

Foundation

GCSE

Combined Science B Twenty First Century Science

J260/04: Combined science (Foundation 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 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. 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. 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 7b

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

11. 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

12. 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 B:

	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.

Question			Answer	Marks	AO element	Guidance
1	(a)	(i)	Hydrogen ✓	1	1.2	
		(ii)	Magnesium chloride ✓	1	2.1	
		(iii)	losing ✓ gaining ✓ ions ✓	3	2.1 x 2 1.1	
	(b)	(i)	H ⁺ ✓	1	1.1	
		(ii)	Magnesium is more reactive (than carbon) / Carbon is less reactive (than magnesium) ✓	1	3.1a	ALLOW magnesium is above carbon / ORA IGNORE reactive / very reactive
	(c)	(i)	Points plotted correctly ✓	1	2.2	ALLOW ± ½ small square tolerance
		(ii)	Line of best fit (smooth curve) ✓	1	2.2	ALLOW curve based on printed points if no answer to (c)(i)
		(iii)	As concentration increases time taken decreases / ORA ✓ Idea that difference in concentration has less of an effect on time at higher concentrations / ORA ✓	2	3.1a	IGNORE faster time / slower time IGNORE correlation

Question			Answer	Marks	AO element	Guidance
2	(a)		E C A D ✓✓	2	1.2	Any two correct for 1 mark
	(b)		×400 ✓	1	2.2	
	(c)		First check answer on answer line If answer = 34 award 2 marks $\frac{36+35+32+33+34}{5} \text{ OR } \frac{170}{5} \checkmark$ 34 ✓	2	2.2	
	(d)	(i)	(Size of stomatal opening) increases and then decreases over time ✓	1	3.1a	ALLOW just increases and decreases IGNORE times given e.g. 12pm / 6am IGNORE the peak is at midday / 12pm / middle of day
		(ii)	Light / (increase in) temperature ✓	1	3.2b	ALLOW sun / sunny ALLOW heat / warmth IGNORE wind / humidity / weather IGNORE time DO NOT ALLOW dark / cold
	(e)		variation ✓ survive ✓ natural selection ✓ chloroplasts ✓	4	2.1 x 2 1.1 x 2	

Question			Answer	Marks	AO element	Guidance
3	(a)		First check answer on answer line If answer = 3.3 (cm) award 2 marks $10 \div 3 \checkmark$ $= 3.3 \text{ (cm)} \checkmark$	2	3.1a	ALLOW 3 waves or 3 (cm) for one mark
	(b)		First check answer on answer line If answer = 3.66 / 3.7 (Hz) award 2 marks $(f =) 18.3 \div 5 \checkmark$ $= 3.66 \text{ (Hz)} \checkmark$	2	2.1	
	(c)		First check answer on answer line If answer = 10 (cm/s) award 3 marks Selection of $v = f \lambda \checkmark$ $v = 4.0 \times 2.5 \checkmark$ $= 10(.0) \text{ (cm/s)} \checkmark$	3	1.1 2.1 x 2	

Question			Answer	Marks	AO element	Guidance
4	(a)		Put finger(s) on wrist / neck / artery / blood vessel ✓	1	1.2	IGNORE skin ALLOW thumb
	(b)	(i)	Student B has a lower resting pulse rate. ✓ Student B's pulse rate returned to resting sooner. ✓	2	3.1b	ALLOW one mark if 3 boxes ticked and 2 correct
		(ii)	Any one from: Idea of standardising the type of exercise ✓ Idea of standardising the intensity of exercise ✓ Idea of standardising recovery ✓ Idea of eliminating factors that affect heart rate e.g. energy drinks / caffeine ✓ Ensure pulse rate is measured at 6 minutes for student A ✓	1	3.3b	IGNORE repeats / different people / more regular measurements ALLOW descriptions of how e.g. both do star jumps, run on a treadmill at 5 mph ALLOW both sitting down
	(c)	(i)	Any one from: What are the side effects? ✓ How often / How much do I need to take? ✓ Can I still drive? ✓	1	3.2a	ALLOW any reasonable question a patient would ask a doctor before taking a new drug ALLOW correct ideas that are not phrased as a question

		(ii)	Any one from: Could you be / Are you pregnant? ✓ Are you breastfeeding? ✓ Do you drink alcohol? ✓ Are you on any other medication? ✓ Do you have any allergies? ✓ Do you have any other health issues? ✓ Do you exercise? ✓	1	3.2a	ALLOW any reasonable question a doctor would ask a patient in a consultation ALLOW correct ideas that are not phrased as a question
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Question			Answer	Marks	AO element	Guidance
5	(a)	(i)	Add mass (to falling mass) ✓	1	3.1a	ALLOW “weight” for mass IGNORE pull it harder / adding mass to trolley
		(ii)	Lubricate / use a smoother surface ✓	1	3.1a	ALLOW use oil / grease / water IGNORE any changes to the trolley / tilt the surface
	(b)	(i)	To reduce the effect of random errors on the result ✓	1	3.2b	
		(ii)	First check answer on answer line If answer = 0.5 (m/s²) award 2 marks (Acceleration =) $\frac{2 \times 1}{2^2}$ or $\frac{2 \times 1}{4}$ or $\frac{2}{4}$ ✓ = 0.5 (m/s ²) ✓	2	2.1	
	(c)	(i)	A single straight diagonal line with positive gradient ✓ through (0,0) ✓	2	3.2b	
		(ii)	F is <u>directly proportional</u> to a ✓✓ OR any two from: F ÷ a is constant / F is proportional to a ✓ Mass is constant ✓ When resultant force is 0, acceleration is 0 ✓ Force increases as acceleration increases ✓	2	3.2b	

