



GCSE MARKING SCHEME

SUMMER 2023

**GCSE
BIOLOGY - UNIT 1
3400U10-1 AND 3400UA0-1**

INTRODUCTION

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.

WJEC GCSE BIOLOGY – UNIT 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 statements.

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

FOUNDATION TIER

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
1	(a)	(i)	Grass(es) / producers		1		1		
		(ii)	Owls (1) Feed on {secondary consumers / carnivores}/ fourth trophic level (1)	1	1		2		
	(b)	(i)	shrew 900 owl 350 insect 12000 3 correct for 2 marks 1/2 correct for 1 mark 0 correct 0 marks		2		2	2	
		(ii)	All four names and numbers in the correct position Owl 1 Shrew 90 Insect 3000 Grasses 10000		1		1		
		(iii)	Energy is lost in {respiration /waste materials/ heat} (1) Each layer has fewer (numbers) than the one before/ the numbers get smaller as you go up the pyramid (1)	1		1	2		
			Question 1	2	5	1	8	2	0

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
2	(a)	(ii)	I	Inclusion drawn in cell and labelled as nucleus		1		1		1
			II	Cytoplasm	1			1		
	(ii)	I	60 mm		1		1	1	1	
		II	5000 Ecf from I		1		1	1	1	
	(b)			Carries oxygen (1) Defence against disease (1) Clots the blood (1)	3			3		
	(c)			B - specialised	1			1		
					Question 2	5	3	0	8	2

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
3	(a)	(i) (ii)		B/ Bronchus (1) D/ alveolus (1)	2			2		
	(b)	(i)	I II III	Rubber sheet (1) Balloons (1) Tube (1)		3		3		
		(ii)		Volume: increases (1) Pressure: decreases (1)	2			2		
		(iii)		Rib cage moves {up / out}/ ribcage expands (1) Cannot be demonstrated as the bell jar {is rigid/ does not move/ cannot expand} (1)	1	1		2		
	(c)			Lactic acid	1			1		
				Question 3	6	4	0	10	0	0

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)	(i)		C	1			1		
		(ii)		glycerol	1			1		
		(iii)		(Bile stored in) gall bladder (1) (Flows down) bile duct (1)	2			2		
	(b)	(i)	I	Ratio 8: 1		1		1	1	1
			II	4 bars plotted at the correct height in correct position = 2 marks 2/3 bars = 1 mark 1 small square tolerance Correctly labelled/ shaded correctly according to key (1) Mark given if at least one pair of bars are correctly shown		2		3	2	3
		(ii)		Increases the activity of lipase (1) {8 times/ mean/ ratio} higher with bile/ use of comparative data (1)			2	2		2
		(iii)		Decreases/ lower {number/value} Accept becomes acid			1	1		1
		(iv)		Control / comparison / {to identify / to see} the difference between the presence of bile and absence of bile			1	1		1
						Question 4	4	4	4	12

Question			Marking details	Marks available															
				AO1	AO2	AO3	Total	Maths	Prac										
5	(a)	(i)	Decreases	1			1												
		(ii)	(-)-0.18 or 0.2 = 2 marks If incorrect award 1 mark for 11.2-7.6		2		2	2											
	(b)	<table border="1"> <thead> <tr> <th>Statements</th> <th>True or False</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>True</td> </tr> <tr> <td>2</td> <td>False</td> </tr> <tr> <td>3</td> <td>False</td> </tr> <tr> <td>4</td> <td>False</td> </tr> <tr> <td>5</td> <td>True</td> </tr> </tbody> </table> <p>5 correct = 4 marks 4 correct = 3 marks 3 correct = 2 marks 2 correct = 1 mark 0/1 correct = 0 marks</p>	Statements	True or False	1	True	2	False	3	False	4	False	5	True		4		4	
Statements	True or False																		
1	True																		
2	False																		
3	False																		
4	False																		
5	True																		
			Question 5	1	6	0	7	2	0										

