

Foundation

GCSE

Biology A Gateway

J247/02: Paper 2 (Foundation Tier)

General Certificate of Secondary Education

Mark Scheme for June 2022

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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 crosses out an answer and provides an alternative response, the crossed out response is not marked and gains no marks
 - if a candidate crosses out an answer to a whole question and makes no second attempt, and if the inclusion of the answer does not cause a rubric infringement, the assessor should attempt to mark the crossed out answer and award marks appropriately.
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.

Level of response question on this paper is **18(d)**.

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:

	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.

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	A✓	1	2.1	
2	C✓	1	1.1	
3	D✓	1	1.1	
4	C✓	1	2.2	
5	A✓	1	1.1	
6	B✓	1	2.1	
7	C✓	1	1.1	
8	B✓	1	1.1	
9	D✓	1	1.1	
10	C✓	1	2.2	
11	B✓	1	1.1	
12	C✓	1	1.1	
13	A✓	1	2.2	
14	D✓	1	2.2	
15	C✓	1	1.1	

Question			Answer	Marks	AO element	Guidance								
16	(a)		Fat ✓ Oxygen ✓ Attack ✓	3	1.1									
	(b)		<table><tr><td>eating vegetables</td><td></td></tr><tr><td>inheriting certain genes</td><td>✓</td></tr><tr><td>regular exercise</td><td></td></tr><tr><td>smoking cigarettes</td><td>✓</td></tr></table>	eating vegetables		inheriting certain genes	✓	regular exercise		smoking cigarettes	✓	1	1.1	Both boxes correct for one mark.
eating vegetables														
inheriting certain genes	✓													
regular exercise														
smoking cigarettes	✓													
	(c)		Idea that the blood bypasses the blockage / can reach the heart (muscle) ✓ (Heart muscle) can respire / contract / obtain oxygen/glucose ✓	2	2 x 2.1	IGNORE flow/volume of blood unless qualified IGNORE replace vessel DO NOT ALLOW unblock the vessel								
	(d)	(i)	FIRST CHECK THE ANSWER ON ANSWER LINE If answer = 125 000 award 2 marks 500 x 250 ✓ 125 000 ✓	2	2 x 2.1	ALLOW 0 or 1175000 – 1200000 for 1 mark								

Question			Answer	Marks	AO element	Guidance
		(ii)	Fewer people (at risk) of heart attacks ✓ More angioplasty (operations done instead) ✓	2	2 x 3.1b	IGNORE references to reasons why there are fewer people at risk of heart attacks
	(e)		(Stem cells) can differentiate/specialise into muscle/heart cells/tissue ✓ The heart will then beat more efficiently ✓ Idea that more oxygen/glucose supply to the body (cells) ✓	3	3 x 2.1	ALLOW they can replace damaged cells / develop into/change/divide/become muscle cells/tissue IGNORE fix/repair muscle cells IGNORE replace scar tissue ALLOW idea of stronger heartbeat IGNORE pump more blood

Question			Answer	Marks	AO element	Guidance
17	(a)		Idea cost of pesticide is less ✓ Cost of growing GM (wheat) is lower / cost saving 18 (euros per hectare) ✓	2	2 x 3.1b	ASSUME taking about GM crops if not stated IGNORE less pesticide IGNORE more profitable/sell/production of wheat ALLOW costs 210 (euros per hectare) rather than 228 DO NOT ALLOW government costs/seeds cost less
	(b)		DNA ✓	1	1.1	
	(c)		Any two from: Concern that they may be harmful to humans if eaten ✓ Plants may escape into the wild ✓ Useful /pollinating insects might be harmed ✓ Disrupt food chains ✓ Ethically wrong ✓	2	2 x 2.1	ALLOW harmful effects not discovered to humans IGNORE dangerous ALLOW resistance / resistance gene could get into other plants IGNORE harmful to insects/pests ALLOW harm the environment / reduce biodiversity ALLOW morally / religiously wrong IGNORE playing God / not natural / disrupt nature IGNORE may not taste good IGNORE reduce gene pool / genetic variation / susceptible to the same disease

