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# **GCE AS MARKING SCHEME**

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**SUMMER 2022**

**AS  
BIOLOGY – UNIT 1  
2400U10-1**

## **INTRODUCTION**

This marking scheme was used by WJEC for the 2022 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 2022 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.

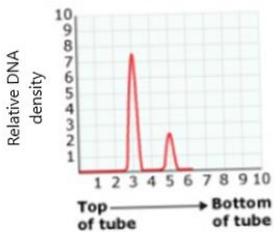
## Marking abbreviations

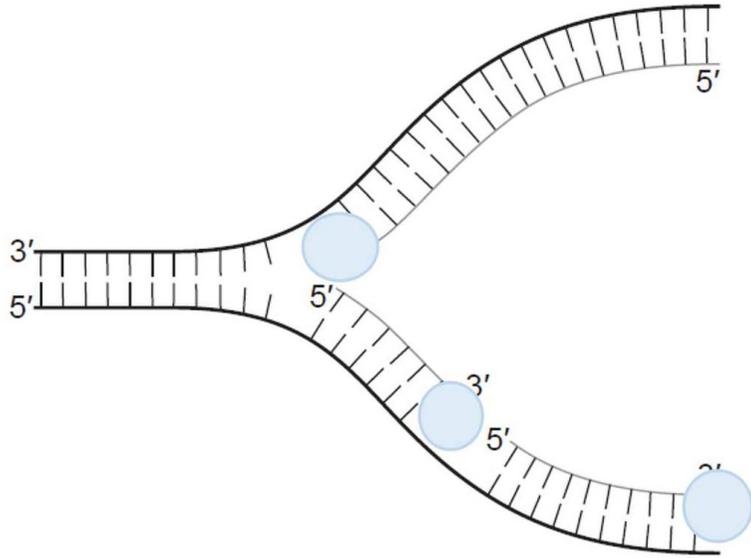
The following may be used in marking schemes or in the marking of scripts to indicate reasons for the marks awarded.

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)			{Flat/ thin/ large surface area/ one cell thick} + {to reduce diffusion distance for gases/ gas exchange/ to make diffusion of gases more efficient}	1			1		1
	(b)	(i)		Basement membrane	1			1		
		(ii)		A group of {similar/same/ specialised/ one type of} cell(s) working together to perform a function	1			1		
		(iii)		The nucleus may have been in a different part of the cell/ the section has been taken from a part of the cell that does not include the nucleus/ the cells have been sectioned in different planes/ owtte		1		1		1
		(iv)		{Simple epithelial tissue/ one} has a single layer of cells + {Stratified epithelial tissue/ the other} has more layers of cells	1			1		
	(c)	(i)		The bladder {can stretch when it is full (of urine) / changes size/ increase in volume} / so the bladder can fill with urine			1	1		
		(ii)		Maximum width = 119 = 2 marks If incorrect award 1 mark for 119.0/ 119.05/ 119.047 50 x 100/42 50/42 x 100		2		2	2	2
		(iii)		Magnification = 200 or 220 = 2 marks Accept 210 If incorrect award 1 mark for Scale bar 10 or 11 mm = 10 000µm or 11000µm 10000/50 Accept 10.5 mm = 10 500		2		2	2	2
				<b>Question 1 total</b>	<b>4</b>	<b>5</b>	<b>1</b>	<b>10</b>	<b>4</b>	<b>6</b>

Question			Marking details	Marks available																
				AO1	AO2	AO3	Total	Maths	Prac											
2.	(a)	(i)	A is a saturated fatty acid + B is unsaturated (1) A contains only single bonds between C atoms + B contains (at least) one double bonds between C atoms (1)	2			2													
		(ii)	<ul style="list-style-type: none"> <li>• Example 2 (1)</li> <li>• Because there are bigger spaces between {phospholipids/ fatty acid tails} the {phospholipids/ fatty acid tails} fit together less closely/ less densely packed (1)</li> </ul>			2	2													
	(b)	(i)	<table border="1"> <tr> <td></td> <td>Phospholipid</td> <td>Triglyceride</td> </tr> <tr> <td rowspan="2">Structure (1)</td> <td>2 fatty acids</td> <td>3 fatty acids</td> </tr> <tr> <td>phosphate</td> <td>no phosphate</td> </tr> <tr> <td>Function (1)</td> <td>Component of cell membranes</td> <td>Energy store/ release of metabolic water</td> </tr> </table>		Phospholipid	Triglyceride	Structure (1)	2 fatty acids	3 fatty acids	phosphate	no phosphate	Function (1)	Component of cell membranes	Energy store/ release of metabolic water	2			2		
	Phospholipid	Triglyceride																		
Structure (1)	2 fatty acids	3 fatty acids																		
	phosphate	no phosphate																		
Function (1)	Component of cell membranes	Energy store/ release of metabolic water																		
		(ii)	A higher proportion of {saturated/ type A} fatty acids can lead to {heart disease/ arteriosclerosis/ cardiovascular disease/ reference to increase in LDL leading to CVD} /ORA (1)	1			1													
			<b>Question 2 total</b>	5	0	2	7	0	<b>0</b>											

