GCSE MARKING SCHEME

SUMMER 2019

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

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.

WJEC GCSE BIOLOGY - UNIT 1

SUMMER 2019 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)*			Cells Organs Organisms	3			3		
	(b)	(i)		**C**	1			1		
		(ii)		Each cell is {adapted/ differentiated/ suited/ made for} to a particular {function/ job/ role} (1) {More efficient / better at the function/ more effective}/ any relevant qualified example of a specialised cell e.g. red blood cell contains haemoglobin to carry oxygen (1)	2			2		
	(c)	(i)		Oesophagus Accept gullet NOT foodpipe	1			1		
		(ii)		Digestive/ digestion	1			1		
		(iii)		Muscles (1) Contract (1) to {force/push} food (1)		3		3		
				Total for Question 1	**8**	**3**	**0**	**11**	**0**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
2	*(a)*	(i)		Active site	1			1		
		(ii)		Protein molecule shown in the active site. Indicated by the active site being shaded in or a line drawn to close the active site.		1		1		
	(b)	(i)		Pprotease	1			1		
		(ii)		Amino acids	1			1		
	(c)	(i)		(Shape of) {active site/ region Y} changed (1) {Substrate/ protein} cannot fit / {substrate/ active site} is no longer complementary/ enzyme substrate complexes cannot form/ (1)	1	1		2		
		(ii)		High temperature / boiling / too hot/ overheated/ above optimum temperature {Wrong/ not at optimum/ unsuitable} pH/ {above/ below} optimum pH	1			1		
				Total for Question 2	**5**	**2**	**0**	**7**	**0**	**0**

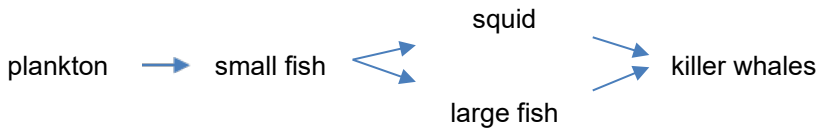
Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
3	*(a)*	(i)		*Blue to .....* orange /(brick) red/ green/ brown/ yellow *Brown to ....* black /blue-black	2			2		
		(ii)		Add {the Benedict's/ it} to the {sample / liquid / test tube/ boiling tube} and {heat strongly/ boil} (1) Accept any temperature above 60 °C	1			1		1
	(b)			• Glucose passed through **and** starch (molecules) have not passed through (1) • the membrane/ (Visking) tubing (1) • The pores are too small for starch/ the starch is too big/ glucose is small enough / pores are large enough for glucose (1)		2	1	3		3
	(c)			• Changes (from blue) to orange/ (brick) red/ there would be a positive result (1) • Glucose present (1) • Starch {broken down/ digested/ changed to glucose} / enzyme has acted on the starch (1)		1	2	3		2
				Total for Question 3	**3**	**3**	**3**	**9**	**0**	**6**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
4	*(a)*	(i)		<table><tr><th>Hazard</th><th>Risk</th><th>Control measure</th></tr><tr><td>Apparatus is hot</td><td>Burning {skin/ yourself} when {moving / touching} {apparatus/ boiling tube} (1)</td><td>Allow apparatus to cool / use tongs (to hold boiling tube)/ wear <u>heatproof</u> gloves (1)</td></tr></table>		2		2		
		(ii)	I	Use a balance / (weighing) scales		1		1		1
			II	Any **two** (×1) from: Volume of water (1) Distance of {food/ flame} from test tube (1) {Mass/ weight} of food (1) Starting temperature (1)			2	2		2
			III	{Measure/ take/ record} {temperature/ °C} (of water using a thermometer) before and after burning (1) Calculate the difference in temperature (1) End temperature – start temperature = 2 marks			2	2		2
		(iii)		{Total/ maximum/ all} energy (content) released (or equivalent wording)		1		1		1
	(b)	(i)		28.0 (*J/g*) = 2 marks 28 = 1 mark $\frac{252}{9}$ = 1 mark		1 1		2	2	
		(ii)		Plain (allow ecf if calculation error made) as highest energy content <u>per gram</u>			1	1		2
				Total for Question 4	**0**	**6**	**5**	**11**	**2**	**10**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
5	*(a)*			Oxygen (1) accept correct chemical symbols Water (1) accept correct chemical symbols	2			2		
	(b)			***Indicative content:*** *Recognition of* • {Differences/ changes} in levels of O_2 • {Differences/ changes} in levels of CO_2 • No change in nitrogen • Water vapour {increases/ changes} • Reference to respiration • CO_2 released (in respiration) • O_2 {taken up/ used} (in respiration) • Water (vapour) released (from the body) • Any reference to gas exchange {at lungs/ alveoli/ in breathing} / O_2 enters the blood and CO_2 leaves the blood **5-6 marks** 7-9 points of 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.* **3-4 marks** 4-6 points of 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.*						

