OCR
Oxford Cambridge and RSA

Foundation

GCSE

Combined Science Biology A Gateway Science

J250/02: 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 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 posted on the RM Cambridge Assessment Support Portal http://www.rm.com/support/ca

3. Log-in to RM Assessor and mark the **required number** of practice responses ("scripts") and the **number of required** standardisation responses.

   YOU MUST MARK 10 PRACTICE AND 10 STANDARDISATION RESPONSES BEFORE YOU CAN BE APPROVED TO MARK LIVE SCRIPTS.

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 or the RM Assessor messaging system, or by email.

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 a tick to confirm that the work has been seen.

7. Award No Response (NR) if:
    - there is nothing written in the answer space

    Award Zero '0' if:
    - anything is written in the answer space and is not worthy of credit (this includes text and symbols).

    Team Leaders must confirm the correct use of the NR button with their markers before live marking commences and should check this when reviewing scripts.

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 e-mail.

9. A*ssistant 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: Not applicable in F501
    a. **To determine the level** – start at the highest level and work down until you reach the level that matches the answer
    b. **To determine the mark within the level**, consider the following

Descriptor	Award mark
On the borderline of this level and the one below	At bottom of level
Just enough achievement on balance for this level	Above bottom and either below middle or at middle of level (depending on number of marks available)
Meets the criteria but with some slight inconsistency	Above middle and either below top of level or at middle of level (depending on number of marks available)
Consistently meets the criteria for this level	At top of level

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 **17(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/Combined Science 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.

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	B✓	**1**	1.1	
2	D ✓	**1**	2.1	
3	C ✓	**1**	1.1	
4	A ✓	**1**	2.1	
5	B ✓	**1**	1.1	
6	C ✓	**1**	1.1	
7	C ✓	**1**	2.1	
8	D ✓	**1**	2.1	
9	C ✓	**1**	1.1	
10	A ✓	**1**	2.2	

Question			Answer	Marks	AO element	Guidance
11	(a)		(Ecosystem) Community ✓ Population ✓ (individual)	2	2 x 1.1	
	(b)		**Any two from:** Releases carbon/carbon dioxide from animals/dead material / adds carbon dioxide to the air ✓ Plants need carbon/carbon dioxide for photosynthesis ✓ Plants need carbon/carbon dioxide to make sugar/food ✓	2	2 x 1.1	
	(c)		Decomposition / decay ✓ Respiration ✓ Exothermic ✓	3	3 x 1.1	**IGNORE** rotting / break down

Question			Answer	Marks	AO element	Guidance
12	(a)	(i)	Spread in the air / spread from coughs/sneezes ✓ Inhaled/breathed in ✓	2	2 x 2.1	**IGNORE** other methods of spread
		(ii)	TB cases remain stable in the years before HIV ✓ As the cases of HIV begin to rise there is a similar rise in TB cases ✓	2	2 x 3.1a	**ALLOW** they both increased
		(iii)	(Bacteria) trapped in mucus ✓ Cilia sweep mucus out of lung ✓	2	2 x 1.1	**IGNORE** mucus kills/blocks bacteria **IGNORE** cilia trap bacteria
	(b)		Mitosis ✓ Undifferentiated ✓	2	2 x 1.1	

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>AO element</th><th>Guidance</th></tr>
<tr><td>13</td><td>(a)</td><td>(i)</td><td>Red = X(chromosome)

White = Y(chromosome) ✓</td><td>1</td><td>2.2</td><td>BOTH correct for the mark</td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td><table><tr><th>Male coin</th><th>Female coin</th><th>Offspring
Boy (B) or Girl (G)?</th></tr><tr><td>red</td><td>red</td><td>G</td></tr><tr><td>red</td><td>red</td><td>G</td></tr><tr><td>white</td><td>red</td><td>B</td></tr><tr><td>white</td><td>red</td><td>B</td></tr><tr><td>white</td><td>red</td><td>B</td></tr><tr><td>red</td><td>red</td><td>G</td></tr><tr><td>white</td><td>red</td><td>B</td></tr><tr><td>white</td><td>red</td><td>B</td></tr><tr><td>red</td><td>red</td><td>G</td></tr><tr><td>white</td><td>red</td><td>B</td></tr></table>✓</td><td>1</td><td>2.2</td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td>3:2 ✓</td><td>1</td><td>2.2</td><td>ALLOW 6:4
ALLOW ecf from (a)(i)</td></tr>
<tr><td></td><td></td><td>(iii)</td><td>1:1 ✓</td><td>1</td><td>1.1</td><td>ALLOW 50:50 / 5:5 / half and half</td></tr>
<tr><td></td><td>(c)</td><td></td><td>Sample size too small ✓

Increase the sample size ✓

or

Idea of bias from one person/the same coin ✓

Use different people to toss the coin / use a different coin✓</td><td>2</td><td>3.3a

3.3b</td><td>ALLOW only tossed the coins 10 times
ALLOW the experiment was only done once

ALLOW toss the coin more times/quoted number
ALLOW repeat the experiment</td></tr>
</table>

