



**...day June 20XX – Morning/Afternoon**

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

**J260/06 Chemistry (Higher Tier)**

**SAMPLE MARK SCHEME**

**Duration:** 1 hour 45 minutes

**MAXIMUM MARK      95**

**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 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 2(a).

## 11. Annotations

<b>Annotation</b>	<b>Meaning</b>
<b>DO NOT ALLOW</b>	Answers which are not worthy of credit
<b>IGNORE</b>	Statements which are irrelevant
<b>ALLOW</b>	Answers that can be accepted
( )	Words which are not essential to gain credit
—	Underlined words must be present in answer to score a mark
<b>ECF</b>	Error carried forward
<b>AW</b>	Alternative wording
<b>ORA</b>	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:

	<b>Assessment Objective</b>
<b>AO1</b>	<b>Demonstrate knowledge and understanding of scientific ideas and scientific techniques and procedures.</b>
<b>AO1.1</b>	Demonstrate knowledge and understanding of scientific ideas.
<b>AO1.2</b>	Demonstrate knowledge and understanding of scientific techniques and procedures.
<b>AO2</b>	<b>Apply knowledge and understanding of scientific ideas and scientific enquiry, techniques and procedures.</b>
<b>AO2.1</b>	Apply knowledge and understanding of scientific ideas.
<b>AO2.2</b>	Apply knowledge and understanding of scientific enquiry, techniques and procedures.
<b>AO3</b>	<b>Analyse information and ideas to interpret and evaluate, make judgements and draw conclusions and develop and improve experimental procedures.</b>
<b>AO3.1</b>	Analyse information and ideas to interpret and evaluate.
<b>AO3.1a</b>	Analyse information and ideas to interpret.
<b>AO3.1b</b>	Analyse information and ideas to evaluate.
<b>AO3.2</b>	Analyse information and ideas to make judgements and draw conclusions.
<b>AO3.2a</b>	Analyse information and ideas to make judgements.
<b>AO3.2b</b>	Analyse information and ideas to draw conclusions.
<b>AO3.3</b>	Analyse information and ideas to develop and improve experimental procedures.
<b>AO3.3a</b>	Analyse information and ideas to develop experimental procedures.
<b>AO3.3b</b>	Analyse information and ideas to improve experimental procedures.

J260/06

Mark Scheme

June 20XX

Question		Answer	Marks	AO element	Guidance
1	(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 ✓  He predicted properties / new elements matched his predictions / new elements had the properties he predicted ✓	2	1.1	



Question	Answer	Marks	AO element	Guidance
2 (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><b>Level 3 (5–6 marks)</b> Correctly describes how and why the water vapour condenses to make the oceans <b>And</b> Correctly describes how and why the carbon dioxide decreases initially after the formation of the oceans <b>And</b> 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><b>Level 2 (3–4 marks)</b> Correctly describes how and why the water vapour condenses to make the oceans <b>And</b> 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 3.1a 2 x 3.2b 2 x 2.1	<p><b>Indicative scientific points may include</b></p> <p><b>AO3.1a links to levels of the gases</b> For example:</p> <ul style="list-style-type: none"> <li>• Water vapour decreases</li> <li>• Carbon dioxide decreases</li> <li>• Oxygen increases</li> </ul> <p><b>AO3.2b linked to a conclusion why these gases changed</b> For example</p> <ul style="list-style-type: none"> <li>• Dissolving in the oceans</li> <li>• Forming sedimentary rocks</li> <li>• By photosynthesis</li> <li>• Earth starts hot, cools</li> <li>• Water condenses to form oceans</li> </ul> <p><b>AO2.1 Links description of oxygen rich atmosphere to appearance of plants</b> For example:</p> <ul style="list-style-type: none"> <li>• First bacteria appeared (cyanobacteria)</li> <li>• These photosynthesised</li> <li>• Made carbon dioxide into glucose and released oxygen into the atmosphere</li> <li>• Slowly the oxygen increased and the carbon dioxide levels decreased</li> </ul>

J260/06

Mark Scheme

June 20XX

Question		Answer	Marks	AO element	Guidance
		<p><b>Level 1 (1–2 marks)</b>            Correctly describes that the water vapour decreases with a valid reason  <b>Or</b>            Correctly identifies that the carbon dioxide decreases with a valid reason  <b>Or</b>            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><b>0 marks</b>            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 <sub>2</sub> 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 <sub>2</sub> in the atmosphere ✓ Causing the earth to increase in temperature ✓	4	2.1	

