GCE AS MARKING SCHEME

SUMMER 2025

AS
BIOLOGY - UNIT 2
2400U20-1

About this marking scheme

The purpose of this marking scheme is to provide teachers, learners, and other interested parties, with an understanding of the assessment criteria used to assess this specific assessment.

This marking scheme reflects the criteria by which this assessment was marked in a live series and was finalised following detailed discussion at an examiners' conference. A team of qualified examiners were trained specifically in the application of this marking scheme. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners. It may not be possible, or appropriate, to capture every variation that a candidate may present in their responses within this marking scheme. However, during the training conference, examiners were guided in using their professional judgement to credit alternative valid responses as instructed by the document, and through reviewing exemplar responses.

Without the benefit of participation in the examiners' conference, teachers, learners and other users, may have different views on certain matters of detail or interpretation. Therefore, it is strongly recommended that this marking scheme is used alongside other guidance, such as published exemplar materials or Guidance for Teaching. This marking scheme is final and will not be changed, unless in the event that a clear error is identified, as it reflects the criteria used to assess candidate responses during the live series.

WJEC GCE AS BIOLOGY

UNIT 2 – BIODIVERSITY AND PHYSIOLOGY OF BODY SYSTEMS

SUMMER 2025 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

<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>(i)</td><td></td><td>Homologous (features)</td><td>1</td><td></td><td></td><td>1</td><td></td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td></td><td>They are <u>analogous</u> features / Arisen by <u>convergent</u> evolution (1)

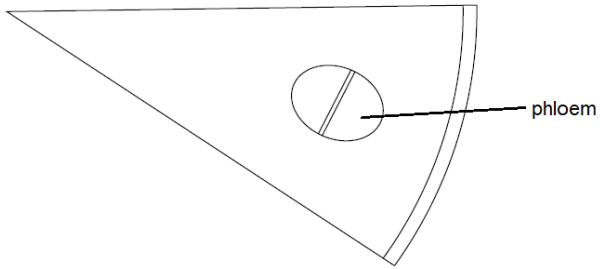
{{Evolved / come} from different structures / have a different origin / do not share a <u>recent</u> common ancestor} and {perform the {same/ similar} function / owtte} (1)</td><td>2</td><td></td><td></td><td>2</td><td></td><td></td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td></td><td>
<table>
<tr><th></th><th>Human</th><th>Tomato</th><th>Yeast</th><th>Protoctista</th><th>Archaea</th><th>Eubacteria</th></tr>
<tr><td>Human</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Tomato</td><td>1</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Yeast</td><td>2</td><td>1</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Protoctista</td><td>3</td><td>2</td><td>1</td><td></td><td></td><td></td></tr>
<tr><td>Archaea</td><td>5</td><td>6</td><td>5</td><td>4</td><td></td><td></td></tr>
<tr><td>Eubacteria</td><td>10</td><td>11</td><td>10</td><td>10</td><td>6</td><td></td></tr>
</table>
All correct = 2 marks
2 correct = 1 mark
0/1 correct = 0 marks</td><td></td><td>2</td><td></td><td>2</td><td></td><td></td></tr>
</table>

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
		(ii)		**Any three (x1) from** A. Humans and {tomato / yeast} have {fewer / minimal / owtte} differences (1) Accept use of correct numbers from table B. {Many / more} differences between archaea and {eukaryotes / humans / tomato / yeast} (1) Accept use of correct numbers from table C. Archaea and eubacteria have {many / more} differences. (1) Accept use of correct numbers from table D. and so should be in separate groups (1) E. Biggest difference is between eubacteria and eukaryotes (1) F. so must be in different groups (1) G. Domain system uses {molecular genetics / owtte} and Kingdom system uses morphology **and** comment on Domain being more {reliable / accurate} MP D only awarded with MP C MP F only awarded with MP E		1	2	3		
				Question 1 total	**3**	**3**	**2**	**8**	**0**	**0**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
2	(a)			By diffusion (1) across the <u>cell</u> membrane (1) Reject facilitated diffusion	2			2		
	(b)	(i)		SA/Vol for flatworm 50(:1) (1) Surface area for earthworm 250 (1)		2		2	2	
		(ii)	I	short diffusion {pathway / distance}	1			1		
			II	so gases can {dissolve / go into solution} (and diffuse)	1			1		
		(iii)		**Any three (x1) from** A. {One directional current / continuous flow / owtte} through burrow **and** maintains {concentration gradient (of oxygen) / high concentration of oxygen} (1) B. (External) gills **and** increase the surface area (for gas exchange) (1) C. Good {capillary network / blood supply} **and** to maintain concentration gradient (1) D. {Blood flows in the opposite direction to water / countercurrent flow} **And** to maintain a concentration gradient (of oxygen) across whole gill surface / enabling oxygen to be taken up across the entire gill / equilibrium not reached} / enabling higher concentration of oxygen (of blood) (1)		3		3		