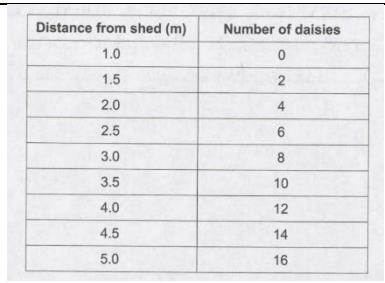
Question			Answer	Marks	AO element	Guidance
Question			**Answer**	**Marks**	**AO element**	**Guidance**
14	**(a)**		Selective breeding ✓	**1**	1.1	**ALLOW** correct answer ringed, ticked or underlined
	(b)	**(i)**	Genome ✓	**1**	1.1	**ALLOW** DNA / chromosomes / genotype **IGNORE** genes / genetic material
		(ii)	**For** **Any one from:** Prevents crop/cauliflower damage (by insects) / increased crop yield / less use of pesticides ✓ **Against** **Any one from:** May produce an allergic reaction / be harmful (to people) / be harmful (to the plant) / genes may spread to other plants ✓	**2**	2 x 3.2a	**ALLOW** farmers do not have to buy pesticides **ALLOW** idea of increased food production / plants grow better / more plants grow **IGNORE** less pollution **ALLOW** not ethically correct to change genes **ALLOW** may affect the taste **ALLOW** may have side effects **IGNORE** not natural / against God **IGNORE** plants more likely to be diseased **IGNORE** harmful to wildlife
	(c)	**(i)**	Adult ✓ Embryonic ✓	**2**	2 x 1.1	**ALLOW** multipotent **ALLOW** pluripotent
		(ii)	White ✓ Rejection ✓	**2**	2 x 2.1	**ALLOW** lymphocyte

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>AO element</th><th>Guidance</th></tr>
<tr><td>15</td><td>(a)</td><td>(i)</td><td>
<table>
<tr><th>Species</th><th>Time the species existed on this planet</th></tr>
<tr><td>killer whale</td><td>present day</td></tr>
<tr><td>C</td><td>41 million years ago</td></tr>
<tr><td>A</td><td>43 million years ago</td></tr>
<tr><td>B</td><td>48 million years ago</td></tr>
</table>
✓ ✓</td><td>2</td><td>2 x 2.1</td><td>3 correct letters = 2 marks
2 or 1 correct letters = 1 mark</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>Fossils ✓</td><td>1</td><td>1.1</td><td>ALLOW DNA (analysis)
IGNORE bones
IGNORE fossil fuels</td></tr>
</table>

Question			Answer	Marks	AO element	Guidance
	(b)*		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)** Describes how the trips aid local biodiversity **AND** Explains a benefit and a challenge resulting from the trips **AND** Makes a judgement on whale watching based on analysis of stated benefits and challenges *There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.* **Level 2 (3–4 marks)** Describes how the trips aid local biodiversity **AND** Explains a benefit **and** a challenge resulting from the trips *There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.* **Level 1 (1–2 marks)** Describes how the trips may aid local biodiversity **OR** Explains a benefit **or** a challenge resulting from the trips	**6**	2 x 2.1 2 x 3.1b 2 x 3.2a	**AO2.1 Apply knowledge and understanding to describe how the trips aid local biodiversity** • marine biologists/experts are in the area • ecotourism brings sustainability/money/jobs for the local community around the Bay • people have the opportunity of learning about the whales **AO3.1b Analyse information to explain the benefits and challenges resulting from the trips** Benefits: • (presence of biologists/experts mean) valuable scientific data about wildlife is collected • (money from ecotourism mean) whales/other wildlife are not killed for resources • (people learn about the whales) and so public are more interested about conserving wildlife Challenges: • gaining agreements to limit frequency of trips • frequent trips might disturb wildlife • pollution/waste from visitors • pollution from diesel engines **AO3.2a Analyse information and ideas to make a judgement on maintaining local biodiversity through whale watching**

Question			Answer	Marks	AO element	Guidance
			There is an attempt at a logical structure with a line of reasoning. The information is in the most part relevant. **0 marks** *No response or no response worthy of credit.*			• judgement includes sensible arguments as to whether the benefits outweigh the challenges

Question			Answer	Marks	AO element	Guidance
16	**(a)**	**(i)**	Quadrat ✓ Random ✓	**2**	2 x 1.1	
		(ii)	**FIRST CHECK THE ANSWER ON ANSWER LINE** **If answer = 660 award 3 marks** 2.5 ✓ $\frac{11 \times 15}{2.5}$ ✓ 660 ✓	**3**	3 x 2.2	**ALLOW** 0.25 and 15 anywhere in answer for one mark **ALLOW** 11 anywhere in answer for one mark **ALLOW** $\frac{15 \times 11}{0.25}$ for 2 marks **ALLOW** 6600 for two marks
	(b)	**(i)**	Suitable scale on correctly chosen axes ✓ Both axes labelled including unit ✓ All points accurately plotted ✓	**4**	4 x 2.2	minimum 50% of grid used scale must be in ascending order / 0,0 not required x-axis distance from shed and y-axis number of daisies x-axis: distance (from shed) m and y-axis: number of daisies

Question			Answer	Marks	AO element	Guidance
			Suitable best straight line ✓			 Distance from shed (m) / Number of daisies 1.0 / 0 1.5 / 2 2.0 / 4 2.5 / 6 3.0 / 8 3.5 / 10 4.0 / 12 4.5 / 14 5.0 / 16 **ALLOW** +/- half a square for plotting **IGNORE** any extrapolation of line **add ticks and crosses to right hand side of grid**
		(ii)	4 ✓	**1**	2.2	**ALLOW** ecf from (b)(i)
		(iii)	**Any two from:** Daisy growth is reduced ✓ (shed) blocks/reduces light on lawn/daisies ✓ Reduced photosynthesis / not able to photosynthesise ✓	**2**	2 x 3.2b	 **ALLOW** less/no daisies near the shed / ORA **ALLOW** the daisies are in the shade **ALLOW** more light further from the shed **ALLOW** daisies need light to grow **IGNORE** just Sun **ALLOW** light is needed for photosynthesis

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