Question			Answer	Marks	AO element	Guidance

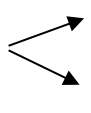
Question			Answer	Marks	AO element	Guidance
18	(a)		Bulbs will grow much faster than seeds ✓ The gardener will know the colour of the flowers from bulbs ✓	2	2 x 1.2	More than 2 boxes ticked then each additional incorrect box negates a mark ALLOW numbers instead of ticks
	(b)		Pathogen ✓ Mutation ✓ Gene ✓	3	3 x 1.1	More than 1 answer for each line negates the mark
	(c)		Microscopes didn't have the magnification/resolution / could not see the virus which was very small ✓	1	2.2	ALLOW microscopes were not developed enough to see viruses ALLOW need an electron microscope / cannot be seen with a light microscope ALLOW ORA for modern day microscopes IGNORE technology

Question	Answer	Marks	AO element	Guidance
(d)*	<p>Please refer to the marking instructions on page 4 of this mark scheme for guidance on how to mark this question.</p> <p>Level 3 (5–6 marks) Provides an explanation of how each control method works AND Provides an evaluation of each method</p> <p><i>There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</i></p> <p>Level 2 (3–4 marks) Provides an explanation of a control method AND Provides an evaluation of a method OR Provides an explanation how each control method works OR Provides an evaluation of each method</p> <p><i>There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.</i></p> <p>Level 1 (1–2 marks) Provides an explanation of a control method OR Provides an evaluation of a method.</p>	6	3 x 1.2 3 x 3.2a	<p>AO1.2 Demonstrate knowledge and understanding of the methods of control for the disease.</p> <ul style="list-style-type: none"> - Digging/burning the plants will destroy/kill the virus/infection / prevent the insects from feeding on the infected tulips - Spraying fields with insecticide will kill the insects - Insects cannot spread infection <p>AO3.2a Analyse information to make judgements on the methods of control.</p> <p>Digging up and burning advantages:</p> <ul style="list-style-type: none"> - Only kill the infected bulbs - Does not involve paying for insecticide - Will not cause bioaccumulation by insecticide - Will not kill harmless/useful insects <p>• Digging up and burning disadvantages:</p> <ul style="list-style-type: none"> - Will not stop further spread by insects - Time consuming / may have to pay for labour - Will not be able to eliminate the virus - Contribute to greenhouse effect / global warming / CO₂ produced / harmful gasses / pollution

Question			Answer	Marks	AO element	Guidance
			<p><i>There is an attempt at a logical structure with a line of reasoning. The information is in the most part relevant.</i></p> <p>0 marks <i>No response or no response worthy of credit</i></p>			<ul style="list-style-type: none"> - Less tulips/crop - Detection of disease maybe too late <ul style="list-style-type: none"> • Insecticide advantages: <ul style="list-style-type: none"> - Faster method - Less labour/ time investment - Does not contribute to greenhouse effect / global warming / CO₂ production - don't destroy the crops • Insecticide disadvantages: <ul style="list-style-type: none"> - Repeat application - Cost involved - Cause bioaccumulation - Kill useful/harmless insects - Disrupt food chains/webs - Reduce biodiversity - Promote insecticide resistance