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
6	(a)			{Control the <u>rate</u> / <u>speed</u> up} reactions.	1			1		
	(b)	(i)	I	Figs/ 1 + kiwi/3 + pineapple/5			1	1		1
			II	(Gelatine/fruit/it) does not {solidify /set}/ (gelatine/ fruit/ it) remains liquid} (1) {Protease/ enzyme} is present (1) Accept reverse argument for both points			2	2		2
	(ii)		I	Peaches were boiled (1) So enzymes denatured (1)	1		1	2		2
			II	{Repeat/ use} with fresh (peaches)			1	1		1
	(iii)			Any value 25 °C or above		1		1		1
	(iv)			Any one (×1) from: Volume of (liquid) gelatine {Mass/ weight} of fruit Time (in refrigerator) Age of fruit			1	1		1
					Question 6	2	1	6	9	0

Question 7 CARBON CYCLE		Marking details		Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
7	(a)		<p>Indicative content</p> <p><u>Carbon (dioxide) in the air</u></p> <p>A. {Photosynthesis/ plants} {use CO₂/reduces CO₂ level in the air/ owtte}</p> <p>B. {Respiration / animals breathing} {releases/produces/ adds} CO₂ (to the air)</p> <p>C. (Use of) fossil fuels.</p> <p>D. (Burning/ use of fossil fuels) {produces/releases/adds} CO₂</p> <p>E. {Respiration / combustion} {causes global warning /increases temperature}.</p> <p><u>Measures to reduce carbon dioxide</u></p> <p>F. {Reduce /avoid} building on {green land/farmland}/ deforestation</p> <p>G. Plant more trees/ nature reserves /protect green spaces/</p> <p>H. Less use of fossil fuel /reduce use of {cars/ transport }/use electric vehicles/ walk/ cycle/ fewer journeys/</p> <p>I. More use of {renewable /eco-friendly methods of energy supply} / wind farms/solar panels / tidal power /biofuels</p> <p>5-6 marks At least 7 points from indicative content. Include suggestion for reducing level of carbon dioxide. <i>There is a sustained line of reasoning which is coherent, relevant, substantiated and logically structured. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar.</i></p>	4	1	1	6		

Question 7 CARBON CYCLE				Marking details	Marks available						
					AO1	AO2	AO3	Total	Maths	Prac	
				<p>3-4 marks At least 4 points from indicative content <i>There is a line of reasoning which is partially coherent, largely relevant, supported by some evidence and with some structure. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar.</i></p> <p>1-2 marks At least 1 point from indicative content <i>There is a basic line of reasoning which is not coherent, largely irrelevant, supported by limited evidence and with very little structure. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar.</i></p> <p>0 marks <i>No attempt made or no response worthy of credit.</i></p>							
				Question 7	4	1	1	6	0	0	

Question			Marking details	Marks available							
				AO1	AO2	AO3	Total	Maths	Prac		
8/1	(a)		{Increased/ larger} surface area (1) Must be comparative	1			1				
	(b)	(i)		Arrow in correct position (1) Labelled xylem (1)	2			2			
		(ii)	I		X – guard (cells) (1)	1			1		
			II		(Stoma) {open / close} (to control water loss) (1) (Cuticle) –reduces water loss/ waterproof (1)	2			2		
		(c)	(i)		Transpiration	1			1		
	(ii)			Same {time / distance of fan from plant/ temperature/ humidity/ light (intensity)/ direction of fan}			1	1		1	
	(iii)			To prevent <u>evaporation</u> (from the surface of the water).		1		1		1	
	(iv)		I		(Increased speeds give an) increase in {loss of water/ evaporation/ transpiration} (1) Recognition of change in gradient of graph after initial rise (1)			2	2		2
			II		Line on graph going up but at a lower level of water loss.	1			1		
				Question 8/1	8	1	3	12	0	5	

Question 9/2			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
9/2	(a)	(i)	95.6 or 96 kg/year = 2 marks If incorrect award 1 mark for (25 - 1.1 =) 23.9 or 24 100-4.4 95		2		2	2	
		(ii)	1350		1		1	1	
	(b)	(i)	Any one (×1) from: {Reduced costs / cheaper} (for farmer) (1) {Better/ easier} monitoring (1) Controlled conditions (1) Less land used (1) {Faster/ more} {growth/ yield/ meat production} (1) Reject reference to eggs Ignore reference to financial gain		1		1		
		(ii)	(Disposal of) waste			1	1		

