GCSE MARKING SCHEME

SUMMER 2019

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

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INTRODUCTION

This marking scheme was used by WJEC for the 2019 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.

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DOUBLE AWARD SCIENCE
UNIT 1 BIOLOGY 1

MARK SCHEME SUMMER 2019

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.

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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

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
1	(a)	(i)		X = intercostal muscles (1) Y = rib(s) / ribcage(1)	1 1			2		
		(ii)		Alveoli / alveolus(1) NOT air sacs	1			1		
		(iii)		Relaxes (1) Increases (1)	1 1			2		
		(iv)		C	1			1		
	(b)			{blow into/ breathe in} {mouthpiece/ tube} (1) measure {drop in level of water / volume}/ take a reading/ reference to numbers e.g 3 litres (1)		2		2		2
	(c)	(i)		all 6 bars correct (2) ±<1 small square 4/5 bars correct (1) 0/1/2/3 bars correct = 0 marks		2		2	2	
		(ii)		**Any two (×1) from** female/male (1) age (1) fitness (1) height/ body mass/ obesity (1) practice (1) smoking (1) named lung conditions e.g. asthma (1)			2	2		
				Question 1 total	**6**	**4**	**2**	**12**	**2**	**2**

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
2	(a)	(i)		A – nucleus (1) contains {chromosomes/DNA/ genetic information}/ controls cells (activities)/ (1) B – <u>cell</u> membrane (1) controls {entry/exit} of {molecules/substances/owtte} (1)	1 1 1 1			4		
		(ii)		(aerobic) respiration (1) NOT anaerobic	1			1		
	(b)			Heart **and** phagocyte	1			1		
	(c)	(i)	I	16		1			1	
			II	50 ecf from(i)		1		1	1	
		(ii)		Carries oxygen (1) reference to improved diffusion/ absorption of more/ more gas exchange/ increased surface area for diffusion (1) carries **more** oxygen = 2 marks	1	1		1 1		
		(iii)		a specific {function/ job/ role/ purpose}	1			1		
				Question 2 total	**8**	**3**	**0**	**11**	**2**	**0**

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
3	(a)	(i)		glucose not present			1	1		1
		(ii)		glucose has {diffused/passed/ gone} through the {membrane/ tubing/ pores/ holes} (1) producing a positive result/ glucose is present (1)		1	 1	2		1 1
	(b)			true false given true true all 4 correct = 3 marks 3 correct = 2 marks 2 correct = 1 mark 0/1 correct = 0 marks		3		3		3
				Question 3 total	**0**	**4**	**2**	**6**	**0**	**6**

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)			low (pollution)		1		1		
	(b)	(i)		usual {wind/ smoke} {direction/ goes} {from East / to West/ from A / to B}/ left to right Ignore air/ pollution		1		1		
		(ii)		**Indicative content:** • examine trees • in wood A • Identify/ count/ spot/ see/ record • Type of lichen • Decides pollution type (example or using table) • look at wood B • compare A and B to (support/disprove hypothesis) • expect less lichen in B than A **5-6 marks** 6-8 indicative points *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.*		4	2	6		6

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
				3-4 marks 3-5 indicative points *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.* **1-2 marks** 1-2 indicative points *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.* **0 marks:** *No attempt made or no response worthy of credit.*						
				Question 4 total	**0**	**6**	**2**	**8**	**0**	**6**

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(a)	(i)		aorta	1			1		
		(ii)		carry blood/ oxygen/ glucose to the (heart) {muscle/ cells/ tissues}	1			1		
	(b)	(i)	I	{heart rate/ it} {rises / increases}		1		1		
			II	**Any two (×1) from:** • to supply <u>more</u> oxygen (1) • <u>more</u> glucose (1) • for {<u>continued/ more</u>} (aerobic) respiration/ more energy(1) • prevent {oxygen debt/ lactic acid build up}/ get rid of lactic acid (1) • muscles work {hard<u>er</u>/ long<u>er</u>}	2			2		
		(ii)		**Any two (×1) from:** • measure heart rate at rest (1) • measure heart rate after exercise until resting rate returns (1) • same {length/ time/ distance/ amount} of exercise (1) • same {intensity/ pace/ speed} of exercise for each person/ owtte (1)			2	2		2
		(iii)		**Any one (×1) from:** • both genders (1) • increase age range (1) • different areas of Wales (1) • bigger sample/ more people/ different schools (1) • different ethnicities (1)			1	1		
				Question 5 total	**4**	**1**	**3**	**8**	**0**	**2**

