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...day June 20XX – Morning/Afternoon

GCSE (9–1) Combined Science (Physics) A (Gateway Science)

J250/12 Paper 12 (Higher Tier)

SAMPLE MARK SCHEME

Duration: 1 hour 10 minutes

MAXIMUM MARK 60

DRAFT

This document consists of 16 pages

MARKING INSTRUCTIONS**PREPARATION FOR MARKING****SCORIS**

1. Make sure that you have accessed and completed the relevant training packages for on-screen marking: *scoris 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 posted on the RM Cambridge Assessment Support Portal <http://www.rm.com/support/ca>
3. Log-in to scoris and mark the **required number** of practice responses (“scripts”) and the **required number** of standardisation responses.

YOU MUST MARK 10 PRACTICE AND 10 STANDARDISATION RESPONSES BEFORE YOU CAN BE APPROVED TO MARK LIVE SCRIPTS.

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 scoris 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 scoris 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 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 scoris **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 scoris 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.

11. Annotations

Annotation	Meaning
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 (Gateway Science).

	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.

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Mark Scheme

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SECTION A

Question	Answer	Marks	AO element	Guidance
1	B	1	2.1	
2	D	1	1.2	
3	C	1	1.1	
4	D	1	1.1	
5	A	1	1.1	
6	D	1	1.1	
7	D	1	1.1	
8	D	1	2.1	
9	C	1	2.1	
10	A	1	2.1	

SECTION B

Question		Answer	Marks	AO element	Guidance
11	(a)*	<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) Explains how transformers affect the circuit AND provides suggestions of how the circuit could be improved.</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) Detailed comparison of the circuits AND states how transformers affect the circuit. Provides a simple suggestion of how the circuit could be improved.</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) Simple comparison of the circuits OR states how transformers affect the circuit.</p> <p><i>The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.</i></p> <p>0 marks <i>No response or no response worthy of credit.</i></p>	6	3.1b 3.3b 2 x 2.2 2 x 1.2	<p>AO3.1a: Analysing the affect of transformers in the circuit</p> <ul style="list-style-type: none"> more efficient transfer as lower current results in less heat loss in wires high voltages low current more efficient to transfer the electrical power means bulb glows brightly <p>AO3.3b: Suggestion of improvements</p> <ul style="list-style-type: none"> wire used could be made of a lower resistance material the step up transformer could have more turns on the secondary coil to step up the p.d. more <p>AO2.2: Comparison of the circuits and function of transformers</p> <ul style="list-style-type: none"> the bulb in Circuit 1 glows more brightly / ORA the resistance wires are made of the same material the p.d. supplied in both circuits is the same <p>AO1.2: States how transformers work and affect the circuit</p> <ul style="list-style-type: none"> step up transformer increases the voltage across the wire step down decreases the voltage for the lamps the bulb in Circuit 1 glows more brightly / ORA circuit 1 has transformers in it / ORA

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Question		Answer	Marks	AO element	Guidance
	(b)	(i)	3	1.1	
		Earth wire provides a safe route for the current (1)		2.2	
		Earth wire has a low resistance/high current (1)		2.2	
		Fuse breaks / circuit disconnected (1)			
		(ii)	1	2.1	
		(idea that it) reduces the resistance (1)			

SPECIMEN

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Question		Answer	Marks	AO element	Guidance
12	(a)	Wavelength decreases (1) Velocity decreases (1)	2	2 x 1.1	DO NOT ALLOW frequency stays the same
	(b)	41 x 2 / indication of the spots being half a wavelength apart (1) 82 (mm) / 0.082 (m) (1)	2	2.2 2.1	ALLOW 0.08(0) / 0.081 / 0.083 / 0.084 (m) (2) ALLOW 80 / 81 / 83 / 84 (1)
	(c)	Convert frequency in MHz to Hz = 2 450 000 000 (1) Recall and apply wave speed = frequency x wavelength = 2 450 000 000 x 0.082 (1) Answer = 200 900 000 (m/s) (1)	3	1.2 2.1 2.1	ALLOW ECF from part (b)
	(d)	$3 \times 10^8 / 2\ 450\ 000\ 000$ (1) 0.12/2 (indication of spots being half a wavelength apart (1) 0.06 m (1)	3	3 x 2.1	
	(e)	The velocity of the wave through the bread will be different from the chocolate (1)	1	1.2	

