



GCE AS MARKING SCHEME

SUMMER 2025

**AS
BIOLOGY - UNIT 1
2400U10-1**

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 1 – BASIC BIOCHEMISTRY AND CELL ORGANISATION
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

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
1	(a)	(i)		Any two (x1) from: DNA <u>replication</u> (1) {Synthesis / production} of new organelles (1) (allow replication only in the context of chloroplasts / mitochondria / centrioles) {Protein / enzyme} synthesis (1) ATP {synthesis / production} (1)	2			2		
		(ii)		Telophase: B Prophase: A Anaphase: F 3 correct = 2 marks 2 correct = 1 mark		2		2		2
		(iii)		(D) A E F B C		1		1		1

Question				Marking details	Marks Available																			
					AO1	AO2	AO3	Total	Maths	Prac														
	(b)			Any three (x 1) mark from: One mark for each pair of comparative statements <table><tr><th>Mitosis</th><th>Meiosis</th></tr><tr><td>one (nuclear/ cell) division</td><td>two (nuclear/ cell) divisions</td></tr><tr><td>produces two cells</td><td>produces four cells</td></tr><tr><td>produces <u>genetically</u> identical cells</td><td>produces <u>genetically</u> different cells</td></tr><tr><td>Chromosome number stays the same</td><td>Halves chromosome number</td></tr><tr><td>no {pairing of homologous chromosomes / bivalent formed/ crossing over occurs/ chiasmata}</td><td>pairing of homologous chromosomes / bivalents formed/ crossing over occurs / chiasmata</td></tr><tr><td>No independent assortment / segregation of homologous chromosomes occurs</td><td>Independent assortment / segregation of homologous chromosomes occurs</td></tr></table>	Mitosis	Meiosis	one (nuclear/ cell) division	two (nuclear/ cell) divisions	produces two cells	produces four cells	produces <u>genetically</u> identical cells	produces <u>genetically</u> different cells	Chromosome number stays the same	Halves chromosome number	no {pairing of homologous chromosomes / bivalent formed/ crossing over occurs/ chiasmata}	pairing of homologous chromosomes / bivalents formed/ crossing over occurs / chiasmata	No independent assortment / segregation of homologous chromosomes occurs	Independent assortment / segregation of homologous chromosomes occurs	3			3		
Mitosis	Meiosis																							
one (nuclear/ cell) division	two (nuclear/ cell) divisions																							
produces two cells	produces four cells																							
produces <u>genetically</u> identical cells	produces <u>genetically</u> different cells																							
Chromosome number stays the same	Halves chromosome number																							
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No independent assortment / segregation of homologous chromosomes occurs	Independent assortment / segregation of homologous chromosomes occurs																							
	(c)	(i)		Mitosis		1		1																
		(ii)		Sporophyte: 104 (1) Gametophyte: 52 (1)		2		2																
				Question 1 total	5	6	0	11	0	3														

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
2	(a)	(i)		A: nuclear pore B: nuclear membrane/ nuclear envelope C: ribosomes / rough endoplasmic reticulum / endoplasmic reticulum / RER / ER Reject: SER / Golgi body 3 correct = 2 marks 2 correct = 1 mark 0/1 correct = 0 marks		2		2		2
		(ii)		They {have been cut / are viewed in a different {plane / angle} / one is a longitudinal (section) the other is a transverse (section) / {different ages / owtte}		1		1		1
	(b)	(i)		Tertiary / 3°	1			1		
		(ii)		258 / 261 / 264		1		1		

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
	(c)	(i)		Any five (x1) from A. {Proinsulin / polypeptide chain} {enters / is transported by} the rough endoplasmic reticulum (and is transported through the cell) (1) Reject protein / insulin B. Folding (of primary structure) to form {secondary / tertiary} structure (1) C. Correct reference to use of vesicle either from RER to Golgi (body) or Golgi (body) to cell surface membrane (1) D. {Proinsulin / Polypeptide} {split to form / modified to / bonds broken to form / converted to} insulin in the Golgi (body) (1) E. Vesicle {fuses with / binds to / merges with / joins with} the (cell surface) membrane (1) F. {Insulin / contents of vesicle / protein} is released via exocytosis (1) Reject excreted / proinsulin Penalise use of vacuole instead of vesicle once	4	1		5		
		(ii)		• {Produces / provides / releases} <u>ATP</u> (1) • Required for the formation of {peptide bonds / disulphide bridges} / Required for activation of {amino acids / tRNA} (1) • Required for {exocytosis / production of secretory vesicles} (1)	1	2		3		
				Question 2 total	6	7	0	13	0	3

