



GCSE MARKING SCHEME

SUMMER 2022

**GCSE
BIOLOGY (DOUBLE AWARD) - UNIT 1
3430U10-1 AND 3430UA0-1**

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 GCSE BIOLOGY (DOUBLE AWARD) – UNIT 1

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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

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
1	(a)	(i)		Continuous line drawn outside membrane	1			1		1
		(ii)	I	<u>Chloroplast</u>	1			1		
			II	Photosynthesis	1			1		
	(b)	(i)		<u>Specialised</u>	1			1		
		(ii)		<u>Tissues</u>	1			1		
				Question 1 total	5	0	0	5	0	1

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
2	(a)			Increases (1) Decreases (1) Inflates (1)	3			3		
	(b)	(i)		Trachea/ windpipe	1			1		
		(ii)		Chest/ thorax/ ribcage / ribs	1			1		
		(iii)		Diaphragm	1			1		
				Question 2 total	6	0	0	6	0	0

Question				Marking details	Marks available																			
					AO1	AO2	AO3	Total	Maths	Prac														
3	(a)			animal plankton (1) → {sand eels/ shrimps} (1) → puffins→ {skua/ gulls} (1) One mark for each organism in correct position		3		3																
	(b)	(i)		Sun/ sunlight/solar	1			1																
		(ii)		Any living process / or description of	1			1																
	(c)	(i)		{Rats/they} { kill/ eat} puffins/ rats eat eggs/ puffins are prey for rats/ rats are predators/ so puffins do not get killed Ignore attack/ reduce number of puffins		1		1																
		(ii)		<table><tr><td>puffin</td><td>true or false</td></tr><tr><td>face predators only at sea.</td><td>false</td></tr><tr><td>numbers are affected by variations in natural factors</td><td>true</td></tr><tr><td>numbers are generally in rising</td><td>false</td></tr><tr><td>numbers on Skomer increased by over 100% between 2013 and 2018</td><td>true</td></tr><tr><td>are at risk from climate change</td><td>true</td></tr><tr><td>usually spend one third of the year at sea</td><td>false</td></tr></table> all 5 correct = 4 marks 4 correct = 3 marks 3 correct = 2 marks 2 correct = 1 mark	puffin	true or false	face predators only at sea.	false	numbers are affected by variations in natural factors	true	numbers are generally in rising	false	numbers on Skomer increased by over 100% between 2013 and 2018	true	are at risk from climate change	true	usually spend one third of the year at sea	false		4		4	1	
puffin	true or false																							
face predators only at sea.	false																							
numbers are affected by variations in natural factors	true																							
numbers are generally in rising	false																							
numbers on Skomer increased by over 100% between 2013 and 2018	true																							
are at risk from climate change	true																							
usually spend one third of the year at sea	false																							
				Question 3 total	2	8	0	10	1	0														

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)	(i)	I	63 = 3 marks If incorrect award 2 marks for 63.4 If incorrect award 1 mark for $\frac{317}{5}$ or $\frac{62+65+67+60+63}{5}$		3		3	3	3
			II	Girls (heart) (rate/ bpm/ mean) is {higher/ faster/ more} (than boys)/ ORA Ignore bigger/ smaller with reference to rate ecf from (I) ignore ref to fitness		1		1		1
		(ii)		Any one (×1) from: picked at random (1) all sat (at rest) for {one minute/same amount of time} (1) same age/ class (1) same (smart)watch (1) Ignore same numbers of boys and girls / ref to fitness			1	1		1
	(b)	(i)	I	All 5 plots correct = 2 3 or 4 correct = 1 Tolerance +/- less than one small square		2		2	2	
			II	accurate line Tolerance +/- less than one small square		1		1	1	
		(ii)		{Yes/data do support/ owtte} + women have higher <u>rate</u> (than men) (ORA) ecf from (i)I			1	1		

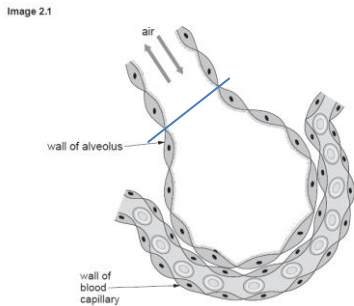
Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
		(iii)		Rises, then falls (1) from 64.5 (bpm)/(age) 50 (1) peaks at {64.5 (bpm)/50 (yrs of age)} = 2 marks ecf from graph for peak value		2		2		
	(c)			Any two (×1) from: Thousands of people/more data/more results/ more people/ bigger sample size (1) Many nations/ from all around the world (1) Many ethnicities/more diverse (1) More ages (1) carried out over longer period of time (1) Note: Reverse arguments apply			2	2		2
				Question 4 total	0	9	4	13	6	7

