



GCSE MARKING SCHEME

SUMMER 2019

**GCSE
BIOLOGY - COMPONENT 1
C400U10-1 AND C400UA0-1**

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.

EDUQAS GCSE BIOLOGY
COMPONENT 1 - CONCEPTS IN BIOLOGY
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

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
1	(a)	(i)		37.5/ 38 (%) = 2 marks If incorrect award 1 mark for: 300/800 0.375 37%		2		2	2	
		(ii)		(Biomass lost in) respiration / production of new cells / (named) waste/ heat	1			1		
	(b)	(i)		Pyramid of correct overall shape (1) Organisms correctly place, with masses (1)		2		2		
		(ii)	I	(Aquatic) plants	1			1		
			II	Beetle/ minnow /pike + Feeds on another animal/ named animal (1)		1		1		
	(c)	(i)		fertilizer / nitrate/ NPK	1			1		
		(ii)		Increased food supply/ more plants to eat		1		1		
				Question 1	3	6	0	9	2	0

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
2	(a)	(i)		Very large numbers of plants / enough plants for statistical tests to be carried			1	1		1
		(ii)		Lectures/ publications/ wrote articles		1		1		
		(iii)		1900 (1) Same experiments carried out by others (1)		1	1	2		1
		(iv)		Chromosomes occur in pairs (1) {Mendel's factors/ genes} were in pairs (1)			2	2		
	(b)	(i)		XY (1) XX (1)	2			2		
		(ii)	I	X X and X Y		1		1		
			II	XX XX XY XY		1		1		
			(iii)	50% consistent with Punnett square and (i)		1		1	1	
				Question 2	2	5	4	11	1	2

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
3	(a)			Cerebral hemispheres/ cerebrum/ cerebral cortex (1)		1		3		
				Balance /coordination (of movement) (1)		1				
				Medulla (1)	1					
	(b)	(i)		C Iris	1			1		
		(ii)		B Lens	1			1		
	(c)	(i)		Short-sightedness / myopia		1		1		
		(ii)		Caused by eyeball being too long/ image not focussed on retina (1) Compensated by wearing concave lenses (1)	2			2		
				Question 3	5	3	0	8	0	0

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)	(i)		B and C	1			1		
		(ii)		Renal artery labelled		1		1		
	(b)	(i)		Bowman`s capsule	1			1		
		(ii)		Increase in pressure / for filtration under pressure / ultrafiltration	1			1		
	(c)	(i)		50 (%) = 2 marks If incorrect award one mark for 150/300		2		2	2	
		(ii)	I	Urea		1		1		
			II	No glucose is removed (from the blood -so none in urine) (1) Some of the protein is removed (-so passes into urine.) (1)			2	2		
		(iii)	I	Add biuret reagent to a sample of urine - lilac colour indicates protein (1)	1			3		3
			II	Add Benedict`s reagent - red/orange colour indicates glucose (1) Heat strongly /boil (1)	2					
				Question 4	6	4	2	12	0	3

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(a)			In the blood	1			1		
	(b)	(i)		Pancreas and correct position identified	1			1		
		(ii)	I	B / carbohydrates	1			1		
			II	When glucose rises (above normal range at 30 min) {insulin is at its highest/ insulin level also. (1) Glucose level then falls (to within normal range)/ glucose falls from 30 minutes (1)		2		2		
			III	Insulin level falls and then becomes steady/ owtte(1) Insulin concentration falls because glucose concentration falls(1) From 150 min, {no increase in insulin/ insulin level is steady} because glucose level is normal (1)		1	1	3		
			IV	C/ negative feedback	1			1		
				Question 5	4	3	2	9	0	0

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
6	(a)	(i)		(protein molecules composed of) different amino acids (1) Folded into unique shape/ leading to different active site (1)	2			2		
		(ii)		Active site	1			1		
		(iii)	I	Substrate drawn in active site (1)	1			1		
			II	Lock and Key	1			1		
	(b)	(i)		Lipase digests fats into fatty acids (and glycerol) (1) Fatty acids lower the pH value (causing the colour change) (1)			2	2		2
		(ii)		107 = 2 marks If incorrect award 1 mark for $\frac{320}{3}$ 106.67 / 106.666666		2		2	2	2
		(iii)		(As temperature increases) enzyme activity rises and falls (1) Change at 30° C recognised (1)			2	2		2
		(iv)	I	30 °C		1		1		1
			II	Increase the number of temperatures tested within the 20 – 40 range/ test at smaller intervals of temperature			1	1		1
				Question 6	5	3	5	13	2	8

