



...day June 20XX – Morning/Afternoon

**GCSE (9–1) Combined Science (Chemistry) A (Gateway Science)
J250/09 Paper 9 (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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SECTION A

Question	Answer	Marks	AO element	Guidance
1	C	1	1.2	
2	D	1	1.1	
3	C	1	1.1	
4	A	1	2.1	
5	A	1	2.2	
6	C	1	1.2	
7	C	1	2.1	
8	D	1	1.1	
9	B	1	2.1	
10	A	1	2.2	

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SECTION B

Question	Answer	Marks	AO element	Guidance
11 (a)*	<p><i>Please refer to the marking instructions on page 4 of this mark scheme for guidance on how to mark this question.</i></p> <p>Level 3 (5–6 marks)</p> <p>Describes the bonding of both materials AND Makes a comparison AND Makes a choice with a justified reason</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)</p> <p>Describes the bonding of both materials OR Describes the structure of one material AND makes a choice with a justified reason</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)</p> <p>Describes the bonding of one material OR makes a choice with a justified reason</p> <p><i>The information is basic and communicated in an unstructured</i></p>	6	1.1 x 3 3.2a x 3	<p>AO1.1: Knowledge of bonding in metals and polymers</p> <p>Bonding in polymers:</p> <ul style="list-style-type: none"> • Covalent bonds in molecule/Macromolecule. • Weak intermolecular forces. • Some have cross linkages. <p>Bonding in metals:</p> <ul style="list-style-type: none"> • Cationic lattice. • Free/mobile pool of electrons. <p>Comparison</p> <ul style="list-style-type: none"> • Polymers are weaker because intermolecular forces are weaker than metallic bonds. • Metals conduct electricity because of free electrons. <p>AO3.2a: Analyse information in the table to make judgements</p> <ul style="list-style-type: none"> • Not carbon-fibre-reinforced-polymer – too expensive. • Aluminium – strong, corrosion resistant, low density so easy to carry but quite expensive. • Steel – strong, cheap but higher density so heavy to carry, corrodes/rusts but can be painted to make look better and

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Question		Answer	Marks	AO element	Guidance
		<p>way. The information is supported by limited evidence and the relationship to the evidence may not be clear.</p> <p>0 marks No response or no response worthy of credit.</p>			<p>resist corrosion.</p> <ul style="list-style-type: none"> PVC – corrosion resistant, low density means cost per chair is low, easy to carry, easy to shape, may not be strong enough. Titanium - strong, corrosion resistant, fairly low density but very expensive.
	(b)	<p><i>Against</i> Carbon-fibre-reinforced-polymer very expensive (so only used in luxury cars) (1)</p> <p><i>For</i> Any two from Carbon-fibre-reinforced-polymer stronger than steel/OR A (1) Carbon-fibre-reinforced-polymer lower density/OR A (1) Carbon-fibre-reinforced-polymer has better corrosion resistance/OR A (1)</p>	3	3.1b x 3	<p>Must have an argument for and against for full marks. ALLOW carbon-fibre-reinforced-polymer would be no good for crumple zones</p> <p>ALLOW carbon-fibre-reinforced-polymer's lower density will result in better fuel economy</p>
	(c)	<p>Conduction of electricity (1) Low density/corrosion resistance (1)</p>	2	3.2b x 2	
	(d)	<p>Mixture of a metal and other element(s)/mixture of two or more metals (1)</p>	1	1.1	

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Question		Answer	Marks	AO element	Guidance
12	(a)	<u>Fractional distillation</u>	1	1.2	DO NOT ALLOW distillation
	(b)	(Use apparatus A) Filter / pour the mixture in the funnel, liquid runs through into conical flask (1) Wash precipitate with distilled water (1) Dry the precipitate (1)	3	1.2	ALLOW AW throughout
	(c) (i)	Distance moved by spot = 29 mm +/- 2 mm AND distance moved by solvent = 69 mm +/- 2 mm (1) $R_f = 29 \div 69 = 0.42$ (1)	2	1.2	Both distances correct for first mark ECF for R_f value ALLOW values between 0.38 – 0.46
	(ii)	Any two from Takes less time to separate/solvent moves faster (1) Spots are more distinct/better separated (1) The solvent moves more evenly (1)	2	2.2	