Question 9/2				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(c)			<p>Any three (x1) from</p> <ul style="list-style-type: none"> • {Reduced growth/ reduced mass/ underdevelopment} of {heart/ organs}/ smaller {heart/organs}/ Use of comparative data (1) • {Reduced growth/ reduced mass/ underdevelopment} of lungs/ smaller lungs/ Use of comparative data (1) • {Reduced growth/ reduced mass/ underdevelopment} of liver/ smaller liver/ Use of comparative data (1) • Reduced strength of bones/ bone density is low/ worse bone quality/ Use of comparative data (1) • More broken bones/ Use of comparative data (1) • Over-crowding / unable to move / behaviour restrictions (1) 		3		3		
				Question 9/2	0	7	1	8	3	0

HIGHER TIER

Question			Marking details	Marks available																		
				AO1	AO2	AO3	Total	Maths	Prac													
3	(a)		A = pancreas (1) reject pancrease B = large intestine (1) Accept colon	2			2															
	(b)	(i)	Add Benedict's (solution) (1) Heat (strongly) / heated / boil / hot water bath (1) Ignore: water bath (unqual)/ ref. clintix / colour change (correct or incorrect) Both marking points awarded independently	2			2		2													
		(ii)	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Time /minutes</th> <th>Starch</th> <th>Protein</th> <th>Amino acids</th> <th>Glucose</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> </tr> <tr> <td>30</td> <td>x</td> <td>x</td> <td>✓</td> <td>x</td> </tr> </tbody> </table> <p>1 line correct = (1) 2 correct lines = (2) <u>All</u> cells must be completed</p>	Time /minutes	Starch	Protein	Amino acids	Glucose	0	x	x	x	x	30	x	x	✓	x		2		2
Time /minutes	Starch	Protein	Amino acids	Glucose																		
0	x	x	x	x																		
30	x	x	✓	x																		
	(c)		Small intestine (1) Any one from <ul style="list-style-type: none"> • {molecules/nutrients} are {digested/broken down}/ it is where digestion occurs (1) • protease {present/found} / contains protease (1) • products of digestion {absorbed/ pass into blood / diffuse into blood} / only small soluble molecules can pass out (1) Ignore ref to other food types/ enzymes/ s.p.m./pores Reject ref. osmosis			2	2															

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
				OR Stomach (1) protease is present/ where protein is {digested/broken down}(1) Reject ref to other food types/ enzymes Reason must be linked to correct part						
				Question 3	4	2	2	8	0	4

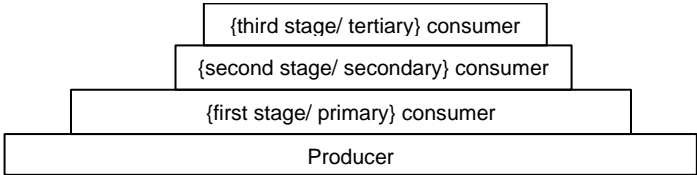
Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
4	(a)		{Moves/pushes} <u>mucus</u> (out of the respiratory system) (1) Paralyse cilia/ cilia cannot move / decrease <u>mean</u> length of cilia (1)	2			2		
	(b)	(i)	78 or 79 (mm)	1			1		1
		(ii)	79mm × 15800 = 2 marks If incorrect award 1 mark for 79000/5 79/0.005 79mm = 79000 μm 5μm = 0.005mm 78 mm × 15600 = 2 marks If incorrect award 1 mark for 78000/5 78/0.005 78mm = 78000 μm 5μm = 0.005mm Ecf from (i)		2		2	2	2
	(c)	(i)	Smoking reduces <u>mean</u> length of cilia (1) Greater variation in length of cilia in smokers/ ORA (1)			2	2		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
		(ii)		Increase {sample size / number of people / number of smokers and non-smokers}/ {same/ knowledge of} {age / length of time smoking/ sex/ other health factors/ number of cigarettes smoked per day} IGNORE ref. repeat test			1	1		1
				Question 4	3	2	3	8	2	4