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
				1-2 marks 1-3 points of 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.*	3	3		6		
				Total for Question 5	**5**	**3**	**0**	**8**	**0**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
6	*(a)*	(i)		Glucose	1			1		
		(ii)	I	A cuticle	1			1		
			II	(More) Light is {absorbed/ taken in} {by chlorophyll/ in chloroplasts} (1) {Palisade cells/ it/ they} have <u>most</u> {chloroplasts/ chlorophyll} (1) {Palisade cells/ it/ they} are near the upper surface (of the leaf so absorb light efficiently) (1)	1	1 1		3		
	(b)	(i)		Correct scale (1) 6 plots correct 2 marks ±<1 small square 4/ 5 plots correct 1 mark Line (1) no extrapolation		1 2 1		4	4	
		(ii)	I	Increase (in rate) then decrease Identification of 35 (°C)/ 64 (a.u.) ecf from 6bi			1 1	2		
			II	29		1		1	1	
		(iii)	I	35 (°C) associated with highest rate of <u>photosynthesis</u> ecf			1	1		
			II	Increase the number of temperatures tested in the 30 – 40 range			1	1		1
				Total for Question 6	**3**	**7**	**4**	**14**	**5**	**1**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
7/1	*(a)*	(i)		 5 correct organisms = 3 marks 4 correct organisms = 2 marks 3 correct organisms = 1 marks 0/1/2 correct organisms = 0 marks		3		3		
		(ii)		{tertiary/ third level/ third stage} consumer NOT third unqualified	1			1		
	(b)			32 / 31.9 ignore units		1		1	1	
	(c)			Bacteria / fungi / saprophytes/ decomposers	1			1		
	(d)			{They/PCBs} {accumulate/ build up} in {tissue/ fat} / bioaccumulation of PCBs/ <u>concentration</u> increases the further along a food chain (1) until it reaches {toxic/ lethal/ fatal/ deadly} {dose/ levels} (1)	2			2		
	(e)			Reduced fertility/ infertility/ stops reproduction (1) Ignore affecting fertility No {killer whales/ offspring} born (1)	1	1		2		
	(f)			PCBs do not {breakdown/ decompose}/ not biodegradable/ do not degrade/ {break down/ decompose} slowly			1	1		
				Total for Question 7/1	**5**	**5**	**1**	**11**	**1**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
8/2	*(a)*			xylem (vessels);	1			1		
	(b)			Any **two** (×1) from: • Photosynthesis/ chemical reactions • Transport {of minerals/ nutrients/ named mineral/ NPK} • Support / keeps cells turgid/ stops wilting NOT keep plants turgid • Cooling effect (of transpiration)	2			2		
	(c)	(i)		0.6 / 0.57/ 0.574712643678161 Accept any correct rounding		1		1	1	1
		(ii)		{Transpiration / uptake of water} is faster in beech cuttings / ORA It = bay tree			1	1		1
	(d)	(i)		Any **one** (×1) from: • light intensity/ strength of light • (air) temperature NOT water temperature • wind speed/ air movement • humidity • number of leaves/ surface area of leaves • age of shoot • diameter of capillary tube			1	1		1
		(ii)		Repeat the experiment/ check other groups results/ check reproducibility			1	1		1
	(e)			Any **two** (×1) from: • Sugars are not transported in xylem/ xylem (only) transports water /{This apparatus/ it} only measures {water loss/ uptake/ transpiration } • Sugars are transported in phloem/ The movement of sugars in the phloem would not affect the movement of water in the capillary tube		2		2		
				Total for Question 8/2	**3**	**3**	**3**	**9**	**1**	**4**

