

Higher

GCSE

Combined Science Biology A Gateway Science

J250/02: 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 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 15.

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 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	1.1	
5	A	1	2.1	
6	C	1	1.1	
7	B	1	2.1	
8	A	1	1.1	
9	A	1	1.2	
10	C	1	2.1	

Question			Answer	Marks	AO element	Guidance
11	(a)	(i)	Plasma ✓ Platelets ✓	2	2 x 1.1	More than one part of the blood ticked in a row = 0 marks for that row
		(ii)	Any two from: Red blood cells are biconcave in shape ✓ Red blood cells have no nucleus / white blood cells have a nucleus ✓ Red blood cells have haemoglobin / white blood cells do not have haemoglobin ✓ Red blood cells are smaller (than white blood cells) ORA	2	2 x 1.1	IGNORE reference to function IGNORE reference to surface area IGNORE references to changes in shape ALLOW accurate description of biconcave
	(b)	(i)	2016 ✓	1	3.1a	
		(ii)	Increase ✓	1	2.1	
		(iii)	Benefit: No ethical issues (unlike embryonic) / Can be sure that the donor does not have the disease ✓ Risk: Rejection ✓	2	2 x 2.1	ALLOW an adult can sign the consent form IGNORE religious reasons ALLOW higher level answer e.g., idea that genes to become blood cells will be switched on/they are already partially differentiated ALLOW may harm donor / pathogens passed on / pass on infection/diseases IGNORE not compatible / cells are not accepted

Question			Answer	Marks	AO element	Guidance
12	(a)	(i)	Temperatures = to -18°C stops mould decomposing the bread ✓	1	3.2b	More than one tick = no marks
		(ii)	<p>First check the answer on answer line If answer = 46 (%) award 2 marks</p> <p>76-30 ✓ = 46 ✓</p>	2	2 x 2.2	<p>ALLOW readings in the range 77- 75 and 31-29 ALLOW answer in the range 48 – 44 for 2 marks ALLOW two readings in the acceptable ranges from the graph for one mark</p>
	(b)		<p>Idea of leaving bread in different moisture levels ✓</p> <p>But a scientific method of how to change moisture levels = 2 marks ✓✓</p> <p>Reference to control of one variable ✓</p>	2	2 x 3.3a	<p>ALLOW different humidity levels</p> <p>E.g., Place one in a plastic bag with drops of water and place one in plastic bag with drying agent / soak pieces of bread in different volumes of water</p> <p>E.g., Leave all of them at the same temperature/20°C DO NOT ALLOW leave them all at -18°C</p>
	(c)		<p>Photosynthesis ✓</p> <p>X and ✓ in correct order in table ✓</p>	2	2 x 1.1	ALLOW no for x and yes for ✓
	(d)	(i)	<p>Condensation ✓</p> <p>Evaporation ✓</p>	2	2 x 1.1	

Question	Answer	Marks	AO element	Guidance
(ii)	<p>Any two from:</p> <p>Allows plants to take in water (from soil) ✓</p> <p>Idea that it returns water to the atmosphere / allows water to be recycled ✓</p> <p>(Allows plants to obtain water) for photosynthesis ✓</p> <p>(Allows plants to obtain water) for cooling ✓</p> <p>(Allows) cotransport/movement of minerals up the plant ✓</p>	2	2 x 1.1	

Question		Answer	Marks	AO element	Guidance
13	(a)	Mutualism ✓	1	2.1	ALLOW any indication of the correct answer e.g., ticking or underlining but circling takes precedence More than one answer indicated = 0 marks
	(b)	Variation ✓ Survive / be successful / reproduce / AW ✓ Generation / offspring ✓ <u>Selection</u> ✓	4	2.1 2.1 1.1 1.1	ALLOW differences/ AW / mutations IGNORE changes ALLOW live longer / produce offspring / pass on their genes/alleles

Question			Answer	Marks	AO element	Guidance
14	(a)	(i)	<p>First check the answer on answer line If answer = 3 award 2 marks</p> <p>$12 \div 4 \checkmark$ $= 3 \checkmark$</p>	2	1.2 2.2	
		(ii)	<p>Only uses a small sample size \checkmark</p> <p>Idea that not all the squares had the same number of snails / some squares had a lot more snails than others / some squares had no snails / they sampled the squares with the most snails in / did not sample the squares with no snails in \checkmark</p>	2	2 x 3.2a	IGNORE each square is different unless qualified
		(iii)	Idea of counting/choosing/selecting more squares \checkmark	1	3.3b	<p>ALLOW increase the sample size</p> <p>ALLOW repeat the method and take a mean/average</p> <p>IGNORE increase the size of the grid so there are more squares to sample</p> <p>IGNORE just using more squares</p>
	(b)		<p>Named piece of apparatus/description of a piece of apparatus and its use \checkmark</p> <p>Then any two from:</p> <p>Capture some snails and mark them \checkmark</p> <p>Release the snails and recapture another sample \checkmark</p> <p>Use the (capture – recapture) formula to estimate population \checkmark</p>	3	3 x 2.2	<p>E.g., tape measure/ruler for making out area / pitfall trap for capture / quadrat for sampling the area / non-toxic pen to mark snails</p> <p>IGNORE pooter / sweep net</p> <p>DO NOT ALLOW mark all the snails in the area</p> <p>ALLOW two marks for correct formula</p>