Question			Answer	Marks	AO element	Guidance
6	(a)		Ink samples under surface of solvent / liquid / water ✓ Line drawn in ink / line not drawn in pencil ✓	2	3.1a	ALLOW the solvent is above the start line ALLOW added too much solvent ALLOW the ink on the start line will run / the ink will dissolve in the solvent
	(b)	(i)	First check answer on answer line If answer = 0.62 award 3 marks $24 \div 39$ ✓ $= 0.615\dots$ ✓ $= 0.62$ (2sf) ✓	3	2.2 x 2 1.2	ALLOW for 1 mark sight of 0.6 if no other marks awarded ALLOW 1.6 for 1 mark
		(ii)	There is more than one spot (in column X) ✓	1	3.2b	ALLOW more than one pigment / colour
	(c)		Change the solvent ✓	1	3.3a	IGNORE water
	(d)		They would have similar R _f values (if chromatography was used) ✓	1	3.2b	ALLOW all samples will be at same height up the paper

Question		Answer	Marks	AO element	Guidance
7	(a)	Appropriate annotation made on graph ✓ Half-life = 2.5 – 3(.0) (s) inclusive ✓	2	2.2	ALLOW lines, a line, a cross, marks on the axes

(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) Technetium-99m chosen AND Detailed explanation of why technetium-99m should be used <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) Technetium-99m chosen AND Limited explanation of why technetium-99m should be used OR Incorrect isotope (iodine-131 or bromine-82) chosen AND Clear explanation of why this isotope should be used <i>There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.</i> Level 1 (1–2 marks) Limited explanation of the properties of the isotopes OR Technetium-99m chosen with no/incorrect justification <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 No response or no response worthy of credit.	6	4 x 2.1 2 x 3.2b	AO3.2b Analyse information and ideas to draw conclusions Technetium-99m is the most suitable because it has a short half-life, has the highest penetrating power and the least ionising power AO2.1 Applies knowledge and understanding of scientific ideas • Radiation needs to have sufficient penetrating power to reach the camera / pass through body tissues (bromine-82 / iodine-131 / technetium-99m / beta / gamma) • Radiation used should have low ionising power to limit the risk of damage to living cells / risk of causing cancer (bromine-82 / iodine-131 / technetium-99m / beta / gamma) • Half-life should be short enough to limit radiation risk (bromine-82 / technetium-99m) • Actinium-225 / alpha is <u>unsuitable</u> because it has the lowest penetrating power / high ionising power / has a long half-life Aspects of the communication statement might typically be missing when: • Irrelevant information is provided • Information presented is incoherent • Information presented is contradictory • Information presented does not have a logical structure • Use of correct terminology is not secure/present within answer
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Question			Answer	Marks	AO element	Guidance
8	(a)		Any two from: Low stiffness / flexible ✓ (Low stiffness / flexible) idea of withstanding impact / idea of improved manoeuvrability ✓ Higher tensile strength ✓ (Higher tensile strength) to resist breakage ✓ Mid-range / lower density ✓ (Mid-range /lower density) so not too heavy ✓	2	3.2a	ALLOW additional correctly named properties not in the table, e.g. glass is fragile, composite is durable or hard wearing IGNORE lowest density ALLOW 1 mark for reasons why skateboard A was not chosen ALLOW 1 mark for reasons why skateboard B was not chosen
	(b)		Composites combine the properties of more than one material (to make a material that is better for its job) ✓	1	1.1	
	(c)		Any one from: Energy needed for disposal ✓ The materials can be burned (to produce electricity) ✓ The ability to reuse ✓ Idea of an impact on the environment ✓ Biodegradability of the materials ✓ Recyclability of the material ✓	1	1.1	ALLOW ideas of breaking the skateboard down and using the parts

	(d)	(i)	(Sulfur dioxide) is acidic / causes acid rain ✓ Any one from: Harmful to plants / animals ✓ Damage to buildings ✓ Skin irritation ✓ Respiratory problems ✓ Haze ✓	2	1.1	
		(ii)	<u>N₂</u> ✓	1	1.2	

Question			Answer	Marks	AO element	Guidance
9	(a)		Put in a water bath ✓	1	3.3a	ALLOW description of a water bath ALLOW description of how to maintain room temperature IGNORE insulation
	(b)		Use a gas syringe with smaller divisions / greater resolution / AW ✓ So the measurements are closer to the true value ✓	2	3.3b	ALLOW stated increments if less than 5cm ³ IGNORE repeating measurements / precision / calculating mean
	(c)		First check answer on answer line If answer = 1.75 / 1.8 (cm³/minute) award 2 marks 35 ÷ 20 ✓ = 1.75 ✓	2	2.2	ALLOW max 1 mark for 25 ÷ 20 = 1.25 OR 30 ÷ 20 = 1.5 if wrong sugar used for the calculation
	(d)		Idea that gills increase its surface area ✓ Idea that gills increase surface area to volume ratio ✓ greater rate of (named) gas exchange / diffusion ✓	3	2.1	ALLOW multicellular animals have a low surface area to volume ratio ALLOW rate of diffusion would be too slow (without gills)

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