GCSE MARKING SCHEME

SUMMER 2024

GCSE
BIOLOGY - UNIT 2
3400U20-1 AND 3400UB0-1

About this marking scheme

The purpose of this marking scheme is to provide teachers, learners, and other interested parties, with an understanding of the assessment criteria used to assess this specific assessment.

This marking scheme reflects the criteria by which this assessment was marked in a live series and was finalised following detailed discussion at an examiners' conference. A team of qualified examiners were trained specifically in the application of this marking scheme. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners. It may not be possible, or appropriate, to capture every variation that a candidate may present in their responses within this marking scheme. However, during the training conference, examiners were guided in using their professional judgement to credit alternative valid responses as instructed by the document, and through reviewing exemplar responses.

Without the benefit of participation in the examiners' conference, teachers, learners and other users, may have different views on certain matters of detail or interpretation. Therefore, it is strongly recommended that this marking scheme is used alongside other guidance, such as published exemplar materials or Guidance for Teaching. This marking scheme is final and will not be changed, unless in the event that a clear error is identified, as it reflects the criteria used to assess candidate responses during the live series.

WJEC GCSE BIOLOGY – UNIT 2

FOUNDATION and HIGHER

SUMMER 2024 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

<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>1</td><td></td><td></td><td></td><td>
<table>
<tr><th>Bacterium</th><th>Virus</th></tr>
<tr><td>✓</td><td></td></tr>
<tr><td></td><td>✓</td></tr>
<tr><td>✓</td><td></td></tr>
<tr><td></td><td>✓</td></tr>
<tr><td>✓</td><td></td></tr>
<tr><td></td><td>✓</td></tr>
</table>
All 6 correct = 5 marks
5 correct = 4 marks
4 correct = 3 marks
3 correct = 2 marks
2 correct = 1 mark
0/1 correct = 0 marks
</td><td>4</td><td>1</td><td></td><td>5</td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td>Question 1 total</td><td>4</td><td>1</td><td>0</td><td>5</td><td>0</td><td>0</td></tr>
</table>

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
2	(a)			A stem cell is an undifferentiated cell that can become specialised	1			1		
	(b)			Embryonic (1) Adult (1)		2		2		
	(c)			(Belief that) destroys {a potential human life/ embryos}/ raises ethical issues	1			1		
				Question 2 total	**2**	**2**	**0**	**4**	**0**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
3	(a)	(i)		European/ meles and Asian/ leucurus (1) Both have same genus/ Meles (1) Reject genes	2			2		
		(ii)		Mellivora capensis (1)		1		1		
		(iii)		**Any one (x1) from:** Same all over the world/universal avoids confusion common names are different	1			1		
		(iv)		Has a backbone	1			1		
	(b)			**Any two (x1) from:** skin is very tough – protect from bites sharp teeth – hunting prey/ {rip/eat/tear} {meat/food} from the bone long claws – hunting prey/ {rip/eat/tear} {meat/food} from the bone Live on their own – Reduces competition (for food)		2		2		
	(c)			Decrease (1) Lions are predators of honey badgers/ lions {hunt/ eat} honey badgers ORA (1)			2	2		
	(d)	(i)		Competition between {members of the same species/ other <u>honey</u> badgers}	1			1		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
		(ii)		**Any three (x 1) from:** Food (1) Space/ shelter/ territory/ habitat (1) Mates (1) Water (1)	3			3		
				Question 3 total	**8**	**3**	**2**	**13**	**0**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)	(i)		Hormone(1) Pancreas (1) Liver (1) Glycogen (1)	4			4		
		(ii)		False False True False False 5 correct = 4 marks 4 correct = 3 marks 3 correct = 2 marks 2 correct = 1 marks 1 correct = 0 marks		4		4		
		(iii)		**Any two (x1) from:** Exercise {more/ regularly} (1) Eat less fat (1) Eat less carbohydrate / named carbohydrate (1) Ignore eat healthily			2	2		
	(b)	(i)		Increased		1		1		1
		(ii)		7		1		1	1	1