Question	Answer	Marks	AO element	Guidance
15*	<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) A discussion which identifies the link between alcohol and the risk of cardiovascular disease and includes reference to another risk factor AND Evaluates evidence from graph to discuss how well the evidence supports the conclusion.</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) A discussion which identifies the link between alcohol and the risk of cardiovascular disease and includes reference to another risk factor AND Provides supporting evidence from graph</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) Discussion which identifies the link between alcohol and the risk of cardiovascular disease OR Identifies another risk factor OR Attempts an evaluation using evidence from the graph.</p>	6	2x 1.1 2 x 2.1 2 x 3.1b	<p>AO1.1 Demonstrates knowledge and understanding of scientific ideas to list risk factors of cardiovascular disease</p> <ul style="list-style-type: none"> • diet • lack of exercise • smoking • obesity • stress • genetics <p>AO2.1a Applies knowledge and understanding of scientific ideas about alcohol consumption and the risk of cardiovascular disease</p> <ul style="list-style-type: none"> • idea that there is a positive link between increased consumption of alcohol and risk of cardiovascular disease • idea that more alcohol consumed means more risk of disease • idea that there is some risk even without consumption and that other factors will also affect risk <p>AO3.1b Analyse information and ideas to evaluate if data supports the conclusion</p> <ul style="list-style-type: none"> • idea that males aged 55-64 have the highest percentage that consumed more alcohol than recommended • idea that 60 is within the range but that any of the other values in the range could be higher • conclusion relates to all people but data is only for males so can't be sure the trend is the same for females

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"> • Do not know how much alcohol participants consumed • The graph does not show alcohol consumption when younger

Question			Answer	Marks	AO element	Guidance									
16	(a)	(i)	Red is <u>dominant</u> ✓ Idea that (all) offspring/they/red flowers have (one) red allele / Offspring/they/red flowers are Rr ✓	2	3.2a 3.2b	<p>ALLOW white is <u>recessive</u> IGNORE it is dominant / R is dominant IGNORE references to parents' genes</p> <p>ALLOW (all) offspring/they/red flowers have (one) red gene ALLOW (all) offspring/they/red flowers are heterozygous ALLOW (all) offspring/they/red flowers inherited the red allele ALLOW mark from a correct genetic diagram</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td>R</td> <td>R</td> </tr> <tr> <td>r</td> <td>Rr</td> <td>Rr</td> </tr> <tr> <td>r</td> <td>Rr</td> <td>Rr</td> </tr> </table> <p>IGNORE offspring are not homozygous</p> <p>ALLOW for 2 marks offspring have the <u>dominant</u> red allele/gene = 2 marks</p>		R	R	r	Rr	Rr	r	Rr	Rr
	R	R													
r	Rr	Rr													
r	Rr	Rr													
		(ii)	Different alleles (for a gene) ✓	1	1.1	<p>ALLOW they have one dominant allele and one recessive allele ALLOW alleles are not the same / have R and r allele / they are Rr</p> <p>ALLOW two versions of the gene are different IGNORE have separate alleles / mixture of two alleles</p> <p>IGNORE two different genotypes</p> <p>DO NOT ALLOW different genes</p>									

	(b)	<p>Correct alleles for parents ✓</p> <p>Correct alleles for offspring ✓</p> <p>Probability = 50(%) / 1/2 / 1 in 2 / 1:1 / 2/4 ✓</p>	3	3 x 2.1	<p>DO NOT ALLOW other letters e.g., W</p> <p>DO NOT ALLOW ECF from incorrect parents</p> <p>ALLOW ECF from incorrect diagram Probability must be correct for cross shown in their Punnett square</p> <div style="text-align: center;"> <p>Homozygous white flower</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td>r</td> <td>r</td> </tr> <tr> <td>Heterozygous red flower</td> <td>R</td> <td>Rr</td> <td>Rr</td> </tr> <tr> <td></td> <td>r</td> <td>rr</td> <td>rr</td> </tr> </table> </div>		r	r	Heterozygous red flower	R	Rr	Rr		r	rr	rr
	r	r														
Heterozygous red flower	R	Rr	Rr													
	r	rr	rr													
	(c)	<p>(i) First check the answer on answer line If answer = 49(%) award 3 marks</p> <p>Number of blue plants = 48 ✓</p> <p>$(48 \div 97 \times 100) = 49.4845$ ✓</p> <p>= 49 ✓</p>	3	3 x 2.2	<p>49.5 / 49.4845 = 2 marks</p> <p>ALLOW one mark for evidence of correctly rounding their calculated value to whole number</p> <p>ALLOW ECF from evidence of incorrect reading of graph for max 2 marks e.g., $(46 \div 97 \times 100) = 47.422 = 47 = 2$ marks e.g., 47 blue = 48.45 = 1 mark</p>											

		(ii)	Idea of no in-between values ✓	1	3.1b	<p>ALLOW are (only) one colour / no different shades of colours / flowers can (only) be any of the five different colours / limited variety of colours / distinct/discrete categories / only be a select number of colours / data in groups / data in categories</p> <p>ALLOW it is a bar chart not a line/histogram / bars don't touch / it is a bar chart because only discontinuous data can be displayed this way</p>
	(d)		<p>Twice ✓</p> <p>Mitosis ✓</p>	2	2 x 1.1	<p>Three rings two correct = 1 mark</p> <p>Three rings one correct = 0 marks</p> <p>More than three rings = 0 marks</p>

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