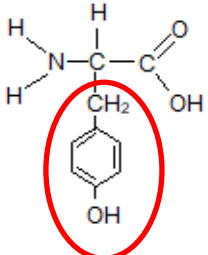
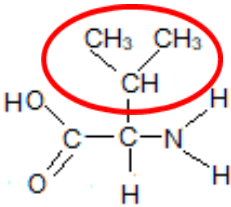
Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
3	(a)			They have different {molecular / chemical} formulae / Accept atomic formula {3.1A / alpha glucose} does not contain {a phosphate group / phosphorus} whereas {3.1B / glucose-1-phosphate} does / they have different numbers of {(H / O) atoms / OH groups} No double bonds in {3.1A / alpha glucose} but there is a double bond in {3.1B / glucose-1-phosphate} (1)		1		1		
	(b)	(i)		(To make sure) {both solutions / they} { were at 20°C / were the same temperature / had the same kinetic energy} (before the reaction took place) (1)		1		1		1
		(ii)		4% = 2 marks 1 mark for: $0.2 / 5 \times 100$		2		2	2	2
		(iii)		7.9 (2) Award 1 mark 8 / 7.87 (incorrect number of dp) 7.8 (incorrect rounding) $1/12.7 \times 100$		2		2	2	2

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
		(iv)		- As concentration increases (from 1% to 4%) the rate (of starch synthesis) increases and {above 4%/ at $12.5 \text{ min}^{-1} \times 10^{-2}$} the rate remains constant / OWTTE (1) (Between 1% and 4% / before the rate levels off) the (concentration) of {glucose-1-phosphate / substrate} is the limiting factor / {starch phosphorylase / enzyme} (concentration) is in excess / increased concentration leads to increased enzyme substrate complexes (1) (At / above 4% / when the rate levels off) the {starch phosphorylase / enzyme} (concentration) is the limiting factor / all the <u>active sites</u> are {occupied / saturated / working at maximum rate / maximum number of enzyme substrate complexes formed} (1)		3		3		3

Question				Marking details	Marks Available																
					AO1	AO2	AO3	Total	Maths	Prac											
		(v)		Any two (×1) correct limitations and two (x1) linked improvements <table><thead><tr><th>Limitation</th><th>Improvement</th></tr></thead><tbody><tr><td>Time interval between measurements is too long / samples were taken every minute (1)</td><td>Take measurements at shorter intervals (1)</td></tr><tr><td>pH not controlled (1)</td><td>adding a (pH) <u>buffer</u> (solution) (1)</td></tr><tr><td>drops (of iodine/extract) are not a fixed volume / OWTTE (1) Reject amount</td><td>use a graduated {pipette/syringe} / add a fixed volume of {iodine / extract} (1)</td></tr><tr><td>Large difference between each glucose 1 phosphate concentration (1)</td><td>Use concentrations in {smaller/0.5%} divisions (1)</td></tr></tbody></table>	Limitation	Improvement	Time interval between measurements is too long / samples were taken every minute (1)	Take measurements at shorter intervals (1)	pH not controlled (1)	adding a (pH) <u>buffer</u> (solution) (1)	drops (of iodine/extract) are not a fixed volume / OWTTE (1) Reject amount	use a graduated {pipette/syringe} / add a fixed volume of {iodine / extract} (1)	Large difference between each glucose 1 phosphate concentration (1)	Use concentrations in {smaller/0.5%} divisions (1)							
Limitation	Improvement																				
Time interval between measurements is too long / samples were taken every minute (1)	Take measurements at shorter intervals (1)																				
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Large difference between each glucose 1 phosphate concentration (1)	Use concentrations in {smaller/0.5%} divisions (1)																				
	(c)			Add Benedict's solution and heat (strongly) (1) Colour change from blue to {yellow / green / orange / (brick) red} (1)	2			2		2											
				Question 3 total	2	9	4	15	4	14											

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)			They allow some {small / soluble} molecules to {move through / cross} but does not allow the passage of other {large / insoluble} molecules. / <u>only</u> allow {small / soluble} molecules through (1)	1			1		
	(b)			<u>Similarity:</u> Both use {intrinsic / carrier} proteins / involve the movement of polar molecules or ions Ignore: transport protein Reject: channel protein <u>Differences: two (x1) mark for</u> - Facilitated diffusion moves molecules down a {concentration gradient / or description of} and active transport moves the molecules against a {concentration gradient / or description of} (1) Accept Facilitated diffusion is down a concentration gradient and active transport is against a concentration gradient - Facilitated diffusion {does not require ATP / is a passive process} and active transport requires ATP (1) - Facilitated diffusion can use channel proteins and active transport {cannot / uses carrier proteins} (1) - Facilitated diffusion is not stopped by {respiratory inhibitors / anaerobic conditions} and active transport is stopped by {respiratory inhibitors / anaerobic conditions} (1)	3			3		

