

Higher

GCSE

Biology A Gateway

J247/04: Paper 4 (Higher Tier)

General Certificate of Secondary Education

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 40% 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. Crossed-Out Responses

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 the annotation 'SEEN' to confirm that the work has been seen and mark any responses using the annotations in section 11.
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 is not 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.**
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.

Level of response question on this paper is **20(d)**

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11. Annotations available in RM Assessor

Annotation	Meaning
	Correct response
	Incorrect response
	Omission mark
	Benefit of doubt given
	Contradiction
	Rounding error
	Error in number of significant figures
	Error carried forward
	Level 1
	Level 2
	Level 3
	Benefit of doubt not given
	Noted but no credit given
	Ignore

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.

The breakdown of Assessment Objectives for GCSE (9-1) in Biology A:

	Assessment Objective
AO1	Demonstrate knowledge and understanding of scientific ideas and scientific techniques and procedures.
AO1.1	Demonstrate knowledge and understanding of scientific ideas.
AO1.2	Demonstrate knowledge and understanding of scientific techniques and procedures.
AO2	Apply knowledge and understanding of scientific ideas and scientific enquiry, techniques and procedures.
AO2.1	Apply knowledge and understanding of scientific ideas.
AO2.2	Apply knowledge and understanding of scientific enquiry, techniques and procedures.
AO3	Analyse information and ideas to interpret and evaluate, make judgements and draw conclusions and develop and improve experimental procedures.
AO3.1	Analyse information and ideas to interpret and evaluate.
AO3.1a	Analyse information and ideas to interpret.
AO3.1b	Analyse information and ideas to evaluate.
AO3.2	Analyse information and ideas to make judgements and draw conclusions.
AO3.2a	Analyse information and ideas to make judgements.
AO3.2b	Analyse information and ideas to draw conclusions.
AO3.3	Analyse information and ideas to develop and improve experimental procedures.
AO3.3a	Analyse information and ideas to develop experimental procedures.
AO3.3b	Analyse information and ideas to improve experimental procedures.

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For answers to Section A if an answer box is blank ALLOW correct indication of answer e.g. circled or underlined.

Question	Answer	Marks	AO element	Guidance
1	C	1	2.2	
2	B	1	2.1	
3	A	1	1.1	
4	A	1	1.1	
5	A	1	1.1	
6	D	1	1.1	
7	B	1	1.1	
8	C	1	1.1	
9	C	1	2.1	
10	B	1	1.1	
11	D	1	1.1	
12	B	1	2.2	
13	D	1	1.1	
14	A	1	1.1	
15	D	1	1.1	

Question			Answer	Marks	AO element	Guidance
16	(a)		Pathogen ✓	1	1.1	IGNORE microbe/fungi/virus/protist/parasite
	(b)	(i)	antibiotics antibodies antigens antiseptics white blood cells chemicals on the surface of the bacteria proteins produced by the body medicine given by the doctor to kill the bacteria cells that provide immunity ✓✓✓✓	4	4 × 1.1	DO NOT ALLOW more than one line from a box
		(ii)	Would not give antibiotics / (would give) an antiviral ✓ (Viruses) are not destroyed by antibiotics ✓	2	2 × 1.1	IGNORE vaccine ALLOW antibiotics only kill bacteria ALLOW viruses are inside cells so antibiotics can't work

Question			Answer	Marks	AO element	Guidance
17	(a)		Any two from: Position at random (on the different sections of pitch) ✓ Count the number (of dandelions in a quadrat) ✓ Repeat/use of several quadrats ✓ AND (Mean) = divide (total) number of dandelions by number of quadrats ✓	3	3 × 1.2	ALLOW random number generator / grid references/co-ordinates DO NOT ALLOW transect line IGNORE percentage cover ALLOW take more samples/quadrats ALLOW correct number of quadrats qualified IGNORE references to calculating populations
	(b)		First check the answers in the table If answers = 78.5-79 and 235-237 award 3 marks 3.14 or $\pi \times 5^2$ or 25 ✓ = 78.5 ✓ 235.5 ✓	3	3 × 2.2	ALLOW any number in the range of 78.5-79 ALLOW any number in the range of 235-237 ALLOW ECF for a correctly calculated total number of dandelions from an incorrectly calculated area
	(c)		Community ✓ Compete ✓ Equally ✓	3	3 × 3.2b	
	(d)		Sample (soil) from each area/around parts of the pitch ✓ Test them with (universal) indicator/a pH meter/probe ✓	2	2 × 3.3a	ALLOW pH paper IGNORE litmus paper

