GCSE MARKING SCHEME

SUMMER 2018

GCSE (NEW)
BIOLOGY - UNIT 1
3400U10-1 and 3400UA0-1

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INTRODUCTION

This marking scheme was used by WJEC for the 2018 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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WJEC GCSE BIOLOGY

UNIT 1

SUMMER 2018 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.

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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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FOUNDATION TIER

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
1	(a)			In table 1 false/ F/ × 2 false/ F/ × 3 true/ T/ ✓ 4 true/ T/ ✓ 5 false/ F/ × 5 correct = 3 marks 4 correct = 2 marks 3 correct = 1 marks 0/1/2 correct = 0 marks	1	2		3		
	(b)	(i)		Diabetes/tooth decay/obesity		1		1		
		(ii)		High blood pressure/ stroke/ heart disease/ CVD		1		1		
				Question 1 total	**1**	**4**	**0**	**5**	**0**	**0**

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
2	(a)			High (power)/ x40		1		1	1	1
	(b)			drop(s) of iodine/ iodine solution(1) onto {cells/onion} (1) (Lower) coverslip (1)	3			3		3
	(c)	(i)	I	79/ 80mm		1		1		1
			II	If 79 answer = 3950 (2) If 80 answer = 4000 (2) 79 or 80/0.02, but incorrect answer =1 Ecf from (I) e.g. 76 = 3800 (2)		2		2	2	2
		(ii)		Cell wall/ vacuole	1			1		
	(d)			Able to see structures in much greater detail/ owtte references to being able to see at higher magnification.	1			1		1
				Question 2 Total	**5**	**4**	**0**	**9**	**3**	**8**

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
3	(a)	(i)		Pulmonary vein	1			1		
		(ii)		Stop backflow (of blood)/ ensure blood only flows in one direction/ stops blood travelling backwards/ owtte Reject prevent backflow of blood into the ventricle	1			1		
	(b)	(i)	I	16.0 – 3.3 = 12.7 (kPa)		1		1	1	
			II	• aorta takes blood to the body **+** pulmonary artery takes blood to lungs / • aorta carries blood {further/ a greater distance}/ • {thicker (muscular) wall/greater pressure} in left ventricle Reject pumping blood with reference to artery		1		1		
		(ii)	I	{Blood pressure/ kPa} (in the capillaries) is {low/ lowest/ very low} Reject lower			1	1		
			II	Thin (walls)/ one cell thick	1			1		
				Question 3 total	**3**	**2**	**1**	**6**	**1**	**0**

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)			• Increase in number of cigarettes smoked related to increased deaths (per year from lung cancer) (1) • Decrease linked to fall in death rate (1) • Time lag between reduction in smoking and reduction in death rate.1951 – 71/OWTTE(1)			3	3		
	(b)	(i)		B		1		1		
		(ii)		C		1		1		
	(c)			Nicotine (1) is addictive (1)	2			2		
				Question 4 total	**2**	**2**	**3**	**7**	**0**	**0**

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(a)	(i)	I	Greater yield (with fertiliser)		1		1		
			II	{Maximum yield/ it} was not reached until after 1960/ until 100 years later/ until many years later		1		1		
		(ii)		Identifies the effect as being due to fertiliser/ a control/ for comparison/ to see if there is a difference			1	1		
	(b)	(i)		Reference to root (growth)	1			1		
		(ii)		Reference to leaf (growth)/yellowing of leaves prevented (1)	1			1		
				Question 5 total	**2**	**2**	**1**	**5**	**0**	**0**

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
6	(a)	(i)		Both for 1 mark Trachea + Bronchus NOT bronchiole	1			1		
		(ii)		Diaphragm {raised/ moves up/ becomes domed} (1) Volume decrease (1) Pressure increase (1)	3			3		
	(b)	(i)		exercise causes the breathing rate to increase = 1 mark more <u>intense</u> exercise, the <u>greater</u> {the increase/ the breathing rate} = 2 marks			2	2		
		(ii)		{More participants/increase sample size}/repeat the investigation			1	1		1
	(c)			<u>More</u> oxygen needed(1) For respiration (1)	**2**			2		
				Question 6 total	**6**	**0**	**3**	**9**	**0**	**1**

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
7	(a)			pH			1	1		1
	(b)	(i)		Scale correct with 0 or 10 at origin. Must cover more than half the grid	1			1	1	
		(ii)		All plots correct , (+/- 1 small square) (one error = 1 mark two/more errors =0)		2		2	2	
		(ii)		Quality of line		1		1	1	
	(c)	(i)		Increase (1) More (successful) collisions /OWTTE (1)		1	1	2		
		(ii)		Denaturation/ altering shape of {active site/ enzyme}/ enzyme destroyed	1			1		
		(iii)	I	40/Consistent with graph as drawn		1		1	1	
			II	Insufficient temperatures/no intermediate values (1) Increase number of temperatures tested {in 35^{o}– 45^{o} C range/ near optimum/ around 40} (1)			2	2		2
				Question 7 total	**2**	**5**	**4**	**11**	**5**	**3**

