



Oxford Cambridge and RSA

Foundation

GCSE

Biology A Gateway

J247/02: Paper 2 (Foundation Tier)

General Certificate of Secondary Education

Mark Scheme for June 2023

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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:
- a. where a candidate crosses out an answer and provides an alternative response, the crossed out response is not marked and gains no marks
 - b. 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 the annotation SEEN to confirm that the work has been read.
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 questions on this paper is **19(b)**.

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 | C | 1 | 2.1 | |
| 2 | D | 1 | 1.1 | |
| 3 | A | 1 | 2.1 | |
| 4 | C | 1 | 2.1 | |
| 5 | B | 1 | 1.1 | |
| 6 | D | 1 | 1.1 | |
| 7 | C | 1 | 2.1 | ALLOW 56 |
| 8 | C | 1 | 1.1 | |
| 9 | B | 1 | 2.1 | |
| 10 | D | 1 | 1.1 | |
| 11 | A | 1 | 1.1 | |
| 12 | D | 1 | 2.2 | ALLOW 12 |
| 13 | B | 1 | 1.1 | |
| 14 | A | 1 | 1.1 | |
| 15 | A | 1 | 1.1 | |

| Question | | Answer | Marks | AO element | Guidance |
|----------|---------|---|-------|------------|---|
| 16 | (a) | Producers ✓ Secondary consumers ✓ | 2 | 2 x 2.1 | |
| | (b) | First check the answer on answer line If answer = 75 000 award 2 marks (15/1000) = 0.015 ✓ or (15 x 5 000 000) = 75 000 000 ✓ 75 000 ✓ | 2 | 2.2 1.2 | |
| | (c) | Gene ✓ Mutation ✓ | 2 | 2 x 1.1 | |
| | (d) | Selective breeding ✓ | 1 | 1.1 | ALLOW artificial selection |
| | (e) (i) | West ✓ | 1 | 2.1 | |
| | (ii) | A lower ✓ | 1 | 2.1 | |
| | (iii) | Because there are fewer birds to eat the sorghum / so less bitter sorghum needed ✓ | 1 | 3.2b | ALLOW less bitter sorghum needed as less likely to get eaten |

| Question | | | Answer | Marks | AO element | Guidance |
|----------|-----|-------|--|-------|------------|--|
| 17 | (a) | (i) | All points correctly plotted ✓✓ | 2 | 2 x 2.2 | 3 points correct = 1 mark ALLOW +/- half a square DO NOT ALLOW a bar graph |
| | | (ii) | Line of best fit ✓ | 1 | 2.2 | ALLOW ECF from incorrect points plotted IGNORE extrapolations |
| | | (iii) | A figure in range of 1.55-1.7 ✓ | 1 | 2.2 | ALLOW ECF figure from candidate's graph |
| | | (iv) | Any two from: Less chance of mutations ✓ Less likely to get cancer/tumours ✓ Cancer/tumours can spread / be lethal ✓ | 2 | 2 x 1.1 | ALLOW uncontrolled growth causes cancer/tumours ALLOW malignant |
| | (b) | | Oxygen ✓ Haemoglobin ✓ Lactic ✓ Natural selection ✓ | 4 | 4 x 1.1 | IGNORE evolution |

| Question | | | Answer | Marks | AO element | Guidance |
|----------|-----|-------|---|-------|------------|--|
| 18 | (a) | (i) | (Hepatitis) A, B and D ✓ | 1 | 2.1 | |
| | | (ii) | (Hepatitis) A ✓ | 1 | 3.1a | |
| | | (iii) | Alcoholic (hepatitis) ✓ | 1 | 3.1a | |
| | | (iv) | (Hepatitis) D ✓ | 1 | 2.1 | |
| | (b) | | Antibiotics do not affect viruses / only kill bacteria ✓ A is caused by viruses / not caused by bacteria ✓ | 2 | 2 x 2.1 | ALLOW only treat bacterial infections / only effective against bacteria |
| | (c) | | Antigens ✓ White blood ✓ Antibodies ✓ Immune ✓ | 4 | 4 x 1.1 | |