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
6/1	(a)			carbon dioxide + water (1) → glucose + oxygen (1) Reject energy as a product	2			2		
	(b)			80 = 2 marks If incorrect award 1 mark for 20/25 × 100;		2		2	2	
	(c)			**Any two (×1) from** • more chlorophyll / ORA for B (1) • more {light/ energy} {absorbed/ taken in}/ less {light/energy} reflected/ / ORA for B (1) • so more photosynthesis/ ORA for B (1) • more glucose/ starch produced/ ORA for B (1)		2		2		
				Question 6/1 total	**2**	**4**	**0**	**6**	**2**	**0**

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
7/2	(a)	(i)		amino acids	1			1		
		(ii)		small intestine/ duodenum/ ileum	1			1		
	(b)	(i)		protease is required (for protein digestion)			1	1		1
		(ii)		contains protease (1) must be acidic/at pH 2/low pH (1)			2	2		2
		(iii)		{protease/enzyme} is protein	1			1		
		(iv)		only protease digests protein / lipase {digests/ breaks down} {fat/ lipids} / lipase does not digest protein (1) reference to active site/ protein does not fit the lipase active site/ no enzyme substrate complexes can form (1)		2		2		
		(v)		temperature	1			1		1
				Question 7/2 total	**4**	**2**	**3**	**9**	**0**	**4**

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
3	(a)			**Any 2 (×1) mark** Heart (1) Blood vessels/named blood vessels (1) Trachea/ windpipe (1) Bronchi/ bronchus (not bronchioles) (1) Oesophagus/ gullet (1) NOT ribs/ intercostal muscles/ diaphragm/ alveoli	2			2		
	(b)			Any 5 (×1) from • Diaphragm {contracts / flattens/ lowers/ moves down} (1) NOT constrict/ tightens/ straightens/ gets thinner • {Intercostal/ rib} muscles <u>contract</u> (1) • causing {ribs/ rib cage/chest wall} to move {out /up}/ chest expands (1) • {Volume/ space} of (thoracic cavity/ chest/ thorax) increases (1) • Pressure in (thoracic cavity/ chest/ thorax) decreases (1) • Lungs {inflate/ expand/ increase in size/ get bigger}/ air enters the lungs/ volume of lungs increases (1)	5			5		
	(c)	(i)		0.09 = 2 marks **If incorrect award 1 mark for:** $\frac{4.8}{5\,500}$ × 100 (method) 0.04 (not doubling volume) 0.0872727 (not 2 dp) 0.08 (rounding down)		2		2	2	

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(c)	(ii)		Candidate must make very clear whether they are referring to the thorax (‘in life’) or the bell jar model. Any 2 for 1 mark each • balloons only occupy {0.04%/ 0.09%} of the space in the bell jar / balloons do not fill the jar/ ORA • Wall of bell jar is {rigid/ does not move}/ does not show the {<u>movement</u>/ <u>contraction</u>} of the intercostal muscles • At {rest/ expiration} rubber sheet is flat / diaphragm is domed}/ In inspiration rubber sheet pulls downwards further / diaphragm goes flat			2	2		
				Question 3 total	**7**	**2**	**2**	**11**	**2**	**0**

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)			(Kelp needs light for) photosynthesis	1			1		
	(b)			Can only {harvest/ take/ cut} up to 0.5 m/day/ Cannot {harvest/ take/ cut} more than 0.5 m/day/ cannot harvest more than they grow in a day			1	1		
	(c)	(i)		Both scales correct + axes labels (rate of flow of oxygen + mass of iodine + units (dm^3/ minute) + (mg/kg) (1) All plots correct = 2 marks ± <1 small square 5/6 plots correct = 1 mark 0/1/2/3/4 plots correct = 0 marks Line joining the plots drawn with a ruler (1)		1 2 1		4	4	
		(ii)		no effect/ stays the same/ stays at 780 (mg/kg)			1	1		
		(iii)		Results are reported as mg/kg			1	1		1
		(iv)		1.229091×10^4 = 2 marks Accept any correct rounding If incorrect award 1 mark for 1.2290×10^4 (incorrect rounding) 676/ 0.055 (method) 12 290.91 (not standard form) 12 291 (rounded not standard form) 12.29091×10^3 (any incorrectly expressed standard form)		2		2	1	
		(v)		Active {transport/ uptake} (1) Reference to respiration (1) Reference to {ATP/ energy} used (1) reject {make/produce} energy	3			3		

