



...day June 20XX – Morning/Afternoon

GCSE (9–1) Combined Science B (Twenty First Century Science)

J260/02 Chemistry (Foundation Tier)

SAMPLE MARK SCHEME

Duration: 1 hour 45 minutes

MAXIMUM MARK 95

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 component. 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.

Level of response question on this paper is 11(a).

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 B:

	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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Question			Answer	Marks	AO element	Guidance																				
1	(a)	(i)	<p>One similarity from: Both have covalent bonds✓ Both contain carbon✓</p> <p>One difference from: Diamond only contains one element but carbon dioxide contains two elements✓ Diamond has a giant (lattice) structure but carbon dioxide has a simple structure✓</p>	2	1.1	IGNORE comments on melting/boiling points and state at room temperature																				
	(b)		Carbon ✓	1	1.1																					
	(c)		<table border="1"> <thead> <tr> <th>Property</th> <th>True for diamond</th> <th>True for graphite</th> <th>True for both</th> </tr> </thead> <tbody> <tr> <td>Very hard so used as a cutting tool</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>High melting point</td> <td></td> <td></td> <td>✓</td> </tr> <tr> <td>Conducts electricity</td> <td></td> <td>✓</td> <td></td> </tr> <tr> <td>Used as a lubricant</td> <td></td> <td>✓</td> <td></td> </tr> </tbody> </table>	Property	True for diamond	True for graphite	True for both	Very hard so used as a cutting tool	✓			High melting point			✓	Conducts electricity		✓		Used as a lubricant		✓		4	1.1	
Property	True for diamond	True for graphite	True for both																							
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Question		Answer	Marks	AO element	Guidance
2	(a)	$2\text{PbS} + 3\text{O}_2 \longrightarrow 2\text{PbO} + 2\text{SO}_2 \checkmark$	1	2.2	One mark for correct balancing
	(b)	(i) The lead has been reduced \checkmark	1	2.1	
		(ii) FIRST CHECK THE ANSWER ON THE ANSWER LINE if = 92.8(%) award 4 marks RMM for PbO = $207.2 + 16.0 = 223.2 \checkmark$ $207.2 \div 223.2 \times 100 \checkmark$ 92.8(%) \checkmark to 3 sig figs \checkmark	4	2.1	
		(iii) FIRST CHECK THE ANSWER ON THE ANSWER LINE if = 863(g) award 3 marks $0.93 \text{ kg} = 930 \text{ g} \checkmark$ $930 \times 92.8 \div 100 \checkmark$ $= 863(\text{g}) \checkmark$	3	2.1	ECF
	(c)	(i) Disadvantages: noise / traffic / possible toxicity / dust \checkmark Advantages: work / jobs / improved transport links / more facilities available \checkmark	2	3.2a	
		(ii) Idea that it cannot be made completely safe / would take time for the mining company to improve safety \checkmark Boosts local economy/ benefits outweigh risks \checkmark	2	3.2a	

Question		Answer	Marks	AO element	Guidance
3	(a)	For 100 atoms: 75.8 have RAM=35 24.2 have RAM=37 $\frac{75.8 \times 35 + 24.2 \times 37}{100} = 35.484 \checkmark$ $= 35.5 \text{ to 1 d.p. } \checkmark$	2	1.2	
	(b) (i)	sodium + chlorine \rightarrow sodium chloride \checkmark $2\text{Na(s)} + \text{Cl}_2\text{(g)} \rightarrow 2\text{NaCl(s)} \checkmark\checkmark$	3	1.1 1.2 1.1	One mark for word equation One mark for balancing at AO1.2 One mark for correct state symbols
	(ii)	Ionic because atoms show as charged/negative and positive Giant structure because many molecules of NaCl in the structure (all bonded together)	2	2.1	
	(iii)	FIRST CHECK THE ANSWER ON THE ANSWER LINE if = 0.179 (nm³) award 3 marks $0.564 \times 0.564 \times 0.564 \checkmark = 0.179 \checkmark$ To 3 sig figs \checkmark	3	1.2	One mark for 3 sig figs
	(iv)	Shows 2 shared electrons between chlorine atoms \checkmark Shows correct number of other electrons for each atom (6) \checkmark	2	1.1 2.2	ALLOW dots or crosses or a mixture of both
	(v)	Shows a total of 20 electrons \checkmark In configuration 2,8,8 \checkmark	2	1.1 2.2	
	(c)	Giant ionic substances have higher melting points than simple covalent substances \checkmark Ions are strongly attracted to each other \checkmark	2	1.1	

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Question		Answer	Marks	AO element	Guidance
4	(a)	Description of use of equipment: <ul style="list-style-type: none"> conical flask on balance with cotton wool in top of flask ✓ hydrochloric acid and magnesium ribbon in the flask ✓ Variables: <ul style="list-style-type: none"> same amount of magnesium ribbon and same volume of acid each time ✓ vary concentration of acid ✓ 	4	1.2 1.2 2.2 2.2	Up to two marks may be awarded for a correct diagram
	(b) (i)	FIRST CHECK THE ANSWER ON THE ANSWER LINE if = 51(s) award 2 marks $49 + 51 + 52 = 152$ $152 \div 3 = 50.6666$ ✓ $= 51 (s)$ ✓	2	2.2	
	(ii)	Magnesium powder larger surface area ✓ therefore Larger area for collisions with the acid ✓ Therefore faster reaction as more collisions per second ✓	3	2.1 1.1 1.1	

