

Foundation

GCSE

Combined Science B Twenty First Century Science

J260/03: Physics (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.

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 questions on this paper are **7d**

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**.

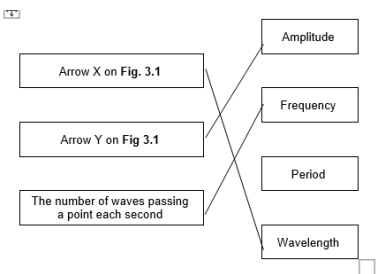
Please ask for help or guidance whenever you need it. Your first point of contact is your Team Leader.

The breakdown of Assessment Objectives for GCSE (9-1) in **Biology/Chemistry/Physics/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)		It has both magnitude and direction ✓	1	1.1	
	(b)		Distance – Scalar Speed – Scalar Velocity – Vector ✓✓	2	1.1	Three correct = two marks Two correct = one mark
	(c)	(i)	Stationary/not moving ✓	1	3.1a	
		(ii)	Alex is moving at a higher speed (between points C and D) / faster/ now running✓	1	3.1a	

Question			Answer	Marks	AO element	Guidance
2	(a)		positive ✓ electrons ✓ hundred-thousandth ✓	3	1.1	
	(b)	(i)	S ✓	1	3.1a	
		(ii)	P and R ✓	1	3.1a	

Question			Answer	Marks	AO element	Guidance
3	(a)		 ✓✓✓	3	1.1	
	(b)	(i)	First check answer on answer line If answer = 250 (m/s) award 2 marks speed = $(2 \times 50) \div 0.40$ ✓ = 250 (m/s) ✓	2	2.1	
		(ii)	First check answer on answer line If answer = 330(m/s) award 2 marks wave speed = 0.55×600 ✓ = 330 (m/s) ✓	2	2.1	
		(iii)	Increase the time between starting and stopping the timer by standing further away from the wall. ✓	1	3.2a	
	(c)		In transverse waves the disturbance (in the medium) / oscillation / vibration is at 90° to the direction (of the wave) ✓ In a longitudinal wave the disturbance (in the medium) / oscillation / vibration is parallel to the direction (of the wave) ✓	2	1.1	

Question			Answer	Marks	AO element	Guidance
4	(a)		Chemical (potential) energy ✓ Force /work done (by force)/mechanically✓ Elastic (potential) energy ✓	3	2.2	
	(b)	(i)	First check answer on answer line If answer = 9(J) award 2 marks Kinetic energy = $0.5 \times 0.125 \times 12^2$ ✓ = 9 (J) ✓	2	2.1	ALLOW Powers of ten error for 1 mark
		(ii)	First check answer on answer line If answer = 7.2(m) award 2 marks Maximum height = $9 / (0.125 \times 10)$ ✓ = 7.2 (m) ✓	2	2.1	ALLOW ECF from (b)(i)
		(iii)	(work has to be done against) air resistance ✓	1	2.1	ALLOW any mention of resistive forces
	(c)	(i)	Resultant force is zero. ✓	1	1.1	
		(ii)	Any two from: (constant speed means) acceleration is zero ✓ Idea of application of $F = ma$ ✓ Balanced forces acting on the rocket ✓ upwards force (air resistance) and downwards force (weight) are equal in size ✓ rocket is in equilibrium ✓	2	1.1	

Question			Answer	Marks	AO element	Guidance
5	(a)		Top left-hand box – freezing ✓ Top right-hand box - condensing ✓ Bottom box - sublimation ✓	3	1.1	
	(b)		Arrangement: In a liquid the particles are close together ✓ In a gas the particles are far apart ✓ Behaviour: In a liquid the particles can move/slide over each other ✓ In a gas the particles move randomly / at high speeds / in all directions ✓	4	1.1	ALLOW arrangement in diagrams
	(c)	(i)	First check answer on answer line If answer = 1800(W) award 3 marks $540000 = P \times 300$ ✓ $P = 540000 \div 300$ ✓ $= 1800 \text{ (W)}$ ✓	3	2.1	
		(ii)	First check answer on answer line If answer = 2700000 (J/kg) award 3 marks Mass of water changing state = $1.00 - 0.80 = 0.20 \text{ kg}$ ✓ Specific latent heat = $540000 / 0.20$ ✓ $= 2700000 \text{ (J/kg)}$ ✓	3	2.1	ALLOW $540000/0.8$ gains 1 mark

