OCR
Oxford Cambridge and RSA

Foundation

GCSE

Combined Science Physics A Gateway Science

J250/05: Paper 5 (Foundation Tier)

General Certificate of Secondary Education

Mark Scheme for June 2024

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of candidates of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, Cambridge Nationals, Cambridge Technicals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support, which keep pace with the changing needs of today's society.

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.

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 the annotation SEEN 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 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 **14**.

11. Annotations available in RM Assessor

Annotation	Meaning
	Correct response
	Incorrect response
^	Omission mark
BOD	Benefit of doubt given
CON	Contradiction
RE	Rounding error
SF	Error in number of significant figures
ECF	Error carried forward
L1	Level 1
L2	Level 2
L3	Level 3
NBOD	Benefit of doubt not given
SEEN	Noted but no credit given
I	Ignore

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.

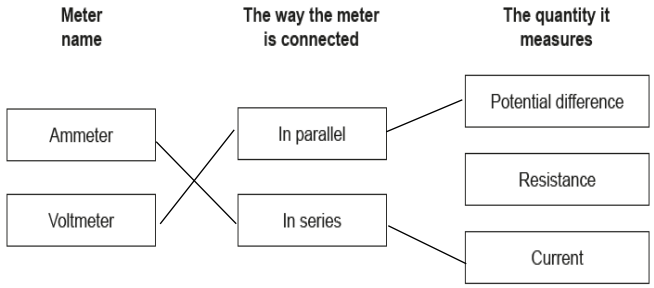
The breakdown of Assessment Objectives for GCSE (9-1) in Combined Science A:

	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	C	1	2.1	**ALLOW** 8.0 (N)
3	D	1	2.2	
4	B	1	2.1	**ALLOW** 4.0 (m/s^2)
5	B	1	2.1	**ALLOW** 2.5 (m/s^2)
6	C	1	2.2	
7	C	1	1.2	
8	D	1	1.1	
9	B	1	1.1	
10	D	1	1.1	

Question			Answer	Marks	AO element	Guidance
11	(a)	(i)	(Dipping) compass ✓	1	1.2	**IGNORE** protractor
		(ii)	(Core of the Earth is) magnetic / (Earth) has a magnetic field ✓	1	1.1	**ALLOW** it's a magnet **IGNORE** magnetic field strength/direction
	(b)	(i)	Sprinkle/put iron filings on the cardboard / around the wire ✓ Tap the card ✓	2	2 × 1.2	 **ALLOW** filings line up with magnetic field
		(ii)	Concentric circles ✓ Three circles getting further apart with distance from wire ✓ Arrow showing anticlockwise direction ✓	3	3 × 1.1	**ALLOW** new diagram drawn Be generous with shape and separation of lines **ALLOW** distance between 2nd and 3rd circle must (on average) be greater than the distance between 1st and 2nd circle **DO NOT ALLOW** if any arrows are clockwise
	(c)		 D ✓ (Strength increases with) more turns (in coil) AND higher current ✓	2	 1.1 3.1b	If D is not chosen zero marks for question. **ALLOW** D indicated on diagram but answer line takes precedence **ALLOW** more turns and 1A / higher current and 9 turns **IGNORE** stronger current

Question			Answer	Marks	AO element	Guidance
12	(a)	(i)	The circuit is incomplete / switch is open ✓	1	1.2	**ALLOW** it is not switched on / there is no current / circuit not connected / there is a gap in the circuit / open circuit
		(ii)	The diode/cell is the wrong way around / diode/cell is backwards / diode is in reverse bias / diode has a very high resistance / diode prevents current ✓	1	2.2	**ALLOW** diode only lets current in one direction **ALLOW** battery for cell
		(iii)	No cell/battery/power supply/(source of) p.d./voltage ✓	1	1.2	**IGNORE** just power
	(b)	(i)	 Correct matching for ammeter ✓ Correct matching for voltmeter ✓	2	2 × 1.2	**ALLOW** if intention clear: One line from ammeter to in series **AND** another line from ammeter to current for 1 mark One line from voltmeter to in parallel **AND** another line from voltmeter to potential difference for 1 mark If no other mark awarded, **ALLOW** 1 mark maximum for lines drawn to clearly show: ammeter connected in series **AND** voltmeter connected in parallel If no other mark awarded, **ALLOW** 1 mark maximum for lines drawn to clearly show: ammeter measures current **AND** voltmeter measures potential difference.

Question			Answer	Marks	AO element	Guidance
12		(ii)	Increases ✓	1	2.2	**ALLOW** increases circled or underlined but answer line takes precedence
		(iii)	15 : 1 ✓	1	1.2	**ALLOW** any correct ratio e.g. 6 : 0.4, 30 : 2
		(iv)	Linear ✓	1	1.1	**ALLOW** linear circled or underlined but answer line takes precedence
	(c)		**First check the answer on the answer line** **If answer = 9 (V) award 2 marks** (V =) 0.6 × 15 ✓ (V =) 9 (V) ✓	2	2 × 2.1	

Question			Answer	Marks	AO element	Guidance
13	(a)		Wrap insulation around the funnel ✓	1	3.3b	
	(b)		(1), 4, 3, 2 ✓	1	1.2	
	(c)		**First check the answer on the answer line** **If answer = 0.06 (N) award 2 marks** (W =) 0.006 × 10 ✓ (W =) 0.06 (N) ✓	2	2 × 2.1	
	(d)		**First check the answer on the answer line** **If answer = 2250 (J) award 2 marks** (E =) 15 × 150 ✓ (E =) 2250 (J) ✓	2	2 × 2.1	
	(e)		**First check the answer on the answer line** **If answer = 334 000 (J / kg) award 3 marks** (Rearrange) (l =) E ÷ m ✓ (l =) 5010 ÷ 0.015 ✓ (l =) 334 000 (J / kg) ✓	3	 1.2 2.1 2.1	 **ALLOW** (l =) energy ÷ mass