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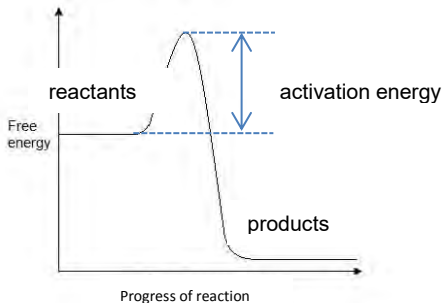
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Question		Answer	Marks	AO element	Guidance
5	(a)	Tall column with condensers coming off at different heights ✓ Column heated at the bottom so hot at the bottom and cool at the top ✓ Substances with high boiling points condense at the bottom ✓ Substances with low boiling points condense at the top ✓	4	1.2	
	(b)	Only 5% petrol, need 22% too low ✓ Only 19% diesel, need 23% too low ✓	2	3.1a	
	(c)	Cracking ✓	1	1.1	
	(d)	Finite resource/does not get renewed/once used up cannot be replaced ✓ Crude oil is the main source of hydrocarbons ✓ Modern life depends on hydrocarbon for energy and feedstock for the petrochemical industry ✓	3	1.1	

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Question		Answer	Marks	AO element	Guidance
6	(a)	 <p style="text-align: center;">✓✓</p>	2	2.2	One mark for reactants and products ALLOW symbols for reactants and products One mark for activation energy
	(b)	Less ✓ Lost to ✓ Exothermic ✓	3	2.1	
7	(a)	Uses (25cm ³) pipette instead of measuring cylinder ✓ Uses a single indicator such as litmus or phenolphthalein instead of universal indicator ✓	2	3.3a	
	(b)	DCAB ✓✓	2	1.2	D and B correct one mark

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Question		Answer	Marks	AO element	Guidance
8	(a)	Oxygen ✓	1	2.1	
	(b)	Group 0 ✓ Unreactive ✓ Does not react ✓	3	1.1 1.1 2.1	
9	(a)	Because it (two from) Uses least energy ✓ Uses least fossil fuel ✓ Produces least solid waste ✓ Gives least greenhouse gases ✓ Uses least water ✓	2	3.1b	
	(b)	FIRST CHECK THE ANSWER ON THE ANSWER LINE if = 55.7 (%) award 4 marks 23.2 – 14.9 = 8.3 ✓ 8.3 ÷ 14.9 x 100 ✓ = 55.7 (%) ✓✓	4	2.1	One mark for one decimal place
	(c)	One from: Biodegradable - rots down in landfill ✓ Recyclable - can be re-used ✓ Sustainable - trees can be replaced ✓	1	2.1	
10	(a)	Bohr linked to electrons in shells ✓ Dalton linked to solid sphere ✓ Thomson linked to plum pudding model ✓	2	1.1	One mark if one correct Two marks if two or three correct
	(b) (i)	Proton +1 ✓ Neutron neutral or 0 ✓ Electron -1 ✓	2	1.1	One mark if two correct Two marks if three correct
	(ii)	Atomic mass ✓ Properties ✓	2	1.1	
	(iii)	Gaps are for undiscovered elements/new elements ✓ He predicted properties / new elements matched his predictions / new elements had the properties he predicted ✓	2	1.1	

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) Correctly describes how and why the water vapour condenses to make the oceans And Correctly describes how and why the carbon dioxide decreases initially after the formation of the oceans And Correctly links to a description how and why an oxygen rich atmosphere developed due to photosynthesising organisms producing oxygen and absorbing carbon dioxide leading to a decrease in carbon dioxide and increase in oxygen in the atmosphere</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) Correctly describes how and why the water vapour condenses to make the oceans And Correctly describes how and why the carbon dioxide decreases initially after the formation of the oceans</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 x 2.1 2 x 3.1a 2 x 3.2b	<p>Indicative scientific points may include</p> <p>AO3.1a links to levels of the gases For example:</p> <ul style="list-style-type: none"> • Water vapour decreases • Carbon dioxide decreases • Oxygen increases <p>AO3.2b linked to a conclusion why these gases changed For example:</p> <ul style="list-style-type: none"> • Dissolving in the oceans • Forming sedimentary rocks • By photosynthesis • Earth starts hot, cools • Water condenses to form oceans <p>AO2.1 Links description of the development of oxygen rich atmosphere to appearance of plants For example:</p> <ul style="list-style-type: none"> • First bacteria appeared (cyanobacteria) • These photosynthesised • Removing carbon dioxide by using it to make glucose and releasing oxygen into the atmosphere • Slowly the oxygen increased and the carbon dioxide levels decreased

Question			Answer	Marks	AO element	Guidance
			<p>Level 1 (1–2 marks) Correctly describes that the water vapour decreases with a valid reason Or Correctly identifies that the carbon dioxide decreases with a valid reason Or Correctly identifies that oxygen increases with a valid reason</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 No response or no response worthy of credit.</p>			
	(b)	(i)	Carbon dioxide increases over the period ✓ Carbon emissions from fossil fuels increases ✓	2	2.2	
		(ii)	CO ₂ builds in the atmosphere around the earth ✓ Radiation from the sun enters through the atmosphere some is absorbed by the earth and some of this radiation is reflected by the Earth ✓ Radiation instead of going into space is reflected back to the earth by the CO ₂ in the atmosphere ✓ Causing the earth to increase in temperature ✓	4	2.1	