

GCSE (9–1)

Examiners' report

**GATEWAY SCIENCE
COMBINED
SCIENCE A**

J250

For first teaching in 2016

J250/04 Autumn 2020 series

Introduction

Our examiners' reports are produced to offer constructive feedback on candidates' performance in the examinations. They provide useful guidance for future candidates.



Reports for the Autumn 2020 series will provide a broad commentary about candidate performance, with the aim for them to be useful future teaching tools. As an exception for this series they will not contain any questions from the question paper nor examples of candidate answers.

The reports will include a general commentary on candidates' performance, identify technical aspects examined in the questions and highlight good performance and where performance could be improved. The reports will also explain aspects which caused difficulty and why the difficulties arose, whether through a lack of knowledge, poor examination technique, or any other identifiable and explainable reason.

A full copy of the question paper and the mark scheme can be downloaded from OCR.

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Paper 4 series overview

J250/04 is the fourth of six foundation tier papers for Gateway Combined Science A. This component assesses Topics C4, C5 and C6, with assumed knowledge of Topics C1, C2, C3 and Topic CS7 (PAGs C1-C5) and is worth 16.7% of the total GCSE.

To do well on this paper, candidates need to demonstrate knowledge and understanding of scientific ideas, techniques and procedures across all three topics. They need to be able to apply their knowledge and understanding to unfamiliar contexts as well as displaying the ability to analyse information. Candidates also need to be familiar with a range of experimental procedures.

J250/04 has an equal emphasis on knowledge and understanding of the assessment outcomes from the specification, application of this knowledge and analysis of information and ideas.

Writing an answer in pencil and then overwriting in ink should be discouraged as it makes answers difficult to decipher. In addition, candidates wishing to change an answer to a multiple choice question should be encouraged to cross out the original answer and write their final response in the space to the right of the answer box. Overwriting an answer often makes it illegible to the examiner.

Level of Response answers need to be in a logical and well thought out order containing the detail required by the question.

<i>Candidates who did well on this paper generally did the following:</i>	<i>Candidates who did less well on this paper generally did the following:</i>
<ul style="list-style-type: none"> • Explained the reactivity of neon; Question 12c • Calculated giving answers to the required precision; mass of product Question 13c, energy used in process Question 15a, rate of reaction Question 18b • Explained the steps in water purification Question 14c • Drew conclusions from data: Questions 13c, 15b, 18ci, 18cii and 18d • Produced a clear and structured answer for the Level of Response Question • Applied knowledge and understanding to questions set in a novel context. 	<ul style="list-style-type: none"> • Found it difficult to apply what they had learnt to unfamiliar situations. • Found it difficult explain concepts Questions 12c, 13b and 13d • Could not construct the formula of a hydrocarbon Question 17cii • Could not explain why elements in a group have similar chemical properties Question 12bii • Could not explain reduction Question 13b • Could not describe a practical method to determine order of reactivity of metals in the Level of Response Question • Could not explain supply and demand of various fractions from crude oil Question 17b.

Section overview

Section A includes 10 multiple choice questions assessing topics across C4 - C6. Comments on individual questions are shown below.

Section B also assesses topics from C4 - C6 and contains a mixture of short answer, extended prose and level of response questions. Comments on these questions are shown below.

Themes in candidate responses

When answering multiple choice questions centres should encourage candidates not to overwrite answers as this can make it impossible to decipher the answer given. It is better for candidates to cross through the answer box and write their final answer next to the answer box.

Calculations should be set out with all of the steps shown so that credit worthy points can be found in a method, particularly where error carried forward points could be gained.

Level of response answers should be arranged logically.

There was no evidence of candidates not having enough time to complete the paper.

Comments on responses by question type

Multiple choice questions

Questions 1, 2, 4, 7 and 9 were answered well by the majority of candidates.

Questions 3, 5, 6 and 10 proved more challenging.

In Question 3, many candidates chose A.

In Question 5, both evaporation and filtration were common incorrect responses.

In Question 6, most did not consider the catalysed reaction and chose A.

In Question 10, all responses were seen in equal numbers.

Level of response questions

Question 16, the 6-mark level of response question, required candidates to describe an experimental method to obtain valid results and explain how the results could be used to place four metals in their order of reactivity. Candidates found this very challenging and a significant number omitted the question. Many repeated what was given in the stem without adding any further details. More able candidates gave a basic method with some control of variables and some explanation of how the results were to be used. Lower ability candidates gave a basic method and either controlled a variable or attempted to explain the use of the results.

Other questions

Calculations were generally well answered although significant figures were not well understood, and standard form proved challenging.

In Questions 11bi and 11bii, early atmospheric gases were well known but ammonia in Question 11biii was not.

In Questions 12a and 12bi, Group 7 of the Periodic Table was generally well-known. Explanation of chemical properties in Question 12bii and unreactivity of neon in Question 12c proved to be very challenging.

In Question 13a, the word equation was answered well.

In Questions 13b and 13d, the reduction and reactivity series of metals were not well known.


In Question 14b, the more able candidates were able to explain the steps in the purification of water.


In Questions 14c, 15b, 17c, 18ci and 18cii, the use of given data proved challenging for many candidates.

In Question 17b, the supply and demand of fractions of crude oil was not well known.

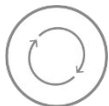
In Question 17cii, the formula of a hydrocarbon proved very challenging.

Common misconceptions

	Misconception	In Question 3, the equilibrium arrow was thought to be \rightarrow .
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	Misconception	Group properties are determined by the number of electrons in the atom rather than the number of electrons on the outer shell.
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Key teaching and learning points – comments on improving performance

	AFL	In calculations, candidates should be encouraged to show all of the steps, error carried forward credit can only be given where the answer is set out clearly.
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Questions need to be read carefully and in full so that all aspects of a question are covered and also that numerical answers are given to the requested number of significant figures.

Level of response answers need to be logically set out, a mini plan at the start may be helpful.

More experience in practical activities will aid performance in questions about experimental technique and use of results.

Guidance on using this paper as a mock

Although this paper had a small cohort of candidates it showed good discrimination. The mark scheme construction was similar to those of previous summer examinations and the questions tested a broad range of topic areas. It is therefore very suitable for use as a mock paper.

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