



...day June 20XX – Morning/Afternoon

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

J250/04 Paper 4 (Foundation Tier)

SAMPLE MARK SCHEME

Duration: 1 hour 10 minutes

MAXIMUM MARK 60

DRAFT

This document consists of 20 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:
- 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.
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

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	B	1	1.1	
3	A	1	2.2	
4	D	1	1.2	
5	C	1	1.2	
6	C	1	1.1	
7	D	1	2.2	
8	D	1	2.1	
9	B	1	1.1	
10	C	1	2.1	

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SECTION B

Question		Answer	Marks	AO element	Guidance
11	(a)	<p>Any two from</p> <p>electromagnetic radiation (at most wavelengths) from the Sun passes through the Earth's atmosphere (1)</p> <p>the Earth absorbs electromagnetic radiation with short wavelengths (and so warms up) (1)</p> <p>heat is radiated from the Earth as longer wavelength infrared radiation (1)</p> <p>some of this infrared radiation is absorbed by greenhouse gases in the atmosphere instead of escaping into space (and so the atmosphere warms up more than without greenhouse gases) (1)</p>	2	1.1	
	(b)	(i)	2	2.1	ALLOW ecf for second mark from incorrect readings
		<p>correct reading for 1900 is 295 AND for 1960 is 315 (1)</p> <p>correct subtraction $315 - 295 = 20$ (ppmv) (1)</p>			

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Question		Answer	Marks	AO element	Guidance
12	(a)	$\text{Zn} + \text{H}_2\text{SO}_4 \rightarrow \text{ZnSO}_4 + \text{H}_2$ (1)	1	1.1	
	(b)	copper powder and copper lumps (1) time taken to collect 50 cm ³ of gas is less / reaction is faster (1) (copper powder and copper lumps) are unchanged at the end of the reaction (1)	3	3.2b 3.1b x 2	
	(c)	provides an alternative reaction pathway / AW (1) with a lower activation energy (1)	2	1.2	
	(d)	rate with copper powder = 1/19 = 0.053 s ⁻¹ rate with copper lumps = 1/56 = 0.018 s ⁻¹ Any one from (powder has) a larger surface area (1) there are more collisions per second / more frequent collisions (1)	2	1.2	One mark for both rates ALLOW collisions are more likely / more chance of collisions IGNORE just more collisions IGNORE faster collisions / quicker collisions

Question		Answer	Marks	AO element	Guidance
13	(a)	(Sarah is correct because) silver can be extracted by heating copper oxide with carbon (1) (Jon is correct because) tin can be extracted by heating with carbon (1)	2	3.2a	ALLOW ora (Sarah is wrong because) tin can be extracted by heating tin oxide with carbon (1)
				3.2a	(Jon is wrong because) aluminium cannot be extracted by heating with carbon / aluminium has to be extracted by electrolysis (1)
	(b)	(because) oxygen is lost / oxygen is removed (1)	1	2.1	

Question		Answer	Marks	AO element	Guidance	
14	(a)	<p>Any four from</p> <ul style="list-style-type: none"> the main requirements for energy input / amount of energy required for making each material (1) the environmental impact and sustainability of making the materials from natural resources (1) the environmental impact of making the product from the material (1) the environmental impact of using the product (1) the environmental impact of disposing of the product by incineration, landfill or recycling (1) comparison of the use of different materials for the same job (1) 	4	1.1		
	(b)	(i)	4564 ÷ 264 = 17 (1)	1	2.2	
		(ii)	<p>Any two from</p> <p>total energy use is less (than plastic bags) (1)</p> <p>fossil fuel use is less (than plastic bags) (1)</p> <p>greenhouse gas emissions are less (than plastic bags) (1)</p>	2	3.1b	

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Question		Answer	Marks	AO element	Guidance
	(c)	<p>Tall column with condensers coming off at different heights (1)</p> <p>Column heated at the bottom so hot at the bottom and cool at the top (1)</p> <p>Substances with high boiling points condense at the bottom (1)</p> <p>Substances with low boiling points condense at the top (1)</p>	4	1.2	
	(d)	<p>Any two from</p> <p>idea that larger molecules have stronger intermolecular forces / ora (1)</p> <p>idea that larger molecules have higher boiling points / ora (1)</p> <p>idea that the stronger the intermolecular forces the higher the boiling point / ora (1)</p>	2	1.1	