Question				Marking details		Marks available						
						AO1	AO2	AO3	Total	Maths	Prac	
5	(a)			Function	Name of structure	5			5			
				Starts digestion of starch	mouth (1)							
				Carries bile from gall bladder	bile duct (1)							
				absorbs water from undigested food waste	large intestine/ colon (1)							
				absorbs digested food molecules into the blood	small intestine (1)							
				makes lipase	pancreas/ small intestine (1)							
	(b)			Indicative content				1	5	6		
				<ul style="list-style-type: none">○ {Stage 1/at start}, (only) starch (present)● starch (molecule) is {large/too large (to pass through)} / pores are too small to allow starch through● Ref to enzyme● Starch {digested/ broken down}● glucose is {produced/appears}● glucose (molecule) is {small/small enough}● (glucose) passes through {pores/holes/wall/tubing/ membrane}● into the water● reference to {active site/lock & key/ enzyme- substrate complex} <p>5-6 marks At least 7 points of indicative content <i>There is a sustained line of reasoning which is coherent, substantiated and logically structured. The information included in the response is relevant to the argument.</i></p>								

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
				<p>3-4 marks <i>At least 4 points of indicative content There is a line of reasoning which is partially coherent, supported by some evidence and with some structure. Mainly relevant information is included in the response but there may be some minor errors or the inclusion of some information not relevant to the argument.</i></p> <p>1-2 marks <i>Any one point of indicative content There is a basic line of reasoning which is not coherent, supported by limited evidence and with very little structure. There may be significant errors or the inclusion of information not relevant to the argument.</i></p> <p>0 marks <i>No attempt made or no response worthy of credit.</i></p>						
				Question 5 total	5	1	5	11	0	0

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
6/1	(a)	(i)		1.2 (g)		1		1	1	
		(ii)		Starch	1			1		
		(iii)		Maintains normal BP/too much salt in the diet can result in high BP/ prevents high blood pressure Ignore lowers BP/ ref heart disease/ stroke	1			1		
	(b)	(i)		2.31/ 2.3 (kJ) (2) Award one mark for $\frac{20 \times 44 \times 0.0042}{1.6}$		2		2	2	2
		(ii)	I	Energy content of dried pasta from {Nutrition Label/ table 6.1/1.1} is {761 (kJ per 100g) / 7.61 (kJ per g)} and Energy content from {experiment/ table 6.3/1.3} is {231 (kJ per 100g)/ 2.31 (kJ per g)} (1) comparisons must be in the same units Energy content from experiment is less than that stated in {table 1/ nutrient label} /ORA (1) ECF from (b)(i) Label has {530 kJ per 100g more/ 5.3kJ per g more}/ ORA = 2 marks		1	1	2	1	2
			II	Any one (×1) from: Not all the energy is {used to heat/goes into} the <u>water</u> /not all the heat goes into the <u>water</u> (1) Some energy is {is heating / has gone into} { <u>environment/surroundings/air/mounted needle</u> } (1) Incomplete combustion/ not all pasta has been burnt/ not all the energy has been released from the pasta (1)			1	1		1

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
		(iii)		{Bunsen burner/ flame} is (too) close and {could be {heating/ affecting} the <u>water</u> / affecting the <u>thermometer</u> }/ OWTTE			1	1		1
				Question 6/1 total	2	4	3	9	4	6

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
7/2	(a)	(i)		line to bronchiole (must be unambiguous) (1) 	1			1		
		(ii)		Arrowhead into plasma (must be unambiguous)	1			1		
	(b)	(i)		(There is less oxygen and more carbon dioxide) because {walls/ membranes} of alveoli have been {destroyed/ damaged/ broken} (1) Therefore less <u>surface area</u> for the {absorption of gases / exchange of gases / diffusion} (1)	1	1		2		
		(ii)		{Increased/faster} <u>rate</u> of breathing/ shortage of oxygen/ short(ness) of breath/ unable to breathe deeply Ignore ref to being unable to walk far or to climb steps/ hard to breathe/ difficulty in breathing		1		1		
		(iii)		Smoking/ working in dusty environment Do not accept coalmining or working underground unless qualified with ref to dust	1			1		
				Question 7/2 total	4	2	0	6	0	0

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
3	(a)	(i)		Sun/ sunlight/ solar	1			1		
		(ii)		Producer(s) Ignore green plants	1			1		
		(iii)		Consumer(s) Reject primary/ secondary/ tertiary	1			1		
	(b)	(i)		TL 5 = 0.01 (%) TL 4 = 0.1 (%) TL 3 = 1(.0) (%) All correct = 2 marks Two correct = 1 mark One or none correct = 0 marks		2		2	2	
		(ii)		Because there is {insufficient/ not enough} <u>energy</u> (to transfer to a TL 6) Reject No energy			1	1		
		(iii)		Waste materials/ respiration/ heat/ excretion/ egestion/ not all {eaten/ digested} (Do not accept repair or maintenance and growth of cells)	1			1		
	(c)			size of the organisms decreases and their numbers increase size of the organisms decreases and their numbers decrease size of the organisms increases and their numbers increase <u>size of the organisms increases and their numbers decrease</u>		1		1		
				Question 3 total	4	3	1	8	2	0