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Question		Answer	Marks	AO element	Guidance
13	(a)	$\text{Mg} + \text{CuSO}_4 \longrightarrow \text{Cu} + \text{MgSO}_4$ (1)	1	2.1	
	(b)	(i)			
		$\text{Mg} + \text{Cu}^{2+} \longrightarrow \text{Mg}^{2+} + \text{Cu}$ (2)	2	2.2	ALLOW $\text{Mg} + \text{Cu}^{2+}$ (1) (reactants) ALLOW $\text{Mg}^{2+} + \text{Cu}$ (1) (products)
		(ii)			
		$\text{Mg} \longrightarrow \text{Mg}^{2+} + 2\text{e}^- / \text{Mg} - 2\text{e}^- \longrightarrow \text{Mg}^{2+}$ (2)	2	2.2	ALLOW $\text{Mg} \longrightarrow \text{Mg}^{2+}$ (1)
		(c)			
		Mg loses electrons/Cu gains electrons (1) Mg is oxidised (1) Cu <u>ions</u> are reduced(1)	3	2.1	ALLOW oxidation is loss of electrons and reduction is gain of electrons (1)

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Question			Answer	Marks	AO element	Guidance
14	(a)	(i)	Protons = 11 (1) Neutrons = 12 (1)	2	1.1	
		(ii)	10	1	1.1	ECF number of electrons/protons minus 1 (1)
	(b)		$35.5 / 6.022 \times 10^{23}$ (1) 5.90×10^{-23} (g) (1)	2	2.1	1 mark for $5.8950514 \times 10^{-23}$ or correctly rounded but not to 3 sig. fig.
	(c)		(add up number of electrons) and this is the atomic number (and look up on periodic table) (1)	1	1.1	ALLOW has 19 electrons and on the Periodic Table, element number 19 is potassium ALLOW element is in Group 1 and Period 4 DO NOT ALLOW it has 19 electrons on its own

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Question			Answer	Marks	AO element	Guidance
15	(a)	(i)	Blue/indigo/violet/purple (1)	1	1.2	
		(ii)	Litmus / phenolphthalein / methyl orange (1)	1	1.2	
	(b)	(i)	Correct labelled axes with appropriate scale so that the graph occupies at least $\frac{1}{2}$ of grid provided (1) Correct plotting of all points to within $\frac{1}{2}$ square (1) Two lines of best fit ignoring anomalous result (1)	3	2.2 2.2 3.2a	
		(ii)	21.5 cm ³ (1)	1	3.2b	ALLOW 21 – 22 cm ³
		(iii)	H ⁺ + OH ⁻ → H ₂ O	1	1.1	
		(iv)	Any 2 from Measure to higher precision/measure to 1dp (1) Reduce heat loss/put lid on polystyrene cup (1) Add acid in smaller portions / use a temperature probe while adding acid continuously (1)	2	3.3b	DO NOT ALLOW use digital thermometer unless linked to precision

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Question			Answer	Marks	AO element	Guidance
16	(a)	(i)	Carbon dioxide (1)	1	1.1	
		(ii)	Turns limewater milky (1)	1	1.2	DO NOT ALLOW ECF Only award the mark if answer to Q16 a(i) is correct.
	(b)		Relative formula mass of $\text{MgCO}_3 = 84.3$ (1) Amount of $\text{MgCO}_3 = 6.72 \div 84.3 = 0.0797$ (1) Ratio is 1:1 so amount of MgSO_4 is also 0.0797 (1) Relative formula mass of $\text{MgSO}_4 = 120.4$ (1) Mass of $\text{MgSO}_4 = 0.0797 \times 120.4 = 9.6 \text{ g}$ (1)	5	2.2	ALLOW 0.08 ALLOW 9.5977 or 9.632