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
7	(a)	(i)		<i>Hymenoscyphus fraxineus</i>		1		1		
		(ii)		Cuticle/ cell walls/ waxy layer/ pectin	1			1		
		(iii)		A and D		1		1		
		(iv)		Use of a {living organism/ predator} (1) To {kill/ reduce/ control} the numbers of a <u>pest</u> organism (1)	2			2		
		(v)	I	Identify trees which are resistant (1) {Reproduce/ breed} <u>these</u> trees (or equivalent wording) (1)		1	1	2		2
			II	No {chemical / biological} control available yet / no other effective {control/ fungicide} available			1	1		
		(vi)		Other species will be lost (if ash trees are killed) (1) As ash trees provide habitat of many other species (1)		2		2		
	(b)	(i)		Scale correct (1) All plots correct = 2 marks , 3/ 4 plots correct = 1 mark <±1 small square Line quality (1)	1	3		4	4	
		(ii)		Similarity – increase up to 2016 (1) Difference – decrease in Scotland {in 2017/ after 2016}, (not in Wales)/ Scotland {increase greater/ reaches higher number} up to 2016/ ORA (1)			2	2		
		(iii)	I	30 = 2 marks If incorrect award 1 mark for $\frac{91}{3}$ 30.33	2			2	3	
			II	126 Ecf from I		1		1		
		(iv)		Same method of observation /same time of year/ same age of trees/ reference to random sampling/ same location			1	1		1
				Question 7	6	9	5	20	7	3

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
8	(a)		(Disease which results from infection by a) {pathogen/ bacteria/ virus/ fungus/ micro-organism}/ disease can be passed from one organism to another (1) Influenza (as specification) or other correct example (1)	2			2		
	(b)		<p>Indicative content:</p> <p><i>Person A lifestyle factors</i></p> <ul style="list-style-type: none"> • <i>Intake of alcohol too high</i> • <i>Energy intake too high/ BMI too high</i> • <i>Insufficient exercise.</i> <p><i>Person B lifestyle factors</i></p> <ul style="list-style-type: none"> • <i>Exposure to uv light / sunbathing too high</i> • <i>Smoker</i> <p><i>Person A disease</i></p> <ul style="list-style-type: none"> • <i>Risk of type 2 diabetes</i> • <i>Risk of CVD/ cirrhosis</i> <p><i>Person B disease</i></p> <ul style="list-style-type: none"> • <i>Risk of cancer(s), including lung, skin,</i> • <i>Emphysema</i> <p>5-6 marks 7-9 indicative points <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 4-6 indicative points <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>	3	3		6		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
				<p>1-2 marks 1-3 indicative points <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: No attempt made or no response worthy of credit</p>						
				Question 8	5	3	0	8	0	0

Question 9 /1			Marking details	Marks available						
				AO1	AO2	AO3	Total	Maths	Prac	
9/1	(a)	(i)		Pulmonary vein and left atrium	1			1		
		(ii)		Semi-lunar (1) Prevents backflow of blood (from pulmonary artery into ventricle /heart) (1)	2			2		
	(b)	(i)		Blood passes through the heart twice / One (circulation) to lungs and one to the body (organs.)/ pulmonary and systemic (circulation)	1			1		
		(ii)	I	0.6 (in table)		1		1		
			II	Left ventricle has {thicker wall /more muscle (in wall)/greater {force/ pressure} when contracting} (than right ventricle)/ ORA	1			1		
			III	{low pressure/ only 0.6} in vena cava/ pressure is too in vena cava (leaving the organs) (1) Accept 0.6 as a reference to vena cava More {force/ pressure} needed (for blood to reach the lungs)/ blood needs to be pumped <u>again</u> (to reach lungs) (1)	1		1	2		
	(c)			2.52 dm ³ = 3 marks If incorrect award 2 marks for 2.520/ 2.5 dm ³ If incorrect award 1 mark for 2520 (cm ³) 70 × 72 × 5		3		3	3	
	(d)			A (1) Diffusion (1) Thin wall/{wall/ it} is only one cell thick (1)	1	1		3		
				Question 9	7	6	1	14	3	0