Question			Answer	Marks	AO element	Guidance												
Question			Answer	Marks	AO element	Guidance												
19	(a)	(i)	<table><tr><td></td><td>Number of people in the family</td></tr><tr><td>Number of males</td><td>6</td></tr><tr><td>Number of people who are homozygous recessive for the gene</td><td>5 ✓</td></tr><tr><td>Number of people who have amyloidosis</td><td>6 ✓</td></tr></table>		Number of people in the family	Number of males	6	Number of people who are homozygous recessive for the gene	5 ✓	Number of people who have amyloidosis	6 ✓	2	2.1 3.1a					
	Number of people in the family																	
Number of males	6																	
Number of people who are homozygous recessive for the gene	5 ✓																	
Number of people who have amyloidosis	6 ✓																	
		(ii)	<table><tr><td></td><td colspan="2">Person 1</td></tr><tr><td></td><td>a</td><td>a</td></tr><tr><td>Person 2</td><td>Aa</td><td>Aa</td></tr><tr><td></td><td>aa</td><td>aa</td></tr></table> <p>✓</p> <p>Probability = 0.5 / ½ / 50% / 1 in 2 / 1:1 ✓</p>		Person 1			a	a	Person 2	Aa	Aa		aa	aa	2	2.1 3.2b	ALLOW 50:50, 2/4 ALLOW ecf for correct interpretation of probability from diagram drawn DO NOT ALLOW correct probability from incorrect diagram
	Person 1																	
	a	a																
Person 2	Aa	Aa																
	aa	aa																
	(b)		(Person 2 has) the dominant allele (A) ✓ Unable to control their blood glucose levels / have diabetes ✓ Would not be able to feel stimuli / slower responses/reactions/reflexes ✓	3	3.1a 2.1 2.1	ALLOW person 2 is heterozygous ALLOW reference to a specific symptom of diabetes IGNORE low blood sugar ALLOW reference to a specific stimulus												

Question			Answer	Marks	AO element	Guidance

Question			Answer	Marks	AO element	Guidance
20	(a)		<p> pine trees → caterpillars  </p> <p> Pine trees to caterpillars correctly drawn ✓ Caterpillars to cuckoos and fungi correctly drawn ✓ </p>	2	2 x 2.1	<p>ALLOW birds instead of cuckoos</p> <p>IGNORE pyramids of biomass/numbers</p> <p>DO NOT ALLOW lines without arrows</p>
	(b)	(i)	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 2px 5px;">D</div> <div style="border: 1px solid black; padding: 2px 5px;">C</div> <div style="border: 1px solid black; padding: 2px 5px;">B</div> <div style="border: 1px solid black; padding: 2px 5px;">A</div> <div style="border: 1px solid black; padding: 2px 5px;">E</div> </div>	3	3 x 2.1	<p>D before C ✓</p> <p>C before B ✓</p> <p>B before A ✓</p>
		(ii)	(Charles) Darwin ✓	1	1.1	ALLOW Wallace
	(c)	(i)	(Use living organism/fugus) to kill a pest/caterpillars ✓	1	1.1	ALLOW using natural predator/natural parasites to kill pests/caterpillar
		(ii)	1000 (times) ✓	1	1.2	ALLOW 1x10 ³ / thousand
		(iii)	<p>Any three from:</p> <p>Kills more caterpillars than water/control ✓</p> <p>(Concentration used on the soil) contain more spores (than tree tops) ✓</p> <p>Lasts longer (than tree tops) ✓</p>	3	3.1a 3.1a 3.2a	<p>ALLOW kills more caterpillars when sprayed on tree tops and soil</p> <p>IGNORE quote numbers unless qualified</p> <p>ALLOW higher concentration (of spores)</p>

Question			Answer	Marks	AO element	Guidance
			Not much difference between caterpillars killed for soil and trees ✓			ALLOW (soil) lasts many years but tree tops only a few months IGNORE lasts many years

Question			Answer	Marks	AO element	Guidance
21	(a)		HIV ✓	1	1.1	ALLOW flu ALLOW Covid/Corona ALLOW any other credit worthy virus
	(b)	(i)	(Use of a) tissue/handkerchief ✓	1	1.2	ALLOW wear a face mask / cover mouth (when sneezing) ALLOW idea of self-isolation / avoid close contact / wash hands IGNORE vaccination / protective clothing
		(ii)	Any two from: Mucus released from goblet cells ✓ Mucus will trap the virus ✓ Cilia will waft the mucus away from the lungs ✓	2	2 x 1.1	IGNORE nose hairs / other defence barriers
	(c)		Weakened or dead virus ✓	1	1.2	AW pathogen/microbe/measles for virus ALLOW virus antigen/attenuated virus
	(d)	(i)	(Number of cases) decreased ✓ (More) people were immune/vaccinated ✓	1 1	2 x 3.2b	ALLOW idea of herd immunity