Question			Answer	Marks	AO element	Guidance
18	(a)		1×10^9 ✓	1	1.2	ALLOW 1.0×10^9
	(b)	(i)	First check the answer on the answer line If answer = 0.005 (hours) award 3 marks $1 \times 10^9 \times 0.001$ or $1\,000\,000$ ✓ $= 5000 \div 1 \times 10^6 / 1\,000\,000$ ✓ $= 0.005$ (hours) ✓	3	3×2.2	ECF from Q18a ALLOW $1\,000\,000\,000 \times 0.001$ ALLOW 1×10^6 ALLOW 5×10^{-3} ALLOW $1 \div 200$ or $\frac{1}{200}$ for 2 marks
		(ii)	Use more than one locust / (Measure the mass of grass eaten) over a longer time ✓	1	3.3b	ALLOW repeat and calculate mean ALLOW (measure mass of grass) longer than an hr
	(c)		Any three from: They may eat crops ✓ They can reproduce/breed very quickly ✓ Due to large numbers they can eat large amounts ✓ They can travel long distances fast ✓	3	$3 \times 3.2a$	ALLOW feed on grazing animals food / feed on food humans eat ALLOW eat food in a short period of time/rapidly ALLOW move quickly/fast/cover large distances in a day

Question			Answer	Marks	AO element	Guidance								
19	(a)		A and B/parents do not have the condition/disorder/SIOD ✓ But have a child/C/offspring who are affected/have the condition/disorder/SIOD ✓	2	2 × 2.1	ALLOW the disorder misses a generation ALLOW parents/A and B are heterozygous/carriers								
	(b)		Parent A Parent B → ↓ <table><tr><td>D</td><td>d</td></tr></table><table><tr><td>D</td><td>DD</td><td>Dd</td></tr><tr><td>d</td><td>Dd</td><td>dd</td></tr></table> } Offspring Both parental genotypes (Dd) ✓ Correct offspring genotypes ✓ Probability = 25% / 0.25 ✓	D	d	D	DD	Dd	d	Dd	dd	3	2.1 2.1 3.2b	Alternative upper and lower case letters used instead of Dd penalise parental genotype mark only ALLOW ECF from parental genotypes DO NOT ALLOW correct offspring from incorrect gametes ALLOW ¼ / 1:3 / 1 in 4 ALLOW correct interpretation of probability from diagram shown IGNORE correct answer from incorrect cross
D	d													
D	DD	Dd												
d	Dd	dd												

Question			Answer	Marks	AO element	Guidance
	(c)	(i)	This is to prevent rejection ✓ As the kidney would have foreign/different <u>antigens</u> ✓	2	2 × 2.1	ACCEPT the body produces antibodies that would attach to the antigens
		(ii)	Increase risk of disease/infection ✓	1	2.1	ALLOW easily get/vulnerable to disease/infection/sick/illness/pathogens
		(iii)	Stem cells are undifferentiated/unspecialised ✓ They can divide/develop into/change/become white blood cells ✓	2	2 × 1.1	ALLOW stem cells can specialise/differentiate ALLOW totipotent/ pluripotent IGNORE can produce white blood cells ALLOW can differentiate/specialise into white blood cells for 2 marks
		(iv)	(Kidney/donor) not recognised as foreign/non self / (White blood cells) would not make antibodies ✓	1	2.1	IGNORE kidney is recognised as own

Question			Answer	Marks	AO element	Guidance
20	(a)		When it feeds on the (microscopic) plants/producer it is a primary consumer ✓ When it feeds on the (microscopic) animals/primary consumer it is a secondary consumer ✓	2	2 × 2.1	ALLOW feeds on (microscopic) plants/producer which is the first trophic level ALLOW when it feeds on (microscopic) plants/producer it's in the second trophic level ALLOW feeds on (microscopic) animals/primary consumer which is the second trophic level ALLOW when it feeds on (microscopic) animals/primary consumer it's in the third trophic level ALLOW it can be a primary or secondary consumer / eats (microscopic) plants/producer and animals/primary consumer for one mark
	(b)		No/less predators / no/less diseases / plenty/more of food available ✓	1	2.1	IGNORE competition unless qualified
	(c)		Less/no light for photosynthesis ✓ So less/no growth/food/glucose production ✓ AND (Plants) have more minerals ✓ For photosynthesis/respiration/cell division/chlorophyll production/enzyme action/metabolism ✓	1 1 1 1	1.1 2.1 1.1 2.1	ALLOW cloudiness reduces photosynthesis which needs light / cloudiness reduces light for photosynthesis ALLOW minerals are available more IGNORE minerals easier to take up ALLOW form amino acids/cell wall formation/turgor pressure/proteins/protein synthesis ALLOW Can produce more organic molecules so more growth ALLOW AVP