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
8	(a)			***Indicative content:*** • Herbivores Any two from: rabbits, mice, flies, aphids, • {Second stage consumers/carnivores} Any two from: birds of prey, shrews, spiders, ladybirds • more plants • {Herbivore/ flies/ aphids/ mice} increase in number • {carnivores/ shrews/ spiders/ ladybirds} increase in number • Numbers of mice could decrease • mice are the <u>only</u> source of food for birds of prey • numbers of birds of prey decrease • reference to competition **5-6 marks** *Herbivores and second stage consumers identified. Explanation of effect on populations if rabbits destroyed. Mice affected differently from other herbivores.* *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.* **3-4 marks** Reference to increased plant growth giving more food for named herbivores and hence secondary consumers (unnamed), Different status of mice not recognised *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.*	3	3		6		

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
				1-2 marks Any reference to increased food for herbivores with examples. OR any relevant reference to secondary consumers with an example. *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.*						
	(b)			Microorganisms/bacteria/fungi/ decomposers (1) Decay/ decomposition/ break down of animal bodies/ break them down (1)		**2**		**2**		
				Question 8 total	**3**	**5**	**0**	**8**	**0**	**0**

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OVERLAP

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
9/1	(a)			It allows {smaller/ small} molecules to pass through	1			1		
	(b)	(i)		Diffusion (through the pores) Accept osmosis	1			1		
		(ii)		(Molecule) B (1) it can {pass/ fit through} through <u>pores</u>/ A is too big to fit through <u>pores</u>/ <u>pores</u> are too small for A to fit through(1)		2		2		
	(c)	(i)		Iodine is <u>small</u> (molecule) (1) (Diffuses) into visking tubing (1) (reacts with) starch which is present (to give blue black colour) (1)	1 1	1		3		2
		(ii)		Starch is a large (molecule) (1) Cannot {pass out (through the membrane)/ fit (through pores)} (1)		2		2		2
	(d)			Oxygen/glucose	1			1		
				Question 9/1 total	**5**	**5**	**0**	**10**	**0**	**4**

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
10/2	(a)	(i)		carbon dioxide + water (1) $\longrightarrow$Glucose + oxygen (1)	2			2		
		(ii)		chlorophyll	1			1		
	(b)			14 = 2 marks If incorrect award 1 mark for incorrect rounding e.g. 14.333		2		2	2	
	(c)			greater the distance the lower the number of bubbles (1) there is less {light/ light intensity}(1) less photosynthesis (1) Accept reverse argument for each point		1	2	3		
	(d)			absorbs heat (but lets light through)/ ref. keeping temperature of experiment constant (1)			1	1		1
	(e)			collect <u>volume</u> of gas (1)			1	1		1
				Question 2 total	**3**	**3**	**4**	**10**	**2**	**2**

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HIGHER TIER

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
3	(a)			A – xylem B – phloem C - guard cell 3 correct = 2 marks 2 correct = 1 mark 0/1 correct = 0 marks	2			2		
	(b)	(i)		They are more efficient (at photosynthesis than non-specialised cells)	1			1		
		(ii)		It comprises several tissues performing function(s)	1			1		
	(c)	(i)		80/ 81mm	1			1		1
		(ii)		80 = 356/ 355.6/ 355.5555 = 2 marks 81 = 360 = 2 marks If incorrect award 1 mark for any of: 355 (incorrect rounding) 225/1000=0.225 80 or 81 x 1000 ECF from (i) e.g. 80.5 = 357.777 or 358 = 2 marks		2		2	2	2
				Question 3 total	**5**	**2**	**0**	**7**	**2**	**3**

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)			blood passes through the heart twice (1) during each full circuit/ cycle (1) Linked to 1st mark point OR blood must pass through pulmonary (1) and systemic system (1)	2			2		
	(b)	(i)		Bicuspid (valve)/left atrio-ventricular valve/ mitral/	1			1		1
	(c)			Any three (x1) from: Valve opens when heart/ ventricle contracts (1) Valve closes when heart/ ventricle relaxes (1) Prevents backflow (of blood) (1) (from aorta) to (left) ventricle (1)		3		3		
	(d)			left ventricle pumps blood to the body(1) right ventricle pumps blood to the lungs/ not as far}(1)	2			2		
	(e)			heart is a muscle (1) (exercise) increases heart size/ heart gets stronger with (exercise)/ (exercise) builds up heart size (1) Heart becomes more muscular = 2 marks			2	2		
	(f)	(i)		CO 5 minutes = 70 x 70 = 4900 **+** CO 20 minutes = 110 x 70 = 7700 (1) (*1 mark for calculating both cardiac outputs)*		1		1	1	
		(ii)		57/57.1/57.142857 = 2 marks If incorrect award 1 mark for 2800/4900 x 100 Incorrect rounding of above answer ECF from (i)		2		2	2	
				Question 4 total	**5**	**6**	**2**	**13**	**3**	**1**