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
		(iii)		350 = 2 marks If incorrect award 1 mark for: $\frac{9-2}{2} \times 100$ Ecf from (ii)		2		2	2	
		(iv)		Accept 11 – 11.5 (if not in range - check graph)			1	1	1	
	(c)	(i)		Benedict's reagent	1			1		1
		(ii)		(brick) red. Accept yellow/green/orange			1	1		1
				Question 4 total	**5**	**8**	**4**	**17**	**4**	**4**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(a)			volcanic eruptions			1	1		
	(b)	(i)		12, 6, 10 (2) Any 2 correct = 1 mark		2		2		2
		(ii)	I	Number of mice + Time period (million years ago) (1)		1		1	1	1
			II	Scales (identical to Location A) (1)		1		1	1	1
			III	6 bars all correct (2) 4/5 bars correct = 1 mark Tolerance = less than one small square Ecf (i)		2		2	2	2
		(iii)	I	Stayed the same		1		1		1
			II	Decreased		1		1		1
	(c)	(i)		Change in a {gene/ DNA/ chromosome}	1			1		
		(ii)		**Any two (x1) from** Location B is dark (rock)/ darker/ black (1) (Dark coloured mice) camouflaged/ or description of (1) less chance of being seen by predators/ owtte (1)			2	2		
		(iii)		Decrease/become extinct/ die out/ none left			1	1		
		(iv)		Charles Darwin Alfred Wallace	2			2		
				Question 5 total	**3**	**8**	**4**	**15**	**4**	**8**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
6				**Indicative content:** A. Cell taken from herbicide resistant plant. B. DNA extracted from the cell. C. Herbicide resistant gene cut out. D. DNA taken out of soya bean cell. E. Gene added to the DNA. F. DNA inserted into soya bean cell. G. Cell division/ divide by mitosis H. Advantage – increased yield/ plants not killed by herbicide/ Herbicide resistant/pesticide resistant/improved nutritional content/increased shelf life / owtte I. Disadvantage – superweeds/effect on pollinators/ side effects **5-6 marks** **7-9 points from IC – must include a correct advantage or disadvantage** *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 from IC** *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 IC** *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.*	2	2	2	6		
				Question 6 total	**2**	**2**	**2**	**6**	**0**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
7/1	(a)	(i)		46	1			1		
		(ii)		XY chromosomes circled	1			1		
	(b)	(i)		<table><tr><td></td><td>X</td><td>X</td></tr><tr><td>X</td><td>XX</td><td>XX</td></tr><tr><td>Y</td><td>XY</td><td>XY</td></tr></table> Gametes (1) Correct mechanics using X and Y (1)		2		2		
		(ii)		1:1 Ecf from (i)		1		1		
		(iii)		male (1) has {2 different sex/ X and Y} <u>chromosomes/</u> has the Y <u>chromosome/</u> female only has X <u>chromosome</u> (1)		1	1	2		
	(c)	(i)		19		1		1		
		(ii)		Gamete(s) Accept eggs/ sperm/ ova	1			1		
		(iii)		Meiosis (correct spelling only)	1			1		
				Question 7 / 1 total	**4**	**5**	**1**	**10**	**0**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
8/2	(a)	(i)		Stimulus: light /screen turns green (1) Receptor: retina (1) Accept eye	2			2		2
		(ii)		As electrical {impulses/ signals} (1) Along the (optic) {nerve/ neurone} (1)	2			2		
	(b)	(i)		438 = 2 marks 438.2 = 1 mark		2		2	2	
		(ii)		**Support** mean is lower for students (than teachers)/ ORA most students {have a lower (reaction) time/ are faster} / ORA (1) **Does not support** {Mr Davies/ a teacher} is faster than some of the students/ {Some students/Harvey/ James/ Iestyn} are slower than a teacher/ Mr Davies / ORA(1)			2	2		2
		(iii)		**Any one (x1) from** Age of <u>teachers</u> (1) Sex of <u>teachers</u> (1) Reference to caffeine/ drugs (1) Reference to environment (1) Time of day (1)		1		1		1
		(iv)		**Any one (x1) from** More than 3 attempts each time/ repeat the test (1) More subjects (1) Compare with other groups (1) Reject reference to accuracy			1	1		1
				Question 8 / 2 total	**4**	**3**	**3**	**10**	**2**	**6**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
3	(a)			sclera labelled **A** **Accept** unambiguous line / arrow	1			1		
	(b)			**Any two for one mark** Fast / rapid Protective Automatic / involuntary	1			1		
	(c)			Iris		1		1		
	(d)			Decreases (1) Protect the retina (1) Ignore constrict / contract	1	1		2		
				Question 3 total	**3**	**2**	**0**	**5**	**0**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)			Bacteria / Prokaryotae (1) **Accept** bacterium Fungi (1) **Accept** fungus Accept in either box	2			2		
	(b)			**In 1825 classified according to** morphology/ (physical) {structure/ characteristics/ features/ appearance}/ description of physical characteristics (1) **Recently** DNA / RNA / genetic {analysis/sequencing/ code} / {DNA/genetic} profiling (1)		2		2		
	(c)	(i)		11 ÷ 35 = 0.31 (1)		1		1	1	