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
5	(a)	(i)	Coronary (artery/ vessel)		1		1		
		(ii)	Platelets	1			1		
	(b)	(i)	<ul style="list-style-type: none"> Narrowing of {artery/blood vessel}/ blood {blocked/cannot flow/cannot reach} / blood flow {restricted /blocked}/ harder for blood to flow (1) {No/stops/prevents} {oxygen/oxygenated blood/ glucose} (reaching heart muscle) (1) No (aerobic) respiration (1) 		3		3		
		(ii)	<p>Any two (x1) from:</p> <ul style="list-style-type: none"> high salt <u>diet</u> high blood pressure high fat <u>diet</u> high cholesterol genetic (factors) / genes smoking diabetes obesity ethnicity/ race <p>IGNORE fatty foods/bad diet/unhealthy diet</p>	2			2		
		(iii)	<p>Any one (x1) from:</p> <ul style="list-style-type: none"> Angioplasty bypass surgery stent 	1			1		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
		(iv)		(health campaigns) {educate/ promote/ advertise/ target/ raise awareness/ encourage/ make laws} and {healthy diet (or description of)/ healthy living/ exercise/ stop smoking}/ Ref to tax increases for unhealthy foods (1)			1	1		
Question 5					4	4	1	9	0	0

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
6	(a)		<u>Adaptation of alveolus</u> Any one (×1) from: <ul style="list-style-type: none"> • large surface area (1) • {thin/ one cell thick} <u>walls</u> (1) • moist {lining/ surface/ walls/ layer} (1) • {rich/ good/ close} blood supply (1) <u>Adaptation blood capillary</u> {thin/ one cell thick} <u>walls</u> / extensive network (1) Reject thin cell walls in either	2			2		
	(b)		Oxygen (1) Diffuses (1) From high concentration of 105 (in alveolus) to low concentration of 40 (in blood capillary)/ down a concentration gradient from 105 to 40 (1) Award three marks for Oxygen moves down a diffusion gradient from 105 to 40		3		3		
			Question 6	2	3	0	5	0	0

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
7	(a)	(i)	First stage consumers / primary consumers	1			1		
		(ii)	Fungi / bacteria	1			1		
	(b)	(i)	11.5 = 2 marks If incorrect answer award 1 mark for 11.538461/ 11.54 / 11.538 / 11.5385 / 11.53846 /11.53 /11.5384 360/3120 x 100		2		2	2	
		(ii)	Any one (x1) from <ul style="list-style-type: none"> no energy in the third stage consumer / no energy available for a {fourth stage/ another} consumer (1) the remaining energy is {transferred / passed on} to decomposers and heat loss (1) <u>all</u> of the energy in 3rd stage is lost (1) IGNORE ref. biomass			1	1		
	(c)	 <p>correct shape – pyramid or block + 4 levels + labelling = 1 mark</p>		1		1			
	(d)	Respiration	1			1			
Question 7				3	3	1	7	2	0

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
8	(a)		<p>More efficient/ efficiency has increased (1)</p> <p>Any one (×1) from:</p> <ul style="list-style-type: none"> as food production has increased, the amount of land used (for food production) has remained almost the same (1) ACCEPT use of data, e.g. land use increase 15% and food production increased 275% Over time more food is being produced {per unit area of land/ on less land} (1) yield {has increased/is better} (1) (because of) intensive farming (1) 			2	2		