| Question | | Answer | Marks | AO element | Guidance |
|----------|-----|---|-------|---------------------|--|
| 19 | (a) | <p>Any two from: Use a quadrat ✓ Place at random ✓ Count plants ✓</p> <p>AND Idea of scale up for the whole area ✓</p> | 3 | 3 x 1.2 | <p>DO NOT ALLOW transect line IGNORE quadrant ALLOW use a random number generator / use coordinates to generate positions</p> |
| | (b) | <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) Identifies both positive and negative actions of buddleia. and a detailed explanation of how the actions effect other organisms.</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) Attempts to identify positive or negative action of buddleia and a simple explanation of how the actions effect other organisms.</p> <p>OR Identifies both positive and negative actions of buddleia.</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> | 6 | 3 x 2.1 3 x 3.1b | <p>AO2.1 Applies knowledge and understanding of scientific ideas to identify the actions of buddleia in the habitats.</p> <p>Friend</p> <ul style="list-style-type: none"> • butterflies depend on buddleia for food • foxes and badgers depend on buddleia for cover <p>Pest</p> <ul style="list-style-type: none"> • buddleia outcompetes other plants • buddleia has reduced biodiversity <p>AO3.1b Evaluates information in the passage to explain why buddleia effects other organisms.</p> <ul style="list-style-type: none"> • buddleia are the producers in food chains • (without them) birds and bats would not have enough food • (without buddleia) foxes and badgers would be more vulnerable to weather/predators |

| Question | Answer | Marks | AO element | Guidance |
|----------|---|-------|------------|--|
| | <p>Level 1 (1–2 marks) Attempts to identify a positive or a negative action of buddleia.</p> <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"> • other plants have decreased because they would lack light/water/minerals/space • (less biodiversity because) there is less variety of (types of) butterflies/plants |

| Question | | Answer | Marks | AO element | Guidance |
|----------|---------|---|-------|------------|---|
| 20 | (a) | <p>It is a quicker process. A</p> <p>It introduces variation into the population. S ✓</p> | 1 | 1 x 1.1 | |
| | (b) (i) | pH (of the pondwater) ✓ | 1 | 2.2 | |
| | (ii) | 4.5 ✓ | 1 | 2.2 | DO NOT ALLOW more than 1 tick |
| | (iii) | <p>Repeat beaker 4 / 14 ✓</p> <p>The result in jar 4 was an anomalous result/outlier/did not fit the pattern ✓</p> | 2 | 2 x 3.3b | |
| | (iv) | <p>Acid pollution causes the enzymes (in duckweed) to work slower/stop working ✓</p> <p>The rate of photosynthesis/food production is slower ✓</p> | 2 | 2 x 3.2b | ALLOW enzymes denature / active site/enzyme changes shape DO NOT ALLOW kills enzymes/enzymes die |
| | (v) | <p>Include other/greater range/smaller intervals of pH values ✓</p> <p>Around pH 6.5 ✓</p> | 2 | 2 x 3.3a | IGNORE just repeat readings ALLOW values in range of 5-8 |

| Question | | Answer | Marks | AO element | Guidance |
|----------|-----|---|-------|------------|---|
| 21 | (a) | <p style="text-align: right;">✓✓</p> | 2 | 2 x 1.1 | <p>IGNORE no soil use hydroponics line</p> <p>Three correct = 2 marks One or two correct = 1 mark</p> <p>DO NOT ALLOW more than 1 line from/to each box</p> |
| | (b) | (i) 220 ✓ | 1 | 2.1 | |
| | | (ii) 36% ✓ | 1 | 2.1 | |
| | (c) | <p>(i) Chinook salmon have a gene that makes them grow fast/desired gene ✓</p> <p>Gene/DNA is taken out of chinook salmon and transferred to Atlantic salmon ✓</p> <p>Makes Atlantic salmon grow faster (so greater mass) ✓</p> | 3 | 3 x 2.1 | Gene/DNA for rapid growth is taken out of chinook salmon and transferred to Atlantic salmon = 2 marks |
| | | <p>(ii) Any two from:</p> <p>GE salmon might outcompete wild salmon ✓</p> <p>GE salmon might breed with wild salmon ✓</p> <p>Wild salmon might decrease in numbers/become extinct ✓</p> | 2 | 2 x 3.2a | |

