

OCR • GCSE COMBINED SCIENCE A (GATEWAY) J250

Physics — Foundation Tier, Paper 1

June 2025 exam series

MARK SCHEME

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Foundation

GCSE

Combined Science Physics A Gateway Science

J250/05: Paper 5 (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

11. Mark strictly to the mark scheme.
12. Marks awarded must relate directly to the marking criteria.
13. 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.
14. 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.

15. Work crossed out:
- where a candidate crosses out an answer and provides an alternative response, the crossed-out response is not marked and gains no marks
 - 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.
16. 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.
17. 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).
18. 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.
19. 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.

20. 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 **14**.

21. 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

22. 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

23. 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	D	1	1.2	
2	D	1	1.1	
3	D	1	2.1	A: $2 \div 8$ B: $2 \div (8 - 2)$ C: $(8 - 2) \div 2$ D: $8 \div 2$
4	B	1	1.2	
5	A	1	2.1	A: $m \div v$ B: $m - v$ C: $m + v$ D: $m \times v$
6	C	1	2.1	A: $10 \div 40$ B: $40 \div 10$ C: 10×40 D: $10^2 \times 40$
7	A	1	1.2	
8	C	1	1.1	
9	D	1	2.1	A: halved B: no change C: doubled once only D: both doubled
10	D	1	2.1	

Question			Answer	Marks	AO element	Guidance
11	(a)			1	1.1	
	(b)		Thermistor added correctly ✓ Voltmeter added to circuit and correct symbol ✓ Voltmeter in parallel with thermistor ✓	3	3 × 2.2	ALLOW ECF from 11(a) for incorrect symbol ALLOW recognisable thermistor symbol with small errors DO NOT ALLOW line drawn through voltmeter symbol ALLOW voltmeter drawn in parallel with thermistor and ammeter ALLOW voltmeter drawn in parallel with battery ALLOW voltmeter drawn in parallel with battery and ammeter ALLOW maximum of 2 marks if an incomplete or unworkable circuit is drawn
	(c)	(i)	As T increases, R decreases / AW ✓ Any quantitative evidence from graph ✓	2	2 × 3.1a	IGNORE negative correlation / inversely proportional ALLOW tolerance of $\pm\frac{1}{2}$ small square (0.25 kΩ or 1 °C) For example: 0 (°C) and 30 (kΩ) 10 (°C) and 18 (kΩ) 20 (°C) and 11 (kΩ) 30 (°C) and 7 (kΩ) 40 (°C) and 4 (kΩ) 50 (°C) and 2 (kΩ)

Question			Answer	Marks	AO element	Guidance
11	(c)	(ii)	11 (k Ω) and 4 (k Ω) quoted / evidence of reading resistance at 20 °C and 40 °C from graph ✓ (Not suitable) because 7(k Ω) < 10(k Ω) ✓	2	2 × 3.2b	ALLOW evidence drawn on graph ALLOW tolerance of $\pm\frac{1}{2}$ small square (0.25 k Ω or 1 °C) ALLOW so change is only 7(k Ω) / 7(k Ω) is not big enough change
	(d)		Light dependent resistor ✓	1	1.1	ALLOW LDR

Question			Answer	Marks	AO element	Guidance
12	(a)		(Idea of measuring) new length and original length ✓ Calculates the difference ✓	2	2 × 1.2	ALLOW new length – original length for 2 marks
	(b)		Elastic ✓	1	1.1	ALLOW elasticity
	(c)		First check the answer on the answer line If answer = 10 (N/m) award 3 marks Rearrange: (spring constant =) force ÷ extension ✓ Substitute: (spring constant =) 4 ÷ 0.4 ✓ Evaluate: (spring constant =) 10 (N/m) ✓	3	1.2 3.1b 2.1	ALLOW (k =) $F \div x$ ALLOW equivalent substitution from another point on the line
	(d)		The elastic limit can be found ✓ It shows that Hooke's Law is not always obeyed ✓	2	2 × 3.3b	Each correct tick = 1 mark Three ticks and two correct = 1 mark Three ticks and one correct = 0 marks Four or more ticks = 0 marks

Question			Answer	Marks	AO element	Guidance
13	(a)		(On melting) particles move further apart / AW ✓ There is the same number/mass of particles in a greater volume/space / AW ✓	2	2 × 2.1	ALLOW particles are further apart in a liquid / particles are closer together in a solid than in a liquid ALLOW idea of particles separating (apart) in a liquid ALLOW solid (chemical) expands when it melts DO NOT ALLOW particles become less dense / particles expand ALLOW volume (of chemical) increases and mass is constant
	(b)		First check the answer on the answer line If answer = 53 100 (J) award 4 marks Select: (thermal energy for a change in state =) mass × specific latent heat ✓ Substitute: (energy =) 0.125 × 425 000 ✓ Evaluate: (energy =) 53 125 (J) ✓ Significant figures: (energy =) 53 100 (J) (to 3 sf) ✓	4	1.2 2.1 2.1 1.2	ALLOW E = ml ALLOW equation in any form ALLOW 1.25 × 10 ⁿ × 425 000 ALLOW clear evidence of correct conversion of incorrect answer to 3 significant figures
	(c)		C would melt completely (at body temperature) / C has low(est) melting point / A would not melt (at body temperature) ✓ C would absorb more energy (from the thermal store in the wound than B) ✓	2	2 × 3.2a	ALLOW the melting point of A is (much) too high