<table>
<tr><th colspan="4" rowspan="2">Question</th><th rowspan="2">Marking details</th><th colspan="6">Marks available</th></tr>
<tr><th>AO1</th><th>AO2</th><th>AO3</th><th>Total</th><th>Maths</th><th>Prac</th></tr>
<tr><td>3</td><td>(a)</td><td></td><td></td><td>
<table>
<tr><td>Hazard</td><td>Risk</td><td>Control measure</td></tr>
<tr><td>Iodine solution is an irritant</td><td>Transfer of iodine solution from hand to eye can irritate the eyes</td><td>Use lowest concentration possible</td></tr>
<tr><td>{Coverslips/ slides} are sharp</td><td>can cut skin when making slide</td><td>handle carefully</td></tr>
<tr><td>Knife is sharp</td><td>Cut skin when cutting onion</td><td>Cut away from body/ use a white tile</td></tr>
<tr><td>Lamp is hot</td><td>Burn hand when {moving/ touching} lamp</td><td>Leave to cool before moving</td></tr>
<tr><td colspan="3">Correct hazard = 1 mark
Correct risk + control measure = 1 mark</td></tr>
</table>
</td><td>2</td><td></td><td></td><td>2</td><td></td><td>2</td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td></td><td>Clear outline of cell + nucleus = 1 mark
Accept single or double line for cell wall</td><td></td><td>1</td><td></td><td>1</td><td></td><td>1</td></tr>
<tr><td></td><td></td><td>(ii)</td><td></td><td>cell wall + nucleus + cytoplasm = 2 marks
any 2 from 3 = 1 mark</td><td>2</td><td></td><td></td><td>2</td><td></td><td>2</td></tr>
<tr><td></td><td>(c)</td><td></td><td></td><td>multiply the (power of the) <u>eyepiece</u> (lens) and the <u>objective</u> (lens)</td><td>1</td><td></td><td></td><td>1</td><td></td><td>1</td></tr>
<tr><td></td><td></td><td></td><td></td><td>Total for Question 3</td><td>5</td><td>1</td><td>0</td><td>6</td><td>0</td><td>4</td></tr>
</table>

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
4	*(a)*			• Water moved in (1) • by osmosis (1) do not award if incorrect context • from a high {concentration of water/water potential} to a low(er) {concentration of water/water potential} / from a low concentration of solutes to a higher concentration of solutes / down a water {potential/ concentration} gradient (1) • through a {partially /semi/ selectively} permeable membrane (1)	3	1		4		4
	(b)			estimate > 0.2 < 0.3mol/ dm^3 (1) mass decreased in bag A, but increased in bag B (therefore concentration must be in between) / water has moved out of {A/0.2} but into {B/0.3} (1)			2	2		2
				Total for Question 4	**3**	**1**	**2**	**6**	**0**	**6**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
5	*(a)*			A = trachea(1) B = bronchiole(s) (1)	2			2		
	(b)			• Rubber sheet {pulled/ moves/ goes} down (1) • increases volume (1) • pressure decreases (1) • air {drawn/ rushes} in / balloons inflate (1)	2	2		4		
	(c)			Any **two** (×1) from • Jar is {rigid/ cannot move} / ribs can move (up and down)/ does not show the {<u>movement</u>/ <u>contraction</u>} of the intercostal muscles (1) • Balloon does not fill the space / lungs do fill the space in the thorax (1) • Rubber sheet pulls down further /diaphragm only goes flat/ diaphragm is dome shaped when relaxed/ rubber sheet is flat at the start of inspiration			2	2		
	(d)	(i)		Any **one** (×1) from • The left and right lung are in separate cavities, (so if there is an injury on one side the other side will not collapse) / • They have two lungs that are separate / • The {left/ other} lung <u>can still work</u> normally		1		1		
		(ii)		Balloons will {not inflate/ inflate less} (1) Air is being drawn in through the hole (rather than down the tube) (1)		1	1	2		
				Total for Question 5	**4**	**4**	**3**	**11**	**0**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
6	*(a)*			Peristalsis	1			1		
	(b)			X = pancreas/ pancreatic duct (1) Y = liver (1)	2			2		
	(c)	(i)	I	Protease/ trypsin	1			1		
			II	Carbohydrase/ amylase	1			1		
		(ii)		Rate of digestion has increased / % digestion (of oil) increased / faster digestion (of oil) (1) Emulsification/ break down (of large droplets) to smaller droplets (1) NOT break down of molecules Greater surface area for {enzyme/ lipase}(1)	1	2		3		
		(iii)		Fatty acids **and** glycerol (1) Energy (1)	1	1		2		
	(d)			Must pass through stomach {which is acidic/ where there is acid/ which has a low pH} (1) Enzymes could be denatured (1)			2	2		
	(e)			Enzymes are proteins (1) Different enzymes contain <u>different</u> amino acids / ref. specificity of enzymes therefore must have <u>different</u> (shaped) active sites/ Specific shape to fit the substrates (1)	1	1		2		
				Total for Question 6	**8**	**4**	**2**	**14**	**0**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
7				**Indicative content** Advantages • More {meat/ eggs/ chicken/ food} / Higher {yield/production} • Less land required / chickens housed in smaller area • Cheaper food • More jobs / more income / more cost effective / more profit/ less energy lost through movement/ less loss to predators Disadvantages • {pesticide/manure} washed into {streams/rivers} / ref. to <u>pollution</u> from {smell/traffic/noise}/ explanation of eutrophication/ pesticide entering food chain • Excess use of antibiotics / ref. to development of antibiotic resistant bacteria • Ref. negative impact on animal welfare / increased incidence of disease Environmental Impact Assessment • Ref. effects on {wildlife/biodiversity} / identify endangered species/ habitat destruction • Decide whether plans {go ahead / are refused / need to be modified} / ref. monitoring effect of plans						