| Question | | Answer | Marks | AO element | Guidance |
|----------|---------|--|-------|-----------------------------|---|
| 22 | (a) | Bacteria / fungi ✓ Respiration ✓ (Re)cycled ✓ | 3 | 3 x 1.1 | ALLOW saprophytes DO NOT ALLOW detritivores IGNORE aerobic/anaerobic ALLOW AW e.g., reused/reabsorbed/released/absorbed IGNORE conserved/stored |
| | (b) (i) | Microorganisms give off heat when they decompose waste ✓ | 1 | 1.2 | DO NOT ALLOW more than 1 tick |
| | (ii) | The higher the nitrogen content compared to carbon, the faster the rate of decomposition ✓ | 1 | 3.2b | DO NOT ALLOW more than 1 tick |
| | (iii) | Any one from: External temperature ✓ Water ✓ Oxygen ✓ | 1 | 2.2 | DO NOT ALLOW just temperature ALLOW room temperature ALLOW moisture/humidity/rain IGNORE time/soil |
| | (c) | Plant material: Horse manure ✓ Reason: Lower ratio of carbon to nitrogen / higher nitrogen content compared to carbon ✓ Fruit Waste: 40:1 Horse Manure: 30:1 Straw: 600:1 ✓ | 3 | 3.2a 3.1a 2.2 | If horse manure is not selected only evidence of correct calculations for all plant material can be awarded ALLOW it has the most nitrogen ALLOW evidence of alternative correct calculations |

| Question | | Answer | Marks | AO element | Guidance | | | | | | | | | | | | | | | | |
|----------|----------|--|-------|--|---|--|--|---|---|--|----------|---|----|----|--|---|----|----|---|---|---|
| 23 | (a) | A and B/parents do not have the syndrome ✓ But they have children/D or/and F/offspring that are affected/have the syndrome ✓ | 2 | 2 x 2.1 | ALLOW the disorder skips a generation ALLOW parents/A and B are heterozygous/carriers ALLOW not all the children have the syndrome | | | | | | | | | | | | | | | | |
| | (b) | <table style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td colspan="2" style="text-align: center;">Person B</td> <td></td> </tr> <tr> <td></td> <td style="border: 1px solid black; padding: 5px;">G</td> <td style="border: 1px solid black; padding: 5px;">g</td> <td></td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">Person A</td> <td style="border: 1px solid black; padding: 5px;">G</td> <td style="border: 1px solid black; padding: 5px;">GG</td> <td style="border: 1px solid black; padding: 5px;">Gg</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;"></td> <td style="border: 1px solid black; padding: 5px;">g</td> <td style="border: 1px solid black; padding: 5px;">Gg</td> <td style="border: 1px solid black; padding: 5px;">gg</td> </tr> </table> <p style="margin-left: 150px;">Gametes ✓ Correct cross ✓</p> <p>Probability = 0.25 / 25% ✓</p> | | Person B | | | | G | g | | Person A | G | GG | Gg | | g | Gg | gg | 3 | 2 x 2.1 3.2b | Alternative upper and lower case letters used instead of Gg penalise gametes mark only DO NOT ALLOW correct offspring for incorrect gametes ALLOW ¼ / 1:3 / 1 in 4 ALLOW correct interpretation of probability from diagram shown |
| | Person B | | | | | | | | | | | | | | | | | | | | |
| | G | g | | | | | | | | | | | | | | | | | | | |
| Person A | G | GG | Gg | | | | | | | | | | | | | | | | | | |
| | g | Gg | gg | | | | | | | | | | | | | | | | | | |
| | (c) | (Person D) has (Gillespie) syndrome ✓ They have their iris missing and damage to their cerebellum ✓ Iris can reduce the amount of bright light entering the eye/pupil ✓ Cerebellum controls balance/co-ordination ✓ | 4 | 2.1 1.1 1.1 1.1 | ALLOW iris controls the amount of light entering the eye/pupil | | | | | | | | | | | | | | | | |

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