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
	(c)	(i)		{exoskeleton / body surface / chitin} is {not permeable to gases / or description of}. (1) **Any one (x1) from:** • The insect does not have a {closed circulatory system/ insect has an open (circulatory) system/ or description of} (1) • No respiratory pigment}/ blood does not carry any oxygen (1) • The surface area to volume ratio is too low to allow sufficient gas exchange (1)	1 1			2		
		(ii)		To prevent them collapsing / keep tracheoles open (when the pressure decreases)		1		1		
		(iii)		{Fluid moves into the muscle (from the tracheoles) / fluid level (in tracheoles) decreases} / ORA (1) Increased surface area (for gas exchange) / shorter diffusion pathway / gases diffuse faster (1)		2		2		
				Question 2 total	**6**	**8**	**0**	**14**	**2**	**0**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
3	(a)			**Any two (x1) from:** (Shape) {increases / large} surface area to {absorb / owtte} oxygen (1) (Shape) allows it to squeeze through capillaries (1) Thin centre = short diffusion path (1)	2			2		
	(b)	(i)	I	7.425×10^{18} (3) Accept correct rounding **If incorrect award 2 marks for** $2.7 \times 10^{8} \times 5 \times 10^{6} \times 5500$ 7 425 000 000 000 000 000 **If incorrect award 1 mark for** $2.7 \times 10^{8} \times 5 \times 10^{6}$		3		3	3	
			II	825g [(5500 ×15) / 100]		1		1	1	
		(ii)		{number of haemoglobin molecules / mass of haemoglobin / the values / they} would increase (1) This would allow more oxygen to be delivered to {muscles / tissues / cells} for respiration (1)		2		2		
	(c)	(i)		So oxygen can {bind / load / associate} to haemoglobin in the lungs where ppO_2 is high (1) (And haemoglobin) {releases / unloads / dissociates} oxygen in the {muscles / tissues / cells} where ppO_2 is low (1)	2			2		
		(ii)		It acts as a {store of oxygen / oxygen reserve} **and** {is only released when haemoglobin has unloaded its oxygen / dissociates at low ppO2} / owtte		1		1		
				Question 3 total	**4**	**7**	**0**	**11**	**4**	**0**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)	(i)			1			1		1
		(ii)	I	Cell **A**: (Phloem) Sieve {tube / element} **and** Cell **B**: companion (cell) (1)	1			1		1
			II	{produces ATP / provides energy / provides metabolic support / carries out protein synthesis / loading of {sucrose / amino acids}} (1)		1		1		
	(b)	(i)		Lignin	1			1		

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
		(ii)		**Any four (x1) from:** A. Water moves through the apoplast pathway in the cell walls (1) B. Water enters the {symplast / vacuolar} pathway passing through {cytoplasm / plasmodesmata} C. Correct ref to osmosis (1) Must be in context of inside root D. The {Casparian strip / suberin} in the endodermis (1) E. This {prevents (further movement in) the apoplast pathway / forces water into symplast pathway} / owtte (1) F. mineral ions are actively transported in to {endodermis / xylem} (1) G. (This causes) water to move down a water potential gradient into the xylem (1) H. Ref to apoplast, symplast and vacuolar pathways (only award if no other markpoints awarded)	4			4		

<table>
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<tr><th>AO1</th><th>AO2</th><th>AO3</th><th>Total</th><th>Maths</th><th>Prac</th></tr>
<tr><td></td><td>(c)</td><td>(i)</td><td></td><td>Sucrose and amino acids (1)
Both for one mark</td><td></td><td>1</td><td></td><td>1</td><td></td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td></td><td>Any two (x1) from
Temperature (1)
Light intensity (1)
Wavelength of light (1)
Carbon dioxide concentration (1)</td><td></td><td>2</td><td></td><td>2</td><td></td><td>2</td></tr>
<tr><td></td><td></td><td>(iii)</td><td></td><td>Award two marks for 7.9
Award one mark for:
7.8947
7.895
7.89</td><td></td><td>2</td><td></td><td>2</td><td>2</td><td></td></tr>
<tr><td></td><td></td><td>(iv)</td><td>I</td><td><table><tr><th></th><th>Source(s)</th><th>Sink(s)</th></tr><tr><td>Late winter</td><td>Bulb</td><td>(Growing) shoot</td></tr><tr><td>spring</td><td>Leaves</td><td>{Flower / seeds / Bulb}</td></tr></table>All correct 2 marks
2/3 correct 1 mark
0/1 correct 0 marks</td><td></td><td>2</td><td></td><td>2</td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td>II</td><td>{Organic molecules / sucrose / products of photosynthesis} {move / translocation occurs} from {leaves / sources} to {seeds / flower} (1)

{Organic molecules / sucrose / products of photosynthesis / translocation occurs} move from {leaves / sources} to be stored in the bulb (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 4 total</td><td>7</td><td>8</td><td>2</td><td>17</td><td>2</td><td>4</td></tr>
</table>