Question			Answer	Marks	AO element	Guidance
		(ii)	(Number of cases) increased ✓ Less children were vaccinated due to risk of autism ✓	1 1	2 x 3.2b	

			Answer	Marks	AO element	Guidance
22	(a)		Any two from: Use a quadrat ✓ Positioned at random / use of several (quadrats) ✓ Count the number (of thistle in a quadrat) ✓ AND Any one from: Idea of scaling up a smaller area of quadrat to the number in 1m ² ✓ Work out the mean (of the 1m ² quadrat) ✓	3	3 x 1.2	DO NOT ALLOW transect line. Max 1 mark from this section. IGNORE quadrant ALLOW random number generator/use co-ordinates to generate positions IGNORE count the organisms/percentage cover ALLOW work out the average/divide number of thistle plants by number of quadrats
	(b)		FIRST CHECK THE ANSWER ON ANSWER LINE If answer = 1.8 award 2 marks 36/20 ✓ OR	2	2 x 2.2	ALLOW rounding to 2 for 2 marks

			Answer	Marks	AO element	Guidance
			$\frac{36}{(1/2 \times 10 \times 4)} \checkmark$ 1.8 ✓			
	(c)		Will receive more light ✓ Will be able to photosynthesise more/faster ✓ Produce more sugars/glucose/raw material (for growth) ✓	3	2.1 1.1 2.1	Assume answer refers to thistles after mowing ALLOW ORA for before mowing ALLOW less competition for light IGNORE less competition for space/water/minerals IGNORE sun ALLOW more sunlight for photosynthesis = 2 marks IGNORE respire faster IGNORE produce more food At least one marking point must be comparative to score any marks

			Answer	Marks	AO element	Guidance
Question			Answer	Marks	AO element	Guidance
23	(a)		To allow oxygen gas into the bottle ✓	1	1.2	
	(b)	(i)	FIRST CHECK THE ANSWER ON ANSWER LINE If answer = 16.3 award 3 marks 300-235 / 4 ✓ or 65/4 ✓ 16.25 ✓ = 16.3 ✓	3	2 x 2.2 1.2	ALLOW 16.2 without working for 1 mark ALLOW Clear evidence of correct conversion of incorrect answer to 3 significant figures
		(ii)	Greater the number of (air) holes, the faster the rate (of decomposition) ✓ Idea that the relationship is not linear e.g. the rate of decomposition is not increasing at the same rate that the number of air holes are ✓	2	2 x 2.2	ALLOW ORA for less number of (air) holes IGNORE air flow IGNORE more air holes more mass lost ALLOW the relationship is not directly proportional
		(iii)	(Easier) to compare (the amount of mass that had been lost) ✓	1	2.2	ALLOW no need to calculate the percentage change

			Answer	Marks	AO element	Guidance
						IGNORE to make it a fair test/is more accurate/is more reliable/is a control variable/fewer calculations
		(iv)	Number of (air) holes ✓	1	2.2	IGNORE air holes unqualified
		(v)	Idea that it/water would not have been weighed / the mass would have been lower ✓ (Collect the water) and measure its mass / pour it back into the bottle ✓	2	2.2 3.3b	ALLOW not all mass lost would have been due to decomposition IGNORE references to loss of plant waste reducing the mass IGNORE mass affected by loss of water DO NOT ALLOW block up the drain holes ALLOW at the end of the experiment measure the plant wastes dry mass

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