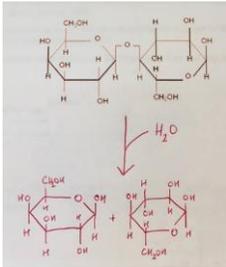
Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
3.	(a)	(i)	Start– 2 <sup>nd</sup> graph Division 1 – 3 <sup>rd</sup> graph Division 2 – 1 <sup>st</sup> graph  All correct (1)		1		1		
		(ii)	 <p>2 peaks (1)            Peaks in correct place (3,5) (1)            Peaks relative heights correct 3:1 (1)</p>		3		3	2	

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
	(b)	(i)	<p>One X correct (1) cross should be centred on the newly synthesised strand.</p> 		1		1		
		(ii)	<p>Unwind DNA/ break <u>hydrogen</u> bonds between bases/ {separates strands of / unzips} DNA</p>	1			1		
		(iii)	<p>It shows that {each original strand of DNA/ the original DNA molecule} acts as a template (for a new strand). (1) New (double stranded) DNA contains one old <b>and</b> one new strand (1)</p>	2			2		

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
	(c)		<p><b>Any three (x1) from:</b></p> <p>A. The {nucleotide/base} sequence (in the DNA) is different / triplet code is different (1)</p> <p>B. This will lead to different mRNA being produced (during transcription)/ change the codons in the mRNA (1)</p> <p>C. And the different amino acid being incorporated into the protein (during translation) / different sequence of amino acids (1)</p> <p>D. The protein may {not function correctly / be non functional}/ different {polypeptide/ protein} formed (1) Reject wrong protein</p> <p>E. due to the changed {tertiary structure/ 3D shape} (1)</p>		3		3		
			<b>Question 3 total</b>	<b>3</b>	<b>8</b>	<b>0</b>	<b>11</b>	<b>2</b>	

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
4.	(a)	(i)	80°C (1) because {the cells are ruptured/ membrane protein denatures} and (all) the pigment has leaked out of the cells/ (1)		2		2		2
		(ii)	All plots correct = 2 marks 1 plot incorrect = 1 mark >1 plot incorrect = 0 marks ½ small square tolerance All points plotted correctly with a smooth curve drawn or a dot to dot plot (1) No extrapolation with plot to plot /small amount allowed with line of best fit		3		3	3	
		(iii)	(The absorbance is not directly proportional to the temperature) {as it is not a straight line/ graph is a curve/ a description of changes in gradient} (1)			1	1		1
		(iv)	<b>Any two (x1) from:</b> (Up to 40°C) As temperature rises the {membrane becomes more fluid/phospholipids gain more kinetic energy/ more gaps form} (1)  (Above 40°C) the proteins in the membrane start to denature (1)  (Above 70°C) membrane fully destroyed (so all pigment released) (1) reject reference to membrane/ phospholipids denaturing.		2		2		2

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
	(b)	(i)	Pigment {leaks/diffuses} {out of the <u>cells</u> / through cell membrane} (1) Acid {denatures the proteins /changes shape of proteins} (1) Ethanol dissolves the {(phospho)lipids/ fatty acids} (1)		2	1	3		3
		(ii)	Water had entered the <u>cells</u> / moved in across <u>cell</u> membrane (1) by osmosis (1) as the beetroot <u>cells</u> had a lower water potential than the water (1)	2	1		3		3
			<b>Question 4 total</b>	2	10	2	14	3	11

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
5.	(a)	(i)		Exocytosis (1)	1			1		
		(ii)		Mitochondrion/ mitochondria (1) provides ATP + {for synthesis of {lipid/ protein/ lactose} / for exocytosis/active transport} (1)	2			2		
		(iii)		They take vesicles into the cell by endocytosis/ phagocytosis/ pinocytosis/ membrane lost surrounding lipid droplets (1) Accept reference to transcytosis in context of removing membrane			1	1		
	(b)	(i)		 <p>Water added (1) Products drawn correctly (1)</p>	2			2		
		(ii)	I	Hydrolysis (1)	1			1		
			II	Galactose <b>and</b> Glucose (1)	1			1		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(c)	(i)	I	<p><b>Any two (x1) from</b></p> <p>A. (Below 50°C) lactase {is more active/ has more kinetic energy} when free (1)</p> <p>B. (Because lactase and lactose can move freely) there is more chance of {successful collisions/ enzyme-substrate complexes forming} (1)</p> <p>C. Takes longer for lactose to diffuse through the alginate beads/ ORA (1)</p>		1	1	2		
			II	<p>A. lactase is more active when immobilised/ comparison of trends of immobilised and free (1) ORA</p> <p>B. the free lactase is {denaturing/denatured} (1)</p> <p>C. Because the immobilisation {stabilises lactase/ maintains shape of active site} (1)</p>		2	1	3		
		(ii)		<p>All give a (blue to orange) colour change with Benedict's so there would be no difference in reactants or products in the reaction/            Reactants and products would both give a blue to orange colour change/            All {monosaccharides/ glucose and galactose} are reducing sugars (1)</p>			1	1		1
				<b>Question 5 total</b>	<b>7</b>	<b>3</b>	<b>4</b>	<b>14</b>	<b>0</b>	<b>1</b>