Question		Answer	Marks	AO element	Guidance
14	*	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) Detailed explanation of how pressure is created AND Detailed explanation of how pressure changes with temperature <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) Clear explanation of how pressure is created AND Clear explanation of how pressure changes with temperature OR Detailed explanation of how pressure is created AND Basic explanation of how pressure increases with temperature OR Basic explanation of how pressure is created AND Detailed explanation of how pressure increases with temperature <i>There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.</i>	6	3 × 1.1 3 × 2.1	AO1.1 Demonstrate knowledge and understanding of how pressure is created - particles in a gas move around freely/randomly/rapidly - gas particles collide - gas particles collide with the container/wall - collisions with the container/wall create pressure - pressure depends on the frequency of collisions - pressure depends on the force/impact/hardness/vigorousness of the collisions AO2.1 Apply knowledge and understanding of how pressure changes with temperature - pressure increases with temperature / ORA - increased temperature increases particle speed/kinetic energy / ORA - pressure increases when speed of particles increases / ORA - increased temperature/faster particles result in more frequent/forceful/vigorous collision / ORA

Question			Answer	Marks	AO element	Guidance
			Level 1 (1–2 marks) Basic explanation of how pressure is created OR Basic explanation of how pressure changes with temperature <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>			- increased temperature/faster particles result in more frequent/forceful/vigorous collisions with container/wall / ORA - more frequent/forceful/vigorous collisions with container/wall give greater pressure / ORA

Question			Answer	Marks	AO element	Guidance
15	(a)		Ammeter ✓	1	1.2	
	(b)		X ✓	1	1.2	
	(c)		To allow the current (in the diode/circuit) to be varied ✓	1	1.2	ALLOW to allow the potential difference (p.d.) across the diode to be varied/increased/decreased ALLOW to allow current (in the diode/circuit) to be increased/decreased
	(d)	(i)	2.0V ✓	1	2.2	
		(ii)	20 (mA) ✓	1	2.2	ALLOW answers in range 19 – 21 (mA)
		(iii)	1.0 (V) ✓	1	1.1	ALLOW answers in range 1.0 - 1.05 (V)
	(e)		Reversed the diode/battery (and took more readings) ✓	1	1.2	DO NOT ALLOW reversed diode and battery

Question			Answer	Marks	AO element	Guidance
16	(a)		Induced ✓	1	1.1	ALLOW temporary
	(b)		Plotting compasses ✓ Iron filings ✓	2	2 × 1.2	ALLOW in either order ALLOW answers if circled or underlined but answer line takes precedence ALLOW compass(es) for plotting compasses ALLOW iron or filings for iron filings
	(c)		Observe the needle direction at different points on the Earth's surface ✓	1	3.3a	ALLOW (idea of) using dipping compass at different places (on Earth's surface)
	(d)		Any two from: Field strength varies from 30 (μT) to 60 (μT) / has a range of 30 (μT) ✓ Field is stronger at A and E / weaker at C ✓ Field is stronger at poles / weaker at equator/away from poles ✓	2	2 × 3.2b	ALLOW north and south for poles ALLOW the magnetic field decreases from the north (pole) to the equator and increases from the equator to the south (pole) for 2 marks

Question			Answer	Marks	AO element	Guidance
17	(a)	(i)	(Idea that) <u>negative</u> charges are spread throughout the atom ✓ <u>Positive</u> charge in the main body/substance of the atom ✓	2	2 × 1.1	ALLOW electrons for negative charge ALLOW (idea that) atom is ball/cloud/sphere/sea of <u>positive</u> charge ALLOW (idea that) the electrons/ <u>negative</u> charges are spread throughout the ball of <u>positive</u> charge for 2 marks ALLOW answers from labelled diagram
		(ii)	Technology not available / newer evidence had not yet been found ✓	1	2.2	ALLOW scientists had not raised these questions
	(b)	(i)	Any two from: To share with other scientists / other scientists can see his work / AW ✓ So that results and/or explanations could be checked / peer reviewed / AW ✓ To document the event (in history) / so people could not steal his ideas / to gain credit for his work / recognise his work / AW ✓ Other scientists can develop his ideas / track progress / AW ✓	2	2 × 2.2	IGNORE to become famous

Question			Answer	Marks	AO element	Guidance
		(ii)	Physicist Change neutrons Bohr electron orbits Marsden nucleus ✓	1	1.1	IGNORE line joining Marsden to nucleus DO NOT ALLOW any other lines drawn

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