Question			Answer	Marks	AO element	Guidance
If only change in velocity or change in resultant force described, then mark capped at L2 and 3 marks.						
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 description of how the velocity of the block changes **AND** Detailed description of how the resultant force on the block changes *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)** Clear description of how the velocity of the block changes **AND** Clear description of how the resultant force on the block changes **OR** Detailed description of how the velocity of the block changes **AND** Basic description of how the resultant force on the block changes **OR** Basic description of how the velocity of the block changes **AND** Detailed description of how the resultant force on the block changes	6	**2 x 2.2** **2 × 3.1a** **2 × 3.2b**	**AO2.2 Applies knowledge and understanding of velocity-time graphs** • Gradient gives acceleration • AB moving at uniform/steady/constant velocity/speed • BC decelerating / constant deceleration / slowing down • CD not moving / stationary / stopped / zero/constant velocity/speed • DE accelerating / constant acceleration / speeding up • Value of deceleration greater than the value of acceleration **AO3 Analyses information and ideas to interpret the graph and draw conclusions about forces** • Between A and B balanced forces • Between B and C unbalanced forces / there is a resultant force • Between C and D balanced forces • Between D and E unbalanced forces / there is a resultant force • Between A and B upward force = downward force / weight = tension / resultant force = 0 • Between B and C upward force < downward force / weight < tension / there is resultant force downwards

14			*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)** Basic description of how the velocity of the block changes **OR** Basic description of how the resultant force on the block changes *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.*			• Between C and D upward force = downward force / weight = tension / resultant force = 0 • Between D and E upward force > downward force / weight > tension / there is resultant force upwards

Question			Answer	Marks	AO element	Guidance
15			**First check the answer on the answer line** **If answer = 20 (m / s) award 4 marks**	4		
			(Distance =) 300 (m) **AND** (time =) 15 (s) ✓		2.2	**IGNORE** other values stated unless these values have been used in a calculation **ALLOW** 15 x 300 for 1 mark unless other values have been used in a calculation
			Rearrange (speed =) distance ÷ time ✓		1.2	**ALLOW** v = s ÷ t / (s =) d ÷ t **ALLOW** 1 mark for multiple readings of (d ÷ t) from the graph e.g. 200 ÷ 5 and 100 ÷ 10 **ALLOW** any distance ÷ any time for 1 mark
			(s =) 300 ÷ 15 ✓		2.1	**DO NOT ALLOW** this mark if calculations with other values are seen
			(s =) 20 (m / s) ✓		2.1	**DO NOT ALLOW** this mark, unless written on the answer line, if calculations with other values are seen.

Question			Answer	Marks	AO element	Guidance
16	(a)		**First check the answer on the answer line** **If answer = 30 000 (J) award 3 marks**	3		
			(W =) Fs selected ✓		1.2	**ALLOW** (W=) F x d / (work=) force x distance **ALLOW** 600 x 0.20 for 1 mark
			(W =) 600 × 0.20 × 250 ✓		2.1	**ALLOW** 120 for 2 marks
			(W =) 30 000 (J) ✓		2.1	
	(b)		**First check the answer on the answer line** **If answer = 0.15 (kW) award 3 marks**	3		
			(P =) 36 000 ÷ 240 ✓		2.1	
			(P =) 150 (W) ✓		2.1	
			(P =) 0.15 (kW) ✓		1.2	**ALLOW** 1.5 x 10^{-1} (kW) **ALLOW** incorrect answer given in W correctly converted to kW e.g. 30 converted to 0.03 **ALLOW** 1.5 x 10^{n} as the final answer for 2 marks

<table>
<tr><td>16</td><td>(c)</td><td></td><td>Any three from:

Measure height (of step) using a metre rule / tape measure / ruler ✓

Count number of steps ✓

Measure weight using a (weighing) scales / balance ✓

Measure time using a stopwatch ✓</td><td>3</td><td>3 × 3.3a</td><td>ALLOW stairs for steps throughout

IGNORE measure height/distance using a trundle wheel

ALLOW (use a set) amount of steps / see how many steps

ALLOW measure weight using a newton meter / measure mass using scales/balance and multiply by g/10

ALLOW measure time using a timer / stop clock

If no other marks scored:
ALLOW two different pieces of equipment to measure two different quantities for 1 mark e.g. use a metre rule and a stopwatch</td></tr>
<tr><td></td><td>(d)</td><td>(i)</td><td><table><tr><th></th><th>Yes</th><th>No</th></tr><tr><td>Precise</td><td>✓</td><td></td></tr><tr><td>Repeatable</td><td>✓</td><td></td></tr></table>✓</td><td>1</td><td>3.2a</td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td>Precise because results are close together / small range ✓

Repeatable because (same person) repeats the experiment/the method/the investigation/using same equipment giving similar results ✓</td><td>2</td><td>2 × 3.2a</td><td>ALLOW results are similar / every test comes out roughly the same / low range / range of 3

ALLOW correct descriptions of precise and repeatable without linking to terms precise or repeatable for 1 mark e.g. the results have a small range because the same person repeats the investigation</td></tr>
</table>

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