



GCE

Biology B

H022/01: Foundations of biology

AS Level

Mark Scheme for June 2025

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

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MARKING INSTRUCTIONS

PREPARATION FOR MARKING

RM ASSESSOR

1. Make sure that you have accessed and completed the relevant training packages for on-screen marking: *RM Assessor Online Training*; *OCR Essential Guide to Marking*.
2. Make sure that you have read and understood the mark scheme and the question paper for this unit. These are available in RM Assessor.
3. Log-in to RM Assessor and mark the **required number** of practice responses ("scripts") and the **required number** of standardisation responses.

MARKING

1. Mark strictly to the mark scheme.
2. Marks awarded must relate directly to the marking criteria.
3. The schedule of dates is very important. It is essential that you meet the RM Assessor 50% and 100% (traditional 50% Batch 1 and 100% Batch 2) deadlines. If you experience problems, you must contact your Team Leader (Supervisor) without delay.
4. If you are in any doubt about applying the mark scheme, consult your Team Leader by telephone, email or via the RM Assessor messaging system.
5. **Work crossed out:**

Where a candidate has crossed out a response and provided a clear alternative then the crossed-out response is not marked. Where no alternative response has been provided, examiners may give candidates the benefit of the doubt and mark the crossed-out response where legible.

Rubric Error Responses – Optional Questions

Where candidates have a choice of question across a whole paper or a whole section and have provided more answers than required, then all responses are marked and the highest mark allowable within the rubric is given. Enter a mark for each question answered into RM assessor, which will select the highest mark from those awarded. (The underlying assumption is that the candidate has penalised themselves by attempting more questions than necessary in the time allowed.)

Multiple Choice Question Responses

When a multiple choice question has only a single, correct response and a candidate provides two responses (even if one of these responses is correct), then no mark should be awarded (as it is not possible to determine which was the first response selected by the candidate). When a question requires candidates to select more than one option/multiple options, then local marking arrangements need to ensure consistency of approach.

Contradictory Responses

When a candidate provides contradictory responses, then no mark should be awarded, even if one of the answers is correct.

Short Answer Questions (requiring only a list by way of a response, usually worth only one mark per response)

Where candidates are required to provide a set number of short answer responses then only the set number of responses should be marked. The response space should be marked from left to right on each line and then line by line until the required number of responses have been considered. The remaining responses should not then be marked. Examiners will have to apply judgement as to whether a 'second response' on a line is a development of the 'first response', rather than a separate, discrete response. (The underlying assumption is that the candidate is attempting to hedge their bets and therefore getting undue benefit rather than engaging with the question and giving the most relevant/correct responses.)

Short Answer Questions (requiring a more developed response, worth two or more marks)

If the candidates are required to provide a description of, say, three items or factors and four items or factors are provided, then mark on a similar basis – that is downwards (as it is unlikely in this situation that a candidate will provide more than one response in each section of the response space.)

Longer Answer Questions (requiring a developed response)

Where candidates have provided two (or more) responses to a medium or high tariff question which only required a single (developed) response and not crossed out the first response, then only the first response should be marked. Examiners will need to apply professional judgement as to whether the second (or a subsequent) response is a 'new start' or simply a poorly expressed continuation of the first response.

6. Always check the pages (and additional objects if present) at the end of the response in case any answers have been continued there. If the candidate has continued an answer there then add a tick to confirm that the work has been seen.
7. There is a NR (No Response) option. Award NR (No Response)
 - if there is nothing written at all in the answer space
 - OR if there is a comment which does not in any way relate to the question (e.g. 'can't do', 'don't know')
 - OR if there is a mark (e.g. a dash, a question mark) which isn't an attempt at the question.

Note: Award 0 marks – for an attempt that earns no credit (including copying out the question).

8. The RM Assessor **comments box** is used by your Team Leader to explain the marking of the practice responses. Please refer to these comments when checking your practice responses. **Do not use the comments box for any other reason.**

If you have any questions or comments for your Team Leader, use the phone, the RM Assessor messaging system, or email.