Question		Answer	Marks	AO element	Guidance	
3	(a)	$2\text{PbS} + 3\text{O}_2 \longrightarrow 2\text{PbO} + 2\text{SO}_2$ ✓✓✓	3	1.1 1.1 1.2	One mark for correct reactants One mark for correct products One mark for correct balancing	
	(b)	(i)	1	2.1	The lead has been reduced because it has gained an electron/ lost oxygen ✓	
		(ii)	4	2.1	<b>FIRST CHECK THE ANSWER ON THE ANSWER LINE if = 1036(g) award four marks</b>  RFM for PbO = 207.2 + 16.0 = 223.2 ✓  1.116kg = 1116 g ✓  1116 ÷ 223.2 = 5 ✓  5 x 207.2 = 1036 (g) ✓	<b>ALLOW 1.036 kg</b> <b>DO NOT ALLOW 1.036</b>
		(iii)	2	1.1	<b>Any one from:</b> Lead is less reactive than carbon ✓ Aluminium is more reactive than carbon ✓  Therefore carbon will displace the lead from the lead oxide but not aluminium compounds ✓	

J260/06

Mark Scheme

June 20XX

Question		Answer	Marks	AO element	Guidance
(c)	(i)	<p>Disadvantages: noise / traffic / possible toxicity / dust Because this could damage health/ damage quality of life AW ✓</p> <p>Advantages: work/jobs / improved transport links / more facilities available</p> <p>Because enables communities to develop / gives livelihood / enhances quality of life AW ✓</p>	2	3.2a	
	(ii)	<p>Idea that it cannot be made completely safe / would take time for the mining company to improve safety ✓</p> <p>Boosts local economy / benefits outweigh risks ✓</p>	2	3.2a	
	(d)	<p>Choose (lead tolerant) plants that will grow on Contaminated soil such as some varieties of grasses ✓</p> <p>Plant plants on the contaminated soil ✓</p> <p>Plants absorb the lead as they grow therefore removing the lead from the soil ✓</p>	3	1.1	

J260/06

Mark Scheme

June 20XX

Question		Answer	Marks	AO element	Guidance
4	(a)	For 100 atoms: 75.8 have RAM=35 24.2 have RAM=37  $\frac{75.8 \times 35 + 24.2 \times 37}{100} = 35.484 \checkmark$ $= 35.5 \text{ to } 1 \text{ d.p.} \checkmark$	2	1.2	
	(b) (i)	$2\text{Na}(s) + \text{Cl}_2(g) \rightarrow 2\text{NaCl}(s)$ <p style="text-align: center;"> <math>\checkmark</math>                      <math>\checkmark</math>                      <math>\checkmark</math> </p>	3	1.1 1.1 1.2	One mark for state symbols  One mark for correct chemical symbols  One mark for correct balancing
	(ii)	Salt formed of ions in a giant ionic structure $\checkmark$  Attraction between oppositely charged ions is stronger than the attraction between the same charged ions $\checkmark$  Therefore large amounts of energy is required to overcome the attractions $\checkmark$	3	1.1	

J260/06

Mark Scheme

June 20XX

Question		Answer	Marks	AO element	Guidance
5	(a)	Description of use of the equipment: <ul style="list-style-type: none"> <li>conical flask on balance with cotton wool in top of flask ✓</li> <li>hydrochloric acid and magnesium ribbon in the flask ✓</li> </ul> Variables: <ul style="list-style-type: none"> <li>same amount of magnesium ribbon and same volume of acid each time ✓</li> <li>vary concentration of acid ✓</li> </ul>	4	1.2 1.2  2.2 2.2	Up to two marks for a correct diagram
	(b) (i)	The more concentrated the acid the shorter time it takes for the magnesium to be used up ✓  For magnesium ribbon the reaction takes 77 s at 1.5 M acid but 201 s at 0.5 M ✓ Or For magnesium powder the reaction takes 48s at 1.5M but 117s at 0.5M ✓	2	3.1a  3.1b	
	(ii)	<b>FIRST CHECK THE ANSWER ON THE ANSWER LINE</b> <b>If = <math>2.13 \times 10^{-3}</math> (g/s) award four marks</b> Mass of Mg in 55 s = 0.116 g Mass used in 1 s = $0.116 \div 55$ ✓ Mean rate = $0.002109$ ✓ = $2.11 \times 10^{-3}$ (g/s) ✓✓	4	2.2	One mark for answer given to 3 sig. figs.
	(iii)	Magnesium powder larger surface area ✓ therefore Larger area for collisions with the acid therefore faster reaction as more (successful) collisions per second ✓	2	2.1	