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(a)			**Any three (x1) from:** • 400m^2 (of woodland to be) sampled / use of data e.g. less than 50% sampled + evaluation (could be advantage or disadvantage) (1) • {Random number generator / ref to 20 sided dice / random sampling} **and** will remove bias (1) • Only {Five coordinates / 5m^2 sampled / five quadrats} / more than 5 quadrats should be used (1) • Not all {invertebrates / species / owtte} {seen / identified} / species misidentified (1) • May be changes in numbers of organisms throughout the year / owtte (1)			3	3		3
	(b)	(i)		0.60 (3) **Award 2 marks for:** 0.40 (not taken from 1) 0.6 (1 d.p) **Award 1 mark for:** $N(N-1)$ = 1417290 and $\sum n(n-1)$ = 566830 0.4 (not taken from 1 or to 2 dp) 0.3999 (not taken from 1 or to 2 dp)		3		3	3	3
		(ii)		• {Deciduous woodland / habitat A} loses leaves so more light (getting to the ground) / {coniferous woodland / habitat B} densely packed so less light (getting to the ground) (1) • more (variety) of plant life (growing on forest floor) (1) • More food available (1) Accept ORA for coniferous woodland			3	3		3
				Question 5 total	**0**	**3**	**6**	**9**	**3**	**9**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
6	(a)	(i)		Stomach / abomasum / true stomach (1) Small intestine/ duodenum / ileum (1)	2			2		
		(ii)		**Cow** A. {cellulose / cell walls} is broken down at the {start of the gut / rumen / before the stomach / before the small intestine} (1) B. so more {proteins / nucleic acids} can be digested in the {stomach / small intestine} (1) C. so more {products of digestion / amino acids / nucleotides} can be absorbed (in the small intestine so this means there are less nitrogen containing compounds in cow manure) (1) **Horse** D. cellulose {broken down / digested} after the {site of digestion / site of absorption / stomach / small intestine} (1) E. {less {nitrogen compounds / protein / nucleic acid} digested} / {less {nitrogen compounds / amino acids / nucleotides} absorbed (1)			4	4		
	(b)	(i)		A – mucosa **and** B – submucosa (1)	1			1		1
		(ii)		40 (2) Accept 38. 66° -41.3 1 mark for 30/0.75 30000/750 Accept measurements of 29-31		2		2	2	2

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
		(iii)		• Peristalsis (1) • waves of contraction / {contraction of circular muscle behind the bolus / owtte} (1) • (controlled so) that the intestine contents {move in the right direction / do not move backwards / owtte} / Reference to the right speed so that absorption can occur / owtte (1)	1	2		3		
				Question 6 total	**4**	**4**	**4**	**12**	**2**	**3**

Question	Marking details			Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
7	**Indicative content:**			4	3	2	9	0	0
	Open vs Closed	A1	Open- blood in {{body cavity / haemocoel} / bathes tissues} **and** Closed- blood in vessels						
		A2	Both have a {heart / pump} to pump blood						
		A3	Open – lower pressure (than closed) / ORA						
		A4	Open - blood pumped slower (than closed) / ORA						
		A5	Closed – {respiratory pigment / haemoglobin / blood carries oxygen} (not in open) / ORA						
	Mammal vs Fish	B1	Fish – blood from heart to gills then body **and** Mammals - blood pumped back to heart before pumped around body						
		B2	Fish blood goes through heart once **and** in Mammals blood goes through heart twice on a circuit (of the body) / or description of						
		B3	Mammals - blood pumped to body at higher pressure. (than fish) / ORA						
		B4	This means {oxygenated blood / oxygen} reaches tissues faster / ORA						
		B5	Double circulation in mammals allows blood to be pumped at different pressures to lungs and body (unlike in fish).						
	Amphibians compared to fish and mammals	C1	Blood pumped from heart to the tissues, + {unlike in fish / same as in mammals}						
		C2	Higher blood pressure to (tissues / organs) than in fish / similar blood pressure to (tissues / organs) as in mammals}						
		C3	Oxygenated blood and deoxygenated blood mix (unlike in fish and mammals)						
		C4	Blood flowing to the body has a lower concentration of oxygen (compared to fish / mammals)						
		C5	Absence of valves in amphibian so blood can flow backwards (as seen in image 7)						

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 areas. *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 content from 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 correct statement from one area of 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 7 total	**4**	**3**	**2**	**9**	**0**	**0**

UNIT 2: Biodiversity and Physiology of Body Systems

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

QUESTION	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	3	3	2	**8**	**0**	**0**
2	6	8	0	**14**	**2**	**0**
3	**4**	**7**	**0**	**11**	**4**	**0**
4	7	8	2	**17**	**2**	**4**
5	0	3	6	**9**	**3**	**9**
6	4	4	4	**12**	**2**	**3**
7	4	3	2	**9**	**0**	**0**
TOTAL	**28**	**36**	**16**	**80**	**13**	**16**