water (1)	2			2		
	(b)	(i)		High heat specific capacity (1) Large input of energy needed to raise temperature of water (1)	1	1		2		
		(ii)		Ice is less dense than water (1) Ice forms an insulating layer on top of bodies of water (1)	1	1		2		
		(iii)		Hydrogen bonds (form between water molecules) (1) Stronger at surface / forms surface tension (1)	1	1		2		
		(iv)		Water is transparent/ light can penetrate for photosynthesis (1) Carbon dioxide/ minerals can be absorbed for photosynthesis (1)	1	1		2		
				Question 1 total	**8**	**4**	**0**	**12**	**0**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
2	(a)	(i)		Ring drawn around one nucleotide	1			1		
		(ii)		0.34 nm = 3 marks If incorrect award 2 marks for: 3.4/10 If incorrect award 1 marks each for: Total length of DNA = 1 x 10^9 nm length of DNA / 2.94 x 10^8		3		3	3	
	(b)	(i)		(Some) amino acids coded for by more than one mRNA codon	1			1		
		(ii)	I	DNA base sequence: TAC CAA ATA TGG CTA ATC		1		1		
			II	Amino acids: Met, Val, Tyr, Thr, Asp, Stop		1		1		
		(iii)		**Any two (×1) from:** Primary structure would be changed / incomplete / shorter polypeptide produced/ ref to stop codon (1) This would affect the {shape of the protein / tertiary structure / folding} (1) Affects function e.g. change in shape of active site in enzyme (1)			2	2		
	(c)	(i)		X: Ribosome (1) Y: Transfer RNA / tRNA (1)	2			2		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
		(ii)		**Any five (×1) from:** • Translation (1) • tRNA brings an amino acid to ribosome (1) • Each tRNA has a {specific / particular} amino acid (1) • Anticodon matches to mRNA codon / Complementary base pairing AtoU, CtoG (1) • A second amino acid is brought to the ribosome / two tRNA molecules can attach to mRNA at the ribosome / reference to two binding sites (1) • A condensation reaction occurs / a peptide bond forms between the amino acids (1) • The ribosome moves along the mRNA {by one codon/until stop codon is reached} (1)	5			5		
				Question 2 total	**9**	**5**	**2**	**16**	**3**	**0**

<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>3</td><td>(a)</td><td></td><td></td><td>
<table>
<tr><td></td><td>Bacteria</td><td>Plant</td></tr>
<tr><td>Differences</td><td>Peptidoglycan/ murein (1)
reject chitin</td><td>Cellulose</td></tr>
<tr><td></td><td>(Chain of) NAM + NAG (1)</td><td>(Chain of) β glucose</td></tr>
<tr><td></td><td>Contains (chains of) amino acids (1)</td><td>No amino acids</td></tr>
<tr><td></td><td>Cross links between amino acids/ no hydrogen bonds (1)</td><td>No cross links between amino acids/ Hydrogen bonds between {β glucose chains / polysaccharide chains}</td></tr>
</table>
One mark for each correct pair of differences</td><td></td><td>4</td><td></td><td>4</td><td></td><td></td></tr>
<tr><td></td><td>(b)</td><td></td><td></td><td>• Water potential inside bacterial cell lower than water potential of environment / higher concentration of solutes inside bacterial cell (1)
• Water enters cell by osmosis down water potential gradient (1)
• Cell wall is strong and withstands expansion of cell contents, preventing the cell from bursting / Accept ref to <u>pressure potential</u> due to cell wall (1)</td><td></td><td>3</td><td></td><td>3</td><td></td><td></td></tr>
<tr><td></td><td>(c)</td><td></td><td></td><td>Cell wall (is weak) cannot withstand expansion due to water intake (1)
Cell will burst / lyse (1)</td><td></td><td></td><td>2</td><td>2</td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td>Question 3 total</td><td>0</td><td>7</td><td>2</td><td>9</td><td>0</td><td>0</td></tr>
</table>

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)	(i)		Microvilli + increase surface area (for diffusion of products of digestion) (1)		1		1		
		(ii)		Thin + so reduce length of diffusion path (for dissolved molecules in/out of capillary) (1)		1		1		
	(b)	(i)		Facilitated diffusion (1)	1			1		
		(ii)	I	**Any four (×1) from:** • Na^+ / K^+ pump transports Na^+ out of epithelial cell into bloodstream (1) • By active transport (1) • Reducing the concentration of Na^+ in (the cytoplasm of) the epithelial cell / maintaining Na^+ concentration gradient. (1) • High Na^+ concentration in lumen from dietary sources (1) • Cotransport of glucose with sodium ions from the lumen of small intestine (1)		4		4		
			II	Blood flow removes glucose that has been absorbed and lowers glucose concentration in the bloodstream (1)		1		1		
	(c)	(i)		**Any three (×1) from:** • Slows down the rate of glucose uptake (1) • Phlorizin has a similar shape to glucose (1) • Fits into the transport protein / is complementary to the transport protein (1) • Preventing glucose from entering the transport protein / competes with glucose (1)		1	2	3		

		(ii)		Cancer cells divide continuously (1) So have a higher demand for glucose for respiration (1)		1	1	2		
				Question 4 total	**1**	**9**	**3**	**13**	**0**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(a)	(i)		Addition of water (1) Galactose and glucose correctly drawn (1)	1	1		2		
		(ii)		(1-4) Glycosidic bond	1			1		
		(iii)		Same chemical formula but different molecular structure (1)	1			1		
	(b)	(i)		Wash off any excess enzyme / calcium chloride (1)			1	1		1
		(ii)		To ensure all bead sizes have the same concentration of lactase (1)			1	1		1
		(iii)		Room temperature varies (1) Carry out in thermostatically controlled waterbath (1)			2	2		2
	(c)	(i)	I	0.0042 = 3 marks If incorrect award 2 marks for 0.0041……. If incorrect award 1 marks for Volume of 1 bead = 4/3 x 3.142 x 0.1^3		3		3	3	3
			II	Total number of beads = 10 / 0.0042 = 2380 = 2 marks If incorrect award 1 mark for 2380.95 2381		2		2	2	2

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
		(ii)		Smaller beads would give higher rate of hydrolysis (1) Larger S.A.: Vol. / overall surface area (1) Higher chance of enzyme – substrate complex forming OWTTE (1) ORA			3	3		3
				Question 5 total	**3**	**6**	**7**	**16**	**5**	**12**

Question	Marking details	Marks available					
		AO1	AO2	AO3	Total	Maths	Prac
6	• Meiosis • Mass of DNA in nucleus has halved • There are two stages of division • A: DNA is replicated during interphase • Mass of DNA doubles • B: First meiotic division. • Mass of DNA halved • Homologues separate • C: Second meiotic division • DNA mass halves again • Chromatids separate • Daughter cells are haploid • Genetic variation • Crossing over during prophase I • Random assortment (of homologues) during metaphase I • Random assortment (of non-identical sister chromatids) in metaphase II • Variation promotes species survival	6	2	1	9	0	0

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
				7-9 marks Indicative content of this level is detailed content from all three sections To award 9 marks a comment linking relevant data from graph to the process of meiosis is required. *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 detail from any two sections or less detail from three. *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 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 6 total	**6**	**2**	**1**	**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	4	0	12	0	0
2	9	5	2	16	3	0
3	0	7	2	9	0	0
4	1	9	3	13	0	0
5	3	6	7	16	5	12
6	6	2	1	9	0	0
TOTAL	**27**	**33**	**15**	**75**	**8**	**12**