J260/06

Mark Scheme

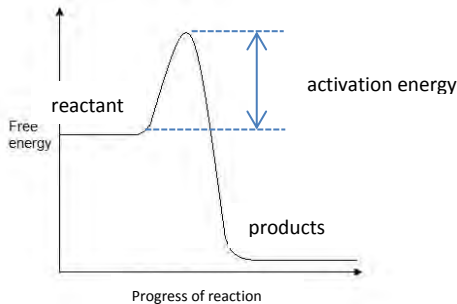
June 20XX

Question		Answer	Marks	AO element	Guidance
6	(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 ✓ Because substances in crude oil have different boiling points ✓ Substances with high boiling points condense at the bottom and substances with low boiling points condense at the top ✓	4	1.2  1.2 1.1  1.2	
	(b)	Cracking breaks long carbon molecules into short molecules like petrol ✓ Could use fractions paraffin, fuel and bitumen and heating oil to crack as these are excess to the need ✓	2	1.1  3.1b	

J260/06

Mark Scheme

June 20XX

Question		Answer	Marks	AO element	Guidance
7	(a)		3	2.2	<p><b>ALLOW</b> symbols for reactants and products</p> <p>One mark for drawing the profile            One mark for reactants and products in the correct places            One mark for correct identification of activation energy</p>
	(b)	<p>Catalysts lower the activation energy ✓            By finding a less energetic pathway so increasing the rate of the reaction ✓</p>	2	1.1	



Question			Answer	Marks	AO element	Guidance
8	(a)	(i)	<p><b>FIRST CHECK THE ANSWER ON THE ANSWER LINE if = 1.2(mol/dm<sup>3</sup>) award four marks</b></p> <p>Amount of NaOH = <math>30 \div 1000 \times 1 \checkmark = 0.3M \checkmark</math>            therefore            Concentration of HCl = <math>0.3 \div 25 \times 1000 \checkmark = 1.2(\text{mol/dm}^3) \checkmark</math></p>	4	2.2	
		(ii)	<p><b>FIRST CHECK THE ANSWER ON THE ANSWER LINE if = 25 (cm<sup>3</sup>) award three marks</b></p> <p><math>2/0.1 = 20</math> times dilution <math>\checkmark</math>  <math>500/20 \checkmark</math>  <math>= 25 (\text{cm}^3) \checkmark</math></p>	3	2.2	
	(b)		<p>Filter the mixture to remove excess calcium carbonate <math>\checkmark</math>            then            Evaporate excess water to concentrate the solution <math>\checkmark</math>            then            Leave to crystallise <math>\checkmark</math>            then            Filter the crystals and dry in an oven <math>\checkmark</math></p>	4	1.2	
	(c)		<p><b>FIRST CHECK THE ANSWER ON THE ANSWER LINE if = 0.585 (g) award six marks</b></p> <p>Ratio = 2:1 <math>\checkmark</math>            Amount of hydrochloric acid = <math>200 \div 1000 \times 0.1 = 0.02M \checkmark \checkmark</math>            Therefore amount of calcium chloride = <math>0.02 \div 2 = 0.01 M \checkmark</math>            RFM of calcium chloride = 58.5 <math>\checkmark</math>            Therefore amount of calcium chloride = <math>58.5 \times 0.01 = 0.585(\text{g}) \checkmark</math></p>	6	2.1 2.1 x 2 2.1 1.2 2.1	
	(d)		<p>Hydrochloric acid is fully ionised <math>\checkmark</math>            whereas            Ethanoic acid is only partially ionised <math>\checkmark</math>            So for the same concentration hydrochloric acid will have a lower pH than ethanoic acid <math>\checkmark</math></p>	3	1.1	

J260/06

Mark Scheme

June 20XX

Question		Answer	Marks	AO element	Guidance
9	(a)	Because when the filament got hot the carbon reacted with the oxygen in the air and burned away ✓	1	2.1	
	(b)	Argon is in Group 0 ✓ It is very unreactive ✓ Therefore the carbon will not react with it when it gets hot ✓	3	1.1 1.1 2.1	

SPECIMEN

J260/06

Mark Scheme

June 20XX

Question		Answer	Marks	AO element	Guidance
10		Polythene ✓ Because it ( <b>any two from</b> ) Uses least energy ✓ Uses least fossil fuel ✓ Produces least solid waste ✓ Gives least greenhouse gases ✓ Uses least water ✓	3	3.2a  3.1b x 2	

SPECIMEN