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
10/ 2	(a)			spongy (mesophyll cell)	1			1		
	(b)	(i)		4 380 (mm ² if not written in table.)		1		1		
		(ii)	I	Fewer stomata/ smaller surface area/ thicker cuticle (in P) (1) {Less/reduced/ no} {evaporation / loss of water} (vapour from leaves) (1)		2		2		
			II	Any three (×1) from: <ul style="list-style-type: none"> • Large(r) leaf area (1) • More/ many chloroplasts (in palisade cells) (1) • Thin(ner) cuticle (1) • More light {absorbed/ owtte} (1) • Greater number of stomata for CO₂ intake (1) 		3		3		
	(c)			xylem cells are dead/ phloem cells are alive/ xylem carries water/ xylem contains lignin (1)	1			1		
	(d)	(i)		Hypothesis is supported (1) Sugars pass to {young leaves (=upwards) and old leaves/ roots (=downwards)/ all parts of plant} (1) Sugar reaches young leaves before older leaves although distance from leaf A is shorter/ Sugar reaches {young leaves/ top of plant} before {root/ bottom of plant} although distance from leaf A is the same. (1)			3	3		3
		(ii)	I	Do the same investigation again (using the same method)			1	1		1
			II	Test a larger number of plants / ref to reproducibility			1	1		1
		(iii)	I	Iodine (solution dropped onto to sample of root material) (1) Colour change (from brown) to black observed (1)	2			2		2
			II	To remove any starch from the plant/ de-starch the plant,	1			1		1
Question 10/2					5	6	5	16	0	8

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
3	(a)	(i)	Eukaryotes correctly placed (1)	1			1		
		(ii)	Both correctly placed (1) Protists/ single celled organisms Fungi	1			1		
	(b)	(i)	(Linnaeus classified) according to morphology/ appearance/ shape/ what they looked like (1) (Scientist in 2007 classified according to) DNA analysis/ genetic profiling/ study DNA/ mapping genome (1) Accept reference to RNA/ genes		2		2		
		(ii)	Any two (×1) from: <ul style="list-style-type: none"> • Research was based on inaccurate information • Less confidence in conclusions/ less valid • Uncertain which leech has been used in research • Research will need to be re-examined 			2	2		2
			Question 3 total	2	2	2	6	0	2

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)	(i)	I	Sugar clearly labelled (1)	1			1		
			II	Phosphate clearly labelled (1)	1			1		
		(ii)		Double helix	1			1		
	(b)	(i)		G = 19.1% = 3 marks G = 19 % = 2 marks If incorrect A + T = $30.9 \times 2 = 61.8\%(1)$ C+G = $100 - 61.8 \% = 38.2\% (1)$		3		3	3	3
		(ii)		Experimental error/ inaccurate measurements (1)			1	1		
	(c)	(i)		<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Allele 1</p> <p>A A G T G G A C G C T C</p> <p>Lys Trp Thr Leu</p> </div> <div style="text-align: center;"> <p>Allele 2</p> <p>A A G T G G A A G C T C</p> <p>Lys Trp Lys Leu</p> </div> </div> <p>4 correct = 2 3 correct = 1 0 or 1 or 2 correct = 0 marks.</p>		2		2		
		(ii)		They have different {base sequences/ triplet codes/ codons/ triplets} (1) Resulting in different {sequences/ order} of amino acids (1) Which produce different proteins (1)	1	2		3		
		(iii)		{Activating / de-activating} genes (1)	1			1		
Question 4 total					5	7	1	13	3	3