		(ii)		Any **one** (x1) from: (1) Human impact e.g. Habitat destruction / deforestation / trade in red pandas / poaching / hunting / caught in traps / agriculture / dogs (1) Disease (1) Pollution (1) Competition for {water/food/ space/ mates} (1) Increase in predation (1) Ignore climate change Any **one** (x1) from: (1) CITES/ prevent {trading/ hunting} (1) SSSI (1) Captive breeding programmes/ zoos (1) National parks/ nature reserves (1) Sperm banks (1) Local biodiversity action plans/ afforestation (1) NOT seed banks	2			2		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
		(iii)		Bhotkola **and** {Highest/largest/greatest} population density / most densely populated area / the densest population / population density is {higher/larger/greater} than other areas (1)			1	1		1
				Question 4 total	**4**	**3**	**1**	**8**	**1**	**1**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(a)	(i)		(Positive) phototropism (1) **Accept** phototropic **Reject** negative phototropism		1		1		
		(ii)		Auxin	1			1		
	(b)	(i)		roots on moon grow {horizontally/ sideways} and on Earth grow {vertically/ down} (and horizontally)/ root growth is deeper on Earth / More roots on Earth (1) Accept 5.1A and 5.1B as references to moon and Earth Ref. to tropism NEUTRAL			1	1		
		(ii)		less {gravity /gravitropism/ geotropism} on moon / ORA (1)			1	1		
	(c)			Control (experiment) (1) To show the effect of {gravitropism/ gravity/ growing on the moon} (1)		1	1	2		2
				Question 5 total	**1**	**2**	**3**	**6**	**0**	**2**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
6	(a)	(i)		(Number of red spaghetti pieces) would decrease / None left (on grass) (1)		1		1		1
		(ii)		Extinction / natural selection (1) **Accept** survival of the fittest			1	1		
	(b)			Sexual (reproduction) (1)	1			1		
	(c)			**Any two (x1) from:** Prey can move / spaghetti unable to move (1) Predator does not hunt on colour alone (1) Actual prey will not all be the same size (1) Reproduction rate always the same / only one offspring is produced / ref. to number of males and females being equal (1) No {immigration/ emigration} (1)			2	2		2
				Question 6 total	**1**	**1**	**3**	**5**	**0**	**3**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
7	(a)			A = lymphocyte / plasma (cells) / spleen (cells) (1) B = myeloma/ tumour (cells)/cancerous white (cells)/ cancer (cells) (1)	2			2		
	(b)			**Any one (x1):** • No {mice/animals} are {killed/harmed} (1) • (some people believe that) humans do not have the right to subject animals to any form of experimentation (1) • {mice/animals} are unable to give consent/ OWTTE (1) Ignore cruel unqualified Reject diseases passed on from animal			1	1		1
	(c)	(i)		Neither {volunteers/ subjects/ patients} nor {doctors/ researchers} know who is receiving {which drug/the placebo/strovimab/monoclonal antibody} (1)	1			1		1
		(ii)		Fake {drug /chemical/treatment}/ {drug/ chemical/control/treatment} which has no effect/ a treatment that does not contain the drug (1)	1			1		1
				Question 7 total	**4**	**0**	**1**	**5**	**0**	**3**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
8	(a)			364 = 2 marks Award 1 mark for 12.5/100 x 2912 0.125 x 2912		2		2	2	
	(b)	(i)		Undifferentiated/ unspecialised cells (1) that {can/ become/ owtte} {another (type of) cell/ specialised (cell) / differentiated (cell)} (1)	2			2		
		(ii)	I	Mitosis (1) correct spelling only		1		1		
			II	(Daughter cells are) {Genetically identical / clones} (1)		1		1		
		(iii)		**Any one (x1) from** {No/ less} chance of rejection / no need to find donor / no need for tissue typing / no need for immunosuppressant drugs (1)	1			1		
		(iv)		Embryos / embryonic (1)	1			1		
	(c)			**Any one (x1) from** increase sample size/ more people (1) Ref. reproducibility (1)			1	1		1
	(d)			**Any one (x1) from** • Temporary treatment/ not a cure (1) • restrictions to diet (1) • patient must visit hospital several times a week for treatment (1) • restriction on employment (1) • Time spent on dialysis machine (1) Accept reverse answer if refer to kidney transplant	1			1		
				Question 8 total	**5**	**4**	**1**	**10**	**2**	**1**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
9	(a)			285 = 3 marks **If incorrect award 2 marks for** 285.185185185185185185185185 (Correctly or incorrectly rounded) **If incorrect award 1 mark** $\frac{7.70}{2.70} x 100$ $\frac{10.4 - 2.70}{2.70} \; x \; 100$		3		3	3	
	(b)			**Indicative content:** A. Negative feedback/ osmoregulation/ homeostasis B. Brain {monitors/ controls} water levels C. Water levels in blood {low / decreases} / blood is concentrated. D. So (more) ADH released (from brain) E. into the blood F. (More ADH =) more reabsorption of water G. by kidney /into blood / from the {tubule/ collecting duct/ nephron} H. Volume of urine is less / less urine. I. (More) concentrated urine.	3	3		6		