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Question			Answer	Marks	AO element	Guidance
13	(a)	(i)	the average time it takes (1) for the number of nuclei of an isotope in a sample to halve (1) or the time it takes (1) for the count rate from a sample containing an isotope to fall to half its starting level (1)	2	2 x 1.1	
		(ii)	(idea that) it is not possible to predict when an individual atoms may decay (1)	1	1.1	
	(b)	(i)	calculation of half-life to be 15 minutes (1)	1	2.1	
		(ii)	so after 3 half-lives counts per minute decreases from 80 to 40 to 20 to 10 (1) 70/80 or 7/8 th (1)	2	2 x 2.1	
	(c)		Contamination transfers the source / irradiation is emission from the source (1) idea that contamination lasts for a long period of time / irradiation is temporary (1)	2	1.1 2.2	

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Question		Answer	Marks	AO element	Guidance
14	(a)	<p>Energy from the hot water in the radiator is transferred to the metal radiator (1)</p> <p>(idea that) temperature of radiator decreases and temperature of room increases as the energy is transferred from the radiator to the room(1)</p>	2	2 x 2.2	ALLOW the same amount of energy is transferred
	(b)	<p>$\frac{18\,900}{4200 \times 3}$ (1)</p> <p>(mass) 1.5 (kg) (1)</p>	2	2 x 2.1	ALLOW 1.5 (kg) (2)
	(c)	<p>Any three from</p> <p>(thermal) insulation to reduce heat loss (1)</p> <p>make the pipes as short as possible so less temperature drop along the pipe (1)</p> <p>change the diameter of the pipes so less heat loss from surface / (idea of) smaller surface area to volume ratio (1)</p> <p>paint pipes silver or white as these are bad emitters of heat (1)</p>	3	3 x 1.1	

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Question			Answer	Marks	AO element	Guidance	
15	(a)	(i)	Repeat test at each distraction and find the mean (1) Details of 2 or more distractions (1) Idea of control e.g use same person each time (1) Idea of same named variable e.g. same level of tiredness / same time of day / no stimulants (1)	4	1.2	ALLOW named types of distraction e.g. using a mobile phone / talking / shouting / listening to the radio / reading / buzzer / flashing lights ALLOW use same hand / no practising first ALLOW only use girls / only use boys / use people of the same age ALLOW any correct control of variables e.g. not tired / not been taking drugs ALLOW only use right hand	
		(ii)	0.66 (s) (1)		1		3.1b
		(iii)	(idea that) distractions lead to a longer reaction time so car stops in a longer distance / distractions leads to a longer reaction time so more likely to hit the car in front (1)		1		1.1
	(b)		(idea that) less depth gives a greater braking distance / ORA (1) (idea that) the relationship between tread depth and braking distance is not linear/ for tread depths less than 1.6 mm the braking distance increases rapidly (1) any correct uses of data e.g. when tread depth is 1.6 mm on tarmac the stopping distance is 33.5 m / when tread depth is 1.6 mm on concrete the stopping distance is 42 m (1) (idea that) the shortest braking distance possible is best for preventing accidents/ greater braking distances on concrete (1)	4	3.1b	ALLOW (idea of) shorter braking distances on tarmac (1)	
				3.1b			
				3.1b	3.2b		

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Question		Answer	Marks	AO element	Guidance	
	(c)	(i)	Area under triangle shaded (1)	1	1.2	
		(ii)	Calculation of total area under graph: Area under rectangle / $35 \times 1.6 = 56$ (1) Area under triangle / $0.5 \times 35 \times (6.6 - 1.6) = 87.5$ (1) Total area: $56 + 87.5 = 144$ (m) (1)	3	3 x 3.1b	ALLOW 143.5 (m)

SPECIMEN