Question		Answer	Marks	AO element	Guidance
15	(a)	melting point of fluorine -190 to -250 (1) boiling point of astatine 310 to 400 (1)	2	2.1	ALLOW answers given as a range if it falls within the stated values
	(b)	(all have) 7 electrons in their outer shell (1)	1	1.2	
	(c)*	<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>Applies knowledge of the reaction of alkali metals to predict some observations of the reaction of caesium with water including a comparison of the rate of reaction with lithium AND constructs a balanced symbol equation for the reaction between caesium or lithium with water.</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>Applies knowledge of the reaction of alkali metals to predict some observations of the reaction of caesium with water AND gives the names or formulae of products formed in the reaction between caesium and water.</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>	6	2.1 x 2 2.2 x 4	<p>AO2.1: Apply knowledge of ideas related to Group 1 metals</p> <ul style="list-style-type: none"> • $2\text{Cs} + 2\text{H}_2\text{O} \rightarrow 2\text{CsOH} + \text{H}_2$ • $2\text{Li} + 2\text{H}_2\text{O} \rightarrow 2\text{LiOH} + \text{H}_2$ • caesium + water \rightarrow caesium hydroxide + hydrogen • hydrogen made • caesium hydroxide made <p>AO2.2: Apply knowledge of a given context to a novel situation to predict observations</p> <ul style="list-style-type: none"> • Faster reaction than with lithium / more reactive / more violent • fizzes • gives a flame • forms a colourless solution • alkaline solution formed • explodes • caesium loses electrons more easily

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Question		Answer	Marks	AO element	Guidance
		<p>Level 1(1–2 marks)</p> <p>Applies knowledge of the reaction of alkali metals to predict some observations of the reaction of caesium with water</p> <p>OR</p> <p>gives the names or formulae of products formed in the reaction between caesium and water.</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</p> <p><i>No response or no response worthy of credit.</i></p>			
	(d)	(Alison should use) evaporation (to obtain solid sodium chloride) (1)	1	3.3a	

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Question		Answer	Marks	AO element	Guidance
16	(a)	measure temperature of sodium thiosulfate and acid mixture (1) (because) temperature will be different from sodium thiosulfate solution alone (1) OR place flask on cross before adding acid (1) idea that reaction has started before timing begins / idea that moving flask will increase mixing (1)	2	3.3b	ALLOW measure temperature of sodium thiosulfate solution when it has been removed from tripod (1) (because) temperature will continue to rise after flask is removed from tripod (1)
	(b)	(reaction is fastest) at 60°C (1) (because) gradient of graph is steepest (1)	2	2.2	ALLOW (reaction is fastest) between 50 – 60 °C (1) ALLOW rate of reaction has highest value (1)
	(c)	At higher temperatures ion/molecules of sodium thiosulfate and hydrochloric acid have more energy (1) So more frequent and more successful collisions (1)	2	2.2	

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Question		Answer	Marks	AO element	Guidance
17	(a)	<p>Order of reactivity (most to least) magnesium iron lead copper</p> <p>magnesium as most reactive and copper as least (1) iron and lead in correct order (1)</p> <p>Explanation Any two from idea that none of the metals displace magnesium (from magnesium oxide) / magnesium displaces all the other metals from their metal oxides so magnesium is most reactive (1) idea that copper is displaced from copper oxide by all three other metals / copper cannot displace any of the other metals so copper is least reactive (1) idea that lead will displace iron or copper so is more reactive than these metals / lead cannot displace magnesium so is less reactive (1)</p>	4	<p>3.1a 3.1a</p> <p>2.2 x 2</p>	<p>ALLOW correct explanation for iron (1)</p>
	(b)	<p>$\text{Cu} + 2\text{AgNO}_3 \rightarrow 2\text{Ag} + \text{Cu}(\text{NO}_3)_2$</p> <p>formulae (1) balancing (1)</p>	2	<p>2.1 2.2</p>	<p>balancing mark is conditional on correct formulae ALLOW any correct multiple e.g. $2\text{Cu} + 4\text{AgNO}_3 \rightarrow 4\text{Ag} + 2\text{Cu}(\text{NO}_3)_2$ ALLOW = or \rightleftharpoons for arrow DO NOT ALLOW 'and' or & for + ALLOW one mark for correct balanced equation with incorrect use of upper and lower case formulae e.g. $\text{CU} + 2\text{AgNO}_3 \rightarrow 2\text{Ag} + \text{Cu}(\text{NO}_3)_2$</p>