9. Assistant Examiners will send a brief report on the performance of candidates to their Team Leader (Supervisor) via email by the end of the marking period. The report should contain notes on particular strengths displayed as well as common errors or weaknesses. Constructive criticism of the question paper/mark scheme is also appreciated.

10. For answers marked by levels of response:

Read through the whole answer from start to finish, using the Level descriptors to help you decide whether it is a strong or weak answer. The indicative scientific content in the Guidance column indicates the expected parameters for candidates' answers, but be prepared to recognise and credit unexpected approaches where they show relevance. Using a 'best-fit' approach based on the skills and science content evidenced within the answer, first decide which set of level descriptors, Level 1, Level 2 or Level 3, best describes the overall quality of the answer.

Once the level is located, award the higher or lower mark:

The higher mark should be awarded where the level descriptor has been evidenced and all aspects of the communication statement (in *italics*) have been met.

The lower mark should be awarded where the level descriptor has been evidenced but aspects of the communication statement (in *italics*) are missing.

In summary:

The skills and science content determines the level.

The communication statement determines the mark within a level.

There are no levels of response questions on this paper.

11. Annotations available in RM Assessor

Marking Annotations

Annotation	Use
	Benefit of Doubt
	Contradiction
	Cross
	Error Carried Forward
	Given Mark
	Extendable horizontal wavy line (to indicate errors / incorrect science terminology)
	Ignore
	Large dot (various uses as defined in mark scheme)
	Highlight (various uses as defined in mark scheme)
	Benefit of the doubt not given
	Tick
	Omission Mark
	Blank Page
	Level 1 answer in Level of Response question
	Level 2 answer in Level of Response question
	Level 3 answer in Level of Response question

12. Abbreviations, annotations and conventions used in the detailed Mark Scheme (to include abbreviations and subject-specific conventions).

Annotation	Meaning
/	alternative and acceptable answers for the same marking point
✓	Separates marking points
DO NOT ALLOW	Answers which are not worthy of credit
IGNORE	Statements which are irrelevant
ALLOW	Answers that can be accepted
()	Words which are not essential to gain credit
—	Underlined words must be present in answer to score a mark
ECF	Error carried forward
AW	Alternative wording
ORA	Or reverse argument

13. Subject-specific Marking Instructions

INTRODUCTION

Your first task as an Examiner is to become thoroughly familiar with the material on which the examination depends. This material includes:

- the specification, especially the assessment objectives
- the question paper
- the mark scheme.

You should ensure that you have copies of these materials.

You should ensure also that you are familiar with the administrative procedures related to the marking process. These are set out in the OCR booklet **Instructions for Examiners**. If you are examining for the first time, please read carefully **Appendix 5 Introduction to Script Marking: Notes for New Examiners**.

Please ask for help or guidance whenever you need it. Your first point of contact is your Team Leader.

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Mark Scheme

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Question	Answer	Marks	Guidance
1	C	1	
2	C	1	
3	D	1	
4	B	1	12 / 2.4
5	B	1	
6	D	1	
7	B	1	
8	B	1	
9	C	1	
10	A	1	
11	B	1	
12	A	1	148 / 100000 x 2.4 x10 ⁷
13	C	1	
14	D	1	
15	B	1	
16	A	1	
17	C	1	
18	A	1	
19	B	1	
20	C	1	
	Total	20	