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
	(c)	(i)		A. (Molecule A) {crosses the membrane via (simple) diffusion / it passes through the phospholipid bilayer} (1) B. Because as (external) concentration increases rate increases / <u>directly</u> proportional (1) C. (Molecule B) {crosses via facilitated diffusion / it passes through {intrinsic / channel / carrier} proteins} (1) D. Because the rate {plateaus / levels off} as {intrinsic / channel / carrier} proteins become {a limiting factor / limited in number / saturated / fully occupied / working at a maximum rate} (1)		2	2	4		
		(ii)		It is (too) large (to pass through the membrane) / it is insoluble / there are no specific {carrier / channel} proteins for it to cross (1)			1	1		
		(iii)		(The increased temperature) increases the kinetic energy of the {phospholipids / membrane proteins} (1) This increases the fluidity of the membrane / phospholipids move further apart / denatures proteins (1) This makes the membrane now permeable (to molecule C) / creates pores in the membrane / owtte (1)		2	1	3		3
				Question 4 total	4	4	4	12	0	3

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(a)	(i)		  and Both for one mark		1		1		
		(ii)		Condensation (reaction) (1) Peptide (bond) (1) Reject {polypeptide / dipeptide} bond	2			2		
	(b)			A. <u>Tyrosinase</u> has a <u>specific shaped</u> active site (1) B. Only <u>tyrosine</u> has the complementary {shape / structure} (to the active site) (1) C. Therefore, it can {fit / form} an enzyme-substrate complex (1)	1	2		3		
	(c)			Any four (x1) from A. (The skin) temperature of the {face / ears / paws / tail / owtte} is {35°C / below 35°C}, therefore, the { <u>tyrosinase</u> / enzyme} is {functional / not denatured / active site is complementary / can form ESC} (1) B. so {large quantities / more} melanin produced (1) C. (The skin) temperature of the (main part of the) body is above 35°C so {enzyme / <u>tyrosinase</u> } is {denatured / non-functional} (1) D. Therefore, {no / little / less} melanin is produced / tyrosine not converted to melanin (1)			4	4		
				Question 5 total	3	3	4	10	0	0

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
6	(a)			Both contain {glycerol / fatty acids / ester bonds} (1) Any one (x1) from: Triglycerides contain three fatty acids and phospholipids contain two fatty acids (1) Triglycerides do not contain a phosphate group and phospholipids do (contain as phosphate group) / Only phospholipids contain phosphate (1)	2			2		
	(b)	(i)		The (phospholipid) heads are {hydrophilic / polar} and the (phospholipid) tails are hydrophobic / non polar} (1) (Hydrophilic) heads are {attracted to / interact with} the water and tails {not attracted to / repelled from / do not interact with} the water (1)		2		2		2
		(ii)		97.8 = 3 marks If incorrect award 2 marks for: 97.8125 If incorrect award 1 mark for $\frac{31.3 \times 10^{12}}{40 \times 8 \times 10^9}$ $\frac{31.3 \times 10^{12}}{3.2 \times 10^{11}}$ 9.8 or 9.78 x 10 ¹⁰ (not used 10 ⁹)		3		3	3	3
		(iii)	I	1.9(:1)		1		1	1	1
			II	Ratio of phospholipids to surface area of red blood cells is 2:1 / twice as many phospholipids (1) (So, they) form a bilayer/ there are two layers (1)			2	2		2
Question 6 total					2	6	2	10	4	8

Question	Marking details	Marks Available					
		AO1	AO2	AO3	Total	Maths	Prac
7	<u>Distribution and function of DNA:</u> A1 {99.9% / Mainly / more} found in the nucleus A2 {0.1% / small quantity} found in mitochondria. A3 Too large to fit through nuclear pores. A4 Carries genetic code / codes for (production of) proteins. A5 DNA involved in transcription. <u>Distribution and function of RNA:</u> B1 Found in nucleus and {cytoplasm / rough ER / ribosomes}. B2 rRNA {synthesised in / contained within} the nucleolus. B3 mRNA is produced in the nucleus B4 Ribosomes, (which are outside the nucleus,) contain rRNA B5 tRNA is involved in <u>translation</u> <u>Transcription:</u> C1 {Helicase / RNA polymerase} {unzips {DNA / gene} / breaks hydrogen bonds (between DNA strands)}} C2 One strand acts as a template (for the formation of mRNA). Accept coding / non coding strand / template strand C3 (Free) <u>RNA nucleotides</u> attached {to the exposed bases on the DNA / by complementary base pairing} C4 RNA polymerase joins the nucleotides together (reject if in reference to complementary base pairing) C5 (catalyses) the formation of the phosphodiester bond/ formation of sugar phosphate backbone.		1	2	9		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 areas. <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> 4-6 marks Indicative content of this level is detailed content from two sections or less detail from three. <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> 1-3 marks Indicative content of this level is any correct statement from one area of the indicative content <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> 0 marks <i>The candidate does not make any attempt or give a relevant answer worthy of credit.</i>						
				Question 7 total	6	1	2	9	0	0

Unit 1: BASIC BIOCHEMISTRY AND CELL ORGANISATION

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

QUESTION	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	5	6	0	11	0	3
2	6	7	0	13	0	3
3	2	9	4	15	4	14
4	4	4	4	12	0	3
5	3	3	4	10	0	0
6	2	6	2	10	4	8
7	6	1	2	9	0	0
TOTAL	28	36	16	80	8	31