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
				5-6 marks 7-9 points of 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.* **3-4 marks** 4-6 points of 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 of 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.*		6		6		
				Question 7 Total	**0**	**6**	**0**	**6**	**0**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
8	*(a)*			Fibre(1)		1		1		
	(b)			Link to {type 2 diabetes/obesity/tooth decay}	1			1		
	(c)			**Energy calculated from the experiment (J/g)** 1 034 = 2 marks 1 033.846153846154 = 1 mark (4.2 × 20 × 16)/ 1.3 = 1 mark **Energy calculated from the experiment (kJ/g)** 1.034 (1) (ecf from above) **Energy recorded on label in kJ/g** 6.58(kJ) (1)		4		4	2	2
	(d)			386.92077/387/386.9 = 2 marks **If incorrect 1 mark for** 18.108/4.680 22.788 - 4.680 = 18.108		2		2	2	2
	(e)			Any **two** (×1) from: • Complete burning *linked to* enhanced oxygen concentrations(1) • {More heat transferred to water/less heat lost} *linked to* container filled with water surrounding burning food (1) • More heat transferred to water/less heat lost} *linked to* heat transfer coil(1) • Less heat lost to environment *linked to* heat proof platform(1) • Equal distribution of temperature in water container *linked to* stirrer(1) Reject no heat loss/ wasted			2	2		3
				Total for Question 8	**1**	**7**	**2**	**10**	**6**	**9**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
9	*(a)*	(i)		Carbon dioxide + Water (1) = Glucose + Oxygen (1) Accept correct symbols (does not need to be balanced) Ignore ref. chlorophyll + sunlight energy on arrow Reject energy on either side of the equation	2			2		
		(ii)		Any **one** (×1) from: • Carbohydrates/ sucrose/ cellulose/ starch NOT glucose) • Fats/ oils/ glycerol/ fatty acid • Proteins/ amino acids • Nucleotides/ named nucleotide	1			1		
	(b)	(i)		150 Giga tonnes (of carbon/year)		1		1	1	1
		(ii)		{light / temperature} start to become limiting factors OR Stomata begin to close reducing gas exchange			1	1		1
	(c)	(i)		{They reproduced the experiments / many experiments carried out} {worldwide / other countries}			1	1		
		(ii)		Plants may grow differently outdoors compared to greenhouses/ Conditions in greenhouses are controlled but conditions outside are not Ignore references to controlling carbon dioxide			1	1		
				Total for Question 9	**3**	**1**	**3**	**7**	**1**	**2**

FOUNDATION TIER

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	8	3	0	11	0	0
2	5	2	0	7	0	0
3	3	3	3	9	0	6
4	0	6	5	11	2	10
5	5	3	0	8	0	0
6	3	7	4	14	5	1
7	5	5	1	11	1	0
8	3	3	3	9	1	4
TOTAL	32	32	16	80	9	21

HIGHER TIER

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	5	5	1	11	1	0
2	3	3	3	9	1	4
3	5	1	0	6	0	4
4	3	1	2	6	0	2
5	4	4	3	11	0	0
6	8	4	2	14	0	0
7	0	6	0	6	0	0
8	1	7	2	10	6	9
9	3	1	3	7	1	2
TOTAL	32	32	16	80	9	21