Question			Answer	Marks	Guidance
21	(a)	(i)	For X max 2 marks X / wall , has fewer cilia / AW ✓ caused by , inflammation / damage , to , epithelium / epithelial cells ✓ OR X / wall , is thinner ✓ caused by , loss of / damage to , (named) tissues ✓ For Y max 2 marks Y / lumen / airway , is wider / AW ✓ caused by , loss of / damage to , (named) tissues in , wall / X ✓ OR Y / lumen / airway , is narrowed (by mucus) / AW ✓ caused by increase in mucus production ✓	max 4	ALLOW (ciliated) epithelium for X for this MP
	(a)	(ii)	<i>Similarity</i> excess mucus production OR airway narrowed due to mucus ✓ <i>Difference for bronchitis</i> cilia , still present / (only) paralysed OR airway is not widened due to , damaged wall / loss of (named) tissues in wall ✓	2	ALLOW AW e.g. build-up of mucus Mucus mentioned once
	(a)	(iii)	(usually) lasts a long time OR (symptoms) may get worse over time OR slow onset ✓	1	ALLOW degenerative
	(b)		expired air resuscitation / EAR ✓	1	ALLOW CPR
			Total	8	

Question			Answer	Marks	Guidance
22	(a)	(i)	<i>Bond K</i> = hydrogen AND <i>Bond L</i> = phosphodiester ✓	1	Both required for 1 mark Must be allocated to correct letter
	(a)	(ii)	<i>function of M</i> attaches to amino acid ✓	1	
	(a)	(iii)	ACC ✓	1	
	(b)		Similarities-max 2 <i>both contain</i> phosphate groups ✓ (correctly named) nitrogenous bases ✓ pentose / C5, sugar ✓ hydrogen bonds (between bases) ✓ phosphodiester bonds ✓ Differences-max 2 tRNA is much smaller / DNA is much bigger ✓ (pentose sugar is) ribose in tRNA and deoxyribose in DNA ✓ thymine / T , is replaced by , uracil / U , in tRNA / AW ✓ tRNA is (mostly) single-stranded and DNA is double-stranded ✓ DNA is a (double) helix and tRNA arranged in clover leaf shape / AW ✓	Max 3	Max 2 for each of similarities/differences e.g. (both contain) adenine / cytosine / guanine ALLOW e.g. Thymine / T in DNA and uracil / U in tRNA

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	(c)	conclusion is correct because AND transcription occurs at 50 nucleotides per second OR DNA replication occurs at 60,000 nucleotide per minute ✓ DNA replication is 20 times faster ✓	2	ALLOW $3000 \div 60 = 50$ ALLOW $1000 \times 60 = 60,000$
	(d)	phosphorylated ✓ hydrolysed ✓ (inorganic) phosphate / P_i ✓	3	IGNORE purine
		Total	11	

Question			Answer	Marks	Guidance
23	(a)	(i)	<i>Advantage</i> fossils can be , carbon dated / aged / AW , to show changes (in species) over time ✓ <i>Disadvantage</i> missing links in fossil record e.g. some fossils not yet discovered OR fossils may be destroyed e.g. by landslides/earthquakes OR soft body parts decay ✓	2	IGNORE references to classification using fossil evidence as this is specific to evolution
	(a)	(ii)	genetics / DNA analysis / RNA analysis ✓ humans have a unique variant of gene involved with , speech / language ✓ OR computer (analysis) ✓ provides , mathematical modelling / simulations , to test (language) theories ✓ OR comparisons with other species ✓ e.g. studies of , brain / (descended) larynx ✓	2	ALLOW named gene e.g. <i>FOXP2</i> ALLOW e.g. reference to hyoid bone
	(b)	(i)	phylogenetic tree ✓	1	ALLOW cladogram / phylogeny

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	(b)	(ii)	<table><tr><th>Conclusion</th><th>True (T) or False (F)</th></tr><tr><td>None of the languages are extinct.</td><td>True / T ✓</td></tr><tr><td>Hittite is the common ancestor for all other languages</td><td>False / F ✓</td></tr><tr><td>Polish is more closely related to English than to Sanskrit.</td><td>True / T ✓</td></tr></table>	Conclusion	True (T) or False (F)	None of the languages are extinct.	True / T ✓	Hittite is the common ancestor for all other languages	False / F ✓	Polish is more closely related to English than to Sanskrit.	True / T ✓	3	
Conclusion	True (T) or False (F)												
None of the languages are extinct.	True / T ✓												
Hittite is the common ancestor for all other languages	False / F ✓												
Polish is more closely related to English than to Sanskrit.	True / T ✓												
			Total	8									