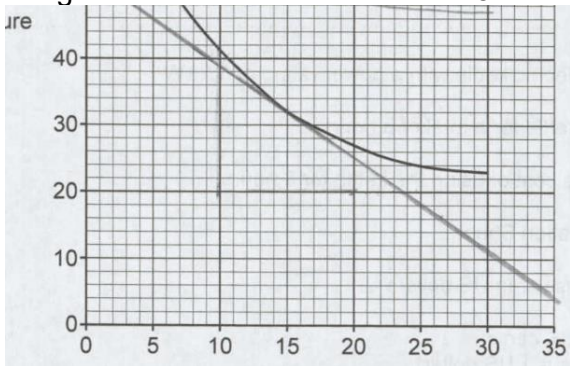
Question			Answer	Marks	AO element	Guidance
6	(a)		Component 1  ✓ Component 2  ✓	2	1.2	ALLOW lines not connected to circuit
	(b)	(i)	Current = 0.44 A ✓	1	2.2	
		(ii)	First check answer on answer line If answer = 5.5 (Ω) award 2 marks Resistance = $2.4/0.44$ ✓ = 5.5 (Ω) ✓	2	2.1	ALLOW ECF from (b)(i) ALLOW 5.45(,,)
		(iii)	As potential difference increases, current increases non-linearly / idea that potential difference not proportional to current ✓ As current increases, resistance increases (which causes graph to get less steep) ✓	2	1.1	

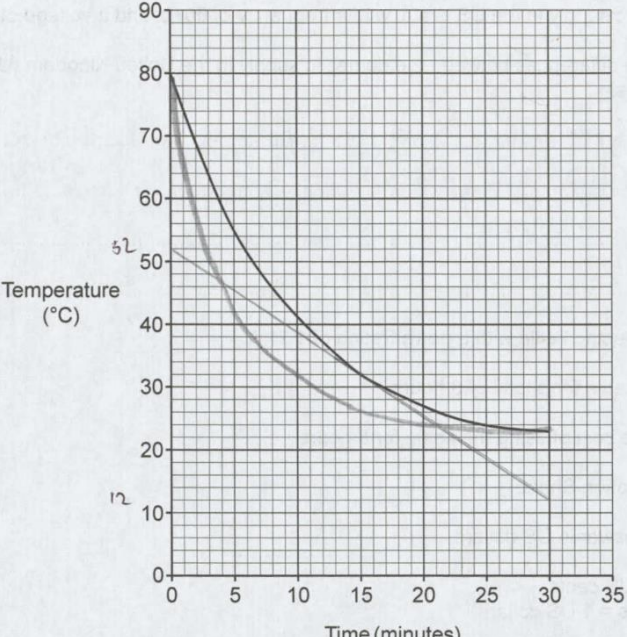
Question			Answer	Marks	AO element	Guidance
7	(a)		50 (Hz) ✓ 230 (V) ✓	2	1.1	
	(b)		a.c. changes / reverses direction AND d.c. flows in one direction only ✓	1	1.1	
	(c)		First check answer on answer line If answer = (£)4.55 award 4 marks E = Pt ✓ = 2.6 x 5 ✓ = 13 kWh ✓ Cost = (13 x 0.35) = (£)4.55 ✓	4	1.1 2.1 x 3	
	(d)		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) Correct explanation of why Circuit B is used in the home rather than Circuit A AND comparison of p.d in each circuit AND why the current in circuit B is larger <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) Two of: Correct explanation of why Circuit B is used in the home rather than Circuit A OR comparison of p.d in each circuit OR why the current in circuit B is larger <i>There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.</i>	6	1.1 x 3 2.1 x 3	AO2.1 Applies knowledge and understanding of ideas to compare the two circuits - In circuit B all the components have the same (normal potential difference) – in A each component has a smaller (than normal) potential difference - In circuit B all components work at their normal power / all bulbs work at normal brightness – in B each component works at less than normal power - In circuit B each component can be switched on and off independently – in A all components are on or off at the same time - In circuit B if one component breaks, the others still work – in A if one component breaks all of them switch off AO1.1 Demonstrates knowledge and understanding of series and parallel circuits Circuit A - Is a series circuit

Question	Answer	Marks	AO element	Guidance
	Level 1 (1–2 marks) Correct explanation of why Circuit B is used in the home rather than Circuit A OR comparison of p.d in each circuit OR why the current in circuit B is larger <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 <i>No response or no response worthy of credit.</i>			• Must be complete for the current to flow • Adding more components increases the resistance of the whole circuit (and so reduces the current to all of them) • The potential difference of the source is shared between all the components Circuit B • Is a parallel circuit • Contains more than one complete loop • The potential difference across each component is the same as the potential difference of the source • Adding more components in parallel reduces the resistance of the circuit (and so increases the current from the source). 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