Question		Marking details		Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
5	(a)		1. (Positive) phototropism (1) 2. Auxin (1) 3. Causes {cell elongation/ growth} on side away from light (1) 4. Auxin on side facing light is inhibited (1)	4			4		
	(b)	(i)	Glucose + oxygen;(1) Carbon dioxide + water + {energy/ATP} (1)	2			2		
		(ii)	(Between day 0 and 4,) as ethene levels increase so does CO ₂ (1) (Between days 4 and 9,) ethene remains constant however CO ₂ levels decrease / Ethene goes down slightly however CO ₂ levels decrease a lot / ethene has no effect on CO ₂ levels between days 4 and 9 (1)		2		2	2	2
		(iii)	1. (Speeds up the rate at which) fruit ripens (1) 2. Ethene causes more respiration (1) 3. More {energy/ ATP } available (1) 4. For (processes involved in) {changes in skin colour/softer internal flesh/aroma/sweetness} (1)	1		3	4		3
		(iv)	Stores of carbohydrates have been used up by fruit / less carbohydrate available for respiration/ {less/ no} respiration (1)			1	1		
	(c)		Control ripening of fruit (when it is transported over long distances) (1)	1			1		
			Question 5 total	8	2	4	14	2	5

Question		Marking details	Marks available							
			AO1	AO2	AO3	Total	Maths	Prac		
6	(a)		(Population is) total number of organisms of {the same/ a} species in a given (geographical) area (1) (Community) is <u>all</u> the (interacting populations of different) {species/ populations} within a location (1)		2			2		
	(b)	(i)	22.5 = 2 marks Numbers/cm ³ /day = 1 mark If 22.5 incorrect award 1 mark for 180 ÷ 8 (1)			3		3	3	3
		(ii)	Biotic - Any two (×1) from <ul style="list-style-type: none"> • Food availability / ref. Availability of bacteria to consume; • Disease Abiotic - Any one (×1) from <ul style="list-style-type: none"> • pH (of media) • Temperature (of media) • Salinity (of media) • Oxygen 		2			3		
		(iii)	1. {Between day 0 and 2/ at the start}, both species increase in density because there is {no/little} competition for {resources/food/bacteria} (1) 2. {between days 2 and 14/ following this} there is increased competition (for resources/food/bacteria) (1) 3. <i>P. Aurelia</i> competes more successfully than <i>P. caudatum</i> for {resources/food/bacteria}(1)				3	3		
		(iv)	Hypothesis is supported and The population of <i>P. caudatum</i> is zero by day 14 / Only <i>P. aurelia</i> remains at day 14(1)				1	1		1
		(v)	Students cannot be confident in validity of conclusion as there is no evidence that the experiment has been repeated/OWTTE(1)				1	1		1
			Question 6 total		5	3	5	13	3	5

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
7	(a)	(i)	A = Bowman's capsule (1) B = Collecting duct (1) C = capillary (network) (1) All correct = 2 marks 2 correct = 1 mark 0/1 correct = 0 marks	2			2		
		(ii)	Any three (×1) from 1. Q is narrower than P/ vice versa (1) 2. Putting blood in the {capillary knot/glomerulus} under {high/ increased} pressure 3. Causing ultrafiltration/filtration (in context of high pressure) 4. {small molecules/glucose/urea/vitamins/water} forced from capillary knot into Bowman's capsule	2	1		3		
	(b)	(i)	1 : 1000 = 2 marks If incorrect award 1 mark for $66\,396\,774 \div 60\,000 = 1\,106.6129$		2		2	2	2
		(ii)	<ul style="list-style-type: none"> (Cysts) prevent glucose, some salts and much water from re-entering the blood; / prevent (selective) reabsorption/ prevents waste products from being excreted (1) Kidneys contain {more than one/millions of} nephrons/ cysts may not completely block a tubule/ takes time for cysts to grow and block tubules (1) 		1	1	2		
	(c)		(Mutation is) a change to a gene/DNA sequence/ base sequence (1)	1			1		
	(d)		Mother = aa, father = Aa Both genotypes correct (1); Correct gametes (1) Correct mechanics (1)		3		3		
			Question 7 total	5	7	1	13	2	2