Question			Answer	Marks	Guidance
24	(a)		Any two correct notes with linked reason from <i>incorrect note</i> 2 / two ✓ <i>reason</i> (antibiotics) can only be used to treat TB ✓ <i>incorrect note</i> 4 / four ✓ <i>reason</i> TB (also) affects different (named) organs (in the body) ✓ <i>incorrect note</i> 7 / seven ✓ <i>reason</i> TB is caused by a bacterium ✓ <i>incorrect note</i> 8 / eight ✓ <i>Reason</i> Mantoux test can (only) test for TB ✓	Max 4	Incorrect note and reason must be linked ALLOW incorrect notes written out from question paper e.g. antibiotics cannot be used to treat HIV infections or TB ALLOW cannot be used to treat HIV ALLOW both TB and AIDS affect different organs IGNORE named bacterium
	(b)	(i)	(T) lymphocyte / (T) helper cell ✓	1	ALLOW T cells
	(b)	(ii)	endocytosis ✓	1	
	(b)	(iii)	analysis involves large (range of) numbers / AW ✓	1	

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	(b)	(iv)	intensity of fluorescence is less (in culture) with inhibitor ✓ (so) fewer cells , have been infected with HIV / express HIV antigens ✓ inhibitor, slows / decreases, activity of dynamin / AW ✓ <i>ref to relevant data</i> ✓	Max 3	ALLOW ora for MP1 and 2 e.g. intensity of fluorescence concentrated between 15 and 150 in host cells but between 10 and 100 with inhibitor no units required
			Total	10	

Question			Answer	Marks	Guidance
25	(a)	(i)	concentrate the alga(e) ✓	1	IGNORE settle algae to the bottom ALLOW solution for alga
	(a)	(ii)	ensure (even) distribution of algae / AW ✓	1	
	(a)	(iii)	count number of individuals of , each species / algal type ✓ count number of , individuals / cells / algae , in one (triple-lined) square ✓ use of north-west rule ✓ <i>idea of</i> calculating number of cells in known volume (of observed square) ✓ <i>idea of</i> counting cells in more than one square to find a mean ✓ <i>idea of</i> multiplying by dilution factor ✓	Max 3	ALLOW correct values used for x dilution factor
	(b)	(i)	some species are , made up of more than one cell / form colonies ✓ <i>idea that</i> mixing of the 20cm ³ algae may lead to , under / over , counting (on the haemocytometer) ✓ <i>idea that</i> not all cells are , in focus / visible on focal plane ✓	Max 1	IGNORE multicellular
		(ii)	FIRST CHECK THE ANSWER ON ANSWER LINE If answer = 45 (µm) award 2 marks 9mm = 9000µm ✓ 9000÷200 = 45 ✓	2	ALLOW 1 mark ECF for incorrect conversion of units in MP1 e.g. 900÷200 = 4.5

		(iii)	FIRST CHECK THE ANSWER ON ANSWER LINE If answer = 1.4×10^{-4} award 3 marks. MP1 volume calculation $\frac{4}{3} \pi (22.5)^3 = 47719 / 4.78 \times 10^4 \mu\text{m}^3$ MP2 unit conversion $4.78 \times 10^4 \mu\text{m}^3 = 4.8 \times 10^{-8} \text{cm}^3$ MP3 biovolume calculation $4.8 \times 10^{-8} \times 3.0 \times 10^3 = 1.4 \times 10^{-4}$	3	ECF diameter from (b)(ii) – can still award 3 marks using incorrect diameter ALLOW calculated mean volume in $\text{cm}^3 \times 3.0 \times 10^3$ (cm^3) for 3 marks e.g. 0.00014 ALLOW 1 mark for volume calculation in μm^3 ALLOW ECF from incorrect unit conversion
	(c)		<i>present</i> S / T ✓ <i>not present</i> R / U ✓	2	
			Total	13	

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