Question				Answer	Marks	AO element	Guidance
8	(a)		(i)	First check answer on answer line If answer = 34 (cm³) award 2 marks 84 - 50 ✓ = 34 (cm ³) ✓	2	1.2	ALLOW 1 mark if one reading incorrect
			(ii)	Systematic error ✓	1	1.2	
			(iii)	95(.0) (g)	1	1.2	
			(iv)	First check answer on answer line If answer = 2.8 (g/cm³) award 4 marks Use of $\rho = m/V$ ✓ $\rho = 95/34$ ✓ $= 2.7941176....$ (g/cm ³) ✓ Answer given to 2sf: = 2.8 (g/cm ³) ✓	4	1.1 2.1 x 2 1.2	ALLOW ECF from 8ai and 8aiii
	(b)			Any two pairs from: Use a measuring cylinder that measures to the nearest 1 cm ³ (or better) ✓ To allow the volume to be measured more accurately ✓ Use a balance that measures mass to the nearest 0.01 g (or better) ✓ Allows the mass to be measured more accurately ✓ Use a larger stone / sample ✓ Reduces the uncertainty in the volume of the stone. ✓ Do not use string ✓ String will displace some water/has volume ✓ Weigh mass when dry ✓ No water mass included ✓	4	3.3b	

Question			Answer	Marks	AO element	Guidance
9	(a)		First check answer on answer line If answer = 12 (m) award 4 marks Select: average speed = distance $\div$ time ✓ Substitute: 20 = distance $\div$ 0.6 ✓ Rearrange: Distance = 20 x 0.6 ✓ = 12(m) ✓	4	1.1 3.1a 2.1 x 2	ALLOW standard letters and rearrangements ALLOW substitution into incorrectly rearranged algebraic or word equation ALLOW Distance = speed x time OR $d = s \times t$ ALLOW up to 3 marks maximum for use of incorrect time between 0.5 and 0.7 s giving an answer between 10 and 14 (m)
	(b)		First check answer on answer line If answer = 40 (m) award 4 marks 174kJ converted to 174000J ✓ Substitute: 174000 = 4350 x distance ✓ Rearrange: distance = 174000 $\div$ 4350 ✓ = 40 (m) ✓	4	2.1	ALLOW substitution into incorrectly rearranged algebraic or word equation ALLOW distance = work done $\div$ force OR $d = W \div F$ ALLOW maximum of 3 marks for POT error
	(c)		Distance travelled during reaction time is lower / gives the driver more time to react ✓ Work needed by brakes to reduce kinetic energy is lower / it is easier to reduce the kinetic energy of the car ✓	2	1.1	ALLOW decreases thinking distance ALLOW decreases braking distance / time needed to brake If no other mark scored ALLOW 1 mark for decreases stopping distance / time OR reduce the chance of collision / injury during a collision

Question			Answer	Marks	AO element	Guidance
10	(a)	(i)	Any two from: Volume / mass of water ✓ Starting / initial temperature of water ✓ Room temperature ✓ Shape / size of containers ✓ Thickness of insulating material ✓	2	3.3a	ALLOW amount ALLOW type of metal used for containers
		(ii)	Metal is a (thermal) conductor OR plastic is a (thermal) insulator ✓ AND any one from: Better (rate of) energy transfer to insulating material (to see the thermal conductivity of the insulating material) ✓ With metal the effect of the insulation is clearer / plastic would make the effect of the insulation less clear ✓	2	1.1	ALLOW reverse argument
	(b)	(i)	Tangent drawn at x-coordinate of 15 minutes ✓ 	1	2.2	Straight line tangent must touch curve at 15 minutes without a gap either side of the curve. DO NOT ALLOW multiple tangents drawn

Question			Answer	Marks	AO element	Guidance
		(ii)	First check answer on answer line If answer = -1.3 ± 0.2 ($^{\circ}\text{C}/\text{min}$) award 2 marks Evidence of change in $y \div$ change in x ✓ $= -1.3 \pm 0.2$ ($^{\circ}\text{C}/\text{min}$) ✓	2	2.2	ALLOW 'counting squares' for this mark if correctly links to drawn triangle ECF for their drawn straight line tangent Note answer must be negative
		(iii)	Curve starts at 80°C and is steeper at the start ✓ Levels off to between 20° and 24° ✓	1 1	3.2a	

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