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(a)			Any 2 (x1) from **<u>warm spring</u>** faster growth of algae/ faster reproduction/ enzymes working faster/more photosynthesis (1) **<u>still June</u>** ref. nutrients not being mixed/distributed throughout whole body of water (1) **<u>wet July and August</u>** more {nutrients/fertilisers/ sewage} (from surrounding lan)d washed into lake (1) ignore pesticide		2		2		
	(b)			Any 3 (x1) from: 1. (Increased) competition for light/ light is blocked (1) 2. some {algae/ plants} (start) dying (1) 3. {bacteria/ microbes/ decomposers} {decomposing / rotting/ breaking down} dead plants (1) 4. use up oxygen for respiration (1) 5. arctic char suffocate/ owtte (1)	3			3		
	(c)	(i)		indicator species/biological indicators	1			1		
		(ii)		<u>no</u> pollution (1) <u>high</u> level of oxygen (1)			2	2		
		(iii)		sample {all/ other} rivers flowing into {Ilyn Padarn/ this lake} (1) ref. reasonable time period, e.g. every month from April to September (1)			2	2		
				Question 5 total	**4**	**2**	**4**	**10**	**0**	**0**

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
6	(a)	(i)		Y		1		1		
		(ii)		maintain <u>optimum</u> pH (1) for (digestive) enzymes (1)	2			2		
		(iii)		Any one (x1) from: temperature/ volume/mass of food/ volume of enzymes/ concentration of enzymes/ time the food is in the gut			1	1		
		(iv)		{Fats/ lipids/ oils} {digested/ broken down} to fatty acids and glycerol	1			1		
	(b)			protease (1) proteins {digested/ broken down} to amino acids (1)			2	2		
	(c)			Any two **(x1)** from: 1. artificial gut gives reproducible results/ 2. easier to control [qualified -variables of artificial gut]/ 3. some factors cannot be controlled in a human/ check repeatability (1) 4. human trials are costly/ resource intensive/OWTTE (1) 5. human trials can be ethically disputable/ ethical issues/ / there are risks to humans/ OWTTE /ORA (1) 6. no need to find volunteers (1)		2		2		
				Question 6 total	**3**	**3**	**3**	**9**	**0**	**0**

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
7	(a)	(i)		13.44/13.4/13 = 3 marks If incorrect award 1 mark for each of breathing rate = 5/25 x 60 = 12 (1) volume of CO_2 = 5.6/5 = 1.12 (1)		3		3	3	3
		(ii)		colour change is {subjective/qualitative}/ref. to difficulty of noting when colour has changed			1	1		1
	(b)	(i)		more {energy/ATP} is needed (for exercise) (1) from <u>aerobic</u> respiration (1)		2		2		
		(ii)		(more {energy/ATP} is now being released by) <u>anaerobic</u> respiration (1) Lactic acid production (causing cramp) (1)		2		2		
		(iii)		Individual 4 because they had <u>cramp</u> {at a lower intensity of exercise/ soonest}			1	1		
	(c)			more accurate measurement of aerobic respiration/ref. validity of conclusions/increased confidence			1	1		
				Question 7 total	**0**	**7**	**3**	**10**	**3**	**4**

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
8	(a)			large surface area/ large area for absorption	1			1		
	(b)			Higher concentration of water outside the cell /lower concentration of solutes outside (1) Water moves into the cell (down a concentration gradient)(1) Through a selectively permeable membrane (1) via osmosis (1)	4			4		
	(c)			***Indicative content:*** • lack of oxygen therefore less aerobic respiration • less energy available • less ATP produced; • active transport of mineral salts • transporting from low to high concentration • Requires ATP/ energy • there is mineral/ nutrient deficiency • poor growth - lack of nitrates • yellow leaves - lack of potassium **5-6 marks** All mineral deficiencies should be accounted for as well as linking oxygen lack of oxygen with less ATP from active transport needed for 6 marks. Use of energy rather than ATP gains 5 marks *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.*	2	4		6		

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
				3-4 marks Description of one of two mineral deficiencies, linking aerobic respiration with lack of oxygen. *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** • there is mineral deficiency • poor growth - lack of nitrates OR yellow leaves - lack of potassium Reference to mineral deficiency and one plant nutrient gains 2 marks. No mention of specific nutrient gains 1 mark. *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 8 total	**7**	**4**	**0**	**11**	**0**	**0**

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FOUNDATION TIER

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	1	4	0	5	0	0
2	5	4	0	9	3	8
3	3	2	1	6	1	0
4	2	2	3	7	0	0
5	2	2	1	5	0	0
6	6	0	3	9	0	1
7	2	5	4	11	5	3
8	3	5	0	8	0	0
9 (OVERLAP)	5	5	0	10	0	4
10 (OVERLAP)	3	3	4	10	2	3
Target	32	32	16	80	8	12
TOTAL	32	32	16	80	11	19

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HIGHER TIER

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	5	5	0	10	0	4
2	3	3	4	10	2	3
3	5	2	0	7	2	3
4	5	6	2	13	3	1
5	4	2	4	10	0	0
6	3	3	3	9	0	0
7	0	7	3	10	3	4
8	7	4	0	11	0	0
Target	32	32	16	80	8	12
TOTAL	32	32	16	80	10	15

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