Question		Answer	Marks	AO element	Guidance
	(d)*	Please refer to the marking instructions on page 4 of this mark scheme for guidance on how to mark this question. Level 3 (5–6 marks) A detailed description of how the gene can be introduced into carp cells including the use of sticky ends and the enzymes involved. AND Explains how the number of carp in the lake decrease <i>There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</i> Level 2 (3–4 marks) A description of how the gene can be introduced into carp cells. AND Explains how the number of carp in the lake decrease OR A detailed description of how the gene can be introduced into carp cells including the use of sticky ends and the enzymes involved. <i>There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.</i>	6	3 × 1.2 3 × 2.1	AO1.2 Describes how a gene can be introduced into carp cells: • restriction enzymes used to cut the carp DNA • will produce sticky ends • idea that sticky ends are complementary • use of DNA ligase • to join the gene into the carp DNA • introduce viral vector / vector(micro) by injection / electroporation • Use of a marker gene AO2.1 Explains how the gene will reduce the carp population: • Genetically modified carp will be male • Fish with the gene/GM carp reproduce • GM carp pass on the gene • offspring will not produce oestrogen • offspring will all develop as males/ no female offspring

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Question			Answer	Marks	AO element	Guidance
			Level 1 (1–2 marks) A description of how the gene can be introduced into carp cells. OR Explains how the number of carp in the lake decrease <i>There is an attempt at a logical structure with a line of reasoning. The information is in the most part relevant.</i> 0 marks <i>No response or no response worthy of credit.</i>			less mating/reproduction occurs

Question			Answer	Marks	AO element	Guidance
21	(a)		C ✓	1	3.1b	
	(b)		D ✓	1	3.1b	
	(c)		Mutations / change in DNA/genes ✓ Rapid/uncontrolled (cell) division ✓	2	2 × 1.1	AW cell replication/multiplication/mitosis IGNORE reproduction/uncontrolled growth
	(d)		Any one from: Might not want to know if they are going to get a disease ✓ Depression/stress ✓ May affect their insurance ✓	1	3.2a	ALLOW idea impact on their mental well being ALLOW may have to change lifestyle / may inform decision to have children

Question			Answer	Marks	AO element	Guidance
22	(a)		They will use the animal's food/nutrients ✓	1	2.1	ALLOW compete for food/nutrients ALLOW feed IGNORE bacteria breaks down food
	(b)	(i)	Any two from: Use a Petri dish/agar with bacteria ✓ (Place) antibiotic disc (on the surface) ✓ Incubate ✓ AND Look for (clear) area where there are /no/killed bacteria/inhibition ✓	3	3 × 1.2	ALLOW circle/disc with antibiotic ALLOW antibiotic added to wells in the agar ALLOW area of inhibition
		(ii)	Any three from: Sheep decrease in the percentage of bacteria killed (from 2019-2021 could indicate) so more bacteria (develop) resistance ✓ Turkey increases the percentage of bacteria killed (from 2019-2021 could indicate) so less bacteria (develop) resistance ✓ Sheep results does not support (a decrease in antibiotic use) ✓ Turkey does support (a decrease in antibiotic use) ✓ Results for cows do not give any clear evidence ✓	3	3 × 3.1b	Bacteria immune will negate a marking point once IGNORE cow data for marking point one and two ORA for non-resistant bacteria ORA for non-resistant bacteria IGNORE correlation
	(c)		1. Bacteria do not have a nucleus ✓ 2. Mutations are random (events) ✓ 3. Allele provides resistance ✓	3	3 × 2.1	ALLOW Bacteria mutate when the DNA in their cytoplasm/plasmid changes ALLOW Bacteria cannot become immune / bacteria become resistant

Question			Answer	Marks	AO element	Guidance
23	(a)		Beetles transmit bacteria to cucumber/plant (by feeding) ✓	4	2.1	ALLOW beetle acts as a vector IGNORE disease/infection IGNORE nutrients
			Xylem transports water (to the leaves) ✓		1.1	
			(If they are blocked by the sticky substance) no/less water can reach the <u>leaves</u> ✓		2.1	
			<u>Cells</u> become flaccid/lose turgor (pressure) ✓		2.1	ALLOW <u>cells</u> become plasmolysed
	(b)		The bacteria are not on the surface of the plant/the bacteria are inside the plant ✓	1	2.1	ALLOW the chemical will not kill the beetles which spread the bacteria IGNORE disease/infection
	(c)	(i)	Biological (control) ✓	1	1.2	
		(ii)	Water moves into bacteria by osmosis ✓	2	2 × 2.1	ALLOW description of osmosis
			Bacteria will not be able to resist the (turgor) pressure ✓			ALLOW increased (turgor) pressure/(turgor) pressure will burst the cell
		(iii)	The virus is effective/kill bacteria over a (wide) range/all of temperatures ✓	2	3.1a	
			Effective/kill bacteria in summer and winter/different seasons ✓		3.1b	IGNORE throughout the year

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