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
6.	(a)	(i)		Quaternary	1			1		
		(ii)		Translation of mRNA by ribosomes/ production of {polypeptides/ protein synthesis} on ribosomes (1) (Packaging of polypeptide) into vesicles/ transport to Golgi (body) (1)		2		2		
		(iii)		<b>Any two (x1) from</b> <ul style="list-style-type: none"> <li>{Assembly/ joining} of {polypeptides/ subunits/ protein} (into quaternary structure) (1)</li> <li>addition of carbohydrate/ glycosylation/ produce glycoprotein/ owtte (1)</li> <li>Packaged (into vesicles) (1)</li> </ul>		2		2		
	(b)			<ul style="list-style-type: none"> <li>Fibrinogen (is globular, so it) dissolves in plasma (1)</li> <li>When it is converted to Fibrin it {becomes insoluble/ forms fibres} (1)</li> <li>(fibres cross a wound and) {seal it/ trap blood cells/ owtte} (1)</li> </ul>		2	1	3		
	(c)			Peptide bond (1) The active site of thrombin is (only) complimentary to {the arginine-glycine bond/ the enzyme}/ ORA thrombin is specific to the arginine - glycine bond (1)	1	1		2		

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
	(d)	(i)	<p>A. {Hirudin/ it} acts as a competitive inhibitor (1)</p> <p>B. {Fits into/ binds to/ complimentary to/ competes for} active site (on thrombin) (1)</p> <p>C. {Preventing/ reducing} {ESCs/ or description of} (1)</p> <p>D. (Hirudin slows down the action of Thrombin) so that blood {clots more slowly/ does not clot} (1)</p>	2	1	1	4		
		(ii)	Used to {prevent/ reduce risk of/ slow down formation of} blood clots/ DVT/ anticoagulant/ owtte			1	1		
			<b>Question 6 total</b>	<b>4</b>	<b>8</b>	<b>3</b>	<b>15</b>		

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
7.			<p><b>Indicative content:</b></p> <p>Events in interphase necessary for mitosis</p> <ul style="list-style-type: none"> <li>• DNA replication</li> <li>• {Replication/ Making new} {organelles/ named organelles}</li> <li>• Synthesis of ATP</li> <li>• Synthesis of proteins</li> </ul> <p>Mitotic index higher</p> <ul style="list-style-type: none"> <li>• Tissues where new cells are being made/ Growth of tissues</li> <li>• will have a higher proportion of cells undergoing mitosis</li> <li>• Example: skin (stem) cells, bone marrow (stem) cells/ gut lining cells / liver cells</li> <li>• Because cells are being {worn away rapidly/ degraded}/ for repair of {worn out/damaged} tissue/ replace cells</li> </ul> <p>Cancer cells and cyclin B</p> <ul style="list-style-type: none"> <li>• If cyclin B levels too high the cell will keep going into mitosis.</li> <li>• uncontrolled cell division</li> <li>• Cancer / Tumours</li> </ul>	3	3	3			

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
				<p><b>7-9 marks</b> Detailed account of all three sections <i>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.</i></p> <p><b>4-6 marks</b> Detail from two sections or less detailed account of three sections <i>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.</i></p> <p><b>1-3 marks</b> Detail from any one area <i>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.</i></p> <p><b>0 marks</b> <i>The candidate does not make any attempt or give a relevant answer worthy of credit.</i></p>						
				<b>Question 7 total</b>	<b>2</b>	<b>5</b>	<b>2</b>	<b>9</b>		

## UNIT 1: BASIC BIOCHEMISTRY AND CELL ORGANISATION

### SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	4	5	1	10	4	6
2	5	0	2	7	0	0
3	3	8	0	11	2	0
4	2	10	2	14	3	11
5	7	3	4	14	0	1
6	4	8	3	15	0	0
7	3	2	4	9	0	0
<b>TOTAL</b>	<b>28</b>	<b>36</b>	<b>16</b>	<b>80</b>	<b>9</b>	<b>18</b>