Question		Marking details		Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
8	(a)		A change from the (balance) in {optimal/normal} (internal) conditions (1) body {compensates/responds/ ref to a response} and restores {balance/optimal conditions/normal conditions/set level} (1)	2			2		
	(b)	(i)	Cerebellum (1)	1*			1		
		(ii)	Medulla (1)	1			1		
		(iii)	cerebral {hemispheres/ cortex}/ cerebrum (1)	1*			1		
	(c)		1. The body cannot produce thyroxine / not enough thyroxine produced (1) 2. (Less thyroxine) causes increased levels of TRH/ TRH is released (1) 3. Leading to {increased/excessive} levels of TSH/ TSH is released (1) 4. Increase in body temperature not stimulated (1) 5. To compensate for <u>heat loss</u> in cold temperatures/ owtte (1)		3	2	5		
			Question 8 total	5	3	2	10	0	0

Question		Marking details	Marks available					
			AO1	AO2	AO3	Total	Maths	Prac
9		<p>Indicative content</p> <ul style="list-style-type: none"> The major limitation is that brain cells do not regenerate when they are lost. {Foetal cells/ treatment 1} {replace damaged cells/ contain undamaged neurones/ already specialised}. In treatment 2 stem cells {will differentiate into dopamine neurones/ can differentiate into any kind of cell} Use of adult stem cells means that there are no ethical issues (involved with destruction of foetuses or embryos) Treatment 3: less chance of rejection of adult stem cells. The disadvantage of treatments 1 and/or 2 is the ethical issues surrounding {destruction of {foetuses/ embryos} / issues of supply}. Treatments 1 and 2 also have greater problems with rejection of transplanted cells/tissues. Disadvantage of adult stem cells is that they are limited in their ability to specialise All treatments have the disadvantage of: unknown long term effects of treatment/ risks of surgery/ brain surgery is invasive <p>5-6 marks Detailed answer including limitations, advantages and disadvantages (7-9 indicative content points)</p> <p><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>	1			1		
			1	1	1	3		
				1	1	2		

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
			<p>3-4 marks 4-6 points of indicative content <i>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 1-3 points of indicative content <i>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</p>						
			Question 9 total	2	2	2	6		

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
10	(a)	(i)	Optimum temperature for {enzymes/metabolism}/ {enzymes/metabolism} work within a narrow range of temperatures (1)	1			1		
		(ii)	Any three (×1) from <ul style="list-style-type: none"> Vasodilation/blood vessels dilate/diameter of blood vessels increase (1) More blood to skin to {carry <u>heat</u> away from core/ release <u>heat</u>} / more blood close to the surface of the skin releases heat (1) Erector muscles relax/ hairs lie flat (1) {no/less} <u>insulating</u> layer of air (next to skin) (1) 	1	1 1		3		
	(b)	(i)	52 (°C) (1) {Sunstroke/ muscle cramp/ heat exhaustion} <u>are likely</u> (1)		2		2	1	2
		(ii)	Concentration gradient between the skin and air is lower (1) Less diffusion/ evaporation (1)		1	1	2		
		(iii)	Low water levels in blood (1) (More) ADH {secreted/ released} (1) must be in correct context More water is reabsorbed (1) Concentrated urine produced (1)	2	2		4		
		(iv)	Body fluids become concentrated compared to cytoplasm of the cells/ water concentration inside cells is higher than outside/ solute concentration outside the cells increases/ ORA (1) Water <u>moves out</u> of the cells by osmosis (1) Reference to dehydration/ cells shrink (1)		3		3		
			Question 10 total	4	10	1	15	1	2

GCSE COMPONENT 1 – CONCEPTS IN BIOLOGY

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	4	6	0	10	2	0
2	2	5	4	11	1	2
3	5	3	0	8	0	0
4	6	4	2	12	0	3
5	4	3	2	9	0	0
6	5	3	5	13	2	8
7	5	9	5	19	7	3
8	5	3	0	8	0	0
9	7	6	1	14	3	0
10	5	6	5	16	0	8
TOTAL	48	48	24	120	15	24

COMPONENT 1 – CONCEPTS IN BIOLOGY

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	7	6	1	14	3	0
2	5	6	5	16	0	8
3	2	2	2	6	0	2
4	5	7	1	13	3	3
5	8	2	4	14	2	5
6	5	3	5	13	3	5
7	5	7	1	13	2	2
8	5	3	2	10	0	0
9	2	2	2	6	0	0
10	4	10	1	15	1	2
TOTAL	48	48	24	120	14	27