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)			Carbon dioxide + water (1) Glucose + oxygen (1) If chemical symbols are used notation must be correct Ignore ref to light/chlorophyll written above or below the arrow. If either are included in the substrates or products then do not award the mark	1 1			2		
	(b)	(i)	I	Less carbon dioxide (in {C/ it} than A)/ ORA (1) Carbon dioxide is <u>the limiting factor</u> (in C) (1)		1	1	2		
			II	Lower temperature in D / ORA (1) Temperature is <u>the limiting factor</u> (in D) (1)		1	1	2		
		(ii)		Increasing {the temperature / carbon dioxide (concentration)}			1	1		
		(iii)		Light (intensity)			1	1		
		(iv)	I	Photosynthesis would stop (1) (High temperature would) {destroy/denature/ change the shape of} the <u>enzymes</u> which control photosynthesis (1)			2	2		
			II	It is the level of carbon dioxide in the {air/ atmosphere}	1			1		
	(c)			Oxygen is {produced/product/by-product} of photosynthesis (1)		1		1		
				Question 4 total	3	3	6	12	0	0

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
5				<p>Indicative content:</p> <ul style="list-style-type: none"> • (left atrium) to left ventricle • via {bicuspid/ av} valves • to aorta which takes blood to body • return of blood via vena cava • to right atrium • to right ventricle • via {tricuspid/ av} valve • to pulmonary artery to lungs • valve prevents backflow of blood <p>5-6 marks At least seven points from the 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 four points from the 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>	6			6		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
				1-2 marks At least one point from the indicative content <i>There is a basic line of reasoning which is not coherent, largely irrelevant, supported by limited evidence and with little structure. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar.</i> 0 marks <i>No attempt made or no response worthy of credit.</i>						
				Question 5 total	6	0	0	6	0	0

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
6	(a)	(i)		Enzyme-substrate complex		1		1		
		(ii)		Glycerol		1		1		
	(b)	(i)		0.11		1		1	1	1
		(ii)		Both scales correct + Y axes label =rate of reaction (1) All plots correct = 2 marks $\pm$ <1 small square 4 plots correct = 1 mark 0/1/2/3 plots correct = 0 marks Line joining plots (1) $\pm$ <1 small square	1	2 1		4	4	
		(iii)		As {temp/ it} increases rate of reaction increases to <u>40(°C)</u> / <u>0.21</u> and then decreases/ the rate of reaction peaks at <u>40(°C)</u> / <u>0.21</u> (1)		1		1		1
		(iv)		More kinetic energy/ increases movement of enzymes (1) More (successful) {collisions/ enzyme substrate complexes} (1)		2		2		
	(c)			To come to the {working/reaction} temperature/ to acclimatise/ equilibrate/ come to the same temperature as the water bath Ignore to get used to the temperature/ to warm up			1	1		
	(d)			Low in fat / does not contain (enough) fat/ as the fat in milk is needed for the experiment/ Only 1% fat		1		1		
				Question 6 total	1	10	1	12	5	3

Question				Marking details				Marks available					
								AO1	AO2	AO3	Total	Maths	Prac
7	(a)				Active transport	Osmosis	Diffusion	3			3		
				Energy (ATP) needed	✓	x	x						
				Against a concentration gradient	✓	x	x						
				Down a concentration gradient	x	✓	✓						
				One mark for each correct row									
	(b)			Any four (x1) from <ul style="list-style-type: none">Concentration of water is higher in the beaker than in the {sucrose solution/ Visking tubing}/ beaker is hypotonic to the sucrose solution/ ORA (1)Causing movement of water into the Visking tubing (1)Which is a {selectively/ semi/ partially} permeable membrane (1)(Correct ref to movement of water related to) osmosis (1){Volume of sucrose solution increases/ water entering Visking tubing} forcing solution up the tube (1)				1	2	1	4		4
				Question 7 total				4	2	1	7	0	4

FOUNDATION TIER

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	5	0	0	5	0	1
2	6	0	0	6	0	0
3	2	8	0	10	1	0
4	0	9	4	13	6	7
5	5	1	5	11	0	0
6	2	4	3	9	4	6
7	4	2	0	6	0	0
Total	24	24	12	60	11	14

HIGHER TIER

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	2	4	3	9	4	6
2	4	2	0	6	0	0
3	4	3	1	8	2	0
4	3	3	6	12	0	0
5	6	0	0	6	0	0
6	1	10	1	12	5	3
7	4	2	1	7	0	4
ACTUAL	24	24	12	60	11	13