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.*						
				Question 9 total	**3**	**6**	**0**	**9**	**3**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
10	(a)			Antigen (from 4CMenB vaccine) (1) (Stimulates) {lymphocytes/ plasma cells} (1) Ref. Antibody production (1) Memory cells produced (against *N. meningitides)* (1)	1 1	2		4		
	(b)			Both Neisseria/ both have same genus (1) Have similar {antigens/structure/DNA }/ are genetically similar/ are closely related (1) **Ignore** • similar species / organism / features / characteristics / properties • Same {antigens/structure/DNA/genetically}		2		2		
	(c)	(i)		Ref. Both increase (1) Ref. Males increase at a faster rate / females increase at slower rate (1) **Ignore** ref. difference between males and females		2		2	2	2
		(ii)		More women are symptomless (than men) / 50% of women are symptomless compared to 10% of men / women more likely to be symptomless (than men)			1	1		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
		(iii)		Any **two (x1)** from • Study has been reproduced / more than one study / reference to {two countries/ US and Australia} / • Similar % reduction / accept use of data , e.g. 33% and 40% reduction • Ref. similar age categories/ only a small range of ages used			2	2		
	(d)			Condoms / celibacy / safe sex Ignore {contraception/protection} unqualified	1			1		2
				Question 10 total	**3**	**6**	**3**	**12**	**2**	**4**

FOUNDATION TIER

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	4	1	0	5	0	0
2	2	2	0	4	0	0
3	8	3	2	13	0	0
4	5	8	4	17	4	4
5	3	8	4	15	4	8
6	2	2	2	6	0	0
7	4	5	1	10	0	0
8	4	3	3	10	2	6
TOTAL	**32**	**32**	**16**	**80**	**10**	**18**

HIGHER TIER

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	4	5	1	10	0	0
2	4	3	3	10	2	6
3	3	2	0	5	0	0
4	4	3	1	8	1	1
5	1	2	3	6	0	2
6	1	1	3	5	0	3
7	4	0	1	5	0	3
8	5	4	1	10	2	1
9	3	6	0	9	3	0
10	3	6	3	12	2	4
TOTAL	**32**	**32**	**16**	**80**	**10**	**20**