Question		Marking details	Marks available					
			AO1	AO2	AO3	Total	Maths	Prac
	(b)	<p>Indicative content:</p> <p>A. Plant {leguminous plants / ref. clover, peas, beans/ plants which have nitrogen fixing bacteria}</p> <p>B. (Nitrogen fixing bacteria fix nitrogen that is) used to make {protein/ amino acids/ nitrates} / plants use nitrates to make {proteins/ amino acids}</p> <p>C. {Spread/use} {manure/ slurry/ animal waste/ compost} contains {protein/ urea} / plough in plants which contain protein</p> <p>D. this is {converted/turned into/ broken down/ decayed} to ammonia</p> <p>E. by {bacteria/ fungi/ decomposers}/ correct ref to urease</p> <p>F. ammonia is converted to nitrates</p> <p>G. Use {fertilisers (containing nitrates) / NPK}/ add nitrates</p> <p>H. nitrates {taken up/ absorbed/ used} by plants</p> <p>I. {draining / ploughing} prevents {denitrification / denitrifying bacteria} / {draining / ploughing} promotes {nitrification / nitrifying bacteria / nitrogen fixing bacteria}</p>	3	3		6		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
				<p>5-6 marks At least 7 points from indicative content <i>There is a sustained line of reasoning which is coherent, relevant, substantiated and logically structured. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar.</i></p> <p>3-4 marks At least 4 points from indicative content <i>There is a line of reasoning which is partially coherent, largely relevant, supported by some evidence and with some structure. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar.</i></p> <p>1-2 marks At least 1 point from indicative content <i>There is a basic line of reasoning which is not coherent, largely irrelevant, supported by limited evidence and with very little structure. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar.</i></p> <p>0 marks <i>No attempt made or no response worthy of credit.</i></p>						
Question 8					3	3	2	8	0	0

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
9	(a)	(i)	<u>Enzyme substrate complex</u>	1			1		
		(ii)	Lock and key	1			1		
	(b)	(i)	A. Volume of {oxygen/gas} increases up until {38cm ³ /25 minutes} (1)	1					1
			B. (because) {hydrogen peroxide/ substrate} is being {broken down/ used up} (1)			1			
		C. Volume of {oxygen/ gas} then {remains constant/ stops increasing/ stays the same/ plateaus}/ no gas is produced after {38cm ³ /25 minutes} (1)	1			4		1	
D. (because) <u>all</u> the {hydrogen peroxide/ substrate} has been {broken down/ used up}/ <u>no</u> substrate left (1) IGNORE ref. denature at 25/30min			1						
(ii)	0.4 = 2 marks If incorrect award 1 mark for (7-5)/5 or 2/5			2		2	2	1	
		(iii)	<ul style="list-style-type: none"> Copper sulfate has bound to (some of the) {catalase/enzyme} / {fewer/some} enzymes are working/ (some) enzymes are not working} (1) Shape of those active sites has changed / {active site/catalase/enzyme} is denatured (1) Enzyme substrate complex cannot form / {hydrogen peroxide/substrate} cannot {fit into/ bind with} the {active site/enzyme/catalase} / {No/ fewer} successful collisions between {active site/ catalase/ enzyme} and {hydrogen peroxide/ substrate} (1) 			3	3		

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
(c)	(i)		<u>Control</u> (experiment/ flask) / {Compare the effect / to show the difference between} of boiled and fresh potato (1)	1			1		1
	(ii)		Any two (x1) from: <ul style="list-style-type: none"> • Temperature (1) • pH (1) • {Mass/weight/ surface area} of potato/ number of potato pieces (1) • {Type/ age} of potato (1) • Concentration of H₂O₂ (1) • Concentration of CuSO₄ (1) IGNORE ref. volume/amount/size		2		2		2
	(iii)		Use a { measuring cylinder with a more detailed scale/ burette/ gas syringe} (1)			1	1		1
			Question 9	5	7	3	15	2	7

FOUNDATION TIER

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	2	5	1	8	2	0
2	5	3	0	8	2	3
3	6	4	0	10	0	0
4	4	4	4	12	3	8
5	1	6	0	7	2	0
6	2	1	6	9	0	8
7	4	1	1	6	0	0
8	8	1	3	12	0	5
9	0	7	1	8	3	0
TOTAL	32	32	16	80	12	24

HIGHER TIER

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	8	1	3	12	0	5
2	0	7	1	8	3	0
3	4	2	2	8	0	4
4	3	2	3	8	2	4
5	4	4	1	9	0	0
6	2	3	0	5	0	0
7	3	3	1	7	2	0
8	3	3	2	8	0	0
9	5	7	3	15	2	7
TOTAL	32	32	16	80	9	20