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(d)			**Any one (×1) from** • time period of the experiment (OWTTE) (1) • salinity/ concentration of the water (1) • light (1) • pH (1) • carbon dioxide concentration (1) • nutrient content (1) • volume of water (1) • size of flask (1)			1	1		1
				Question 4 total	**4**	**6**	**4**	**14**	**5**	**2**

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(a)	(i)		Atria (walls) are {thin(ner)/ less muscular) as they {pump/ send } {blood to the ventricles/ send blood a short distance}/ the ventricle (walls) are {thick(er)/ more muscular} as they {pump/ send} blood {to the lungs/ round the body/ a long distance} Ignore reference to left/ right		1		1		
		(ii)		{(Blood) pressure/ it} drops as it passes through the lungs/ The blood in the (pulmonary) artery has been pumped (by the heart) / the blood in the (pulmonary) vein has not been pumped Reject blood pumped by arteries		1		1		
		(iii)		**Any two (×1) from** • Left ventricle has a thicker wall (than the right ventricle) (1) • Left ventricle produces a higher pressure (in the aorta) (1) • (in order to pump) the blood travels {the longer distance/ further} (around the body)/ Pulmonary artery carries blood the shorter distance (to the lungs)/ Aorta carries blood around the body **and** pulmonary only to the lungs (1)		1 1		2		
	(b)			{the blood pressure/ pressure in pulmonary vein} is {too low/ is 10mmHg/ is not high enough} (1) (It goes back to the heart to) {receive 120 mmHg / increase pressure/ enough pressure/ to be pumped at high blood pressure} (to go around the body.) (1)			1 1	2		
	(c)			valves {prevent backflow of blood/ allow blood to flow in one direction only}	1			1		
				Question 5 total	**1**	**4**	**2**	**7**	**0**	**0**

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
6	(a)			***Indicative content:*** *Mucus function* • Ref. to (breathed in air containing) {dust / bacteria/ microbes} (not dirt/pollution) • Which {sticks to/trapped} by mucus *Cilia function* • Cilia moves the {mucus upward/ towards throat/ from lungs} • Mucus coughed {out/swallowed} (not spat out) • This prevents {dust/bacteria/mucus} entering the {alveoli/ lungs} *Smoking* • Smoke contains {soot/ tar/ particles} (not dust) • Which clogs the mucus/ makes mucus too thick for cilia to move • {Smoke/ chemicals/ smoking} {paralyses/damages} cilia/ {Smoke/ chemicals/ smoking} stops cilia from {working/beating} • Cleaning mechanism {fails/stops} /mucus {travels to alveoli/ is not moved up/ stays in lungs}/ owtte **5-6 marks** 7-9 points from indicative content *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.*	6			6		

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
				3-4 marks 4-6 points from indicative content *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.* **1-2 marks** 1-3 points from indicative content *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.* **0 marks:** *No attempt made or no response worthy of credit.*						
				Question 6 total	**6**	**0**	**0**	**6**		

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
7	(a)	(i)		(J) = 552 (kJ) = 0.552/ 0.55/ 0.6 ecf		1 1		2	2	2
		(ii)		5 072.46/ 5 072.5/ 5 072 = 2 marks ECF from (i) 2 800/ (answer from(i) in kJ **If incorrect award 1 mark for** 2 800 8 400 ÷ 3		1 1		2	2	2
		(iii)		Not all the energy is {used to heat/ goes into} the water/ not all the heat goes into the water/ some of the energy {is heating / has gone into} {environment / surroundings/ air} / some energy lost as light			1	1		1
	(b)			Made up of different amino acids / different amino acids are linked to form chains / the chains of amino acids are different (1) Because folding maintains the shape/ they can form an active site/ enzyme molecules are different because {they need to be specific to their substrates/ break down different substrates}/ different enzymes have different active sites (1)		2		2		
				Question 7 total	**0**	**6**	**1**	**7**	**4**	**5**

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FOUNDATION TIER

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	6	4	2	12	2	2
2	8	3	0	11	2	0
3	0	4	2	6	0	6
4	0	6	2	8	0	6
5	4	1	3	8	0	2
6	2	4	0	6	2	0
7	4	2	3	9	0	4
Paper TOTAL	24	24	12	60	6	20

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HIGHER TIER

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

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

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